RAS 12932

State of New Jersey

JON S. CORZINE
Governor

OFFICE OF THE ATTORNEY GENERAL
DEPARTMENT OF LAW AND PUBLIC SAFETY
DIVISION OF LAW
25 MARKET STREET
PO BOX 093
TRENTON, NJ 08625-0093

STUART RABNER
Attorney General

ROBERT J. GILSON
Director

DOCKETED
USNRC

January 16, 2007 (4:54pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Docket No. 40-7102-MLA

January 16, 2007

via email and first class mail
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
Attention: Rulemakings and Adjudications Staff

Re: Petition for Hearing on the Shieldalloy Metallurgical Corporation (License No. SMB-743) Decommissioning Plan (Docket No. 04007102)

Dear Staff:

Enclosed for filing, please find an original and two copies of the Petition for a Hearing on the Shieldalloy Metallurgical Corporation (License No. SMB-743) Decommissioning Plan (Docket No. 04007102), the Declarations and/or reports of Michael Malusis, Jennifer Goodman, Steven Sayd, Donna Gaffigan, Timothy Disbrow, John Burke, exhibits, and a certification of service. This Petition is being filed on behalf of the New Jersey Department of Environmental Protection ("NJDEP").

Service on the NJDEP should be provided to me at the address listed below. My email address is reeseand@dol.lps.state.nj.us.

Sincerely yours,

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY

By: Andrew Reese
Andrew D. Reese
Deputy Attorney General

Template=SECY-037

SECY-02

c: **via UPS overnight mail**
David R. Smith, Radiation Safety Officer
Shieldalloy Metallurgical Corporation
12 West Boulevard
PO Box 768
Newfield, New Jersey 08344-0768

via email and UPS overnight mail
Office of the General Counsel
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

UNITED STATES NUCLEAR REGULATORY COMMISSION

Docket No. 04007102

IN RE PETITION FOR A HEARING on)
the SHIELDALLOY METALLURGICAL
CORP. DECOMMISSIONING PLAN,)
pursuant to 10 C.F.R. § 2.309
and 42 U.S.C. § 2239(a)(1))
(A)
)

PETITION FOR A HEARING
PART I OF III

Technical Contentions

Submitted by:

State of New Jersey,
Department of Environmental Protection

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
(609) 292-1509

Andrew D. Reese
Kenneth W. Elwell
Deputy Attorneys General
On the Petition

TABLE OF CONTENTS

PAGE

CASES CITED

FEDERAL STATUTES CITED

FEDERAL REGULATIONS CITED

The New Jersey Department of Environmental Protection ("NJDEP") files this petition for a hearing pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A) seeking a hearing on the decommissioning plan (Docket No. 04007102) ("DP") that was submitted by Shieldalloy Metallurgical Corporation (License No. SMB-743) ("Shieldalloy"). The NJDEP respectfully requests NRC to grant a hearing because Shieldalloy's proposed decommissioning of radioactive waste that will remain a radiological hazard for billions of years will not protect the public health and safety. Furthermore, the Long Term Control ("LTC") license sought by Shieldalloy is not permitted by law.

A State has standing in a proceeding that involves a "facility located within [the State's] boundaries." 10 C.F.R. § 2.309(d)(2)(i). Thus, when a State advises the NRC that a proceeding involves a facility within its borders, the NRC "shall not require a further demonstration of standing." Id. § 2.309(d)(2)(ii).

Contention 1

THE SOIL ON WHICH SHIELDALLOY PROPOSES TO SITE THE RADIOACTIVE WASTE WILL ALLOW RADIONUCLIDES TO CONTAMINATE THE GROUNDWATER.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

Shieldalloy proposes to conduct onsite disposal of its radioactive waste on native soil without any protective liner. However, disposal of Radioactive waste should not be conducted in this area because the radionuclides will easily infiltrate the relatively thin layer of soil (the vadose zone) and enter the underlying groundwater. Malusis Report[1] page 4.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of radioactive waste.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099,

[1] "Malusis Report" refers to the letter sent by Michael Malusis to Kenneth Elwell dated January 16, 2007.

2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983).

The License Termination Rule ("LTR") requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes to conduct onsite disposal of its radioactive waste on native soil.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to maintain the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently isolate the Radioactive waste. 42 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP proposes to dispose the Radioactive waste on native soil. However, the vadose zone in this area is relatively thin (2.5 meters) and consists of fine to coarse sand and gravel deposits, followed by a saturated zone layer consisting primarily of coarse sand with little to trace silt. Malusis Report page 4. The DP estimates the saturated hydraulic conductivity of the native vadose zone material at 0.017 m/yr (5.4×10^{-8} cm/s). DP rev. 1a page 39. However, this reported value is a gross underestimate, i.e., the value is representative of a clay-rich soil and is not remotely representative of a relatively clean sand/gravel layer. Malusis Report page 4. The true saturated hydraulic conductivity of this layer likely ranges between 10^{-1} and 10^{-3} cm/s based on the reported texture. Id. As a result, water that infiltrates through the waste material will also infiltrate easily through the vadose zone and into the underlying saturated zone, carrying those contaminants that leach from the waste mass. Id.

The hydraulic conductivity of the saturated zone is estimated at 16,000 m/yr (i.e., 0.05 cm/s), DP rev. 1a page 79, which is consistent with that expected for a coarse sand aquifer, Malusis Report page 4. These hydraulic properties, in addition to the relatively thin vadose zone layer and the absence of an engineered liner system beneath the waste, are not favorable for long-term protection of the groundwater pathway. Id.; Gaffigan Dec. ¶ 11.

The DP appears to justify the onsite disposal under these conditions upon the ability of the vadose zone and saturated zone soils to provide attenuation (i.e., adsorption) of the radionuclides, since the distribution coefficients (K_d) assigned to the vadose zone and saturated zone layers are the same as those assigned to the waste material itself. Malusis Report page 4 (citing DP rev. 1a Table 17.5). Yet, Shieldalloy failed to perform any sorption tests to verify that the underlying soil formations exhibit adsorption capacity for the contaminants of concern. Malusis Report page 4. Moreover, the underlying soils consist primarily of sand, gravel, and little to trace silt. DP rev o Envt'l Report Page 3-13. As a result, the vadose zone and saturated zone materials are largely inert (i.e., do not participate in ion exchange reactions) and may provide little, if any, attenuation of inorganic contaminants (both radioactive and non-radioactive species) that leach from the waste mass. Malusis Report page 4; Spayd Report page 2. In this case, K_d would be close to zero. Malusis Report page 4. The lack of attenuation capacity is an additional concern regarding the long-term protectiveness of the groundwater. Id.

The DP excludes consideration of the groundwater on the basis that it is presently contaminated. DP § 5.2.2.2.4. This area is a relatively populated area. The DP fails to consider that current municipal supply wells are located less than one mile form the site and draw water from the same aquifer that Shieldalloy has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigate wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility. Gaffigan Dec. ¶ 18. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id.

Finally, Shieldalloy should have considered contamination of the Hudson Branch stream since it is fed by groundwater discharge in times of no or low precipitation. Malusis Report page 5; Spayd Report page 3. The stream flows through portions of the Shieldalloy facility and continues through residential and agricultural areas. DP rev o Envt'l Report page 3-17.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP estimates the saturated hydraulic conductivity of the native vadose zone material at 0.017 m/yr (5.4×10^{-8} cm/s). DP rev. 1a page 39. However, this reported value is a gross underestimate, i.e., the value is representative of a clay-rich soil and is not remotely representative of a relatively clean sand/gravel layer. Malusis Report page 4. The true saturated hydraulic conductivity of this layer likely ranges between 10^{-1} and 10^{-3} cm/s based on the reported texture. Id. As a result, water that infiltrates through the waste material will also infiltrate easily through the vadose zone and into the underlying saturated zone, carrying those contaminants that leach from the waste mass. Id.

The DP appears to justify the onsite disposal under these conditions upon the ability of the vadose zone and saturated zone soils to provide attenuation (i.e., adsorption) of the radionuclides, since the distribution coefficients (K_d) assigned to the vadose zone and saturated zone layers are the same as those assigned to the waste material itself. Malusis Report page 4 (citing DP rev. 1a Table 17.5). Yet, Shieldalloy failed to perform any sorption tests to verify that the underlying soil formations exhibit adsorption capacity for the contaminants of concern. Id. Moreover, the underlying soils consist primarily of sand, gravel, and little to trace silt. DP rev o Envt'l Report Page 3-13. As a result, the vadose zone and saturated zone materials are largely inert (i.e., do not participate in ion exchange reactions) and may provide little, if any, attenuation of inorganic contaminants (both radioactive and non-radioactive species) that leach from the waste mass. Id. In this case, K_d would be close to zero. Malusis Report page 4.

The DP excludes consideration of the groundwater on the basis that it is presently contaminated. DP § 5.2.2.2.4. This area is a relatively populated area. The DP fails to consider that current municipal supply wells are located less than one mile form the site and draw water from the same aquifer that Shieldalloy has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigate wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility. Gaffigan Dec. ¶ 18. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id.

Finally, Shieldalloy should have considered contamination of the Hudson Branch stream since it is fed by groundwater discharge in times of no or low precipitation. Malusis Report page 5; Spayd Report page 3. The stream flows through portions of the

Shieldalloy facility and continues through residential and agricultural areas. DP rev o Envt'l Report page 3-17.

Because the Radioactive waste will likely leach contaminants, see Contention 2, and because the proposed cap will likely allow water infiltration, see Contention 3, the DP should be rejected because of the likelihood of groundwater contamination. Malusis Report pages 4-9.

Contention 2

THE DP FAILS TO ACKNOWLEDGE THE LEACHABILITY OF RADIONUCLIDES FROM THE SLAG DESPITE SHIELDALLOY'S OWN TESTS SHOWING THAT THE RADIOACTIVE WASTE WILL LEACH RADIONUCLIDES FROM RAINWATER.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP instead places heavy reliance on the argument that the Radioactive waste will resist leaching contaminants. Malusis Report page 5. However, Shieldalloy's own tests show that the Radioactive waste does leach contaminants. Id. page 6. Furthermore, because of the volume of Radioactive waste and the fact that no tests were performed on the baghouse dust, more tests should have been completed. Id. Also, the type of tests actually conducted may not provide an accurate representation of long-term leaching behavior, which should be required in this case because of the long half lives of the materials. Id.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires the "permanent isolation" of low-level radioactive waste. Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. Pac. Gas & Elec., 461 U.S. at 207.

The LTR requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that relies upon the argument that the materials will resist leachability. DP rev. 1a page 41.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to meet the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently isolate the Radioactive waste. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7). The DP relies heavily on their argument that the materials resist leaching. DP rev. 1a page 41.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

In each of the TCLP tests, the combined concentration of leached radium isotopes (i.e., Ra-226 and Ra-228 combined) easily exceeded the Maximum Contaminant Level (MCL) of 5 pCi/L established in the National Primary Drinking Water Regulations. Malusis Report page 6. The combined radium concentration in the leachant from the TCLP test on the slag was 6,660 pCi/L (more than 1,000 times the MCL), and the combined radium concentrations in the leachant from the two TCLP tests on the baghouse dust were 32.6 pCi/L and 19.39 pCi/L. Id. In addition, the EP Toxicity tests performed on the ferrocolumbium slag samples in 1987 indicate that the slag releases barium (Ba) at concentrations in excess of the drinking water MCL of 2 mg/L. Leached Ba concentrations from the two slag samples were 14 and 23 mg/L. Id.

While it is acknowledged that the population would not be directly exposed to undiluted leachate, the above results are sufficient to cause concern regarding potential degradation of the groundwater due to release of contaminants from the waste. There are some significant overall limitations associated with the leaching tests that also warrant consideration. Id. First, no tests appear to have been conducted on the baghouse dust to evaluate the potential for leaching of non-radioactive contaminants (e.g., heavy metals) despite the fact that the baghouse dust represents approximately 20% of the radioactive waste volume to be disposed. Id. The contaminated soils and building materials were not analyzed for leachability of radionuclides. Gaffigan Dec. ¶ 13. Also TCLP leachate for the slag and baghouse dust was only analyzed for radionuclides. Id. The leachate should have also been analyzed for chemical contaminants pursuant to RCRA to determine if they are hazardous waste and possibly banned from land disposal. Id. Even if the results are below the limits for hazardous waste classification, the TCLP results will indicate if any of the materials are contaminated with metals or other contaminants that may be leachable and present a continuing source of ground water contamination. Id.

Second, the number of leaching tests performed is insufficient to assess potential variability in the leaching behavior of the waste materials and establish statistical confidence that the test results are representative of the waste mass as a whole. Malusis Report page 6. Only three samples of slag (for more than 30,000 cubic meters of a variety of slags) and two samples of baghouse dust (for more than 13,000 cubic meters of dust) were subjected to TCLP and subsequent radionuclide analysis. Gaffigan Dec. ¶ 15.

Third, the leached concentrations reported may not represent equilibrium conditions. Id. The standard test durations for the TCLP and EP Toxicity tests are 18 and 24 hours, respectively. Id. No demonstration apparently has been performed to verify that these testing durations are sufficient to allow equilibrium conditions to be established between the liquid and solid phases (i.e., to allow the leaching process to reach completion). Id. Longer extraction times would result in higher leached concentrations if equilibrium had not been established in these tests. Id. Finally, tests such as the TCLP and EP Toxicity tests are single extraction tests and, alone, may not provide an accurate representation of long-term leaching behavior. Id.

Regarding test duration, a similar concern exists for the short-term batch tests used to determine K_d values for the waste mass. Id. pages 6 to 7.

Furthermore, the referenced report by Dave Raviv Associates in footnote 34 contains radiological analyses that do not conform to the requirements of reporting of radiological environmental data. Goodman Report[2] page 3. For example, the minimum detectable activities ("MDAs") should be reported for each analysis. Id. The

[2] "Goodman Report" refers to the memo from Jenny Goodman to Donna Gaffigan dated January 16, 2007.

MDAs for gross alpha and gross beta are not always below the requirements in the Environmental Protection Agency's Safe Drinking Water regulations. (40 CFR 141.25(c) (1) and (2)). The uranium concentrations reported are above that which would be expected in this area of the state. Goodman Report page 3. The concentration of uranium in the Kirkwood-Cohansy aquifer is typically 0.03 micrograms per liter (ug/L) according to the US Geological Geological Survey. Id. Uranium-238 concentrations in the report (Appendix 19.2) are three orders of magnitude above that level.[3] Id. Thus, the statement in the plan that the radionuclides are bound tightly to the slag and will not leach into the groundwater, is not supported by SMC's own groundwater data. Id.

As discussed above in Contention 1, radionuclides will easily infiltrate the relatively thin layer of the vadose zone. As discussed below in Contention 3, the cap will allow rainwater infiltration. Because the Radioactive waste will leach contaminants, the proposed disposal will likely cause groundwater contamination. Malusis Report pages 4-9.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that the materials will resist leachability. DP rev. 1a page 41. However, in each of the TCLP

[3] The mass concentration of total uranium is obtained by dividing the activity concentration of Uranium-238 (in picocuries per liter) by 0.3365.

tests, the combined concentration of leached radium isotopes (i.e., Ra-226 and Ra-228 combined) easily exceeded the Maximum Contaminant Level (MCL) of 5 pCi/L established in the National Primary Drinking Water Regulations. Malusis Report page 6; Gaffigan ¶ 16. The combined radium concentration in the leachant from the TCLP test on the slag was 6,660 pCi/L (more than 1,000 times the MCL), and the combined radium concentrations in the leachant from the two TCLP tests on the baghouse dust were 32.6 pCi/L and 19.39 pCi/L. Malusis Report page 6. In addition, the EP Toxicity tests performed on the ferrocolumbium slag samples in 1987 indicate that the slag releases barium (Ba) at concentrations in excess of the drinking water MCL of 2 mg/L. Leached Ba concentrations from the two slag samples were 14 and 23 mg/L. Id. While it is acknowledged that the population would not be directly exposed to undiluted leachate, the above results are sufficient to cause concern regarding potential degradation of the groundwater due to release of contaminants from the waste.

Contention 3

SHIELDALLOY'S CAP DESIGN IS FATALLY FLAWED BECAUSE IT WILL ALLOW RAINWATER TO EASILY INFILTRATE THE RADIOACTIVE WASTE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The proposed cover system consisting of soil and crushed stone is not protective of the public health because it will allow rainwater infiltration. Malusis Report pages 7 to 8.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires the "permanent isolation" of low-level radioactive waste. Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. Pac. Gas & Elec., 461 U.S. at 207.

The LTR requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes a LTC restricted use disposal design.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to maintain the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently .isolate the Radioactive waste. 42 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP states that the cover "is designed to prevent rainwater infiltration into the consolidated material." DP rev. 1a page 41. However, this statement does not appear to have been justified to any reasonable extent. Malusis Report page 7. For example, a considerable amount of analysis has been performed to demonstrate that the crushed rock surface will provide long-term protection against erosive forces. Id. However, erosion protection is not sufficient to prevent infiltration and subsequent release of contaminants into the subsurface. Id. The plan currently appears to be devoid of consideration regarding the hydraulic performance of the cover. Id. No specifications have been provided for the index properties (i.e., grain size distribution, Atterberg limits, activity, etc.) and hydraulic conductivity of the soil layer, no evaluation of candidate borrow sources has been documented, and no specifications for placement of the soil layer are included. Id. In addition, no justification is provided for the use of a surface runoff coefficient as high as 0.8 (i.e., 80 % of the precipitation runs off) or an evapotranspiration rate of 24 inches per year for a cover with a crushed rock surface and no vegetation. Id.; Spayd Report pages 1-2. Surface runoff likely will be a negligible component of the water balance for this cover. Malusis Report page 7.

NRC staff stated at the public meeting held in Newfield on December 5, 2006 that the barrier will be design to allow rainwater infiltration. Gaffigan Dec. ¶ 11. However, such a cap is not protective of the public health, especially when considering the leachability of the radioactive waste and ease of which the radionuclides will infiltrate the relatively thin layer of soil (the vadose zone) and enter the underlying groundwater. Malusis Report pages 4-9.

In addition to the above, other considerations such as slope stability, soil development, and root intrusion do not appear to have been considered in this plan. Id. Slope stability is a potential concern in the short- and long-term due to the proposed 3:1 side slopes, the lack of information provided regarding the cover soil requirements and the potential for at least a portion of the cover to be inundated based on the PMF scenario. Id.

Soil development and root intrusion have been shown to be problematic in UMTCRA-type covers such as that proposed in this plan and have the potential to cause an increase in hydraulic conductivity of a soil cover by several orders of magnitude over the long term. Id. Soil development and root intrusion has been a common problem to landfills located in New Jersey. Disbrow Dec. ¶ 2.

Vegetation rooted in contaminated materials may contain elevated levels of uranium, thorium, radon, and radium. Exh. B page 2.

The climate of southern New Jersey is not favorable to the long-term isolation of the waste. Malusis Report page 8. Long-term hydrologic isolation of buried wastes at arid and semi-arid sites is favorable because of the relatively low precipitation, high potential evapotranspiration, and thick unsaturated soils. Id. However, these conditions are not present at the Newfield site. Id.

NUREG-1757 Vol.2, Section 3.5.3 states that a parametric or component sensitivity analysis should be provided to identify how much degradation of the engineered barrier would result. However, the DP fails to perform this analysis. Goodman Report page 2.

SMC did not provide natural analogs for the effectiveness of their engineered barrier. Id. NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15.

The DP contains conflicting information regarding the cap. Revision 1a states that a geomembrane liner will be used in the cap. DP rev. 1a pages 38, 64, 73, 74, note 184. Revision 1a states that a runoff coefficient of 1 is used with a geomembrane. DP rev. 1a page 73. Revision 1 of the DP states that the geomembrane is used to divert surface water, DP rev. 1 page 37 note 92, pages 60-61, limit the impact of burrowing animals, DP rev. 1 page 158, and is an integral part of the engineered barrier, DP rev. 1 pages 166, 177. However, the June 30, 2006 transmittal letter accompanying revision 1a of the DP states that the geomembrane has been removed. Page 7.

As discussed above in Contention 1, radionuclides will easily infiltrate the relatively thin layer of the vadose zone. As discussed be in Contention 2, Shieldalloy's own testing has found that the waste will will leach contaminants. Because the proposed cap will likely cause rainwater infiltration, groundwater contamination will also be likely where the waste will remain a radioactive hazard for billions of years. Malusis Report pages 4-9; Goodman Dec.[4] ¶ 2. In contrast, Shieldalloy contaminated the groundwater at the facility with chromium, trichloroethene and other contaminants during in a mere 50 years. Gaffigan Dec. ¶ 11.

[4] "Goodman Dec." refers to the Declaration of Jennifer Goodman, which is attached to the Goodman Report.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that the cover "is designed to prevent rainwater infiltration into the consolidated material." DP rev. 1a page 41. However, this statement does not appear to have been justified to any reasonable extent. Malusis Report page 7. The plan currently appears to be devoid of consideration regarding the hydraulic performance of the cover. Id. No specifications have been provided for the index properties (i.e., grain size distribution, Atterberg limits, activity, etc.) and hydraulic conductivity of the soil layer, no evaluation of candidate borrow sources has been documented, and no specifications for placement of the soil layer are included. Id. In addition, no justification is provided for the use of a surface runoff coefficient as high as 0.8 (i.e., 80 % of the precipitation runs off) or an evapotranspiration rate of 24 inches per year for a cover with a crushed rock surface and no vegetation. Id.; Spayd pages 1-2. Surface runoff likely will be a negligible component of the water balance for this cover. Malusis Report page 7.

In addition to the above, other considerations such as slope stability, soil development, and root intrusion do not appear to have been considered in this plan. Id. Slope stability is a potential concern in the short- and long-term due to the proposed 3:1 side slopes, the lack of information provided regarding the cover soil requirements and the potential for at least a portion of the cover to be inundated based on the PMF scenario. Id. Soil development and root intrusion have been shown to be problematic in UMTCRA-type covers such as that proposed in this plan (e.g., see and have the potential to cause an increase in hydraulic conductivity of a soil cover by several orders of magnitude over the long term. Id. Soil development and root intrusion has been a common problem to landfills located in New Jersey. Disbrow Dec. ¶ 2.

Contention 4

BECAUSE SHIELDALLOY HAS FAILED TO FULLY CHARACTERIZE ITS FACILITY FOR RADIONUCLIDE CONTAMINATION, IT HAS FAILED TO PRESENT SUFFICIENT INFORMATION TO ASSESS WHETHER PORTIONS OF THE SITE MEET THE DOSE CRITERIA UNDER THE LICENSE TERMINATION RULE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP contends that the facility is fully characterized for radionuclide contamination. DP rev. 1 Chapter 4. However, the characterization that was submitted (IT April, 1992 "Assessment of Environmental Radiologcial Conditions at the Newfield Facility") is not adequate. Goodman Report pages 3 to 5. Shieldalloy should be required to fully characterize the facility before it submits a DP so NRC can ensure that the site is classified correctly for the final status survey so that it can be determined if the site is fully remediated and complies with the LTR.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

NUREG-1757 requires the final status survey to be submitted with the DP to allow the NRC to determine whether the survey is adequate for demonstrating compliance with the radiological criteria for license termination. Vol. 1 page 15-9. Shieldalloy has failed to conduct a full characterization survey of its facility. Exh. M.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP pursuant to the LTR.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC is required to review the final status survey as part of the DP to determine if the facility will meet the radiological criteria in the LTR. NUREG-1757 Vol. 1 page 15-9

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The site has not been fully characterized to determine the levels of radioactivity above background. Goodman Report page 1. The soil samples were sporadic and the EPA protocol for further analysis of water samples was not followed properly. Id. The laboratory data was either not present, or had problems, like not meeting the required minimum detectable activities (MDA). Id. For example, there is no indication if soil samples were sealed for 21 days prior to analysis in order to reach secular equilibrium. Id. This could bias all the soil results low. Without adequate and full characterization of the site, the NRC and NJDEP cannot determine if any portion of the site meets the dose criterion for unrestricted use. Id.

Given the fact that SMC confirms that the Hudson branch is in need of remediation, other areas of the site should be sampled to ensure that radionuclides did not migrate from the areas that were licensed. Goodman report page 3.

SMC states definitively that the only areas within the SMC property lines where residual radioactivity exists in surface soils, other than the Storage Yard, are the concrete pads that housed the former AAF and Flex-Klean Baghouses, D-111 and D-102/112. DP rev. 1 page 28. This statement is premature considering there has been no final status survey of the property. Goodman Report § 4.4.2. We believe that in addition to Class 1 survey units, Class 2 and Class 3 survey units are imperative considering the site has never been fully characterized and considering it is unknown where slag was used on site. Id.

The scale drawing and map of soil and water sampling results in Appendix B of the Environmental Report (Appendix 19.9 of the Plan) shows contamination above background levels in the Hudson's Branch and outside the fence line, to the north of the storage yard, and in areas where licensed material was never stored or used. These areas need to be addressed in the final status survey of the site prior to the license amendment. Goodman Report § 4.4.2.

There does not appear to be an accurate accounting of the locations of where slag may have been used as fill. Goodman Report § 4.5. There is not an accurate assessment of whether or not the slag was radioactive. Id. Considering this uncertain history, the entire site should be included in a final status survey. Id.

The DP states that subsurface radioactivity may be present at the site where slag was used as fill. DP rev. 1 page 29. While the DP states that these areas have not been well-characterized, it states that "they would have a nominal radionuclide content." Id. Pages 29-30. However, multiplying out the assumptions of the quantity of radioactive material that may be present as fill slag yields a concentration that is three orders of magnitude above New Jersey's cleanup standards, which would not be considered a nominal radionuclide content. Goodman Report § 4.5.

Sections 4.2.1 to 4.2.3, 4.4.1, and 4.5 to 4.7 of Goodman's

Report provide other DP deficiencies associated with the failure to properly characterize the site.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

Chapter 4 of the DP purports to adequately describe the radiological status of the facility. However, the site has not been fully characterized to determine the levels of radioactivity above background. Goodman Report page 1. The previous section of this Petition describes the various deficiencies in Chapter 4 of the DP and sets forth the various ways in which the site was not fully characterized.

SMC states definitively that the only areas within the SMC property lines where residual radioactivity exists in surface soils, other than the Storage Yard, are the concrete pads that housed the former AAF and Flex-Klean Baghouses, D-111 and D-102/112. DP rev. 1 page 28. This statement is premature considering there has been no final status survey of the property. Goodman Report § 4.4.2. We believe that in addition to Class 1 survey units, Class 2 and Class 3 survey units are imperative considering the site has never been fully characterized and considering it is unknown where slag was used on site. Id.

The DP states that subsurface radioactivity may be present at the site where slag was used as fill. DP rev. 1 page 29. While the

DP states that these areas have not been well-characterized, it states that "they would have a nominal radionuclide content." Id. Pages 29-30. However, multiplying out the assumptions of the quantity of radioactive material that may be present as fill slag yields a concentration that is three orders of magnitude above New Jersey's cleanup standards, which would not be considered a nominal radionuclide content. Goodman Report § 4.5.

Contention 5

THE DP OBTAINS INACCURATE DOSE MODELING RESULTS BY IGNORING THE LIKELY SCENARIO OF GROUNDWATER CONTAMINATION AND IGNORING OTHER REASONABLE ASSUMPTIONS.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

DP fails to assume likely scenarios in its modeling, such as contamination of groundwater. If this likely scenario is modeled, the radioactive doses would exceed the limits established by the License Termination Rule ("LTR"). See 10 C.F.R. § 20.1403(e). The DP also fails to assume other reasonable scenarios, which would further raise the radioactive doses.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR requires residual radioactivity at the site to be reduced "so that if the institutional controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either (1) 100 mrem (1 mSv) per year; or (2) 500 mrem (5 mSv)" under certain circumstances. 10 C.F.R. § 20.1403(e).

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. If this pathway is included in the modeling, with more reasonable parameters used for this type of cap, a TEDE of 1,718 mrem/yr at 800 years would result. Goodman Report page 11. This dose level is not protective of human health and exceeds the 500 mrem limit in the LTR. Id. Furthermore, the DP excludes other reasonable scenarios that would raise the TEDE even higher. Id. Pages 6 to 11.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP seeking to decommission its facility under the LTR. The LTR requires an applicant to ensure that the TEDE from residual radioactivity meet various criteria. 10 C.F.R. 20.1403. Thus, modeling must use accurate assumptions to ensure that the TEDE meets the criteria. However, the DP fails to use realistic assumptions.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether modeling will accurately ensure that the dose criteria in the LTR are met. See 10 C.F.R. § 20.1403.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. The DP states that groundwater below the Shieldalloy facility is contaminated and not likely to be ingested by anyone. DP § 5.2.2.2.4. SMC therefore excludes the drinking water pathway from its modeling. Id. However, the aquifer beneath the SMC site is classified as a Class IIA aquifer which means it can be used as potable water with treatment. Goodman Report § 5.2.2.2.4. Treatment is considered a contol that will fail. Id. Current municipal supply wells are located less than one mile from the site and draw water from the same aquifer that Shieldalloy has contaminated. Gaffigan Dec. 18. Shieldalloy has been operating a treatment system on site to remediate the groundwater that was contaminated by Shieldalloy.

Id. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id. The DP states that RESRAD supports the position that a suburban resident does not drink groundwater. DP rev. 1a page 61 note 157. The RESRAD Manual states that in an EPA study (U.S. Environmental Protection Agency, 1994, *Radiation Site Cleanup Regulations: Technical Support Document for the Development of Radionuclide Cleanup Levels for Soil,* review draft, Office of Radiation and Indoor Air, Washington, D.C.), an on-site well is assumed for drinking in the suburban resident scenario. Goodman Report page 8. Therefore, SMC must include the drinking water pathway in its all controls fail analysis. Gaffigan Dec. ¶ 19; Goodman Report § 5.2.2.2.4; Malusis Report page 5; Spayd Report page 3.

The DP also excludes other reasonable exposure scenarios from its modeling. Farming up to the property boundary and on the unrestricted portion of the property should be considered since the DP states that the property will be subdivided for unrestricted release, DP vol 1 page 154 note 102. Goodman Report page 6.

The DP assumes that the hypothetical resident lives 1000 feet from the pile. DP rev. 1a page 60 note 156. However, because a portion of the property will be released for unrestricted use, and because a resident currently resides only 100 feet from the property, the modeling should assume a family living on the unrestricted portion of the property. Goodman Report §§ 5.3.1, 5.3.3.2. Also, it is unreasonable to assume that municipal water will be available in the foreseeable future. Id. § 5.3.3.2. It is also reasonable to assume that the family grows a garden and consumes produce from it. Id. Since 10 C.F.R. § 20.1403(e) requires the assumption that institutional controls will fail, and since the materials will remain a radioactive hazard in perpetuity, the modeling should assume that the radioactive slag will be exposed. Id. § 5.3.3. In sum, all pathways should be used for this scenario, namely direct radiation exposure, particulate inhalation, direct soil ingestion, crop ingestion, and drinking water ingestion. Goodman Report page 8.

The DP states the suburban resident scenario is unlikely because of the lack of available space to construct a house and parking and because the majority of the area surrounding the Storage Yard is assigned for natural resource damage mitigation. DP rev. 1a page 61. However, since a resident currently lives 100 feet from the property, DP rev. 1 § 1.2, there is no basis to claim that a resident scenario is unlikely. Furthermore, institutional controls will likely fail while the materials remain a radioactive hazard in perpetuity. Goodman Report § 5.1. Therefore, the natural resource limitation must also be assumed to fail. Id. page 8.

The amount of time a suburban resident assumed by the DP to spend at the site is not conservative. Id. The US Environmental Protection Agency's Exposure Factors Handbook[5] recommends 16.4 hours per day for time indoors. Id. The RESRAD Manual uses 50% of the time spent indoors. Id. There is no recommendation for how many days per year, but the average number of vacation days taken in the US is 13. Id. The standard days per year for a resident is typically 350. Id. The values listed, 240 days for 8 hours per day are not justified. Id. That means the resident is away from home for 4 months out of the year. Id.

The engineered cap and slag may be an ideal source for construction material. Id. Page 6. In fact, Shieldalloy used the slag material as fill for a road and underneath a building knowing full well that this material was radioactive. DP rev. 1 pages 27, 29. Therefore, this scenario should be modeled. Goodman Report page 6.

The DP states that an all controls fail scenario is being modeled. DP rev. 1a page 34, line 20. However, the DP is actually modeling only a slight degradation of controls. Goodman Report § 5.1. Modeling needs to be performed assuming that the engineered controls completely degrade since the materials will remain a radioactive hazard into perpetuity. Id.

---

[5] Exposure Factors Handbook Volume III, Activity Factors, US Environmental Protection Agency, EAP/600/P-95/002Fc, August, 1997.

The DP fails to take into account exposure from direct contact with the uncovered pile. DP rev. 1a § 5.5.10. However, as discussed above, contact with the uncovered pile when institutional controls fail is a reasonable scenario.

The Microshield runs neglected to take into account all the progeny associated with uranium and thorium. Goodman Report § 5.5.9. Because the uranium and thorium in the slag are in equilibrium with their associated decay products, and because most of them are gamma emitters, all of these decay products should be included in the source term. Id. Using the same geometries as SMC for the shape of the source and the distance from the source, the exposure rates are two orders of magnitude higher than shown in Appendix 19.5. Id.

The DP states that modeling to predict future doses has been derived from "previously completed radiological assessments of the residual radioactivity at the Newfield site." DP rev. 1a § 5.2.1. However, the lateral and vertical extent of contamination has never been determined. Exh. M. Accurate dose modeling of radionuclide contamination into the groundwater cannot be conducted without determining the vertical extent of the contamination. Goodman Report § 5.2.1. Also, without a determination of the lateral extent of the contamination, contamination above the established cleanup levels could be missed in the final status survey. Id.

The DP derives the source term using the weighted averages of the concentrations of material in the storage yard. DP Table 17.7. This would make sense if the material were capable of being blended together. Goodman Report § 5.2.1.2. However, the concentration in the slag will not change even if other, less concentrated material is placed near it. Id. If the slag were uncovered, as would be the case in an all controls fail scenario, it is reasonable to assume that the receptor would be exposed to the higher concentration, not the derived concentration. Id. Thus, the Derived Source Term should use the concentration of the slag. Id.

The fence should be assumed to fail since the waste will remain a radioactive hazard into perpetuity. Goodman Report page 7.

The DP includes erroneous assumptions that affects the dose modeling. Goodman Report § 5.4.3.3. For example, it is stated that the saturated hydraulic conductivity was measured for the native sand material at the site as 2,000 m/y. DP rev. 1a page 77. However, SMC uses 0.017 m/y for the saturated hydraulic conductivity of the unsaturated zone (which is the native sand layer). Id. Page 79. Also, Table 17.5 lists the K_d of Radium as 50, which is much lower than the RESRAD default, but this is not even mentioned in the text. Goodman Report § 5.4.3.3. This seems to contradict the statement that the slag is essentially insoluble even under the most extreme in-situ conditions that might reasonably be encountered. Id. A site-specific K_d was not determined for the baghouse dust or the contaminated soil. Id.; Spayd Report page 2. This will be important when the drinking water pathway is included in the analysis. Id.

The DP inputs a parameter of 0.004 for the hydraulic gradient of the saturated zone, as shown in Appendix A and B and referenced in the April 1992 Remedial Investigation Technical Report. Spayd Report Page 2. However, measurement of the hydraulic gradient of the saturated zone in the 1992 Report show the gradient at the site to be 0.002, one half the gradient used in RESRAD. Id. The Ground Water Modeling Memo also uses the 0.002 hydraulic gradient value. Id. Therefore, the hydraulic gradient of the saturated zone used in RESRAD is not correct and should be changed to 0.002. Id. NJDEP modeling found that using the lower value of 0.002 increases the doses.

Sections 5.1, 5.2.2.2.1 to 5.2.2.2.3, 5.3, 5.3.3.1 to 5.3.3.4, 5.5.1, 5.5.11 of Goodman's Report provide other DP deficiencies associated with the dose modeling. Page 3 of Spayd's Report also provide DP deficiencies.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. The DP states that groundwater below the Shieldalloy facility is contaminated and not likely to be ingested by anyone. DP § 5.2.2.2.4. SMC therefore excludes the drinking water pathway from its modeling. Id. However, the aquifer beneath the SMC site is classified as a Class IIA aquifer which means it can be used as potable water with treatment. Goodman Report § 5.2.2.2.4. Treatment is considered a control that will fail. Id. Shieldalloy has been operating a treatment system on site to remediate the groundwater that was contaminated by Shieldalloy. Gaffigan Dec. ¶ 17. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id. Because the radiological hazard from these materials will remain in perpetuity, Goodman Dec. ¶ 2, Shieldalloy's dismissal of the groundwater pathway because of present contamination is not warranted. Malusis Report page 5; Goodman Report § 5.2.2.2.4; Gaffigan Dec. ¶ 19; Spayd Report page 3. Therefore, SMC must include the drinking water pathway in its all controls fail analysis. Id.

The DP states that RESRAD supports the position that a suburban resident does not drink groundwater. DP rev. 1a page 61 note 157. However, the RESRAD Manual states that in an EPA study (U.S. Environmental Protection Agency, 1994, *Radiation Site Cleanup Regulations: Technical Support Document for the Development of*

Radionuclide Cleanup Levels for Soil, review draft, Office of Radiation and Indoor Air, Washington, D.C.), an on-site well is assumed for drinking in the suburban resident scenario. Goodman Report page 8.

The DP also excludes other reasonable exposure scenarios from its modeling. Farming up to the property boundary and on the unrestricted portion of the property should be considered since the DP states that the property will be subdivided for unrestricted release, DP vol 1 page 154 note 102. Goodman Report page 6.

The DP assumes that the hypothetical resident lives 1000 feet from the pile. DP rev. 1a page 60 note 156. However, because a portion of the property will be released for unrestricted use, and because a resident currently resides only 100 feet from the property, the modeling should assume a family living on the unrestricted portion of the property. Goodman Report §§ 5.3.1, 5.3.3.2. Also, it is unreasonable to assume that municipal water will be available in the foreseeable future. Id. § 5.3.3.2. It is also reasonable to assume that the family grows a garden and consumes produce from it. Id. Since 10 C.F.R. § 20.1403(e) requires the assumption that institutional controls will fail, and since the materials will remain a radioactive hazard in perpetuity, the modeling should assume that the radioactive slag will be exposed. Id. § 5.3.3. In sum, all pathways should be used for this scenario, namely direct radiation exposure, particulate inhalation, direct soil ingestion, crop ingestion, radon, and drinking water ingestion. Goodman Report page 8.

The DP states the suburban resident scenario is unlikely because of the lack of available space to construct a house and parking and because the majority of the area surrounding the Storage Yard is assigned for natural resource damage mitigation. DP rev. 1a page 61. However, since a resident currently lives 100 feet from the property, DP rev. 1 § 1.2, there is no basis to claim that a resident scenario is unlikely. Furthermore, institutional controls will likely fail while the materials remain a radioactive hazard in perpetuity. Goodman Report § 5.1. Therefore, the natural resource limitation must also be assumed to fail. Id. page 8.

The amount of time a suburban resident assumed by the DP to spend at the site is not conservative. Id. The US Environmental Protection Agency's Exposure Factors Handbook[6] recommends 16.4 hours per day for time indoors. Id. The RESRAD Manual uses 50% of the time spent indoors. Id. There is no recommendation for how many days per year, but the average number of vacation days taken in the US is 13. Id. The standard days per year for a resident is typically 350. Id. The values listed, 240 days for 8 hours per day are not justified. Id. That means the resident is away from home for 4 months out of the year. Id.

---

[6] Exposure Factors Handbook Volume III, Activity Factors, US Environmental Protection Agency, EAP/600/P-95/002Fc, August, 1997.

The DP fails to model excavation of the engineered cap and slag. Id. Page 6. However, these materials may be an ideal source for construction material. Id. In fact, Shieldalloy used the slag material as fill for a road and underneath a building knowing full well that this material was radioactive. DP rev. 1 pages 27, 29. Therefore, this scenario should be modeled. Goodman Report page 6.

The DP states that an all controls fail scenario is being modeled. DP rev. 1a page 34, line 20. However, the DP is actually modeling only a slight degradation of controls. Goodman Report § 5.1. Modeling needs to be performed assuming that the engineered controls completely degrade since the materials will remain a radioactive hazard into perpetuity. Id.

The DP fails to take into account exposure from direct contact with the uncovered pile. DP rev. 1a § 5.5.10. However, as discussed above, contact with the uncovered pile when institutional controls fail is a reasonable scenario.

The Microshield runs neglected to take into account all the progeny associated with uranium and thorium. Goodman Report § 5.5.9. Because the uranium and thorium in the slag are in equilibrium with their associated decay products, and because most of them are gamma emitters, all of these decay products should be included in the source term. Id. Using the same geometries as SMC for the shape of the source and the distance from the source, the exposure rates are two orders of magnitude higher than shown in

Appendix 19.5. Id.

The DP states that modeling to predict future doses has been derived from "previously completed radiological assessments of the residual radioactivity at the Newfield site." DP rev. 1a § 5.2.1. However, the lateral and vertical extent of contamination has never been determined. Exh. M. Accurate dose modeling of radionuclide contamination into the groundwater cannot be conducted without determining the vertical extent of the contamination. Goodman Report § 5.2.1. Also, without a determination of the lateral extent of the contamination, contamination above the established cleanup levels could be missed in the final status survey. Id.

The DP derives the source term using the weighted averages of the concentrations of material in the storage yard. DP Table 17.7. This would make sense if the material were capable of being blended together. Goodman Report § 5.2.1.2. However, the concentration in the slag will not change even if other, less concentrated material is placed near it. Id. Goodman Report § 5.2.1.2. If the slag were uncovered, as would be the case in an all controls fail scenario, it is reasonable to assume that the receptor would be exposed to the higher concentration, not the derived concentration. Id. Thus, the Derived Source Term should use the concentration of the slag. Id.

The fence should be assumed to fail since the waste will remain a radioactive hazard into perpetuity. Goodman Report page 7.

The DP includes erroneous assumptions that affects the dose modeling. Goodman Report § 5.4.3.3. For example, it is stated that the saturated hydraulic conductivity was measured for the native sand material at the site as 2,000 m/y. DP rev. 1a page 77. However, SMC uses 0.017 m/y for the saturated hydraulic conductivity of the unsaturated zone (which is the native sand layer). Id. Page 79. Also, Table 17.5 lists the K_d of Radium as 50, which is much lower than the RESRAD default, but this is not even mentioned in the text. Goodman Report § 5.4.3.3. This seems to contradict the statement that the slag is essentially insoluble even under the most extreme in-situ conditions that might reasonably be encountered. Id. A site-specific K_d was not determined for the baghouse dust or the contaminated soil. Id.; Spayd Report page 2. This will be important when the drinking water pathway is included in the analysis. Id.

The DP inputs a parameter of 0.004 for the hydraulic gradient of the saturated zone, as shown in Appendix A and B and referenced in the April 1992 Remedial Investigation Technical Report. Spayd Report Page 2. However, measurement of the hydraulic gradient of the saturated zone in the 1992 Report show the gradient at the site to be 0.002, one half the gradient used in RESRAD. Id. The Ground Water Modeling Memo also uses the 0.002 hydraulic gradient value. Id. Therefore, the hydraulic gradient of the saturated zone used in RESRAD is not correct and should be changed to 0.002. Id. NJDEP modeling found that using the lower value of 0.002 increases the doses.

Sections 5.1, 5.2.2.2.1 to 5.2.2.2.3, 5.3, 5.3.3.1 to 5.3.3.4, 5.5.1, 5.5.11 of Goodman's Report provide other DP deficiencies associated with the dose modeling. Page 3 of Spayd's Report also provide DP deficiencies.

Contention 6

THE 1000 YEAR MODELING CONDUCTED BY SHIELDALLOY FAILS TO ADEQUATELY PROTECT THE PUBLIC SAFETY AND HEALTH BECAUSE THE WASTE WILL REMAIN A RADIOACTIVE HAZARD FOR BILLIONS OF YEARS.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP's modeling for only 1000 years violates the Low-Level Radioactive Waste Policy Act ("LLRWPA"), the Atomic Energy Act ("AEA"), and the License Termination Rule ("LTR") by failing to require the permanent isolation of low-level radioactive waste or protect the public health and safety.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of low-level radioactive waste.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983).

The LTR requires an applicant for decommissioning to calculate the peak annual TEDE to the average member of the critical group expected within the first 1000 years after decommissioning. 10 C.F.R. § 20.1401(d). However, this provision is intended to only apply to short-lived nuclides. 62 Fed. Reg. at 39083 (Response F.7.3). Short-lived nuclides are defined as having half-lives between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. Id. at 39069. For long-lived nuclides, future calculations beyond 1000 years would be valuable. Id. at 39083. Thus, the intent of 10 C.F.R. § 20.1401(d) is to actually require longer dose assessments depending on the duration of the nuclides.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that relies upon modeling the TEDE from residual radioactivity for only 1000 years. However, the materials sought to be disposed at the facility have a half-life of billions of years. Goodman Dec. 2.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the 1000 year modeling is sufficient to determine whether the onsite disposal will be safe and protective of the public health even though the half-life of the nuclides is billions of years.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP only conducts dose modeling assessments for 1,000 years, even though the radiological hazard from the waste will endure for billions of years. The 1000 year modeling is inadequate for this particular waste. Goodman Dec. ¶ 3.

NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15. It goes on to state that archaeologists have dated the mounds by excavating bones and artifacts from the mounds and determining the age of the object or the data of its burial. Id. However, these examples demonstrate that human excavation of an engineered barrier is reasonably foreseeable thousands of years later. Goodman Report page 2.

The DP states that it is "extremely unlikely" that institutional controls and physical controls would fail. DP rev. 1 page xxiv. However, the Shieldalloy waste will remain a radioactive hazard for billions of years. Goodman Dec. ¶ 2. If a LTC license is utilized for institutional controls, it is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce maintain the institutional controls required by the LTC license.

The DP states that the greatest annual dose occurs past 1000 years. DP rev. 1a page 75. Since the material will still be a radioactive hazard, this dose should be considered. Goodman Report § 5.4.3.2.

10 <u>C.F.R.</u> § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP only conducts dose modeling assessments for 1,000 years, even though the radiological hazard from the waste will endure for billions of years. The 1000 year modeling is inadequate for this particular waste. Goodman Dec. ¶ 3.

NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15. It goes on to state that archaeologists have dated the mounds by excavating bones and artifacts from the mounds and determining the age of the object or the data of its burial. Id. However, these examples demonstrate that human excavation of an engineered barrier is reasonably foreseeable thousands of years later. Goodman Report page 2.

The DP states that it is "extremely unlikely" that institutional controls and physical controls would fail. DP rev. 1 page xxiv. However, the Shieldalloy waste will remain a radioactive hazard for billions of years. Goodman Dec. ¶ 2. If a LTC license is utilized for institutional controls, it is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce maintain the institutional controls required by the LTC license.

The DP states that the greatest annual dose occurs past 1000 years. DP rev. 1a page 75. Since the material will still be a radioactive hazard, this dose should be considered. Goodman Report § 5.4.3.2.

Contention 7

SHIELDALLOY HAS FAILED TO DEMONSTRATE THAT OFFSITE DISPOSAL WILL CAUSE NET PUBLIC OR ENVIRONMENTAL HARM OR THAT RESIDUAL RADIOACTIVITY FROM ONSITE DISPOSAL IS AS LOW AS REASONABLY ACHIEVABLE ("ALARA").

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

Shieldalloy did not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15. Furthermore, Shieldalloy has failed to conduct an ALARA analysis. Id. Therefore, Shieldalloy has not demonstrated that the proposed onsite disposal will reduce residual radioactivity to levels that are ALARA.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR provides:

> A site will be considered acceptable for license termination under restricted conditions if:
>
> > (a) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA.

10 C.F.R. § 20.1403.

Shieldalloy has not addressed the question in the DP of whether greater public or environmental harm will result if it disposes the materials offsite at a licensed facility. Goodman Report page 15. Furthermore, Shieldalloy has failed to conduct an ALARA analysis. Id. Therefore, Shieldalloy has not demonstrated that the proposed onsite disposal will reduce residual radioactivity to levels that are ALARA.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes to conduct onsite disposal of its radioactive waste and to decommission the property. The LTR requires the licensee to demonstrate that "reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a).

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether Shieldalloy has demonstrated that "reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

An ALARA analysis requires the licensee to demonstrate that "further reductions in residual radioactivity . . . were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a). Thus, ALARA requires the applicant to consider both the costs and benefits of reducing residual radioactivity.

The DP fails to conduct an ALARA analysis because it only considers the costs of reducing residual radioactivity. Goodman Report page 11. An ALARA analysis is required to also consider the benefits, including the collective dose averted. NUREG-1757 vol. 2 page N-2. The DP fails to consider any benefit. Goodman Report page 11.

In order for the averted dose to be calculated, the drinking water pathway must be included for each alternative since groundwater contamination is likely if the DP is implemented. Goodman Report page 12; see also Contentions 1, 2, 3, and 5 above. Since the material will remain radioactive in perpetuity, the length of time for modeling should be increased past 1000 years. Goodman Report page 12.

The costs considered by the DP for offsite disposal are higher than was actually quoted by the disposal facility. The DP considers a cost of $62,864,543. DP Table 17.15. However, Energy Solutions has repeatedly quoted a price of $33 million for a turnkey operation. Exh. A. Adding a 25% contingency required by the NRC brings it to $41,250,000.

The DP does not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15.

The whole discussion of radiation risks is misleading. The author discusses chronic exposures and acute exposures without explaining the difference and the different health effects. Goodman Report page 12. The author's discussion of radiation effects would lead one to believe that the material at SMC is harmless. DP § 7.2.1. The Health Physics position paper actually states that the risks of health effects below 5-10 rem (which includes occupational and environmental exposures), are either too small to be observed or are nonexistent. Goodman Report page 12. The paper goes on to state that "the possibility that health effects might occur at small doses should not be entirely discounted. Id. The Health Physics Society also recognizes the practical advantages of the linear, no-threshold hypothesis to the practice of radiation protection. Id. Nonetheless, risk assessment at low doses should focus on establishing a range of health outcomes in the dose range of interest and acknowledge the possibility of zero health effects." Id.

