From: John Hayes
To: "Shieldalloy" <>
Date: 11/26/2007 3:50:22 PM
Subject: Response to RAIs
cc: "Shieldalloy_Public_Emails" <Shieldalloy_Public_Emails@nrc.gov>

Attached are pdfs of the response to the RAIs. This is the response to the RAIs themselves without the attachments. Also included is the cover letter and cover sheet.

Hearing Identifier: Shieldalloy_DP_Public
Email Number: 17

Mail Envelope Properties (474AEB45.HQGWDO01.TWGWPO02.100.131646F.1.263.1)

Subject: Response to RAIs
Creation Date: 11/26/2007 3:50:22 PM
From: John Hayes

Created By: JJH@nrc.gov

Recipients
"Shieldalloy_Public_Emails" <Shieldalloy_Public_Emails@nrc.gov>
"Shieldalloy" <>

Post Office	Route
TWGWPO02.HQGWDO01	nrc.gov

Files	Size	Date & Time
MESSAGE	169	11/26/2007 3:50:22 PM
Response.pdf	175835	11/26/2007 3:50:29 PM
Cover.pdf	610923	11/26/2007 3:50:29 PM
Letter.pdf	257245	11/26/2007 3:50:29 PM

Options
Priority: Standard
Reply Requested: No
Return Notification: None
None

Concealed Subject: No
Security: Standard

ENCLOSURE
Shieldalloy Metallurgical Corporation Response to the
USNRC's Request for Additional Information of July 5, 2007

RAI No. 1: (Section 3.6.2) Update the data on surface water flow in the Hudson Branch at and near the site to account for the impact of site decommissioning activities and other changes on this flow. **Path Forward No. 1a:** SMC should update the stream flow inventory of the Hudson Branch, or provide a justification for why an update is not necessary.

SMC Response: The stream flow inventory summarized in Section 3.4.1.3 of Vol. III, Section 19.9 of the DP (Rev. 1, Environmental Report or ER) was conducted at nine (9) locations ranging from upgradient of the site on the Hudson Branch watershed (Hudson Branch), to downstream to the Maurice River. The studies were conducted in October/November of 1993 and April through June of 1995. An update of the stream flow inventory to reflect activities at the site is not necessary because no significant impacts to the overall stream flow regime have occurred since the surface water inventory in the 1993 to 1995 time frame. As a result, the conclusions of that study (i.e., that the Hudson Branch is a minor tributary of the Burnt Mill Branch and, under typical conditions, the discharge from SMC does not reach Burnt Mill Pond and cannot affect conditions in the Maurice River) still hold true.

On-site activities conducted since the 1993/1995 time frame that had the potential to impact surface features at the site and therefore had the potential to impact discharges to the stream included the following:

- The closure of the wastewater treatment lagoons;
- The relocation of the treated groundwater discharge outfall;
- The discontinuation of non-contact cooling water discharges; and
- The demolition of several buildings (most notably Buildings D106 and D102(A)).

The wastewater treatment lagoons did not discharge to the Hudson Branch so their closure did not cause any change in the facility's discharges to the stream. The little stormwater drainage from the now-closed and vegetated lagoon area discharges to an on-site detention basin, with discharge volumes from the basin controlled under the facility's NJDPES permit. Given the permit limitations, the control provided by the H-flume located at the detention basin discharge point, and the storage offered by the detention basin, impacts on the stream flow would be minimal if any.

The relocation of the treated groundwater discharge outfall resulted in the relocation of the discharge point. The previous outfall location coincided with the Newfield Borough

stormwater outfall, as indicated on Figure 1-4 of the ER. The new outfall location (Outfall DSN 004-A) is indicated on Figures 1-2 and 1-4 of the ER. While changes in the flow within the small section of the stream between these two points may have resulted from the relocation, all of the flow measurement points characterized in the 1993/1995 time frame, with the exception of one (located in the area between these two points), were either located upgradient or downgradient of this area and the measurements taken in 1993/1995 would thus not be impacted by the relocation process. In any event, no significant impacts on the surface water inventory would have resulted from the relocation of the groundwater discharge outfall.

The discontinuation of non-contact cooling water discharges would have had no impact on discharges from the site as the volume of cooling water discharges dropped significantly when recirculation cooling systems were installed in the early 1990s. Again, this took place prior to the aforementioned stream inventory. After installation, discharges of cooling water were minimal, so discontinuation of these discharges would not impact the stream inventory significantly.

Finally, the demolition of several on-site buildings would have had minimal impact on stormwater discharges from the site as the buildings were of minimal size and, in the case of at least one building (D106), the demolition area was subsequently covered with asphalt pavement. Therefore, the demolition of these buildings would have no impact on runoff volumes.

Action to be Taken: Justification for the continued validity of the existing stream flow inventory, as outlined above, will be incorporated at the end of the stream inventory discussion in Section 3.4.1.3 of the ER (as referenced in Section 3.6.2 of the DP). Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

Path Forward No. 1b: SMC should tabulate the most recent surface water withdrawals that have occurred since the 1990 to 1999 values listed in Figure 3-1 3 of the ER and summarized on page 3-26 of the ER.

SMC Response: With respect to the surface water withdrawals presented in Figure 3-13 of the ER and summarized on page 3-26 of the ER, the referenced information represents regional information for the Maurice, Salem and Cohansey Rivers watershed management area, an area that covers 885 square miles. That information is the most current information available from the State of New Jersey Geological Survey (see the following web site: http://www.state.nj.us/dep/njgs/geodata/dgs04-9.htm). Even if more recent information were available, it would have little impact on the site-specific evaluation. SMC is not aware of any surface water withdrawals from the Hudson Branch within the immediate vicinity of the Newfield facility. As stated in the ER, Newfield and Vineland obtain public potable water strictly from groundwater sources.

Action to be Taken: The following sentence will be added to Section 3.4.19 of the ER, following the 6th sentence: "The information presented in Figure 3-13 is the most currently available information for the Maurice, Salem and Cohansey Rivers watershed management area." The second sentence of this section will be revised to reflect that the WMA "covers 885 square miles in the southwest corner of the state, including the Newfield area." Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 2: (Section 3.7.2) Update the data in Table 3-4 of the ER, on the existing monitoring wells (both onsite and offsite) for the SMC site.
Path Forward No. 2a: SMC should provide the updated well statistics mentioned above for the wells listed in Table 3-4 of the ER. SMC should also indicate which existing figure(s) displays all of these wells or provide a new figure that shows all wells.

SMC Response: The requested information is being provided.

Action to be Taken: The information in Table 3-4 of Vol. III, Section 19.9 of the DP (Rev. 1), "Environmental Report" (ER) has been updated as follows:

- Location - Table 3-4 has been revised to include a column indicating where the location of each monitoring well or extraction well listed in the table can be found. Figure 3-14 of the ER has been modified to indicate the locations of all existing monitoring and extraction wells, as summarized in Table 3-4, with the exception of one: monitoring well SC-32D was installed in December 2006 at a location approximately 3,000 feet southwest of the Storage Yard, along West Forest Grove Road, well beyond the limits of the area depicted in modified Figure 3-14. This well was added as part of on-going CERCLA investigations and was included in the July 2007 radiological groundwater sampling event. Its location is indicated in newly created Figure 3-14A, along with the locations of the two Newfield public water supply wells that have been sampled by SMC for radiological parameters. Table 3-4 and Figure 3-14 also have been revised to include four additional historic wells (W-2, W-3S, SC-11S and SC-13S) where groundwater samples were collected for radiological analysis (see Attachment 1).

- Ownership - All existing wells listed in Table 3-4 are owned by SMC with the exception of well OBS-2A which, as noted in the table, is a USGS observation well. This is documented in a note at the bottom of Table 3-4.

- Well status - All wells listed as existing wells in Table 3-4 are "active" (i.e., not damaged or abandoned). Wells listed as historic wells (i.e., wells W2, W3S, SC-11S and SC-13S) have been damaged or abandoned, and with the exception of wells W3S and SC-13S, have been replaced by new wells W2(R) and SC-11S(R).

- Hydro stratigraphic unit screened - All wells are screened in the Cohansey Sand. As discussed in Section 3.4.2.3 of the ER, because of differences in transmissivities

between the coarse sands of the upper Cohansey Sand and the finer sand and silt of the lower Cohansey Sand, historically the groundwater data for the shallow wells have been evaluated separately from the data for the deeper wells. Therefore, the wells characterized as upper Cohansey Sand wells are listed separately from those characterized as lower Cohansey Sand wells in Table 3-4.

- Well type - All wells listed in Table 3-4 are either monitoring wells or extraction wells used in the ongoing CERCLA groundwater treatment operations at the site, as noted in the revised table. The construction details for the extraction wells, which were inadvertently omitted from the original table, have been added to the revised table.

The revised Table 3-4 is provided in Attachment 1, along with revised Figure 3-14 and newly created Figure 3-14A, which together provide the locations of all wells listed on Table 3-4. The revised table and figures will be incorporated into the ER, to which Section 3.7.2 of the DP, Rev. 1 already refers. As all monitoring and extraction wells in the immediate vicinity of the SMC facility will now be depicted on Figure 3-14, the sentences in Section 3.4.2.3 of the ER and in Section 3.7.2 of the DP, Rev. 1 that describes Figures F-3 and F-4 as providing additional well locations will be deleted or revised. Available information on the depths of the Newfield Borough potable water supply wells, which are not monitoring wells but are wells that have been sampled for radiological analyses in association with SMC ground water monitoring activities, is provided in Table F-1 of Appendix F to the ER. Both of these wells are screened in the lower Cohansey Sand. The locations of the Newfield Borough potable water supply wells (Newfield Well #3 and Newfield Well #5) are also included on newly created Figure 3-14A of the ER. Additional information regarding those wells that have been used specifically for radiological monitoring is provided in the response to RAI No. 4. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 3: (Section 3.7.7) SMC should provide the input data, other pertinent model procedures, and model results for the groundwater flow and transport modeling performed using the MODFLOW-SURFACT model referenced in Appendix D of the DP (Rev. 1a).
Path Forward No. 3a: The model results should include the calibration model run and the simulation scenario run in which the engineered barrier for the slag pile fails, radionuclides leach from the slag pile into the groundwater, and a well about 100 feet down gradient of the Storage Yard provides groundwater for a residential use. SMC should provide electronic versions (CD or DVD) of the input data, model procedures, and aforementioned model results of its groundwater flow and transport modeling using the MODFLOW-SURFACT model.

SMC Response: The design of the engineered barrier has been fine tuned to incorporate erosion control and infiltration control features. As a result, the evaluation of groundwater quality and associated radiation dose potential does not require the use of a more site-specific model (i.e., the MODFLOW-SURFACT model referenced in Appendix D of Rev. 1a of the DP).

Action to be Taken: Rev. 1b of the DP, when submitted to the USNRC by May 16, 2008, will contain no references to the MODFLOW-SURFACT model. In order to facilitate the Staff's review of the DP, the simplified groundwater model in the RESRAD computer code will be used for evaluation of groundwater quality.

RAI No. 4: (Section 3.7.8) SMC should provide the existing radiological data for the SMC site from the 1990's to the present for all onsite, and offsite groundwater, surface water, and stream sediment monitoring sites.

Path Forward No. 4a: Provide a tabular summary of all groundwater, surface water, and stream sediment investigations conducted at the site. SMC should provide all existing radiological data for this site from the 1990's to the present for all upgradient (including background), onsite, and downgradient groundwater, surface water, and stream sediment monitoring sites. Provide those data not previously transmitted to the NRC for radiological characterization.

SMC Response: A summary of all environmental investigations conducted at the SMC site, including those that focused on radiological parameters, is presented in Table RAI 4 in Attachment 2.

All existing radiological groundwater data from the 1990s to the present, with the exception of data that were newly collected in July 2007 and the results of a 1995 sampling round, were presented in the DP. The data provided also include the groundwater summary tables for quarterly groundwater data collected from December 1988 through September 1989, as reported by Dan Raviv in 1990 and presented in the DP, Rev. 1, Appendix 19.2 (Table VII, "Summary of Analytical Results - Radiological Parameters, Quarterly Sampling of "Slag Area" Wells").

In 1995, as part of routine sample collection, groundwater samples were analyzed for the presence of radiological constituents. Attachment 3 contains a summary of those data.

The next radiological groundwater data were collected in 2004 by TRC, with the data presented in Table F-4 of Appendix F of the ER (DP Rev. 1, Section 19.9, Appendix F). Additional radiological groundwater data were collected in 2005, as reported by IEM in a June 9, 2005 letter report, also included in Appendix F of the ER. Additional groundwater samples were collected for radiological analyses in July 2007. The analytical reports from that campaign are provided in Attachment 4. Split samples were collected at the same time by the NJDEP and the USNRC, the results of which have not yet been provided to SMC.

A new table, Table RAI 4A, that summarizes the radiological analyses listed above is provided in Attachment 2.

Soil, sediment and surface water data were collected during a 1991 study conducted by ENSR, a former environmental contractor to SMC. Uranium-238, Thorium-232 and Radium-226 concentrations in soil, sediment and surface water samples are presented in

Appendix B of the ER (DP Rev. 1, Section 19.9, Appendix B). Attachment 5 contains a listing of the results.

Action to be Taken: Section 3.7.8 of the DP will be revised to include a summary of all environmental investigations conducted at the site as shown in Table RAI 4A (see Attachment 2).

The results of the 1995 and 2007 radiological groundwater analyses will be incorporated into Appendix F of the ER.

The text of Section 3.7.8 of the DP will be modified to include the following: "Radiologic groundwater data collected since December 1988 are summarized in Table RAI 4A and can be found in Appendix 19.2 (Table VII, "Summary of Analytical Results - Radiological Parameters, Quarterly Sampling of "Slag Area" Wells") and in Appendix F of the ER (September 8, 1995 letter report, Table F-4 (containing April 2004 data), June 9, 2005 letter report, and August 29, 2007 Outreach Laboratory report of July 2007 sampling)."

Section 3.4.2.5 of the ER will be modified to include a summary of the analytical results reported by SMC, the New Jersey Department of Environmental Protection (NJDEP) and the USNRC from the 2007 campaign.

Radiological constituents in sediment and surface water will be summarized in the Source Term document being prepared in response to RAI No. 7, 8 and 17 and the Technical Basis Document being prepared in response to RAI No. 9.

Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

Path Forward No. 4b: SMC should provide an updated figure delineating the location of all groundwater, surface water, and stream sediment monitoring sites from the 1990s to the present. The figure should include background, upgradient, onsite, and downgradient sampling locations.

SMC Response: All radiological groundwater monitoring sites from late 1988 to the present, including Newfield public water supply wells 3 and 5, are indicated in new Figures RAI 4 or 3-14A (see Attachment 1). All CERCLA groundwater monitoring locations in the immediate vicinity of the Newfield site are indicated in revised Figures 3-14 and 3-14A (see response to RAI 2). The Newfield wells, the USGS observation well located to the northeast of the SMC facility, well SC-25S, well SC-14S and well W3S are representative of upgradient/background water quality. Wells to the southwest of the Storage Yard are downgradient wells. The locations of surface water and stream sediment samples collected by ENSR in 1991 are shown in Appendix B of the ER and will be shown in the Technical Basis Document being prepared in response to RAI No. 9.

Action to be Taken: New Figures RAI 4 and 3-14A, as shown in Attachment 1, will be incorporated into the DP and Section 3.7.8 of the DP will be modified to include the following text: "Radiologic groundwater sampling locations are indicated in Figure RAI 4 and in Figure 3-14A in the ER. As groundwater flows from northeast to southwest, the Newfield wells, the USGS observation well located to the northeast of the SMC facility, well SC-25S, well SC-14S and well W3S are representative of upgradient/background water quality. The wells located to the west and southwest of the Storage Yard are downgradient sampling locations." The locations of all surface water and sediment samples will be shown in the Technical Basis Document being prepared in response to RAI No. 9. In addition, a modified Figure 3-14, as shown in Attachment 1, will be provided for incorporation into the ER, as previously described in SMC's response to RAI No. 2. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

Path Forward No. 4c: If the existing data for these parameters are not adequate for characterization, then SMC should develop additional upgradient, onsite, and downgradient groundwater monitoring sites to collect the radiological data.

SMC Response: The existing data are adequate for characterization of radiological impacts on groundwater quality. The data span a period of over twenty years and therefore would indicate changes in groundwater quality during that period. The data represent wells screened in the upper and lower Cohansey Sands, and therefore provide information on potential impacts throughout the underlying aquifer. The data represent both background/upgradient well locations and downgradient well locations. All of the currently existing wells closest to the Storage Yard for which radiological analyses have been performed, have been sampled multiple times, with isotope-specific results provided.

Action to be Taken: None required.

