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Los Alamos NATIONAL LABORATORY EST. 1943

Environmental Protection Division
Water Quality & RCRA Group (ENV-RCRA)
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National Nuclear Security Administration
Los Alamos Site Office, A316
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Los Alamos, New Mexico 87545
(505) 667-5794/FAX (505) 667-5946

Date: SEP 2 0 2012
Refer To: ENV-RCRA-12-0202
LAUR: 12-24131

U1201872

Mr. John E. Kieling, Bureau Chief
RCRA Permits Management Program
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Dear Mr. Kieling:

SUBJECT: REQUEST FOR CLASSIFICATION DETERMINATION FOR PROPOSED MODIFICATION TO THE LOS ALAMOS NATIONAL LABORATORY (LANL) HAZARDOUS WASTE FACILITY PERMIT, EPA ID NO. NM0890010515

The purpose of this letter is to request a classification determination from the New Mexico Environment Department – Hazardous Waste Bureau (NMED-HWB) for proposed changes to the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (Permit), as described below. In July 2012 NMED-HWB requested that the U.S. Department of Energy and Los Alamos National Security, LLC (collectively the Permittees) submit a formal request for a classification determination to modify the Permit to add macroencapsulation treatment. The Permittees believe that such a modification would qualify as a Class 1 permit modification requiring prior NMED-HWB approval pursuant to the criteria outlined in 20.4.1.900 NMAC (incorporating 40 CFR §270.42(a)(2)).

Pursuant to 40 CFR 270.42, classification decisions are based on two criteria: (1) the similarity of the modification to those modifications in Appendix I of 40 CFR § 270.42; and (2) application of the general definitions of Class 1, 2, or 3 (see 270.42(d)(2)). Under Appendix I, Item F.1.c, a modification or addition of a treatment process to treat waste restricted from land disposal to meet the treatment standards qualifies as a Class 1 permit modification requiring prior NMED-HWB approval (see 54 Fed. Reg. 9596, 9598, 9603 (Mar. 7, 1989)).

For the following reasons, the Permittees believe that macroencapsulation is a treatment process that meets the criteria for a Class 1 permit modification requiring prior NMED-HWB approval under Appendix I, Item F.1.c. Macroencapsulation is an EPA-approved treatment process as described in 40 CFR §§ 268.40 and 268.45 and meets the criteria under Item F.1.c as a "treatment process to treat waste restricted from land disposal to meet all or some of the treatment standards". The Permittees would like to use macroencapsulation for on-site treatment of hazardous waste stored at permitted storage units at Technical Area (TA-54), Area G. On-site treatment will also serve to expedite off-site disposal and facilitate the compliance commitments under the Federal Facility Compliance Order (Los Alamos National Laboratory, 1995) and the Compliance Order on Consent (2005, as revised).

Enclosure 1 contains a detailed description of the macroencapsulation technology and its applicability to treat radioactive lead solids and hazardous debris waste stored at TA-54, Area G. Also included are details about land disposal restriction (LDR) requirements as they apply to this waste stream and a discussion of how this macroencapsulation technology meets those requirements.

The types of regulated waste stored and generated at TA-54, Area G, include contaminated or suspect contaminated lead, glove boxes with contaminated or suspect contaminated lead, and debris waste from repackaging fiberglass reinforced plywood (FRP) boxes and drums. These waste streams are restricted from land disposal and must be treated to meet LDR treatment standards prior to disposal.

The macroencapsulation treatment process will not add to or change the permitted units, does not require an increase in the storage capacity, and does not add different waste to those already managed at the permitted units. Benefits of adding this treatment include increased worker safety, limited need for size reduction and repackaging, increased cost savings by eliminating the need to transport untreated waste off-site for treatment, and decreased processing time.

If you have comments or questions regarding this request, please contact Gene E. Turner (LASO-EPO) at (505) 667-5794 or Mark P. Haagenstad (ENV-RCRA) at (505) 665-2014.

Sincerely,

Anthony R. Grieggs
Group Leader
Water Quality & RCRA Group (ENV-RCRA)
Los Alamos National Security, LLC

Sincerely,

Gene E. Turner
Environmental Permitting Manager
Environmental Projects Office
Los Alamos Site Office
U.S. Department of Energy

ARG:GET:TD/lm

Enclosure: (1) Proposed Macroencapsulation of Hazardous Waste at Technical Area 54 (TA-54), Area G

Cy: Laurie King, USEPA/Region 6, Dallas, TX, w/enc.
Tim Hall, NMED/HWB, Santa Fe, NM, w/o enc.,
Pete Maggiore, LASO-EPO, w/o enc., (E-File)
Gene E. Turner, LASO-EPO, w/o enc., (E-File)
George C. Henckel, LSSO-EPPO, w/o enc., (E-File)
Carl A. Beard, PADOPS, w/o enc., A102
Michael T. Brandt, ADESH, w/o enc., (E-File)
Alison M. Dorries, ENV-DO, w/o enc., (E-File)
Charles O. Lenoie, PMFS-DO, LANL, w/o enc., (E-File)
Mike J. Romero, LTP-OCP, LANL, w/o enc., (E-File)
Mark P. Haagenstad, ENV-RCRA, w/o enc., (E-File)
Tammy Diaz, ENV-RCRA, w/o enc., (E-File)
Robert A. Lechel, ENV-ES, w/o enc., (E-File)
LASO Records Center, w/enc., A316
IRM-RMMSO, w/enc., (E-File)
ENV-RCRA Correspondence File, w/enc., K490

