March 19, 2007

Mr. David R. Smith
Environmental Manager
Shieldalloy Metallurgical Corporation
Aluminum Products & Powders Division
14 West Boulevard, P. O. Box 768
Newfield, NJ 08344-0768

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR ENVIRONMENTAL REVIEW OF PROPOSED DECOMMISSIONING PLAN FOR SHIELDALLOY METALLURGICAL CORPORATION, NEWFIELD, NEW JERSEY

Dear Mr. Smith:

The U.S. Nuclear Regulatory Commission (NRC) staff is conducting its environmental review of Shieldalloy Metallurgical Corporation's (SMC) proposed Decommissioning Plan (DP) and alternatives for the Newfield, New Jersey site in support of preparing an Environmental Impact Statement (EIS) as required under the National Environmental Policy Act (NEPA). Based on its review of SMC's updated Environmental Report, submitted by letter dated June 30, 2006, and of previously submitted site-specific information, the NRC staff is requesting additional information to support its evaluation of the potential environmental impacts of SMC's proposed DP and alternatives. The requested information is identified in the enclosure to this letter.

The NRC staff requests that SMC provide this additional information within 30 days of the date of this letter. If SMC is not able to provide the information by that date, please contact me using the contact information below. The NRC staff requests that SMC provide a revised submittal date at that time.

If you have any questions concerning this matter or the requested information, please contact me either by phone at (301) 415-5405, or by e-mail at pbs2@nrc.gov.

Sincerely,

**/RA/**

Patricia B. Swain, Project Manager
Environmental Review and
Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No.: 40-7102
License No.: SMB-743

Enclosure: Requested Information

cc: Shieldalloy Distribution List, (without enclosures)

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**Request for Additional Information**
**Shieldalloy Metallurgical Corporation**
**Docket No. 04007102**

The U.S. Nuclear Regulatory Commission (NRC) staff is conducting its environmental review of Shieldalloy Metallurgical Corporation's (SMC's) proposed plan for decommissioning its Newfield, New Jersey site in support of preparing the Environmental Impact Statement (EIS). In October 2005, SMC submitted a Decommissioning Plan (DP) (Rev 1) and a draft Environmental Report (ER). On June 30, 2006, a supplemental DP was submitted. Based on NRC staff review of these reports and previously submitted information, the NRC staff is requesting the following additional information to support its evaluation of the potential environmental impacts of SMC's proposed DP and alternatives.

**1.** Provide background information of range of alternatives considered but eliminated.

**Basis:**

The alternatives analysis is a key component of the National Environmental Policy Act environmental review process. Please provide the available information on the full range of alternatives analyzed by SMC but eliminated from further consideration during development of the DP. This information will be used to either support the analysis of reasonable alternatives that will be analyzed in the EIS or support the justification for eliminating alternatives from detailed analysis. This information will also be used to conduct a beneficial reuse economic analysis of the alternatives evaluated in the cost benefit section of the EIS.

**Path forward:**

Please provide the following information:

a. Reports/correspondence on concrete use/reuse opportunities that were examined, including information regarding the Pennsylvania State University studies and contact with the U. S. Army Corps of Engineers Baltimore District.

b. Reports/correspondence on concrete use/reuse opportunities that were examined with respect to contaminated slag/contaminated material reuse reports prepared for the SMC Cambridge, Ohio facility.

c. Reports/correspondence with the countries of Malaysia and China that explored the beneficial reuse of contaminated slag /contaminated materials and the resulting economic analysis/information. Include information regarding market prices, material quantities, and relevant extraction and processing costs associated with processing and beneficial reuse of these materials. Include all assumptions and parameters used to determine the feasibility of each beneficial reuse considered.

d. Please provide feasibility analysis calculations and reports that were prepared to examine the economic potential of selling slag material to a uranium mill and/or extracting valuable constituents (i.e. uranium extraction). Identify the specific uranium mills considered.

**2.** Please provide the cost information identified below related to the offsite disposal alternative to support gaining a full understanding of all the assumptions and parameters used in developing costs for the proposed off-site disposal alternative in consideration of the EIS cost benefit analysis.

**Basis:**

The major costs and benefits of each alternative must be considered in the EIS in accordance with 10 CFR 51.71. The cost benefit analysis provides input to determine the relative merits of various alternatives.

