IM # 8,037

**Department of Energy**
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

MAR 03 2014

RECEIVED
MAR 11 2014
WA Dept of Health
Radioactive Air Emissions Section

14-ESQ-0058

Mr. J. Martell, Manager
Radioactive Air Emissions Section
State of Washington
Department of Health
309 Bradley Boulevard, Suite 201
Richland, Washington 99352

Mr. P. M. Gent
Nuclear Waste Program
State of Washington
Department of Ecology
3100 Port Benton Boulevard
Richland, Washington 99354

Addressees:

NOTICE OF CONSTRUCTION (NOC) APPLICATION FOR THE J-361 FUGITIVE EMISSIONS FROM THE 361 BUILDING, 300 AREA, HANFORD SITE, REVISION 2

Enclosed is the NOC Application, Revision 2, for the 361 Building, emission unit J-361 (Washington Department of Health emission unit identification number 1185), in the 300 Area of the Hanford Site in Richland, Washington (Attachment 1). The application is to add new radioisotopes to the existing permit and update the potential to emit. This application is submitted pursuant to Washington Administrative Code 246-247, "Radiation Protection- Air Emissions."

This letter also transmits the associated Hanford Site Air Operating Permit, Notification of Off Permit Change Form (Attachment 2). Attachment 2 is provided to the State of Washington, Department of Ecology (Ecology), consistent with Ecology's role as lead for the Hanford Site Air Operating Permit.

If you have any questions, please contact me, or your staff may contact Stacy L. Charboneau, Assistant Manager for Safety and Environment, on (509) 373-3841.

Sincerely,

Matt McCormick
Manager

ESQ:DEJ

Attachments

cc w/attachs: See page 2

EU 1185

MAR 03 2014

cc w/attachs:
R. H. Anderson, MSA
J. M. Barnett, PNNL
G. Bohnee, NPT
S. Harris, CTUIR
R. Jim, YN
R. A. Kaldor, MSA
T. M. McDermott, PNSO
K. M. McDonald, PNNL
D. Powaukee, NPT
J. W. Schmidt, WDOH
M. B. Skorska, Ecology
M. J. Stephenson, PNNL
R. J. Utley, WDOH
D. Zhen, EPA
Administrative Record (File: 361 Building)
Environmental Portal, LMSI, A3-95

# Pacific Northwest National Laboratory

# Radioactive Air Pollutants
# Notice of Construction Application

**for the**
**361 Building, Revision 2**
**300 Area, Hanford Site**
**Richland, Washington**

**February 2014**

**PACIFIC NORTHWEST NATIONAL LABORATORY**
**Radioactive Air Pollutants Notice of Construction**
**for the 361 Building, Revision 2, 300 Area, Hanford Site**

## Contents

The "Response to Item" subtitle under each of the following sections identifies the corresponding Appendix A Notice of Construction application information item listed under Washington Administrative Code 246-247-110.

**PACIFIC NORTHWEST NATIONAL LABORATORY**
**Radioactive Air Pollutants Notice of Construction**
**for the 361 Building, Revision 2, 300 Area, Hanford Site**

## 1. Introduction

This document serves as a modification Notice of Construction (NOC) application pursuant to the requirements of the Washington Administrative Code (WAC) 246-247, "Radiation Protection - Air Emissions" to request approval to add additional radioisotopes for activities performed in the 361 Building. The 361 Building fugitive emissions releases, conducted by Pacific Northwest National Laboratory (PNNL), will occur in the 300 Area of the Hanford Site. New radioisotopes are anticipated to be utilized at this emission unit in 2014 and will continue over several years.

## 2. Facility Location (Response to Item 1)

U.S. Department of Energy, Richland Operations Office
361 Building
300 Area, Hanford Site
Richland, Washington 99352

Latitude: 46.3636 degrees North
Longitude: 119.2821 degrees West

The 361 Building is located in the south west corner of the 300 Area within the Department of Energy's Hanford Site. The 361 Building is shown in Figure 1.

