



LB# 4326

AIR 15-305
NOC 949

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
OFFICE OF RADIATION PROTECTION
309 Bradley Blvd., Suite 201 • Richland, Washington 99352
TDD Relay Service: 1-800-833-6388

March 12, 2015

Ms. Stacy Charboneau, Manager
for Safety and Environment
United States Department of Energy
Richland Operations Office
P.O. Box 550, MSIN: A5-14
Richland, Washington 99352

Dear Ms. Charboneau:

Pursuant to Chapter 246-247 of the Washington Administrative Code (WAC), your application to operate is hereby approved according to the enclosed emission unit specific license for:

**Radiochemical Processing Laboratory (325 Building), Revision 3, 300 Area, Hanford Site,
Richland, Washington (Replaces NOC 807)
(NOC 949, EU 361)**

The conditions, controls, monitoring requirements, and limitations of this license must be observed in order for you to be in compliance with WAC 246-247. Failure to meet any provision of this license may result in the revocation of approval, the issuance of Notices of Violation, or other enforcement actions under WAC 246-247-100.

If you have any questions regarding this approval, please contact Mr. Ernest McCormick at (509) 946-0624.

Sincerely,

P. John Martell, Manager
Radioactive Air Emissions Section

Enclosures: Conditions and Limitations for NOC 949 (EU 361)

cc: (see next page)



cc: Ruth Allen, WRPS
Matthew Barnett, PNNL
Lucinda Borneman, WRPS
Lee Bostic, BNI
Cliff Clark, USDOE-RL
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Valarie Peery, Ecology
John Schmidt, WDOH
Maria Skorska, Ecology
Jeff Voogd, WRPS
Joan Woolard, MSA
Davis Zhen, EPA
Environmental Portal
RAES Tracking: Line# 1010; Follow-up to LB# 4275; NOC 949; EU 361

Emission Unit ID: 361

300 EP-325-01-S

EP-325-01-S

This is a MAJOR, ACTIVELY ventilated emission unit.

325 Building Radiological Processing Laboratory

Emission Unit Information

Stack Height: 89.00 ft. 27.13 m. Stack Diameter 8.00 ft. 2.44 m.

Average Stack Effluent Temperature: 77 degrees Fahrenheit. 25 degrees Celsius.

Average Stack Exhaust Velocity: 46.53 ft/second. 14.18 m/second.

Abatement Technology ALARACT WAC 246-247-040(4)

state only enforceable: WAC 246-247-010(4), 040(5), 060(5)

Zone or Area	Abatement Technology	Required # of Units	Additional Description
	HEPA	2	2 in series
	Fan	1	Variable flow (4 in parallel, up to 3 operational) Variable flow 4 in parallel (1 minimum operational). The system has the capability to going down to 1 fan during set back operations.

Monitoring Requirements

state enforceable: WAC 246-247-040(5), 060(5), and federally enforceable: 40 CFR 61 subpart H

Federal and State Regulatory	Monitoring and Testing Requirements	Radionuclides Requiring Measurement	Sampling Frequency
40 CFR 61.93(b)(4)(i) & WAC 246-247-075(2)	40 CFR 61, Appendix B, Method 114	Each radionuclide that could contribute greater than 10% of the potential TEDE	Particulates are continuously sampled and collected every two-weeks for gross alpha and gross beta analysis, and composited on a semi-annual basis and analyzed isotopically. Tritium samples are collected on a monthly basis for analysis.

Sampling Requirements Record Sample; tritium by silica gel

Additional Requirements

Additional monitoring or sampling requirements established by this License will be listed in the Conditions and Limitations section, if applicable.

Operational Status This 89 foot tall stack exhausts filtered building air. Emissions were sampled using a record particulate sampler and a tritium sampler. The building contains radiochemistry laboratories and hot cells used for research process development, mixed waste treatment activities, and radioanalytical services.

This Emission Unit has 1 active Notice(s) of Construction.

