



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Environmental Conservation

Division of Spill Prevention and Response
Contaminated Sites Program

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January 13, 2017

File No: 780.38.001

Aemon Wetmore
FAA Alaska Region
222 West 7th Ave., #14
Anchorage, AK 99513-7587

Re: DEC Approval of the Decision Document for 24 Areas of Concern at the Federal Aviation Administration Station Farewell, Alaska (October 2016)

Dear Mr. Wetmore:

The Alaska Department of Environmental Conservation (DEC) completed review of Decision Document for 24 Areas of Concern at the Federal Aviation Administration Station Farewell, Alaska, on March 5, 2015. A response to comments (RTC) was received on March 7, 2016. DEC Completed an RTC response on April 1, 2016. A draft final redline version of the document was received on May 6, 2016. A final was received on June 20, 2016. DEC made additional comments on July 8, and August 22, 2016 based on management feedback. A teleconference was held in September, 2016 to resolve the remaining comments. A final was received on October 14, 2016.

This document presents Decision Documents (DD) and information necessary to support decisions regarding the cleanup status of 24 areas of concern (AOC) located at the Federal Aviation Administration (FAA) Station in Farewell, Alaska. The cleanup status for each AOC shall either be closed as "Cleanup Complete" or left as an "active" site because the AOC needs further investigation or cleanup.

DEC promulgated regulations including an update of Table B1 and Table C soil and groundwater cleanup levels (CULs) on November 6, 2016. As a result, the Hydrocarbon Risk Calculator (HRC) is no longer consistent with how site-specific cleanup levels are calculated under 18 AAC 75. With this in mind, DEC performed a backcheck review of this document against the newly promulgated CULs. It was determined that multiple AOCs have COCs which are now greater than method 2 migration to groundwater cleanup levels, and do not meet the method 2 requirements for a "Cleanup Complete" determination. These COCs now above method 2 migration to groundwater cleanup levels include ethylbenzene, xylenes, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene, and at one dry well AOC, mercury. However, DEC utilized the input data from the HRC calculations to calculate new method 3 alternative cleanup levels (ACLs) using the "Cleanup Levels Calculator" for Table B1 compounds (<http://dec.alaska.gov/spar/csp/Calculators.htm>). Calculator inputs were the same for each AOC at the FAA Farewell facility to match HRC inputs, with the exception of source length (L), so as a sensitivity test DEC ran the calculator with the maximum and minimum L across the AOCs. There was very little difference in the resulting ACLs (see table below).

The following concentrations were calculated for FAA Farewell AOCs:

Contaminant	Method 2 Table B1 CULs (mg/kg)	Method 3 Alternative Migration to Groundwater Cleanup Level (mg/kg)	
		L = 9.45m	L = 43.6m
-	-	L = 9.45m	L = 43.6m
Ethylbenzene	0.13	1.2	1.2
Xylenes	1.5	13	13
1-methylnaphthalene	0.41	5.1	5
2-methylnaphthalene	1.3	16	15
Naphthalene	0.038	0.45	0.44
Mercury	0.36	0.45	0.44

mg/kg – milligrams per kilogram

L – source length

m – meters

Therefore, using these newly calculated method 3 ACLs, DEC was able to concur with 10 of the 12 “Cleanup Complete” recommendations for the petroleum AOCs under the new regulations. Two AOCs, the Tank Farm Refueling Area and Building 101 AST, had several compounds remaining above the method 3 ACLs. Following an evaluation of the depth to groundwater, depth of contamination, and the HRC-modeled groundwater concentrations, DEC determined that the contaminants at these AOCs are at steady-state equilibrium, will not migrate to groundwater, and warrant a “Cleanup Complete” determination.

