Los Alamos National Laboratory's Revised Nitrate Salt-Bearing Waste Container Isolation Plan

May 29, 2014

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NATIONAL LABORATORY
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Office of the Director

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NM Environment Department
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National Nuclear Security Administration
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MAY 29 2014
NMED
Hazardous Waste Bureau

May 29, 2014

Ryan Flynn, Cabinet Secretary
New Mexico Environment Department
Harold Runnels Building
1190 St. Francis Dr., Room 4050
Santa Fe, NM 87505

Dear Mr. Flynn:

On May 23, 2014, the U.S. Department of Energy (DOE) and Los Alamos National Security, LLC (LANS) ("Permittees") received the New Mexico Environment Department's (NMED's) contingent approval of the Permittees' May 21, 2014, *LANL Nitrate Salt–Bearing Waste Container Isolation Plan* ("Isolation Plan"). NMED approved the Isolation Plan contingent on the submittal of a revised Isolation Plan that incorporated additional requirements ("Revised Isolation Plan"). NMED required the Permittees to address all of the items enumerated in their May 23, 2014 letter, incorporate those changes and resubmit the plan by May 29, 2014.

Enclosed please find a copy of LANL's proposed Revised Isolation Plan. The Permittees' addressed all of NMED's requirements in this Revised Isolation Plan, including attaching all relevant procedures. Additionally, we have enclosed a cross-walk documenting NMED's additional requirements and where these requirements were addressed in the Revised Isolation Plan.

Please contact Jeff Mousseau at (505) 606-2337 (jmousseau@lanl.gov) or Peter Maggiore at (505) 665-5025 (peter.maggiore@nnsa.doe.gov) if you have any questions regarding the Revised Isolation Plan.

Sincerely,

For:
Charles F. McMillan, Director
Los Alamos National Laboratory
PO Box 1663, MS K499
Los Alamos, New Mexico 87545

Sincerely,

Kimberly Davis Lebak, Manager
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3747 West Jemez Road, MS A316
Los Alamos, New Mexico 87544

JM/PM/KR:sm

Enclosures: 1. Revised LANL Nitrate Salt–Bearing Waste Container Isolation Plan (LA-UR-14-32820)

2. Cross-Walk of NMED's May 23, 2014 Additional Requirements and the LANL Revised Isolation Plan (LA-UR-14-23821)

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Cross-Walk Documenting NMED's Additional Requirements and Location Requirements are Addressed in the LANL Revised Isolation Plan

NMED Item Number	NMED Item from May 23, 2014 Contingent Approval Letter	LANL Revised Isolation Plan Section
1	In Part IV, the Permittees shall describe how daily temperature measurements will be taken from the closed containers that are over packed in standard waste boxes ("SWBs").	Section IV(4)
2	In Part IV, the Permittees shall describe how the additional tamper seals were installed and if there are plans to install other tamper seals on any additional containers.	Section IV(1)
3	In Part IV, the Permittees shall describe how the Permittees are preventing workers from coming into contact with the nitrate salt-bearing waste containers in question and how workers are being protected, including but not limited to, a discussion of how and if other protective shields and/or barriers will be utilized to protect workers.	Section IV(6)
4	In Part IV, the Permittees shall provide copies of monitoring procedures and checklists associated with the monitoring of the waste in the storage areas, including visual inspection and temperature monitoring.	Attachments
5	In Part IV, the Permittees shall state the temperature range at which the nitrate salt- bearing waste container are maintained while in the 375 Permacon.	Section IV(4)
6	Part IV states the remediated nitrate salt-bearing waste containers are currently stored in Dome 230 and will be moved to the Permacons at Domes 231 and 375. Part V states the unremediated nitrate salt-bearing waste containers are currently stored in Dome 232 and will be moved to the Permacons at Domes 231 or 375. The Permittees shall include in Parts IV and V a discussion of how Dome 231, Dome 375 and the Permacons are adequate for the containment of a breach with energy similar to the WIPP incident.	Section IV(3) and V(2)
7	In Part IV, the Permittees shall discuss in more detail the active fire suppression system in storage areas, including but not limited to, whether the system is compatible with the waste and how any by- products produced would be contained in the event a reaction occurs.	Section IV(3) and V(2)
8	Parts IV(4) and V(2) state "[a]ction levels will be established and response instructions prepared." These parts shall clearly state what parameters will be used for the action levels. Also, the emergency response plan referenced in Parts IV(4) and V(2) must be attached to the Plan.	Section IV(4) and V(3) (note - Section V(2) has been re-numbered)
9	Part IV(5) and V(3) state that the subject containers will be placed "an adequate distance apart." These Parts shall state what distance was determined to be adequate by LANL and the basis for that determination.	Sections IV(5) and V(4) (note - Section V(3) has been re-numbered)