Path Forward No. 4d: SMC should list its sampling and analytical procedures, minimum detectable concentrations, and uncertainty for all radiological analyses performed on the above requested water and sediment samples.

SMC Response: For the 1988-1989 radiological analyses of groundwater samples conducted by Dan Raviv, the report in which the data summary tables were provided did not specifically describe sampling procedures. Other Dan Raviv groundwater sampling reports from the same period indicate that groundwater samples were collected in accordance with Dan Raviv sampling protocols, which were based on NJDEP requirements. Samples were analyzed for gross alpha and gross beta, with isotopic analyses (specific analyses varied with the sampling date) performed if gross alpha or beta exceeded specific screening criteria. The summary tables presented in the DP, Rev. 1, Appendix 19.2 (Table VII, "Summary of Analytical Results - Radiological Parameters, Quarterly Sampling of 'Slag Area' Wells") provide detection limits for those samples where relevant isotopes were not detected, along with the analytical uncertainty.

For the 1995 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC in accordance with CERCLA groundwater sampling procedures. The samples were analyzed by gamma spectroscopy with the concentration of all positively identified radionuclides reported. (If not positively identified, the detection limits for Ac-228, Bi-214, K-40, Pb-212, Pb-214 and Tl-208 were reported). A September 8, 1995 letter summarizing the results, with the laboratory report attached, is included herein as Attachment 3 and will be incorporated within Appendix F of the ER.

For the April 2004 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC followed CERCLA groundwater sampling procedures. Gross alpha, gross beta, Radium 226 and Radium 228 analyses were performed on filtered and unfiltered samples. Summary table F-4 within Appendix F of the ER (DP Rev. 1) presents detection limits for those samples where radioisotopes were not detected (indicated by a "U" qualifier) and the uncertainties associated with the analyses. The data package is provided in Attachment 6 to this document and will be incorporated into Appendix F of the ER.

For the April 2005 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC following CERCLA groundwater sampling procedures. Isotopic analyses (Ra-226, Ra-228, Th-232, Th-230, Th-228, U-238, U-235 and U-234) were performed on filtered and unfiltered samples. The summary tables within the June 9, 2005 letter report presented in Appendix F of the ER (DP Rev. 1) present detection limits for those samples where radioisotopes were not detected. The data package is provided in Attachment 7 to this document and will be incorporated into Appendix F of the ER.

For the July 2007 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC following CERCLA groundwater sampling procedures. Gross alpha, gross beta and isotopic analyses (isotopic Uranium, isotopic Thorium, K-40, Ra-226 and Ra-228) were performed on filtered and unfiltered samples. The laboratory data packages presented as Attachment 4 to this document present detection limits and uncertainties associated with the analyses. This data was provided to Region I NRC on October 30, 2007. The laboratory data packages will be incorporated into Appendix F of the ER

Action to be Taken: Section 3.7.8 of the DP will be revised to read as follows: "For the radiological analyses of groundwater samples conducted by Dan Raviv in 1988-1989, the report in which the data summary tables were provided did not specifically describe sampling procedures. Other Dan Raviv groundwater sampling reports from the same period indicate that groundwater samples were collected in accordance with Dan Raviv sampling protocols, which were based on NJDEP requirements. Samples were analyzed for gross alpha and gross beta, with isotopic analyses (specific analyses varied with the sampling date) performed if gross alpha or beta exceeded specific limits. The summary tables presented in the Appendix 19.2 (Table VII, "Summary of Analytical Results - Radiological Parameters, Quarterly Sampling of "Slag Area" Wells") provide detection limits for those samples where radioisotopes were not detected and the uncertainties associated with the analyses.

For the 1995 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC in accordance with CERCLA groundwater sampling procedures. The samples were analyzed by gamma spectroscopy with the concentration of all positively identified radionuclides reports (if not positively identified, the detection limits for Ac-228, Bi-214, K-40, Pb-212, Pb-214 and Tl-208 were reported). A September 8, 1995 letter summarizing the results, with the laboratory report attached, is included within Appendix F of the ER.

For the April 2004 groundwater sampling and radiological analyses, groundwater samples were collected by TRC following CERCLA groundwater sampling procedures. Gross alpha, gross beta, Ra- 226 and Ra -228 analyses were performed on filtered and unfiltered samples. Summary table F-4 within Appendix F of the ER (Appendix 19.9 of the DP) presents detection limits for those samples where radioisotopes were not detected (indicated by a "U" qualifier) and the uncertainties associated with the analyses. The laboratory report is also included in Appendix F of the ER.

For the April 2005 groundwater sampling and radiological analyses, groundwater samples were collected by TRC following CERCLA groundwater sampling procedures. Isotopic analyses (Ra-226, Ra-228, Th-232, Th-230, Th-228, U-238, U-235 and U-234) were performed on filtered and unfiltered samples. The summary tables within the June 9, 2005 letter report presented in Appendix F of the ER (Appendix 19.9 of the DP) present detection limits for those samples where radioisotopes were not detected. The laboratory report is also included in Appendix F of the ER.

For the July 2007 groundwater sampling and radiological analyses, the groundwater samples were collected by TRC following CERCLA groundwater sampling procedures. Gross alpha, gross beta and isotopic analyses (isotopic Uranium, isotopic Thorium, K-40, Ra-226 and Ra-228) were performed on filtered and unfiltered samples. The laboratory data package presented in Appendix F of the ER (Appendix 19.9 of the DP) presents detection limits and uncertainties associated with the analyses."

Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

Path Forward No. 4e: SMC should summarize how the measured characterization data support the volume estimates of radioactive materials accumulated in the Storage Yard and in other areas (such as the TI2 Tank and the sediments in the Hudson Branch), and the estimated labor and waste disposal volumes required for the proposed action.

SMC Response: The requested information is provided in SMC's Response to RAI No. 7, 8, 9, 10 and 17.

Action to be Taken: None required.

RAI No. 5: (Section 3.7.8) An evaluation of potential leachate (radionuclides and other inorganic materials) movement from the consolidated radioactive materials (slag and baghouse dust) to the saturated zone (Upper Cohansey sands) needs to be provided for current and future conditions.
Path Forward No. 5a: SMC should perform an evaluation of current and potential leachate generated from the consolidated radioactive materials. This evaluation should include the current and potential leachate transport through the vadose zone into the saturated zone with site developed/estimated hydraulic conductivities (K) and distribution coefficients (Kd). The evaluation of current and potential leachate generated by the proposed action should consider all types of accumulated materials including the various types of slag, baghouse dust, building rubble, and soil.

SMC Response: Three zones are described for the purposes of the radiation dose modeling, as explained in Chapter 5 of the DP, namely the contaminated zone, the unsaturated or vadose zone and the saturated zone. The contaminated zone comprises the slag, baghouse dust and impacted soil present in the Storage Yard (also referred to as the restricted area) as well as the surface soil outside the restricted area that has been evaluated and/or remediated to levels of uranium and thorium below the derived concentration guideline levels. The unsaturated and saturated zones exist beneath the contaminated zone. Water percolating through the surface soil and slag moves through the unsaturated zone before combining with the groundwater in the saturated zone.

For the contaminated zone confined by the engineered barrier, SMC will use measured values of Kd. In regard to leachate movement potential through the subsoil beneath the contaminated area, SMC will follow the guidance provided by the USNRC in NUREG-1757, Volume 2, Appendix I.6.4.4. In that document, the USNRC recommends that Kd values be selected for input to the RESRAD computer code by using: (a) literature values, (b) default distributions present in the DandD code; or (c) default distributions present in the RESRAD computer code. In NUREG-1757, the USNRC states that "no single set of ancillary parameters such as pH or soil texture, is universally appropriate for all cases for determining the appropriate Kd values" and recommends the use of a range of Kd values selected from a listing of literature sources. It goes on to state: "For those isotopes where the Kd does not have a significant impact on the dose assessment, the median value within the range is an acceptable input parameter." Based on this guidance, the range of the values given in the literature would be appropriate distributions to use in sensitivity analysis of the Kd parameters.

SMC's selected approach to evaluating potential leaching is analogous to that used during the performance assessment of the Salt Waste Disposal facility at the USDOE Savannah River site in South Carolina, a project that was offered to SMC by USNRC staff as a "template" for Kd selection during an August 29, 2007 teleconference. The Savannah River project used USNRC guidance (NUREG-5512) and literature values (Sheppard and Thibault) to establish a range of Kds for each element. The sources relied upon at Savannah River represent the state of industry knowledge of the movement of elements in subsurface soils. Furthermore, the range of Kd values that were used by the USDOE for dose modeling was selected from the same literature sources cited in NUREG-1757. Therefore, they are

deemed acceptable for use as Kd input to the dose modeling for the Newfield site as it pertains to subsurface soils. As discussed during the October 4, 2007 teleconference with the USNRC, experimentally-determined Kd values for the release rate of radioactivity from the stockpiled materials are more applicable than the aforementioned literature values.

Action to be Taken: For the dose modeling and sensitivity analyses presented in Chapter 5 of the DP, SMC will follow the guidance of NUREG-1757 and select Kd values for subsurface soil from the literature listing given therein, and experimentally-determined values for SMC slag for the release rate from the stockpiled materials. The following table, which gives the values that will be used for the subsurface Cohansey sand (unsaturated and saturated layers) and the stockpiled materials (i.e., SMC slag), will be incorporated in the revised dose modeling for Rev. 1b of the DP, to be provided to the USNRC by May 16, 2008:

Partition Coefficients for Dose Modeling and Sensitivity Analysis
(Kd) (cm^3/gram)

Element	Sheppard and Thibault, 1990 Sand	Kennedy and Strenge, 1992 Sand	RESRAD Default, 2001	SMC Slag (Stockpiled Materials)
Actinium	450	420	20	2,400[a]
Protactinium	550	510	50	2,700[a]
Lead	270	270	100	100[c]
Radium	500	500	70	53[d]
Thorium	3,200	3,200	60,000	52,010[d]
Uranium	35	15	50	70,355[d]

a. Sheppard and Thibault, *Default Soil Solid/Liquid Partition Coefficients, K_dS, for Four Major Soil Types: A Compendium*, Health Physics Journal, Volume 59, Number 4, October 1990.
b. Kennedy and Strenge, *Residual Radioactive Contamination from Decommissioning*, NUREG/CR-5512, Volume 1, October, 1992.
c. Yu, Zielen, Cheng, et al, *User's Manual for RESRAD Version 6*, ANL/EAD-4, July, 2001
d. Outreach Laboratory, Report Number 20050135, March 25, 2005.

RAI No. 6: (Section 5.2.2.2.1) SMC should indicate the volume and type of soil that will be used in the engineered barrier that will overlie the consolidated radionuclide- bearing materials in the Storage Yard.
Path Forward No. 6a: SMC should identify the volume and type of soil that will be used in the engineered barrier and its appropriate soil parameters that impact runoff and evapotranspiration from the cap.

SMC Response: The requested information is being provided.

Action to be Taken: As discussed with the USNRC during recent teleconferences, the engineered barrier design has been "fine tuned" to incorporate both erosion control and infiltration control features. The volumes and types of material to be incorporated in the barrier are being finalized and will be presented in Section 8.3 (and associated appendices)

of Rev. 1b of the DP, to be provided to the USNRC by May 16, 2008. An evaluation of runoff and evapotranspiration from the engineered barrier will be included in the submission.

RAI No. 7: (Section 4.4) Provide bases for the radionuclide concentrations for materials to be consolidated into the restricted area cell.
Path Forward No. 7a: Provide a detailed discussion of the development of the radionuclide concentrations used for the derived source term of the materials proposed for consolidation in the restricted area cell. Supporting measurement data should be provided.

SMC Response: A detailed discussion of the materials to be consolidated under the engineered barrier is presented in Chapter 4 of the Decommissioning Plan. The capped materials are comprised of slag, baghouse dust, soil and demolition rubble collected over time from a variety of locations at the Newfield facility and maintained separately from each other. The volumes of each of the material types were described in Table 17.1 of the DP. However, as part of SMC's response to this set of RAIs, additional characterization data will be acquired which will provide additional technical basis for the source term in the planned restricted area (see RAI No. 8 and 17).

Action to be Taken: A source term document will be prepared that describes the volumes of material and the "upper confidence level" (UCL) radionuclide concentrations. It will also contain a description of the data sets used to develop volumes and concentrations and present the data points used in the UCL calculation will also be provided. The technical bases for the concentration estimates will include data acquired to date as well as data to be acquired during a sampling campaign to be conducted in December, 2007.

The source term document will be included as an appendix to the DP. In addition, Figure 18.3 and Table 17.1 in the DP will be modified to reflect an updated description of stockpiled material in the various areas. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 8: (Section 4.4 and Table 17.1) Provide bases for the volumes of materials proposed for consolidation into the restricted area cell.
Path Forward No. 8a: Provide a detailed discussion of the volume estimates developed for the materials proposed for consolidation in the restricted area cell. Supporting measurement data should be provided, as appropriate.

SMC Response: The volume estimates for the consolidated materials were presented in Table 17.1 of the DP (Rev. 1) and in Table 1-1 of the ER. These were CAD-generated volumes estimated by a visual areal delineation of the different types of materials in the Storage Yard (as indicated in Figure 18.3 of Rev. 1 of the DP) and a comparison of Storage Yard topographic contours, as measured in 2005, to estimate natural base contours for the area (based on an extension of surrounding contours across and beneath the Storage Yard area). CAD-generated volumes for each of the delineated areas were rounded up to the nearest 1,000 cubic yards. Additional detail on how the volumes were estimated was

provided in SMC's April 24, 2007 response to the USNRC staff request for additional information (response to RAI No. 2b, Table 2 footnote).

Action to be Taken: A source term document will be prepared that describes the volumes of material, the "upper confidence level" radionuclide concentrations and the data sets used to summarize the contents of the consolidated material under the engineered barrier. Where CAD-generated volumes are used, the basis for their calculation will be described. The source term document will be included as an appendix to the DP. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 9: (Chapters 4 and 5) Provide a complete discussion about radiological contamination in the Hudson Branch, and how the radiological criteria are or will be met.
Path Forward No. 9a: If the licensee intends no remediation in the Hudson Branch, then SMC should provide a detailed discussion of the residual radioactivity in the Hudson Branch and the basis for concluding that the existing conditions are within the radiological criteria for unrestricted use (i.e., 25 millirem per year and ALARA). Supporting measurement data should be provided.

SMC Response: Data from the Hudson Branch watershed, both exposure rate information and sediment sampling results, have been retrieved from work performed in 1991. The data set is comprised of 35 sediment sampling results, 73 grid point exposure rate measurements, and 79 ambient (one-meter height) exposure rate measurements, which SMC believes to be sufficient to characterize the radiological status of this area. However, in order to fully respond to this RAI, a verification sampling and measurement program will be implemented.

Action to be Taken: A verification sampling/measurement program for the Hudson Branch is scheduled to begin on December 3, 2007. Attachment 8 contains the work plan for this effort. Once the analytical results are received/validated, a non-parametric statistical test will be performed to determine whether there is any significant difference between the verification samples/measurements and those acquired in 1991. If there is no significant difference between the two data sets, their results will be combined, and compared to the unrestricted release criteria Derived Concentration Guideline Levels (DCGLs) to determine if remedial actions are needed. The DP will be modified to include any remedial actions and provide the classification of this area for the final status survey. (If the difference between the two data sets is significant, the basis for the difference will be investigated. Based on the conclusions of the investigation, the more reliable data will be used in the comparison with the unrestricted release DCGLs, for determining the need for remedial actions and to classify the Hudson Branch for Final Status Survey). Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

Path Forward No. 9b: If the licensee intends to perform radiological remediation in the Hudson Branch, then SMC should describe the planned remediation, and should demonstrate that the remediation will achieve the radiological criteria for unrestricted use (i.e., 25 millirem per year and ALARA). Supporting measurement data should be provided.

SMC Response: See Action to be Taken in response to RAI No. 9a.

Action to be Taken: If the characterization data demonstrate that remediation of the Hudson Branch watershed is necessary, the DP will be modified to describe the planned remedial actions and demonstrate that the remediation will meet the applicable release criteria. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 10: (Section 4.5) Describe the remedial characterization data that will be needed to evaluate residual radioactivity in soils that have not been identified or sufficiently characterized.
Path Forward No. 10a: SMC should identify additional locations where residual radioactivity exists and evaluate the data needed for those areas (including the two areas already identified) to determine if they meet the dose criteria for unrestricted use or if remediation would be necessary. In addition, the licensee should describe the locations of the southwest fence line and the TI 2 Tank Area, including the use of figures or maps, as appropriate.