Petroleum AOCs:

Cleanup Complete with Method Three Cleanup Levels Calculator

1. Building 102 AST – QS AOC 10
2. Building 103 underground storage tank (UST) – QS AOC 11
3. Building 104 AST – QS AOC 22
4. Building 200 AST – QS AOC 12
5. Building 201 AST – QS AOC 20
6. Building 203 ASTs (including Pipeline Station 7+178) – QS AOC 21
7. Building 300 AST – QS AOC 13
8. Building 301 ASTs (including Pipeline Station 4+140) – QS AOC 14, 15, 17
9. Building 401 Drum Storage – SBRA AOC 1
10. Building 600 ASTs, Drums, and Batteries – QS AOC 16

Cleanup Complete with Method Three Cleanup Levels Calculator and Steady State Determination

11. Tank Farm Refueling Area (Station 0+00) – QS AOC 6
12. Building 101 aboveground storage tank (AST) – QS AOC 9

There were multiple determinations in this document that were unaffected by the regulations change:

Petroleum AOCs:

Cleanup Complete with Method Two:

13. Building 400 ASTs – Flight Service Station (FSS) AOC 2

Further Action Required:

14. Tank Farm – QS AOC 5
15. “Creosote-Like Substance” Drum Spill Area – QS AOC 23
16. Building 400 Drum Disposal Site – FSS AOC 3

Dry Wells:Cleanup Complete with Method Two:

17. Building 204 Dry Well – QS AOC 4
18. Building 600 Dry Well – QS AOC 3

Further Action Required:

19. Building 103 Dry Well – QS AOC 24

AOCs with Lead-Contaminated Soil:Further Action Required:

20. Building 200 – QS AOC 18
21. Building 300 – QS AOC 25
22. Building 301 – QS AOC 19
23. Building 600 – QS AOC 26

Other:Cleanup Complete with Method Two:

24. Building 400 Polychlorinated Biphenyls (PCB) Transformer – FSS AOC 2 (also listed in item 16 above)

Further Action Required:

25. Salmon River Drum Site – TR AOC 1

The following AOCs could not be closed with the calculated method 3 alternative cleanup levels following the cleanup levels updates:

Dry Wells:

26. Building 300 Dry Well – QS AOC 13 (included as a separate source area in the petroleum AOC listed in item 21 above)
 - a. Mercury remains at this site above the migration to groundwater cleanup levels, at 1.36 mg/kg. Additional action is needed prior to closure.

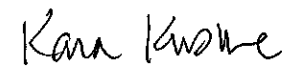
With these modified determinations and cleanup levels, this decision document is approved. DEC will update the contaminated sites database to reflect these changes.

Sincerely,

Recommended By

Monte Garrouette
Environmental Program Specialist

Approved By


Kara Kusche
Program Manager

Enclosure: Cleanup Levels Calculator Outputs
Decision Document Signature Page

- 22. Building 300 – QS AOC 25
- 23. Building 301 – QS AOC 19
- 24. Building 600 – QS AOC 26

Other:

Cleanup Complete with Method Two:

- 25. Building 400 Polychlorinated Biphenyls (PCB) Transformer – FSS AOC 2 (also listed in item 13 above)

Further Action Required:

- 26. Salmon River Drum Site – TR AOC 1

1.3 Site Soil Management

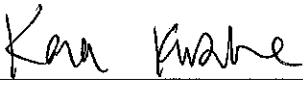
In accordance with 18 AAC 75.325(i), the FAA will obtain ADEC approval before disposing of soils or groundwater (or moving soils offsite) which are subject to the site cleanup rules or for which the FAA has received a written determination from the department. The FAA currently uses the Federal Aviation Administration Environmental Site Cleanup Report Automated Tracking System (FEATS) to track the contamination at all of our sites. FEATS has previously been approved as a “management plan” to ensure soil left in place above the Method 2 Migration to groundwater cleanup level or approved site-specific soil cleanup levels is managed and monitored appropriately. The recent adoption of FAA Order 3900.57A requires that all projects undergo an upfront employee occupational safety and health review which would also identify the contamination.

1.4 Authorizing Signatures

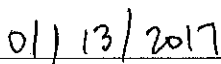
The undersigned parties concur with this DD for the 24 AOCs located at the FAA Station in Farewell, Alaska.

