Appendix I

Quality Level Designation and Record

414.02
11/10/98
Rev. 02

QUALITY LEVEL DESIGNATION AND RECORD

Quality Level Evaluation Performed By: F. L. Webber Date: 04/20/2000

Facility/Structure/System: ARA-01, -02, -07, -08, -12, -13, -16, -21, -23, -25 & PBF-16 Quality Level: 3

IDENTIFICATION OF ITEM	QUALITY LEVEL DESIGNATION	TECHNICAL JUSTIFICATION
Remedial Actions at above listed Operable Unit 5-12 sites listed above	3	Hazard Classification for Remedial Activities at OU 5-12 Sites: ARA-01, -02, -07, -08, -12, -13, -16, -21, -23, -25, and PBF-16

Note: Assign and record quality level in accordance with MCP-540, and obtain appropriate approvals. Completed and approved form becomes a quality assurance record. (Master Equipment List may be used as a Q-List.)

R. G. Thompson		04/20/2000
Quality Assurance Concurrence Printed/Typed Name	Quality Assurance Concurrence Signature	Date
F. L. Webber		4/20/2000
Facility/Program/Project Approval Printed/Typed Name	Facility/Program/Project Approval Signature	Date

Appendix J

Air Emissions from WAG 5 Contaminated Soil Remediation Activities

Appendix J

Particulate, Radionuclide and Hazardous Air Pollutant Emissions from Remediation Activities WAG 5: ARA-01, ARA-12, ARA-23, and PBF-16

The assumptions and calculations used to estimate air emissions of particulates and radionuclide and/or hazardous air pollutants that could result from planned soil remediation site activities at ARA and PBF are presented herein. These calculations are intended to satisfy the requirements of 40 CFR 61.92 and 61.94(a), "NESHAPS for Emissions of Radionuclides Other than Radon from DOE Facilities," and the IDAPA 16.01.01.585 and .586, "Toxic Substances."

The following tables summarize the sites addressed in the Phase II Workplan along with the estimated volume of contaminated media to be removed and COCs. This information is based on the site descriptions and estimates as presented in the description of the nature and extent of contamination and human health risk assessment results presented in the PBF and ARA Record of Decision (ROD) (DOE-ID 2000a).

Contaminated material volumes and air emissions of particulates and COCs from the planned remediation activities are presented in the following tables. The particulate emission estimates were based on emission factor calculations for two scenarios during remediation: 1) movement of equipment heavy equipment on the contaminated surface (i.e., unpaved roads), and 2) handling of contaminated material (i.e., pickup and dropping). Estimates for these two scenarios were calculated based on the equations presented in Sections 13.2.2 and 13.2.4 of the Fifth Edition of the Compilation of Air Pollutant Emission Factors (AP-42).

Based on the calculated particulate emissions, an estimate of the potential release of radionuclides and/or hazardous air pollutants associated with the remediation was calculated. The calculations were based on the upper confidence limit or maximum contaminant concentration (i.e., whichever was deemed appropriate for use in the human health risk assessment) as presented in the ROD (DOE-ID 2000a). For radionuclides, the release, in curies, was used as input to the CAP88PC Model, an EPA approved computer code. CAP88PC calculates the radionuclide dose to a receptor at specified distances from the source. This information can then be interpolated to provide an estimate of dose to a receptor at the nearest site boundary and nearest community. The outputs are included as Attachment J1. The estimated dose is then compared to the NESHAPS limit of 10 mrem/year. For nonradiological COCs, the release in lbs/hr was estimated for comparison to the screening emission level values as presented in the IDAPA 16.01.01.585.

The total emissions (in lbs) were calculated by multiplying the emission rates by the time it takes to remove all of the contaminated material. The amount of material to be moved per hour (61.92 ton/hr) was estimated for TAN TSF-06, Area B Site remediation and assumed to be appropriate for use herein. The estimate was calculated by taking the amount of material transported per dump truck load (12 yd^3) multiplied by 4 loads per hour and the weight of soil per yd^3 (1.29 ton/yd^3). The time to excavate the contaminated volume was estimated by dividing the total weight of the material by the amount of material to be moved per hour.

Table J-1. Volume estimate for ARA-01 from DOE (2000a).

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	32,155 ft^2 x 2 ft removal	64,310	2,382	6,145,178	3,073

Assuming that the COC contamination is homogeneously distributed throughout the contaminated media and will be released with particulates, radionuclide activity or concentration released was calculated by multiplying the particulate emissions by the soil concentrations.

