

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
CH-22	Section 7.4 Sensitivity Analysis	Details of Sensitivity Analysis Not Included	10CFR20.2002(d)	Doses of 2.9 mrem for Acute Well-Driller, 3.0 mrem for Chronic Well-Driller, and 16 mrem for the Construction Intruder are provided but the details are not provided in an Attachment. Details are necessary because it is unclear what the concentration and dilution assumptions are for these scenarios.	Please provide the detailed calculations for these doses as were provided for the other scenarios.
<b>Response Summary:</b> Detailed calculations for each of the three scenarios are attached.					
<b>Response Detail:</b> In all cases the bounding concentration was based on 100 percent of the activity being from 3000 pCi/g of total uranium, with the isotopic composition based on existing sample data.					

## Chronic Exposure for Intruder Well Drilling Scenario Summary

### Basis

NUREG-0782/945 Scenario, PDCF values as modified by NUREG 4370, volume 1 (using ICRP 30)

### Description

An inadvertent intruder occupies the site upon which a well had been drilled through waste materials.

### Dose Model

$$H = \sum_n (f_o f_d f_w f_s)_{\text{air}} \bullet C_w \bullet \text{PDCF}_2 + \sum_n (f_o f_d f_w f_s)_{\text{DG}} \bullet C_w \bullet \text{PDCF}_5$$

### Explanation of calculation and terms:

PDCF <sub>2</sub>	Radionuclide Specific Pathway Dose Conversion Factor - Intruder Construction Scenario - Air Source - NUREG-4370, volume 1
PDCF <sub>5</sub>	Radionuclide Specific Pathway Dose Conversion Factor - Intruder Construction Scenario - Direct Gamma Source - NUREG-4370, volume 1
C <sub>w</sub>	Maximum Concentration in Cuttings from Intruder Drilling Scenario
f <sub>o</sub>	Activity fraction remaining after decay Value of 1 used, (no adjustment for radionuclide decay due to long half life of radionuclides)
f <sub>d</sub>	Dilution factor due to particular disposal practices Value of 1 used (no dilution)
f <sub>w</sub>	Waste form and Package Factor - No credit is taken for waste form or solidification
f <sub>s</sub>	<p><u>Site Selection Factor (air)</u></p> <p> <math>f_s = T_{sa} \times \text{Exposure Factor}</math>  <math>T_{sa} = 4.4 \times 10^{-11}</math>                      (based on a weighted average of the following, based on NUREG - 0782)                      gardening : 100 hr at <math>0.454 \text{ mg/m}^3</math>                      ( value of <math>0.454 \text{ mg/m}^3</math> is based on the <math>T_{sa}</math> value used in the Intruder Construction Scenario (<math>2.84 \times 10^{-10}</math>)                      outdoors : 1700 hr at <math>0.100 \text{ mg/m}^3</math>                      indoors : 4380 hr at <math>0.050 \text{ mg/m}^3</math>                      Exposure Factor = 0.71  <math>f_s = (4.4 \times 10^{-11}) \bullet (0.71) = 3.1 \times 10^{-11}</math> </p> <p><u>Site Selection Factor (direct gamma)</u></p> <p> <math>f_s = \text{Exposure Factor}</math>                      (based on a product of site occupancy and external gamma shielding factor                      outdoors : 1800 hr                      indoors : 4380 hr                      external gamma shielding factor = 0.7 (based on Resrad input)  <math>\text{Exposure Factor} = \left( \frac{(1800+4380)}{8760} \right) \bullet \left( \frac{(1800 \bullet 1) + (4380 \bullet 0.7)}{(1800+4380)} \right) = 0.56</math> </p>

### Maximum concentration in cuttings from intruder drilling scenario (Soil Disposed at WAC with 100% U, undiluted into 1 ft layer)

Radionuclide	Concentration (pCi/g)
Tc-99	0.0E+00
U-234	3.5E+01
U-235	1.5E+00
U-238	6.5E+00

### Results Summary

Dose (mrem) = 3.0

**Chronic Exposure for Intruder Well Drilling Scenario**  
**Shipped at WAC Concentration (100% U), Undiluted, 1 ft layer**  
**Detailed Calculations**

**Air Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C <sub>w</sub> (Ci/m <sup>3</sup> )	PCDF-2	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
<b>Tc-99</b>	0.0E+00	0.0E+00	5.80E+10	1	1	1	3.1E-11	0.0E+00
<b>U-234</b>	3.5E+01	5.3E-05	8.88E+14	1	1	1	3.1E-11	1.4E+00
<b>U-235</b>	1.5E+00	2.3E-06	7.98E+14	1	1	1	3.1E-11	5.6E-02
<b>U-238</b>	6.5E+00	9.8E-06	7.89E+14	1	1	1	3.1E-11	2.4E-01
								<b>1.7E+00</b>

**Direct Gamma Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C <sub>w</sub> (Ci/m <sup>3</sup> )	PCDF-5	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
<b>Tc-99</b>	0.0E+00	0.0E+00	1.3E-02	1	1	1	5.6E-01	0.0E+00
<b>U-234</b>	3.5E+01	5.3E-05	2.8E+02	1	1	1	5.6E-01	8.1E-03
<b>U-235</b>	1.5E+00	2.3E-06	7.0E+05	1	1	1	5.6E-01	8.8E-01
<b>U-238</b>	6.5E+00	9.8E-06	6.3E+04	1	1	1	5.6E-01	3.4E-01
								<b>1.2E+00</b>

**Total - All Pathways**

**3.0E+00**

# **Intruder Construction Dose Calculation per NUREG-0782 / 954 Summary**

## **Basis**

NUREG-0782/945 Scenario, PDCF values as modified by NUREG 4370, volume 1 (using ICRP 30)

## **Description**

An inadvertent intruder may excavate or construct a building on a disposal site following a breakdown in institutional controls. Under these circumstances, dust will be generated from the application of mechanical forces to the surface materials (soil, rock) through tools and implements (wheels, blades) that pulverize and abrade these materials. The dust particles generated may be then entrained by localized turbulent air currents and can thus become available for inhalation by the intruder. The intruder may also be exposed to direct gamma radiation resulting from airborne particulates and by working directly in the waste-soil:mixture.

Disposal of soil at weighted median and USEI WAC and disposal of building debris at estimated average and USEI WAC were evaluated using this scenario.

## **Dose Model**

$$H = \sum_n (f_0 f_d f_w f_s)_{\text{air}} \bullet C_w \bullet \text{PDCF}_2 + \sum_n (f_0 f_d f_w f_s)_{\text{DG}} \bullet C_w \bullet \text{PDCF}_5$$

## **Explanation of calculation and terms:**

PDCF <sub>2</sub>	Radionuclide Specific Pathway Dose Conversion Factor - Intruder Construction Scenario - Air Source - NUREG-4370, volume 1
PDCF <sub>5</sub>	Radionuclide Specific Pathway Dose Conversion Factor - Intruder Construction Scenario - Direct Gamma Source - NUREG-4370, volume 1
C <sub>w</sub>	Radionuclide Concentration in Waste Four Scenarios considered: 1 - Disposal of Waste Material at Site-wide Average Concentration 2 - Disposal of Waste Material at US Ecology WAC
f <sub>0</sub>	Activity fraction remaining after decay value of 1 used, (no adjustment for radionuclide decay due to long half life of radionuclides)
f <sub>d</sub>	Dilution factor due to particular disposal practices Two Scenarios are Considered: 1 - Undiluted Material placed into cell in 1 foot layer  fd = (0.31)  The 0.31 factor (12/39) included to account for US Ecology practice of layering materials into pits in 12 inch layers and scenario basis of 1 meter of waste at the time of intrusion.  2 - Materials diluted based on average dilution of HDP material with corresponding total amount of waste placed into the disposal cell during the period of receipt (725,000 ton).  fd = (0.053)
f <sub>w</sub>	Waste form and Package Factor - No credit is taken for waste form or solidification
f <sub>s</sub>	Site Selection Factor (air) f <sub>s</sub> = T <sub>sa</sub> × Exposure Factor T <sub>sa</sub> = 2.53 × 10 <sup>-10</sup> × (10/v) × (s/30) × (50/PE) <sup>2</sup> = 2.84 × 10 <sup>-10</sup> Exposure Factor = 0.057 f <sub>s</sub> = 1.6 × 10 <sup>-11</sup> where: v = 4.47 m/s (average annual wind speed at Boise, ID Airport) s = 50% (default silt content of soil) PE = 91 (default precipitation-evaporation index) Exposure Factor = 0.057 <u>Site Selection Factor (direct gamma)</u> fs = Exposure Factor = 0.057

## **Results Summary**

Material Concentration	Placement Scenario	Dose (mrem)
WAC (100% U)	Average Cell Concentration	2.8
	1 ft layer	16

**Intruder Construction Dose Calculation per NUREG-0782 / 954**  
**Shipped at WAC Concentration (100% U), Mixed Into Cell**

**Waste Concentration Scenarios Evaluated:**

Radionuclide	Gondola Concentration (pCi/g) Average
Tc-99	
U-234	1815
U-235	81.0
U-238	341

**Air Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (Ci/m3)	PCDF-2	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	5.8E+10	1	0.053	1	1.6E-11	0.0E+00
U-234	1.8E+03	2.7E-03	8.9E+14	1	0.053	1	1.6E-11	2.1E+00
U-235	8.1E+01	1.2E-04	8.0E+14	1	0.053	1	1.6E-11	8.2E-02
U-238	3.4E+02	5.1E-04	7.9E+14	1	0.053	1	1.6E-11	3.4E-01
								2.5

**Direct Gamma Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (Ci/m3)	PCDF-5	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.3E-02	1	0.053	1	5.7E-02	0.0E+00
U-234	1.8E+03	2.7E-03	2.8E+02	1	0.053	1	5.7E-02	2.3E-03
U-235	8.1E+01	1.2E-04	7.0E+05	1	0.053	1	5.7E-02	2.6E-01
U-238	3.4E+02	5.1E-04	6.3E+04	1	0.053	1	5.7E-02	9.7E-02
								3.6E-01

**Total - All Pathways**

2.8
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**Intruder Construction Dose Calculation per NUREG-0782 / 954**  
**Shipped at WAC Concentration (100% U), Undiluted, 1 ft layer**

**Waste Concentration Scenarios Evaluated:**

Radionuclide	Gondola Concentration (pCi/g) Average
Tc-99	0
U-234	1815
U-235	81.0
U-238	341

**Air Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (Ci/m3)	PCDF-2	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	5.8E+10	1	0.31	1	1.6E-11	0.0E+00
U-234	1.8E+03	2.7E-03	8.9E+14	1	0.31	1	1.6E-11	1.2E+01
U-235	8.1E+01	1.2E-04	8.0E+14	1	0.31	1	1.6E-11	4.8E-01
U-238	3.4E+02	5.1E-04	7.9E+14	1	0.31	1	1.6E-11	2.0E+00
								14

**Direct Gamma Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (Ci/m3)	PCDF-5	f <sub>o</sub>	f <sub>d</sub>	f <sub>w</sub>	f <sub>s</sub>	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.3E-02	1	0.31	1	5.7E-02	0.0E+00
U-234	1.8E+03	2.7E-03	2.8E+02	1	0.31	1	5.7E-02	1.3E-02
U-235	8.1E+01	1.2E-04	7.0E+05	1	0.31	1	5.7E-02	1.5E+00
U-238	3.4E+02	5.1E-04	6.3E+04	1	0.31	1	5.7E-02	5.7E-01
								2

**Total - All Pathways**

16
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# Intruder Well Drilling Dose Calculation per NUREG-4370 (modified for use at USEI)

## Summary

### Basis:

An intruder accesses the site and develops a well. The intruder is exposed to contaminated drill cuttings spread over the ground surface and contaminated airborne dust. The scenario presented in NUREG 4370 was modified to exclude consideration of exposure to cuttings in a mud pit due to the standard practices in the area around the waste site. The assumption that drill cuttings are spread over the ground will result in higher dose estimates than if the cuttings were assumed to be in a mud pit because of the decrease in the shielding factor.

The driller is assumed to work on site for a period of 40 hrs and it is assumed that the contaminated layer is drilled through in 8 hrs. As such the driller is assumed to be exposed to the undiluted cuttings for 8 hours and to diluted material for the balance of the exposure duration. The dilution is calculated based on the ratio of the depth of the waste layer to the total well depth.

### Internal Dose Model

$$H_{int} = \left( \sum_n C_w \cdot \chi \cdot BR \cdot DCF_n \cdot T_1 + \sum_n C_w' \cdot \chi \cdot BR \cdot DCF_n \cdot (T_2 - T_1) \right)$$

$C_w$  – concentration of  $n^{th}$  nuclide (in waste) (pCi/g)  
 $\chi$  – concentration in air during drilling ( $g/m^3$ )  
 $BR$  – breathing rate ( $m^3/hr$ )  
 $DCF_n$  – dose conversion factor for  $n^{th}$  nuclide (mrem/pCi)  
 $T_1$  – time to drill through waste layer (hr)  
 $C_w'$  – concentration of  $n^{th}$  nuclide in diluted drill cuttings (pCi/g)  
 $T_2$  – total drilling time (hr)

### External Dose Model

$$PDCT_5 = Dose Conversion Factor - mrem/yr / Ci/m^3 (NUREG-4370)$$

$C_w$  – concentration of  $n^{th}$  radionuclide in Waste Layer ( $Ci/m^3$ )  
 $f_1$  – Time to drill through waste layer (fraction of year)  
 $C_w'$  – concentration of  $n^{th}$  radionuclide in drill cuttings - diluted  
 $f_2$  – Total drilling time (fraction of year)

\*Dilution factor due to particular disposal practices

Two Scenarios Considered:

1 - Undiluted Material placed into cell in 1 foot layer

fd= 1

2 - Materials diluted based on material shipment and receipt characteristics contained

fd= 0.053

**Intruder Well Drilling Dose Calculation per NUREG-4370 (modified for use at USEI)**  
**Summary**

**Assume 22 inch diameter well**

**Volume of waste material**

r = 11 inch =	0.28 m	(radius of well)
h =	33.6 m	(height of waste material)
v =	8.27 m <sup>3</sup>	(volume of waste)
h' =	0.31 m	(height of HDP waste contribution)
v' =	0.08 m <sup>3</sup>	(volume of HDP waste)

**Volume of cuttings**

r = 11 inch =	0.28 m	(radius of well)
Cover	3.6 m	
Waste	33.6 m	
unsat 1	1 m	From Site Resrad Model
unsat 2	4.6 m	
unsat 3	21.3 m	
unsat 4	16.8 m	
unsat 5	12.2 m	
h =	93.1 m	(height of well)
v =	23 m <sup>3</sup>	

**Drilling Duration (Waste Material)** 8 hr

**Drilling Duration (Site Occupancy)** 40 hr

**Breathing Rate** 1.2 m<sup>3</sup>/hr

**Dust Loading - Drilling Waste** 1.E-03 g/m<sup>3</sup>

**Material Density** 1.5 g/cm<sup>3</sup>

**Waste Dilution Factor - Drill Cuttings**

	Volume	Dilution Factor	
well cutting volume in cell layer	8.27 m <sup>3</sup>	0.36	
well cutting volume in 1 foot waste layer	0.08 m <sup>3</sup>	0.0033	109.2
well cutting volume - total	23 m <sup>3</sup>		

**Dose Conversion Factors**

Radionuclide	PDCF5	DCF mrem/pci
Tc-99	1.3E-02	8.3E-06
U-234	2.8E+02	1.3E-01
U-235	7.0E+05	1.2E-01
U-238	6.3E+04	1.2E-01

**Results Summary**

Material Concentration	Placement Scenario	Dose (mrem)
WAC (100% U)	Average Cell Concentration	0.38
	1 ft layer	2.9

**Intruder Well Drilling Dose Calculation per NUREG-4370 (modified for use at USEI)**  
**Shipped at WAC Concentration (100% U), Undiluted, 1 ft layer**  
**Detailed Calculations**

**Waste Concentration Scenarios Evaluated:**

Radionuclide	Gondola Concentration Average	Cell Concentration (pCi/g) Average
Tc-99		0.0E+00
U-234	1.8E+03	9.6E+01
U-235	8.1E+01	4.3E+00
U-238	3.4E+02	1.8E+01

**Air Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (pCi/g)	χ g/m <sup>3</sup>	BP m <sup>3</sup> /hr	DCF mrem/pCi	T1 hr	T2 hr	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.0E-03	1.2	8.31E-06	8	40	0.0E+00
U-234	9.6E+01	3.5E+01	1.0E-03	1.2	1.33E-01	8	40	3.0E-01
U-235	4.3E+00	1.5E+00	1.0E-03	1.2	1.23E-01	8	40	1.2E-02
U-238	1.8E+01	6.5E+00	1.0E-03	1.2	1.18E-01	8	40	5.0E-02

**3.6E-01**

**Direct Gamma Pathway**

Isotope	C <sub>w</sub> (Ci/m <sup>3</sup> )	C' <sub>w</sub> (Ci/m <sup>3</sup> )	PCDF-5	f <sub>1</sub>	f <sub>2</sub>		Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.3E-02	9.1E-04	4.6E-03		0.0E+00
U-234	1.4E-04	5.2E-05	2.8E+02	9.1E-04	4.6E-03		8.9E-05
U-235	6.4E-06	2.3E-06	7.0E+05	9.1E-04	4.6E-03		1.0E-02
U-238	2.7E-05	9.8E-06	6.3E+04	9.1E-04	4.6E-03		3.8E-03

**1.4E-02**

**Total - All Pathways**

**3.8E-01**

**Intruder Well Drilling Dose Calculation per NUREG-4370 (modified for use at USEI)**  
**Shipped at WAC Concentration (100% U), Undiluted, 1 ft layer**  
**Detailed Calculations**

**Waste Concentration Scenarios Evaluated:**

Radionuclide	Gondola Concentration Average
Tc-99	0.0E+00
U-234	1.8E+03
U-235	8.1E+01
U-238	3.4E+02

**Air Pathway**

Isotope	C <sub>w</sub> (pCi/g)	C' <sub>w</sub> (pCi/g)	χ g/m <sup>3</sup>	BP m <sup>3</sup> /hr	DCF mrem/pCi	T1 hr	T2 hr	Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.0E-03	1.2	8.31E-06	8	40	0.0E+00
U-234	1.8E+03	6.0E+00	1.0E-03	1.2	1.33E-01	8	40	2.3E+00
U-235	8.1E+01	2.7E-01	1.0E-03	1.2	1.23E-01	8	40	9.7E-02
U-238	3.4E+02	1.1E+00	1.0E-03	1.2	1.2E-01	8	40	3.9E-01

**2.8E+00**

**Direct Gamma Pathway**

Isotope	C <sub>w</sub> (Ci/m <sup>3</sup> )	C' <sub>w</sub> (Ci/m3)	PCDF-5	f <sub>1</sub>	f <sub>2</sub>		Dose (mrem/year)
Tc-99	0.0E+00	0.0E+00	1.3E-02	9.1E-04	4.6E-03		0.0E+00
U-234	2.7E-03	9.0E-06	2.8E+02	9.1E-04	4.6E-03		6.9E-04
U-235	1.2E-04	4.0E-07	7.0E+05	9.1E-04	4.6E-03		7.8E-02
U-238	5.1E-04	1.7E-06	6.3E+04	9.1E-04	4.6E-03		3.0E-02

**1.1E-01**

**Total - All Pathways**

**2.9E+00**

**Overall Comments on Request for Additional Alternate Disposal Approval and Exemptions for Specific Hematite Decommissioning Project Waste at US Ecology Idaho**

GEN-1	The licensee needs to provide a clear discussion of quantifiable objectives followed by the demonstration of if and how characterization activities achieved those goals. This would include the number of statistical samples required per population; the method for demonstrating criteria are satisfied; the basis for the use of surrogates; spatial boundaries associated with each population; the relationship between area, facility, and sample location; the rationale for use of historical data in decisions, etc.
<b>Response Summary:</b> This general comment summarizes many of the individual RAIs addressed elsewhere. The quantifiable objective is limiting alternate disposal exposures to not more than “a few millirem per year” to any member of the public. Westinghouse endeavored to demonstrate that objective was met by applying the methods that ultimately supported approval of a prior 20.2002 request approved in Amendment 58 for soil and debris.	
<b>Response Detail:</b> HDP-TBD-WM-906 provides a detailed account of how existing characterization data was collected and how that data would support the dose assessment calculations contained in this 20.2002 request. Requested clarifying information has been provided as requested. The following additional information is provided in regards to the identified data request.	
<p><u><i>The number of statistical samples required per population and method for demonstrating criteria are satisfied:</i></u></p> <p>Soil: Sampling of soils will be performed using the characterization plan methodology and sample frequency described in the prior exemption request (i.e., 1 sample per 20 yd<sup>3</sup> of material). As indicated in Section 5.2.1 of Enclosure 1 to HEM-12-2, the mean concentration and associated standard deviation of Tc-99 for the material addressed in this application (13 and 36 pCi/g, respectively) are bounded by the values used in the sample size calculations for the previous exemption request (average of 27 pCi/g and standard deviation of 225 pCi/g).</p> <p>Piping and Miscellaneous Equipment (except for the HEPA units): As stated in Section 5.2.2 of Enclosure 1 to HEM-12-2, statistical sampling of piping will be performed at a frequency of 1 sample per 7.1 m<sup>3</sup> (14 samples per batch of 100 m<sup>3</sup> as determined using Visual Sampling Plan). The technical basis for this sample frequency is provided in this same section. The waste sampling procedure will require that each 7.1 m<sup>3</sup> batch of piping and miscellaneous equipment be assayed using HRGS to determine the uranium content. A composite sample (e.g., smear, scale) composed of at least four aliquots collected at random will be obtained from each batch for laboratory analysis of uranium and Tc-99. These data will be used to define the ratio of each radionuclide that will be applied to the uranium result obtained from the assay performed using HRGS.</p> <p>Additional biased samples will be collected at locations of elevated gamma scanning measurements as indicated by NSA-TR-11-11 (summarized below).</p> <p><b>Administrative CSC 06:</b> All subterranean piping sections SHALL be exposed prior to excavation by removing the overlying soil burden.</p> <p><b>Administrative CSC 07:</b> All subterranean piping (i.e., intact and crushed subterranean piping) SHALL be independently assayed prior to exhumation using independent assay instruments (i.e., physically separate). The average <sup>235</sup>U concentration of the subterranean piping SHALL be demonstrated to not exceed 0.1 g<sup>235</sup>U/L prior to treating as NCS Exempt Material.</p> <p>Notes: 1 In lieu of two external independent surface measurements, internal in-situ radiological surveys of the subterranean piping coupled with visual data may be used, provided this method is evaluated and documented in a NCSA.</p>	

2. This CSC does not apply to underground utilities such as electrical conduit or gas lines.

**Administrative CSC 17:** All miscellaneous D&D equipment intended for consignment to the USEI site for disposal SHALL be independently assayed using independent assay instruments (i.e., physically separate) or be independently assayed by at least two qualified individuals using the HRGS assay equipment. The average  $^{235}\text{U}$  concentration of the miscellaneous D&D equipment SHALL be demonstrated to not exceed  $0.1 \text{ g}^{235}\text{U/L}$  prior to treating as NCS Exempt Material.

Notes: 1. In the event that the assay equipment and/or software models do not accurately capture the properties of the miscellaneous D&D equipment, then all activities concerning the characterization of miscellaneous D&D equipment SHALL cease and the NCS organization SHALL be contacted.

A minimum of one biased sample will be collected from each category of piping system (e.g., sanitary, stormwater, or process) in a building.

The existing characterization of the HEPA units is considered to be sufficient, as explained in the responses to RAIs SA-8 and SA-9.

A detailed procedure for survey/sampling of piping and miscellaneous equipment will be provided under separate cover.

Concrete/asphalt: The response to RAI CH-6 describes the process by which additional concrete sampling data will be collected prior to disposal. Data from a new systematic sampling program will be combined with the existing data to determine the representative radionuclide concentration. The Tc-99 concentration determined for the general area of the concrete slabs (as detailed in Section 6 of HDP-TBD-WM-906) will be applied to other non-burial area concrete/asphalt to be consigned to USEI. The Tc-99 concentration determined for the general area of the process building floors is a conservative representative of the Tc-99 concentration of other concrete/asphalt materials (e.g., building walls, sub-grade foundations and outdoor asphalt pads) since these other concrete/asphalt materials have been subject to much less radiological impact than the impact experienced in fuel work areas. This Tc-99 attributed to other concrete/asphalt will be counted against the action level listed in the response to RAI CH-3.

Waste volumes, activity, and tracking against applicable criteria is performed by HDP Waste Management Staff in accordance with established procedures. Requirements from the soil/debris characterization plan for the prior 20.2002 request (approved by Amendment 58 to SNM-33) were incorporated into procedure HDP-PR-WM-903, *Waste Material Control and Tracking*. This procedure will be updated as necessary to incorporate additional requirements upon their approval.

*The basis for the use of surrogates:*

The only material for which surrogate radionuclides will be used is the HEPA equipment that is identified in Table 8-1 of HDP-TBD-WM-906 in which case U-235 will be used as an indicator of Tc-99 activity. The justification for the use of such a surrogate radionuclide is provided in Section 8.1 of HDP-TBD-WM-906 and HDP-TBD-WM-901, which was provided to NRC via Westinghouse letter HEM-12-41, dated March 28, 2012 (ML12090A191). Additional clarification of the applicability of the selected surrogate scaling factors is provided in response to RAI SA-9.

*Spatial boundaries associated with each population:*

Spatial boundaries associated with the different waste streams are as follows:

- 1) Soils – site-wide, subject to the same limitations and exclusions as defined in the previous 20.2002 exemption request (i.e., segregation of high Tc-99 concentration materials from the evaporation pond area). See also the response to RAI CH-5 above.

- 2) Piping – Material identified in HDP-TBD-WM-906, Appendix F, with the exception that material identified in Table 7.4 (same document) will be excluded from disposal at USEI due to high Uranium and Tc-99 concentrations within those materials.
- 3) Miscellaneous Equipment – Ventilation equipment identified in HDP-TBD-WM-906, Table 8-1. Other equipment, tools, used protective clothing, etc., as identified during the course of the HDP decommissioning project, subject to characterization defined in section 8.1 (same document).
- 4) Concrete /Asphalt – Material identified in HDP-TBD-WM-906, Appendix A through C with the exception that materials identified in Table 6-6 (same document).

*The relationship between area, facility, and sample location:*

The location of samples associated with building surfaces, sub-surface piping, and sub-surface soils are shown in HDP-TBD-WM-906, Appendix D, G, and H, respectively. Additional information on the location of these samples is provided in response to RAIs SA-3 and SA-7.

*The rationale for use of historical data in decisions*

The rationale for use of historical data is contained within HDP-TBD-WM-906 as is expanded on in the RAI responses contained herein.

GEN-2	A formal characterization plan should be prepared for the waste materials. In some cases, historical data may be acceptable for use. However, there are numerous data gaps that should require additional investigations and sampling. For example, when looking at Appendix D Figure 1 and Table 1, it is apparent that the sampling was primarily biased, concentrating on locations of elevated direct radiation and cracks/joints in the floor. The majority of the surface has not been characterized by sampling. Data provided in Table 6.3 also seem to suggest that Tc-99 contamination is present outside of the identified elevated uranium areas. These issues are further exasperated by the fact that there is no indication that alpha-beta scans were performed to further evaluate surface contamination levels on those portions of the slab that have not had contamination covered by resurfacing. Such scans would confirm if there are other anomalous regions with significant Tc-99 contamination and/or uranium. The identified contaminated areas have been extensively sampled. It is recommended that additional systematic probabilistic samples, based on the DQO process be developed and implemented for the remainder of the slab and combined with documented alpha-beta surface scans.
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**Response Summary:** The responses to RAIs GEN-1 and CH-6 discuss characterization plans for the waste materials.

**Response Detail:** Historical information about the locations where processes occurred and sampling data have been used to establish the radionuclide inventory in materials to be shipped to USEI in order to perform a bounding dose assessment. The proposed soil volume will be characterized in the manner that is currently approved for soil. Additional measurements (radiological surveys, HRGS assay or sampling and laboratory analysis) of intact piping and miscellaneous equipment will be performed prior to shipment. The Tc-99 inventory will be determined and added to the total inventory shipped which will in turn be compared against the total inventory limits based on this and the prior application. A description of this sampling is provided in the response to RAI GEN-1 above.

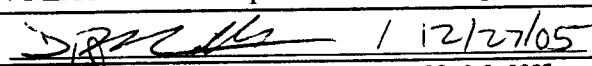
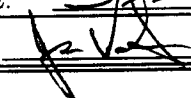
The alpha-beta scans of concrete slab surfaces prior to application of fixative are described in the response to RAI CH-6, and the results are attached.

