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NA-LA NEPA COMPLIANCE OFFICER (NCO) COMPLIANCE DETERMINATION FORM

LAN No: 17-09

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<b>PROJECT/ACTIVITY TITLE:</b> Stabilization and Characterization of Americium 241 Residues from Thermo Fisher Scientific	<b>Accession No:</b> 21156 <b>PRID No:</b> 15P-0255 and 17P-0213	<b>Date:</b> December 26, 2017
<b>PURPOSE:</b> The U.S. Department of Energy/National Nuclear Security Administration (DOE/NNSA) proposes to stabilize, characterize, and repackage a drum containing americium-241 residues previously owned by Thermo Fisher Scientific and transported to Los Alamos National Laboratory (LANL) from their Santa Fe storage facility. The drum was received at LANL on February 21, 2016, and remains in storage. The necessary actions are to put the drum in a safer configuration through venting, opening the original drum, repackaging the contents, and performing non-destructive assay and radiography on the daughter drums to allow for the continued safe storage or future onsite/offsite transport, processing, and disposal.		
<b>Location:</b> Technical Area 3 (TA-3) –Chemistry and Metallurgy Research (CMR) Facility Building 0029	<b>Project Contact:</b> Randall Reddick, LANS EPC-ES, 667-4299, reddick_r@lanl.gov	
<b>NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) COVERAGE:</b> The 2008 <i>Final Site-Wide Environmental Impact Statement for the Continued Operations of Los Alamos National Laboratory at Los Alamos, New Mexico</i> , May 2008, (DOE/EIS-0380) (SWEIS), and the associated Record of Decision as published in the September 26, 2008, Federal Register Vol. 73, No. 188, 55833.		

## BACKGROUND

In the late 1970s, the Albuquerque branch of Eberline Instrument Corporation (bought by Thermo Fisher Scientific) was producing 1.0 microcuries of americium-241 electroplated sources for use in household smoke detectors. As a result of strong sales, Eberline procured an additional 9.3 curies (approximately 2.7 grams) of americium. When Eberline's source production operation was terminated in 1979, the remaining americium inventory was placed in a safe storage configuration in secure underground vaults in Albuquerque for future business opportunities.

In 2000, the americium-241 material was repackaged in seven Department of Transportation 2R pipes (containers). These pipes were placed inside a stainless-steel 55-gallon drum. The 55-gallon drum was overpacked into an 85-gallon container. The 85-gallon overpack container was transported to the Thermo Fisher Scientific facility in Santa Fe, where it remained in storage from 2000 to early 2016.

In April 2012, the New Mexico Environment Department contacted the DOE/NNSA Los Alamos Field Office requesting assistance with the Thermo Fisher Scientific americium-241 inventory residing inside the Santa Fe city limits. In support of DOE's program to reestablish a capability for americium oxide production, DOE agreed to include the Thermo Fisher Scientific material in the program for recovery, purification, and ultimate programmatic use. The state of New Mexico was responsible for and transported the drum to Los Alamos National Laboratory (LANL) on February 21, 2016. LANL's Chemistry and Metallurgy Research (CMR) Facility was designated for initial receipt and storage of the drum (PRID 15P-0255). An assay performed of the drum upon receipt at the CMR Facility measured the contents to be 1.74 grams of americium-241.

Prior to the February receipt of the drum a NEPA review was conducted on January 22, 2016 and the following conclusion reached as documented by the email synopsis below from Charles Pergler, NA-LA NEPA support contractor, to Steve Fong, NA-LA General Engineer who was assigned interim NA-LA NEPA responsibilities:

The Americium-241 drum stabilization, characterization, and repackaging proposal (Permits Requirements Identification System [PRID] 15P-0255) has National Environmental Policy Act (NEPA) coverage under the 2008 Site-Wide Environmental Impact Statement DOE/EIS-0380 (EIS). My conclusion is based on: an analysis of the PRID project description and subject matter experts comments; independent discussions with Jen Payne, Randy Reddick, and Donald Thorp on January 21, 2016; review of the EIS; review of the NA-LA categorical exclusion determination for Domestic Source Recovery- FY 2016 LAN No: 15-07 dated December 10, 2015; and review of the Department of Energy (DOE) NEPA regulations Appendix B categorical exclusions.