Furthermore, the Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation recently released the Biological Effects of Ionizing Radiation (BEIR) VII report. Id. The BEIR VII committee concluded that current scientific evidence is consisitent with the hypothesis that there is a linear dose-response relationship between exposure to ionizing radiation and the development of radiation-induced solid cancers in humans. Id. This conclusion is based on many facts (contrary to the statement made in the DP that this conclusion is not supported with facts). Id. For example, the committee stated that there is compelling support for the linearity view of how cancers form. Id. Studies in radiation biology show that "a single radiation track (resulting in the lowest exposure possible) traversing the nucleus of an appropriate target cell has a low but finite probability of damaging the cells' DNA. Id. Subsets of this damage, such as ionization "spurs" that can cause multiple damage in a short length of DNA, may be difficult for the cell to repair or may be repaired incorrectly. Id. The committee has concluded that there is no compelling evidence to indicate a dose threshold below which the risk of tumor induction is zero."[7] Id. The explanation of radiation risks in the DP would lead one to believe that the radioactive material at SMC is harmless. Id. The current scientific evidence does not support this view. Id.

The benefits of unrestricted use versus restricted use should include the Regulatory Costs Avoided (NUREG 1757, Vol. 2, p. N-6). Included in these costs are additional licensing fees to develop an EIS and costs associated with public meetings, to name a few. Because NRC has already held two public meetings and started the EIS process, these costs can not now be avoided. The NRC has violated its own guidance by conducting these meetings and starting the EIS process without first determining if the site complies with the requirements in 10 CFR 20.1403(a). Goodman Report pages 1 to 2. The DP should include the costs associated with two years of NRC review of the DP. Creation of a new disposal site at the SMC facility in Newfield will require the additional expenditure of human resources and funds to regulate and maintain an additional disposal facility in perpetuity. These costs should be considered in the DP.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP fails to conduct an ALARA analysis because it only

[7] Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII Phase 2, National Research Council, National Academies Press, Washington, D.C., 2006.

considers the costs of reducing residual activity. Goodman Report page 11. An ALARA analysis is required to also consider the benefits, including the collective dose averted. NUREG-1757 vol. 2 page N-2. The DP fails to consider any benefit. Goodman Report page 11.

In order for the averted dose to be calculated, the drinking water pathway must be included for each alternative since groundwater contamination is likely if the DP is implemented. Goodman Report page 12; see also Contentions 1, 2, 3, and 5 above. Since the material will remain radioactive in perpetuity, the length of time for modeling should be increased past 1000 years. Goodman Report page 12.

The costs considered by the DP for offsite disposal are higher than was actually quoted by the disposal facility. The DP considers a cost of $62,864,543. DP Table 17.15. However, Energy Solutions has repeatedly quoted a price of $33 million for a turnkey operation. Exh. A. Adding a 25% contingency required by the NRC brings it to $41,250,000.

The DP does not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15.

The whole discussion of radiation risks is misleading.

The author discusses chronic exposures and acute exposures without explaining the difference and the different health effects. Goodman Report page 12. The author attributes the statement that no effect has ever been observed at levels below 5,000 mrem delivered over a one year period to the Health Physics Society. DP § 7.2.1. However, the current scientific evidence does not support this view. Goodman Report page 12.

Contention 8

THE SMC DP FAILS TO PROVIDE SUFFICIENT FINANCIAL ASSURANCE.

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP fails to provide sufficient financial assurance in the proposed selected long term control license (LTC) alternative.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The regulations require an applicant seeking restricted use license termination to provide "sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control and maintenance of the site. 10 C.F.R.

§20.1403(c).

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which must meet the requirements of 10 C.F.R. §1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the financial assurance requirements of 10 C.F.R. §1403(C) have been met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

The LTC alternative will create a disposal site with a very long-lived radionuclides. Financial assurance must be sufficient to ensure that sufficient funds are available during the entire time period that the radiological hazard continues in order to conduct required survey, maintenance, license and inspection and trust expenses.

The DP fails to require sufficient financial assurance and fails to require an adequate ALARA analysis because it fails to consider inflation. Over the past 50 years inflation has dramatically increased the cost of goods and services. Failure to consider the effect of inflation on all costs to maintain the disposal site and comply with license and record keeping obligations dramatically undermines the sufficiency of the financial assurance amount posted at the time of establishment of the disposal facility. This is particularly true at a disposal facility which is to be maintained in perpetuity, and is also true notwithstanding the 25% contingency included in the Table 17.14 Cost Estimate for the LTC Alternative.

The Table 17.14 Cost Estimate in the DP for the LTC Alternative does not provide sufficient funds for remedial action, should that be required. In the event that radioactive contaminants are found at some future date to be escaping the cap into groundwater, for example, it is very unlikely that the amount of financial assurance provided for would be sufficient to fund recovery and treatment of contaminated groundwater along with modification of the cap to prevent continuing contamination. The annual amount allocated to "cap maintenance" is a mere $7,440.00. The amount set aside for annual cap maintenance is only half of the $14,376 set aside for annual paperwork review and a site inspection by the NRC once every five years by the NRC. Additionally, in the event that SMC defaults on its obligation to operate and maintain the disposal site over it's perpetual existence, a contractor would have to be hired by the NRC to maintain the disposal facility. Such a contractor will require a profit to maintain the disposal facility. The Table 17.14 Cost Estimate for the LTC Alternative does not provide sufficient funding to support a cost plus profit arrangement and therefore does not establish sufficient financial assurance. Burke Declaration ¶ 2 to 5.

10 <u>C.F.R.</u> §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP asserts that the amount of financial assurance proposed for the LTC alternative is adequate.

Contention 9

THE SMC DP MISSTATES EXISTING SITE USE RESTRICTIONS AND THEREFORE MISCHARACTERIZES THE SITE AND EXPOSURE SCENARIOS

10 <u>C.F.R.</u> §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP misstates existing site use restrictions and therefore mischaracterizes the site and exposure scenarios.

10 <u>C.F.R.</u> §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

A proposed restricted use decommissioning must demonstrate that the DP will meet the regulatory criteria for restricted use including the existence of institutional controls and exposure scenarios that provide reasonable assurance that exposure to radiation will not exceed the 25 mrem per year limit.

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

The SMC DP proposed and selects a restricted use alterative which must meet the requirements of 10 C.F.R. 1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the TEDE requirement of 10 C.F.R. §1403 will be met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

In the discussion on page 41 of the DP about the reasonably likely foreseeable future use (100 years) scenarios for the site it is stated that there are existing site use restrictions due to natural resource restoration and potential future residential use restrictions due to chemically contaminated soil.

The DP also mentions the proximity of the Pinelands National Reserve, states that these restrictions will result in a land buffer to prevent construction in close proximity to the engineered barrier. SMC uses these assumptions in the dose assessment to limit the evaluation to non-residential exposure scenarios. The DP (page 89) also asserts that future residential use of the site will be prohibited by soil contamination levels. This approach is erroneous since these land use restrictions are only institutional controls that are considered to disappear under an "all controls fail" scenario. Gaffigan Dec. ¶ 8.

Nor have final decisions been made with respect to the nature and extent of cleanup of chemical contamination at the facility and whether some or all of the Newfield site will be restricted in use after chemical cleanup. Gaffigan Dec. ¶ 9. It is important to note that with properly managed engineering and institutional controls of areas with residual chemical contamination, no future use of the facility, including residential, is precluded. Id. It is therefore erroneous for SMC to suggest in the DP that chemical contamination precludes future residential use of the facility. Id. Foreseeable future use evaluation by SMC in the DP must include residential use. Id.

10 C.F.R. §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP misstates existing site use restrictions.

Contention 10

THE SMC DP PROPOSES A LTC DISPOSAL DESIGN WHICH IS NOT PROTECTIVE OF GROUNDWATER OR HEALTH

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP proposes a LTC restricted use disposal design which is not protective of groundwater or health.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The Atomic Energy Act, 42 U.S.C. 2012(D), 2201(B), and NRC regulations, 10 C.F.R. 1403, require that a restricted use decommissioning proposal be protective of health and the environment and that reductions in residential radioactivity be as low as reasonably achievable. The proposed selected LTC alterative does not meet those requirements.

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which must meet the requirements of 10 C.F. R. §1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the requirements of 10 C.F.R. §1403 have been met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

In chapter 5 of the DP (Dose Modeling) SMC improperly excludes the evaluation of groundwater as an exposure pathway on the basis that: the engineered barrier (cap) is designed to prevent rainwater infiltration; TCLP results show the slag will not leach radioactivity; groundwater is already contaminated with chemicals and is not a potable supply; it is unreasonable to assume that future site use would include an on-site drinking water well when a municipal water supply is near.

The assumptions in the DP are either incorrect or unsupported. The DP is contradictory in its discussion of the engineered barrier. In some sections the DP states that a geomembrane will be present to prevent water infiltration through the buried materials and in others the absence of such a membrane is noted. Also, at the public meeting held in Newfield on December 5, 2006, the NRC staff stated that the engineered barrier will be designed to *allow rainwater infiltration*. A permeable engineered barrier allows for the potential leaching of contaminants from the buried materials directly into the ground water. No liner is proposed beneath the contaminated material, and the material sites on the native sandy and very permeable soil.

The slags and baghouse dust were submitted to the

Toxicity Characteristic Leachability Procedure (TCLP) in 2005. The resulting "leachate" was then analyzed for radionuclides only, with the results presented in Appendix 19.4 of the DP. There are many problems with this analysis, including

a. failure to analyze radioactively contaminated soils and building materials which will be buried under the engineered barrier;

b. failure to analyze samples of materials which will be buried to determine if they are hazardous waste and banned for land disposal;

c. failure to submit a sufficient number of samples to TCLP and subsequent radionuclide analysis to be representative of the materials to be disposed of under the engineered barrier;

d. analytical results indicate that radium may leach from the slag and the DP is contradictory whether radionuclides will leach from the slag (e.g. DP pages 27 and 30).

Groundwater should not be eliminated or excluded in the DP as an exposure pathway. SMC's DP states that the groundwater at the facility is already contaminated and suggests it should therefore essentially be DISREGARDED as not worthy of protection from contamination by the proposed permanent radioactive waste disposal pile. SMC has for 27 years operated a treatment system on site to remediate groundwater contamination caused by SMC. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. TRC's goal is to remediate the ground water potable standard as quickly as possible, potentially within 20 years. It is incorrect to conclude that just because the groundwater is already contaminated it should be excluded as an exposure pathway and should not be protected against further contamination or should not be considered to be a potable source for the next 1000 years.

SMC's DP fails to mention that the current municipal supply wells are located less than one mile from the site and draw water from the same aquifer that SMC has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigation wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility over the next 1000 years. In addition, SMC is located in the New Jersey Coastal Plain Sole Source Aquifer and as such there are obvious limits to alternative water supplies. (see http://www.epa.gov/region02/water/aquifer/coast/coastpln.htm#I19). Protection of this resource is critical yet the DP fails to properly and fully consider and evaluate groundwater protection and future use. Gaffigan Declaration ¶ 19.

10 <u>C.F.R.</u> §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP asserts on page 100 that the proposed selected LTC alternative is designed to prevent groundwater impact and that the groundwater exposure pathway need not be considered in dose modelling. The DP does no support this assertion.

Contention 11

RESIDUAL RADIOACTIVITY FROM SMC'S OPERATIONS IN SURFACE WATER AND SEDIMENT IS NOT ADEQUATELY ADDRESSED IN THE DP.

10 <u>C.F.R.</u> §2.309(f)(i) Provide a specific statement of the issue of law or fact.

Residual radioactivity from SMC's operations in surface water and sediment is not adequately addressed in the DP.

10 <u>C.F.R.</u> §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The Atomic Energy Act, 42 <u>U.S.C.</u> 2012(D), 2201(B), and NRC regulations, 10 <u>C.F.R.</u> 1403, require that a DP be protective of health and the environment and reductions and residual radioactivity be as low as reasonably achievable. The DP does not meet those requirements.

10 <u>C.F.R.</u> §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which fails to address radioactivity identified in the DP in sediment and/or surface water.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding

For the NRC to make a determination on the proposed selected LTC alternative in the DP the NRC must determine whether it is protective of health and the environment.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

Residual radioactivity has been identified in the Hudson's Branch as indicated in the DP Executive Summary and Appendix 19.9, Environmental Report. The data referenced is from a 1992 report which concluded that the radioactivity detected in the Hudson's Branch water and sediments is not significantly different from background. It does not appear that sampling of the stream has been conducted since 1991. Existing sediment and/or surface water contamination does not appear to be adequately addressed in the DP. Gaffigan Declaration ¶ 19.

10 C.F.R. §2.309(f(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP fails to address sediment and/or surface water contamination identified in the DP.

Contention 12

THE LTC LICENSE SOUGHT BY SHIELDALLOY FAILS TO ADEQUATELY PROTECT THE PUBLIC SAFETY AND HEALTH FOR MATERIALS CONTAINING LONG LIVED NUCLIDES.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license violates the Low-Level Radioactive Waste Policy Act ("LLRWPA"), the Atomic Energy Act ("AEA"), and the intent of the LTR.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of low-level radioactive waste.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983)

The intent of the decommissioning regulations is to limit the release of sites containing long-lived nuclides to unrestricted release. 62 Fed. Reg. at 39069 (Response B.3.2). The NRC stated: "termination of a license for unrestricted use is preferable because it requires no additional precautions or limitations on use of the site after licensing control ceases, in particular for those sites with long-lived nuclides." Id. Short-lived nuclides include radioactive materials where the half-lives are between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. 62 Fed. Reg. at 39069. Such short-lived nuclides can be safely secured under restricted release through the use of institutional control. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that is seeking to decommission under restricted release using the LTC license for institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the LTC license proposed in the DP will provide adequate institutional controls to permanently isolate the low-level radioactive waste and protect the public health and safety.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely

at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

Shieldalloy radioactive waste contains thorium-232, which has a half-life of over 14 billion years, and uranium-238, which has a half-life of over 4 billion years. Goodman Dec. ¶ 2. It is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce the LTC license.

With regards to onsite disposal by facilities that continue operating at the site under a license, NRC Staff admitted that there exists "uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." SECY-06-0143 page 5. These releases and transport of contamination occur even in cases where the materials are disposed onsite for a limited period of time and then disposed offsite under the LTR. Id.

The problems of contamination and transport of contamination related to disposals that remain onsite for a limited period of time is even more applicable to onsite disposals of long-lived nuclides that remain onsite in perpetuity pursuant to the LTR. Goodman Dec. ¶ 5. Facilities disposing long-lived nuclides onsite under the LTC license have a much higher likelihood of releasing and transporting contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Id.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that it is unlikely that all controls will fail when utilizing the LTC license. DP rev. 1a page 31. However, the NJDEP asserts that it is self-evident that all controls will fail since neither Shieldalloy nor and independent third-party trustee can be expected to endure for the billions of years that the waste remains a radiological hazard.

Contention 13

THE DP CONFLICTS WITH THE REGULATIONS REGARDING TERMINATION OF THE LICENSE UPON DECOMMISSIONING.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP seeks to amend Shieldalloy's current license to a LTC license upon decommissioning. DP rev. 1 page 155. However, amending its current license upon decommissioning would violate the regulatory provisions requiring termination of the license upon decommissioning.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis

for the contention.

The DP provides that the LTC license would be used to satisfy the LTR requirement for enforceable institutional controls over the site. DP rev 1 page 155.

The regulations define "decommission" as follows:

> to remove a facility or site safely from service and reduce residual radioactivity to a level that permits -
>
> > (1) Release of the property for unrestricted use and termination of the license; or
> >
> > (2) Release of the property under restricted conditions and termination of the license.
>
> 10 C.F.R. §§ 20.1003, 30.4, 40.4, 50.2, 70.4, 72.3 (emphasis added).

Under the LTR, termination of the license under unrestricted use occurs when, among other factors, residual radioactivity results in a "TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year." 10 C.F.R. § 20.1402. License termination under restricted use occurs when, among other factors, "[r]esidual radioactivity at the site has been reduced so that if the institutional controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either -- (1) 100 mrem (1 mSv) per year; or (2) 500 mrem (5 mSv) per year provided that the licensee-- . . . ." 10 C.F.R. § 20.1403(e).

The DP models the TEDE based upon a 1000 year modeling, regardless of the duration of the radiological hazard. Furthermore, as discussed in greater detail in Contention 5, when realistic assumptions are used, including the dose contributions from the drinking water pathway, but even excluding the gamma exposure pathway, modeling indicates a TEDE of 1,718 mrem per year at year 800. Goodman Dec. 11. Thus, because the TEDE from residual radioactivity distinguishable from background to the average member of the critical group exceeds 500 mrem, residual radioactivity has not been reduced to permit termination of the license.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks a LTC license upon decommissioning for the institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

The NRC must determine whether the proposed decommissioning and issuance of the LTC license would violate the LTR by failing to reduce residual radioactivity to a level that permits license termination as required by 10 C.F.R. § 20.1403(e).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely

at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP measures the TEDE from residual radioactivity based upon a 1000 year modeling, even though the radiological hazard will endure for billions of years. Goodman Dec. ¶ 2. As discussed in Contention 1, the 1000 year modeling in this case violates the AEA, the LLRWPA, and the LTR. Dose modeling should be required for the entire duration of the radiological hazard. Goodman Dec. ¶ 3.

As discussed in greater detail in Contention 5, when realistic assumptions are used, including the dose contributions from the drinking water pathway, but even excluding the gamma exposure pathway, modeling indicates a TEDE of 1,718 mrem per year at year 800. Goodman Dec. 11.

The conflict between the LTR and the LTC license for long-lived nuclides is admitted by NRC in the following statement: "NRC licensing oversight for some sites could be permanent because the current sites considering restricted release are sites with uranium and thorium contamination. Although this NRC role was not envisioned under the LTR . . . ." SECY-03-0069 page 27.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that the TEDE from residual radioactivity will not exceed 100 mrem assuming that institutional controls fail and engineering controls degrade gradually. DP rev. 1 section 5.5. However, NJDEP's modeling finds that the TEDE would be 1,718 mrem/yr at 800 years. Goodman Report page 11.

Contention 14

SHIELDALLOY FAILED TO ADEQUATELY ELICIT OR CONSIDER PUBLIC INPUT ON THE DECOMMISSIONING PROPOSAL.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP failed to consider public input through the Site Specific Advisory Board. Furthermore, the DP fails to consider the strong and nearly universal public opposition to the DP.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR requires licensees proposing to decommission using the restricted use option to "seek advice from such affected parties regarding . . . the proposed decommissioning," including whether the proposed institutional controls "[w]ill not impose undue burdens on the local community or other affected parties" and whether adequate financial assurance will be provided. 10 C.F.R. § 20.1403(d)(1). The licensee is also required to provide "[a]n opportunity for a comprehensive, collective discussion on the issues by the participants represented." Id. § 20.1403(d)(2)(ii). The DP must then demonstrate "how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and incorporated, as appropriate, following analysis of that advice." 10 C.F.R. § 20.1403(d).

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

The LTR requires Shieldalloy to elicit public advice on the decommissioning plan and requires the advice to be incorporated into the DP. 10 C.F.R. § 20.1403(d). Shieldalloy has failed to adequately elicit public advice or to incorporate it into the DP. Gaffigan Dec. ¶¶ 3-7.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

In reviewing the DP, NRC must determine whether Shieldalloy complied with 10 C.F.R. § 20.1403(d) by adequately eliciting and incorporating public advice into the decommissioning proposal.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and

documents on which the requestor/petitioner intends to rely to support its position on the issue.

Shieldalloy failed to adequately elicit public advice on their decommissioning plan. Shieldalloy convened four meetings of a Site Specific Advisory Board ("SSAB"). However, the SSAB failed to adequately elicit public advice on the proposed decommissioning. Gaffigan Dec. ¶ 4. The SSAB never selected a chairperson or adopted a charter or operating procedures. Id. Instead, Shieldalloy's legal counsel conducted the meetings by simply advancing Shieldalloy's arguments in support of the decommissioning. Id. Members of the SSAB were encouraged to ask questions during the meetings, but there was never an opportunity for members to discuss their own issues among themselves without the direction of Shieldalloy. Id.

Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on certain issues. Id. ¶ 5. For example, the members could not provide advice on whether the proposed institutional controls would assure that an average member of the public would not incur a radiation dose in excess of 25 millirem Total Effective Dose Equivalent (TEDE). Id. Shieldalloy failed to provide sufficient information to provide advice on this issue, such as the characterization of the slag and baghouse dust or the engineering design of the engineered cap. Id.

Also, Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on whether the $5 million financial assurance would be adequate to enable an independent third party to assume responsibility for control and maintenance of the site. Id. ¶ 6. Shieldalloy did not provide information regarding the engineering design of the proposed barrier. Id.

The DP fails to acknowledge the strong public opposition to the proposed onsite disposal. Elected officials from the local municipalities, the county, and State and Federal offices have staunchly opposed the DP. Exhs. E to L. The NJDEP and other SSAB members (besides Shieldalloy's counsel) were unanimous in opposing the DP. Id. ¶ 7. These office holders and SSAB members have been unanimous in advising Shieldalloy that institutional controls would not be enforceable for the billions of years that the waste remains a radioactive hazard. Id. The NJDEP and members from the public were unanimous in advising that the institutional controls would impose undue burdens on the local community. Id. However, the only time that the DP cites public advice is when it states that the "public strongly support[s]" the provisions of the DP concerning the financial assurance, the LTC license, and the sale of portions of the land that will be released for unrestricted use. DP rev. 1 page 154, note 102. Thus, the DP clearly fails to incorporate the public outcry against the proposed onsite disposal.

Furthermore, where public opposition actually is acknowledged by the DP, the DP still fails to adequately address the particular opposition. For example, the SSAB advised that the institutional controls proposed will not be enforceable for the time period required, in perpetuity. Gaffican Dec. ¶ 7. The DP responds that it is reasonable to assume that the Federal government will remain in perpetuity to enforce the provisions of the LTC license to require institutional controls. DP rev. 1 page 164. However, the DP fails to acknowledge that it will be Shieldalloy or a private trustee that will be the licensee who owns the site that would have the responsibility to enforce the institutional controls into perpetuity. It is self-evident that a private company cannot be expected to endure into perpetuity to enforce the provisions of a LTC license. Although the Federal government may have the power to enforce environmental permits into perpetuity, it is self-evident that the licensee will eventually cease to exist and the Federal government will have no entity to which to enforce the LTC license. Furthermore, the DP fails to acknowledge that institutional and engineering controls will completely fail if the $5 million proposed for financial assurance is not sufficient last into perpetuity.

Also, while the DP acknowledges the SSAB comment that the institutional controls may prevent the development of the surrounding area and thus impose an undue burden, DP rev. 1 page 166-67, the DP fails to adequately address this comment. The DP simply responds that there will be no restrictions on the portion of the property that would be released for restricted use. However, it is self-evident that people do not wish to live or work near a low-level radioactive waste site. See, e.g., Report to the Governor: Disposal Options Report, (1999), http://www.nj.gov/dep/rpp/llrw/download/disposal.pdf. The DP thus fails to address the fact that the onsite disposal will have an undue economic impact on the local community.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

As discussed in the previous section, Shieldalloy failed to adequately elicit public advice on their decommissioning plan because there was never an opportunity for the SSAB members to discuss their problems with the DP. Gaffigan Dec. ¶ 4. However, the DP states that the first two SSAB meetings "were spent discussing the decommissioning plans." DP rev. 1 page 161.

Shieldalloy failed to provide sufficient information to comment on the TEDE limit or the proposed financial assurance. Gaffigan Dec. ¶¶ 5, 6. However, the DP disputes this contention. DP rev. 1 page 161.

Also as addressed in the previous section, the DP fails to address the public opposition against the onsite disposal or the particular issues raised by the SSAB. Gaffigan Dec. ¶ 7; Exhs. E to L. The DP actually states that the "public strongly support[s]" the provisions of the DP concerning the financial assurance, the LTC license, and the sale of portions of the land that will be released for unrestricted use. DP rev. 1 page 154, note 102. Yet, the public has asserted its strong opposition to the onsite disposal. Gaffigan Dec. ¶ 7; Exhs. E to L.

Contention 15

THE LTC LICENSE SOUGHT BY SHIELDALLOY CONFLICTS WITH THE REGULATIONS REGARDING THE RADIOLOGICAL CRITERIA FOR UNRESTRICTED AND RESTRICTED USE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license sought by Shieldalloy conflicts with the intent of the LTR, 20 C.F.R. §§ 20.1402, 20.1403, because Shieldalloy is seeking to conduct onsite disposal of long-lived nuclides.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The intent of the decommissioning regulations is to limit the release of sites containing long-lived nuclides to unrestricted release. 62 Fed. Reg. at 39069 (Response B.3.2). The NRC stated: "termination of a license for unrestricted use is preferable because it requires no additional precautions or limitations on use of the site after licensing control ceases, in particular for those sites with long-lived nuclides." Id.

Short-lived nuclides include radioactive materials where the half-lives are between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. 62 Fed. Reg. at 39069. Such short-lived nuclides can be safely secured under restricted release through the use of institutional control. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks to decommission under restricted release by conducting onsite disposal of radioactive waste containing long-lived nuclides. Shieldalloy is seeking the LTC license upon decommissioning to constitute the institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

The NRC must determine whether issuing the LTC license to Shieldalloy, which would constitute the institutional controls for the onsite disposal of long-lived nuclides, would violate the LTR.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The LTC license makes it easier for decommissioning facilities to conduct onsite disposal of radioactive materials containing long-lived nuclides under restricted release. Goodman

Dec. ¶ 4. The LTC license allows a facility to conduct onsite disposal of long-lived nuclides where the Federal or State government is not willing to take ownership or control of the site. Id. This will create a greater number of decommissioned facilities with onsite disposals of long-lived radioactive waste under restricted release throughout the country. Id. Additional disposal sites multiply the number of locations which present a risk to public health and the environment, and require the additional expenditure of human resources and funds to regulate and maintain an additional disposal facilities.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

NRC believes that NUREG-1757 complies with the LTR. NRC Response to Comment 2.4.3. (Document # ML062370521).

Contention 16

THE LTC LICENSE VIOLATES NRC POLICIES BY PROMOTING THE CREATION OF LEGACY SITES.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license will create additional legacy sites throughout the country by making it easier to obtain approval for the restricted release option for long-lived nuclides without adequate protection to the public health. Goodman Dec. ¶¶ 4, 5. However, this result is in direct contradiction to settled NRC policy to prevent future legacy sites. SECY-03-0069 Attach. 4 page 3; SECY-06-0143 pages 5 to 7. The LTC license is in conflict with settled NRC policy and is therefore arbitrary and capricious.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

While agencies may reverse settled policy, such reversals must have a rational basis and may not be arbitrary and capricious. Citizens Awareness Network v. NRC, 59 F.3d 284, 291 (1st Cir. 1995). Furthermore, the reversal must be accompanied by some reasoning to indicate that the reversal is not arbitrary and capricious. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks to decommission under restricted release using the LTC license for institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must demonstrate a rational basis for its violation of policy and demonstrate that issuing a LTC license to SMC is not arbitrary and capricious.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and

documents on which the requestor/petitioner intends to rely to support its position on the issue.

NRC has continually reasserted its policy to prevent future legacy sites. SECY-03-0069 Attach. 4 page 3; SECY-06-0143 pages 5 to 7. A legacy site is defined as "[a]n existing decommissioning site that is complex and difficult to decommission for a variety of financial, technical, or programmatic reasons." NUREG-1757 vol. 1 page xxxii.

On May 2, 2003, the NRC issued SECY-03-0069, which discussed its policy of preventing legacy sites. The NRC stated in SECY-03-0069 that the restricted releases under a dose criterion of 1 millisievert per year ("mSv/yr") (100 mrem/yr) gives the licensee the most flexibility to conduct onsite disposals. SECY-03-0069 Attach. 4 page 3. While NRC stated that such option could lead to additional legacy sites, requiring additional financial assurance would help ensure remediation of the onsite disposal to comply with the dose restrictions when the facility decides to decommission under the LTR. Id.

On July 5, 2006, NRC revisited the problem of legacy sites in SECY-06-0143. In this latest document, NRC stressed that allowing a dose criterion of 1 mSv/yr (100 mrem/yr) and requiring additional financial assurance could still lead to the creation of additional legacy sites. SECY-06-0143 page 5. The NRC reasoned that the amount of additional financial assurance required may likely be underestimated "because of uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." Id. The NRC therefore recommended finalizing decommissioning guidance and to conduct rulemaking to only allow onsite disposals resulting in doses no greater than a few millirem per year. Id. page 5 to 6. NRC may approve higher dose criteria based on the following considerations: (a) time of potential dose impacts based on half-lives of the material; (b) mobility of the material to be disposed; (c) additional financial assurance; and (d) other aspects that ensure that the facility will not become a future legacy site. Id. page 5.

The NRC is currently developing a rule and associated guidance to prevent future legacy sites for onsite disposals. Id. at 6.

This NRC policy regarding legacy sites was discussed in the context of onsite disposals for facilities that continued to operate under a license. Id. page 3. After the onsite disposal, these facilities would continue to operate until they decide to decommission the entire site subject to the LTR. Id. The NRC concluded that for the limited time that passed between the onsite disposal and the facility-wide decommissioning, uncertainties still exist for the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs. Id. page 5. Such concerns are warranted to a much greater extent for facilities disposing long-lived nuclides onsite under the LTR that remain hazardous in perpetuity. Goodman Dec. ¶ 5. In the case of LTR onsite disposals containing long-lived nuclides, it is more likely that controls will eventually fail and cause the release of contamination thereby posing a hazard to the public. Goodman Dec. ¶¶ 4, 5. Such is the case at the Shieldalloy site where some of the radionuclides contained in the radioactive waste at Shieldalloy are thorium-232, which has a half-life of over 14 billion years, and uranium-238, which has a half-life of over 4 billion years. Goodman Dec. ¶¶ 2, 4, 5.

Although NRC policy of preventing legacy sites for onsite disposals is clear, NUREG-1757 directly contradicts this policy by allowing the creation of additional legacy sites under the LTR. NUREG-1757 will create additional legacy sites by making it easier for facilities to permanently dispose of radioactive materials containing long-lived nuclides in a number of ways. Goodman Dec. ¶ 4. First, NUREG-1757 allows the durable institutional control requirement to be met by the issuance of the LTC license or the LA/RC for sites containing long-lived nuclides where the Federal or State government is not willing to take ownership or control of the site. See NUREG-1757 vol. 1 pages 17-65 to 67. NUREG-1757 admits that the LTC license will be issued for sites where complex monitoring or maintenance activities, including maintenance of an engineered barrier or continued monitoring of groundwater or radiological hazards, are needed at a restricted use site. NUREG-1757 vol. 1 page 17-66.

Second, NUREG-1757 allows for dose assessments of 1,000 years, regardless of the duration of the radioactive hazard. NUREG-1757 vol. 1 pages 17-87 to 17-88. 1,000 year dose modeling is not adequate for long-lived nuclides. Goodman Dec. ¶ 3. The 1000 year time frame for dose assessment is clearly not appropriate for materials that have a half-life of billions of years. Goodman Dec. ¶ 3.

Third, by limiting the analysis to these time periods, regardless of the radioactive half-life of the materials, facilities will now have greater flexibility to choose the onsite disposal and restricted release option. Goodman Dec. ¶ 4. NRC admits that the restricted releases under a dose criterion of 1 mSv/yr (100 mrem/yr) gives the licensee the most flexibility to conduct onsite disposals. SECY-03-0069 Attach. 4 page 3.

Fourth, NUREG-1757 underestimates the amount of financial assurance required by a licensee, thereby making permanent onsite disposal upon decommissioning under NUREG-1757 more attractive to licensees. NUREG-1757 claims that the licensee must provide sufficient financial assurance so that the licensee funds the long-term control of the site with no additional costs being passed on to a future site owner/licensee, even where a site contains long-lived nuclides. NUREG-1757 vol. 1 pages 15-2 and 17-82. However, this reliance on financial assurance ignores the NRC conclusions that the amount of additional financial assurance required may likely be underestimated "because of uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." SECY-0600143 page 5. These conclusions were made regarding onsite disposal by licensed facilities that would continue operating at the site and may be subject to future remediation when the facilities decide to permanently decommission their entire site and terminate their license. Id. NRC concluded that uncertainties associated with the burial performance and potential releases of contamination and transport of contamination in the subsurface environment existed for the limited time periods that facilities continued to operate. Id.

Furthermore, NUREG-1757 fails to require adequate financial assurance because it ignores the effects of inflation. Burke Dec. ¶ 3. Money set aside today will gradually be reduced by the effects of inflation. Id. If the effects of inflation are considered, the applicant would be required to post greater financial assurance. Id. Furthermore, the longer the period of time is required to maintain financial assurance, the greater the underestimation of the amount of financial assurance will be. Id.

The problems of contamination and transport of contamination related to disposals that remain onsite for a limited period of time is even more applicable to onsite disposals of long-lived nuclides that remain onsite in perpetuity pursuant to the LTR. Goodman Dec. ¶ 5. Facilities disposing long-lived nuclides onsite under the LTC or LA/RC are more likely to release and transport contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Id. It is therefore arbitrary and capricious for NRC to conclude that adequate financial assurance can be provided for long-lived nuclides where controls are required in perpetuity (as is the case in Shieldalloy) even though NRC admits that underestimation of the financial assurance is a problem for sites that are decommissioned for a limited period of time.

NRC admitted that "uncertainties" existed regarding contamination and transport of contamination for onsite disposal for facilities that continue to operate, even under current NRC regulations. SECY-06-0143 page 5. NRC therefore recommended the promulgation of a new rule. Id. at 6. NRC further admits that the emphasis of 10 C.F.R. Part 20 is for the protection of the public and workers from "imminent exposures" to excessive radiation, "not projected long-term exposures." SECY-03-0069. Such concerns are warranted to a much greater extent for facilities disposing long-lived nuclides onsite under the LTR since it is reasonable to assume that facilities disposing long-lived nuclides onsite under the LTR have a higher likelihood of releasing and transporting contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Goodman Dec. ¶ 5.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

NRC issued NUREG-1757, which provides for the LTC license, despite its policy against the creation of legacy sites. See SECY-06-0143.

UNITED STATES NUCLEAR REGULATORY COMMISSION

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	))))

PETITION FOR A HEARING
PART II OF III

Environmental Contentions

Submitted by:

State of New Jersey,
Department of Environmental Protection

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
(609) 292-1509

Andrew D. Reese
Kenneth W. Elwell
Deputy Attorneys General
On the Petition

TABLE OF CONTENTS

PAGE

CASES CITED

STATUTES CITED

FEDERAL RULE CITED

FEDERAL REGULATION CITED

Contention 1

THE SOIL ON WHICH SHIELDALLOY PROPOSES TO SITE THE RADIOACTIVE WASTE WILL ALLOW RADIONUCLIDES TO CONTAMINATE THE GROUNDWATER.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

Shieldalloy proposes to conduct onsite disposal of its radioactive waste on native soil without any protective liner. However, disposal of Radioactive waste should not be conducted in this area because the radionuclides will easily infiltrate the relatively thin layer of soil (the vadose zone) and enter the underlying groundwater. Malusis Report[1] page 4.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of radioactive waste.

[1] "Malusis Report" refers to the letter sent by Michael Malusis to Kenneth Elwell dated January 16, 2007.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983).

The License Termination Rule ("LTR") requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes to conduct onsite disposal of its radioactive waste on native soil.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to maintain the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently isolate the

Radioactive waste. 42 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP proposes to dispose the Radioactive waste on native soil. However, the vadose zone in this area is relatively thin (2.5 meters) and consists of fine to coarse sand and gravel deposits, followed by a saturated zone layer consisting primarily of coarse sand with little to trace silt. Malusis Report page 4. The DP estimates the saturated hydraulic conductivity of the native vadose zone material at 0.017 m/yr (5.4 x 10^{-8} cm/s). DP rev. 1a page 39. However, this reported value is a gross underestimate, i.e., the value is representative of a clay-rich soil and is not remotely representative of a relatively clean sand/gravel layer. Malusis Report page 4. The true saturated hydraulic conductivity of this layer likely ranges between 10^{-1} and 10^{-3} cm/s based on the reported texture. Id. As a result, water that infiltrates through the waste material will also infiltrate easily through the vadose zone and into the underlying saturated zone, carrying those contaminants that leach from the waste mass. Id.

The hydraulic conductivity of the saturated zone is estimated at 16,000 m/yr (i.e., 0.05 cm/s), DP rev. 1a page 79, which is consistent with that expected for a coarse sand aquifer, Malusis Report page 4. These hydraulic properties, in addition to the relatively thin vadose zone layer and the absence of an engineered liner system beneath the waste, are not favorable for long-term protection of the groundwater pathway. Id.; Gaffigan Dec. ¶ 11.

The DP appears to justify the onsite disposal under these conditions upon the ability of the vadose zone and saturated zone soils to provide attenuation (i.e., adsorption) of the radionuclides, since the distribution coefficients (K_d) assigned to the vadose zone and saturated zone layers are the same as those assigned to the waste material itself. Malusis Report page 4 (citing DP rev. 1a Table 17.5). Yet, Shieldalloy failed to perform any sorption tests to verify that the underlying soil formations exhibit adsorption capacity for the contaminants of concern. Malúsis Report page 4. Moreover, the underlying soils consist primarily of sand, gravel, and little to trace silt. DP rev o Envt'l Report Page 3-13. As a result, the vadose zone and saturated zone materials are largely inert (i.e., do not participate in ion exchange reactions) and may provide little, if any, attenuation of inorganic contaminants (both radioactive and non-radioactive species) that leach from the waste mass. Malusis Report page 4; Spayd Report page 2. In this case, K_d would be close to zero. Malusis Report page 4. The lack of attenuation capacity is an additional concern regarding the long-term protectiveness of the groundwater. Id.

The DP excludes consideration of the groundwater on the basis that it is presently contaminated. DP § 5.2.2.2.4. This area is a relatively populated area. The DP fails to consider that current municipal supply wells are located less than one mile form the site and draw water from the same aquifer that Shieldalloy has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigate wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility. Gaffigan Dec. ¶ 18. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id.

Finally, Shieldalloy should have considered contamination of the Hudson Branch stream since it is fed by groundwater discharge in times of no or low precipitation. Malusis Report page 5; Spayd Report page 3. The stream flows through portions of the Shieldalloy facility and continues through residential and agricultural areas. DP rev o Envt'l Report page 3-17.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP estimates the saturated hydraulic conductivity of the native vadose zone material at 0.017 m/yr (5.4 x 10^{-8} cm/s). DP rev. 1a page 39. However, this reported value is a gross underestimate, i.e., the value is representative of a clay-rich soil and is not remotely representative of a relatively clean sand/gravel layer. Malusis Report page 4. The true saturated hydraulic conductivity of this layer likely ranges between 10^{-1} and 10^{-3} cm/s based on the reported texture. Id. As a result, water that infiltrates through the waste material will also infiltrate easily through the vadose zone and into the underlying saturated zone, carrying those contaminants that leach from the waste mass. Id.

The DP appears to justify the onsite disposal under these conditions upon the ability of the vadose zone and saturated zone soils to provide attenuation (i.e., adsorption) of the radionuclides, since the distribution coefficients (K_d) assigned to the vadose zone and saturated zone layers are the same as those assigned to the waste material itself. Malusis Report page 4 (citing DP rev. 1a Table 17.5). Yet, Shieldalloy failed to perform any sorption tests to verify that the underlying soil formations exhibit adsorption capacity for the contaminants of concern. Id. Moreover, the underlying soils consist primarily of sand, gravel, and little to trace silt. DP rev o Envt'l Report Page 3-13. As a result, the vadose zone and saturated zone materials are largely inert (i.e., do not participate in ion exchange reactions) and may provide little, if any, attenuation of inorganic contaminants (both radioactive and non-radioactive species) that leach from the waste mass. Id. In this case, K_d would be close to zero. Malusis Report page 4.

The DP excludes consideration of the groundwater on the basis that it is presently contaminated. DP § 5.2.2.2.4. This area is a relatively populated area. The DP fails to consider that current municipal supply wells are located less than one mile form the site and draw water from the same aquifer that Shieldalloy has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigate wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility. Gaffigan Dec. ¶ 18. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id.

Finally, Shieldalloy should have considered contamination of the Hudson Branch stream since it is fed by groundwater discharge in times of no or low precipitation. Malusis Report page

5; Spayd Report page 3. The stream flows through portions of the Shieldalloy facility and continues through residential and agricultural areas. DP rev o Envt'l Report page 3-17.

Because the Radioactive waste will likely leach contaminants, see Contention 2, and because the proposed cap will likely allow water infiltration, see Contention 3, the DP should be rejected because of the likelihood of groundwater contamination. Malusis Report pages 4-9.

Contention 2

THE DP FAILS TO ACKNOWLEDGE THE LEACHABILITY OF RADIONUCLIDES FROM THE SLAG DESPITE SHIELDALLOY'S OWN TESTS SHOWING THAT THE RADIOACTIVE WASTE WILL LEACH RADIONUCLIDES FROM RAINWATER.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP instead places heavy reliance on the argument that the Radioactive waste will resist leaching contaminants. Malusis Report page 5. However, Shieldalloy's own tests show that the Radioactive waste does leach contaminants. Id. page 6. Furthermore, because of the volume of Radioactive waste and the fact that no tests were performed on the baghouse dust, more tests should have been completed. Id. Also, the type of tests actually conducted may not provide an accurate representation of long-term leaching behavior, which should be required in this case because of the long half lives of the materials. Id.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires the "permanent isolation" of low-level radioactive waste. Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. Pac. Gas & Elec., 461 U.S. at 207.

The LTR requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that relies upon the argument that the materials will resist leachability. DP rev. 1a page 41.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to meet the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently isolate the Radioactive waste. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7). The DP relies heavily on their argument that the materials resist leaching. DP rev. 1a page 41.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

In each of the TCLP tests, the combined concentration of leached radium isotopes (i.e., Ra-226 and Ra-228 combined) easily exceeded the Maximum Contaminant Level (MCL) of 5 pCi/L established in the National Primary Drinking Water Regulations. Malusis Report page 6. The combined radium concentration in the leachant from the TCLP test on the slag was 6,660 pCi/L (more than 1,000 times the MCL), and the combined radium concentrations in the leachant from the two TCLP tests on the baghouse dust were 32.6 pCi/L and 19.39 pCi/L. Id. In addition, the EP Toxicity tests performed on the ferrocolumbium slag samples in 1987 indicate that the slag releases barium (Ba) at concentrations in excess of the drinking water MCL of 2 mg/L. Leached Ba concentrations from the two slag samples were 14 and 23 mg/L. Id.

While it is acknowledged that the population would not be directly exposed to undiluted leachate, the above results are sufficient to cause concern regarding potential degradation of the groundwater due to release of contaminants from the waste. There are some significant overall limitations associated with the leaching tests that also warrant consideration. Id. First, no tests appear to have been conducted on the baghouse dust to evaluate the potential for leaching of non-radioactive contaminants (e.g., heavy metals) despite the fact that the baghouse dust represents approximately 20% of the radioactive waste volume to be disposed. Id. The contaminated soils and building materials were not analyzed for leachability of radionuclides. Gaffigan Dec. ¶ 13. Also TCLP leachate for the slag and baghouse dust was only analyzed for radionuclides. Id. The leachate should have also been analyzed for chemical contaminants pursuant to RCRA to determine if they are hazardous waste and possibly banned from land disposal. Id. Even if the results are below the limits for hazardous waste classification, the TCLP results will indicate if any of the materials are contaminated with metals or other contaminants that may be leachable and present a continuing source of ground water contamination. Id.

Second, the number of leaching tests performed is insufficient to assess potential variability in the leaching behavior of the waste materials and establish statistical confidence that the test results are representative of the waste mass as a whole. Malusis Report page 6. Only three samples of slag (for more than 30,000 cubic meters of a variety of slags) and two samples of baghouse dust (for more than 13,000 cubic meters of dust) were subjected to TCLP and subsequent radionuclide analysis. Gaffigan Dec. ¶ 15.

Third, the leached concentrations reported may not represent equilibrium conditions. Id. The standard test durations for the TCLP and EP Toxicity tests are 18 and 24 hours, respectively. Id. No demonstration apparently has been performed to verify that these testing durations are sufficient to allow equilibrium conditions to be established between the liquid and solid phases (i.e., to allow the leaching process to reach completion). Id. Longer extraction times would result in higher leached concentrations if equilibrium had not been established in these tests. Id. Finally, tests such as the TCLP and EP Toxicity tests are single extraction tests and, alone, may not provide an accurate representation of long-term leaching behavior. Id.

Regarding test duration, a similar concern exists for the short-term batch tests used to determine K_d values for the waste mass. Id. pages 6 to 7.

Furthermore, the referenced report by Dave Raviv Associates in footnote 34 contains radiological analyses that do not conform to the requirements of reporting of radiological environmental data.

Goodman Report[2] page 3. For example, the minimum detectable activities ("MDAs") should be reported for each analysis. Id. The MDAs for gross alpha and gross beta are not always below the requirements in the Environmental Protection Agency's Safe Drinking Water regulations. (40 CFR 141.25(c) (1) and (2)). The uranium concentrations reported are above that which would be expected in this area of the state. Goodman Report page 3. The concentration of uranium in the Kirkwood-Cohansy aquifer is typically 0.03 micrograms per liter (ug/L) according to the US Geological Geological Survey. Id. Uranium-238 concentrations in the report (Appendix 19.2) are three orders of magnitude above that level.[3] Id. Thus, the statement in the plan that the radionuclides are bound tightly to the slag and will not leach into the groundwater, is not supported by SMC's own groundwater data. Id.

As discussed above in Contention 1, radionuclides will easily infiltrate the relatively thin layer of the vadose zone. As discussed below in Contention 3, the cap will allow rainwater infiltration. Because the Radioactive waste will leach contaminants, the proposed disposal will likely cause groundwater contamination. Malusis Report pages 4-9.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

---

[2] "Goodman Report" refers to the memo from Jenny Goodman to Donna Gaffigan dated January 16, 2007.

[3] The mass concentration of total uranium is obtained by dividing the activity concentration of Uranium-238 (in picocuries per liter) by 0.3365.

The DP states that the materials will resist leachability. DP rev. 1a page 41. However, in each of the TCLP tests, the combined concentration of leached radium isotopes (i.e., Ra-226 and Ra-228 combined) easily exceeded the Maximum Contaminant Level (MCL) of 5 pCi/L established in the National Primary Drinking Water Regulations. Malusis Report page 6; Gaffigan ¶ 16. The combined radium concentration in the leachant from the TCLP test on the slag was 6,660 pCi/L (more than 1,000 times the MCL), and the combined radium concentrations in the leachant from the two TCLP tests on the baghouse dust were 32.6 pCi/L and 19.39 pCi/L. Malusis Report page 6. In addition, the EP Toxicity tests performed on the ferrocolumbium slag samples in 1987 indicate that the slag releases barium (Ba) at concentrations in excess of the drinking water MCL of 2 mg/L. Leached Ba concentrations from the two slag samples were 14 and 23 mg/L. Id. While it is acknowledged that the population would not be directly exposed to undiluted leachate, the above results are sufficient to cause concern regarding potential degradation of the groundwater due to release of contaminants from the waste.

Contention 3

SHIELDALLOY'S CAP DESIGN IS FATALLY FLAWED BECAUSE IT WILL ALLOW RAINWATER TO EASILY INFILTRATE THE RADIOACTIVE WASTE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The proposed cover system consisting of soil and crushed stone is not protective of the public health because it will allow rainwater infiltration. Malusis Report pages 7 to 8.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires the "permanent isolation" of low-level radioactive waste. Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. Pac. Gas & Elec., 461 U.S. at 207.

The LTR requires the TEDE from residual radioactivity to not exceed either 100 mrem per year or 500 mrem per year, under certain circumstances, assuming that institutional controls fail. 10 C.F.R. § 20.1403(e). The LTR also requires the TEDE to be as low as reasonably achievable. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes a LTC restricted use disposal design.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the proposed onsite disposal is sufficient to maintain the required dose criteria for the duration of the radiological hazard. See 10 C.F.R. § 20.1403. NRC must also determine whether the cap is sufficient to protect the public health and safety and will permanently isolate the Radioactive waste. 42 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2021b(7). .

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP states that the cover "is designed to prevent rainwater infiltration into the consolidated material." DP rev. 1a page 41. However, this statement does not appear to have been justified to any reasonable extent. Malusis Report page 7. For example, a considerable amount of analysis has been performed to demonstrate that the crushed rock surface will provide long-term protection against erosive forces. Id. However, erosion protection is not sufficient to prevent infiltration and subsequent release of contaminants into the subsurface. Id. The plan currently appears to be devoid of consideration regarding the hydraulic performance of the cover. Id. No specifications have been provided for the index properties (i.e., grain size distribution, Atterberg limits, activity, etc.) and hydraulic conductivity of the soil layer, no evaluation of candidate borrow sources has been documented, and no specifications for placement of the soil layer are included. Id. In addition, no justification is provided for the use of a surface runoff coefficient as high as 0.8 (i.e., 80 % of the precipitation runs off) or an evapotranspiration rate of 24 inches per year for a cover with a crushed rock surface and no vegetation. Id.; Spayd Report pages 1-2. Surface runoff likely will be a negligible component of the water balance for this cover. Malusis Report page 7.

NRC staff stated at the public meeting held in Newfield on December 5, 2006 that the barrier will be design to allow rainwater infiltration. Gaffigan Dec. ¶ 11. However, such a cap is not protective of the public health, especially when considering the leachability of the radioactive waste and ease of which the radionuclides will infiltrate the relatively thin layer of soil (the vadose zone) and enter the underlying groundwater. Malusis Report pages 4-9.

In addition to the above, other considerations such as slope stability, soil development, and root intrusion do not appear to have been considered in this plan. Id. Slope stability is a potential concern in the short- and long-term due to the proposed 3:1 side slopes, the lack of information provided regarding the cover soil requirements and the potential for at least a portion of the cover to be inundated based on the PMF scenario. Id.

Soil development and root intrusion have been shown to be problematic in UMTCRA-type covers such as that proposed in this plan and have the potential to cause an increase in hydraulic conductivity of a soil cover by several orders of magnitude over the long term. Id. Soil development and root intrusion has been a common problem to landfills located in New Jersey. Disbrow Dec. ¶ 2.

Vegetation rooted in contaminated materials may contain elevated levels of uranium, thorium, radon, and radium. Exh. B page 2.

The climate of southern New Jersey is not favorable to the long-term isolation of the waste. Malusis Report page 8. Long-term hydrologic isolation of buried wastes at arid and semi-arid sites is favorable because of the relatively low precipitation, high potential evapotranspiration, and thick unsaturated soils. Id. However, these conditions are not present at the Newfield site. Id.