ENCLOSURE 1

MACROENCAPSULATION OF HAZARDOUS WASTE

AT TECHNICAL AREA 54, AREA G

ENV-RCRA-12-0202

LAUR-12-24131

Date: SEP 2 0 2012

Introduction

Per conversation with the New Mexico Environment Department – Hazardous Waste Bureau (NMED-HWB) staff in July 2012, it was requested that the US Department of Energy/ National Nuclear Security Administration (DOE/NNSA) and Los Alamos National Security, LLC (LANS) (collectively the Permittees) submit a white paper explaining the macroencapsulation processes proposed for use at Technical Area 54 (TA-54). The following discussion explains how macroencapsulation meets land disposal restriction (LDR) treatment standards for hazardous and mixed low level waste (MLLW) debris and radioactive lead solids (RLS) as defined in Title 40 of the Code of Federal Regulations (40 CFR) §§ 268.40, 268.42, and 268.45.

Background

The Permittees propose requesting approval from the NMED-HWB for a permit modification to allow treatment by macroencapsulation for appropriate mixed low-level waste streams. The proposed modification is necessary to achieve closure of Area G and its nine permitted storage units by the end of 2015 as required by Compliance Order on Consent (2005, as revised). In the Los Alamos National Laboratory (LANL) Framework Agreement (2012), the Permittees committed to removing all uncemented legacy and newly generated (as of October 1, 2011) transuranic (TRU) waste containers, stored above-ground at Area G, by June 30, 2014. A schedule for below-ground retrievable TRU waste will be developed by December 31, 2012.

The wastes stored at TA-54, Area G include TRU wastes, mixed TRU (MTRU) waste, low-level waste (LLW), and MLLW. Many of the waste containers do not meet U.S. Department of Transportation (DOT) or off-site waste disposal facility packaging requirements and must undergo processing and repackaging to render them acceptable for offsite shipment or disposal. Proposed waste processing may include segregation, decontamination (when possible), size reduction (if necessary), and repackaging according to waste composition (i.e. the waste matrix), chemical and physical characterization, and determination of compatibility, reactivity, and likely disposal destination. The waste may also be further treated to meet LDRs, void space requirements, and other waste acceptance criteria before they can be shipped to an approved off-site disposal facility. After approval of the modification, the processing will be completed within existing storage units at TA-54, Area G. The domes will provide containment, fire suppression, heat and cooling, and power requirements.

Macroencapsulation is a viable treatment option to meet LDRs for hazardous debris waste and radioactive lead solids (RLS) resulting from these operations. Commercially available macro-liner encapsulation systems (macro liners) are available and in use at other DOE/NNSA sites for treatment of both hazardous debris waste and RLS. Descriptions of the systems and their compliance with regulatory treatment standards are presented in the following discussion.

Compliance with RCRA Land Disposal Restrictions and Regulations

In order to meet LDR treatment standards for off-site disposal of wastes from TA-54, the Permittees propose to use commercially available macro-liners for macroencapsulation of hazardous debris waste and RLS. The proposed macroencapsulation systems consist of stainless steel (SS) macro-liners for debris, and high density polyethylene (HDPE) macro-liners for RLS. The macro-liners are inserted into or directly cast inside DOT and accepting waste facility compliant packages (e.g. DOT Type-A drums or

boxes). In both cases, the macro-liner is separate from the container, is not a structural component of the container, and is not integral to the DOT certification of the container. Once sealed, the macro-liner becomes an item shipped in the container.

The alternative treatment standard for hazardous debris is specified in 40 CFR § 268.45, Table 1, as: "Macroencapsulation: Application of surface coating materials such as polymeric organics (e.g., resins and plastics) or use of a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media." The performance and/or design and operating standard is that the "(E)ncapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes)." The standard for hazardous debris differs from the standard for RLS, which is identified in 40 CFR § 268.40 as a special subcategory under the D008 definition of regulated lead waste.

> *"Radioactive Lead Solids Subcategory (Note: These lead solids include, but are not limited to, all forms of lead shielding and other elemental forms of lead. These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ashes that can undergo conventional pozzolanic stabilization, nor do they include organolead materials that can be incinerated and stabilized as ash. This subcategory consists of non-wastewaters only.)"*

EPA specifies the treatment standard for RLS waste as "MACRO" (macroencapsulation) in Table 1 of 40 CFR § 268.42, "Technology Codes and Descriptions for Technology-Based Standards:"

> *"Macroencapsulation with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR § 260.10". (40 CFR 260.10 – "Container means any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled.")*

The standard for hazardous debris differs from the standard for RLS in that the use of "any material that would be classified as a tank or container according to 40 CFR § 260.10" is allowed for macroencapsulation of hazardous debris, but it is not allowed for macroencapsulation of RLS. Macro-liners must not meet the definition of a container, in order to be used for the treatment of RLS to meet Land Disposal Restrictions.