SMC Response: The reference to the T12 Tank Area in Rev. 1a of the DP was in error. The T12 Tank Area was located in the vicinity of the former lagoons which were remediated in 1998 (see Section 2.3.7 of the DP). During that effort, the excavated materials, including the T12 Tank Area, were staged for release and sampled for radionuclide content (see Attachment 4k2 in the Supplement to the DP). In addition, surveys and sampling were performed within the excavated area. The analytical results demonstrated that the materials and the excavated area could be released for unrestricted use (see Quarter 3, 1998 surveillance report, Appendix I).

In regard to the southwest fence line, the 1991 radiological characterization effort showed ambient gamma exposure rates at a height of one (1) meter above the ground that ranged from 7.7 to 28.1 microR per hour, including background, from the southwest corner of the fence to a point approximately 110 meters to the east.[1] A fence line exposure rate survey performed during the same characterization effort revealed exposure rates ranging from 5.7 to 24.6 microR per hour, including background, in the same location.[2] Soil samples collected within the area exhibited uranium, thorium and radium concentrations that ranged from background to 8.9, 10.8 and 47 picocuries per gram, respectively.[3] As of the date of Rev. 1a of the DP, it had never been established whether the source of these elevated exposure rates was due to the presence of licensed materials.

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[1] IT Corporation, "Assessment of Environmental Radiological Conditions at the Newfield Facility", Report No. IT/NS-92-106, April 2, 1992, Appendix G1, Grid Locations A0 through A11 and Map 1.

[2] IT Corporation, "Assessment of Environmental Radiological Conditions at the Newfield Facility", Report No. IT/NS-92-106, April 2, 1992, Appendix I, Grid Locations A0 through A11 and Map 2.

[3] IT Corporation, "Assessment of Environmental Radiological Conditions at the Newfield Facility", Report No. IT/NS-92-106, April 2, 1992, Appendix K, Grid Locations 1a0 through 1a11, A0 through A11, B0 through B11 and Maps 6, 7 and 8.

Other than information from the Hudson Branch watershed, there was no evidence of residual radioactivity of significance outside of the named restricted areas. Furthermore, SMC is unaware of any locations on the property where slag may have been buried. Issues associated with the Hudson Branch are addressed in the response to RAI No. 9.

Action to be Taken: Section 4.5 and Table 17.1 of the DP will be modified to remove references to the T12 Tank Area. The description of the lagoon remediation effort in Section 2.3.7 of the DP will be modified to include the following : "The T12 Tank Area, referenced in Section 2.2 of this DP, was removed concurrent with the lagoon remediation. As part of the remedial effort, the excavated materials and the remediated area were surveyed/sampled for residual radioactivity prior to release." A footnote with the reference for the measurement results (i.e., Integrated Environmental Management, Inc., Report No. 94005/G-5169, "Report of Radiation Safety Surveillance for Quarter 3, 1998", September 8, 1999, Appendix I) will be included. In addition, Footnote 65 will be modified to read as follows: "Remediation was performed and the areas surveyed. However, the radiological status will be re-confirmed during the performance of the site-wide final status survey (see Chapter 14)."

To address the southwest fenceline issue, a verification sampling/measurement program is scheduled to begin on December 3, 2007. Attachment 8 contains the work plan for this effort. Once the analytical results are received/validated, and if the source of the elevated exposure rates is attributable to licensed material, the need for remediation will be evaluated based on comparison with the unrestricted release DCGLs and the area will be classified for Final Status Survey. Based upon the results, the DP will be modified to include the basis for classifying the southwest fence line for Final Status Survey and the remedial actions that will be performed.

The second and third paragraphs in Section 4.5 of the DP will be combined to read as follows: "During walkover surveys performed in 1991, slightly elevated count rates (i.e., background to a few tens of microR per hour) were noted on the southwest fence line of the property.[4] This area was never designated a "Restricted Area". There are some 1991 analytical results from this area, but the lateral and depth extents were not well-characterized. Furthermore, the type of material contributing to the elevated exposure rates was not confirmed, and there is no historical evidence of licensable radioactivity in this area."

Section 14.1 of the DP will be modified to include the approach and results of the pending verification sampling/measurement program for the southwest fenceline. Section 4.5 of the DP will be modified as well to include the radiological characteristics of the area. If the findings from the verification sampling/measurement program demonstrate licensable radioactivity above the applicable DCGLs for this portion of the property, Section 8.3 of the

[4] IT Corporation, "Assessment of Environmental Radiological Conditions at the Newfield Facility", IT Corporation Report No. IT/NS-92-106, April 1, 1992.

DP will be revised to include provisions for remediating the area and 14.2 will be modified to include provisions for final status survey of the area.

Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 11: (Section 5) Provide additional input for the responses to the Environmental RAIs (Numbers 7 through 14) that were submitted on March 19, 2007.
Path Forward No. 11a: Provide complete responses to each of the questions that NRC staff transmitted on March 19, 2007.

SMC Response: The requested information is being provided.

Action to be Taken: Additional input to the dose analysis will be provided in revised Chapter 5 of the DP. In addition, all other commitments made in SMC's response to No. 7 through 4 of the March 19, 2007 RAI will be addressed as well in. Rev. 1b of the DP wil be provided to the USNRC by May 16, 2008.

RAI No. 12: (Section 5) Identify the category for each type of scenario analyzed.
Path Forward No. 12a: Clearly identify each scenario analyzed according to the terminology provided in Table 5.1 of NUREG-1 757, Vol. 2.

SMC Response: NUREG-1757, Volume 2, published in 2006, lists the types of exposure scenarios that should be evaluated as part of the dose assessment process. The following table lists those that will be addressed in Chapter 5 of the DP for the Newfield site:

Scenario	Location	Controls	Type of Scenario	Evaluation Purpose	Comments
Industrial Worker	Unrestricted Area	Not relevant	Reasonably foreseeable	Demonstrate compliance with the criteria of the License Termination Rule (LTR)	The DCGL for surface soils in the unrestricted area is based on this exposure scenario.
Occasional Trespasser	Unrestricted Area	Not relevant	Less likely but plausible	Not analyzed for compliance but used for risk-informed decisions.	The Newfield site will be occupied such that access by trespassers will be prohibited.
Maintenance Worker	Restricted Area	In Place	Reasonably foreseeable	Demonstrate compliance with the criteria of the LTR.	The maintenance worker performs periodic inspections and minor maintenance on the engineered barrier. The thickness of the barrier is intended to reduce external radiation exposure to the maintenance worker.

Scenario	Location	Controls	Type of Scenario	Evaluation Purpose	Comments
Recreational Hunter	Restricted Area	Fail	Less likely but plausible	Not analyzed for compliance but used for risk-informed decisions.	The Storage Yard will be fenced and it is not likely that the Storage Yard will provide an attractive habitat to hunted animals, even in the event that controls fail.
Trespasser	Restricted Area	Fail	Less likely but plausible	Demonstrate compliance with the criteria of the LTR.	The suburban resident may build a house in the unrestricted area after the industrial operation is terminated (although CERCLA-based institutional land use controls may restrict residential use). The resident is potentially exposed to radiation and radioactive materials originating from the Storage Yard.
Industrial Worker	Restricted Area	Fail	Less likely but plausible	Not analyzed for compliance but used to make risk-informed decisions.	It is assumed that the industrial worker works in the unrestricted area. In the event the controls fail, the industrial worker may have greater access to the Storage Yard.
Excavator	Restricted Area	Fail	Less likely but plausible	Not analyzed for compliance but used to make risk-informed decisions.	The effort to remove the slag from the Storage Yard is intensive and is assumed to be unsuccessful. The scenario assumes that the individual incurring exposures is the one who attempts the excavation.
Suburban Resident (Cover Excavated)	Restricted Area	Fail	Less likely but plausible	Not analyzed for compliance but used to make risk-informed decisions.	An excavation in the restricted area occurs after the controls fail. However, this scenario assumes a house is built (and occupied) in the unrestricted area, adjacent to the Storage Yard.
Recreational Hunter (Cover Excavated)	Restricted Area	Fail	Less likely but plausible	Not analyzed for compliance but used to make risk-informed decisions.	It is assumed that animals gain access to the property after the cover is excavated. The hunter is assumed to enter the property and encounter the open excavation.

Action to be Taken: Chapter 5 of the DP, to be submitted to the USNRC by May 16, 2008, will be revised to include the aforementioned table.

RAI No. 13: (Section 5.3) Provide additional support for assumptions made regarding the receptor location.

Path Forward No. 13a: Provide a map that identifies the location of the CERCLA well restriction area. Provide a map that identifies the location of the nearest residence relative to the SMC site, and correct the DP, as appropriate. Justify the assumed location of the residence and industrial worker in relation to the proposed engineered barrier, in light of potential uses of the site, failure of access controls to the restricted area, and given current surrounding land-use trends. Alternatively, re-evaluate the potential doses for these scenarios considering a closer location relative to the proposed engineered barrier, including one within the restricted area when controls fail.

SMC Response: Figure F-2 in Appendix F of the ER shows the limits of the CERCLA well restriction area. Figure 1-4 of the ER has been revised to show the approximate location of the nearest existing residence, which was constructed since the aerial photo was taken in January 2005 (see Attachment 1 for the revision). Section 5.3.2 of the DP will be modified to describe the CERCLA restrictions related to the private potable wells and a figure will be provided as requested.

SMC agrees with the NRC regarding the controls related to the long-term control (LTC) license as it applies to the restricted area. The LTC license, by itself, does not prevent encroachment outside of and up to the fence line of the restricted area. Industrial, commercial, residential and agricultural land uses exist in the vicinity of the SMC facility. However, SMC disagrees with the proposition that CERCLA restrictions related to soil contamination do not provide a strong basis for preventing future residential construction after soil remediation is complete. All CERCLA soil remedial analyses conducted for the SMC facility to date have been based on the use of non-residential soil cleanup criteria in combination with institutional controls to prevent future residential site use, in keeping with New Jersey site remediation regulations. Therefore, it is fully expected that once soil remediation is complete, the site will not be suitable for residential use and, as a result, institutional controls will be implemented in accordance with NJAC 7:26E-8. The requirements for institutional controls established at NJAC 7:26E-8 include continued monitoring of future land use and the submittal of biennial reports certifying that the institutional control(s) are being maintained in a manner that is protective of human health. As a result, New Jersey's institutional control program for site remediation provides a reasonable basis for predicting that future construction at the site after soil remediation is complete will be limited to non-residential uses. Consequently, the likelihood that a suburban resident will occupy a house in the unrestricted area is unlikely. The potential radiation exposure from this scenario, a suburban resident, is described in Chapter 5 of the DP as an example of "Controls fail".

Action to be Taken: Chapter 5 of the DP will be modified to generally address the dose modeling requirements outlined in NUREG-1757. The details for the specific scenarios will be captured in a stand-alone, scenario-driven dose modeling document to be included in the DP as an Appendix. For dose modeling scenarios applicable to the nearest off-site resident in Chapter 5 of the DP, the distance shown to the house closest to the Storage Yard in

revised Figure 1-4 of the ER (i.e., 550 to 600 feet from the southern fenceline) will be used as input to the analysis, rather than the 1,000-foot distance shown in Section 5.3.3.2 of Rev. 1a of the DP. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 14: (Section 5.3) Provide additional information on agricultural uses in the area.
Path Forward No. 14a: Identify farms or agricultural activities occurring within the vicinity of the SMC site and give their proximity to the site. Specifically, explain whether the farmlands in the area are used for cattle grazing. Identify what crops, if any, are grown on the adjacent farmlands. Provide details (i.e. type of agricultural activities and location) on the type of agricultural activities that SMC references in the aforementioned RAI responses. Explain any other future plans for agricultural activities in the area. Provide justification for excluding the resident farmer scenario or include a resident farmer scenario in the dose analysis. The justification should explain how potential uses of the site differ from current agricultural land use trends in the region.

SMC Response: A tour of the area surrounding the SMC facility was conducted in July 2007 to identify agricultural or farmland uses. Crop production, rather than animal breeding, is the main agricultural activity in the area. No cattle grazing was observed in the area surrounding the SMC site. Where crops could be visually identified, they are indicated on the figure that is included herein as Figure 1 in Attachment 9. At the time the observations were made, the farmland owned by SMC to the southwest of the manufacturing facility had been plowed with no new growth. Subsequently, green beans were observed growing on the SMC-owned farmland.

In the foreseeable future, SMC plans to use the Newfield property for industrial purposes. Future plans for agricultural use in the surrounding area are difficult to define, as they depend on the plans of individual landowners. State and regional planning documents encourage rural, agricultural and residential uses of much of the area surrounding the SMC facility (see Section 3.1 and Figure 3-2 of the ER). However, a reduced supply of properties suitable for residential use in urban areas has resulted in a growing attractiveness of the cheaper land prices in rural areas and an associated increase in rural land values. This has resulted in an intense competition for farmland, with development usually winning out over agricultural use in areas including Cumberland County, where total farmland acreage decreased by 5% from 1982 to 2002.[5] Under an "all controls fail" scenario, it is likely that agricultural land use in the area would fall victim to developmental pressures.

Action to be Taken: Included in Chapter 5 of the DP will be justification for assuming the Newfield property, for the foreseeable future, will be used as an industrial operation. The details for the specific scenarios will be captured in a stand-alone dose modeling document

[5] A National View of Agricultural Easement Programs: Measuring Success in Protecting Farmland – Report 4, December 2006, a Joint Project of American Farmland Trust and Agricultural Issues Center, by Alvin D. Sokolow, Agricultural Issues Center, University of California.

to be included as an Appendix. Rev. 1b of the DP which will be provided to the USNRC by May 16, 2008.

RAI No. 15: (Section 5.3.3.1) Clarify the discrepancy regarding the cover erosion rate under the controls-fail scenario.
Path Forward No. 15a: Revise the statement regarding the cover erosion rate for the recreational scenario when controls fail. Explain whether SMC assumes that this cover will or will not erode. In addition, provide a basis for this assumption given the proposed cover design and performance of that design over 1000 years.

SMC Response: The requested information is being provided.

Action to be Taken: The features and characteristics of the cover will be provided in Section 8 of the DP (and associated appendices), including the anticipated rate of erosion over a 1,000 year period. The input parameters for the dose modeling to be summarized in Chapter 5 will be modified for consistency with the current cover design parameters. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 16: (Section 5.3.3.3) Justify exclusion of the ingestion and inhalation pathways for the excavation scenario.
Path Forward No. 16a: Provide stronger justification for the elimination of the ingestion and inhalation pathway for the excavation scenario or include these pathways in the analysis.

SMC Response: The inhalation and ingestion pathways were excluded from the analysis in Rev. 1a of the DP because the dose from the direct exposure pathway greatly exceeds the dose associated with fractional resuspension and intake by ingestion or inhalation. However, these pathways will be included in the Rev.1b analysis.

Action to be Taken: In Chapter 5 of the DP, all excavation scenarios evaluated for dose potential will include the direct exposure, inhalation (i.e., re-suspension followed by intake) and ingestion pathways, with the total dose potential being the sum of the potentials for the individual pathways. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 17: (Section 5.4.3.3) Provide appropriate characterization of the radioactive solids, slag, baghouse dust, and soil, to support a source term for the performance assessment model.
Path Forward No. 17a: Characterize the stored materials to estimate the leachability of the slag and baghouse dust. This would include an analysis of the existing radionuclides, parents and decay products, to determine the extent of secular equilibrium. Also, SMC should identify in which phases in the slag the radionuclides are contained. This information would help to justify the leaching mechanism responsible for release of the radionuclides. Sampling should capture the variability of material types (e.g. slag, baghouse dust, radioactive concrete, and radioactive soils). Leaching and

solubility procedures should include determining the effects of surface area, particle size, experiment duration, and range of future water chemistries on radionuclide concentrations in the groundwater.

SMC Response: As discussed during an October 4, 2007 teleconference with the USNRC, SMC will use experimentally determined Kd values to estimate the release rate of radioactivity from the stockpiled materials. However, Kd values selected from literature references will be used to represent the unsaturated and saturated Cohansey Sands, the justification for which is presented in SMC's Response to RAI No. 5.

The Kd distribution coefficients describe the ratio of the concentration of radionuclides on the solid to the concentration in the coexisting liquids. The radioactivity in the slag at the Newfield facility is intrinsic to the slag rather than adsorbed on it. Nonetheless, in order to provide an added element of conservatism in the dose assessments, the Kd determinations for the slag were made after crushing the samples to 12-mesh size prior to placement into the reaction vessel. Due to the increased surface area, the Kd estimate that resulted would overestimate the release rate of radioactivity, which would thus over-estimate and bound the estimates of radiation dose from the groundwater pathway using the RESRAD computer code.

