ESHID-603957

Environmental Protection and Compliance Division
Los Alamos National Laboratory
P.O. Box 1663, MS M969
Los Alamos, NM 87545
505-667-2211

National Nuclear Security Administration
Los Alamos Field Office
3747 West Jemez Road, A316
Los Alamos, NM 87544
505-667-5794/Fax 505-606-5948

Symbol: EPC-DO-26-104
Date: May 7, 2026

Mr. JohnDavid Nance, Chief
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313

Subject: Documentation Associated with Macroencapsulation Treatment at Los Alamos National Laboratory

Dear Mr. Nance:

The United States Department of Energy National Nuclear Security Administration, Los Alamos Field Office (NA-LA) and Triad National Security, LLC (Triad) submit the enclosed information to the New Mexico Environment Department-Hazardous Waste Bureau (NMED-HWB) to fulfill a requirement of the Los Alamos National Laboratory (LANL) Hazardous Waste Facility Permit (Permit), EPA ID# NM0890010515. Permit Part 8, *Treatment by Macroencapsulation*, Permit Section 8.2(5) states, "[p]rior to using a specific method for treatment by macroencapsulation, the Permittees shall demonstrate to NMED that the specific method utilized meets the requirements of 40 CFR §§ 268.42 and 268.45."

The documentation in Enclosure 1 includes manufacturer specifications about the PacTec MacroBag®, and the approval of this technology standard for acceptance for disposal at the Nevada National Security Site after treatment. The waste treated via macroencapsulation will be treated at the permitted unit at Technical Area 3, Building 29 as well as within multiple central accumulation areas across LANL. This is mixed hazardous waste that is generated during routine maintenance, housekeeping, material processing, and research and development activities consisting of debris including electronic debris. Macroencapsulation treatment technology is appropriate for these wastes per 40 CFR §§ 268.40, 268.42 and 268.45. Page 7 of the enclosed document includes the Nevada Division of Environmental Protection approval of this technology for macroencapsulation.

If you have any questions or comments concerning this information, please contact Robert A. Gallegos (NA-LA) at (505) 901-3824 or by email at robert.gallegos@nnsa.doe.gov or Naveen Chennubhotla (Triad) at (505) 629-7401 or by email at naveenc@lanl.gov.

Sincerely,

KATHERINE HIGGINS
(Affiliate)
2026.04.30 09:24:40 -06'00'

Katherine J.W. Higgins
Acting Division Leader
Environmental Protection and Compliance
Triad National Security, LLC

Sincerely,

ROBERT GALLEGOS
Digitally signed by ROBERT GALLEGOS
Date: 2026.05.07 12:16:08 -06'00'

Robert A. Gallegos
Program Manager
Environmental Permitting and Compliance Program
National Nuclear Security Administration
Los Alamos Field Office
U.S. Department of Energy

SLS/RAG

Enclosure: *PacTec MacroBag® Macroencapsulation for Low Level Mixed Waste & Radioactive Lead Solids Documentation*

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COPY

Received
MAY 8 2026
NMED Hazardous Waste Bureau

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ENCLOSURE

PacTec MacroBag® Macroencapsulation for Low Level Mixed Waste & Radioactive Lead Solids Documentation

Date: May 7, 2026

EPC-DO-26-104

U.S. Department of Energy,
National Nuclear Security Administration Los Alamos Field Office, and
Triad National Security, LLC

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MacroBag®

Macroencapsulation for Low Level Mixed Waste & Radioactive Lead Solids

Patent 9,679,669 & 9,478,322

INTRODUCTION

The MacroBag® is PacTec's patented macroencapsulation system for providing MACRO treatment of hazardous waste debris & providing DOT-compliant packaging in flexible bags of various sizes. The bag sizes have the capacity of drums between 30 to 110 gallons size and boxes of various sizes up to and including SeaLand Containers.

The PacTec MacroBag® system meets the Resource, Conservation, and Recovery Act definitions and treatment standards for radioactive lead solids (RLS)- D008 subcategory and alternate treatment standards for debris. The alternate debris treatment standard includes radioactively contaminated Mercury, Silver, and Cadmium batteries.

PACTEC (800) 272-2832
www.pactecinc.com
We manufacture packaging. We engineer solutions.

