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Department of Environmental Protection

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MEMORANDUM

TO: Stephen Maybury, Chief, BEECRA

FROM: Jill Lipoti, Ph.D., Assistant Director Jill Lipoti

SITE: Viacom (formerly Westinghouse Electric Corporation / CBS)

DATE: May 8, 2001

Responsible Party/ Property Owner:	Viacom (Formerly Westinghouse Electric Corporation / CBS)
Document dated:	January 31,2001
Project Activity Code:	V3W2
Job Code:	G020HZ00
ISRA Case Name:	North American Phillips Lighting
ISRA Case #:	E86070
Site Location:	Bloomfield Twp., Essex County
Referral Date:	March 12, 2001

Staff of the Radiological Assessment Section (RAS) of the Bureau of Environmental Radiation (BER) performed a radiological review of the Revised January 2001, Earth Science Consultants, Inc. document *Final Radiological Status Survey Report, Building 7 and Sewer System Remediation, Former Lamp Manufacturing Plant, Bloomfield, New Jersey.* Staff also reviewed the accompanying January 31, 2001 Viacom letter to S. Myers that responds to the NJDEP January 2, 2001 comments on the document of the same name dated August 2000.

The documents under review are considered complete except for additional information requested on comment 7. NJDEP January 2, 2001 comments are in bold. Viacom January 31, 2001 responses are in normal font. NJDEP May 2001 comments are in italic.

1. **The NJDEP acknowledges that soil samples were analyzed by either alpha spec or gamma spec, both with extensive quality control procedures. Is there data correlating the results of samples from one location analyzed by both methods?**

Six of nine background samples were the only "Final Survey Samples" taken in accordance with the Final Survey Plan, analyzed by both alpha and gamma spec. The results of samples are summarized in Section 3.7 and Table N-1 of Appendix N. However, before final survey activities commenced, eleven characterization samples were taken and analyzed for both alpha and gamma spec. The

results of the characterization samples and the background samples are presented in new Table L-2. Note that the background soil activity for uranium is relatively low resulting in Minimum Detectable Activity (MDA) values reported for uranium when analyzed by gamma spec. Sample results above MDA correlate well, with an average difference of 17 percent.

The NJDEP accepts this response.

2. **The NJDEP suggests that μ_a be calculated with the same number of significant figures in the input data on the following sets of tables and figures: Table C-1 and Figure C-1, Table D-1 and Figure D-1, Table H-4 and Figure H-1, Table I-1 and Figure I-1, and Table J-1 and Figure J-1. Viacom shall confirm that the μ_a calculations for each of these survey units are the same. If they are not, Viacom shall explain.**

The data shown on the above-referenced figures did not carry the same number of significant figures as the corresponding tables, which lead to rounding differences in the final result. The results presented in the tables are correct. The figures have been revised and are now consistent with the corresponding tables. In addition, the calculation of μ_α for individual grids has been replaced on applicable figures with the calculation of the average, consistent with the guidance given in NUREG/CR-5849. (The calculation of μ_α for individual grids is conservative and is only required for the entire survey unit, as is presented in the tables.) Figures that have been revised include A-1, B-1, C-1, D-1, E-1, F-1, G-2, G-3, G-4, H-1, I-1, and J-1. Also, Tables A-4 and B-4 have been revised to include the weighted average for elevated areas in the calculation of average and standard deviation used in the calculation of μ_α.

The NJDEP accepts this response.

3. **Viacom shall inform the NJDEP if Figures G-2 and G-3 contain data that is prior to the final remediation and therefore not part of the final survey. Additionally, Viacom shall clarify if Figure G-4 should be labeled "final survey" and not "final excavation?"**

Figures G-2 and G-3 present data prior to the final survey. Additional remediation was performed based on the results presented on Figure G-2. Samples in areas that were remediated were replaced by new samples. Samples in areas that were not remediated were carried over. Figure G-3 presents these sample results. While waiting for the additional analytical analyses results, remediation was performed based on gross gamma scan results and samples were again taken in areas where additional remediation was performed. Figure G-4 presents these results together with samples from areas that were not remediated. Therefore, Figure G-4 represents the final survey (as left) of Survey Unit G. The title of Figure G-4 has been revised to "Final Survey Sample Locations Survey Unit G".

