



THE STATE
of **ALASKA**
GOVERNOR MIKE DUNLEAVY

**Department of
Environmental Conservation**

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

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DEC File No.: 141.38.062

October 11, 2024

U.S. Army Garrison Alaska, Fort Greely
ATTN: Chief, Environmental Division, Directorate of Public Works (Crofford)
P.O. Box 31310
Fort Greely, Alaska 99731-1310

Re: Decision Document: Fort Greely Bldg 144 BRAC 101
Cleanup Complete Determination

Dear Mr. Crofford:

The Alaska Department of Environmental Conservation, Contaminated Sites Program (DEC) has completed a review of the environmental records associated with the Fort Greely Bldg 144 BRAC 101 located at C Street in Fort, Greely, Alaska. Based on the information provided to date, it has been determined that the contaminant concentrations remaining on site do not pose an unacceptable risk to human health or the environment and no further remedial action will be needed.

This Cleanup Complete determination is based on the administrative record for the Fort Greely Bldg 144 BRAC 101 maintained by DEC. This decision letter summarizes the site history, cleanup actions, regulatory decisions, and specific conditions required to determine site closure.

Site Name and Location:

Fort Greely Bldg 144 BRAC 101
C Street

Fort Greely, Alaska 99731

DEC Site Identifiers:

File No.: 141.38.062
Hazard ID.: 3837

Name and Mailing Address of Contact Party:

U.S. Army Garrison Alaska, Fort Greely
ATTN: Chief, Environmental Division, Directorate of Public
Works (Crofford)
P.O. Box 31310
Fort Greely, Alaska 99731-1310

Regulatory Authority for Determination:

18 Alaska Administrative Code (AAC) 75

Site Description and Background

The Fort Greely Building 144 site was used as a mess hall and bakery. A 1,000-gallon heating oil underground storage tank (UST) was formerly located on the north side of the building. In 1995, this UST was removed and replaced by a 1,000-gallon above ground storage tank (AST). The Army discovered petroleum-contaminated soils during the removal of the UST. An unknown amount of contaminated soil was removed with the UST. The excavation was backfilled with clean gravel.

In 1995, the BRAC Commission listed Fort Greely for realignment and partial closure. Portions of the post were closed, with the land proposed for eventual transfer to the City of Delta Junction. To prepare for the land transfer, the main cantonment area Allen Army Airfield (AAAF) were divided into parcels and allocated a BRAC designation and investigated to determine whether environmental issues would prohibit the land transfer. The Building 144 site was allocated BRAC 101.

Soil in the Fort Greely area is mainly comprised of shallow, well-drained silt loams with sandy to gravelly underlying material. Local borings show that sandy gravels dominate but are interlaced with discontinuous silt-rich zones that are less permeable and can slow migration of contaminants through the substrate. Groundwater at Fort Greely typically sits at around 200 feet below ground surface (bgs).

Contaminants of Concern

During the site investigation and cleanup activities at this site, samples were collected from soil and groundwater and analyzed for diesel, gasoline, and residual range organics (DRO, GRO, RRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile and semi-volatile organic carbons (VOCs and SVOCs), and Resource Conservation and Recovery Act (RCRA) metals. Based on these analyses, the following contaminants were detected above the applicable cleanup levels and are considered Contaminants of Concern (COCs) at this site:

- DRO
- GRO
- Total Xylenes
- 1- and 2-Methylnaphthalene
- Naphthalene
- 1,2,4- and 1,3,5-Trimethylbenzene

Cleanup Levels

Soil cleanup levels applicable to the site are the most stringent Method 2 cleanup levels for the under 40-inches of precipitation climate zone found in 18 AAC 75.341(c), Table B1 and 18 AAC 75.341(d), Table B2. Groundwater cleanup levels applicable to this site are found in 18 AAC 75.345, Table C. Groundwater samples at the site never showed exceedances of Table C values, and so are not represented in Table 1.

