Westinghouse Electric Company LLC
Hematite Decommissioning Project
3300 State Road P
Festus, MO 63028
USA

ATTN: Document Control Desk
Director, Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Direct tel: 314-810-3368
Direct fax: 636-937-6380
E-mail: hackmaek@westinghouse.com
Our ref: HEM-11-90
Date: June 20, 2011

Subject: Draft Supplemental Response to NRC Request for Additional Information on the Hematite Decommissioning Plan Chapter 11 (License No. SNM-00033, Docket No. 070-00036)

Reference:
1) Westinghouse (E. K. Hackmann) letter to Document Control Desk (NRC), HEM-10-84, dated August 10, 2010, "Response to Request for Additional Information Concerning Hematite Decommissioning Plan: Chapter 11, Environmental Monitoring Program"
2) NRC (J. J. Hayes) Memorandum to NRC (P. Michalak), dated June 13, 2011, "Westinghouse Hematite Request for Additional Information Resolution" (ML111640173)

Reference 1 provided Westinghouse responses to NRC's Requests for Additional Information (RAIs) concerning Chapter 11 of the Hematite Decommissioning Plan (DP). This letter provides draft supplemental responses to those RAIs where NRC required clarification. These draft supplemental responses are provided in support of the scheduled June 24 and 27 conference calls identified in Reference 2.

Please contact Kevin Davis at 314-810-3348 should you have questions or need any additional information.

Sincerely,

Kevin Harris for E. Kurt Hackmann

E. Kurt Hackmann
Director, Hematite Decommissioning Project

Attachment: 1) Draft Supplemental Response to NRC Requests for Additional Information on Decommissioning Plan Chapter 11

cc: J. J. Hayes, NRC/FSME/DWMEP/DURLD
J. W. Smetanka, Westinghouse, w/o attachment
J. E. Tapp, NRC Region III/DNMS/MCID, w/o attachment

ATTACHMENT 1

Draft Supplemental Response to NRC Requests for Additional Information on Decommissioning Plan Chapter 11

Westinghouse Electric Company LLC,
Hematite Decommissioning Project

Docket No. 070-00036

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RAI No.	Issues	Path Forward	Discussion Points	Proposed Resolution
2a	Meeting 10CFR20.1101(d)	Modify DP and RAI response to commit to 10CFR 20.1101(d).	HDP will revise the DP to clarify the intent to maintain air emissions consistent with the requirements of 10 CFR 20.1101(d). The ALARA goal of 20 percent of the values in Column 1 of Table 2 in Appendix B to 10 CFR 20 equates to 10 mrem/year, which is the numerical value of the 10 CFR 20.1101(d) constraint.	The following text will be added to DP Section 11.1.1.1: "HDP will constrain airborne radioactivity emissions in accordance with the requirements of 10 CFR 20.1101(d) and will demonstrate compliance with this requirement using methodology contained within Regulatory Guide 4.20 using the data obtained from air monitoring locations defined in Table 11-1 of this chapter."
2b	ALARA limited to controlling dust from soil movement and excavation.	Expand the ALARA program to include activities such as the soil vapor extraction process. The resolution to include the SVE system as a point source emission is acceptable. See additional comments below on the limit for gross radioactivity analyses.	ALARA was not intended to be "limited" to dust. Dust is the primary concern in outdoor excavation work. The soil vapor extraction process should have been included as a point source emission. It will be added to Table 11-1 within Chapter 11 of the DP, which includes an ALARA goal and investigation level in addition to other parameters.	The revised DP Table 11-1, in Attachment 1 to this matrix, will replace the current DP Table 11-1.
3	Soil vapor extraction process as a point source.	Add this process as an effluent release point & monitor the effluent. Proposed enhanced wording to Section 11.2.3.3 may need clarification. May wish to state that the effluent from the vapor extraction process will be a point source whose location will change over the course of decommissioning.	The soil vapor extraction process will be added as a point source in Table 11-1 of the DP. Sampling of the system will be conducted as described in the Response to RAI C12-Q3.	The revised DP Table 11-1, in Attachment 1 to this matrix, will replace the current DP Table 11-1. The following text will be added to the end of Section 11.2.1: "Air effluents from the soil vapor extraction will be treated and monitored as discussed in Section 12.4.3.4." The following text will be added to the end of Section 11.2.3.3: "The point source of air effluent from the soil vapor extraction system (SVES) will initially originate from the equipment location on the eastern portion of the slab of the former process buildings. During remediation of the former process building slab and underlying soil, it is planned that the SVES equipment will be relocated to a location in the Central Tract that does not impact remediation work activities."
11	Basis for the regulatory levels.	Due to the length of the text, the NRC Path Forward and Discussion Points are in Appendix A.	Due to the length of the text, the Westinghouse Discussion and Proposed Resolution are in Appendix A.	
15	Leak Detection Systems	Confirm that there are no leak detection systems and that only visual inspections will be performed. Westinghouse commits to a daily visual inspection of the Temporary Storage Tanks, WTS, and connecting piping, including underground crossings, in the response to RAI –C11-Q14.	The information provided in Westinghouse letter HEM-10-84 with respect to no leak detection systems and visual inspections is confirmed.	Westinghouse has provided requested confirmation. No further action required.