The NJDEP accepts this response.

4. **Table G-5 shows the results of 59 soil concentration data points and calculations of average, standard deviation and μ_a for these data points in survey unit G. Nine of these data points (FS-122, FS-125, FS-127, FS-133, FS-143, FS-146, FS-157, FS-158, and FS-159) are not listed in Figure G-4. Viacom shall clarify why these data points are not on Figure G-4.**

The noted sample points were samples taken in areas of Survey Unit G that were subsequently remediated (see response to Question 3 above) and, therefore, are not included in subsequent figures. Replacement samples were taken after remediation and are included in subsequent figures. Figure G-4 represents the "as left" final survey results for Survey Unit G. Table G-5 was conservative in that the table included the sample results (most greater than the acceptance criteria) of areas that were subsequently remediated. However, a calculation of μ_α that accurately reflects the "as left" condition of Survey Unit G should not include the nine sample results from areas that were

subsequently remediated. Table G-5 has been revised to reflect the "as left" condition of Survey Unit G, consistent with Figure G-4.

The NJDEP accepts this response.

5. **Table G-5a for weighted average is labeled as Grid 1. It contains data points from Grids 1, 2 and 3, therefore should Table G-5a be relabeled? Viacom shall explain why the weighted average for grid 1 and grid 2 were not done separately, since they contain elevated results. Viacom shall explain why data point FS-148 is in Figure G-4 for Grid 1 and not in Table G-5a. Viacom shall explain why data points FS-122, FS-127, FS-133, FS-143, FS-146, FS-157, FS-158, and FS-159 included in Table 6-5a and not included in Figure G-4.**

Based on the final samples presented on Figure G-4 (and in the revised Table G-5), the only remaining elevated area is located in a 10 m^2 area of Grid 1. Table G-5a has been revised to include only Grid 1 data. The previous table was conservative in that it included sample results greater than the acceptance criteria that were subsequently remediated. The Grid 2 final survey results are less than the acceptance criteria and, therefore, do not require the weighted average calculation. Sample FS-148 is included in the revised Table g-5a and Samples FS-122, FS-127, FS-133, FS-143, FS-146, FS-157, FS-158 and FS-159 are not included, consistent with the elevated area presented on Figure G-4.

The NJDEP accepts this response.

6. **Viacom shall inform the NJDEP which data points in Table G-5a are included in the 4 m^2 hot spot with an average of 1.01 Sum, and in the 8 m^2 hot spot with an average of 1.28 Sum.**

See the response to Question 5 above. Table G-5a has been revised and includes a weighted average calculation for one 10 m^2 hot spot located in Grid 1, based on the final sample results presented on Figure G-4. Based on the final sample results after all additional remediation was completed, the hot spot was characterized by four sample results in a 10 m^2 area, with an average sum of fractions equal to 1.22.

The NJDEP accepts this response.

7. **There is no hot spot weighted average for the backfill material used for Survey Unit A, see Table K-1a. It is stated in Appendix K that approximately 12 pCi/g of Thorium was observed in three of the 30 samples. Viacom shall clarify if this material was mixed before it was backfilled into Survey Unit A. Viacom shall also determine the average concentration of the total uranium and the total thorium represented by these 30 samples. That is, multiply each sample result by the volume of soil it represents. Total these figures and divide by the total volume of soil referenced on Table K-1a. The calculation of μ_a is meaningless in this application. μ_a assumes a near-homogeneous depth of contamination and does not take into consideration the volume of soil that is represented by each soil concentration result in Table K-1a.**

The sand was mixed and used to form bedding beneath the new storm drainpipe. Samples of sand and backfill were taken systematically to be representative of the total volume, i.e., each sample represents an approximately equal volume of backfill material. Therefore, the averages presented in Table K-1a are representative of the total uranium and total thorium in the volume of backfill material used in Survey Unit A. A weighted average calculation is not required, i.e., will yield the same average. Table K-1a has been revised to include average, standard deviation and υ_α values for total thorium and total uranium.