Treatment Standard Compliance

The distinction between a waste container liner or jacket for macroencapsulation and the waste container itself, as identified in the applicable regulations for macroencapsulation of RLS, was an important issue for the State of Nevada, Division of Environmental Protection (NDEP), which is the permitting authority for the Nevada National Security Site (NNSS) – a likely destination for some of the LANL MLLW following macroencapsulation treatment. In 2007, NDEP explicitly accepted that the HDPE liners used in the macroencapsulation process, discussed below, are not equivalent to containers according to the EPA definition in 40 CFR §260.10.

On November 1, 2007, the NDEP approved an UltraTech macro-liner macroencapsulation system (as described in Attachment 1) as complying with the requirements for macroencapsulation of RLS, and also stated that the technology can be used for wastes sent to the NNSS for disposal (Attachment 2). In 2012,

the NDEP also approved the use of a Product Drum Model (PD) Macro Pack, a 1/2" thick external HDPE liner, as an alternative method for compliance with LDRs for all National Nuclear Security Administration (NNSA) generators (Attachment 3). NDEP's approval acknowledged that the PD Macro Pack provides equivalent performance to the specified method in 40 CFR § 268.42, and meets the 40 CFR § 268.45 "Treatment Standard for Hazardous Debris and Radioactive Cadmium and Mercury Batteries," as well as the 40 CFR § 268.40 "Treatment Standard for Radioactive Lead Solids." In so doing, NDEP explicitly accepted that the HDPE liners used in the macroencapsulation process are not containers, and do not meet the description of a container as specified in 40 CFR §260.10.

Discussion

In the NDEP-approved treatment process for RLS (as noted in Attachment 1), an HDPE liner is placed or molded within a DOT-approved container; waste is placed into the macro-liner; and a non-biodegradable filler material meeting offsite disposal facility requirements (e.g. vermiculite, polyurethane expansion foam, etc.) is added in the liner to eliminate void space. The HDPE liner and filler materials that are used in the process have been proven to be effective and are inert, impermeable, resistant to potentially leaching media, compatible with the waste types, and nonreactive with the waste. After void space is filled and verified, the HDPE liner lid is put in place and bonded to the liner, completely sealing the waste in the liner. The bonding process is verified, and the DOT-container lid is put in place and secured. The chemically inert, HDPE liner jackets the waste, totally isolating the waste from the environment and from any potential leaching media, while the outer container meets the necessary requirements for shipping and off-site disposal.

The HDPE liner used in this method acts as a "coating or jacket of inert material" that is completely sealed, thus substantially reducing the potential for leaching materials to come into contact with the surface of the lead waste. The liner is the encapsulating material (i.e., it meets the RCRA definition of a "jacket of inert inorganic material"); it is separate from, but inside, the DOT approved container for the waste; and the liner is not considered in the DOT certification of the container. Therefore, the liners do not meet the description of "containers" or "tanks" as defined in 40 CFR 260.10.

Two EPA letters elucidate EPA's original intent regarding macroencapsulation. The first is a July 30, 1990 letter to the Naval Nuclear Propulsion program [RCRA Online number 9554.1990(07)], in which the EPA Director of the Office of Solid Waste provided an explanation of macroencapsulation as it applies to RLS:

> "....*The key to assuring compliance with the standard is the stipulation in the regulatory language that the "jacket of inert inorganic materials" (i.e., the steel surrounding the lead) "substantially re duce(s) surface exposure to potential leaching media". ..... The key to this decision is whether the steel is indeed sealed and thereby minimizing potential exposure to any leaching material."*

The July 30, 1990 letter further states:

> "*.....EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the "jacket of inorganic material" from being interpreted as including materials that are merely containers or drums."*

U1201872

EPA stated that the "key" was "minimizing potential exposure to any leaching material," and that the "jacket of inorganic material" cannot include materials that "are merely containers or drums."

EPA's position regarding the definition of macroencapsulation was reemphasized in a letter dated December 27, 1990 [RCRA Online number 9554, 1990(14)]:

> *".....Paraphrasing the regulatory language, compliance with the macroencapsulation standard explicitly prohibits containerization of wastes or material in a tank or container meeting the regulatory criteria under the 40 CFR § 260.10. .....EPA purposely modified the proposed standard for D008 radioactive lead solids to include "jackets of inorganic materials" in order to specifically account for these submarine reactor compartments. EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the "jacket of inorganic material" from being interpreted as including materials that are merely containers or drums."*

These documents show that EPA's intent for a macroencapsulation treatment system was, and is, to protect the environment from lead or other hazards that could be leached from RLS. This is achieved by reducing the potential of a leaching material, such as infiltrating water or a dilute acid, from coming in contact with the surface of the contaminated lead. The encapsulating inert media must be "sealed" and, when applied to RLS, the macroencapsulation system cannot "merely" be a simple container or tank.

The December 27, 1990 letter also stated that EPA would recognize SS as meeting the MACRO treatment requirements:

> *".....With regards to the lead weights in Question 2, the wastes may be considered to meet the specified method of "MACRO", as generated, provided the stainless steel surrounding the lead weights does not meet the definition of a tank or container and provided a substantial reduction in surface exposure to potential leaching media can be determined."*

In this response, EPA reiterated that the macroencapsulation methodology must significantly protect the contaminated lead solids from exposure to leaching media by completely sealing them in the protective material and that the protective material cannot be considered a container or tank.

