

August 30, 2011

Ms. Sara Parker-Pauley, Director  
Missouri Department of Natural Resources  
P.O. Box 176  
Jefferson City, MO 65102-0176

SUBJECT: SOLICITATION OF MISSOURI DEPARTMENT OF NATURAL RESOURCES  
COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT WITH A FINDING  
OF NO SIGNIFICANT IMPACT ASSOCIATED WITH THE APPROVAL OF THE  
HEMATITE DECOMMISSIONING PLAN (Docket No. 70-00036)

Dear Ms. Pauley:

By letter dated April 15, 2011, the U.S. Nuclear Regulatory Commission (NRC) solicited comments from the Missouri Department of Natural Resources (MDNR) on the Draft Environmental Assessment with a Finding of No Significant Impact Associated with the Approval of the Hematite Decommissioning Plan (Docket No. 70-00036). By letter dated May 13, 2011, the NRC received your response in which the MDNR concurred with the NRC conclusion that there are no significant environmental impacts associated with the Decommissioning Plan (DP).

In your response, the MDNR expressed two concerns and had 11 comments on the draft document. Provided below are the NRC's response to your two concerns.

**MDNR Concern 1** Derived Concentration Guidelines (DCGLs) listed in Table 1 may not achieve the intended protection of this action. We are appreciative of your involving us in the ongoing discussions regarding this matter.

**NRC Response 1** NRC staff believes the DGCL's listed in Enclosure 1 of this correspondence will achieve the intended protection of this decommissioning action. Before the NRC license is terminated, the radiological doses to the average member of the critical group at the Hematite site will be in compliance with NRC's criteria in 10 CFR Part 20. Subpart E provides an all-pathways dose criteria of no more than 0.25 millisieverts per year (25 millirem per year) and that are as low as reasonably achievable (ALARA), to an average member of the critical group. The dose criteria in Part 20, Subpart E are fully protective of the public health and safety, and were the result of a comprehensive rulemaking. Furthermore, individuals at a decommissioned site are expected to receive doses substantially below the constraint level because of ALARA, conservative dose modeling assumptions, and the nature of the cleanup process itself, which often reduces residual contamination levels significantly below site DCGLs. The DCGLs in the

DP represent the maximum levels for each radionuclide without considering the existence of other radionuclides. Thus, in applying the sum of fractions requirement, the actual cleanup values will be reduced such that the potential dose from all residual radioactivity at the site from all media is less than 25 millirem per year.

**MDRN Concern 2** Investigation of current and potential impacts to groundwater is incomplete. Construction of bedrock wells for sampling within the interior of the facility has not yet been nor have the fluctuations of radiological concentrations in overburden wells been explained.

**NRC Response 2** The following response focuses on the fluctuations of radiological concentrations in the clay overburden and assessment of radiological impact on the underlying sand/gravel hydrogeologic unit and Jefferson City-Cotter bedrock aquifer.

Fluctuations of radiological concentrations in the clay overburden

- 1) Hematite ground water monitoring wells that exhibit fluctuating radiological concentrations are primarily “hybrid” wells. These hybrid wells are screened across two hydrologic units: the silty clay overburden and the sand/gravel unit. The hybrid wells screens hydraulically connect the two units. As such, ground water level and water quality data from these wells are complex and require careful evaluation.
- 2) In response to this issue, sand/gravel wells were constructed by Westinghouse adjacent to a number of the hybrid wells (well couplets) located downgradient of the process buildings. Monitoring data from these well couplets (e.g., GW-T/DM-02; GW-U/EP-20, GW-V/NB-31) indicate that the sand/gravel unit is not significantly impacted with radionuclides (i.e., low levels of radiological constituents with respect to the levels in the hybrid wells). The Technesium-99 varies on the order of between 50 to over 200 pCi/L in hybrid well NB-31, while Technesium-99 is almost constant just above 0 pCi/L in sand/gravel well GW-V during the same time of period from the 3<sup>rd</sup> Quarter 2009 to the 3<sup>rd</sup> Quarter 2010.
- 3) Groundwater flow in the sand/gravel unit is predominantly horizontal and moves toward the Joachim Creek. The wells screened in the sand/gravel unit downgradient of the impacted hybrid wells at the process buildings do not show elevated levels of radionuclides and, in fact, are much lower in concentration than levels detected in hybrid wells.

Based on above, it is concluded that source of radionuclides in hybrid wells appears to be in clay overburden.

As part of Westinghouse's Decommissioning Plan, extensive excavations are proposed in the areas of the impacted hybrid wells. In the area of the process buildings containing hybrid wells BD-02 and BD-04, excavations are proposed to approximately 30 feet below land surface, with post-excavation sampling of the soil to verify that radiological constituents are at or below their respective Derived Concentration Guideline Levels (DCGLs).