The NJDEP accepts this response and requests the following information:

a) *Where did the "sand" and "backfill" material referenced in Table K-1a originate, i.e. where was it taken from the ground?*
b) *Where was the "sand" and "backfill" material used as backfill? At what depth? What area does it cover and what thickness was stockpile used to cover the "sand" and "backfill" material?*
c) *What is the approximate volume of material represented by each of the 30 samples in Table K-1a?*
d) *The concentration of the Th-232 in the "sand" and "backfill" material is not only greater than the NRC-approved acceptance criteria (GLV) in three of five samples, but it is five to seven times the NJDEP's unrestricted use standard. We request a dose assessment be performed assuming a resident intruder in the area where this elevated backfill was placed. The acceptable parameters are attached.*

8. **Viacom shall correct or explain the radionuclide designations on pp. 39-40 of Table P-1, "Final Soil Sample Locations and Laboratory Results," for samples: FS-159, FS-160, FS-161, FS-162, FS-164, FS-166, FS-167, FS-168, FS-169, FS-170, FS-171, and FS-172.**

The consecutive radionuclide numbers that appear are the result of the "autofill" feature in Microsoft Excel. The tables have been revised so that for each of the samples, the radionuclides listed are U-238, U-235, Th-234, Th-228, Ra-228, and Ra-226 if analyzed by gamma spec and as U-234, U-235, U-238, Th-228, Th-230, and Th-232 if analyzed by alpha spec. Table P-1 has been revised.

The NJDEP accepts this response.

If you have any questions please contact Ed Truskowski at 609-984-5542, Jennifer Goodman at 609-985-5498 or either person at NJDEP - BER, PO Box 415, Trenton, NJ 08625-0415.

Attachment

C: Gerald Nicholls, Director, DESHAP
Stephen Myers, Case Manager, DRPSR\BEECRA, 5th floor
Frank Camera, Technical Coordinator, DPFSR\BEERA, 4th floor
David Kaplan, Geologist, DPFSR\BGWPA, 4th floor
Patricia Gardner, Chief, BER, PO Box 415
Jennifer Goodman, BER, PO Box 415
Nancy Stanley, BER, PO Box 415
Edward Truskowski, BER, PO Box 415
Mark Roberts, NRC, King of Prussia, PA

ASSUMED PARAMETERS FOR PATHWAY ANALYSES

ASSUMPTIONS PERTAINING TO EXCAVATION SCENARIO		
uncontaminated surface soil lost from grading (ft):	1.0	
Parameters Specific to Construction Scenario	**Basement**	**Slab on Grade**
depth of excavation (ft):	7.0	4.0
width of excavation (ft):		2.0
Parameters Specific to Site Use Scenario	**Residential**	**Commercial**
building length (ft):	40	60
building width (ft):	25	40
lot size ((ft²):	10,890	87,120
fraction of time spent indoors on site:	68%	18%
fraction of time spent outdoors on site:	8%	5%
ASSUMPTIONS PERTAINING TO EXTERNAL GAMMA PATHWAY		
shielding factor through basement or slab:	0.20	
shielding factor through walls:	0.80	
shielding factor outside:	1.00	
cover coefficient (% through 1 ft clean soil):	10%	
Parameters Specific to Site Use Scenario	**Residential**	**Commercial**
area factor for under basement or slab:	0.53	0.66
area factor for side contribution:	0.43	0.96
area factor for four basement walls:	1.45	1.62
area factor for outside:	0.96	1.61
ASSUMPTIONS PERTAINING TO INTAKE PATHWAYS		
indoor dust level as percent of outdoor:	40%	
resuspension dilution length (ft):	10	
drinking water consumption rate (l/yr):	700	
root depth (ft):	3	
Parameters Specific to Site Use Scenario	**Residential**	**Commercial**
soil ingestion rate (g/yr):	70	12.5
outdoor mass loading (µg/m³):	100	200
indoor on site breathing rate of adult (m³/hr):	0.63	1.40
outdoor on site breathing rate of adult (m³/hr):	1.40	1.40
homegrown crop ingestion rate (g/yr):	17,136	0
ASSUMPTIONS PERTAINING TO RADON PATHWAY		
radon to radium ratio (pCi/l per pCi/g):	1.5	