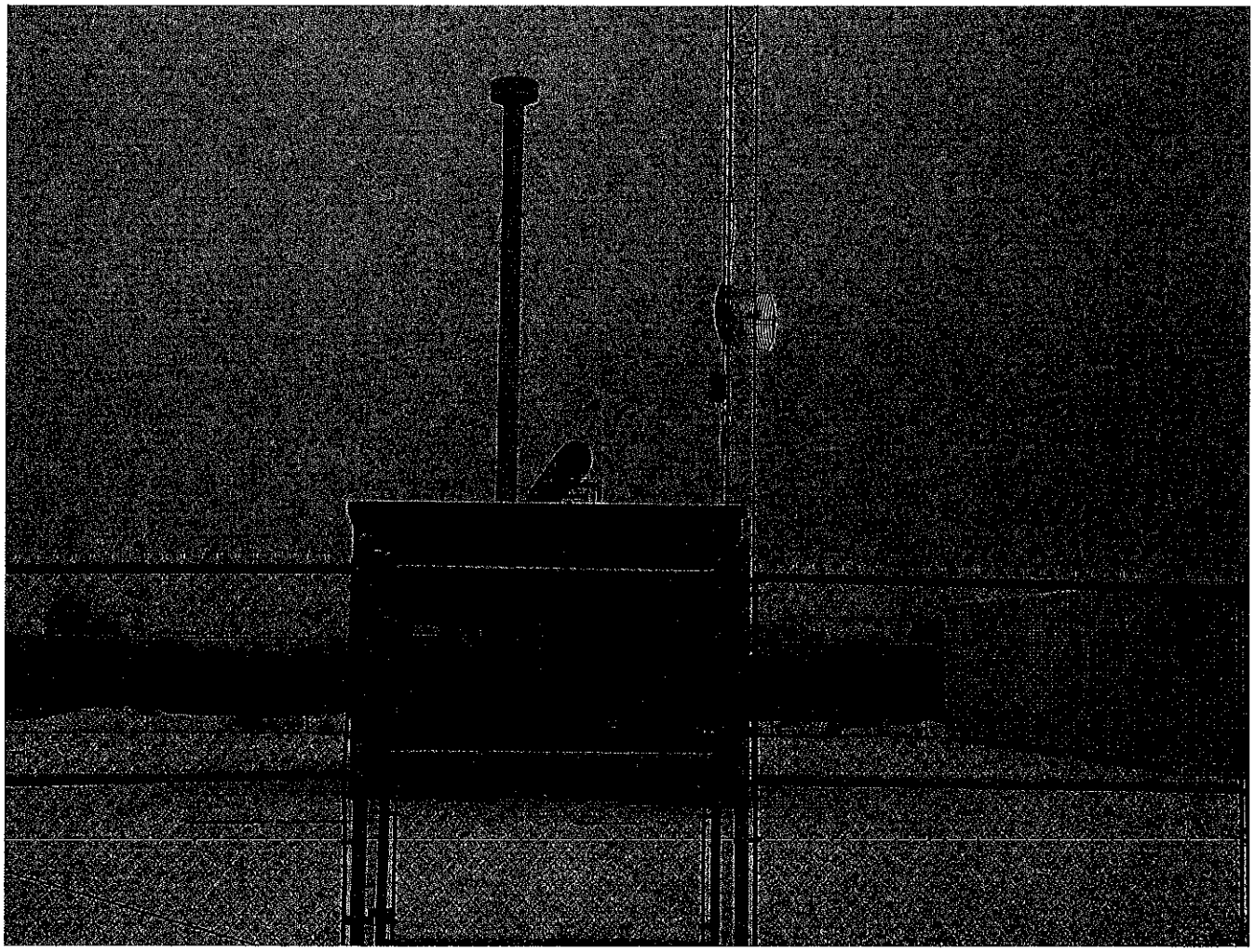

**Figure 1 – 361 Building, 300 Area, Hanford Site**

## 3. Responsible Manager (Response to Item 2)

Matthew S. McCormick, Manager
Richland Operations Office
U.S. Department of Energy
P.O. Box 550, MSIN A7-50
Richland, Washington 99352
(509) 376-7395

## 4. Type of Proposed Action (Response to Item 3)

This NOC application is being submitted as a modification for fugitive emission activities at an existing location. The proposed action is to perform equipment operability utilizing small quantities of radioactive material including radioxenon and radon gases to evaluate atmospheric gases. Releases will occur at the building. After being routed through a sample system and collected in a sample archive bottle, any remaining radioactive material will be considered a fugitive emission. This activity will remain a PNNL Potential Impact Category 4 emission unit (i.e., emissions < 0.001 mrem/yr) (PNNL 2012).