FOR INFORMATION

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RADIOLOGICAL SURVEY REPORT

CH -122705-05

SURVEY LOCATION: Building 240 Laboratory						RWP: IR05-036		Page 1 of 4						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 12/21/05		TIME: 10:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.6	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	8.0	124	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	84	84	322	74	71	183	926	918	6288	572	448	2036	
2	Floor	62	62	237	50	47	121	338	330	2260	324	200	909	
3	Floor	72	72	276	82	79	203	346	338	2315	330	206	936	
4	Floor	38	38	145	44	41	106	286	278	1904	468	344	1564	
5	Floor	60	60	230	38	36	91	732	724	4959	480	356	1618	N/A
6	Floor	46	46	176	32	29	75	1476	1468	10055	1184	1060	4818	
7	Floor	52	52	199	38	36	91	550	542	3712	616	492	2236	
8	Floor	62	62	237	40	37	96	170	162	1110	224	100	455	
9	Floor	36	36	137	36	34	86	172	164	1123	210	86	391	
REMARKS: Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; β/γ = 31 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 150 dpm/100cm <sup>2</sup> ; 316 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE:  / 12/21/05														
REVIEWER SIGNATURE/ DATE:  / DEC 28 2005														

FOR INFORMATION

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RADIOLOGICAL SURVEY REPORT

CH-122705-05



SURVEY LOCATION: Building 240 Laboratory													Page 2 of 4	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta\gamma$ N/A			Total $\alpha$ N/A			Total $\beta\gamma$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	dpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	dpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr
10	Floor	84	84	322	62	59	152	324	316	2164	334	210	955	
11	Floor	80	80	307	92	89	229	314	306	2096	324	200	909	
12	Floor	100	100	384	78	75	193	720	712	4877	448	324	1473	
13	Floor	134	134	515	91	89	227	500	492	3370	592	468	2127	
14	Floor	104	104	399	94	91	234	316	308	2110	276	152	691	
15	Floor	118	118	453	88	85	219	534	526	3603	842	718	3264	
16	Wall	8	8	29	12	9	24	8	0	0	176	52	236	
17	Wall	54	54	207	52	49	127	30	22	151	242	118	536	N/A
18	Wall	14	14	53	26	23	60	22	14	96	168	44	200	
19	Wall	2	2	6	6	4	9	44	36	247	254	130	591	
20	Wall	4	4	14	6	4	9	116	108	740	208	84	382	
21	Wall	8	8	29	12	9	24	20	12	82	310	186	845	
22	Wall	14	14	53	16	13	34	68	60	411	210	86	391	
23	Wall	4	4	14	10	7	19	20	12	82	262	138	627	
24	Wall	16	16	60	10	7	19	20	12	82	138	14	64	
25	Wall	8	8	29	8	5	14	20	12	82	220	96	436	
REMARKS: None														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> 12/27/05														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / DEC 28 2005														

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RADIOLOGICAL SURVEY REPORT

CH-122705-05

SURVEY LOCATION: Building 240 Laboratory													Page 3 of 4		
Contamination Limits: (dpm/100cm <sup>2</sup> )				Removable $\alpha$ N/A			Removable $\beta\gamma$ N/A			Total $\alpha$ N/A			Total $\beta\gamma$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	mR/hr or uR/hr	
26	Wall	8	8	29	4	2	4	22	14	96	204	80	364		
27	Wall	6	6	22	12	9	24	24	16	110	186	62	282		
28	Wall	8	8	29	14	11	29	18	10	68	160	36	164		
29	Wall	24	24	91	18	16	40	16	8	55	146	22	100		
30	Wall	20	20	76	12	9	24	66	58	397	196	72	327		
31	Wall	8	8	29	14	11	29	20	12	82	178	54	245		
32	Wall	4	4	14	4	2	4	16	8	55	160	36	164		
33	Wall	30	30	114	8	5	14	78	70	479	396	272	1236	N/A	
34	Wall	2	2	6	6	4	9	26	18	123	188	64	291		
35	Wall	12	12	45	26	23	60	34	26	178	194	70	318		
36	Wall	18	18	68	18	16	40	90	82	562	158	34	155		
37	Wall	32	32	122	32	29	75	30	22	151	176	52	236		
38	Wall	4	4	14	12	9	24	28	20	137	178	54	245		
39	Wall	4	4	14	10	7	19	74	66	452	186	62	282		
40	Wall	8	8	29	14	11	29	22	14	96	150	26	118		
41	Wall	22	22	83	44	41	106	36	28	192	186	62	282		
42	Wall	116	116	445	88	85	219	238	230	1575	214	90	409		
TECHNICIAN(S) SIGNATURE/ DATE:  / 12/27/05															
REVIEWER SIGNATURE/ DATE:  / DEC 28 2005															

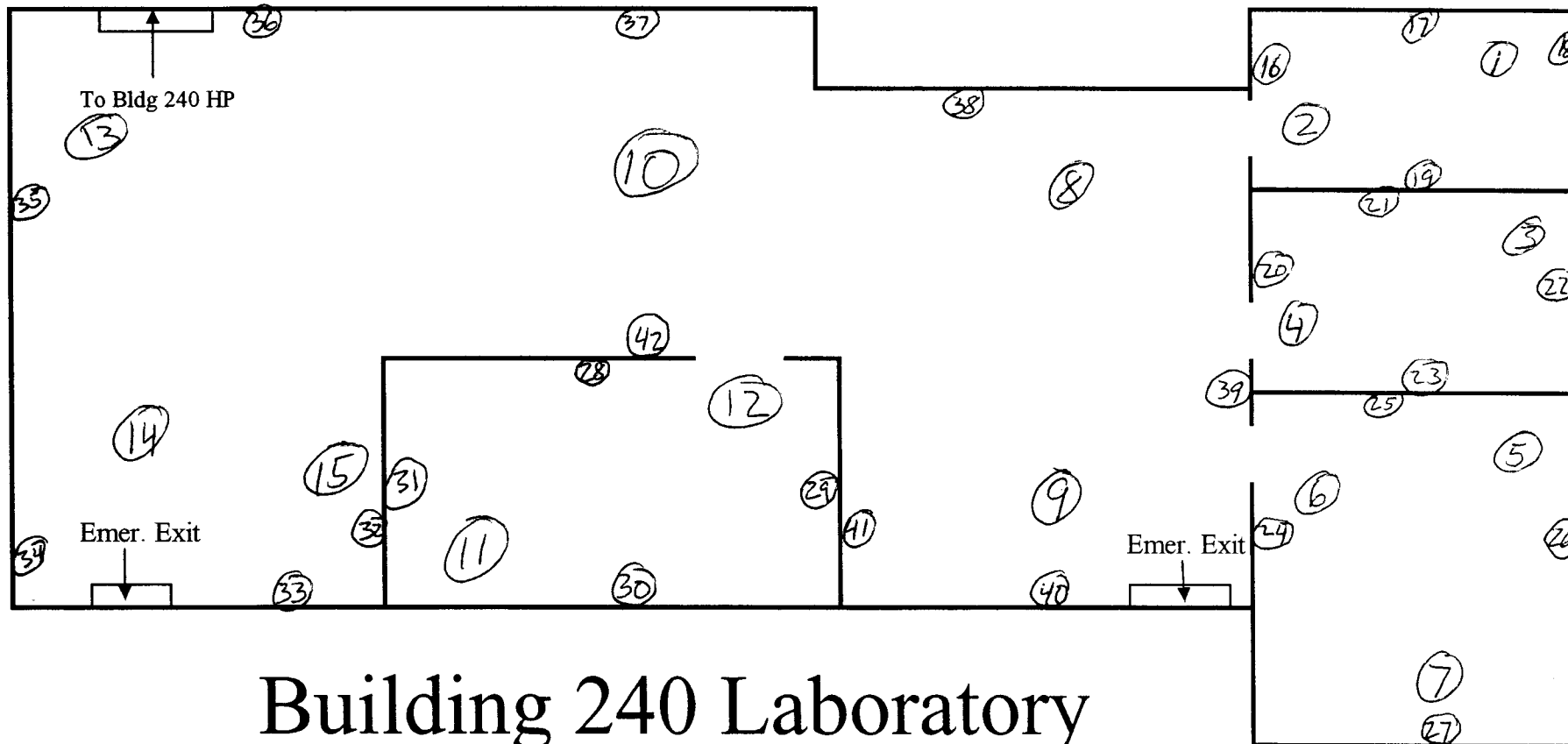
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RADIOLOGICAL SURVEY REPORT

CH-122705-05

SURVEY LOCATION: Building 240 Laboratory	RWP:	IR05-036	Page 4 of 4
LEGEND: (fill in blank)  = Smear and Total Location		DATE: 12/21/05	TIME: 10:00



REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE:



12/27/05

REVIEWER SIGNATURE/ DATE:



DEC 28 2005

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RADIOLOGICAL SURVEY REPORT

CH-12 2705-06

SURVEY LOCATION: Bldg 240 "Red Room"						RWP: IR05-036		Page 1 of 3						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 12/22/05		TIME: 8:30						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.01	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	8.0	124	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm α	Gross CPM β	Net CPM β	dpm/100cm β	Gross CPM α	Net CPM α	dpm/100cm α	Gross CPM β	Net CPM β	dpm/100cm β	mR/hr or uR/hr
1	Floor	78	78	299	66	64	164	1040	1032	7068	2616	2492	11327	
2	Floor	48	48	184	40	38	97	752	744	5096	5060	4936	22436	
3	Floor	64	64	245	50	48	123	908	900	6164	6392	6268	28491	
4	Floor	124	124	476	84	82	210	1376	1368	9370	3486	3362	15282	
5	Floor	152	152	584	90	88	225	1506	1498	10260	2854	2730	12409	N/A
6	Floor	1292	1291	4975	958	956	2449	17958	17950	122945	66722	66598	302718	
7	Floor	2390	2389	9204	1722	1720	4406	37932	37924	259753	254672	254548	1157036	
8	Floor	532	532	2048	474	472	1209	2994	2986	20452	20356	20232	91964	
9	Wall	34	34	130	18	16	41	388	380	2603	408	284	1291	
REMARKS: Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; β/γ = 31 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 150 dpm/100cm <sup>2</sup> ; 316 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> / 12/27/05														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / DEC 28 2005														

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RADIOLOGICAL SURVEY REPORT

CH-122705-06


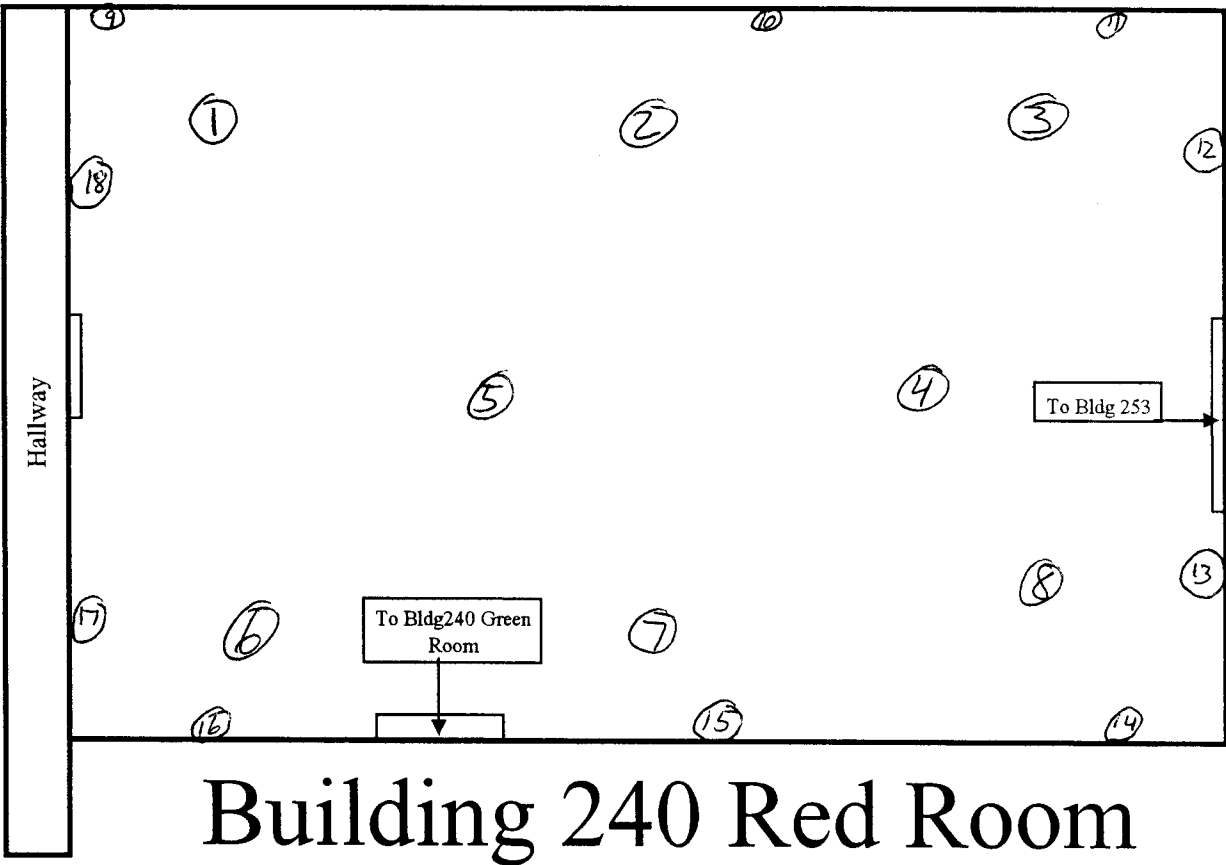


SURVEY LOCATION: Bldg 240 "Red Room"														Page 2 of 3	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable α <u>N/A</u>			Removable β <u>N/A</u>			Total α <u>N/A</u>			Total β <u>N/A</u>			
Sample No.	Description / Location	Gross CPM α Removable	Net CPM α Removable	Bpm/100cm α Removable	Gross CPM β Removable	Net CPM β Removable	Bpm/100cm β Removable	Gross CPM α Total	Net CPM α Total	Bpm/100cm α Total	Gross CPM β Total	Net CPM β Total	Bpm/100cm β Total	mR/hr or uR/hr	
10	Wall	8	8	29	14	12	31	176	168	1151	540	416	1891		
11	Wall	40	40	153	24	22	56	304	296	2027	676	552	2509		
12	Wall	26	26	99	22	20	51	318	310	2123	354	230	1045		
13	Wall	30	30	114	30	28	72	326	318	2178	1166	1042	4736		
14	Wall	28	28	106	16	14	36	342	334	2288	906	782	3555		
15	Wall	42	42	160	28	26	66	346	338	2315	484	360	1636		
16	Wall	858	858	3303	716	714	1829	8210	8202	56178	10652	10528	47855		
17	Wall	260	260	1000	202	200	512	1266	1258	8616	1938	1814	8245	N/A	
18	Wall	52	52	199	56	54	138	578	570	3904	562	438	1991		
19															
20															
21															
22															
23															
24															
REMARKS: <i>None</i>															
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 12/27/05															
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / DEC 28 2005															

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RADIOLOGICAL SURVEY REPORT

CH-122705-06

SURVEY LOCATION: Building 260		RWP:	IR05-036	Page 3 of 3
LEGEND: (fill in blank)  = Smear and Total Location		DATE: 12/22/05		TIME: 0830
<div><p>Building 240 Red Room</p></div>				
REMARKS: None				
TECHNICIAN(S) SIGNATURE/ DATE:  / 12/27/05				
REVIEWER SIGNATURE/ DATE:  / DEC 28 2005				

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RADIOLOGICAL SURVEY REPORT

CH-02306-01

SURVEY LOCATION: Bldg 240 Maintenance Shop						RWP: IR05-038		Page 1 of 3						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/11/06		TIME: 9:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.07	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	14.0	114	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	40	40	152	25	23	60	248	234	1603	1882	1768	8036	
2	Floor	63	62	241	45	43	109	376	362	2479	3172	3058	13900	
3	Floor	71	70	271	53	51	130	910	896	6137	27428	27314	124155	
4	Floor	92	91	352	81	78	201	940	926	6342	11276	11162	50736	
5	Floor	65	64	248	50	48	123	720	706	4836	5164	5050	22955	N/A
6	Floor	59	58	225	53	51	130	606	592	4055	1768	1654	7518	
7	Floor	137	136	525	127	125	321	968	954	6534	1120	1006	4573	
8	Floor	26	26	99	24	22	57	716	702	4808	22662	22548	102491	
9	Floor	51	51	195	51	49	126	820	806	5521	508	394	1791	
REMARKS: Tennelec MDA: α = 18 dpm/100cm <sup>2</sup> ; β/γ = 19.2 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 207 dpm/100cm <sup>2</sup> ; 347 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 1-18-06														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / JAN 23 2006														

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RADIOLOGICAL SURVEY REPORT

CH-012306-01

SURVEY LOCATION: Bldg 240 Maintenance Shop													Page 2 of 3	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	mR/hr or $\mu$ R/hr
10	Floor	48	48	183	41	39	100	432	418	2863	514	400	1818	
11	Floor	44	44	168	47	44	114	1190	1176	8055	1994	1880	8545	
12	Floor	68	67	260	50	48	123	686	672	4603	1332	1218	5536	
13	Wall	12	12	45	11	9	22	36	22	151	310	196	891	
14	Wall	4	4	14	9	7	17	32	18	123	194	80	364	
15	Wall	22	22	83	20	18	46	64	50	342	498	384	1745	
16	Wall	77	76	294	136	133	342	406	392	2685	5470	5356	24345	N/A
17	Wall	80	79	306	73	71	182	36	22	151	374	260	1182	
18	Wall	8	8	29	17	15	38	36	22	151	292	178	809	
19	Wall	14	13	52	13	11	27	16	2	14	242	128	582	
20	Wall	20	20	75	42	40	102	34	20	137	206	92	418	
21	Wall	16	16	60	17	15	38	174	160	1096	324	210	955	
22	Wall	27	26	102	34	32	83	344	330	2260	464	350	1591	
23	Wall	24	24	91	19	17	43	140	126	863	394	280	1273	
24	Wall	8	8	29	7	5	13	26	12	82	218	104	473	

REMARKS: None.

TECHNICIAN(S) SIGNATURE/ DATE: [Signature] / 1-18-06


REVIEWER SIGNATURE/ DATE: [Signature] / JAN 23 2006

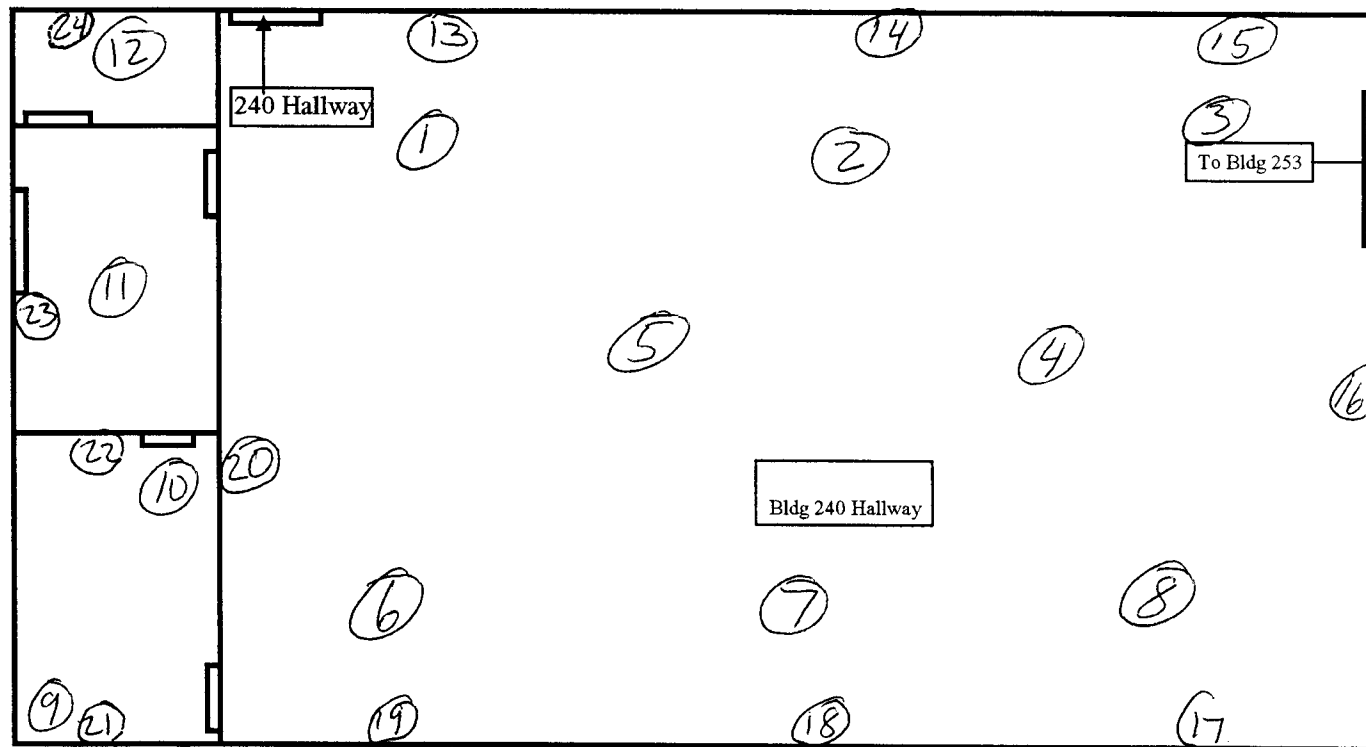
FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

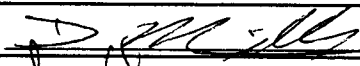
CH-012306-01

SURVEY LOCATION: Building 240	RWP: IR05-038	Page 3 of 3
LEGEND: (fill in blank)  = Smear and Total Location	DATE: 1/11/06	TIME: 09:00



## Building 240 Maintenance Shop

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE:  1-18-06

REVIEWER SIGNATURE/ DATE:  / JAN 23 2006

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## RADIOLOGICAL SURVEY REPORT

CH-012306-02

SURVEY LOCATION: Bldg 240 "Green Room"						RWP: IR05-038		Page 1 of 3						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/11/06		TIME: 10:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.07	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	14.0	114	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	74	74	284	56	54	138	2104	2090	14315	2096	1982	9009	N/A
2	Floor	764	764	2941	596	594	1522	11570	11556	79151	15856	15742	71555	
3	Floor	518	518	1994	402	400	1025	4684	4670	31986	13262	13148	59764	
4	Floor	270	270	1039	206	204	522	2002	1988	13616	3744	3630	16500	
5	Floor	202	202	777	166	164	420	1238	1224	8384	1554	1440	6545	
6	Floor	96	96	368	88	86	220	876	862	5904	970	856	3891	
7	Floor	260	260	1000	200	198	507	1668	1654	11329	2610	2496	11345	
8	Floor	114	114	438	98	96	246	1302	1288	8822	3878	3764	17109	
9	Wall	74	74	284	54	52	133	66	52	356	550	436	1982	
REMARKS: Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; β/γ = 31 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 207 dpm/100cm <sup>2</sup> ; 347 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> 1/18/06														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / JAN 23 2006														

FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

CH-012306-02

SURVEY LOCATION: Bldg 240 "Green Room"														Page 2 of 3	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ <u>N/A</u>			Removable $\beta\gamma$ <u>N/A</u>			Total $\alpha$ <u>N/A</u>			Total $\beta\gamma$ <u>N/A</u>			
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	dpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	dpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr	
10	Wall	128	128	492	98	96	246	220	206	1411	416	302	1373		
11	Wall	280	280	1077	282	280	717	604	590	4041	1508	1394	6336		
12	Wall	102	102	391	98	96	246	260	246	1685	1950	1836	8345		
13	Wall	40	40	153	30	28	72	52	38	260	804	690	3136		
14	Wall	30	30	114	20	18	46	48	34	233	290	176	800		
15	Wall	20	20	76	16	14	36	126	112	767	268	154	700		
16	Wall	364	364	1401	226	224	574	658	644	4411	714	600	2727		
17														N/A	
18															
19															
20															
21															
22															
23															
24															
REMARKS: <i>None</i>															
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 1/18/06															
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / JAN 23 2006															

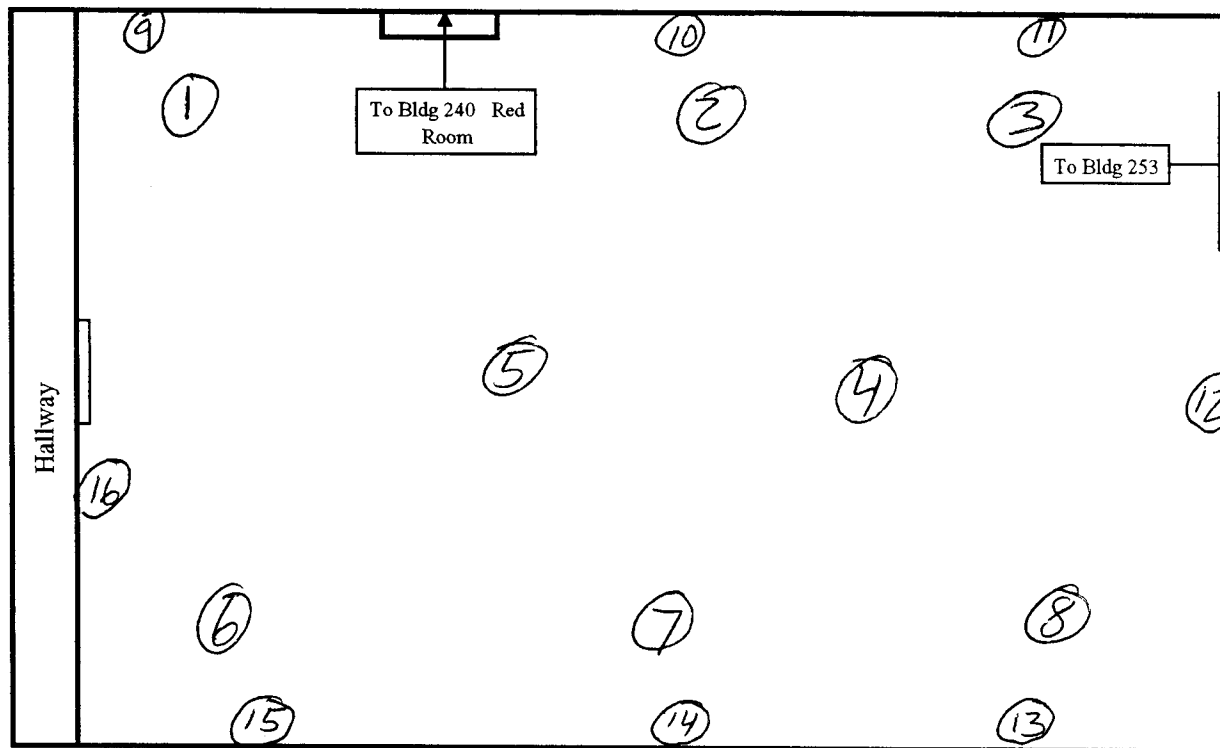
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RADIOLOGICAL SURVEY REPORT

CH-012306-02

SURVEY LOCATION: Building 240	RWP: IR05-038	Page 3 of 3
LEGEND: (fill in blank) <input type="radio"/> = Smear and Total Location	DATE: 1/11/06	TIME: 10:00



## Building 240 Green Room

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE:	<i>[Signature]</i> 1/11/06
REVIEWER SIGNATURE/ DATE:	<i>[Signature]</i> / JAN 23 2006

FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

CH-012306-03

SURVEY LOCATION: Bldg 240 HEPA Room						RWP: IR05-037		Page 1 of 2						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/16/06		TIME: 11:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.07	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	14.0	114	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	80	80	307	54	52	133	574	560	3836	454	340	1545	
2	Floor	194	194	746	316	314	804	300	286	1959	506	392	1782	
3	Floor	414	414	1593	570	568	1455	792	778	5329	494	380	1727	
4	Floor	156	156	599	88	86	220	636	622	4260	434	320	1455	
5	Floor	80	80	307	108	106	271	474	460	3151	412	298	1355	N/A
6	Wall	8	8	29	14	12	31	70	56	384	156	42	191	
7	Wall	18	18	68	12	10	25	78	64	438	212	98	445	
8	Wall	28	28	106	20	18	46	46	32	219	170	56	255	
9	Wall	6	6	22	8	6	15	18	4	27	138	24	109	
10	Wall	84	84	322	60	58	148	190	176	1205	270	156	709	
REMARKS Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; β/γ = 31 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 207 dpm/100cm <sup>2</sup> ; 347 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> 1-18-06														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> 1 JAN 23 2006														

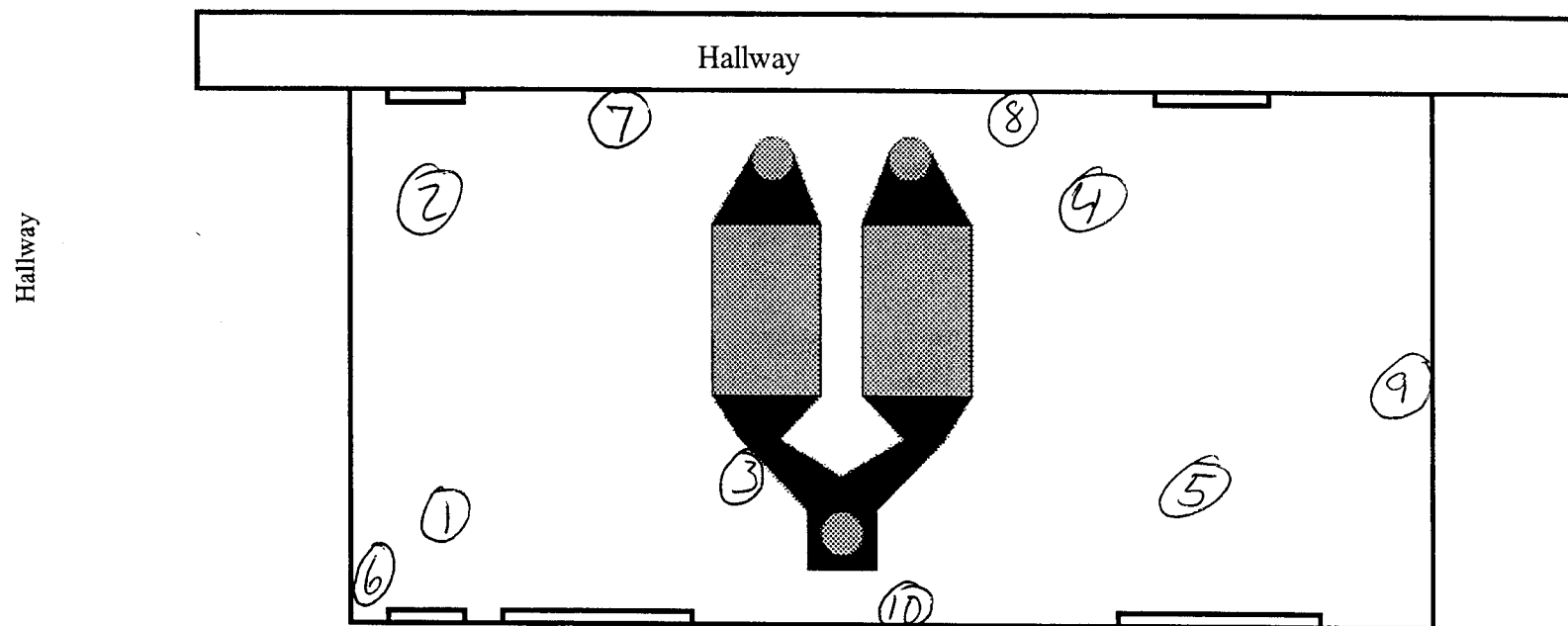
FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

CH-012306-03

SURVEY LOCATION: Building 240	RWP: IR05-037	Page 2 of 2
LEGEND: (fill in blank)  = Smear and Total Location	DATE: 1/16/06	TIME: 11:00



REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: Justin M. H. 1/18/06

REVIEWER SIGNATURE/ DATE: J. H. / JAN 23 2006

FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

CH-012706-01

SURVEY LOCATION: Bldg 253 Can Storage and Decontamination						RWP: IR05-036		Page 1 of 3						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/25/06		TIME: 8:30						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.3	2.57	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 S	100	218861	130035	2/16/06	2/16/06	24.0	133	13.3%	23.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	196	196	754	156	153	393	290	266	2000	508	375	1630	
2	Floor	208	208	800	294	292	747	444	420	3158	800	667	2900	
3	Floor	58	58	222	72	69	178	276	252	1895	1069	936	4070	
4	Floor	170	170	654	158	155	398	563	539	4053	1035	902	3922	
5	Floor	260	260	1000	184	181	465	4808	4784	35970	42004	41871	182048	N/A
6	Floor	26	26	99	22	20	50	164	140	1053	934	801	3483	
7	Floor	32	32	122	14	11	29	579	555	4173	2159	2026	8809	
8	Floor	36	36	138	62	59	152	461	437	3286	1921	1788	7774	
9	Floor	24	24	91	30	27	70	666	642	4827	1785	1652	7183	
REMARKS: Tennelec MDA: α = 30 dpm/100cm <sup>2</sup> ; β/γ = 33.1 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 194 dpm/100cm <sup>2</sup> ; 246 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 1/26/06														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / JAN 30 2006														

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RADIOLOGICAL SURVEY REPORT

CH-012706-01

SURVEY LOCATION: Bldg 253 Can Storage and Decontamination														Page 2 of 3	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A			
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	Bpm/100cm $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	Bpm/100cm $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	Bpm/100cm $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	Bpm/100cm $\beta$ Total	mR/hr or uR/hr	
10	Floor	36	36	138	30	27	70	693	669	5030	1519	1386	6026		
11	Wall	44	44	168	34	32	81	151	127	955	316	183	796		
12	Wall	26	26	99	24	21	55	46	22	165	165	32	139		
13	Wall	22	22	84	20	18	45	49	25	188	193	60	261		
14	Wall	28	28	107	16	13	34	45	21	158	1392	1259	5474		
15	Wall	270	270	1039	208	205	526	1857	1833	13782	2749	2616	11374		
16	Wall	18	18	68	6	4	9	41	17	128	155	22	96		
17	Wall	68	68	261	38	36	91	302	278	2090	527	394	1713	N/A	
18	Wall	4	4	14	20	18	45	61	37	278	267	134	583		
19	Wall	74	74	284	68	66	168	131	107	805	272	139	604		
20	Wall	18	18	68	12	9	24	50	26	195	735	602	2617		
21															
22															
23															
24															

REMARKS: None.