Table 1 – Approved Cleanup Levels

Contaminant	Soil – Migration to Groundwater ¹ (mg/kg)	Soil – Human Health ² (mg/kg)
DRO	250	10,250
GRO	300	1400
Total Xylenes	1.5	57 (490) ³

1-Methylnaphthalene	0.41	38 (230) ³
2-Methylnaphthalene	1.3	310
Naphthalene	0.038	29
1,2,4-Trimethylbenzene	0.61	43 (280) ³
1,3,5-Trimethylbenzene	0.66	37 (250) ³

Notes:

- ¹ Soil cleanup level protective of groundwater used as a drinking water source.
- ² Soil cleanup level protective of people exposed to contaminated soil by the ingestion pathway.
- ³ This level is based on a soil saturation concentration (Csat) using the equations set out in *Procedures for Calculating Cleanup Levels*, adopted by reference in 18 AAC 75.340. The Csat value is listed first, followed by the human health risk-based cleanup level in parenthesis. Please refer to 18 AAC 75.341, Table B1 for more details.

Characterization and Cleanup Activities

After the removal of the UST in 1995, a number of investigations and remedial actions took place. The building was demolished sometime after 1995, though it is unclear exactly when. The Army first conducted a site investigation in 1997, advancing two soil borings at the old UST excavation location to a depth of 17 feet bgs. No analytes exceeded applicable cleanup levels. A follow up investigation in 1998 also did not show any exceedances of applicable cleanup levels in the tank footprint down to a depth of 32 feet bgs.

In 2007, the Army conducted an electromagnetic survey to locate any other USTs or piping that may have been associated with the site. Small and large anomalies were detected, and so eight soil borings were advanced to a maximum depth of 60 feet bgs. Samples collected from five to 45 feet bgs showed exceedances of DRO, naphthalene, and 1- and 2-methylnaphthalene. All exceedances were between migration to groundwater cleanup levels and human health levels.

As the 2007 investigation did not adequately capture the vertical extent of contamination, the Army conducted a remedial investigation in 2009. As part of this effort, the Army also excavated 550 cubic yards (cy) of petroleum contaminated soils to a depth of 15 feet bgs. Confirmation samples collected from the bottom and the sidewalls of the excavation were analyzed for petroleum COCs. Some exceedances of migration to groundwater were noted in the bottom samples. The sidewall sample 5S showed an exceedance of DRO, indicating horizontal delineation was not complete in this area.

The Army advanced six soil borings (SB01 - SB06) in the center of the backfilled excavation area to 85 feet bgs. Soil borings SB05 and SB06 showed exceedances of COCs to a depth of 55 feet bgs, though deeper samples showed no analytical exceedances of cleanup levels, indicating vertical extent of contamination at the site had been achieved. Additionally, as part of the 2009 remedial investigation, the Army considered vapor intrusion concerns as part of efforts to construct a new fire station in the area of the former Building 144 footprint. The risk associated with the DRO contamination remaining in soil was determined to not be a significant health hazard.

In 2010, the Army completed another remedial investigation action, where 76 cy of soil was excavated in the area of 5S, the sidewall sample exceedance from 2009's remedial investigation. Soils were excavated to a depth of 16 feet bgs, and three samples collected were analyzed for COCs. No exceedances were detected. Given the lack of evidence of contamination present, the stockpiled soils were returned to the excavated area.

Two more excavations occurred in 2011. The Army encountered petroleum impacted soil during construction of the fire station and so excavated 99 cys of contaminated soil. Confirmation samples

collected showed no remaining exceedances of any COCs. An additional 30 cys of contaminated soil were discovered and excavated from the southeast side of the fire station's footprint, approximately 300 feet from the initial release area. Confirmation samples from this area showed one exceedance of the migration to groundwater cleanup level in the floor of the excavation, at a depth of 10 feet bgs.

To close the data gap of unknown vertical delineation in this second excavated area, the Army advanced three soil borings in 2013 to a depth of 45 feet bgs. No exceedances of any cleanup levels were detected in any samples.