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

NRC Issue: Basis for the Regulatory Levels

Clarify where in Part 20, Appendix B, Table 2, the regulatory levels came from.

Address all radionuclides of concern, not just uranium. Use the most limiting value and clearly explain this determination.

Westinghouse should evaluate whether or not the most conservative gross beta limit is being used. For example, the Pb-210 effluent limit is more restrictive than the Th-234 limit. Pb-210 (with a half life of around 22.3 years) may be present as a daughter of Ra-226. It was indicated in the DP that the installation of contaminated equipment brought Ra-226 contamination on site. A similar comment was made by NRC staff during the discussion of Chapter 12 RAI-3.

The NRC staff is agreeable to the usage of the Special Effluent Limit values, but it is still not clear whether soil outside the burial pit area will be treated and whether additional Th-232 special effluent limit areas exist. Figure 11-2 (provided in Attachment 4) only addresses the burial pit. While Th-232 impacted areas were not deemed appropriate for compliance surveys, Th-232 data indicate that there are additional elevated Th-232 samples outside of those currently designated in the updated Figure 11-2.

Address additional elevated Th-232 samples and clarify whether Special Effluent Limits would also apply there."

NRC staff has two concerns with Westinghouse's proposed effluent limit values:

(1) NRC staff disagrees that the mixture is known for effluent media. Westinghouse has provided information on ratios of radionuclides in soil, but based on the results provided, there is significant variability in ratios of Th-232 to other radionuclides. Also, Westinghouse assumes that the ratio in soil will be the same as the ratio in effluents (air and water). Especially given the variability in ratios in soil, the staff has seen no evidence which demonstrates that the soil ratio will equate to the effluent ratio.

(2) If the effluent radionuclide mixture is known, as Westinghouse claims, then Westinghouse should be following Note 4 of Appendix B. This Note states, "If the identity and concentration of each radionuclide in a mixture are known, the limiting values should be derived as follows: determine, for each radionuclide in the mixture, the ratio between the concentration present in the mixture and the concentration otherwise established in Appendix B for the specific radionuclide when not in a mixture. The sum of such ratios for all of the radionuclides in the mixture may not exceed "1" (i.e., "unity")."

Considering the two issues presented, that there is insufficient evidence that the radionuclide concentrations and ratios in soil equate to the same concentrations and ratios in an effluent media (i.e., water or air). In addition, the proposed approach for mixtures appears to be inconsistent with Note 4 of Appendix B to 10 CFR 20, the following potential paths forward are presented:

(1) Westinghouse could commit to using the most restrictive effluent concentration values from Appendix B, Table 2, per Note 1. Or,

(2) Westinghouse could commit to determining the radionuclide mixture in effluents (i.e., by isotopic analyses) and then use Note 4 to determine appropriate effective limit values.

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Air

- Describe isotopic analysis that will be performed for SVE system effluent composite sampler and confirm that it is weekly.
- For the remainder of the air effluent samples, describe how the identity and concentrations will be verified in order to allow utilization of the Unity Rule. (Note 4 of App B of 10CFR20)
- Describe how Westinghouse will calculate the effective limit which is derived from Note 4.

Water

- Describe isotopic analysis that will be performed for liquid effluent samples and the frequency.
- Describe how the identity and concentrations will be verified in order to allow utilization of the Unity Rule. (Note 4 of App B of 10CFR20)
- Describe how the sampling and analysis methodology will vary between the water treatment system (treatment) and the other outfall (non-treatment) effluent release points.