Table J-2. Particulate/HAP Emission Calculations – ARA-01.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	3,073	3,073	3,073	3,073	3,073
Amount of Material Moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	49.6	49.6	49.6	49.6	49.6
Material Handling (i.e., Pickup and Dropping)					
Emission Factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission Rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate Emissions (lbs)	2.97E00	1.93E00	1.41E00	8.05E-01	4.43E-01
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission Factors (lbs/VMT)	9.29E00	-	2.85E00	-	4.17E-01
Emission Rates (lbs/hr)	9.29E-01	-	2.85E-01	-	4.17E-02
Particulate Emissions (lbs)	4.6E01	-	1.4E01	-	2.1E00
Total Particulate Emissions					
Emission Rates (lbs/hr)	9.9E-01	3.9E-02	3.1E-01	1.6E-02	5.1E-02
Particulate Emissions (lbs)	4.9E01	1.93E00	1.5E01	8.05E-01	2.5E00
Emission/Release Calculations					
Arsenic (mg/kg in soil)			22.1		
Arsenic (mg/lb)			10.02		
Total particulate emission (lb)			69.2		
Arsenic (mg) (69.2 lbs * 10.02 mg/lb)			706		
Arsenic (lb) (706 mg *1E-03 mg/g / 454 g/lb)			1.56E-3		
Arsenic (lb/hr) (1.56E-03 lbs/49.6 hr)			3.14E-05		

Table J-3. Volume estimate for ARA-12.

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	2,337 ft^2 × 1 ft removal + 43,278 ft^2 × 0.5 ft removal	23,976	888	2,291,040	1,145

Table J-4. Particulate/Radionuclide Emission Calculations – ARA-12.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	1,145	1,145	1,145	1,145	1,145
Amount of Material Moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	18.5	18.5	18.5	18.5	18.5
Material Handling (i.e., Pickup and Dropping)					
Emission Factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission Rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate Emissions (lbs)	1.12E00	7.2E-01	5.2E-01	3.0E-01	1.6E-01
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission Factors (lbs/VMT)	9.29E00	-	2.85E00	-	4.17E-01
Emission Rates (lbs/hr)	9.29E-01	-	2.85E-01	-	4.17E-02
Particulate Emissions (lbs)	1.7E01	-	5.3E00	-	4.2E-01
Total Particulate Emissions					
Emission Rates (lbs/hr)	9.9E-01	3.9E-02	3.1E-01	1.6E-02	5.1E-02
Particulate Emissions (lbs)	1.8E01	7.2E-01	5.8E00	3.0E-01	6.0E-01
Emission/Release Calculations					
Ag-108m as Cs-137 (pCi/g)			120		
Ag-108m as Cs-137 (pCi/lb)			54,432		
Ag-108m as Cs-137 – Ci (CAP88 input)			9.4E-07		

Note: Because CAP88 does not accommodate estimates of Ag-108m, the risk as noted in the ROD (1E-03 for the current occupational receptor) was used to estimate Cs-137 activities for modeling and dose estimate purposes.

Table J-5. Volume estimate for ARA-23.

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	2,510,000 ft^2 by 0.5 ft removal depth	1,255,000	46,481	1.2E08	59,961

Table J-6. Particulate/Radionuclide Emission Calculations – ARA-23.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	59,961	59,961	59,961	59,961	59,961
Amount of Material Moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	968	968	968	968	968
Material Handling (i.e., Pickup and Dropping)					
Emission Factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission Rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate Emissions (lbs)	5.8E01	3.8E01	2.7E01	1.6E01	8.6E00
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission Factors (lbs/VMT)	1.4E01	-	4.0E00	-	5.9E-01
Emission Rates (lbs/hr)	1.5E01	-	4.05E-01	-	5.9E-02
Particulate Emissions (lbs)	1.4E04	-	3.9E02	-	5.7E01
Total Particulate Emissions					
Emission Rates (lbs/hr)	1.5E01	3.9E-02	4.05E-01	1.6E-02	5.9E-02
Particulate Emissions (lbs)	1.4E04	3.8E01	4.2E02	1.6E01	6.6E01
Emission/Release Calculations					
Cs-137 & Ba-137m (pCi/g)			88.5		
Cs-137 & Ba-137m (pCi/lb)			40,143		
Cs-137 & Ba-137m – Ci (CAP88 input)			5.7E-03		

Note: Because Ba-137m is a decay product of Cs-137 both were assumed to be present, at equivalent activities, as input to the CAP88 model.

Table J-7. Volume estimate for PBF-16.

Contaminated Material to be Removed	Dimension	Volume (ft^3)	Volume (yd^3)	Weight (lbs)	Weight (tons)
Soil	3,000 ft^2 × 4.5 ft removal	13,500	500	1,290,000	645

Table J-8. Particulate Emission Calculations – PBF-16.

