Radiological Characterization Report (RCR-09) Rev.0
Westinghouse Electronic Corporation # D0-08-003, July 2009
Request for Additional Information

1. (RCR-09-Q1) Comment: In RCR-09 Table 4-25, it appears that Westinghouse Electronic Corporation (WEC) obtained additional soil samples in 2007 from beneath buildings to be demolished. However, based on the information provided it is not clear where the location of the UBC soil samples were taken. The GPS coordinates provide a means to locate the 2007 in the field, but the 2007 sample locations are not correlated to the 2003 sample locations and results presented in the 2005 Decommissioning Plan (DP) and reviewed with WEC in 2006.

   Basis: Hematite Decommissioning Plan (HDP) Section 14.2.7. "Adequacy of the Characterization" states that "Samples taken in each area, along with historical information, provide a clear picture of the residual radioactive materials and its vertical and lateral extent at the site." In the U.S. Nuclear Regulatory (NRC) Summary Letter (ML 060900323) for the January 25, 2006, meeting, to Mr. Henry Sepp, WEC Hematite Project Director, NRC identified the need for additional characterization of under building contamination (UBC) for the buildings expected to be demolished as part of the decommissioning. The NRC basis for this comment was based on the limited number of UBC soil samples that were taken and the need for WEC to obtain additional samples and investigate areas having significant contamination, especially in rooms and areas having a history of high levels of radiological contamination where floor cracks, crevices and joints could provide access to under building substrate. At the January 25, 2006, meeting and a site visit in April 2006, NRC specifically identified two areas, the Red and Erbia Rooms, warranting additional subsurface characterization. One of the specific areas identified by the NRC was Building 240 Red Room, which has a history of spills and contamination in excess of 1 Million dpm/100 cm^2 beta and 0.25 Million dpm/100 cm^2 alpha loose surface activity. WEC confirms these radiological conditions on Page 4-47 of RCR-09.

   Path Forward: Please provide building maps identifying both the 2003 and 2007 sample locations. Please revise Table 4-25 to provide a clear description of the 2007 sample locations and results.

2. (RCR-09-Q2) Comment: Having performed subsurface soil core borings in 2007, it is not clear to the NRC staff why additional soil samples were not obtained of the Red and Erbia Room under slab soils at that time to complete the subsurface soils characterization. Shallow ground water samples, e.g. Well BD-04 has had detectable activity as high as 6080 pCi/l Tc-99 and 60 pCi/l total uranium that is originating from contamination from the under building sub surface soil contamination.

   Basis: HDP Section 14.2.7 Adequacy of the Characterization states that "Samples taken in each area, along with historical information, provide a clear picture of the residual radioactive materials and its vertical and lateral extent at the site." In the August 12, 2009, letter from Mr. E. Kurt Hackmann to NRC with the subject, Decommissioning Plan and Revision to License Application, WEC provided a response to NRC January 25, 2006 Meeting Comments. In the original response to Comment 6 concerning the subsurface sampling to characterize the soil beneath the process building slab, WEC

responded that it would not be efficient to core through the cement foundations to obtain soil samples and that the samples will be taken after the buildings have been demolished.

In the 2009 WEC response, WEC states, "soils under site buildings are provided in Sections 4.8 and 4.20 of the Hematite Radiological Characterization Report (HRCR) and summarized in HDP Chapter 4, section 4.3". HDP Chapter 4, section 4.1.3 and 4.1.4 discuss which buildings will be demolished and which buildings will be subjected to the Final Status Survey (FSS). Building sub-slab soil data is presented in Tables 4-24 and 4-46 of the HRCR and Tables 4-13 and 4-24 of HDP Chapter 4. Additional characterization sampling of sub-slab soil including was conducted in the fall of 2007 by WEC contractor Energy Solutions. Methodology and results are presented in Section 3.2 and 4.1 of the HRCR. Also the Section in Chapter 14.2.8 entitled, "Inaccessible or Not Readily Accessible Areas" includes the following within the buildings that will remain after site closure. Floor drains were evaluated by direct survey of the drain surface and sampling and analysis of residue within the drain traps. The storm drain system and the Sanitary Wastewater Treatment Plant have not been extensively characterized directly by radiological surveys and sampling.

Path Forward: Please provide a safety evaluation that justifies performing additional characterization sampling at the time of decontamination and/or removal to ensure nuclear safety. Please clarify the difference between these two time periods. In the evaluation, please justify how it would significantly reduce the potential for a release of contaminated soil onsite and offsite to sample subsurface soils and floor drains after the buildings serving as containments are removed.

3. (RCR-09-Q3 or HDP-14-QX) Comment: Clarification is needed on what appears to be a discrepancy between 2006 and 2009 characterization results.

   Basis: HDP Section 14.2.7 Adequacy of the Characterization states that "Samples taken in each area, along with historical information, provide a clear picture of the residual radioactive materials and its vertical and lateral extent at the site." In RCR-09, Table 4-24, Soil Sample BLD255-08-01 results are significantly less than the results previously provided to the NRC. In the Hematite DP (DO-04-004), Rev 3, dated April 2006, Table 14-3, "Soil Samples Underneath Facility Buildings" and in the Hematite Radiological Contamination Report (DO-04-010), results are significantly different:

Soil Sample BLD255-08-01	Np-237	Tc-99	U-234	U-235	U-238
RCR-09	0.02	0	0	13.4	17.3
DO-04-004	2.6	30.2	604	23.1	13.8

   The above sample was from Building 255 Erbia Room subsurface soil. The Erbia Room historically had significant radioactive contamination during operations.

Path Forward: Please conduct an audit of sample information provided in RCR-09 and provide corrections to data table(s) as appropriate and any conclusions based on the review of the data.