During the June 10 call, there was some discussion on how Westinghouse would be able to verify the identity and concentrations of radionuclides for the water effluent and the remainder of the air effluents (outside the SVE). This would require isotopic analysis, and there is some guidance on "radionuclide analyses" under Section 3 (Analysis of Samples) of Regulatory Guide 4.16. Specifically, the following two paragraphs discuss radionuclide analyses (the second and fourth paragraph of Section 3.1):

Radionuclide analyses should be performed on selected samples unless (1) the gross alpha and gross beta activities are so low that individual radionuclides could not be present in concentrations greater than 10% of the quantities specified in Table II of Appendix B to 10 CFR Part 20 or (2) the radionuclide composition of the sample is known through such operational data as the composition of the feed material.

Radionuclide analyses should be made more often (1) at the beginning of the monitoring program until a predictable radionuclide composition of effluents is established, (2) whenever there is a significant unexplained increase in gross radioactivity, or (3) whenever a process change or other circumstance might cause a significant variation in the radionuclide composition. Reports in which estimates of quantities of individual radionuclides are based on methods other than direct measurement should include an explanation and justification of how the result was obtained. The results of the analyses of the samples for each release point should be used to determine (1) the total gross alpha and gross beta activity (as applicable) discharged, (2) the average concentration of gross alpha and gross beta activity (as applicable) discharged, and (3) the total activity and average concentrations of each of the radionuclides discharged.

It may be useful for Westinghouse to consider Section 3.1 as they determine isotopic analyses to verify the identity and concentrations of radionuclides for the water effluent and the remainder of the air effluents (outside the SVE).

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Westinghouse Response: The following response consolidates discussion points and proposed resolutions.

A new Section 11.2.5, Effluent Limits, will be added to DP Chapter 11, as follows:

11.2.5 Effluent Limits

Historically, the SNM-33 License Applications committed to using the effluent limits for gross alpha radioactivity based on the U-234 (Class Y) effluent limits from Table 2 of Appendix B to 10 CFR 20. Similarly, the effluent limits for gross beta radioactivity were based on the Th-234 (class Y) effluent limits from Table 2 of Appendix B to 10 CFR 20. These pre-DP effluent limits were based on effluents associated with fuel fabrication processes within the buildings. In consideration of the potential change in the radionuclide mixture in effluents during remediation, DP effluent limits have been derived for remediation work based on the concentrations in buried debris and soil. The derivation is explained in the following subsections, and is based on Notes 1 and 4 to Appendix B of 10 CFR 20.

11.2.5.1 Radionuclides Included in Derivation

Based on DP Section 4.0, the primary radionuclides of concern (ROCs) requiring direct measurement in effluents are U-234, U-235, U-238, Tc-99, Th-232, Ra-226. Data for the balance of the ROCs (Am-241, Np-237, Pu-239/240) have been included in the derivation of Site effluent limits but do not require further measurement.

With the exception of Tc-99, the ROCs primarily emit alpha radiation, so the derivation of the gross alpha radioactivity effluent limits use the limits for these ROCs from Table 2 of Appendix B to 10 CFR 20. In addition, Th-228 is included in this derivation since it is a long-lived daughter.

The derivation of gross beta radioactivity effluent limits use the limits from Table 2 of Appendix B to 10 CFR 20 for the ROC Tc-99 and the daughters of the other ROCs where the daughters have restrictive limits in Table 2 of Appendix B to 10 CFR 20. Specifically, Pa-233 (daughter of Np-237), Pb-210 (daughter of Ra-226), Ra-228 (daughter of Th-232), Th-231 (daughter of U-235), and Th-234 (daughter of U-238) are used in the derivation.

The daughters are assumed to be in equilibrium with the parent ROC, even though sufficient time has not passed in all cases for equilibrium to have been established (e.g., Pb-210). This is a conservative assumption resulting in a more restrictive derivation.

11.2.5.2 Relationship of ROCs in Soil to ROCs in the Air and Liquid Effluents

The concentration of ROCs in soil directly relate to the concentration of ROCs in effluent since remediation disturbs soil, creating the potential for dust (airborne effluent) and suspended solids to be present in water (liquid effluent). Considering the relative solubility of the ROCs, applying the activity fractions of radionuclides in the mixture for the soil as the activity fractions in the water effluent is reasonable since the compounds containing the more restrictive radionuclides (lower limits) are on balance less soluble in water (based on the distribution coefficients identified in DP Table 5-6) than the uranium radionuclides.