Aemon Wetmore
Environmental Engineer
Federal Aviation Administration

Date



Kara Kusche
Manager, Federal Aviation Administration projects
Alaska Department of Environmental Conservation



Date

Site-specific Equation Inputs for Migration to Groundwater

Variable	Value
TR (target cancer risk) unitless	1.0E-5
THQ (target hazard quotient) unitless	1
LT (lifetime - resident) year	70
K (volatilization factor of Andelman) L/m ³	0.5
l_{sc} (apparent thickness of stratum corneum) cm	0.001
ED_{res} (exposure duration - resident) year	26
$ED_{res,c}$ (exposure duration - child) year	6
$ED_{res,a}$ (exposure duration - adult) year	20
$ED_{n,1}$ (mutagenic exposure duration first phase) year	2
$ED_{2,6}$ (mutagenic exposure duration second phase) year	4
$ED_{6,16}$ (mutagenic exposure duration third phase) year	10
$ED_{16,26}$ (mutagenic exposure duration fourth phase) year	10
EF_{res} (exposure frequency) day/year	350
$EF_{res,c}$ (exposure frequency - child) day/year	350
$EF_{res,a}$ (exposure frequency - adult) day/year	350
$EF_{n,1}$ (mutagenic exposure frequency first phase) day/year	350
$EF_{2,6}$ (mutagenic exposure frequency second phase) day/year	350
$EF_{6,16}$ (mutagenic exposure frequency third phase) day/year	350
$EF_{16,26}$ (mutagenic exposure frequency fourth phase) day/year	350
$ET_{res,adj}$ (age-adjusted exposure time) hour/event	0.67077
$ET_{res,mut,adj}$ (mutagenic age-adjusted exposure time) hour/event	0.67077
ET_{res} (exposure time) hour/day	24
$ET_{res,c}$ (dermal exposure time - child) hour/event	0.54
$ET_{res,a}$ (dermal exposure time - adult) hour/event	0.71
$ET_{res,c}$ (inhalation exposure time - child) hour/day	24
$ET_{res,a}$ (inhalation exposure time - adult) hour/day	24
$ET_{n,1}$ (mutagenic inhalation exposure time first phase) hour/day	24
$ET_{2,6}$ (mutagenic inhalation exposure time second phase) hour/day	24
$ET_{6,16}$ (mutagenic inhalation exposure time third phase) hour/day	24
$ET_{16,26}$ (mutagenic inhalation exposure time fourth phase) hour/day	24
$ET_{n,1}$ (mutagenic dermal exposure time first phase) hour/event	0.54
$ET_{2,6}$ (mutagenic dermal exposure time second phase) hour/event	0.54
$ET_{6,16}$ (mutagenic dermal exposure time third phase) hour/event	0.71
$ET_{16,26}$ (mutagenic dermal exposure time fourth phase) hour/event	0.71

Site-specific Equation Inputs for Migration to Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
BW_{reswr} (body weight - child) kg	15
BW_{0-2} (mutagenic body weight) kg	15
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-26} (mutagenic body weight) kg	80
$IFW_{res-adj}$ (adjusted intake factor) L/kg	327.95
$IFWM_{res-adj}$ (mutagenic adjusted intake factor) L/kg	1019.9
IRW_{reswr} (water intake rate - child) L/day	0.78
IRW_{reswa} (water intake rate - adult) L/day	2.5
IRW_{0-2} (mutagenic water intake rate) L/day	0.78
IRW_{2-6} (mutagenic water intake rate) L/day	0.78
IRW_{6-16} (mutagenic water intake rate) L/day	2.5
IRW_{16-26} (mutagenic water intake rate) L/day	2.5
EV_{reswa} (events - adult) per day	1
EV_{reswr} (events - child) per day	1
EV_{0-2} (mutagenic events) per day	1
EV_{2-6} (mutagenic events) per day	1
EV_{6-16} (mutagenic events) per day	1
EV_{16-26} (mutagenic events) per day	1
$DFW_{res-adj}$ (age-adjusted dermal factor) cm^2 -event/kg	2610650
$DFWM_{res-adj}$ (mutagenic age-adjusted dermal factor) cm^2 -event/kg	8191633
SA_{reswc} (skin surface area - child) cm^2	6365
SA_{reswa} (skin surface area - adult) cm^2	19652
SA_{0-2} (mutagenic skin surface area) cm^2	6365
SA_{2-6} (mutagenic skin surface area) cm^2	6365
SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652
DAF (dilution attenuation factor) unitless	16.5325627
DF (dilution factor) unitless	4.13314068
AF (attenuation factor) unitless	4
f_{oc} (fraction organic carbon in soil) unitless	0.0106