The Army has sampled MW-15 as part of the site-wide groundwater monitoring well network. MW-15 is the nearest downgradient well to the site as it is 1,000 feet to the northeast. Though groundwater was sampled, the Army has shown contaminant concentrations clean up to below migration to groundwater cleanup levels at approximately 55 feet bgs, while groundwater sits at approximately 200 feet bgs.

Remaining Contamination

The maximum concentrations of contaminants remaining at the site are shown in Table 2. These concentrations are all below their respective human health cleanup levels, but above the migration to groundwater cleanup levels identified in 18 AAC 75.341, Tables B1 and B2. All samples were collected from SB05 at a depth of 45 feet bgs in September 2009.

Table 2 – Maximum Contaminant Concentrations Remaining in Soil

Contaminant	Soil – Migration to Groundwater ¹ (mg/kg)
DRO	7300
GRO	450
Xylenes, total	8.5 J
1-Methylnaphthalene	29
2-Methylnaphthalene	56
Naphthalene	24
1,2,4-Trimethylbenzene	23 J
1,3,5-Trimethylbenzene	8.1 J

Notes:

- ¹ Soil cleanup level protective of groundwater used as a drinking water source.

Cumulative Risk Evaluation

Pursuant to 18 AAC 75.325(g), when detectable contamination remains on-site following a cleanup, a cumulative risk determination must be made that the risk from hazardous substances does not exceed a cumulative carcinogenic risk standard of 1 in 100,000 across all exposure pathways and does not exceed a cumulative noncarcinogenic risk standard at a hazard index (HI) of 1 across all exposure pathways.

Based on a review of the environmental record, DEC has determined that residual contaminant concentrations meet the human health cumulative risk criteria for residential land use.

Exposure Pathway Evaluation

Following investigation and cleanup at the site, exposure to the remaining contaminants was evaluated using DEC's Exposure Tracking Model (ETM). Exposure pathways are the conduits by which contamination may reach human or ecological receptors. ETM results show all pathways to be one of the following: De-Minimis Exposure, Exposure Controlled, or Pathway Incomplete. A summary of this pathway evaluation is included in Table 3.

Table 3 – Exposure Pathway Evaluation

Pathway	Result	Explanation
Surface Soil Contact	De Minimis Exposure	Contamination has been cleaned up in surface soil to below human health cleanup levels.
Subsurface Soil Contact	De Minimis Exposure	Contamination remains in the subsurface below human health cleanup levels in 18 AAC 75.341, Tables B1 and B2.
Inhalation – Outdoor Air	De Minimis Exposure	Contamination remains in the subsurface soil below human health and inhalation levels identified in 18 AAC 75.341, Tables B1 and B2.
Inhalation – Indoor Air (vapor intrusion)	De Minimis Exposure	The site background indicates there is clean fill material overlying and mitigating volatile petroleum related compounds from the residual soil contamination. The current fire station overlays the site and incorporated vapor intrusion preventative measures into the design. Additionally, as there is no impacted groundwater there are no exceedances of groundwater vapor intrusion target levels. Residual contamination is not above inhalation levels.
Groundwater Ingestion	Pathway Incomplete	Subsurface sampling at depth indicated contamination is below migration to groundwater cleanup levels identified in 18 AAC 75.341, Tables B1 and B2 beneath the source area. Groundwater at the site is approximately 200 ft bgs, whereas exceedances stop at 48 ft bgs and are not present in concentrations that would be expected to reach ground water.
Surface Water Ingestion	Pathway Incomplete	Contaminants are not expected to migrate to surface water. The closest surface water to the site is over 3000 feet downgradient.
Wild and Farmed Foods Ingestion	Pathway Incomplete	Contaminants of concern do not have the potential to bioaccumulate in plants or animals.
Exposure to Ecological Receptors	Pathway Incomplete	The site is on an active military installation and there are no terrestrial or aquatic exposure routes.

Notes:

1. “De Minimis Exposure” means that, in DEC’s judgment, the receptors are unlikely to be adversely affected by the minimal volume or concentration of remaining contamination.
2. “Pathway Incomplete” means that, in DEC’s judgment, the contamination has no potential to contact receptors.

