



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

045590

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MAY 01 1997

Ms. Anita Frankel
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101



Dear Ms. Frankel:

SUBMITTAL OF THE APPLICATION FOR APPROVAL TO REMOVE WATER/SEDIMENT FROM THE 107-N, 1310-N AND 1314-N FACILITIES

Enclosed is the subject application for approval in accordance with 40 Code of Federal Regulations (CFR), Part 61. This letter and its enclosure serve as the application for approval of the project.

The application consists of the presentation prepared for the State of Washington Department of Health (DOH) on the same subject. The proposed action was approved by DOH on March 17, 1997.

The purpose of the project described in the enclosure is to remove the water/sediment from the 107-N, 1310-N and 1314-N facilities. Potentially, radioactive air emissions will be generated during activities. With approval from the U.S. Environmental Protection Agency, this letter will also serve as the notification of anticipated startup and notification of actual startup in accordance with 40 CFR 61.09.

Should you have any questions or comments, please contact Mr. G. Richardson of my staff at (509)376-9629 or Mr. H. M. Rodriguez at (509)376-6421.

Sincerely,

Paul M. Pak, Senior Project Manager
N Area Project

NAP:GR

Enclosure

cc w/o encl:
M. E. Greenidge, BHI

**Documentation of Approval
for the Water/Sediment Removal from the
107-N, 1310-N and 1314-N Facilities**

INTRODUCTION

The following description and any attachments and references are provided to the Washington State Department of Health, Division of Radiation Protection, Air Emissions & Defense Section as a notice of Construction (NOC) in accordance with the Washington Administrative Code (WAC) 246-247, Radiation Protection - Air Emissions. The WAC 246-247-060, "Applications, registration and Licensing", states "This section describes the information requirements for approval to construct, modify, and operate an emission unit. Any NOC requires the submittal of the information listed in Appendix A." Appendix A (WAC 246-247-110), lists the requirements that must be addressed.

REQUIREMENTS

1. **Location:** The 107-N, 1310-N, and 1314-N facilities located at the 100-N Area (see attached figures). Washington State Plane Coordinates N149575, E571109 are for the emission point located at the 107-N Facility.
2. **Responsible Manager:** Mr. Glenn Richardson, DOE/RL Project Manager.
3. **Proposed Action:** Insignificant modification of an existing emission unit that creates a temporary new potential pathway to the air.
4. **SEPA:** SEPA not applicable.
5. **Chemical and Physical Processes:** The proposed activities to be conducted are to remove contaminated water/sediment from the 107-N and 1310-N facilities and contaminated water from the 1314-N facility.

107-N Facility

The 107-N facility cooled, filtered, and demineralized the 105-N Basin water. The basin water was supplied to a 107-N building pump well where it was pumped through the cooling, filtering, and demineralizing process and then returned to the N Basin. The primary source of water and sediment in the 107-N facility came from the 105-N Basin water, dissolved and suspended solids, and sediment. There are six areas in the 107-N facility where accumulated water and sediment will be removed from: 1) the pump well, where the 105-N basin water entered the 107-N facility; 2) the T-4 Regeneration Waste Tank, where the regeneration chemicals and dissolved solids were flushed during the demineralization ions exchange process; 3) the sump, located in the basement of the 107-N facility, where equipment leakage and other floor drains in the building collected; 4) the two sand filter vessels where basin water was filtered; 5) the three ion exchanger

vessels where basin water was demineralized; and 6) the T-1 backwash settling tank where sediment collected on the sand filters was backwashed.

The process to remove the water/sediment from the accumulation areas is to pump most of the water, via an enclosed system, to tanker trucks for disposal at the Effluent Treatment Facility (ETF). The remaining water will be slurried with the sediment and pumped into disposal containers. Adsorbent will be added to any remaining sediment and then will be removed by shoveling and placed into disposal containers.

1310-N Pumphouse Valve Pit

The 1310-N pumphouse valve pit processed decontamination chemicals to and from the Waste Storage Tank ("golf ball"). Additionally, the 105-N and 109-N building floor drains; and radioactive chemicals and water from the Waste Storage Tank drained into the valve pit. Therefore, equipment leakage/drainage during maintenance were the primary sources of the water/sediment accumulation in the valve pit.

