Alaska Department of Environmental Conservation
Waterbody Determination Paper
Cold Bay, Alaska
Petroleum Hydrocarbons, Oils and Grease Demonstration

Category Placement

Waterbody Name: Cold Bay

Category change: 5 to 4b

Water Quality Standard Affected: Petroleum Hydrocarbons, Oils, and Grease for Marine Water Uses

Designated Uses Affected: all

Pollutant: Petroleum products

Executive Summary

This document describes the data analysis and conclusions reached in evaluating Cold Bay for the 2020 Integrated Report (IR). Cold Bay is a contaminated site that was originally listed as water quality impaired in 1998 due to petroleum products seeping onto a beach and into the near-shore waters of Cold Bay. Several remedial actions have taken place at the contaminated site and the petroleum beach seep is greatly reduced. Following the Environmental Protection Agency's required 6-elements for a Category 4b demonstration[1], this paper documents how the site is being remediated to meet water quality standards. Because of these remedial actions, DEC is moving Cold Bay from Category 5 to Category 4b.

Table 1. Basic waterbody information

Assessment Unit ID	AK_M_3010122_001
Assessment Unit Name	Cold Bay
Location description	Cold Bay, Alaska; HUC10 1903010122
Water Type	Bay
Water Size	105 square miles
Area of impairment	.0096 acres
Time of impairment	Year round

[1] USEPA (2006) *Information Concerning 2008 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions.* October 12, 2006.

1. Identification of segment and statement of problem causing the impairment

A. Segment description

The Formerly Used Defense Site (FUDS) at Fort Randall is adjacent to the city of Cold Bay, Alaska (Table 1). Cold Bay is located approximately 30 miles from the west end of the Alaska Peninsula and approximately 640 miles southwest of Anchorage (Figure 1). The only available transportation to the community is by air or sea.

The Drum Disposal Area (DDA) and Beach Seep Area (BSA) are located approximately 1,000 feet from the east end of the airport's East-West Runway, which was used as a fuel storage area during World War II. There is no defined border between the DDA and BSA and they are considered as one site in this Category 4b demonstration. The total area encompassing the DDA and BSA sites is approximately 15 acres causing a 300 foot impaired area in Cold Bay's nearshore marine waters (Figures 1 and 2).

The Fort Randall FUDS number is F10AK0845-02, the U.S. Environmental Protection Agency identification number is AKS9799F7088, and the Alaska Department of Environmental Conservation (DEC) contaminated site record number is 2538.38.019. The Fort Randall site is not listed on the Environmental Protection Agency's National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or more commonly known as Superfund) sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories.

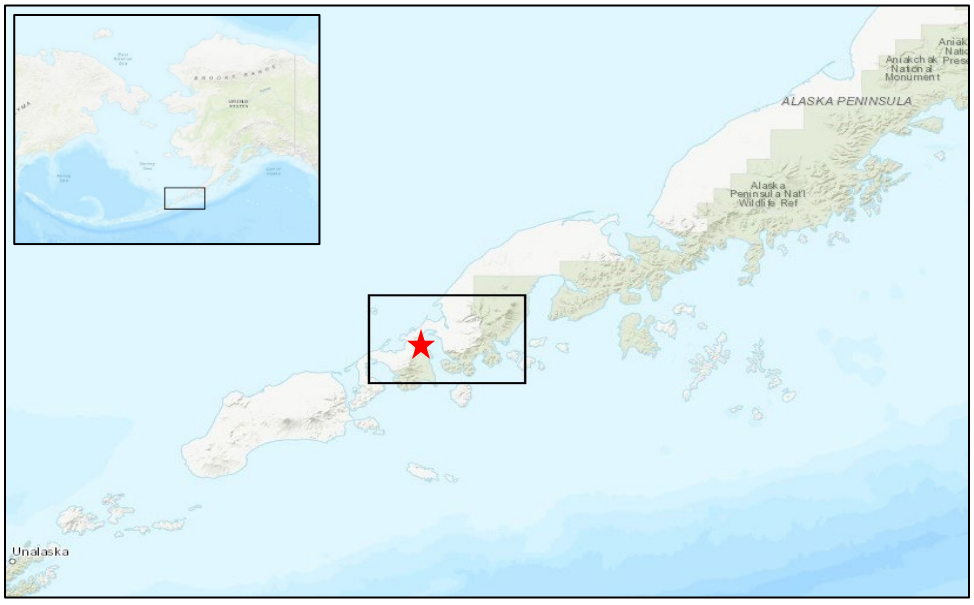

Figure 1 Cold Bay near the town of Cold Bay, Alaska.

