



State of Ohio Environmental Protection Agency

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Region 3  
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**RE: Battelle Memorial Institute, West Jefferson Decontamination and Decommissioning (D&D) Comments and Recommendations**

Dear Mr. Loudon:

Ohio EPA was recently asked by U.S. EPA to review the final results of the Decontamination and Decommissioning (D&D) of Battelle Memorial Institute's West Jefferson facility (Battelle). This facility is licensed by the Nuclear Regulatory Commission (NRC) to use and store regulated quantities of nuclear materials in order to conduct experiments on nuclear fuel and reactor processes for the U.S. Department of Energy. Battelle has chosen to pursue a D&D plan that, if successful, would allow unrestricted use of the property. Ohio EPA is aware unrestricted use is based upon removal of radioactive materials and infrastructure and a dose assessment of residual radionuclides. The dose assessment is used to provide an evaluation of the risk to human health.

Ohio EPA's primary concerns with the dose assessment model and underlying data collection methodology and/or inputs are:

- 1) Several model assumptions may not accurately represent site hydrology or the hydrogeologic setting, and data quality concerns may influence the model input parameters.
- 2) The model may not include the most sensitive receptor population found near the Battelle West Jefferson site.
- 3) The Bog Area is not considered as a source of contamination and risk, nor is there adequate consideration of the fate of cesium-137 (Cs-137) contained in (and flushed from) the filter beds.

Ted Strickland, Governor  
Lee Fisher, Lieutenant Governor  
Chris Korleski, Director

**Several model assumptions may not accurately represent site hydrology or the hydrogeologic setting, and data quality concerns may influence the model input parameters.**

#### Hydrology or Hydrogeologic Concerns

The dose assessment model assumes radionuclides are contained in the upper surface soil and will migrate to ground water via leaching and then be transported to various receptors. Ground water is found in several hydrostratigraphic units at the site, including a surface till layer, sand layers within the till of varying depths and extent, and a lower sand unit which overlies a limestone aquifer. Specifically, the hydraulic conductivity of the upper water bearing units was considered by Battelle to be too small to permit transport of radionuclides. However, the 805 layer was used in the model as a water producing unit available for unrestricted use. The Ohio EPA has reviewed the hydrologic data and believes the upper water bearing zones are transmissive and useable for unrestrictive use. We believe our review indicates the surface till unit and the 885 layer have hydraulic conductivities of  $1.2 \times 10^{-3}$  cm/sec,  $2.4 \times 10^{-2}$  cm/sec respectively. In addition, we believe these units appear to be laterally continuous. It is our opinion the dose model should be reviewed to reflect these highly transmissive water bearing units.

The model used a "resident farmer" scenario to estimate the potential dose to the population. Battelle conservatively assumed radionuclides would not attenuate over the duration of the model (1000 years). The model assumes one of the sand layers in the till is contaminated with radionuclides and ground water would discharge into Battelle Lake where the resident farmer would be exposed by consuming fish and drinking the water. Ground water in another sand layer in the till was considered contaminated in the model and would serve as a drinking water and irrigation source for the farmer. The other hydrostratigraphic units are considered to be isolated from contamination by aquitards which would limit the migration of radionuclides to the main drinking water supply aquifers. Using this model, Battelle estimated the dose to a receptor to be 21 mrem/year which is below the goal of 25 mrem/year for unrestricted use.

In review, Ohio EPA believes several potential pathways and receptors were excluded from consideration using this approach which could impact the final dose assessment. For example, the available hydrogeologic data appears inconclusive that the upper sand layers are not capable of being potable water supplies. Further we are concerned about the existence of pathways that may discharge contamination to Big Darby Creek and other interconnected ground water zones. All of these additional pathways should be considered in the dose assessment model to see if it materially impacts the estimated dose to a receptor.

#### Analytical and Data Quality Objective Discrepancies

Risk assessment relies on usable, valid data as specific inputs into the model. We have identified several potential data quality objective concerns that may influence the model input parameters. For example, Battelle has indicated that at least some water samples were collected, stored and composited for up to a year, then filtered before being sent for lab analysis. Because of this sample handling practice, we are concerned that the analytical results for ground and surface waters may be lower than actually present. While this may be analytically acceptable, Ohio EPA views this as a potential problem because most private wells in Ohio are not filtered prior to distribution through the home, thus, potentially exposing them to higher levels than may be identified by your results.