	PM_{30}	PM_{15}	PM_{10}	PM_5	$PM_{2.5}$
Particulate Emission Estimates					
Tons of contaminated material to be moved	645	645	645	645	645
Amount of Material Moved per hour (ton/hr)	61.92	61.92	61.92	61.92	61.92
Time to remove contaminated material (hrs)	10.4	10.4	10.4	10.4	10.4
Material Handling (i.e., Pickup and Dropping)					
Emission Factors (lbs/ton)	9.7E-04	6.3E-04	4.5E-04	2.6E-04	1.4E-04
Emission Rates (lbs/hr)	6.0E-02	3.9E-02	2.8E-02	1.6E-02	8.9E-03
Particulate Emissions (lbs)	6.2E-01	4.1E-01	3.0E-01	1.7E-01	9.3E-02
Particulate Emission Estimates – Removal (i.e., Unpaved Road)					
Emission Factors (lbs/VMT)	9.29E00	-	2.85E00	-	4.17E-01
Emission Rates (lbs/hr)	9.29E-01	-	2.85E-01	-	4.17E-02
Particulate Emissions (lbs)	9.7E00	-	3.0E00	-	4.3E-01
Total Particulate Emissions					
Emission Rates (lbs/hr)	9.9E-01	3.9E-02	3.1E-01	1.6E-02	5.0E-02
Particulate Emissions (lbs)	1.0E01	4.1E-01	3.3E00	1.7E-01	5.2E-01
Emission/Release Calculations					
Not Applicable					

Note: No radiological or nonradiological human health COCs identified.

ATTACHMENT J1

C A P 8 8 - P C

Version 2.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Jul 14, 2000 02:30 pm

Facility: ARA
Address: INEEL
City:
State: ID Zip:

Source Category: Area
Source Type: Area
Emission Year: 2000

Comments:

Effective Dose Equivalent
(mrem/year)

4.51E-06

At This Location: 400 Meters North Northeast
Dataset Name: ara-12
Dataset Date: Jul 14, 2000 02:30 pm
Wind File: C:\CAP88PC2\WNDFILES\24156.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 400 Meters North Northeast
Lifetime Fatal Cancer Risk: 1.18E-10

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	4.31E-06
BREAST	4.70E-06
R MAR	4.27E-06
LUNGS	4.36E-06
THYROID	4.97E-06
ENDOST	2.99E-06
RMNDR	4.84E-06
EFFEC	4.51E-06

RADIONUCLIDE EMISSIONS DURING THE YEAR 2000

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
CS-137	D	1.00	9.4E-07	9.4E-07

SITE INFORMATION

Temperature:	6 degrees C
Precipitation:	22 cm/y
Mixing Height:	1000 m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.
Area (sq m): 4242.

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.	0.	0.	0.	0.	0.	0.

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

400 800 3100 6200

C A P 8 8 - P C

Version 2.00

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Individual Assessment
Jul 13, 2000 04:57 pm

Facility: ARA-23
Address: INEEL
City:
State: ID Zip:

Source Category: Area
Source Type: Area
Emission Year: 2000

Comments:

Effective Dose Equivalent
(mrem/year)

2.54E-03

At This Location: 400 Meters North Northeast
Dataset Name: ARA-23
Dataset Date: Jul 13, 2000 04:57 pm
Wind File: C:\CAP88PC2\WNDFILES\24156.WND

MAXIMALLY EXPOSED INDIVIDUAL

Location Of The Individual: 400 Meters North Northeast
Lifetime Fatal Cancer Risk: 6.65E-08

ORGAN DOSE EQUIVALENT SUMMARY

Organ	Dose Equivalent (mrem/y)
GONADS	2.43E-03
BREAST	2.65E-03
R MAR	2.41E-03
LUNGS	2.46E-03
THYROID	2.80E-03
ENDOST	1.69E-03
RMNDR	2.73E-03
EFFEC	2.54E-03

RADIONUCLIDE EMISSIONS DURING THE YEAR 2000

Nuclide	Class	Size	Source #1 Ci/y	TOTAL Ci/y
CS-137	D	1.00	5.8E-04	5.8E-04
BA-137M	D	1.00	5.8E-04	5.8E-04

SITE INFORMATION

Temperature:	6	degrees C
Precipitation:	22	cm/y
Mixing Height:	1000	m

SOURCE INFORMATION

Source Number: 1

Source Height (m): 1.
Area (sq m): 233430.

Plume Rise Pasquill Cat:	A	B	C	D	E	F	G
Zero:	0.	0.	0.	0.	0.	0.	0.

AGRICULTURAL DATA

	Vegetable	Milk	Meat
Fraction Home Produced:	0.700	0.399	0.442
Fraction From Assessment Area:	0.300	0.601	0.558
Fraction Imported:	0.000	0.000	0.000

Food Arrays were not generated for this run.
Default Values used.

DISTANCES (M) USED FOR MAXIMUM INDIVIDUAL ASSESSMENT

400 800 3100 6200