## 5. State Environmental Policy Act (Response to Item 4)

The proposed activity described in this application is categorically exempt (WAC 197-11-845) from the State Environmental Policy Act.

## 6. Process Description (Response to Items 5)

The 361 Building is a pre-cast concrete portable equipment shelter that is permanently located in the southwest corner of the 300 Area on the Hanford Site. Sampling equipment (i.e., Swedish Automatic Unit for Noble gas and Acquisition and analysis [SAUNA]) samples atmospheric gases, some of which may be radioactive. Periodically radioactive gases/materials will be used to confirm operability of the instrument. The SAUNA is a collection and analysis system. Gases/materials are consumed by the system, analyzed, transferred to an archive storage bottle, and then finally released by evacuating the archive bottle into the room air space. Other radioactive gases/materials may also be utilized by the project.

## 7. Annual Possession Quantity and Physical Form (Response to Items 10, 11, and 12)

Table 1 presents a summarized annual possession quantity for gross alpha and gross beta/gamma radionuclides. Worst-case radioisotopes of Am-241 (gross alpha) and Cs-137 (gross beta/gamma) have been utilized in preparing the annual possession quantity. Additionally, the physical forms have been set to gas, rather than particulate/liquid or solid, because the primary fugitive emissions from processes at the 361 Building will continue to be from radioactive gases. Table 2 presents the list of radioisotopes for approval that could be used at the 361 Building based on the PNNL composite inventory of radioactive materials. If a new radioisotope not listed in Table 2 is expected to be brought into the 361 Building, it will be compared against the existing annual possession quantity limits, verified that the

361 Building remains below the authorized potential-to-emit limit, and WDOH will be notified of the introduction of a new radioisotope. The resultant maximum offsite estimated dose from the proposed activity is 9.0 E-4 mrem/yr.

**8. Emission Control System** (Response to Item 6 and 7)

This is a proposed fugitive emission. There is currently no abatement technology in place for the 361 Building. No emission controls are proposed for this activity because of the low quantities of radioactive materials, the short half-lives, the holding time prior to release, and the use of several inert noble gases. Since no control devices are proposed, the control technology efficiency has been set to 1.0 (see Table 1).

**8.1 High Efficiency Particulate Air (HEPA) Filters**

N/A

**8.2 Emission Unit Specifics**

Height of Release Point: N/A (height of building is ~3 m)
Diameter of Release Point: N/A (Fugitive emissions)
Volume of Release: N/A
Exhaust Velocity: N/A
Average Temperature: N/A
Effective Stack Height: N/A

**9. Monitoring System** (Response to Item 9)

Because the total unabated potential-to-emit (PTE) for this project is < 0.1 mrem/yr total effective dose equivalent (TEDE) to the maximally exposed individual (MEI), the radionuclide emissions will be determined using 40 CFR 61 Appendix D calculations in lieu of monitoring.

**10. Potential Radionuclide Emissions** (Response to Items 8 and 13)

The total unabated and abated PTE for this activity as determined under WAC 246-247-030(21)(a) is 9.0 E-4 mrem/yr (Table 1).

There were no radioactive air emissions from the 361 Building during calendar year 2012 to report. Fugitive emissions from the Hanford Site were calculated to be 8.6 E-03 mrem for calendar year 2012, the most recent year with data available (DOE 2013).

**11. Potential Offsite Impact** (Response to Items 14 and 15)

For 2012, the offsite MEI is located approximately 1.8 km to the south of the 361 Building (DOE 2013). Dose conversion factors for the MEI were calculated using the EPA-approved dose-modeling program, CAP88-PC (EPA 2007). The CAP88-PC program-derived dose conversion factors from *Calculating*

*Potential-to-Emit Radiological Releases and Doses* were used in determining the potential offsite impact (DOE 2010).

The unabated PTE for the proposed activity as determined under WAC 246-247-030(21)(a) is 9.0 E-4 mrem/yr. The abated PTE for this activity is the same since no emission controls are considered for this fugitive emission point.

**12. Cost Factors** (Response to Item 16)

No control technologies are proposed therefore cost factors are not discussed here.

**13. Facility Lifetime** (Response to Item 17)

The estimated lifetime of this project is ten years.