TECHNICIAN(S) SIGNATURE/ DATE: *Dustin Miller* 1/26/06


REVIEWER SIGNATURE/ DATE: *[Signature]* / JAN 30 2006

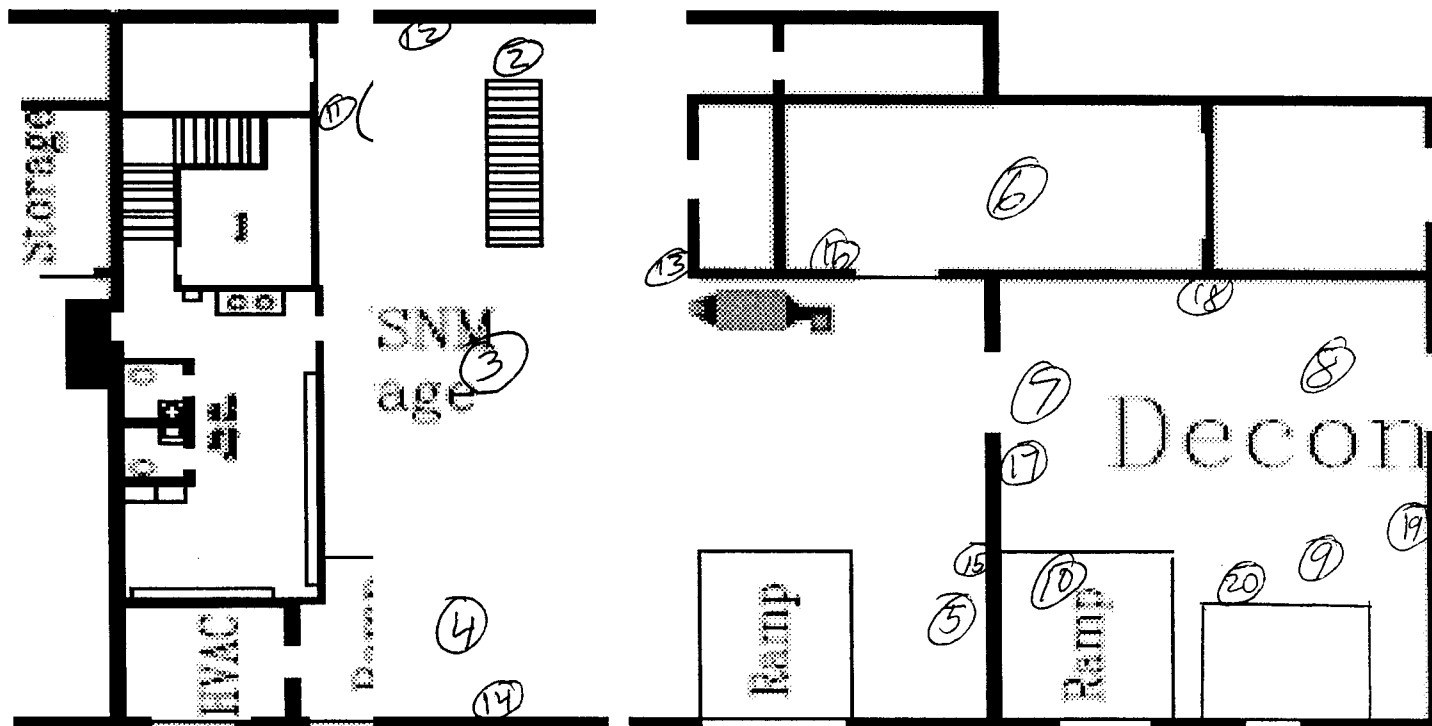
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RADIOLOGICAL SURVEY REPORT

CH-012706-01

SURVEY LOCATION: Bldg Storage and Decontamination	RWP: IR05-036	Page 3 of 3
LEGEND: (fill in blank)  and Total Location	DATE: 12/22/05	TIME: 0830



Building 253

N ←

REMARKS: None

TECHNICIAN(S) SIGNATURE

*[Signature]*

1/26/06

REVIEWER SIGNATURE/ DA

*[Signature]*

1 JAN 30 2006

FOR INFORMATION ONLY

## RADIOLOGICAL SURVEY REPORT

CH-012706-04

SURVEY LOCATION: Bldg 254 Pellet Plant						RWP: IR05-037		Page 1 of 4						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/25/06		TIME: 11:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.5	2.97	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	18.0	83	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α Removable	Net CPM α Removable	dpm/100cm <sup>2</sup> α Removable	Gross CPM β Removable	Net CPM β Removable	dpm/100cm <sup>2</sup> β Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm <sup>2</sup> α Total	Gross CPM β Total	Net CPM β Total	dpm/100cm <sup>2</sup> β Total	mR/hr or uR/hr
1	1st Floor	594	593	2286	476	473	1212	2260	2242	15356	3726	3643	16559	
2	1st Floor	288	287	1107	250	247	633	3736	3718	25466	2806	2723	12377	
3	1st Floor	416	415	1600	320	317	812	6196	6178	42315	5698	5615	25523	
4	1st Floor	426	425	1639	360	357	915	8328	8310	56918	8458	8375	38068	
5	1st Floor	158	158	607	90	87	223	2710	2692	18438	3072	2989	13586	N/A
6	1st Floor	178	178	684	132	129	331	1612	1594	10918	2634	2551	11595	
7	1st Floor	84	84	322	88	85	218	808	790	5411	1382	1299	5905	
8	1st Floor	206	206	792	208	205	525	11258	11240	76986	59262	59179	268995	
9	1st Floor	456	455	1754	344	341	874	8474	8456	57918	6556	6473	29423	
10	1st Floor	356	355	1369	338	335	858	2516	2498	17110	2280	2197	9986	
11	1st Floor	336	335	1292	232	229	587	10664	10646	72918	10380	10297	46805	
12	2nd Floor	792	792	3049	622	619	1586	5494	5476	37507	8474	8391	38141	
REMARKS Tennelec MDA: α = 34dpm/100cm <sup>2</sup> ; β/γ = 34.6 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 229 dpm/100cm <sup>2</sup> ; 300 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> 1/26/06														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> 1 JAN 30 2006														

FOR INFORMATION ON

## RADIOLOGICAL SURVEY REPORT

CH-012706-04

SURVEY LOCATION: Bldg 254 Pellet Plant														Page 2 of 4	
Contamination Limits: (dpm/100cm <sup>2</sup> )				Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	mR/hr or $\mu$ R/hr	
		Removable	Removable	Removable	Removable	Removable	Removable	Total	Total	Total	Total	Total	Total		
13	2nd Floor	496	495	1908	414	411	1053	6214	6196	42438	25064	24981	113550		
14	2nd Floor	172	172	661	134	131	336	4276	4258	29164	3358	3275	14886		
15	2nd Floor	200	199	768	136	133	341	1342	1324	9068	892	809	3677		
16	3rd Floor	460	459	1770	328	325	833	2048	2030	13904	2754	2671	12141		
17	3rd Floor	632	631	2432	470	467	1197	3652	3634	24890	4276	4193	19059		
18	Wall	16	16	60	18	15	39	24	6	41	148	65	295		
19	Wall	206	206	792	136	133	341	306	288	1973	608	525	2386		
20	Wall	46	45	175	30	27	69	676	658	4507	880	797	3623	N/A	
21	Wall	70	70	268	64	61	156	112	94	644	250	167	759		
22	Wall	310	309	1192	376	373	956	50	32	219	48	-35	0		
23	Wall	122	121	468	80	77	197	34	16	110	158	75	341		
24	Wall	24	24	91	18	15	39	9234	9216	63123	4994	4911	22323		
25	Wall	28	28	106	24	21	54	60	42	288	316	233	1059		
26	Wall	87	86	332	518	515	1319	90	72	493	182	99	450		
27	Wall	23	23	87	50	47	121	48	30	205	394	311	1414		
28	Wall	26	26	100	62	59	151	14	-4	0	176	93	423		
29	Wall	30	30	115	78	75	192	154	136	932	166	83	377		
30	Wall	8	7	27	10	7	18	106	88	603	170	87	395		

REMARKS: None,

TECHNICIAN(S) SIGNATURE/ DATE: *[Signature]* 1/26/06

REVIEWER SIGNATURE/ DATE: *[Signature]* / JAN 30 2006

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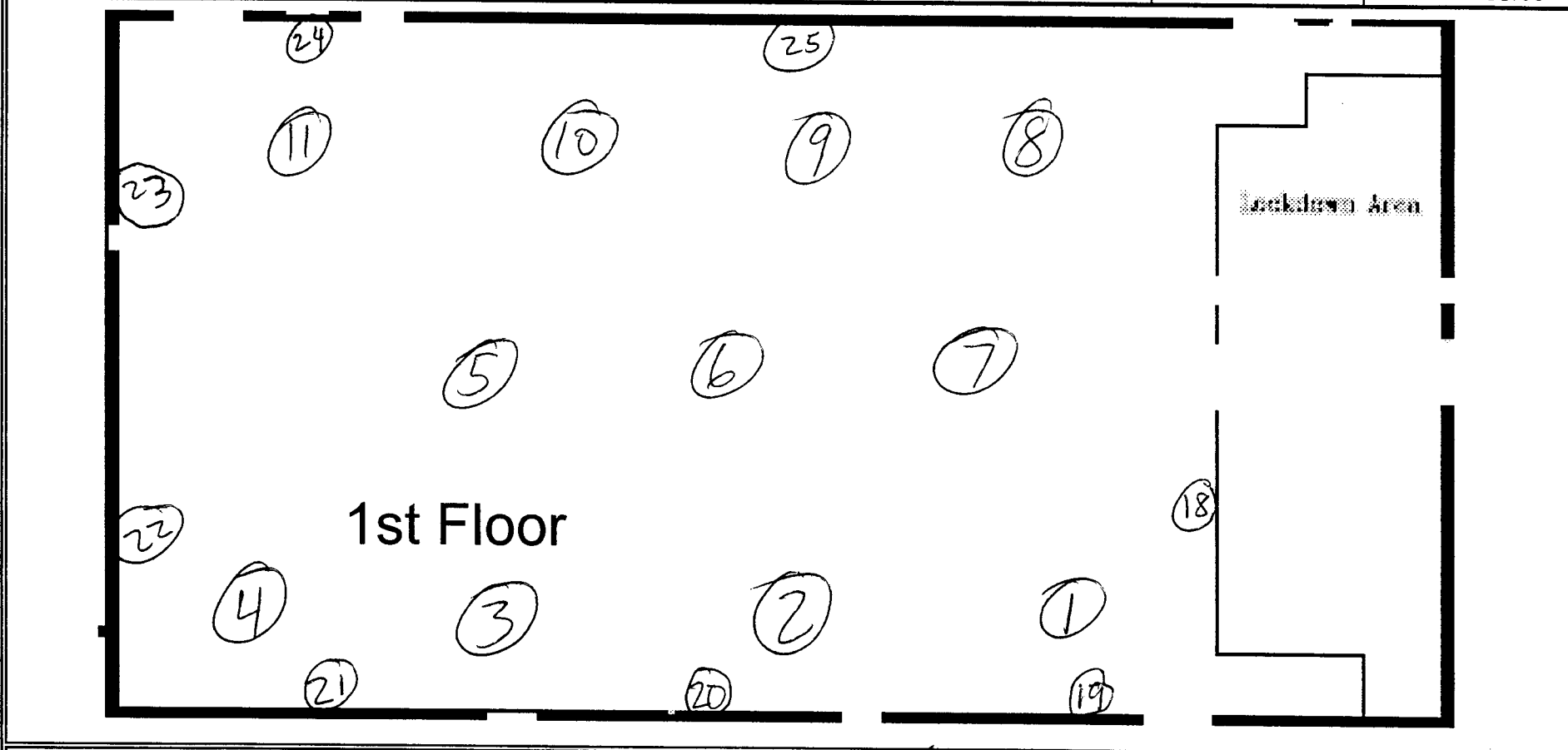
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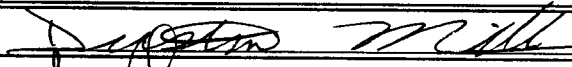
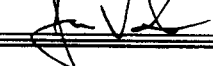
RADIOLOGICAL SURVEY REPORT

CH-012706-04

SURVEY LOCATION: Bldg 254 Pellet Plant RWP: IR05-037 Page 3 of 4

LEGEND: (fill in blank)  = Smear and Total Location DATE: 1/25/06 TIME: 11:00



TECHNICIAN(S) SIGNATURE/ DATE:  1/26/06  
REVIEWER SIGNATURE/ DATE:  / JAN 30 2006

Attachment 1

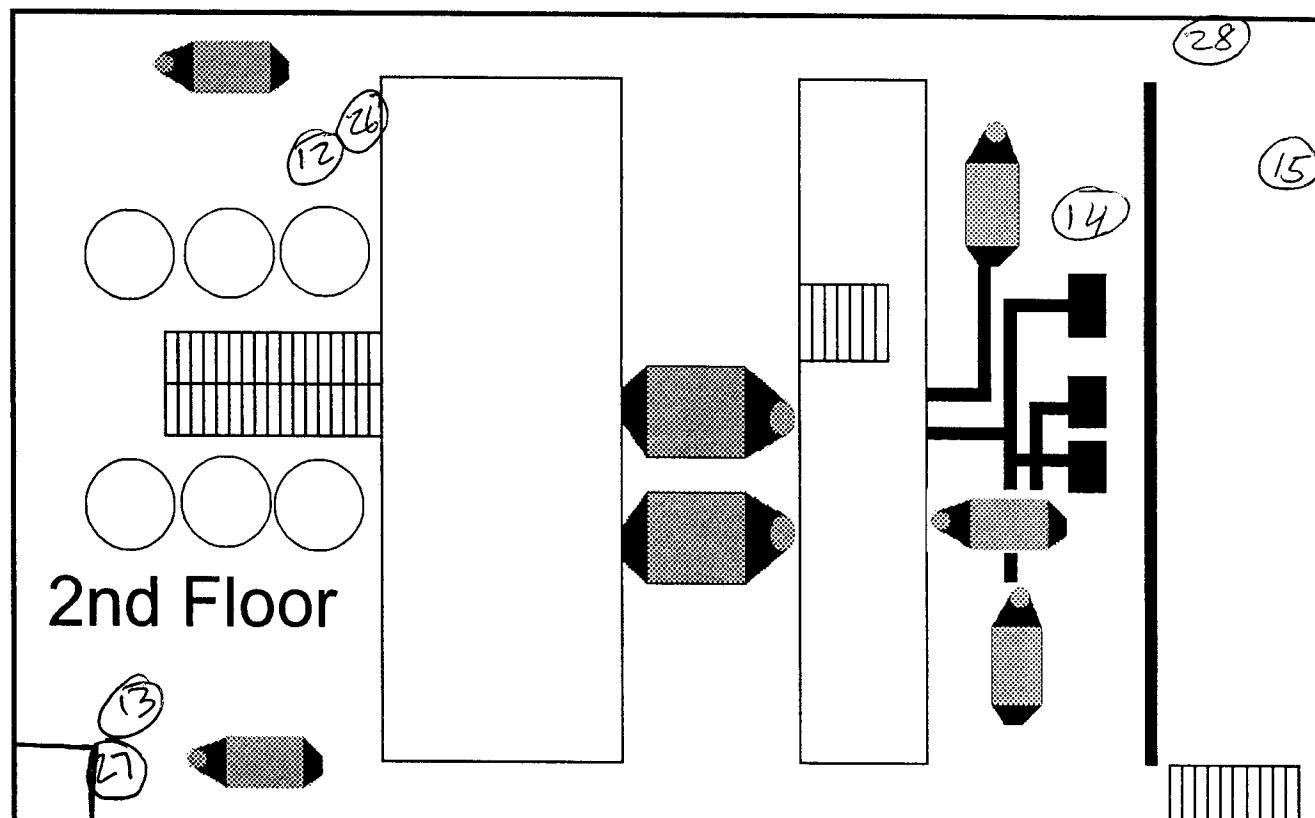
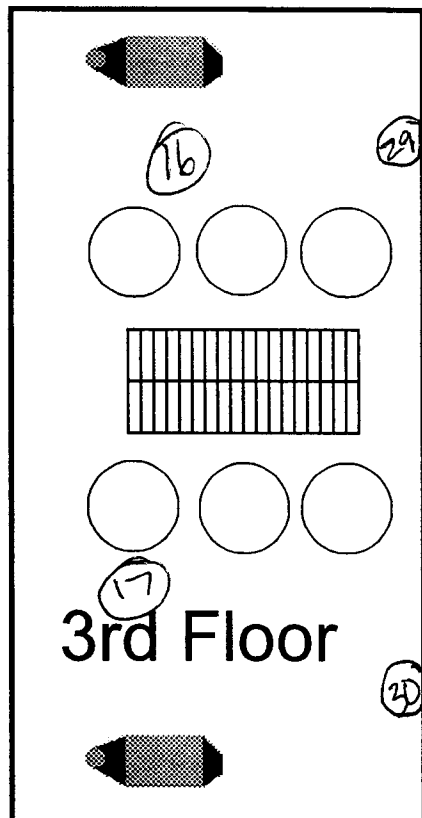
FOR INFORMATION ON


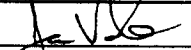
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RADIOLOGICAL SURVEY REPORT

CH-012706-04

SURVEY LOCATION: Bldg 254 Pellet Plant	RWP:	IR05-037	Page 4 of 4
LEGEND: (fill in blank)  = Smear and Total Location	DATE: 1/25/06	TIME: 11:00	



TECHNICIAN(S) SIGNATURE/ DATE:	 / 1/26/06
REVIEWER SIGNATURE/ DATE:	 / JAN 30 2006

Attachment 1

FOR INFORMATION ONLY

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# RADIOLOGICAL SURVEY REPORT

CH-122705-07

SURVEY LOCATION: Building 255 Erbia						RWP: IR05-036		Page 1 of 4						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 12/22/05		TIME: 16:30						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.07	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	8.0	124	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100													
<input type="checkbox"/> Micro - R NA	N/A													
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mr/hr or uR/hr
1	Floor	442	442	1701	386	384	984	1448	1440	9863	658	534	2427	
2	Floor	646	646	2487	632	630	1614	6076	6068	41562	5628	5504	25018	
3	Floor	268	268	1031	230	228	584	1726	1718	11767	1266	1142	5191	
4	Floor	162	162	623	112	110	282	5028	5020	34384	7650	7526	34209	
5	Floor	142	142	546	108	106	271	954	946	6479	2050	1926	8755	N/A
6	Floor	210	209	807	120	118	302	3294	3286	22507	6032	5908	26855	
7	Floor	88	88	338	62	60	154	3340	3332	22822	4118	3994	18155	
8	Floor	90	90	345	60	58	148	1328	1320	9041	13106	12982	59009	
9	Floor	126	126	484	104	102	261	2260	2252	15425	4688	4564	20745	
REMARKS: Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; β/γ = 31 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 150 dpm/100cm <sup>2</sup> ; 316 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 12/27/05														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / DEC 28 2005														

FOR INFORMATION ON

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RADIOLOGICAL SURVEY REPORT

CH-122705-07

SURVEY LOCATION: Building 255 Erbia															Page 2 of 4
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A			
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	Bpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	Bpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	Bpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	Bpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr	
10	Floor	106	106	407	74	72	184	1404	1396	9562	8108	7984	36291		
11	Floor	214	214	823	184	182	466	1044	1036	7096	1522	1398	6355		
12	Floor	286	286	1100	186	184	471	1902	1894	12973	5276	5152	23418		
13	Floor	120	120	461	82	80	205	600	592	4055	556	432	1964		
14	Floor	100	100	384	54	52	133	848	840	5753	1464	1340	6091		
15	Floor	124	124	476	86	84	215	764	756	5178	2116	1992	9055		
16	Floor	196	196	754	138	136	348	1572	1564	10712	1018	894	4064		
17	Floor	1840	1840	7086	1460	1458	3735	7342	7334	50233	23324	23200	105455	N/A	
18	Floor	338	337	1300	202	200	512	3336	3328	22795	3768	3644	16564		
19	Floor	342	342	1316	222	220	563	2388	2380	16301	3300	3176	14436		
20	Floor	370	369	1423	292	290	743	3124	3116	21342	3296	3172	14418		
21	Wall	30	30	114	30	28	72	396	388	2658	368	244	1109		
22	Wall	3414	3413	13148	2562	2560	6558	5276	5268	36082	2760	2636	11982		
23	Wall	48	48	184	24	22	56	30	22	151	202	78	355		
24	Wall	10	10	37	12	10	25	2330	2322	15904	1472	1348	6127		
25	Wall	34	34	130	18	16	41	24	16	110	218	94	427		

REMARKS: NONE

TECHNICIAN(S) SIGNATURE/ DATE: *[Signature]* / 12/27/05

REVIEWER SIGNATURE/ DATE: *[Signature]* / DEC 28 2005

FOR INFORMATION ON

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RADIOLOGICAL SURVEY REPORT

CH-122705-07

SURVEY LOCATION: Building 255 Erbia														Page 3 of 4
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable α N/A			Removable β N/A			Total α N/A			Total β N/A		
Sample No.	Description / Location	Gross CPM α	Net CPM α	Bpm/100cm α	Gross CPM β	Net CPM β	Bpm/100cm β	Gross CPM α	Net CPM α	Bpm/100cm α	Gross CPM β	Net CPM β	Bpm/100cm β	mR/hr or uR/hr
		Removable	Removable	Removable	Removable	Removable	Removable	Total	Total	Total	Total	Total	Total	
26	Wall	52	52	199	68	66	169	330	322	2205	1226	1102	5009	
27	Wall	120	120	461	94	92	236	1878	1870	12808	1700	1576	7164	
28	Wall	54	54	207	44	42	107	2240	2232	15288	1454	1330	6045	
29	Wall	298	298	1146	244	242	620	3754	3746	25658	2882	2758	12536	
30	Wall	82	82	314	66	64	164	316	308	2110	1500	1376	6255	
31	Wall	16	16	60	16	14	36	64	56	384	268	144	655	
32	Wall	1632	1631	6284	1170	1168	2992	4512	4504	30849	4402	4278	19445	
33	Wall	38	38	145	40	38	97	32	24	164	168	44	200	
34	Wall	170	170	653	110	108	277	52	44	301	358	234	1064	N/A
35	Wall	54	54	207	40	38	97	24	16	110	326	202	918	
36	Wall	72	72	276	60	58	148	102	94	644	174	50	227	
37	Wall	148	148	569	118	116	297	116	108	740	248	124	564	
38	Wall	32	32	122	10	8	20	264	256	1753	462	338	1536	
39	Wall	58	58	222	64	62	159	476	468	3205	572	448	2036	
40	Wall	690	689	2656	436	434	1112	3882	3874	26534	1974	1850	8409	

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: *Dustin M. [Signature]* / 12/27/05

REVIEWER SIGNATURE/ DATE: *[Signature]* / DEC 28 2005

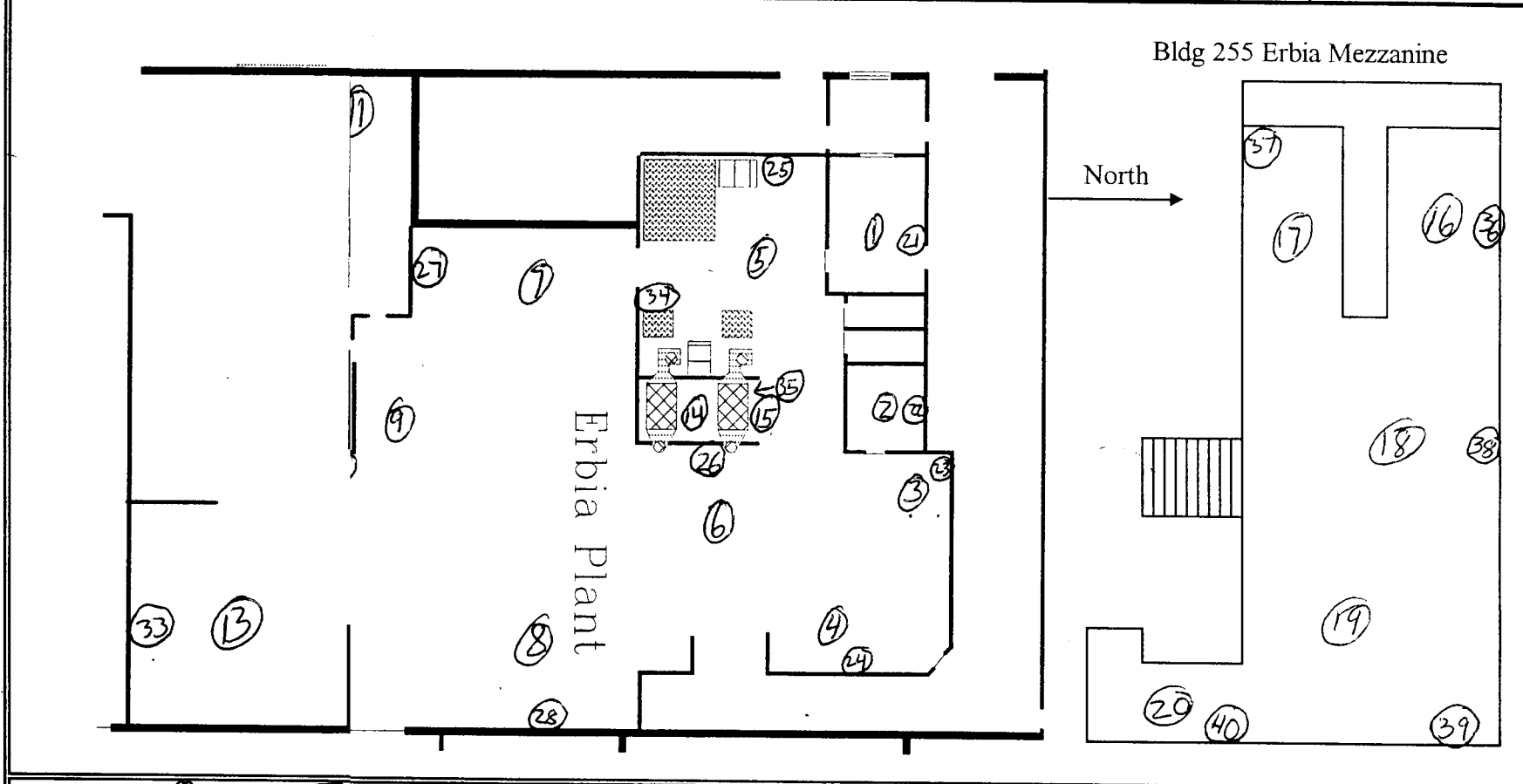
FOR INFO

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RADIOLOGICAL SURVEY REPORT

CIT-122705-07

SURVEY LOCATION: BuErbia	RWP:	IR05-036	Page 4 of 4
LEGEND: (fill in blank) <u>Car and Total Location</u>		DATE: 12/22/05	TIME: 16:30