10	Parts IV and V shall state whether fire department/emergency responders will be present or alerted when the subject containers are being transported and if responders will be present/alerted during other actions.	Sections IV(7) and V(6)
11	Part IV(5) states that "where possible, fire resistant curtains will be used in lieu of spacing." The Plan shall describe the effectiveness of fire resistant curtains, including the temperatures the curtains are rated for in contrast to the estimated temperatures reached in Panel 7, Room 7, based on the most recent evidence available.	Sections IV(5) and V(4)
12	Part IV(7) shall state that the sister drum and the 57 subject containers have been/will be clearly labeled with the appropriate warning labels and any other required labeling.	Section IV(9) (note - Section has been re-numbered)
13	In Part V, the Permittees shall describe how daily temperature measurements will be taken of the unremediated nitrate salt-bearing waste containers.	Section V(3)
14	In Part V, the Permittees shall detail how the Permittees are preventing workers from coming into contact with these containers and how workers are being protected, including but not limited to, discussion of how and if other protective shields and/or barriers will be utilized to protect workers.	Section V(5)
15	In Part VI, the Permittees shall further explain the basis for the determination that the cementation process and the associated procedures adequately remove characteristics of ignitability and reactivity from the nitrate salt waste stream and why no further controls are necessary for the legacy and newly generated cemented nitrate salt-bearing waste.	Section VI
16	The Plan shall state that the Permittees will maintain records of all monitoring and all events related to disposition of the nitrate salt- bearing waste. The Plan shall state that all records will be updated on a daily basis and be available to NMED for inspection.	Monitoring: Sections IV(4) and V(3) Events Related to Disposition: Sections IV(10) and V(8)
17	Table D-2 of the contingency plan for TA-54 Area G does not list Dome 230, 231, and 375 as being equipped with fire suppression systems. Instead, it states that there are several fire hydrants in Area G which will supply water at an adequate volume and pressure to satisfy the requirement of 40 CFR 264.32(d). The Plan shall address this discrepancy, including discussion of whether firefighters or other trained and certified personnel will be available 24-hours a day to utilize the fire hydrants in the event of a fire or reaction if the fire suppression system in not automated.	Sections IV(3) and V(2)
18	Table D-2 of the contingency plan lists Dome 375 as being equipped with pull fire alarm stations that must be activated by an employee; the Plan does not describe how the Permittees will provide access to pull alarms during an event.	Sections IV(3) and V(2)

19	All LANL and CCP procedures related to any activity in the Plan shall be attached to the Plan.	Attachments
20	The Acceptable Knowledge Summary Document (CCP-AK-LANL-006) for waste stream LA-MHD01.001 states that the waste stream contains varying amounts of nitrate salts remediated with cat litter absorbent. The Permittess must incorporate into the Plan the basis for the exclusion of the LA-MHD01.001 waste stream from the Plan and specifically explain why the LA-MHD01.001 waste stream does not pose a threat. Otherwise, this stream should be treated with the same caution as waste stream LA-MIN02.001.	Section III
21	The spreadsheet titled "Carlsbad_LANL_List_Varience_2014-05-20.xlsx" includes, in addition to the LA-MIN02.001 and LA-MHD01.001 waste streams, reference to the LA-CIN01.001 and LA-MIN04-S.001 waste streams. These waste streams must also be addressed in the Plan in accordance with Item 20, above.	Section III
22	Part IV and V state the numbers of nitrate salt- bearing waste containers that are remediated and unremediated. These designations are for waste stream LA-MIN02.001 only, and as discussed in Item 20, shall include containers in the LA-MHD01-001 waste stream, unless it is explained to NMED why the waste stream does not pose a similar threat.	Section III
23	Treatment of the nitrate salt-bearing waste containers is not explicitly discussed in the Plan, but treatment is referenced. Part IV(8) and V(5) state that the Permittees have established a Remediation Team to identify a path forward for remediation of the nitrate salt-bearing waste containers as necessary and appropriate. Any treatment plans or proposals that are developed by the Remediation Team shall be discussed with NMED, and shall include, but not be limited to, the neutralization steps, the reagents used, the location of process, the process for treating drums overpacked into 85 gallon containers and any other specific information related to treatment and neutralization. The treatment plans that are developed shall detail which characteristic (toxicity, reactivity, ignitability, corrosively) mixed transuranic ("TRU") wastes the Permacons are authorized to treat. As discussed prior, permit modifications may be necessary for treatment of the nitrate salt- bearing waste containers, and such permit considerations shall be taken into account by the Permittees and discussed with NMED.	Sections IV(10) and V(8)