NUREG-1757 Vol.2, Section 3.5.3 states that a parametric or component sensitivity analysis should be provided to identify how much degradation of the engineered barrier would result. However, the DP fails to perform this analysis. Goodman Report page 2.

SMC did not provide natural analogs for the effectiveness of their engineered barrier. Id. NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15.

The DP contains conflicting information regarding the cap. Revision 1a states that a geomembrane liner will be used in the cap. DP rev. 1a pages 38, 64, 73, 74, note 184. Revision 1a states that a runoff coefficient of 1 is used with a geomembrane. DP rev. 1a page 73. Revision 1 of the DP states that the geomembrane is used to divert surface water, DP rev. 1 page 37 note 92, pages 60-61, limit the impact of burrowing animals, DP rev. 1 page 158, and is an integral part of the engineered barrier, DP rev. 1 pages 166, 177. However, the June 30, 2006 transmittal letter accompanying revision 1a of the DP states that the geomembrane has been removed. Page 7.

As discussed above in Contention 1, radionuclides will easily infiltrate the relatively thin layer of the vadose zone. As discussed be in Contention 2, Shieldalloy's own testing has found that the waste will will leach contaminants. Because the proposed cap will likely cause rainwater infiltration, groundwater contamination will also be likely where the waste will remain a radioactive hazard for billions of years. Malusis Report pages 4-9; Goodman Dec.[4] ¶ 2. In contrast, Shieldalloy contaminated the groundwater at the facility with chromium, trichloroethene and other contaminants during in a mere 50 years. Gaffigan Dec. ¶ 11.

---

[4] "Goodman Dec." refers to the Declaration of Jennifer Goodman, which is attached to the Goodman Report.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that the cover "is designed to prevent rainwater infiltration into the consolidated material." DP rev. 1a page 41. However, this statement does not appear to have been justified to any reasonable extent. Malusis Report page 7. The plan currently appears to be devoid of consideration regarding the hydraulic performance of the cover. Id. No specifications have been provided for the index properties (i.e., grain size distribution, Atterberg limits, activity, etc.) and hydraulic conductivity of the soil layer, no evaluation of candidate borrow sources has been documented, and no specifications for placement of the soil layer are included. Id. In addition, no justification is provided for the use of a surface runoff coefficient as high as 0.8 (i.e., 80 % of the precipitation runs off) or an evapotranspiration rate of 24 inches per year for a cover with a crushed rock surface and no vegetation. Id.; Spayd pages 1-2. Surface runoff likely will be a negligible component of the water balance for this cover. Malusis Report page 7.

In addition to the above, other considerations such as slope stability, soil development, and root intrusion do not appear to have been considered in this plan. Id. Slope stability is a potential concern in the short- and long-term due to the proposed

3:1 side slopes, the lack of information provided regarding the cover soil requirements and the potential for at least a portion of the cover to be inundated based on the PMF scenario. Id. Soil development and root intrusion have been shown to be problematic in UMTCRA-type covers such as that proposed in this plan (e.g., see and have the potential to cause an increase in hydraulic conductivity of a soil cover by several orders of magnitude over the long term. Id. Soil development and root intrusion has been a common problem to landfills located in New Jersey. Disbrow Dec. ¶ 2.

Contention 4

BECAUSE SHIELDALLOY HAS FAILED TO FULLY CHARACTERIZE ITS FACILITY FOR RADIONUCLIDE CONTAMINATION, IT HAS FAILED TO PRESENT SUFFICIENT INFORMATION TO ASSESS WHETHER PORTIONS OF THE SITE MEET THE DOSE CRITERIA UNDER THE LICENSE TERMINATION RULE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP contends that the facility is fully characterized for radionuclide contamination. DP rev. 1 Chapter 4. However, the characterization that was submitted (IT April, 1992 "Assessment of Environmental Radiologcial Conditions at the Newfield Facility") is not adequate. Goodman Report pages 3 to 5. Shieldalloy should be required to fully characterize the facility before it submits a DP so NRC can ensure that the site is classified correctly for the final status survey so that it can be determined if the site is fully remediated and complies with the LTR.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

NUREG-1757 requires the final status survey to be submitted with the DP to allow the NRC to determine whether the survey is adequate for demonstrating compliance with the radiological criteria for license termination. Vol. 1 page 15-9. Shieldalloy has failed to conduct a full characterization survey of its facility. Exh. M.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP pursuant to the LTR.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC is required to review the final status survey as part of the DP to determine if the facility will meet the radiological criteria in the LTR. NUREG-1757 Vol. 1 page 15-9

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The site has not been fully characterized to determine the levels of radioactivity above background. Goodman Report page 1. The soil samples were sporadic and the EPA protocol for further analysis of water samples was not followed properly. Id. The laboratory data was either not present, or had problems, like not meeting the required minimum detectable activities (MDA). Id. For example, there is no indication if soil samples were sealed for 21 days prior to analysis in order to reach secular equilibrium. Id. This could bias all the soil results low. Without adequate and full characterization of the site, the NRC and NJDEP cannot determine if any portion of the site meets the dose criterion for unrestricted use. Id.

Given the fact that SMC confirms that the Hudson branch is in need of remediation, other areas of the site should be sampled to ensure that radionuclides did not migrate from the areas that were licensed. Goodman report page 3.

SMC states definitively that the only areas within the SMC property lines where residual radioactivity exists in surface soils, other than the Storage Yard, are the concrete pads that housed the former AAF and Flex-Klean Baghouses, D-111 and D-102/112. DP rev. 1 page 28. This statement is premature considering there has been no final status survey of the property. Goodman Report § 4.4.2. We believe that in addition to Class 1 survey units, Class 2 and Class 3 survey units are imperative considering the site has never been fully characterized and considering it is unknown where slag was used on site. Id.

The scale drawing and map of soil and water sampling results in Appendix B of the Environmental Report (Appendix 19.9 of the Plan) shows contamination above background levels in the Hudson's Branch and outside the fence line, to the north of the storage yard, and in areas where licensed material was never stored or used. These areas need to be addressed in the final status survey of the site prior to the license amendment. Goodman Report § 4.4.2.

There does not appear to be an accurate accounting of the locations of where slag may have been used as fill. Goodman Report § 4.5. There is not an accurate assessment of whether or not the slag was radioactive. Id. Considering this uncertain history, the entire site should be included in a final status survey. Id.

The DP states that subsurface radioactivity may be present at the site where slag was used as fill. DP rev. 1 page 29. While the DP states that these areas have not been well-characterized, it states that "they would have a nominal radionuclide content." Id. Pages 29-30. However, multiplying out the assumptions of the quantity of radioactive material that may be present as fill slag yields a concentration that is three orders of magnitude above New Jersey's cleanup standards, which would not be considered a nominal radionuclide content. Goodman Report § 4.5.

Sections 4.2.1 to 4.2.3, 4.4.1, and 4.5 to 4.7 of Goodman's

Report provide other DP deficiencies associated with the failure to properly characterize the site.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

Chapter 4 of the DP purports to adequately describe the radiological status of the facility. However, the site has not been fully characterized to determine the levels of radioactivity above background. Goodman Report page 1. The previous section of this Petition describes the various deficiencies in Chapter 4 of the DP and sets forth the various ways in which the site was not fully characterized.

SMC states definitively that the only areas within the SMC property lines where residual radioactivity exists in surface soils, other than the Storage Yard, are the concrete pads that housed the former AAF and Flex-Klean Baghouses, D-111 and D-102/112. DP rev. 1 page 28. This statement is premature considering there has been no final status survey of the property. Goodman Report § 4.4.2. We believe that in addition to Class 1 survey units, Class 2 and Class 3 survey units are imperative considering the site has never been fully characterized and considering it is unknown where slag was used on site. Id.

The DP states that subsurface radioactivity may be present at the site where slag was used as fill. DP rev. 1 page 29. While the

DP states that these areas have not been well-characterized, it states that "they would have a nominal radionuclide content." Id. Pages 29-30. However, multiplying out the assumptions of the quantity of radioactive material that may be present as fill slag yields a concentration that is three orders of magnitude above New Jersey's cleanup standards, which would not be considered a nominal radionuclide content. Goodman Report § 4.5.

Contention 5

THE DP OBTAINS INACCURATE DOSE MODELING RESULTS BY IGNORING THE LIKELY SCENARIO OF GROUNDWATER CONTAMINATION AND IGNORING OTHER REASONABLE ASSUMPTIONS.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

DP fails to assume likely scenarios in its modeling, such as contamination of groundwater. If this likely scenario is modeled, the radioactive doses would exceed the limits established by the License Termination Rule ("LTR"). See 10 C.F.R. § 20.1403(e). The DP also fails to assume other reasonable scenarios, which would further raise the radioactive doses.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR requires residual radioactivity at the site to be reduced "so that if the institutional controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either (1) 100 mrem (1 mSv) per year; or (2) 500 mrem (5 mSv)" under certain circumstances. 10 C.F.R. § 20.1403(e).

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. If this pathway is included in the modeling, with more reasonable parameters used for this type of cap, a TEDE of 1,718 mrem/yr at 800 years would result. Goodman Report page 11. This dose level is not protective of human health and exceeds the 500 mrem limit in the LTR. Id. Furthermore, the DP excludes other reasonable scenarios that would raise the TEDE even higher. Id. Pages 6 to 11.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP seeking to decommission its facility under the LTR. The LTR requires an applicant to ensure that the TEDE from residual radioactivity meet various criteria. 10 C.F.R. 20.1403. Thus, modeling must use accurate assumptions to ensure that the TEDE meets the criteria. However, the DP fails to use realistic assumptions.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether modeling will accurately ensure that the dose criteria in the LTR are met. See 10 C.F.R. § 20.1403.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. The DP states that groundwater below the Shieldalloy facility is contaminated and not likely to be ingested by anyone. DP § 5.2.2.2.4. SMC therefore excludes the drinking water pathway from its modeling. Id. However, the aquifer beneath the SMC site is classified as a Class IIA aquifer which means it can be used as potable water with treatment. Goodman Report § 5.2.2.2.4. Treatment is considered a contol that will fail. Id. Current municipal supply wells are located less than one mile from the site and draw water from the same aquifer that Shieldalloy has contaminated. Gaffigan Dec. 18. Shieldalloy has been operating a treatment system on site to remediate the groundwater that was contaminated by Shieldalloy.

Id. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id. The DP states that RESRAD supports the position that a suburban resident does not drink groundwater. DP rev. 1a page 61 note 157. The RESRAD Manual states that in an EPA study (U.S. Environmental Protection Agency, 1994, *Radiation Site Cleanup Regulations: Technical Support Document for the Development of Radionuclide Cleanup Levels for Soil,* review draft, Office of Radiation and Indoor Air, Washington, D.C.), an on-site well is assumed for drinking in the suburban resident scenario. Goodman Report page 8. Therefore, SMC must include the drinking water pathway in its all controls fail analysis. Gaffigan Dec. ¶ 19; Goodman Report § 5.2.2.2.4; Malusis Report page 5; Spayd Report page 3.

The DP also excludes other reasonable exposure scenarios from its modeling. Farming up to the property boundary and on the unrestricted portion of the property should be considered since the DP states that the property will be subdivided for unrestricted release, DP vol 1 page 154 note 102. Goodman Report page 6.

The DP assumes that the hypothetical resident lives 1000 feet from the pile. DP rev. 1a page 60 note 156. However, because a portion of the property will be released for unrestricted use, and because a resident currently resides only 100 feet from the property, the modeling should assume a family living on the unrestricted portion of the property. Goodman Report §§ 5.3.1, 5.3.3.2. Also, it is unreasonable to assume that municipal water will be available in the foreseeable future. Id. § 5.3.3.2. It is also reasonable to assume that the family grows a garden and consumes produce from it. Id. Since 10 C.F.R. § 20.1403(e) requires the assumption that institutional controls will fail, and since the materials will remain a radioactive hazard in perpetuity, the modeling should assume that the radioactive slag will be exposed. Id. § 5.3.3. In sum, all pathways should be used for this scenario, namely direct radiation exposure, particulate inhalation, direct soil ingestion, crop ingestion, and drinking water ingestion. Goodman Report page 8.

The DP states the suburban resident scenario is unlikely because of the lack of available space to construct a house and parking and because the majority of the area surrounding the Storage Yard is assigned for natural resource damage mitigation. DP rev. 1a page 61. However, since a resident currently lives 100 feet from the property, DP rev. 1 § 1.2, there is no basis to claim that a resident scenario is unlikely. Furthermore, institutional controls will likely fail while the materials remain a radioactive hazard in perpetuity. Goodman Report § 5.1. Therefore, the natural resource limitation must also be assumed to fail. Id. page 8.

The amount of time a suburban resident assumed by the DP to spend at the site is not conservative. Id. The US Environmental Protection Agency's Exposure Factors Handbook[5] recommends 16.4 hours per day for time indoors. Id. The RESRAD Manual uses 50% of the time spent indoors. Id. There is no recommendation for how many days per year, but the average number of vacation days taken in the US is 13. Id. The standard days per year for a resident is typically 350. Id. The values listed, 240 days for 8 hours per day are not justified. Id. That means the resident is away from home for 4 months out of the year. Id.

The engineered cap and slag may be an ideal source for construction material. Id. Page 6. In fact, Shieldalloy used the slag material as fill for a road and underneath a building knowing full well that this material was radioactive. DP rev. 1 pages 27, 29. Therefore, this scenario should be modeled. Goodman Report page 6.

The DP states that an all controls fail scenario is being modeled. DP rev. 1a page 34, line 20. However, the DP is actually modeling only a slight degradation of controls. Goodman Report § 5.1. Modeling needs to be performed assuming that the engineered controls completely degrade since the materials will remain a radioactive hazard into perpetuity. Id.

---

[5] Exposure Factors Handbook Volume III, Activity Factors, US Environmental Protection Agency, EAP/600/P-95/002Fc, August, 1997.

The DP fails to take into account exposure from direct contact with the uncovered pile. DP rev. 1a § 5.5.10. However, as discussed above, contact with the uncovered pile when institutional controls fail is a reasonable scenario.

The Microshield runs neglected to take into account all the progeny associated with uranium and thorium. Goodman Report § 5.5.9. Because the uranium and thorium in the slag are in equilibrium with their associated decay products, and because most of them are gamma emitters, all of these decay products should be included in the source term. Id. Using the same geometries as SMC for the shape of the source and the distance from the source, the exposure rates are two orders of magnitude higher than shown in Appendix 19.5. Id.

The DP states that modeling to predict future doses has been derived from "previously completed radiological assessments of the residual radioactivity at the Newfield site." DP rev. 1a § 5.2.1. However, the lateral and vertical extent of contamination has never been determined. Exh. M. Accurate dose modeling of radionuclide contamination into the groundwater cannot be conducted without determining the vertical extent of the contamination. Goodman Report § 5.2.1. Also, without a determination of the lateral extent of the contamination, contamination above the established cleanup levels could be missed in the final status survey. Id.

The DP derives the source term using the weighted averages of the concentrations of material in the storage yard. DP Table 17.7. This would make sense if the material were capable of being blended together. Goodman Report § 5.2.1.2. However, the concentration in the slag will not change even if other, less concentrated material is placed near it. Id. If the slag were uncovered, as would be the case in an all controls fail scenario, it is reasonable to assume that the receptor would be exposed to the higher concentration, not the derived concentration. Id. Thus, the Derived Source Term should use the concentration of the slag. Id.

The fence should be assumed to fail since the waste will remain a radioactive hazard into perpetuity. Goodman Report page 7.

The DP includes erroneous assumptions that affects the dose modeling. Goodman Report § 5.4.3.3. For example, it is stated that the saturated hydraulic conductivity was measured for the native sand material at the site as 2,000 m/y. DP rev. 1a page 77. However, SMC uses 0.017 m/y for the saturated hydraulic conductivity of the unsaturated zone (which is the native sand layer). Id. Page 79. Also, Table 17.5 lists the K_d of Radium as 50, which is much lower than the RESRAD default, but this is not even mentioned in the text. Goodman Report § 5.4.3.3. This seems to contradict the statement that the slag is essentially insoluble even under the most extreme in-situ conditions that might reasonably be encountered. Id. A site-specific K_d was not determined for the baghouse dust or the contaminated soil. Id.; Spayd Report page 2. This will be important when the drinking water pathway is included in the analysis. Id.

The DP inputs a parameter of 0.004 for the hydraulic gradient of the saturated zone, as shown in Appendix A and B and referenced in the April 1992 Remedial Investigation Technical Report. Spayd Report Page 2. However, measurement of the hydraulic gradient of the saturated zone in the 1992 Report show the gradient at the site to be 0.002, one half the gradient used in RESRAD. Id. The Ground Water Modeling Memo also uses the 0.002 hydraulic gradient value. Id. Therefore, the hydraulic gradient of the saturated zone used in RESRAD is not correct and should be changed to 0.002. Id. NJDEP modeling found that using the lower value of 0.002 increases the doses.

Sections 5.1, 5.2.2.2.1 to 5.2.2.2.3, 5.3, 5.3.3.1 to 5.3.3.4, 5.5.1, 5.5.11 of Goodman's Report provide other DP deficiencies associated with the dose modeling. Page 3 of Spayd's Report also provide DP deficiencies.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP completely excludes the likely scenario of radionuclides contaminating the groundwater. Goodman Report § 5.2.2.2.4. The DP states that groundwater below the Shieldalloy facility is contaminated and not likely to be ingested by anyone. DP § 5.2.2.2.4. SMC therefore excludes the drinking water pathway from its modeling. Id. However, the aquifer beneath the SMC site is classified as a Class IIA aquifer which means it can be used as potable water with treatment. Goodman Report § 5.2.2.2.4. Treatment is considered a control that will fail. Id. Shieldalloy has been operating a treatment system on site to remediate the groundwater that was contaminated by Shieldalloy. Gaffigan Dec. ¶ 17. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. Id. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. Id. Because the radiological hazard from these materials will remain in perpetuity, Goodman Dec. ¶ 2, Shieldalloy's dismissal of the groundwater pathway because of present contamination is not warranted. Malusis Report page 5; Goodman Report § 5.2.2.2.4; Gaffigan Dec. ¶ 19; Spayd Report page 3. Therefore, SMC must include the drinking water pathway in its all controls fail analysis. Id.

The DP states that RESRAD supports the position that a suburban resident does not drink groundwater. DP rev. 1a page 61 note 157. However, the RESRAD Manual states that in an EPA study (U.S. Environmental Protection Agency, 1994, *Radiation Site Cleanup Regulations: Technical Support Document for the Development of*

Radionuclide Cleanup Levels for Soil, review draft, Office of Radiation and Indoor Air, Washington, D.C.), an on-site well is assumed for drinking in the suburban resident scenario. Goodman Report page 8.

The DP also excludes other reasonable exposure scenarios from its modeling. Farming up to the property boundary and on the unrestricted portion of the property should be considered since the DP states that the property will be subdivided for unrestricted release, DP vol 1 page 154 note 102. Goodman Report page 6.

The DP assumes that the hypothetical resident lives 1000 feet from the pile. DP rev. 1a page 60 note 156. However, because a portion of the property will be released for unrestricted use, and because a resident currently resides only 100 feet from the property, the modeling should assume a family living on the unrestricted portion of the property. Goodman Report §§ 5.3.1, 5.3.3.2. Also, it is unreasonable to assume that municipal water will be available in the foreseeable future. Id. § 5.3.3.2. It is also reasonable to assume that the family grows a garden and consumes produce from it. Id. Since 10 C.F.R. § 20.1403(e) requires the assumption that institutional controls will fail, and since the materials will remain a radioactive hazard in perpetuity, the modeling should assume that the radioactive slag will be exposed. Id. § 5.3.3. In sum, all pathways should be used for this scenario, namely direct radiation exposure, particulate inhalation, direct soil ingestion, crop ingestion, radon, and drinking water ingestion. Goodman Report page 8.

The DP states the suburban resident scenario is unlikely because of the lack of available space to construct a house and parking and because the majority of the area surrounding the Storage Yard is assigned for natural resource damage mitigation. DP rev. 1a page 61. However, since a resident currently lives 100 feet from the property, DP rev. 1 § 1.2, there is no basis to claim that a resident scenario is unlikely. Furthermore, institutional controls will likely fail while the materials remain a radioactive hazard in perpetuity. Goodman Report § 5.1. Therefore, the natural resource limitation must also be assumed to fail. Id. page 8.

The amount of time a suburban resident assumed by the DP to spend at the site is not conservative. Id. The US Environmental Protection Agency's Exposure Factors Handbook[6] recommends 16.4 hours per day for time indoors. Id. The RESRAD Manual uses 50% of the time spent indoors. Id. There is no recommendation for how many days per year, but the average number of vacation days taken in the US is 13. Id. The standard days per year for a resident is typically 350. Id. The values listed, 240 days for 8 hours per day are not justified. Id. That means the resident is away from home for 4 months out of the year. Id.

---

[6] Exposure Factors Handbook Volume III, Activity Factors, US Environmental Protection Agency, EAP/600/P-95/002Fc, August, 1997.

The DP fails to model excavation of the engineered cap and slag. Id. Page 6. However, these materials may be an ideal source for construction material. Id. In fact, Shieldalloy used the slag material as fill for a road and underneath a building knowing full well that this material was radioactive. DP rev. 1 pages 27, 29. Therefore, this scenario should be modeled. Goodman Report page 6.

The DP states that an all controls fail scenario is being modeled. DP rev. 1a page 34, line 20. However, the DP is actually modeling only a slight degradation of controls. Goodman Report § 5.1. Modeling needs to be performed assuming that the engineered controls completely degrade since the materials will remain a radioactive hazard into perpetuity. Id.

The DP fails to take into account exposure from direct contact with the uncovered pile. DP rev. 1a § 5.5.10. However, as discussed above, contact with the uncovered pile when institutional controls fail is a reasonable scenario.

The Microshield runs neglected to take into account all the progeny associated with uranium and thorium. Goodman Report § 5.5.9. Because the uranium and thorium in the slag are in equilibrium with their associated decay products, and because most of them are gamma emitters, all of these decay products should be included in the source term. Id. Using the same geometries as SMC for the shape of the source and the distance from the source, the exposure rates are two orders of magnitude higher than shown in

Appendix 19.5. Id.

The DP states that modeling to predict future doses has been derived from "previously completed radiological assessments of the residual radioactivity at the Newfield site." DP rev. 1a § 5.2.1. However, the lateral and vertical extent of contamination has never been determined. Exh. M. Accurate dose modeling of radionuclide contamination into the groundwater cannot be conducted without determining the vertical extent of the contamination. Goodman Report § 5.2.1. Also, without a determination of the lateral extent of the contamination, contamination above the established cleanup levels could be missed in the final status survey. Id.

The DP derives the source term using the weighted averages of the concentrations of material in the storage yard. DP Table 17.7. This would make sense if the material were capable of being blended together. Goodman Report § 5.2.1.2. However, the concentration in the slag will not change even if other, less concentrated material is placed near it. Id. Goodman Report § 5.2.1.2. If the slag were uncovered, as would be the case in an all controls fail scenario, it is reasonable to assume that the receptor would be exposed to the higher concentration, not the derived concentration. Id. Thus, the Derived Source Term should use the concentration of the slag. Id.

The fence should be assumed to fail since the waste will remain a radioactive hazard into perpetuity. Goodman Report page 7.

The DP includes erroneous assumptions that affects the dose modeling. Goodman Report § 5.4.3.3. For example, it is stated that the saturated hydraulic conductivity was measured for the native sand material at the site as 2,000 m/y. DP rev. 1a page 77. However, SMC uses 0.017 m/y for the saturated hydraulic conductivity of the unsaturated zone (which is the native sand layer). Id. Page 79. Also, Table 17.5 lists the K_d of Radium as 50, which is much lower than the RESRAD default, but this is not even mentioned in the text. Goodman Report § 5.4.3.3. This seems to contradict the statement that the slag is essentially insoluble even under the most extreme in-situ conditions that might reasonably be encountered. Id. A site-specific K_d was not determined for the baghouse dust or the contaminated soil. Id.; Spayd Report page 2. This will be important when the drinking water pathway is included in the analysis. Id.

The DP inputs a parameter of 0.004 for the hydraulic gradient of the saturated zone, as shown in Appendix A and B and referenced in the April 1992 Remedial Investigation Technical Report. Spayd Report Page 2. However, measurement of the hydraulic gradient of the saturated zone in the 1992 Report show the gradient at the site to be 0.002, one half the gradient used in RESRAD. Id. The Ground Water Modeling Memo also uses the 0.002 hydraulic gradient value. Id. Therefore, the hydraulic gradient of the saturated zone used in RESRAD is not correct and should be changed to 0.002. Id. NJDEP modeling found that using the lower value of 0.002 increases the doses.

Sections 5.1, 5.2.2.2.1 to 5.2.2.2.3, 5.3, 5.3.3.1 to 5.3.3.4, 5.5.1, 5.5.11 of Goodman's Report provide other DP deficiencies associated with the dose modeling. Page 3 of Spayd's Report also provide DP deficiencies.

Contention 6

THE 1000 YEAR MODELING CONDUCTED BY SHIELDALLOY FAILS TO ADEQUATELY PROTECT THE PUBLIC SAFETY AND HEALTH BECAUSE THE WASTE WILL REMAIN A RADIOACTIVE HAZARD FOR BILLIONS OF YEARS.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP's modeling for only 1000 years violates the Low-Level Radioactive Waste Policy Act ("LLRWPA"), the Atomic Energy Act ("AEA"), and the License Termination Rule ("LTR") by failing to require the permanent isolation of low-level radioactive waste or protect the public health and safety.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of low-level radioactive waste.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983).

The LTR requires an applicant for decommissioning to calculate the peak annual TEDE to the average member of the critical group expected within the first 1000 years after decommissioning. 10 C.F.R. § 20.1401(d). However, this provision is intended to only apply to short-lived nuclides. 62 Fed. Reg. at 39083 (Response F.7.3). Short-lived nuclides are defined as having half-lives between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. Id. at 39069. For long-lived nuclides, future calculations beyond 1000 years would be valuable. Id. at 39083. Thus, the intent of 10 C.F.R. § 20.1401(d) is to actually require longer dose assessments depending on the duration of the nuclides.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that relies upon modeling the TEDE from residual radioactivity for only 1000 years. However, the materials sought to be disposed at the facility have a half-life of billions of years. Goodman Dec. 2.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the 1000 year modeling is sufficient to determine whether the onsite disposal will be safe and protective of the public health even though the half-life of the nuclides is billions of years.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP only conducts dose modeling assessments for 1,000 years, even though the radiological hazard from the waste will endure for billions of years. The 1000 year modeling is inadequate for this particular waste. Goodman Dec. ¶ 3.

NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15. It goes on to state that archaeologists have dated the mounds by excavating bones and artifacts from the mounds and determining the age of the object or the data of its burial. Id. However, these examples demonstrate that human excavation of an engineered barrier is reasonably foreseeable thousands of years later. Goodman Report page 2.

The DP states that it is "extremely unlikely" that institutional controls and physical controls would fail. DP rev. 1 page xxiv. However, the Shieldalloy waste will remain a radioactive hazard for billions of years. Goodman Dec. ¶ 2. If a LTC license is utilized for institutional controls, it is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce maintain the institutional controls required by the LTC license.

The DP states that the greatest annual dose occurs past 1000 years. DP rev. 1a page 75. Since the material will still be a radioactive hazard, this dose should be considered. Goodman Report § 5.4.3.2.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP only conducts dose modeling assessments for 1,000 years, even though the radiological hazard from the waste will endure for billions of years. The 1000 year modeling is inadequate for this particular waste. Goodman Dec. ¶ 3.

NUREG-1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. Vol. 2 pages 3-14 to 3-15. It goes on to state that archaeologists have dated the mounds by excavating bones and artifacts from the mounds and determining the age of the object or the data of its burial. Id. However, these examples demonstrate that human excavation of an engineered barrier is reasonably foreseeable thousands of years later. Goodman Report page 2.

The DP states that it is "extremely unlikely" that institutional controls and physical controls would fail. DP rev. 1 page xxiv. However, the Shieldalloy waste will remain a radioactive hazard for billions of years. Goodman Dec. ¶ 2. If a LTC license is utilized for institutional controls, it is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce maintain the institutional controls required by the LTC license.

The DP states that the greatest annual dose occurs past 1000 years. DP rev. 1a page 75. Since the material will still be a radioactive hazard, this dose should be considered. Goodman Report § 5.4.3.2.

Contention 7

SHIELDALLOY HAS FAILED TO DEMONSTRATE THAT OFFSITE DISPOSAL WILL CAUSE NET PUBLIC OR ENVIRONMENTAL HARM OR THAT RESIDUAL RADIOACTIVITY FROM ONSITE DISPOSAL IS AS LOW AS REASONABLY ACHIEVABLE ("ALARA").

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

Shieldalloy did not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15. Furthermore, Shieldalloy has failed to conduct an ALARA analysis. Id. Therefore, Shieldalloy has not demonstrated that the proposed onsite disposal will reduce residual radioactivity to levels that are ALARA.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR provides:

> A site will be considered acceptable for license termination under restricted conditions if:
>
> (a) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA.

10 C.F.R. § 20.1403.

Shieldalloy has not addressed the question in the DP of whether greater public or environmental harm will result if it disposes the materials offsite at a licensed facility. Goodman Report page 15. Furthermore, Shieldalloy has failed to conduct an ALARA analysis. Id. Therefore, Shieldalloy has not demonstrated that the proposed onsite disposal will reduce residual radioactivity to levels that are ALARA.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that proposes to conduct onsite disposal of its radioactive waste and to decommission the property. The LTR requires the licensee to demonstrate that "reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a).

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether Shieldalloy has demonstrated that "reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

An ALARA analysis requires the licensee to demonstrate that "further reductions in residual radioactivity . . . were not being made because the residual levels associated with restricted conditions are ALARA." 10 C.F.R. § 20.1403(a). Thus, ALARA requires the applicant to consider both the costs and benefits of reducing residual radioactivity.

The DP fails to conduct an ALARA analysis because it only considers the costs of reducing residual radioactivity. Goodman Report page 11. An ALARA analysis is required to also consider the benefits, including the collective dose averted. NUREG-1757 vol. 2 page N-2. The DP fails to consider any benefit. Goodman Report page 11.

In order for the averted dose to be calculated, the drinking water pathway must be included for each alternative since groundwater contamination is likely if the DP is implemented. Goodman Report page 12; see also Contentions 1, 2, 3, and 5 above. Since the material will remain radioactive in perpetuity, the length of time for modeling should be increased past 1000 years. Goodman Report page 12.

The costs considered by the DP for offsite disposal are higher than was actually quoted by the disposal facility. The DP considers a cost of $62,864,543. DP Table 17.15. However, Energy Solutions has repeatedly quoted a price of $33 million for a turnkey operation. Exh. A. Adding a 25% contingency required by the NRC brings it to $41,250,000.

The DP does not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15.

The whole discussion of radiation risks is misleading. The author discusses chronic exposures and acute exposures without explaining the difference and the different health effects. Goodman Report page 12. The author's discussion of radiation effects would lead one to believe that the material at SMC is harmless. DP § 7.2.1. The Health Physics position paper actually states that the risks of health effects below 5-10 rem (which includes occupational and environmental exposures), are either too small to be observed or are nonexistent. Goodman Report page 12. The paper goes on to state that "the possibility that health effects might occur at small doses should not be entirely discounted. Id. The Health Physics Society also recognizes the practical advantages of the linear, no-threshold hypothesis to the practice of radiation protection. Id. Nonetheless, risk assessment at low doses should focus on establishing a range of health outcomes in the dose range of interest and acknowledge the possibility of zero health effects." Id.

Furthermore, the Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation recently released the Biological Effects of Ionizing Radiation (BEIR) VII report. Id. The BEIR VII committee concluded that current scientific evidence is consisitent with the hypothesis that there is a linear dose-response relationship between exposure to ionizing radiation and the development of radiation-induced solid cancers in humans. Id. This conclusion is based on many facts (contrary to the statement made in the DP that this conclusion is not supported with facts). Id. For example, the committee stated that there is compelling support for the linearity view of how cancers form. Id. Studies in radiation biology show that "a single radiation track (resulting in the lowest exposure possible) traversing the nucleus of an appropriate target cell has a low but finite probability of damaging the cells' DNA. Id. Subsets of this damage, such as ionization "spurs" that can cause multiple damage in a short length of DNA, may be difficult for the cell to repair or may be repaired incorrectly. Id. The committee has concluded that there is no compelling evidence to indicate a dose threshold below which the risk of tumor induction is zero."[7] Id. The explanation of radiation risks in the DP would lead one to believe that the radioactive material at SMC is harmless. Id. The current scientific evidence does not support this view. Id.

The benefits of unrestricted use versus restricted use should include the Regulatory Costs Avoided (NUREG 1757, Vol. 2, p. N-6). Included in these costs are additional licensing fees to develop an EIS and costs associated with public meetings, to name a few. Because NRC has already held two public meetings and started the EIS process, these costs can not now be avoided. The NRC has violated its own guidance by conducting these meetings and starting the EIS process without first determining if the site complies with the requirements in 10 CFR 20.1403(a). Goodman Report pages 1 to 2. The DP should include the costs associated with two years of NRC review of the DP. Creation of a new disposal site at the SMC facility in Newfield will require the additional expenditure of human resources and funds to regulate and maintain an additional disposal facility in perpetuity. These costs should be considered in the DP.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP fails to conduct an ALARA analysis because it only

[7] Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII Phase 2, National Research Council, National Academies Press, Washington, D.C., 2006.

considers the costs of reducing residual activity. Goodman Report page 11. An ALARA analysis is required to also consider the benefits, including the collective dose averted. NUREG-1757 vol. 2 page N-2. The DP fails to consider any benefit. Goodman Report page 11.

In order for the averted dose to be calculated, the drinking water pathway must be included for each alternative since groundwater contamination is likely if the DP is implemented. Goodman Report page 12; see also Contentions 1, 2, 3, and 5 above. Since the material will remain radioactive in perpetuity, the length of time for modeling should be increased past 1000 years. Goodman Report page 12.

The costs considered by the DP for offsite disposal are higher than was actually quoted by the disposal facility. The DP considers a cost of $62,864,543. DP Table 17.15. However, Energy Solutions has repeatedly quoted a price of $33 million for a turnkey operation. Exh. A. Adding a 25% contingency required by the NRC brings it to $41,250,000.

The DP does not address the question of whether offsite disposal of its radioactive waste will cause net public or environmental harm by disposing the waste offsite at a licensed facility rather than disposing the materials onsite. Goodman Report page 15.

The whole discussion of radiation risks is misleading.

The author discusses chronic exposures and acute exposures without explaining the difference and the different health effects. Goodman Report page 12. The author attributes the statement that no effect has ever been observed at levels below 5,000 mrem delivered over a one year period to the Health Physics Society. DP § 7.2.1. However, the current scientific evidence does not support this view. Goodman Report page 12.

Contention 8

THE SMC DP FAILS TO PROVIDE SUFFICIENT FINANCIAL ASSURANCE.

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP fails to provide sufficient financial assurance in the proposed selected long term control license (LTC) alternative.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The regulations require an applicant seeking restricted use license termination to provide "sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control and maintenance of the site. 10 C.F.R.

§20.1403(c).

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which must meet the requirements of 10 C.F.R. §1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the financial assurance requirements of 10 C.F.R. §1403(C) have been met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

The LTC alternative will create a disposal site with a very long-lived radionuclides. Financial assurance must be sufficient to ensure that sufficient funds are available during the entire time period that the radiological hazard continues in order to conduct required survey, maintenance, license and inspection and trust expenses.

The DP fails to require sufficient financial assurance and fails to require an adequate ALARA analysis because it fails to consider inflation. Over the past 50 years inflation has dramatically increased the cost of goods and services. Failure to consider the effect of inflation on all costs to maintain the disposal site and comply with license and record keeping obligations dramatically undermines the sufficiency of the financial assurance amount posted at the time of establishment of the disposal facility. This is particularly true at a disposal facility which is to be maintained in perpetuity, and is also true notwithstanding the 25% contingency included in the Table 17.14 Cost Estimate for the LTC Alternative.

The Table 17.14 Cost Estimate in the DP for the LTC Alternative does not provide sufficient funds for remedial action, should that be required. In the event that radioactive contaminants are found at some future date to be escaping the cap into groundwater, for example, it is very unlikely that the amount of financial assurance provided for would be sufficient to fund recovery and treatment of contaminated groundwater along with modification of the cap to prevent continuing contamination. The annual amount allocated to "cap maintenance" is a mere $7,440.00. The amount set aside for annual cap maintenance is only half of the $14,376 set aside for annual paperwork review and a site inspection by the NRC once every five years by the NRC. Additionally, in the event that SMC defaults on its obligation to operate and maintain the disposal site over it's perpetual existence, a contractor would have to be hired by the NRC to maintain the disposal facility. Such a contractor will require a profit to maintain the disposal facility. The Table 17.14 Cost Estimate for the LTC Alternative does not provide sufficient funding to support a cost plus profit arrangement and therefore does not establish sufficient financial assurance. Burke Declaration ¶ 2 to 5.

10 C.F.R. §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP asserts that the amount of financial assurance proposed for the LTC alternative is adequate.

Contention 9

THE SMC DP MISSTATES EXISTING SITE USE RESTRICTIONS AND THEREFORE MISCHARACTERIZES THE SITE AND EXPOSURE SCENARIOS

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP misstates existing site use restrictions and therefore mischaracterizes the site and exposure scenarios.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

A proposed restricted use decommissioning must demonstrate that the DP will meet the regulatory criteria for restricted use including the existence of institutional controls and exposure scenarios that provide reasonable assurance that exposure to radiation will not exceed the 25 mrem per year limit.

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

The SMC DP proposed and selects a restricted use alterative which must meet the requirements of 10 C.F.R. 1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the TEDE requirement of 10 C.F.R. §1403 will be met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

In the discussion on page 41 of the DP about the reasonably likely foreseeable future use (100 years) scenarios for the site it is stated that there are existing site use restrictions due to natural resource restoration and potential future residential use restrictions due to chemically contaminated soil.

The DP also mentions the proximity of the Pinelands National Reserve, states that these restrictions will result in a land buffer to prevent construction in close proximity to the engineered barrier. SMC uses these assumptions in the dose assessment to limit the evaluation to non-residential exposure scenarios. The DP (page 89) also asserts that future residential use of the site will be prohibited by soil contamination levels. This approach is erroneous since these land use restrictions are only institutional controls that are considered to disappear under an "all controls fail" scenario. Gaffigan Dec. ¶ 8.

Nor have final decisions been made with respect to the nature and extent of cleanup of chemical contamination at the facility and whether some or all of the Newfield site will be restricted in use after chemical cleanup. Gaffigan Dec. ¶ 9. It is important to note that with properly managed engineering and institutional controls of areas with residual chemical contamination, no future use of the facility, including residential, is precluded. Id. It is therefore erroneous for SMC to suggest in the DP that chemical contamination precludes future residential use of the facility. Id. Foreseeable future use evaluation by SMC in the DP must include residential use. Id.

10 C.F.R. §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP misstates existing site use restrictions.

Contention 10

THE SMC DP PROPOSES A LTC DISPOSAL DESIGN WHICH IS NOT PROTECTIVE OF GROUNDWATER OR HEALTH

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

The SMC DP proposes a LTC restricted use disposal design which is not protective of groundwater or health.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The Atomic Energy Act, 42 U.S.C. 2012(D), 2201(B), and NRC regulations, 10 C.F.R. 1403, require that a restricted use decommissioning proposal be protective of health and the environment and that reductions in residential radioactivity be as low as reasonably achievable. The proposed selected LTC alterative does not meet those requirements.

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which must meet the requirements of 10 C.F. R. §1403.

10 C.F.R. §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For the NRC to make a determination on the proposed selected LTC alternative in the DP it must determine whether the requirements of 10 C.F.R. §1403 have been met.

10 C.F.R. §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

In chapter 5 of the DP (Dose Modeling) SMC improperly excludes the evaluation of groundwater as an exposure pathway on the basis that: the engineered barrier (cap) is designed to prevent rainwater infiltration; TCLP results show the slag will not leach radioactivity; groundwater is already contaminated with chemicals and is not a potable supply; it is unreasonable to assume that future site use would include an on-site drinking water well when a municipal water supply is near.

The assumptions in the DP are either incorrect or unsupported. The DP is contradictory in its discussion of the engineered barrier. In some sections the DP states that a geomembrane will be present to prevent water infiltration through the buried materials and in others the absence of such a membrane is noted. Also, at the public meeting held in Newfield on December 5, 2006, the NRC staff stated that the engineered barrier will be designed to *allow rainwater infiltration*. A permeable engineered barrier allows for the potential leaching of contaminants from the buried materials directly into the ground water. No liner is proposed beneath the contaminated material, and the material sites on the native sandy and very permeable soil.

The slags and baghouse dust were submitted to the

Toxicity Characteristic Leachability Procedure (TCLP) in 2005. The resulting "leachate" was then analyzed for radionuclides only, with the results presented in Appendix 19.4 of the DP. There are many problems with this analysis, including

a. failure to analyze radioactively contaminated soils and building materials which will be buried under the engineered barrier;

b. failure to analyze samples of materials which will be buried to determine if they are hazardous waste and banned for land disposal;

c. failure to submit a sufficient number of samples to TCLP and subsequent radionuclide analysis to be representative of the materials to be disposed of under the engineered barrier;

d. analytical results indicate that radium may leach from the slag and the DP is contradictory whether radionuclides will leach from the slag (e.g. DP pages 27 and 30).

Groundwater should not be eliminated or excluded in the DP as an exposure pathway. SMC's DP states that the groundwater at the facility is already contaminated and suggests it should therefore essentially be DISREGARDED as not worthy of protection from contamination by the proposed permanent radioactive waste disposal pile. SMC has for 27 years operated a treatment system on site to remediate groundwater contamination caused by SMC. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. TRC's goal is to remediate the ground water potable standard as quickly as possible, potentially within 20 years. It is incorrect to conclude that just because the groundwater is already contaminated it should be excluded as an exposure pathway and should not be protected against further contamination or should not be considered to be a potable source for the next 1000 years.

SMC's DP fails to mention that the current municipal supply wells are located less than one mile from the site and draw water from the same aquifer that SMC has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigation wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the potable wells a real possibility over the next 1000 years. In addition, SMC is located in the New Jersey Coastal Plain Sole Source Aquifer and as such there are obvious limits to alternative water supplies. (see http://www.epa.gov/region02/water/aquifer/coast/coastpln.htm#I19). Protection of this resource is critical yet the DP fails to properly and fully consider and evaluate groundwater protection and future use. Gaffigan Declaration ¶ 19.

10 C.F.R. §2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP asserts on page 100 that the proposed selected LTC alternative is designed to prevent groundwater impact and that the groundwater exposure pathway need not be considered in dose modelling. The DP does no support this assertion.

Contention 11

RESIDUAL RADIOACTIVITY FROM SMC'S OPERATIONS IN SURFACE WATER AND SEDIMENT IS NOT ADEQUATELY ADDRESSED IN THE DP.

10 C.F.R. §2.309(f)(i) Provide a specific statement of the issue of law or fact.

Residual radioactivity from SMC's operations in surface water and sediment is not adequately addressed in the DP.

10 C.F.R. §2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The Atomic Energy Act, 42 U.S.C. 2012(D), 2201(B), and NRC regulations, 10 C.F.R. 1403, require that a DP be protective of health and the environment and reductions and residual radioactivity be as low as reasonably achievable. The DP does not meet those requirements.

10 C.F.R. §2.309(f)(iii) Demonstrate that the issue raised is within the scope of the proceeding.

SMC has submitted a DP which proposes and selects a LTC restricted use alternative which fails to address radioactivity identified in the DP in sediment and/or surface water.

10 <u>C.F.R.</u> §2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding

For the NRC to make a determination on the proposed selected LTC alternative in the DP the NRC must determine whether it is protective of health and the environment.

10 <u>C.F.R.</u> §2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which petitioner intends to rely at hearing, together with reference to the specific sources and documents on which requestor/petitioner intends to rely to support its position on the issue.

Residual radioactivity has been identified in the Hudson's Branch as indicated in the DP Executive Summary and Appendix 19.9, Environmental Report. The data referenced is from a 1992 report which concluded that the radioactivity detected in the Hudson's Branch water and sediments is not significantly different from background. It does not appear that sampling of the stream has been conducted since 1991. Existing sediment and/or surface water contamination does not appear to be adequately addressed in the DP. Gaffigan Declaration ¶ 19.

10 <u>C.F.R.</u> §2.309(f(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of fact.

SMC's DP fails to address sediment and/or surface water contamination identified in the DP.

Contention 12

THE LTC LICENSE SOUGHT BY SHIELDALLOY FAILS TO ADEQUATELY PROTECT THE PUBLIC SAFETY AND HEALTH FOR MATERIALS CONTAINING LONG LIVED NUCLIDES.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license violates the Low-Level Radioactive Waste Policy Act ("LLRWPA"), the Atomic Energy Act ("AEA"), and the intent of the LTR.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LLRWPA requires "the permanent isolation of low-level radioactive waste pursuant to the requirements established by the Nuclear Regulatory Commission under applicable laws, or by an agreement State if such isolation occurs in such agreement State." 42 U.S.C. § 2021b(7). Thus, the LLRWPA requires the "permanent isolation" of low-level radioactive waste.

Furthermore, NRC's paramount responsibility, as required by the AEA, is to regulate radiological material in a manner that protects the public health and safety. 42 U.S.C. §§ 2012(d), 2013(d), 2022(f)(3), (referring to § 2022(b)(2)), 2099, 2111(b)(1)(A), 2113(b)(1)(A), 2114(a)(1), 2201(b). The Supreme Court held that "[the] Commission's prime area of concern in the licensing context, . . . is national security, public health, and safety." Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 207 (1983)

The intent of the decommissioning regulations is to limit the release of sites containing long-lived nuclides to unrestricted release. 62 Fed. Reg. at 39069 (Response B.3.2). The NRC stated: "termination of a license for unrestricted use is preferable because it requires no additional precautions or limitations on use of the site after licensing control ceases, in particular for those sites with long-lived nuclides." Id. Short-lived nuclides include radioactive materials where the half-lives are between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. 62 Fed. Reg. at 39069. Such short-lived nuclides can be safely secured under restricted release through the use of institutional control. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that is seeking to decommission under restricted release using the LTC license for institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must determine whether the LTC license proposed in the DP will provide adequate institutional controls to permanently isolate the low-level radioactive waste and protect the public health and safety.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely

at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

Shieldalloy radioactive waste contains thorium-232, which has a half-life of over 14 billion years, and uranium-238, which has a half-life of over 4 billion years. Goodman Dec. ¶ 2. It is self-evident that neither Shieldalloy nor a private third party trustee can be expected to endure in perpetuity to enforce the LTC license.

With regards to onsite disposal by facilities that continue operating at the site under a license, NRC Staff admitted that there exists "uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." SECY-06-0143 page 5. These releases and transport of contamination occur even in cases where the materials are disposed onsite for a limited period of time and then disposed offsite under the LTR. Id.

The problems of contamination and transport of contamination related to disposals that remain onsite for a limited period of time is even more applicable to onsite disposals of long-lived nuclides that remain onsite in perpetuity pursuant to the LTR. Goodman Dec. ¶ 5. Facilities disposing long-lived nuclides onsite under the LTC license have a much higher likelihood of releasing and transporting contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Id.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that it is unlikely that all controls will fail when utilizing the LTC license. DP rev. 1a page 31. However, the NJDEP asserts that it is self-evident that all controls will fail since neither Shieldalloy nor and independent third-party trustee can be expected to endure for the billions of years that the waste remains a radiological hazard.

Contention 13

THE DP CONFLICTS WITH THE REGULATIONS REGARDING TERMINATION OF THE LICENSE UPON DECOMMISSIONING.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP seeks to amend Shieldalloy's current license to a LTC license upon decommissioning. DP rev. 1 page 155. However, amending its current license upon decommissioning would violate the regulatory provisions requiring termination of the license upon decommissioning.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis

for the contention.

The DP provides that the LTC license would be used to satisfy the LTR requirement for enforceable institutional controls over the site. DP rev 1 page 155.

The regulations define "decommission" as follows:

> to remove a facility or site safely from service and reduce residual radioactivity to a level that permits -
>
> > (1) Release of the property for unrestricted use and <u>termination of the license</u>; or
> >
> > (2) Release of the property under restricted conditions and <u>termination of the license</u>.

10 <u>C.F.R.</u> §§ 20.1003, 30.4, 40.4, 50.2, 70.4, 72.3 (emphasis added).

Under the LTR, termination of the license under unrestricted use occurs when, among other factors, residual radioactivity results in a "TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year." 10 <u>C.F.R.</u> § 20.1402. License termination under restricted use occurs when, among other factors, "[r]esidual radioactivity at the site has been reduced so that if the institutional controls were no longer in effect, there is reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group is as low as reasonably achievable and would not exceed either -- (1) 100 mrem (1 mSv) per year; or (2) 500 mrem (5 mSv) per year provided that the licensee-- . . . ." 10 C.F.R. § 20.1403(e).

The DP models the TEDE based upon a 1000 year modeling, regardless of the duration of the radiological hazard. Furthermore, as discussed in greater detail in Contention 5, when realistic assumptions are used, including the dose contributions from the drinking water pathway, but even excluding the gamma exposure pathway, modeling indicates a TEDE of 1,718 mrem per year at year 800. Goodman Dec. 11. Thus, because the TEDE from residual radioactivity distinguishable from background to the average member of the critical group exceeds 500 mrem, residual radioactivity has not been reduced to permit termination of the license.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks a LTC license upon decommissioning for the institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

The NRC must determine whether the proposed decommissioning and issuance of the LTC license would violate the LTR by failing to reduce residual radioactivity to a level that permits license termination as required by 10 C.F.R. § 20.1403(e).

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely

at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The DP measures the TEDE from residual radioactivity based upon a 1000 year modeling, even though the radiological hazard will endure for billions of years. Goodman Dec. ¶ 2. As discussed in Contention 1, the 1000 year modeling in this case violates the AEA, the LLRWPA, and the LTR. Dose modeling should be required for the entire duration of the radiological hazard. Goodman Dec. ¶ 3.

As discussed in greater detail in Contention 5, when realistic assumptions are used, including the dose contributions from the drinking water pathway, but even excluding the gamma exposure pathway, modeling indicates a TEDE of 1,718 mrem per year at year 800. Goodman Dec. 11.

