54-3000-101(9/91)

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FROM E T Coenenberg

Please replace corresponding pages in Document, DOE/RL-93-15, Rev. 0, "Radioactive Air Emissions Notice of Construction for the Waste Receiving and Processing Facility" with the attached revised pages.

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"TO MAKE LIFE LAST, PUT SAFETY FIRST"

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Table 2-1. Waste Receiving and Packaging Module 1 Facility Radioactive Emissions Inventory.

Radioisotopes	Average curies/ drum (Ci/drum)	Process rate (Ci/year)
PARTICULATE RADIONUCLIDES		
^{141}Ce	5.28 E-35	1.08 E-30
^{144}Ce, ^{144}Pr	2.54 E-02	5.21 E+02
^{60}Co	1.76 E-02	3.60 E+02
^{137}Cs, ^{137}Ba	8.61 E+00	1.76 E+05
^{155}Eu	4.02 E-05	8.23 E-01
^{147}Pm	1.10 E-01	2.25 E+03
^{106}Ru, ^{106}Rh	4.89 E-04	1.00 E+01
^{90}Sr, ^{90}Y	8.47 E+00	1.73 E+05
^{241}Am	1.41 E-02	2.89 E+02
^{243}Am	2.20 E-02	4.51 E+02
^{252}Cf	3.60 E-03	7.37 E+01
^{245}Cm	1.71 E-04	3.50 E+00
^{238}Pu	3.51 E-01	7.19 E+03
^{239}Pu	6.12 E-01	1.25 E+04
^{240}Pu	1.46 E-01	2.99 E+03
^{241}Pu	2.66 E+00	5.44 E+04
^{242}Pu	8.29 E-06	1.70 E-01
^{232}Pu	1.52 E-05	3.11 E-01
^{233}U	1.81 E-03	3.71 E+01
^{235}U	2.47 E-04	5.05 E+00
^{237}Np	5.63 E-05	1.15 E+00
VOLATILE RADIONUCLIDES		
^{3}H	9.79 E-05	2.00 E+00
^{14}C	3.61 E-05	7.40 E-01
^{85}Kr	5.04 E-02	1.03 E+03

NOTE: Based on processing 20,475 drums per year.

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Table 2-2. Emissions Results Based on 40 CFR 61 Methodology.

Radioisotopes	Process rate (Ci/year)	Release rate multiplier	Resultant emission rate (Ci/year)	App. D HEPA adj. factor	Total emissions (Ci/year)
PARTICULATE RADIONUCLIDES					
^{141}Ce	1.08 E-30	0.001	1.08 E-33	0.01	1.08 E-35
^{144}Ce, ^{144}Pr	5.21 E+02	0.001	5.21 E-01	0.01	5.21 E-03
^{60}Co	3.60 E+02	0.001	3.60 E-01	0.01	3.60 E-03
^{137}Cs, ^{137}Ba	1.76 E+05	0.001	1.76 E+02	0.01	1.76 E+00
^{155}Eu	8.23 E-01	0.001	8.23 E-04	0.01	8.23 E-06
^{147}Pm	2.25 E+03	0.001	2.25 E+00	0.01	2.25 E-02
^{106}Ru, ^{106}Rh	1.00 E+01	0.001	1.00 E-02	0.01	1.00 E-04
^{90}Sr, ^{90}Y	1.73 E+05	0.001	1.73 E+02	0.01	1.73 E+00
^{241}Am	2.89 E+02	0.001	2.89 E-01	0.01	2.28 E-03
^{243}Am	4.51 E+02	0.001	4.51 E-01	0.01	4.51 E-03
^{252}Cf	7.37 E+01	0.001	7.37 E-02	0.01	7.37 E-04
^{245}Cm	3.50 E+00	0.001	3.50 E-03	0.01	3.50 E-05
^{238}Pu	7.19 E+03	0.001	7.19 E+00	0.01	7.19 E-02
^{239}Pu	1.25 E+04	0.001	1.25 E+01	0.01	1.25 E-01
^{240}Pu	2.99 E+03	0.001	2.99 E+00	0.01	2.99 E-02
^{241}Pu	5.44 E+04	0.001	5.44 E+01	0.01	5.44 E-01
^{242}Pu	1.70 E-01	0.001	1.70 E-04	0.01	1.70 E-06
^{232}Th	3.11 E-01	0.001	3.11 E-04	0.01	3.11 E-06
^{233}U	3.71 E+01	0.001	3.71 E-02	0.01	3.71 E-04
^{235}U	5.05 E+00	0.001	1.05 E-03	0.01	1.05 E-05
^{237}Np	1.15 E+00	0.001	1.15 E-03	0.01	1.15 E-05
VOLATILE RADIONUCLIDES					
^{3}H	2.00 E+00	1.000	2.00 E+00	N/A	2.00 E+00
^{14}C	7.40 E-01	1.000	7.40 E-01	N/A	7.40 E-01
^{85}Kr	1.03 E+03	1.000	1.03 E+03	N/A	1.03 E+03