While drum receipt, potential recovery of the americium-241 within the drum, and drum storage is not part of the Off-site Source Recovery Project (OSRP) the receipt of the americium-241 within the drum is bounded by the OSRP analysis regarding the number of actinide sources that could be received by Los Alamos National Laboratory (LANL). The OSRP, managed by the Los Alamos National Security, LLC (LANS) Nuclear Engineering and Nonproliferation Division, proposes to recover up to 4,000 domestic origin actinide and non-actinide sealed sources from locations within the United States in fiscal year (FY) 2016. Based on performance planning for FY 2016, LANS previously determined that sufficient handling and storage facilities exist at Los Alamos National Laboratory (LANL) to support OSRP operations. NEPA coverage is provided by the EIS and supported by the December 2015 NA-LA categorical exclusion determination.

Receipt, processing of the drum's contents, and storage are all activities that have been and are currently performed at LANL and are covered under the EIS.

The PRID 15P-0255 provides sufficient NEPA analysis to determine that no other actions are necessary from a NEPA perspective.

Due to the time lag between drum receipt and receipt of more detailed information regarding the proposed treatment plan an additional NEPA evaluation is being conducted as captured in this follow-up NEPA Determination.

## **DESCRIPTION OF PROPOSED ACTION**

The proposed action is to place the drum contents into a safe configuration allowing for continued safe storage or future onsite/offsite transport, processing, and disposal. DOE proposes to vent the 55-gallon drum, which would involve the following operations to be conducted at CMR:

1. Opening the vented, 85-gallon overpack container that has the 55-gallon drum of americium-241 residues;
2. removing (lifting with a crane) the 55-gallon drum, penetrating (e.g., drilling) and venting the drum through the addition of a high efficiency particulate air (HEPA)-filtered vent/gas sampling port through its lid, and collecting a headspace gas sample;
3. placing the 55-gallon vented drum in a overpack container and then placing the drum in storage in the basement of the CMR Facility; and
4. unpacking the 2R pipes and other containers from the 55-gallon drum and repackaging in Department of Transportation 7A Type A containers.

While unlikely to be used, an alternative venting option is to drill through both the overpack drum and the 55-gallon drum. The vented gas would be stored in a controlled environment subject to HEPA filtration.

After analysis of gas samples, the 55-gallon drum would be unpacked to remove the inner containers (pipe sections). Unpacking of inner containers may occur with the 55-gallon drum inside of an overpack container or the drum may be lifted out of the overpack container prior to the operation. The drum opening operation could be performed via a “bagout” type technique that would allow removal of the seven 2R pipe containers one by one into a “vented bag sleeve” and placing them individually into seven new Department of Transportation 7A Type A containers. There are alternative methods to removing the 2R pipes. The drum opening and unpacking operation could be performed within a contamination-controlled environment, such as a tent, as directed by the Radiation Protection Program. The seven 2R pipe containers could then be analyzed (e.g., non-destructive assay counting) and radiographed through the new containers.

Once the contents of the americium-241 drum have been repackaged in Department of Transportation 7A Type A containers that are certified for transportation, the containers will be placed back in storage at the CMR Facility pending future programmatic decisions. These actions will include recovery and purification of americium as well as onsite transportation to other LANL facilities as needed or offsite for disposal.

## IMPACT ASSESSMENT

Americium-241 is routinely handled and managed at the CMR Facility and in much greater quantities than in this proposed action. LANL personnel routinely vent and repackage drums at TA-54 and TA-50. The SWEIS Tables 3-3 and 3-17 identify that support for processing actinides (including americium-241), research, and transuranic waste characterization (including ventilation, staging, and storage) would be conducted at the CMR Facility.

**Radiological Air Quality:** Only certain areas of the CMR Facility have a credited HEPA filtration system. Thus, venting of the americium-241 drum will be conducted into a controlled HEPA filtered volume. The potential radiological release from this operation is up to  $7.2 \times 10^{-7}$  curies<sup>1</sup>, although the goal is to operate with no emissions. The 2008 SWEIS evaluated the release of americium-241 under routine conditions and estimated that  $4.2 \times 10^{-6}$  curies per year could be released.<sup>2</sup> Venting of this drum is bounded by the 2008 SWEIS. The CMR stack is monitored so that any releases can be reported.