The conflict between the LTR and the LTC license for long-lived nuclides is admitted by NRC in the following statement: "NRC licensing oversight for some sites could be permanent because the current sites considering restricted release are sites with uranium and thorium contamination. Although this NRC role was not envisioned under the LTR . . . ." SECY-03-0069 page 27.

10 <u>C.F.R.</u> § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

The DP states that the TEDE from residual radioactivity will not exceed 100 mrem assuming that institutional controls fail and engineering controls degrade gradually. DP rev. 1 section 5.5. However, NJDEP's modeling finds that the TEDE would be 1,718 mrem/yr at 800 years. Goodman Report page 11.

Contention 14

SHIELDALLOY FAILED TO ADEQUATELY ELICIT OR CONSIDER PUBLIC INPUT ON THE DECOMMISSIONING PROPOSAL.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The DP failed to consider public input through the Site Specific Advisory Board. Furthermore, the DP fails to consider the strong and nearly universal public opposition to the DP.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The LTR requires licensees proposing to decommission using the restricted use option to "seek advice from such affected parties regarding . . . the proposed decommissioning," including whether the proposed institutional controls "[w]ill not impose undue burdens on the local community or other affected parties" and whether adequate financial assurance will be provided. 10 C.F.R. § 20.1403(d)(1). The licensee is also required to provide "[a]n opportunity for a comprehensive, collective discussion on the issues by the participants represented." Id. § 20.1403(d)(2)(ii). The DP must then demonstrate "how the advice of individuals and institutions in the community who may be affected by the decommissioning has been sought and incorporated, as appropriate, following analysis of that advice." 10 C.F.R. § 20.1403(d).

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

The LTR requires Shieldalloy to elicit public advice on the decommissioning plan and requires the advice to be incorporated into the DP. 10 C.F.R. § 20.1403(d). Shieldalloy has failed to adequately elicit public advice or to incorporate it into the DP. Gaffigan Dec. ¶¶ 3-7.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

In reviewing the DP, NRC must determine whether Shieldalloy complied with 10 C.F.R. § 20.1403(d) by adequately eliciting and incorporating public advice into the decommissioning proposal.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and

documents on which the requestor/petitioner intends to rely to support its position on the issue.

Shieldalloy failed to adequately elicit public advice on their decommissioning plan. Shieldalloy convened four meetings of a Site Specific Advisory Board ("SSAB"). However, the SSAB failed to adequately elicit public advice on the proposed decommissioning. Gaffigan Dec. ¶ 4. The SSAB never selected a chairperson or adopted a charter or operating procedures. Id. Instead, Shieldalloy's legal counsel conducted the meetings by simply advancing Shieldalloy's arguments in support of the decommissioning. Id. Members of the SSAB were encouraged to ask questions during the meetings, but there was never an opportunity for members to discuss their own issues among themselves without the direction of Shieldalloy. Id.

Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on certain issues. Id. ¶ 5. For example, the members could not provide advice on whether the proposed institutional controls would assure that an average member of the public would not incur a radiation dose in excess of 25 millirem Total Effective Dose Equivalent (TEDE). Id. Shieldalloy failed to provide sufficient information to provide advice on this issue, such as the characterization of the slag and baghouse dust or the engineering design of the engineered cap. Id.

Also, Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on whether the $5 million financial assurance would be adequate to enable an independent third party to assume responsibility for control and maintenance of the site. Id. ¶ 6. Shieldalloy did not provide information regarding the engineering design of the proposed barrier. Id.

The DP fails to acknowledge the strong public opposition to the proposed onsite disposal. Elected officials from the local municipalities, the county, and State and Federal offices have staunchly opposed the DP. Exhs. E to L. The NJDEP and other SSAB members (besides Shieldalloy's counsel) were unanimous in opposing the DP. Id. ¶ 7. These office holders and SSAB members have been unanimous in advising Shieldalloy that institutional controls would not be enforceable for the billions of years that the waste remains a radioactive hazard. Id. The NJDEP and members from the public were unanimous in advising that the institutional controls would impose undue burdens on the local community. Id. However, the only time that the DP cites public advice is when it states that the "public strongly support[s]" the provisions of the DP concerning the financial assurance, the LTC license, and the sale of portions of the land that will be released for unrestricted use. DP rev. 1 page 154, note 102. Thus, the DP clearly fails to incorporate the public outcry against the proposed onsite disposal.

Furthermore, where public opposition actually is acknowledged by the DP, the DP still fails to adequately address the particular opposition. For example, the SSAB advised that the institutional controls proposed will not be enforceable for the time period required, in perpetuity. Gaffican Dec. ¶ 7. The DP responds that it is reasonable to assume that the Federal government will remain in perpetuity to enforce the provisions of the LTC license to require institutional controls. DP rev. 1 page 164. However, the DP fails to acknowledge that it will be Shieldalloy or a private trustee that will be the licensee who owns the site that would have the responsibility to enforce the institutional controls into perpetuity. It is self-evident that a private company cannot be expected to endure into perpetuity to enforce the provisions of a LTC license. Although the Federal government may have the power to enforce environmental permits into perpetuity, it is self-evident that the licensee will eventually cease to exist and the Federal government will have no entity to which to enforce the LTC license. Furthermore, the DP fails to acknowledge that institutional and engineering controls will completely fail if the $5 million proposed for financial assurance is not sufficient last into perpetuity.

Also, while the DP acknowledges the SSAB comment that the institutional controls may prevent the development of the surrounding area and thus impose an undue burden, DP rev. 1 page 166-67, the DP fails to adequately address this comment. The DP simply responds that there will be no restrictions on the portion of the property that would be released for restricted use. However, it is self-evident that people do not wish to live or work near a low-level radioactive waste site. See, e.g., Report to the Governor: Disposal Options Report, (1999), http://www.nj.gov/dep/rpp/llrw/download/disposal.pdf. The DP thus fails to address the fact that the onsite disposal will have an undue economic impact on the local community.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

As discussed in the previous section, Shieldalloy failed to adequately elicit public advice on their decommissioning plan because there was never an opportunity for the SSAB members to discuss their problems with the DP. Gaffigan Dec. ¶ 4. However, the DP states that the first two SSAB meetings "were spent discussing the decommissioning plans." DP rev. 1 page 161.

Shieldalloy failed to provide sufficient information to comment on the TEDE limit or the proposed financial assurance. Gaffigan Dec. ¶¶ 5, 6. However, the DP disputes this contention. DP rev. 1 page 161.

Also as addressed in the previous section, the DP fails to address the public opposition against the onsite disposal or the particular issues raised by the SSAB. Gaffigan Dec. ¶ 7; Exhs. E to L. The DP actually states that the "public strongly support[s]" the provisions of the DP concerning the financial assurance, the LTC license, and the sale of portions of the land that will be released for unrestricted use. DP rev. 1 page 154, note 102. Yet, the public has asserted its strong opposition to the onsite disposal. Gaffigan Dec. ¶ 7; Exhs. E to L.

Contention 15

THE LTC LICENSE SOUGHT BY SHIELDALLOY CONFLICTS WITH THE REGULATIONS REGARDING THE RADIOLOGICAL CRITERIA FOR UNRESTRICTED AND RESTRICTED USE.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license sought by Shieldalloy conflicts with the intent of the LTR, 20 C.F.R. §§ 20.1402, 20.1403, because Shieldalloy is seeking to conduct onsite disposal of long-lived nuclides.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The intent of the decommissioning regulations is to limit the release of sites containing long-lived nuclides to unrestricted release. 62 Fed. Reg. at 39069 (Response B.3.2). The NRC stated: "termination of a license for unrestricted use is preferable because it requires no additional precautions or limitations on use of the site after licensing control ceases, in particular for those sites with long-lived nuclides." Id.

Short-lived nuclides include radioactive materials where the half-lives are between 5.3 and 30 years and which would decay to unrestricted dose levels in about 10-60 years. 62 Fed. Reg. at 39069. Such short-lived nuclides can be safely secured under restricted release through the use of institutional control. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks to decommission under restricted release by conducting onsite disposal of radioactive waste containing long-lived nuclides. Shieldalloy is seeking the LTC license upon decommissioning to constitute the institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

The NRC must determine whether issuing the LTC license to Shieldalloy, which would constitute the institutional controls for the onsite disposal of long-lived nuclides, would violate the LTR.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

The LTC license makes it easier for decommissioning facilities to conduct onsite disposal of radioactive materials containing long-lived nuclides under restricted release. Goodman

Dec. ¶ 4. The LTC license allows a facility to conduct onsite disposal of long-lived nuclides where the Federal or State government is not willing to take ownership or control of the site. Id. This will create a greater number of decommissioned facilities with onsite disposals of long-lived radioactive waste under restricted release throughout the country. Id. Additional disposal sites multiply the number of locations which present a risk to public health and the environment, and require the additional expenditure of human resources and funds to regulate and maintain an additional disposal facilities.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

NRC believes that NUREG-1757 complies with the LTR. NRC Response to Comment 2.4.3. (Document # ML062370521).

Contention 16

THE LTC LICENSE VIOLATES NRC POLICIES BY PROMOTING THE CREATION OF LEGACY SITES.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The LTC license will create additional legacy sites throughout the country by making it easier to obtain approval for the restricted release option for long-lived nuclides without adequate protection to the public health. Goodman Dec. ¶¶ 4, 5. However, this result is in direct contradiction to settled NRC policy to prevent future legacy sites. SECY-03-0069 Attach. 4 page 3; SECY-06-0143 pages 5 to 7. The LTC license is in conflict with settled NRC policy and is therefore arbitrary and capricious.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

While agencies may reverse settled policy, such reversals must have a rational basis and may not be arbitrary and capricious. Citizens Awareness Network v. NRC, 59 F.3d 284, 291 (1st Cir. 1995). Furthermore, the reversal must be accompanied by some reasoning to indicate that the reversal is not arbitrary and capricious. Id.

10 C.F.R. § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks to decommission under restricted release using the LTC license for institutional controls.

10 C.F.R. § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

NRC must demonstrate a rational basis for its violation of policy and demonstrate that issuing a LTC license to SMC is not arbitrary and capricious.

10 C.F.R. § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and

documents on which the requestor/petitioner intends to rely to support its position on the issue.

NRC has continually reasserted its policy to prevent future legacy sites. SECY-03-0069 Attach. 4 page 3; SECY-06-0143 pages 5 to 7. A legacy site is defined as "[a]n existing decommissioning site that is complex and difficult to decommission for a variety of financial, technical, or programmatic reasons." NUREG-1757 vol. 1 page xxxii.

On May 2, 2003, the NRC issued SECY-03-0069, which discussed its policy of preventing legacy sites. The NRC stated in SECY-03-0069 that the restricted releases under a dose criterion of 1 millisievert per year ("mSv/yr") (100 mrem/yr) gives the licensee the most flexibility to conduct onsite disposals. SECY-03-0069 Attach. 4 page 3. While NRC stated that such option could lead to additional legacy sites, requiring additional financial assurance would help ensure remediation of the onsite disposal to comply with the dose restrictions when the facility decides to decommission under the LTR. Id.

On July 5, 2006, NRC revisited the problem of legacy sites in SECY-06-0143. In this latest document, NRC stressed that allowing a dose criterion of 1 mSv/yr (100 mrem/yr) and requiring additional financial assurance could still lead to the creation of additional legacy sites. SECY-06-0143 page 5. The NRC reasoned that the amount of additional financial assurance required may likely be underestimated "because of uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." Id. The NRC therefore recommended finalizing decommissioning guidance and to conduct rulemaking to only allow onsite disposals resulting in doses no greater than a few millirem per year. Id. page 5 to 6. NRC may approve higher dose criteria based on the following considerations: (a) time of potential dose impacts based on half-lives of the material; (b) mobility of the material to be disposed; (c) additional financial assurance; and (d) other aspects that ensure that the facility will not become a future legacy site. Id. page 5.

The NRC is currently developing a rule and associated guidance to prevent future legacy sites for onsite disposals. Id. at 6.

This NRC policy regarding legacy sites was discussed in the context of onsite disposals for facilities that continued to operate under a license. Id. page 3. After the onsite disposal, these facilities would continue to operate until they decide to decommission the entire site subject to the LTR. Id. The NRC concluded that for the limited time that passed between the onsite disposal and the facility-wide decommissioning, uncertainties still exist for the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs. Id. page 5. Such concerns are warranted to a much greater extent for facilities disposing long-lived nuclides onsite under the LTR that remain hazardous in perpetuity. Goodman Dec. ¶ 5. In the case of LTR onsite disposals containing long-lived nuclides, it is more likely that controls will eventually fail and cause the release of contamination thereby posing a hazard to the public. Goodman Dec. ¶¶ 4, 5. Such is the case at the Shieldalloy site where some of the radionuclides contained in the radioactive waste at Shieldalloy are thorium-232, which has a half-life of over 14 billion years, and uranium-238, which has a half-life of over 4 billion years. Goodman Dec. ¶¶ 2, 4, 5.

Although NRC policy of preventing legacy sites for onsite disposals is clear, NUREG-1757 directly contradicts this policy by allowing the creation of additional legacy sites under the LTR. NUREG-1757 will create additional legacy sites by making it easier for facilities to permanently dispose of radioactive materials containing long-lived nuclides in a number of ways. Goodman Dec. ¶ 4. First, NUREG-1757 allows the durable institutional control requirement to be met by the issuance of the LTC license or the LA/RC for sites containing long-lived nuclides where the Federal or State government is not willing to take ownership or control of the site. See NUREG-1757 vol. 1 pages 17-65 to 67. NUREG-1757 admits that the LTC license will be issued for sites where complex monitoring or maintenance activities, including maintenance of an engineered barrier or continued monitoring of groundwater or radiological hazards, are needed at a restricted use site. NUREG-1757 vol. 1 page 17-66.

Second, NUREG-1757 allows for dose assessments of 1,000 years, regardless of the duration of the radioactive hazard. NUREG-1757 vol. 1 pages 17-87 to 17-88. 1,000 year dose modeling is not adequate for long-lived nuclides. Goodman Dec. ¶ 3. The 1000 year time frame for dose assessment is clearly not appropriate for materials that have a half-life of billions of years. Goodman Dec. ¶ 3.

Third, by limiting the analysis to these time periods, regardless of the radioactive half-life of the materials, facilities will now have greater flexibility to choose the onsite disposal and restricted release option. Goodman Dec. ¶ 4. NRC admits that the restricted releases under a dose criterion of 1 mSv/yr (100 mrem/yr) gives the licensee the most flexibility to conduct onsite disposals. SECY-03-0069 Attach. 4 page 3.

Fourth, NUREG-1757 underestimates the amount of financial assurance required by a licensee, thereby making permanent onsite disposal upon decommissioning under NUREG-1757 more attractive to licensees. NUREG-1757 claims that the licensee must provide sufficient financial assurance so that the licensee funds the long-term control of the site with no additional costs being passed on to a future site owner/licensee, even where a site contains long-lived nuclides. NUREG-1757 vol. 1 pages 15-2 and 17-82. However, this reliance on financial assurance ignores the NRC conclusions that the amount of additional financial assurance required may likely be underestimated "because of uncertainties associated with the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs." SECY-0600143 page 5. These conclusions were made regarding onsite disposal by licensed facilities that would continue operating at the site and may be subject to future remediation when the facilities decide to permanently decommission their entire site and terminate their license. Id. NRC concluded that uncertainties associated with the burial performance and potential releases of contamination and transport of contamination in the subsurface environment existed for the limited time periods that facilities continued to operate. Id.

Furthermore, NUREG-1757 fails to require adequate financial assurance because it ignores the effects of inflation. Burke Dec. ¶ 3. Money set aside today will gradually be reduced by the effects of inflation. Id. If the effects of inflation are considered, the applicant would be required to post greater financial assurance. Id. Furthermore, the longer the period of time is required to maintain financial assurance, the greater the underestimation of the amount of financial assurance will be. Id.

The problems of contamination and transport of contamination related to disposals that remain onsite for a limited period of time is even more applicable to onsite disposals of long-lived nuclides that remain onsite in perpetuity pursuant to the LTR. Goodman Dec. ¶ 5. Facilities disposing long-lived nuclides onsite under the LTC or LA/RC are more likely to release and transport contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Id. It is therefore arbitrary and capricious for NRC to conclude that adequate financial assurance can be provided for long-lived nuclides where controls are required in perpetuity (as is the case in Shieldalloy) even though NRC admits that underestimation of the financial assurance is a problem for sites that are decommissioned for a limited period of time.

NRC admitted that "uncertainties" existed regarding contamination and transport of contamination for onsite disposal for facilities that continue to operate, even under current NRC regulations. SECY-06-0143 page 5. NRC therefore recommended the promulgation of a new rule. Id. at 6. NRC further admits that the emphasis of 10 C.F.R. Part 20 is for the protection of the public and workers from "imminent exposures" to excessive radiation, "not projected long-term exposures." SECY-03-0069. Such concerns are warranted to a much greater extent for facilities disposing long-lived nuclides onsite under the LTR since it is reasonable to assume that facilities disposing long-lived nuclides onsite under the LTR have a higher likelihood of releasing and transporting contamination over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard. Goodman Dec. ¶ 5.

10 C.F.R. § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

NRC issued NUREG-1757, which provides for the LTC license, despite its policy against the creation of legacy sites. See SECY-06-0143.

UNITED STATES NUCLEAR REGULATORY COMMISSION

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	))))

PETITION FOR A HEARING
PART III OF III

Miscellaneous Contention

Submitted by:

State of New Jersey,
Department of Environmental Protection

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
(609) 292-1509

Andrew D. Reese
Kenneth W. Elwell
Deputy Attorneys General
On the Petition

TABLE OF CONTENTS

PAGE

CASES CITED

FEDERAL REGULTIONS CITED

Contention 17

THE NRC MAY NOT ISSUE A LTC LICENSE UNTIL IT PROMULGATES RULES AND REGULATIONS TO ESTABLISH ITS TERMS AND CONDITIONS.

10 C.F.R. § 2.309(f)(i) Provide a specific statement of the issue of law or fact to be raised or controverted.

The NRC is required to promulgate rules or regulations when setting forth the information an applicant for a license is required to submit or when the NRC establishes the form and conditions of a license pursuant to the AEA. 42 U.S.C. §§ 2022(f)(3) 2232(a), 2233.

10 C.F.R. § 2.309(f)(ii) Provide a brief explanation of the basis for the contention.

The AEA provides as follows:

> Each application for a license hereunder shall be in writing and shall specifically state such information as the Commission, by rule or regulation, may determine to be necessary to decide such of the technical and financial qualifications of the applicant, the character of the applicant, the citizenship of the applicant, or any other qualifications of the applicant as the Commission may deem appropriate for the license.

42 U.S.C. § 2232(a) (emphasis added). The AEA also provides the following: "Each license shall be in such form and contain such terms and conditions as the Commission may, by rule or regulation, prescribe to effectuate the provisions of this chapter." 42 U.S.C. § 2233 (emphasis added).

The AEA also requires the NRC to promulgate regulations or rules regarding the disposal of byproduct material. Environmental Defense Fund v. U.S. N.R.C., 902 F.2d 785, 789-90 (10th Cir. 1990). The AEA provides: "Not later than 6 months after the date on which the Administrator promulgates final standards pursuant to subsection (b) of this section, the Commission shall, after notice and opportunity for public comment, amend the October 3 regulations, and adopt such modifications, as the Commission deems necessary to conform to such final standards of the Administrator." 42 U.S.C. § 2022(f)(3). The referenced subsection (b) requires the EPA to promulgate regulations concerning the protection of the public health, safety and the environment from radiological and nonradiological hazards associated with the possession, transfer, and disposal of byproduct material. Id. § 2022(b)(1). The U.S. Court of Appeals for the Tenth Circuit held that this provision of the AEA requires the NRC to promulgate rules or regulations regarding the disposal of byproduct material. Environmental Defense Fund, 902 F.2d at 789-90.

A rule or regulation imposes rights and obligations on a person or entity. Texaco, Inc. v. Federal Power Com., 412 F.2d 740, 744 (3d Cir. 1969). A rule or regulation creates a binding standard on an agency and the regulated public. Cabais v. Egger, 690 F.2d 234, 237 (D.C. Cir. 1982); Guadamuz v. Bowen, 859 F.2d 762, 767 (9th Cir. 1988).

10 <u>C.F.R.</u> § 2.309(f)(iii) Demonstrate that the issue raised in the contention is within the scope of the proceeding.

Shieldalloy has submitted a DP that seeks a LTC license upon decommissioning. DP rev. 1 page xxv.

10 <u>C.F.R.</u> § 2.309(f)(iv) Demonstrate that the issue raised in the contention is material to the findings the NRC must make to support the action that is involved in the proceeding.

For NRC to review the DP, it must determine whether it is permitted by the AEA to issue a LTC license despite the existence of an applicable rule or regulation.

10 <u>C.F.R.</u> § 2.309(f)(v) Provide a concise statement of the alleged facts or expert opinions which support the requestor's/petitioner's position on the issue and on which the petitioner intends to rely at hearing, together with references to the specific sources and documents on which the requestor/petitioner intends to rely to support its position on the issue.

NUREG-1757 states that it is a guidance document that does not establish a binding norm. NUREG-1757, Vol. 1, page xvii ("This NUREG is not a substitute for NRC regulations, and compliance with it is not required."). However, NUREG-1757 provides a new license called LTC license though a guidance document. NUREG-1757 vol. 1 page 17-65. NUREG-1757 provides various terms and conditions that an LTC license would provide. NUREG-1757 vol. 1 pages 17-65 to 17-66, 17-79 to 17-80. Furthermore, NUREG-1757 sets forth guidance on the information that an applicant should submit in an application for a LTC license. NUREG-1757 vol. 1 pages 17-71 to 17-82; vol. 2 pages 2-4 to 2-15. Also, NUREG-1757 applies to the disposal of byproduct material at a decommissioned facility. NUREG-1757 vols. 1 and 2 page xv.

10 <u>C.F.R.</u> § 2.309(f)(vi) Provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a material issue of law or fact.

NRC believes that NUREG-1757 does not require rulemaking because the changes are within the scope of the LTR requirements. NRC Response to Comment 2.4.3. (Document # ML062370521).

CONCLUSION

In light of the preceding, the NJDEP respectfully requests NRC to grant a hearing regarding on the DP because Shieldalloy's proposed decommissioning will not protect the public health and safety and the LTC license sought by Shieldalloy will violate the law. A hearing should be granted because a genuine dispute exists regarding these issues.

Respectfully submitted,

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY

Dated: 1/16/07

By: Andrew D. Reese

ANDREW D. REESE
KENNETH W. ELWELL
Deputy Attorneys General

UNITED STATES NUCLEAR REGULATORY COMMISSION

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	))))

PETITION FOR A HEARING

EXHIBITS

Submitted by:

State of New Jersey,
Department of Environmental Protection

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
(609) 292-1509

Andrew D. Reese
Kenneth W. Elwell
Deputy Attorneys General
On the Petition

ENERGYSOLUTIONS

October 9, 2006

Mr. David Smith, Environmental Manager
Shieldalloy Metallurgical Corporation
14 West Boulevard
P.O. Box 768
Newfield, New Jersey 08344-0768

Re: **Proposal for Site Cleanup and Off-Site Disposal**

Dear Mr. Smith:

Energy*Solutions* has reviewed Shieldalloy Metallurgical Corporation's Decommissioning Plan (Revision 1a, dated June 30, 2006). Additionally, based on the inquiries of public agencies and the media, we wanted to renew our offer for the cleanup, transportation and offsite disposal services for Shieldalloy's radioactive slag, ash and soil material through **turnkey cleanup**.

Based on Sheildalloy's Decommissioning Plan, there are 81,000 tons of radioactive material requiring disposal. A total project cost can be calculated from Energy*Solutions*' proposal as follows:

Startup including refurbishing existing railway, installing additional Railway and adjacent loading scales, and other startup, mobilization activities...$ 2,600,000

Material cleanup and disposal:
81,000 tons @ $37,600 per railcar (ie. 810 railcars @ $37,600 ea.)....$30,456,000
included: project management, excavation, loading, transportation offsite disposal and an environmental protection barrier

Total cost...$33,056,000

These are fixed costs for a turnkey, all-inclusive site cleanup with off-site disposal of material. If the actual volumes differ, the cost would be more or less, based on the actual amounts loaded. Energy*Solutions* remains willing to take responsibility for the site cleanup and would agree to offer Shieldalloy a financial plan to spread payments over several fiscal years based on an adequate financial guarantee.

Our proposal for offsite disposal would be prudent compared to cost underestimates in Shieldalloy's Decommissioning Plan for license continuation or long-term control for costs such as construction, monitoring and security. In the plan, these alternatives also lack provision for adequate financial surety for items such as remediation of contaminated groundwater, repairs from intruder damage, etc.

423 West 300 South, Suite 200 • Salt Lake City, Utah 84101
801.649.2000 • Fax: 801.321.0453 • www.energysolutions.com

EXHIBIT A

ENERGY*SOLUTIONS*

Page Two
Mr. David Smith
October 9, 2006

Similar to our October 2005 letter and in light of inflated numbers being cited in publications to the public and the interest shown by residents and officials, this letter may be provided to interested parties requesting a clear understanding of cost.

Energy*Solutions* is anxious to assist Shieldalloy in completing this project. Should you have additional questions, please do not hesitate to contact me.

Very truly yours,

Al Rafati
President, Business Development

FGC/mab
Enclosure

cc: Eric Jackson, Shieldalloy Metallurgical Corporation

DESIGN, PERFORMANCE, AND SUSTAINABILITY OF ENGINEERED COVERS FOR URANIUM MILL TAILINGS

Final remedies at most uranium mill tailings sites include engineered covers designed to contain metals and radionuclides in the subsurface for hundreds of years. Early cover designs rely on compacted soil layers to limit water infiltration and release of radon, but some of these covers inadvertently created habitats for deep-rooted plants. Root intrusion and soil development increased the saturated hydraulic conductivity several orders of magnitude above design targets. These covers may require high levels of maintenance to sustain long-term performance. Relatively low precipitation, high potential evapotranspiration, and thick unsaturated soils favor long-term hydrologic isolation of buried waste at arid and semiarid sites. Later covers were designed to mimic this natural soil-water balance with the goal of sustaining performance with little or no maintenance. For example, the cover for the Monticello, Utah, Superfund site relies on a thick soil-sponge layer overlying a sand-and-gravel capillary barrier to store precipitation while plants are dormant and on native vegetation to dry the soil sponge during the growing season. Measurements of both off-site caisson lysimeters and a large 3-ha lysimeter built into the final cover show that drainage has been well below a U.S. Environmental Protection Agency target of less than 3.0 mm/yr. Our stewardship strategy combines monitoring precursors to failure, probabilistic risk-based modeling, and characterization of natural analogs to project performance of covers for a range of possible future environmental scenarios. Natural analogs are needed to understand how ecological processes will influence cover performance, processes that cannot be predicted with short-term monitoring and existing numerical models.

Introduction

The U.S. Department of Energy Office of Legacy Management (DOE–LM) is responsible for long-term stewardship of disposal sites for uranium mill tailings (www.gjo.doe.gov/LM/). Final remedies at most sites include engineered covers. Cover design and performance evaluation guidelines are prescriptive in nature and fail to consider consequences of inevitable changes in ecological settings (1,2). In contrast, the DOE–LM Environmental Sciences Laboratory (ESL)* in Grand Junction, Colorado, combines monitoring, modeling, and natural analog studies to evaluate the long-term performance of covers. Below are examples and lessons learned over many years of experience monitoring existing covers, designing alternative covers that accommodate ecological change, and using natural analog studies in combination with monitoring and modeling to project the long-term performance of covers for uranium mill tailings.

Monitoring Existing Covers

Disposal cell covers designed to satisfy the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) have evolved in response to regulatory changes and lessons learned (3). Early designs focused on radon attenuation and a 1,000-year longevity standard (4). Early designs basically consisted

EXHIBIT B

*The Environmental Sciences Laboratory is operated by S.M. Stoller Corporation for the U.S. Department of Energy, Grand Junction, Colorado, under DOE Contract Number DE–AC01–02GJ79491.

of three layers: 1) a compacted soil layer (CSL) overlying the tailings for radon attenuation, 2) a surface layer of durable rock for erosion protection, and 3) a lateral drainage layer consisting of coarse sand or gravel sandwiched between the CSL and the surface layer (2). The CSLs were later advocated as low-permeability barriers (2).

Plants began growing in the rock-armored, low-permeability covers within a few years after construction (5). Plant encroachment should have been anticipated. Surface layers of rock reduce evaporation (6), increase soil water storage (7), and, consequently, create habitat for deep-rooted plants. Deep-rooted plants may either decrease or increase the likelihood of contaminant releases from disposal cells, thus long-term maintenance has become problematic. Extraction of soil water by plants (transpiration) may significantly decrease recharge through covers. Even in humid climates where precipitation exceeds potential evapotranspiration (ET), water extraction by plants may account for more than half of soil water loss from disposal cell covers (8). Woody vegetation has also been shown to improve the stability of riprap-armored slopes (9).

Conversely, plants rooted in uranium mill tailings may contain elevated levels of U, Mo, Se, ^{226}Ra, ^{230}Th, and ^{210}Po (10,11,12). Radon-222 can be transported into the atmosphere through transpiration water (13). Roots may also alter waste chemistry, potentially mobilizing contaminants (14). Root intrusion can physically degrade covers. CSLs are vulnerable to desiccation and cracking from wet–dry cycles, freeze–thaw cycles, and biointrusion (8,15). Macropores left by decomposing plant roots may act as channels for water and gases to bypass the soil mass in CSLs. Plant roots also tend to concentrate in and extract water from CSLs high in clay, causing desiccation and cracking, even when overlying soils are nearly saturated (16). Furthermore, roots can clog lateral drainage layers (5), potentially increasing percolation rates.

A cover constructed at Shiprock, New Mexico, in 1986, before the U.S. Environmental Protection Agency (EPA) proposed groundwater quality standards for UMTRCA sites, exemplifies the dilemma. The Shiprock area receives an average of about 15 cm precipitation per year. The Shiprock cover consists of three layers: a 198-cm silt loam CSL for radon attenuation, a 15-cm sand drainage layer overlying the CSL, and a 30-cm layer of large, durable cobble sized to prevent erosion. Early laboratory tests suggested that the Shiprock CSL had a saturated hydraulic conductivity (K_{sat}) between 6.4 x 10^{-8} and 2.3 x 10^{-6} cm/s (17). After groundwater standards for UMTRCA sites were promulgated, DOE became concerned that potentially deep-rooted plants observed growing on the cover, including tamarisk, rabbitbrush, and Russian thistle, could increase the permeability of the CSL.

Soil moisture monitoring and in situ measurements of K_{sat} suggest that recharge through the cover is higher than previously thought (18). Neutron hydroprobe measurements from June 1999 through September 2000 show that the CSL and upper tailings were saturated. In situ K_{sat} was measured using air-entry permeameters (19) in pits where tamarisk, rabbitbrush, and Russian thistle rooted into the CSL and in adjacent pits without plant roots. Results were highly variable with a mean K_{sat} equal to 4.4 x 10^{-5} cm/s. Given saturation of the CSL and tailings and a higher K_{sat} than previously assumed, higher than expected recharge through the cover is likely. ESL is investigating methods for direct measurement of water flux from the cover and, as a contingency, for retrofitting the cover to accelerate plant establishment and ET (see "Alternative Cover Design"). Regulatory agreements currently require spraying cover vegetation with herbicides.

Effects of root intrusion on the performance of the cover at the Burrell, Pennsylvania, site were also evaluated (20). Annual precipitation at Burrell averages more than 100 cm/yr. The Burrell cover consists of a 90-cm CSL overlying tailings materials, a 30-cm sand and gravel drainage layer, and a 30-cm rock riprap layer. Within 3 years after construction, woody plants, including sycamore, box elder, black locust, tree-of-heaven, and Japanese knotweed, began emerging from the rock cover. Within 10 years, Japanese knotweed had rooted through the CSL. At Burrell, K_{sat} averaged 3.0 x 10^{-5} cm/s at locations where Japanese knotweed roots penetrated the CSL, but only 2.9 x 10^{-7} cm/s at locations without plants. The weighted-average K_{sat}, calculated using the leaf area index (LAI) (21) for Japanese knotweed, was 4.4 x 10^{-6} cm/s. At a nearby site with a subsoil similar to the material used to construct the CSL, the K_{sat} averaged 1.3 x 10^{-4} cm/s. Earthworm holes, root channels, and pedogenic structure all contributed to macropore flow. The nearby site was considered to be a reasonable analog of a long-term ecological scenario for the Burrell cover (see "Natural Analogs of Long-Term Performance").

Alternative Cover Design

Lessons learned from monitoring early UMTRCA covers contributed to design improvements. DOE and EPA Region 8 collaborated on an alternative design for a uranium mill tailings disposal cell at the Monticello, Utah, Superfund site (22). The goal at Monticello was to design an engineered cover system that enhances beneficial natural processes to help make long-term containment possible (23).

At semiarid sites such as Monticello, relatively low precipitation (P), high potential evapotranspiration (PET), and thick unsaturated soils seem to favor long-term hydrologic isolation of buried waste (24). But simple P/PET relationships inadequately predict recharge that can approach 60 percent of precipitation in arid-land soils denuded of vegetation (25). Recharge can be minimized if disposal cells are covered with thick, fine-textured soil layers that store precipitation in the root zone where ET seasonally removes it (26,27). Capillary barriers consisting of coarse-textured sand and gravel placed below this soil-sponge layer can enhance water storage and limit unsaturated flow (28,29).

The Monticello cover design (Figure 1) relies on the water-storage capacity of a 163-cm fine-textured soil-sponge layer overlying a 38-cm capillary barrier of coarse sand to retain precipitation until it is seasonally removed by vegetation. Gravel mixed into the surface helps control erosion when vegetation is sparse (following construction, fires, drought, etc.), mimicking conditions that lead to the formation of gravel pavements. The gravel admixture can control both wind and water erosion (30,31) and can enhance

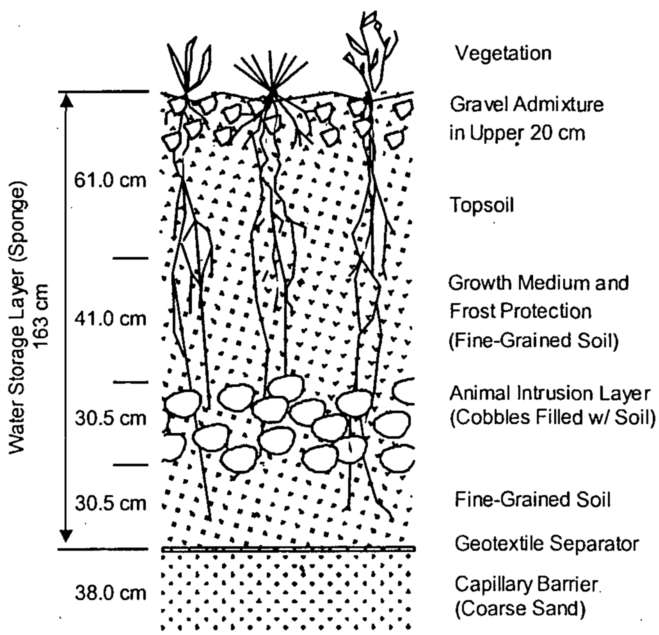

Figure 1. Alternative cover constructed at Monticello, Utah.

seedling emergence and plant growth by functioning as a mulch. The soil-sponge thickness is the primary biointrusion deterrent. Water retention in the soil sponge creates habitat for relatively shallow-rooted plants, and the thickness of the sponge exceeds the depth of most burrowing vertebrates in the Monticello area. A layer of cobble-size rock 30.5 cm above the capillary barrier is an added deterrent should deeper burrowers, such as prairie dogs, move into the area in response to climate change. Fine-textured sponge soil fills the interstices of the cobble layer, preventing it from behaving like a second capillary barrier. Physical and hydraulic properties of the topsoil layer, obtained from the root zone of the borrow area, match the rest of the soil sponge. However, the topsoil also contains available nutrients, propagules, and microorganisms (e.g., mycorrhizae) needed to sustain a diverse and resilient plant community.

ESL personnel conducted a series of field lysimeter experiments to help design and monitor the performance of the Monticello cover. The lysimeter test facility evolved as a sequence of installations, first to test the concept of using an ET/capillary barrier cover design at Monticello, next to evaluate the soil-water balance of the design, and finally to monitor the hydrologic performance of a large facet of the completed cover. In 1990, ESL installed small weighing lysimeters containing intact, 100-cm-deep columns of undisturbed native silt loam soil (monoliths) overlying a pea-gravel capillary barrier and supporting mature native grasses (32). Leaf water potential, leaf transpiration, and whole-plant gas exchange of plants growing in and adjacent to the lysimeters were compared to test the physiological responses of plants to confinement in the small lysimeters. Favorable results led to construction of an array of 15 additional small weighing lysimeters in 1993 to compare drainage, ET, and water-storage capacities of cover designs with varying soil types and soil layer thickness (32). Favorable results this time led to a final cover design for Monticello.

In 1999, ESL teamed with EPA Region 8 on a study using large caisson lysimeters to evaluate the hydrological and ecological performance of the Monticello cover as built. Covers constructed inside the caissons matched the range of conditions as built in the actual cover (33). Finally, in 2000, ESL and the EPA Alternative Cover Assessment Program (ACAP) collaborated on installation of a large drainage lysimeter under a 3-ha facet of the 14-ha disposal cell cover at Monticello. Both the caisson and ACAP lysimeter studies show that plant transpiration has kept drainage flux levels well below the EPA target of 3.0 mm/yr.

Natural Analogs of Long-Term Performance

Understanding how inevitable ecological processes may alter the long-term performance of engineered covers is crucial to designing, constructing, and maintaining cover systems (34). Effective performance modeling requires both current and possible future ecological scenarios (35). Natural analog studies are needed to identify and evaluate likely shifts in cover environments (36), to design covers that mimic favorable natural systems, to bound possible future conditions for input to models, and to provide clues about the possible evolution of engineered covers as a basis for monitoring precursors of failure. Natural analogs also provide tangible evidence of the reliability of numerical predictions. ESL and its partners have collaborated on studies of natural and archaeological analogs to discern likely long-term changes in the environmental setting of cover systems, including climate change, pedogenesis (soil development), and ecological succession (37).

Reasonable projections of possible future changes in climate states and extreme events are needed to design sustainable covers. ESL and its partners are demonstrating methods based on global change models and paleoecological evidence to establish a first approximation of possible future climatic states at DOE–LM sites. A preliminary analysis of paleoclimate data for Monticello yielded average annual temperature and precipitation ranges of 2 to 10 °C and 80 to 60 cm, respectively, corresponding to late glacial and mid-Holocene periods (38). Instrumental records were used as a basis for selecting soil and vegetation analog sites that span a reasonable range of future climate scenarios for Monticello (37).

Pedogenic processes will change the soil physical and hydraulic properties of engineered covers. Pedogenesis includes processes such as formation of macropores and preferential flow associated with root growth, animal holes, and soil structural development; secondary mineralization, deposition, and illuviation of fines, colloids, soluble salts, and oxides that can alter water storage and movement; and soil mixing caused by freeze–thaw activity, animal burrows, and the shrink–swell action of expansive clays (37). ESL and its partners are characterizing natural and archaeological soils considered representative of pedogenic changes in engineered cover soils. For example, key soil physical and hydraulic properties at natural and archaeological soil profiles at climate analog sites were measured to infer possible future pedogenic changes in the performance of the Monticello cover.

Plant communities will establish and change on soil covers in response to climate, soil development, and disturbances such as fire, grazing, or noxious plant invasion. Changes in plant abundance, ET rates, root instrusion, and animal habitat may alter the soil water balance and stability of a cover. ESL and its partners draw evidence of possible future ecological changes using successional chronosequences (a mosaic of plant communities that represent different stages of recovery following a disturbance). For example, at the Lakeview, Oregon, uranium mill tailings disposal site, possible future responses of plant community composition and LAI to fire were evaluated using a regional chronosequence. Similarly, possible future vegetation responses to climate change scenarios were evaluated at regional global-change analog sites. LAI, an index of plant transpiration, ranged from 0.15 to 1.28 for the fire chronosequence and from 0.43 to 1.62 for dry and wet climate analog sites.

Conclusions

The DOE office in Grand Junction, Colorado, has learned several lessons from monitoring, designing, and evaluating the long-term performance of engineered covers constructed to contain uranium mill tailings in the subsurface that could be of benefit to designers of the next generation of covers.

Early rock-armored covers that rely on CSLs to limit water movement into tailings may fall short of permeability targets, and many inadvertently created habitats for deep-rooted plants. Root intrusion and soil development may have increased the K_{sat} several orders of magnitude above design targets in several covers. At Shiprock, New Mexico, ESL is evaluating methods for measuring flux directly to ensure that ongoing efforts to remediate groundwater are not compromised by contaminants seeping from the disposal cell. Saturated flow into tailings is likely occurring in the Burrell, Pennsylvania, disposal cell. But because of low contaminant concentrations, root intrusion and increased saturated flow are not adversely impacting human health or the environment at the Burrell site. Overall, these low-permeability covers attempt to resist natural processes, rather than work with them, and will likely require increasing levels of maintenance or retrofitting to sustain long-term performance.

Relatively low precipitation, high potential ET, and thick unsaturated soils favor long-term hydrologic isolation of buried waste at arid and semiarid sites. The cover constructed at the Monticello site mimics this natural soil-water balance. The Monticello cover relies on a thick soil sponge layer overlying a sand and gravel capillary barrier to store precipitation while plants are dormant and on native vegetation to dry the sponge layer during the growing season. Lysimeter results show that less than 0.05 mm of drainage has occurred since 2000, an amount well below the EPA target of less than 3.0 mm/yr.

Given unprecedented longevity requirements, a stewardship objective should be to design or retrofit covers to accommodate long-term ecological processes with the goal of sustaining performance with as little maintenance as possible. Investigations of natural analogs can provide insights into how ecological processes may influence the performance of engineered covers. Evidence from natural analogs can improve our understanding of meteorological variability associated with possible long-term changes in climate; vegetation responses to climate change and disturbances; effects of vegetation dynamics on ET, soil permeability, soil erosion, and animal burrowing; and effects of soil development processes on water storage and permeability.

Literature Cited

1. U.S. Environmental Protection Agency. Technical Guidance Document, Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530–SW–89–047, Washington, DC, USA (1989).

2. U.S. Department of Energy. Technical Approach Document, Revision II, UMTRA–DOE/AL 050425.0002, DOE UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, USA (1989).

3. W.J. Waugh, G.M. Smith, D. Bergman-Tabbert, and D.R. Metzler. Evolution of Cover Systems for the Uranium Mill Tailings Remedial Action Project, US. Mine Water and the Environ. **20**:190–197 (2001).

4. U.S. Environmental Protection Agency. Health and Environmental Protection Standards for Uranium Mill Tailings. 48 FR 602, 40 CFR 192, Washington, DC. (1983).

5. U.S. Department of Energy. Vegetation Growth Patterns on Six Rock-Covered UMTRA Project Disposal Cells, DOE UMTRA Project Office, Albuquerque Operations Office, Albuquerque, New Mexico, USA (1992).
6. P.H. Groenevelt, P. van Straaten, V. Rasiah, and J. Simpson. Modification in Evaporation Parameters by Rock Mulches. Soil Technol. **2**:279–285 (1989).
7. W.D. Kemper, A.D. Nicks, and A.T. Corey. Accumulation of Water in Soils Under Gravel and Sand Mulches. Soil Sci. Soc. Am. J. **58**:56–63 (1994).
8. S. Melchior, K. Berger, B. Vielhaber, and G. Miehlich. "Multilayer Landfill Covers: Field Data on the Water Balance and Liner Performance," in: G.W. Gee and N.R. Wing (eds.), In-Situ Remediation: Scientific Basis for Current and Future Technologies, Battelle Press, Columbus, Ohio, USA, pp. 411–425 (1994).
9. R.P.C. Morgan and R.J. Rickson (eds.). Slope Stabilization and Erosion Control: A Bioengineering Approach. Chapman and Hall, London (1995).
10. D.R. Dreesen, and J.M. Williams. Mobility and Bioavailability of Uranium Mill Tailings Contaminants. Environ. Sci. Technol. **16**:702–709 (1982).
11. L.R. Hosner, H.J. Woodard, and J. Bush. Growth and Selenium Uptake of Range Plants Propagated in Uranium Mine Soils. J. Plant Nutrition **15**:2743–2761 (1992).
12. P.M. Markose, I.S. Bhat, and K.C. Pillai. Some Characteristics of ^{226}Ra Transfer From Soil and Uranium Mill Tailings to Plants. J. Environ. Radioactivity **21**:131–142 (1993).
13. R.C. Morris, and L. Fraley, Jr. Effects of Vegetation, a Clay Cap, and Environmental Variables on Rn-222 Fluence Rate From Reclaimed U Mill Tailings. Health Physics **56**:431–440 (1989).
14. D.A. Cataldo, C.E. Cowan, K.M. McFadden, T.R. Garland, and R.E. Wildung. Plant Rhizoshpere Processes Influencing Radionuclide Mobility in Soil, PNL–6277, Pacific Northwest National Laboratory, Richland, Washington, USA (1987).
15. W.H. Kim, and D.E. Daniel. Effects of Freezing on the Hydraulic Conductivity of Compacted Clay. J. Geotech. Eng. **118**:1083–1097 (1992).
16. T.E. Hakonson. Evaluation of Geologic Materials To Limit Biological Intrusion Into Low-Level Radioactive Waste Disposal Sites, LA–10286–MS, Los Alamos National Laboratory, Los Alamos, New Mexico, USA (1986).
17. U.S. Department of Energy. Moisture Contents and Unsaturated Conditions in UMTRA Radon Barriers, UMTRA–DOE/AL, Uranium Mill Tailings Remedial Action Project, Albuquerque, New Mexico, USA (1989).
18. E. Glenn and J. Waugh. Disposal Cell Cover Moisture Content and Hydraulic Conductivity, Long-Term Surveillance and Maintenance Program, Shiprock, New Mexico, Site, GJO–2001–204–TAR, U.S. Department of Energy, Grand Junction, Colorado, USA (2001).
19. D.B. Stephens, M. Unruh, J. Havlena, R.G. Knowlton, Jr., E. Mattson, and W. Cox. Vadose Zone Characterization of Low-Permeability Sediments Using Field Permeameters. Ground Water Monitoring Rev. **8**:59–66 (1988).
20. W.J. Waugh, S.J. Morrison, G.M. Smith, M. Kautsky, T.R. Bartlett, C.E. Carpenter, and C.A. Jones. Plant Encroachment on the Burrell, PA, Disposal Cell: Evaluation of Long-Term Performance and Risk, GJO–99–96–TAR, U.S. Department of Energy, Grand Junction, Colorado, USA (1999).
21. 25. J.M. Wells and J.M. Norman. Instrument for Indirect Measurement of Canopy Architecture. Agron. J. **83**:818–825 (1991).
22. J. Berwick, T. Meiers, and J. Waugh. Expansive Cover Installed by DOE To Contain Mixed Wastes in Eastern Utah. EPA Tech Trends, May 2000, U.S. Environmental Protection Agency, Washington, DC, USA (2000).

23. W.J. Waugh and G.N. Richardson. "Ecology, Design, and Long-Term Performance of Surface Barriers: Applications at a Uranium Mill Tailings Site," in: Barrier Technologies for Environmental Management, National Research Council. National Academy Press, Washington, DC, USA, pp. 36–49 (1997).

24. C.C. Reith and B.M. Thompson (eds.). Deserts as Dumps? The Disposal of Hazardous Materials in Arid Ecosystems. University of New Mexico Press, Albuquerque, New Mexico, USA (1992).

25. G.W. Gee and S.W. Tyler (eds.). Symposium: Recharge in Arid and Semiarid Regions. Soil Science Society of America Journal **58**:5–72 (1994).

26. S.O. Link, W.J. Waugh, and J.L. Downs. "The Role of Plants on Isolation Barrier Systems," in: G.W. Gee and N.R. Wing (eds.), In-Situ Remediation: Scientific Basis for Current and Future Technologies. Battelle Press, Columbus, Ohio, USA (1994).

27. A. Ward and G. Gee. Performance Evaluation of a Field-Scale Surface Barrier. Journal of Environmental Quality **26**:694–705 (1997).

28. J. Stormont and C. Anderson. Method To Estimate Water Storage Capacity of Capillary Barriers. Journal of Geotechnical and Geoenvironmental Engineering **124**:297–302 (1998).

29. M.V. Khire, C.H. Benson, and P.J. Bossher. Capillary Barriers: Design Variables and Water Balance. Journal of Geotechnical and Geoenvironmental Engineering **126**:695–708 (2000).

30. M.W. Ligotke. "Control of Eolian Soil Erosion From Waste-Site Surface Barriers," in: G.W. Gee and N.R. Wing (eds.), In-Situ Remediation: Scientific Basis for Current and Future Technologies, Battelle Press, Columbus, Ohio, USA, pp. 545–559 (1994).

31. J.B. Finley M.D. Harvey, and C.C. Watson. "Experimental Study: Erosion of Overburden Cap Material Protected by Rock Mulch," in: Proceedings of Seventh Symposium on Management of Uranium Mill Tailings, Low-Level Waste, and Hazardous Waste,. Colorado State University, Ft. Collins, Colorado, USA, pp. 273–282 (1985).

32. W.J. Waugh. "Monticello Field Lysimetry: Designing and Monitoring an Alternative Cover," Proceedings of the Waste Management 2002 Symposium, February 25–28, University of Arizona, Tucson, Arizona, USA (2002).

33. W.J. Waugh, G.M. Smith, and P. Mushovic. "Monitoring the Performance of an Alternative Cover Using Caisson Lysimeters," Proceedings of the Waste Management 2004 Symposium, University of Arizona, Tucson, Arizona, USA (2004).

34. J.H. Clarke, M.M. MacDonell, E.D. Smith, R.J. Dunn, and W.J. Waugh. Engineered Containment and Control Systems: Nurturing Nature. Risk Analysis (In Press).

35. C.K. Ho, B.W. Arnold, J.R. Cochran, and R.Y. Taira. Development of a Risk-Based Probabilistic Performance Assessment Method for Long-Term Cover Systems, Second Edition, SAND2002-3131, Sandia National Laboratories, Albuquerque, New Mexico, USA (2002).