DEC Decision

Soil contamination at the site has been cleaned up to concentrations below the approved cleanup levels suitable for residential land use. This site will receive a “Cleanup Complete” designation on the Contaminated Sites Database.

DEC approval is required for movement and disposal of soil and/or groundwater subject to the Site Cleanup Rules, in accordance with 18 AAC 75.325(i). Please contact DEC for information about applicable regulations and requirements. A “site”, as defined by 18 AAC 75.990, means an area that is contaminated, including areas contaminated by the migration of hazardous substances from a source area, regardless of property ownership.

Movement or use of contaminated material in an ecologically sensitive area or in a manner that results in a violation of 18 AAC 70 water quality standards is prohibited. Furthermore, groundwater throughout Alaska is protected for use as a water supply for drinking, culinary and food processing, agriculture including irrigation and stock watering, aquaculture, and industrial use. Contaminated site cleanup complete determinations are based on groundwater being considered a potential drinking water source. If, in the future, groundwater from this site is to be used for other purposes, additional testing and treatment may be required to ensure the water is suitable for its intended use.

This determination is in accordance with 18 AAC 75.380 and does not preclude DEC from requiring additional assessment and/or cleanup action if information indicates that contaminants at this site may pose an unacceptable risk to human health, safety, or welfare or to the environment.

Informal Reviews and Adjudicatory Hearings

A person authorized under a provision of 18 AAC 15 may request an informal review of a contested decision by the Division Director in accordance with 18 AAC 15.185 and/or an adjudicatory hearing in accordance with 18 AAC 15.195 – 18 AAC 15.340. See DEC’s “Appeal a DEC Decision” web page <https://dec.alaska.gov/commish/review-guidance/> for access to the required forms and guidance on the appeal process. Please provide a courtesy copy of the adjudicatory hearing request in an electronic format to the parties required to be served under 18 AAC 15.200. Requests must be submitted no later than the deadline specified in 18 AAC 15.

If you have questions about this closure decision, please feel free to contact the project manager Carly Jensen at (907) 269-3077 or at carly.jensen@alaska.gov.

Sincerely,

Carly Jensen
Remedial Project Manager

Enclosure: Cumulative Risk Evaluation

cc: DEC, Division of Spill Prevention and Response, Cost Recovery Unit
Dennis Shepard, DEC
Samuel Klein, USAEC
Taren Frescatore, FGA ENVR
Justin Hogrefe, FGA ENVR
Chris Locke, FGA ENVR
Guy Warren, USACE

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED _{res} (exposure duration - resident) yr	26
ED _{resc} (exposure duration - child) yr	6
ED _{resca} (exposure duration - adult) yr	20
ET _{res} (exposure time - resident) hr/day	24
ET _{resc} (exposure time - child) hr/day	24
ET _{resca} (exposure time - adult) hr/day	24
BW _{resca} (body weight - adult) kg	80
BW _{resc} (body weight - child) kg	15
SA _{resca} (skin surface area - adult) cm ² /day	6032
SA _{resc} (skin surface area - child) cm ² /day	2373
LT (lifetime - resident) yr	70
EF _{res lt 40 in} (exposure frequency - resident) day/yr	270
EF _{resc lt 40 in} (exposure frequency - child) day/yr	270
EF _{resca lt 40 in} (exposure frequency - adult) day/yr	270
IRS _{resca} (soil intake rate - adult) mg/day	100
IRS _{resc} (soil intake rate - child) mg/day	200
AF _{resca} (skin adherence factor - adult) mg/cm ²	0.07
AF _{resc} (skin adherence factor - child) mg/cm ²	0.2
IFS _{res lt 40 in -adj} (age-adjusted soil ingestion factor) mg/kg	28350
DFS _{res lt 40 in -adj} (age-adjusted soil dermal factor) mg/kg	79758
IFSM _{res lt 40 in -adj} (mutagenic age-adjusted soil ingestion factor) mg/kg	128700
DFSM _{res lt 40 in -adj} (mutagenic age-adjusted soil dermal factor) mg/kg	330372
AF _{0.7} (skin adherence factor) mg/cm ²	0.2
AF _{2.6} (skin adherence factor) mg/cm ²	0.2
AF ₆₋₁₆ (skin adherence factor) mg/cm ²	0.07
AF ₁₆₋₂₆ (skin adherence factor) mg/cm ²	0.07
BW _{0.7} (body weight) kg	15
BW _{2.6} (body weight) kg	15
BW ₆₋₁₆ (body weight) kg	80
BW ₁₆₋₂₆ (body weight) kg	80
ED ₀₋₂ (exposure duration) yr	2