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

11.2.5.3 Equation for Derived Effluent Limits

The comparison of the total amount of gross alpha and beta radioactivity in effluents to the effluent limits for an identified mixture of radionuclides is based on the sum of the ratios of the concentration of each radionuclide in the effluent divided by the radionuclide effluent limit. The result is compared to the limit expressed as the unity value (1.0).

$$\frac{C_A}{EL_A} + \frac{C_B}{EL_B} + \cdots \leq 1 \qquad \textbf{(11-1)}$$

$Where,$
$C_A = concentration\ of\ radionuclide\ A$
$C_B = concentration\ of\ radionuclide\ B$
$EL_A = \ effluent\ concentration\ limit\ for\ radionuclide\ A$
$EL_B = effluent\ concentration\ limit\ for\ radionuclide\ B$

An effective EL value, EL_{eff}, is determined based on the following equation. The gross alpha and beta radioactivity effluent limits will be effective limits as derived here:

$$\frac{C_A}{EL_A} + \frac{C_B}{EL_B} + \ \ldots = \frac{C_A + C_{B+\ldots}}{EL_{eff}}$$

$Dividing\ both\ sides\ by\ C_A + C_{B+\ldots}$

$$\frac{C_A/(C_A + C_B + \ \ldots)}{EL_A} + \frac{C_B/(C_A + C_{B+\ldots})}{EL_B} + \ \ldots = \frac{1}{EL_{eff}}$$

$Substituting\ f_A = \frac{C_A}{C_A + C_{B+\ldots}}, f_B = \frac{C_B}{C_A + C_B + \ \ldots}, \ldots$

$$\frac{f_A}{EL_A} + \frac{f_B}{EL_B} + \ \ldots = \frac{1}{EL_{eff}}$$

Where

$f_A = activity\ fraction\ of\ radionuclide\ A\ in\ the\ mixture$

$f_B = activity\ fraction\ of\ radionuclide\ B\ in\ the\ mixture$

$Regrouping\ terms\ yields\ the\ final\ expression$

$$EL_{eff} = \frac{1}{\frac{f_A}{EL_A} + \frac{f_B}{EL_B} + \ \ldots} \qquad \textbf{(11-2)}$$

11.2.5.4 Radionuclide Mixtures

Based on a review of the soil data in the Hematite Radiological Characterization Report (Reference 11-7), the site has three areas where the radionuclide mixture in effluents will be different and warrant independent consideration. These areas are:

- An area of elevated Ra-226 contamination in the north end of the burial pit area (the Derived Effluent Limits for the Elevated Ra-226 Area will apply).

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

- An area of elevated Th-232 contamination in the south end of the burial pit area (the Derived Effluent Limits for the Elevated Th-232 Area will apply).
- The balance of the Site impacted area (the Derived Effluent Limits for the Balance of the Site will apply).

The Derived Effluent Limits for the Elevated Ra-226 Area and the Derived Effluent Limits for the Elevated Th-232 Area will only apply to effluents associated with soil/debris from the elevated Ra-226 and Th-232 areas, which are shown on Figure 11-2. The boundaries of these areas are based on the conceptual survey units identified in DP Chapter 14.

The Derived Effluent Limits for the Balance of the Site will apply to the remainder of the Site unless soil data collected as part of decommissioning or effluent data collected at a quarterly frequency show different activity fractions for the mixture such that Equation 11-1 is no longer met and a different derived effluent limit is required to be developed and applied. Data obtained after remediation of soil in areas requiring the Derived Effluent Limits for Elevated Ra-226 or Th-232 Areas may be used to justify resumption of the Derived Effluent Limits for the Balance of the Site in those post-remediation areas. The RSO shall approve the calculations of derived effluent limits to meet Equation 11-1, and the justification for using the Derived Effluent Limits for the Balance of the Site instead of a different derived effluent limit after remediation of an area.

For each of these areas, the available soil characterization data was used to determine effective air and water effluent concentration limits for gross alpha and beta radioactivity. To avoid skewing the derivation, soil characterization data at soil depths that was not contaminated was not used. Ra-226 and Th-232 results were corrected for background contribution by subtracting the mean site background concentration value of 0.9 and 1.0 pCi/g, respectively.

11.2.5.4.1 Elevated Ra-226 Area

The radionuclide mixture within the elevated Ra-226 area is tabulated below.