36. W.J. Waugh, K.L. Petersen, S.O. Link, B.N. Bjornstad, and G.W. Gee. "Natural Analogs of the Long-Term Performance of Engineered Covers," in: G.W. Gee and N.R. Wing (eds.), In-Situ Remediation: Scientific Basis for Current and Future Technologies, Battelle Press, Columbus, Ohio, pp. 379–409. (1994).

37. J. Waugh, S. Link, E. McDonald, D. Rhode, and S. Sharpe. Characterization of the Environmental Envelope for the Design of Long-Term Covers: Closeout Report, GJO–2003–48–TAC, Environmental Sciences Laboratory, U.S. Department of Energy, Grand Junction, Colorado, USA (2003).

38. W.J. Waugh and K.L. Petersen. "Paleoclimatic Data Application: Long-Term Performance of Uranium Mill Tailings Repositories," in: W.J. Waugh (ed.), Climate Change in the Four Corners and Adjacent Regions: Implications for Environmental Restoration and Land-Use Planning, CONF-9409325, U.S. Department of Energy, Grand Junction, Colorado, USA, pp. 163–185 (1995).

This document was authored by the following individuals on behalf of the Office of Legacy Management:
W. Jody Waugh

DEC - 9

State of New Jersey

Richard J. Codey
Acting Governor

Department of Environmental Protection

Radiation Protection and Release Prevention Programs
PO Box 415
Trenton, NJ 08625-0415
Phone (609) 984-5520
Fax (609) 633-2210

Bradley M. Campbell
Commissioner

December 6, 2004

Samuel J. Collins, Regional Administrator
US Nuclear Regulatory Commission Region 1
King of Prussia, PA 19406-1415

Dear Mr. Collins:

I am writing to express my concern regarding the way in which the "decommissioning" of the Shieldalloy Metallurgic Corporation (SMC) site is proceeding. This time we have concerns about how meetings of the Site Specific Advisory Board (SSAB) should be conducted and what is expected of the members.

According to Nuclear Regulatory Commission (NRC) regulations at 10 CFR 20.1403, Criteria for license termination under restricted conditions, the licensee should seek advice from the members of the SSAB on various aspects of the proposed institutional controls and financial assurance. The representative of SMC stated this objective clearly, and members were encouraged to bring up any other issues they felt should be addressed.

However, it is the way in which these meetings are being conducted that concerns us. According to Volume 1 of the Consolidated NMSS Decommissioning Guidance (NUREG 1757), the SSAB should select a chairperson and adopt a charter. This was never done. Instead SMC's legal counsel conducts the meetings and drives the agenda. Members of the SSAB are encouraged to ask questions, but there has been no opportunity for members to discuss issues among themselves.

The most recent meeting of the SSAB was conducted on November 5, 2004 with several members of the public in attendance. Included in the packet of material was a form to be completed by SSAB members, which I have enclosed for your review. This form follows the letter of the NRC regulations, however we believe insufficient information was provided to SSAB members to allow them to complete it. The cover page to this form states that this will be considered the SSAB input and be included in the site wide decommissioning plan. How can these questions be answered without the decommissioning plan, the dose assessment, the ALARA analysis, or any documentation on financial assurance?

Of particular note is the question of scenarios that are being assessed. Based on an October 7, 2004 letter from David Smith of SMC to Kenneth Kalman of Headquarters, which summarized the key issues of two conference calls that were held on September 23, 2004 (to which we were

EXHIBIT C

not invited), the NRC has agreed to intruder scenarios that are less than reasonably conservative (hunters, recreationalists, and casual visitors). We believe that two realistic but justifiable exposure scenarios should include a person who builds a home next to the pile upon failure of the institutional and engineering controls, and a person who builds a home where the slag is used as fill under and around the house. We believe that the latter scenario is certainly realistic, given the fact that it was done by SMC at this site, even having full knowledge of the radioactive content of the material.

Also included in this letter is the NRC's interpretation of *all controls fail*. Apparently "all controls fail" means only institutional controls fail. The NRC states that engineering controls may or may not fail once institutional controls fail, or their effectiveness may degrade over time. Since we know this material will be present in perpetuity, the Department believes it is safe to assume that eventually there will be neither institutional nor engineering controls present. We understand that sometimes a degradation of engineering controls may be considered more conservative because erosion usually occurs irregularly and may form gullies that allow contamination to be channeled and concentrated at a particular location, referred to as the "bathtub effect". According to SMC, the type of material present at the site is not readily soluble, so this type of degradation of engineering controls would not be considered conservative in our view. The Department believes that all scenarios should be assessed based on the failure of both institutional and engineering controls.

We have also learned that the NRC allowed SMC to use a draft Environmental Impact Statement from the SMC facility in Cambridge, Ohio for their ALARA analysis. While it is true the licensed material is the same, the site-specific factors such as land use are totally different.

Finally, there is no evidence currently available that will ensure the institutional or engineering controls proposed will be effective in perpetuity, or will last even 1000 years. Indeed, NRC's own regulations at 10 CFR 61.59 state that institutional controls may not be relied on for more than 100 years.

I believe that the NRC's willingness to entertain the long-term control license option sets a dangerous precedence and should be reconsidered. The NRC has allowed SMC to accumulate this waste with no regard for its disposition for years. The NRC needs to use its regulatory authority to resolve the problem now without placing a perpetual burden on the citizens of Newfield.

Sincerely,

Jill Lipoti

Jill Lipoti, Ph.D.,
Assistant Director

Enclosure

SITE SPECIFIC ADVISORY BOARD
Shieldalloy Metallurgical Corporation
Input Form

NJDEP's responses:

1. Do the institutional controls proposed by Shieldalloy Metallurgical Corporation (SMC) provide reasonable assurance that an average member of the public will not incur a radiation dose in excess of 25 millirem Total Effective Dose Equivalent (TEDE)?

The New Jersey Department of Environmental Protection (NJDEP) does not have sufficient information on which to base a response. The characterization of the slag and baghouse dust pile was not provided to the Site Specific Advisory Board (SSAB), nor was the engineering design of the cap.

2. Do you believe the institutional controls will be enforceable?

No. There has been no demonstration that the institutional controls proposed will be enforceable for the time period necessary, basically in perpetuity. The United States Nuclear Regulatory Commission's (USNRC) own regulations under 10 CFR Part 61.59 state that institutional controls may not be relied on for more than 100 years.

3. Do you believe the institutional controls will not impose undue burdens on the local community or other affected parties?

No. The institutional controls may well prevent the development of the rest of the SMC site, as well as surrounding properties. The NJDEP believes this presents an undue burden on the local and neighboring communities.

4. Do you believe SMC can provide sufficient financial assurance to enable an independent third party to assume responsibility for control and maintenance of the site?

No. SMC appears to be downsizing this operation. There is no value to the property with the slag pile present, only liability, possibly in the hundreds of millions of dollars. It appears that SMC is seeking the Long Term Control (LTC) option only to continue operating the facility for as long as SMC can profit from it. If SMC can not profit from this operation, abandonment of all radioactively contaminated materials appears likely.

Also, SMC states that it currently has posted $5 million dollars in financial assurance for addressing the USNRC regulated materials on the site. This amount was not posted in accordance with 10 CFR 20.1403(c) for license termination under restricted conditions, but rather in accordance with paragraph 16 of the March 26, 1997 Bankruptcy Settlement Agreement. This amount was posted as a "Predetermined Cost" in bankruptcy negotiations based on licensing issues relevant at that time and was not based on SMC's and USNRC's current proposal for a LTC license. It is impossible for NJDEP to know if this amount will be sufficient for the current proposal since very few details have been made available to the SSAB.

5. In its decommissioning plan, SMC must present an assessment of the radiation dose potential associated with its planned decommissioning option for the following population groups: (1) on-site workers that do not have access to the capped area; (2) on-site workers that perform routine maintenance and inspection of the capped area; (3) trespassers; and (4) the nearest off-site resident. Are there other population groups that you think should be included in the dose assessment process?

Yes. According to the October 7, 2004 letter to Kenneth Kalman of the USNRC from SMC, the trespasser scenario means recreational, casual visitors, or hunters. While NJDEP agrees that the resident farmer scenario is not realistic because a house cannot be placed directly on top of the slag pile, we believe that a more conservative realistic scenario should be assessed, namely a future resident who uses crushed slag as fill under a house. We believe this is certainly realistic, given the fact that it was done by SMC at this site, even having full knowledge of the radioactive content of the material. NJDEP also believes that the nearest resident scenario should assume that the house is built next to the slag pile and that the engineering controls degrade and completely fail over time (see Comment No. 6 under Additional Concerns, below).

Additional Concerns:

1. NJDEP is on record with the USNRC opposing the issuance of the first Long Term Control license in the country based on both administrative and technical concerns. Please refer to the attached letter dated June 25, 2004 from NJDEP Commissioner Bradley M. Campbell, to USNRC Chairman Nils J. Diaz for details. The information that has been provided to the SSAB to date has not changed NJDEP's position regarding issuance of a Long Term Control license to SMC.

2. The statement made by SMC at the November 5, 2004 Site Specific Advisory Board meeting that one of the reasons SMC does not consider disposal of the slag pile a viable option is because of liability issues, such as the possibility that the material would have to be sent back to Newfield from Envirocare of Utah. Subsequent to the meeting, NJDEP spoke with Envirocare of Utah, who explained that this requirement is just an extension of the USNRC "cradle-to-grave" policy. Every generator of radioactive waste is responsible for the waste that it generates forever. This is a standard part of the contract that every Envirocare client must sign before they will accept the waste. NJDEP has dealt with numerous cleanups across the State with responsible parties ranging from private companies to the United States government. This issue has never been brought up as a reason to abandon disposal as an option.

3. The SSAB does not seem to be functioning as the regulatory framework suggests. Namely, NUREG 1757, Volume 1, Chapter 17 states that the SSAB should elect a

chairperson and adopt a charter and operating procedure. This was not done. The minutes of previous meetings reflect that SMC or its representatives have driven the discussion. Basic radiation protection principles were discussed at two SSAB meetings (which were necessary), but little discussion on specifics of the dose assessments or financial assurance was presented. According to NUREG 1757 the licensee is supposed to provide the SSAB with licensee studies and analyses that are pertinent to the decommissioning. The SSAB does not have the dose assessment or the 1996 Draft Environmental Impact Statement for the SMC site in Cambridge, OH that is supposed to contain the ALARA analysis that the USNRC is allowing to be used at this site. The SSAB should also have been provided with the thermoluminescent dosimeter (TLD) data from the fenceline near the slag pile. This would at least provide a point of reference when discussing regulatory dose limits. The SSAB has no documentation on financial assurance, only the total amount that SMC says is available. The work of the SSAB cannot be considered complete until these documents are distributed and a discussion is held among the members.

4. The cover page to this Input Form states that the form must be completed by November 30 in order for the SSAB input to be captured in the site-wide decommissioning plan. It then states that these concerns will be addressed in the Decommissioning Plan. Is this the final input on the question of institutional controls and financial assurance? If it is going to be included in the decommissioning plan then we assume this is the input that the USNRC is going to evaluate against their regulations. NJDEP believes that the SSAB should work to provide a consensus opinion to SMC. It is difficult for this to happen based on the way the SSAB meetings are currently being conducted.

5. When discussing institutional controls at the SSAB, SMC states that the controls will need to be relied on for 1000 years. This seems inappropriate given the half-life of the material that will be remaining at the site and the exposure rates when the engineering controls fail.

6. A copy of SMC's October 7, 2004 letter to Kenneth Kalman of the USNRC was provided to SSAB members at the November 5, 2004 meeting. NJDEP has concerns regarding item number 3 under Dose Modeling. The USNRC is allowing SMC to assume that engineering controls may or may not fail once institutional controls fail, or their effectiveness may degrade over time. Since we know this material will be present in perpetuity, NJDEP believes it is safe to assume that eventually there will be neither institutional nor engineering controls present. We understand that sometimes a degradation of engineering controls may be considered more conservative because erosion usually occurs irregularly, which may focus the flow and allow contamination to be channeled and concentrated at a particular location, referred to as the "bathtub effect." According to SMC, the type of material present at this site is not readily soluble, so this type of degradation of engineering controls would not be considered conservative in our view. NJDEP believes that all scenarios should be assessed based on the failure of <u>both</u> institutional and engineering controls.

Shieldalloy Corporation

DIVISION OF METALLURG. INC.
NEWFIELD, NEW JERSEY 08344
TELEPHONE 692-4200 (AREA CODE 609)

TWX 510-687 8918
SHIDALLOY NEFD

CABLE REGISTRATION
SHIELDALOY

March 20, 1987

Ms. Susan Savoca
NJDEP - ORS
CN-042
Trenton, NJ 08625

Dear Ms. Savoca:

Enclosed are the results of EP Toxicity (metals) and reactivity analyses of Shieldalloy Corporation by-product materials (e.g., slags) and soil samples as requested by you on 6/30/86.

Sixteen samples were tested on 2/10/87. Out of 160 samples, only 22% were above the laboratory's detectable limits; 10% were above 1% of the 40CFR261 maximum allowable limits (MAL). Neither soil sample exceeded 1% of the MAL. Four percent were above 10% of the MAL (2 Cr, 5 Ba). Only one sample exceeded the MAL; sample 13S, Cr Slag. The MAL is 5 mg/l and the result showed 6.4 mg/l.

Shieldalloy would like to resample this slag for the following reasons; 1) the sample only slightly exceeded the limit, 2) the sample collected represented a worse case scenario wherein your Henry Schuver selected from among some particularly bad looking slag a piece which represented 50% of the sample, but probably only 1% of the slag present, 3) samples 11S Cr Ram Oversize and 12S Cr Ram Fines which are a product of 13S Cr Slag did not exceed 20% of the MAL. We have already requested that sample 13S, collected on 2/10/87, be reanalyzed for Cr. If this retest again shows exceedance of the Cr MAL, Shieldalloy will request, by 3/20/87, that an unbiased composite and representative sample be taken.

Sincerely yours,

SHIELDALLOY CORPORATION

Michael Morgenstern

Michael R. Morgenstern
Environmental Manager

MRM/ljb

EXHIBIT D

cc: CFS/Lee Harp/Sonya Soshua/Dave Zervas/John Rinella/Henry Schuver

JAN 08 2007 16:55 FR TO 93415031 P.03/21

CENTURY LABORATORIES, INC.
P.O. Box 248/1501 Grandview Avenue/MidAtlantic Park, Thorofare, NJ 08086
Phone: (609) 848-3939 NJ 800-222-0589

SHIELDALLOY CORPORATION

West Boulevard
Newfield, New Jersey 08344

ATTENTION: MICHAEL MORGENSTERN

REPORT NO: F0358

MARCH 2, 1987

CENTURY LABORATORIES, INC.

Rodney T. Miller

Rodney T. Miller
Laboratory Manager

Frank M Raffo Jr

Frank M. Raffo, Jr.
Manager, Quality Assurance

TABLE OF CONTENTS

REPORT NARRATIVE

This report contains the results of the analysis by Century Laboratories, Inc. (CLI), of samples submitted by Shield Alloy Corporation (SAC). The samples were received in the laboratory on Feburary 11, 1987, with all seals intact.

The samples were analyzed for EP Toxicity Metals, and Reactive Cyanide and Sulfide. The samples covered by this report are listed in the laboratory chronicles which follow.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY 08625

CHAIN OF CUSTODY RECORD

NAME OF UNIT AND ADDRESS: Shield alloy Corporation
west Boulevard Newfield NJ 08344

SAMPLE NUMBER	NUMBER OF CONTAINERS	DESCRIPTION OF SAMPLES
3S	1	FeAl Drass
1S	1	Titanium Scrap
16S	1	Unidentified Dark
17S	1	Soil outside fence
15S	1	Inside Fence
4S	1	FeV 80%

Please log in the fact that all samples 1S thru 9S and 11S thru 17S were placed in a box which was wrapped in paper and sealed with tape around all 6 sides. mr Henry Schruver of NJDEP witnessed same an signed his name across the tape and the paper. Century to confirm package was received undamaged.

PERSON ASSUMING RESPONSIBILITY FOR SAMPLE: Michael R. Morgenstern — TIME: 50m — DATE: 2/11/[illegible]

SAMPLE NUMBER	RELINQUISHED BY:	RECEIVED BY:	TIME	DATE	REASON FOR CHANGE OF CUSTODY
1S, 3S, 4S, 15S	Michael Morgenstern	[illegible]	9:55	2/11/87	EP toxicity and reactivity
16S, 17S,	"	[illegible]	4:00	2/11/87	analysis
		rec'd in good			
		sealed condition			

Form DWM 0-4 Revised

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY 08625

CHAIN OF CUSTODY RECORD

NAME OF UNIT AND ADDRESS: Shield alloy Corp
West Boulevard Newfield NJ 08344

SAMPLE NUMBER	NUMBER OF CONTAINERS	DESCRIPTION OF SAMPLES
13S	1	Chromium Slag
9S	1	FeCb High Ratio & FeCb Columbite (10S)
7S	1	Fe Cb ~~High Ratio~~ Standard
2S	1	Cb Ni
14S	1	FeB
5S	1	FeV
6S	1	Lime pit Contents
8S	1	Furnace Cleanout

PERSON ASSUMING RESPONSIBILITY FOR SAMPLE: Michael R Morgenstern — TIME: 5pm — DATE: 2/10/[illegible]

SAMPLE NUMBER	RELINQUISHED BY:	RECEIVED BY:	TIME	DATE	REASON FOR CHANGE OF CUSTODY
2S, 5S, 6S	Michael Morgenstern	[illegible]	9:55	2/	
7S, 8S 9S	"			7/11/	EP Toxicity and Reactiv
13S, 14S	"			81	Analysis

Form DWM 006 Revised

[illegible]

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
TRENTON, NEW JERSEY 08625

CHAIN OF CUSTODY RECORD

NAME OF UNIT AND ADDRESS: Shieldalloy Corp
West Blvd Newfield NJ

SAMPLE NUMBER	NUMBER OF CONTAINERS	DESCRIPTION OF SAMPLES
[illegible]		
11S	1	Cr Ram oversize
12S	1	Cr Fines (on map), Cr Ram Fines on sign

PERSON ASSUMING RESPONSIBILITY FOR SAMPLE: Michael R Morgenstern

TIME: 5pm | DATE: [illegible]

SAMPLE NUMBER	RELINQUISHED BY:	RECEIVED BY:	TIME	DATE	REASON FOR CHANGE OF CUSTODY
11S ~~[illegible]~~	Michael Morgenstern	[illegible]	[illegible]	[illegible]	EP toxicity and
12S ~~[illegible]~~		/			reactivity analysis

Form DWM 6-4 Revised [illegible]

METHODOLOGY SUMMARY

EP TOXICITY TEST METHOD - METALS:

EP Toxicity Metals were extracted by method 1310 from SW846. Extracts were analyzed in accordance with the method prescribed in Methods for Chemical Analysis of Water and Wastes 600/4-79-020 March 1979.

REACTIVITY CYANIDE & SULFIDE:

Soils were analyzed by the Interim Method for the Determination of Reactive Cyanide and Sulfide Containing Waste, NJDEP Division of Waste Management.

Laboratory Chronicle

Client: Shield Alloy Job #: F0358

Sampling Date: 02-10-87 Receipt Date: 02-11-87

Client ID	Century ID	Matrix
FeAl Dross 3S	F0358-01	Non-Aqueous
Titanium Scrap 1S	-02	"
Unidentified 16S	-03	"
Soil Outside Fence 17S	-04	"
Inside Fence 15S	-05	"
FeV 80% 4S	-06	"
Chromium Slag 13S	-07	"

Sample ID:	FeAl Dross 3S	Titanium Scrap 1S	Unidentified 16S	Soil Outside Fence 17S	Inside Fence 15S	FeV 80% 4S	Chromium Slag 13S	Intl
Extraction:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Leachate	2-20	2-20	2-20	2-20	2-20	2-20	2-20	KB
Digestion:								
Furnace Metals								
ICP/AA Metals								
Analysis:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Volatile Organics(GC/MS)								
Purgeable Halocarbons (GC)								
Purgeable Aromatics (GC)								
ICP	2-26	2-26	2-26	2-26	2-26	2-26	2-26	KB
Selenium	2-23	2-23	2-23	2-23	2-23	2-23	2-23	KB
Arsenic	2-24	2-24	2-24	2-24	2-24	2-24	2-24	KB
Lead	2-25	2-25	2-25	2-25	2-25	2-25	2-25	KB
Mercury	2-25	2-25	2-25	2-25	2-25	2-25	2-25	KB
Cyanide - Reactive	2-26	2-26	2-27	2-27	2-27	2-17	2-19	CH
Sulfide Reactive	2-13	2-13	2-13	2-13	2-17	2-17	2-19	CH

Quality Control Manager Review and Approval: Frank M Raffo Jr Feb 28, 1987
Date

Laboratory Chronicle

Client: Shieldalloy Job #: F0358

Sampling Date: 02/10/87 Receipt Date: 02/11/87

Client ID	Century ID	Matrix
FeCb Columbite 10S	F0358-08	NON-AQUEOUS
FeCb Standard 7S	-09	"
CbNi 2S	-10	"
FeB 14S	-11	"
FeV 5S	-12	"
Lime Pit Contents 6S	-13	"
Furnace Cleanout 8S	-14	"

Sample ID:	FeCb Columbite 10S	FeCb Standard 7S	Cb Ni 2S	FeB 14S	FeV 5S	Lime Pit Contents 6S	Furnace Cleanout 8S	Intl
Extraction:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Leachate	2-20	2-18	2-18	2-18	2-18	2-18	2-18	KB
Digestion:								
Furnace Metals								
ICP/AA Metals								
Analysis:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Volatile Organics (GC/MS)								
Purgeable Halocarbons (GC)								
Purgeable Aromatics (GC)								
ICP	2-26	2-20	2-20	2-20	2-20	2-20	2-20	KS
Selenium	2-23	2-23	2-23	2-23	2-23	2-23	2-23	KB
Arsenic	2-24	2-24	2-24	2-24	2-24	2-24	2-24	KB
Lead	2-25	2-25	2-25	2-25	2-25	2-25	2-25	KS
Mercury	2-25	2-25	2-25	2-25	2-25	2-25	2-25	KB
Cyanide, Reactive	2-19	2-20	2-20	2-24	2-24	2-25	2-25	CK
Sulfide, Reactive	2-19	2-20	2-20	2-24	2-24	2-25	2-25	CK

Quality Control Manager Review and Approval: Frank M Raffo, Jr Feb 28, 1987
Date

Laboratory Chronicle

Client: SHIELDALLOY Job #: F0358

Sampling Date: 02/10/87 Receipt Date: 02/11/87

Client ID	Century ID	Matrix
Cr Ram oversize 1/5	F0358-15	NON AQUEOUS
Cr Ram Fines	-16	"

Sample ID:	Cr Ram Oversize 1/5	Cr Ram Fines						Intl
Extraction:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Leachate	2-18	2-18						KB
Digestion:								
Furnace Metals								
ICP/AA Metals								
Analysis:								
Acid Extractables								
Base/Neutrals								
Pesticides/PCBs								
Volatile Organics (GC/MS)								
Purgeable Halocarbons (GC)								
Purgeable Aromatics (GC)								
ICP	2-20	2-20						KB
Selenium	2-23	2-23						KB
Arsenic	2-24	2-24						KB
Lead	2-25	2-25						KB
Mercury	2-25	2-25						KB
Cyanide, Reactive	2-25	2-25						CR
Sulfide, Reactive	2-25	2-25						CR

Quality Control Manager Review and Approval: Frank M. Raffa, Jr. Feb 27, 1987

Date

CENTURY LABORATORIES, INC.

DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

	MAL*	3S FEAL DROSS	1S TITANIUM SCRAP	16S UNIDENTIFIED
TOTAL SAMPLE ANALYSIS (mg/kg):				
Reactivities:				
Cyanide	N.A.	<1.1	<1.1	<1.1
Sulfide	N.A.	<1.1	<1.1	<1.1
LEACHATE ANALYSIS (mg/l):				
Arsenic	5.0	<0.003	<0.003	<0.003
Barium	100.0	0.7	0.5	0.4
Cadmium	1.0	<0.005	0.075	0.009
Chromium	5.0	0.01	0.01	0.02
Lead	5.0	<0.005	<0.005	<0.005
Mercury	0.2	<0.0002	<0.0002	<0.0002
Selenium	1.0	<0.005	<0.005	<0.005
Silver	5.0	<0.01	<0.01	<0.01

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CENTURY LABORATORIES, INC. DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

	MAL*	17S SOIL OUTSIDE FENCE	15S SOIL INSIDE FENCE	4S FeV 80%
TOTAL SAMPLE ANALYSIS (mg/kg):				
Reactivities:				
Cyanide	N.A.	<1.1	<1.0	<1.1
Sulfide	N.A.	<1.1	<1.0	4.3
LEACHATE ANALYSIS (mg/l):				
Arsenic	5.0	<0.003	<0.003	0.096
Barium	100.0	0.9	0.9	23
Cadmium	1.0	<0.005	0.005	<0.005
Chromium	5.0	0.02	0.02	0.02
Lead	5.0	<0.005	<0.005	<0.005
Mercury	0.2	<0.0002	<0.0002	<0.0002
Selenium	1.0	<0.005	<0.005	<0.005
Silver	5.0	<0.01	<0.01	<0.01

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CENTURY LABORATORIES, INC.

DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

TOTAL SAMPLE ANALYSIS (mg/kg):	MAL*	13S CHROMIUM SLAG	10S FeCb COLUMBITE	7S FeCb STANDARD
Reactivities:				
Cyanide	N.A.	<1.0	<1.0	<1.0
Sulfide	N.A.	<1.0	<1.0	2.0
LEACHATE ANALYSIS (mg/l):				
Arsenic	5.0	<0.003	<0.003	0.006
Barium	100.0	1.0	14	23
Cadmium	1.0	0.008	<0.005	<0.005
Chromium	5.0	6.4	0.07	<0.01
Lead	5.0	<0.005	<0.005	<0.005
Mercury	0.2	<0.0002	<0.0002	<0.0002
Selenium	1.0	<0.005	<0.005	<0.005
Silver	5.0	<0.01	<0.01	<0.01

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CENTURY LABORATORIES, INC.

DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

	MAL*	2S CbNi	14S Feb	FeV-5S FeV-Std 5S
TOTAL SAMPLE ANALYSIS (mg/kg):				
Reactivities:				
Cyanide	N.A.	<1.0	<1.0	<1.0
Sulfide	N.A.	6.0	<1.0	6.0
LEACHATE ANALYSIS (mg/l):				
Arsenic	5.0	0.013	<0.003	0.025
Barium	100.0	11	15	2.2
Cadmium	1.0	<0.005	<0.005	<0.005
Chromium	5.0	<0.01	0.03	<0.01
Lead	5.0	<0.005	<0.005	<0.005
Mercury	0.2	<0.0002	<0.0002	<0.0002
Selenium	1.0	0.007	<0.005	<0.005
Silver	5.0	<0.01	<0.01	<0.01

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CENTURY LABORATORIES, INC. DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

	MAL*	6S LIME PIT	8S FURNACE CLEANOUT	11S Cr RAM OVERSIZE
TOTAL SAMPLE ANALYSIS (mg/kg):				
Reactivities:				
Cyanide	N.A.	<1.1	<1.0	<1.0
Sulfide	N.A.	<1.1	<1.0	<1.0
LEACHATE ANALYSIS (mg/l):				
Arsenic	5.0	<0.003	<0.003	<0.003
Barium	100.0	0.2	1.0	0.6
Cadmium	1.0	<0.005	<0.005	<0.005
Chromium	5.0	0.02	0.02	0.09
Lead	5.0	<0.005	<0.005	<0.005
Mercury	0.2	<0.0002	<0.0002	<0.0002
Selenium	1.0	<0.005	<0.005	<0.005
Silver	5.0	<0.01	<0.01	<0.01

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CENTURY LABORATORIES, INC. DATE: 02/28/87

CLIENT: Shield Alloy
REPORT #: F0358
CLIENT I.D.: Cr Ram Fines (12S)

CERTIFICATE OF ANALYSIS
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

	MAL*	RESULTS
TOTAL SAMPLE ANALYSIS (mg/kg):		
Reactivities:		
Cyanide	N.A.	<1.1
Sulfide	N.A.	<1.1
LEACHATE ANALYSIS (mg/l):		
Arsenic	5.0	<0.003
Barium	100.0	0.2
Cadmium	1.0	0.034
Chromium	5.0	0.10
Lead	5.0	<0.005
Mercury	0.2	<0.0002
Selenium	1.0	<0.005
Silver	5.0	0.08

*MAL - Maximum allowable level, as per 40 CFR 261
N.A. - Not applicable
< - Less than. Parameter not detected at or above value shown.

CLIENT: SHIELDALLOY **CENTURY SAMPLE NO's: F0358-01 thru 08**

CLIENT SAMPLE NO's:

PARAMETER	QC SAMPLE BATCH: DUP SAMPLE NUMBER	QC SAMPLE BATCH: SPIKE SAMPLE NUMBER	MDL* UNITS: mg/l	QC REPLICATE ANL.: R1	QC REPLICATE ANL.: R2	QC REPLICATE ANL.: RPD**	QC MATRIX SPIKE ANALYSIS: UN-SPK SAMPLE CONC:	QC MATRIX SPIKE ANALYSIS: CONC ADDED UNITS	QC MATRIX SPIKE ANALYSIS: % RECOVERY	METHOD BLANK ANALY.
Se	359-3DMS	359-3MS	0.005	.009	0.008	11.8	<0.005	0.005	190	<0.003
As	359-3DMS	359-3MS	0.003	.042	0.041	2.4	<0.003	0.04	105	<0.003
Pb	332-2DMS	332-2MS	0.005	.045	0.050	10.5	<0.005	0.05	90	<0.005
Hg	409-1DMS	409-1MS	0.0002	.0012	0.0012	0	0.0004	0.001	84	<0.0002
Cr	358-1DMS	358-1MS	0.01	.11	0.11	0	0.02	0.1	94	<0.01
Ag	358-1DMS	358-1MS	0.01	.3	0.3	0	<0.01	0.5	60	<0.01
Ba	358-1DMS	358-1MS	0.1	1.5	1.5	0	0.7	1.0	94	<0.1
Cd	358-1DMS	358-1MS	0.005	.10	0.10	0	<0.005	0.10	100	<0.005

*MDL: MINIMUM DETECTION LIMIT
**RPD: RELATIVE PERCENT DIFFERENCE

CLIENT: SHIELDALLOY

CENTURY SAMPLE NO's: F0358-09 thru 16

CLIENT SAMPLE NO's:

	QC SAMPLE BATCH			QC REPLICATE ANL.			QC MATRIX SPIKE ANALYSIS			
PARAMETER	DUP SAMPLE NUMBER	SPIKE SAMPLE NUMBER	MDL* UNITS: mg/L	R1	R2	RPD**	UN-SPK SAMPLE CONC:	CONC ADDED UNITS	% RECOVERY	METHOD BLANK ANALY.
Ba	358-14DMS	358-14MS	0.1	2.1	2.0	4.9	1.0	1.0	120	<0.1
Cd	358-14DMS	358-14MS	0.005	0.10	0.10	0	<0.005	0.10	100	<0.005
Cr	358-14DMS	358-14MS	0.01	0.12	0.12	0	0.02	0.10	102	<0.01
Se	359-3DMS	359-3MS	0.005	0.009	0.008	11.8	<0.005	0.005	190	<0.005
Ag	013-1DMS	013-1MS	0.01	<0.01	<0.01	0	<0.01	0.05	100	<0.01
As	359-3DMS	359-3MS	0.003	0.04	0.041	2.4	<0.003	0.04	105	<0.003
Pb	332-02DMS	332-2MS	0.005	0.045	0.050	10.5	<0.005	0.05	90	<0.005
Hg	409-1DMS	409-1MS	0.0002	.0012	0.0012	0	0.0004	0.001	84	<0.0002

*MDL: MINIMUM DETECTION LIMIT

**RPD: RELATIVE PERCENT DIFFERENCE

CLIENT: SHIELDALLOY

CENTURY SAMPLE NO's: F0358-01 thru 16

CLIENT SAMPLE NO's:

PARAMETER	QC SAMPLE BATCH: DUP SAMPLE NUMBER	QC SAMPLE BATCH: SPIKE SAMPLE NUMBER	MDL* UNITS: mg/kg	QC REPLICATE ANL.: R1	QC REPLICATE ANL.: R2	QC REPLICATE ANL.: RPD**	QC MATRIX SPIKE ANALYSIS: UN-SPK SAMPLE CONC:	QC MATRIX SPIKE ANALYSIS: CONC ADDED UNITS	QC MATRIX SPIKE ANALYSIS: % RECOVERY	METHOD BLANK ANALY.
R-CN	F0358-09	NA	1.0	<1.0	<1.0	0.0	NA	NA	NA	<1.0
R-S	F0358-09	NA	1.0	2.0	2.0	0.0	NA	NA	NA	<1.0

*MDL: MINIMUM DETECTION LIMIT

**RPD: RELATIVE PERCENT DIFFERENCE

State of New Jersey
OFFICE OF THE GOVERNOR
PO Box 001
TRENTON NJ 08625-0001

JON S CORZINE
Governor

September 28, 2006

Dale E. Klein, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C.

Dear Chairman Klein:

Over the past several years, the Nuclear Regulatory Commission (NRC) has received numerous correspondences from myself, US Senators Lautenberg and Menendez, Congressman LoBiondo, State Senator Madden, Assemblyman Mayer, Gloucester County Freehold Director Sweeney, former New Jersey Department of Environmental Protection (DEP) Commissioner Bradley Campbell, current DEP Commissioner Lisa Jackson and staff of the DEP regarding the NRC's potential issuance of a Long Term Control (LTC) license to the Shieldalloy Metallurgical Corporation (SMC) of Newfield, New Jersey. This time, as Governor of New Jersey, I am writing to once again express my objection to the possibility of allowing radioactive slag from the former SMC operations to remain in Newfield in perpetuity.

I believe this situation is a textbook example of what can happen from inadequate regulatory oversight. In 1986, twenty years ago, the DEP wrote a letter to the NRC warning them that continuing to allow SMC to accumulate slag would result in an unfeasible disposal problem at license termination. Unfortunately, that prediction has come to fruition. But rather than enforce a real decommissioning, the NRC developed a way out of their predicament by allowing licensing in perpetuity. I believe that the NRC should bear some responsibility since it knowingly allowed this situation to develop.

In spite of all the correspondences, I believe that NRC has not adequately addressed my concerns regarding storing low level radioactive waste without following the NRC's strict standards associated with siting a low level radioactive waste disposal facility. Although I recognize that no other waste will be brought onto this site, I still believe it should meet the same requirements as a low level waste facility. Additionally, I still question why the LTC license criteria was issued as guidance and not promulgated in a formal rulemaking process. Finally, I request that you provide the criteria used to determine what is an undue burden to the community.

EXHIBIT E

Leaving the material in place is unacceptable to the citizens of Newfield and the surrounding towns, their representatives, management and technical staff of the DEP, and to me. I support Senator Lautenberg's and Senator Menendez's call for a public hearing. At the same time I will investigate taking legal action to disallow the issuance of a long term control license at this site.

Sincerely,

Jon S. Corzine

Frank R. Lautenberg
UNITED STATES SENATOR FOR NEW JERSEY

FOR IMMEDIATE RELEASE:
Tuesday, December 12, 2006

CONTACT:
Alex Formuzis 202.224.7340
Chris Bender 202.224.4858

LAUTENBERG OPPOSES SHEILDALLOY DECOMMISSIONING PLAN
THE PUBLIC'S CONCERNS MUST BE CONSIDERED BEFORE A PLAN IS FINALIZED

At a public meeting today on the decommissioning plan put forth by Shieldalloy Metallurgical Corporation at the Edgarton Memorial Elementary School in Newfield, New Jersey, Senator Frank R. Lautenberg (D – N.J.) issued the following public statement:

"Let me thank NRC Chairman Dale Klein for agreeing to hold this public meeting and the Edgarton Elementary School for providing a venue for the residents to express their views.

"Tonight I would like to express my strong opposition to the decommissioning plan recently submitted by the Shieldalloy Metallurgical Corporation (SMC) regarding its site in Newfield, New Jersey. This plan proposes the consolidation of all radioactive material into a single pile that would be capped, fenced off, and then monitored and maintained for one thousand years.

"During last week's meeting, the public voiced their opposition to the plan and described the past and present environmental impact of this site on their town. They described the particulate that floats through the air and lays on their homes and cars. They talked about the many instances of cancer that they feel are directly related to mismanagement at SMC. They are concerned about their groundwater and do not want their health and the health of their families put at risk. These are all valid concerns which must be considered before a final plan is set in motion.

"The focus of tonight's meeting is the environmental impact of the decommissioning plan. I am very concerned that this plan may put the health and well being of the residents and the fragile ecosystems surrounding the site at risk. At the previous meeting, members of the public educated on nuclear materials informed the audience that the radioactive slag will take anywhere from five hundred thousand years to fourteen billion years to break down. Shieldalloy's plan calls for the site to be closed and monitored for one thousand years. However, the NRC readily admits that the site will be contaminated well beyond that timeframe

"I believe that this plan is not in the best interests of the citizens of Newfield. No cost-benefit analysis can accurately account for the environmental and health risks that this community faces for potentially thousands of years. I urge you to support a decommissioning plan that is protective of the health of Newfield's residents and of the environment and includes the removal of the slag.

"Thank you for your time and consideration.

###

EXHIBIT F

SENATOR ROBERT MENENDEZ

NRC Public Scoping Meeting
Newfield, New Jersey

Tuesday, December 12, 2006

Copy of Remarks

Good Evening. I am very glad to be here in Newfield Borough to voice my concerns about such an important issue. Several months ago Senator Lautenberg and I wrote to Chairman Klein of the Nuclear Regulatory Commission and asked him to hold public hearings on the Shieldalloy decommissioning plan as soon as possible, and I greatly appreciate the fact that we are having those hearings now. As you are certainly aware after last week's hearing, this is an issue of tremendous importance to the local community and the state, and one that I have been following closely since being given the honor of representing New Jersey in the United States Senate.

I am not a scientist, so I am not going to talk about the details of the Shieldalloy plan and its deficiencies. I will leave that to others. But I am an elected representative of the people of New Jersey, and as such I must protest vigorously whenever a company proposes to skip town and leave its toxic garbage behind. This is not simply about one large pile of radioactive waste – this is about a fundamental principle: New Jersey is not a toxic dumping ground, and if you make a mess, you'd better be prepared to clean it up.

Twenty six years ago yesterday, President Carter signed the Comprehensive Environmental Response, Compensation, and Liability Act – which is far better known as Superfund. The idea behind Superfund was simple, straightforward, and fair: polluters should pay for cleaning up their toxic messes, not the public. But ten years ago, something changed. A different leadership in Congress allowed the fees levied on corporations to expire, and the Superfund trust fund was gradually whittled away. A few years ago it went bankrupt, and

EXHIBIT G

taxpayers are now forced to pay the full cost of cleaning up sites where the responsible party can not be found, or no longer exists. Worse yet, the current administration has slowed the program down – we were cleaning over 80 Superfund sites a year in the late nineties, but now we barely reach 40. Taxpayers are not only paying to clean up these sites, they are paying with their health, as families drink polluted water and children play in contaminated soil.

This is particularly relevant here because Shieldalloy has been a Superfund site for over twenty two years, with extensive contamination of the soil, river, and groundwater by chromium and other toxic compounds. Shieldalloy has been cleaning this up since the late seventies, as they should, but there is no denying that the residents of Newfield had been exposed to a serious health hazard for quite some time, one that still lingers to this day. I am aware of concerns in the community that a cancer cluster may exist here, and these concerns need to be investigated. On top of this existing hardship that the community has experienced, it is simply too much to ask them to also accept a 30-foot-high pile of radioactive waste that will supposedly need to be monitored for one thousand years.

I believe the NRC has to take into account the well-being of the community in making the decision to accept or reject this plan. And there is absolutely no benefit for the people of Newfield in allowing this pile to stay, which is why it is unacceptable to force them to be stewards of this for a millennium. The idea that companies can simply sweep problems under the rug – or, in this case, under a pile of dirt – and call it a day is not the way that this country should do business, and certainly not something that should be approved by the NRC.

Just last week, a Shieldalloy spokesman said the company's decision to leave the material here was not based on economics, but on the public interest. I find that hard to believe. They want the people of Newfield to be content to live near this radioactive waste for a thousand years because it is so harmless, but say they don't want to transport it because of the threat of an accident that would expose people to the material. They can't have it both ways. If the material is so dangerous that it should be transported, then it certainly shouldn't be encased in Newfield. If the material is safe enough that you wouldn't mind your children playing next to it, then there's no reason not to move it. It seems obvious that this is truly a question of economics, and the people of this community should not be forced to pay because a company is unwilling to.

For me, these hearings are not about the technical details of Shieldalloy's plan. They are about the principle of the matter, and, more importantly, they are about the interests of the people of the Borough of Newfield, the Township of Franklin, the City of Vineland, and the Counties of Gloucester, Cumberland and Atlantic, as well as the State of New Jersey. The principle we would set by approving this plan would be a very dangerous one – it would say to polluters that they can take the cheap way out. That we will not hold them fully responsible for the messes they create. And the interests of the people would not be served by accepting this plan. It would not be served by cordoning off a portion of their town for a thousand years. It would not be served by adding one more threat to an already contaminated environment. The mission of the federal government is to serve the public's interest, and in this case the right decision is clear. I urge the commission to reject this plan and force Shieldalloy to clean this site up right.

Thank you very much.

BOARD OF CHOSEN FREEHOLDERS
COUNTY OF CUMBERLAND

RESOLUTION 2006 – 569A **DATE: December 7, 2006**

MEMBER	AYE	NAY	ABSTAIN	ABSENT	MOVED	SECOND
CHRISTY	✓					✓
GRUCCIO	✓					
MAGAZZU	✓				✓	
PETERSON	✓					
ROCCO	✓					
TROUT	✓					
RAINEAR	✓					

Resolution Opposing The Decommissioning Plan For Shieldalloy Metallurgical Corporation

WHEREAS, the Shieldalloy Metallurgical Corporation is located at 35 Southwest Boulevard in the Borough of Newfield; and

WHEREAS, the site covers 67.7 acres; and

WHEREAS, a slag pile is situated on the site that contains approximately 76,000 cubic yards of radioactive materials; and

WHEREAS, the Corporation has submitted a Decommissioning Plan for the facility to the United States Nuclear Regulatory Commission; and

WHEREAS, the Decommissioning Plan describes the radiological remedial actions that will be implemented at the site; and

WHEREAS, the Decommissioning Plan proposes actions that include on-site stabilization for the slag pile which will include approximately 8 acres of ground for a period of 1,000 years; and

WHEREAS, the Plan proposes long-term control for the site;

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF CUMBERLAND, as follows:

1. That this Board strongly opposes the Decommissioning Plan and the storage of any radioactive materials at the site.

2. That this Board hereby requests that the radioactive materials are to be removed from the site and transported to a USNRC, USEPA and NJDEP approved waste disposal facility.

3. That this Board further requests that USNRC, USEPA and NJDEP conduct the necessary air, groundwater, surface water and soil samplings.

4. That this Board further requests that all correspondence and reports regarding Shieldalloy be submitted to Cumberland County Board of Chosen Freeholders in a timely manner.

Passed and adopted at a special meeting of the Board of Chosen Freeholders held at the Cumberland County Administration Building, 790 East Commerce Street, Bridgeton, New Jersey on Thursday, December 7, 2006 at 5:00 p.m. prevailing time.

DATED: December 7, 2006

THE GLOUCESTER COUNTY BOARD OF CHOSEN FREEHOLDERS

RESOLUTION OF THE GLOUCESTER COUNTY BOARD OF CHOSEN FREEHOLDERS OPPOSING THE SHIELDALLOY DECOMMISSIONING PLAN PENDING BEFORE THE UNITED STATES NUCLEAR REGULATORY COMMISSION

BACKGROUND

WHEREAS, Shieldalloy Metallurgical Corporation ("SMC") operated a ferrocolumbium manufacturing process at its facility in Newfield Borough, Gloucester County, New Jersey, at which ores containing radioactive source material (uranium and thorium) were handled and used; and

WHEREAS, in 2001 SMC notified the United States Nuclear Regulatory Commission ("NRC") of SMC's intent to cease operations at the facility and decommission it under a long term control license; and

WHEREAS, pursuant to this long term control license, SMC proposes to leave documented radioactive waste from nearly fifty years of manufacturing operations on the property in Newfield; and

WHEREAS, SMC submitted a decommissioning plan and an environmental report for its Newfield facility to the NRC on October 21, 2005, which was denied on two separate occasions by NRC, but which is currently being reviewed and considered by the NRC; and

WHEREAS, the Board of Chosen Freeholders ("Board") of the County of Gloucester ("County") is gravely concerned about the health, safety and welfare of the residents of Newfield and the County if the NRC approves SMC's decommissioning plan, as proposed, in that it is tantamount to SMC abandoning a half century of its waste in the Borough and County; and

WHEREAS, the Board is concerned about contamination of the drinking water supplies for Newfield and other County residents down gradient of the SMC, both as a result of the uncontrolled waste pile that currently exists at the SMC facility and as a result of the proposed long-term storage of the material for the next millennium; and

WHEREAS, the Board is likewise concerned about the long-term negative financial impact of SMC's decommissioning plan on Newfield and the County, which SMC has failed to account for in its application to the NRC; and

WHEREAS, the Board questions, and indeed doubts, SMC's willingness and ability to post and maintain appropriate financial assurance to ensure the safety and environmental protectiveness of the radioactive waste pile for the time contemplated by the decommissioning plan; and

WHEREAS, testimony in the record indicates that SMC has unfairly and improperly inflated the projected cost to SMC to remove and dispose of this radioactive waste pile at a location specifically designed to handle this kind of waste material; and

WHEREAS, the Board is unaware of any other location in the United States where the NRC has allowed a manufacturer like SMC to leave radioactive waste on-site after the manufacturing activity has cease, making this case the first of its kind in the country; and

WHEREAS, the Board wishes to take advantage of all possible administrative and legal opportunities to challenge SMC's proposed decommissioning plan in order to protect the health, safety and welfare of the residents of Newfield and the County.

EXHIBIT I

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF GLOUCESTER, NEW JERSEY, AS FOLLOWS:

Section 1. Incorporation of Recited Facts. The Board hereby incorporate and adopts the foregoing recitals as if set forth in their entirety in the body of this Resolution.

Section 2. Purpose of Resolution. The purpose of this Resolution is to memorialize in writing the Board's opposition to the SMC decommissioning plan pending before the NRC and to make this Resolution and the Board's concerns a part of the formal record before the NRC.

Section 3. The Board hereby authorizes the law firm Parker McCay to request an adjudicatory before the NRC to challenge SMC's decommissioning plan and to act as trial counsel in that matter on behalf of the Board and the County.

Section 4. All other resolutions, or parts thereof, inconsistent herewith are hereby rescinded and repealed to the extent of any such inconsistency.

Section 5. This Resolution shall take effect immediately upon adoption.

ADOPTED at a regular meeting of the Board of Chosen Freeholders of the County of Gloucester held on Wednesday, December 20, 2009 at Woodbury, New Jersey.

COUNTY OF GLOUCESTER

STEPHEN M. SWEENEY, DIRECTOR

ATTEST:

ROBERT N. DiLELLA, CLERK

Resolution #25-06

A RESOLUTION OPPOSING THE DECOMMISSIONING PLAN FOR SHIELDALLOY METALLURGICAL CORPORATION

WHEREAS, the Shieldalloy Metallurgical Corporation is located at 35 Southwest Boulevard in the Borough of Newfield; and

WHEREAS, the site covers 67.7 acres; and

WHEREAS, a slag pile is situated on the site that contains approximately 76,000 cubic yards of radioactive materials; and

WHEREAS, the Corporation has submitted a Decommissioning Plan for the facility to the United States Nuclear Regulatory Commission; and

WHEREAS, the Decommissioning Plan describes the radiological remedial actions that will be implemented at the site; and

WHEREAS, the Decommissioning Plan proposes actions that include onsite stabilization for the slag pile for a period of 1,000 years; and

WHEREAS, the Plan proposes long term control for the site; and

NOW THEREFORE BE IT RESOLVED by Borough Council of the Borough of Newfield that:

1. The Borough of Newfield is in opposition to the storage of any radioactive materials at the site.

2. The Borough of Newfield requests that the radioactive materials are removed from the site and transported to a USNRC, USEPA, and NJDEP approved waste disposal facility.

3. To ensure the safety of the Borough's residents, the Borough requests that USNRC, USEPA and NJDEP conduct the necessary air, groundwater, surface water and soil sampling.

3. The Borough further requests that all correspondence and reports regarding Shieldalloy are submitted to Mayor and Council in a timely manner.

Richard Westergaard, Mayor

ATTEST:

Toni L. Van Camp, Clerk/Administrator

I, Toni L. Van Camp, did hereby certify that the foregoing is a true and accurate copy of a resolution duly adopted by Borough Council at a meeting held February 14, 2006.

Clerk/Administrator

EXHIBIT J

01/08/2010 12:19 FAX 8566973014 NEWFIELD BOROUGH 002/002

CITY OF VINELAND, NJ

RESOLUTION NO. 2006-77

A RESOLUTION OPPOSING THE DECOMMISSIONING PLAN FOR SHIELDALLOY METALLURGICAL CORPORATION.

WHEREAS, the Shieldalloy Metallurgical Corporation is located at 35 Southwest Boulevard in the Borough of Newfield; and

WHEREAS, the site covers 67.7 acres; and

WHEREAS, a slag pile is situated on the site that contains approximately 76,000 cubic yards of radioactive materials; and

WHEREAS, the Corporation has submitted a Decommissioning Plan for the facility to the United States Nuclear Regulatory Commission; and

WHEREAS, the Decommissioning Plan describes the radiological remedial actions that will be implemented at the site; and

WHEREAS, the Decommissioning Plan proposes actions that include onsite stabilization for the slag pile for a period of 1,000 years; and

WHEREAS, the Plan proposes long term control for the site; and

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Vineland that:

1. The City of Vineland is in opposition to the storage of any radioactive materials at the site.

2. The City of Vineland requests that the radioactive materials are removed from the site and transported to a USNRC, USEPA, and NJDEP approved waste disposal facility.

3. To ensure the safety of the City's residents, the City requests that USNRC, USEPA and NJDEP conduct the necessary air, groundwater, surface water and soil sampling.

4. The City further requests that all correspondence and reports regarding Shieldalloy are submitted to Mayor and Council in a timely manner.