4. (RCR, - Q4) Comment: It is indicated in the HRCR (Th-232 Soil Concentration Comparison With Background Th-232 Soil Concentration, Appendix A) that the preliminary site Derived Concentration Guideline Level (DCGL) for Th-232 is only slightly higher than the typical background concentration and that some areas would be considered indistinguishable from background. Additional details are needed on the analysis used to determine that Th-232 concentrations in certain areas are indistinguishable from background.

   Basis: NRC staff considers methodology from NUREG-1505, Rev. 1, "A Nonparametric Statistical Methodology for the Design and Analysis of Final Status Decommissioning Surveys," as acceptable to determine a radionuclide's indistinguishability from background. Licensees should provide a sufficiently detailed justification to establish consistency with NUREG-1505.

   WEC suggests that a Th-232 activity greater than 1.7 pCi/g (based on the Background Threshold Value generated from a ProUCL V4.0 analysis of surface Th-232 data) is distinguishable from background and that only values above this level will be used in the sum of fractions analysis. Section 13.3 of NUREG-1505 (Establishing the Concentration Level That is Indistinguishable) suggests that a component of variance (ω^2) be calculated for reference areas and that a multiple of ω be used to establish the Lower Boundary of the Gray Region (LBGR). NUREG-1505 indicates that a specific multiple of ω should be decided during the Data Quality Objectives (DQO) process and that a "reasonable default" LBGR value is 3ω. The established LBGR value would then be used in Wilcoxon Rank Sum (WRS) and Quantile tests of survey measurements.

   Path Forward: Provide a detailed description of the analysis to determine Th-232 is indistinguishable from background, and provide the complete survey and reference area data sets that were used. Provide specific details and calculations used to determine the activity level or threshold value that represents indistinguishable values from background. Demonstrate that background threshold values are consistent with (or comparable to) the LBGR analysis recommended in Chapter 13 of NUREG-1505.

5. (RCR-Q5) Comment: Additional details are needed on survey methods and contamination levels for Ra-226 during burial pit remediation.

   Basis: RCR-09 Section 4.4.3 Elevated Radium Results discusses Ra-226 activity believed to have been introduced in the burial pits as contaminated equipment or materials from the Mallinckrodt Site Uranium Division. Results reported for samples, SO-BP6C-12 and SS-BP-028-DV-EL-9 were 414 pCi/g and 183 pCi/g, respectively. Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Power Reactors" and NRC Policy and Guidance Directive FC 83-23, "Guidelines For Decontamination of Facility and Equipment Prior to Release of Unrestricted Use or Termination of Licenses for Byproduct, Source and Special Nuclear Materials," have specific contamination limits

for Ra-226. The Ra-226 limits for fixed contamination are 100 dpm/100 cm^2 average and 300 dpm/100 cm^2 maximum and 20 dpm/100 cm^2 removable contamination. The Ra-226 limits are confirmed in HDP Chapter 10, Table 10-3.

The Hematite Radiation Protection Plan (HRPP) (PO-HP-001, Rev 4) defines the site contamination action levels as 200 dpm/100 cm^2 for Step-off Pad Areas, 5000 dpm/100 cm^2 for contamination Areas and 200 dpm/ 100 cm^2 for Clear Areas.

Path Forward: Please provide the survey methods to be employed during the burial pit remediation (and other areas found to have Ra-226 contamination) to ensure that Ra-226 contaminated materials are identified controlled to ensure personnel safety is maintained. Please provide the methods by which personnel will be surveyed for contamination and the technical basis for the measurements, including instrumentation and minimum detectable count rates and minimum detectable activities.

6. (RCR-Q6) Comment: WEC's approach to radiological characterization of the structures that may remain after decommissioning is incomplete and inconsistent with NRC guidance.

   Basis: In NUREG 1757 V2 Rev1 Appendix O (page O-19), the guidance provides examples of characterization shortcomings. These include, "only limited information is being provided about the presence of Transuranic Radionuclides (TRU) (e.g., plutonium-239, americium-241) and hard-to-detect radionuclides. In other instances, the data failed to provide sufficient information in determining the fraction of surface contamination that is fixed or removable. Similar shortcomings were noted for removable alpha and beta radioactivity found in embedded pipe, usually contained in residues. It should be noted that characterization surveys provide the most important information (i.e., the basis to design the Final Status Survey Plan (FSSP); define radionuclide distributions and concentrations; identify hard-to-detect radionuclides and develop surrogate ratios;…)"

   The technical bases for the structural DCGLs are derived from building floor drain sediment samples as given in RCR-09 Section 3.3.5.1 and discussed briefly in HDP Section 14.2.9.1. The sediment samples may be representative of the loose (non-fixed) contamination in the floor drain pipes. However, the characterization data (radionuclides identified and fractional abundances) may not be representative of the radionuclides fixed or loose in structures. It is inappropriate to extend the data floor drain sediment data to building structure surveys (gross $\alpha + \beta$ measurements). These surveys do not identify (or confirm) the nuclides that may be loose or fixed in the building structures. RCR-09 Section 3.3.5.1 states "Alpha plus beta scans were performed of joints and cracks in Building 230 for elevated radiation levels and locations of elevated radiation levels were identified and samples from these areas were collected, with some of the samples sent off-site for analysis." Since this sample data was not provided the nuclides and fractional abundances are not known, and these measurements may not account for self attenuation and other impacts that may generate technically defensible results with which to design the FSSP.

Path Forward: Perform structural characterization surveys and sampling to identify the radionuclides present and the fractional abundances for determining the DCGLs for structures that will remain after decommissioning. Evaluate the data to determine if new DCGLs are required and the impact of the data on the FSSP design.