Gross Alpha Constituents		
Radionuclide	**Average Activity** (pCi/g)	**Activity Fraction**
Am-241 (W)	9.90E-03	1.3E-04
Np-237 (W)	3.69E-02	4.9E-04
Pu-239 (W)	4.62E-03	6.2E-05
Ra-226 (W)	5.55E+00	7.4E-02
Th-232 (Y)	0.00E+00*	0.0E+00
U-234(Y)	5.63E+01	7.5E-01
U-235 (Y)	2.76E+00	3.7E-02
U-238 (Y)	1.00E+01	1.3E-01

Gross Beta Constituents		
Radionuclide	**Average Activity** (pCi/g)	**Activity Fraction**
Tc-99 (W)	2.07E+00	1.0E-01
Np-237 [Pa-233] (W)	3.69E-02	1.8E-03
Ra-226 [Pb-210] (W)	5.55E+00	2.7E-01
Th-232 [Ra-228] (Y)	0.00E+00	0.0E+00
U-235 [Th-231] (Y)	2.76E+00	1.4E-01
U-238 [Th-234] (Y)	1.00E+01	4.9E-01

* Average concentration was less than zero, so value was set to zero for calculations.

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The Derived Effluent Limits for the Elevated Ra-226 Area are calculated using Equation 11-2 to be:

Media	Gross Alpha Derived Effluent Limits for Elevated Ra-226 Area (μCi/ml)	Gross Beta Derived Effluent Limits for Elevated Ra-226 Area (μCi/ml)
Air	5.5E-14	2.2E-12
Water	2.3E-07	3.7E-08

11.2.5.4.2 Elevated Th-232 Area

The radionuclide distribution within the elevated Th-232 area is tabulated below.

Gross Alpha Constituents				Gross Beta Constituents		
Radionuclide	Average Activity (pCi/g)	Activity Fraction		Radionuclide	Average Activity (pCi/g)	Activity Fraction
Am-241 (W)	0.00E+00*	0.0E+00		Tc-99 (W)	2.87E-01	9.4E-04
Np-237 (W)	0.00E+00*	0.0E+00		Np-237 [Pa-233] (W)	0.00E+00*	0.0E+00
Pu-239 (W)	0.00E+00*	0.0E+00		Ra-226 [Pb-210] (W)	2.85E-01	9.3E-04
Ra-226 (W)	2.85E-01	2.1E-04		Th-232 [Ra-228] (Y)	1.23E+02	4.0E-01
Th-232 (Y)	1.23E+02	9.0E-02		U-235 [Th-231] (Y)	3.75E+01	1.2E-01
U-234(Y)	9.35E+02	6.9E-01		U-238 [Th-234] (Y)	1.45E+02	4.7E-01
U-235 (Y)	3.75E+01	2.8E-02				
U-238 (Y)	1.45E+02	1.1E-01				

* Average concentration was less than zero, so value was set to zero for calculations.

The Derived Effluent Limits for the Elevated Th-232 Area are calculated using Equation 11-2 to be:

Media	Gross Alpha Derived Effluent Limits for Elevated Th-232 Area (μCi/ml)	Gross Beta Derived Effluent Limits for Elevated Th-232 Area (μCi/ml)
Air	2.8E-14	4.9E-12
Water	1.6E-07	1.5E-07

11.2.5.4.3 Balance of the Site

The radionuclide distribution for the balance of the Site (outside of the elevated Ra-226 and Th-232 areas) is tabulated below.

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Gross Alpha Constituents		
Radionuclide	**Average Activity** (pCi/g)	**Activity Fraction**
Am-241 (W)	3.27E-02	2.1E-04
Np-237 (W)	1.98E-02	1.3E-04
Pu-239 (W)	1.60E-03	1.0E-05
Ra-226 (W)	5.05E-02	3.2E-04
Th-232 (Y)	0.00E+00*	0.0E+00
U-234(Y)	1.40E+02	9.0E-01
U-235 (Y)	6.22E+00	4.0E-02
U-238 (Y)	9.67E+00	6.2E-02

Gross Beta Constituents		
Radionuclide	**Average Activity** (pCi/g)	**Activity Fraction**
Tc-99 (W)	4.06E+01	7.2E-01
Np-237 [Pa-233] (W)	1.98E-02	3.5E-04
Ra-226 [Pb-210] (W)	5.05E-02	8.9E-04
Th-232 [Ra-228] (Y)	0.00E+00*	0.0E+00
U-235 [Th-231] (Y)	6.22E+00	1.1E-01
U-238 [Th-234] (Y)	9.67E+00	1.7E-01

* Average concentration was less than zero, so value was set to zero in calculations.

Based on the above data, derived effluent limits are calculated using Equation 11-2 to be as follows. However, in the following assessment of variability in the soil data, lower derived effluents limits are calculated and will be used instead as the Derived Effluent Limits for the Balance of the Site.