Adopted: February 28, 2006

President of Council jb

ATTEST:

City Clerk kp

CERTIFICATION

I, Keith Petrosky, RMC, Municipal Clerk of the City of Vineland, Cumberland County, New Jersey, do hereby certify that the foregoing Resolution is a true and correct copy of a Resolution adopted by the Council of the City of Vineland, at a meeting conducted on February 28, 2006, at City Hall, Vineland, New Jersey.

(SEAL)

Keith Petrosky, RMC

EXHIBIT K

TOWNSHIP OF UPPER DEERFIELD

RESOLUTION 06-210

A RESOLUTION OPPOSING THE DECOMMISSIONING PLAN FOR SHIELDALLOY METALLURGICAL CORPORATION

WHEREAS, the Shieldalloy Metallurgical Corporation is located at 35 Southwest Boulevard in the Borough of Newfield; and

WHEREAS, the site covers 67.7 acres; and

WHEREAS, a slag pile is situated on the site that contains approximately 76,000 cubic yards of radioactive materials; and

WHEREAS, the Corporation has submitted a Decommissioning Plan for the facility to the United States Nuclear Regulatory Commission; and

WHEREAS, the Decommissioning Plan describes the radiological remedial actions that will be implemented at the site; and

WHEREAS, as the Decommissioning Plan proposes actions that include onsite stabilization for the slag pile for a period of 1,000 years; and

WHEREAS, the Plan proposes long term control for the site; and

WHEREAS, the Borough of Newfield is in opposition to the storage of any radioactive materials at the site; and

NOW, THEREFORE, BE IT RESOLVED by the Township Committee of the Township of Upper Deerfield that The Township of Upper Deerfield is in opposition to the storage of any radioactive materials at the site; and

BE IT FURTHER RESOLVED THAT The Township of Upper Deerfield requests that the radioactive materials be removed from the site and transported to a USNRC, USEPA, and NJDEP approved waste disposal facility; and

BE IT FURTHER RESOLVED THAT to ensure the safety of Newfield Borough and Cumberland County residents, the Township of Upper Deerfield request that USNRC, USEPA and NJDEP conduct the necessary air, groundwater, surface water and soil sampling and that all correspondence and reports regarding Shieldalloy are submitted to Newfield Borough and neighboring communities.

ATTEST:

Roy Spoltore

Roy J. Spoltore, Township Clerk

TOWNSHIP OF UPPER DEERFIELD

BY: C. Kenneth Hill

C. Kenneth Hill, Chairperson/Mayor

EXHIBIT L

Moved By: Doug Rainear

Seconded By: Jim Crilley

VOTING	In Favor	Against	Abstain	Absent
Ralph A. Cocove	X			
James Crilley	X			
C. Kenneth Hill	X			
George E. Joyce, Jr.	X			
Douglas M. Rainear	X			

CERTIFICATION

I hereby certify that the foregoing is a true copy of Resolution adopted by the Township Committee of the Township of Upper Deerfield, in the County of Cumberland, at a meeting thereof held December 21, 2006

Roy J. Spoltore, Township Clerk

DECEIVED
DEC 3 1992

State of New Jersey
Department of Environmental Protection and Energy
Division of Environmental Safety, Health and Analytical Programs
CN 415
Trenton, NJ 08625-0415

Scott A. Weiner
Commissioner

Gerald P. Nicholls, Ph.D.
Director

December 1, 1992

M E M O R A N D U M

To: Donna Gaffigan, Case Manager
Bureau of Federal/State Case Management

Through: Robert Stern, Ph.D., Chief
Bureau of Environmental Radiation Bob S.

From: Nancy Stanley, NMS Radiation Physicist 2
Bureau of Environmental Radiation

Subject: Comments on the "Assessment of Environmental Radiological Conditions at the Newfield Facility"

The Bureau of Environmental Radiation (BER) has completed a review of the Assessment of Environmental Radiological Conditions at the Newfield Facility of the Shieldalloy Metallurgical Corporation (SMC) dated April 9, 1992, performed by ENSR Consulting and Engineering and prepared by IT Corporation/Nuclear Sciences. Comments are provided below in both a page-specific and generalized format.

SECTION 3.0, METHODOLOGY

1. <u>Page 3-2, third paragraph.</u>

No soil samples were collected east of the slag piles or to the west of the plant. Sampling in the vicinity of areas known to be contaminated is not sufficient to fully determine the extent of contamination. A complete characterization of this site cannot be performed unless the entire site is sampled in a more representative manner. Additionally, it must be explained why there were 30 soil samples taken in a pre-determined background area when the purpose of this characterization was to identify possible contaminated areas. Background has already been established via separate sampling (Appendix F).

EXHIBIT M

2. Page 3-3, second paragraph

The screening levels for gross alpha and gross beta, respectively, are 5 pCi/L and 15 pCi/L (40 CFR 141), not 15 and 50 as stated (these are maximum contaminant levels; MCL's).

3. Page 3-5, last paragraph

A more comprehensive discussion of the specific methodologies employed by the subcontractor is needed.

SECTION 5.0, SUMMARY

4. Page 5-1, second paragraph

10 CFR 20 states that for an unrestricted area, no individual may receive a dose in excess of 100 millirem in any seven consecutive days. No indication is made in this passage as to how the particular figures presented were determined. They are not presented as a dose, but as an exposure rate. SMC cannot be considered in compliance with this regulation until it can be shown that this condition has been met.

5. Page 5-1, third paragraph

It is indicated that the elevated walkover survey results are caused by shine due to the presence of the slag piles as opposed to any soil contamination. This cannot be substantiated without any soil sampling in the area.

6. Page 5-2, first and second paragraphs

No mention is made of the numerous high levels of radium-226 in both the water and soil/sediment samples in the Hudson Branch. A majority of the results for the soil/sediment samples exceed the 5 pCi/g limit set by 40 CFR 192. Additionally, no distinction is made as to which isotope of radium the 33.1 pCi/L value is for. No discussion of background values for surface waters is presented in this document, yet it is stated that the values obtained during this study do not differ significantly from them. Also, the values of 15 pCi/L alpha and 50 pCi/L beta activity are maximum contaminant levels, not background levels, and do not take into account any contribution from uranium. Additionally, no mention is made of any of the water samples which exceeded both of these limits (grid location 0+60L, for example, from Appendix K).

APPENDICES

7. Appendix B

It would be helpful to show the equation obtained for the regression here.

8. Appendix E

This map indicates the sporadic nature of the soil sampling. These locations are not sufficient to truly characterize this site. No samples are taken in areas shown previously to be contaminated (ORAU 1988). For example, there is no sampling near South Haul Road, where gamma exposure rates are elevated (Appendices G and H). Without soil sampling in this area, it cannot be determined what is causing the elevated readings. The investigation of South Haul Road is mentioned as an objective of this study.

9. Appendix G

There are no data for areas along the northern fenceline which has been shown to be contaminated (ORAU 1988).

10. Appendix H

Map 1 eliminates the use of the 30 uR/hr contour line "for clarity". This eliminates all of the higher readings creating the impression that there is no exposure rate above this. Map 3, Haul Road exposure rates, shows readings all above established background rates. There is no discussion of this in the text of the report. Map 4 of the Hudson's Branch indicates a single anomalous reading. No explanation or discussion of this measurement is given in the text.

11. Appendix J

Elevated fenceline gamma exposure rates are indicated along the northern fenceline. This is a further indication that more soil sampling must be performed in this area.

12. Appendix K

There are several issues relating to the presentation of the data in this Appendix as well as the data itself which must be addressed.

a. The data for soil, sediment and water samples would be best presented separately, for clarity, as opposed to being presented only by grid location.

b. It is stated in the text of the report that all water samples were to have been analyzed for both suspended and dissolved alpha and beta. This data does not appear to be included. If it is here, it is not indicated as such.

c. As stated above, it is not indicated which water data, suspended, dissolved or otherwise, is presented. This must be added.

d. No distinction is made between a QC and duplicate sample. An explanation of each type of sample must be given.

e. There are no reported uncertainties associated with this data. At a minimum, the error associated with the counting of the sample must be reported with an indication as to the level of confidence.

f. What little QC data exists is insufficient. There are no reported blank or spike samples for any of the analyses. If these were performed, the results must be supplied.

g. For the soil and sediment samples, presumably analyzed by gamma spectroscopy, there was no consistency as to the nuclides reported. All soil and sediment samples were to be analyzed for the same nuclides. These gaps in the data must be filled or explained.

h. There is no indication or description of which methods were utilized for these analyses. This is also true for the remainder of the report. It is not sufficient to refer the reader to previous reports for this information.

i. Where there are duplicate measurements made, the analyses reported are not the same for the two samples. In the case of grid location EE47, the duplicate measurement does not include U-238, Th-232 or Ra-226.

j. Explanations must be provided in instances where there is missing data (grid location DD41 soil, as an example).

k. The sample at grid location A33 is designated a water while the QC sample at the same location is designated a soil. An explanation for this is needed.

l. Settling pond data is given in this appendix but there is no discussion of the results.

m. Sample collection and analysis dates must be provided for all samples.

n. There is no indication of whether the soil and sediment samples were sealed for 21 days prior to analysis in order to reach secular equilibrium. This must be noted.

13. <u>Appendix N</u>

It is evident from looking at this presentation of the data that Hudson's Branch is contaminated with radium-226 (values above 5 pCi/g as per 40 CFR 192). A discussion of these results must be made and the problem addressed.

GENERAL COMMENTS

Overall, the organization of this presentation was poor. There are many questions which remain unanswered concerning contamination at this site. The data was offered in such a way as to present an incomplete picture of the site. The overall objective of this study, as per the workplan, was to determine the location and extent of contamination. This was barely addressed in the text of the report.

There are numerous problems with the actual data as it is presented here. These items are discussed under the page-specific comments made previously, but in general the overall presentation of the results is inadequate. It appears as though very little QC was performed, leading to the question of whether the data is actually valid. Additionally, there is very little discussion of the results and how they relate to the established objectives of the characterization.

If the objective was indeed to characterize this site and determine potential areas of contamination, the way in which sampling was performed did not begin to address this. Some areas which had previously been determined to be contaminated (the 1988 ORAU study), such as portions along the northern fenceline, were not even sampled. Other regions not adequately sampled, if at all, include the western and eastern fencelines. It is impossible to assess the extent of contamination without investigating all possible effected areas in and around the site. A reliable characterization must include much more rigorous sampling and analysis. The area in the vicinity of South Haul Road as well as those fenceline areas listed above must be sampled before this investigation can be considered complete.

An additional task stated at the beginning of this report was to determine the fenceline exposure rate. This was reported as a maximum of 0.13 milliR/hour (22 milliR in seven days). The report goes on to state that SMC is therefore not in excess of the limits set forth in 10 CFR 20. An exposure rate is being compared to a dose rate, which is not appropriate. As specifically outlined in 10 CFR 20, the radiation level not to be exceeded for an individual in an unrestricted area is 100 millirem over seven consecutive days. This limit is in millirem, which is a unit of dose, while the values presented in the report are in units of exposure, microR. It must be shown through calculation of absorbed dose (accounting for all radiations present) that they are in compliance.

Supplemental to this discussion, it should be noted that numerous references are made to the Quality Assurance Plan for this project (listed under the section of the report entitled "References"). The DEPE has yet to receive a copy of this document and as such cannot determine whether or not this plan was followed or if it was sufficient to address the objectives of this study.

Additionally, in April of 1991, comments to the final ENSR workplan (dated March 1991) for this assessment were submitted by the BER. To date, none of the recommendations set forth in this memo (attached) have been implemented. In brief, the majority of the recommendations made by the BER in the April memo dealt with the characterization of the slag and lime piles stored on site, investigation of the ferrovanadium slag and addition of several nuclides to the list of isotopic analyses performed. Without implementation of these recommendations to constitute a more thorough plan, it cannot be agreed that this characterization is complete.

c. Fred Sickels, BER

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Andrew D. Reese
Deputy Attorney General
(609) 292-1509

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	DECLARATION OF MICHAEL A. MALUSIS

DECLARATION OF MICHAEL A. MALUSIS

Under the penalty of perjury, I, MICHAEL A. MALUSIS, hereby declare:

The attached assessment regarding the long-term technical viability of the proposed on-site consolidation and capping of radioactive waste at the Shieldalloy Metallurgical Corporation (SMC) facility, Newfield, NJ is true and accurate. The attached Curriculum Vitae is also true and accurate.

DATE: 1/15/07

Michael A. Malusis

Michael A. Malusis, Ph.D.,
Consulting Geotechnical and Geoenvironmental Engineer

15 Hawthorne Drive
Lewisburg, PA 17837
(570) 412-2069 Fax (570) 577-3415

January 15, 2007

Kenneth W. Elwell, Senior Deputy Attorney General
State of New Jersey
Office of the Attorney General
Department of Law and Public Safety
Division of Law
25 Market Street
PO Box 093
Trenton, NJ 08625-0093

Subject: Technical Assessment of proposed on-site consolidation and capping of radioactive waste at the Shieldalloy Metallurgical Corporation (SMC) facility, Newfield, NJ

Dear Mr. Elwell:

I am pleased to provide the following assessment to the State of New Jersey (the State) regarding the long-term technical viability of the proposed on-site consolidation and capping of radioactive waste at the Shieldalloy Metallurgical Corporation (SMC) facility, Newfield, NJ. This assessment was conducted in accordance with the signed Scope of Services.

1.0 INTRODUCTION

The assessment provided herein has been developed based upon my review of relevant documents provided by the State. These documents include the following:

(1) *SMC Decommissioning Plan for the Newfield Facility,* Rev. 1a, Section 5, "Dose Modeling Evaluations" (55 pages);

(2) *SMC Decommissioning Plan for the Newfield Facility,* Rev. 1, Appendix 19.4, "Distribution Coefficients and Leachability" (7 pages);

(3) *June 30, 2006 Letter from SMC to the U.S. Nuclear Regulatory Commission, re: "Follow-up to the March 9, 2006 Meeting and Response to USNRC Letter of January 26, 2006" and accompanying Attachment 1 (13 pages);*

(4) *June 30, 2006 Letter from SMC to the U.S. Nuclear Regulatory Commission,* Appendix D, "Groundwater Modeling Memo" (11 pages);

(5) *SMC Decommissioning Plan for the Newfield Facility,* Rev. 1a, Table 17.5, "Partition Coefficients" (1 page);

(6) March 2, 1987 laboratory report submitted by Century Laboratories, Inc. to SMC (Report No. F0358), re: EP Toxicity test results for 16 slag samples (19 pages);

(7) *June 30, 2006 Letter from SMC to the U.S. Nuclear Regulatory Commission,* Appendix F, "Revised Chapter 8 Sections" (3 pages);

(8) *SMC Decommissioning Plan for the Newfield Facility,* Rev. 1, Figures 18.2, 18.6, 18.7, and 18.8 (4 pages);

(9) *SMC Decommissioning Plan for the Newfield Facility,* Rev. 1, Appendix 19.9, "Environmental Report", Sections 1 (13 pages), 3.3 (8 pages), and 3.4.1.2 (~4 pages); and

(10) TRC Environmental Corporation (2006). *Engineered Barrier Design Calculations.* TRC Project No. 26770-0100, June 2006.

In addition, the following documents were consulted to support this assessment:

(11) U.S. EPA (1989). *Stabilization/Solidification of CERCLA and RCRA Wastes: Physical Tests, Chemical Testing Procedures, Technology Screening, and Field Activities.* EPA/625/6-89/022, Cincinnati, OH;

(12) U.S. EPA (1992). *Technical Resource Document: Batch-Type Procedures for Estimating Soil Adsorption of Chemicals.* EPA/530-SW-87-006-F, Washington, D.C;

(13) ASTM (1993). Standard Test Method for Distribution Ratios by the Short-Term Batch Method, *ASTM D4319-93*, American Society for Testing and Materials, Philadelphia, PA;

(14) Holtz, R.D. and Kovacs, W.D. (1981). An Introduction to Geotechnical Engineering. Prentice-Hall, Upper Saddle River, NJ, 733 p.;

(15) Sharma, H.D. and Lewis, S.P. (1994). Waste Containment Systems, Waste Stabilization, and Landfills. John Wiley and Sons, New York, NY, 588 p.;

(16) SC&A, Inc. (1999). Special Five-Year Review Report for Denver Radium Site, S.W. Shattuck Chemical Operable Unit #8, City and County of Denver, State of Colorado. Web link: ftp://ftp.epa.gov/r8/shattuck/Special5YrReviewOU8Only.pdf;

(17) Koerner, R.M. (1999). Designing with Geosynthetics. 4th Ed., Prentice-Hall, Upper Saddle River, NJ, 761 p.;

(18) Waugh, W.J. (2001). Uranium Mill Tailings Covers: Evaluating Long-Term Performance. *Proceedings, 2001 International Containment and Remediation Technology Conference*, Orlando, FL, Jun. 10-13, Florida State University, Talahassee, FL, http://www.containment.fsu.edu/cd/content/pdf/244.pdf; and

(19) Waugh, W.J. (2004). Design, Performance, and Sustainability of Engineered Covers for Uranium Mill Tailings. *Workshop Summary Report, Joint Workshop on Long-Term Monitoring of Metals and Radionuclides in the Subsurface: Strategies, Tools, and Case Studies*. http://www.cistems.fsu.edu/PDF/waugh.pdf.

All of the documents listed above are cited by number within the text (italicized and in boldface), where appropriate.

Due to the limited time available to perform this review and the disorganized, piecemeal nature of the latest version of the Decommissioning Plan (i.e., some portions are Rev. 1, other portions are Rev. 1a, and some of the Rev. 1 sections have not been updated to reflect changes made in Rev. 1a), it is possible that some key information in the documents has been overlooked. In addition, it is possible that relevant documents other than those listed above may contain information that would influence the outcome of this assessment. Therefore, I reserve the right to modify the opinions rendered herein upon identification of such information. My review and subsequent assessment was focused on the geotechnical and environmental aspects of the proposed cover system, waste materials, and underlying strata within the proposed consolidation area footprint based solely on consideration of the documentation above. No independent geotechnical, hydrologic, or contaminant fate and transport calculations or modeling were performed as part of this assessment.

2.0 TECHNICAL ASSESSMENT

As stated above, this assessment is focused on the long-term geotechnical and environmental performance of the proposed on-site consolidation/capping remedy for the Newfield facility. In summary, this proposed remedy includes the consolidation of all residual radioactive materials (~50,000 m^3 of coarse slag and fine baghouse dust) and additional debris (~15,000 m^3) within the existing Storage Yard at the Newfield facility and construction of a soil cover over the consolidated materials. Radionuclides of concern within the radioactive waste include isotopes of radium (Ra-226 and Ra-228), uranium (U-238 and U-234), and thorium (Th-228, Th-230, and Th-232) ***(2)***.

Upon review of information contained in the documents listed above and consideration of this information in context with the proposed remedial action, I have several concerns regarding the viability of the consolidation/capping approach for long-term protection of human health and the environment. These concerns primarily are related to three general aspects: (1) the location of the proposed consolidation area and the properties of the underlying soils; (2) the chemical properties and leaching behavior of the waste materials, and (3) design, construction, and performance considerations for the soil cover. Specific concerns regarding each of these three aspects are identified below.

2.1 Location and Soil Conditions

According to Rev. 1 of the Decommissioning Plan ***(8)***, the proposed consolidation area covers approximately 3.6 acres within the existing Storage Yard on the eastern side of the Newfield facility. The consolidation area is underlain by a relatively thin vadose (unsaturated) zone consisting of approximately 2.5 meters (~8 feet) of native fine to coarse sand and gravel deposits, followed by a saturated zone layer consisting primarily of coarse sand with little to trace silt ***(1)***. The hydraulic conductivity of the native vadose zone material is estimated at 0.017 m/yr (5.4×10^{-8} cm/s) ***(1)***. This reported value is a gross underestimate, i.e., the value is representative of a clay-rich soil and is not remotely representative of a relatively clean sand/gravel layer. The true hydraulic conductivity of this layer likely ranges between 10^{-1} and 10^{-3} cm/s based on the reported texture ***(14)***. As a result, water that infiltrates through the waste material will also infiltrate easily through the vadose zone and into the underlying saturated zone, carrying those contaminants that leach from the waste mass. The hydraulic conductivity of the saturated zone is estimated at 16,000 m/yr (i.e., 0.05 cm/s) ***(1)***, consistent with that expected for a coarse sand aquifer. These hydraulic properties, in addition to the relatively thin vadose zone layer and the absence of an engineered liner system beneath the waste, are not favorable for long-term protection of the groundwater pathway.

In addition to the above, it appears that the current justification for the proposed remedy relies upon the ability of the vadose zone and saturated zone soils to provide attenuation (i.e., adsorption) of the contaminants of concern. For example, the distribution coefficients (K_d) assigned to the vadose zone and saturated zone layers are the same as those assigned to the waste material itself ***(5)***. Thus, the soils underlying the waste are assumed to hold the contaminants to the same extent as the waste material. However, no sorption tests apparently have been performed to verify that the underlying soil formations exhibit adsorption capacity for the contaminants of concern. Moreover, the underlying soils consist primarily of sand, gravel, and little to trace silt. There is no mention of any clay within these soils, other than the occasional, discontinuous clay lenses in the lower portion of the Cohansey Sand formation ***(9)***. As a result, the vadose zone and saturated zone materials are largely inert (i.e., do not participate in ion exchange reactions) and may provide little, if any, attenuation of inorganic contaminants (both radioactive and non-radioactive species) that leach from the waste mass. In this case, K_d would be close to zero. The importance of this consideration, at least in the saturated zone, is shown in the groundwater modeling study performed by TRC Consultants in November 2005, in which the authors note that the model results are highly sensitive to decreases in the distribution coefficient ***(4)***. For example, the K_d value assigned to the saturated zone for Ra-226 in the MODFLOW model was 48, a value similar to the value assigned to the contaminated zone, unsaturated zone, and saturated zone in the RESRAD model (i.e., K_d = 53) ***(5)***. The simulated maximum concentration of Ra-226 and associated annual dose at an adjacent water supply well at year 1,000 were estimated at 3.43 pCi/L and 1.87 mrem/yr, respectively. However, reduction of the saturated zone K_d by 50 % resulted in nearly an order-of-magnitude increase in the maximum dose (i.e., 17.10 mrem/yr). Thus, the potential lack of attenuation capacity within the soils underlying the consolidation area has significant implications with regard to the adequacy of the proposed remedy for long-term protectiveness of the groundwater pathway.

According to the Decommissioning Plan ***(1)***, exclusion of the groundwater pathway is justified on the basis that the groundwater beneath the site is "not a potable water supply", and that the groundwater would not be utilized for drinking in the future because "a source of municipal water is readily available." However, these lines of reasoning do not represent a long-term viewpoint with regard to groundwater protection. The Newfield/Vineland area is relatively populated and is likely to become considerably more populated over the next 1,000 years and beyond. Given that the half-lives of most of the radionuclides of concern within the waste are on the order of thousands to billions of years, these assumptions regarding potability of the groundwater and use of the groundwater as a drinking supply may be valid in the short-term but are speculative for the duration over which the remedy will need to remain protective. In addition, my understanding is that significant efforts are ongoing to remediate the existing groundwater contamination to below federal drinking water standards.

Finally, according to the Environmental Report ***(9)***, a surface water feature (i.e., the Hudson Branch) originates just to the east of the Newfield facility and is fed by groundwater discharge in times of no or low precipitation. The Hudson Branch flows through portions of the Newfield facility and subsequently through a combination of undeveloped, residential, and agricultural areas until it joins with the Burnt Mill Branch that feeds the Burnt Mill Pond. Also, according to (9), the Burnt Mill Pond is surrounded by residences and likely is used for recreational purposes (e.g., fishing). There does not appear to be any consideration, at least in the documents reviewed as part of this assessment, regarding the potential for leached contaminants from the waste mass to enter the Hudson Branch and subsequent surface water bodies due to either groundwater discharge or a surface flooding. It is noted that, under a Probable Maximum Flood (PMF) scenario, the peak water surface elevation would be approximately five feet above the southern toe of the waste pile ***(10)***.

2.2 Waste Properties

According to Rev. 1 of the Decommissioning Plan ***(9)***, the proposed remedial action includes "on-site stabilization of the residual radioactivity, followed by long-term control." It should be noted that the term "stabilization" traditionally refers to a waste treatment process designed to reduce leachability of the waste ***(11, 15)***, as has been applied in other on-site radioactive waste disposal remedies *(e.g.,* ***16****)*. No such treatment process is proposed as part of this remedy. Rather, it appears that this proposed remedy places heavy reliance on a limited leachability testing program to demonstrate that "there is marked resistance to leaching" from the waste materials ***(1)***.

To the best of my knowledge based on the information provided, the only tests performed to date to evaluate the leachability of waste materials representative of those that remain on site include the following:

- two EP Toxicity tests performed in 1987 on samples of ferrocolumbium slag to evaluate leaching of non-radioactive metal species ***(6)***;
- one Toxicity Characteristic Leaching Procedure (TCLP) test performed on the slag to evaluate leaching of the radium, uranium, and thorium isotopes ***(2)***;
- two TCLP tests performed on samples of the baghouse dust to evaluate leaching of the radium, uranium, and thorium isotopes ***(2)***; and

- three short-term batch tests (reportedly performed in accordance with ***13***) on slag samples to determine distribution coefficients (K_d) for the radium, uranium, and thorium isotopes ***(2)***.

In each of the TCLP tests, the combined concentration of leached radium isotopes (i.e., Ra-226 and Ra-228 combined) easily exceeded the Maximum Contaminant Level (MCL) of 5 pCi/L established in the National Primary Drinking Water Regulations (see www.epa.gov/safewater/ contaminants/index.html). The combined radium concentration in the leachant from the TCLP test on the slag was 6,660 pCi/L (more than 1,000 times the MCL), and the combined radium concentrations in the leachant from the two TCLP tests on the baghouse dust were 32.6 pCi/L and 19.39 pCi/L ***(2)***. In addition, the EP Toxicity tests performed on the ferrocolumbium slag samples in 1987 indicate that the slag releases barium (Ba) at concentrations in excess of the drinking water MCL of 2 mg/L. Leached Ba concentrations from the two slag samples were 14 and 23 mg/L ***(6)***. While it is acknowledged that the population would not be directly exposed to undiluted leachate, the above results cause concern regarding potential degradation of the groundwater due to release of contaminants from the waste.

There are some significant overall limitations associated with the leaching tests that also warrant consideration. First, the testing is not comprehensive. For example, no tests appear to have been conducted on the baghouse dust to evaluate the potential for leaching of non-radioactive contaminants (e.g., heavy metals). Considering that the baghouse dust represents approximately 20 % of the radioactive waste volume to be disposed, the lack of characterization of this material is noteworthy. Second, the number of leaching tests performed is insufficient to assess potential variability in the leaching behavior of the waste materials and establish statistical confidence that the test results are representative of the waste mass as a whole. Third, the leached concentrations reported in ***(2)*** and ***(6)*** may not represent equilibrium conditions. The standard test durations for the TCLP and EP Toxicity tests are 18 and 24 hours, respectively ***(15)***. No demonstration apparently has been performed to verify that these testing durations are sufficient to allow equilibrium conditions to be established between the liquid and solid phases (i.e., to allow the leaching process to reach completion). Longer extraction times would result in higher leached concentrations if equilibrium had not been established in these tests. Finally, tests such as the TCLP and EP Toxicity tests are single extraction tests and, alone, may not provide an accurate representation of long-term leaching behavior ***(11, 15)***.

Regarding test duration, a similar concern exists for the short-term batch tests used to determine K_d values for the waste mass. According to ***(2)***, the K_d tests were performed in accordance with ASTM D4319 ***(13)***. This test method, in actuality, is designed to yield the distribution ratio, R_d, of a contaminant between the liquid and a solid phases. While K_d and R_d both represent the ratio between the concentration of a contaminant sorbed onto the solid phase to the concentration of the contaminant in solution, K_d reflects the specific case in which equilibrium has been achieved between the liquid and solid phases and is valid only for ion exchange-adsoprtion reactions. In order to apply R_d to field situations, the assumption that $K_d = R_d$ is necessary ***(13)***. However, the test method specifically states, "This is a short-term test and the attainment of equilibrium in this test is not presumed, although this may be so for certain systems (for example, strictly interlayer ionic exchange reactions of clays" ***(13)***. The cited condition regarding ion exchange reactions in clays is not applicable to the slag and baghouse dust. Ion exchange reactions are probably not responsible for the release of contaminants from the waste, because the occurrence of such reactions implicitly requires that the waste materials are negatively charged and, thus, exhibit cation exchange capacity. There are no indications that this is the case. If equilibrium conditions were not achieved, then the values of K_d used in the RESRAD model are actually R_d values that are higher than true K_d values (i.e., unconservative overestimates of the true K_d values). Also, since none of the specific testing details (e.g., contact times, extractant fluid used in the tests, and environmental conditions such as pH, temperature, redox potential, and specific conductance) were reported in ***(2)***, any further assessment of the validity of the tests results is not possible. The reported K_d values should be treated with caution.

Additional note: Although ASTM D4319 was cited as the test method used to determine the reported values ***(2)***, the test procedure is actually an adsorption test procedure (i.e., the contaminants are introduced in the liquid phase and partition to the solid phase) and not a leaching test procedure. Further explanation is necessary regarding how these tests were actually performed.

2.3 Cover System

According to Section 5 of the Decommissioning Plan ***(1)***, the soil cover will consist of "a thick layer of unimpacted native soil, topsoil, rock, and vegetation brought onto the site." My understanding is that the plan now includes only a 1-m thick soil layer and an overlying 3-inch to 6-inch layer of crushed stone ***(8)*** to address long-term erosion concerns ***(7)***. Revision 1 of the plan also included a geomembrane beneath the soil layer. However, although inclusion of a geomembrane is still mentioned in various portions of the documentation reviewed as part of this assessment, the geomembrane apparently has been removed from the plan because "the geomembrane was deemed unessential" ***(3)***. The proposed cover is to be constructed with 3:1 (H:V) side slopes and a top surface slope of 4 % ***(8)***.

Section 5 ***(1)*** also states that the groundwater exposure pathway can be excluded, in part because the cover "is designed to prevent rainwater infiltration into the consolidated material." This statement does not appear to have been justified to any reasonable extent. For example, a considerable amount of analysis has been performed to demonstrate that the crushed rock surface will provide long-term protection against erosive forces ***(10)***. However, erosion protection is not sufficient to prevent infiltration and subsequent release of contaminants into the subsurface. The plan currently appears to be devoid of consideration regarding the hydraulic performance of the cover. No specifications have been provided for the index properties (i.e., grain size distribution, Atterberg limits, activity, etc.) and hydraulic conductivity of the soil layer, no evaluation of candidate borrow sources has been documented, and no specifications for placement of the soil layer are included. In addition, no justification is provided for the use of a surface runoff coefficient as high as 0.8 (i.e., 80 % of the precipitation runs off) ***(1)*** or an evapotranspiration rate of 24 inches per year ***(1)*** for a cover with a crushed rock surface and no vegetation. Surface runoff likely will be a negligible component of the water balance for this cover (although some lateral subsurface drainage may occur at the interface between the rock and soil layer along the side slopes, depending on the cover soil properties), and transpiration by plants will be nil.

In addition to the above, other considerations such as slope stability, soil development, and root intrusion do not appear to have been considered in this plan. Slope stability is a potential concern in the short- and long-term due to the proposed 3:1 side slopes, the lack of information provided regarding the cover soil requirements and the potential for at least a portion of the cover to be inundated based on the PMF scenario ***(10)***. Soil development and root intrusion have been shown to be problematic in UMTCRA-type covers such as that proposed in this plan (e.g., see ***18, 19***) and have the potential to cause an increase in hydraulic conductivity of a soil cover by several orders of magnitude over the long term ***(19)***. According to ***(19)***, long-term hydrologic isolation of buried wastes at arid and semi-arid sites is favorable because the relatively low precipitation, high potential evapotranspiration, and thick unsaturated soils reduce the reliance on a low hydraulic conductivity. These characteristics of semi-arid and arid sites clearly are not applicable to southern New Jersey, in general, and the Newfield site, in particular.

3.0 CONCLUSIONS AND RECOMMENDATIONS

In summary, my review of the proposed on-site consolidation, capping, and long-term disposal of residual wastes at the SMC Newfield facility indicates that there are several limitations associated with the current plan, and these limitations may have serious implications regarding the long-term protectiveness of this approach. The identified limitations include:

- climate and subsurface soil conditions that are not favorable for long-term isolation of the waste and protection of the groundwater exposure pathway;
- gross underestimation of the hydraulic conductivity of the vadose zone;
- uncertainty regarding the attenuation capacity of the subsurface soils for the contaminants of concern;
- absence of an engineered lining system under the waste mass;
- potential for contaminant migration into surface water as a result of groundwater discharge or flooding scenarios;
- potential future use of the local groundwater as a drinking water supply, considering adjacent development, future growth, and current groundwater remediation activities;
- leached concentrations of contaminants from the waste that exceed federal drinking water standards;
- lack of chemical analysis for non-radionuclides in the baghouse dust;

- multiple uncertainties and limitations related to the leachability testing program (i.e., the low number of tests performed, short test durations, and applicability of the test results for representing long-term leaching behavior);

- uncertainty regarding the validity of the distribution coefficient (K_d) values reported for the waste materials;

- lack of consideration of multiple aspects of the cover system pertaining to long-term hydrologic (infiltration) performance (e.g., material requirements, borrow evaluation, construction requirements;

- potential for the hydrologic performance of the cover to be compromised in the long term due to issues such as pedogenesis and invasion by deep-rooted vegetation.

I recommend that each of these issues be given serious consideration when evaluating the potential long-term effectiveness of this remedy. The proposed on-site consolidation/capping approach bears some resemblance to the S.W. Shattuck remedy in Denver, Colorado that was challenged in an EPA five-year review ***(16)*** for similar issues as those raised herein (e.g., vulnerability of the cover to long-term degradation, potentially inadequate protection of groundwater). The Shattuck waste ultimately was removed and disposed off site. The proposed remedy for this site perhaps should be evaluated in context with the outcome at the Shattuck site.

I appreciate the opportunity to provide these services to the State and look forward to discussing this assessment with you. If you have any questions regarding this report, please contact me at (570) 412-2069 or mam028@bucknell.edu.

Sincerely,

Michael A. Malusis

Michael A. Malusis, Ph.D., P.E.

cc: Andrew Reese, State of NJ
Jennifer Goodman, State of NJ

Curriculum Vitae For
MICHAEL A. MALUSIS
(latest update: 01/08/2007)

WORK:
Department of Civil and Environmental Engineering
Bucknell University
Lewisburg, PA 17837
Phone: (570) 577-1683
Fax: (570) 577-3415
e-mail: mam028@bucknell.edu

HOME:
15 Hawthorne Drive
Lewisburg, PA 17837
Phone: (570) 522-7092
Cell: (570) 412-2069

EMPLOYMENT:

Bucknell University, Department of Civil and Environmental Engineering, Lewisburg, PA
Assistant Professor (July 2005 – present)

Sentinel Consulting Services, LLC, Englewood, CO
Principal and Senior Engineer/Project Manager (October 2003 – June 2005)

GeoTrans, Inc., Westminster, CO
Senior Engineer/Project Manager (August 2000 – October 2003)

PROFESSIONAL REGISTRATION:

Professional Engineer #37734, Colorado (2003 - present)

EDUCATION:

Ph.D. (Aug. 2001), Civil Engineering, Colorado State University, Fort Collins, CO
Dissertation: *Membrane Behavior and Coupled Solute Transport Through a Geosynthetic Clay Liner*
Advisor: Professor Charles D. Shackelford

M.S. (Aug. 1995), Civil Engineering, Colorado State University, Fort Collins, CO
Thesis: *Stabilization of Metal-Bearing Wastes Using Chain-Structure Clay Admixtures*
Advisor: Professor Charles D. Shackelford

B.S. (summa cum laude, May 1993), Civil Engineering, Bucknell University, Lewisburg, PA
Advisor: Professor Jeffrey C. Evans

TEACHING AND RESEARCH INTERESTS:

Teaching: Undergraduate-level engineering courses, including statics, mechanics of materials, geotechnical, and transportation engineering. Undergraduate elective and/or graduate level geotechnical and geoenvironmental engineering courses with emphasis on waste containment, *in situ* remediation, contaminant transport, soil-liquid interactions, unsaturated flow, and laboratory measurement of geotechnical, hydraulic, and solute transport properties of soil.

Research: Enhanced waste containment barriers; alternative earthen final covers; geo-environmental sustainability.

HONORS AND AWARDS:

- Bucknell University Scholarly Development Grant (Summer 2006)
- Colorado Graduate Fellowship, Colorado State University (annually, 1994-1998)
- President's Award for Distiguished Academic Achievement, Bucknell University (1993)
- Oliver J. Decker Prize, Bucknell University (1993)
- William Bucknell Prize, Bucknell University (1993)
- Christensen Award, Bucknell University (1993)
- Tau Beta Pi National Engineering Honor Society (1992)

TEACHING EXPERIENCE:

Spring 2006: Department of Civil and Environmental Engineering, Bucknell University
Introduction to Transportation Engineering (CENG 330; team-taught with R.G. McGinnis)
Enrollees: 36 Sections: 2 lecture, 2 laboratory Avg. evaluation score: 4.54/5.00

Environmental Geotechnology (CENG 451/651)
Enrollees: 23 Sections: 1 lecture, 1 laboratory Avg. evaluation score: 4.55/5.00

Senior Design Project Team (CENG 491), 3 students
Project Title: *Soil Cover Design for In-Situ Waste Containment at the Rocky Mountain Arsenal Shell Disposal Trenches*

Fall 2005: Department of Civil and Environmental Engineering, Bucknell University
Introduction to Soil Mechanics (CENG 350; W-2 course)
Enrollees: 39 Sections: 1 lecture, 3 laboratory Avg. evaluation score: 4.79/5.00

Summer 2000: Department of Civil Engineering, Colorado State University
Combined Statics and Mechanics of Materials for Non-Engineers (CE358)

Fall 1999: Department of Civil Engineering, Colorado State University
Advanced Soil Mechanics Laboratory (CE655)

Fall 1998: Department of Civil Engineering, Colorado State University
Statics for Non-Engineers (CE256)

Summer 1997: Department of Civil Engineering, Colorado State University
Statics for Engineers (CE260)

Fall 1995: Department of Civil Engineering, Colorado State University
Advanced Soil Mechanics Laboratory (CE655)

Spring 1995: Department of Civil Engineering, Colorado State University
Soil Mechanics Laboratory (CE450)

RESEARCH PROJECTS:

Oct. 2005 – Present: Department of Civil and Environmental Engineering, Bucknell University
Project Title: *COLLABORATIVE RESEARCH: Enhanced Clay Membrane Barriers for Sustainable Waste Containment*
Funding Source: National Science Foundation ($94,598); collaborative proposal between Bucknell University (M. Malusis, PI; J. Evans, Co-PI) and Colorado State University (C. Shackelford, PI)

June 2006 – Present: Department of Civil and Environmental Engineering, Bucknell University
Project Title: *Activated Carbon-Amended Geosynthetic Clay Liners*
Funding Source: none

June 2006 – Present: Department of Civil and Environmental Engineering, Bucknell University
Project Title: *Geomembrane-Clay Nanocomposites for Enhanced Waste Containment*
Funding Source: Bucknell University (Undergraduate Summer Research Award, J. Padgett ['07 CHEG], Summer 2006)

July 2005 – Present: Department of Civil and Environmental Engineering, Bucknell University
Project Title: *Laboratory Investigation of Moisture Retention in Model Soil-Bentonite Slurry Wall Backfills*
Funding Source: Bucknell University (Scholarly Development Proposal, Summer 2006; CEE Department Chiloro Award for Half-Time Summer Research, N. Woodward ['07 CENG], Summer 2006)

July 2005 – Present: Department of Civil and Environmental Engineering, Bucknell University
Project Title: *Membrane Behavior in a Geosynthetic Clay Liner Exposed to Organic Solutes*
Funding Source: Bucknell University (Michael Baker Research Award, J. Scalia ['07 CENG], Summer 2006)

Jan. 1997 – May 2000: Department of Civil Engineering, Colorado State University
Project Title: *Coupled Solute Migration Through Clay Barrier Materials*
Funding Source: National Science Foundation

Jan. 1996 – Dec. 1996: Department of Civil Engineering/Department of Chemical and Bioresources Engineering, Colorado State University
Project Title: *Bioremediation in the Engineering Curriculum: A Module-Based Approach*
Funding Source: National Science Foundation

May 1996 - Aug. 1996: Department of Civil Engineering/Department of Chemical and Bioresources Engineering, Colorado State University
Project Title: *Microbial Transport in Soils*
Funding Source: Camp Dresser and McKee, Inc. (Denver, CO)

Jan. 1995 - Apr. 1995: Department of Civil Engineering, Colorado State University
Project Title: *Alternative Landfill Cover Demonstration*
Funding Source: Sandia National Laboratories (Albuquerque, NM)

Sept. 1993 - Dec. 1994: Department of Civil Engineering, Colorado State University
Project Title: *Use of Floridin Clay Products for Stabilization and Compatibility Applications*
Funding Source: The Floridin Company (Quincy, FL) and the National Science Foundation

ENGINEERING/CONSULTING EXPERIENCE:

- *Michael A. Malusis, Consulting Civil Engineer, Lewisburg, PA (July 2005 – Present)*

  Rocky Mountain Arsenal (RMA), Commerce City, CO - Technical expert representing Colorado Department of Public Health and Environment (CDPHE) in oversight of design and construction of over 400 acres of RCRA-equivalent, alternative earthen final covers (AEFCs) and chemical compatibility testing program for a proposed soil-bentonite cutoff wall utilizing a new salt-resistant bentonite.

- *GeoTrans, Inc./Sentinel Consulting Services, LLC, Denver, CO (August 2000 – June 2005)*

  Selected Projects:
  Canon City Milling Facility, Canon City, CO – Technical expert representing the Colorado Department of Public Health and Environment (CDPHE) in assessment of the regulatory conformance and technical viability of existing waste containment and leak detection systems for primary and secondary radioactive tailings impoundments.

  Rocky Mountain Arsenal (RMA), Commerce City, CO - Technical expert and project manager representing Colorado Department of Public Health and Environment (CDPHE) in oversight of ongoing remedial efforts, including oversight of the design of an enhanced triple-lined hazardous waste landfill and negotiation of full-scale design requirements for over 400 acres of RCRA-equivalent, evapotranspirative covers.

  Confidential Client, Denver, CO – Project manager for geotechnical investigation and design in support of commercial land development. Work included subsurface field investigation and sampling, geotechnical stability analysis, geotechnical testing, foundation design, and AASHTO pavement design.

  Hidden Glenn Landfill, Napa, CA – Geotechnical design analysis, including static and pseudo-static (seismic) slope stability analysis of multi-layer landfill cover system.

  Tri-State Generation and Transmission Association, Westminster, CO – Geotechnical design for a fly ash disposal facility expansion in western Colorado. Work included hydraulic evaluation of subgrade materials within footprint of proposed impoundment and development of a design and operations (D&O) report and permit application for the facility.

  Stanton County Landfill, Johnson City, KS – Combined HELP/Multi-Med infiltration, flow, and contaminant transport analysis for a municipal landfill.

  Battle Mountain Resources, Inc., San Luis, CO – Geotechnical design for water treatment pond at a mine site. Work included field geotechnical testing and construction QA/QC during placement of compacted clay and geomembrane liner.

  Phelps-Dodge, Inc., Hurley, NM – Unstaturated flow modeling effort to estimate generation of acid-rock drainage (ARD) from mine spoils.

  Motive Power, Boise, ID - Field oversight of Fenton's reagent injection for *in situ* treatment of chlorinated hydrocarbons at a locomotive remanufacturing facility.

PUBLICATIONS:

Journals/Special Publications - Refereed

Malusis, M.A. and Scalia, J. (2007). Hydraulic Conductivity of an Activated Carbon-Amended Geosynthetic Clay Liner. ASCE Geotechnical Special Publication (submitted on 7/24/06; currently in review).

Malusis, M.A. and Benson, C.H. (2006). Lysimeters versus Water-Content Sensors for Performance Monitoring of Alternative Earthen Final Covers. *Unsaturated Soils 2006*, ASCE Geotechnical Special Publication No. 147, Vol. 1, 741-752.

Malusis, M.A. and Shackelford, C.D. (2004). Explicit and Implicit Coupling during Solute Transport Through Clay Membrane Barriers. *Journal of Contaminant Hydrology*, 72, 259-285.

Malusis, M. A. and Shackelford, C. D. (2004). Predicting Solute Flux through a Clay Membrane Barrier. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 130(5), 477-487.

Malusis, M.A., Shackelford, C.D., and Olsen, H.W. (2003). Flow and Transport through Clay Membrane Barriers. *Engineering Geology*, 70(3-4), 235-248.

Malusis, M.A. and Shackelford, C.D. (2002). Coupling Effects During Steady-State Solute Diffusion through a Semi-Permeable Clay Membrane. *Environmental Science and Technology*, 36(6), 1312-1319.

Malusis, M.A. and Shackelford, C.D. (2002). Chemico-Osmotic Efficiency of a Geosynthetic Clay Liner. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 128(2), 97-106.

Malusis, M.A. and Shackelford, C.D. (2002). Theory for Reactive Solute Transport through Clay Membrane Barriers. *Journal of Contaminant Hydrology*, 59(3-4), 291-316.

Malusis, M.A., Shackelford, C.D., and Olsen, H.W. (2001). Laboratory Apparatus to Measure Chemico-Osmotic Efficiency Coefficients for Clay Soils. *ASTM Geotechnical Testing Journal*, 24(3), 229-242.

Shackelford, C.D., Malusis, M.A., Majeski, M.J., and Stern, R.T. (1999). Electrical Conductivity Breakthrough Curves. *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE, 125(4), 260-270.

Conference Publications - Refereed

Shackelford, C. D., Malusis, M. A., and Olsen, H. W. (2003). Clay Membrane Behavior for Geoenvironmental Containment, *Soil and Rock America Conference 2003* (Proceedings of the joint 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering and the 39th U. S. Rock Mechanics Symposium), P. J. Culligan, H. H. Einstein, and A. J. Whittle, eds., Verlag Glückauf GMBH, Essen, Germany, Vol. 1, 767-774.

Malusis, M. A., Shackelford, C. D., and Olsen, H. W. (2001). Flow and Transport through Clay Membrane Barriers. *Geoenvironmental Engineering, Geoenvironmental Impact Management, Proceedings of the 3rd BSA Conference on Geoenvironmental Engineering*, Edinburgh, Scotland, September 17-19, 2001, R. N. Yong and H. R. Thomas, eds., Thomas Telford Publ., London, UK, 334-341.

Malusis, M.A. and Shackelford, C.D. (2001). Modeling Contaminant Transport Through Clay Membrane Barriers. *Proceedings, 2001 International Containment and Remediation Technology Conference*, Orlando, FL, Jun. 10-13, Florida State University, Talahassee, FL, 146-149.

Malusis, M.A., Adams, D.J., Reardon, K.F., Shackelford, C.D., Mosteller, D.C., and Bourquin, A.W. (1997). Microbial Transport in a Pilot-Scale Biological Treatment Zone. *Proceedings,* *4th International Symposium on In Situ and On Site Bioremediation*, New Orleans, LA, April 28-May 1, 1997, Vol. 4, pp. 559-564.

Malusis, M.A. and Shackelford, C.D. (1997). Modeling Biodegradation of Organic Pollutants During Transport through Permeable Reactive Bio-Walls. *Proceedings, 1997 International Containment Technology Conference and Exhibition*, St. Petersburg, FL, Feb. 9-12, 1997, pp. 937-944.

Archival Magazines - Refereed

Shackelford, C.D., Malusis, M.A., and Olsen, H.W. (2001). Clay Membrane Barriers for Waste Containment. *Geotechnical News*, 19(2), 39-43.

Book Chapters

(contributing author) Sleep, B.E., Shackelford, C.D., Parker, J.C., et al. (2006). Modeling of Fluid Transport through Barriers. Chapter 2, *Barrier Systems for Environmental Contaminant Containment and Treatment*, C.C. Chien, H.I. Inyang, and L.G. Everett, eds., CRC Press, Boca Raton, FL.

Conferences - Nonrefereed

Shackelford, C. D., and Malusis, M. A. (2002). Clay Membrane Behavior and Coupled Solute Diffusion. *Proceedings, Chemico-Mechanical Coupling in Clays; From Nano-Scale to Engineering Applications*, June 28-30, 2001, Maratea, Italy, Swets and Zeitlinger, Lisse, 289-296.

FORMAL PEER REVIEWS:

Journal and Special Publication Manuscripts

July 2006: Haque, A., Kabir, E., and Bouazza, A. Cyclic filtration apparatus for testing subballast under rail track. Submitted for publication in *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE (Contacted by R. Sharma, Louisiana State University, on 7/9/06; comments submitted on 7/28/06).

July 2006: Spinelli, L.F., Schnaid, F., Selbach, P.A., and Bento, F.M. Biological effects on the structure of soil particles in a soil-gasoline artificially contaminated microcosm. Submitted for publication in *Journal of Geotechnical and Geoenvironmental Engineering*, ASCE (Contacted by R. Sharma, Louisiana State University, on 7/9/06; comments submitted on 7/28/06).

January 2006: Chmiel, G. and Fritz, S.J. Concentration-dependent diffusion in hyperfiltration systems. Submitted for publication in *Geochimica et Cosmochimica Acta* (Contacted by GCA Editorial Office on behalf of Associate Editor Eric Oelkers on 1/03/2006; comments submitted on 2/10/2006).

October 2005: Shafer, D.S.,Young, M.H., Zitzer, S.F., McDonald, E.V., and Caldwell, T.G. Coupled Environmental Processes in the Mohave Desert and Implications for ET Covers as Stable Landforms. Submitted for Publication in *Unsaturated Soils 2006*, Geotechnical Special Publication 147 (Contacted by session editor C.D. Shackelford, Colorado State University; comments submitted on 10/17/2005).

October 2005: Stockdill, D., Jorgenson, R.R., and Obermeyer, J.E. Case History and Regulatory Aspects of a Final Cover Performance Evaluation Involving Conventional and

Evapotranspirative Cover Designs. Submitted for Publication in *Unsaturated Soils 2006*, Geotechnical Special Publication 147 (Contacted by session editor C.D. Shackelford, Colorado State University; comments submitted on 10/14/2005).