Another concern is that we believe the Minimum Detectable Activities (MDAs) used by Battelle often exceed the Maximum Contaminant Levels (MCLs) for drinking water for some samples. This would allow for a radionuclide to be present at a level exceeding its MCL, but not be detected. For instance, Battelle reported in our June 29, 2007, meeting that any Uranium detected at the site is naturally occurring. We are unable to locate any background data for ground water to establish naturally occurring levels of Uranium for ground water in the area. Additionally, this explanation fails to explain MCL exceedences for Uranium, an increasing trend for Uranium in the Bog Area, or the ratios of Uranium isotopes present at the site.

#### **The model may not include the most sensitive receptor population found near the Battelle West Jefferson site.**

Ohio EPA is concerned that the significant receptor populations may have been overlooked in the dose assessment model. If this is the case, it could suggest the potential population drinking contaminated ground water is not being factored in the dose assessment analysis. For example, Girl Scouts from Camp Ken Jockety and the general public use Big Darby Creek for recreational purposes. It is not known whether the resident farmer scenario and those exposure factors used in the risk assessment model are adequate to describe the risk for the general population located near the Battelle site.

Our second concern is that approximately 5,000 residents all are within one mile of the Battelle campus and drink water from wells (Attachment). A well log search of the Ohio Department of Natural Resources records revealed over 90 public and private wells within one mile of Battelle. Twenty nine (29) of these wells are completed in sand and gravel aquifers. Eleven (11) of these wells draw from sand and gravel aquifers that are equal to or shallower than the depth of the contaminated Bog Area. We are concerned that this demonstrates how the shallow sand and gravel aquifers in the area (which are currently source of drinking water) may be at risk.

**The Bog Area is not considered as a source of contamination and risk, nor is there discussion of consideration of the fate of cesium-137 (Cs-137) contained in the filter or where the contamination went after it was flushed out of these beds.**

Our main concern with the Bog Area is that areas of potential contamination were not addressed in the site characterization and that these areas may impact the dose assessment model. Reports indicate the Bog Area was contaminated by a sewer line discharge from the site which has since been abandoned. Figure 2 from the September 14, 1990, Hydrogeologic Report from Battelle shows that in addition to the bog area sewer line, four other abandoned sewer lines discharged into Battelle Lake from the site. At this time we have been unable to locate ground water, surface water or sediment analyses for the other four discharge points to Battelle Lake and are concerned there may also be an impact as observed in the Bog Area.

We also understand that the Bog Area data was not considered in the dose assessment model. Given the possible impacts and linkages between the Bog Area and the sources of ground water that are potable and will be widely available for use if an unrestricted use designation is granted by NRC, we believe it should be included in the dose assessment model since it represents a potential pathway for risk exposure.

Lastly, our review has found several reports which discuss how cesium-137 (Cs-137) was a contaminant in the filter beds which were flushed to remove it. We cannot or have not yet been able to determine where the contamination went. Also, well 110R in the filter bed area has an activity 36.50 pCi/l of Uranium, exceeding the MCL. Either because of a lack of available data, or because of the limited analysis we have been able to complete due to time restrictions, we are concerned about the fate of the cesium and its possible impacts on possible receptors.

### **Recommendations**

As noted our comments and recommendations are based upon a limited review of a significant amount of data recently received from Battelle and other sources. We are aware that Battelle and NRC are planning a September 2007, public hearing on the proposed D&D. However, we feel strongly that our concerns and recommendations need to be considered, analyzed, discussed, and addressed prior to this meeting taking place, or at least be considered by NRC prior to any final decisions about whether the Battelle site is suitable for unrestricted use.

Our recommendations are as follows:

- 1) When determining ground water and surface water contamination, the data should use the 95% Upper Confidence Level of the mean as a source term in the dose assessment model.

- 2) The Bog Area should be considered as a source of contamination and risk and factored into the dose assessment model.
- 3) Because we are concerned that the leaching potential is not consistent with observed radionuclide detections in lower water bearing units, we recommend that the dose assessment model use appropriate hydrologic settings and transport input parameters.
- 4) Other potential users, in addition to the resident farmer used in the dose assessment model, should be included in the dose assessment model to accurately reflect risk to the general population.

If you have any questions or concerns or would like additional information, please contact Tom Allen, Assistant Chief, Division of Drinking and Ground Waters at (614) 644-2745.

Sincerely,



Chris Korleski  
Director

c: Mike Baker, Chief, DDAGW  
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