Project Title

Radiochemical Processing Laboratory (325 Building), Revision 3, 300 Area, Hanford Site, Richland, Washington (Replaces NOC 807)

Approval #

AIR 15-305

Date Approved

3/12/2015

NOC_ID

949

Conditions (state only enforceable: WAC 246-247-040(5), 060(5) if not specified)

- 1) The total abated emission limit for this Notice of Construction is limited to 5.70E+00 mrem/year to the Maximally Exposed Individual (WAC 246-247-040(5)).
- 2) his approval applies to those additional activities described below. No additional activities or variations on the approved activities that constitute a "modification" to the emission unit, as defined in WAC 246-247-030(16), may be conducted.

The research and development (R&D) operations in the 325 Building involve: radiochemical process science and engineering; evaluation, analysis, and testing of radioactive, radiochemical, chemical and physical material properties; development and experimentation in the design and application of Radiation Generating Devices (RGDs); and the development and conduct of analytical procedures in support of research activities.

Radiochemical work routinely conducted in the 325 Building includes the following:

- analyzing, characterizing, preparing and testing tritium and tritium-bearing materials
- characterizing, analyzing, and stabilizing sodium-bearing materials (Na and NaK)
- conducting chemical process development and rheology tests and experiments, which may include bench-scale testing, precipitation and extraction activities, material performance, and testing
- conducting non-destructive analysis evaluations of waste drums and other materials and x-ray verification and compaction of low-level waste (LLW)
- conducting nuclear material evaluations
- conducting research activities involving mixed activation products (MAPs) and mixed fission products (MFPs), and naturally occurring radioactive material, actinides, and a wide range of standard and tracer radionuclides
- conducting research and laboratory activities that may include processes where the temperature may be equal to or exceed 100°C
- conducting, testing, and implementing environmental research
- developing and preparing radioactive material standards and sources for laboratory use
- developing and testing radioactive material immobilization and stabilization processes
- evaluating and testing decontamination and decommissioning technologies
- fabricating, extracting, development, and purifying target samples
- material storage and management, including East lay-down yard and North pad
- performing actinide chemistry R&D including developing and testing plutonium and other actinide technologies
- performing characterization and research with nuclear fuel including fuel cycles, spent fuels, and reprocessing
- performing electrochemical waste processing including salt splitting, nitrate destruction, organic destruction and electroplating
- performing property testing of irradiated materials including performance of reactor dosimetry and hydrogen and helium measurements to characterize radiation damage in materials; analyzing, fabricating, and characterizing radioactive colloids
- performing radiochemical and physical characterization of tank wastes, contaminated soils, and proposed final waste forms such as glass and ceramics, all at various stages of processing
- performing radioisotope research, process development, and separations
- preparing and analyzing samples for x-ray diffraction, electron microscopy, optical microscopy, auger analysis, and other surface techniques
- preparing standard solutions of radionuclides from stock batches for use in R&D of analytical procedures and for quality control; analyzing performance evaluation samples submitted by the U.S. Environmental Protection Agency, the Environmental Monitoring Laboratory, and other organizations as a routine part of the laboratory quality control program
- providing treatment services for hazardous waste or mixed (hazardous and radioactive) waste, which includes: grouting, neutralizing, and distilling; demonstrating new and emerging technologies for waste treatment and destruction; and developing and testing waste treatment technologies such as evaporation/concentration of radioactive solutions, or vitrification and testing of glass waste forms
- separating and processing medically usable radioisotopes; developing and testing equipment and materials for nuclear medicine
- setting up laboratory projects involving fume hood removals/upgrades and ductwork tie-in

- storing and managing samples and materials

Depending on the radioactive or hazardous nature of the work, activities in the 325 Building are divided among the two hot cell complexes and general laboratories containing glove boxes, fume hoods, and laboratory benches.

Hot cells are used for work with high-dose-rate materials when the additional shielding provided by the hot cell walls and remote handling capability provided by the manipulators are necessary for protecting workers from unnecessary occupational exposures to radiation. Glove boxes are used to provide control and confinement of dispersible radioactive materials as necessary for the work activity. Fume hoods are used for low-level radiochemical work to primarily protect workers from chemical fumes and to provide a limited degree of confinement for radioactive materials. Work with radioactive materials on bench tops is limited to activities in which the possibility of spreading contamination is low. Individual projects frequently involve working in and transferring materials among more than one of these locations. For example, sample preparation or dilution may be performed in a hot cell or glove box, and then the sample may be moved to a laboratory fume hood for analysis.