July 2004: Neupane, D., Bowders, J.J., Loehr, J.E., and Bouazza, A. Field Performance of an Asphalt Barrier Test Pad. Submitted for Publication in *GeoFrontiers 2005*, Geotechnical Special Publications 130-142 and GRI-18 (Contacted by GeoFrontiers 2005 conference session organizer C.D. Shackelford, Colorado State University; comments submitted on 7/28/2004).

Book Chapters

September 2005: Dominijanni, A. and Manassero, M. Osmosis and Solute Transport Through Geosynthetic Clay Liners. Submission for publication as a chapter in the book entitled *Geosynthetic Clay Liners in Waste Containment Applications*, A. Bouazza and J. Bowders, eds., A.A. Balkema (Taylor Francis) (Contacted by co-editor A. Bouazza, Monash University, Australia; comments submitted on 9/04/2005).

Grant Proposals

February 2006: Hatfield, K., Annable, M.D., and Clark, C.J. Collaborative Florida-Brazilian Investigation of Subsurface Mass Flows. Submitted to National Science Foundation (NSF) Geoenvironmental Engineering and Geohazard Mitigation Division (Contacted by R. Fragaszy, NSF Program Manager; comments submitted on 02/13/06).

PROFESSIONAL AFFILIATIONS:

- Member, ASCE, including the Geo-Institute and the Pennsylvania chapter (2006)
- Member, American Society for Testing and Materials (ASTM)

SERVICE:

University Level

- Faculty member of Board of Review on Academic Responsibility (2006 – present)
- Faculty representative of Composition Council (2006 - present)
- Representative of First-Year Faculty Working Group, Bucknell University (2005 – 2006)
- Representative of CEE Department at Bucknell open houses (2005 – present)

Department Level

- CEE Department Liaison to the Writing Center, Bucknell University (2006 - present)
- CEE Department Library Liaison, Bucknell University (2005 - present)
- CEE Senior Field Trip Chaperone, Bucknell University (2005)

External

- Member, ASTM Committee D18 on Soil and Rock (2005)

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Andrew D. Reese
Deputy Attorney General
(609) 292-1509

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	DECLARATION OF JENNIFER GOODMAN

I, JENNIFER GOODMAN, hereby declare as follows:

1. Attached please find my memo to Donna Gaffigan dated January 16, 2007 and my resume, both of which are true and accurate.

2. I am familiar with NUREG-1757, the first two volumes of which were finalized on October 27, 2006. I am also familiar with the radioactive waste located at the Shieldalloy Metallurgical Corporation (License No. SMB-743) ("Shieldalloy") in Newfield, New Jersey. Some of the radionuclides contained in the radioactive waste at Shieldalloy are thorium-232, which has

a half-life of over 14 billion years, and uranium-238, which has a half-life of over 4 billion years. I am also familiar with the decommissioning plan (Docket No. 04007102) ("DP") submitted by Shieldalloy.

3. NUREG-1757's allowance to model for only 1000 years, regardless of the duration of the radioactive hazard, is not adequate to protect the public health and safety from materials containing long-lived nuclides. For facilities seeking to decommission under the License Termination Rule ("LTR"), 10 C.F.R. Part 20, Subpart E, NRC should require modeling for the length of time that the materials remain a radioactive hazard. The time period of the radioactive hazard relates to the amount of time that the nuclides decay to unrestricted use levels. It is possible that a total effective dose equivalent ("TEDE") of less than 500 mrem/y could occur at 1000 years, but then peak of greater than 500 mrem/y may occur in the time period after 1000 years.

4. NUREG-1757 makes it easier for decommissioning facilities to conduct onsite disposal of radioactive materials containing long-lived nuclides under restricted release. NUREG-1757 makes it easier by providing a LTC license or a LA/RC for sites

containing long-lived nuclides where the Federal or State government is not willing to take ownership or control of the site. Also, NUREG-1757 allows dose assessment modeling for 1000 years, regardless of the duration of the radioactive hazard.

5. I am familiar with SECY-06-0143, in which the NRC Staff discussed the problem of the creation of legacy sites where onsite disposals are approved for facilities that continue to operate under a license. I agree with the NRC Staff that financial assurance is typically underestimated because uncertainties exist regarding the burial performance and potential releases of contamination, transport of contamination in the subsurface environment, cleanup costs of subsurface contamination, and future disposal costs. Such concerns are warranted to a much greater extent for facilities decommissioning under the LTC license or the LA/RC with long-lived nuclides onsite since it is more likely that releases and transport of contamination will occur over the thousands, millions, or billions of years that long-lived nuclides remain a radioactive hazard compared to the limited time frame discussed in SECY-06-0143 regarding onsite disposals. Because it is not unreasonable to assume that sites utilizing onsite disposal of long-lived radionuclides will release contamination and transport contamination in the subsurface environment,

NUREG-1757 is not adequate to protect the public health and safety for long-lived nuclides.

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

DATE: 1/16/07

Jennifer Goodman

Jennifer Goodman

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

Radiation Protection and Release Prevention Programs
Bureau of Environmental Radiation
PO Box 415
Trenton, New Jersey 08625-0415
Phone (609) 984-5405
Fax (609) 984-5595

To: Donna Gaffigan, Case Management
Bureau of Case Management

From: Jenny Goodman, Research Scientist
Bureau of Environmental Radiation

Date: January , 2007

Subject: Shieldalloy Metallurgical Corporation (SMC) Decommissioning Plan, Rev. 1a

I have reviewed the subject document and find it unacceptable. My comments are provided below.

General

The site has not been fully characterized to determine the levels of radioacitvity above background. The soil samples were sporadic and the EPA protocol for further analysis of water samples was not followed properly. The laboratory data was either not present, or had problems, like not meeting the required minimum detectable activities (MDA). For example, there is no indication if soil samples were sealed for 21 days prior to analysis in order to reach secular equilibrium. This could bias all the soil results low. Full characterization of the radiological constituents is necessary to determine if the survey unit classifications in Figure 18.11 are adequate. The survey unit classifications determine the spacing of sampling points in the final status survey. If a survey unit classification is underestimated (Class 2 instead of Class 3), then contamination above the established cleanup levels could be missed.

It is not clear that there has been a correctly performed eligibility determination made in the DP in accordance with 10 CFR 20.1403(a). In its response to comments on NUREG 1757, the NRC states that the NRC would not approve an LTC license option for a site that did not comply with the eligibility requirements in 10 CFR 20.1403(a). This should have been reviewed and accepted as accurate before the NRC continued with the LTC process.

The benefits of unrestricted use versus restricted use should include the Regulatory Costs Avoided (NUREG 1757, Vol. 2, p. N-6). Included in these costs are additional licensing fees to develop an EIS and costs associated with public meetings, to name a few. Because NRC has already held two public meetings and started the EIS process, these costs can not now be avoided. The NRC has violated its own guidance by conducting these meetings and starting the EIS process without first determining if the site complies with the requirements in 10 CFR 20.1403(a). What is the total cost of two years of NRC review of the DP? See more specific comments under Chapter 7.

When references are cited, such as the Draft Feasibility Report for the determination of density and hydraulic conductivity of the slag, the volume and page should also be referenced. This is done throughout the Decommissioning Plan, reports are given as reference, but the details on exactly where the information is located is not included.

Engineered Barrier

A parametric or component sensitivity analysis to identify how much degradation of the engineered barrier would result in non-compliance was not performed as per NUREG 1757 Vol.2, Section 3.5.3.

SMC did not provide natural analogs for the effectiveness of their engineered barrier. NUREG 1757 uses Native American Mounds to demonstrate erosional stability, but states that the ability of the mounds to limit infiltration is unknown. It goes on to state that archaeologists have dated the mounds by excavating bones and artifacts from the mounds and determining the age of the object or the data of its burial. This is a perfect analog for human intervention (excavation) of an engineered barrier (Native American mound) which is reasonably forseeable (it happened).

The type of soil that will be used for the cap was not specified. Therefore, the density, runoff coefficient and evapotranspiration coefficient cannot be known accurately. These parameters are required to accurately model the radiological impacts on groundwater.

Revision 1a of the Decommissioning Plan (DP)

Chapter 1

The DP conducts modeling for only 1000 years. However, this could be misleading to the public since the half-lives of the radionuclides are over a billion years. By not stating the half-lives of the radioactive materials in the DP, one could assume that the radiological hazard has completely decayed after 1000 years. SMC should conduct modeling for the amount of time that the materials remain a radiological hazard.

1.6 Summary of Radiation Dose Analysis

The Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM) does not provide recommendations on determining Derived Concentration Guideline Levels (DCGLs) as indicated in footnote 3. Page Roadmap-1 of MARSSIM states "MARSSIM does not provide guidance for translating the release criterion into DCGLs."

It is not "extremely unlikely" that institutional controls will fail given the amount of time the slag pile will be radioactive.

1.7 Summary of ALARA Analysis

SMC did not calculate the benefit of the averted doses, so it cannot determine if the LTC Alternative meets the first statement listed: No practice shall be adopted unless its introduction produces a positive net benefit.

INTRODUCTION
Page 3, lines 5-8: Reference should be made to the June 30, 2006 submission.

3 FACILITY DESCRIPTION

3.7.3 Ground Water Flow Direction, Velocities and Other Physical Parameters

The referenced report by Dave Raviv Associates in footnote 34 contains radiological analyses that do not conform to the requirements of reporting of radiological environmental data. For example, the MDAs should be reported for each analysis. The MDAs for gross alpha and gross beta are not always below the requirements in the Environmental Protection Agency's Safe Drinking Water regulations. (40 CFR 141.25(c) (1) and (2). The uranium concentrations reported are above that which would be expected in this area of the state. The concentration of uranium in the Kirkwood-Cohansy aquifer is typically 0.03 micrograms per liter (ug/L) according to the US Geological Geological Survey. Uranium-238 concentrations in the report (Appendix 19.2) are three orders of magnitude above that level.[1] Further detailed comments on water data is presented below. Thus, the statement in the plan that the radionuclides are bound tightly to the slag and will not leach into the groundwater, is not supported by SMC's own groundwater data.

4 RADIOLOGICAL STATUS OF THE FACILITY

It is clear from the discussion in this section, that the SMC facility was never fully characterized for radiological constituents. Given the fact that SMC confirms that the Hudson branch is in need of remediation, other areas of the site should be sampled to ensure that radionuclides did not migrate from the areas that were licensed.

4.2.1 Ambient Gamma

A figure should be referenced depicting the locations that these ambient measurements were taken. Are the 15 uR/h readings close to the storage yard?

4.2.2 Surface Contamination

Where were the background readings taken?

4.2.3 Surface and Subsurface Soil

Table 17.2: Radiological data should always include the associated uncertainty. A measurement result and the uncertainity together allow one to place reasonable bounds on what the "true" value might be. "If the result of a measurement is reported without some indication of its uncertainity, the result is useless for decision making."[2]

4.4.1 Storage Yard

The new leach study should be referenced. The statement that the physical form of the slag does not permit the radioactive elements to leach out into the regional water supply or local wetands is not true since SMC presents evidence that radioactive elements above background have gotten into the sediment and surface water of the Hudson Branch and are evident in the groundwater as well

---

[1] The mass concentration of total uranium is obtained by dividing the activity concentration of U-238 (in picocuries per liter) by 0.3365.

[2] Multi-Agency Radiological Laboratory Analytical Protocols Manual Part I Training Manual, Section 6.

(Appendix 19.6 and Appendix 19.3). Also, the distribution coefficient for radium (Appendix 19.4) shows that it is quite soluble and capable of being leached from the slag.

Since SMC does not distinguish between naturally occurring radioactive materials (NORM) and technologically enhanced NORM (TENORM), to state that the uranium and thorium in the Haul Road slag was naturally occurring is misleading. The uranium and thorium in the high ratio slag is also naturally occurring in this context. Readings of 26 uR/h and 90 uR/h are not " only slightly discernible from background," as stated on page 27 of the DP. Footnote 53 does not take the geometry of the slag in the pile vs. the crushed slag on the road into consideration.

A paragraph on the radiation exposure from the slag pile is not adequate. A detailed map of exposure rate readings and locations should be included. The TLD data should be presented in the Plan. This data is necessary to determine if the exposure rates used in the ALARA analysis are accurate.

4.4.2 Demolition Concrete

SMC states definitively that the only areas within the SMC property lines where residual radioactivity exists in surface soils, other than the Storage Yard, are the concrete pads that housed the former AAF and Flex-Klean Baghouses, D-111 and D-102/112. This statement is premature considering there has been no final status survey of the property. We believe that in addition to Class 1 survey units, Class 2 and Class 3 survey units are imperative considering the site has never been fully characterized and considering it is unknown where slag was used on site.

The scale drawing and map of soil and water sampling results in Appendix B of the Environmental Report (Appendix 19.9 of the Plan) shows contamination above background levels in the Hudson's Branch and outside the fenceline, to the north of the storage yard, and in areas where licensed material was never stored or used. These areas need to be addressed in the final status survey of the site prior to the license ammendment.

4.5 Subsurface Soil Contamination

There does not appear to be an accurate accounting of the locations of where slag may have been used as fill. There is not an accurate assessment of whether or not the slag was radioactive. Considering this uncertain history, the entire site should be included in a final status survey.

The Decommissioning Plan contains inconsistencies concerning the slag density. The slag density is given a value of 1.3 grams per cubic centimeter (g/cm^3) in footnote 64, but 2.8 g/cm^3 for the input into the RESRAD code.

Multiplying out the assumptions of the quantity of radioactive material that may be present as fill slag yields a concentration that is three orders of magnitude above New Jersey's cleanup standards. This would not be considered a nominal radionuclide content. The assumptions presented, including the curie content of 8.4 Curies of uranium and thorium, confirm that the entire site should be characterized.

4.6 Surface Water

The report cited in footnote 66 and pages 3-23 to 3-24 of the Environmental Report (Appendix 19.9) show that surface water has elevated concentrations of radionuclides. To state that surface water in the vicinity of the Newfield site does not exhibit elevated (above background) radionuclide concentrations is not true.

4.7 Groundwater

Footnote 67 refers to the upgradient Newfield well. In the memo referenced in footnote 68, the Newfield well is reported to have a Ra-228 concentration of 6.39 pCi/L (the uncertainty is not provided). The Bureau of Safe Drinking Water has data on the Newfield well going back several years. At no time did the concentration of Ra-228 exceed 2.4 pCi/L. Since the laboratory data is not provided, it is difficult to determine whether the data is valid. There are many problems with the memo referenced in footnote 68. They are discussed in the comments below on Appendix 19.9, the Environmental Report.

Since the baghouse dust and contaminated soil and building debris were not analyzed to determine the distribution coefficient, it is not known if the radionuclides in these materials are soluble or insoluble.

In footnote 69, SMC admits that the fill slag has not been characterized.

Thus, because Chapter 4 of the DP fails to establish that the site was fully characterized, contamination above the established cleanup levels could be missed in the final status survey.

5 DOSE MODELING EVALUATIONS

5.1 Assessment Methodology

Table 5.1 referenced in footnote 81 could not be located.

It is misleading to state that an all controls fail scenario is being modeled (page 34, Rev. 1a, line 20). It should be made clear that what is being modeled is a slight degradation of controls. Modeling needs to be performed assuming that the engineered controls completely degrade since the materials will remain a radioactive hazard into perpetuity.

5.2.1 Source Term

The lateral and vertical extent of contamination has never been determined. Refer to December 1, 1992 memo from Nancy Stanley to Donna Gaffigan (Attachment 1). Accurate dose modeling of radionuclide contamination into the groundwater cannot be conducted without determining the vertical extent of the contamination. Also, without a determination of the lateral extent of the contamination, contamination above the established cleanup levels could be missed in the final status survey.

5.2.1.2 Values Used to Describe the Restricted Area Source Term

The Derived Source Term using the weighted averages of the concentrations of material in the storage yard (Table 17.7) would make sense if the material were capable of being blended together. The concentration in the slag will not change even if other, less concentrated material is placed near it. If the slag were uncovered, as would be the case in an all controls fail scenario, it is reasonable to assume that the receptor would be exposed to the higher concentration, not the derived concentration. Thus, the Derived Source Term should use the concentration of the slag.

5.2.2.2.1 Engineered Barrier Layer

This revised section indicates that there will be a geomembrane, but in the response to comment letter to the NRC dated June 30, 2006, SMC maintains that the geomembrane has been removed from the design. (See Response to Issue No.7).

See comments from Appendix 19.3

5.2.2.2.2 Contaminated Zone Layer

Kd testing indicates that Radium is not tightly bound and will tend to leach into the groundwater. It is unknown what the partition coefficients are for the baghouse dust and contaminated soil and building debris since it was not provided in Appendix 19.4.

5.2.2.2.3 Undisturbed Surface Layer

The letter referenced in footnote 98 is not in the NJDEP files. If the reference is not publicly available, it should be provided in the Decommissioning Plan.

5.2.2.2.4 Saturated Zone Layer

SMC does not provide sufficient justification for excluding the drinking water pathway. The aquifer beneath the SMC site is classified as a Class IIA aquifer which means it can be used as potable water with treatment. Treatment is considered a control that will fail. Therefore, SMC must include the drinking water pathway in its all controls fail analysis. The potability of groundwater is clearly under the State's jurisdiction and cannot be preempted by the federal government.

5.3 Exposure Scenarios

Residential encroachment should not be excluded since institutional controls will likely fail during the time period that the materials remain a radioactive hazard into perpetuity. SMC does not explain what the anticipated land use factors would be that would prevent farming up to the property boundary.

The exposure scenario assumes that the property will remain intact. DP vol. 1a page 40. However, the DP states that it is likely that the property will be subdivided. DP vol. 1 page 154 note 102. SMC should therefore conduct modeling to determine the dose consequences of leaving the property intact vs. subdividing it.

Stating that all controls will remain in force in perpetuity is unrealistic since the materials will remain a radioactive hazard in perpetuity.

Given the recent rise in the price of uranium to its highest level ever, to state that there is no economic value in the materials is not true. No one can predict the future of the uranium market. The DEP believes that is a possibility that the material may become so valuable that an intruder scenario with removal of the engineered barrier is quite plausible.

The nearby surface contains sand. If rock material were needed as fill or for some other construction project, the engineered cap, as well as the slag beneath it would be an ideal source. SMC should therefore conduct modeling using this scenario.

How can institutional controls be considered a natural separation which is not conducive to construction in close proximity to the engineered barrier? What distance does the DP consider to be "close proximity"? This needs further explanation.

The fence should be assumed to fail since it is reasonable to assume that institutional controls will eventually fail since the materials will remain a radiological hazard into perpetuity.

Site restrictions due to the natural resource restoration requirements should be assumed to failFurthermore, SMC is currently conducting remediation of the soil contamination under CERCLA. Therefore, the current restrictions on future residential use will eventually be lifted once contamination has been remediated.

There is not sufficient justification for excluding the groundwater exposure pathway. It is unreasonable to assume that a municipal source of drinking water will be available in perpetuity. If an aquifer is classified as Class IIA then it must be included in the exposure scenarios where all controls fail. Treating the water is also an engineering control that should be assumed to fail. The engineered barrier should be assumed to fail.
The distribution coefficients determined in Appendix 19.4 for radium in the slag are lower than the RESRAD default, which means that radium is more soluble than RESRAD assumptions.

5.3.1 Exposure Scenarios for the Unrestricted Portion of the Site
The exposure scenario which assumes an Industrial Worker and an Occasional Trespasser are not the appropriate scenarios for an unrestricted use. SMC should have modeled a resident or resident farmer since the site will not have restrictions. A resident scenario is very likely since a resident currently lives 100 feet from the facility (DP section 1.2). Therefore, sections 5.3.1.1 and 5.3.1.2 need to be revised. These sections were not reviewed.

5.3.3. Exposure Scenarios Involving the Restricted Portion of the Site (Controls Fail)
One exposure scenario that was not modeled is the family that lives near the pile with the slag exposed (failure of the engineered barrier). The Department believes that this scenario is reasonably forseeable, given the fact that these controls are supposed to last for 1000 years and the slag material will be radioactive for billions of years. Furthermore, a resident currently lives only 100 feet from the facility. DP rev.1 section 1.2.

5.3.3.1 Recreational Hunter Scenario
Inhalation Rate - The default inhalation value of 8,400 cubic meters per year is reduced by RESRAD based on the occupancy factor, so the discussion about the conservatism of the inhalation rate is overstated.

Cover Erosion Rate- The first sentence states that the cover does not erode and the thickness of the cover does not change. The last sentence states that the erosion rate is calculated in Appendix 19.3.

The input into RESRAD is 4.6 x 10^{-4} meters per year, which results in .46 meters (18 inches) of cover eroding in 1000 years.

5.3.3.2 Suburban Resident Scenario

Footnote 156 does not provide sufficient justification for the distance from the pile to a hypothetical resident. The distance from the pile could be much less than 1000 feet, considering the closest resident is currently 100 ft from the site (DP section 1.2). Since the groundwater is classified as potable, this pathway should not be eliminated. It is unreasonable to assume that municipal water will be available for the foreseeable future. The family could also grow a garden and consume some produce from it. Therefore, all pathways should be used for this scenario, namely direct radiation exposure, particulate inhalation, radon, direct soil ingestion, crop ingestion, and drinking water ingestion.

There is no reason why a house could not be built in the reforested area when all controls fail.

Footnote 157 states that RESRAD supports the position that a suburban resident does not drink groundwater. The same section of the RESRAD Manual also states that in an EPA study (U.S. Environmental Protection Agency, 1994, *Radiation Site Cleanup Regulations: Technical Support Document for the Development of Radionuclide Cleanup Levels for Soil*; review draft, Office of Radiation and Indoor Air, Washington, D.C.), an on-site well is assumed for drinking in the suburban resident scenario. The DEP assumes a resident has an on-site well, especially in an all controls fail scenario. It is reasonable to assume that municipal water comes from groundwater as it does for most residents in this area of New Jersey, including Newfield.

Indoor Time Fraction - The amount of time spent at the site is not conservative. The US Environmental Protection Agency's Exposure Factors Handbook[3] recommends 16.4 hours per day for time indoors. The RESRAD Manual uses 50% of the time spent indoors. There is no recommendation for how many days per year, but the average number of vacation days taken in the US is 13. The standard days per year for a resident is typically 350. The values listed, 240 days for 8 hours per day are not justified. That means the resident is away from home for 4 months out of the year.

Outdoor Time Fraction - The total time at the site contradicts the Indoor Time Fraction (8,760 vs. 1920 hours). In any case, this parameter will need to be adjusted when the Indoor Time Fraction is corrected.

Inhalation Rate - The statement that the resident is assumed to be on site 100% of the time is confusing. Is it 100% of 1920 hours or 8760 hours?

Soil Ingestion Rate - Since it is assumed that a family will live in the house, the soil ingestion rate should be higher to account for children's soil ingestion rate (200 mg/d or 70 g/y)[4].

---

[3] Exposure Factors Handbook Volume III, Activity Factors, US Environmental Protection Agency, EAP/600/P-95/002Fc, August, 1997.

[4] USEPA, 1991. OSWER Directive 9285.603.

Ingestion of Water - It must be assumed that the resident consumes groundwater. Just because there are no wells inside the Storage Yard does not mean that one cannot be drilled at the edge of the contaminated zone sometime in the future.

Distance from the Storage Yard - There is no justification for the distance chosen considering the nearest current resident is 100 feet.

5.3.3.3 Barrier Excavation Scenario

Exposure to the Excavator - the excavator would not have to climb a fence because it is assumed that the fence is no longer there, or broken. Again, the geomembrane is mentioned, but in the letter it states that there will be no geomembrane.

Exposure to a Nearby Suburban Resident - Once the small area is excavated and the barrier is breached, erosive forces will more easily degrade the cover. This should be taken into account and the exposed area should be enlarged for the Suburban Resident and Recreational Hunter scenarios.

Pathways Included in the Barrier Excavation Scenario - Inhalation and soil ingestion should be included in the excavation scenario considering the baghouse dust and contaminated soil will also be exposed.

Suburban Resident Exposure Duration - Since it is assumed that a family lives in the house, it is unrealistic to assume they will always be indoors and that no one will investigate the exposed pile. Children should be assumed to play on the pile. It is not conservative to assume that the resident does not have direct contact with the slag after the engineered barrier is breached.

5.3.3.4 Industrial Worker Scenario

Justification for Key Parameters Used in the Analysis - The report states that a worker spends 8 hrs/d, 5 d/week, and 50 weeks/y at the site which equals 2000 hours per year. It goes on to say that 69% or 1,324 hours of that time will be spent indoors, and 31% or 595 hours will be spent outdoors. These values should be 1,380 and 620 hours respectively.

Ingestion of groundwater by an industrial worker should be assumed.

Using the erosion rate that was used in the RESRAD model for the Industrial Scenario, All Controls Fail, the cover will erode 0.46 meters in 1000 years vs. 0.015 meters as stated in the DP.

Section 5.4.3.1 Exposure Factors

Soil Ingestion Rate – The ingestion rate should include the contribution from children for the all controls fail and unrestricted use scenarios.

Section 5.4.3.2 Geophysical Parameters for the Engineered Barrier

Evapotranspiration Coefficient - Since there will not be vegetation on the cover, the evapotranspiration rate should be lowered.

Runoff Coefficient - NJGS will provide specific comments on this parameter.

Cover Soil Density – Again, a geomembrane is mentioned when the June 30 letter states that there will be no geomembrane in the design of the cap.

Surface Soil Erosion Rate - The erosion rate state in the DP ($4.6x10^{-4}$ **feet**/y) is different than the erosion rate that is used in RESRAD ($4.6x10^{-4}$ **meters**/y). So instead of 6 inches eroded in 1000 years, it is 18 inches. This is significant and even more significant for modeling past 1000 years.

The DP is silent on the issue of tree growth (since there will be no mowing of the cover) and animal burrowing in its evaluation of the integrity of the cap for 1000 years.
SMC states that the greatest annual dose occurs past 1000 years. Since the material will still be radioactive, this dose should be considered. NJDEP modeling shows that the greatest annual dose occurs at 800 years.

Section 5.4.3.3 Geophysical Parameters for Sub-Barrier Zones
Contaminated Zone Thickness - SMC needs to explain the sentence "The amount of radioactive material deposited rapidly depletes as the depth increases and terminates at a maximum thickness of approximately 30 feet."
Contaminated Zone Hydraulic Conductivity - It is stated that the hydraulic conductivity was measured for the native sand material at the site as 2,000 m/y. However, SMC uses 0.017 m/y for the hydraulic conductivity of the unsaturated zone (which is the native sand layer).
Distribution Coefficient, Contaminated Zone - Table 17.5 lists the K_d of Radium as 50, which is much lower than the RESRAD default, but this is not even mentioned in the text. This seems to contradict the statement that the slag is essentially insoluble even under the most extreme in-situ conditions that might reasonably be encountered. A site-specific K_d was not determined for the baghouse dust or the contaminated soil. This will be important when the drinking water pathway is included in the analysis.
Hydraulic Conductivity, Undisturbed Surface Layer - The cited reference has no information regarding the hydraulic conductivity of the unsaturated zone. However, there was a table in the report of vertical hydraulic gradient with a value of 0.017 m/y that may have been mistakenly used.

Section 5.5 Results
All scenarios where controls fail should include the drinking water pathway. The crop ingestion pathway should be included in any residential scenario where controls fail.

Section 5.5.1 DCGL for Unrestricted Areas
The DCGLs are flawed because the scenario and parameters used to derive them are not consistent with unrestricted use. The LTR requires the licensee to demonstrate that the TEDE from residual radioactivity is below 25 mrem/y for unrestricted use (10 CFR 20.1402). Since there will be no restrictions on this part of the site, some version of a resident scenario (either a resident farmer or suburban resident) must be modeled. The stated DCGLs will result in over 25 mrem/y for a residential scenario.

The activity ratio of U-238 is listed in the DP as 0.0.47.
Further explanation is required as to how the ratios for U-238, U-234, U-235, and Ra-226 were derived and why they were used. The units for the dose factors should be mrem/y per pCi/g, not pCi/g as described in the text.

5.5 Results
5.5.3 Suburban Resident Scenario (Unrestricted Area, Controls Fail)
It is stated that the only source of exposure was external radiation stemming from the Storage Yard. This is not the case if the suburban resident is located in the unrestricted area and exposed to the DCGLs derived for an industrial scenario. We calculate the dose to be over 25 mrem/y for a residential scenario.

5.5.9 Slag Excavation Scenario (Restricted Area, Controls Fail)
The Microshield runs neglected to take into account all the progeny associated with uranium and thorium. Because the uranium and thorium in the slag are in equilibrium with their associated decay products, and because most of them are gamma emitters, all of these decay products should be included in the source term. Using the same geometries as SMC for the shape of the source and the distance from the source, the exposure rates are two orders of magnitude higher than shown in Appendix 19.5.

5.5.10 Suburban Resident Scenario (Restricted Area, Controls Fail, Excavation)
No attempt was made to take into account exposure from direct contact with the uncovered pile. This is considered a realistic scenario given that a family is assumed to live next to the pile. Also, what is the justification that prevents the house from being located closer than 1000 feet, considering the nearest current resident is 100 feet away. The correct external exposure needs to be determined.

5.5.11 Recreational Hunter Scenario (Restricted Area, Controls Fail, Excavation)
The external exposure was not assessed properly.

Chapter 5 Conclusion: : Based on the comments above, the following parameters were changed from the SMC dose assessment (see Attachment 2 summary report from RESRAD 6.22). This assessment results in a peak dose of 1,718 mrem/y at 800 years for the LTC License Alternative even without considering the external gamma dose, which must also be included. This dose level is not protective of human health.

Initial principle radionuclide (pCi/g):	359 for Uranium and Thorium series 16 for Actinium series
Time Since Placement of Material (y)	43
Runoff Coefficient:	0.26
Saturated Zone hydraulic conductivity (m/y)	22,000
Saturated Zone hydraulic gradient	0.002
Unsaturated Zone hydaulic conductivity (m/y)	10,000
Distribution Coefficients for unsaturated and saturated zones	RESRAD default

Because of all the reasons stated above, the DP does a very poor job in modeling the TEDE from the materials' residual radioactivity. As such, one cannot determine whether the proposed decommissioning will meet the dose criteria limits in the LTR or will be protective of the public health and safety. In fact, modeling using more reasonable parameters demonstrates that the dose is above 500 mrem/y criteria which exceeds the limits set forth in the LTR. Therefore, the NRC should reject the DP and require that the slag be disposed of in an offsite licensed low level radioactive waste facility.

Chapter 7 ALARA Analysis

The report states that the three alternatives are described in Chapter 6 of the DP, yet Chapter 6 just refers to Appendix 19.9. SMC should state that the three alternatives are described in Appendix 19.9.

It is difficult to determine how to do an ALARA analysis for the LTC alternative, since reducing the residual radioacitivity below the dose levels is not being performed.

NUREG 1757 Vol.2 Appendix N states that the ALARA analysis should provide an unbiased analysis of the remediation action, which can both avert future dose (a benefit to society) and cost money (a potential detriment..). Since there is never a benefit calculated in this chapter, a true ALARA analysis was not performed. This is needed in order to determine if restricted use is even allowed pursuant to 10 CFR 20.1403(a). In order for the averted dose to be calculated, the drinking water pathway must be included for each alternative. Since the material will remain radioactive in perpetuity, the length of time for modeling should be increased past 1000 years.

7.1.1.
The on-site stabilization and Long Term Control (LTC) Alternative is not a decommissioning option as described in the heading of section 7.1, rather it is a license amendment.
A final status survey will not be able to determine if the restricted portion of the site can meet 100 mrem per year if all controls fail.

7.2.1
The whole discussion of radiation risks is misleading. The author discusses chronic exposures and acute exposures without explaining the difference and the different health effects. This may confuse the lay reader and does not present a fair assessment of the health effects of radiation. The author attributes the statement that no effect has ever been observed at levels below 5,000 mrem delivered over a one year period to the Health Physics Society. The Health Physics position paper actually states that the risks of health effects below 5–10 rem (which includes occupational and environmental exposures), are either too small to be observed or are nonexistent. The paper goes on to state that "the possibility that health effects might occur at small doses should not be entirely discounted. The Health Physics Society also recognizes the practical advantages of the linear, no-threshold hypothesis to the practice of radiation protection. Nonetheless, risk assessment at low doses should focus on establishing a range of health outcomes in the dose range of interest and acknowledge the possibility of zero health effects."

Furthermore, the Committee to Assess Health Risks from Exposure to Low Levels of Ionizing Radiation recently released the Biological Effects of Ionizing Radiation (BEIR) VII report. The BEIR VII committee concluded that current scientific evidence is consisitent with the hypothesis that there is a linear dose-response relationship between exposure to ionizing radiation and the development of radiation-induced solid cancers in humans. This conclusion is based on many facts (contrary to the statement made in the DP that this conclusion is not supported with facts). For example, the committee stated that there is compelling support for the linearity view of how cancers form. Studies in radiation biology show that "a single radiation track (resulting in the lowest exposure possible) traversing the nucleus of an appropriate target cell has a low but finite probability of damaging the cells' DNA. Subsets of this damage, such as ionization "spurs" that can cause multiple damage in a short length of DNA, may be difficult for the cell to repair or may be repaired incorrectly. The committee has concluded that there is no compelling evidence to indicate a dose threshold below which the risk of tumor induction is zero."[5] The explanation of radiation risks in the DP would lead one to believe that the radioactive material at SMC is harmless. The current scientific evidence does not support this view.

The risk coefficient that is used in the DP is not consistent with Table 4-2 of the BEIR V report. The derivation of the risk coefficient should be described so that it can be verified whether or not it was determined correctly. Also it is not stated whether the $5x10^{-4}$ risk coefficient is an annual or lifetime risk. Using Table 4-2 for lifetime risks per 100,000 exposed persons, it cannot be determined how this coefficient in the DP was derived. It is uncertain how the risk from high Linear Engergy Transfer (LET) radiation was taken into account in this risk coefficient since it is stated that radiation could be taken into the body through inhalation and ingestion. If the risk coefficient used is not accurate, all the risk calculations in this section would need to be reworked.

7.2.1.1 On-site Workers

LTC Alternative

Are the adjusted Annual Limit on Intakes (ALI) and Derived Air Concentrations (DAC) applied to the assumed air concentrations of uranium and thorium still applicable considering the site is not operational? Since the workers will be working in close proximity to the slag, it is not unreasonable to assume that their dose rate potential will be higher than the average measured exposure rate.

LT Alternative

Footnote 173 is misplaced; the slag will not be covered in the LT Alternative. The dose from airborne radionuclides is overestimated since the disposal facility stated that crushing is not necessary on site. Dose and risk values should be adjusted accordingly.

7.2.1.2 Members of the Public

LC Alternative

How is the radon dose rate of $8.2x10^{-3}$ uR/h determined?

Assuming the risk coefficient is correct, the lifetime risk from 70 years of exposure would be 2.5×10^{-2}. Since conservatism is used for this scenario (assuming that a member of the public is present somewhere around the storage yard constantly and continuously), then it should also be used for the all controls fail LTC scenario so that there is a fair comparison. The LTC will come out as the safest alternative when the doses from the LC and LT alternatives are conservative, but the doses from the LTC scenario are not.

LTC Alternative

The dose incurred from the all controls fail scenario should be added to the dose from the shaping of the slag pile and installation of the engineered barrier. The dose should be comparable to the LC Alternative in order to present a fair comparison.

LT Alternative

[5] Health Risks from Exposure to Low Levels of Ionizing Radiation, BEIR VII Phase 2, National Research Council, National Academies Press, Washington, D.C., 2006.

Footnote 180 is misplaced since the material will not be covered in this scenario. Since crushing will not be done in Newfield, the concentration of respirable airborne particulates should be corrected.

7.2.3 Transportation
The transportation accident fatality rate is listed as 6.6x 10^{-7} per kilometer. It not clear as to whether this is for for truck or train transportation. The total accident incident rate with fatalities from the Federal Railroad Administration, Office of Safety Analysis may not be the most appropriate statistic since it includes commuter rail lines. What rail carrier was used to generate this coefficient? Is this from all rail carriers in the US? Is that appropriate?

<u>LTC Alternative</u>
Since section 8.3 of the DP states that the neither the source for the rock layer nor the soil source for the barrier has been identified, this analysis cannot be completed.
7,220 miles equals 11,620 kilometers, not 12,033 kilometers.

<u>LT Alternative</u>
It is unclear which accident fatality risk coefficient is used for train travel. Based on the website given, it should be 7.82×10^{-8} rather than 2.3×10^{-7}. The units for the calculation should be rail car kilometers, not kilometers. The conversion from miles to kilometers is wrong. If the accident fatality risk coefficient listed is used, the resultant fatalities are greater than 1. The risk calculations need futher justification and explanation. Correct units should be used and calculations should be clearly stated.

7.3.1 Remedial Action Activities
Revision 1a of Tables 17.14-17.16 have different cost figures than stated in the sections of the text of Rev.1. The text should be updated with the new figures.

<u>LC Alternative</u>
The cost for remedial action for the License Continuation alternative should be $0 since no remediation is taking place.

<u>LT Alternative</u>
According to NUREG-1757, page N-7, survey costs related to evaluating compliance at the dose limit are not part of the ALARA analysis. It is not clear whether SMC is doing an ALARA analysis or just a cost comparison between the alternatives. If it is an ALARA analysis, then the cost for the final status survey should be subtracted.

EnergySolutions has repeatedly quoted a price of $33 million dollars for a turnkey operation. Adding the 25% contingency brings it to $41,250,000 rather than $62,864,543 listed in Table 17.15, Rev. 1a.

7.2.3 Transportation of Waste
<u>LT Alternative</u>
The cost of transporting the waste was included in the figure for Remedial Action Activities. It is being counted twice.

7.2.3 Waste Disposal

LT Alternative

The cost of disposing the waste was included in the figure for Remedial Action Activities. It is being counted twice.

7.2.3 Cost of Construction (non-Radiological) Risks

Footnote 193 and 194: It is unclear why SMC would use $20,000 since they are not demonstrating that further reductions in residual radioactivity are prohibitively expensive.

7.2.4 Cost of Transporation Risks

LT Alternative

The cost should be revised based on the correct transporation fatality risk coefficient.

7.3.6 Cost of Radiological Risks (with Long-Term Surveillance and Maintenance)

According to NUREG-1757, long-term surveillance and maintenance should not be included in the analysis.

LC Alternative

The cost should be zero since there is no remediation taking place.

LTC Alternative

Cost estimates are not accurate since the dose from the all controls fail scenario is not included.

LT Alternative

There was an error in calculating the person-rem, and therefore the cost. Assuming a population density of 109 persons and a dose of 1,802 mrem, the collective dose would be 196 person-rem, not 344 person-rem. The cost is then closer to $13,053,532 rather than $22,901,000.

7.3.7 Licensing Costs

NUREG-1757 states that Regulatory Costs avoided should not be included as costs related to restricted release.

7.3.8 Change in Land Value

LC Alternative

NUREG-1757 states that other costs should include the loss of economic use of the property while the remediation is taking place. For the LC Alternative that cost should be zero since no remediation is taking place.

LTC Alternative

The loss of economic use of the property should be calculated for 1000 years and beyond. To state that the value of the land will increase is absurd. It can only be assumed that if the land were unrestricted, there would be greater economic use of the property.

LT Alternative

The loss of economic use of the property should be calculated for two years.

7.3.9 Environmetnal Impacts

According to NUREG-1757, Environmental impacts refer to ecological damage to the environment as a result of the remedial action.

LC Alternative

Long-term leaching of Ra-226 into the groundwater should be accounted for.
<u>LTC Alternative</u>
Long-term leaching of Ra-226 into the groundwater should be accounted for.
<u>LT Alternative</u>
According to EnergySolutions, the material will not be crushed on site. Indirect environmental costs associated with the disposal site in Utah should not be considered here.

7.4 Cost/Benefit Analysis
The equation used by SMC to calculate the cost of a given level of protection (X), could not be located in NUREG-1757. The use of $20,000 per person-rem averted (α), is not being used correctly since the person-rem listed for each alternative is not the dose averted, but the dose incurred. Since there has not been a benefit calculated, the requirements of 10 CFR 20.1403(a) have not been fulfilled.

7.5 Summary
As stated above, an ALARA analysis was not completed. Also, since no benefit was calculated, it is unknown if the LTC practice should be adopted. Because of the inconsistencies throughout this chapter, it cannot be stated that the LTC is the most defensible decommissioning option for this site based upon ALARA considerations.

8 Planned Decommissioning Activities
The State contends that the LTC option should not be referred to as decommissioning, but a license amendment.
The final status survey of the remainder of the site should be performed before consolidation of the waste material so that additional waste can be identified.

8.1 Contaminated Structures
SMC does not identify the release limits for those portions of the concrete pads that will be disposed of as industrial waste.

8.3.1 Engineered Barrier Construction
It should be stated how monitoring will be performed and what the levels are that will be used to trigger more extensive dust control measures.

8.3.2 Adjacent Soil Characterization
SMC should also include the area outside SMC's property, the fence line to the North, in its additional soil characterization. SMC needs to identify what soil materials it is referring to when it says "other soil materials regulated by NJDEP." Does this refer to chemically contaminated soils? If so, it may be considered a mixed waste and disposal would be subject to US Environmental Protection Agency (EPA) regulation.

8.3.3 Engineered Barrier Completion
The potential for radiation exposures from all exposure pathways over the next 1,000 years, even if no barrier maintenance takes place, is greater than 500 mrem/y if the drinking water pathway and external gamma exposure are taken into account. The external gamma exposure of the daughter products of uranium and thorium were not accounted for correctly in the Microshield model.

8.3.4 Final Status Survey

Since SMC is not sure how much or where slag was used on other portions of the site, (Section 4.5), the whole site should be classified as impacted. According to MARSSIM impacted is defined as areas with the possibility of containing residual radioactivity in excess of natural background or fallout levels.

8.4 Surface and Groundwater

There is data in the Environmental Report (Appendix 19.9, Appendix B) that show results of water samples. It is unclear if they are surface water samples or groundwater samples, since this is not indicated. In either case, the results are above the NJ Surface Water standards at N.J.A.C. 7:9B1.14(c) (the Hudson Branch is classifed as FW2-NT) and above the NJ Groundwater Quality Standards at N.J.A.C. 7:9C. Since this data did not come with the associated laboratory results sheets, it is difficult to determine how it was analyzed and whether or not the data is valid. There is no uncertainty or minimum detectable concentration listed.

In Appendix 19.2 there is groundwater data presented. Table 1 lists the filtered radiological data that is over the US EPA groundwater screening levels or whose minimum detectable activity (MDA) is over the US EPA's required MDA. The US EPA requires a MDA of 3.0 pCi/L for gross alpha analysis and 4.0 pCi/L for gross beta analysis.

Well	Sample date	Gross Alpha (pCi/L)	Gross Beta (pCi/L)
W3S	12/17/88	<5.0	<6.0
W2	8/1/89	<4.0	
SC11S	4/26/89	**5.5 +/ 1.3**	**75 +/ 1.9**
	8/1/89	<5.0	<8.0
SC12S	10/26/88	**5.6 +/ 3.1**	**59 +/ 6**
	4/25/89		**71 +/ 8**
	8/1/89	<9.0	
	9/28/89	<9.0	**69 +/ 1.5**
SC13S	4/25/89	**10+/ 2 [7.2 +/ 1.8]**	
	8/1/89	<10.0	<20.0
A	8/1/89	<4.0	<5.0
	9/28/89		<5.0

Bold values are above EPA screening levels. Less than values are above the required MDA.

As required by the EPA (including the standards that were current at the time of sampling), when the gross alpha result is above 5 pCi/L, then radium-226 must be analyzed. Although Ra-226 was analyzed as required, Ra-228 was not analyzed, so it is unknown if the maximum contaminant level of 5 pCi/L Ra-226+Ra-228 was exceeded. Radium-228 is a beta emitter and may be a contributor to the elevated gross beta. At the time that the samples were taken, if the gross beta was above 50 pCi/L, then additional analysis to identify the contributing nuclides was required. The EPA now requires that if gross beta is above 50 pCi/L, then potassium should be measured and subtracted. If the gross beta result is still greater than 50 pCi/L, then additional testing must be performed to determine the specific nuclides that are contributing to the elevated reading. In any case, the statement made in the DP that no radiological impacts above EPA screening levels exist in downgradient groundwater is not true.

Since it is unknown if there are radiological exceedences of the groundwater standards in the downgradient groundwater, the planned license amendment should take into account continual monitoring of the groundwater, which should be incorporated into the cost estimate. Although the cap design was intended to prevent discharges of radiological and/or chemical constituents to the groundwater, the RESRAD model shows that radium will leach into the groundwater starting at about 450 years, using the SMC parameters, with a hypothetical drinking water well at the edge of the contaminated zone.

9.4.3 Radiation Worker Training

There is no discussion of chronic effects of exposure to radiation or naturally occurring radiation sources, both of which directly apply to this site.

10.1.1 Workplace Air Sampling Program

The DP states that Th-230 has the most limiting Derived Air Concentration (DAC), however, according to Table 1, Column 3 of Appendix B of 10 CFR 20, Actinium-227, Thorium-232, and Protoactinium-231 all have more limiting DACs and are all present in the contaminated material (Table 17.7 of the DP).

The DP states that some air sampling will be performed to achieve a baseline value as soon as operations begin and routinely thereafter. Baseline readings are normally taken before operations begin so the effect of the operation can be distinguished from background. This would allow the 4-5 days for decaying the radon and thoron daughters without concerns about exceedences since the operations would not have started. Once background is established, the delayed count would not be necessary during operations since it could be subtracted.

10.1.6 Contamination Control Program

Table 17.10, Acceptable Surface Contamination Levels, is missing the row which includes Radium-226, Radium-228, Thorium-230, Thorium-228, Protoactinium-231, and Actinium-227. Since all of these nuclides are present in the slag, this row, which is one-tenth the limit of thorium, should be included.

Radionuclide	Contamination Level (dpm/100cm^2)		
	Average	Maximum	Removable
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20

11 Environmental Monitoring and Control Plan

11.1 Environmental ALARA Evaluation

Footnote 77 should specify that it is Table 2, Column 1 in Appendix B of 10 CFR 20 which the air sampling results will be compared to. It is not specified in section 10.1.1 how individual nuclide concentrations will be determined.

11.2 Effluent Monitoring Program

The DP states that the action levels in section 10 will be used for effluent monitoring. The action level in section 10, 10% of the DAC would exceed the allowed effluent concentration for air (Table 2, Column 1 of Appendix B of 10CFR 20).

13.2.1 Procedures
The Quality Implementing Procedures should be reviewed by the NRC and the NJDEP before use.

13.2.3 Laboratory Services
Off-site laboratory sample analysis should be performed by a laboratory certified by the NJDEP's Office of Quality Assurance.

14.1 Characterization Surveys
Comments on the characterization performed in 1991 are included in the attachment to this memo. This memo covers comments on Measurement Descriptions, Field Instruments, Methods and Detection Sensitivities, Laboratory Instruments, Methods and Detection Sensitivities, Survey Results, and Adequacy of Characterization Survey outlined in this Decommissioning Plan. (Sections 14.1.1 through 14.1.4 and 14.1.6)

14.1.5 Maps and Drawings Showing Non-Impacted/Impacted Areas
Appendix 19.6 does not contain site maps or drawings. According to MARSSIM, a non-impacted area is an area "where there is no reasonable possibility (extremely low probability) of residual contaminations. Non-impacted areas are typically located off-site and may be used as background reference areas." There are no non-impacted areas on the SMC site since it is unknown where slag was used as fill.

14.2.1 Materials and Equipment Release Criteria
This section refers to a Table 1, however there is no Table 1 in the DP. Table 17.10 lists the acceptable surface contamination levels, but leaves out the levels for Radium-226, which is also present in the slag, and has release levels that are more restrictive than the levels for natural thorium. SMC should be aware that some landfills and metal recycling facilities have radiation detectors which are set to reject material at 10% above background. So even if the material meets the release limits, it should be checked to make sure the gamma levels are indistinguishable from background.
If material exhibits surface contamination levels above background, the plan states that it will be disposed of as low level radioactive waste (LLRW). The DP needs to specify whether these materials will it be sent to a licensed LLRW disposal facility or buried with the LLRW in the storage yard.

14.3.1 Final Status Survey Design Overview
The DP incorrectly states that SMC's current license (No. SMB-743) will be terminated. NRC has stated that SMC's current licnese will be amended into a LTC license.

14.3.2 Derived Concentration Guideline Levels (DCGLs)
Further explanation is required for the statement "Although Class 1 survey units are present at the Newfield site, in order to interject an element of conservatism into the decommissioning effort, only wide-area DCGLs, using the values shown in Table 17.11 are applicable."

14.3.4 Classification of Areas
In the first paragraph it is implied that there will be non-impacted areas, but Figure 18.11 and the last paragraph of this section states that all areas that are not Class 1 or Class 2 will be Class 3. The map does not delineate the Class 3 areas. Are they all other areas out to the property line? The Hudson Branch should be a Class 1 area since there is contamination above the DCGLs in the sediment. The area north of the storage yard (outside the property boundary) should be a Class 2 survey unit since there is documentation of thorium contamination in that area (Map 7 Appendix B of Appendix 19.9).
The Note on Figure 18.11 refers the reader to Appendix P of the 1991 site characterization report to find the areas where slag was used as fill and that these areas will be Class 1 areas. It is unclear if these Class 1 areas are marked on the map or not. Since the plan states that it is not known where slag was used as fill (Section 4.5), the areas designated as Class 3 on the map should be Class 2 for suspected contamination.

14.3.10 Analytical Instrument Description
The analytical laboratory must be certified by the NJDEP's Office of Quality Assurance. Consult the NJDEP website for approved laboratories. `http://www.nj.gov/dep/oqa/`

14.3.11.1 Surface Soil Survey Methods
It should be stated how the fill slag mentioned in Section 4.5 of the plan will be detected. Different scan MDCs would need to be developed to account for shielding of the buried slag.

14.3.11.3 Sample Analysis
This section states that there may be on-site gamma spectroscopy performed which contradicts section 14.3.9 which states that "no in-situ measurements of radionuclide concentration in soils or other solid material will be made. Instead, samples will be collected and forwarded to a commercial analytical laboratory for analysis."

14.3.14.2 Area Factors
There is not enough information presented to determine if the area factors were derived correctly.

This section neglected to mention that Section 8.5.2 in MARSSIM must be followed, that is a determination of the average residual radioactivity in the survey unit.