NOTES: Based on processing 20,475 drums per year.
N/A = Not Applicable.

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Table 2-3. Good Engineering Judgement Radioactive Emissions.

Radioisotopes	Unabated emissions (Ci/year)	HEPA filter DF	Abated emission rate (Ci/year)
PARTICULATE RADIONUCLIDES			
^{141}Ce	1.08 E-33	2.0 E+06	5.40 E-40
^{144}Ce, ^{144}Pr	5.21 E-01	2.0 E+06	1.04 E+06
^{60}Co	3.60 E-01	2.0 E+06	1.80 E-07
^{137}Cs, ^{137}Ba	1.76 E+02	2.0 E+06	8.80 E-05
^{155}Eu	8.23 E-04	2.0 E+06	4.12 E-10
^{147}Pm	2.25 E+00	2.0 E+06	1.13 E-06
^{106}Ru, ^{106}Rh	1.00 E-02	2.0 E+06	5.01 E-09
^{90}Sr, ^{90}Y	1.73 E+02	2.0 E+06	8.65 E-05
^{241}Am	2.89 E-01	2.0 E+06	1.45 E-07
^{243}Am	4.51 E-01	2.0 E+06	2.26 E-07
^{252}Cf	7.37 E-02	2.0 E+06	3.69 E-08
^{245}Cm	3.50 E-03	2.0 E+06	1.74 E-09
^{237}Np	1.15 E-03	2.0 E+06	5.75 E-10
^{238}Pu	7.19 E+00	2.0 E+06	3.60 E-06
^{239}Pu	1.25 E+01	2.0 E+06	6.25 E-06
^{240}Pu	2.99 E+00	2.0 E+06	1.50 E-06
^{241}Pu	5.44 E+01	2.0 E+06	2.72 E-05
^{242}Pu	1.70 E-04	2.0 E+06	8.50 E-11
^{232}Th	3.11 E-04	2.0 E+06	1.56 E-10
^{233}U	3.71 E-02	2.0 E+06	1.86 E-08
^{235}U	5.05 E-03	2.0 E+06	2.53 E-09
VOLATILE RADIONUCLIDES			
^{3}H	2.00 E+00	1.00	2.00 E+00
^{14}C	7.40 E-01	1.00	7.40 E-01
^{85}Kr	1.03 E+03	1.00	1.03 E+03

NOTES: Based on processing 20,475 drums per year.
Assumed stack flowrate = 78,000 ft^3/min.

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Table 4-1. Waste Receiving and Processing Module 1 Facility Effective Dose Equivalent Estimates for an Individual Receiving Maximum Exposure to Radiological Emissions.