It is also important to note that one of the references cited in this RAI, NUREG-1703, states that "a bulk dissolution or leach rate does not provide an accurate representation of slag leaching over long times (1000 years)" and that "It overestimates the release of radionuclides to the environment." This NRC guidance supports the conservatism of using a radioactivity release rate from the slag, as determined using the ASTM D4319 protocol, to estimate dose from the groundwater pathway.

During the October 4, 2007 teleconference with the USNRC, an issue was raised about potential depletion of the source term if maximized release rates were used as input to the RESRAD code. Therefore, SMC will further bound the dose estimates by modeling the case where no radioactivity leaches from the consolidated material. This approach would maximize the continued presence of the source term, and likewise maximize the resulting dose from the external pathway.

In regard to the equilibrium issue, NUREG/CR-6632 states that in all slags the thorium parent (Th-232) was found to be in secular equilibrium with progeny. Likewise, the uranium parent (U-238) was in equilibrium with its progeny, including Ra-226. However, in that reference, Ra-226 was noted to be in disequilibrium with its daughters, presumably as a result of the continuous escape of Rn-222 gas from the extremely porous slag types. While this assumption may be valid for other waste forms, the slag produced at the Newfield facility is vitrified, thus the release of radon from its surface, if any, would be trivial. Assuming Rn-222 does not escape from the vitrified slag provides an additional conservatism in the analysis. The findings of this NUREG will be used to support the assumption of secular equilibrium for the entirety of the uranium and thorium decay series

With respect to the baghouse dust, because of its low radioactivity concentration, it was not possible to perform Kd testing because many of the results were not detectable (i.e., results were not above the MDA). However, the baghouse dust is chemically similar to the slag, and its only physical difference is significantly greater surface area. The following brief discussion of the metallurgical process that has been in place at Newfield over the years may be helpful in understanding this conclusion.

In the production of ferroniobium (ferrocolumbium) or ferrovanadium, the ore concentrate is melted in a three-phase electric arc furnace with a number of additives, including iron (Fe), lime (CaO), magnesium oxide (MgO) and aluminum (Al) plus other minor additives.[6] In the process, the more easily-reduced metallic elements, Fe and Nb, separate and sink to the bottom of the furnace while the less-easily reduced oxides remain on top of the furnace as slag. During this high temperature processes, gases, dusts and fumes are produced from the furnace which are removed by a gas treatment system, primarily a baghouse and extraction fan system. The materials in the gas stream that end up in the bag house can be produced by the following:

- Volatilization of materials in the furnace - This will be primarily materials from the top of the furnace (the slag) but biased toward the more volatile elements (Na, K, Zn, Al, Ca). Heavier elements, such as uranium and thorium, are not easily volatilized even at the temperatures of the furnace, thus they tend to remain with the slag.

- Mass transport of dusts out of the furnace in the gas stream - These will be primarily materials from the top of the furnace (the slag).

- Mass transport of materials being fed to the furnace in the gas stream - Typically the ore is fed to the furnace in the earlier stages of the reduction process while aluminum is fed in the later stages.

As a result of these processes, slag-like material is transported from the furnace in the gas stream. The primary difference between slag and baghouse dust is thus particle size and surface area. While slag is generated in pieces with dimensions measured in inches to feet, the baghouse dust has a much smaller particle size and is best described as “granular” or “sandy”, rather than dusty.

Because baghouse dust is similar in nature to slag, with the exception of surface area, it is reasonable to assume that the Kd determined for the release rate of radioactivity from crushed slag, is equally applicable to the baghouse dust.

Action to be Taken: A source term document will be prepared that describes the volumes of the consolidated material, the “upper confidence level” radioactivity release rates, the radionuclide concentrations and the data sets used to develop these numbers. Applicable

[6] SMC uses electric arc furnace for assisted aluminothermic reduction of niobium and vanadium ores.

sections of the DP will be revised to include the aforementioned information. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 18: (Section 5.4.3.3) Provide adequate characterization of sorption parameters for use in the performance assessment.
Path Forward No. 18a: Determine the Kd values for each of the zones to be used in the performance assessment or explain why the values in the DP are adequate.

SMC Response: See response to RAI No. 5 and 17.

Action to be Taken: See Actions to Be Taken in response to RAI No. 5 and 17.

RAI No. 19: (Appendix E) SMC should provide information regarding riprap gradations, riprap durability, and quality assurance procedures for rock production and placement.
Path Forward No. 19a: Provide additional information regarding the quality assurance (QA) programs, quality control (QC) programs, testing procedures, and inspection procedures that will be used during construction to confirm rock gradations, rock layer thicknesses, and rock quality. The information should include the specific tests and the frequency of testing. General guidance may be found in NUREG-1623 and NUREG-1757.

SMC Response: The requested information is being provided.

Action to be Taken: The rock to be used as the cover of the engineered barrier will be selected in accordance with NUREG-1623 criteria to be durable and withstand the forces of weathering. Rock durability testing will be conducted in accordance with NUREG-1623 in order to determine an "overall rock quality score." The rock scoring will be evaluated with respect to scoring guidelines established in NUREG-1623 and NUREG-1757 (Vol. 2, Rev. 1). Petrographic analyses of the rock source and available published data will be used to demonstrate the absence of adverse minerals that could cause rapid degradation of the rock, such as clays, olivine, or calcite cement. The presence of heterogeneities such as clay or shale partings, interbeds, fractures, alteration zones or vein deposits will also be evaluated since these features can also have an impact on resistance to freeze-thaw forces and ability to achieve the acceptable size of rock from the quarry. Direct evidence and/or indirect evidence will also be used in the evaluation of the rock's resistance to weathering.

Visual inspection of a test section of rock placement will be used to determine if any modifications to the proposed placement methods are required. An engineering specification similar to the sample presented in Appendix F of NUREG-1623 and in-field QA/QC controls during the placement of the rocks will ensure proper rock placement during construction. Such controls could include visual inspections (shapes, sizes, seams) and possibly in the performance of continued testing (e.g., Schmidt Hammer tests) throughout the placement process. As the Abt/Johnson method of rock sizing described in NUREG-1623 was used in designing the rock cover, the rock thickness is at least twice the average rock size (D50). As indicated in Figure 18.8 of the DP (Rev. 1a) and in Appendix E of the DP (Rev. 1a), the

side slope will be covered with 6 inches of rock with a D50 of 3 inches, the top will be covered with 3 inches of rock with a D50 of 1 inch and the apron at the toe of the slope will be covered with 15 inches of rock with a D50 of 5 inches. As D50 rock sizes are less than 8 inches, providing a relatively uniform thickness of rock at the specified gradation should not be difficult; therefore, the need for individual rock placement is not envisioned, in accordance with the NUREG-1623 guidance.

Rev. 1b of the DP will include specifications for the rock material that is selected, including QA/QC programs, testing procedures and inspection procedures. Applicable sections of the DP will be revised to include the aforementioned information.

Path Forward No. 19b: SMC should select a rock source and indicate the quarry and source that will be used. As discussed above, SMC should provide detailed information and test data regarding gradations, durability, and QA/QC procedures that will be used for the selected rock source. If there is significant variability in the rock source at the quarry, SMC should provide additional information regarding the QA/QC programs that will be implemented at the quarry to assure consistency in rock production.

SMC Response: The requested information is being provided.

Action to be Taken: SMC is currently evaluating potential sources of rock and will be conducting a visit to a local quarry(ies) to further support the identification of a potential source of rock in Rev. 1b. The NRC will be invited to participate in such visits. Depending in part on the availability of existing test data for the rock source, SMC anticipates that rock samples will be collected for subsequent testing and source characterization. Section 8.3 (or associated appendices) of Rev. 1b of the DP will include information regarding the source of the rock, the quarry and available test data for the rock. If variability in the rock source is indicated, additional information will be provided regarding the QA/QC programs that will be implemented at the quarry to ensure the quality and uniformity of the rock delivered to the site. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 20: (Sections 5.2.2.2.1, 5.3.3, and 5.4.3.2) Correct the statements related to the use of a geomembrane in the engineered barrier.
Path Forward No. 20a: Correct these and any other inconsistencies in the DP so the entire document reflects the latest design information

SMC Response: The requested action will be taken.

Action to be Taken: All references to a geomembrane will be removed from the DP. Rev. 1b of the DP that captures this commitment, and that corrects any other inconsistencies in the design of the engineered barrier will be provided to the USNRC by May 16, 2008.

RAI No. 21: (Section 5.3) Correct discussion in the DP regarding the engineered barrier and its relation to the groundwater pathway considerations.
Path Forward No. 21a: Clarify and correct statements made regarding the engineered barrier and its relation to the groundwater pathway considerations of the dose assessment.

SMC Response: The requested action will be taken.

Action to be Taken: All references to a geomembrane will be removed from the DP and a discussion will be provided of the infiltration control features to be incorporated into the engineered barrier. Dose assessments performed in support of the DP will include the groundwater pathway as applicable. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 22: (Sections 5.4.3.2 and 8.3): Provide an appropriate and complete engineered barrier design and degradation analysis.
Path Forward No. 22a: Provide an analysis of the impact of the range of disruption/degradation mechanisms and scenarios, and either a comparison of those impacts to the non-conformance level of degradation or a comparison of the resulting doses to the 10 CFR 20.1403 dose criteria. In this analysis, include the engineered barrier geotechnical degradation mechanisms of slope stability, settlement, liquefaction, freeze/thaw, and root penetration, particularly under the loss-of-control conditions. Figure 18.8 of the DP (Rev. 1) shows vegetation on the cover surface. Identify the type of seed mixes to be used and provide a planting schematic that shows the type and location of vegetation that would be planted on the engineered barrier.

SMC Response: The requested information is being provided. The referenced figure (Figure 18.8 of Rev. 1 of the DP) was associated with the original soil cover engineered barrier and does not reflect the stone cover that was incorporated into the engineered barrier under Rev. 1a of the DP. As indicated in Figure 18.8 of Rev. 1a, a rock-covered surface is now the basis for the engineered barrier. Any vegetation proposed as part of the stone cover would only serve as a non-structural landscaping feature.

Action to be Taken: Section 8.3 (or associated appendices) of DP will be revised to include an analysis of the disruption/degradation mechanisms, including slope stability, settlement, liquefaction, freeze/thaw, and root penetration. An evaluation with respect to either the non-conformance level of degradation or a comparison of the resulting doses to the applicable 10 CFR 20.1403 dose criteria will be provided. Any potential vegetative cover proposed as part of the stone cover will be shallow-rooted drought-resistant grasses that are designed only to enhance the visual appearance of the barrier. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 23: Evaluate the effect of additional leach test results on the engineered barrier design.
Path Forward No. 23a: Evaluate the effect of additional slag and baghouse dust leach testing results on dose assessments, and, if necessary for compliance, revise the engineered barrier design and related monitoring and maintenance as appropriate. This revaluation could result in the potential

need for added elements to the cover design to reduce potential leaching and transport of radionuclides, such as an infiltration layer to reduce infiltration or a composite rock/vegetative cover to increase evapotranspiration, or both. To risk-inform the design process and evaluate uncertainties in long-term natural processes and engineered barrier performance, consider conducting sensitivity analyses of a range of assumptions for leaching, infiltration, evapotranspiration, cover degradation, and other factors to demonstrate the significance of these key factors and design elements on compliance with the dose criteria. Use the results from these analyses to describe the risk-informed basis for the engineered barrier design. Furthermore, if the engineered barrier cover design is revised, the proposed long-term monitoring and maintenance activities and annual costs may also need revision along with the trust fund amount.

SMC Response: As described in the response to RAI No. 5 and 17, no additional leach testing of the slag and baghouse dust is deemed necessary. The design of the engineered barrier is being fine-tuned to add an infiltration barrier consisting of a very low permeability soil layer and other naturally-occurring soil and processed rock layers.

Action to be Taken: Uncertainties in long-term natural processes and engineered barrier performance will be evaluated by conducting sensitivity analyses of assumptions related to such factors as leaching, infiltration, evapotranspiration and cover degradation. The results of these analyses will establish the significance of these factors on maintaining compliance with the applicable dose criteria and will be used to present the risk-informed basis for the engineered barrier design. If long-term monitoring and maintenance requirements change as a result of this analysis, the associated monitoring/maintenance costs will be adjusted accordingly. Section 8.3 of the DP will be revised to reflect the results of the sensitivity analyses of engineering design factors and the risk-informed basis for the engineered barrier. Chapter 5 of the DP will be revised to include consideration for the results of the sensitivity analyses. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 24: (Sections 5.4.3.2 and 5.4.3.3) Explain or correct inconsistencies in assumptions for material properties.

Path Forward No. 24a: Explain or correct the apparent inconsistencies in the dose assessment assumptions for hydraulic conductivity and density of cover materials and sub-soils. Identify the source for the off-site materials.

SMC Response: The text in Section 5.4.3.2 and 5.4.3.3 was not revised at the same time that other information regarding the subsurface soils was revised, leading to the apparent inconsistencies in dose assessment assumptions.

Action to be Taken: The features and characteristics of the subsurface soil, for both the unsaturated and saturated zones will be provided in the DP. The input parameters to the RESRAD computer code for each exposure scenario will be modified to be consistent with current conditions at the site. The input parameters will be reviewed to verify consistency with the scenario and text provided in Chapter 4 and 5 of the DP. The characteristics of the

off-site materials to be used in the engineered barrier will be defined within the detailed design information to be incorporated within the DP, as described in the response to RAI No. 25. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 25: (Section 8.3) Provide information related to the final design, construction, monitoring, and maintenance of the engineered barrier.
Path Forward No. 25a: Provide more specific and detailed information on the engineered barrier design, sequence of engineered barrier construction activities, monitoring, and maintenance as itemized in the list in Section 8.3, page 95. Include engineered barrier design details, geotechnical characterization and testing of materials, QA and QC plans for construction, the Operation and Maintenance Plan, information on post-closure monitoring, and revisions to the current surveillance and monitoring costs (Table 17.14) once the actual monitoring and maintenance has been identified. Supporting information should include schematics and cross sections of the restricted area cell/engineered barrier. Provide a description of the equipment (for example, bulldozers and front-end loaders) that will be used for constructing the engineered barrier and plans for survey and decontamination of the equipment.

SMC Response: The requested information is being provided.

Action to be Taken: Section 8.3 and associated appendices of the DP will be revised to incorporate/reference engineering design information and specifications for the engineered barrier, including additional information on the need for monitoring and maintenance and engineering cross-sections. Typical types of equipment to be used in the construction of the barrier will be described and descriptions of the release protocol for the equipment will be provided. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 26: (Section 8.3) Additional information and analyses should be provided if SMC intends to use rounded rock for erosion protection.
Path Forward No. 26a: SMC should select a rock source as soon as possible. If rounded rock will be used, SMC should discuss the effects on the required size of the rock.

SMC Response: While SMC indicated during initial on-site technical discussions with the USNRC that rounded rock might be considered for the engineered barrier, after further consideration the use of angular rock for erosion control was selected. The calculations presented in Appendix E of the DP (Rev. 1a) indicate that the analysis is conducted for rock that was assumed to meet the criteria specified in section D-2.2.2 of NUREG 1623. The referenced criteria include the assumption that the rock is angular, so the analyses presented in Appendix E of the DP (Rev. 1a) were based on the use of angular rock.

Action to be Taken: Section 8.3 of the DP will be revised to reflect the changes made to the cover design and will clearly state that angular rock will be used. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 27: (Sections 7 and 16) Eligibility criteria of 10 CFR 20.1403(a): Demonstrate clearly what method SMC is using to show compliance with 10 CFR 20.1403(a), the eligibility requirements for use of restricted use.
Path Forward No. 27a: To demonstrate compliance with 10 CFR 20.1403(a), clarify which of the two options (or both) is intended to demonstrate compliance: that further reductions in residual radioactivity to comply with the unrestricted use criteria: (1)would result in net public or environmental harm; or (2) were not being made because the residual levels associated with restricted conditions are ALARA.

SMC Response: As shown in Chapter 7 of the DP, the total risk of fatality to the public under the license termination (LT) alternative is significantly greater than that associated with the other two available alternatives (i.e., Long-term Control or LTC and license continuation or LC). Further reductions in residual radioactivity beyond that proposed would result in net public harm.

From an ALARA standpoint, the total costs of each alternative, including implementation costs and the costs associated with radiological and non-radiological risks, were calculated. Once again, the cost for the LTC alternative is lower than for either the LC or the LT alternatives.

In summary, Chapter 7 of the DP shows that the LTC option provides both the lowest risk to a member of the public and the lowest cost. However, the dose modeling to be performed in support of the DP is being revised (see RAI No. 13), the results of which will be used as input to revised ALARA calculations. At this time SMC is relying on both eligibility criteria. A final determination will be made after the revised analyses are complete.