**14. Technology Standards** (Response to Item 18)

**14.1 ASME/ANSI AG-1**

N/A

**14.2 ASME/ANSI N509**

N/A

**14.3 ASME/ANSI N510**

N/A

**14.4 ANSI/ASME NQA-1**

N/A – for Technology Standards

The quality assurance requirements for tracking radiological material are outlined in EM-QA-01, Effluent Management Quality Assurance Plan (PNNL 2013). This QA plan is compatible with EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans (EPA 2001).

**14.5 40 CFR 60, Appendix A**

N/A

**14.6 ANSI N13.1**

N/A

## 15. References


Pacific Northwest National Laboratory (PNNL). 2012. *Pacific Northwest National Laboratory Potential Impact Categories for Radiological Air Emission Monitoring*, PNNL-19904, Current Revision. Effluent Management, Richland, WA.

Pacific Northwest National Laboratory (PNNL). 2013. *Effluent Management Quality Assurance Plan*, EM-QA-01, Current Revision. Effluent Management, Richland, WA.

U.S. Department of Energy (DOE). 2010. *Calculating Potential-to-Emit Radiological Releases and Doses*, Rev. 1. DOE/RL-2006-29. Richland Operations Office. Richland, Washington.

U.S. Department of Energy (DOE). 2013. *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2012,* Rev. 0, DOE/RL-2013-12. Richland Operations Office, Richland, Washington.

U.S. Environmental Protection Agency (EPA). 1989. *Methods for Estimating Radionuclide Emissions*, 40 CFR 61, Appendix D. U.S. Government Printing Office, Washington, DC.

U.S. Environmental Protection Agency (EPA). 2001. *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5. Office of Environmental Information, Washington, DC.

U.S. Environmental Protection Agency (EPA). 2002. *National Emission Standards for Hazardous Air Pollutants for Radionuclides Other Than Radon from Department of Energy Facilities*, 40 CFR 61, Subpart H. U.S. Government Printing Office, Washington, D.C.

U.S. Environmental Protection Agency (EPA). 2007. *CAP88-PC Version 3.0 User Guide*. Office of Radiation and Indoor Air, Washington, DC.

Washington Administrative Code (WAC). 2003. *SEPA Rules*, WAC 197-11. Statute Law Committee, Washington State.

Washington Administrative Code (WAC). 2011. *Radiation Protection – Air Emissions*, WAC 246-247. Statute Law Committee, Washington State.

## Table 1 – Summarized Radionuclide Inventory, Form, and Potential Unabated and Abated Emissions

| Nuclide | Form[a] | Inventory (Ci y-1) | Release Fraction | Potential Unabated Emissions (Ci y-1) | Unit Dose Factor (mrem Ci-1) | Potential Unabated Dose (mrem y-1) | Control Technology Efficiency (1.0-Eff.) | Potential Abated Emissions (Ci y-1) | Potential Abated Dose (mrem y-1) |
|---|---|---|---|---|---|---|---|---|---|
| Alpha[b] | G | 9.2E-06 | 1.0E+00 | 9.2E-06 | 7.76E+01 | 7.1E-04 | 1.0E+00 | 9.2E-06 | 7.1E-04 |
| Beta/Gamma[c] | G | 8.0E-05 | 1.0E+00 | 8.0E-05 | 2.33E+00 | 1.9E-04 | 1.0E+00 | 8.0E-05 | 1.9E-04 |
| Totals | | **8.9E-05** | | **8.9E-05** | | **9.0E-04** | | **8.9E-05** | **9.0E-04** |

Footnotes:

a – The form is listed as "G" for gases; "L" for liquids, "P" for particulates, and "S" for solids are not used.

b – Am-241 used as worst-case gross alpha emitting representative.

c – Cs-137 used as worst-case gross beta/gamma emitting representative.