Revised LANL Nitrate Salt-Bearing Waste Container Isolation Plan

May 29, 2014

I. Introduction

On May 19, 2014, the Department of Energy (DOE) and the Los Alamos National Security, LLC (LANS) ("Permittees") received Administrative Order No. 5-19001 ("Order") issued by the New Mexico Environment Department (NMED). The Order, at paragraph 18, required the Permittees to submit a *LANL Nitrate Salt Bearing Waste Container Isolation Plan* ("Isolation Plan"). The Isolation Plan was submitted by 2:00 PM on May 21, 2014.

On May 23, 2014, NMED approved the Isolation Plan contingent on the submittal of a revised Isolation Plan that incorporated additional requirements ("Revised Isolation Plan"). NMED required the Permittees to address all of the items enumerated in their May 23, 2014 letter, incorporate those changes and resubmit the Revised Isolation Plan by May 29, 2014.

As described below, this Revised Isolation Plan incorporates the additional requirements enumerated by NMED. It describes how the Permittees will isolate, secure and/or treat all nitrate salt-bearing waste containers currently stored at Los Alamos National Laboratory (LANL), so that a potential release from any nitrate salt-bearing container at LANL does not pose a threat to human health or the environment. The plan also includes a schedule of implementation for isolating, securing and/or treating nitrate salt-bearing waste containers currently stored at LANL.

Additional measures above those described in this Revised Isolation Plan may also be taken and will be identified to NMED during the daily technical calls established in Section VIII below.

II. Background

On May 1, 2014, the Waste Isolation Pilot Plant (WIPP) declared a potentially inadequate safety analysis (PISA) on the possibility of unremediated nitrate salt-bearing waste contained in waste packages at WIPP. On May 2, 2014, LANS convened a critique to perform an extent of condition on the PISA issued by WIPP. As a result of the critique, the Permittees implemented several corrective and precautionary actions immediately to ensure protection of human health and the environment. The Permittees identified the current storage locations of all remediated and unremediated nitrate salt-bearing waste containers. The Permittees moved all remediated nitrate salt-bearing waste containers into TA-54, Area G, Dome 230 (because Dome 230 has an active fire suppression system) and daily temperature measurements of each container commenced. Additionally, continuous radiological air monitoring was initiated in Dome 230. Finally, any further processing of nitrated salt waste streams was suspended and all transuranic (TRU) waste shipments from LANL were paused.

On May 15, 2014, WIPP released photographs showing a LANL drum containing remediated nitrate salt-bearing waste that appeared to be breached in Panel 7, Room 7. The cause of this breach and other potentially impacted drums is currently unknown, but is being actively investigated by multiple parties.

On May 16, 2014, the Permittees convened a critique to review the new information. A PISA was declared (ORPS NA-LASO-LANL-WASTEMGT-2014-0004) on the possibility of inadequate safety basis controls specified for the remediated nitrate salt-bearing waste. As a result of the critique, the Permittees implemented several corrective and precautionary actions immediately to ensure protection of human health and the environment (described below).

III. Waste Container Categories

The current inventory of nitrate salt-bearing waste containers stored at LANL can be divided into three categories: 1) remediated nitrate salt-bearing wastes; 2) unremediated nitrate salt-bearing wastes and; 3) cemented legacy and newly generated nitrate salt-bearing wastes.

To identify all of the nitrate salts drums generated, a focused review of the generator records was conducted. Unconsolidated nitrate salts were only generated at TA-55 in a specific room and glove box from 1979 through 1991. It is important to note that after 1991, all nitrate wastes were cemented.