Action to be Taken: Chapter 7 of the DP will be revised to note that both options demonstrate compliance. Section 7.3.11 of the DP will be modified to incorporate the findings of both options after the revised dose estimates are incorporated into the calculations. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 28: (Section 7) Eligibility criteria of 10 CFR 20.1403(a): If asserting net public or environmental harm, then demonstrate net harm.
Path Forward No. 28a: If the licensee asserts net public or environmental harm as the basis for compliance with 10 CFR 20.1403(a), then the licensee must demonstrate that there is net harm, and the public or environmental benefits must be compared to detriments, without including the cost of the action in the equation.

SMC Response: Section 7.3.6 of the DP shows the collective dose for the LTC option is 193 person-rem versus 344 person-rem for the LT option and 763 person-rem for the LC option. The benefit from averted dose is thus negative and there would be net public or

environmental harm from pursuing either the LC or LT options according to the following equation from NUREG-1757:

$$\text{Net harm occurs if } B_{AD} < Cost_{ACC} + COST_{TR} + COST_{WDOSE} + COST_{ED}$$

where B_{AD} is the benefit from averted dose, $Cost_{ACC}$ is the costs of workplace accidents, $COST_{TR}$ is the costs of transportation fatalities, $COST_{WDOSE}$ is the costs of remediation worker dose, and $COST_{ED}$ is the costs of any environmental degradation.

The dose modeling to be performed in support of the DP is being revised, the results of which will be used as input to revised ALARA calculations. Therefore, at this time SMC believes a net harm is shown, but a final response to this RAI based on site-specific dose values will be provided once the dose modeling is completed.

Action to be Taken: Chapter 7 of the DP will be revised to make clear that both net harm and cost were considered in the demonstration of compliance, and that there is net harm from implementing other than the LTC option due to higher cost and greater risk. Applicable sections of the DP will be modified to incorporate results of revised calculations after the revised dose estimates are incorporated into the calculations. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 29: (Section 7) Eligibility criteria of 10 CFR 20.1403(a): If asserting ALARA for the eligibility requirements, then incremental changes to the proposed restricted use approach should be evaluated.
Path Forward No. 29a: Include, as part of the ALARA analysis, consideration of incremental changes to the proposed restricted use approach. If the licensee believes there are no such incremental changes to evaluate, the licensee should provide a justification.

SMC Response: Incremental analyses are not expected to show any conclusions different from those presented in the DP. For example, removal of everything other than slag from the materials to be consolidated under the engineered barrier will not reduce the dose potential beyond that associated with the LTC option because of the relative difference in radionuclide concentrations, and will increase the total project cost. Another option, removal of the slag only, leaving behind the baghouse dust and soil, will not permit release of the site for unrestricted use nor will it reduce the cost or accident potential beyond that associated with the LTC option. An analysis that assumes a portion of the slag was removed would have to assume removal of essentially all of the slag because the continued presence of even a few hundred pounds of slag would preclude release of the site for unrestricted use.

Action to be Taken: Notwithstanding the above considerations, the following incremental analyses will be performed once the dose modeling has been completed: (1) Off-site disposal of all materials as radioactive waste with the exception of the slag stockpiles; (2) Off-site disposal of the slag stockpiles only as radioactive waste; and (3) Off-site disposal of 50% of the slag stockpiles only as radioactive waste. The findings of these analyses will

be incorporated into Chapter 7 of Rev. 1b of the DP, to be provided to the USNRC by May 16, 2008.

RAI No. 30: (Section 7) Eligibility criteria of 10 CFR 20.1403(a): If asserting ALARA for the eligibility requirements, benefits and detriments should be compared.
Path Forward No. 30a: For the ALARA analysis, the licensee should compare benefits to detriments or costs. The licensee should evaluate the doses averted as a benefit of each alternative.

SMC Response: If the LC alternative (i.e., no action) is used as the baseline or point of comparison, the LT and LTC alternatives may be compared to it. As shown in Chapter 7 of the DP, the LC alternative results in a total dose potential of 828 person-rem. The LT alternative, with its dose potential of 344.5 person-rem, gives a net benefit of 483.5 person-rem. Using the NUREG-1757 Volume 2 Appendix N recommendation of cost per person-rem (i.e., $2,000), this translates into a dollar benefit of $967,000. The LTC alternative, with its dose potential of 193.2 person-rem, results in a dose benefit over the LC alternative of 634.8 person-rem and a dollar benefit of $1,269,600. As shown in Chapter 7 of the DP, the maximum dose averted (i.e., the lowest overall population dose) is associated with the LTC alternative, which also provides the greatest benefit.

Action to be Taken: Section 7.3.7 of the DP will be revised to include a more detailed presentation of the benefits of dose averted. In addition, a statement regarding the net harm from implementing the options with the higher cost and greatest risk will be added. Further changes to Chapter 7 will be made after the results of revised dose estimates are incorporated into the various calculations. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 31: (Section 7) Eligibility criteria of 10 CFR 20.l403(a): Address minimal incremental actions necessary to achieve unrestricted use.
Path Forward No. 31a: Whether using either the net public or environmental harm option or the ALARA option, the licensee should either evaluate what minimal incremental actions or measures (compared to the proposed action) would be necessary to meet the unrestricted use criteria, or demonstrate that the LT alternative provides the minimum further reduction in residual radioactivity and dose necessary to meet the unrestricted use criteria.

SMC Response: See response to RAI No. 29.

Action to be Taken: See Action to be Taken in response to RAI No. 29.

RAI No. 32: (Section 7) Eligibility criteria of 10 CFR 20.1403(a): The licensee's eligibility ALARA analysis should address other societal and socioeconomic considerations.
Path Forward No. 32a: SMC's eligibility analysis, for compliance with 10 CFR 20.1403(a), needs to more fully discuss the costs and benefits of the proposed action, and of alternatives to the proposed action. In the eligibility analysis, SMC should include societal and socioeconomic considerations, including the undue burdens identified by the SSAB, considerations identified in the

Statements of Consideration for the LTR, and the considerations identified in the NRC staff guidance (NUREG-1757). The licensee should quantify benefits and costs that can reasonably be quantified, to allow better comparison between alternatives. Alternative decommissioning activities such as removal of the radioactive material may produce a societal benefit of reduction in public opposition, which may be difficult to quantify. One approach that would be acceptable to the NRC staff is for the licensee to determine the bases of the public opposition, and to quantify those bases (e.g., quantification of the benefit of avoiding impact on property values versus costs of removing the contaminated material). For other benefits or costs that cannot be quantified, the licensee should discuss the benefit or cost and should indicate that it cannot quantify that aspect.

SMC Response: One area where societal benefit can be reasonably quantified is the potential value of the real estate which could released for unrestricted use. Review of current (October 2007) local real estate prices in the Newfield area indicates a maximum value of land of approximately $150,000 per acre. Assuming the eight-acre Storage Yard is released for unrestricted use and is developed and sold for industrial purposes at this unit rate, it would be worth $1,200,000, although it should be noted that the land is adjacent to a disused but not yet closed municipal waste disposal facility that will limit the value of this property significantly. This valuation may also increase property tax revenues by an undetermined, but small, annual amount. It is also expected that the cost of remediating this property for release for residential use at the maximum potential land value would exceed the additional value of the land. Therefore, a limited industrial use of the property is the most likely scenario (see also Response to RAI No. 13 in regard to future land use).

As the NRC notes, there are also perception-related aspects that are difficult to quantify. While there currently is public opposition as discussed in the response to RAI 71, SMC believes much of this controversy can be addressed once the NRC completes its technical evaluation. While removing the residual radioactivity from the Storage Yard in order to permit free-release of the site may be one method, SMC implemented an approach at its Cambridge, Ohio facility that is similar to that proposed in the DP. Timely completion of decommissioning work was equally effective in reducing public opposition. Specifically, the potential incremental increase in adjacent property values from not being in proximity to the engineered barrier, and the aesthetic benefit of not having a mound of earth surrounded by a fence in the neighborhood cannot be reasonably assessed as the visual site analysis presented in Section 4.9 of the ER indicates that the covered materials in the Storage Yard will not be visible from most of the area surrounding the facility due to the surrounding vegetation and structures.

Action to be Taken: The aforementioned quantifiable and unquantifiable information will be presented in Chapter 7 of the DP, which will be revised to incorporate the findings of the site-specific dose modeling. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 33: (Section 7) Eligibility criteria of 10 CFR 20.1403(a): Provide justification for concluding that sale to, and disposal of slag at, the International Uranium Corporation (IUC) uranium mill is not a viable decommissioning option.
Path Forward No. 33a: Provide documentation to support the conclusion about the non-feasibility of sending the slag to IUC for uranium extraction.

SMC Response: It has always been SMC's position that beneficial reuse of the materials currently in the Storage Yard at the Newfield site, particularly the slag, is a desirable option. Such a reuse, if feasible, would displace the use of other slags or raw materials in an industrial process. In the case of uranium extraction, it would replace uranium ore.

Because of the presence of licensable radioactivity in the slag, recycling as a slag fluidizer in steel manufacture, much like SMC's vanadium slag is used, is not viable. Likewise, the opportunity for uranium recovery is not currently viable and is not likely to become viable in the foreseeable future. From recent e-mail exchanges with Mr. Harold R Roberts of International Uranium Corporation (see Attachment 10), the price of uranium would have to reach in excess of $200 per pound of U_3O_8 in order for extraction to be economically viable. While uranium recovery, if undertaken, would likely be through a long-term contract, comparison to the spot uranium price can be used to gauge market conditions. As of October 22, 2007 the spot uranium price was $85.00 per lb as U_3O_8 (http://www.uxc.com/review/uxc_Prices.aspx).[7] While the uranium demand has led to roughly an eight-fold an increase in price since the 1990's, that increase is still insufficient to make uranium recovery commercially viable for Newfield slag.

It is important to note that mineral recovery opportunities, even if viable, are only applicable to the recycle/re-use of the slag. The baghouse dust, soils and other materials to be consolidated under the engineered barrier could not be subject to recovery. Furthermore, the thorium in the slag has no re-use potential and would thus require disposal at additional cost (see Attachment 10).

Action to be Taken: Section 7.1 of the DP will be modified to include a new Subsection 7.1.4, "Non-viable Recovery Options" that will present the aforementioned information. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 34: (Section 7 and 16) ALARA analysis under 10 CFR 20.1403(e): Provide an ALARA evaluation of the residual radioactivity under conditions of institutional controls no longer in effect, to demonstrate compliance with 10 CFR 20.1403(e).
Path Forward No. 34a: Provide a demonstration of compliance for §20.1403(e), ALARA for conditions when institutional controls are no longer in effect. This demonstration should evaluate potential incremental changes to the proposed approach and their impact on doses for conditions when institutional controls are no longer in effect.

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[7] This does not include the cost of transportation, estimated to be between $125 and $150 per pound.

SMC Response: The requested information is being provided.

Action to be Taken: A demonstration of ALARA conditions in the case when institutional controls are no longer in effect will be presented in Chapter 7 of the DP as it is revised to incorporate the findings of the site-specific dose modeling. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 35: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Calculate doses or dose averted over the 1000-year compliance period.
Path Forward No. 35a: For the eligibility and ALARA analyses, the licensee should either calculate doses or doses averted over the 1000-year dose compliance period or justify the alternative used. See NUREG-1 757, Section N.1.2.

SMC Response: The requested information is being provided.

Action to be Taken: Section 7.2.1.2 of the DP will be revised to include clarification that the annual doses associated with the applicable alternatives are either unchanged over the 1,000-year compliance period, or that the maximum dose potential, regardless of when it occurs over the 1,000-year compliance period, was used for the calculations. Furthermore, the updated calculations to be performed once the site-specific dose modeling is complete will include the discounted cost of the dose. Finally, the dose to an individual over a 70-year life span or a 30-year working life will be clarified to reflect these as individual risks. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 36: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: For changes in land values, consider land use over the 1000-year compliance period.
Path Forward No. 36a: For evaluating changes in land values, the licensee should consider the reasonably foreseeable land uses over the 1000-year compliance period and discuss the status of non-radiological, investigations at the soil site. The licensee should either include evaluation of land uses foreseeable after non-radiological contaminants have been substantially reduced or justify that non-radiological contaminants will not be reduced sufficiently for residential land use.

SMC Response: See Response to RAI No. 13 in regard to future land use and to RAI No. 32 in regard to an estimated land value of $1,200,000 if the restricted area is remediated and made suitable for industrial use.

Action to be Taken: See Action to be Taken in response to RAI No. 13 and 32.

RAI No. 37: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Provide a comparison among alternatives of all costs and benefits evaluated.
Path Forward No. 37a: The licensee needs to compare all the costs and benefits among the alternatives, to complete the eligibility and ALARA analyses. In particular, for costs or benefits that

have not been quantified, SMC should still provide sufficient discussion to qualitatively compare the alternatives.

SMC Response: The requested information is being provided as part of the revised ALARA evaluation in a revision to Chapter 7. The quantified costs are already described in Chapter 17, and will be referenced in the revised ALARA analysis. As discussed in the response to RAI No. 32, unquantifiable societal and socioeconomic considerations will be addressed in Rev. 1b of the DP.

Action to be Taken: Section 7.3.8 of the DP will be revised to include a description of all costs and benefits as described above. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 38: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Provide an evaluation using zero discount rate or with a sensitivity analysis of the discount rate for the present worth calculations for the value of future doses.
Path Forward No. 38a: The licensee should include some method for analyzing the intergenerational concerns, by including an analysis with no discounting or with a sensitivity analysis of the discount rate. (The NRC staff acknowledges, that as it currently stands, the DP (Rev. 1) is somewhat unclear about whether discounting is applied. The calculations of Section 7.3.6 include use of a 3% discount rate. However, it appears that the costs of the doses included in the Table in Section 7.4 do not include any discounting.)

SMC Response: The requested information is being provided.

Action to be Taken: Chapter 7 of the DP will be revised to include an undiscounted cost of the present value of doses received over the 1,000-year compliance period. If and when discount rates are used, they will consistently applied at 1% and/or a sensitivity analysis will be performed to demonstrate the effect of the discounted rate on the selection of the alternatives. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 39: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Correct the use of the formula and recalculate the results for present worth in the eligibility and ALARA analyses.
Path Forward No. 39a: If SMC continues to use a discount rate to calculate the present worth of future doses, the calculation should be corrected.

SMC Response: The requested information is being provided.

Action to be Taken: The applicable sections of Chapter 7 will be revised to reflect the fact that the annual dose is used to calculate present value rather than the dose over a life time or working life. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 40: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: For doses to members of the public after decommissioning, use more site- specific, unbiased analyses for the dose assessments.
Path Forward No. 40a: The licensee should either use more site-specific, unbiased dose estimates for the
ALARA analyses or demonstrate why the values used do not inappropriately bias the results of the eligibility and ALARA analyses.

SMC Response: The current dose estimates and subsequent costs were not intended to be biased. The assessments were based on the assumption that the maximum doses allowed by regulations under each alternative would be realized. This was a worst case scenario for all alternatives. More site-specific dose estimates will be generated and will be provided.

Action to be Taken: Chapter 7 of the DP will be revised to make it clear that both net harm and cost are considered in the demonstration of compliance. Applicable sections of the DP will be modified to incorporate results of revised ALARA calculations based on site-specific dose modeling after these results become available. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 41: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Correct inconsistencies in the eligibility and ALARA analyses.
Path Forward No. 41a: The licensee should either be consistent in the eligibility and ALARA analyses, or should justify the inconsistencies.

SMC Response: The requested information is being provided.

Action to be Taken: Where applicable, the dollar value of $2,000 per person-rem averted, as recommended in NUREG-1757, Volume 2, Appendix N, Section N.1.1, Equation N-1, will be used for the ALARA calculations, to be finalized once the results of site-specific dose modeling become available. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 42: (Section 7) Calculations of costs and benefits for eligibility and ALARA analyses: Provide more complete justification for the analysis of rail accidents.
Path Forward No. 42a: The licensee should provide additional details on and justification for the rail fatality risk coefficient used in the eligibility and ALARA analyses. If appropriate, the licensee should revise the calculation to correctly apply the risk coefficient.

SMC Response: The requested information is being provided.

Action to be Taken: An updated rail fatality risk coefficient will be taken from 2005 accident data as presented by the Federal Railroad Administration.[8,9] These data show 887 fatalities over a total of 790,496,598 miles. The railcar miles data will be taken from the 2005 from the Federal Bureau of Transportation Statistics, which shows 37,712 million railcar miles and 548 million train miles for Class 1 rail freight, for an average of 68.8 cars per train.[10] Multiplying the total train miles by the average number of cars per train, for total railcar miles, then dividing the total fatalities (887) by this value (i.e., $877 \div 3.77 \times 10^{10}$) gives a risk coefficient of 2.35×10^{-8} fatalities per rail car mile. Rev. 1b of the DP reflecting this information will be provided to the USNRC by May 16, 2008.