The macro-liners proposed for use at LANL will be housed within DOT compliant containers, and act as a jacket of inert material that is completely sealed, thus, substantially reducing the potential for leaching materials to come into contact with the surface of the waste. The key for the macro-liner to meet the requirements of 40 CFR § 268.42 is that the liner cannot be construed as a "container" or "tank" and given that the liner is within, yet separate from a DOT approved container, and is not integral to the DOT certification, it is not a container or a tank. Therefore, the proposed, commercially available macro-liners meet the "MACRO" definition in 40 CFR § 268.42. SS macro-liners offer an appropriate treatment process for hazardous debris waste, and HDPE macro-liners offer an appropriate treatment process for RLS.

Conclusion

After careful evaluation of the regulations, available EPA guidance, and past precedents, the Permittees believe that the proposed macro-liner macroencapsulation systems clearly comply with the EPA definitions of "MACRO," for the following reasons.

1. As applied to RLS, the HDPE liners meet the requirements of 40 CFR § 268.42 because they do not meet the description of a tank or container;

2. As applied to hazardous debris, the SS liners likewise meet the requirements of 40 CFR § 268.45.

This conclusion is in agreement with positions adopted by EPA and the State of Nevada. Therefore, the Permittees intend to request addition of macroencapsulation to the Permit as a minor permit modification for appropriate, LDR-compliant treatment of applicable waste streams generated from processing legacy wastes at TA-54.

Attachments:

Attachment 1 – Request for Nevada Division of Environmental Protection (NDEP) Approval of Alternative Treatment Standard for Radioactive Lead Solids, E. Frank Di Sanza, Federal Project Director, Waste Management Project, Department of Energy, National Nuclear Security Administration, Nevada Site Office, Las Vegas, NV, October 22 2007 (with enclosure).

Attachment 2 – Re: Request for Nevada Division of Environmental Protection (NDEP) Approval of Alternative Treatment Standard for Radioactive Lead Solids, T. H. Murphy, Chief, Bureau of Federal Facilities, Nevada Division of Environmental Protection, Las Vegas, NV, November 1, 2007.

Attachment 3 – Re: Request for Nevada Division of Environmental Protection (NDEP) Approval of Alternative Treatment Standard for Radioactive Lead Solids, Tim Murphy, Chief, Bureau of Federal Facilities, Nevada Division of Environmental Protection, Las Vegas, NV, May 22, 2012. (Also includes the original request from NNSA.)

Department of Energy
National Nuclear Security Administration
Nevada Site Office
P.O. Box 98518
Las Vegas, NV 89193-8518

OCT 22 2007

Timothy Murphy, Chief
Nevada Division of Environmental Protection
Bureau of Federal Facilities
2030 E. Flamingo Road, Suite 230
Las Vegas, Nevada 89119

REQUEST FOR NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) APPROVAL OF ALTERNATIVE TREATMENT STANDARD FOR RADIOACTIVE LEAD SOLIDS

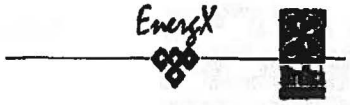
The National Nuclear Security Administration, Nevada Site Office, Waste Management Project (WMP) requests NDEP's review of the enclosed macroencapsulation method as a treatment method for radioactive lead solids. The WMP finds the method compelling and feels it would be a useful method for generators wanting to dispose Mixed Low-Level Waste (MLLW) at the Nevada Test Site (NTS). If the NDEP agrees, would the NDEP provide written approval to the NSO to allow the NTS generators to use the technology for disposing of their waste at the NTS.

E. Frank Di Sanza
Federal Project Director
Waste Management Project

WMP: 3562.JC

Enclosures:
As stated

cc w/out encl via email:
J. K. Wrapp, NSTec, Las Vegas, NV
Carlos Ramirez, NSTec, Las Vegas, NV
S. K. Krenzien, NREI, Las Vegas, NV



EnergX Macroencapsulation Process
Compliance Evaluation

August 2007

Summary
After carefully comparing the EnergX macroencapsulation process to the Environmental Protection Agency (EPA) definition of macroencapsulation as a treatment for radioactive lead solids, we have concluded that the macroencapsulation processes being deployed by EnergX meets the definition of macroencapsulation for radioactive lead solid, and as such can be used to treat both contaminated debris and lead solids without having to use an alternative method or seeking an equivalency from the EPA.

Issue
It is readily accepted that the UltraTech Macroencapsulation systems meet the EPA definition of macroencapsulation as applied to hazardous debris waste. However, the UltraTech macroencapsulation systems have not, as of yet, been recognized as a compliant means of treating radioactive lead solids, as defined by the EPA.

This evaluation was performed to determine if the UltraTech macroencapsulation systems, as being deployed by EnergX at the TRU Waste Processing Center (TWPC) and other sites, meets the EPA definition of macroencapsulation as applied to the treatment of radioactive lead solids.

Requirements/Regulations
40 CFR 268.40 identifies radioactive lead solids as a special subcategory under the D008 definition of regulated lead waste.

> "Radioactive Lead Solids Subcategory (Note: These lead solids include, but are not limited to, all forms of lead shielding and other elemental forms of lead. These lead solids do not include treatment residuals such as hydroxide sludges, other wastewater treatment residuals, or incinerator ashes that can undergo conventional pozzolanic stabilization, nor do they include organolead materials that can be incinerated and stabilized as ash. This subcategory consists of nonwastewaters only.)"