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

Variable	Value
ED _{2-f} (exposure duration) yr	4
ED ₆₋₁₆ (exposure duration) yr	10
ED ₁₆₋₂₆ (exposure duration) yr	10
EF _{0-2 ft 40 in} (exposure frequency) day/yr	270
EF _{2-6 ft 40 in} (exposure frequency) day/yr	270
EF _{6-16 ft 40 in} (exposure frequency) day/yr	270
EF _{16-26 ft 40 in} (exposure frequency) day/yr	270
ET ₀₋₂ (exposure time) hr/day	24
ET ₂₋₆ (exposure time) hr/day	24
ET ₆₋₁₆ (exposure time) hr/day	24
ET ₁₆₋₂₆ (exposure time) hr/day	24
IRS ₀₋₂ (soil intake rate) mg/day	200
IRS ₂₋₆ (soil intake rate) mg/day	200
IRS ₆₋₁₆ (soil intake rate) mg/day	100
IRS ₁₆₋₂₆ (soil intake rate) mg/day	100
SA ₀₋₂ (skin surface area) cm ² /day	2373
SA ₂₋₆ (skin surface area) cm ² /day	2373
SA ₆₋₁₆ (skin surface area) cm ² /day	6032
SA ₁₆₋₂₆ (skin surface area) cm ² /day	6032
A _e (acres)	0.5
Q/C _{wp} (g/m ² -s per kg/m ³)	93.7736
PEF (particulate emission factor) m ³ /kg	1.36E+09
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V(fraction of vegetative cover) unitless	0.5
U _m (mean annual wind speed) m/s	4.69
U _t (equivalent threshold value)	11.32
F(x) (function dependent on U _m /U _t) unitless	0.194
A _e (acres)	0.5
Q/C _{wp} (g/m ² -s per kg/m ³)	93.7736

Site-specific Risk Models

Resident Soil (<40 in. Zone) Inputs

Variable	Value
foc (fraction organic carbon in soil) g/g	0.001
ρ_b (dry soil bulk density) g/cm ³	1.5
ρ_s (soil particle density) g/cm ³	2.65
Theta _w (water-filled soil porosity) L_{water}/L_{soil}	0.15
Theta _a (air-filled soil porosity) L_{air}/L_{soil}	0.28396
n (total soil porosity) L_{pore}/L_{soil}	0.43396
T (exposure interval) s	819936000
A (VF Dispersion Constant)	16.2302
B (VF Dispersion Constant)	18.7762
C (VF Dispersion Constant)	216.108

Site-specific Risk Models

Resident Cumulative Risk

Soil (<40 in. Precipitation Zone)

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL), ca** (Where nc SL < 10 x ca SL),
 max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat, sol=SL exceeds Solubility
 I=IRIS; D=Drinking Water/Health Advisory Goals; P=PPRTV; A=ATSDR; C=Cal EPA; X=APPENDIX PPRTV SCREEN; H=HEAST; S=SURROGATE; W=RPF

Chemical	Mutagen?	Volatile?	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (μg/m ³) ⁻¹	IUR Ref	GIABS	ABS	MW
Methylnaphthalene, 1-	No	Yes	7.00E-02	A	-		2.90E-02	P	-		1	0.13	142.2
Methylnaphthalene, 2-	No	Yes	4.00E-03	I	-		-		-		1	0.13	142.2
Naphthalene	No	Yes	2.00E-02	I	3.00E-03	I	-		3.40E-05	C	1	0.13	128.18
Trimethylbenzene, 1,2,4-	No	Yes	1.00E-02	I	6.00E-02	I	-		-		1	-	120.2
Trimethylbenzene, 1,3,5-	No	Yes	1.00E-02	I	6.00E-02	I	-		-		1	-	120.2
Xylenes	No	Yes	2.00E-01	I	1.00E-01	I	-		-		1	-	106.17
<i>*Total Risk/Hi</i>			-		-		-		-		-	-	-