RAI No. 43: (Section 9.2) SMC should provide information on how Radiation Work Permits (RWPs) are developed, reviewed, and implemented.
Path Forward No. 43a: Provide information about how radioactive material work procedures/practices (such as RWPs) will be developed, reviewed, implemented, and managed to comply with the regulatory requirements and protect workers from ionizing radiation during decommissioning activities.

SMC Response: The requested information is being provided.

Action to be Taken: The last paragraph in Section 9.2 of the DP will be modified to read as follows: "Work procedures and practices associated with radioactive materials, such as RWPs, are developed, reviewed, implemented and managed pursuant to RSP-012, "Control of Work", and RSP-003, "Control of Radiation Safety Procedures". In regard to how individuals implementing RWP commitments will be informed, a bullet will be added to the listing shown in Section 9.4.3 of the DP that reads as follows: "Radiation Work Permit (RWP) issue, modification, termination and use." Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 44: (Section 9.3) Provide information to describe responsibilities, authorities and minimum qualification of all positions listed in Figure 18.10.
Path Forward No. 44a: SMC should submit information regarding responsibilities and authorities and minimum qualifications of all positions listed in Figure 18.10. SMC also should describe how it will provide NRC with the qualifications of any newly hired employees or replacements for these positions.

SMC Response: The requested information is being provided.

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[8] See http://safetydata.fra.dot.gov/OfficeofSafety/Query/Default.asp?page=statsSas.asp.

[9] The 2005 data are the most recent available as of the date of this response. A review of data from previous years indicates there is not a large fluctuation from year to year. If new data are released prior to issuing Revision 1b of the DP it will be incorporated at that time.

[10] See http://www.bts.gov/publications/national_transportation_statistics/csv/table_01_32.csv.

Action to be Taken: Section 9.3.2 will be modified to include a new Section 9.3.2.5 entitled "Subcontractor H&S and QA Contacts", to read as follows: "Subcontractor personnel who are assigned Health/Safety responsibilities for the services to be performed will be bound, by contract requirements, to having a combination of education and experience in safety practices appropriate to the services to be provided, and will have designated responsibility for ensuring the safety program for their own personnel is consistent with the requirements of Section 9.3.2.3 of the DP. All applicable personnel performing on-site work will also require current (within the past 18 months) OSHA (29 CFR 1910.120) Hazardous Waste Operations (HAZWOPER) training. Subcontractor personnel who are assigned Quality Assurance responsibilities for the services to be provided will be bound, by contract requirements, to having training in the implementation of quality programs, and will ensure the relevant aspects of Section 9.3.2.4 of the DP are captured in in-house QA activities." The second paragraph of Section 9.1 of the DP will be modified to include the following sentence (after existing sentence two): "The names and qualifications of each individual assigned to serve as the Quality Assurance Officer, Project Manager and Site Health & Safety Officer will be provided to the USNRC immediately prior to the start of work. If one of those key individuals is absent or unavailable for more than 10 calendar days, a new appointment will be made and the USNRC will be notified of the name and qualifications of the appointee. The new appointee will be designated "Acting" until such time as the USNRC has concurred with his/her qualifications." Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 45: (Section 9.3) Provide information regarding the authority to stop work.
Path Forward No. 45a: SMC should describe which positions have the authority to stop work and under what conditions. If the QAO does not have the authority to stop work, provide an explanation for this position.

SMC Response: The requested information is being provided.

Action to be Taken: The following sentence will be added to the end of Section 9.3.2.2 of the DP: "The Project Manager has the responsibility and authority to terminate any work activities that do or may violate regulatory or contract requirements pursuant to SMC's Radiation Safety Procedure No. RSP-017, 'Stop Work Authority'." The last bullet in Action 9.3.2.3 of the DP will be modified to read as follows: "The Site Health and Safety Officer has the responsibility and authority to terminate any work activities pursuant to SMC's Radiation Safety Procedure No. RSP-017, 'Stop Work Authority' if conditions indicate the potential for unnecessary radiation exposure to site personnel or members of the public, or for unsafe working conditions." The following sentence will be added to the end of Section 9.3.2.4 of the DP: "The QAO has the responsibility and authority to terminate any work activities that may lead to conditions adverse to the quality requirements of the DP (see Chapter 13) pursuant to SMC's Radiation Safety Procedure No. RSP-017, 'Stop Work Authority'." Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 46: (Section 9.3.1) The Radiation Safety Officer (RSO) needs to meet more stringent requirements than those described in the DP.
Path Forward No. 46a: SMC should revise the DP (Rev. 1) description of its qualifications for the RSO.

SMC Response: The requested information is being provided.

Action to be Taken: Section 9.3.1 of the DP will be modified to read as follows: "The RSO will be an employee of SMC or an SMC contractor and will have a Bachelors' degree in the physical sciences, industrial hygiene or engineering from an accredited college or university, with at least one (1) year of work experience in applied health physics, industrial hygiene or similar work relevant to radiological hazards, and a thorough knowledge of the proper application and use of all radiation safety equipment used in connection with the radioactivity present at the site, the chemical and analytical procedures used for radiological sampling and monitoring, and methodologies used to calculate personnel exposure to the radionuclides present at the site. Decommissioning-specific support will be provided to the RSO by the Decommissioning Contractor (see Section 9.3.2.1)." The name and qualifications of the individual serving as RSO for this work will be provided to the USNRC prior to the start of the on-site efforts." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 47: (Sections 9.4.2 and 9.4.3) SMC should provide information on how it will determine qualifications of its general employees and radiation workers.
Path Forward No. 47a: SMC should identify who will have authority over the general employees and the radiation workers, and how those in authority will determine the qualifications of the general employees and radiation workers.

SMC Response: The requested information is being provided.

Action to be Taken: The following bullet will be added to the listing of Site HSO responsibilities in Section 9.3.2.3 of the DP: "With the assistance of the RSO, designate all project personnel as either "General Employees" or "Radiation Workers" and maintain documentation sufficient to demonstrate that qualifications for those assignments remain in effect for the duration of work at the site." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 48: (Section 13) The DP does not discuss the revision of quality assurance (QA) documents.
Path Forward No. 48a: SMC should address how its QA documents will be revised. In addition, SMC should explain how its process for revising the documents will be as rigorous as the process used to develop them.

SMC Response: The requested information is being provided.

Action to be Taken: The following paragraph will be added to Section 13.3 of the DP: "All QA documents prepared in support of the decommissioning effort (i.e., the QAPP, project-specific quality control manuals/policies, quality-affecting procedures, and technical reports) will be peer-reviewed by an individual not responsible for their preparation and approved by the Project Manager, the QAO, and the RSO prior to implementation. Review, update and re-approval of QA documents shall follow the same process as the creation of a new document. No revisions to QA documents, other than for error corrections, to address identified quality failures, or as mandated by changes in the scope or work or work approach will be made for the duration of the work effort." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 49: (Section 13.1) There appear to be inconsistencies in the titles and functions of personnel.
Path Forward No. 49a: Be consistent in terminology, and correct Figure 18.1 0 to reflect the actual organization. Explain how the QAO will be afforded sufficient authority and freedom to identify quality problems, provide solutions, stop work, and verify that solutions have been implemented. Explain whether the QAO is a contractor or an SMC employee. It must be clear that quality is the responsibility of SMC, not the contractor.

SMC Response: The requested information is being provided.

Action to be Taken: The first sentence of Section 9.3.2.4 of the DP will be modified to read as follows: "An individual, with a reporting line directly to SMC, will be assigned to serve as the Quality Assurance Officer (QAO) for the project." The first sentence of Section 13.1 of the DP will be modified to read as follows: "SMC will appoint a Quality Assurance Officer (QAO) who reports directly to the corporate authority. The QAO may be a contractor or an SMC employee."

The first sentence of the last paragraph of Section 13.1 of the DP (after the bulleted list) will be modified to read as follows: "The ultimate responsibility for implementing the elements of the QA Program rests with SMC, who will ensure the quality programs of principle subcontractors are acceptable under the provisions of the quality provisions of this DP." (See Response to RAI No. 54, below.)

Figure 18.10 will be modified to show a direct reporting line from the QAO to SMC. In regard to the QAO's ability to stop work at the site, see response to RAI No. 45. The DP will be modified, as necessary to ensure the titles of each key position are as shown in Figure 18.10.

The following paragraph will be added to the end of Section 13.1: "The technical and quality assurance procedures necessary for implementation of the QA Program will be consistent with regulatory, licensing, and the requirements noted in this Chapter of the DP. Specifically, SMC commits to the following:

- Performing management reviews of the QA Program on a semi-monthly schedule;

- Maintaining control over quality-affecting procedures of the principal contractors by ensuring SMC approvals of such procedures prior to their implementation.

- Ensuring USNRC approval of any significant changes in the QA provisions of this DP is received before the allowing activities influenced by those provisions to proceed.

- Ensuring USNRC is notified of any changes in key personnel (see Figure 18.10) within 30 days of the change."

Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 50: Overall control and authority rests with the licensee.
Path Forward No. 50a: SMC should revise its organizational structure so that overall control and authority rests with the licensee. Major delegations of work should be fully described and in each case, organizational responsibilities and methods for control of the work by the applicant should be described, including how responsibility for delegated work is to be retained and exercised.

SMC Response: The requested information is being provided.

Action to be Taken: The first sentence of Section 9.1 will be modified to read as follows: "SMC will maintain primary responsibility for all site activities conducted under the requirements of License No. SMB-743 and this DP." The second paragraph of Section 9.1 will be modified to read as follows: "Figure 18.10 shows the organizational structure of the project. In general, SMC will delegate the implementation of the DP to a Decommissioning Contractor. This streamlined arrangement serves to minimize administrative functions, keeps overhead costs to a practical minimum, provides maximum flexibility for resource allocation, and facilitates SMC oversight of all decommissioning operations. The Decommissioning Contractor will, as necessary, subcontract the support and services that do not exist within its own organization. While the Decommissioning Contractor and all subcontractors will maintain in-house quality assurance and health/safety programs, SMC will ensure they are consistent with the relevant provisions of this DP. The Decommissioning Contractor will issue and monitor the status of all work orders associated with this DP, SMC will received planned and periodic status reports, will approve all work orders and will approve all subcontracted services. The following subsections contain . . ."

RAI No. 51: (Section 13.1) The DP refers to the use of a summary of the Decommissioning Contractor's corporate QA policy rather than the licensee's corporate QA Policy.
Path Forward No. 51a: Pursuant to NUREG-1757, Section 17.6.2, the licensee should submit a summary of the licensee's corporate QA policy.

SMC Response: The requested information is being provided.

Action to be Taken: Section 13.2 of the DP will be modified to summarize SMC's corporate QA policy as applicable to the decommissioning of the Newfield facility. In addition, the requirement for the Decommissioning Contractor's compliance with the relevant portions of SMC's QA policy will be captured in applicable portions of Section 13.2. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 52: (Section 13.2) The DP is inconsistent with NRC's policies in stating that the Quality Assurance Program Plan (QAPP) will be provided to the NRC for review and acceptance.
Path Forward No. 52a: SMC should explain how it will develop, implement and revise its QAPP and demonstrate that revisions to the QAPP will be made with the same rigor as the original development of the QAPP. Furthermore, the frequency and method of revisions to the QAPP should be specified.

SMC Response: The requested information is being provided.

Action to be Taken: Paragraph 3 of Section 13.2 will be deleted. In regard to revisions to the QAPP, see Action to be Taken in Response to RAI No. 48. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 53: (Section 13.2.3) The DP states that the off-site laboratory will be responsible for assuring that all appropriate laboratory personnel are thoroughly familiar with the QAPP.
Path Forward No. 53a: Shieldalloy should consider whether to hold the off-site laboratory responsible for being thoroughly familiar with Shieldalloy's QAPP or use a chain-of-custody process. If SMC opts to use the chain-of-custody process, it should be described including responsibilities of the individuals involved.

SMC Response: The requested definition of the off-site laboratory responsibilities will be provided.

Action to be Taken: Paragraph 2 of Section 13.2.3 of the DP will be revised to read as follows: "The off-site laboratory will be responsible for assuring that all appropriate laboratory personnel are thoroughly familiar with its corporate quality policy and good laboratory practices, that demonstrable chain of custody is maintained from the point of sample receipt to sample disposal is maintained, and that all appropriate laboratory personnel meet the requisite . . .". Paragraph 3 of Section 13.2.3 of the DP will be revised to read as follows: "The off-site laboratory will have a QA designee who will be responsible for assuring that the QA/QC requirements outlined in the contracting agreement, the corporate quality policy, and its associated operating procedures, including the chain of custody process, are strictly followed. The QA designee will be responsible for review of data, and alerting the Project Manager of the need for corrective action (when necessary). The QA designee will also be responsible for preparing project-specific QA/QC plans, as necessary."

Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 54: (Section 13.4) The DP discusses control of Measuring and Test Equipment but does not provide a summary of Measuring and Test Equipment that will be used during decommissioning activities.
Path Forward No. 54a: The description of the test and measurement equipment QA program should include: a summary of the test and measurement equipment used in the program; a description of how and at what frequency the equipment will be calibrated; a description of the daily calibration checks that will be performed on each piece of test or measurement equipment; and a description of the documentation that will be maintained to demonstrate that only properly calibrated and maintained equipment was used during the decommissioning.

SMC Response: The requested information is being provided.

Action to be Taken: Section 13.4 of the DP will be modified to read as follows: "A variety of radiation measurement equipment will be used during the performance of decommissioning activities and the final status survey. These will include exposure rate instruments, dose rate instruments, dose/exposure integrating devices, contamination survey instruments, analytical instruments (i.e., smear counters), field-ready spectrometers and ancillary devices (e.g., data loggers, geolocation devices, etc.)."

"Procedures for calibration, maintenance, accountability, operation and quality control of radiation detection instruments implement the guidelines established in American National Standard Institute (ANSI) standard ANSI N323-1978 and ANSI N42.17A-1989.[11,12] Although maintenance procedures may vary depending on the specific instrument type, the information and use limitations provided by the vendor of the instrument type will be followed."

"Instruments will be calibrated at least annually or more frequently if so recommended by the vendor. (Cable and battery changes may not necessitate re-calibration, depending upon whether such action induces response changes.) Each ratemeter will be calibrated with a specific detector, designated by the detector serial number."

"A contractor will provide calibration services using radiation sources which are traceable to the National Institute of Standards and Technology (NIST). Instruments shall be calibrated according to the guidelines of ANSI-N323, "Radiation Protection Instrumentation Test and Calibration", ANSI/NCSL Z540, "Calibration Laboratories and Measuring and Test

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[11] American National Standards Institute, Radiation Protection Instrumentation and Calibration, ANSI N323-1978, September, 1977.

[12] American National Standards Institute, Performance Specifications for Health Physics Instrumentation - Portable Instrumentation for Use in Normal Environmental Conditions, ANSI N42.17A-1989, November, 1988.

Equipment—General Requirements" and/or the ISO/IEC 17025:1999 General Requirements for the Competence of Testing and Calibration Laboratories, with the Certificate of Calibration citing the applicable standard used, and certifying that radiation sources are traceable to NIST."

"Calibration schedules will be staggered to maintain at least two (2) calibrated instrument of each type (i.e., exposure rate instrument, dose rate instrument, direct contamination instrument, smear counter) at the site for the duration of the work effort. A copy of all calibration certificates will be maintained at the site and will be available for review during regulatory inspections."

"Each instrument will be labeled with a unique identifier (e.g., serial number of detector and rate meter) to enable traceability to surveys and records. Prior to each use, or daily when kept in use, each instrument shall be checked for the following, as applicable: battery function, high voltage, response to a reference source, reset button function, audible response function, physical damage, current calibration sticker and response to background radiation. The results of the daily checks will be recorded on forms which will be maintained as part of the project records. Instruments failing any pre-operational check will be taken out of service, segregated from other instruments, tagged as "out of service", and repaired and calibrated prior to use."

Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 55: (Section 14) Submit final status survey plan.
Path Forward No. 55a: The licensee should submit the FSSP.

SMC Response: The requested information is being provided.

Action to be Taken: A Final Status Survey Plan will be prepared pursuant to the guidance found in NUREG-1575, MARSSIM. Section 14.3 of the DP will be revised significantly to remove the design considerations present in Rev. 1, and instead reference a stand-alone Final Status Survey Plan, to be included as an Appendix to the DP. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 56: (Section 14) Justify the approach for determinations of area classification for final status surveys.
Path Forward No. 56a: The licensee should either provide additional justification for its approach to determining area classifications, or should consider modifying the approach. The licensee should use all available information (including historical and current radiological information) to determine area classifications.