## Table 2 – Radionuclides Authorized for Use

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ac-225 | Au-199 | Ca-41 | Co-57 | Eu-156 | I-122 | Kr-83m | Nb-93m |
| Ac-227 | Ba-131 | Ca-45 | Co-58 | Eu-157 | I-123 | Kr-85 | Nb-94 |
| Ac-228 | Ba-133 | Ca-47 | Co-60 | F-18 | I-125 | Kr-85m | Nb-95 |
| Ag-108 | Ba-133m | Cd-107 | Co-60m | Fe-55 | I-126 | Kr-87 | Nb-95m |
| Ag-108m | Ba-137m | Cd-109 | Cr-49 | Fe-59 | I-128 | Kr-88 | Nb-97 |
| Ag-109m | Ba-139 | Cd-111m | Cr-51 | Fr-221 | I-129 | Kr-89 | Nb-97m |
| Ag-110 | Ba-140 | Cd-113 | Cr-55 | Fr-223 | I-130 | Kr-90 | Nb-98 |
| Ag-110m | Ba-141 | Cd-113m | Cs-131 | Ga-67 | I-130m | La-137 | Nb-100 |
| Ag-111 | Ba-142 | Cd-115 | Cs-132 | Ga-68 | I-131 | La-138 | Nb-101 |
| Al-26 | Ba-143 | Cd-115m | Cs-134 | Ga-70 | I-132 | La-140 | Nb-103 |
| Al-28 | Be-7 | Cd-117 | Cs-134m | Ga-72 | I-132m | La-141 | Nd-144 |
| Am-240 | Be-10 | Cd-117m | Cs-135 | Gd-148 | I-133 | La-142 | Nd-147 |
| Am-241 | Bi-207 | Ce-139 | Cs-136 | Gd-149 | I-133m | La-144 | Ni-56 |
| Am-242 | Bi-208 | Ce-141 | Cs-137 | Gd-151 | I-134 | Lu-177 | Ni-57 |
| Am-242m | Bi-210 | Ce-142 | Cs-138 | Gd-152 | I-134m | Lu-177m | Ni-59 |
| Am-243 | Bi-210m | Ce-143 | Cs-139 | Gd-153 | I-135 | Mg-27 | Ni-63 |
| Am-245 | Bi-211 | Ce-144 | Cs-140 | Ge-68 | In-106 | Mg-28 | Ni-65 |
| Am-246 | Bi-212 | Cf-249 | Cs-141 | Ge-71 | In-111 | Mn-52 | Np-235 |
| Ar-37 | Bi-213 | Cf-250 | Cu-64 | Ge-71m | In-113m | Mn-54 | Np-236 |
| Ar-39 | Bi-214 | Cf-251 | Cu-66 | Ge-75 | In-114 | Mn-56 | Np-237 |
| Ar-41 | Bk-247 | Cf-252 | Cu-67 | Ge-77 | In-114m | Mo-93 | Np-238 |
| Ar-42 | Bk-249 | Cl-36 | Dy-159 | Ge-77m | In-115 | Mo-99 | Np-239 |
| As-74 | Bk-250 | Cm-241 | Dy-165 | H-3 | In-115m | Mo-103 | Np-240 |
| As-76 | Br-82 | Cm-242 | Dy-169 | Hf-175 | In-116 | Mo-104 | Np-240m |
| As-77 | Br-82m | Cm-243 | Er-169 | Hf-178m | In-116m | Mo-105 | O-15 |
| At-217 | Br-83 | Cm-244 | Er-171 | Hf-179m | In-117 | N-13 | O-19 |
| Au-193 | Br-84 | Cm-245 | Es-254 | Hf-181 | In-117m | Na-22 | Os-191 |
| Au-194 | Br-84m | Cm-246 | Eu-150 | Hf-182 | Ir-192 | Na-24 | P-32 |
| Au-195 | Br-85 | Cm-247 | Eu-152 | Hg-203 | K-40 | Na-24m | P-33 |
| Au-196 | C-11 | Cm-248 | Eu-152m | Ho-163 | K-42 | Nb-91 | Pa-231 |
| Au-198 | C-14 | Cm-250 | Eu-154 | Ho-166 | Kr-81 | Nb-91m | Pa-233 |
| Au-198m | C-15 | Co-56 | Eu-155 | Ho-166m | Kr-81m | Nb-92 | Pa-234 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pa-234m | Pu-239 | Rn-224 | Sn-126 | Te-131 | U-240 | Zr-88 |
| Pb-209 | Pu-240 | Ru-97 | Sr-85 | Te-131m | V-48 | Zr-89 |
| Pb-210 | Pu-241 | Ru-103 | Sr-87m | Te-132 | V-49 | Zr-93 |
| Pb-211 | Pu-242 | Ru-105 | Sr-89 | Te-133 | W-181 | Zr-95 |
| Pb-212 | Pu-243 | Ru-106 | Sr-90 | Te-133m | W-185 | Zr-97 |
| Pb-214 | Pu-244 | S-35 | Sr-91 | Te-134 | W-187 | Zr-98 |
| Pd-103 | Pu-246 | Sb-122 | Sr-92 | Th-227 | W-188 | Zr-99 |
| Pd-107 | Ra-223 | Sb-124 | Ta-179 | Th-228 | Xe-122 | Zr-100 |
| Pd-109 | Ra-224 | Sb-125 | Ta-180 | Th-229 | Xe-123 | |