**Path forward:**

a. Please provide copies of the two EnergySolutions letters/proposals provided to SMC referenced in the Request for Additional Information (RAI) teleconference of March 13, 2007. The NRC staff understands that these letters contain cost estimates for off-site disposal by rail.

b. Please also provide the results of any SMC independent analysis of the off-site disposal cost. For example, to the extent it is available, please provide either the cost spreadsheets or information on the derivation of costs to excavate and to dispose of the tonnage of materials. Provide any statistical uncertainty for this estimate or for confidence intervals associated with the total tonnage estimates. Provide the data and calculations that show the number of rail cars needed to accommodate tonnage, their size and load capacities, how many cars would move per day over the full removal period, how long the entire cleanup would take, assumed rail trip routes, planning and project management costs, excavation costs, loading costs, any onsite pulverizing/crushing and related equipment costs, and environmental controls and barriers, including labor estimates by task over the construction period.

c. With respect to past SMC independent estimates, have any of the input parameters or physical variables (outside of price inflation) used to calculate these estimates changed substantially (since the time they were completed) to render the previous estimates either not applicable or useful to assess this disposal option? If so, please indicate which parameters and physical variables have changed and update the estimate accordingly.

**3.** Provide more detail on assumptions, parameters, and calculations used in the as low as reasonably achievable (ALARA) cost benefit analysis.

**Basis:**

The major costs and benefits of each alternative must be considered in the EIS in accordance with 10 CFR 51.71. The cost benefit analysis provides input to determine the relative merits of various alternatives. The following data will be used as background information to understand the assumptions and data contained within the radiological assessment and assumptions that were used in the DP ALARA cost benefit analysis.

**Path forward:**

a. Provide more detail on how the man rems were calculated for each category of cost, i.e. worker on-site and offsite exposure scenarios for each alternative. These details should include assumptions and explanations used to document the provided dose response coefficients and examples of how they were applied.

b. Please clarify if the man rems calculated in the cost benefit analysis represent the cumulative year's worth of exposure that corresponds to the remedial construction period work length. If so, please document the time periods used and cross reference to the number of workers or relevant potentially exposed populations.

c. Please define the relevant populations considered in the radiological risk analysis for both on-site and off-site disposal options. Specifically, how were these populations measured, from what year and what population base?

**4.** Provide the following technical documents and materials.

**Basis:**

The EIS will evaluate the radiation dose to humans from the implementation of each alternative. The information below is being requested to clarify radon release rates from the waste form and, to provide a measurement of radionuclide content in the source term, and to obtain environmental measurement results (e.g., air concentrations during different operations) to estimate worker and public doses from implementing each alternative.

**Path forward:**

Provide the information listed below:

a. Any studies that provide results of radon characterization from baghouse dust and slag.

b. Any radiological and non-radiological analytical data that exists for slag and baghouse dust.

c. Results from baghouse materials testing studies conducted in the mid-1990s.

d. Quarterly surveillance reports for ferrocolumbium campaign – including bioassay, air monitoring and personnel dosimetry – from a representative/active year.

e. NRC inspection results occurring approximately in the 1994/1995 timeframe regarding side by side comparisons for air quality and areal contamination.

f. Analytical results from stack monitoring, if available.

g. Groundwater Focused Feasibility Study, TRC 1994

h. A copy of the Administrative Consent Order (ACO) between TRC and NJDEP (date unknown)

i. Annual Groundwater Monitoring Report, TRC 2006.

j. Air quality sampling/modeling data associated with site contaminants

k. A summary report documenting the closure of the on site wastewater lagoons prepared in 1996. If there was no final report submitted to the New Jersey Department of Environmental Protection documenting the closure, please provide a summary of remedial method(s) for closure, contaminants present prior to closure, and a map of cleanup boundaries with resulting cleanup concentrations.

l. A copy of the "CANAL Paper".

**5.** Provide the following electronic materials:

**Basis:**

Geographic Information Systems (GIS) shape files/AUTOCAD files and the drawings for all figures developed for the DP and ER will be used as base maps to permit expeditious production and reproduction of legible figures for the EIS.

**Path forward:**

Provide all drawings and layers for the GIS shape files/AUTOCAD files and drawings used for the figures in the DP and ER.

**6.** Please provide the following traffic/transportation related information for use in the evaluation of transportation impacts.

**Basis:**

The EIS analysis will evaluate the transportation impacts, both incident-free and accidents, for each alternative. This analysis will evaluate transportation issues associated with on-site activities and with the off-site shipment of materials.