The water/sediment will be slurried into small containers, the containers transferred to a staging area located outside the pumphouse, then either packaged for disposal or if necessary, transferred into larger disposal containers. The smaller containers are used inside of the pumphouse because of space limitations. Any remaining sediment would be removed by shoveling and placed into the small disposal containers.

1314-N Tank

The 1314-N Waste Pump Tank is a 3,800 liter (1,000 gallon) capacity tank which collected water overflows from shipping containers in the railroad car loadout area; from spills into the sump below the railroad car loading area; and from the 1310-N pumphouse valve pit and 107-N facility. The primary source in this tank is the radioactively contaminated water which were contained in the effluents from the 1310-N pumphouse valve pit and 107-N facility.

The 1314-N tank contains only water. The removal process will be to pump out the water via an enclosed system, into disposal containers and solidified for disposal, or pumped into tankers for transfer to ETF.

- 6. Proposed Controls:** The 107-N facility ventilation system exhausts air through two stages of HEPA filtration prior to discharge through the 107-N Stack. The stack is located on the roof of the facility in the NE corner and is 8 m (27 ft) above ground. Therefore, any potential emissions from activities conducted in the 107-N facility are controlled by the facility's HEPA filtration system.

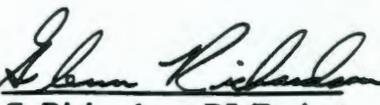
The proposed controls for the 1310-N and 1314-N activities (removal of water/sediment) will be to keep the sediment thoroughly saturated during pumping/slurring activities. The pumping of the water is via an enclosed system.

7. **Drawings of Controls:** Not applicable.
8. **Radionuclides of Concern:** See Attachment.
9. **Monitoring:** The monitoring of the activities in 107-N facility will consist of operating the 107-N Stack record sampler continuously during the duration of the water/sediment removal activities.
- The monitoring of the water/sediment removal activities from 1310-N and 1314-N facilities will consist of using the existing near-field monitors that are established around the 100-N Area and radiological portable air samplers for "close-in" monitoring during these activities.
10. **Annual Possession Quantity:** The estimated maximum source term associated with these activities is shown in the Attachment.
11. **Physical Form:** Particulate solids, and liquid.
12. **Release Form:** Particulates and gas (tritium).
13. **Release Rate:** See Attachment.
14. **Location of the MEI:** The MEI is 14.7 km east of the 100-N Area.
15. **TEDE to the MEI:** The total unabated offsite dose was calculated to be ~~xxx~~ ^{293E-02} mrem/yr. *AWC*
Assumptions and calculations are shown in the attachment.
16. **Cost Factor:** HEPA filters are accepted as BARCT. Removing sediment via a wet process (ie pump/slurry) has been accepted as BARCT for such activities where a HEPA filtered containment structure is not feasible or economical.
17. **Duration of Lifetime:** The removal activities for all three facilities is proposed to begin late April 1997 and last for approximately 3 months.
18. **Standards:** Not applicable for an insignificant modification.
19. **Clarifications (for regulator use):**

Approval:


A. W. Conklin, DOH

3/17/97
Date


G. Richardson, RL/Project

3/17/97
Date

**Attachment to the Documentation of Approval
Water/Sediment Removal from the
107-N, 1310-N, and 1314-N Facilities**

Assumptions

- The source term for the 107-N facility was derived from the 105-N Basin Radionuclide Inventory presented in the *Radioactive Air Emissions Notice of Construction for the 105-N Basin Stabilization*, DOE/RL-94-14, Rev. 0, Table 2-2. The annual possession quantity for the six areas in the 107-N facility was determined by multiplying the radionuclide concentration by the volume of material to be removed.
- The source term for the 1310-N and the 1314-N facilities was from the *Preliminary Hazard Classification for Buildings 1310-N and 1314-N*.
- The approximate total quantity of water/sediment in the facilities which will be removed are:
 - 107-N Facility
 - Pump Well -- 10,000 gallons of water, 28 ft³ of sediment
 - Building Sump -- 2,250 gallons of water, 5 ft³ of sediment
 - T-4 Tank -- 20,000 gallons of water, no sediment
 - Sand Filters (2) -- 4800 gallons of water (total), no sediment
 - Ion Exchangers (3) -- 2700 gallons of water (total), no sediment
 - T-1 Tank -- 650 gallons of water, no sediment
 - 1310-N Facility
 - 275 gallons of water, 36 ft³ of sediment
 - 1314-N Facility
 - 800 gallons of water
- The release fraction of 1.00E-03 (except for Tritium where 1.00E+00 is used) is allowed according to WAC 246-247-030 (20)(c).
- The Clean Air Assessment Package (CAP-88) Unit Dose Factor for the Selected Individual was taken from the *Radioactive Air Emissions Notice of Construction for the 105-N Basin Stabilization*, DOE/RL-94-14, Rev. 0, CAP-88 evaluation.

Determination of Release Rate and Offsite Dose

The following equation was used to determine the Annual Release Rate and Offsite Dose for each identified radionuclide:

$$(\text{Annual Possession Quantity in Ci}) (\text{Release Fraction}) = \text{Annual Release Rate in Ci/yr}$$

$$(\text{Annual Release Rate in Ci/yr}) (\text{Unit Dose Factor in mrem/Ci}) = \text{Offsite dose in mrem/yr}$$

Example for Am²⁴¹ in the 1310-N Water:

$$(1.63\text{E-}07 \text{ Ci}) (1.00\text{E-}03) = 1.63\text{E-}10 \text{ Ci/yr}$$

$$(1.63\text{-}10\text{E Ci/yr})(4.25\text{E+}00 \text{ mrem/Ci}) = 6.93\text{E-}10 \text{ mrem/yr}$$

Estimated Unabated Offsite Dose = Sum of radionuclide mrem/yr

**Grand Total of the Potential Annual Unabated Emissions
(mrem/yr)**

1310-N	Water		2.52 E-06
	Sediment		9.60 E-05
1214-N	Water		2.52 E-06
107-N	Water	Pumpwell	2.77 E-04
		Sump	3.62 E-06
		T-4	1.65 E-05
		Sand Filters	7.62 E-06
		Ion Exchangers	4.28 E-06
		T-1	1.03 E-06
	Sediment	Pumpwell	2.47 E-02
		Sump	4.17 E-03
			2.93 E-02

ANNUAL RELEASE RATE AND ANNUAL OFFSITE UNABATED DOSE					
1310-N - Water					
Radionuclide	Annual Possession Quantity (Ci)	Release Fraction	Annual Release Rate (Ci/yr)	CAP-88 Unit Dose Factor for Selected Individual mrem/Ci	Annual Unabated Offsite Dose mrem/yr
Am-241	5.39E-07	1.00E-03	5.39E-10	4.25E+00	2.29E-09
Co-60	4.54E-06	1.00E-03	4.54E-09	5.71E-02	2.59E-10
Cs-134	1.36E-05	1.00E-03	1.36E-08	3.14E-02	4.27E-10
Cs-137	8.58E-03	1.00E-03	8.58E-06	1.37E-02	1.18E-07
H-3	2.34E-01	1.00E+00	2.34E-01	6.98E-06	1.63E-06
K-40	1.22E-05	1.00E-03	1.22E-08	4.53E-02	5.53E-10
Mn-54	1.44E-06	1.00E-03	1.44E-09	3.65E-03	5.26E-12
Pu-238	2.17E-07	1.00E-03	2.17E-10	2.58E+00	5.60E-10
Pu-239/240	1.48E-06	1.00E-03	1.48E-09	2.78E+00	4.11E-09
Pu-241	3.14E-05	1.00E-03	3.14E-08	4.39E-02	1.38E-09
Sb-125	2.09E-05	1.00E-03	2.09E-08	5.78E-03	1.21E-10
Sr-90	1.97E-02	1.00E-03	1.97E-05	3.85E-02	7.58E-07
TOTAL					2.52E-06