Media	**Gross Alpha Derived Effluent Limits** (μCi/ml)	**Gross Beta Derived Effluent Limits** (μCi/ml)
Air	5.1E-14	3.2E-10
Water	3.0E-07	7.3E-06

11.2.5.4.4 Consideration of Variability in Soil Data

In order to evaluate the effect of variability in activity fractions for the balance of the site, derived effluent limits were developed using the methodology above for the individual conceptual survey units containing previously identified individual elevated thorium samples outside the elevated Th-232 and Ra-226 areas identified above. The results of this investigation, tabulated below, warranted a modification to the derived effluent limits in the preceding section.

Survey Unit	**Air** (μCi/ml)		**Water** (μCi/ml)	
	Gross Alpha	**Gross Beta**	**Gross Alpha**	**Gross Beta**
LSA-02-01	5.0E-14	9.7E-11	2.9E-07	2.3E-06
LSA-02-02	5.1E-14	1.3E-10	2.9E-07	2.4E-06
LSA-02-03	5.1E-14	2.5E-10	2.7E-07	6.3E-06
LSA-05-01	5.2E-14	2.2E-10	2.9E-07	4.9E-06
LSA-08-05	5.1E-14	2.6E-10	2.9E-07	6.2E-06
LSA-08-10	5.2E-14	3.8E-10	3.0E-07	9.5E-06

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Survey Unit	Air (μCi/ml)		Water (μCi/ml)	
	Gross Alpha	Gross Beta	Gross Alpha	Gross Beta
LSA-08-11	5.1E-14	5.3E-10	2.9E-07	1.8E-05
LSA-08-12	5.1E-14	2.2E-10	2.8E-07	4.7E-06
LSA-08-14	5.0E-14	1.8E-10	3.0E-07	4.4E-06
Minimum	**5.0E-14**	**9.7E-11**	**2.7E-07**	**2.3E-06**

The Derived Effluent Limits for the Balance of the Site will be set to the lowest value for calculated above, as shown in the table below.

Media	Gross Alpha Derived Effluent Limits for the Balance of the Site (μCi/ml)	Gross Beta Derived Effluent Limits for the Balance of the Site (μCi/ml)
Air	5.0E-14	9.7E-11
Water	2.7E-07	2.3E-06

11.2.5.5 Verification of Mixture

Verification of the isotopic activity fractions for air effluent will be performed in the following manner:

- Individual air samples at Stationary Environmental Air Sampling Stations will be composited on a quarterly basis and submitted for isotopic analysis. The isotopic results will then be used to calculate the effluent concentration directly and to verify the annual activity fractions. Prior to the quarterly composite analysis, the samples from Stationary Environmental Air Sampling Stations will be analyzed weekly for gross alpha and beta radioactivity.
- Individual air effluent/environmental samples from Perimeter Sampling Locations and from Stationary Environmental Air Sampling Stations that reach or exceed the 50 percent (based on gross alpha or beta results) of the limit will be submitted for isotopic analysis. This isotopic data will be used to verify the annual activity fractions that were used in the derivation of the effective effluent limits.
- Individual air samples will be collected from the air exhaust from the SVE system on a weekly basis during SVE operations. For SVE operations without added heat, sample analysis will be for gross alpha and beta radioactivity, and isotopic analysis if the investigation threshold is exceeded. For SVE operations with added heat, sample analysis will include gamma spectroscopy (to detect U-235, U-238, Th-232 and Ra-226) followed by beta analysis for Tc-99, Ra-228, and Pb-210. This isotopic data will be used to verify the annual activity fractions that were used in the derivation of the effective effluent limits.

Verification of the isotopic activity fractions for liquid effluent will be performed in the following manner:

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- Weekly composite and quarterly grab liquid effluent samples will be analyzed for gross alpha and beta radioactivity with the results compared against the appropriate effluent limit from Table 11-1. Individual samples which exceed 50 percent of the effluent limit will submitted for isotopic analysis (Uranium, Th-232, Ra-226, Ra-228, Tc-99, and Pb-210). This isotopic data will be used to verify the annual activity fractions that were used in the derivation of the effective effluent limits.
- In addition to the weekly analysis for gross alpha and beta radioactivity, isotopic analysis (Uranium, Th-232, Ra-226, Ra-228, Tc-99, and Pb-210) will be routinely performed on quarterly composite samples from the Water Treatment System and Outfalls #001, 002, and 006, unless analyzed for isotopic content during a calendar quarter as a result of exceeding the threshold in the preceding bullet. This isotopic data will be used to calculate the effluent concentration directly and to verify the annual activity fractions that were used in the derivation of the effective effluent limits.