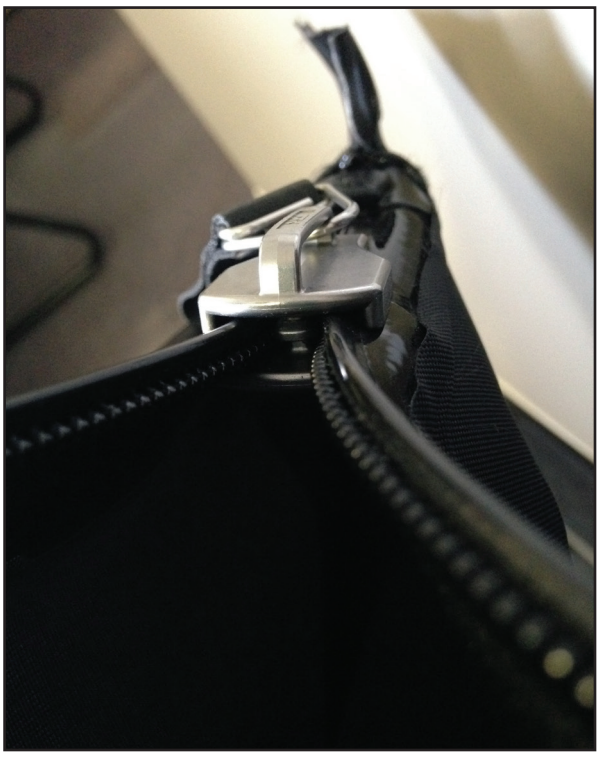
CONSTRUCTION

The MacroBag® system consists of a three layer packaging and may have cardboard integrated into it for structural shape. Hazardous debris and RLS is placed directly inside a MacroBag®, or within a drum or box prior to being placed in the bag. The debris and RLS will be configured and void filler added as needed to minimize settling and subsidence. The MacroBag® is manufactured with high-strength HDPE and polypropylene specially formulated to resist contaminants and leachate. The MacroBag® three layer system functions as follows:

- The inner liner protects the middle liner from potential damage from the debris and RLS placed within the bag. The inner bag is closed by pulling two opposing industrial zipper tabs together.

- The middle liner, designed and manufactured with a Water & Gas tight zipper seal from one end to the other, is a polymeric material formulated to resist contaminants and leachate. The Water & Gas Tight Zipper seal creates a permanent, impermeable barrier between the waste debris and RLS, and the outside environment , thus encapsulating the debris and RLS.

- The outer shell is then closed using a patented closure method that incorporates two zipper pulls for added security. This outer shell acts as the U.S. Department of Transportation (DOT) packaging for shipping to treatment, storage, and disposal facilities.



REGULATORY COMPLIANCE

The MacroBag® three layer design meets the definitions of macroencapsulation because the middle liner acts as the "jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media."

On March 27, 2008, PacTec performed a Type A packaging water spray test per 49 CFR 173.465 to demonstrate the water proof seal of the bag (water being the potential leaching media). The MacroBag® passed the water spray test (results are available upon request).

In 2014, the MacroBag® performance was improved by constructing the middle liner of more durable PVC coated nylon material with a Water and Gas Tight Zipper seal, rather than a Ziploc type of seal.

MacroBag®

Macroencapsulation for Low Level Mixed Waste & Radioactive Lead Solids

PACTEC

We manufacture packaging.
We engineer solutions.

1/2023 Rev 3

MacroBag®

Macroencapsulation for LLMW & RLS

PacTec has pioneered and patented a cost-effective treatment technology with the MacroBag®. PacTec's MacroBag® is a flexible package used for the secure macroencapsulation of radioactive hazardous debris. The MacroBag® provides a safe, cost-effective, and easy-to-use solution for disposing of low-level mixed waste debris that can be custom-sized to meet the needs of your project.

Applications:

- Radioactive Lead Solids
- Circuit Boards
- LLMW Debris

Features:

- Approved by EPA for macroencapsulation
- Proprietary airtight closure system
- Approved for RLS
- Approved at NNSS & Multiple disposal sites

Advantages:

- Easy zipper closure system
- No grout, no welding, no control panels
- Load drums and boxes directly into the MacroBag

Quality Assurance is a top priority for PacTec.

Our reputation is built on it. Our certifications confirm it.

PacTec maintains a formal quality management system that meets the requirements of ISO 9001 and NQA-1.

Innovative design, customized solutions and rigorous testing are a part of everything we do at PacTec.

