



Pennsylvania Department of Environmental Protection

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Bureau of Radiation Protection

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Mr. Larry Camper
Chief, Decommissioning Branch
Office of Nuclear Materials Safety and Safeguards
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852-2738

Re: Cabot Reading Site

Dear Mr. Camper:

As we discussed in our April 30, 2002 conference call, Pennsylvania has serious reservations about the conclusions drawn by NRC regarding the radiological conditions at the Cabot Site in Reading, PA. After our further review of the available information from the licensee (and their contractors), NRC, Sandia National Laboratory, and the NRC Office of Research Draft report on the Characterization of Radioactive Slags, we believe there is not a clear record for resolution of many valid technical issues that have been raised. In addition, we have concerns as a result of limited survey measurements our staff has made at the site. These technical issues are summarized below and detailed in the attachment to this letter.

The Commonwealth's basic concern is that the radiological assessments that conclude the Cabot license can be terminated and the site released for unrestricted use may be based on a source term that significantly underestimates the actual conditions at the site. Specifically, we are concerned that:

1. The estimate of the amount of radioactivity used in the licensee's radiological assessment has not accounted for the large volume of waste shipped and disposed of at the site from out of state in 1977.
2. The subsurface sources of radioactive slag are not as homogeneously distributed as has been assumed in the assessments.
3. The split-spoon technique used for subsurface characterization would be unable to sample the large blocks of radioactive slag that are known to be buried at the site. Furthermore, no test borings were made along the slope of the slag pile where the large blocks of radioactive slag are known to have been dumped. Both factors appear to have reduced the radioactive source term for dose assessments. Based on these factors, trenching on the slope of the slag pile may be required for accurate characterization.
4. Recent limited measurements of the gamma exposure levels by PA-DEP personnel significantly exceed the results reported by the licensee and its contractors.

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5. As a result of these lower reported surface gamma exposure levels, the licensee's contractor has reduced the reported measurements of near-surface contamination levels by over a factor of 2 for the dose assessment calculations.
6. Parameters used for some of the dose assessments may not be appropriately conservative, given the uncertainty in the characterization of the source term.
7. Scenarios that may be realistic over the 1000-year assessment time frame and could result in doses above the NRC's criteria for unrestricted use have not been considered.

For your information, we have been advised that the Agency for Toxic Substances and Disease Registry (ATSDR) has received several inquiries from concerned local citizens. We understand that these contacts include a family concerned about health effects. The George Washington University Pediatric Environmental Health Specialty Unit is following up on this concern. The ATSDR has also documented a citizen's concern about occupational exposures related to the slag pile. Based on the concerns noted above and other interactions between local citizens and the Commonwealth, the Bureau of Radiation Protection recommends that NRC hold a public information meeting in the area prior to taking any major licensing action.

Lastly, we believe there is insufficient information available about this site at this time to conclude that the Cabot Reading license can be terminated for unrestricted use. It is our opinion that unrestricted release under the present conditions will result in this site becoming a defacto unlicensed burial site for radioactive material. Since approval of the licensee's Decommissioning Plan and termination is a major licensing action, please advise if NRC intends to afford an opportunity for the Commonwealth (and other parties) a licensing hearing pursuant to 10 CFR 2.1205(d).

Sincerely,



David J. Allard, CHP
Director
Bureau of Radiation Protection

Enclosure: Detailed Comments

cc: G. Pangburn, NRC, Region I
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PA-DEP Detailed Comments on Cabot Reading Site*

1. Ref. 1 reports that a Maryland Department of the Environment (MDE) letter dated July 25, 1977 indicates that 286 20-ton truckloads (total of 5720 tons) of Sn slag and sand were shipped from Baltimore to the Cabot Reading site. In Ref. 2, NES reports that only 1000 tons of Sn slag and sand were shipped from Baltimore. Assuming that the MDE letter is correct, NES has underestimated the inventory by almost a factor of 6. As a result, Ref. 1 estimates that approximately 153 tons of U+Th were disposed of in the site slag pile, while NES estimated only 33 tons of U+Th are in the pile.
2. The radiological assessments provided in Ref. 3, are based on the assumption that the radioactive slag was broken up prior to disposal, mixed with the non-radioactive materials, and is indistinguishable from other materials. However, Ref. 1 clearly shows in photographs that much of the slag is in the form of large blocks, many up to 2-3 feet across. Implicit in the dose assessments is the assumption that the radioactive sources are homogeneous in the slag pile.

In addition, there is an indication that filtrates were disposed of in the slag pile. It is reasonable to assume that these filtrates would have sifted down through the slag pile due to rainwater descending through the relatively porous pile. There is no indication that the characterization sampling or the radiological assessments considered this possible additional source of radioactive contamination.

3. NRC guidance for subsurface soil sampling, Ref. 4 (p. 6-9) states "... rocks...and foreign objects are removed from soil samples to the degree practical at the time of sampling." However, this guidance is modified, "(I)f there is reason to believe these materials contain activity they should be retained as separate samples." In spite of this guidance, the split-spoon sampling was the only method used in the subsurface characterization (Ref. 2). The split-spoon technique is physically incapable of sampling the large blocks of slag that are known to be buried at the site (Ref. 1), and these larger pieces of slag are acknowledged to contain the highest concentrations of radioactivity (Ref. 3). Consequently a significant source of radioactivity has not been considered in the dose assessments.