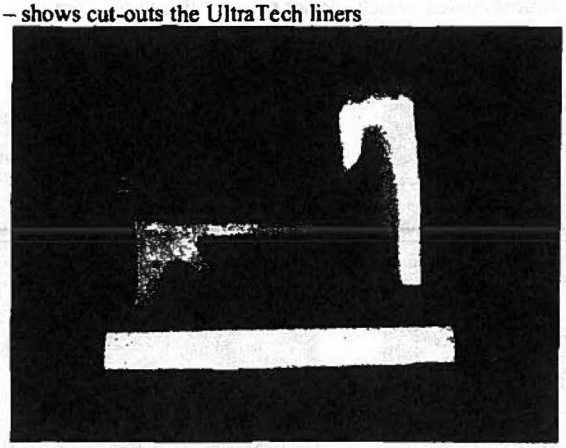
This section further defines the treatment standard for radioactive lead solids as "MACRO" (macroencapsulation). Table 1, Technology Codes and Descriptions for Technology-Based Standard, of 40 CFR 268.42 defines "MACRO" as:

> "Macroencapsulation with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. *Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10.* [emphasis added]

Macroencapsulation Systems
EnergX is employing the use of the latest UltraTech International (UltraTech) macroencapsulation macro-liner systems (macro-liner), which are comprised of high-density/low-density polyethylene (PE) macro-liners housed within DOT compliant packages, such as DOT Type-A drum or box. Macro-liners can be customized to fit into almost any container.

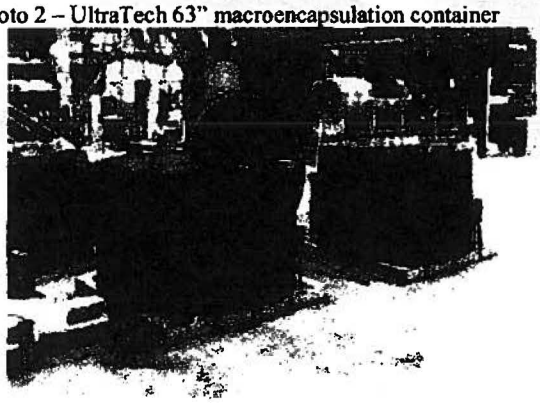
UltraTech macro-liners are inserted inside the DOT containers in one of two fashions. Typically for drums, UltraTech uses the cast-in-place process to insert the liner directly into the drum. In this case, the drum itself functions as part of the roto-molding process to cast the liner in place. The box liners are cast in standalone molds and are later slipped into the DOT box. In either case, even though the liners are in intimate contact with the DOT package they are not integral to the DOT certification. Photo 1 show the profiles of the two liners with lids bonded on.

Photo 1 – shows cut-outs the UltraTech liners



UltraTech also produces robust heavy-duty (nominally 1 ½ inches thick) stand-alone macro tubes, which also qualify as a DOT strong-tight or IP-1 container, and can even be qualified as a high integrity container (HIC). These are typically referred to as macro-containers and can be produced in a large array of diameters and lengths. Photo 2 shows the 63" HDPE macro-container that qualifies as a DOT IP1 container. These macro-containers can be transported as standalone packages while the macro liner must be packaged within a DOT compliant container in order to be transported.

Photo 2 – UltraTech 63" macroencapsulation container



EnergX Macroencapsulation Process

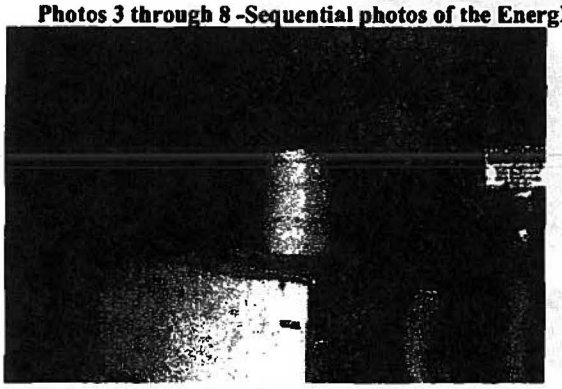
EnergX is currently using the macro-liner systems in both the drum and the box configurations, but are not using any of the macro-containers (tubes) at this time.

The EnergX macroencapsulation process typically consists of the following steps (see photos 3 - 8); the waste is placed into the UltraTech PE macro-liner and a filler material (e.g. polyurethane expansion foam, vermiculite, etc.) is pumped into the liner in a continuous fashion to eliminate

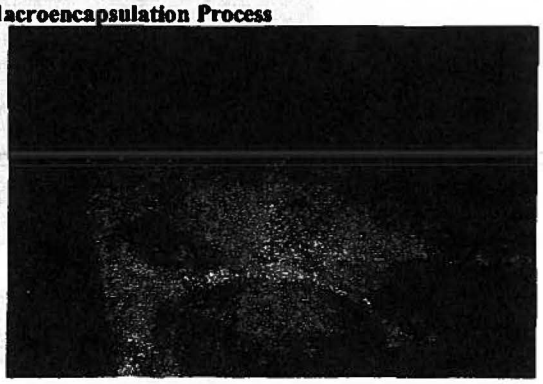
all void space within the macro liner. Once filled, the half-inch thick PE macro lid is put in place and bonded to the PE liner body (nominally a half-inch thick) using a patented bonding process, which yields a highly durable, completely sealed liner. At this point the waste is now totally isolated from the environment and any potential leaching media by the half-inch thick, chemically inert, PE coating or jacket.