**Path forward:**

a. For the no action alternative (nonradiological impacts – emissions and traffic accidents)

  - The number of cars and trucks that enter and leave the site on a daily basis and an estimate of the number of miles traveled

b. For the alternative involving off-site shipment of materials (radiological and nonradiological impacts):

  - The number of cars and trucks that would enter and leave the site daily and an estimate of the number of miles traveled

   - The amount of radiological, nonradiological, and RCRA materials that would be transported offsite
   - The amount of materials that would be shipped by truck and/or rail
   - Physical characteristics (e.g., volume, density) of shipped materials
   - Radiological characteristics (radionuclide concentrations, total curies) of shipped materials
   - Shipping configurations (e.g., 40 foot vans, roll off containers, gondola cars) and geometries of shipping containers

c. If any transportation analyses have been performed using the RADTRAN, WebTRAGIS, or MicroShield computer codes, the following information would be useful since they will either be used or verified:
   - Input and output files for all RADTRAN computer runs
   - Input and output files for all WebTRAGIS computer runs
   - Input and output files for all MicroShield calculations (i.e., transport index computations for all truck and rail shipping containers and radioactivity concentrations)

d. For the proposed action, please provide an estimate of both the number of cars and trucks that would enter and leave the site daily and of the number of miles traveled.

**7.** Provide a traceable and transparent dose analysis.

**Basis:**

SMC dose analyses are not transparent or traceable, making it difficult to confirm the credibility of the results. For example, the MicroShield analyses are not labeled which makes it difficult to ascertain which scenarios they represent. The reference to MicroShield analyses cited in Table 17.8 does not specify which results were used to derive the estimated dose. In addition, some of the input parameters listed in the tables in Chapter 17 do not match the input reflected in the RESRAD summary reports. Further, there appears to be discrepancies between some of the inputs for MicroShield versus the inputs for RESRAD (e.g., the size of radioactive area, activities, and density of the contaminated material).

The description of the suburban resident scenario described in Section 5.3.2.2 of the Supplement to the DP is especially difficult to follow. It cites exposure pathways (Table 17.4.3) and parameters for this scenario (Table 17.3.2) used in RESRAD; however, the NRC staff was unable to locate any RESRAD results for this scenario. Further, the exposure pathways listed in Table 17.4.3 do not agree with those discussed in Section 5.3.2.2 (e.g., the meat and milk ingestion pathways are listed in Table 17.4.3). The table identified as listing the parameters (i.e., Table 17.3.2) is actually for the industrial worker scenario. It is difficult to believe that these parameters would be appropriate for both an industrial worker and suburban dweller. The text also cites the use of MicroShield for estimating exposure from gamma radiation; however, the specific MicroShield analysis used for this purpose is not identified. Lastly, no discussion is provided on how the doses from RESRAD were integrated with those from MicroShield.

Another staff concern is that in some cases, the information reported in the Supplement to the DP does not appear to be credible. For example, the reported doses for the industrial worker in the restricted area while controls are assumed to be in place are greater than when the controls are assumed to have failed. Statistical distributions are reported in the tables of Chapter 17 for some parameters that are not even used by the analysis (i.e., some of the unsaturated and saturated zone parameters). In other cases, the reported central tendency value is outside of the reported range of values (e.g., the contaminated zone erosion rate).

Finally, the reported dose for the industrial worker, when the controls are in place is difficult to comprehend. Based on the RESRAD results (new 3005006.RAD), the industrial worker in the unrestricted area should receive a dose of 20.51. Assuming this worker receives an additional 0.6 millirem from the pile, as reported in Table 17.8.4, the total dose that should be reported should be 21.1 millirem/year, not <20.8 as reported.

**Path forward:**

Clarify the derivation of doses for the suburban resident scenario. Revise the tables in Chapter 17 to include both RESRAD and MicroShield parameters. Address any discrepancies between RESRAD and MicroShield inputs. Address discrepancies between information in the tables and the discussion. Provide an electronic copy of the inputs for all analyses. This includes both deterministic and probabilistic RESRAD files and the MICROSHIELD analysis. Provide a cross-walk between all analyses described in Table 17.8 and the model runs.

**8.** Provide a basis for the assumed source term for the dose analysis involving the restricted release area of the site.