Construction of bedrock wells for sampling within the interior (of the process buildings).

We do not believe the present data supports the postulate of radiological impacts occurring in the bedrock aquifer below the process buildings for the following reasons.

- 1) The sand/gravel unit is a confined system (i.e., the piezometric surface is above the top of the sand/gravel unit, and is located within the clay overburden). In addition, flow in the sand/gravel unit is predominantly horizontal due to the high hydraulic conductivity in the unit. The flow direction is toward the Joachim Creek, located southeast of the facility.
- 2) Consequently, we do not see a pathway for the radionuclides to enter the bedrock system. This is supported by the lack of significant radiological contamination in the overlying sand/gravel unit.
- 3) Data collected from the bedrock aquifer monitoring system (approximately over one dozen of Jefferson City-Cotter wells primarily located closely downgradient of the facility and in the flood plain) does not indicate radiological contamination in the aquifer.

This is in contrast to the chlorinated hydrocarbon contamination in the bedrock system. Those solvents are dense nonaqueous phase liquids (DNAPLs) and are not influenced by either the confined sand/gravel unit condition or the predominately horizontal flow.

The NRC's response to MDNR's 11 comments are provided in Enclosure 2.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Order," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or in ADAMS. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

S. Parker-Pauley

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If you have any further questions, please contact me at (301) 415-5928 or via email at [John.Hayes@nrc.gov](mailto:John.Hayes@nrc.gov).

Sincerely,

**/RA/**

John J. Hayes, Senior Project Manager  
Materials Decommissioning Branch  
Decommissioning and Uranium Recovery  
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Division of Waste Management  
and Environmental Protection  
Office of Federal and State Materials  
and Environmental Management Programs

Enclosures:

1. Proposed DCGL values
2. NRC Responses to MDNR Comments  
on Draft Environmental Assessment

Ms. Parker-Pauley

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Distribution:

J. Tapp, RIII

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## **Proposed DCGL Values**

Westinghouse proposes 4 sets of Derived Concentration Guidelines (DCGLs) in Chapter 5 of the Decommissioning Plan (ML092330129), each based on a separate conceptual site model. These DCGL values relate to two different source term geometries, a three stratum geometry and a uniform geometry. In the three stratum geometry, different DCGL values were generated for different layers of the subsurface soil. In the uniform geometry, the same DCGL value is used for the entire thickness of the contaminated zone. Compliance with the 25 mrem dose criteria will be demonstrated for different areas of the site using either the three stratum approach or the uniform approach. A description of the four categories of DCGL values generated by Westinghouse is listed below.

Three stratum geometry approach:

- Surface - surface soil to a depth of 15 cm below the ground surface;
- Root - subsurface soil starting at 15 cm and extending to 1.5 m below the ground surface to include the entire root stratum; and
- Excavation - subsurface soil located below 1.5 m (i.e., below the root stratum) and extending to the bottom of the Contaminated Zone which was conservatively estimated to be 6.7 m below the ground surface.

Uniform geometry approach:

- Uniform - uniform soil contamination from the ground surface to the bottom of the Contaminated Zone (6.7 m).

The Surface, Root, and Excavation DCGL values presented in the following table correspond to a dose of 25 mrem assuming that the other two layers do not contain any contamination. If contamination exists in more than one layer, the sum of fractions approach will be used to demonstrate compliance and the maximum allowable remaining contamination would be less than listed in the table. The Excavation DCGL values were generated based on a scenario in which the soil is excavated to construct the basement for a house. In the Decommissioning Plan, Westinghouse also proposed a set of Deep DCGLs, which were an alternative to the Excavation DCGL. However, Westinghouse has committed not to use Deep DCGLs based on Response to an NRC Request for Additional Information (Chapter 5 Question 9), [ML102850223].

	Three Layer Approach DCGL Values (pCi/g)			Uniform DCGL Values (pCi/g)
	0 to 0.15 m layer	0.15 to 1.5 m layer	> 1.5 m layer	
Americium-241	220.7	118.5	229.2	79.3
Neptunium-237+D	17.4	5.0	0.3*	0.3
Plutonium-239/ Plutonium-240	239.6	85.1	246.6	83.1
Radium-226+C	5.4	2.3	5.8	2.0
Technetium-99	162	32.3	79.4	26.9
Thorium-232+C	5.0	2.1	5.6	2.1
Uranium-234	545.4	252.7	935.6	209.6
Uranium-235+D	109.7	68.7	223.2	55.3
Uranium-238+D	319.2	196.6	591	181.0
Total Uranium**	1001 mg/kg	617 mg/kg	1862 mg/kg	564 mg/kg

\* Neptunium-237 DCGL for >1.5 m is determined using the DEEP CSM, while all other radionuclides are determined using the Excavation CSM.

\*\* The total uranium concentration was calculated by the NRC based on the DCGLs provided by Westinghouse.