- 3) The PTE for this project as determined under WAC 246-247-030(21)(a-e) [as specified in the application] is $4.10E+02$ mrem/year. Approved are the associated potential release rates (Curies/year) of:

Ac - 227	4.10E-03	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Alpha - 0	1.50E+02	Gas	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Am - 241	5.10E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
Contributes greater than 0.1 mrem/yr to the MEI, and represents greater than 10% of the unabated PTE to the MEI			
Am - 243	2.40E-01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Beta - 0	7.90E+04	Gas	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Cm - 244	3.00E-01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Cs - 137	7.50E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Eu - 152	1.20E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Eu - 154	1.20E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Gd - 153	1.80E+01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
H - 3	1.60E+03	Gas	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Pu - 238	4.10E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
Contributes greater than 0.1 mrem/yr to the MEI, and represents greater than 10% of the unabated PTE to the MEI			
Pu - 239	4.00E+00	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
Contributes greater than 0.1 mrem/yr to the MEI, and represents greater than 10% of the unabated PTE to the MEI			
Pu - 240	8.90E-01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Pu - 241	2.60E+01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Ra - 226	2.20E-01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			

Rn - 220	2.00E+03	Gas	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Rn - 222	1.00E+03	Gas	WAC 246-247-030(21)(a)
Contributes less than 0.1 mrem/yr to the MEI, and represents greater than 25% of the abated dose.			
Ru - 106	6.10E+01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Sr - 90	1.00E+01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
Tc - 99	8.50E-01	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
U - 232	2.70E-02	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			
U - 233	8.10E-02	Liquid/Particulate Solid	WAC 246-247-030(21)(a)
*Contributes greater than 0.1 mrem/yr PTE unabated TEDE to the MEI.			

The radioactive isotopes identified for this emission unit are (no quantities specified):

Ac - 225	Ac - 227	Ac - 228	Ag - 108 m	Ag - 108
Ag - 109 m	Ag - 110 m	Ag - 110	Ag - 111	Ag - 112
Al - 26	Al - 28	Am - 240	Am - 241	Am - 242 m
Am - 242	Am - 243	Am - 245	Am - 246	Ar - 37
Ar - 39	Ar - 41	Ar - 42	As - 74	As - 76
As - 77	At - 217	Au - 193	Au - 194	Au - 195
Au - 196	Au - 198	Au - 198 m	Au - 199	Ba - 131
Ba - 133	Ba - 133 m	Ba - 137 m	Ba - 139	Ba - 140
Ba - 141	Ba - 142	Ba - 143	Be - 10	Be - 7
Bi - 207	Bi - 208	Bi - 210 m	Bi - 210	Bi - 211
Bi - 212	Bi - 213	Bi - 214	Bk - 247	Bk - 249
Bk - 250	Br - 82	Br - 82 m	Br - 83	Br - 84
Br - 84 m	Br - 85	C - 11	C - 14	C - 15
Ca - 41	Ca - 45	Ca - 47	Cd - 107	Cd - 109
Cd - 111 m	Cd - 113 m	Cd - 113	Cd - 115 m	Cd - 115
Cd - 117	Cd - 117 m	Ce - 139	Ce - 141	Ce - 142
Ce - 143	Ce - 144	Cf - 249	Cf - 250	Cf - 251
Cf - 252	Cl - 36	Cm - 241	Cm - 242	Cm - 243
Cm - 244	Cm - 245	Cm - 246	Cm - 247	Cm - 248
Cm - 250	Co - 56	Co - 57	Co - 58	Co - 60
Co - 60 m	Cr - 49	Cr - 51	Cr - 55	Cs - 131
Cs - 132	Cs - 134	Cs - 134 m	Cs - 135	Cs - 136
Cs - 137	Cs - 138	Cs - 139	Cs - 140	Cs - 141
Cu - 64	Cu - 66	Cu - 67	Dy - 159	Dy - 165
Dy - 169	Er - 169	Er - 171	Es - 254	Eu - 150
Eu - 152	Eu - 152 m	Eu - 154	Eu - 155	Eu - 156