We manufacture packaging. We engineer solutions.

Exceeding Expectations, One Customer at a Time . . .

SCAN ME

PACTEC

1-800-272-2832

www.pactecinc.com

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

JUN 25 2008

John Lash, Senior Vice President of Operations, Perma-Fix Environmental Services, Inc., Oak Ridge, TN

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION (NDEP) LIMITED APPROVAL OF HIGH MODULUS POLYMERIC PACKAGING SYSTEM (HMPPS) FOR MACROENCAPSULATION OF MIXED WASTE DEBRIS

The NDEP has reviewed the use of the Perma-Fix Environmental Services, Inc. and PacTec, Inc., HMPPS for macroencapsulation of mixed waste debris. Based on the review, NDEP will allow the limited use of the HMPPS for the macroencapsulation of compactable debris. The limitations are specified on the attached letter from Tim Murphy, Chief, Bureau of Federal Facilities, to E. Frank Di Sanza, Federal Project Director, Waste Management Project, Subject: Review of the High Modulus Polymeric Packaging System (HMPPS) Assembly, Loading and Closure Instructions, dated June 24, 2008.

Since the HMPPS is not listed as a package type on currently approved Materials & Energy Corporation (M&EC) Perma-Fix NTS waste profiles, please ensure that any waste profiles that are proposed candidates for this package are revised to include the HMPPS and sent through the NNSA/NSO Radioactive Waste Acceptance Program (RWAP) for review.

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

E. Frank Di Sanza
Federal Project Director
Waste Management Project

WMP:4322.FD

Enclosure:
As stated

cc w/encl via e-mail:
Renee Echols, Perma-Fix, Oak Ridge, TN
Andrew Rosenman, Perma-Fix, Oak Ridge, TN
R. G. Geisinger, NSTec, Las Vegas, NV
K. J. Rohrer, OPA, NNSA/NSO, Las Vegas, NV
S. A. Hejazi, SC, NNSA/NSO, Las Vegas, NV
J. J. Cebe, WMP, NNSA/NSO, Las Vegas, NV
NNSA/NSO Mailroom

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

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

Jim Gibbons, Governor
Allen Biaggi, Director
Leo M. Drozdoff, P.E., Administra

June 19, 2008

E. Frank Di Sanza, Federal Project Director
Office of Environmental Management
Waste Management Project
U.S. Department of Energy
Nevada Site Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Review of the High Modulus Polymeric Packaging System (HMPPS) Assembly, Loading, and Closure Instructions

Dear Mr. Di Sanza,

The Nevada Division of Environmental Protection (NDEP), Bureau of Federal Facilities (BFF) staff has received and reviewed the final HMPPS Assembly, Loading, and Closure Instructions. The BFF additionally sent a representative to the PacTec facility in Clinton, Louisiana to observe a loading and testing demonstration of the HMPPS.

The HMPPS does meet the definition of macroencapsulation pursuant 40 CFR §268.45 by using a jacket of inert inorganic material (i.e. HMPPS) to substantially reduce surface exposure to potential leaching media. Additionally, the HMPPS would be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after disposal.

However, serious concerns exist with the type of debris and loading methodology, specifically heavy and light debris that is not hand loaded. The HMPPS assembly provides less structural integrity than other macroencapsulation technologies increasing the likelihood of a breach in the liner. Container breaches have been observed at waste generator sites and the NTS in more robust steel containers.

Therefore, NDEP approval will only cover HMPPS for macroencapsulation of compactible debris as defined in Section 4.4.3 fo the HMPPS Assembly, Loading, and Closure Instructions (attached). Compactable debris is defined as light debris that is bendable, malleable, or transforms shape under weighted pressure (e.g., PPE, plastics, and paper).

Address any questions or concerns regarding this matter to Tim Murphy at (702) 486-2850 ext. 231.

Sincerely,

T.H. Murphy
Chief,
Bureau of Federal Facilities

2030 E. Flamingo Road, Suite 230 • Las Vegas, Nevada 891

ACTION
INFO
NSO/MGR
AMBCM
AMEM
AMNS
AMSO
AMSS
COR-RAI-
File Code

AMEM

cc: Brian Moran, NSTec, Las Vegas, NV
R.H. Geisinger, NSTec, Las Vegas, NV
John K. Wrapp, NSTec, Las Vegas, NV
John T. Carilli, NNSA, Las Vegas, NV