Site-specific Equation Inputs for Migration to Groundwater

Variable	Value
d_a (aquifer thickness) m - site-specific	10
d (mixing zone depth) m - site-specific	5.5
L (source length parallel to ground water flow) m	9.45
i (hydraulic gradient) m/m	0.002
K (aquifer hydraulic conductivity) m/yr	876
I (Infiltration Rate) m/yr	0.086
p_c (soil particle density) kg/L	2.7
p_h (dry soil bulk density) kg/L	2.18
θ_w (water-filled soil porosity) L_{water}/L_{enil}	0.126
foc (fraction organic carbon in soil) g/g	0.0106

Site-specific

Cleanup Levels Calculator for Migration to Groundwater

ca=Cancer, nc=Noncancer, ca* (Where nc CL < 100 x ca CL), ca** (Where nc CL < 10 x ca CL),

max=CL exceeds ceiling limit (see User's Guide), sat=CL exceeds csat, sol=CL 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

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (ug/m ³) ⁻¹	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref
Ethylbenzene	100-41-4	No	Yes	1.10E-02	C	2.50E-06	C	1.00E-01	I	1.00E+00	I
Mercury (elemental)	7439-97-6	No	Yes	-		-		1.60E-04	C	3.00E-04	I
Methylnaphthalene, 1-	90-12-0	No	Yes	2.90E-02	P	-		7.00E-02	A	-	
Methylnaphthalene, 2-	91-57-6	No	Yes	-		-		4.00E-03	I	-	
Naphthalene	91-20-3	No	Yes	-		3.40E-05	C	2.00E-02	I	3.00E-03	I
Xylenes	1330-20-7	No	Yes	-		-		2.00E-01	I	1.00E-01	I

Chemical	K _d (cm ³ /g)	K _{oc} (cm ³ /g)	H'	Dilution Attenuation Factor (DAF) (unitless)	Noncarcinogenic CL Child HI=1 (ug/L)	Carcinogenic CL TR=1.0E-5 (ug/L)	Water Concentration (Child CL × DAF) (ug/L)
Ethylbenzene	4.73E+00	4.46E+02	3.22E-01	16.532563	8.06E+02	1.50E+01	1.33E+04
Mercury (elemental)	5.20E+01	-	3.52E-01	16.532563	5.23E-01	-	8.65E+00
Methylnaphthalene, 1-	2.68E+01	2.53E+03	2.10E-02	16.532563	6.23E+02	1.14E+01	1.03E+04
Methylnaphthalene, 2-	2.63E+01	2.48E+03	2.12E-02	16.532563	3.59E+01	-	5.94E+02
Naphthalene	1.64E+01	1.54E+03	1.80E-02	16.532563	6.11E+00	1.65E+00	1.01E+02
Xylenes	4.06E+00	3.83E+02	2.71E-01	16.532563	1.93E+02	-	3.19E+03

Chemical	Water Concentration (Cancer CL × DAF) (ug/L)	MCL	Water Concentration (MCL × DAF) (ug/L)	Cleanup Level (MCL) (mg/kg)	Cleanup Level (Child HI=1) (mg/kg)	Cleanup Level (TR=1.0E-5) (mg/kg)	Cleanup Level (mg/kg)
Ethylbenzene	2.48E+02	7.00E+02	1.16E+04	5.6E+01	6.39E+01	1.19E+00	1.2E+00
Mercury (elemental)	-	2.00E+00	3.31E+01	1.7E+00	4.50E-01	-	4.5E-01
Methylnaphthalene, 1-	1.88E+02	-	-	-	2.77E+02	5.05E+00	5.1E+00
Methylnaphthalene, 2-	-	-	-	-	1.56E+01	-	1.6E+01
Naphthalene	2.73E+01	-	-	-	1.66E+00	4.48E-01	4.5E-01
Xylenes	-	1.00E+04	1.65E+05	6.8E+02	1.32E+01	-	1.3E+01

Site-specific Equation Inputs for Migration to Groundwater

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Site-specific Equation Inputs for Migration to Groundwater