Eu - 157	F - 18	Fe - 55	Fē - 59	Fr - 221
Fr - 223	Ga - 67	Ga - 68	Ga - 70	Ga - 72
Gd - 148	Gd - 149	Gd - 151	Gd - 152	Gd - 153
Gd - 159	Ge - 68	Ge - 71	Ge - 71 m	Ge - 75
Ge - 77	Ge - 77 m	H - 3	Hf - 175	Hf - 178 m
Hf - 179 m	Hf - 181	Hf - 182	Hg - 203	Ho - 163
Ho - 166	Ho - 166 m	I - 122	I - 123	I - 125
I - 126	I - 128	I - 129	I - 130	I - 130 m
I - 131	I - 132	I - 132 m	I - 133	I - 133 m
I - 134	I - 134 m	I - 135	In - 106	In - 111
In - 113 m	In - 114 m	In - 114	In - 115	In - 115 m
In - 116	In - 116 m	In - 117	In - 117 m	Ir - 189
Ir - 190	Ir - 192	Ir - 194	K - 40	K - 42
Kr - 81	Kr - 81 m	Kr - 83 m	Kr - 85	Kr - 85 m
Kr - 87	Kr - 88	Kr - 89	Kr - 90	La - 137
La - 138	La - 140	La - 141	La - 142	La - 144
Lu - 177	Lu - 177 m	Mg - 27	Mg - 28	Mn - 52
Mn - 54	Mn - 56	Mo - 103	Mo - 104	Mo - 105
Mo - 93	Mo - 99	N - 13	Na - 22	Na - 24
Na - 24 m	Nb - 100	Nb - 101	Nb - 103	Nb - 91
Nb - 91 m	Nb - 92	Nb - 93 m	Nb - 94	Nb - 95
Nb - 95 m	Nb - 96	Nb - 97	Nb - 97 m	Nb - 98
Nd - 144	Nd - 147	Ni - 56	Ni - 57	Ni - 59
Ni - 63	Ni - 65	Np - 235	Np - 236	Np - 237
Np - 238	Np - 239	Np - 240	Np - 240 m	O - 15
O - 19	Os - 191	P - 32	P - 33	Pa - 231
Pa - 233	Pa - 234	Pa - 234 m	Pb - 203	Pb - 209
Pb - 210	Pb - 211	Pb - 212	Pb - 214	Pd - 103
Pd - 107	Pd - 109	Pd - 112	Pm - 143	Pm - 144
Pm - 145	Pm - 146	Pm - 147	Pm - 148 m	Pm - 148
Pm - 149	Pm - 151	Po - 208	Po - 209	Po - 210
Po - 211	Po - 212	Po - 213	Po - 214	Po - 215
Po - 216	Po - 218	Pr - 143	Pr - 144	Pr - 144 m
Pt - 191	Pt - 192	Pt - 193	Pt - 193 m	Pt - 195 m
Pt - 197 m	Pt - 197	Pt - 198	Pt - 199	Pt - 199 m
Pu - 234	Pu - 236	Pu - 237	Pu - 238	Pu - 239
Pu - 240	Pu - 241	Pu - 242	Pu - 243	Pu - 244
Pu - 246	Ra - 223	Ra - 224	Ra - 225	Ra - 226

