

**CABOT**

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February 15, 2001

CERTIFIED/RETURN RECEIPT  
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U.S. Nuclear Regulatory Commission  
Mr. Larry W. Camper, Chief  
Decommissioning Branch  
Division of Waste Management  
Office of Nuclear Material Safety and Safeguards  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852

**RE: 12/27/00 REQUEST FOR ADDITIONAL INFORMATION  
REGARDING THE CABOT-REVERE SITE DECOMMISSIONING  
PLAN AND RADIOLOGICAL ASSESSMENT**

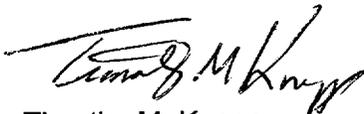
Dear Mr. Camper:

Enclosed are Cabot's responses to the Commission's request for additional information dated December 27, 2000 regarding the Cabot Revere site Decommissioning Plan and Radiological Assessment. In addition, our responses have addressed the comments of the Pennsylvania Department of Environmental Protection in their letter to the NRC dated February 1, 2001. Cabot feels that the DEP comments were sufficiently similar to the Commission's comments in the RAI and that a single response letter that addresses both DEP and NRC comments is more appropriate and expeditious.

In addition to this correspondence, Cabot intends to revise the Decommissioning Plan and Radiological Assessment. These revised documents will be forwarded to your attention once they have been finalized.

We appreciate your continued support in the effort to decommission this site.

Sincerely,  
CABOT PERFORMANCE MATERIALS



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Radiation Safety Officer

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Your letter presented a series of requests in summary form, supplemented by an attachment that provided explanation and elaboration for each request in the series. This response addresses each NRC request in series. The summary form of the NRC request is duplicated in Italics and the Cabot response follows immediately. Although the NRC explanatory information is not reproduced in this response letter, please be assured that it was carefully considered in development of the responses.

*Dose Assessment:*

- 1) *Staff considers that there is insufficient justification for treating the warehouse/loading dock as an unaffected area in the DP and RA. Further justification should be provided or the warehouse/loading dock area should be included in the evaluation.*

Interviews and signed statements from personnel employed at the site in the late 1960's indicate that the loading dock area was paved prior to the handling of radiological ores. Air photos have been ordered to confirm these statements. A review of all the previous reports also indicated that the loading dock area is not impacted by radiological slag. The May 1994 Ensearch characterization report found no elevated readings or samples in the warehouse/loading dock area in late 1993. The August 1994 NES Subsurface Characterization report noted readings of 2 to 3 times background in the area but no samples with elevated concentration. The 1996 NES Decommissioning Plan stated that the elevated readings in 1994 were due entirely to K-40.

Cabot believes, based on site characterization, that the warehouse/loading dock area and other areas of the site not explicitly analyzed in the radiological assessment contain, at worst, few isolated small pieces of slag bearing licensed radionuclides. In addressing some of the remaining requests for additional information, Cabot is preparing a revised radiological assessment and decommissioning plan. The revised documents will discuss more completely the basis for the selection and exclusion of areas warranting explicit evaluation. They will also explain why the areas selected can be considered as bounding representatives—for purposes of demonstrating compliance with 10 CFR Part 20 requirements for termination of the license with release of the site for unrestricted use—for any other site areas that may contain isolated pieces of slag bearing licensed radionuclides.

- 2) *As discussed in previous NRC letters to Cabot (June 25, 1996, and March 12, 1997), staff believes that the dose assessment analysis cannot take credit for an undisturbed soil cover under unrestricted use conditions.*

The revised radiological assessment that will include evaluation of radiation dose from exposure scenarios that include both residence and gardening directly on slag materials with no soil cover or amendment. (It should be noted that one of the exposure scenarios evaluated as a sensitivity study in the 1997 radiological assessment was a scenario for a resident on the slag with no soil cover or amendment. For reasons discussed in the assessment, the scenario did not include exposure pathways associated with gardening.)

- 3) *Staff considers that the agricultural dose pathways should be included in the assessment, perhaps using a total available uranium calculation to assess the potential dose. Alternatively, a stronger justification could be provided for excluding this dose pathway.*

The revised assessment will include evaluation of radiation dose from exposure scenarios that assume residence and gardening directly on slag materials with no soil cover or amendment. A calculation of total available uranium will be used to evaluate the dose from ingestion of agricultural produce from gardening.

- 4) *Staff considers that the dose modeling should be done using the most recent RESRAD code (version 6.0) to incorporate recent changes which may affect the calculated results for the Revere site.*

The revised radiological assessment will use version 6.0, as requested. (The 1997 radiological assessment used the most current version of RESRAD available at that time.)