Following review of generator records, it was determined that all of the nitrate salt parents exist as subsets in both a debris (LA-MHD01.001) and cemented (LA-CIN01.001-Cans) waste stream. The LA-MHD01.001 waste stream contains over a thousand containers, but only 164 original parent drums that contained nitrate salts. LA-CIN01.001-Cans waste stream also contains over a thousand containers, but only 103 original parent drums that contained nitrate salts.

In total, there were 267 original nitrate salt parent containers identified. A large portion of these 267 parent containers have been remediated into nitrate salt daughter containers. As a result, there are currently 707 nitrate salt-bearing containers. After remediation, all of the remediated nitrate daughters were assigned to two homogeneous absorption waste streams; LA-MIN02-V.001 and LA-MIN04-S.001. However, after real-time radiography, daughter containers may have been re-assigned to a final waste stream based the volume percentages of the final waste content.

Of the 707 identified nitrate salt-bearing containers, a total of 86 remain at LANL, 57 are remediated daughter containers and 29 are unremediated parent containers.

The above-referenced waste streams, LA-MHD01.001, LA-CIN01.001, LA-MIN02-V.001 and LA-MIN04-S.001 are not solely dedicated to nitrate salts. All other containers in waste streams LA-MHD01.001, LA-CIN01.001, LA-MIN02-V.001 and LA-MIN04-S.001 do not contain nitrate salts and do not require isolation or management as nitrate salts.

Additional information on the Permittees' evaluation and identification of LANL nitrate salt drums is provided in the *Summary of Evaluation and Identification of LANL Nitrate Salt Containers,* LA-UR14-23807. (Attachment 1)

If any additional nitrate salt-bearing waste containers are identified based on new information, these will be managed in the same manner as the currently identified nitrate salt-bearing waste containers. The Permittees will notify NMED during the daily technical calls established in Section VIII below.

This plan addresses isolation, securing and/or treatment of the remediated and unremediated, nitrate salt-bearing wastes. In this plan, "remediated" containers are defined as LANL unconsolidated nitrate salts that were remediated with kitty litter absorbent and were repackaged into new drums. "Unremediated" containers are defined as LANL unconsolidated nitrate salts drums to which absorbent material has not been added.

The third category, cemented legacy and newly generated cemented nitrate salt-bearing wastes, is not addressed in this plan because, as discussed in Section VI, per the definitions of ignitable and reactive in 40 CFR §264.21 and §264.23, legacy cemented nitrate salt-bearing waste generated since 1991, as well as newly generated cemented nitrate salt-bearing waste generated at Technical Area (TA)-55, is not ignitable or reactive.

IV. Immediate Actions for Remediated Nitrate Salt-Bearing Waste Containers

There are currently 57 remediated nitrate salt-bearing waste containers at LANL. The Permittees validated this number through review of data from the Waste Characterization and Action Tracking System (WCATS) database and a field walk-down verification. Below is a description of the activities the Permittees have already taken and/or are currently underway to address isolating, securing, and/or treating the remediated nitrate salt-bearing waste containers.

1) On May 16, 2014, LANS applied five LANL tamper indicating devices (TIDs) to drum number 68685 as shown in the attached photo (Attachment 2, photo 1). This TRU waste drum is the sister drum related to the suspect drum at WIPP (drum 68660 was confirmed as the damaged drum during the May 22, 2014 WIPP entry, and drum 68685 is its sibling). Additionally, a member of the DOE Los Alamos Field Office observed the application of the TIDs.

   On May 16, 2014, drum number 68685 was placed inside an SWB along with three empty dunnage drums (Attachment 2, photo 2) and was sealed. LANS applied two additional TIDs to either end of the SWB as shown in the attached photo (Attachment 2, photo 3).

   On May 16, 2014, the empty parent containers for the two drums of initial interest (68660 and 68533) in the WIPP underground repository were identified onsite at LANL. As a

result, LANS applied TIDs to both empty parent containers (69120 and 68359) during the early afternoon of May 16, 2014. This evolution was observed by DOE Los Alamos Field Office. Since that time S855793 was determined to be the parent container of drums 68685 and 68660.