Ra - 228	Rb - 81	Rb - 82	Rb - 83	Rb - 84
Rb - 86	Rb - 87	Rb - 88	Rb - 89	Rb - 90
Rb - 90 m	Re - 186	Re - 187	Re - 188	Rh - 101
Rh - 102	Rh - 102 m	Rh - 103 m	Rh - 104	Rh - 105
Rh - 105 m	Rh - 106	Rn - 219	Rn - 220	Rn - 222
Rn - 224	Ru - 103	Ru - 105	Ru - 106	Ru - 97
S - 35	Sb - 122	Sb - 124	Sb - 125	Sb - 126
Sb - 126 m	Sb - 127	Sb - 129	Sc - 44	Sc - 46
Sc - 47	Sc - 48	Se - 75	Se - 79	Se - 79 m
Si - 31	Si - 32	Sm - 145	Sm - 146	Sm - 147
Sm - 148	Sm - 151	Sm - 153	Sm - 157	Sn - 113
Sn - 117 m	Sn - 119 m	Sn - 121 m	Sn - 121	Sn - 123
Sn - 125	Sn - 126	Sr - 82	Sr - 85	Sr - 87 m
Sr - 89	Sr - 90	Sr - 91	Sr - 92	Ta - 179
Ta - 180	Ta - 182	Ta - 182 m	Ta - 183	Tb - 157
Tb - 158	Tb - 160	Tb - 161	Tc - 101	Tc - 103
Tc - 106	Tc - 95 m	Tc - 95	Tc - 97	Tc - 97 m
Tc - 98	Tc - 99	Tc - 99 m	Te - 121 m	Te - 121
Te - 123	Te - 123 m	Te - 125 m	Te - 127 m	Te - 127
Te - 129 m	Te - 129	Te - 131	Te - 131 m	Te - 132
Te - 133	Te - 133 m	Te - 134	Th - 227	Th - 228
Th - 229	Th - 230	Th - 231	Th - 232	Th - 233
Th - 234	Ti - 44	Ti - 45	Ti - 51	Ti - 201
Ti - 204	Ti - 206	Ti - 207	Ti - 208	Ti - 209
Tm - 168	Tm - 170	Tm - 171	U - 232	U - 233
U - 234	U - 235	U - 235 m	U - 236	U - 237
U - 238	U - 239	U - 240	V - 48	V - 49
W - 181	W - 185	W - 187	W - 188	Xe - 122
Xe - 123	Xe - 125	Xe - 127	Xe - 127 m	Xe - 129 m
Xe - 131 m	Xe - 133	Xe - 133 m	Xe - 135	Xe - 135 m
Xe - 137	Xe - 138	Xe - 139	Y - 88	Y - 90
Y - 90 m	Y - 91	Y - 91 m	Y - 92	Y - 93
Yb - 164	Yb - 169	Yb - 175	Yb - 177	Zn - 65
Zn - 69	Zn - 69 m	Zr - 100	Zr - 88	Zr - 89
Zr - 93	Zr - 95	Zr - 97	Zr - 98	Zr - 99

The potential release rates described in this Condition were used to determine control technologies and monitoring requirements for this approval. DOE must notify the Department of a "modification" to the emission unit, as defined in WAC 246-247-030(16). DOE must notify the Department of any changes to a NESHAP major emission unit when a specific isotope is newly identified as contributing greater than 10% of the potential TEDE to the MEI, or greater than 25% of the TEDE to the MEI after controls. (WAC 246-247-110(9)) DOE must notify the Department of any changes to potential release rates as required by state or federal regulations including changes that would constitute a significant modification to the Air Operating Permit under WAC 173-401-725(4). Notice will be provided according to the particular regulation under which notification is required. If the applicable regulation(s) does not address manner and type of notification, DOE will provide the Department with advance written notice by letter or electronic mail but not solely by copies of documents.

4) **RELEASE RATE - Physical Form**

Activities at the 325 building will be assessed to ensure operations that involve heating of radiological material does not result in gaseous forms of radionuclides that are not accounted for in the license. WAC 246-247-060 (5)

5) **WDOH NOTIFICATION - New Radionuclide**

Activities at the 325 building will be assessed to ensure that no radionuclides are handled that are not listed in this license. If any activity at the 325 building results in a new radionuclide being handled at the building a written notification will be made to the Washington Department of Health. WAC 246-247-060 (5)

6) **TECHNOLOGY STANDARDS – Ductwork modifications.**

Any modification resulting in an increase in the emission unit's operating design capacity including those involving ductwork tie-in will be constructed to the ASME AG-1 standard, or equivalent. WAC-267-247-030(16) and WAC 246-247-110(18)