REMARKS: ① through ②① vents taken on Floor; ②①-④① are wall measurements.	
①⑤ and ③⑤ are measure room beneath HEPA Bank units.	
TECHNICIAN(S) SIGNATU: <u>[Signature]</u>	12/27/05
REVIEWER SIGNATURE/ I <u>[Signature]</u>	DEC 28 2005

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## RADIOLOGICAL SURVEY REPORT

CH-012706-02


SURVEY LOCATION: Building 256-1 Filter Shredder Rm						RWP: IR05-037		Page 1 of 2						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/25/06		TIME: 13:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.5	2.97	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	18.0	83	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100			N/A				N/A						
<input type="checkbox"/> Micro - R NA	N/A			N/A				N/A						
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	74	74	285	45	42	108	508	490	3356	512	429	1950	
2	Floor	190	190	730	182	179	459	9184	9166	62781	20926	20843	94741	
3	Floor	36	36	137	44	41	105	788	770	5274	1156	1073	4877	
4	Floor	80	79	306	82	79	203	394	376	2575	636	553	2514	
5	Floor	44	44	168	40	37	95	376	358	2452	712	629	2859	
6	Wall	162	161	622	142	139	356	2510	2492	17068	3514	3431	15595	N/A
7	Wall	68	67	260	60	57	146	154	136	932	378	295	1341	
8	Wall	8	8	29	6	3	8	96	78	534	372	289	1314	
9	Wall	32	31	121	14	11	28	704	686	4699	618	535	2432	
10	Wall	24	24	91	20	17	44	268	250	1712	374	291	1323	
REMARKS Tennelec MDA: α = 32dpm/100cm <sup>2</sup> ; βγ = 31 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 229 dpm/100cm <sup>2</sup> ; 300 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> 1/26/06														
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> 1 JAN 30 2006														

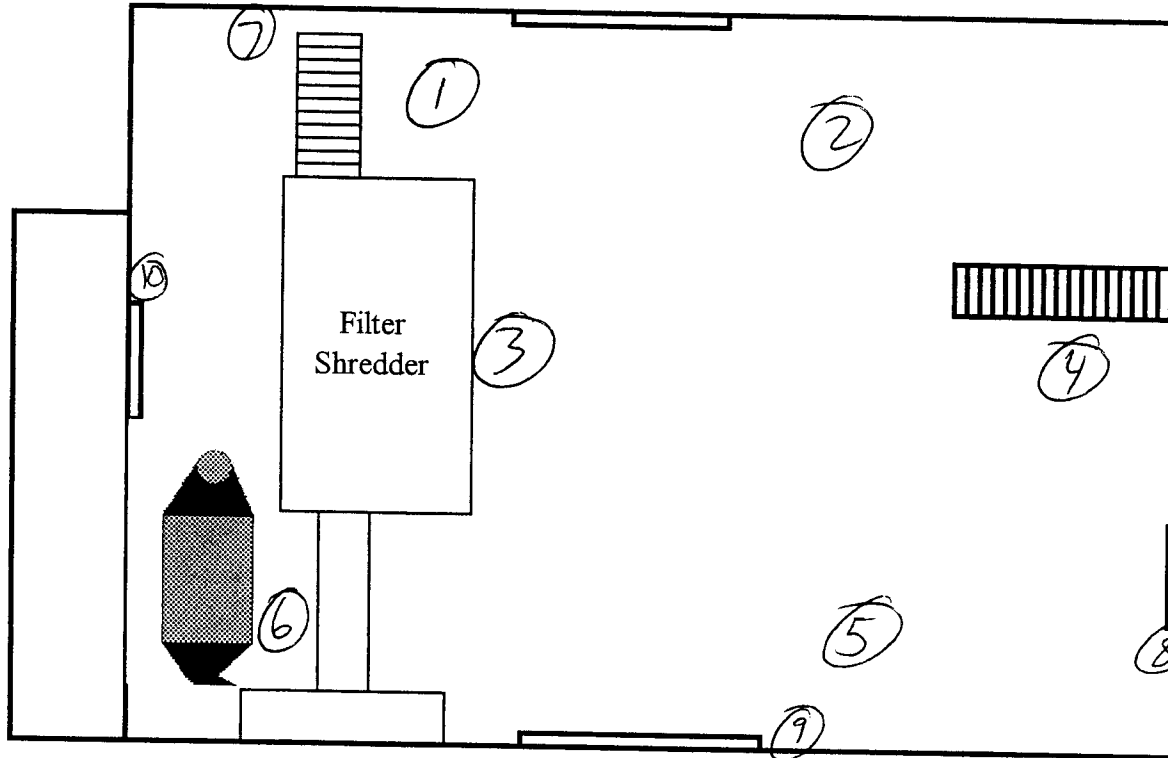
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RADIOLOGICAL SURVEY REPORT

CH-012706-02

SURVEY LOCATION: Building 256-1 Filter Shredder Rm		RWP: IR05-037	Page 2 of 2
LEGEND: (fill in blank)  = Smear and Total Location		DATE: 1/25/06	TIME: 13:00



REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: Dustin Mills / 1/26/06  
REVIEWER SIGNATURE/ DATE: [Signature] / JAN 30 2006

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RADIOLOGICAL SURVEY REPORT

CH-012706-03


SURVEY LOCATION: Bldg 256-2 Warehouse						RWP: IR05-037		Page 1 of 2						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/25/06		TIME: 7:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec <u>4</u>	N/A	1224	1224	4/12/06	4/12/06	0.5	2.97	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 <u>S</u>	100	218861	130035	2/16/06	2/16/06	24.0	95	13.3%	23.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 <u>N/A</u>	100		N/A				N/A							
<input type="checkbox"/> Micro - R <u>NA</u>	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α <u>N/A</u>		Removable βγ <u>N/A</u>		Total α <u>N/A</u>		Total βγ <u>N/A</u>						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	64	64	245	50	47	121	342	318	2391	797	702	3052	
2	Floor	100	99	383	106	103	264	343	319	2398	971	876	3809	
3	Floor	62	62	237	96	93	238	150	126	947	381	286	1243	
4	Floor	54	53	206	32	29	74	219	195	1466	512	417	1813	
5	Floor	26	25	98	14	11	28	133	109	820	387	292	1270	N/A
6	Wall	22	22	83	30	27	69	256	232	1744	612	517	2248	
7	Wall	12	11	44	20	17	44	33	9	68	186	91	396	
8	Wall	6	5	21	8	5	13	38	14	105	147	52	226	
9	Wall	4	4	14	6	3	8	33	9	68	196	101	439	
10	Wall	10	10	37	10	7	18	32	8	60	189	94	409	
REMARKS Tennelec MDA: α = 34dpm/100cm <sup>2</sup> ; β/γ = 34.6 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 194 dpm/100cm <sup>2</sup> ; 210 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> 1/26/06														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / JAN 30 2006														

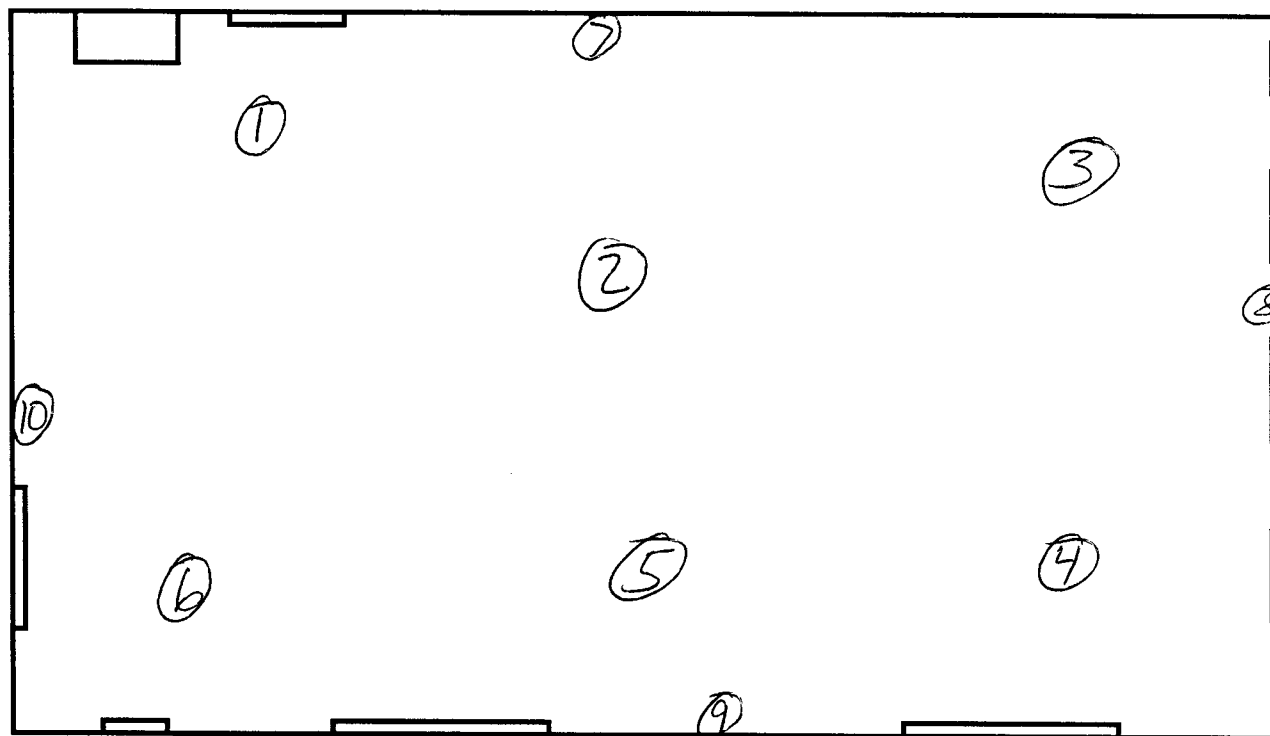
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RADIOLOGICAL SURVEY REPORT

CH-012706-03

SURVEY LOCATION: Building 256-2 Warehouse	RWP: IR05-037	Page 2 of 2
LEGEND: (fill in blank)  = Smear and Total Location	DATE: 1/25/06	TIME: 07:00



Building 256-2 Warehouse

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: [Signature] 1/26/06

REVIEWER SIGNATURE/ DATE: [Signature] / JAN 30 2006

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## RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION: Building 260 -- Dock, Control Room, and all 4 floors.						RWP: IR05-036		Page 1 of 11						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 12/9/05		TIME: 15:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha ( $\alpha$ )	Beta ( $\beta\gamma$ )	Alpha ( $\alpha$ )	Beta ( $\beta\gamma$ )					
<input checked="" type="checkbox"/> Tennelec <u>2</u>	N/A	66819-1	66819-1	2/10/06	2/10/06	0.4	2.67	26.0%	42.8%					
<input checked="" type="checkbox"/> Ludlum 3 / 43-90 <u>E</u>	100	124775	133476	2/24/06	2/24/06	5.0	N/A	16.7%	N/A					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 <u>Q</u>	100	125609	130029	1/25/06	1/25/06	N/A	144	N/A	24.8%					
<input type="checkbox"/> Micro - R <u>NA</u>	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable $\alpha$ <u>N/A</u>		Removable $\beta\gamma$ <u>N/A</u>		Total $\alpha$ <u>N/A</u>		Total $\beta\gamma$ <u>N/A</u>						
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr
1	Wall, Oxide Dock - North	8	8	29	6	3	8	30	25	150	810	666	2685	
2	Wall, Oxide Dock - North	10	10	37	20	18	41	90	85	509	650	506	2040	
3	Wall, Oxide Dock - North	4	4	14	20	18	41	10	5	30	600	456	1839	
4	Wall, Oxide Dock - South	96	96	367	95	92	215	980	975	5838	2040	1896	7645	
5	Wall, Oxide Dock - South	84	84	321	107	104	243	710	705	4222	2620	2476	9984	N/A
6	Wall, Oxide Dock - South	366	366	1404	353	350	818	10140	10135	60689	16930	16786	67685	
7	Wall, Oxide Dock - East	12	11	44	10	7	17	170	165	988	11370	11226	45266	
8	Wall, Oxide Dock - East	10	10	37	28	26	60	350	345	2066	1790	1646	6637	
9	Wall, Oxide Dock - East	48	48	183	34	32	74	250	245	1467	840	696	2806	
REMARKS: Tennelec MDA: $\alpha = 33\text{dpm}/100\text{cm}^2$ ; $\beta\gamma = 31\text{dpm}/100\text{cm}^2$ . Batch Key 5056. (Total $\beta\gamma$ measurements added 12/16/05)														
Ludlum Model 3 with 43-90: MDA = $326\text{dpm}/100\text{cm}^2$ $\alpha$ . Ludlum Model 2224 w/ 43-89: MDA = $1210\text{dpm}/100\text{cm}^2$ $\beta$ .														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> / 12/28/05														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / DEC 28 2005														

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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:

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Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A			
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	dpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	dpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr	
10	Wall, Oxide Dock - West	36	36	137	30	27	64	410	405	2425	600	456	1839		
11	Wall, Oxide Dock - West	192	192	736	206	203	474	9050	9045	54162	950	806	3250		
12	Wall, Oxide Dock - West	34	34	129	34	32	74	150	145	868	2100	1956	7887		
13	Floor, Oxide Dock -- NE	328	328	1258	242	239	559	10400	10395	62246	5530	5386	21718		
14	Floor, Oxide Dock -- SE	68	68	260	69	66	154	4410	4405	26377	32360	32216	129903		
15	Floor, Oxide Dock -- NW	40	40	152	44	42	97	1270	1265	7575	3090	2946	11879		
16	Floor, Oxide Dock -- SW	294	294	1128	413	410	959	12040	12035	72066	26120	25976	104742		
17	Floor, Oxide Dock -- Center	158	158	605	137	134	314	7260	7255	43443	13390	13246	53411		N/A
18	Wall, 1st Floor - North	30	30	114	36	34	79	160	155	928	2850	2706	10911		
19	Wall, 1st Floor - North	84	84	321	57	54	126	200	195	1168	3060	2916	11758		
20	Wall, 1st Floor - North	16	16	60	14	12	27	260	255	1527	2540	2396	9661		
21	Wall, 1st Floor - South	12	11	44	12	9	22	1200	1195	7156	1640	1496	6032		
22	Wall, 1st Floor - South	20	20	75	34	32	74	790	785	4701	940	796	3210		
23	Wall, 1st Floor - South	396	396	1519	328	326	761	320	315	1886	810	666	2685		
24	Wall, 1st Floor - East	44	43	167	40	38	88	380	375	2246	2510	2366	9540		

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE:

1/12/28/05

REVIEWER SIGNATURE/ DATE:

DEC 28 2005

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Page 2 of 3

RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:														Page 3 of 11		
Contamination Limits: (dpm/100cm <sup>2</sup> )				Removable α N/A			Removable βγ N/A			Total α N/A			Total βγ N/A			
Sample No.	Description / Location	Gross CPM α Removable	Net CPM α Removable	dpm/100cm <sup>2</sup> α Removable	Gross CPM β Removable	Net CPM β Removable	dpm/100cm <sup>2</sup> β Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm <sup>2</sup> α Total	Gross CPM β Total	Net CPM β Total	dpm/100cm <sup>2</sup> β Total	mR/hr or uR/hr		
25	Wall, 1st Floor - East	8	8	29	16	13	31	220	215	1287	1490	1346	5427			
26	Wall, 1st Floor - East	110	110	421	103	100	234	1270	1265	7575	3550	3406	13734			
27	Wall, 1st Floor - West	34	34	129	36	34	79	1440	1435	8593	2670	2526	10185			
28	Wall, 1st Floor - West	6	5	21	16	13	31	30	25	150	750	606	2444			
29	Wall, 1st Floor - West	198	198	759	151	149	347	1960	1955	11707	2930	2786	11234			
30	Floor, 1st Floor -- NE	114	114	436	97	94	220	2310	2305	13802	8120	7976	32161			
31	Floor, 1st Floor -- SE	228	228	874	153	151	352	3110	3105	18593	12220	12076	48694			
32	Floor, 1st Floor -- NW	102	102	390	105	102	239	1990	1985	11886	6220	6076	24500			
33	Floor, 1st Floor -- SW	134	134	513	101	98	229	2050	2045	12246	9360	9216	37161	N/A		
34	Floor, 1st Floor -- Center	144	143	551	105	102	239	3520	3515	21048	8020	7876	31758			
35	Wall, Control Room/Lab - North	22	22	83	24	21	50	16	11	66	1340	1196	4823			
36	Wall, Control Room/Lab - South	42	42	160	26	24	55	17	12	72	2120	1976	7968			
37	Wall, Control Room/Lab - East	38	37	144	38	36	83	11	6	36	1290	1146	4621			
38	Wall, Control Room/Lab - West	6	5	21	10	7	17	11	6	36	740	596	2403			
39	Floor, Control Room -- N	198	197	758	208	205	479	1900	1895	11347	3520	3376	13613			
REMARKS: None																
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> / 12/28/05																
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / DEC 28 2005																

Attachment 1

FOR INFORMATION ONLY

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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:														Page 4 of 11	
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A			
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$	Net CPM $\alpha$	dpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	dpm/100cm <sup>2</sup> $\beta$	mR/hr or $\mu$ R/hr	
		Removable	Removable	Removable	Removable	Removable	Removable	Total	Total	Total	Total	Total	Total		
40	Floor, Control Room -- S	142	142	544	129	126	295	4350	4345	26018	5510	5366	21637		
41	Floor, Control Room -- E	142	142	544	117	114	266	2550	2545	15240	4420	4276	17242		
42	Floor, Control Room -- W	184	184	705	170	167	390	7920	7915	47395	6320	6176	24903		
43	Wall, 2nd Floor - North	28	28	106	36	34	79	2200	2195	13144	2160	2016	8129		
44	Wall, 2nd Floor - North	50	49	190	42	40	93	1220	1215	7275	3270	3126	12605		
45	Wall, 2nd Floor - North	502	502	1927	564	562	1312	1010	1005	6018	2720	2576	10387		
46	Wall, 2nd Floor - South	58	58	221	54	52	121	180	175	1048	1500	1356	5468		
47	Wall, 2nd Floor - South	40	40	152	34	32	74	160	155	928	1380	1236	4984		
48	Wall, 2nd Floor - South	80	80	306	60	58	135	260	255	1527	1520	1376	5548	N/A	
49	Wall, 2nd Floor - East	480	480	1842	467	465	1086	2200	2195	13144	2840	2696	10871		
50	Wall, 2nd Floor - East	54	54	206	46	44	102	240	235	1407	2850	2706	10911		
51	Wall, 2nd Floor - East	34	34	129	10	7	17	320	315	1886	1860	1716	6919		
52	Wall, 2nd Floor - West	144	143	551	105	102	239	470	465	2784	8140	7996	32242		
53	Wall, 2nd Floor - West	142	142	544	93	90	210	910	905	5419	810	666	2685		
54	Wall, 2nd Floor - West	182	181	697	133	130	304	1570	1565	9371	3220	3076	12403		

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: *[Signature]* / 12/28/05

REVIEWER SIGNATURE/ DATE: *[Signature]* / DEC 28 2005

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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:														Page 5 of 11	
Contamination Limits: (dpm/100cm <sup>2</sup> )				Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	dpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	dpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr	
55	Floor, 2nd Floor -- NE	204	204	782	185	183	427	1670	1665	9970	6330	6186	24944		
56	Floor, 2nd Floor -- SE	102	102	390	63	60	140	1980	1975	11826	5490	5346	21556		
57	Floor, 2nd Floor -- NW	194	194	744	218	215	502	3480	3475	20808	29260	29116	117403		
58	Floor, 2nd Floor -- SW	224	224	859	179	177	413	3000	2995	17934	7200	7056	28452		
59	Floor, 2nd Floor -- Center	588	588	2257	476	473	1105	2950	2945	17635	11460	11316	45629		
60	Wall, 3rd Floor - North	30	30	114	28	26	60	240	235	1407	1110	966	3895		
61	Wall, 3rd Floor - North	54	54	206	67	64	150	250	245	1467	3690	3546	14298		
62	Wall, 3rd Floor - North	38	37	144	20	18	41	580	575	3443	1380	1236	4984		
63	Wall, 3rd Floor - South	66	66	252	46	44	102	700	695	4162	2110	1966	7927	N/A	
64	Wall, 3rd Floor - South	28	28	106	36	34	79	120	115	689	2740	2596	10468		
65	Wall, 3rd Floor - South	16	16	60	16	13	31	150	145	868	2260	2116	8532		
66	Wall, 3rd Floor - East	234	234	897	169	166	389	2200	2195	13144	1850	1706	6879		
67	Wall, 3rd Floor - East	80	80	306	89	86	201	400	395	2365	5090	4946	19944		
68	Wall, 3rd Floor - East	64	64	244	60	58	135	510	505	3024	1660	1516	6113		
69	Wall, 3rd Floor - West	12	11	44	10	7	17	460	455	2725	7930	7786	31395		
REMARKS: None															
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 12/28/05															
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / DEC 28 2005															

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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:														Page 6 of 11
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable $\alpha$ N/A			Removable $\beta$ N/A			Total $\alpha$ N/A			Total $\beta$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$	Net CPM $\alpha$	Bpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	Bpm/100cm <sup>2</sup> $\beta$	Gross CPM $\alpha$	Net CPM $\alpha$	Bpm/100cm <sup>2</sup> $\alpha$	Gross CPM $\beta$	Net CPM $\beta$	Bpm/100cm <sup>2</sup> $\beta$	mR/hr or uR/hr
70	Wall, 3rd Floor - West	50	49	190	42	40	93	420	415	2485	1950	1806	7282	
71	Wall, 3rd Floor - West	38	37	144	63	60	140	320	315	1886	6800	6656	26839	
72	Floor, 3rd Floor -- NE	88	87	336	72	70	163	6930	6925	41467	8560	8416	33935	
73	Floor, 3rd Floor -- SE	550	550	2111	476	473	1105	13510	13505	80868	20890	20746	83653	
74	Floor, 3rd Floor -- NW	94	93	359	77	74	173	1780	1775	10629	5660	5516	22242	
75	Floor, 3rd Floor -- SW	286	286	1097	236	233	545	4190	4185	25060	4440	4296	17323	
76	Floor, 3rd Floor -- Center	1194	1194	4584	1044	1041	2432	5980	5975	35778	14130	13986	56395	
77	Wall, 4th Floor - North	10	10	37	24	21	50	380	375	2246	1290	1146	4621	
78	Wall, 4th Floor - North	102	102	390	101	98	229	360	355	2126	1640	1496	6032	N/A
79	Wall, 4th Floor - North	10	10	37	8	6	13	280	275	1647	1390	1246	5024	
80	Wall, 4th Floor - South	18	18	68	12	9	22	300	295	1766	1740	1596	6435	
81	Wall, 4th Floor - South	18	18	68	22	20	46	280	275	1647	1700	1556	6274	
82	Wall, 4th Floor - South	32	32	121	30	27	64	300	295	1766	1600	1456	5871	
83	Wall, 4th Floor - East	28	27	105	26	24	55	460	455	2725	1590	1446	5831	
84	Wall, 4th Floor - East	20	20	75	18	15	36	280	275	1647	1800	1656	6677	

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE: [Signature] / 12/28/05

REVIEWER SIGNATURE/ DATE: [Signature] / DEC 28 2005

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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION:														Page 7 of 11
Contamination Limits: (dpm/100cm <sup>2</sup> )			Removable α N/A			Removable βγ N/A			Total α N/A			Total βγ N/A		
Sample No.	Description / Location	Gross CPM α Removable	Net CPM α Removable	dpm/100cm <sup>2</sup> α Removable	Gross CPM β Removable	Net CPM β Removable	dpm/100cm <sup>2</sup> β Removable	Gross CPM α Total	Net CPM α Total	dpm/100cm <sup>2</sup> α Total	Gross CPM β Total	Net CPM β Total	dpm/100cm <sup>2</sup> β Total	mR/hr or uR/hr
85	Wall, 4th Floor - East	10	10	37	12	9	22	220	215	1287	2180	2036	8210	
86	Wall, 4th Floor - West	232	232	890	173	171	399	800	795	4760	1220	1076	4339	
87	Wall, 4th Floor - West	56	55	213	75	72	168	600	595	3563	1640	1496	6032	
88	Wall, 4th Floor - West	52	52	198	63	60	140	320	315	1886	1470	1326	5347	
89	Floor, 4th Floor -- NE	90	90	344	54	52	121	930	925	5539	11230	11086	44702	N/A
90	Floor, 4th Floor -- SE	694	694	2664	645	642	1500	12610	12605	75479	13790	13646	55024	
91	Floor, 4th Floor -- NW	108	108	413	91	88	206	2010	2005	12006	7010	6866	27685	
92	Floor, 4th Floor -- SW	50	49	190	48	46	107	1040	1035	6198	4410	4266	17202	
93	Floor, 4th Floor -- Center	1496	1496	5744	1632	1629	3807	12070	12065	72246	11510	11366	45831	
94														
95														
96														
97														
98														
99														
REMARKS:														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> / 12/28/05														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / DEC 28 2005														

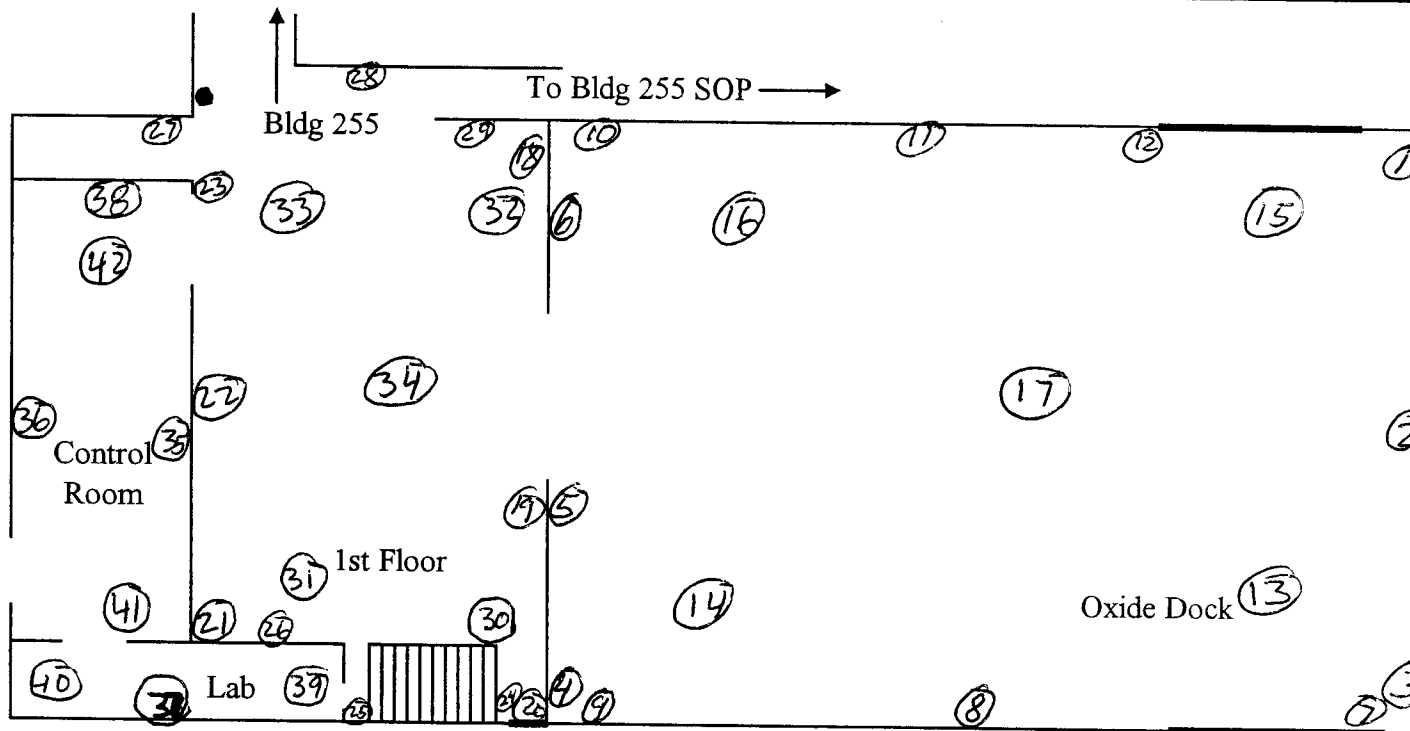
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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION: Building 260	RWP: IR05-036	Page 8 of 11
LEGEND: (fill in blank)  = Smear and Total Location	DATE:	TIME:



Building 260

N →

REMARKS: None

TECHNICIAN(S) SIGNATURE/ DATE:

*M. J. Hill*

12/28/05

112/12/05

N/A

REVIEWER SIGNATURE/ DATE:

*[Signature]*


DEC 28 2005

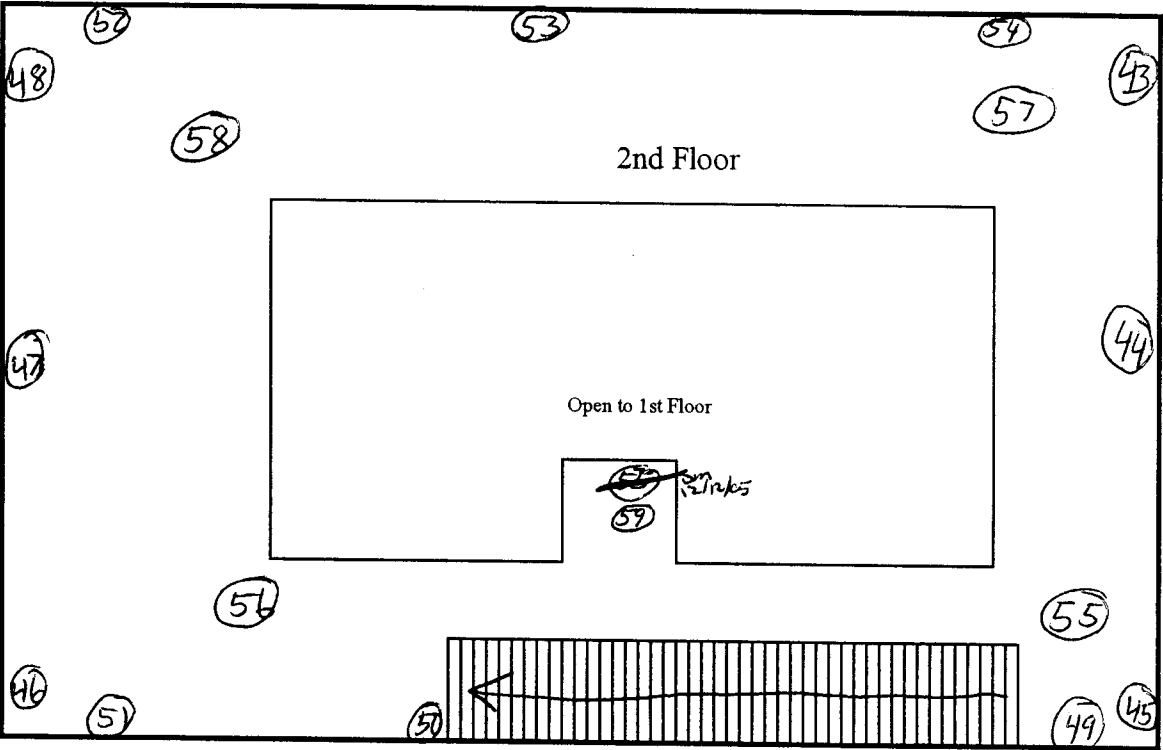
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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION: Building 260		RWP:	IR05-036	Page 9 of 11
LEGEND: (fill in blank)  = Smear and Total Location			DATE:	TIME:



2nd Floor

Open to 1st Floor

Building 260

N →

REMARKS: None				
TECHNICIAN(S) SIGNATURE/ DATE:		12/28/05		
REVIEWER SIGNATURE/ DATE:		DEC 28 2005		

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RADIOLOGICAL SURVEY REPORT

CH-120405-03

SURVEY LOCATION: Building 260		RWP: IR05-036	Page 10 of 11
LEGEND: (fill in blank) <input type="radio"/> = Smear and Total Location		DATE:	TIME:

3rd Floor

Open to 1st Floor

Building 260

N →

REMARKS: None	
TECHNICIAN(S) SIGNATURE/ DATE:	<i>Mill</i> 12/28/05
REVIEWER SIGNATURE/ DATE:	<i>[Signature]</i> / DEC 28 2005

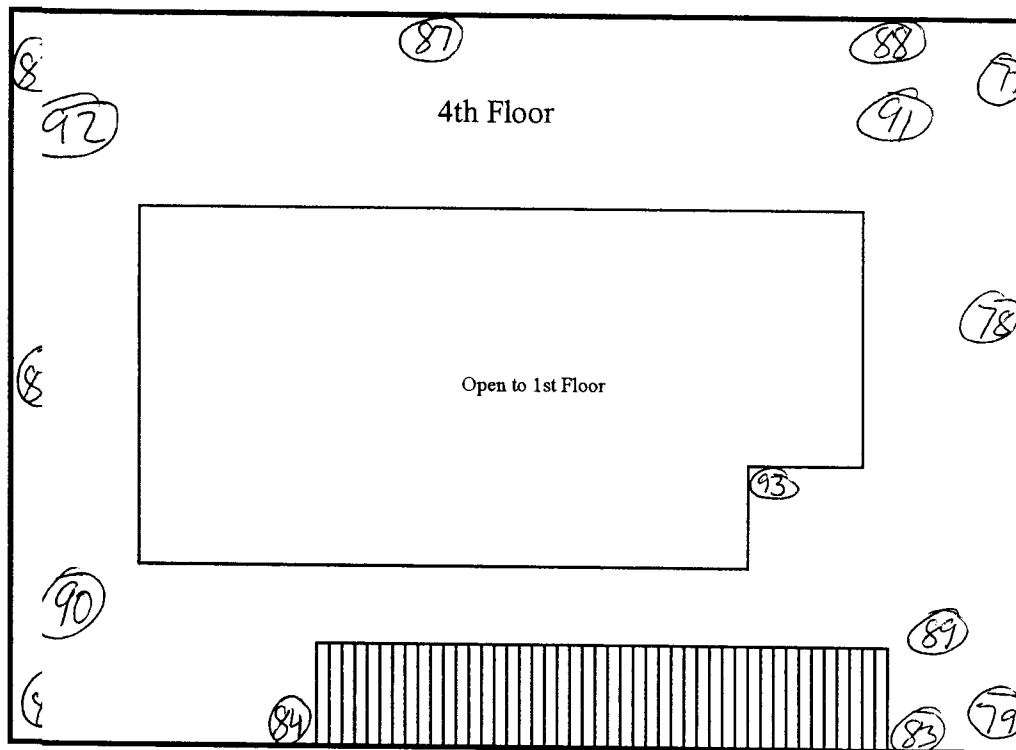
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RADIOLOGICAL SURVEY REPORT

CH-120905-03

SURVEY LOCATION: 260	RWP:	IR05-036	Page 11 of 11
LEGEND: (fill in blank) — Smear and Total Location		DATE:	TIME:



N →

REMARKS: None

TECHNICIAN(S) SIGNATURE:

*[Signature]*

12/28/05

1/2/12/05

MA

REVIEWER SIGNATURE

*[Signature]*

DEC 28 2005

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RADIOLOGICAL SURVEY REPORT

CH-012706-05


SURVEY LOCATION: Bldg 260 Limestone Shed						RWP: IR05-036		Page 1 of 2						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/24/06		TIME: 11:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.3	2.57	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 S	100	218861	130035	2/16/06	2/16/06	24.0	133	13.3%	23.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
		Removable	Removable	Removable	Removable	Removable	Removable	Total	Total	Total	Total	Total	Total	
1	Floor	24	24	91	8	5	14	460	436	3278	816	683	2970	N/A
2	Floor	20	20	76	20	18	45	312	288	2165	714	581	2526	
3	Floor	40	40	153	28	26	66	245	221	1662	669	536	2330	
4	Floor	30	30	114	36	34	86	64	40	301	252	119	517	
5	Floor	34	34	130	38	36	91	192	168	1263	509	376	1635	
6	Floor	44	44	168	34	31	81	616	592	4451	1535	1402	6096	
7	Wall	4	4	14	3	0	0	24	0	0	108	-25	0	
8	Wall	6	6	22	4	2	4	26	2	15	134	1	4	
9	Wall	2	2	7	8	5	14	27	3	23	127	-6	0	
10	Wall	6	6	22	12	9	24	22	-2	0	142	9	39	
11	Wall	14	14	53	10	7	19	49	25	188	428	295	1283	
REMARKS Tennelec MDA: α = 31dpm/100cm <sup>2</sup> ; βγ = 32.5 dpm/100cm <sup>2</sup> . Ludlum Model 2224 w/ 43-89: MDA - α = 194 dpm/100cm <sup>2</sup> ; 246 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <u>[Signature]</u> / 1/26/06														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / JAN 30 2006														

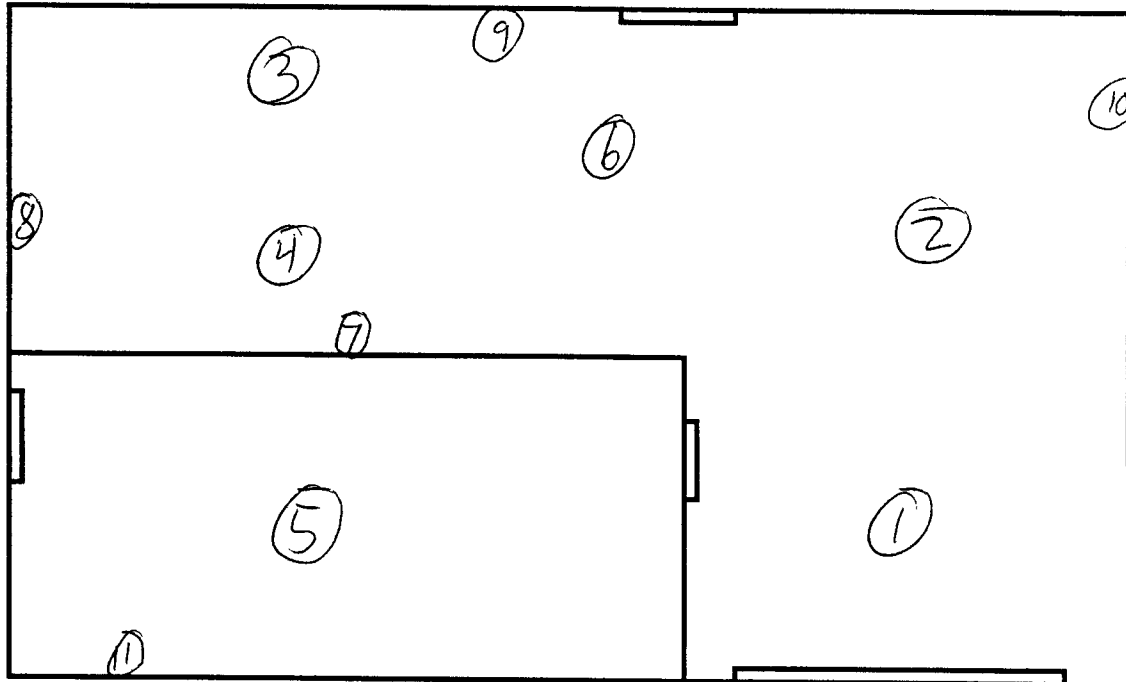
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RADIOLOGICAL SURVEY REPORT

CH-012706-05

SURVEY LOCATION: Limestone Building	RWP:	IR05-036	Page 2 of 2
LEGEND: (fill in blank)  = Smear and Total Location		DATE: 1/24/06	TIME: 11:00



Limestone Bldg

REMARKS: None.

TECHNICIAN(S) SIGNATURE/ DATE:  1/26/06  
REVIEWER SIGNATURE/ DATE:  1 JAN 30 2006

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RADIOLOGICAL SURVEY REPORT

CH-012306-04

SURVEY LOCATION: South Vault						RWP: IR05-037		Page 1 of 3						
PURPOSE OF SURVEY: Characterization of Walls and Floors Prior to Building Demolition						DATE: 1/16/06		TIME: 14:00						
Instrument Type(s):	Detector Area (cm <sup>2</sup> )	Serial Number:		Cal. Due Date		Background: (CPM)		Efficiency: (%)						
		meter	detector	meter	detector	Alpha (α)	Beta (βγ)	Alpha (α)	Beta (βγ)					
<input checked="" type="checkbox"/> Tennelec 4	N/A	1224	1224	4/12/06	4/12/06	0.4	2.07	26.0%	39.0%					
<input checked="" type="checkbox"/> Ludlum 2224 / 43-89 Q	100	125609	130029	1/25/06	1/25/06	14.0	114	14.6%	22.0%					
<input type="checkbox"/> Ludlum 2224 / 43-89 N/A	100		N/A				N/A							
<input type="checkbox"/> Micro - R NA	N/A		N/A				N/A							
Contamination Limits: (dpm/100cm <sup>2</sup> )		Removable α N/A		Removable βγ N/A		Total α N/A		Total βγ N/A						
Sample No.	Description / Location	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	Gross CPM α	Net CPM α	dpm/100cm <sup>2</sup> α	Gross CPM β	Net CPM β	dpm/100cm <sup>2</sup> β	mR/hr or uR/hr
1	Floor	46	46	176	56	54	138	1320	1306	8945	1820	1706	7755	N/A
2	Floor	56	56	214	70	68	174	578	564	3863	1822	1708	7764	
3	Floor	50	50	191	44	42	107	212	198	1356	840	726	3300	
4	Floor	114	114	438	116	114	292	454	440	3014	1000	886	4027	
5	Floor	148	148	569	120	118	302	1506	1492	10219	1986	1872	8509	
6	Floor	114	114	438	74	72	184	1844	1830	12534	1892	1778	8082	
7	Floor	76	76	291	76	74	189	1764	1750	11986	2574	2460	11182	
8	Floor	208	208	800	212	210	538	1780	1766	12096	6226	6112	27782	
9	Floor	88	88	338	90	88	225	1080	1066	7301	2596	2482	11282	
REMARKS: Tennelec MDA: α = 32 dpm/100cm <sup>2</sup> ; β/γ = 31.1 dpm/100cm <sup>2</sup> .														
Ludlum Model 2224 w/ 43-89: MDA - α = 207 dpm/100cm <sup>2</sup> ; 347 dpm/100cm <sup>2</sup> β.														
TECHNICIAN(S) SIGNATURE/ DATE: <u>Dustin Mills</u> /														
REVIEWER SIGNATURE/ DATE: <u>[Signature]</u> / JAN 23 2006														

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RADIOLOGICAL SURVEY REPORT

CH-012306-04


SURVEY LOCATION: South Vault														Page 2 of 3	
Contamination Limits: (dpm/100cm <sup>2</sup> )				Removable $\alpha$ N/A			Removable $\beta\gamma$ N/A			Total $\alpha$ N/A			Total $\beta\gamma$ N/A		
Sample No.	Description / Location	Gross CPM $\alpha$ Removable	Net CPM $\alpha$ Removable	dpm/100cm <sup>2</sup> $\alpha$ Removable	Gross CPM $\beta$ Removable	Net CPM $\beta$ Removable	dpm/100cm <sup>2</sup> $\beta$ Removable	Gross CPM $\alpha$ Total	Net CPM $\alpha$ Total	dpm/100cm <sup>2</sup> $\alpha$ Total	Gross CPM $\beta$ Total	Net CPM $\beta$ Total	dpm/100cm <sup>2</sup> $\beta$ Total	mR/hr or uR/hr	
10	Floor	456	456	1755	190	188	482	5528	5514	37767	6482	6368	28945		
11	Floor	64	64	245	64	62	159	338	324	2219	1278	1164	5291		
12	Floor	40	40	153	24	22	56	346	332	2274	1274	1160	5273		
13	Wall	50	50	191	48	46	118	166	152	1041	354	240	1091		
14	Wall	6	6	22	10	8	20	32	18	123	194	80	364		
15	Wall	118	118	453	46	44	113	34	20	137	176	62	282		
16	Wall	34	34	130	34	32	82	48	34	233	192	78	355		
17	Wall	40	40	153	40	38	97	106	92	630	272	158	718	N/A	
18	Wall	16	16	60	22	20	51	294	280	1918	382	268	1218		
19	Wall	250	250	962	80	78	200	246	232	1589	338	224	1018		
20	Wall	200	200	769	140	138	353	166	152	1041	320	206	936		
21	Wall	110	110	422	70	68	174	694	680	4658	394	280	1273		
22	Wall	1632	1631	6284	660	658	1686	984	970	6644	1670	1556	7073		
23	Wall	34	34	130	18	16	41	1322	1308	8959	632	518	2355		
24	Wall	8	8	29	8	6	15	134	120	822	338	224	1018		
25	Floor	194	194	746	206	204	522	1056	1042	7137	11572	11458	52082		
26	Floor	124	124	476	136	134	343	794	780	5342	16998	16884	76745		
TECHNICIAN(S) SIGNATURE/ DATE: <i>[Signature]</i> / 1/18/06															
REVIEWER SIGNATURE/ DATE: <i>[Signature]</i> / JAN 23 2006															

FOR INFORMATION ONLY

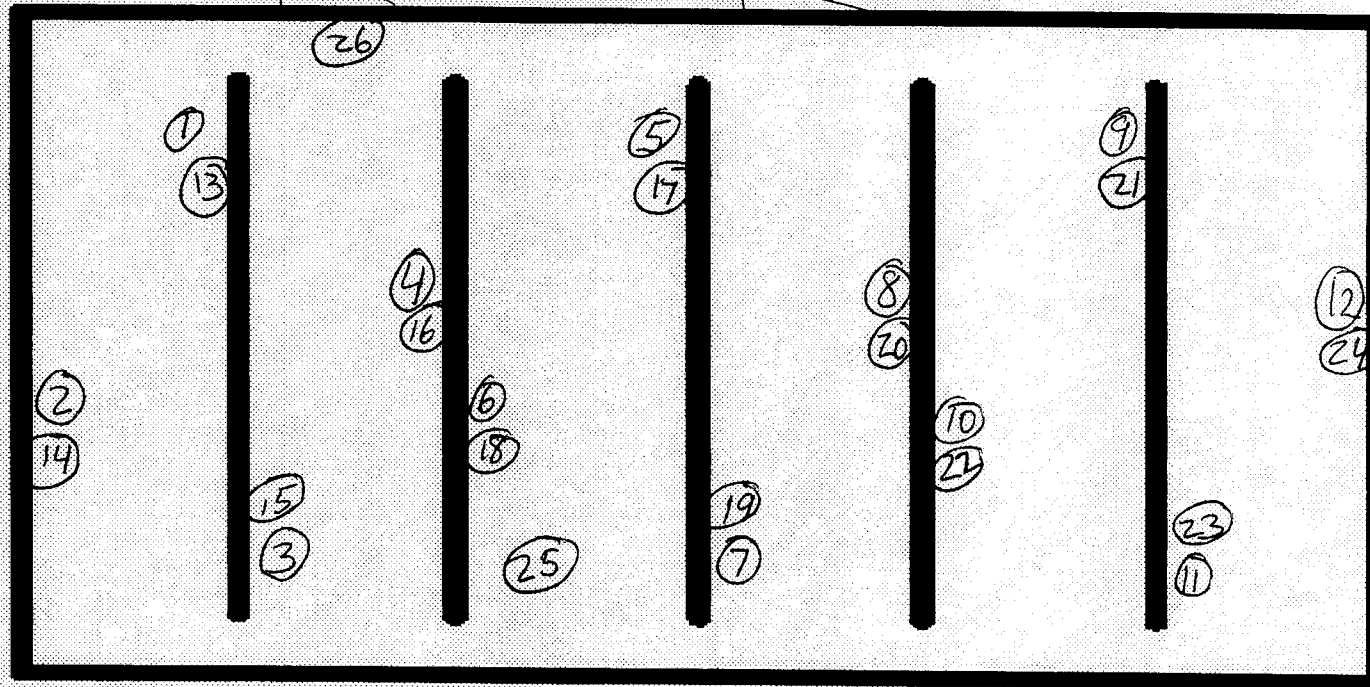
Appendix A  
Page 3 of 3

RADIOLOGICAL SURVEY REPORT

CH-012306-04

SURVEY LOCATION: South Vault	RWP:	IR05-037	Page 3 of 3
LEGEND: (fill in blank)  = Smear and Total Location		DATE: 1/16/06	TIME: 14:00

South Vault



REMARKS: None.

TECHNICIAN(S) SIGNATURE/ DATE: Dustin Mills / 1/18/06

REVIEWER SIGNATURE/ DATE: [Signature] / JAN 23 2006

**Safety Assessment for Additional Hematite Project Waste at USEI  
RAIs and Proposed Resolution**

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-1	HEM-12-2 Section 5.2 and HDP-TBD-WM-906 Section 8.1	Waste characterization plan for "additional equipment which may be identified as candidate material for USEI" is not provided.	10CFR20.2002(a)	Section 5.2 discusses examples of miscellaneous equipment being identified as candidate material. An example was the water treatment equipment. The section further indicates these materials would receive HP surveys, which could be interpreted to mean just direct surface activity measurements. The statement is made that the results of these surveys will be used to determine the radionuclide inventory. Overall, the discussion is very vague as to the requirements for adequately characterizing these materials for shipment. The commitments made in Section 5.2, although vague, are then further confounded in Attachment 1, as Section 8.1 states that for HEPA units scaling factors were used for Tc-99 and U-235 based on gamma radiation levels and MCNP. It is noted in the final sentence that <u>no additional characterization of this miscellaneous equipment is planned.</u>	Is characterization of miscellaneous equipment planned?  Clarifying information should be provided for the processes used to characterize miscellaneous equipment and for quantifying the radionuclide-specific inventory.
<b>Response Summary:</b> Characterization of miscellaneous equipment is planned, with the exemption of the equipment listed in Table 8.1 of HDP-TBD-WM-906. The equipment listed in Table 8.1 of HDP-TBD-WM-906 has been characterized as described in that document. See RAI GEN-1 regarding a procedure for survey/sampling of equipment, other than equipment listed in Table 8.1.					
<b>Response Detail:</b> Section 8.1 of HDP-TBD-WM-906 will be revised to indicate that no additional characterization of the equipment identified in Table 8.1 is planned. Miscellaneous equipment to be consigned to USEI is predicted to have insignificant Tc-99 contribution (i.e., <0.1% of the total inventory allowance for Tc-99 in this application), any contribution from these materials will be included in and tracked against the allowable Tc-99 inventory in accordance with the procedure for survey/sampling discussed in RAI GEN-1.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-2	HEM-12-2 Section 5.2.2	There is an issue with the additional characterization batching and analytical approach for piping.	10CFR20.2002(a)	The context that batching is used here appears similar to the concept of survey units or survey populations. The type of survey, required number of samples, and related data quality batches generally infer the batched population is similar in type or historical use of the material. However the batching	Provide further justification as to appropriateness of batching characterization populations based on railcar lots and for using gamma spectroscopy for total uranium determination.

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
				description discusses using the railroad car as the designator. This would be appropriate if the data were being collected to ensure dosimetric conditions, discussed in later sections, were being met, but may not be appropriate for gathering characterization data. The potential for dissimilar piping being batched then leads to additional concerns as to whether the use of gamma spectrometry to quantify enriched uranium quantities is appropriate without specific further details as to how the U-234 contribution to the total uranium concentrations will be calculated. Are the isotopic abundances consistent enough where a single scaling factor will be used or will a comparison of the U-235 to U-238 concentration be made with a subsequent enrichment estimate from which the multiplier will be determined?	Provide details on the processes used to characterize piping and for quantifying the radionuclide-specific inventory.  Clarify how scaling factors will be used in piping analyses and whether or not a comparison of the U-235 to U-238 concentration will be made along with a subsequent enrichment estimate from which the multiplier will be determined.
<p><b>Response Summary:</b> Additional justification is provided that the piping to be consigned to USEI is similar for batching considerations. The use of gamma spectroscopy is sufficient for total uranium determination since U-234 activity is determined by using the U-235 to U-238 ratio and an enrichment lookup table previously submitted with the Decommissioning Plan. Additional details are provided for characterizing the balance of the radionuclide inventory in piping.</p>					
<p><b>Response Detail:</b> <i>Similarity of Piping for Batching:</i> The exclusion of the most contaminated piping from disposal at USEI results in the remaining piping being similar in nature. Based on the characterization data for the remaining piping designated for USEI (as shown in the Table 1 to RAI SA-2 below) uranium enrichment ranges only from 2.1 to 6 percent by weight, and Tc-99 concentrations in a relatively narrow band of 1.6 pCi/g to 174 pCi/g. Additionally, the exclusion of piping from disposal at USEI results in a reduction of the observed Tc-99 standard deviation within the characterization dataset from 1261 pCi/g to 39 pCi/g. (Section 7.1 of HDP-TBD-WM-906 describes the piping that is associated with significant Tc-99 activities (i.e., all piping located below buildings 240 and 260) will be excluded from disposal at USEI. This piping represents 87 percent of the Tc-99 inventory for all building piping, but comprises only 17 percent of the total piping volume.)</p> <p><i>Characterization Details:</i> As indicated in Section 5.2.2 of Enclosure 1 to HEM-12-2, 14 samples will be collected from each railcar-sized lot of piping materials. (1 sample per 7.1 m<sup>3</sup>) These samples will be analyzed for Tc-99, and for U-235 and U-238 by gamma spectroscopy. As discussed in RAI GEN-1, a procedure for this sampling of piping will be provided under separate cover. <i>U-234 Activity Determination:</i> Tc-99 concentrations will be determined by radiological sample analysis, as will U-235 and U-238 concentrations (gamma spectroscopy). The U-235 to U-238 ratio will be used to locate the associated enrichment and U-234 activity fraction from Table C-1 Appendix C (<i>Calculation Methodology for Determining U-234:U-235 scaling factors relative to Enrichment</i>) to DO-08-008 (<i>Derivation of Surrogates and Scaling Factors for Hard to Detect Radionuclides</i>). DO-08-008 was submitted with the Decommissioning Plan.</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion		Path Forward	
Table 1 to RAI SA-2, Sample Data, Piping Included in USEI Exemption Request							
Location			Tc-99 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)	U-238/U-235 (Calculated)	Enrichment (wt % U-235)
255-53			2	4.49	32.31	7.19	2.12
255-47			28	122.01	765.60	6.27	2.42
255-53			36	0.16	0.91	5.79	2.62
Storm Drain - North Between 110 and Process			6	0.13	0.66	5.23	2.89
Storm Drain - South 240			2	0.01	0.03	5.15	2.93
Storm Drain - East of Process Bldg.			174	101.01	432.30	4.28	3.51
Storm Drain - Between 240 and 255			33	5.86	24.68	4.21	3.56
255-59			2	60.48	166.98	2.76	5.33
255-61			3	14.51	35.97	2.48	5.90
255-56			44	258.30	633.60	2.45	5.96