Site-specific Risk Models

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ρ (g/cm ³)	D _{ia} (cm ² /s)	D _{iw} (cm ² /s)	H`	Volatilization Factor (m ³ /kg)	K _{oc} (cm ³ /g)	K _d (cm ³ /g)	Particulate Emission Factor (m ³ /kg)	RBA	Concentration (mg/kg)	Ingestion Noncarcinogenic CDI Child
1.02E+00	5.28E-02	7.85E-06	2.10E-02	3.35E+04	2.53E+03	2.53E+00	1.36E+09	1.00E+00	2.90E+01	2.86E-04
1.01E+00	5.24E-02	7.78E-06	2.12E-02	3.31E+04	2.48E+03	2.48E+00	1.36E+09	1.00E+00	5.60E+01	5.52E-04
1.03E+00	6.05E-02	8.38E-06	1.80E-02	2.67E+04	1.54E+03	1.54E+00	1.36E+09	1.00E+00	2.40E+01	2.37E-04
8.76E-01	6.07E-02	7.92E-06	2.52E-01	4.85E+03	6.14E+02	6.14E-01	1.36E+09	1.00E+00	2.30E+01	2.27E-04
8.62E-01	6.02E-02	7.84E-06	3.59E-01	4.10E+03	6.02E+02	6.02E-01	1.36E+09	1.00E+00	8.10E+00	7.99E-05
8.64E-01	6.85E-02	8.46E-06	2.71E-01	3.69E+03	3.83E+02	3.83E-01	1.36E+09	1.00E+00	8.50E+00	8.38E-05
-	-	-	-	-	-	-	-	-	-	-

Site-specific Risk Models

Resident Cumulative Risk

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Inhalation Noncarcinogenic (Volatiles) CDI Child	Inhalation Noncarcinogenic (Particulates) CDI Child	Dermal Noncarcinogenic CDI Child	Ingestion Carcinogenic CDI	Inhalation (Volatiles) Carcinogenic CDI	Inhalation (Particulates) Carcinogenic CDI	Dermal Carcinogenic CDI	Ingestion HI Child	Inhalation (Volatiles) HI Child
-	-	8.82E-05	3.22E-05	-	-	1.18E-05	4.09E-03	-
-	-	1.70E-04	-	-	-	-	1.38E-01	-
6.64E-04	1.31E-08	7.30E-05	-	2.47E-01	4.85E-06	-	1.18E-02	2.21E-01
3.51E-03	1.25E-08	-	-	-	-	-	2.27E-02	5.84E-02
1.46E-03	4.41E-09	-	-	-	-	-	7.99E-03	2.43E-02
1.71E-03	4.62E-09	-	-	-	-	-	4.19E-04	1.71E-02
-	-	-	-	-	-	-	1.85E-01	3.21E-01

Site-specific Risk Models

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Inhalation (Particulates) HI Child	Dermal HI Child	Noncarcinogenic HI Child	Ingestion Risk	Inhalation (Volatiles) Risk	Inhalation (Particulates) Risk	Dermal Risk	Carcinogenic Risk
-	1.26E-03	5.35E-03	9.33E-07	-	-	3.41E-07	1.27E-06
-	4.26E-02	1.81E-01	-	-	-	-	-
4.35E-06	3.65E-03	2.37E-01	-	8.39E-06	1.65E-10	-	8.39E-06
2.09E-07	-	8.11E-02	-	-	-	-	-
7.34E-08	-	3.23E-02	-	-	-	-	-
4.62E-08	-	1.75E-02	-	-	-	-	-
4.68E-06	4.75E-02	5.54E-01	9.33E-07	8.39E-06	1.65E-10	3.41E-07	9.66E-06