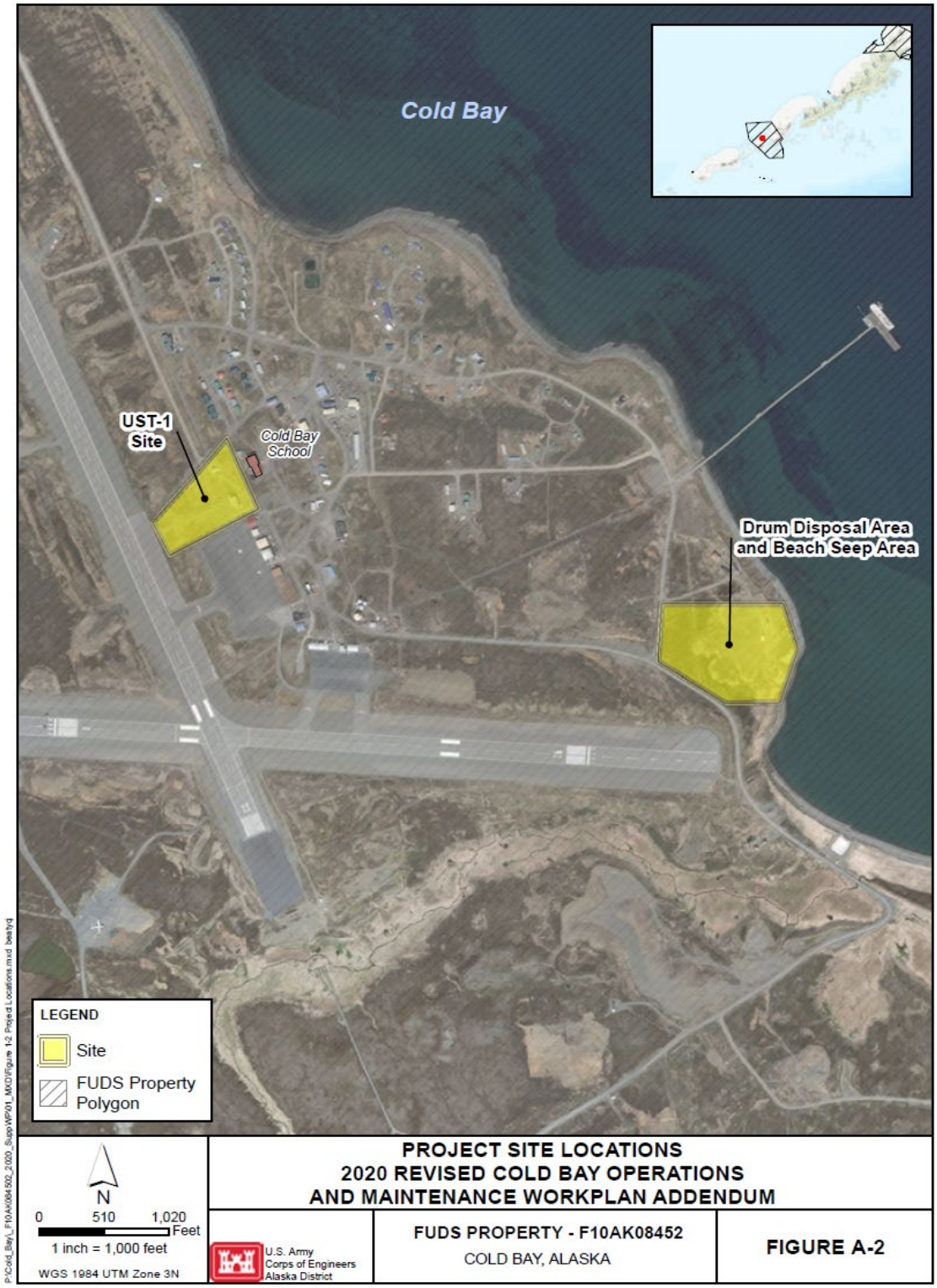

Figure 1. Beach seep and drum disposal area near Cold Bay, AK[2].