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-3	HDP-TBD-WM-906 Section 6.4, Tables 6-2 and 6-3	It is not clear how the values in Table 6-2 and Table 6-3 were determined, or which area each result represents.	10CFR20.2002(a)	<p>It is noted in Section 6.4 of the TBD that Tables 6-2 and 6-3 provide details on the calculation of the two activity components for both elevated areas and areas not in the "six identified areas." It is not clear which data are calculated using a scaling factor or other indirect method and which data are from actual radionuclide specific sampling results.</p> <p>It is not clear how these samples are organized, and the origin of each result. As presented, the reviewer is left to assume each table represents a single population. Figure 1 in Appendix D suggests the samples can be divided into building footprints (potential population) and elevated area (potential subpopulations).</p>	<p>Provide details on how each data set was determined and whether or not actual sampling results were used for each nuclide.</p> <p>Add columns to show relationships with buildings, areas, and any other appropriate subdivision.</p>
<b>Response Summary:</b> The values shown Tables 6-2 and 6-3 were based on actual sample data from Tables 1 through 4 of Appendix D of HDP-					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward																																																																																																																
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<p><b>Response Detail:</b> While columns have been added to Tables 6-2 and 6-3 with information on their location, associated sample locations are shown in HDP-TBD-WM-906, Appendix D, Figure 1. In the context of paragraphs 4 to 6 of Section 6.4 of HDP-TBD-WM-906, the term ‘elevated area’ should not have been used since this term is used elsewhere in the document for the specific six areas identified on Figure 1 of Appendix D. In the context of paragraphs 4 to 6 of Section 6.4 ‘elevated areas’ should be replaced with ‘areas where GWS exceeded 4,400 cpm or higher Tc-99 Samples’. The title of Table 6-2 has been changed accordingly below.</p> <p>The values shown in Tables 6-2 and 6-3 are weighted average concentrations for all samples from that specific location; the concentrations are located Tables 1 through 4 of Appendix D. For example if 3 samples were taken at a location (from top 1/4 inch, next 1/2 inch, remainder), then each sample result was weighted the thickness of concrete it represented to determine the average.</p> <p><b>Table 6-2 to HDP-TBD-WM-906, Determination of Average Activity where GWS Results Exceeded 4,400 cpm or Tc-99 Results Were Higher*</b></p> <table> <tr> <th rowspan="2">Sample #</th><th rowspan="2">Location (Building)</th><th colspan="4">Concentration (pCi/g)</th></tr> <tr> <th>Tc-99</th><th>U-234</th><th>U-235</th><th>U-238</th></tr> <tr><td>1</td><td>240 Respirator Wash</td><td>0.1</td><td>81</td><td>3.9</td><td>8.8</td></tr> <tr><td>4</td><td>240 Red Room</td><td>4.0</td><td>2837</td><td>146</td><td>1010</td></tr> <tr><td>5</td><td>240 Green Room</td><td>1.8</td><td>1909</td><td>92</td><td>563</td></tr> <tr><td>6</td><td>240 Maintenance Shop</td><td>2.7</td><td>1053</td><td>58</td><td>308</td></tr> <tr><td>7</td><td>240 Maintenance Shop</td><td>0.2</td><td>145</td><td>6.4</td><td>47</td></tr> <tr><td>8</td><td>253</td><td>15</td><td>178</td><td>6.1</td><td>24</td></tr> <tr><td>10</td><td>254</td><td>0.2</td><td>1374</td><td>48</td><td>221</td></tr> <tr><td>13</td><td>255</td><td>1.0</td><td>394</td><td>15</td><td>46</td></tr> <tr><td>14</td><td>255 Erbia Lab</td><td>0.4</td><td>282</td><td>13</td><td>7.1</td></tr> <tr><td>16</td><td>260 SW HVAC Rm</td><td>13</td><td>565</td><td>22</td><td>140</td></tr> <tr><td>17</td><td>255</td><td>1.3</td><td>748</td><td>29</td><td>158</td></tr> <tr><td>18</td><td>255/260</td><td>0.3</td><td>293</td><td>15</td><td>156</td></tr> <tr><td>56</td><td>South Vault</td><td>1.6</td><td>2103</td><td>90</td><td>165</td></tr> <tr><td>57</td><td>South Vault</td><td>3.4</td><td>1603</td><td>69</td><td>2.3</td></tr> <tr><td>58</td><td>254</td><td>0.78</td><td>961</td><td>39</td><td>147</td></tr> <tr><td>59</td><td>254</td><td>2.1</td><td>2687</td><td>116</td><td>423</td></tr> <tr><td><b>Average</b></td><td></td><td><b>3.0</b></td><td><b>1076</b></td><td><b>48</b></td><td><b>214</b></td></tr> </table> <p>*Sample locations excluded since in areas that will not be shipped to USEI: 2, 3, 20, 21 and 35. Sample</p>						Sample #	Location (Building)	Concentration (pCi/g)				Tc-99	U-234	U-235	U-238	1	240 Respirator Wash	0.1	81	3.9	8.8	4	240 Red Room	4.0	2837	146	1010	5	240 Green Room	1.8	1909	92	563	6	240 Maintenance Shop	2.7	1053	58	308	7	240 Maintenance Shop	0.2	145	6.4	47	8	253	15	178	6.1	24	10	254	0.2	1374	48	221	13	255	1.0	394	15	46	14	255 Erbia Lab	0.4	282	13	7.1	16	260 SW HVAC Rm	13	565	22	140	17	255	1.3	748	29	158	18	255/260	0.3	293	15	156	56	South Vault	1.6	2103	90	165	57	South Vault	3.4	1603	69	2.3	58	254	0.78	961	39	147	59	254	2.1	2687	116	423	<b>Average</b>		<b>3.0</b>	<b>1076</b>	<b>48</b>	<b>214</b>
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RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward																																																																																																																																																				
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		<p align="center"><b>Table 6-3 to HDP-TBD-WM-906, Determination of Average Activity for Remaining Slab Area where GWS Results Were Less Than 4,400 cpm and Tc-99 Results Were Nominal*</b></p> <table> <tr> <th rowspan="2">Sample #</th><th rowspan="2">Location (Building)</th><th colspan="4">Concentration, pCi/g</th></tr> <tr> <th>Tc-99</th><th>U-234</th><th>U-235</th><th>U-238</th></tr> <tr><td>9</td><td>254</td><td>0.6</td><td>585</td><td>20</td><td>78</td></tr> <tr><td>11</td><td>254</td><td>-0.3</td><td>120</td><td>4.7</td><td>23</td></tr> <tr><td>12</td><td>254</td><td>0.3</td><td>127</td><td>4.7</td><td>19</td></tr> <tr><td>15</td><td>255</td><td>1.6</td><td>38</td><td>1.7</td><td>7</td></tr> <tr><td>19</td><td>260</td><td>0.7</td><td>189</td><td>7.4</td><td>46</td></tr> <tr><td>31</td><td>240 Red Room</td><td>1.7</td><td>1.1</td><td>0.1</td><td>0.2</td></tr> <tr><td>32</td><td>240 Red Room</td><td>1.9</td><td>0.4</td><td>0.0</td><td>0.2</td></tr> <tr><td>33</td><td>240 Red Room</td><td>1.8</td><td>1.2</td><td>0.1</td><td>0.3</td></tr> <tr><td>34</td><td>240 Red Room</td><td>2.2</td><td>9.7</td><td>0.5</td><td>0.8</td></tr> <tr><td>36</td><td>253 Ring Storage</td><td>2.0</td><td>0.4</td><td>0.0</td><td>0.2</td></tr> <tr><td>38</td><td>260 UF6 Vaporizer</td><td>3.7</td><td>13</td><td>0.7</td><td>2.8</td></tr> <tr><td>39</td><td>260 UF6 Vaporizer</td><td>2.7</td><td>11</td><td>0.6</td><td>2.8</td></tr> <tr><td>40</td><td>260 UF6 Vaporizer</td><td>10.9</td><td>44</td><td>2.4</td><td>12</td></tr> <tr><td>41</td><td>260 UF6 Vaporizer</td><td>7.6</td><td>39</td><td>2.2</td><td>9.3</td></tr> <tr><td>42</td><td>260 UF6 Vaporizer</td><td>5.0</td><td>12</td><td>0.6</td><td>3.2</td></tr> <tr><td>43</td><td>240 Laundry</td><td>1.7</td><td>1.1</td><td>0.1</td><td>0.5</td></tr> <tr><td>44</td><td>240 Green Room</td><td>1.7</td><td>5.4</td><td>0.3</td><td>1.7</td></tr> <tr><td>45</td><td>240 Maintenance Shop</td><td>2.5</td><td>2.7</td><td>0.1</td><td>1.9</td></tr> <tr><td>46</td><td>240 Maintenance Shop</td><td>1.7</td><td>15</td><td>0.8</td><td>6.2</td></tr> <tr><td>47</td><td>253 Ring Storage</td><td>1.7</td><td>1.4</td><td>0.1</td><td>0.4</td></tr> <tr><td>48</td><td>253 Waste Prep</td><td>2.5</td><td>3.0</td><td>0.2</td><td>0.7</td></tr> <tr><td>49</td><td>254 Ceramic</td><td>1.7</td><td>0.2</td><td>0.0</td><td>0.1</td></tr> <tr><td>50</td><td>256 Pellet</td><td>1.8</td><td>0.3</td><td>0.0</td><td>0.2</td></tr> </table>				Sample #	Location (Building)	Concentration, pCi/g				Tc-99	U-234	U-235	U-238	9	254	0.6	585	20	78	11	254	-0.3	120	4.7	23	12	254	0.3	127	4.7	19	15	255	1.6	38	1.7	7	19	260	0.7	189	7.4	46	31	240 Red Room	1.7	1.1	0.1	0.2	32	240 Red Room	1.9	0.4	0.0	0.2	33	240 Red Room	1.8	1.2	0.1	0.3	34	240 Red Room	2.2	9.7	0.5	0.8	36	253 Ring Storage	2.0	0.4	0.0	0.2	38	260 UF6 Vaporizer	3.7	13	0.7	2.8	39	260 UF6 Vaporizer	2.7	11	0.6	2.8	40	260 UF6 Vaporizer	10.9	44	2.4	12	41	260 UF6 Vaporizer	7.6	39	2.2	9.3	42	260 UF6 Vaporizer	5.0	12	0.6	3.2	43	240 Laundry	1.7	1.1	0.1	0.5	44	240 Green Room	1.7	5.4	0.3	1.7	45	240 Maintenance Shop	2.5	2.7	0.1	1.9	46	240 Maintenance Shop	1.7	15	0.8	6.2	47	253 Ring Storage	1.7	1.4	0.1	0.4	48	253 Waste Prep	2.5	3.0	0.2	0.7	49	254 Ceramic	1.7	0.2	0.0	0.1	50	256 Pellet	1.8	0.3	0.0	0.2
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42	260 UF6 Vaporizer	5.0	12	0.6	3.2																																																																																																																																																				
43	240 Laundry	1.7	1.1	0.1	0.5																																																																																																																																																				
44	240 Green Room	1.7	5.4	0.3	1.7																																																																																																																																																				
45	240 Maintenance Shop	2.5	2.7	0.1	1.9																																																																																																																																																				
46	240 Maintenance Shop	1.7	15	0.8	6.2																																																																																																																																																				
47	253 Ring Storage	1.7	1.4	0.1	0.4																																																																																																																																																				
48	253 Waste Prep	2.5	3.0	0.2	0.7																																																																																																																																																				
49	254 Ceramic	1.7	0.2	0.0	0.1																																																																																																																																																				
50	256 Pellet	1.8	0.3	0.0	0.2																																																																																																																																																				

RAI No.	Section	Issue	Regulatory Link	Discussion				Path Forward
		51	256 Warehouse	1.7	0.2	0.0	0.2	
		52	South Vault	8.4	51	2.8	10	
		53	South Vault	3.0	40	2.2	4.4	
		54	West Vault	1.8	9.2	0.5	0.8	
		55	West Vault	2.0	34	1.7	1.0	
		Average		2.7	48	1.9	8.3	
		*Sample locations identified on Figure 1 of Appendix D. For each sample location, the results in Tables 1 to 4 of Appendix D and the thickness of the concrete represented by the sample were used to calculate a weighted average for that location.						

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-4	HDP-TBD-WM-906 Section 6.4	Attachment 1, Section 6.4 provides the discussion of the gamma walkover but no indications of additional surveys for alpha-beta surveys. Table 6.3 shows Tc-99 contamination present outside the 6 "identified" areas.	10CFR20.2002(a)	The gamma walkover surveys were appropriate for identifying high levels of enriched uranium contamination that had been covered by a concrete cap. However, additional alpha-beta surveys should also have been performed to have identified Tc-99 or lower level contamination on uncapped floors if a contaminating event occurred after the cap was placed. The data shown in Table 6.3 provide evidence that Tc-99 contamination is present outside the uranium "identified" areas and substantiates the need to perform surveys capable of identifying Tc-99.	This RAI is essentially a companion to the previous comments indicating that a formal characterization plan should be developed. The recommended path forward is to perform and document these recommended surveys and determine the need for judgmental sampling of suspect areas or provide the basis for why a formal characterization plan is not necessary.
<b>Response Summary:</b> The responses to RAI CH-6 and RAI GEN-1 & 2 describe the nature and extent of additional sampling to be performed prior to dispose of these materials. The response to RAI GEN-2 provides the results of alpha-beta scans of concrete slab surfaces prior to application of fixative.					
<b>Response Detail:</b> Although Westinghouse is committed to the systematic and biased sampling plan, Westinghouse did not consider in HEM-12-2 that Tc-99 up to 10.9 pCi/g to be sufficient to warrant additional sampling in the areas of the concrete slabs to be consigned to USEI.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-5	HDP-TBD-WM-906 Section 6.	Attachment 1, Section 6.4, Table 6-5 does not provide all necessary information to interpret the data.	10CFR20.2002(a)	Average concentration values are assumed by the bold font values beneath each radionuclide but, it is unclear how these values were calculated.	Clarify how Table 6-5 values are produced and provide additional statistics such as median, standard deviation, and distribution (e.g., normal, lognormal, etc.)
<p><b>Response Summary:</b> Calculations for the values in Table 6-5 are shown below and additional statistics are provided where possible. The data sets were too small to determine the appropriate distribution.</p> <p><b>Response Detail:</b> The following tables show the data used in the calculation. For Elevated Locations 1 and 2, the calculations were done conservatively using data that would skew the average high. For Elevated Locations 1 and 2, the tables also show what the result would have been had all of the data been used, as a demonstration of the conservative nature of the original calculation.</p> <p>The concrete population was grouped based on area and activity levels from the following slabs:</p> <ul style="list-style-type: none"> <li>• Elevated Area 1 - Bldg 240, Red Room</li> <li>• Elevated Area 2 - Bldg 240, Green Room</li> <li>• Elevated Area 3 - Bldg 254</li> <li>• Elevated Area 4 -Bldg 255</li> <li>• Elevated Area 6 - Bldg 252</li> <li>• Bldg 235</li> <li>• Balance of Process Buildings Excluding: (a) Elevated Areas (1, 2, 3, 4, 6) and Bldg. 235, listed above; and (b) Elevated Area 5 and the Area 1 cap, both of which will not be consigned to USEI</li> <li>• Concrete outside process buildings</li> <li>• Asphalt</li> </ul> <p>The average concentration, total mass and total activity was determined for each of these areas using sampling data contained in Appendix D, Tables 1 and 4. Multiple samples representing different depth intervals were collected at some of the sample locations and are indicated accordingly in Appendix D. The concentration at each measurement location was based on the weighted average of these subsamples and is calculated for each of the following (as indicated in the notations on the right hand 'Notes' column of Appendix D): 1) the entire core, 2) just the upper cap and 3) just the layer below the upper cap.</p> <p>For concrete associated with Elevated Areas, mass data was based on GIS determination area of the Elevated Areas, slab thickness, and concrete density of 150 lb/ft<sup>3</sup>. For and mass data contained in Appendix A, B, and C in HDP-TBD-WM-906 for other concrete and asphalt.</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward				
<b>Elevated Area 1 - Bldg 240, Red Room</b>									
Nine sample locations are associated with Elevated Area 1. Four samples (2, 3, 4, and 5) were collected at elevated locations and five samples (31, 32, 33, 34, and 35) were collected along the periphery of the observed elevated activity. The average of measurements 2, 3, 4, 5 and 35 were assigned to this area. Note that the concentration excluding the top 3 inches (representing the upper cap) was used for locations 2, 3, 34, and 35 since the cap is excluded from disposal at USEI. With the exception of location 35, the bounding samples were not included in the calculated average as this would have resulted in a less conservative value. Since the concentration was elevated at location 35, it was included in the average. The concentration values shown below were multiplied by the total mass (2.47 x 10 <sup>5</sup> lb) to arrive at the total concentrations values for Elevated Area 2 tabulated in Table 6-5.									
		<b>Mass Calculation</b>							
		<b>area (ft<sup>2</sup>)</b>	<b>Thickness (inch)</b>	<b>Volume (ft<sup>3</sup>)</b>	<b>Mass (lb)</b>				
		1067	6*	534	-				
		1487	9	1115	-				
		Total		1649	2.47E5				
<b>Data Used in Calculation of Average as Conservative Measure</b>				<b>All Data for Location</b>					
<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>	<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>
2	0.37	11	0.40	0.42	2	0.37	11	0.40	0.42
3	3.6	9.7	0.40	4.5	3	3.6	9.7	0.40	4.5
4	4.0	2837	146	1010	4	4.0	2837	146	1010
5	0.45	12	0.63	4.5	5	0.45	12	0.63	4.5
35	1.8	1.1	0.061	0.25	31	1.70	1.06	0.06	0.21
Average	2.0	574	30	204	32	1.85	0.43	0.02	0.22
Median	1.75	10.76	0.40	4.50	33	1.79	1.25	0.07	0.31
Standard Deviation	1.7	1265	65	451	34	2.20	9.66	0.49	0.81
					35	1.8	1.1	0.061	0.25
					Average	2.0	320	16	113
*Does not include the top 3 inches of cover since that would not be consigned to USEI.									

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward				
<b>Elevated Area 2 - Bldg 240, Green Room</b>									
Seven sample locations are associated with Elevated Area 2. Three samples (6, 7, and 8) were collected at elevated locations and four samples (36, 37, 45, and 46) were collected along the periphery of the observed elevated activity. The average of measurements 6, 7, and 8 were assigned to this area. The bounding samples (36, 37, 45, and 46) were not included in the calculated average as this would have resulted in a less conservative value. The concentration values shown below were multiplied by the total mass (2.16 x 10 <sup>5</sup> lb) to arrive at the total concentrations values for Elevated Area 2 tabulated in Table 6-5.									
		<b>Mass Calculation</b>							
		<b>area (ft<sup>2</sup>)</b>	<b>Thickness (inch)</b>	<b>Volume (ft<sup>3</sup>)</b>	<b>Mass (lb)</b>				
		2880	6.0	1440	2.16E5				
<b>Data Used in Calculation of Average as Conservative Measure</b>				<b>All Data for Location</b>					
<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>	<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>
6	2.7	1053	58	308	6	2.7	1053	58	308
7	0.15	145	6.4	47	7	0.15	145	6.4	47
8	15	178	6.1	24	45	2.50	2.70	0.14	1.92
Average	6.1	459.0	23.3	126.3	46	1.70	15.00	0.78	6.15
Median	2.70	178.40	6.41	46.74	8	15	178	6.1	24
Standard Deviation	8.2	515	30	158	Average	4.5	279.0	14.2	77.4
<b>Elevated Area 3 - Bldg 254</b>									
Two sample locations are associated with Elevated Area 3 (58 and 59). Since both of these samples were collected from 0 – 0.75 inches, the average concentration within samples below 0.75 inches (shown in Table 6-4) was used to account for the activity in the un-sampled material. Use of this data results in a conservative determination of the average Tc-99 concentration since the value assigned (2.8 pCi/g) is greater than the average concentration measured in the top 0.75 inch portion (1.4 pCi/g). The sample results included in this calculation are shown below. Note that Tc-99 is the bounding radionuclide from the standpoint of the dose calculated in the 10 CFR 20.2002 request. The concentration values shown below were multiplied by the total mass (3.43 x 10 <sup>4</sup> lb) to arrive at the total concentrations values for Elevated Area 3 tabulated in Table 6-5.									
		<b>Mass Calculation</b>							
		<b>area (ft<sup>2</sup>)</b>	<b>Thickness (inch)</b>	<b>Volume (ft<sup>3</sup>)</b>	<b>Mass (lb)</b>				
		457	6.0	228	3.43E4				
<b>All Data Used in Calculation of Average as Conservative Measure</b>									

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
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Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
58*	0.8	961	39	147
59*	2.1	2687	116	423
**	2.8	39	2	14
Average	2.6	262	11.6	48
Median	1.75	10.76	0.40	4.50
Standard Deviation	1.7	1265	65	451

\*Sample Depth 0 - 0.75 inch  
\*\*Maximum Concentration for each isotope from >0.75" core samples (excluding samples at expansion joints, cracks, seams, and/or near walls) from Table 6-4 of HDP-TBD-WM-906.

Elevated Area 4 - Bldg 255				
Three sample locations are associated with elevated area 4 (14, 15, and 16). The average of these measurements was assigned to this area. The concentration values shown below were multiplied by the total mass (8.24 x 10 <sup>4</sup> lb) to arrive at the total concentrations values for Elevated Area 4 tabulated in Table 6-5.				

Mass Calculation				
area (ft <sup>2</sup> )	Thickness (inch)	Volume (ft <sup>3</sup> )	Mass (lb)	
549	12	549	8.24E4	

All Data Used in Calculation of Average as Conservative Measure				
Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)
14	0	282	13	7
15	2	38	2	7
16	13	565	22	140
Average	4.9	295.1	12.1	51.2
Median	1.60	282.09	12.59	7.06
Standard Deviation	6.7	264	10	77

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward																																																																										
<p align="center"><b>Elevated Area 6 - Bldg 252</b></p> <p>Four sample locations are associated with elevated area 6 (52, 53, 56, and 57). Since samples 56 and 57 were collected from 0 – 0.75 inches, the average concentration within samples below 0.75 inches (shown in Table 6-4) was used to account for the activity in the un-sampled material. Use of this data results in a conservative determination of the average Tc-99 concentration since the value assigned (2.8 pCi/g) is greater than the average concentration measured in the top 0.75 inch portion (2.5 pCi/g). The sample results included in this calculation are shown below. Note that Tc-99 is the bounding radionuclide from the standpoint of the dose calculated in the 10 CFR 20.2002 applications. The concentration values shown below were multiplied by the total mass (<math>1.54 \times 10^5</math> lb) to arrive at the total concentrations values for Elevated Area 6 tabulated in Table 6-5.</p> <table> <tr> <td colspan="2" rowspan="3"></td><td align="center" colspan="4"><b>Mass Calculation</b></td></tr> <tr> <td align="center"><b>area (ft<sup>2</sup>)</b></td><td align="center"><b>Thickness (inch)</b></td><td align="center"><b>Volume (ft<sup>3</sup>)</b></td><td align="center"><b>Mass (lb)</b></td></tr> <tr> <td align="center">2050</td><td align="center">6.0</td><td align="center">1025</td><td align="center">1.54E5</td></tr> <tr> <td align="center" colspan="6"><b>All Data Used in Calculation of Average</b></td></tr> <tr> <td align="center"><b>Sample Station</b></td><td align="center"><b>Tc-99 (pCi/g)</b></td><td align="center"><b>U-234 (pCi/g)</b></td><td align="center"><b>U-235 (pCi/g)</b></td><td align="center"><b>U-238 (pCi/g)</b></td><td></td></tr> <tr> <td align="center">52</td><td align="center">8.4</td><td align="center">51</td><td align="center">2.8</td><td align="center">10</td><td></td></tr> <tr> <td align="center">53</td><td align="center">3.0</td><td align="center">40</td><td align="center">2.2</td><td align="center">4.4</td><td></td></tr> <tr> <td align="center">56*</td><td align="center">1.6</td><td align="center">2103</td><td align="center">90</td><td align="center">165</td><td></td></tr> <tr> <td align="center">57*</td><td align="center">3.4</td><td align="center">1603</td><td align="center">69</td><td align="center">2.3</td><td></td></tr> <tr> <td align="center">**</td><td align="center">2.8</td><td align="center">39</td><td align="center">2.1</td><td align="center">14</td><td></td></tr> <tr> <td align="center">Average</td><td align="center">4.2</td><td align="center">155.6</td><td align="center">7.1</td><td align="center">14.9</td><td></td></tr> <tr> <td align="center">Median</td><td align="center">3.00</td><td align="center">51.00</td><td align="center">2.81</td><td align="center">10.30</td><td></td></tr> <tr> <td align="center">Standard Deviation</td><td align="center">2.6</td><td align="center">1007</td><td align="center">43</td><td align="center">70</td><td></td></tr> </table> <p>*Sample Depth 0 - 0.75 inch **Maximum Concentration for each isotope from &gt;0.75" core samples (excluding samples at expansion joints, cracks, seams, and/or near walls) from Table 6-4 of HDP-TBD-WM-906.</p>								<b>Mass Calculation</b>				<b>area (ft<sup>2</sup>)</b>	<b>Thickness (inch)</b>	<b>Volume (ft<sup>3</sup>)</b>	<b>Mass (lb)</b>	2050	6.0	1025	1.54E5	<b>All Data Used in Calculation of Average</b>						<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>		52	8.4	51	2.8	10		53	3.0	40	2.2	4.4		56*	1.6	2103	90	165		57*	3.4	1603	69	2.3		**	2.8	39	2.1	14		Average	4.2	155.6	7.1	14.9		Median	3.00	51.00	2.81	10.30		Standard Deviation	2.6	1007	43	70	
		<b>Mass Calculation</b>																																																																													
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Standard Deviation	2.6	1007	43	70																																																																											
<p align="center"><b>Bldg 235</b></p> <p>Two sample locations are associated with west vault (54, and 55). The average of these measurements was assigned to this area. The concentration values shown below were multiplied by the total mass (<math>4.47 \times 10^4</math> lb from Appendix A of HDP-TBD-WM-906) to arrive at the total concentrations values for the west vault tabulated in Table 6-5.</p> <table> <tr> <td align="center" colspan="6"><b>All Data Used in Calculation of Average</b></td></tr> </table>						<b>All Data Used in Calculation of Average</b>																																																																									
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RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
	<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>
	54	2	9	2.2	4.44
	55	2	34	1.7	0.98
	Average	1.9	21.6	1.9	2.71
	Median	1.90	21.60	1.95	2.71
	Standard Deviation	0.1	17.5	0.4	2.4
<p><b>Process Buildings Slabs - Excluding Bldg. 235 and Specified Elevated Areas on Figure 1 of Appendix D in HDP-TBD-WM-906</b></p> <p>The radionuclide concentration assigned to the balance of the process building (outside the identified Elevated Areas) was determined using sample data as follows:</p> <ul style="list-style-type: none"> <li>• A cumulative probability distribution plot was made of the gamma walkover results for the process building slab (Figure 6-4).</li> <li>• The percentage of the floor space with a gamma response greater than 2 times the average value (4400 cpm) was determined.</li> <li>• The concentration in the portion of the building not exceeding 4400 cpm was based on the average concentration shown in Table 6-3.</li> <li>• The concentration in the portion of the building exceeding 4400 cpm was based on the average concentration shown in Table 6-2.</li> </ul> <p>The total assigned activity was set at the weighted average of these two concentrations based on the relative mass represented by each. The portion of the building not exceeding 4400 cpm was 82 percent of the total mass. The portion exceeding 4400 cpm was 18 percent of the total mass.</p> <p>The total mass of the slabs was calculated as follows: The masses shown above for Elevated Areas 1, 2, 3, 4, 5, and Bldg. 235 slabs are subtracted from 5,254,627 lb (From Appendix A row Total Processing Buildings Slabs Available for Disposal, which already exclude Elevated Area 5 and the Area 1 cap since they will not be consigned to USEI). The result is 4.48E6 lb.</p>					
<b>All Data Used in Calculation of Average</b>					
	<b>Sample Station</b>	<b>Tc-99 (pCi/g)</b>	<b>U-234 (pCi/g)</b>	<b>U-235 (pCi/g)</b>	<b>U-238 (pCi/g)</b>
	***	3.0	1076	48	214
	****	2.7	48	1.9	8.3
	Weighted Average	2.7	233.3	10.2	45.4

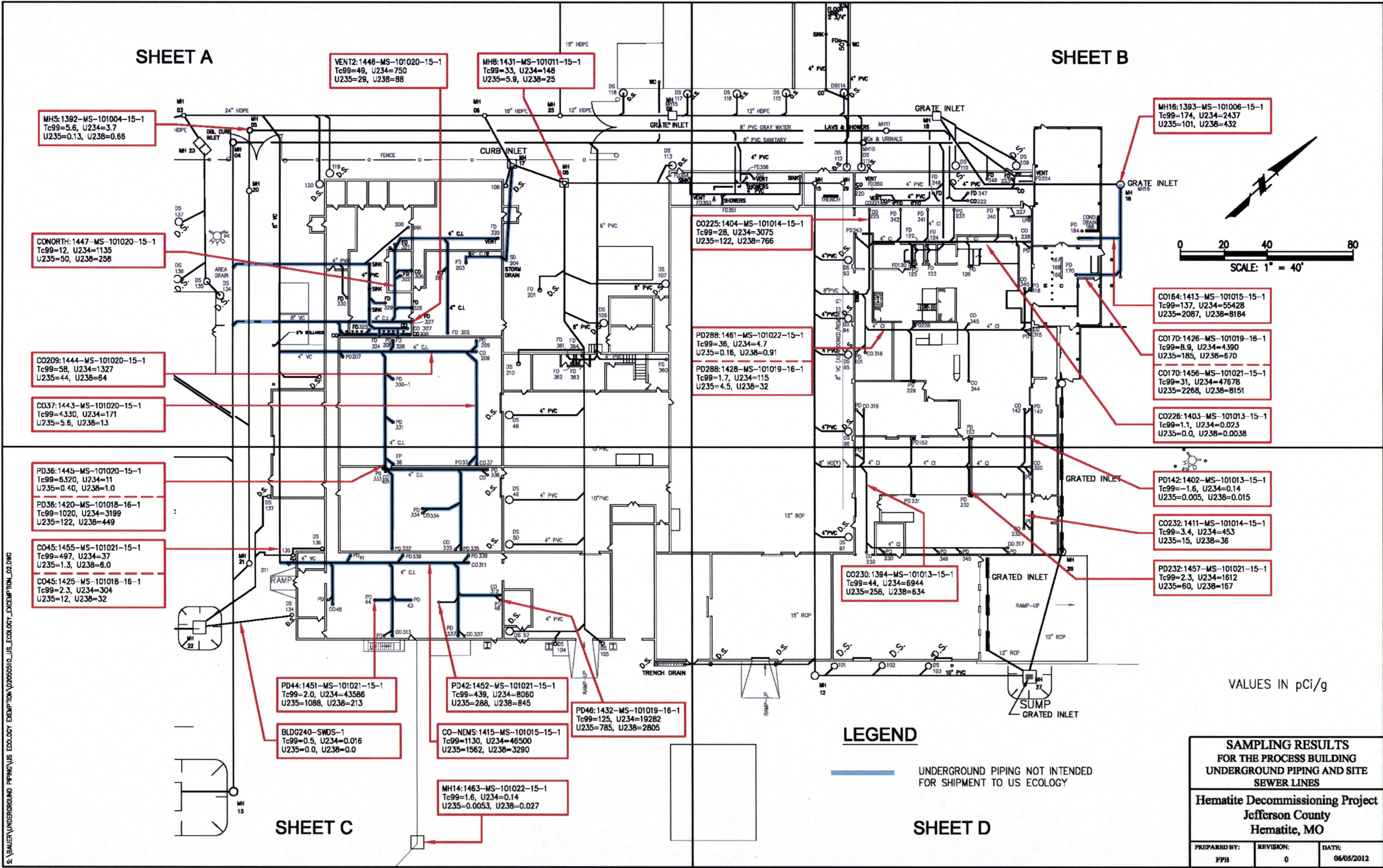
RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward															
***Average concentration inside areas where GWS exceeded 4,400 cpm or where there are higher Tc-99 samples. Averages are from Table 6-2 of HDP-TBD-WM-906. This average represents 18 percent of the total area and volume. ****Average concentration outside elevated areas where GWS exceeded 4,400 cpm or where there are higher Tc-99 samples. Averages are from Table 6-3 of HDP-TBD-WM-906. This average represents 82 percent of the total area and volume.																				
<div><div>Concrete Other Than Processing Building Slabs</div><div>The radionuclide concentration in concrete outside the process building was based on the average concentrations shown in Table 6-3. The concentration values shown below were multiplied by the total mass (1.72 x 10<sup>7</sup> lb from Appendix B of HDP-TBD-WM-906) to arrive at the total concentrations values for the west vault tabulated in Table 6-5.</div><table><tr><th colspan="5">All Data Used in Calculation of Average</th></tr><tr><th>Sample Station</th><th>Tc-99 (pCi/g)</th><th>U-234 (pCi/g)</th><th>U-235 (pCi/g)</th><th>U-238 (pCi/g)</th></tr><tr><td>Average concentration outside elevated area</td><td>3</td><td>48</td><td>2</td><td>8</td></tr></table></div>						All Data Used in Calculation of Average					Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)	Average concentration outside elevated area	3	48	2	8
All Data Used in Calculation of Average																				
Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)																
Average concentration outside elevated area	3	48	2	8																
<div><div>Asphalt</div><div>The radionuclide concentration in asphalt outside the process building was based on the average concentrations shown in Table 6-3. The concentration values shown below were multiplied by the total mass (4.32 x 10<sup>6</sup> lb from Appendix C of HDP-TBD-WM-906) to arrive at the total concentrations values for the west vault tabulated in Table 6-5.</div><table><tr><th colspan="5">All Data Used in Calculation of Average</th></tr><tr><th>Sample Station</th><th>Tc-99 (pCi/g)</th><th>U-234 (pCi/g)</th><th>U-235 (pCi/g)</th><th>U-238 (pCi/g)</th></tr><tr><td>*Average concentration outside elevated area</td><td>3</td><td>48</td><td>2</td><td>8</td></tr></table></div>						All Data Used in Calculation of Average					Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)	*Average concentration outside elevated area	3	48	2	8
All Data Used in Calculation of Average																				
Sample Station	Tc-99 (pCi/g)	U-234 (pCi/g)	U-235 (pCi/g)	U-238 (pCi/g)																
*Average concentration outside elevated area	3	48	2	8																