## **NRC Response to MDNR Comments**

**MDNR Comment C1, Section 6.1, Paragraph 1.** The acronym GAC is mentioned regarding previous ownership of the facility; however, the acronym GAC is not mentioned elsewhere nor defined.

**NRC Response C1.** The acronym GAC was a typographical error and has been corrected to the acronym GOC.

**MDNR Comment C2, Section 6.2, Paragraph 2.** The description of nearby residences is limited to homes on Westinghouse property, the town of Hematite to the west, and the subdivision to the south of Joachim Creek. This section should be revised to recognize nearby residences to the north and east.

**NRC Response C2.** The section has been revised to include reference to the fact that there are residences to the north and east of the facility.

**MDNR Comment C3, Section 6.4.2, Paragraph 4.** The description of the evaporation ponds as existing needs revision. One of the ponds has been backfilled (still needs to be exhumed for cleanup) and the other has been modified into a sump for the French drain.

**NRC Response C3.** The section has been revised to reflect the fact that one of the ponds has been backfilled and the other pond has been modified into a sump for the French drain and that further remediation of the site will be required.

**MDNR Comment C4, Section 6.4.2, Paragraph 6.** The description of the NPDES permit having 3 outfalls needs to be modified. There are actually 6 permitted outfall monitoring points.

**NRC Response C4.** The section has been revised to reflect the fact that there are 6 permitted NPDES outfalls.

**MDNR Comment C5, Section 6.4.2, Paragraph 6.** The description of the NPDES permit non-radiological parameters needs to be modified. Oil & Grease and Fluoride should be removed. Flow and Ammonia as N should be added. Changes to the list may occur during the next few months as part of the renewal process and in preparation for beginning soil and sediment remediation activities.

**NRC Response C5.** The section has been revised and the non-radiological factors Oil & Grease and Fluoride have been deleted and the parameters Flow and Ammonia as N have been added. The section has also been revised to reflect the fact that there may be changes to the list during the next few months as part of the renewal process in preparation for beginning soil and sediment remediation.



**MDNR Comment C6, Section 6.4.3, Paragraph 2.** The description of the sand/gravel layer is that it can range in thickness from 0-4 feet under the facility and is 8 feet thick adjacent to the Joachim Creek. It is 0-4 feet thick typically under the facility (up to 8 feet thick near well PL06) and is generally 15 feet thick adjacent to Joachim Creek.

**NRC Response C6.** The section has been revised to reflect that the sand/gravel layer is typically 0-4 feet under the facility, up to 8 feet thick near well PL06 and is generally 15 feet thick adjacent to Joachim Creek.

**MDNR Comment C7, Section 6.4.3, Paragraph 3.** Please provide references from which the water yield values were taken that are listed in this paragraph.

**NRC Response C7.** The water yield values were extrapolated from information provided to the NRC, specifically, the field water quality data from the hybrid and the sand/gravel wells that were part of the MDNR assessment to allow the WEC to abandon the hybrid wells.

**MDNR Comment C8, Section 6.4.3, Paragraph 3.** Guidance for groundwater yield to be usable is given in EPA 570/9-91-004. It lists:

- Homeowner – per resident – 50-75 gpd
- Campgrounds – per camper – 15 gpd
- Cottages seasonal per resident – 50 gpd
- Restaurant – per patron – 7-10 gpd

**NRC Response C8.** The section has been revised to include the reference to the EPA document EPA570/-91-004 as well as the listed values Homeowner - per resident – 50-75 gpd; Campgrounds – per camper – 15 gpd; Cottages seasonal per resident – 50 gpd and Restaurant – per patron – 7-10 gpd.

**MDNR Comment C9, Section 6.4.3, Paragraphs 4,7.** Change references of Jefferson City-Carter formation to Jefferson City-Cotter.

**NRC Response C9.** The typographical error has been corrected and references to the Jefferson City-Carter have been replaced with the references to the Jefferson City-Cotter formation.

**MDNR Comment C10, Section 6.4.3, Paragraph 7.** Discussions on closest public supply wells should include the PWSD well in Hematite that is maintained for emergency use.

**NRC Response C10.** This section has been revised to include reference to the fact that a PWSD well is located in Hematite and that it is maintained for emergency use.

**MDNR Comment C11, Section 7.10.1, Paragraph 3.** This mentions the DCGLs coming from DP Chapter 5 as shown in ADAMS No. ML092330129. This ADAMS reference is no longer accurate for a table of DCGL values. Most of the values as shown in Table 1 of the EA will differ by small amounts from this ADAMS reference, and a few will differ significantly (see U-235+D values for Uniform DCGL).

**NRC Response C11.** The DCGLs found in DP Chapter 5 as was shown in ADAMS No. ML092330129 have been updated. The updated DCGLs can be found in ADAMS No. ML111880290.