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ANNUAL RELEASE RATE AND ANNUAL OFFSITE UNABATED DOSE

1314-N - Water

Radionuclide	Annual Possession Quantity (Ci)	Release Fraction	Annual Release Rate (Ci/yr)	CAP-88 Unit Dose Factor for Selected Individual mrem/Ci	Annual Unabated Offsite Dose mrem/yr
Am-241	5.39E-07	1.00E-03	5.39E-10	4.25E+00	2.29E-09
Co-60	4.54E-06	1.00E-03	4.54E-09	5.71E-02	2.59E-10
Cs-134	1.36E-05	1.00E-03	1.36E-08	3.14E-02	4.27E-10
Cs-137	8.58E-03	1.00E-03	8.58E-06	1.37E-02	1.18E-07
H-3	2.34E-01	1.00E+00	2.34E-01	6.98E-06	1.63E-06
K-40	1.22E-05	1.00E-03	1.22E-08	4.53E-02	5.53E-10
Mn-54	1.44E-06	1.00E-03	1.44E-09	3.65E-03	5.26E-12
Pu-238	2.17E-07	1.00E-03	2.17E-10	2.58E+00	5.60E-10
Pu-239/240	1.48E-06	1.00E-03	1.48E-09	2.78E+00	4.11E-09
Pu-241	3.14E-05	1.00E-03	3.14E-08	4.39E-02	1.38E-09
Sb-125	2.09E-05	1.00E-03	2.09E-08	5.78E-03	1.21E-10
Sr-90	1.97E-02	1.00E-03	1.97E-05	3.85E-02	7.58E-07
TOTAL					2.52E-06

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ANNUAL RELEASE RATE AND ANNUAL OFFSITE UNABATED DOSE

1310-N - Sediment

Radionuclide	Annual Possession Quantity (Ci)	Release Fraction	Annual Release Rate (Ci/yr)	CAP-88 Unit Dose Factor for Selected Individual mrem/Ci	Annual Unabated Offsite Dose mrem/yr
Am-241	8.60E-06	1.00E-03	8.60E-09	4.25E+00	3.66E-08
Ce-144	4.12E-03	1.00E-03	4.12E-06	4.27E-03	1.76E-08
Co-60	1.34E+00	1.00E-03	1.34E-03	5.71E-02	7.65E-05
Cs-134	8.90E-04	1.00E-03	8.90E-07	3.14E-02	2.79E-08
Cs-137	1.37E-01	1.00E-03	1.37E-04	1.37E-02	1.88E-06
H-3	0.00E+00	1.00E+00	0.00E+00	6.98E-06	0.00E+00
K-40	0.00E+00	1.00E-03	0.00E+00	4.53E-02	0.00E+00
Mn-54	3.59E-03	1.00E-03	3.59E-06	3.65E-03	1.31E-08
Pu-238	3.47E-06	1.00E-03	3.47E-09	2.58E+00	8.95E-09
Pu-239/240	2.37E-05	1.00E-03	2.37E-08	2.78E+00	6.59E-08
Pu-241	5.01E-04	1.00E-03	5.01E-07	4.39E-02	2.20E-08
Ru-106	6.05E-03	1.00E-03	6.05E-06	5.57E-03	3.37E-08
Sb-125	1.60E-01	1.00E-03	1.60E-04	5.78E-03	9.25E-07
Sr-90	3.14E-01	1.00E-03	3.14E-04	3.85E-02	1.21E-05
U-234	2.23E-03	1.00E-03	2.23E-06	1.04E+00	2.32E-06
U-235	4.05E-04	1.00E-03	4.05E-07	9.93E-01	4.02E-07
U-238	1.81E-03	1.00E-03	1.81E-06	9.27E-01	1.68E-06
TOTAL					9.60E-05