**Human Health – Worker Health:** Workers supporting the proposed action would be employees from the existing LANL workforce. DOE Order 458.1 requires that radiation doses are kept as low as reasonably achievable (ALARA). LANL’s Environmental ALARA Program is implemented to systemically verify and document that environmental radiological impacts are ALARA.<sup>3</sup> ALARA is achieved through the use and implementation of shielding, safe work practices, procedures, and personal protective equipment. Worker doses are required to be kept below 5,000 millirem<sup>4</sup> per year, as mandated in 10 Code of Federal Regulations (CFR) Part 835. DOE established an agency-wide administrative control limit of 2,000 millirem per year in its

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<sup>1</sup> E-mail dated 11/16/2017; D. Fuehne, LANS EPC-CP to R. Reddick, LANS, EPC-ES; Re: Am-241.

<sup>2</sup> 2008 SWEIS, Table 5-12 Summary of Annual Projected Radiological Air Emissions (curies per year), page 5-60.

<sup>3</sup> *Los Alamos National Laboratory Environmental ALARA Program, Rev. 2*, PD410, Los Alamos National Laboratory, Los Alamos, New Mexico, November 7, 2014.

<sup>4</sup> Millirem is one-thousandth of a rem (0.001 rem). Rem is an acronym for roentgen equivalent man, a unit of dose equivalent. The dose equivalent in rem equals the absorbed dose in rad in tissue multiplied by the appropriate quality factor and possibly other modifying factors.

Radiological Control Manual.<sup>5</sup> This manual also requires DOE contractors, such as Los Alamos National Security, LLC (LANS), to establish a lower administrative control limit, on the order of 500 millirem to 1,500 millirem per year.<sup>15</sup> LANS has also established action levels, for example 1,000 millirem<sup>6</sup> for whole-body dose.<sup>7</sup>

The 2008 SWEIS identifies that the projected radiation exposure for the average individual worker is 139 millirem per year and 280 person-rem.<sup>8,9</sup> In 2016, LANS reported an average LANL individual worker dose of 86 millirem and 95.6 person-rem.<sup>10</sup> Workers for this activity will be dressed in personnel protective equipment suitable for an environment with potential radioactive contamination. It is anticipated that the 55-gallon drum was not packaged to the same pedigree that LANS conducts. The inner contents of the 55-gallon drum will likely contain surface contamination so the level of personnel protective equipment will be commensurate with that risk. The dose to workers from implementation of the proposed action is not expected to be different from that analyzed in the 2008 SWEIS and is thus bounded by the 2008 SWEIS.

**Waste Management:** Potentially contaminated packaging material or debris from repackaging would be removed from the drum with guidance from LANS Radiation Protection Program personnel. If a tent is used for the venting and repackaging activities, then those materials will also be managed as waste when the operation is complete. Packing material and debris would be managed as low-level or transuranic waste and would be disposed of according to standard practices. The anticipated volume of waste generated from this activity is bounded by the 2008 SWEIS.<sup>11</sup>

**Facility Accidents:** Because this drum and its contents were not a product of LANL operations, the comparison to previously analyzed NEPA facility accidents is not direct but is comparable. LANL manages americium at the CMR Facility in quantities much larger than contained in this drum and routinely vents and repackages drums at TA-54 and TA-50.

LANS safety experts evaluated a potential accident for this proposed action involving the buildup of hydrogen gas generated from the radiolytic decomposition of the other contents (e.g., nitric acid solution, polymer bottles).<sup>7</sup> A flammable gas such as hydrogen would likely be generated. While hydrogen generation from radiolysis of a non-reactive polystyrene resin appears minimal at this point, it was assumed that the failure of the container would be expected to lead to a release of all the radiological contents. In this scenario, it is assumed that all of the nuclear material is in the form of powder located in a single container and pressurized with radiolytically generated gas, either to the point of container failure and venting or with ignition leading to

<sup>5</sup> U.S. Department of Energy Radiological Control Manual, DOE/EH-0256T, Rev. 1, Assistant Secretary for Environment, Safety and Health, April 1994.

<sup>6</sup> LANL Procedure Radiation Protection, P121, Table 12-2, Rev. 4, June 6, 2014.

<sup>7</sup> Whole body dose—defined for the purposes of external exposure include head, trunk (including male gonads), arms above and including the elbow, or legs above and including the knee (10 CFR 835).

<sup>8</sup> 2008 SWEIS, Table 5-25 Projected Worker Radiation Exposure under the No Action Alternative, page 5-101.