Once verified that the macroencapsulation bonding process has been successfully completed the drum or box lid is put in place and bolted closed, which further protects the waste from the environment and facilitates transportation.

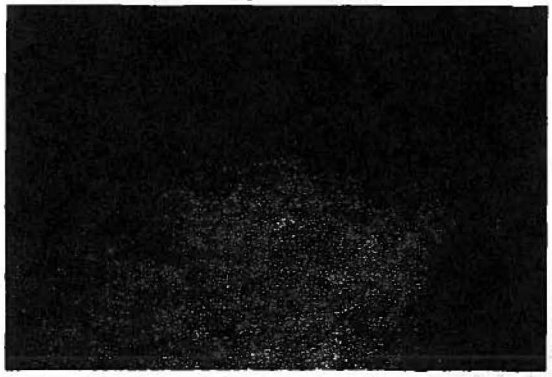
Photos 3 through 8 -Sequential photos of the EnergX Macroencapsulation Process



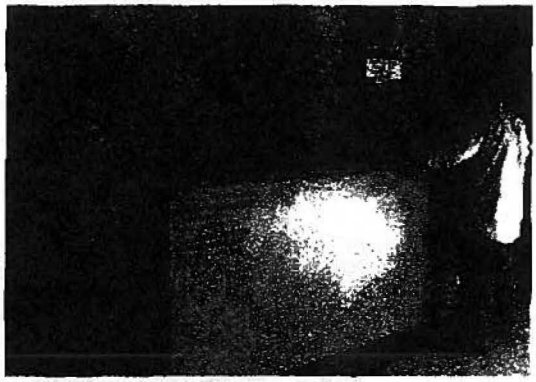
3 - Drums being placed in macro box



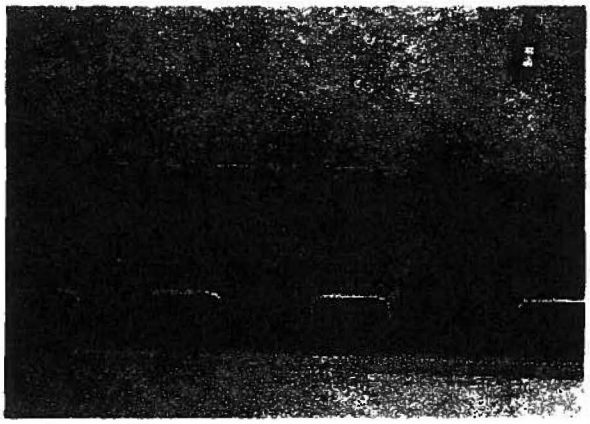
4 - Foam being added to fill void



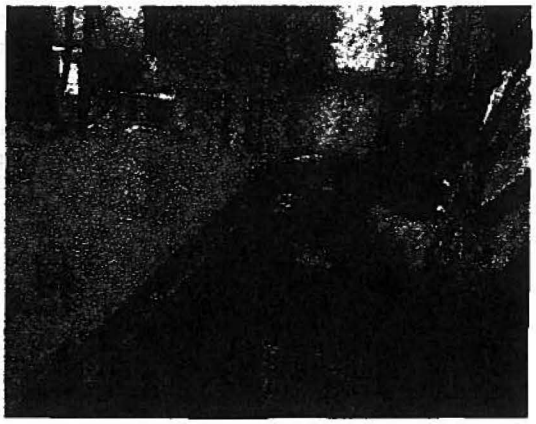
5 - Void space filled



6 - Macro liner being placed onto macro body



7 - Macro liner being sealed



8 - Type-A Box lid being bolted

Evaluation

Since the definition and performance requirements for macroencapsulation are open to interpretation additional research into the EPA's basis for the definition of "MACRO" as applied to radioactive lead solids was conducted. Two EPA letters were found that provided some insight into the EPA's original thoughts as applied to macroencapsulation. The first was the July 30 1990 letter to the Naval Nuclear Propulsion Program[1]. As shown in the below excerpts from this letter, the EPA Director of the Office of Solid Waste essentially provides an explanation of macroencapsulation as it applies to radioactive lead solids and also explains how and why the EPA expanded the original definition of macroencapsulation to cover the defueled submarine reactor compartments.

> "In summary, EPA determined that the practice of direct land disposal of these compartments may meet the "Macroencapsulation" BDAT treatment standard for D008 radioactive lead solids. *The key to assuring compliance with the standard is the stipulation in the regulatory language that the "jacket of inert inorganic materials" (i.e., the steel surrounding the lead) "substantially reduce(s) surface exposure to potential leaching media".* Since the information in your letter and your comments appears to indicate that this is true, the Agency believes that the practice probably complies with the BDAT standard for D008 radioactive lead solids. The compartments probably are considered to meet BDAT "as generated", because the lead shielding (as originally constructed) is surrounded in a thick, sealed steel jacket. *The key to this decision is whether the steel is indeed **sealed** and thereby minimizing potential exposure to any leaching material.*" [emphasis added]

It further states:

> "EPA purposely modified the proposed standard for D008 radioactive lead solids to include "jackets of inorganic materials" in order to specifically account for the submarine reactor compartments. However, *EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the "jacket of inorganic material" from being interpreted as including materials that are merely containers or drums.* Thus, we concur with your

[1] Letter to Richard A. Guida, Associate Director, Naval Nuclear Propulsion Program, Department of Navy, from Sylvia K. Lowrance, Director, Office of Solid Waste, EPA, July 30 1990, Submarine Reactor Compartments – Land Disposal Restrictions, 9554.1990(07).