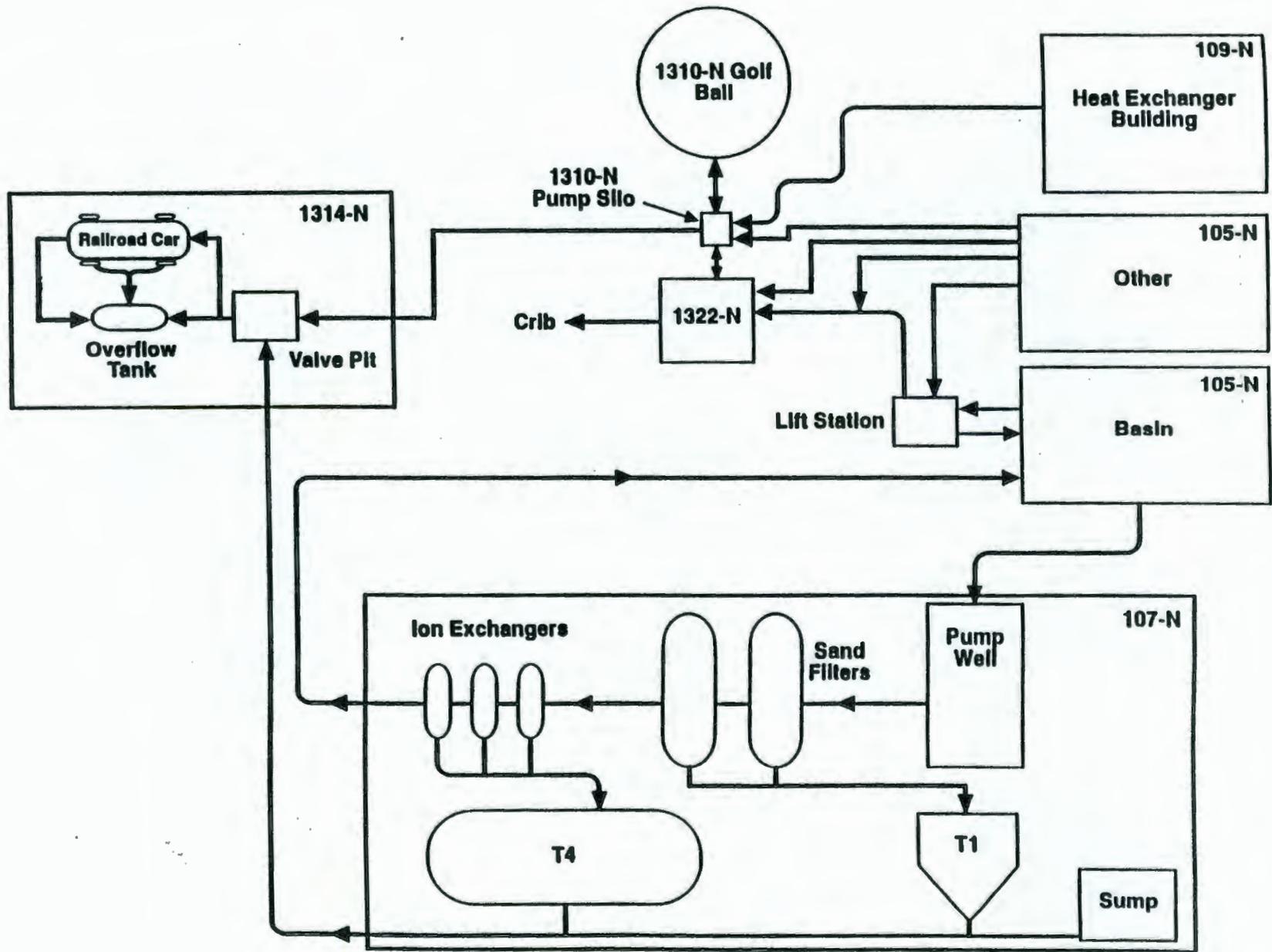
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**ANNUAL RELEASE RATE AND ANNUAL OFFSITE UNABATED DOSE
FOR THE REMOVAL OF WATER FROM 107-N FACILITY**