**Basis:**

The source term used in the MicroShield analyses (i.e., $1 \times 10^{-3}$ μCi/cm$^3$) is totally unsupported. NRC staff was unable to derive comparable activities based upon the concentrations reported in Table 17.7. In addition, not all radioisotopes expected to be present within the pile are included in the assessment. For example, Pa-231 is not included in the assessment, and a number of short-lived radioisotopes are not considered.

**Path forward:**

Provide a detailed description of the derivation of the source term used in the MicroShield analysis. Justify the omission of any radioisotopes that are expected to be present within the pile.

**9.** Identify and justify key parameters used and/or assumed within the dose analysis.

**Basis:**

During pre-submittal discussions between the NRC and SMC, the staff advised SMC to clearly identify parameters that are considered sensitive to the derived dose and then to provide an appropriate justification for those parameters that are considered to be sensitive. However, some of the information provided in the tables of Chapter 17 raises questions about the validity of the approach used by SMC to identify sensitive parameters. Further, staff has concerns with the justification offered for several parameters that were identified as being sensitive.

For example, it is not clear how PRECIP and RUNOFF can be considered to be significant parameters and EVAPTR not be significant given that all three parameters are used to estimate the amount of infiltration into the source zone. Further, several unsaturated and saturated zone parameters are listed as significant even though they are not even used in the analysis. In addition, for sections 5.3.3.1 and 5.3.3.2 of the Supplement to the DP, it is unclear how the cover erosion rate is considered to be a key parameter for the recreational hunter scenario and not considered as a key parameter for the suburban resident scenario. These issues raise concerns about the approach used to identify key parameters.

In terms of justifying key parameters, it is clear that the amount of time that the person, in any of the scenarios, is assumed to spend outside at the site is going to be a critical parameter. However, for most of the scenarios analyzed by SMC very little justification is provided for this key assumption. For the industrial worker scenario, derivation of the fraction of time spent outdoors is largely based on an assumption that the worker will be assigned to work inside. Further, in the case of analyzing doses for the restricted release area, the worker is arbitrarily assumed to receive <1% of his dose from the pile. It is not clear why the assumed indoor time and outdoor time fractions for the industrial worker scenarios are considered to be appropriate or conservative. The reference cited by SMC for deriving the indoor time fraction reflects the maximum fraction per day that a plant, factory, or warehouse worker spends indoors while at work. The 69% value assumed by SMC is above the 99$^{th}$ percentile of all reported values. While this value may be conservative in terms of examining impacts within a building, it is extremely non-conservative for looking at impacts outside of the building because the more time the individual is assumed to spend within the building, the less time the person is assumed to spend outside. For example, use of the reported 90$^{th}$ percentile value for the fraction of time the worker spends indoors (i.e., 0.465) results in an outdoor time fraction of 0.12 versus the 0.07 currently assumed by SMC. For the recreational hunter when the controls are assumed to fail and the pile is partially excavated, the hunter is again arbitrarily assumed to be exposed 1percent of the time to the uncovered material in the pile, with no basis or justification provided for this assumption.

The justification offered for the assumed mass loading for inhalation parameter value is also insufficient. First, SMC cites the use of the RESRAD default parameter value as part of its justification; however, as noted in NRC guidance (NUREG-1757, Vol. 2, Rev. 1, page I-61) use of default parameter values should be justified with consideration of their appropriateness in light of the site-specific conceptual model, exposure scenario, and the process used to obtain the value. In some cases, default parameter values may be simply "placeholders" for site-specific values. Second, SMC's argument for justifying the use of its assumed value is somewhat circular in that because it is assumed that the worker works indoors, the person is assumed not to be exposed to airborne dust from the surface soil. This begs the obvious question as whether or not the assumed parameter value would be considered appropriate if the worker is assumed to be an outdoor worker.

**Path forward**:

Clearly describe the approach used to identify sensitive parameters. Clarify any discrepancies between parameters listed as sensitive and those not used in the analysis. Justify the assumed parameter value or range of parameter values for all sensitive parameters through either site-specific data or demonstration (not simply a statement) that the selection provides a conservative estimate of dose. Justification for key parameter values or ranges of values cannot be based upon unsupported assumptions. In general, generic and default parameter values should not be used for sensitive parameters unless the value can be shown to be either appropriate for the site or shown to be conservative based on what is known about the site.