SMC Response: Historical information was used to prepare Figure 18.11 of the DP, which shows Area Classifications. That figure outlines the Class 1 and Class 2 areas, and states

that the remainder of the site is designated Class 3. The basis for designating areas as Class 3 in Rev. 1 of the DP was historical information, and characterization data from ENSR 1991 and ORAU 1988. As noted in Section 14.3.4 of the DP, "Class 3 areas are expected to contain levels of residual radioactivity at a small fraction of the DCGL based on site operating history and previous radiation surveys." Since preparation of Figure 18.11, however, SMC has concluded that the "footprint" of some of the Class 1 and Class 2 areas should be expanded in light of historical usage information (i.e., outside areas that were used as transportation paths to the Storage Yard that were formerly designated Class 3 should be re-classified).

Action to be Taken: Because the DCGL's for the unrestricted portion of the property (based on an industrial worker scenario) are being revised, and because additional survey and sampling information is forthcoming (see Action to be Taken in response to RAI No. 7, 9 and 10), all of the area classifications will be reevaluated in accordance with MARSSIM guidance. The Final Status Survey Plan, to be referenced in Chapter 14 of the DP, will include a table that identifies preliminary individual Survey Units for each Survey Area Classification that will be limited by the area limits described in MARSSIM as follows:

Classification	Maximum Survey Unit Size
Outside Areas	
Class 1	2,000 m^2
Class 2	2,000 - 10,000 m^2
Class 3	no limit
Buildings and Structures	
Class 1	100 m^2 floor area
Class 2	100 - 1,000 m^2
Class 3	no limit

Included as well will be survey unit size limitations, the approximate area for each preliminary survey unit, and a commitment to re-classify survey units to more conservative classifications if the final status survey data indicates residual radioactivity in excess of the levels anticipated in the preparation of the final status survey plan. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 57: (Section 14) Provide justification for statements about adequacy of characterization.
Path Forward No. 57a: If the licensee is relying on statements or conclusions about the adequacy of characterization efforts, it should support those statements by explaining how and when these areas were characterized and why that was sufficient. If, instead, the licensee plans further characterization of certain areas prior to the Final Status Survey (FSS), then the licensee should indicate this.

SMC Response: The 1991 site characterization results from ENSR give analytical results for 29 sample points to the north of the property line and north of the Storage Yard. These data are sufficient to characterize the radiological status of that location. The area will nonetheless be included in the Final Status Survey because of the potential for impact from the licensed operations over the years.[13] Once the DCGL for unrestricted release is fully developed, the area outside of the Storage Yard, on the north boundary, will be compared to that value and then classified as either Class 1, Class 2 or Class 3 for the Final Status Survey.

The area outside the property line and along the Hudson Branch watershed will also be classified as Class 1, Class 2, or Class 3 based on unrestricted use DCGLs for soil, the data acquired by ENSR in 1991 and additional data that will be collected during the December, 2007 sampling campaign.

Action to be Taken: Section 14.1 will be revised to include the findings of the supplemental measurement/sampling efforts to be performed in response to RAI No. 9, 10 and those that pertain to the material to be consolidated under the engineered barrier. In addition, Section 14.1.6 will be expanded to further explain why SMC considers the characterization surveys to be adequate for demonstrating that significant quantities of residual radioactivity have not gone undetected. For those areas that were not surveyed, a discussion as to why they were not and what the path forward will be will be included. Rev. 1b of the DP that captures these commitments will be provided to the USNRC by May 16, 2008.

RAI No. 58: (Section 14) Provide complete plans for final status surveys of buildings.
Path Forward No. 58a: The licensee should provide a FSS Plan that addresses building surface surveys. The licensee should justify adequacy of the MDCs, relative to the DCGLs for building surfaces.

SMC Response: Section 14.3 of the DP will be revised to include detail about final status surveys of building surfaces. Survey unit sizes for building surfaces will be described in Section 14.3.6 as indicated in the response for RAI 56. Additional sections will be added to DP section 14.3 to describe final status surveys of building surfaces

Site specific DCGLs will be developed for building surfaces based on an industrial worker scenario. The values presented in Table 17.11 are based on a residential scenario, and are

[13] The sample results show activity concentrations ranging from background to slightly above for Th-232, U-238 and Ra-226.

considered to be too restrictive.[14] The values in Table 17.11 will be replaced with DCGLs from a site-specific model for an industrial worker.

The MDCs for scans of surfaces, shown in Table 17.12 of the DP, will be reevaluated using guidance from NUREG-1507, *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions*, 1998. If the scan MDC is unable to see DCGL then the number of measurements within the survey unit will be increased using guidance from MARSSIM section 5.5.2.4. This will be described in the Final Status Survey Plan that will be included as an Appendix to Rev 1b of the DP and submitted to the USNRC by May 16, 2008.

Action to be Taken: (1) Section 14.3 of the DP will be revised significantly to only reference a stand-alone Final Status Survey Plan, which will be included as an Appendix to the DP. (2) Site-specific building surface DCGLs will be developed for the industrial worker scenario; these building surface DCGLs will replace the screening DCGLs that are currently in Table 17.11 of the DP. (3) Table 17.11 will be revised based on guidance contained in NUREG-1507. (4) The Final Status Survey Plan will include provisions for building surface surveys.

RAI No. 59: (Section 14) Clarify the applicability of the proposed criteria for release of materials and equipment.
Path Forward No. 59a: The licensee should clarify that the criteria will only be applied to surface-contaminated materials. If the licensee intends to release materials or equipment that becomes volumetrically contaminated, the licensee should describe and justify criteria to be used.

SMC Response: The requested information is being provided.

Action to be Taken: The first paragraph of Section 14.2.1 will be modified to read as follows: "Release surveys for materials and equipment that may become surface-contaminated during decommissioning will be performed using portable radiation survey instruments. Since it will not be possible to distinguish between radioactivity from thorium or uranium using portable instruments, SMC will use the more restrictive levels for thorium in Table 1 of ANSI/HPS N13.12-1999, "Surface and Volume Radioactivity Standards for Clearance" as the acceptable surface contamination level for release of the object. The thorium and uranium release criteria are 600 and 6,000 dpm/l00 cm^2, respectively. Items that may be volumetrically contaminated must meet the volume screening criterion for thorium (i.e., 3 pCi/g) in Table 1 of the ANSI Standard." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

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[14] Federal Register, Vol. 63. No. 222, Wednesday, November 18, 1998 pages 64132 through 64134, recognized that the screening values from NUREG-5512, Vol. 3, Table 5.19, for alpha emitting radionuclides, were too restrictive and therefore did not publish them in the Table 1 of this FR notice and they were subsequently not published in NUREG-1757. The FR notice further recommends that licensees are encouraged to use, site-specific dose assessments based on actual site conditions.

RAI No. 60: (Section 15) Update the cost estimate for decommissioning and the amount of funding necessary for the long-term control and maintenance fund.
Path Forward No. 60a: To the extent that costs to meet the conditions of the LTC license may change in
response to the RAIs transmitted here, update the cost estimate for decommissioning and the amount of funding necessary for the long-term control and maintenance fund. The update should include changes that affect cost such as changes in the volume of material proposed for consolidation in the cell, changes in cap construction, and changes in long-term monitoring and maintenance.

SMC Response: The requested information is being provided.

Action to be Taken: The cost estimates will be revised based on changes incorporated into the DP in response to these RAIs. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 61: (Section 16.3.1) Update the status of the State's response regarding the State government role in providing a durable institutional control or independent third party arrangement.
Path Forward No. 61a: SMC should revise Section 16.3.1 of the DP (Rev. 1) to describe the status of its request and indicate that it will continue to propose the LTC license option based on the record summarized above that indicates the State of New Jersey is likely to reject a role. However, SMC should continue its communications with the State and provide NRC with the State's response when it is received. The DP should also explain that the State's response is not part of the initial eligibility requirement for restricted use under 10 CFR.

SMC Response: The requested information is being provided.

Action to be Taken: Attachment 11 contains copies of the communications between the State and SMC. Section 16.3.1 will be modified to include the updated information on those communications and indicate that SMC will continue to propose the LTC license option. As documented in Attachment 11, the State of New Jersey will not evaluate assuming a role in providing a durable institutional controls unless SMC provides proprietary financial information that is irrelevant to the potential role of the State in providing institutional controls. The NJDEP letter of October 1, 2007 states that NJ intends not to respond to any more correspondence from SMC on this subject. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 62: (Section 16.3.1) Clarify the basis for not selecting a local government role with durable institutional control or independent third party arrangements.
Path Forward No. 62a: Revise Section 16.3.1 of the DP (Rev. 1) to reflect the discussion above and correct the record.

SMC Response: The requested information is being provided, however the request pertains to Section 16.2 and not 16.3.1.

Action to be Taken: A new second-to-last paragraph in Section 16.2 will be added to read as follows: "In Rev. 0 of the DP, SMC proposed retaining title to the Newfield property until such time as all remaining plant operations cease, at which time, title would be turned over to the Borough of Newfield, along with sufficient funds to insure the property's perpetual care. However, pursuant to the USNRC's guidance on using a risk-informed graded approach for selecting institutional controls, State or Federal control would be considered more appropriate, the proposed plan to transfer of the property to the Borough were abandoned." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 63: (Section 16.3.1) Correct the discussion in the DP that NRC has agreed to issue the LTC license as part of the overall approval of the DP.
Path Forward No. 63a: Revise the statement in Section 16.3.1 to be consistent with Section 8.5 and the NRC guidance on the LTC license as summarized above.

SMC Response: The requested information is being provided.

Action to be Taken: The first paragraph of Section 16.3.1 will be modified to read as follows: "The primary means of ensuring institutional control over the restricted area of the decommissioned Newfield site will be perpetual USNRC oversight in accordance with the provisions outlined herein. The form of control will be set forth in an amendment of License No. SMB-743 after completion and regulatory approval of decommissioning activities. Under the terms of the LTC license, SMC will be legally required to remain in compliance with the conditions of the license and, as with any licensee, take the necessary corrective actions if they are not in compliance." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 64: (Section 16.3.1) Correct the statements regarding NRC terminating the LTC license.
Path Forward No. 64a: Section 16.3.1 should be revised as follows: "Under the LTC license, SMC would be legally required to remain in compliance with the conditions of the license and, as with any licensee, take the necessary corrective actions if they are not in compliance." Furthermore, NRC could take a variety of actions, including enforcement, to correct compliance problems.

SMC Response: The requested information is being provided.

Action to be Taken: See Action to be Taken in response to RAI No. 63.

RAI No. 65: (Section 16.3.1) Clarify the purpose of the proposed deed notice.
Path Forward No. 65a: SMC has two options. First, Section 16.3.1 could be revised to discuss the purpose of the deed notice as described above and in NRC's guidance (note that footnote 97 of Section 5.3 provides a better discussion of the deed notice and LTC license than Section 16.3.1). Second, SMC could describe why it believes the deed notice is a legally enforceable institutional control that can restrict future site use, in addition to simply informing future owners of NRC's LTC license.

SMC Response: The requested action will be taken (i.e., the DP will be modified in accordance with the first option outlined in the RAI).

Action to be Taken: The third paragraph of Section 16.3.1 will be modified to read as follows: "In addition, SMC will document the restrictions established in the LTC license in the form of a legal document recognized by and recorded with Gloucester County. The contents of the deed notice will be prepared and submitted for USNRC approval as part of the final decommissioning and final status survey report (see Section 14.3.15). Once filed, it will also serve to alert any future owners of the restricted area that the property brings with it all of the obligations of License No. SMB-743, and that they must establish, re-record and maintain a deed notice, to be approved by the USNRC, as a condition of the license." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 66: (Section 16.3.1) Identification of institutional controls and their role in compliance. **Path Forward No. 66a:** Clarify the discussion in Section 16.3.1 to indicate the existing institutional controls and their role, if any, in demonstrating compliance.

SMC Response: See response to RAI No. 13 regarding the use of non-residential soil clean-up criteria to form the basis for the CERCLA remedial action evaluations and the institutional controls and associated NJDEP regulatory requirements for monitoring their implementation in the future. With respect to the natural resource restoration requirements that require much of the site to be replanted with trees, NJDEP's approval of the Natural Resource Restoration Plan (NRRP) required that the restoration area be placed under a conservation easement documented within a deed restriction.

Action to be Taken: Section 16.3.1 will be revised as follows to reflect the institutional controls described above and their role in demonstrating compliance: "In addition to the institutional controls described above, other institutional controls will be established under a natural resources damage settlement and it is anticipated that institutional controls will be established under CERCLA remedial actions at the facility. The natural resource restoration requirements applicable to 9.65 acres of the Newfield facility (outside of the limits of the Storage Yard), will necessitate the planting and maintenance of upland tree areas, a requirement that will help prevent future development of the planted areas. In addition, all CERCLA soil remedial analyses conducted for the SMC facility to date have been based on the use of non-residential soil cleanup criteria in combination with institutional controls to prevent future residential site use, in keeping with New Jersey site remediation regulations. Therefore, it is fully expected that once CERCLA soil remediation activities are complete, residential use of the site will be precluded by institutional controls will be implemented in accordance with NJAC 7:26E-8. The requirements for institutional controls established at NJAC 7:26E-8 include continued monitoring of future land use and the submittal of biennial reports certifying that the institutional control(s) are being maintained in a manner that is protective of human health." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 67: Section 16.3.1) The discussion of prohibited and permitted uses of the restricted area is scattered and unclear.
Path Forward No. 67a: Section 16.3.1 should be revised to provide one clear and comprehensive discussion of both prohibited and permitted uses based on the risk insights from dose assessments and analyses of human processes that could disrupt the performance of the engineered barrier. It should be clear that both prohibited and permitted uses should eventually be incorporated into the LTC license, LTC Plan, and be provided for information in the deed notice. For permitted uses, the licensee should reference dose assessment results as a basis for demonstrating that the hours per year that workers would need for inspection and maintenance will be safe and thus permitted. These results could also be used for concluding that inspections by others, such as NRC or the State will also be safe, and therefore permitted.

SMC Response: The requested information is being provided.

Action to be Taken: The second paragraph of Section 16.3.1 will be modified to read as follows: "The purpose of the LTC license is to provide the legally enforceable and durable institutional controls required by 10 CFR 20.1403(b) to ensure the long-term protection of the public health, safety, and the environment. The conditions incorporated into the LTC license would specify the necessary controls to limit site access and land use that the licensee must monitor and maintain and that the USNRC would inspect and enforce, if necessary. These would include the following:

- Prohibitions on agricultural, residential and industrial activities within the restricted area;
- Prohibitions on demolition, excavation, digging, drilling or any other activity that might result in the removal or breach of the engineered barrier;
- Prohibitions on the disturbance of soil, ground or groundwater within the restricted area;
- Prohibitions on the use or removal of soil, ground or groundwater from the restricted area.

The LTC license would also specify other required long-term control activities to be conducted by SMC. These would include the following:

- Fence maintenance;
- Warning sign maintenance;
- Planned and periodic inspections of the restricted area and the engineered barrier for settlement, erosion or other breaches;

- Routine and adverse-event monitoring of the ambient radiation environment;
- Adverse event surveillance;
- Visitor access logs;
- Planned and periodic audits of the long-term control program; and
- Air and/or groundwater monitoring to be undertaken only in response to a significant breach of the engineered barrier."

Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 68: (Section 16.3.2) Clarify the use of barricades to restrict access to the restricted area.
Path Forward No. 68a: Further discuss the purpose, extent, and method proposed for barricading the restricted area, including the roads. If major excavation that requires use of heavy equipment is considered an adverse disruptive human process, the design of the engineered barriers should discourage the potential for future excavation of the cover with heavy equipment. Describe the barricade materials such as very large sized durable rock that may be low maintenance and not need replacement, or concrete that could need maintenance and replacement.

SMC Response: Barricades are not required and will not be installed on any of the access roads to the restricted area.

Action to be Taken: The last item in the second bulleted list in Section 16.4 will be modified to read as follows: "SMC will maintain all roads that surround or approach the restricted area." Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 69: (Section 16.4) Long-term monitoring plans in Section 16.4 are incomplete and no risk-informed basis is given.
Path Forward No. 69a: Reevaluate the monitoring activities in the DP using the process described above and in NRC's decommissioning guidance. Revise the discussion of monitoring activities based on this evaluation, and describe the basis for the monitoring identified. Consider long- term monitoring of: groundwater contamination; slag and baghouse weathering and leaching; settlement of the cover and disruption of the shielding and erosion cover. The LTC plan that would eventually be proposed after decommissioning activities are completed should identify the detailed procedures. Revise the cost estimates in Section 15.1 of the DP (Rev. 1) to reflect the revised long- term monitoring plan as described in the DP (Rev. 1).

