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U.S. Nuclear Regulatory Commission	Our ref: HEM-15-39
Washington, DC 20555-0001	Date: April 27, 2015

Subject: Hematite Decommissioning Project - Additional Statistical Analysis for Backfill Soil from an Off-site Borrow Location (License No. SNM-00033, Docket No. 070-00036)

References: 1) Westinghouse (Fussell) Letter HEM-14-89 to NRC (Document Control Desk) dated November 19, 2014, "Hematite Decommissioning Project - Radiological Testing of Backfill Soil from an Off-site Borrow Location" (ML14323A238)

2) Westinghouse (Fussell) Letter HEM-15-25 to NRC (Document Control Desk) dated April 2, 2015, "Hematite Decommissioning Project – Additional Statistical Analysis of Backfill Soil from an Off-site Borrow Location"

In Reference 1, Westinghouse submitted to the U.S. Nuclear Regulatory Commission (NRC) a statistical assessment to demonstrate the suitability of soil from a potential off-site borrow location for onsite backfill at the Hematite Decommissioning Project (HDP). The statistical analysis performed by Westinghouse was based on *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*, EPA 540-R-01-003. This analysis did not include outlier data points identified in both the reference area and borrow material. In a March 12, 2015, public telephone conference call, the NRC staff stated that removing the outliers from the data set was inconsistent with NRC guidance, and therefore requested that the analysis be performed with the outliers included.

In Reference 2, Westinghouse submitted to the NRC additional statistical analysis of the backfill soil. The additional statistical analysis was conducted according to the guidance in NUREG-1505 and NUREG-1575 Supplement 1.

During the April 16, 2015, Publicly Noticed Teleconference, the NRC contract staff stated that the statistical analysis should be performed with the upper bound of the gray region set as the mean of the reference area results plus three times the associated standard deviation.

The purpose of this letter is to provide details concerning the results of the re-analysis that were performed with the upper bound of the gray region set as the mean of the reference area results plus three times the associated standard deviation.

The retrospective power curves (Attachment 1) were generated for each WRS test to determine if an appropriate number of samples had been collected. The mean of the reference area results plus three times the associated standard deviation was used for each radionuclide as the upper

bound of the gray region. The standard deviation of the borrow data set was input, and the lower bound of the gray region was set at the  $3\sigma$  value. A 0.025 alpha error and 0.1 beta error was utilized. The resulting sample sizes follow:

Ra-226 – 9 samples

Th-232 – 9 samples

U-234 – 9 samples

U-238 – 9 samples

#### Conclusion

As stated in Reference 1, *“A total of 32 samples were taken from the two reference areas, for a total of 63 samples from all three locations.”* Therefore, the sample population met the minimum sample size as determined by the statistical analysis utilizing the upper bound of the gray region set as the mean of the reference area results plus three times the associated standard deviation.

Attachment 1 presents the retrospective power curves for each radionuclide's WRS test.

Please contact Ken Pallagi at 314-810-3353, should you have questions or need additional information.

Sincerely,



Gay M. Fussell  
Deputy Director  
Hematite Decommissioning Project

Attachment: 1) Retrospective Power Curves

Cc: J. Smetanka, Westinghouse  
J. J. Hayes, NRC/DUWP/MDB  
A. Persinko, NRC/NMSS/DUWP  
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**Attachment 1**

**Wilcoxon Rank Sum Test Results**

**Westinghouse Electric Company LLC, Hematite Decommissioning Project**

**Docket No. 070-00036**

April 27, 2015

## Ra-226 Retrospective Power Curve

Survey Unit ID:

Radionuclide: Ra-226

DCGL 1.575

Sigma .121

Statistical Test

☐ Sign Test☒ WRS TestCritical Value:  
108

Decision Errors

Alpha:

0.025

Beta:

0.10

Required Sample Size

Survey Unit: 9

Reference: 9

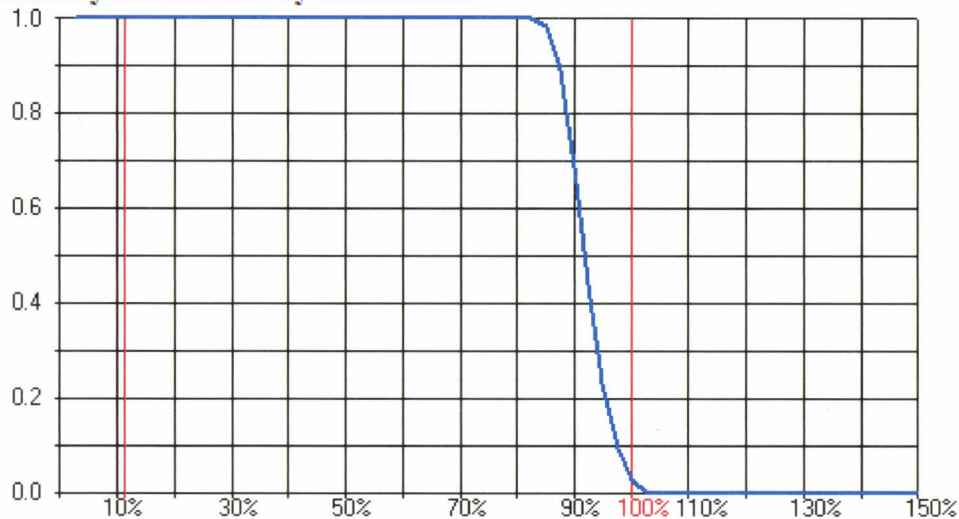
0

1.575

LBGR 0.18

 $\Delta/\sigma = 11.53$ 

Probability that the Survey Unit Passes



Click  
anywhere on  
the graph to  
update the  
power curve  
using newly  
entered  
parameter  
values

True Survey Unit Concentration (percent of DCGL)

Exit Program



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## Th-232 Retrospective Power Curve

Survey Unit ID:

Radionuclide: Th-232

DCGL 1.675

Sigma .131

Statistical Test

☐ Sign Test☒ WRS Test

Critical Value:

108

Decision Errors

Alpha:

0.025

Beta:

0.10

Required Sample Size

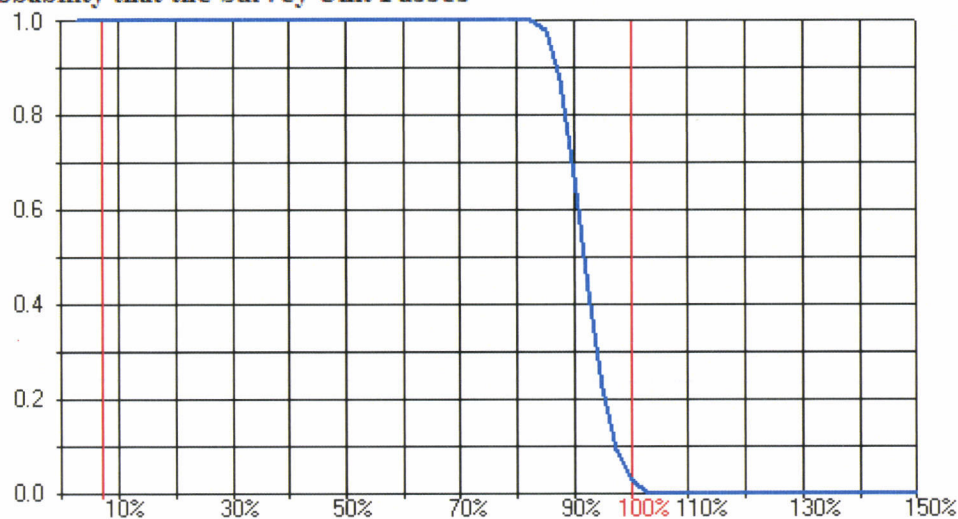
Survey Unit: 9

Reference: 9

0

1.675

LBGR 0.12

 $\Delta/\sigma = 11.87$ **Probability that the Survey Unit Passes**

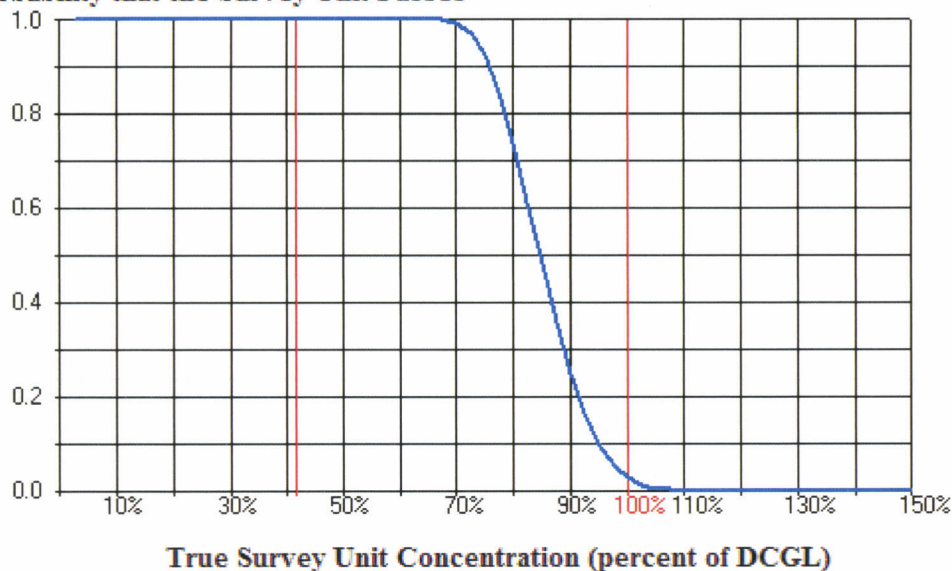
*Click  
anywhere on  
the graph to  
update the  
power curve  
using newly  
entered  
parameter  
values*

**True Survey Unit Concentration (percent of DCGL)**[Exit Program](#)

April 27, 2015

## U-234 Retrospective Power Curve

Survey Unit ID:		Decision Errors		Required Sample Size	
Radionuclide: U-234		Alpha:	Beta:	Survey Unit: 9	
DCGL: 1.411		0.025	0.10	Reference: 9	
Sigma: .206		0		1.411	
Statistical Test: <input type="radio"/> Sign Test <input checked="" type="radio"/> WRS Test		LBGR: 0.59		$\Delta/\sigma = 3.99$	
Critical Value: 108					

**Probability that the Survey Unit Passes**

*Click  
anywhere on  
the graph to  
update the  
power curve  
using newly  
entered  
parameter  
values*

[Exit Program](#)

April 27, 2015

## U-238 Retrospective Power Curve

Survey Unit ID:

Radionuclide: U-238

DCGL 1.278

Sigma .251

Statistical Test

- ☐ Sign Test  
☒ WRS Test

Critical Value:  
108

Decision Errors

Alpha:

0.025

Beta:

0.10

Required Sample Size

Survey Unit: 9

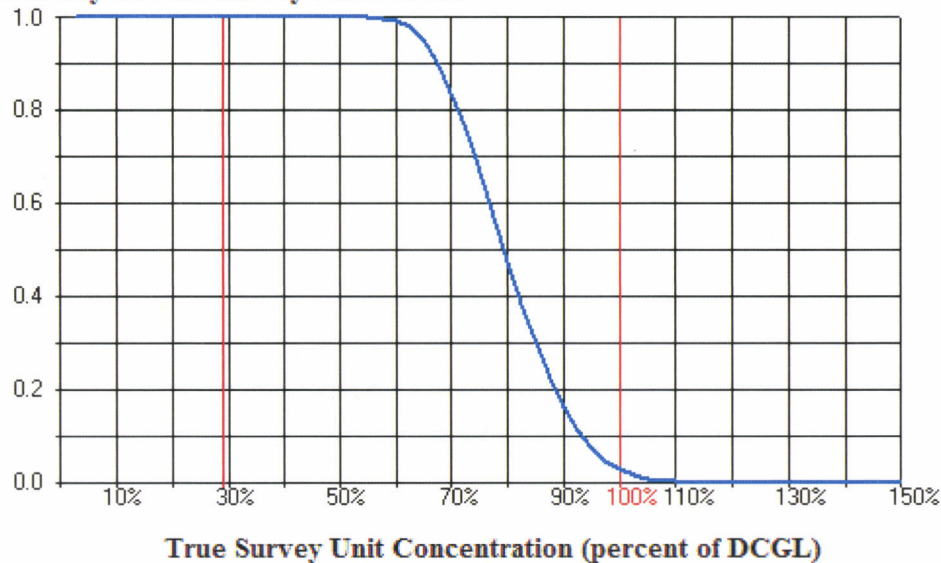
Reference: 9

0 1.278

LBGR 0.37062

 $\Delta/\sigma = 3.62$ 

Probability that the Survey Unit Passes



Click  
anywhere on  
the graph to  
update the  
power curve  
using newly  
entered  
parameter  
values

Exit Program