Specifically, provide a basis for the amount of time that a person is assumed to spend outside at the site, for each scenario considered. Provide a basis for the assumed fraction of the dose that an industrial worker in the planned unrestricted area will receive from the pile. Further, provide a basis for the assumed mass loading for inhalation or appropriately demonstrate that this is not a sensitive parameter.

**10.** Address issues with the treatment of parameter uncertainty within the dose analysis.

**Basis:**

Staff has a number of concerns with how SMC attempted to address parameter uncertainty. For example, it is not clear what statistical distribution SMC assumed in its analysis for the size of the contamination zone for the unrestricted release analysis. The text on page 35 of the Supplement to the DP states that a triangular distribution was used to establish the minimum area (i.e., the minimum of the range of values); however, the report also states that the range of values assumed for this triangular distribution is the same as the full range of values considered in the analysis (i.e., 244,000 – 295,000 $m^2$). In addition, the report states that the minimum area is considered to be the most likely value.

In Table 17.3, it is reported that a loguniform distribution was used to represent the full range of values for the area of the contamination zone. It is not clear why a loguniform distribution (for example, as opposed to a uniform distribution) was used. Further, even if a loguniform distribution is considered to be the appropriate distribution, it is unclear how the minimum value of that distribution could be the central tendency value as reflected in the table.

Similarly, clarification is needed on the range of values for the area of the contamination zone assumed by SMC in its assessment for the restricted release case. The Supplement to the DP states that a range of 18,228 to 28,767 $m^2$ was used, which differs from what is reflected in Table 17.3.7, which has a range of 14,580 to 28,767 $m^2$. SMC provides a basis for the 18,228 $m^2$ value; however, no discussion is provided on the source or basis for the other two values (i.e., 14,580 and 28,767). The Supplement to the DP also states that use of a loguniform distribution is considered to be realistic and conservative. It is difficult to understand how something can be both conservative and realistic. Regardless, SMC needs to explain why it believes that use of a loguniform distribution is appropriate. Given that the assumed range of values are within a factor of 10, use of a uniform distribution would appear to be more appropriate.

It is also not clear why the area of the contaminated zone is treated as an uncertain parameter when it should be known. Treating known parameters as uncertain could have the unintended consequence of masking (i.e., reducing) the calculated risk (dose). In addition, it is not clear why a loguniform distribution (e.g., as opposed to a uniform distribution) is considered appropriate given the narrow range of values considered.

SMC also needs to explain why assuming a central tendency value of 0.15 meters for the contamination zone thickness in the unrestricted area is considered to be conservative. Table 17.3.1 of the Supplement to the DP states that this value is based upon US Environmental Protection Agency guidance; however, it is not clear why it is more appropriate to base this value on generic guidance as opposed to the expected configuration of contamination at the site following decommissioning. For example, SMC should explain how the assumed maximum depth of contamination of 0.3 m assumed in the analysis compares with the known depth of contamination at the site or expected at the site following decommissioning.

It difficult to determine what the range of values for the thickness of the contamination zone in the planned restricted area is intended to be. The text on page 36 of the Supplement to the DP states that the actual thickness of the pile, on average, will exceed the central tendency value. It is not clear why the central tendency value for the thickness of the contaminated zone would be set below the average thickness of the pile. In addition, table 17.3.6 contradicts the text because it provides a central tendency value of 2.8 meters for the thickness of the contaminated zone, which is close to the maximum value (3.0 meters) in the table.

Lastly, no discussion is provided on whether any input parameters were correlated in the analysis. For example, the distribution coefficients for Ra-226 and Ra-228 should be correlated, as should the distribution coefficients for U-234, U-235, and U-238, and Th-228, Th-230, and Th-232. Further, given the expected importance of the meat-consumption pathway for the recreational hunter scenario, uncertainty associated with the meat-transfer factor should have been considered.

**Path forward:**

Clarify the statistical distribution used to represent the area of contamination for the unrestricted release analysis. Included with this clarification, clearly state the range of values (i.e., minimum and maximum) and statistical parameters used (e.g., mean, mode, minimum, and maximum). Further, SMC needs to explain its rationale for assuming the particular distribution used in the analysis.

Clarify the range of values assumed for the area of the contamination zone in the assessment for the restricted release case. Provide a basis for the selected values. Provide a rationale for the use of a loguniform distribution. Provide clarification for the need to treat the area of the contaminated zone as an uncertain parameter. Further, justify the assumed statistical distribution used in the uncertainty assessment.