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-6	HDP-TBD-WM-906 Section 6.5	In Attachment 1 Section 6.5 the final paragraph states that the data are sufficient to serve as	10CFR20.2002(a)	An argument for the conclusion that the data are of sufficient quality has not been presented (as elaborated	Refer to previous comments indicating that a formal characterization plan should be

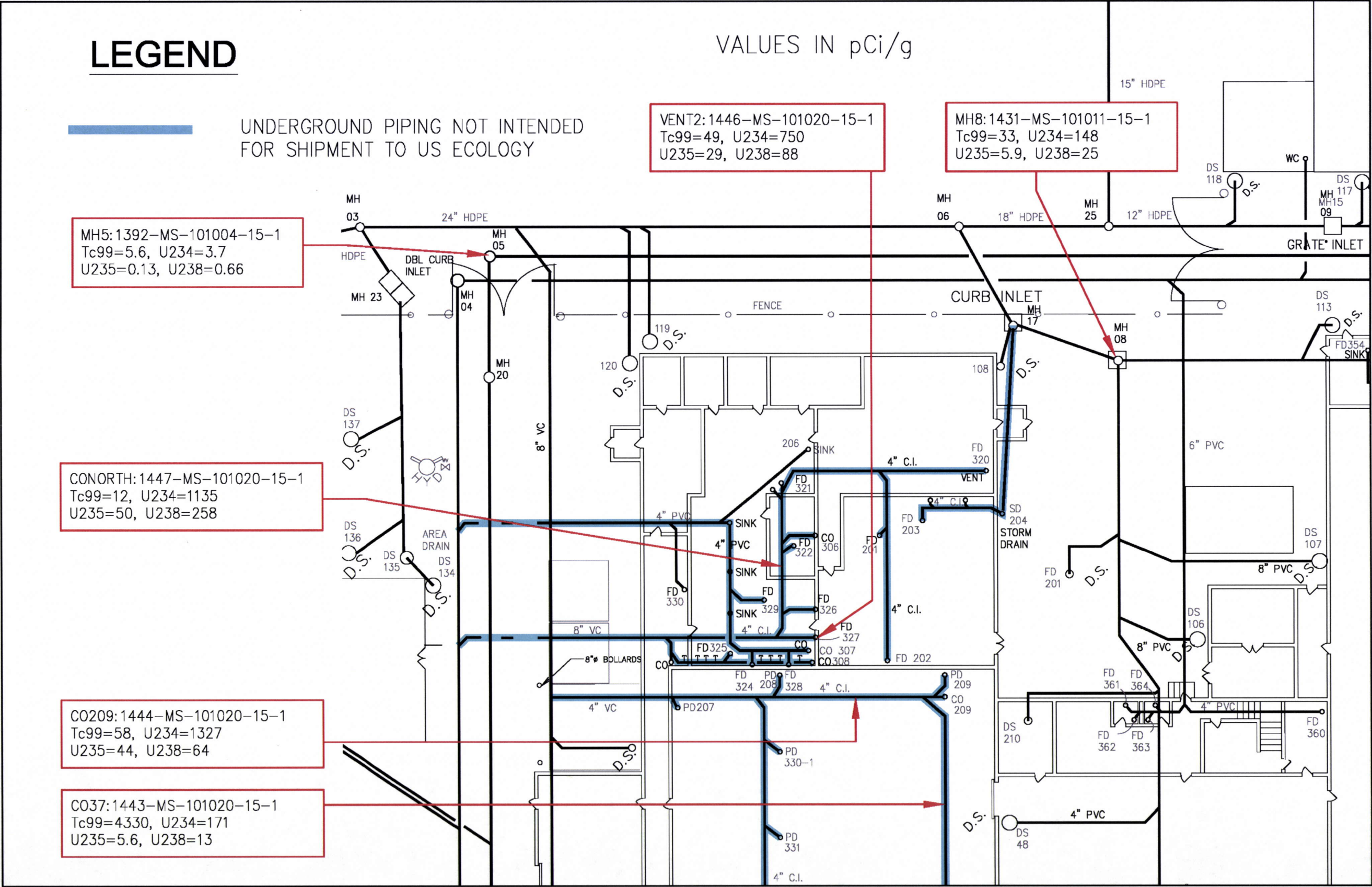
RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
		the basis for determining the radionuclide concentration in materials shipped.		upon in RAIs applicable to Section 6.4), and the provided documentation does not support that conclusion.	developed or provide the basis for why a formal characterization plan is not necessary.
<b>Response:</b> The responses to RAI CH-6 and RAI GEN-1 & 2 describe the nature and extent of additional sampling to be performed prior to disposal of these materials.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-7	HDP-TBD-WM-906 Section 7.1 and Appendix G	TBD Section 7.1 and App. G Figure 1 are not descriptive of piping location.	10CFR20.2002(a)	The link between piping to area and building populations is unclear.	Provide additional graphics or tables to clearly segregate piping and identify the location.
<b>Response Summary:</b> Additional graphics are provided to provide visual reference between					
<b>Response Detail:</b> Appendix F contains the specific piping included in each of the piping group designation (such as “Building 240 Middle System”) identified in Tables 7-4 and 7-5 of Section 7.1 of HDP-TBD-WM-906. In Appendix F of HDP-TBD-WM-906, the ‘From’ and ‘To/Toward’ columns contain identifiers that can be located on Figure 1 of Appendix G to HDP-TBD-WM-906 for the piping groups identified in Tables 7-4 and 7-5 of Section 7.1 of HDP-TBD-WM-906. Figure 1 to Appendix G has been broken into quadrants to facilitate it use, as provided below. A number on the figure without an associated alpha character (e.g., 203) should be read as being associated with ‘FD’ (e.g., FD 203). In some the entire words may be spelled out instead of just the alpha character (e.g., ‘204 Storm Drain’ instead of ‘SD 204’).					

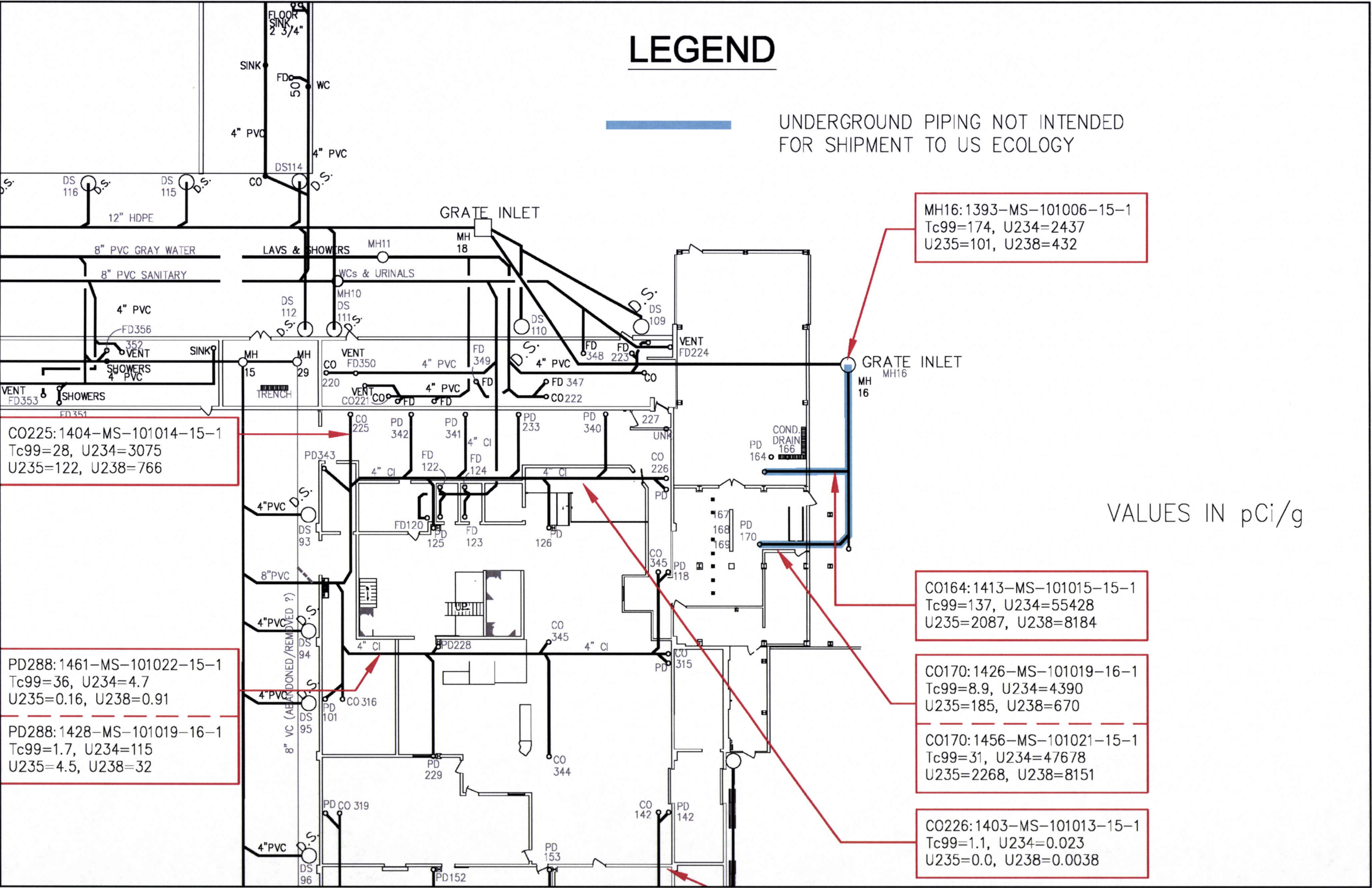
Figure 1 to Appendix G of HDP-TBD-WM-906, Sampling Results for the Process Buildings Underground Piping and Site Sewer Lines



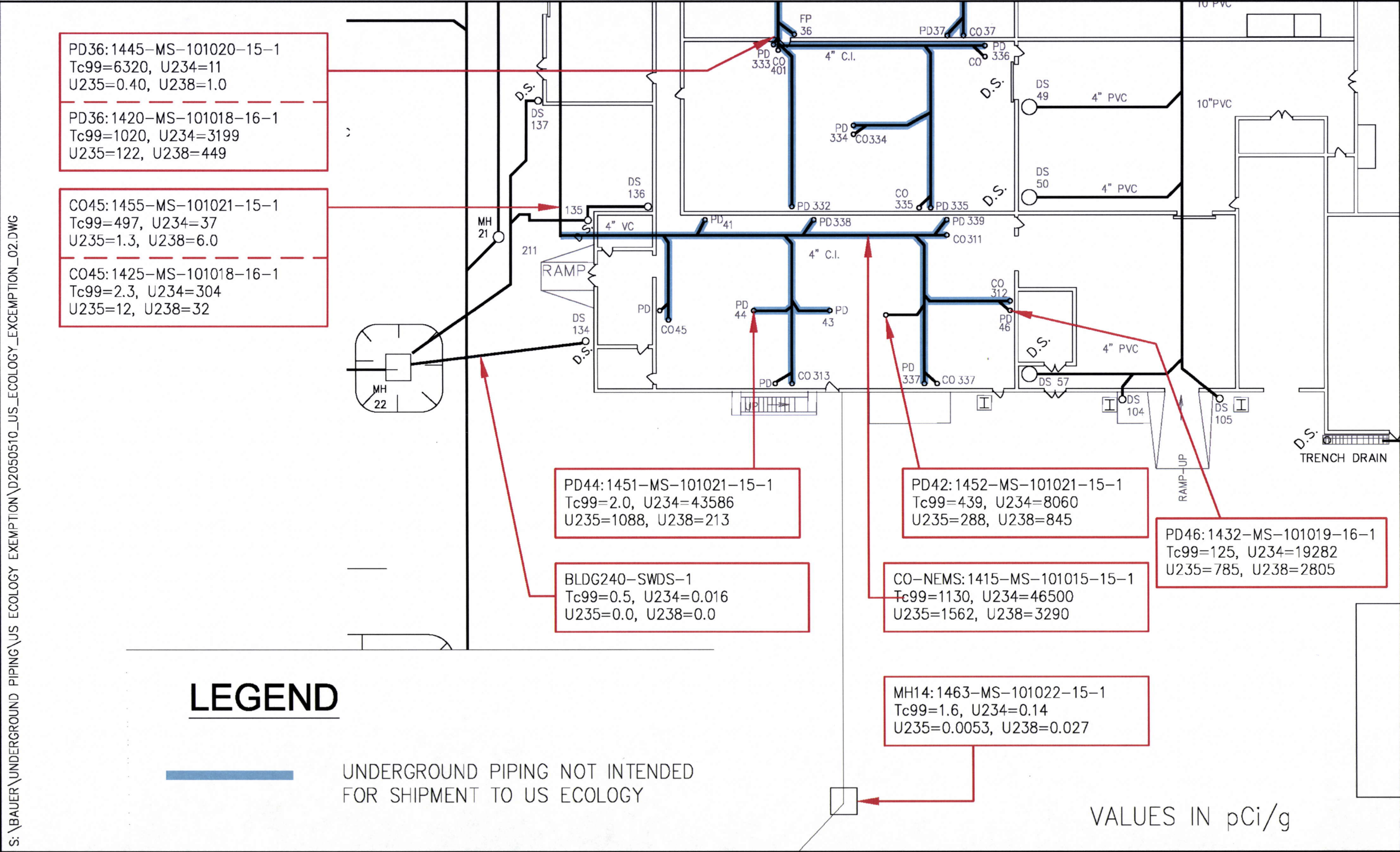
Sheet A to Figure 1 to Appendix G of HDP-TBD-WM-906, Sampling Results for the Process Buildings Underground Piping and Site Sewer Lines



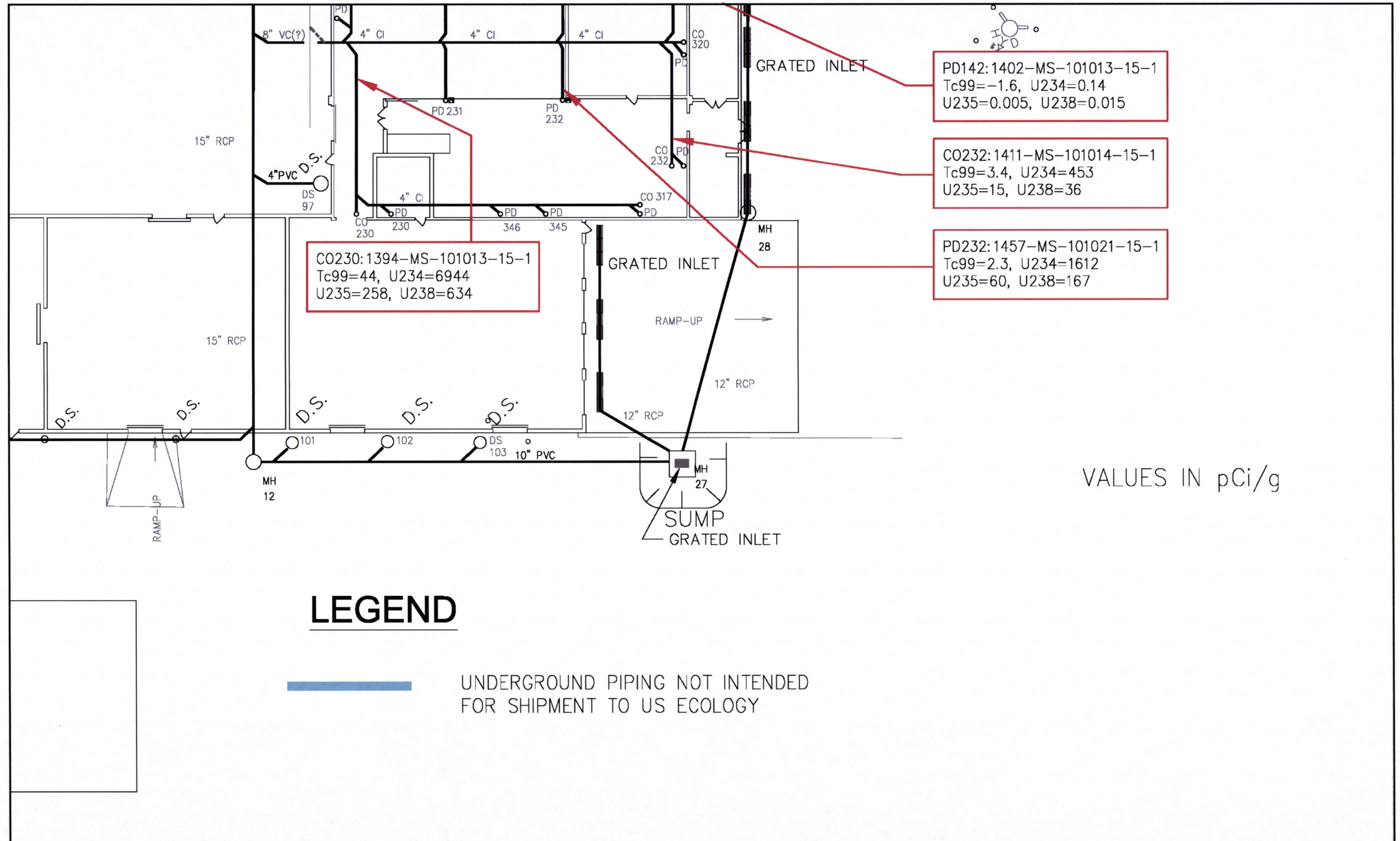
Sheet B to Figure 1 to Appendix G of HDP-TBD-WM-906, Sampling Results for the Process Buildings Underground Piping and Site Sewer Lines



Sheet C to Figure 1 to Appendix G of HDP-TBD-WM-906, Sampling Results for the Process Buildings Underground Piping and Site Sewer Lines



Sheet D to Figure 1 to Appendix G of HDP-TBD-WM-906, Sampling Results for the Process Buildings Underground Piping and Site Sewer Lines



RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-8	HDP-TBD-WM-906 Section 8.0	<p>(a) Attachment 1, Section 8.0 and Table 8.1 do not provide justification for scaling factors other than by reference,</p> <p>(b) Table 8.3 lists different trace elements than earlier in the document.</p>	10CFR20.2002(a)	<p>Justification for the use of building scaling factors for miscellaneous equipment is not sufficiently detailed to allow for an independent assessment. Survey data to substantiate the usage of these scaling factors do not appear to have been provided.</p> <p>It is unclear what "equivalent" equipment means as it is noted that the "use of the scaling data is justified since the scaling factors were derived from equipment equivalent to that under consideration."</p> <p>The trace elements reported earlier were Am-241, Np-237 and Pu239/240. Table 8.3 now lists Th-230 and -232 and Np-237.</p>	<p>Justify specifically why these scaling factors are appropriate.</p> <p>Provide details on survey data that substantiate the usage of building scaling factors for miscellaneous equipment. Clarify what is meant by "equipment equivalent to that under consideration."</p> <p>Provide information as to the difference in trace element radionuclides. Is there a separate listing of trace elements for HEPA systems relative to the remainder of the site? If so, please explain.</p>
<p><b>Response Summary:</b> Justification and clarification regarding the scaling factors for the HEPA units is provided. Because a more extensive list of radionuclides were included in the analysis of samples from the HEPA units, there are more trace radionuclides for HEPA units than there are for other materials being considered in this 20.2002 request. However, the trace radionuclides are too insignificant to be carried forward in calculations.</p>					
<p><b>Response Detail:</b> <i>Scaling Factors Justification and Survey Data for Scaling Factors:</i> Additional detail on the scaling factors discussed in Section 8.0 of HDP-TBD-WM-906 is contained in HDP-TBD-WM-901, which was provided to NRC via Westinghouse letter HEM-12-41, dated March 28, 2012 (ML12090A191). HDP-TBD-WM-901 describes how the scaling factors of 0.478 for Tc-99 to U-235 and 20.3 for U-234 to U-235 were established based on data from swipe samples collected in areas of the process buildings in 2004. A total of 10 smears were collected from the following areas (Building 240 Red Room, Building 240 Green Room, Building 240 Maintenance/Decontamination Area, Building 253, Building 254, Building 255, Building 256, and Building 260). The 10 smears in a given area were composited to generate 1 sample for analysis. Below is a reproduction of a table of the sample results in Attachment 9.11 to HDP-TBD-WM-901.</p> <p>The fact that the ventilation system would have drawn air from the same facility conditions that resulted in surface contamination identified in the swipe samples. The common facility conditions justify the use of radionuclide profile data originating from equipment within those same areas</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion					Path Forward				
where the ventilation system operated. It should be noted that the average concentration ratios for the building were used to establish the values in Table 8-2 of HDP-TBD-WM-906. Even if the maximum observed Tc-99 to U-235 ratio were used, the total Tc-99 associated with the ventilation equipment would only change from 2.6 E -5 Ci to 1.5 E -4 Ci. This quantity is insignificant in relation to the total quantity of Tc-99 associated with this application (0.32 Ci).													
The scaling factors discussed in this section were used solely to characterize the ventilation equipment listed in Table 8-1 of HDP-TBD-WM-906. Other equipment that may be disposed at USEI under this application would be subject to a separate characterization which would include Tc-99, as discussed in RAI SA-1 above.													
Trace Radionuclides: The trace radionuclides listed in Table 8-3 are based on the data contained in the source document (HDP-TBD-WM-901). These trace radionuclides do not represent an inventory specific to the HEPA units, but rather are an artifact of the list of radionuclides for which laboratory analysis was being conducted at the time. .													
Table from Attachment 9.11 of HDP-TBD-WM-901, 10 CFR 61 Sample Results from Severn Trent Labs (STL)													
		Becquerel/Sample											
		U-234	U-235	U-238	Th-228	Th-230	Th-231	Th-232	Th-234	Np-237	Tc-99	Pu-239/240	Pu-241
Bldg 240 Red Room		719	32	104	0.13	0.21	4.0	0	11	0.067	15	0.012	0
Bldg 240 Green Room		1611	71	218	0.09	0.25	6.4	0.024	24	0.024	1.6	0.000	107
Bldg Maint/Decon		1359	59	179	0.19	0.28	5.0	0	20	0.026	1.1	0.000	0
Bldg 253		396	16	53	0.00	0.61	1.6	0	7	0.000	1.6	0.000	0
Bldg 254		1196	50	160	0.11	0.13	5.0	0	18	0.063	0.0	0.000	0
Bldg 256		515	23	80	0.00	0.09	7.4	0	7	0.000	0.0	0.000	0
Bldg 255		807	38	113	0.09	0.14	2.9	0	13	0.031	0.0	0.000	0
Bldg 260		1163	65	164	0.08	0.07	3.8	0	16	0.030	7.9	0.000	0
Average Concentration		971	44	134	0.09	0.22	4.5	0.00	14	0	3	0	13
Percent of Total		82%	4%	11%	0.01%	0.02%	0.38%	0.00%	1.22%	0.00%	0.28%	0.00%	1.13%
NOTE: Results that were less than MDC have been entered as zero.													

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-9	HDP-TBD-WM-906 Section 8.1	Apparent lack of radioactive contamination results for	10CFR20.2002(a)	For HEPA units, activity estimates are based on measurements of gamma radiation levels performed during the characterization of remaining equipment in 2008, and the gamma	Confirm if any contamination measurements were taken on the equipment described in Section 8.1.

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
		HEPA units. Radiation survey results may miss internal contamination.		<p>radiation levels were subsequently interpreted using the MCNP code to determine the amount and enrichment of U-235, and the amount of total uranium in each component. Tc-99 was then determined based on waste scaling factors derived from the laboratory analytical data obtained during the initial characterization surveys and sampling performed in 2008 (Reference 3.1). It appears that no actual contamination samples were taken (only radiation exposure measurements).</p> <p>Sufficient justification was not provided on how radiation exposure measurements and MCNP are able to be used to fully characterize radioactive contamination on equipment. Contamination on internal surfaces could potentially be shielded by the equipment itself and may not be detected by exposure measurements. This could result in an underestimate of the contamination.</p>	A plan to characterize radioactive contamination on the HEPA units, which addresses NRC staff concerns that both external and internal contamination have been accounted for or the ' basis for why such a plan is not necessary, should be provided. If a plan is provided, the characterization method should ensure that shielding by the equipment itself does not result in an underestimate of contamination.
<p><b>Response Summary:</b> The characterization information for the HEPA units is consistent with previous characterization information submitted to NRC in support authorization of process building dismantlement.</p>					
<p><b>Response Detail:</b> Characterization of the HEPA units was conducted as part of characterization activities for the process buildings prior to their dismantlement. Westinghouse letter HEM-09-121, dated October 23, 2009, to NRC described the rigorous, conservative MCNP calculation effort correlating gamma instrument readings on the HEPA units with a gram quantity of U-235 (Section 5.2.3 of Attachment 1 to HEM-09-121). The MCNP calculation was specific to the construction (materials and configuration) of the HEPA units to account for potential shielding.</p> <p>While HEM-09-121 contained summary results of the characterization effort, characterization results specific to individual items were submitted to NRC by Westinghouse letter HEM-10-8, dated January 27, 2010. Table 1-6 of NSA-TR-09-25 (Attachment 2 to HEM-10-8) specifically identified the characterization results for the HEPA units in terms of grams of U-235. The information in Section 8.1 of HDP-TBD-WM-906 is in terms of pCi, but otherwise consistent with Table 1-6 of NSA-TR-09-25.</p> <p>Removable contamination measurements were not requested for these past submittals of process building characterization information. Accordingly, Westinghouse believed the data to be sufficient for uranium characterization. See the response to RAI SA-8 above for justification on the use of surrogate factors for Tc-99 for the HEPA units.</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
The HEPA units, including internal surfaces, have been coated with a sealant to mitigate the dispersal of loose contamination.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
SA-10	HDP-TBD-WM-906 Appendix D	Figure 1 provides the first indication of the characterization sampling plan.	10CFR20.2002(a)	Figure 1 and associated tables indicates the sampling that was done was primarily biased based on gamma walkover results or the presence of cracks/joints in the floor. There is no information for how the remaining locations were selected.	Refer to previous comments indicating that a formal characterization plan should be developed or the basis for why such a plan is not necessary, should be provided. If a plan is provided, it is recommended that additional systematic probabilistic samples, based on the DQO process be developed and implemented for the remainder of the slab and combined with documented alpha-beta surface scans.
<b>Response:</b> The responses to RAI CH-6 and RAI GEN-1 & 2 describe the nature and extent of additional sampling to be performed prior to disposal of these materials. RAI CH-6 describes alpha and beta/gamma measurements which were performed prior to application of sealant.					