Radioisotopes	Abated emission rate (Ci/year)	Modeled dose factor (mrem/Ci)	Abated MEI dose (mrem/year)	Percent of abated MEI dose
PARTICULATE RADIONUCLIDES				
^{141}Ce	5.40 E-40	8.14 E-03	4.40 E-42	3.29 E-37
^{144}Ce, ^{144}Pr	2.60 E-07	8.14 E-03	2.12 E-09	1.58 E-04
^{60}Co	1.80 E-07	1.72 E-02	3.10 E-09	2.32 E-04
^{137}Cs, ^{137}Ba	8.80 E-05	1.42 E-02	1.25 E-06	9.34 E-02
^{155}Eu	4.12 E-10	1.16 E-03	4.80 E-13	3.59 E-08
^{147}Pm	1.13 E-06	6.75 E-04	7.63 E-10	5.70 E-05
^{106}Ru, ^{106}Rh	5.01 E-09	1.24 E-02	6.21 E-11	4.64 E-06
^{90}Sr, ^{90}Y	8.65 E-05	2.60 E-02	1.25 E-06	9.34 E-02
^{241}Am	1.45 E-07	7.79 E+00	1.13 E-06	8.44 E-02
^{243}Am	2.26 E-07	7.79 E+00	1.76 E-06	1.31 E-01
^{252}Cf	3.69 E-08	NA	NA	NA
^{245}Cm	1.74 E-09	NA	NA	NA
^{237}Np	5.75 E-10	7.05 E+00	4.05 E-09	3.03 E-04
^{238}Pu	3.60 E-06	4.76 E+00	1.17 E-05	8.74 E-01
^{239}Pu	6.25 E-06	5.15 E+00	3.22 E-05	2.41 E+00
^{240}Pu	1.50 E-06	5.14 E+00	7.71 E-06	5.76 E-01
^{241}Pu	2.72 E-05	8.17 E-02	2.22 E-06	1.66 E-01
^{242}Pu	8.50 E-11	5.15 E+00	4.38 E-10	3.27 E-05
^{232}Th	1.56 E-10	4.83 E+00	7.53 E-10	5.62 E-05
^{233}U	1.86 E-08	1.92 E+00	3.57 E-08	2.67 E-03
^{235}U	2.53 E-09	1.76 E+00	4.45 E-09	3.32 E-04
Subtotal Particulate Radionuclide Dose			5.93 E-05	4.4276
VOLATILE RADIONUCLIDES				
Subtotal Volatile Radionuclides			1.28 E-03	95.5724
TOTAL ABATED DOSE			1.34 E-03	100.00

NOTES: Based on processing 20,475 drums per year.
Assumed stack flowrate = 78,000 ft^3/min.

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Maximally Exposed Individual: Doses were estimated for an individual living 24 km (10 mi) east of the WRAP 1 facility.

Meteorology: The Hanford Meteorological Station (HMS) data and onsite meteorological data were used (WHC 1991).

4.3 RESULTS OF METHOD (EFFECTIVE DOSE EQUIVALENT FOR WHOLE BODY AND RELEVANT ORGANS)

Table 4-1 shows the dose factors derived from the CAP-88 modeling and the EDE for each radionuclide. The source term (i.e., emissions after abatement in curies per year) are multiplied by the dose factors to obtain the EDE. The total projected EDE from controlled airborne radiological emissions to the offsite MEI is 1.34E-03 mrem/year. The dose attributable to radiological emissions from WRAP 1 will, then, constitute 0.013 percent of the WAC 246-247 EDE regulatory limit of 10 mrem/year to the offsite MEI.

For comparison, natural background radiation dose for the Tri-Cities (i.e., the cities of Richland, Kennewick, and Pasco) area of Washington State is estimated to be 300 mrem (Jaquish 1989). The projected EDE to the MEI from the WRAP 1 facility would constitute 0.00045 percent of the natural ambient radiation.

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4.4 DESCRIPTION OF INTERNAL STANDARDS USED TO ENSURE COMPLIANCE WITH APPLICABLE STATE AND FEDERAL LAWS AND REGULATIONS

Information pertaining to the internal standard used at the Hanford Site to ensure compliance with applicable state and federal laws and regulations has been provided to the DOH previously, as a part of data packages submitted in support of the Hanford Site's *State of Washington Department of Health Radioactive Air Emissions Permit Number FF-01* (DOH 1989). From that supporting documentation, the following responds to the requirements of this sections:

- *State of Washington Department of Health, Radioactive Air Emissions Permit FF-01: Supplemental Information* (DOH-RL 1990), Chapter 3.0, Section 3.4 of each facility-specific chapter
- *Response to State of Washington Department of Health Technical Review of Hanford Site Permit FF-01 Supplemental Information* (DOE-RL 1992).

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(Short Form)

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