Although Ref. 1 shows that the large blocks of slag were dumped on the slope of the pile, no borings or other subsurface sampling techniques have ever been utilized on the slope of the pile. A summary of slag sample analysis provided in Ref. 2 and indicates the average gross Th + U concentration to be approximately 917 pCi/g. Ref. 2 also indicates 600 tons of slag was disposed along with 1080 tons of soil/rock/debris and 1040 tons of sand. Assuming that everything other than the slag contains no radioactivity, the average concentration of U + Th in the slag pile is 202 pCi/g, a factor of 8 higher than the near

*Numbers correspond to numbered summary statements in letter.

surface concentration used by the licensee in their Radiological Assessment (Ref. 3) and a factor of 2.7 higher than their calculated average net activity concentration.

4. On February 25, 2002, PA-DEP staff performed a limited survey on the flat top of the slag pile. These gamma exposure measurements, observed by two NRC inspectors, indicated levels up to 55 $\mu\text{R/hr}$ (corrected for background). Earlier DEP measurements at the toe of the slag pile outside of the controlled area indicated surface radiation levels up to 55 $\mu\text{R/hr}$ corrected for background. On the other hand, Ref. 2 reported in Table 3.9, gamma scan results corrected for background which average 10 $\mu\text{R/hr}$ ^{**}, significantly lower than DEP measurements of 55 $\mu\text{R/hr}$. This discrepancy should be resolved. If a future residence were postulated to exist on top of the pile (see 7, below), and using the RESRAD default outdoor occupancy factor of 0.25, the level of 55 $\mu\text{R/hr}$ translates to a dose of approximately 120 mrem/yr, nearly 5 times the 25 mrem/yr for unrestricted release.
5. In Ref. 3, pp. 2-2 and 2-3, the licensee's contractor reviews the surface gamma exposure levels reported in Ref. 2 and concludes that the radiological analyses of soil samples from the near-surface (0-2 ft) are inconsistent with the lower gamma levels. Therefore the contractor "adjusts" the soil sample results to correspond to the reported gamma levels. As a result the actual measured soil sample concentrations of total U+Th are arbitrarily reduced from an average value of 55 pCi/g to 25 pCi/g. This reduces the source term for the radiological assessments by the same amount. As discussed in the previous comment, we believe it is important to resolve the discrepancy between the gamma scan results obtained from independent measurements by DEP and the gamma results of Ref. 2. Until appropriate resolution is achieved, the dose assessment results are questionable.
6. Sandia Laboratory in Ref. 5 and 6. has raised valid concerns about some of the parameters used in the dose assessments reported by the licensee's contractor in Ref. 3. NRC's recent review of the Sandia reports as given in Ref. 7 does not address all of the Sandia concerns. We are in agreement with Sandia that some of the parameters in Ref. 3 require further justification, including: (a) plant mass loading with contaminated soil, (b) reduced garden area, (c) produce consumption rate, and (d) assumption of two consumers which reduces the dose by $\frac{1}{2}$. The scenario identified in Ref. 3 as a resident gardener, does not actually allow for a residence in the contaminated area (see 7, below), and consequently the combined dose for the "removed" residents and a garden is reduced, thus meeting NRC's unrestricted use criteria.
7. There are several scenarios, or modifications to scenarios that are not considered in Ref. 3 that we believe may be realistic over the long term of 1000 years. These scenarios could result in doses above NRC's criteria for unrestricted use of the site. We agree with Sandia in Ref. 5 and 6. that a residential trailer could be located within the contaminated

^{**} Furthermore, about $\frac{1}{2}$ of the gamma exposure levels reported in Ref. 2 and corrected for background exceed 10 $\mu\text{R/hr}$, a level frequently used by NRC to release outside areas of sites for unrestricted use.

area on top of the slag pile, and still allow adequate space for a garden in this same area. We also agree with Sandia that a partial subgrade structure with substantial occupancy, either residential or occupational should be considered, especially in light of Sandia's results that a dose significantly greater than 25 mrem/yr will be incurred. Finally, we agree with Sandia's conclusion that inadequate justification is provided for the very limited occupancy time and excessively thick building slab assumed for the worker scenario in Ref. 3.

In addition, we are concerned that the possibility of excavation of contaminated material from the slag pile has been ruled out in Ref. 3. Even though Ref. 3 makes an argument that there is no present economic incentive for excavation, the licensee should follow NRC guidance that requests for unrestricted use should not rely solely on current practices or conditions when the site is contaminated with long-lived radionuclides. Furthermore, the previous discussion pointed out that no consideration has been given either to the substantial amounts of radioactive material shipped to the site, or the large blocks of slag containing higher levels of radioactivity are present in the pile. Both of these factors would be major contributors to public and/or worker exposures if a realistic excavation scenario were considered.

References:

1. "Characterization of Radioactive Slags", March 2000, Draft Report prepared by Johns Hopkins Univ., et.al., sponsored by NRC-RES (with some investigations by NRC-RES staff).
2. "Characterization Report for the Reading Slag Pile", Revision 1, April 1996, NES, Inc.
3. "Radiological Assessment for the Reading Slag Pile Site", Revision 1, March 2000, ST Environmental Professionals, Inc.
4. "Manual for Conducting Radiological Surveys in Support of License Termination", Draft Report, NUREG/CR-5849, Oak Ridge Associated Universities for the NRC.
5. "Preliminary Assessment of the Cabot Corporation Reading Slag Pile Site, Reading Pennsylvania", 1999, Sandia National Laboratories.
6. "Review of the Revised Decommissioning Plan for the Cabot Corporation Reading Slag Pile Site, Reading Pennsylvania", June 2000, Sandia National Laboratories.
7. "Technical Assistance Regarding the Radiological Assessment for the Cabot-Reading Pennsylvania Site", Draft, March 8, 2002, NRC (Mark Thaggard).