--End of new DP Section 11.2.5--

A new reference will be added to DP Chapter 11 as follows: "11-7 Westinghouse Electric Company Document No. DO-08-003, "Hematite Radiological Characterization Report."

A new DP Table 11-1 will be added to DP Chapter 11; this table is on the pages immediately following this page.

A new DP Figure 11-2 will be added to DP Chapter 11; this figure is the last page in this attachment to the DP Chapter 11 matrix.

The following sentence identified in Westinghouse letter HEM-10-84 for RAI C11-Q6 for DP Section 11.2.3.4 will be replaced: "Consistent with Reference 11-6, isotopic analysis of effluent water samples shall be performed when radioactivity concentrations are in excess of 10 percent of the annual limits specified in 10 CFR 20, Appendix B, Table 2, Column 2." The following sentence is the replacement: "Consistent with Reference 11-6, isotopic analysis of effluent water samples will be performed on selected samples, e.g., quarterly composite samples and individual samples when radioactivity concentrations are in excess of the Investigation Level."

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Table 11-1a. Air Effluent Monitoring and Limits

Type	Frequency	Analytical Method	Concentration Limits[a] (ALARA Goals[a] and Investigation Levels[b] are 20 and 50 percent, respectively, of the Limits)
Stationary Environmental Air Sampling Stations[c] (AS-A, AS-B, AS-C, AS-D, AS-F, AS-G, AS-H, AS-I [enabled mobility])	Weekly Media Change-out	Gross Alpha/Beta	Gross Alpha: 5.0E-14 µCi/ml Gross Beta: 9.7E-11 µCi /ml
	Single Elevated Weekly Sample (≥ 50% Limit)	Isotopic Analysis	Analytes: Uranium, Tc-99, Th-232, Ra-226 Limits: Column 1, Table 2, Appendix B, 10 CFR 20
	Quarterly Composite of Weekly Samples (each station)	Isotopic Analysis	Analytes: Uranium, Tc-99, Th-232, Ra-226 Limits: Column 1, Table 2, Appendix B, 10 CFR 20
Perimeter Sampling Locations	Daily[d] Media Change-out	Gross Alpha/Beta	<u>Derived Effluent Limit for Elevated Th-232 Area</u> Alpha: 2.8E-14 µCi /ml Beta: 4.9E-12 µCi /ml <u>Derived Effluent Limit for Elevated Ra-226 Area</u> Alpha: 5.5E-14 µCi/ml Beta: 2.2E-12 µCi/ml <u>Derived Effluent Limit for the Balance of the Site</u> Alpha: 5.0E-14 µCi/ml Beta: 9.7E-11 µCi/ml
	Single Elevated Daily Sample (≥ 50% Limit)	Isotopic Analysis	Analytes: Uranium, Tc-99, Th-232, Ra-226 Limits: Column 1, Table 2, Appendix B, 10 CFR 20

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Table 11-1a. Air Effluent Monitoring and Limits

Type	Frequency	Analytical Method	Concentration Limits[a] (ALARA Goals[a] and Investigation Levels[b] are 20 and 50 percent, respectively, of the Limits)
Soil Vapor Extraction System (during operations)	Weekly Media Change-out (operations without added heat)	Gross Alpha/Beta	Derived Effluent Limit for Elevated Th-232 Area* Alpha: 2.8E-14 µCi/ml Beta: 4.9E-12 µCi/ml Derived Effluent Limit for Elevated Ra-226 Area* Alpha: 5.5E-14 µCi/ml Beta: 2.2E-12 µCi/ml Derived Effluent Limit for the Balance of the Site* Alpha: 5.0E-14 µCi/ml Beta: 9.7E-11 µCi/ml * Limits applied based on the original location of the soil being processed in the SVE system.
	Elevated Weekly Sample (≥ 50% Limit) (operations without added heat)	Isotopic Analysis	Analytes: Uranium, Tc-99, Th-232, Ra-226 Limits: Column 1, Table 2, Appendix B, 10 CFR 20
	Weekly Media Change-out (operations with added heat)	Isotopic Analysis	Analytes: Uranium, Tc-99, Th-232, Ra-226, Ra-228, Pb-210 Limits: Column 1, Table 2, Appendix B, 10 CFR 20

[a] Values reflect the annual average concentration.
[b] Values reflect the results obtained from individual samples.
[c] These permanent sampling stations are also a part of the Environmental Monitoring Program.
[d] Daily frequency may be extended up to a week to achieve the necessary MDC for Derived Effluent Limits for Elevated Ra-226 or Th-232 Areas.