15.1 Cost Estimate
SMC failed to include the cost of groundwater monitoring for the LTC option.

16.1 Overview
The license will not be terminated.

16.2 Eligibility Demonstration
The problems with the costs of the alternatives were described in the comments to Chapter 7. The plan states that it is clear that implementation of the LTC Alternative results in radiation dose potential that is ALARA, but the calculations are flawed. Therefore, it is not clear that the eligibility requirement in 10 CFR 20.1403 was met.

The State has not responded to SMC's request for New Jersey's position on State Ownership, Control, or Oversight. Before the State could answer, it requested written responses to its comments on NUREG-1757, and financial disclosure from SMC. (Jackson to SMC dated 8/3/06). We have not received the information from SMC.

16.3.1 Description of Legally-Enforceable and Durable Institutional Controls
The State objects to the provisions in NUREG-1757 that allow SMC to pursue a Long Term Control License. See Petition to the Third Circuit Court of Appeals, Request to the NRC for Rulemaking, and Request to the NRC for a Hearing.

16.4 Site Maintenance and Financial Assurance
The plan states that the presence of a geomembrane will limt the depth of impact that burrowing animals could have on the integrity of the barrier. The geomembrane was removed from the design, but the impact of burrowing animals on the integrity of the barrier is not accounted for.

16.5.4 Evaluation of SSAB Advice
The response to the comment that there should be a liner mentions the leachability tests that were done and states that no discernable leaching occurred at all. This is not true, as shown in Attachment B to Appendix 19.4. The distribution coefficients for radium show that radium is capable of being leached. The modeling results confirm this. High pH water is usually not used for TCLP testing. This response does not address the public's concern.

16.6 Dose Modeling and ALARA Demonstration
The dose modeling used parameters that are not conservative enough and excluded the drinking water pathway without sufficient justification. The ALARA analysis was not done properly.

TABLES
17.2: There is no uncertainty provided with the analytical results. "A reported value without an accompanying uncertainty statement is for nearly all purposes worthless."[6]

Table 17.3 RESRAD Input Parameters
There should be a Table for Common Parameters (similar to Table 17.3.1) for the Restricted Area, Controls in Place. This would be less confusing than justifying restricted use parameters in Table 17.3.1 which is entitled Common Parameters (Unrestricted Area, Controls in Place).
Also, the printouts in Appendix 19.5 do not include all the scenarios.
[Parameters described in Steve Spayd's memo are in this table]

Table 17.4 RESRAD Exposure Pathways
The justification for excluding the radon pathway does not make sense. The fact that the source term has a very long half-life does not preclude radon from being a contributor to dose. Radon should be included in the assessment, especially of the unrestricted area.

Table 17.5 Partition Coefficients

[6] Colle, R. Abee, H.H., et al,"Reporting of Environmental Radiation Measurements Data", in Upgrading Environmental Radiation Data, EPA 520/1-80-012, US Environmental Protection Agency, Washington D.C.

The listed values for the partition coefficients were determined site specifically on the slag. The baghouse dust and contaminated soil partition coefficients (K_d) were not determined. In addition, the K_d determined for the slag cannot be used for the unsaturated and saturated zone K_ds.

Table 17.7 Source Term
Since the slag is vitreous in nature, it cannot be blended with the soil and baghouse dust. Therefore, the concentration of the slag should be input into the model, not the "derived" concentration. Using the concentration of the slag in the model results in a dose of over 500 mrem/y, if the drinking water pathway is included.

Table 17.8 Dose Modeling Results
None of the results are justifiable based on the comments on Chapter 5.

Table 17.9 Since the dose was not determined correctly, the costs and risks are not accurate.

Table 17.10 Row for radium is missing and is the most limiting.

Table 17.13 Not enough information was provided to determine if the Area Factors were determined accurately.

Table 17.14 The cost estimate for the LTC Alternative does not take into account leaching of the radionuclides into the groundwater.

Table 17.15 EnergySolutions estimate is different than that one that is describe here.

Appendix D to Rev. 1a June 30, 2006 submittal Groundwater Modeling Memo
The plan states that RESRAD assumes that a well is installed directly on top of the engineered barrier, with groundwater drawn from immediately below the location of the licensed radioactivity. This is not the case. When the Nondispersion option is selected in RESRAD, the well is assumed to be installed at the edge of the contaminated zone. The RESRAD run referenced (Newfield: 300308.rad) is not included so it is not known if this option was selected. Since in the all controls fail scenario, there is nothing to prevent the installation of such a well, this MODFLOW groundwater transport supplement is not needed.

Appendix 19.4Distribution Coefficient
The letter from Carol Berger to Dave Smith states that TCLP tests were run on the baghouse dust, yet there is no Kd listed in Attachment B for baghouse dust.

Appendix 19.6 Radionuclide Concentrations in Soil
Although the title of the Appendix indicates this is soil data, the table contains soil, sediment and water data. It is unknown if the water is ground water or surface water since it is not clearly stated. There are no uncertainties included with the results.

Appendix 19.9 Environmental Report
It is assumed that the NRC Environmental Impact Statement will replace this Appendix, so the text of the Environmental Report was not reviewed.

Appendix B
The water sample at H49 on Map 6 is above the surface water standard for total uranium[7], 52 ug/L compared to the NJ Surface water standard of 30 ug/L. Several samples of water on Map 8 are above the surface water standard for radium. Several sediment samples are above the NJDEP soil cleanup standards for radium. Clearly, the Hudson Branch is contaminated above background concentrations and needs to be addressed in the DP.

Appendix F
Letter from Carol Berger to Dave Smith dated June 9, 2005
Attachments 1 and 2 are not included. The laboratory data reporting sheets should be included also. The gross beta results are not included so it cannot be determined if the 50 pCi/L screening value is exceeded. Again, the uncertainties are not reported.
The interpretation of Table 2 is not correct. There is an EPA MCL for total uranium which is 30 ug/L. Total Uranium can be determined by dividing the U-238 concentration in pCi/L by 0.3365 pCi/ug. The referenced EPA regulation 40 CFR141.66(d)(2) is very specific in that the dose must be calculated using the National Bureau of Standards Handbook 69 as amended August 1963, US Department of Commerce, not the EPA's Federal Guidance Report No. 11. Therefore, the MCLs calculated in Table 3 are wrong. In addition, as stated above, there is an EPA MCL for total uranium.

The Borough of Newfield wells have been tested by the Bureau of Safe Drinking Water and have generally been below 2 pCi/L for Ra-228 for the past several years. Therefore, the statement that the radionuclides in the wells at SMC are indistinguishable from background cannot be made.

[7] U-238 concentration (pCi/L) is divided by 0.3365 pCi/ug to determine total uranium mass concentration.

Jennifer Goodman
PO Box 415
25 Arctic Parkway
Trenton, NJ 08625-0415
(609) 984-5498
jenny.goodman@dep.state.nj.us

EDUCATION

Rutgers University Graduate School, New Brunswick, NJ
MS Radiation Science, October, 1987
Institute of Nuclear Power Operators (INPO) Fellowship recipient

Cook College (Rutgers University), New Brunswick, NJ
BS Biochemistry, 1980

EXPERIENCE

US Environmental Protection Agency, Region 2, New York, NY
1984-85, Emergency Planning, Member of Radiological Assistance Committee

NJ Department of Environmental Protection, Trenton, NJ
1985-88, Bureau of Nuclear Engineering, Coordinated nuclear power plant emergency exercises, wrote standard operating procedures, designed and supervised construction of the Emergency Laboratory Facility.
1988-92, Bureau of Environmental Radiation, Supervised Radon Section, responsible for implementation of radon certification regulations.
1992-Present, Bureau of Environmental Radiation, Supervise Radiological Assessment Section
Responsible for reviewing characterization, remediation and final status survey plans for sites contaminated with radioactive materials. Sites include mineral extraction industries, former Manhattan Engineering District sites (nuclear weapons production), military bases, and manufacturing operations. Part of a team that developed cleanup standards for naturally occurring radioactive materials. Developed and promulgated a regulation for soil remediation standards for radioactive materials. Assist the Bureau of Safe Drinking Water with radionuclides in drinking water issues including occurrence, treatment, waste management, health effects, and costs.
Member of the Interagency Steering Committee on Radiation Standards Sewage Sludge Subcommittee
Assisted the NJ Drinking Water Quality Institute in developing a standard for Ra-224, currently assisting with development of radon in water standard.
Member of National Council on Radiation Protection and Measurements Scientific Committee 6-2.

REPORTS

New Jersey Drinking Water Quality Institute Report on Radium-224
Health Effects Subcommittee, November 2001
Radon in Air Investigation of the Pequest Trout Hatchery, Mansfield,

Liberty, and White Townships, Warren County, 2004
Investigation of Charlotte Uranium Mine, Byram Township, Sussex County, February 2004
ISCORS Assessment of Radioactivity in Sewage Sludge:
Radiological Survey Results and Analysis, November 2003
Modeling to Assess Radiation Doses, February 2005
Recommendations on Management of Radioactive Materials in Sewage Sludge and Ash at Publicly Owned Treatment Works, February 2005
A Study of Technologically Enhanced Naturally Occurring Radioactive Material (TENORM) at a New Jersey POTW, January 2005
A Review of "Understanding Patterns and Trends of Radioactive Strontium-90 in Baby Teeth of New Jersey Children with Cancer: A Report to the New Jersey State Department of Health and Senior Services", September, 2005

PUBLICATIONS

Amidon, T., Stern, R., and Goodman, J., *A Pathways Analysis Approach to Developing Remediation Standards for Radioactively Contaminated Soils,* in Contaminated Soils, Volume 4, Kostecki, P. and Calabrese, E. editors, 1999.
Goodman, J., New Jersey and MARSSIM: Perfect Together (Well, Almost). *Health Physics*. 84(6) Supplement 3, June 2003
Bastian, R. et al, Radioactive Materials in Biosolids: National Survey, Dose Modeling, and Publicly Owned Treatment Works (POTW) Guidance, *Journal of Environmental Quality* 34:64-74, 2005.
Wolbarst, A.B.et al, Radioactive Material in Biosoilds: Dose Modeling. *Health Physics*. 90(1), January 2006

PRESENTATIONS

Ingestion Pathway Planning in NJ and the Impact on a State Radiation Laboratory, Health Physics Society, Boston, MA, July, 1988.
Implementation of NJ Soil Remediation Standards for Radioactively Contaminated Sites, Health Physics Society, Philadelphia, PA, June, 1999.
ISCORS Update on Sewage Sludge, Conference of Radiation Control Program Directors Mid-Atlantic Meeting, Atlantic City, NJ, October, 2003
Cleaning Up the BOMARC Site, from Missile Maidens to MARSSIM NJ Chapter of the Health Physics Society, March, 2005
Implementation of ISCORS Guidance Documents: New Jersey's Experience, ISCORS Principals, Washington D.C., March 2005

AWARDS

Appreciation Award in Recognition of Outstanding Achievement as a member of the Tom's River Working Group, June 1999
Professional Achievement Award for assistance to the Drinking Water Quality Institute in developing a Radium-224 in water standard, April, 2003

REFERENCES

Available upon request

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Andrew D. Reese
Deputy Attorney General
(609) 292-1509

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)	DECLARATION OF STEVEN SPAYD

I, STEVEN SPAYD, hereby declare as follows:

1. Attached please find my memo to Jenny Goodman and Donna Gaffigan dated January 12, 2007 and my resume, both of which are true and accurate.

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

DATE: 1/16/07

Steven Spayd
STEVEN SPAYD

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Land Use Management
New Jersey Geological Survey
29 Arctic Pkwy
PO Box 427
Trenton, NJ 08625-0427
Tel. # (609) 292-1185 – Fax (609) 633-1004 – Home Page: http//www.state.nj.us/dep/njgs/

JON S. CORZINE
Governor

LISA P. JACKSON
Commissioner

To: Jenny Goodman, Bureau of Environmental Radiation
Donna Gaffigan, Site Remediation Program

Through: Dave Pasicznyk, Chief, Bureau of Water Resources, NJ Geological Survey
Dave Hall, Section Chief, Bureau of Water Resources, NJ Geological Survey

From: S. Spayd
Steven Spayd, Supervising Geologist, Bureau of Water Resources, NJGS

Subject: Shieldalloy Metallurgical Corporation, Newfield, Gloucester County
Review of Decommissioning Plan Documents

Date: January 12, 2007

As per your request, I have reviewed several of the Decommissioning Plan documents for the Shieldalloy Metallurgical Corporation site in Newfield, Gloucester County, including the following:

Remedial Investigation Technical Report, April 1992
Appendix A, Dose Modeling Evaluations, June 2006
Appendix B, Tables, June 2006
Appendix C, Ground Water Potability Analysis, June 2006
Appendix D, Ground Water Modeling Memo, November 17, 2005
Appendix E, Engineered Barrier Design Calculations, June 2006
Appendix 19.9, Environmental Report for the Newfield Facility

Several problems were identified.

RESRAD Input Parameters

Runoff Coefficient: The runoff coefficient of 0.45 appears to be excessively high without justification. The mounded topography of the contaminated zone is not expected to increase the runoff to this degree. We estimate that a stone and soil cover for the contaminated zone would result in a net recharge of about 11-inches per year and a runoff coefficient approximating 0.26.

Hydraulic Conductivity of the Unsaturated Surface Layer: The hydraulic conductivity of the Unsaturated Surface Layer is incorrectly given as 0.017 meters per year (m/yr). This number is orders of magnitude too low for a sand and gravel sediment. Table 17.3 in Appendix B states that this value represents measured hydraulic conductivity in the sandy soils present at the site and references the April 1992 Remedial Investigation Technical Report. The 1992 Report presents no data on measured hydraulic conductivities of this layer. It appears possible that TRC incorrectly selected the vertical hydraulic gradient value measured at monitor well cluster SC13S and SC13D in Table 22 of the 1992 Report as a measured hydraulic conductivity.

The unsaturated surface layer consists of gravel and sand of the Bridgeton Formation. The expected hydraulic conductivity of this material is in the range of 100-200 feet per day which equates to 11,000 to 22,000 m/yr.

<u>Hydraulic Gradient of the Saturated Zone</u>: The hydraulic gradient of the saturated zone is listed as an estimate in Appendix A and B as 0.004. Reference is given to the April 1992 Remedial Investigation Technical Report. However, measurement of the hydraulic gradient of the saturated zone in the 1992 Report show the gradient at the site to be 0.002, one half the gradient used in RESRAD. The Ground Water Modeling Memo also uses the 0.002 hydraulic gradient value. Therefore, the hydraulic gradient of the saturated zone used in RESRAD is not correct and should be changed to 0.002.

<u>Distribution Coefficient for Radium</u>: Appendix A and B list a distribution coefficient (Kd) for Radium of 53 cm^3/g. The justification provided is the leaching tests on the waste slag materials. This value may be justified for calculations in the slag, but not for bag house dust materials, and not for use in the unsaturated surface layer or in the saturated layer.

According to the USEPA (EPA 2004), there is very little data available on Kd values for Radium in soils and sediments. EPA recommends using lookup tables for Strontium as guidance because the adsorption behavior of Radium will be somewhat similar to that of Strontium and there are extensive studies and data for Strontium. Using the Strontium lookup tables available from EPA, we see that for sediments with low cation exchange capacity, low clay content, and low pH, the Kd values will be low. The unsaturated zone sediments of the Bridgeton Formation and the saturated sediments of the Cohansey Formation are both low in cation exchange capacity and clay content. The pH levels are also low. An analysis of the pH data, from the 1992 Report, for ground water at the site indicates that about 50% of the monitor wells have water with a pH of less than 6.0 and 68% have a pH of less than 7.0. Radium adsorption is minimal at acidic pH values (< 7) and adsorption increases with increasing pH. Therefore, adsorption of Radium is likely to be quite low in these zones. The same technical basis partially explains why Radium is a naturally occurring contaminant in well water of the Cohansey Aquifer in southern New Jersey – the aquifer has minimal capacity to adsorb it.

Therefore, to adequately model the potential transport of Radium from the waste into ground water and to down gradient receptors, adsorption/desorption tests should be conducted on the bag house dust, and sediments from both the unsaturated zone Bridgeton Formation and the saturated zone Cohansey Formation.

Ground Water Modeling Memo

Insufficient Data Submitted: The ground water modeling memo is only a summary of the work conducted. There is not enough information supplied to complete an adequate evaluation of the modeling results. The MODFLOW input and output files, as well as the results of the sensitivity analysis are needed for evaluation. However, there is enough information to make some obvious criticisms.

Hudson Branch: The surface water of Hudson Branch flows through the model domain. It is expected that the Hudson Branch is in direct connection with shallow ground water. It should probably be included in the model as a drain feature.

Distribution Coefficients: As described above in the RESRAD comments, the adsorption/desorption tests conducted on the waste slag materials are not directly transferable to the aquifer materials. Therefore, adsorption/desorption tests should be conducted on the site sediments from the saturated zone Cohansey Formation, so that the transport of the radionuclides can be modeled with some level of confidence.

Ground Water Potability

Ground Water Potability: The Ground Water Potability Report fails to mention that the goal of the NJDEP required pump and treat systems are to decontaminate and restore the aquifer to potable conditions. Eventually, the Classification Exception Area should be removed. The Ground Water Potability Report should include a timeline showing when levels of chromium, volatile organics, and other contaminants will meet drinking water standards. Since the Decommissioning Plan is dealing with radioactive materials that will remain a hazard for thousands of years, it is clear that the ground water cleanup and aquifer restoration should be complete in the relatively near future. The assertion in the Ground Water Potability Report, that ground water at and near the site is not potable must be put in context of the timeline for ground-water cleanup. The drinking water pathway must be taken into consideration over the long term.

If you have any questions or require further clarification, please let me know.

Reference

USEPA, 2004, Understanding Variation in Partition Coefficient, Kd, Values, Volume III: Review of Geochemistry and Available Kd Values for Americium, Arsenic, Curium, Iodine, Neptunium, Radium, and Technetium, EPA 402-R-04-002C.

c: Karl Muessig, State Geologist, NJ Geological Survey
George Nicholas, Site Remediation Program

STEVEN E. SPAYD

New Jersey Department of Environmental Protection
P. O. Box 427
Trenton, New Jersey 08625
609-633-1039

EXPERIENCE

Over 25 years of environmental, hydrogeologic, and research experience. Collection and analysis of geologic, hydrogeologic, and engineering data. Design, evaluation, and management of numerous ground-water pollution investigations and cleanups including sites with volatile organics, petroleum hydrocarbons, PCBs, pesticides, nitrates, bacteria, base neutrals, metals, dioxin, and radionuclides. Aquifer test analysis. Delineation of Well Head Protection Areas and investigation of numerous contaminated well fields, including identification of natural and anthropogenic contaminant sources. Development of NJDEP policies, regulations, and standard operating procedures regarding ground-water protection, pollution investigation and cleanup. Knowledge of state and federal environmental, ground-water, and drinking water regulations. Management skills include: prioritization and assignment of projects; review and approval of technical outputs; preparation of workplans and monthly reports; budget development and tracking; fee collection; and hiring staff.

EDUCATION

M.P.H., Master of Public Health, Environmental Health,
University of Medicine and Dentistry of New Jersey, School of Public Health

Graduate Work in Hydrogeology:
Wright State University, Dayton, Ohio and Montclair State University, New Jersey (GPA = 4.0)

B.S., Geoscience, Montclair State University, New Jersey (GPA = 3.77, Magna Cum Laude)

Attended University of Arizona, Tucson, Arizona as well as numerous Short Courses, Seminars and Conferences.

SPECIAL SKILLS

- Expertise in hydrology, geology, contaminant transport, well head protection, well hydraulics, and modeling.
- Writing and editing technical reports, and overseeing field work.
- Development and implementation of research proposals.
- Computer skills include database, spreadsheet, word-processing, scientific modeling, and GIS applications.
- Understanding and coordinating with regulatory programs.
- Public speaking, education, and negotiating with responsible parties.

PUBLICATIONS

Ruimin Xie, Willie Johnson, Steve Spayd, Gene S. Hall, Brian Buckley, 2006, Arsenic speciation analysis of human urine using ion exchange chromatography coupled to inductively coupled plasma mass spectrometry. *Analytica Chimica Acta 578 (2006) 186–194*

Serfes, M. E., Spayd S. E., and Herman, G. C., 2005, Arsenic Occurrence, Sources, Mobilization, and Transport in Groundwater in the Newark Basin of New Jersey, in, Advances in Arsenic Research: Integration of Experimental and Observational Studies and Implications for Mitigation" ACS Symposium Series Vol. 915, American Chemical Society, (2005) Editors: Peggy A. O'Day, Dimitrios Vlassopoulos, Xiaoguang Meng, Liane G. Benning; Oxford University Press, P 448.

"Arsenic Water Treatment for Residential Wells in New Jersey"
New Jersey Geological Survey & Bureau of Safe Drinking Water Information Circular, 2005.

"Guidelines for Delineation of Well Head Protection Areas in New Jersey"
New Jersey Geological Survey Open File Report OFR 03-1, 2003.

"Arsenic Occurrence, Sources and Possible Mobilization Mechanisms in Ground Water of the Piedmont Physiographic Province in New Jersey" Poster, in EOS, Transactions of the American Geophysical Union Fall Meeting, November 2000.

"Private Party Cleanups: A Success Story,"
Water Resource News, N. J. Dept. of Environmental Protection, Fall 1985.

"Movement of Volatile Organics Through a Fractured Rock Aquifer,"
Ground Water Journal, July 1985.

POSITIONS HELD

Research Hydrogeologist, Bureau of Water Resources, New Jersey Geological Survey,
N. J. Department of Environmental Protection. September 1993 - present.

- Project Manager for research on effective water-treatment systems for arsenic in drinking water.
- Co-Project Manager for research on the sources, mobilization, fate, and transport of arsenic in bedrock aquifers.
- Ground-water flow modeling and hydrogeologic support for Toms River Childhood Cancer Cluster Workgroup.
- Assist state agencies and the public with water quality and hydrogeologic issues.

Bureau Chief, Bureau of Aquifer Restoration, NJDEP, July 1991 - September 1993.
Bureau of Aquifer Protection, NJDEP, July 1990 - June 1991.
Bureau of Ground-Water Pollution Assessment, NJDEP, May 1988 - June 1990.

Section Chief, NJDEP, July 1985 - May 1988.

Supervising Geologist, NJDEP, November 1984 - July 1985.

Principal Geologist, NJDEP, November 1983 - November 1984.

Senior Geologist, NJDEP, April 1983 - November 1983.

Assistant Geologist, NJDEP, January 1982 - April 1983.

The responsibilities while in the above six NJDEP positions included: identifying aquifer contamination and pollution sources; monitoring and evaluating the movement of contaminated ground water; determining the chemical identity and degree of contamination; evaluating public health implications of pollution events; providing expert testimony; coordinating investigatory efforts; providing technical expertise on hydrogeology and aquifer restoration programs; ground-water modeling; preparing technical reports; monitoring aquifer restoration programs; and interacting with attorneys, consultants, other agencies, the media, and the public.

Staff Geologist Converse Ward Davis Dixon, Caldwell, N.J.
Ground-water supply and quality studies, sanitary landfill site selections, engineering studies, and geotechnical projects. Drilling inspections; rock, soil and water sampling; and geophysical surveys. August 1980 - January 1982.

Chief Geologist Northeast Geo-Consulting, Wyckoff, N.J.
Organized geologic and environmental service firm. April - August 1980.

Science Teacher Ramsey Board of Education, Ramsey, N.J.
Taught High School Earth Science. September 1979 - August 1980.

Field Geologist Century Geophysical Corp., Casper, Wyoming
Collecting and interpreting geophysical data relating to hydrology, geology, and mineral value. May 1979 - August 1979.

CERTIFICATIONS

Registered Professional Geologist, Commonwealth of Pennsylvania, 1995 - Present.
Certified Professional Geologist, American Institute of Professional Geologists, 1985 - 1995.
Certified Teacher of Science, State of New Jersey, 1979 - Present.

ASSOCIATIONS

Geological Society of America, Geology and Health Division, 2006 - Present.
Association of Ground Water Scientists and Engineers, National Ground Water Association, 1984-1996.

SELECTED RECENT PRESENTATIONS

February 2006 - National Ground Water Association Naturally Occurring Contaminants Conference: Arsenic, Radium, Radon, and Uranium. Invited Special Guest Speaker. Presented: Arsenic Exposure Reduction for Residential Wells via Drinking Water Treatment Systems.

November 14, 2005 - New England Private Drinking Well Symposium, Portsmouth, New Hampshire. Presented: Arsenic Water Treatment and Human Exposure.

July 27, 2005 – Penn State Harrisburg Environmental Training Center, USEPA Small Public Water Systems Technology Assistance Center, and New Jersey Water Association Workshop on Arsenic Compliance – A Small System Approach at Raritan Valley College, Branchburg, NJ. Presented: Arsenic Occurrence, Exposure and Health Effects.

June 15, 2005 - Eastern Water Quality Association Annual Meeting, Princeton, NJ. Presented: Update on Nature, Extent, Sources, and Treatment of Arsenic in New Jersey Well Water.

February 25, 2005 – National Ground Water Association Naturally Occurring Contaminants Conference: Arsenic, Radium, Radon, and Uranium. Invited Special Guest Speaker. Presented: Efficacy of Arsenic Exposure Reduction via Drinking Water Treatment Systems.

September 15, 2004 – Oral Deposition in the matter of NJDEP vs. Robert E. Johnson, et al. Provided testimony on contaminated well case in Pine Lake Park, Manchester Township, NJ.

June 15, 2004 - Eastern Water Quality Association Annual Meeting, East Windsor, NJ. Presented: Nature, Extent, Sources, and Treatment of Arsenic in New Jersey Well Water.

April 7, 2004 – Arsenic Symposium, Rutgers EcoComplex, Burlington, NJ. Presented: Source, Nature, and Extent of Arsenic Contamination in New Jersey.

February 18, 2004 – Private Well Testing Act – NJDEP Health Agency Training Seminar, Mt. Holly, NJ. Presented: Arsenic in New Jersey Well Water: Nature, Extent, Sources, and Treatment.

November 3, 2003 – Columbia University, NYC. Superfund Basic Research Program Seminar Series. Presented: 1) Arsenic in New Jersey Well Water: Nature, Extent, Sources & Treatment and 2) Human Exposure to Arsenic and Biomonitoring of the Families with the Highest Known Arsenic Levels in NJ Well Water.

September 30, 2003 – Wellcare Workshop, American Ground Water Trust, Princeton. Presented: Geology, Aquifers & Threats to Wells in NJ.

September 24, 2003 – New Jersey Water Association Management/Technical Conference, Atlantic City, NJ. Presented: Geology, Aquifers & Threats to Wells in NJ.

July 24, 2003 – Columbia University, NYC, Environmental Sciences and Policy Class. Presented: Arsenic in New Jersey Well Water.

March 21, 2003 – 29th Annual Water Quality Association Convention, Las Vegas, Nevada. Presented: Arsenic Water Treatment for Residential Wells & Human Exposure Monitoring.

October 26, 2001 – Geology in Service to Public Health, Joint Meeting of the Geological Association of New Jersey and the New Jersey Section-American Water Resources Association. Presented: Keynote Address – Arsenic, Geology & Public Health.

October 17, 2001 – Protecting Source Water Quality, NJ Section, American Water Works Association, Princeton, NJ. Presented: Delineation of Well Head Protection Areas for New Jersey.

July 20, 2001 – Ground Water Institute for Teachers, American Ground Water Trust, Parsippany, NJ. Presented: Summary of the Common Threats to the State's Ground Water – New Jersey Ground Water Protection Program.

April 20, 1999 – Water Supply Issues and Uncertainties in New Jersey's Atlantic Coastal Region, Jacques Cousteau National Estuarine Research Reserve, Atlantic City – Presented: Source Water Assessment Program (Well Head Protection).

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R. J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Kenneth W. Elwell
Deputy Attorney General
(609) 292-1401

IN RE PETITION FOR A HEARING on)
REQUEST FOR DECOMMISSIONING)
FOR SHIELDALLOY METALLURGICAL)
CORPORATION, NEWFIELD, NJ,)
pursuant to 10 C.F.R. §2.309)
and 42 U.S.C. §2239(a)(1)(A))

DECLARATION OF DONNA L. GAFFIGAN

Under the penalty of perjury, I, DONNA L. GAFFIGAN, hereby declare:

1. Attached please find my resume, which is incorporated into this Declaration by reference.
2. I have reviewed portions of the Shieldalloy Metallurgical Corporation (SMC) revised Decommissioning Plan for Newfield, NJ (DP) submitted to the Nuclear Regulatory Commission (NRC) on or about June 30, 2006. For the past 18 years I have been the Case Manager for the cleanup of chemical contamination caused by SMC at the Newfield, NJ facility.
3. I represented the NJDEP as a member of the Site Specific Advisory Board ("SSAB"). I attended all four of the SSAB meetings. The SSAB was convened by Shieldalloy.

4. The SSAB failed to adequately elicit public advice on the proposed decommissioning. The SSAB never selected a chairperson or adopted a charter or operating procedures as recommended in NUREG-1757, Appendix M, Section M.6. Instead, Shieldalloy's legal counsel conducted the meetings by simply advancing Shieldalloy's arguments in support of the decommissioning. Members of the SSAB were encouraged to ask questions during the meetings, but there was never an opportunity for members to discuss issues among themselves without the licensee or its representatives present to direct the discussion.
5. Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on certain issues. For example, the members could not provide advice on whether the proposed institutional controls would assure that an average member of the public would not incur a radiation dose in excess of 25 millirem Total Effective Dose Equivalent (TEDE). Shieldalloy failed to provide sufficient information to provide advice on this issue, such as the characterization of the slags, baghouse dust and other materials or the engineering design of the engineered barrier.
6. Also, Shieldalloy failed to provide sufficient information to the SSAB members in order to provide advice on whether the $5

million financial assurance would be adequate to enable an independent third party to assume responsibility for control and maintenance of the site. Shieldalloy failed to provide sufficient information such as the engineering design of the proposed engineered barrier.

7. Shieldalloy did not incorporate the public advice into the DP. NJDEP and other SSAB members (besides Shieldalloy and its representatives) were unanimous in opposing the DP. The NJDEP did not believe that institutional controls would be enforceable for the billions of years that the waste remains a radioactive hazard. The NJDEP believed that the institutional controls would impose undue burdens on the local community. The members of the public responded that they did not know if the institutional controls would be enforceable or if the institutional controls would impose undue burdens on the local community. However, this advice was not incorporated into the DP.

8. In the discussion on page 41 of the DP about the reasonably likely foreseeable future use (100 years) scenarios for the site it is stated that there are existing site use restrictions due to natural resource restoration and potential future residential use restrictions due to chemically contaminated soil. The DP also mentions the proximity of the

Pinelands National Reserve. It further states that these restrictions will result in a land buffer to prevent construction in close proximity to the engineered barrier. SMC uses these assumptions in the dose assessment to limit the evaluation to non-residential exposure scenarios. This approach is erroneous since these three land use restrictions are only institutional controls that are considered to disappear under an "all controls fail" scenario, and do not preclude residential use of the property in the future. Therefore, the dose assessment must include residential exposure scenarios.

9. Final decisions have not been made with respect to the nature and extent of cleanup of chemical contamination at the facility and whether some or all of the Newfield site will be restricted in use after the remediation of the chemical contamination. It is important to note that with properly managed engineering and institutional controls of areas with residual chemical contamination, no future use of the facility, including residential, is precluded. It is erroneous for SMC to suggest in the DP that chemical contamination precludes future residential use of the facility. Therefore, the dose assessment must include residential exposure scenarios.

10. The DP states that there is sufficient justification for excluding the ground water pathway from the dose assessments because the engineered barrier is designed to prevent rainwater infiltration into the consolidated material; the Toxicity Characteristic Leachability Procedure (TCLP) results and distribution coefficients determined for the residual radioactivity in SMC's slag show that there is marked resistance to leaching; the ground water at the SMC site contains chemical contaminants that exceed the National Primary Drinking Water Standards which shows it is not a potable water supply; and it is unreasonable to assume that an onsite drinking water well will be maintained when a source of municipal water is readily available. These justifications are not sufficient to preclude the ground water pathway from the dose assessment for the following reasons discussed in paragraphs 11 through 18. Therefore, the dose assessment must include the groundwater exposure pathway.

11. The DP is contradictory as to whether the engineered barrier will prevent rainfall infiltration into the consolidated materials. In some sections the DP states that a geomembrane will be present to prevent water infiltration and in others the absence of such a membrane is noted. Also, at

the public meeting held in Newfield on December 5, 2006, the NRC staff stated that the engineered barrier will be designed to *allow rainwater infiltration*. Without the geomembrane, the proposed design of engineered barrier allows for the potential leaching of contaminants from the buried materials directly into the ground water. This is of critical importance since no liner is proposed beneath the contaminated materials, and the material sits directly on the native sandy and very permeable soil. In a mere 50 years of operations SMC contaminated the groundwater at the facility with chromium, trichloroethene and other contaminants. The DP proposes disposal of radioactive waste for thousands of years in a manner which would allow further groundwater contamination. The DP must include definitive language about the presence or absence of an impermeable layer in the engineered barrier.

12. Limited TCLP data is used in the DP to support the claim that the slag shows a marked resistance to leaching. The DP states that slags and baghouse dust were subjected to the TCLP in 2005. The resulting "leachate" was then analyzed for radionuclides only, with the results presented in Appendix 19.4 of the DP. However, there are many limitations to this data as indicated in paragraphs 13 through 16.

13. TCLP was only conducted on the slag and baghouse dust. SMC proposes to consolidate radioactively contaminated soils and building materials along with the slag and baghouse dusts under the engineered barrier. However, the contaminated soils and building materials were not analyzed for leachability of radionuclides. Before these materials can be considered for inclusion under the engineered barrier, they must be analyzed for the leachability of radionuclides using an appropriate method.

14. The TCLP leachate for the slag and baghouse dust was only analyzed for radionuclides. The leachate should have also been analyzed for chemical contaminants pursuant to RCRA to determine if they are hazardous waste and possibly banned from land disposal. Representative samples of any and all of the materials (including contaminated soils and building materials) that will be placed under the engineered barrier must be analyzed for TCLP. Even if the results are below the limits for hazardous waste classification, the TCLP results will indicate if any of the materials are contaminated with metals or other contaminants that may be leachable and present a continuing source of ground water contamination. For example, 1987 EP Toxicity (the predecessor to the TCLP) data of ferrocolumbium slag samples indicate that barium

concentrations as high as 23,000 ppb were present in the leachate. The Safe Drinking Water Act Maximum Contaminant Level for barium is 2000 ppb.

15. Only three samples of slag (for more than 30,000 cubic meters of a variety of slags) and two samples of baghouse dust (for more than 13,000 cubic meters of dust) were subjected to TCLP and subsequent radionuclide analysis. It is unlikely that these few samples are sufficient to accurately represent the large volume and variety of materials present. A representative number of samples of any and all materials (including contaminated soils and building materials) that will be placed under the engineered barrier must be collected and analyzed to determine the leachability of both radionuclides and chemical contaminants.

16. The results indicate that radium leaches from the slag, contradicting SMC's statements that the slag shows a marked resistance to leaching. The text of the DP is also contradictory on the issue of whether radionuclides will leach from the slag (See, e.g., pages 27 and 30). The results show that the baghouse dust was analyzed for leachability of radionuclides, but the distribution coeffiecients were not determined.

17. SMC's DP states that the groundwater at the facility is already contaminated and not a potable supply but fails to mention that the existing ground water contamination was caused by SMC. SMC has for 27 years operated a treatment system on site to remediate this groundwater contamination. SMC's consultant, TRC Environmental Company, has entered into an oversight document with the NJDEP to remediate the chemical contamination in the ground water, soil, sediment and soil. TRC's goal is to remediate the ground water as quickly as possible, potentially within 20 years. It is therefore incorrect for SMC to state that just because the groundwater at the site is already contaminated that it should not be protected against further contamination or should not be considered to be potable source for the next 1000 years in the dose assessments. Therefore, the dose assessment must include the groundwater exposure pathway.

18. SMC's DP fails to mention that the current municipal supply wells are located less than one mile from the site and draw water from the same aquifer that SMC has contaminated. The wells are located upgradient of the site, but the presence of large volume irrigation wells in the immediate area, in conjunction with the constant pumping of the municipal wells, makes transport of the contamination towards and into the

potable wells a real possibility over the next 1000 years. In addition, SMC is located in the New Jersey Coastal Plain Sole Source Aquifer and as such there are obvious limits to alternative water supplies. (see http://www.epa.gov/region02/water/aquifer/coast/coastpln.htm#I19). Protection of this resource against further contamination is critical yet the DP fails to include the ground water exposure pathway in the dose assessments. Therefore, the dose assessment must include the groundwater exposure pathway.

19. Residual radioactivity has been identified in the Hudson's Branch as indicated in the Executive Summary and Appendix 19.9 (Environmental Report). The data referenced is from the 1992 Assessment of Environmental Radiological Conditions at the Newfield Facility which concluded that the radioactivity detected in the Hudson's Branch water and sediments is not significantly different from background. It does not appear that sampling of the stream has been conducted since 1991 while storage of the slags, baghouse dust and other materials has continued for an additional 15 years. The full extent of contamination in the surface water and sediments was not evaluated in the DP nor is the potential impact from

contaminated ground water discharging the stream. The DP must include these media.

Dated: 1/16/07

Donna L Gaffigan
DONNA L. GAFFIGAN

Donna L. Gaffigan
PO Box 028
401 East State Street, 5th Floor
Trenton, NJ 08626-0028
(609) 633-1494
Donna.Gaffigan@dep.state.nj.us

EDUCATION

Cook College, Rutgers University, New Brunswick, New Jersey
BS Environmental Science, 1983

EXPERIENCE

New Jersey Department of Environmental Protection

1988–Present, Bureau of Case Management, Case Manager, responsible for oversight and coordination hazardous site remediation pursuant to federal, state and local environmental laws including CERCLA, RCRA, and New Jersey Spill Act; implement public communication activities.

1987-88, Bureau of Planning Assessment, responsible for preparation of Preliminary Assessments, Site Inspections and RCRA Facility Assessments; preparation and execution of sampling plans; proficient use of air monitoring equipment; assisted section chief with staff supervision and work review; performed other special projects; staff training.

1986-87, Bureau of Site Assessment, responsible for preparation of Preliminary Assessments, Site Inspections and RCRA Facility Assessments; preparation and execution of sampling plans; proficient use of air monitoring equipment.

S-R Analytical Inc.
1983-86, laboratory technician, responsible for preparation of environmental and waste samples for metals, pesticides, herbicides, volatile organic compounds, semi-volatile organic compounds and petroleum hydrocarbons analyses; analysis of prepared environmental and waste samples using gas chromatograph, infrared spectrometer and gas chromatograph/mass spectrometer.

TRAINING

Hazardous Materials Incident Response Operations Course
Hazardous Material Annual Refresher Courses

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R. J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Kenneth W. Elwell
Deputy Attorney General
(609) 292-1401

IN RE PETITION FOR A HEARING on)
REQUEST FOR DECOMMISSIONING)
FOR SHIELDALLOY METALLURGICAL)
CORPORATION, NEWFIELD, NJ,)
pursuant to 10 C.F.R. §2.309)
and 42 U.S.C. §2239(a)(1)(A))

DECLARATION OF JOHN BURKE

Under the penalty of perjury, I, JOHN BURKE, hereby declare:

1. Attached please find my resume, which is incorporated into this Declaration by reference.

2. I have reviewed the portions of the Shieldalloy Metallurgical Corporation (SMC) revised Decommissioning Plan for Newfield, NJ (DP) submitted to the Nuclear Regulatory Commission (NRC) on or about June 30, 2006, which concern financial requirements.

3. The DP fails to require sufficient financial assurance and fails to require an adequate ALARA analysis because it fails to consider inflation. Over the past 50 years inflation has dramatically increased the cost of goods and services. Failure to consider the effect of inflation on all costs to maintain the disposal site and comply with license and record keeping

obligations dramatically undermines the sufficiency of the financial assurance amount posted at the time of establishment of the disposal facility. This is particularly true at a disposal facility which is to be maintained in perpetuity, and is also true notwithstanding the 25% contingency included in the Table 17.14 Cost Estimate for the LTC Alternative.

4. Nor does the Table 17.14 Cost Estimate for the LTC Alternative provide sufficient funds for remedial action, should that be required. In the event that radioactive contaminants are found at some future date to be escaping the cap into groundwater, for example, it is very unlikely that the amount of financial assurance provided for would be sufficient to fund recovery and treatment of contaminated groundwater along with modification of the cap to prevent continuing contamination. The annual amount allocated to _cap maintenance_ is a mere $7,440.00.

5. In the event that SMC defaults on its obligation to operate and maintain the disposal site over it's perpetual existence, a contractor would have to be hired by the NRC to maintain the disposal facility. Such a contractor will require a profit to maintain the disposal facility. The Table 17.14 Cost Estimate for the LTC Alternative does not provide sufficient funding to support a cost plus profit arrangement and therefore does not establish sufficient financial assurance.

Date: 1-16-07

JOHN BURKE

Personnel Data

Name:	John T. Burke
Address:	410 E. State St. PO Box 402 Trenton, NJ 08625-0402
Education:	B.S. La Salle University, Philadelphia, P.A.
Major Field:	Accounting
Minor Field:	Business Administration
Post Graduate Studies:	Federal and New Jersey State Income Taxation, Insurance and Financial Planning
Organizations:	Association of Government Accountants, Trenton Chapter

Government Employment:

Aug. 2,1997 to Date — Administrative Analyst 1(FM) New Jersey Department of Environmental Protection, Office of Legal Affairs.

Duties: Perform Economic Benefit and Ability to Pay analyses as requested by Department program elements and the advising deputies attorney general. Manage Budget, Fiscal and Personnel matters for the NJDEP's Offices of Legal Affairs, Legislative Affairs, Business and External Affairs, Communications and Press Office.

Sept. 5,1992 to Aug. 1,1997 — Administrative Analyst 1(FM) New Jersey Department of Environmental Protection, Office of Enforcement Coordination.

Duties: Perform Economic Benefit and Ability to Pay analyses as requested by Department program elements and the advising deputies attorney general. Manage the Enforcement Information Services unit. Serve as Enforcement's representative on NJDEP's Budget Process Evaluation and ITF Subcommittees. Manage Budget, Fiscal and Personnel matters for NJDEP's Air and Water Enforcement programs.

Nov. 8,1986 to Sept. 4,1992 — Supervising Auditor New Jersey Department of Environmental Protection, Office of Environmental Claims.

Duties: Perform Economic Benefit and Ability to Pay analyses as requested by Department program elements and the advising deputies attorney general. Serve as the representative of the Administrator of the New Jersey Sill Compensation Fund on cost recovery investigation carried out by Department program elements. Advise Environmental Claims Administration staff on claims involving complex issues of a financial nature and or the construction of public water systems made necessary due to ground water contamination.

May 28,1985 to Nov. 7,1986 — Auditor I New Jersey Department of Environmental Protection, Office of Audit

Duties: Prepare audit programs and perform internal and external audits of all NJDEP activities. Prepare reports based on audit work papers and when applicable discuss findings with appropriate officials. Perform special projects and assignments of a financial nature. Review audit reports and work papers, when necessary, prepared be other organizations, government agencies, and or consulting firms. Supervise the duties of other auditors as required.

Jan. 10,1981 to May27,1986 — Auditor II Taxation (Emergency Audit) New Jersey Transfer Inheritance Bureau.

Duties: Examine and audit estates primarily selected to be expedited: classified large, intermediate, small, or emergency audit.

Oct. 6, 1979 to Jan. 9,1981 — Auditor III Taxation New Jersey Transfer Inheritance Bureau.

Duties: Examine and audit estates classified as small estates.

Oct. 2,1978 to Oct 5,1979		Auditor Accountant Trainee New Jersey Transfer Inheritance Bureau.
	Duties:	Examine and audit estates classified as un-taxable or small estates.

Private Sector Employment:

For the past twenty nine years I have operated a public accounting and financial planning practice. I currently have over four hundred accounts which include C and S Corporations, Limited Liability Companies, Partnership and Individuals. The services I provide include installing accounting systems and procedures, preparation of financial statements and tax returns, advising clients with respect to organization, financing, employee benefit programs, pensions and investments.

Professional Licenses

NASD Series 63, Series 65 and Series 7
State of New Jersey Life Insurance License

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R.J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Andrew D. Reese
Deputy Attorney General
(609) 292-1509

Docket No. 04007102

IN RE PETITION FOR A HEARING on the SHIELDALLOY METALLURGICAL CORP. DECOMMISSIONING PLAN, pursuant to 10 C.F.R. § 2.309 and 42 U.S.C. § 2239(a)(1)(A)

DECLARATION OF TIMOTHY DISBROW

I, TIMOTHY DISBROW, hereby declare as follows:

1. Attached please find my resume, which is incorporated into this Declaration by reference.

2. I am familiar with the portions of the Shieldalloy Decommissioning Plan ("DP") which pertain to the proposed cap. Based upon my experience with landfill caps in New Jersey, vegetation will likely grow over time on the cap as proposed by the DP. Vegetation will likely grow due to wind-borne deposits of soil and seed that land on the cap. Large rooted vegetation

such as trees, if allowed to grow, will likely infiltrate the radioactive waste below the proposed cap. Large rooted vegetation may cause additional water infiltration into the radioactive waste. The vegetation that grows on the cap will need to be mowed three or more times per year to prevent large rooted vegetation from infiltrating the cap.

3. Groundwater should be monitored to detect any leaching of nuclides. Groundwater monitoring is especially necessary for the DP's proposed design since there is no liner underneath the waste.

4. Sufficient financial assurance should be posted to ensure the long-term care and maintenance of the disposal facility and the environment for the duration that the waste remains a radioactive hazard. Maintenance of the cap includes mowing three or more times per year as discussed above in paragraph 2. Also, settlement and animal burrowing commonly occurs on caps. Therefore, maintenance will also include inspections approximately four times per year and repairing any settled areas or animal burrows.

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are willfully false, I am subject to punishment.

DATE: 1/16/07

Timothy Disbrow

21 Woodcrest Drive, Mount Holly, NJ 08060
609-267-6453 tim.disbrow@dep.state.nj.us

Timothy W. Disbrow

1988 to present NJDEP, Solid and Hazardous Waste Management Program
Bureau of Solid and Hazardous Waste Permitting South
PO Box 414, 401 E. State St., Trenton, NJ 08625

Experience

2005 to present
Hazardous Site Mitigation Specialist I

Site Remediation Program case management – manage multi-media contamination projects subject to "Department Oversight of the Remediation of Contaminated Sites" (NJAC 7:26C). Review reports submitted pursuant to the Technical Rules for Site Remediation (NJAC7:26E) involving Preliminary Assessments, Site Investigations, Remedial Investigations and Remedial Actions. Organize and lead team meeting with Technical Coordinator and Geologist. Issue correspondence and approvals as needed, under own signature. Assess feasibility of proposed remedial action plan designed to be protective of human health and environment. Attend public meeting to convey technical issues to officials and residents relating to site investigations and cleanups. Organize, coordinate and participate in performance of emergency/nonemergency remedial actions requiring expertise in management of hazardous and nonhazardous substance and wastes. Organize, supervise and review the conduct of sampling, assessments, investigations, cleanup plans, closure and post-closure procedures to determine presence and degree of impact or damage caused to the environment or public health by improper hazardous and nonhazardous substance or waste disposal methods. Interact with the regulated community, the public, contractors and other government agencies regarding management of hazardous/nonhazardous wastes.

1988 to 2005
Principal Environmental Engineer – Waste Management

Landfill case management – review technical and environmental documents related to landfills along with coordination and oversight of review by other programs. Conduct public participation in the form of notices, public meetings and hearings. Responsible for ensuring compliance with permit submittal requirements, construction oversight and certifications and approving landfill closure and post-closure compliance. On-going review of environmental monitoring data, escrow fund release requests and financial plan reviews. Served as acting section chief for two separate 6-month periods in the 1990's.

1983 to 1988 NJDEP, Division of Solid and Hazardous Waste
Trenton, New Jersey

Engineer-in-training, Assistant Env. Engineer and Senior Environmental Engineer

(Same as landfill case management above.)

1981 to 1982 Self-employed subcontractor for local manufacturing business doing work for the Federal Government and private industry.

1973 to 1980 NJ Bell Telephone Company
Trenton, New Jersey

Assistant Manager

Supervised a group of computer specialists doing software implementation, converting mechanical switching systems to computerized switching systems. Duties involved budget planning, employee evaluations, technical report writing and workload scheduling. (1977 to 1980)

Field Engineer

Plan, design and oversight of construction of poles, cables, manholes and underground conduit. (1973 to 1977)

Education

1967 to 1972 Brown University, Providence Rhode Island
BS in Civil Engineering
BA in Liberal Arts

1986 to 1988 New Jersey Institute of Technology, Newark, New Jersey
24 credits in graduate level studies in Environmental and Geotechnical Engineering

STUART RABNER
ATTORNEY GENERAL OF NEW JERSEY
R. J. Hughes Justice Complex
25 Market Street
P.O. Box 093
Trenton, New Jersey 08625-0093
Attorney for Petitioner

By: Andrew D. Reese
Deputy Attorney General
(609) 292-1509

IN RE PETITION FOR A HEARING on)
REQUEST FOR DECOMMISSIONING)
FOR SHIELDALLOY METALLURGICAL)
CORPORATION, NEWFIELD, NJ,)
pursuant to 10 C.F.R. §2.309)
and 42 U.S.C. §2239(a)(1)(A))

CERTIFICATION OF SERVICE

I, Andrew D. Reese, hereby certify that on January 16, 2007, I caused a true copy of the Petition for a Hearing on the Shieldalloy Metallurgical Corporation (License No. SMB-743) Decommissioning Plan (Docket No. 04007102), the Declarations and/or reports of Michael Malusis, Jennifer Goodman, Steven Sayd, Donna Gaffigan, Timothy Disbrow, John Burke, and exhibits in this matter to be served by UPS Next Day Air, and where indicated by an asterisk by electronic mail, upon the following parties:

Shieldalloy Metallurgical Corporation
12 West Boulevard
Newfield, NJ 08344-0768
ATTN: David R. Smith
Radiation Safety Officer

*Office of the General Counsel
U.S. Nuclear Regulatory Commission
One White Fling North
11555 Rockville Pike
Rockville, MD 20852-2738

I certify that the foregoing statements made by me are true. I am aware that if any of the foregoing statements made by me are wilfully false, I am subject to punishment.

Andrew D. Reese

Dated: January 16, 2007