Radionuclide	uCi/L	Annual Possession Quantity (Ci)						Release Fraction	Annual Release Rate Ci/yr						CAP-88 Unit Dose Factor for Selected Individual mrem/yr	Annual Unabated Offsite Dose mrem/yr					
		Pump Well	Sump	T-4	Snd Filter	T-1	I.X.		Pump Well	Sump	T-4	Snd Filter	T-1	I.X.		Pump Well	Sump	T-4	Snd Filter	T-1	I.X.
		Am-241	8.99E-05	3.41E-06	7.75E-07	6.80E-08	1.63E-06		2.21E-07	9.19E-07	1.00E-03	3.41E-09	7.75E-10	6.80E-09		1.63E-09	2.21E-10	9.19E-10	4.25E+00	1.45E-08	3.29E-09
Co-60	7.57E-04	5.02E-05	6.53E-06	5.73E-06	1.37E-05	1.86E-06	7.74E-06	1.00E-03	5.02E-08	6.53E-09	5.73E-09	1.37E-08	1.86E-09	7.74E-09	5.71E-02	2.87E-09	3.73E-10	3.27E-10	7.82E-10	1.06E-10	4.42E-10
Cs-134	2.26E-03	1.50E-03	1.95E-05	1.71E-04	4.10E-05	5.56E-06	2.31E-05	1.00E-03	1.50E-06	1.95E-08	1.71E-07	4.10E-08	5.56E-09	2.31E-08	3.14E-02	4.71E-08	6.12E-10	5.37E-09	1.29E-09	1.75E-10	7.25E-10
Cs-137	1.43E+00	9.48E-01	1.23E-02	1.08E-01	2.56E-02	3.52E-03	1.46E-02	1.00E-03	9.48E-04	1.23E-05	1.08E-04	2.56E-05	3.52E-06	1.46E-05	1.37E-02	1.30E-05	1.69E-07	1.48E-06	3.51E-07	4.82E-08	2.00E-08
H-3	3.90E+01	2.58E+01	3.36E-01	7.57E-01	7.08E-01	9.59E-02	3.98E-01	1.00E+00	2.58E+01	3.36E-01	7.57E-01	7.08E-01	9.59E-02	3.98E-01	6.98E-06	1.80E-04	2.35E-06	5.28E-06	4.94E-06	6.69E-07	2.78E-07
K-40	2.04E-03	1.35E-03	1.76E-05	6.02E-04	3.71E-05	5.02E-06	2.08E-05	1.00E-03	1.35E-06	1.76E-08	6.02E-07	3.71E-08	5.02E-09	2.08E-08	4.53E-02	6.12E-08	7.97E-10	2.73E-08	1.88E-09	2.27E-10	9.42E-10
Mn-54	2.40E-04	1.59E-04	2.07E-06	1.80E-05	4.38E-06	5.90E-07	2.45E-06	1.00E-03	1.59E-07	2.07E-09	1.80E-08	4.36E-09	5.90E-10	2.45E-09	3.65E-03	5.80E-10	7.56E-12	6.57E-11	1.59E-11	2.15E-12	6.94E-12
Pu-238	3.62E-05	2.40E-05	3.12E-07	2.74E-06	6.58E-07	8.90E-08	3.70E-07	1.00E-03	2.40E-08	3.12E-10	2.74E-09	6.58E-10	8.90E-11	3.70E-10	2.58E+00	6.19E-08	8.05E-10	7.07E-09	1.70E-09	2.30E-10	9.55E-10
Pu-239/240	2.47E-04	1.64E-04	2.13E-06	1.87E-05	4.49E-06	6.08E-07	2.52E-06	1.00E-03	1.64E-07	2.13E-09	1.87E-08	4.49E-09	6.08E-10	2.52E-09	2.78E+00	4.56E-07	5.92E-09	5.20E-08	1.25E-08	1.69E-09	7.01E-09
Pu-241	5.24E-03	3.47E-03	4.52E-05	3.97E-04	9.52E-05	1.29E-05	5.35E-05	1.00E-03	3.47E-06	4.52E-08	3.97E-07	9.52E-08	1.29E-08	5.35E-08	4.39E-02	1.52E-07	1.98E-09	1.74E-08	4.18E-09	5.66E-10	2.35E-09
Sb-125	3.48E+03	2.31E-03	3.00E-05	2.63E-04	6.32E-05	8.56E-06	3.56E-05	1.00E-03	2.31E-06	3.00E-08	2.63E-07	6.32E-08	8.56E-09	3.56E-08	5.78E-03	1.34E-08	1.73E-10	1.52E-09	3.65E-10	4.95E-11	2.06E-10
Sr-90	3.28E+00	2.17E+00	2.83E-02	2.48E-01	5.96E-02	6.07E-03	3.35E-02	1.00E-03	2.17E-03	2.83E-05	2.48E-04	5.96E-05	6.07E-06	3.35E-05	3.85E-02	8.35E-05	1.09E-06	9.55E-06	2.29E-06	3.11E-07	1.29E-07
TOTAL																2.77E-04	3.62E-06	1.65E-05	7.62E-06	1.03E-06	4.28E-06