Provide an explanation as to why a contamination zone thickness of 0.15 meter (m) for the unrestricted release case is considered to be conservative. Further, provide a discussion on how the assumed maximum contamination thickness of 0.3 m compares with the depth of contamination existing at the site or expected at the site following decommissioning.

Clarify the minimum, maximum and central tendency values for the thickness of the contaminated zone for the restricted release analysis. In addition, provide an explanation as to why SMC's chosen value for the thickness of the contaminated zone is considered to be appropriate or conservative.

Provide a discussion on how parameter correlations were handled in the uncertainty analysis. If no correlations were considered, provide a demonstration that this does not affect the results. Note that this demonstration should be made in light of how issues relate to the use of the groundwater (RAI # 11) and selection of appropriate distribution coefficients (RAI #12) are addressed. Address uncertainty with the meat-transfer factor for the recreational hunter scenario.

**11.** Provide justification for excluding the groundwater as a potential exposure pathway.

**Basis:**

SMC's argument for excluding the groundwater exposure pathway is insufficient for eliminating such a potentially important exposure pathway. First, statements concerning the infiltration barrier and the insoluble nature of the slag are germane in the context of how much radionuclides are expected to reach the groundwater, but have no bearing on someone's ability to use the groundwater. Even if only a nominal amount of radionuclides are expected to reach the groundwater, the impacts associated with this should be evaluated. Second, it is inappropriate to use existing contamination within the groundwater, caused by SMC, as a basis for excluding future use of the groundwater. Finally, the argument that there are readily available municipal sources of water may be appropriate for short-term consideration; however, over a very long period (i.e., 1000-years), it is unreasonable to assume that such a source will be available. It should be noted that the SMC cites the NRC's approval of the SCA Hartley & Hartley Landfill as part of its basis for relying on the availability of a municipal source of water. However, in the specific case of the SCA Hartley and Hartley Landfill, the NRC found it acceptable to exclude the groundwater exposure pathway because of existing contamination of the groundwater (not necessarily from the Hartley and Hartley landfill) and State requirements on how wells are to be constructed, which precluded the use of the upper groundwater source. It should be also noted that the SCA Hartley and Hartley Landfill is located in an area with an abundant source of nearby surface water, which could also serve as a viable alternative to the groundwater.

The Groundwater Potability Analysis provided by SMC only reinforces SMC's argument that the groundwater should be excluded as an exposure pathway based on contamination caused by SMC. Use of this as a premise for excluding the groundwater pathway does not address whether or not the groundwater will be a viable pathway in the future after it has been remediated. Further, the groundwater analysis provided by SMC (Appendix D) as additional support for excluding the groundwater pathway is largely unsupported because no basis is provided to support several key input parameters (e.g., dispersivity[1] and distribution coefficients[2]). Even if the results from this analysis are accepted as credible, they show that the expected doses from the groundwater pathway are not trivial because they show doses that are more than 10 percent of the dose limit.

**Path forward:**

Provide an acceptable basis for excluding the groundwater exposure pathway or include the groundwater pathway in a reassessment of doses.

**12.** Provide justification for the application of derived distribution coefficients ($K_d$s).

**Basis:**

Distribution coefficients for the contaminated zone were derived based on leaching experiments conducted on slag samples. Given that radionuclides bound up within the slag are expected to be released as a function of the dissolution of the slag, an assumption of release based on a simple partitioning between the solid and liquid may be quite conservative (depending upon how well the leaching experiment represents long-term conditions). Thus, $K_d$ values based upon this assumption may be conservative when considering slag. However, extrapolation of these $K_d$ values to other media may not be appropriate and could be extremely non-conservative. For example, the unsaturated and saturated zones at the site have been characterized as consisting primarily of sands and some gravel. Radionuclides interacting with these materials are expected to have very little partitioning between the liquid and solids and they clearly will not be bound up within the interior of these materials. Accordingly, it is difficult to understand SMC's basis for the range of $K_d$ values assumed for the unsaturated and saturated zones for both the unrestricted and restricted cases[3]. It should be noted that

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[1]The TRC memorandum states that the assumed longitudinal dispersivity value of 30 feet for a 100-foot travel distance is highly conservative; however, NRC staff questions the validity of this assertion. While it is true that this dispersivity value is probably conservative in terms of estimating the break-through time for radionuclides, it may be quite non-conservative in terms of estimating the peak concentration.