**Attachment 1 to HEM-12-2 - RAIs and Proposed Resolution March 2012**

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ATT1-1	Section 6.0	Surface sampling only at locations 56-59	10CFR20.1302(a) and 10CFR20.1302(b)	It is indicated that for samples at locations 56-59, the samples were limited to the first 3/4 inch based upon information which indicated that contamination was limited to the top concrete layer only. It also indicates that the existing information was that there were no cracks and/or seems evident in the sampling locations. It would seem possible that the seams or crack could not be seen by the eye so that it would have been appropriate to sample deeper.	Subsurface core sampling should be performed at locations 56-59 unless surface samples indicate the absence of radioactivity.
<p><b>Response Summary:</b> Biased sampling has been conducted at visible seams and cracks at Station IDs 1, 3, 4, 6, 9, 13, 14, 16, 17, 18, and 20. The results demonstrate that the maximum Tc-99 concentration is within the top 3/4 inch of the slab. Westinghouse considers this to be indicative of all of the slabs, including any unseen seams or cracks. Additional subsurface core sampling at Stations 56-59 is not warranted given the conservative assignment of a Tc-99 concentration to general area concrete and asphalt, as discussed in the response to RAI SA-5 above.</p> <p><b>Response Detail:</b> As shown in HDP-TBD-WM-906, Appendix D, Table 4, Stations 1, 3, 4, 6, 9, 13, 14, 16, 17, 18, and 20 were located at visible cracks, seams, joints or walls. The results demonstrate that the maximum Tc-99 concentration is within the top 3/4 inch of the slab. These results also indicate a downward trend from the top 3/4" (weighted average of the two top samples) to the remainder of the core. These results demonstrate that samples from the top 3/4" will bound the samples from deeper in the concrete. .</p> <p>Tc-99 concentrations at Station 56-59 are low. The weighted average for the top 3/4" of slab at Stations 56-59 are 1.6, 3.4, less than MDC, and 2.1 pCi/g, respectively. Since Stations 58 and 59 are in Elevated Area 3, they are averaged together to get 2.1 pCi/g. Since Stations 56 and 57 are in Elevated Area 6, they are averaged together to get 2.5 pCi/g for the top 3/4" of Elevated Area 3.</p> <p>As shown in the response to RAI SA-5 above, the calculated Tc-99 concentration for Elevated Area 3 and Elevated Area 6 are 2.6 and 4.2, respectively. The Tc-99 concentration of 2.6 pCi/g, which is applied to the entire volume of the concrete slab in Elevated Area 3, exceeds the average Tc-99 concentration of 2.1 pCi/g in the top 3/4" of the slab from Stations 58 and 59 (in Elevated Area 3). The Tc-99 concentration of 4.2 pCi/g, which is applied to the entire volume of the concrete slab in Elevated Area 6, exceeds the average Tc-99 concentration of 2.5 pCi/g in the top 3/4" of the slab from Stations 56 and 57.</p> <p>Since these two elevated areas are characterized for this 20.2002 request at higher levels than indicated by the top 3/4" samples and the top 3/4" samples are shown at known seams, cracks, etc. to bound the remaining core samples, additional core sampling at Station 56-59 is not warranted.</p> <p>Re-review of the survey records and the slabs identified that Station 56-59 were identified by elevated results during the gamma walkover survey after building dismantlement. In addition, Stations 56 and 57 are associated with wall seams. The fourth sentence of the first paragraph of Section 6.0 of HDP-TBD-WM-906 will be revised to read, "The final four samples (locations 56 - 59) were collected to provide additional data regarding elevated results from the gamma walkover survey after building dismantlement. These stations were not sampled below 3/4 inch based on existing information indicating that results from the top 3/4" would be sufficient to characterize these readings.</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ATT1-2	Section 6.0	Analysis for Tc-99	10CFR20.1302(a) and 10CFR20.1302(b)	In Section 6.0 it is indicated that a second gamma walkover was conducted on the building slabs to identified contamination. Such an approach would not identify Tc-99 since it is a beta emitter.	Provide basis for the conclusion that the performance of a gamma walkover would identify Tc-99?
<b>Response:</b> The second walkover was performed to identify areas with elevated radiation levels from uranium contamination, which are indicative process leaks and/or poor material management practices. This survey is not sensitive to the low energy beta emission from Tc-99, but does provide a level of assurance that no areas with significant uranium surface contamination were missed. See the responses to RAI CH-6, RAI GEN-1, and RAI-GEN-2 for additional information on Tc-99 assessment.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward		
ATT1-3	Section 6.3	Uranium concentrations	10CFR20.1302(a) and 10CFR20.1302(b)	It is stated, "Considering the concentration of uranium at these sample locations, Th-232 is considered to be only present at trace levels, and Th-232 is not carried forward into subsequent inventory calculations." Where are the uranium data that this sentence is referring to? Was it submitted with the 20.2002 request?	Provide the uranium data that the sentence in Section 6.3 is referring or provide where the data is presented in the January 16, 2012 submittal.		
<b>Response Summary:</b> The uranium data was provided in Table 3 to Appendix D of HDP-TBD-WM-906. The average thorium activity concentration is less than 0.01 percent of the U-234 activity concentration.							
<b>Response Detail:</b> Table 3 in Appendix D to HDP-TBD-WM-906 provides the sample results that are discussed in Section 6.3 of HDP-TBD-WM-906. An excerpt of Table 3 from Appendix D is provided below with the Th-232 / U-234 ratio calculated and sorted by ascending ratio.							
<b>Table1 to RAI ATT1-3, Th-232 and Associated U-234 Concentrations in Surface Layers</b>							
Location	Th-232			U-234			Th-232 / U-234
	(pCi/g)			(pCi/g)			
	Conc.	±2s	MDC	Conc.	±2s	MDC	
2a	0.068	0.095	0.092	34384	4986	95	*
8	0.0090	0.070	0.21	2599	463	1.7	*
21	0.64	0.33	0.11	170561	26694	389	3.7E-06
10	0.19	0.18	0.24	36426	5775	82	*
3a	0.12	0.14	0.23	15232	4884	5.6	*
5	0.50	0.25	0.16	<u>37544</u>	6057	145	1.3E-05
9	0.18	0.15	0.082	11874	2919	4.8	1.5E-05

RAI No.	Section	Issue	Regulatory Link		Discussion				Path Forward
		14	0.011	0.086	0.26	534	79	0.38	*
		20	0.093	0.14	0.24	1929	560	0.88	*
		6	1.1	0.41	0.24	20166	3281	104	5.5E-05
		19	0.30	0.24	0.27	3925	857	3.8	7.6E-05
		16	1.2	0.47	0.27	10714	3817	8.5	1.1E-04
		17	0.13	0.15	0.24	1125	199	1.2	*
		11	0.24	0.21	0.28	1523	257	1.1	*
		13	0.34	0.24	0.28	2154	378	1.1	1.6E-04
		7	0.87	0.38	0.24	3304	868	5.6	2.6E-04
		4	0.39	0.23	0.088	1439	262	1.3	2.7E-04
		12	1.4	0.50	0.10	4481	949	2.2	3.1E-04
		15	0.22	0.18	0.23	495	76	0.50	*
		18	0.51	0.27	0.092	629	108	1.2	8.1E-04
		1	0.19	0.16	0.20	178	26	0.23	*
		3b	0.20	0.17	0.22	107	16	0.27	*
		2b	0.51	0.27	0.21	123	18	0.29	4.1E-03
		Average							
* Ratio is not calculated when either U-234 or Th-232 value is less than MDC.									

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ATT1-4	Section 6.4	Tc-99 measurements	10CFR20.1302(a) and 10CFR20.1302(b)	As noted above, what is the basis that a gamma walkover would determine the presence of Tc-99 as indicated in Section 6.4?	See RAI No. 2 above.
<b>Response:</b> As stated in Section 6.5 of HDP-TBD-WM-906, gamma walkover data was used to identify areas of elevated surface contamination and to bound such areas. It is understood that Tc-99 is not directly measured using such equipment. Areas with elevated radiation levels are indicative of process leaks and/or poor material management practices affecting Tc-99 as well as uranium. As indicated in Section 6.5, historical information on process activities was used to target areas where Tc-99 would be present. Additional sampling was performed to bound these areas and to verify the absence of Tc-99 outside of them.					

Enclosure 1 to HEM-12-67  
June 19, 2012

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ATT1-5	Section 8.1	Scaling Factors for Tc-99	10CFR20.1302(a) and 10CFR20.1302(b)	Reference is made to HDP-TBD-WM-901, <i>Scaling Factors for Radioactive Waste Associated with the Above Slab Portion of the Process Buildings</i> . Subject reference is not provided to permit staff's assessment of the appropriateness of the scaling.	Provide HDP-TBD-WM-901 on the Hematite docket.
<b>Response:</b> HDP-TBD-WM-901 was submitted to NRC via Westinghouse letter HEM-12-41, dated March 28, 2012 (ML12090A191)					

**Enclosure 1 to HEM-12-2 - RAIs and Proposed Resolution**

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-1	Section 2	Criticality Safety Assessment & SNM at USEI	10CFR20.2002	It is unclear whether USEI has or expects to receive and dispose of other sources of SNM in their disposal cells.	Does USEI have SNM in their cell from any other sources? Is USEI aware of any other applications to dispose of SNM at USEI?
<p><b>Response Summary:</b> Information on SNM that USEI has received in their cell is provided. As far as other alternate disposal request involving SNM, USEI is aware of one currently under review at NRC for PG&amp;E's Humboldt Bay Decommissioning Project. This Humboldt Bay request is to dispose of 100,000 ft<sup>3</sup> of soil and debris that may contain SNM.</p>					
<p><b>Response Detail:</b> USEI has been permitted to receive unregulated SNM since 2009. Since that time, there have been a few other shipments of unregulated SNM received at the USEI landfill in addition to the initial shipments from Hematite. These include:</p> <ul style="list-style-type: none"> <li>• ~ 140 tons of exempt soil and debris from BASF/Englehard Metals in Massachusetts with average concentrations of 289 pCi/g U-234, 13 pCi/g U-235, and 51 pCi/g U-238. The Massachusetts agreement state license was previously terminated as part of a site decommissioning. NRC was consulted by the Massachusetts Department of Public Health prior to shipping waste to USEI. Using a soil density of 1440 g/L, 13 pCi<sup>235</sup>U/g equates to 0.009 g<sup>235</sup>U/L.</li> <li>• ~20 tons of soil from remediation of a historical weapons accident (circa 1958) containing HEU at Dyess AFB in Abilene, TX. Material was classified as 91(b) by the U.S. Air Force. Soils contained the following average concentrations: 379.2 pCi/g U-234, 11.5 pCi/g U-235, and 1.89 pCi/g U-238. Using a soil density of 1440 g/L, 11.5 pCi<sup>235</sup>U/g equates to 0.008 g<sup>235</sup>U/L.</li> <li>• ~400 tons of debris from the decommissioning of the Aberdeen Pulse Radiation Facility (APRF). Material was classified as 91(b) by the U.S. Army as part of the Army's Nuclear Reactor Program. The debris contained an average concentration of 0.2 pCi/g U-235. Using a soil density of 1440 g/L, 0.2 pCi<sup>235</sup>U/g equates to 0.0001 g<sup>235</sup>U/L.</li> </ul> <p>All of this other SNM material was below the average 0.1 g<sup>235</sup>U/L concentration limit for HDP waste consigned to USEI. The concentration is further reduced since these shipments were received between 2010 and 2011 and were combined with approximately 1.3 million tons of other non-SNM soils and debris in the USEI landfill. Therefore, no additional impact needs to be evaluated.</p>					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-2	Section 2	Dose Assessment	10CFR51.31	Attachment 9 contains the work related injuries and illnesses at Hematite and USEI through the 2 <sup>nd</sup> quarter of 2011.	Update Attachment 9 to include the information from the last 6 months of 2011.

**Response Summary:** HDP and USEI safety statistics for 2011 are provided.

**Response Detail:** In addition to the 2011 data, the HDP entry for 'Injuries per 10,000 hours' for 2010 was corrected.

**Work-related injuries at the HDP**

Year	Work Hours	Injuries	OSHA Recordable Injury/Illness	Fatalities	Injuries per 10,000 hours
2010	111,015	1	1	0	0.2
2011	146,727	5	0	0	0.3
TOTAL	1,557,524	129	60	0	N/A

**Work-related injuries at the USEI**

Year	Work Hours	Injuries	OSHA Recordable Injury/Illness	Fatalities	Injuries per 10,000 hours
2011	461,366	7	3	0	0.15
TOTAL	1,725,480	200	40	0	N/A

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-3	Section 4	Performance Assessment & Waste Characterization	10CFR20.2002	Westinghouse made reference to the USEI web site for information on the USEI waste acceptance criteria. Westinghouse needs to provide the waste acceptance criteria upon which their submittal is based so that the staff is clear as to what criteria Westinghouse is intending to meet. These criteria could change from the time Enclosure 1 was generated and over the course of the staff's review. If the criteria changes, then the Westinghouse submittal may be revised.	Provide the current USEI waste acceptance criteria on which the Westinghouse submittal is based.

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
<b>Response Summary:</b> The current USEI Waste Acceptance Criteria (WAC) is attached.					
<b>Response Detail:</b> Revising the 20.2002 request for every change to the USEI Waste Acceptance Criteria would involve a great deal of administrative complexity. Westinghouse intends to follow the more restrictive of this submitted WAC or its revision, and submit to NRC only those less restrictive WAC changes that Westinghouse desires to implement.					

## C.3 WASTE ACCEPTANCE CRITERIA

### C.3.1 Pre-acceptance Review

The pre-acceptance protocol has been designed to ensure that only hazardous and radioactive material that can be properly and safely stored, treated and/or disposed of by USEI are approved for receipt at the facility. A two-step approach is taken by USEI. The first step is the chemical and/or radiological and physical characterization of the candidate waste stream by the generator. The second step is the pre-acceptance evaluation performed by USEI to determine the acceptability of the waste for receipt at the facility. Figure C-2 presents a logic diagram of the pre-acceptance protocol that is utilized at the facility.

### C.3.2 Radioactive Material Waste Acceptance Criteria

The following waste acceptance criteria are established for accepting radiological contaminated waste material that is generally or specifically exempted from regulation by the Nuclear Regulatory Commission (NRC) or an Agreement State under the Atomic Energy Act of 1954 ("AEA"), as amended. Material may also be accepted if it is not regulated or licensed by the NRC or has been authorized for disposal by the IDEQ and is within the numeric waste acceptance criteria. Waste acceptance criteria are consistent with these restrictions.

The following five tables establish types and concentrations of radioactive materials that may be accepted. These tables are based on categories and types of radioactive material not regulated by the NRC based on statute or regulation or specifically approved by the NRC or an Agreement State for alternate disposal. The criteria are consistent with these restrictions and detailed analyses set forth in *Waste Acceptance Criteria and Justification for FUSRAP Material*, prepared by Radiation Safety Associates, Inc. (RSA) as subsequently refined, expanded and updated in *Waste Acceptance Criteria and Justification for Radioactive Material*, prepared by USEI.

Material may be accepted if the material has been specifically exempted from regulation by rule, order, license, license condition, letter of interpretation, or specific authorization under the following conditions: Thirty (30) days prior to intended shipment of such materials to the facility, USEI shall notify IDEQ of its intent to accept such material and submit information describing the material's physical, radiological, and/or chemical properties, impact on the facility radioactive materials performance assessment, and the basis for determining that the material does not require disposal at a facility licensed under the AEA. The IDEQ will have 30 days from receipt of this notification to reject USEI's determination or require further information and review. No response by IDEQ within thirty (30) days following receipt of such notice shall constitute concurrence. IDEQ concurrence is not required for generally exempted material as set forth in Table C.4a.

Based on categories of waste described in the waste acceptance criteria, the concentration of the various radionuclides in the conveyance (e.g., rail car gondola, other container etc.) shall not exceed the concentration limits established in the WAC without the specific written approval of the IDEQ unless generally exempted as set forth in Table C.4a. Radiological surveys will be performed as outlined in ERMP-01 to verify compliance with the WAC. If individual "pockets" of activity are detected indicating the limits may be exceeded, the RSO or RPS shall investigate the discrepancy and estimate the extent or volume of the material with the potentially elevated

radiation levels. The RPS or RSO shall then make a determination on the compliance of the entire conveyance load with the appropriate WAC limits. If the conveyance is determined not to meet the limits, USEI will notify IDEQ's RCRA Program Manager within 24 hours of a concentration based exceedance of the facility WAC to evaluate and discuss management options. The findings and resolution actions shall then be documented and submitted to the IDEQ.

The radioactive material waste acceptance criteria, when used in conjunction with an effective radiation monitoring and protection program as defined in the USEI *Radioactive Material Health and Safety Plan* and *Exempt Radioactive Materials Procedures* provides adequate protection of human health and the environment. Included within this manual are requirements for USEI to submit a written summary report of Table C.1 through C.2 radioactive material waste receipts showing volumes and radionuclide concentrations disposed at the USEI site on a quarterly basis. USEI will also submit a Table C.3 through C.4b annual report of exempted products devices, materials or items within 60 (sixty) days of year end (December 31<sup>st</sup>). The annual report will provide total volumes or mass of isotopes and total activity by isotope listing the activity of each radionuclide disposed during the preceding year, and the cumulative total of activity for each radionuclide disposed at the facility. The report will include an updated analysis of the impact on the facility performance assessment.

These criteria and procedures are designed to assure that the highest potential dose to a worker handling radioactive material at USEI shall not exceed 400 mrem/year TEDE dose, and that no member of the public is calculated to receive a potential post closure dose exceeding 15 mrem/year TEDE dose, from the USEI program. TEDE is defined as the "Total Effective Dose Equivalent", which equals the sum of external and internal exposures. The public dose limit during operation activities is limited to 100 mrem/yr TEDE dose. An annual summary report of environmental monitoring results will be submitted to IDEQ by June 1<sup>st</sup> for the preceding year.

Materials that have a radioactive component that meets the criteria described in Tables C.1 through C.4b and are RCRA regulated material will be managed as described within this WAP for the RCRA regulated constituents.

**Table C.1: Unimportant Quantities of Source Material Uniformly Dispersed\* in Soil or Other Media\*\***

	Status of Equilibrium	Maximum Concentration of Source Material	Sum of Concentrations Parent(s) and all progeny present
a	Natural uranium in equilibrium with progeny	<500 ppm / 167 pCi/g ( $^{238}\text{U}$ activity)	$\leq 3000$ pCi/g
	Refined natural uranium ( $^{238}\text{U}$ , $^{235}\text{U}$ , $^{234}\text{U}$ , $^{234\text{Th}}$ , $^{234\text{mPa}}$ , $^{231}\text{Th}$ )	<500 ppm / 333 pCi/g	$\leq 2000$ pCi/g
	Depleted Uranium ( $^{234\text{Th}}$ , $^{234\text{mPa}}$ )	<500 ppm / 169 pCi/g	$\leq 2000$ pCi/g
b	Natural thorium ( $^{232}\text{Th}$ + $^{228}\text{Th}$ )	<500 ppm / 110 pCi/g	$\leq 2000$ pCi/g
	$^{230}\text{Th}$ in equilibrium with progeny	<0.01 ppm / 200 pCi/g	$\leq 2000$ pCi/g
	$^{230}\text{Th}$ (with no progeny)	0.1 ppm / $\leq 2000$ pCi/g	
	Any mixture of Thorium and Uranium	Sum of ratios $\leq 1$ ****	$\leq 2000$ pCi/g

**Table C.2: Naturally Occurring Radioactive Material Other Than Uranium and Thorium Uniformly Dispersed\* in Soil or Other Media\*\***

	Status of Equilibrium	Maximum Concentration of Parent Nuclide	Sum of Concentrations of Parent and All Progeny Present
a	$^{226}\text{Ra}$ or $^{228}\text{Ra}$ with progeny in bulk form <sup>1</sup>	500 pCi/g	$\leq 4500$ pCi/g
b	$^{226}\text{Ra}$ or $^{228}\text{Ra}$ with progeny in reinforced IP-1 containers <sup>1</sup>	1500 pCi/g	13,500 pCi/g
c	$^{210}\text{Pb}$ with progeny (Bi & $^{210}\text{Po}$ )	1500 pCi/g	4500 pCi/g
	$^{40}\text{K}$	818 pCi/g	N/A
	Any other NORM		$\leq 3000$ pCi/g

<sup>1</sup> Any material containing  $^{226}\text{Ra}$  greater than 222 pCi/g shall be disposed at least 6 meters from the external point on the completed cell.

**Table C.3: Particle Accelerator Produced Radioactive Material**

Acceptable Material	Activity or Concentration
Any particle accelerator produced radionuclide.	All materials shall be packaged in accordance with USDOT packaging requirements. Any packages containing iodine or volatile radionuclides will have lids or covers sealed to the container with gaskets. Contamination levels on the surface of the packages shall not exceed those allowed at point of receipt by USDOT rules. Gamma or x-ray radiation levels may not exceed 10 millirem per hour anywhere on the surface of the package. All packages received shall be directly disposed in the active cell. All containers shall be certified to be 90% full.

\*Average over conveyance or container. The use of the phrase "over the conveyance or container" is meant to reflect the variability on the generator side. The concentration limit is the primary acceptance criteria.

\*\*Unless otherwise authorized by IDEQ, other Media does not include radioactively contaminated liquid (except for incidental liquids in materials). See radioactive contaminated liquid definition (definition section of Part B permit).

$$*** \frac{\text{Conc. of U in sample}}{\text{Allowable conc. of U}} + \frac{\text{Conc. of Th in Sample}}{\text{Allowable conc. of Th}} \leq 1$$

Table C.4a: NRC Exempted Products, Devices or Items

Exemption 10 CFR Part*	Product, Device or Item	Isotope, Activity or Concentration
30.15	As listed in the regulation	Various isotopes and activities as set forth in 30.15
30.14, 30.18	Other materials, products or devices specifically exempted from regulation by rule, order, license, license condition, concurrence, or letter of interpretation	Radionuclides in concentrations consistent with the exemption
30.19	Self-luminous products containing tritium, <sup>85</sup> Kr, <sup>3</sup> H or <sup>147</sup> Pm	Activity by Manufacturing license
30.20	Gas and aerosol detectors for protection of life and property from fire	Isotope and activity by Manufacturing license
30.21	Capsules containing <sup>14</sup> C urea for <i>in vivo</i> diagnosis of humans	<sup>14</sup> C, one $\mu$ Ci per capsule
40.13(a)	Unimportant quantity of source material: see table above	$\leq 0.05\%$ by weight source material
40.13(b)	Unrefined and unprocessed ore containing source material	As set forth in rule
40.13(c)(1)	Source material in incandescent gas mantles, vacuum tubes, welding rods, electric lamps for illumination	Thorium and uranium, various amounts or concentrations, see rules
40.13(c)(2)	(i) Source material in glazed ceramic tableware  (ii) Piezoelectric ceramic  (iii) Glassware not including glass brick, pane glass, ceramic tile, or other glass or ceramic used in construction	$\leq 20\%$ by weight  $\leq 2\%$ by weight  $\leq 10\%$ by weight
40.13(c)(3)	Photographic film, negatives or prints	Uranium or Thorium
40.13(c)(4)	Finished product or part fabricated of or containing tungsten or magnesium-thorium alloys. Cannot treat or process chemically, metallurgically, or physically.	$\leq 4\%$ by weight thorium content.
40.13(c)(5)	Uranium contained in counterweights installed in aircraft, rockets, projectiles and missiles or stored or handled in connection with installation or removal of such counterweights.	Per stated conditions in rule.
40.13(c)(6)	Uranium used as shielding in shipping containers if conspicuously and legibly impressed with legend "CAUTION RADIOACTIVE SHIELDING – URANIUM" and uranium incased in at least 1/8 inch thick steel or fire resistant metal.	Depleted Uranium
40.13(c)(7)	Thorium contained in finished optical lenses	$\leq 30\%$ by weight thorium, per conditions in rule.
40.13(c)(8)	Thorium contained in any finished aircraft engine part containing nickel-thoria alloy.	$\leq 4\%$ by weight thorium, per conditions in rule.

**Table C.4b: Materials Specifically Exempted by the NRC or NRC Agreement State**

Exemption	Materials	Isotope, Activity or Concentration*
10 CFR 30.11**	Byproduct material including production particle accelerator material exempted from NRC or Agreement State regulation by rule, order, license, license condition or letter of interpretation may be accepted as determined by specific NRC or Agreement State exemption.***	Byproduct material at concentrations consistent with the exemption
10 CFR 40.14**	Source material exempted from NRC or Agreement State regulation by rule, order, license, license condition or letter of interpretation may be accepted as determined by specific NRC or Agreement State exemption.***	Source material at concentrations consistent with the exemption.
10 CFR 70.17	Special Nuclear Material (SNM) exempted from NRC regulation by rule, order, license, license condition or letter of interpretation may be accepted as determined by specific NRC or Agreement State exemption.***	SNM at concentrations consistent with the exemption.

\*Sum of all isotopes up to a maximum concentration of 3,000 pCi/gm.

\*\*Also includes equivalent Agreement State regulation where applicable.

\*\*\* Similar material not regulated or licensed by the NRC may also be accepted. Sum of all isotopes up to a maximum concentration of 3,000 pCi/gm. IDEQ shall be notified prior to the receipt of Special Nuclear Material not regulated or licensed by the NRC.

#### Additional Information for USEI's Waste Analysis Plan

1. US Ecology Idaho, Inc. (USEI) may receive contaminated materials or other materials as described in Tables C.1 - C.4b above. USEI may not accept for disposal any material that by its possession would require USEI to have a radioactive material license from the Nuclear Regulatory Commission (NRC).
2. Unless approved in advance by USEI and IDEQ, average activity concentrations may not exceed those concentrations enumerated in Tables C.1 and C.2. Additionally, for Tables C.1 and C.2, individual pockets of material may exceed the WAC for the radionuclides present as long as the average concentration of all radionuclides within the package or conveyance remains at or below the WAC and the highest dose rate measured on the outside of the unshielded package or conveyance does not exceed those action levels enumerated in ERMP-01.
3. Other items, devices or materials listed in Table C.4a, which are exempted in accordance with 10 CFR Parts 30, 40 or equivalent Agreement State regulations or 10 CFR Part 70 may be accepted at or below the activities (per device or item) or concentrations specified in those exemptions.
4. 10CFR20.2008 authorizes disposal of certain byproduct material as defined in Section 11.e(3) and 11.e(4) of the Atomic Energy Act, as amended, at disposal facilities authorized to dispose of such material in accordance with any Federal or State solid or hazardous waste law, as authorized under the Energy Policy Act of 2005.
5. The generator of particle accelerator produced waste must specify that the waste meets applicable acceptance criteria.
6. In accordance with permit requirements, notification of any exceedance of the WAC will be provided to the RCRA Program Manager within 24 hours, in accordance with the permit.

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-4	Section 5.1	Waste Characterization	10CFR20.2002	It is indicated that the average waste $\rho$ was 1.5 g/cm <sup>3</sup> for the slabs and the soil under the slabs.	Provide the basis for determining that the average waste $\rho$ was 1.5 g/cm <sup>3</sup> for the slabs and the soil under the slabs.
<b>Response Summary:</b>					
<b>Response Detail:</b> The value of 1.5 g/cm <sup>3</sup> is the average ex-situ density over all of the waste that will be shipped under this 20.2002 request. This value is the weighted average of the constituent materials whose density is estimated based on the professional judgment of waste management staff with extensive experience. Ex-situ constituent material density values used in this calculation are 15, 15, 110, and 90 lb/ft <sup>3</sup> (0.24, 0.24, 1.76, and 1.44 g/cm <sup>3</sup> ) for subsurface piping, miscellaneous equipment, concrete / asphalt, and ex-situ soil, respectively..					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-5	Section 5.1	Criticality Safety Assessment, FNMCP & Physical Security	10CFR74.11	It is stated that the waste in the soil, slabs, concrete, asphalt, or HVAC equipment would consist of U-235 at enrichment levels averaging below 10%.	Provide the basis for concluding that there will be any U-235 in the soil, slabs, concrete, asphalt, or HVAC equipment enriched to levels above 5%.
<b>Response Summary:</b> Existing characterization data has identified					
<b>Response Detail:</b> Table 4-1 from HDP-TBD-WM-906 provides a summary of the average enrichment measured for each waste stream component. These range from 3.4 to 5 percent. While this represents the average enrichment, there are individual samples that indicate the presence of materials with a higher enrichment. For example, four concrete samples (1, 2B, 13 and 14) have enrichments exceeding 5 percent (8.2, 18.7, 9.4 and 15.6 percent), as listed in Table 1-2 of NSA-TR-HDP-11-11 (Attachment 10 to HEM-12-2). Other examples are internal pipe sample results listed in the figure associated with RAI SA-7 above.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-6	Section 5.2	Characterization	10CFR20.1302 (a) and 10CFR20.1302 (b)	Section indicates that no additional characterization will be performed on asphalt/concrete or specific miscellaneous equipment. No basis is provided for excluding additional characterization of these items. Such characterization and its associated	Provide the basis for not performing additional characterization on asphalt/concrete or specific miscellaneous equipment prior to shipment and the basis for

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward										
				characterization data would be necessary to demonstrate that the dose consequences to the maximum exposed individual would only be a few mrem/yr for the asphalt/concrete and specific miscellaneous equipment. No characterization can be performed on the water treatment equipment since it has not operated. Only a projection could be made based upon the material to be processed.	concluding that the dose consequences to the maximum exposed individual is only a few mrem/yr.  Provide an estimate of the anticipated concentrations of radioactive materials expected to be found on the waste water treatment facility's equipment										
<b>Response Summary:</b> See responses to RAI CH-6, RAI GEN-1, and RAI-GEN-2.															
<b>Response Detail:</b> The first sentence of Section 5.2 of Enclosure 1 to HEM-12-2 discusses that characterization data and analysis (i.e., justification or basis) is contained in HDP-TBD-WM-906 for those items where additional characterization was not planned. That said, additional characterization is now planned as discussed in responses to RAI CH-6, RAI GEN-1, and RAI-GEN-2. However, additional characterization of asphalt is not believed to be warranted since the material was conservatively assigned an inventory based on concentrations within the process building pad, even though the asphalt was outdoors and not subject to the same contaminating events as the process building floors.  The basis for concluding the dose consequences to the maximum exposed individual is only a few mrem/yr is based on analysis described in Section 6.0 (and subsections) of Enclosure 1 to HEM-12-2. The following waste volume and curie content was used in the dose estimate.  <div><b>Table 1 from Enclosure 1 to HEM-12-2, Expected Radionuclides in Westinghouse Hematite Waste</b><table><tr><th>Shipped Volume (m<sup>3</sup>)</th><th>U-234 (Ci)</th><th>U-235 (Ci)</th><th>U-238 (Ci)</th><th>Tc-99 (Ci)</th></tr><tr><td>22848</td><td>2.2</td><td>0.1</td><td>0.4</td><td>0.3</td></tr></table></div> The anticipated concentrations of radioactive materials expected on equipment from the Water Treatment System would be bounded by the subsurface piping characterization data.						Shipped Volume (m <sup>3</sup> )	U-234 (Ci)	U-235 (Ci)	U-238 (Ci)	Tc-99 (Ci)	22848	2.2	0.1	0.4	0.3
Shipped Volume (m <sup>3</sup> )	U-234 (Ci)	U-235 (Ci)	U-238 (Ci)	Tc-99 (Ci)											
22848	2.2	0.1	0.4	0.3											

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-7	Section 5.2.2	Characterization	Omission	The unnamed and unnumbered Table on the bottom of page 5 needs to be labeled. The table identified as Table 2 on page 10 needs to be designated as Table 3.	Add Table number and title to Table on page 5. With the addition, the reference to Table 2 in Section 6.1 should be changed to Table 3 and present Table 2 on page 10 changed to Table 3.
<b>Response:</b> See responses to RAI CH-2.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-8	Section 6.2 - 6.7	USEI Worker Doses	10CFR20.2002	These sections describe the number of USEI workers who share in the responsibility for the various identified tasks. It is indicated that the dose is divided among the number of workers. Is the number of workers sharing in these tasks the minimum that have performed these functions or has there been circumstances such as layoffs, etc. where the number of individuals performing these tasks is less than indicated in these sections?	Provide information as to whether the number of workers specified in the dose assessments of Sections 6.2 - 6.7 is the minimum maintained during USEI operation and that layoffs or other circumstances have not resulted in a decrease in the number performing the identified tasks.
<b>Response Summary:</b> The number of workers sharing the various identified tasks in Sections 6.2 to 6.7 of Enclosure 1 to HEM-12-2 are the minimum number of workers that will share those tasks during USEI operations, even considering circumstances such as layoffs.					
<b>Response Detail:</b> The minimum number of workers in Sections 6.2 to 6.7 of Enclosure 1 to HEM-12-2 are the same as the number of workers identified in the 20.2002 application and RAI responses that resulted in Amendment 58 to SNM-33.					

RAI No.	Section	Issue	Regulatory Link	Discussion	Path Forward
ENCL-9	Section 8	Criticality Safety	10CFR70.24	Westinghouse addresses the criticality safety issues associated with the disposition of Hematite material at the USEI site but does not address the potential criticality issues associated with the Hematite material interacting with other SNM buried in the USEI cell.	Provide an assessment which addresses the criticality safety aspects associated with the Hematite material potentially interacting with other SNM buried in the USEI cell.
<b>Response:</b> See the response to RAI ENCL-1 above.					