These TIDs, and all subsequent TIDs, were installed in accordance with the LANL TID User Manual, NMCA-TID-FWI-002 R.1, LA-UR-13-27213 (Attachment 3) by trained and qualified LANL TID users.

No additional TIDs have been applied to date, nor do the Permittees intend to install any additional TIDs at this time. However, additional TIDs will be applied as necessary to ensure that valuable information is not lost or as otherwise needed.

If directed to open the containers, the TIDs must be removed by qualified TID personnel in accordance with the TID User Manual (Section 3.21). In this instance, a two-person rule must be followed to verify chain of custody has been maintained and to verify that the TID has been properly destroyed once removed. Additionally, to ensure the TIDs are not removed without approval from the Facility Operations Director (FOD), they also have postings stating "Do Not Remove TIDs without FOD Approval."

2) The Permittees have overpacked the 57 remediated nitrate salt-bearing waste containers at LANL into standard waste boxes (SWBs). These containers were in isolated storage in Dome 230 at TA-54, Area G, which has an active fire protection system. This dry-pipe fire protection system is not included within the LANL Hazardous Waste Facility Permit ("Permit"), Attachment D ("Contingency Plan") as it was inoperable during the re-application process for the Permit. This system became operable in November 2011, and currently the Permittees have chosen not to credit this system as fire control equipment in the Contigency Plan.

   Additionally, as described in Permit Attachment A.4.5 and Attachment D, TA-54 Area G, Table D-2, fire control equipment is located throughout Area G, including Dome 230. This equipment includes ABC-rated or BC-rated fire extinguishers and several fire hydrants. These fire hydrants will supply water at an adequate volume and pressure to satisfy the requirements of 40 CFR 264.32(d).

3) The Permittees have moved all remediated nitrate salt-bearing waste SWBs at LANL to the Permacon in Dome 375 located at TA-54, Area G. For operational efficiency, the Permittees may also utilize the Permacon in Dome 231 for storage of these containers. As described in Permit Attachment A.4.5 and Attachment D, TA-54 Area G, Table D-2, fire control equipment is located throughout Area G, including Domes 231 and 375. This equipment includes ABC-rated or BC-rated fire extinguishers and several fire hydrants.

These fire hydrants will supply water at an adequate volume and pressure to satisfy the requirements of 40 CFR 264.32(d).

The Los Alamos Fire Department (LAFD) is manned and available 24-hours a day. They are able to utilize fire hydrants in the event of a fire or reaction. Additionally, the LANL emergency management organization is also on call 24-hours a day, and will respond promptly.

The Permacon in Dome 375 and the Permacon in Dome 231, as part of permitted units, are authorized under the LANL Permit for storage of mixed TRU wastes. The dry-pipe fire protection systems within the Permacons in the Domes are not included within the Permit Contingency Plan as the Permacons have been generally used for processing waste containers, a process that requires added safety / emergency controls more prescriptive than those of normal waste storage. Therefore, currently the Permittees have chosen not to credit these systems as fire control equipment in the Contigency Plan.

Pre-action fire suppression systems (FSSs) were installed in the Permacon within Dome 231 in November 2012, and in the Permacon within Dome 375 in February 2013. The FSSs are designed as an ordinary group 2 pre-action sprinkler system to protect the moderate hazard operations in the Permacon. Drawings of these FSSs are found in *TA-54 Area G Nitrate Salt Waste Container Response Instructions,* EP-AREAG-PLAN-1248, R.0. LA-UR-14-23795 (Attachment 4). This system uses water for fire suppression, which is compatible with the nitrate salt waste. Should the fire suppression system activate, Pad 9 has a fire water collection system that would contain water from the 231 Permacon FSS. Dome 375 has curbing that provides approximately 49,000 gallons of retention capacity.

The sprinkler system pre-action valve is automatically activated by a combination of any 2 of 3 types of electronic initiating devices located in the Dome or the Permacon: smoke detection, heat detection, or fire alarm pull stations. During an event, fire alarm pull stations can be accessed and manually activated by staff. Pull stations are located in accordance with National Fire Protection Association (NFPA) standards, and are in both Domes and both Permacons. Also, access is facilitated by maintaining emergency egress aisles with a minimum aisle space of two feet in the Domes and the Permacons. Further, in compliance with Permit Section 3.5.1(1), the Permittees will maintain adequate aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment within the 231 and 375 Domes and Permacons. Finally, in the event of an abnormal condition, staff will evacuate quickly and will promptly report to 911, the operations center or the shift manager. Should an abnormal condition be observed, the Permittees will implement their emergency response plan and provide notice to NMED within 24 hours.