> interpretation that the submarine compartment does not meet the definition of either a drum or a container." [emphasis added]

Even though the allowance for the use of a jacket of inorganic material was specifically added to allow the Navy to credit the steel housing surrounding the reactor compartments, it appears that the EPA did not intend to limit its application only to the reactor compartments, otherwise they would have simply granted the Navy an exemption or equivalency and would not have expanded and codified a new definition.

On December 27 1990, EPA issued another letter that reemphasized EPA's position regarding the reactor compartments and the definition of macroencapsulation[2]:

> "This letter is in response to your letter dated November 16, 1990 requesting clarification on certain issues regarding treatment standards for certain mixed radioactive wastes.
>
> With regards to Question 1 (as referred to in your letter), "placement in a heavy stainless steel box and welding the box closed" would not be considered to comply with the standard identified as "MACRO" in 268.42 Table 1 (55 FR 22693 (June 1, 1990). This standard is quite clearly described in regulatory language in Table 1 as "Macroencapsulation with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10" (emphasis added). Paraphrasing the regulatory language, *compliance with the macroencapsulation standard explicitly prohibits containerization of wastes or materials in a tank or container meeting the regulatory criteria under the 40 CFR 260.10. [emphasis added]*
>
> This is not the same situation as where the U.S. Naval Nuclear Propulsion Program wanted to land dispose defueled submarine reactor compartments. The information provided by the Navy indicated that the "Jacket of inert inorganic materials" (i.e., the stool surrounding the lead) could "substantially reduce surface exposure to potential leaching media" and that due to their size and structure these compartments would not be classified as a tank or container according to the definitions in 40 CFR 260.10. EPA purposely modified the proposed standard for D008 radioactive lead solids to include "Jackets of inorganic materials" in order to specifically account for these submarine reactor compartments. EPA felt that it was necessary to add the language to the definition of macroencapsulation to prevent the "jacket of inorganic material" from being interpreted as including materials that are merely containers or drums."

It is obvious from these two letters that the EPA's intent for a macroencapsulation system was (is) to protect the environment from lead or other hazards that could be leached off contaminated lead solids. This can be achieved by reducing the potential of a leaching material, such as a dilute acid, to come into contact with the exposed surface of the contaminated lead. Critical to their position is that the protective media must be "sealed" and when applied to radioactive lead solids the macroencapsulation system cannot be a simple container or tank [*"containerization of wastes or materials in a tank or container"*].

[2] Letter to Kevin S. Dunn, Project Manager, Environmental Policy Center, Law Companies Environmental Group from Sylvia K. Lawrence, Director, Office of Solid Waste, EPA, December 27 1990, Treatment Standards for Certain Mixed Radioactive Waste, 9554,1990(14).

The EPA provides further insight into their thoughts of macroencapsulation in the December 27 1990 letter when they stated that they would recognize the simple plastic coating covering lead lined gloves as macroencapsulation:

> "With regards to the plastic coated, lead lined gloves in Question 2 of your letter, they would be considered to comply with the standard identified as "MACRO" provided that none of the lead is exposed (i.e., the entire surface of the lead is coated) and provided that the coating provides a substantial reduction in surface exposure to potential leaching media (i.e., the gloves should not be expected to be exposed to physical, chemical, or thermal conditions where the integrity of the surface coating could likely be breached). With regards to the lead weights in Question 2, the wastes may be considered to meet the specified method of "MACRO", as generated, provided the stainless steel surrounding the lead weights does not meet the definition of a tank or container and provided a substantial reduction in surface exposure to potential leaching media can be determined."

One can interpret this response to say that the macroencapsulation methodology does not have to be an extremely robust mechanism, such as metal shielding around the naval containment vessels, as long as the contaminated lead solids are significantly protected from the exposure to leaching media by being completely sealed by the protective material and that the protective material is not considered a container or tank.

These two key elements were used to review the two UltraTech macroencapsulation systems to determine compliance with the requirements of 40 CFR 268. 42. The macro-liners and the macro-containers were evaluated separately due to the unique differences between the two systems.

Macro-Liners

In this case, the macro-liners, which are housed in a DOT complaint container, act as a coating or jacket of inert material that are completely sealed, thus substantially reducing the potential for leaching materials to come into contact with the surface of the contaminated lead. One can equate this scenario to the lead lined glove scenario. Since the liners are housed inside a DOT approved container, and are not integral to the DOT certification, the liners cannot be construed as a "container" or a "tank", which are specifically excluded under the "MACRO" definition in 40 CFR 268.42. As such, the macro-liner systems are an appropriate treatment for both debris and radioactive lead solids.

Macro-Containers

Based on verbatim compliance, one must conclude that the use of the macro-containers do not meet the EPA definition of "MACRO" as applied to radioactive lead solids, simply because the tube can function as a container.