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Table 11-1b. Liquid Effluent Monitoring and Limits

Location	Frequency	Analytical Method	Concentration Limits[a] (ALARA Goals[a] and Investigation Levels[b] are 20 and 50 percent, respectively, of the Limits)
Outfall #001 (Sanitary Wastewater Treatment Plant)	Weekly Composite	Gross Alpha/Beta	Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml
	Quarterly Composite	Isotopic Analysis	Analytes: Uranium, Th-232, Ra-226, Ra-228, Pb-210, and Tc-99 Limits: Column 2, Table 2, Appendix B, 10 CFR 20
Outfall #002[c] (Site Pond Dam)	Weekly Composite	Gross Alpha/Beta	Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml
	Quarterly Composite	Isotopic Analysis	Analytes: Uranium, Th-232, Ra-226, Ra-228, Pb-210, and Tc-99 Limits: Column 2, Table 2, Appendix B, 10 CFR 20
Outfall #004 (East Culvert)	Quarterly Grab	Gross Alpha/Beta	Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml
Outfall #005 (South Culvert)	Quarterly Grab	Gross Alpha/Beta	Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml
Outfall #006 (Soil Laydown Area)	Weekly Composite	Gross Alpha/Beta	Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml
	Quarterly Composite	Isotopic Analysis	Analytes: Uranium, Th-232, Ra-226, Ra-228, Pb-210, and Tc-99 Limits: Column 2, Table 2, Appendix B, 10 CFR 20
Water Treatment System[e]	Weekly Composite or Tank Batch	Gross Alpha/Beta	<u>Derived Effluent Limit for Elevated Th-232 Area</u> Gross Alpha: 1.6E-07 µCi/ml Gross Beta: 1.5E-07 µCi/ml <u>Derived Effluent Limit for Elevated Ra-226 Area</u> Gross Alpha: 2.3E-07 µCi/ml Gross Beta: 3.7E-08 µCi/ml <u>Derived Effluent Limit for the Balance of the Site</u> Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml

Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Table 11-1b. Liquid Effluent Monitoring and Limits

Location	Frequency	Analytical Method	Concentration Limits[a] (ALARA Goals[a] and Investigation Levels[b] are 20 and 50 percent, respectively, of the Limits)
	Quarterly Composite (not including batch)	Isotopic Analysis	Analytes: Uranium, Th-232, Ra-226, Ra-228, Pb-210, and Tc-99 Limits: Column 2, Table 2, Appendix B, 10 CFR 20
Ponded Surface Water Not Requiring Treatment	Batch Grab Sample (multiple aliquots) Prior to Each Release	Gross Alpha/Beta	Derived Effluent Limit for Elevated Th-232 Area* Gross Alpha: 1.6E-07 µCi/ml Gross Beta: 1.5E-07 µCi/ml Derived Effluent Limit for Elevated Ra-226 Area* Gross Alpha: 2.3E-07 µCi/ml Gross Beta: 3.7E-08 µCi/ml Derived Effluent Limit for the Balance of the Site* Gross Alpha: 2.7E-07 µCi/ml Gross Beta: 2.3E-06 µCi/ml * Runoff from the soil laydown area which accumulates in the evaporation pond will be evaluated using Derived Effluent Limits for Elevated Th-232 or Ra-226 Areas, as appropriate, when soil from the radium or thorium areas is present or being loaded at the Loading Pad.
Any	Single Sample Gross Alpha or Beta Activity ≥ 50% Limit	Isotopic Analysis	Analytes: Total U, Th-232, Ra-226 (when gross alpha >50%) Ra-228, Pb-210, and Tc-99 (when gross beta > 50%) Limits: Column 2, Table 2, Appendix B, 10 CFR 20

[a] Values reflect the annual average concentration.
[b] Values reflect the results obtained from individual samples.
[c] Outfall #003 effluent enters the Site Pond, which is monitored at Outfall #002.
[d] The sampling location is within Building 230, even though the discharge is at Outfall #003.

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Appendix A. DP Chapter 11, RAI 11-11, Site Effluent Limits

Figure 11-2. Areas Requiring Special Effluent Limits