[2] USACE (U.S. Army Corps of Engineers). 2020. *Draft 2020 Revised Cold Bay Operations and Maintenance Work Plan Addendum; Fort Randall, Cold Bay, Alaska*. FUDS No. F10AK0845-02. February 2020. Prepared by Jacobs Engineering Group Inc.

B. Impairment and pollutant causing impairment

Cold Bay is impaired by Petroleum Hydrocarbons, Oils, and Grease for Marine Water Uses as described in Title 18, Chapter 70 of the Alaska Administrative Code (AAC) Section 70.020(b)(17) (Table 2).

Table 2. Alaska's Water Quality Standards at 18 AAC 70 (17) for petroleum hydrocarbons, oils, and grease for marine water uses[3].

Designated Use	Water Quality Criteria	Status
(A) Water Supply (i) aquaculture	Total aqueous hydrocarbons (TAqH) in the water column may not exceed 15 µg/l (see note 7[4]). Total aromatic hydrocarbons (TAH) in the water column may not exceed 10 µg/l (see note 7). There may be no concentrations of petroleum hydrocarbons, animal fats, or vegetable oils in shoreline or bottom sediments that cause deleterious effects to aquatic life. Surface waters and adjoining shorelines must be virtually free from floating oil, film, sheen, or discoloration.	Not Supporting
(A) Water Supply (ii) seafood processing	May not cause a film, sheen, or discoloration on the surface or floor of the waterbody or adjoining shorelines. Surface waters must be virtually free from floating oils. May not exceed concentrations that individually or in combination impart odor or taste as determined by organoleptic tests.	Not Supporting
(A) Water Supply (iii) industrial	May not make the water unfit or unsafe for the use.	Not Supporting
(B) Water Recreation (i) contact recreation	May not cause a film, sheen, or discoloration on the surface or floor of the waterbody or adjoining shorelines. Surface waters must be virtually free from floating oils.	Not Supporting
(B) Water Recreation (ii) secondary recreation	Same as (17)(B)(i).	Not Supporting

[3] Alaska Department of Environmental Conservation. 2020. 18 AAC 70.010 Water Quality Standards. Amended as of March 5, 2020.

[4]Note 7: Samples to determine concentrations of total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH) must be collected in marine and fresh waters below the surface and away from any observable sheen; concentrations of TaqH must be determined and summed using a combination of: (A) EPA Method 602 (plus xylenes) or EPA Method 624 to quantify monoaromatic hydrocarbons and to measure TAH; and (B) EPA Method 610 or EPA Method 625 to quantify polynuclear aromatic hydrocarbons listed in EPA Method 610; use of an alternative method requires department approval; the EPA methods referred to in this note may be found in Appendix A of 40 C.F.R. 136, Appendix A, as revised as of July 1, 2003 and adopted by reference.

(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife	Same as (17)(A)(i).	Not Supporting
(D) Harvesting for Consumption of Raw Mollusks or Other Raw Aquatic Life	May not exceed concentrations that individually or in combination impart undesirable odor or taste to organisms as determined by bioassay or organoleptic tests.	Not Supporting

C. Sources of pollutant causing impairment

The primary contamination sources are historic leaks and spills associated with aboveground storage tanks and related piping, as well as drum and unidentified source leaks. Historical evidence indicates the military used the DDA and BSA during World War II as an area for storing 55-gallon drums, as well as storing bulk quantities of fuel received from supply ships for distribution to fuel trucks. The fuel distribution system was originally composed of three 25,000-gallon wood stave tanks that received diesel fuel by pipeline from the Cold Bay dock for distribution to two truck fill stations. The wood stave tanks were later abandoned in place, and a 210,000-gallon above-ground storage tank replaced them for diesel fuel storage. At some unknown point – likely shortly after the end of World War II – many of the stored drums were buried in the DDA.