- 5) *Staff has questions about the assumptions (e.g., homogenized or concentration gradient geometry, consistency with other exposure pathway calculations) made in using measured gamma exposure readings to determine gamma dose, in lieu of the RESRAD calculated gamma dose.*

The 1997 radiological assessment used measured gamma exposure rate to estimate direct dose from radionuclides in slag and used estimated uniform concentrations of radionuclides in slag in the RESRAD code to calculate radiation doses from other exposure pathways. The assessment noted that the direct dose based on measurement was significantly lower than the direct dose that would have been calculated using RESRAD and the estimated concentration of radionuclides in slag. As noted in the radiological assessment, this inconsistency was interpreted as indicating that the estimated concentrations of radionuclides in slag were higher than actual concentrations. The inconsistency was allowed to stand because the only impact on the outcome of the analysis was that doses from exposure pathways other than direct exposure were conservatively overestimated.

The revised radiological assessment will use an alternate approach to estimate concentrations of licensed radionuclides in slag on the site. This approach is summarized in the response to RAI 7, which, while focused on source term, also addresses spatial variability of radionuclide concentration.

*Site Characterization and Environmental Assessment:*

- 6) *Staff questions the instrumentation calibration methods for the gamma exposure rate data used in the RA. The calibration information is necessary to validate the exposure rate data.*

The calibration data in question was not included in the ENSERCH report ("Radiological Characterization Survey Report for the Cabot Performance Materials Revere Plant," ENSERCH Environmental Corp., April 1994). However, that report did include (see page 6-2 and Figure 6-1) a study of the correlation of ENSERCH measurements with similar measurements made by the Oak Ridge Institute for Science and Education (ORISE). The measurements correlated well, although the ENSERCH measurements showed a linear bias of about 3  $\mu\text{R}/\text{h}$  to the high side. The ORISE measurements were made using a NaI gamma scintillation detector/ratemeters that were cross-calibrated to a PIC ("Confirmatory Radiological Survey for Portions of the Cabot Corporation Revere Plant Revere, Pennsylvania," by J. D. Berger and B. M. Smith, Oak Ridge Institute for Science and Education, April 1993, page 5). This correlation indicates that the ENSERCH calibration was appropriate for the measurement purpose.

In the 1997 radiological assessment, the measured gamma exposure rate was the primary basis for the estimate of radiation dose from the direct exposure pathway. In the revised radiological assessment, the radiation dose for this pathway will be computed using the RESRAD code and the average radionuclide concentration in slag. The measured gamma exposure rate will provide confirmation that the potential direct dose would not substantially exceed that calculated using the RESRAD code.

- 7) *Staff questions the methods and data used in the total activity calculation, as well as the assumptions about the fraction of material that is contaminated slag. Cabot should provide additional justification for the source term calculation, or provide a justified alternate source term calculation.*

Cabot has reviewed available information, and has located information that permits derivation of an alternate source term. The alternate source term will be used in the revised radiological assessment. The approach is only summarized here, but will be described and supported in detail in the revised radiological assessment.

Some of the information located supports a more accurate computation of the total licensed radionuclide inventory in slag produced. This slag was combined with a much larger volume of slag that was generally similar except for the absence of licensed radionuclides. During site cleanups, the combined slag was excavated and monitored and slag containing elevated concentrations of licensed radionuclides was segregated. Some of the segregated slag was removed to the Boyertown facility during site cleanups. Billing records by the remediation contractor provides an estimate of the minimum weight/volume of slag removed but, because the radionuclide concentration in the removed slag is not well known, the radionuclide inventory removed is not known precisely. A conservatively low estimate of the quantity of radionuclides removed will be assumed in the radiological assessment to allow estimation of an upper bound of the radionuclide inventory remaining on the site.

Site data indicate that the remaining inventory is distributed more or less uniformly over the volume of slag in four areas. Slag bearing licensed material was detected in measurements in all four areas. Photographs of cleanup activities show that mixing of slag during excavation, sorting, replacement and regrading was extensive. Because general homogenization of the slag during this handling was undoubtedly substantial, it is likely that concentrations of licensed radionuclides, averaged over sizable volumes of slag, are fairly uniform. Despite the homogenization, the possibility remains that average radionuclide concentrations over the volume of slag in each area varies between areas. The likelihood and implications of substantial variability of this kind will be addressed in the revised radiological assessment.

Because the licensed radionuclides are associated with discrete pieces of only small portions of the slag, variability in radionuclide concentration over small volumes are substantial. However, substantial "effective" averaging would result from a receptor's use of the site. For example, in walking about on the site, a receptor would be no more likely to be exposed preferentially to one small area of the site than to any other. Thus, computation of dose based on an assumption of uniform radionuclide concentration over the slag volume is warranted.

- 8) *Staff requests Cabot provide any additional information as it relates to historical and cultural site reviews, and endangered species evaluations at the Revere site.*

Interviews (conducted on January 23, 2001) and signed statements of two current employees at the site indicate that they are not aware of any archeological, historical, or endangered species issues associated with the site. Cabot is unaware of any information indicating any special historical or cultural interest in the site or that the site is the habitat for any endangered species.