Variable	Value
BW_{reswa} (body weight - adult) kg	80
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BW_{2-6} (mutagenic body weight) kg	15
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EV_{16-26} (mutagenic events) per day	1
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SA_{6-16} (mutagenic skin surface area) cm^2	19652
SA_{16-26} (mutagenic skin surface area) cm^2	19652
DAF (dilution attenuation factor) unitless	16.2248517
DF (dilution factor) unitless	4.05621293
AF (attenuation factor) unitless	4
f_{oc} (fraction organic carbon in soil) unitless	0.0106

Site-specific Equation Inputs for Migration to Groundwater

Variable	Value
d_a (aquifer thickness) m - site-specific	10
d (mixing zone depth) m - site-specific	5.5
L (source length parallel to ground water flow) m	43.6
i (hydraulic gradient) m/m	0.002
K (aquifer hydraulic conductivity) m/yr	876
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p_h (dry soil bulk density) kg/L	2.18
θ_w (water-filled soil porosity) L_{water}/L_{enil}	0.126
foc (fraction organic carbon in soil) g/g	0.0106

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max=CL exceeds ceiling limit (see User's Guide), sat=CL exceeds csat, sol=CL 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

Chemical	CAS Number	Mutagen?	VOC?	Ingestion SF (mg/kg-day) ⁻¹	SFO Ref	Inhalation Unit Risk (ug/m ³) ⁻¹	IUR Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ³)	Chronic RfC Ref
Ethylbenzene	100-41-4	No	Yes	1.10E-02	C	2.50E-06	C	1.00E-01	I	1.00E+00	I
Mercury (elemental)	7439-97-6	No	Yes	-		-		1.60E-04	C	3.00E-04	I
Methylnaphthalene, 1-	90-12-0	No	Yes	2.90E-02	P	-		7.00E-02	A	-	
Methylnaphthalene, 2-	91-57-6	No	Yes	-		-		4.00E-03	I	-	
Naphthalene	91-20-3	No	Yes	-		3.40E-05	C	2.00E-02	I	3.00E-03	I
Xylenes	1330-20-7	No	Yes	-		-		2.00E-01	I	1.00E-01	I

Chemical	K _d (cm ³ /g)	K _{oc} (cm ³ /g)	H'	Dilution Attenuation Factor (DAF) (unitless)	Noncarcinogenic CL Child HI=1 (ug/L)	Carcinogenic CL TR=1.0E-5 (ug/L)	Water Concentration (Child CL × DAF) (ug/L)
Ethylbenzene	4.73E+00	4.46E+02	3.22E-01	16.224852	8.06E+02	1.50E+01	1.31E+04
Mercury (elemental)	5.20E+01	-	3.52E-01	16.224852	5.23E-01	-	8.49E+00
Methylnaphthalene, 1-	2.68E+01	2.53E+03	2.10E-02	16.224852	6.23E+02	1.14E+01	1.01E+04
Methylnaphthalene, 2-	2.63E+01	2.48E+03	2.12E-02	16.224852	3.59E+01	-	5.83E+02
Naphthalene	1.64E+01	1.54E+03	1.80E-02	16.224852	6.11E+00	1.65E+00	9.91E+01
Xylenes	4.06E+00	3.83E+02	2.71E-01	16.224852	1.93E+02	-	3.13E+03

Chemical	Water Concentration (Cancer CL × DAF) (ug/L)	MCL	Water Concentration (MCL × DAF) (ug/L)	Cleanup Level (MCL) (mg/kg)	Cleanup Level (Child HI=1) (mg/kg)	Cleanup Level (TR=1.0E-5) (mg/kg)	Cleanup Level (mg/kg)
Ethylbenzene	2.43E+02	7.00E+02	1.14E+04	5.4E+01	6.28E+01	1.17E+00	1.2E+00
Mercury (elemental)	-	2.00E+00	3.24E+01	1.7E+00	4.42E-01	-	4.4E-01
Methylnaphthalene, 1-	1.85E+02	-	-	-	2.72E+02	4.96E+00	5.0E+00
Methylnaphthalene, 2-	-	-	-	-	1.53E+01	-	1.5E+01
Naphthalene	2.68E+01	-	-	-	1.63E+00	4.40E-01	4.4E-01
Xylenes	-	1.00E+04	1.62E+05	6.7E+02	1.29E+01	-	1.3E+01