[2]Most of the assumed distribution coefficients used in the analysis are RESRAD defaults, which may or may not be appropriate for the site. The distribution coefficient for radium was derived for slag, which may not be appropriate for the native soils. The argument that the assumed radium $K_d$ value is appropriate because it is less than the RESRAD default is baseless because there is no basis to assume that the RESRAD default values are either appropriate or relevant for the site.

[3]The Supplement to the DP indicates that uranium and thorium $K_d$ values for the unsaturated and saturated zones are the same as those for the source zone, which were derived from leaching experiments. In reality, these values are not used because the ground-water pathway is suppressed in the analysis. If SMC can appropriately justify exclusion of the ground-water pathway, NRC staff concerns about the application of these $K_d$ values to the unsaturated and saturated zones may be resolved.

the same concerns would also apply to other types of contaminated material within the slag pile (e.g., the bag-house dust); that is, it is not clear why it would be appropriate to assume the same or similar distribution coefficients between the slag and these other materials where radionuclides are not bound up within the material matrix.

**Path forward:**

Provide justification for extrapolating $K_d$ values derived for the slag to other materials within the slag pile. Alternatively, establish a range of $K_d$ values more appropriate for these materials. Further, if the ground-water exposure pathway cannot be appropriately eliminated (see RAI #11), provide justification for the range of $K_d$ values assumed for the unsaturated and saturated zones for both the unrestricted and restricted use cases. For sensitive parameters, generic or default parameter values should not be used unless they can be shown to be either appropriate or shown to be conservative based upon what is known about the site.

**13.** Provide additional support for assumptions made with respect to the maintenance worker scenario.

**Basis:**

Inspection and maintenance activities at the Cambridge, Ohio site is used as the basis for the amount of time the worker is assumed to spend at the Newfield, New Jersey site. This seems like a reasonable approach for making estimates provided a similar type of cover will be installed at the Newfield site to that installed at the Cambridge site. However, the maintenance and inspection hours indicated for the Cambridge site appear to only reflect routine inspections. Assuming that maintenance activities were to also take place, it is expected that the worker would spend more than 24-hours/year on the site.

Further, part of SMC's justification for its assumed inhalation rate for the worker is that the worker is assumed to be assigned to only carry-out inspection activities; i.e., the worker is assumed not to be involved in any maintenance activities. It is not clear why it is considered reasonable or appropriate to assume that the worker is not involved in any maintenance activities. In addition, this assumption appears to conflict the assumption used to derive the outdoor time fraction, which is presumably based on the worker carrying out both inspection and maintenance activities.

**Path forward:**

SMC needs to discuss the amount (if any) of maintenance activities that have taken place on the cover at the Cambridge, Ohio facility. The assumed outdoor time fraction for the maintenance worker scenario should be based on an appropriate consideration of the worker conducting both routine inspections and non-routine maintenance activities at the site.

SMC needs to provide an acceptable basis for the assumed inhalation rate for the worker assuming the individual is involved in both inspection and maintenance activities.

**14.** Provide justification for the assumption of very limited excavation into the pile.

**Basis:**

For its scenarios involving the assumption of excavation, SMC assumes very limited excavation into the cover (i.e., only 1 $m^2$) based largely on the assumption that the individual uses some type of unspecified hand-held, manual excavation method (presumably a shovel). However, it is not clear why the person would be restricted to using a hand-held, manual excavation method as oppose to using some type of machine. Thus, the basis for assuming only a 1 $m^2$ breach into the cover is not supported.

Further, SMC maintains that the likelihood of excavation into the cover is very low given the nature of the slag. SMC cites the conclusion reached by the NRC for the Cambridge, Ohio site as its basis for concluding that excavation of slag at the Newfield site is unlikely to occur. However, it should be noted that this was a conclusion reached in a draft environmental impact statement (EIS). Given that this EIS was never finalized, it is uncertain what the staff's final position would have been. Further, SMC provides no discussion on how the pile at Newfield compares with the piles at the Cambridge site in terms of the disposition of material within the pile.

**Path forward:**

Evaluate the potential doses to hypothetical receptors assuming excavation into the pile by more mechanized excavation methods. Describe how the final disposition of material within the pile will compare against the piles at the Cambridge, Ohio site. For example, describe where the soil, baghouse dust, and demolition concrete will be placed within the pile in relationship to the slag. Further, discuss why this placement is expected to minimize future excavation within the pile.