The 210,000-gallon diesel above ground storage tank was located near the center of the BSA site on the edge of the bluff. The four DDAs contained over 2,000 55-gallon drums, underground AvGas and diesel pipelines, and two truck filling stations. The primary release mechanisms include infiltration/percolation and overland flow. Groundwater at the BSA/DDA sites discharge to the surface water of Cold Bay.

2. Description of pollution controls and how they will achieve Water Quality Standards

A. Water quality target

Cleanup goals for soil and groundwater have been established based on Alaska Administrative Code (AAC), Title 18, Chapter 75[5]; cleanup goals for surface waters have been established based on 18 AAC 70.

[5] ADEC. 2018b (27 October). *Oil and Other Hazardous Substances Pollution Control*. Division of Spill Prevention and Response, Contaminated Sites Program. 18 AAC 75.

B. Point and nonpoint source loadings that when implemented will achieve Water Quality Standards

- **DDA and BSA Soils:** Soil contaminated with diesel fuel at concentrations above 10,480 milligrams per kilogram (mg/kg) of diesel-range organics (DRO) is considered a primary contaminant of concern and will be excavated to a depth of 15 feet below ground surface and thermally treated onsite. Soil contaminated with diesel fuel at concentrations above the cleanup level of 524 mg/kg DRO, but less than 10,480 mg/kg DRO, will be treated with bioventing. Soils contaminated with diesel fuel and located at depths greater than 15 feet below ground surface will also be treated with bioventing. Soil contaminated with volatile contaminants will be treated with soil vapor extraction (SVE).
- **DDA and BSA Sediments, Free Product, and Groundwater:** This remedy will rely on the existing high-vacuum extraction (HVE) system to capture free product that is floating on the groundwater surface. This free product is considered a primary contaminant of concern. Operation of the HVE system will continue as long as removal of free product is feasible and cost effective. The removal of free product and the remediation of contaminated soil will reduce the migration of contaminants to groundwater and downgradient sediments.

Table 3 lists the cleanup goals for soil and groundwater at both the BSA and DDA sites.

Table 3. BSA/DDA soil and groundwater cleanup goals[6].

Site	Contaminant	Soil Cleanup Level[a] (mg/kg)	Groundwater Cleanup Level[b] (mg/L)
DDA	Diesel Range Organics (DRO)	524	1.5
	Gasoline Range Organics (GRO)	578	1.3
	Residual Range Organics (RRO)	-	1.1
	Benzene	0.0228	0.005
	Ethylbenzene	9.15	-
	Toluene	8.01	1.00
	Xylenes	129	-
	Beta-BHC (b-HCH)	0.0176	-
	2-Methylnaphthalene	86.6	-
	1,2,4-Trimethylbenzene	25.2	-
	1,3,5-Trimethylbenzene	35.5	-
	1,2-Dibromoethane	0.000173	0.00005
	1,2-Dichloroethane	-	0.005
	Trichloroethene	-	0.005
BSA	DRO	524	1.5

[6] USACE. 2005. *Decision Document for Five Areas of Concern, Fort Randall, Cold Bay, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.

	RRO	-	1.1
	Benzene	-	0.005
	1,2-Dibromoethane	-	0.00005
	TAH	-	0.010
	TAqH	-	0.015

a. Source of cleanup levels for contaminants in soil: 18 AAC 75 Method 3.
b. Source of cleanup levels for contaminants in groundwater: 18 AAC 75.345, Table C, except 1,2-dibromoethane from Technical Memo 01-007 and TAH and TAqH based on 18 AAC 70.