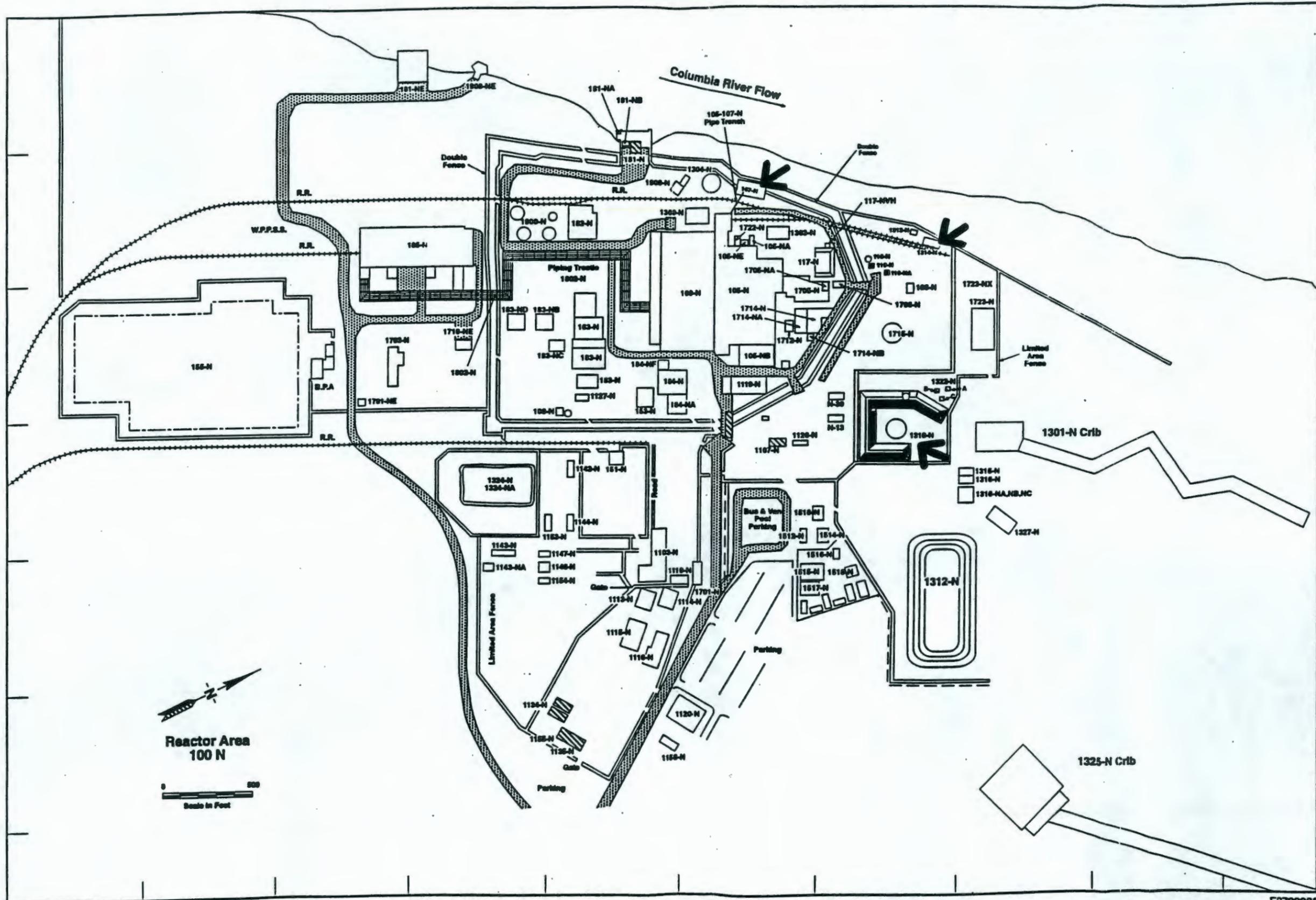
**ANNUAL RELEASE RATE AND ANNUAL OFFSITE UNABATED DOSE
FOR THE REMOVAL OF SEDIMENT FROM 107-N FACILITY**