| Pm-143 | Ra-225 | Sb-126 | Ta-182 | Th-230 | Xe-125 | |
| Pm-144 | Ra-226 | Sb-126m | Ta-182m | Th-231 | Xe-127 | |
| Pm-145 | Ra-228 | Sb-127 | Ta-183 | Th-232 | Xe-127m | |
| Pm-146 | Rb-81 | Sb-129 | Tb-157 | Th-233 | Xe-129m | |
| Pm-147 | Rb-83 | Sc-44 | Tb-158 | Th-234 | Xe-131m | |
| Pm-148 | Rb-84 | Sc-46 | Tb-160 | Ti-44 | Xe-133 | |
| Pm-148m | Rb-86 | Sc-47 | Tb-161 | Ti-45 | Xe-133m | |
| Pm-149 | Rb-87 | Se-75 | Tc-95 | Ti-51 | Xe-135 | |
| Pm-151 | Rb-88 | Se-79 | Tc-95m | Tl-201 | Xe-135m | |
| Po-208 | Rb-89 | Se-79m | Tc-97 | Tl-204 | Xe-137 | |
| Po-209 | Rb-90 | Si-31 | Tc-97m | Tl-206 | Xe-138 | |
| Po-210 | Rb-90m | Si-32 | Tc-98 | Tl-207 | Xe-139 | |
| Po-211 | Re-186 | Sm-145 | Tc-99 | Tl-208 | Y-88 | |
| Po-212 | Re-187 | Sm-146 | Tc-99m | Tl-209 | Y-90 | |
| Po-213 | Re-188 | Sm-147 | Tc-101 | Tm-168 | Y-90m | |
| Po-214 | Rh-101 | Sm-148 | Tc-103 | Tm-170 | Y-91 | |
| Po-215 | Rh-102 | Sm-151 | Tc-106 | Tm-171 | Y-91m | |
| Po-216 | Rh-102m | Sm-153 | Te-121 | U-232 | Y-92 | |
| Po-218 | Rh-103m | Sm-157 | Te-121m | U-233 | Y-93 | |
| Pr-143 | Rh-104 | Sn-113 | Te-123 | U-234 | Yb-164 | |
| Pr-144 | Rh-105 | Sn-117m | Te-123m | U-235 | Yb-169 | |
| Pr-144m | Rh-105m | Sn-119m | Te-125m | U-235m | Yb-175 | |
| Pu-234 | Rh-106 | Sn-121 | Te-127 | U-236 | Yb-177 | |
| Pu-236 | Rn-219 | Sn-121m | Te-127m | U-237 | Zn-65 | |
| Pu-237 | Rn-220 | Sn-123 | Te-129 | U-238 | Zn-69 | |
| Pu-238 | Rn-222 | Sn-125 | Te-129m | U-239 | Zn-69m | |

# HANFORD SITE AIR OPERATING PERMIT

## NOTIFICATION OF OFF-PERMIT CHANGE
**Permit Number: 00-05-006 Renewal 2**
**for the 361 Building**
**Fugitive Emissions J-361 (EUID 1185)**

This notification is provided to Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as a notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1), WAC 173-401-724(2), and WAC 173-401-724(6):
1. Change is not specifically addressed or prohibited by the permit terms and conditions,
2. Change does not weaken the enforceability of the existing permit conditions,
3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA,
4. Change meets all applicable requirements and does not violate an existing permit term or condition,
5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.

Provide the following information pursuant to WAC-173-401-724(3):

| **Description of the change:** |
|---|
| The 361 Building radioactive air emissions permit is updated to include additional radionuclides for program research and updates the potential to emit. |
| **Date of Change:** (To be provided in the agency approval order.) |
| TBD |
| **Describe the emissions resulting from the change:** |
| There will be no change to the annual potential to emit as a result of this proposed change. |
| **Describe the new applicable requirements that will apply as a result of the change:** (To be provided in the agency approval order.) |
| TBD |

| For Hanford Use Only: | |
|---|---|
| AOP Change Control Number: | Date Submitted: |