C. Description of controls to achieve Water Quality Standards[7,8]

Several interim removal actions have taken place to address environmental contamination at the Fort Randall DDA and BSA sites beginning as early as 1985. Early work included removing the 210,000-gallon diesel above ground storage tank and demolishing adjacent structures. Additional activities included removal of 2,267 drums from the DDA (1998-1999), installation of the high-vacuum extraction (HVE) system to capture free product discharging to the BSA (1998), and treatment of over 5,000 cubic yards of contaminated soil at the DDA (2000- 2001).

Other treatment systems included installation of the bioventing system in 2007 and soil vapor extraction (SVE) system in 2008. The SVE system began showing signs of achieving the planned cleanup objectives in 2012, and completed treatment of volatile contaminants in 2013. The SVE was turned off in January 2014. The bioventing system continues to show positive progress toward meeting the cleanup goals.

Data collected during soil-gas monitoring from 2014 through the end of 2019 indicated a decrease in microbial activity compared to previous years, signifying that the fuel contaminants were depleting. Similarly, the HVE system has started showing less diesel fuel recovered per unit of groundwater extracted during operations between 2015 and 2020, suggesting that free-floating fuel is becoming a smaller portion of the contamination remaining. In September 2018, the HVE remediation system was upgraded with low energy-demand submersible pumps that helped to optimize free product recovery. The submersible pumps decreased electrical usage by up to 50 percent annually and were effective at increasing the product capture zones, thereby mitigating downgradient migration of contamination toward Cold Bay. Groundwater modeling is ongoing to optimize the system and improve free product removal.

As of March 2020, the HVE system had removed approximately 8,958 gallons of diesel and treated over 7.2 million gallons of contaminated groundwater. The bioventing system had

[7] USACE (U.S. Army Corps of Engineers). 2003. *2003 Feasibility Study, Cold Bay, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.
[8] USACE. 2020. *Fact Sheet Fort Randall – Cold Bay, Alaska.*

biodegraded 34,113 gallons of fuel with another 400 gallons of vapor-phase contamination removed through the former SVE system. The amount of contamination discharging to the beach has decreased due to these treatment systems.

D. Description of requirements for implementing controls

The lead agency for addressing environmental contamination at Fort Randall is the U.S. Army Corps of Engineers (USACE), Alaska District. DEC is the lead state regulatory agency. Cleanup monies are provided by the U.S. Department of Defense FUDs program.

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent practicable. This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of petroleum concentrations as a principal element through treatment). USACE will continue close coordination with DEC to ensure that the remedy is, or will be, protective of human health and the environment.

Key guiding regulatory documents include:

- U.S. Army Corps of Engineers. 2005. *Decision Document for Five Areas of Concern, Fort Randall, Cold Bay, Alaska.* Final. Prepared by Jacobs Engineering Group Inc.
- U.S. Army Corps of Engineers. 2020. *Draft 2020 Revised Cold Bay Operations and Maintenance Work Plan Addendum; Fort Randall, Cold Bay, Alaska*. FUDS No. F10AK0845-02. February 2020. Prepared by Jacobs Engineering Group Inc.

3. Projection of the time when Water Quality Standards will be met

The overall cleanup objectives at the BSA/DDA are to restore each site to a level that is protective of human health and the environment and to comply with applicable or relevant and appropriate requirements. The restoration will be complete when cleanup levels for soil and groundwater are met.

4. Schedule for implementing pollution controls

Clean up activities began in 1985 and continue to present day. The DEC Contaminated Sites database provides a chronological list of site activities and documents for the BSA/DDA. Key documents with activity decisions and schedules include:

- *Final Site Investigation and Interim Removal Action Report, Beach Seep Area and Former Fuel Storage Tank, World War II Drum Disposal Area, Aviation Gasoline Underground Storage Tank Area*, Cold Bay, Alaska, August 1998.
- *Final 1998 Removal Action Report, World War II Drum Disposal Area, Stapp Creek Pipeline, and Beach Seep Area*, Cold Bay, Alaska, May 1999.
- U.S. Army Engineer District, Alaska 2002 *Beach Seep Area and Drum Disposal Area Remedial Investigation and Feasibility Study Work Plan* and *Remedial Investigation and Feasibility Study Supplemental Work Plan* summarize historical site data.
- U.S. Army Engineer District, Alaska 2003 *Final Remedial Investigation* report provides a detailed description of the extent of contamination.
- U.S. Army Engineer District, Alaska 2003 *Final Feasibility Study* evaluates remedial alternatives to address site contamination.
- U.S. Army Corps of Engineers 2005 *Decision Document for Five Areas of Concern, Fort Randall, Cold Bay, Alaska.* Final. Prepared by Jacobs Engineering Group Inc. outlines the final selected remedy for Fort Randall cleanup activities.
- U.S. Army Corps of Engineers *Draft 2020 Revised Cold Bay Operations and Maintenance Work Plan Addendum; Fort Randall, Cold Bay, Alaska*. FUDS No. F10AK0845-02. February 2020. Prepared by Jacobs Engineering Group Inc. describes ongoing operations and maintenance work for the BSA/DDA area including monitoring and action response.

5. Monitoring plan to track effectiveness of pollution controls

In general, all monitoring and/or sampling activities are designed to evaluate the performance of the remediation system, compliance with the DEC Wastewater General Permit, and quantification of the petroleum hydrocarbons removed from the vadose zone and groundwater. Effectiveness tracking includes the following activities[9]:

- **Annual groundwater monitoring** is conducted at the BSA/DDA site to quantify contamination degradation and possible migration.
- **Biannual soil gas monitoring** is conducted to assess oxygen consumption rates throughout the bioventing well gallery to quantify biodegradation at the BSA/DDA.
- **Biannual discharge vapor gas sampling** is conducted to quantify vapor phase remediation as a result of HVE operation.
- **Periodic treated water sampling** is conducted to ensure that discharged water is below the DEC cleanup level and to assess the effectiveness of the filtration gallery.

[9] USACE (U.S. Army Corps of Engineers). 2020. *Draft 2020 Revised Cold Bay Operations and Maintenance Work Plan Addendum; Fort Randall, Cold Bay, Alaska*. FUDS No. F10AK0845-02. February 2020. Prepared by Jacobs Engineering Group Inc.

- **BSA survey** activities provide a visual approach to assess the area of beach impacted by downgradient migration of contamination at the BSA/DDA.
- **Downloading data from BSA/DDA data loggers** provides groundwater elevation data that can be used to evaluate free product trends and contaminant migration.
- **Reporting:** Quarterly treatment reports and annual site report. The annual report is completed at the end of each calendar year and presents a summary of scheduled and unscheduled maintenance. The report focuses on the effectiveness and efficiency of the remediation systems and potential migration of contamination. It includes recommendations for remediation system optimization and exit strategy. Annual data totals are included that document the quantity of contamination removed from each remediation system. The report also details the results of annual groundwater sampling that inform system operation, data collection, performance of the HVE, bioventing, and submersible pump systems, and conclusions and recommendations for groundwater sampling schedule and target contaminants for the coming year. The annual report will be available by contacting DEC or USACE.

Following treatment, natural attenuation processes are expected to reduce groundwater contaminant concentrations below cleanup levels. After system shutdown, groundwater monitoring will occur for up to 30 years to ensure cleanup goals continue to be met.

6. Commitment to revise pollution controls, as necessary

The Decision Document (2005) presents the U.S. Army Corps of Engineers, Alaska District, selected remedy for Fort Randall, chosen in accordance with the Administrative Record for this site. The BSA/DDA within this decision document fall under the CERCLA petroleum exclusion and are thus being addressed under the authority of the Defense Environmental Restoration Program United States Code, Title 10, Chapter 2701 et seq.

The response actions meet DEC requirements for cleanup of petroleum contaminated sites and are consistent with the response process set forth in the National Contingency Plan. DEC commits to revising the pollution controls, as necessary, if progress towards meeting water quality standards is not being shown. Any changes will be documented on the DEC Contaminated Sites database accessible to the public via the internet. Additionally, DEC will update the Cold Bay record, as needed, in EPA's Assessment, Total Maximum Daily Load Tracking and Implementation System (ATTAINS) database.