SMC Response: If institutional controls should fail at the Newfield site, under even the most conservative use scenarios, the dose potential to members of the public is well-below the 100 millirem TEDE limit established in 10 CFR 20.1403. Therefore, after

implementation of the DP, the site would ordinarily be considered "low risk", which would require the implementation of legally-enforceable institutional controls only.[15] However, USNRC guidance states that certain sites regardless of the dose potential (i.e., those where the half-life of the residual radioactivity is greater than 100 years), are to be classified as "high risk", which mandates more reliable or sustainable protection be maintained over the time period of interest.

The relevant dose pathway, even under the most extreme scenarios, is the external exposure pathway. The effective control of releases via the external exposure pathway is through the engineered barrier. The only disruptive process that could lead to non-compliance with the applicable dose criteria would be the removal of the barrier. Thus, the only monitoring activities that would be necessary would be those required to identify such a disruptive process: radiation monitoring around the perimeter of the restricted area and inspection and surveillance of the barrier during routine patrols and after potentially significant events (e.g., significant storms, intruder activity, etc.).

In regard to the USNRC's request to consider long-term monitoring of the groundwater, dose modeling indicates that, even after hundreds of years, ground water impacts would not occur. (This assessment is confirmed by the fact that the materials in the Storage Yard have been located there, uncovered, for over 50 years with no impact on the groundwater.) In light of the long transit time from the contaminated zone to the groundwater, a groundwater monitoring program would not be capable of identifying cap disruption in as timely a fashion as the radiation monitoring and surveillance programs that will be required by the LTC license.

In regard to the request to consider monitoring of slag and baghouse dust weathering and leaching, because the materials beneath the engineered barrier will be covered by layers of sand, clay, and rock, weathering could not be observed without removal of all or a portion of the cap, the results of which would be noted during routine radiation monitoring and surveillance.

In regard to the request to consider monitoring of cover settlement and erosion, the nature of the underlying materials and the robust design of the engineer barrier should preclude such disruption; should it occur, the most timely means of identifying it is during routine radiation monitoring and surveillance and inspections of the barrier.

The monitoring activities outlined in Section 16.3 of the DP (i.e., periodic inspections, adverse event surveillance and passive/active radiation monitoring) are the most appropriate means of identifying disruptions such as cover settlement and erosion of the cap, since cap breaches are the only disruption with the potential to increase radiation exposure potentials significantly above background. SMC maintains that this approach is sound and no further action is required.

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[15] U. S. Nuclear Regulatory Commission, NUREG-1757, Vol. 1, Rev. 2, Appendix M. Section M.2.

Action to be Taken: See Action to be Taken in response to RAI No. 67.

RAI No. 70: (Section 16.4) Long-term maintenance plans in Section 16.4 are incomplete and no risk-informed basis is given.

Path Forward No. 70a: Reevaluate the maintenance activities in the DP using the process described above and in NRC's decommissioning guidance. Revise the maintenance activities based on this evaluation, and describe the basis for the maintenance identified. Consider long-term maintenance of the following actions: cover settlement, disruption of the shielding and erosion cover, and the duration of maintenance.

SMC Response: See Response to RAI No. 69.

Action to be Taken: Section 8.3 of the DP will be revised to reflect the reevaluation of maintenance activities based on the analysis described in response to RAI No. 23. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

Path Forward No. 70b: Revise the cost estimates in Section 15.1 of the DP (Rev. 1) for the revised long-term maintenance plans.

SMC Response: The requested information is being provided.

Action to be Taken: The cost estimates in Section 15.1 of the DP will be revised accordingly to reflect the reevaluation of maintenance activities presented in Section 8.3 of the DP. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

Path Forward No. 70c: Add a discussion of the robust design of the erosion barrier and how the design provides the basis for no ongoing active maintenance or periodic repair.

SMC Response: The erosion barrier components of the engineered barrier presented in Rev. 1a of the DP will remain largely unchanged in the fine-tuned engineered barrier design to be presented in Rev. 1b of the DP. The erosion barrier components have been designed in accordance with NUREG-1757 and NUREG-1623, Design of Erosion Protection for Long-Term Stabilization. NUREG-1623 provides methods, guidelines and procedures to be used for designing long-term protection with respect to erosion, with the following specific objectives: 1) preventing radioactive releases due to erosion; 2) providing long-term stability; 3) designing for minimal maintenance; and 4) meeting radon release limits. The guidance requires that a barrier be designed to resist severe localized rainfall events and large floods on nearby streams. The engineering barrier described in the DP has been designed to meet the flooding and erosion protection criteria of NUREG-1623 using the Probable Maximum Precipitation (PMP) as the design rainfall event and the Probable Maximum Flood (PMF) as the design flood.

The design of the layer of rock to be installed over the top and sides of the barrier in accordance with the guidelines of NUREG-1623 ensures that the engineered barrier meets cover design option 3 (soil covers totally protected by a layer of rock riprap on both the top and side slopes) as defined in NUREG-1623. NUREG-1623 states that "The preferred options to design a cover system are Options 1, 2, and 3; such designs will be stable and will be effective for a 1,000 year period." As described in the response to RAI 19, the stone materials to be used on the surface of the barrier will be selected and sized to meet the durability requirements of NUREG-1623 and NUREG-1757, and construction specifications and QA/QC procedures will be provided in accordance with NUREG-1623 guidance that will ensure the quality and proper placement of the riprap. Petrographic analyses and available published data will be used to determine the absence or presence of heterogeneities that could impact the potential degradation of the rock. NUREG-1623 notes that following the NUREG-1623 methodology "will provide reasonable assurance of the effectiveness of the rock over the design lifetime of the project."

Action to be Taken: By documenting the design of the engineered barrier in accordance with NUREG-1623 and NUREG-1757 (as described above) in Section 8.3 and associated appendices of the DP (Rev. 1b), the robustness of the erosion barrier will be demonstrated and the lack of required maintenance with respect to erosion justified. Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008.

RAI No. 71: (Section 16) An opportunity should be provided for continued SSAB meetings to inform the SSAB of changes that might result from the NRC RAIs.
Path Forward No. 71a: As a follow-on to NRC issue No. 18 and as a matter of good practice, SMC should determine if there is interest in future SSAB meetings to keep the SSAB informed. SMC could discuss the NRC RAIs related to the four questions and its responses. SMC and the SSAB may also want to discuss other topics for general information and background for the four questions.

SMC Response: (a) The regulations in 10 CFR §20.1403(d) require that the advice of individuals and institutions in the community who may be affected by the decommissioning be sought on four specific questions and incorporated into the DP, as appropriate, following analysis of that advice. The SSAB was established by SMC for that purpose and input from SSAB members was elicited on the four questions required by NRC regulations. Public input was considered prior to preparation of the DP. Therefore, the SSAB has served its purpose and its mission is complete.

The SSAB held four meetings. At the conclusion of the fourth SSAB meeting on September 21, 2005, the SSAB stated that there was no interest in another meeting, as documented in the transcript of the fourth SSAB meeting (provided in Appendix 19.7 of the DP). SMC believes that the SSAB process was therefore successful in informing the community fully of SMC's plans with regard to decommissioning of the Newfield facility and receiving interested parties' input with respect to those plans. That input and SMC's analysis of it is summarized in Section 16.5.4 of the DP. Based on these discussions with the SSAB and in

the institution of licensing proceedings related to the DP, it is SMC's belief that further productive discussions with members of the community are unlikely prior to the NRC's issuance of its safety evaluation report and environmental impact statement (EIS).

(b) 10 C.F.R. Part 51 provides for public comment on the EIS. The NRC has provided notice of its intent to prepare an EIS on the DP. 71 Fed. Reg. 78,232 (2006). 10 C.F.R. §§ 51.73 and 74 require the NRC to distribute the draft EIS and solicit comments on it. Public review and the opportunity for submitting comments on the draft EIS will provide an opportunity for public input that will supplement, and be broader than, convening the SSAB.

(c) Following the submission of the DP, NRC provided notice of the submission and a hearing opportunity. In response to the notice several hearing requests were submitted and an NRC Atomic Safety and Licensing Board was established. The Board has determined that the NJDEP has submitted an admissible contention that will potentially be the subject of evidentiary hearings. The hearing process will provide an additional means for the public to be informed about the DP.

(d) SMC is committed to issuing a revision to the DP that will clarify, where needed, certain aspects of the DP, describe additional analysis, and present additional data. Continuing the on-going public information effort described in DP Section 16.5.5, SMC will make this revision available on its website. The DP revision will serve to further inform the public and provide an opportunity for public input consistent with the NRC guidance in NUREG-1757, Appendix M, pages M-30 to M-31. SMC will utilize the following methods to elicit public comments on the revised DP:

- Upon issuing the revised DP SMC will solicit additional input on any of the four questions set forth in 10 C.F.R. § 20.1403(d) that are significantly impacted by the revised DP. At this time, SMC envisions sending to each SSAB member and making generally available to the public an input form, similar to that provided previously (see DP, Appendix 19.9). SMC anticipates that only one of the four questions set forth in 10 C.F.R. § 20.1403(d) will be need to be addressed is 10 C.F.R. § 20.1403(d)(i)(1)(A), i.e., the question dealing with reasonable assurance of meeting radiation dose criteria.

- SMC will review the public input received. If significant input is received, SMC will provide copies of the input and SMC's analysis to the NRC. If warranted, SMC will also revise the DP.

Meaningful public input was received via the SSAB in the process of developing the current DP. The NRC regulations provide several other means for members of the public, including the SSAB, to provide input after the DP is filed. Those means are currently being utilized and will remain in place as the licensing evaluation of the DP continues.

Action to be Taken: Once Rev. 1b of the DP is issued, SMC will solicit additional input from the public and the SSAB in regard to the issues raised in 10 C.F.R. § 20.1403(d). Any input received will be evaluated by SMC and that evaluation, with copies of the input, will be provided to the USNRC within 60 days of receipt by SMC. If warranted, SMC will also revise the DP.

RAI No. 72: (Section 16.5) Provide a response to the SSAB, local community, and other affected parties that explains the reasons why SMC believes it cannot select the removal alternative.
Path Forward No. 72a: Discuss the reasons why the removal alternative is not feasible for SMC and provide evidence that documents the reasons. Include a discussion of obstacles to removal for reuse and removal for disposal. For example, if applicable, include a thorough discussion and evidence of insufficient funds for disposal, considering all potential sources of funds such as funds available to SMC, as well as funds which some parties might assume could be available from the SMC holding company and disposal options, such as partial removal of radioactive material, potential disposal at facilities other than EnergySolutions.

SMC Response: Section 16.5.4 of the DP summarized the input received from the SSAB in regard to the issues outlined in 10 CFR 20.1403(d). There were only three (3) valid concerns raised in regard to undue burden on the community from the proposed institutional controls.[16] These were:

- The controls would prevent development of the rest of the SMC site and surrounding properties.

- The property should be subdivided such that the unrestricted portion can be used for other purposes.

- Impact on property values and rateables is unknown.

In all cases, SMC provided a response that explicitly addressed each concern and provided a description of the actions to be taken in order to address the concern, as applicable. SMC maintains that reasons for incorporating or not incorporating guidance from the SSAB, in cases where guidance was actually provided, were clearly stated.

SMC understands that members of the local community are opposed to the preferred decommissioning alternative for the Newfield site, but none of the burdens or other concerns raised by the SSAB, with one exception, could have influenced the decision-making process. SMC did agree to include in the DP a provision for subdividing the property in the DP, such that non-residential development of the unrestricted area would not be hampered by the preferred alternative. SMC also pointed out to the SSAB, both in Section 16.5.4 of the DP and during the various meetings of the group, that radiological conditions at the property after implementation of either the LTC (long term control) option or the LT (license

[16] The only other issue raised was merely a statement about the lack of available information.

termination) option would be identical, since both demand compliance with a 25 millirem TEDE maximum dose limit. Furthermore, the radiological risks associated with either option would be indistinguishable from those at any other commercial or industrial property in Newfield. SMC knows of no valid scientific, regulatory or health drivers that could result in decreases in property values.

Whether sufficient funding is available for implementing the LT option is irrelevant to the selection of preferred options. The selection process was designed to ensure the option with the lowest associated overall cost and dose/risk was the preferred option. SMC has gone through the process and has clearly demonstrated that any option other than the LTC option offers increased costs and risk potential. SMC's responses to the RAIs regarding incremental removal of the material off-site demonstrates that partial removal of the residual radioactivity does not reduce the risk potential further. The expenditure of funds to ship materials off-site with no associated benefit to the community is not consistent with the ALARA philosophy.

Action to be Taken: None required.

RAI No. 73: (Section 16) No identification or description of the total system, its elements and contribution to protection was provided.
Path Forward No. 73a: Use NRC's decommissioning guidance to prepare a description of the total system of controls used to provide protection, its elements, and the purpose and contribution to protection of each element. SMC should provide a discussion that could enhance the NRC staff's understanding of its proposed alternative and help affected parties understand how SMC believes all the elements of their total system work together to provide sustained protection.

SMC Response: The requested information is being provided.

Action to be Taken: Section 16.1 will be modified to read as follows: "This Chapter of the SMC Decommissioning Plan demonstrates that when License No. SMB-743 is terminated, the requirements of 10 CFR 20.1403 will have been met. Included in this discussion is the eligibility determination (Section 16.1), a discussion of institutional controls in place to support this action (Section 16.2), a discussion of public involvement (Section 16.3), and a summary of dose modeling and ALARA demonstration (Section 16.4).

Release of the Newfield facility for unrestricted use is not appropriate because the alternatives present greater public/environmental harm and because the cost of achieving unrestricted release is excessive when compared to the cost of achieving the same dose objective by restricting site use to eliminate exposure pathways. In order to impose the necessary restrictions, SMC proposes a total system of controls that is comprised of the following elements:

- Legally enforceable institutional controls in the form of an LTC license issued by the USNRC (a federal agency) and the filing of a deed notice, which will include

restrictions on land uses and activities, as well as provisions for long-term monitoring and maintenance, all of which will ensure negligible radiation dose potentials;

- A robust and durable engineered barrier that will ensure radiation exposures to population groups are indistinguishable from background exposures with all controls in place, and less than 100 millirem TEDE in the unlikely event that controls fail;

- Monitoring in the form of passive and active radiation surveillance, routine patrols and inspections in order to track the continued effectiveness of the engineered barrier and ascertain its physical condition;

- Maintenance of the engineered barrier, access roads, signage and vegetation control in order to ensure the continued effectiveness of the engineered barrier for dose control;

- Independent third party oversight of SMC's activities and commitments in the form of routine inspections by the USNRC; and

- Funding in the form of a trust, for the benefit of the USNRC, that would ensure sufficient moneys for radiation surveillance, site security and maintenance, engineered barrier maintenance and repair, licensing and inspection fees, annual reporting, and trust fund fees and expenses in perpetuity.

All of these elements work together to sustain the protection afforded by the decommissioning approach outlined herein by keeping the residual radioactivity contained, ensuring the containment remains in place and effective, providing oversight of all commitments, and assuring the availability of funding for all of these things indefinitely."

Rev. 1b of the DP that captures this commitment will be provided to the USNRC by May 16, 2008. In addition, the minor issues and typographical errors identified by the USNRC on page 42 and 43 of the July 5, 2007 will be resolved in Rev. 1b.

Response to
July 5, 2007 Request for Additional Information
DECOMMISSIONING PLAN
SHIELDALLOY METALLURGICAL CORPORATION, NEWFIELD, NJ

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SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

Prepared by
Integrated Environmental Management, Inc.
and
TRC Environmental Corporation

November 9, 2007

Shieldalloy
Metallurgical
Corporation

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November 9, 2007

Keith I. McConnell
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management Programs
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Response to "Request for Additional Information for Safety Review of Proposed Decommissioning Plan for Shieldalloy Metallurgical Corporation, Newfield, New Jersey" (License No. SMB-743)

Dear Mr. McConnell:

Shieldalloy Metallurgical Corporation (SMC) is in receipt of your July 5, 2007 request for additional information on the "Decommissioning Plan for the Newfield Facility" (Report No. 94005/G-28247, Rev. 1a), hereinafter referred to as the "DP". The purpose of this letter is to respond to your requests. Specifically, the enclosure to this letter transmits additional information, proposed modifications to Rev. 1a of the DP and other commitments pertinent to your inquiries.

If you have any questions or if I can provide you with additional information, I can be reached at (856)362-8680. We look forward to the timely approval of the DP

Sincerely,

David R. Smith
Radiation Safety Officer

cc:
w/enc. (electronic): Eric Jackson - SMC
David J. White Ph.D. - SMC
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