<sup>9</sup> Person-rem is a unit of collective radiation dose applied to populations or groups of individuals; that is, a unit for expressing the dose when summed across all persons in a specified population or group.

<sup>10</sup> E-mail dated April 7, 2017, RE: SWEIS Yearbook CY2015 and 2016 Data Request for Ionizing Radiation and Worker Exposures; From Paul Hoover, LANL, to Karen Musgrave, LANL.

<sup>11</sup> 2008 SWEIS, Table 5-37 Summary of Total (Operations, Decontamination, Decommissioning, and Demolition, and Remediation) Waste Generation Projections by Alternative (Cumulative 2007 through 2016), page 5-136.

deflagration with subsequent failure and venting. Once the drum is vented, the pressurization of the drum from radiolytically generated gas is no longer a credible risk.

In this analysis, the material-at-risk is assumed to be 100 grams  $^{239}\text{PuE}$ , an unmitigated damage ratio of 1, and the airborne release fraction and respirable fraction were set at 0.1 and 0.7, respectively, based on DOE-HDBK-3010.<sup>12</sup> The Leak Path Factor is assumed to be 1, meaning all material-at-risk is released to the environment. No credit is taken for the multiple container levels (2R container, 55-gallon drum, 85-gallon overpack drum). The resulting dose to the maximally exposed offsite individual for this accident was calculated at 4.2 rem.

This accident analysis is conducted in the same manner to provide designations of safety-related equipment. DOE requires<sup>13</sup> that if unmitigated offsite doses between 5 rem and 25 rem are calculated (i.e., challenging the 25 rem Evaluation Guideline), then controls should be considered. For NEPA design-basis accidents, a leak path factor of 1 would not be realistic since HEPA-filtration, three layers of containment, deposition in the building, and deposition inside the filter plenum were not credited.

The 2008 SWEIS<sup>14</sup> Seismic 1 (Performance Category-2 earthquake) evaluates a complete failure of structures, systems, and components (given the seismic ground shaking), thereby resulting in the maximum possible radioisotope release to the environment. This 2008 SWEIS accident is a different initiator but evaluates a release of the entire radiological inventory. The maximally exposed individual in the 2008 SWEIS seismic analysis for the CMR Facility would receive a dose of 62 rem. Thus, the proposed activity is bounded by the 2008 SWEIS analysis.

## CONCLUSION

Based on this NEPA determination analysis, there are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects or threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders. Consequently, no further NEPA analysis is necessary or required.

<sup>12</sup> DOE-HDBK-3010. *Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities*. Change Notice 1. Washington DC: U.S. Department of Energy, March 2000. Reaffirmed 2013.

<sup>13</sup> DOE-STD-3009-2014. *DOE Standard Preparation of Nonreactor Nuclear Facility Documented Safety Analysis*, Washington DC: U.S. Department of Energy, November 2014.

<sup>14</sup> 2008 SWEIS, Table 5-68 Site-Wide Seismic 1 Radiological Accident Offsite Population Consequences for the No Action, Reduced Operations, and Expanded Operations Alternative, p. 5-189.

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**NEPA Determination**

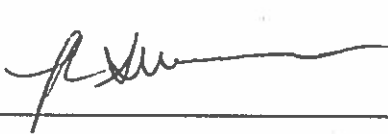
Based on my review of the Proposed Action, as the National Nuclear Security Administration's Los Alamos Field Office (NA-LA) NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the Proposed Action as described herein, falls within the boundaries of activities previously analyzed in the 2008 *Final Site-Wide Environmental Impact Statement for Continued Operations of Los Alamos National Laboratory Los Alamos, New Mexico* (DOE/EIS-0380) and September 26, 2008 Record of Decision. Therefore, no additional NEPA analysis is required. If changes are made to the scope of the action so that it is no longer bounded by the enclosed description, or the project is changed to encompass other actions, NEPA requirements for the action will need to be reassessed at that time and further analysis may be required.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects or threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or executive orders. If changes are made to the scope of the action so that it is no longer bounded by the enclosed description, or the project is changed to encompass other actions, NEPA requirements for the action will need to be reassessed at that time and further analysis may be required.

NNSA NEPA Compliance Officer: Jane Summerson

Date:

Signature:

 , NCO

4/3/18