Conclusion

After careful evaluation of the requirements as applied to the EnergX macroencapsulation process it has been concluded that the EnergX macroencapsulation process using UltraTech macro-liners macroencapsulation systems clearly complies with the definitions of "macro" as applied to radioactive lead solids. However, the UltraTech macro-containers (tubes) cannot be used to treat radioactive lead solids without seeking an equivalency or a variance from the EPA requirements.

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administra

May 22, 2012

Janet L. Appenzeller-Wing
Deputy Assistant Manager for Environmental Management
National Nuclear Security Administration (NNSA/NSO)
Nevada Site Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Request for Nevada Division of Environmental Protection (NDEP) Approval of Alternative Treatment Standard for Radioactive Lead Solids

Dear Ms. Appenzeller-Wing:

The NDEP staff has received and reviewed the NNSA/NSO request to permit NNSS generators to use the Product Drum Model (PD Macro Pack) as a treatment method for radioactive lead solids. NDEP concurs that this alternative method for compliance with the Land Disposal Restrictions is equivalent in performance to the specified method in 40 CFR 268.42, and meets the Land Disposal Restrictions of 40 CFR 268.45 (Treatment Standard for Hazardous Debris and Radioactive Cadmium and Mercury Batteries), and 40 CFR 268.40 (Radioactive Lead Solids).

NNSS generators may use this technology for disposal of applicable waste at the NNSS.

If you have any questions regarding this matter contact Jeff MacDougall at (702) 486-2850 ext 233, or me ext. 231.

Sincerely,

Tim Murphy
Chief
Bureau of Federal Facilities

THM/JJM/JW/SP/TZ/KC

cc: R. G. Geisinger, NSTec, Las Vegas, NV
NSTec Correspondence Control, MS NLV008
J. J. Cebe, WMP, NNSA/NSO, Las Vegas, NV
K. K. Snyder, PSG, NNSA/NSO, Las Vegas, NV
S. A. Hejazi, SC, NNSA/NSO, Las Vegas, NV
D. J. Morgan, OPA, NNSA/NSO, Las Vegas, NV

National Nuclear Security Administration

Department of Energy
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MAY 17 2012

Timothy Murphy, Chief
Nevada Division of Environmental Protection
Bureau of Federal Facilities
2030 East Flamingo Road, Suite 230
Las Vegas, NV 89119

REQUEST FOR NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) APPROVAL OF ALTERNATIVE TREATMENT STANDARD FOR RADIOACTIVE LEAD SOLIDS

The National Nuclear Security Administration Nevada Site Office (NNSA/NSO), Waste Management Project requests NDEP's review of the enclosed macroencapsulation method as a treatment method for radioactive lead solids. The Advance Mixed Waste Treatment Project is anticipating using this method to macroencapsulate radioactive lead solids under waste profile AMWP000000005 for disposal at the Nevada National Security Site (NNSS). If NDEP agrees, please provide written approval to NNSA/NSO to permit NNSS generators to use this technology for disposal of waste at the NNSS.

If you have any questions or comments, please contact James J. Cebe, Waste Management Project, at (702) 295-0957.

Janet L. Appenzeller-Wing
Deputy Assistant Manager
for Environmental Management

WMP:8588.JJC

Enclosure:
As stated

U1201872

MAY 17 2012

cc w/encl. via e-mail:
J. J. MacDougall, NDEP, Las Vegas, NV
R. G. Geisinger, NSTec, Las Vegas, NV
NSTec Correspondence Control, MS NLV008
J. J. Cebe, WMP, NNSA/NSO, Las Vegas, NV
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NNSA/NSO Read File

Macroencapsulation using the HDPE Macro Pack - Product Drum Model

At the Advanced Mixed Waste Treatment Project, super compaction is used to significantly reduce the volume of both transuranic (TRU) and low-level waste debris which will ultimately be treated and disposed. Mixed Low-Level Waste (MLLW) debris that can be processed in the AMWTP facility may be inspected, sorted, assayed and compacted. Some 55-gallon drums of MLLW debris are "direct feed into the Super Compactor, for super compaction resulting in "pucks", after RTR and assay are performed. The compacted waste pucks are placed into 100-gallon drums called product drums. If radiological characterization shows the final compacted waste containers, and each inner puck are < 100 nCi/g concentration of alpha emitting TRU nuclides and do not contain prohibited items, then they are candidates for macroencapsulation treatment and disposal.

Product drums are US DOT Type A containers which are processed and packaged in accordance with 40 CFR 264.315 (b), Special Requirements for Containers and loaded to the maximum extent practical and are considered full.

After filling the product drum, it is then placed into a Product Drum Model (PD Macro Pack); a ½" thick external High Density Polyethylene (HDPE) liner. Void space filler (e.g. vermiculite) is added to fill the PD Macro Pack to 90% full or greater. An HDPE lid is placed onto the PD Macro Pack. Using macro sealing wires imbedded in the lid, a control unit is connected to the wires to bond the HDPE lid to the PD Macro Pack. This process macroencapsulates the waste container thus meeting the Land Disposal Restrictions of 40 CFR 268.45, Treatment Standard for Hazardous Debris, radioactive Cadmium and Mercury batteries, and 40 CFR 268.40 Radioactive Lead Solids.