Radionuclide	uCi/g	Annual Possession Quantity (Ci)		Release Fraction	Annual Release Rate Ci/yr		CAP-88 Unit Dose Factor for Selected Individual mrem/yr	Annual Unabated Offsite Dose mrem/yr		
		Pump Well	Sump		Pump Well	Sump		Pump Well	Sump	
		Am-241	2.34E-01		1.57E-01	2.49E-03		1.00E-03	1.57E-04	2.49E-06
Ce-144	1.79E-02	1.18E-02	1.91E-03	1.00E-03	1.18E-05	1.91E-06	4.27E-03	5.04E-08	8.16E-09	
Co-60	5.82E+00	3.86E+00	6.20E-01	1.00E-03	3.86E-03	6.20E-04	5.71E-02	2.20E-04	3.54E-05	
Cs-134	3.87E-03	2.57E-03	4.12E-02	1.00E-03	2.57E-06	4.12E-05	3.14E-02	8.07E-08	1.29E-06	
Cs-137	5.95E-01	3.94E-01	6.34E-02	1.00E-03	3.94E-04	6.34E-05	1.37E-02	5.40E-06	8.69E-07	
Mn-54	1.56E-02	1.03E-02	1.66E-03	1.00E-03	1.03E-05	1.66E-06	3.65E-03	3.76E-08	6.07E-09	
Pu-238	5.32E-01	3.53E-01	5.67E-02	1.00E-03	3.53E-04	5.67E-05	2.58E+00	9.11E-04	1.46E-04	
Pu-239/240	3.25E+00	2.15E+00	3.46E-01	1.00E-03	2.15E-03	3.46E-04	2.78E+00	5.98E-03	9.62E-04	
Pu-241	6.90E+01	4.57E+00	7.35E+00	1.00E-03	4.57E-03	7.35E-03	4.39E-02	2.01E-04	3.23E-04	
Ru-106	2.63E-02	1.74E-02	2.80E-03	1.00E-03	1.74E-05	2.80E-06	5.57E-03	9.69E-08	1.56E-08	
Sb-125	6.96E-01	4.61E-01	7.42E-02	1.00E-03	4.61E-04	7.42E-05	5.78E-03	2.66E-06	4.29E-07	
Sr-90	6.56E+02	4.35E+02	6.99E+01	1.00E-03	4.35E-01	6.99E-02	3.85E-02	1.67E-02	2.69E-03	
U-234	9.69E+03	6.43E-03	1.03E-03	1.00E-03	6.43E-06	1.03E-06	1.04E+00	6.69E-06	1.07E-06	
U-235	1.76E-03	1.16E-03	1.87E-04	1.00E-03	1.16E-06	1.87E-07	9.93E-01	1.15E-06	1.86E-07	
U-238	7.88E-03	5.22E-03	8.40E-04	1.00E-03	5.22E-06	8.40E-07	9.27E-01	4.84E-06	7.79E-07	
								TOTAL	2.47E-02	4.17E-03



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Simplified Flow Path.



Overview of the 100-N Area