The Permacons are constructed of stainless steel frame and sheeting. They are contamination-control structures that are temperature-controlled and equipped with a High Efficiency Particulate Air (HEPA) filtration and fire suppression systems. The Permacons are also maintained at negative pressure. Additionally, the remediated drums have been overpacked into new SWBs. Since SWBs are considered robust enough to prevent lid loss due to deflagration or fire, according to DOE-STD-5506, they would act as a barrier to provide a significant measure of worker protection. While the energy of the WIPP event in Panel 7, Room 7 has not been determined at this time, should an event occur, the 231 and 375 Permacons are designed to contain a radiological release.

4) The Permittees are monitoring, on a daily basis, the temperature of the SWBs that contain remediated nitrate salt-bearing waste drums. As discussed above, all remediated nitrate salt-bearing containers are overpacked in SWBs. Daily temperature measurements are taken of the external surface of the SWB using a calibrated infrared thermometer. The target temperature at which the nitrate salt-bearing waste containers are maintained in both the 375 and 231 Permacons is less than 90°F.

   The Permittees are also performing visual inspections of these containers on an hourly basis, 24 hours per day, to identify abnormal conditions (e.g., signs of smoking and fire, evidence of deterioration, bulging). These activities will be performed in accordance with LANL's Procedure on *Nitrate Salt-bearing TRU Waste Container Monitoring,* EP-AREAG-FO-DOP-1246, R.0, LA-UR-14-23822 (Attachment 5).

   The Permittees will maintain records of all such monitoring. (See, Attachment 5) These records will be updated on a daily basis and be available to NMED for inspection.

   Additionally, the Permittees are using continuous air monitors (CAMs) with alarm capablility, and will continue their use until further notice. There are CAMs in place in the 375 Permacon, two of which have remote alarm notification capability. These two remotely monitored CAMs provide remote notification if there is a significant airborne release (the 375 Permacon currently contains the LANL remediated nitrate salt-bearing waste). Additionally, there are CAMs in place in the 231 Permacon. Lastly, the Emergency Response/Hazardous Materials organization has been briefed on the storage configuration.

   Action levels have been established and response instructions prepared. These are contained in LANL's Procedure on *Nitrate Salt-bearing TRU Waste Container Monitoring,* EP-AREAG-FO-DOP-1246, R.0 (Attachment 5). Should an abnormal condition be observed, the Permittees will implement their emergency response plan and

provide notice to NMED within 24 hours. Area G's building emergency plan is found at Attachment 6, and associated procedures are found at Attachments 7, 8 and 9.

5) Remediated nitrate salt-bearing SWBs are spaced an adequate distance apart to limit any potential interactions between SWBs. This distance has been determined to be 2 feet between containers. This distance is based on the Permittees' review of evidence from the event at WIPP, a calculation on the heat transfer from an SWB undergoing a similar reaction, and a review of fire protection and Permit requirements.

   The Permittees have reviewed photographs of the impacted drum in WIPP Room 7, Panel 7 and the adjacent containers. From the photographs, the adjacent drum and the adjacent SWB appear to have minimal damage and no release. The adjacent drums are in contact with the impacted drum and the adjacent SWBs are within inches of the impacted drum.

   The Permittees have performed a preliminary calculation on the minimum separation distance between SWBs to ensure that an incident in one SWB will not impact an adjacent SWB. Assuming the offending SWB reaches a maximum temperature of approximately 1100°F and that the adjacent SWB does not to exceed 200°F, the heat generated from the offending SWB drops off to below 200°F within 1 inch. The 2 foot spacing in use provides additional assurance that the adjacent SWBs will not be impacted by the heat generated during an exothermic event in a single SWB. The use of fire curtains in between SWBs will not provide a measurable reduction in the thermal conductivity across the 24 inches but does provide protection from flame impingement.

   SWBs will be placed in rows that allow for emergency egress and that have Permit compliant spacing between each row. When used, the fire curtains will be placed within a row (that is, between the adjacent SWBs in that row) to mitigate the potential for interaction between adjacent SWBs. While the temperatures of the event in Panel 7 have not been determined at this time, the Permittees are procuring fire curtains that are rated to a continuous temperature of 1800°F and intermittent temperatures of 2500°F.

   The NFPA consensus standards were also reviewed and NFPA 211 provided the most similar type of control. NFPA 211 covers the installation of chimney pipes and stoves and the distance recommended between the pipe and unprotected combustibles is 18 inches. There are no unprotected combustibles in the Permacons is Domes 231 and 375.

   This 2 foot distance also meets the requirements in Permit Section 3.5.1(1). This section requires the Permittees to maintain adequate aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment within the 231 and 375 Domes and Permacons.

The Permittees may also use fire resistant curtains may be used in lieu of spacing. SWBs will be placed in rows that allow for safe egress and that have Permit compliant spacing between each row. When used, the curtains will be placed within a row (that is, between the adjacent SWBs in that row) to mitigate the potential for interaction between adjacent SWBs. While the temperatures of the event in Panel 7, Room 7 have not been determined at this time, the Permittees are procuring fire curtains that are rated to a continuous temperature of 1800°F and intermittent temperatures of 2500°F. Prior to using fire resistant curtains, the Permittees will discuss the details of their use with NMED during the daily technical calls established in Section VIII below.

6) The Permittees will protect workers by restricting access to the remediated nitrate salt-bearing waste containers. Only those personnel performing the ongoing container monitoring activities (e.g., daily temperature monitoring), other sampling / data collection work (e.g., periodic head space gas sampling), and other required inspections (e.g., Permit required inspections) will be allowed into the storage areas. This is documented in Standing Order EP-AREAG-SO-1247, R.0, LA-UR-14-23796 (Attachment 10).

   Additionally, all remediated nitrate salt-bearing waste has been recently packed in new drums and overpacked into new SWBs. Since SWBs are considered robust enough to prevent lid loss due to deflagration or fire, according to DOE-STD-5506, they would act as a barrier to provide a significant measure of worker protection. No other protective shields or barriers are deemed necessary for the protection of workers.

   Furthermore, the ongoing data collection activities provide continuing information on the physical condition of the waste so that appropriate additional worker safety measures can be taken, if required.

   Finally, there will be warning signs posted at the entrance to the Permacons in Domes 231 and 375, stating the following: "Segregation Area – Nitrate Salts Holding Area – Do not move without approval from the Ops. Manager or Shift Ops Manager."

7) Prior to moving nitrate salt-bearing containers, the Permittees will notify the LANL Emergency Operations Center (EOC). The EOC will notify the Los Alamos Fire Department and other responders, if needed. The Permittees will notify the EOC at the completion of the move. The Permittees do not anticipate that responders will be present during the movement of these containers, or that responders will be present / alerted during other actions.

8) The Permittees are updating all procedures and safety basis documents to convert the processing facilities into storage facilities.

9) SWBs will display the required labels for all inner containers or will be reclassified as a new container in WCATS. The 57 subject containers (including the sister drum to the suspect drum in WIPP) have been clearly labeled with the appropriate warning labels and any other required labeling. Specifically, the containers have the hazardous waste labels required by Permit Section 3.6(1). Additionally, the remediated nitrate salt-bearing waste containers are also marked as "Radioactive", as required by Permit Section 3.6(1).

10) The Permittees have established a "Remediation Team" to identify a path forward for remediation of these containers as necessary and appropriate.

    Any treatment plans or proposals that are developed by the Remediation Team shall be discussed with NMED. These plans or proposals shall include, but not be limited to, the neutralization steps, the reagents used, the location of the process for treating wastes, and any other key specific information related to treatment and neutralization. Any treatment plans that are developed shall detail which characteristic (toxicity, reactivity, ignitability, corrosivity) mixed TRU wastes the Permacons (or other locations) are authorized to treat. Permittees shall discuss with NMED any permit modifications or authorizations that may be necessary for treatment of the nitrate salt-bearing wastes.

    The Permittees will maintain records of all key events, actions and activities related to the disposition of the remediated nitrate salt-bearing waste as documented in the treatment plan (e.g. safe storage configuration, the neutralization steps, the reagents used, the location of the process for treating drums). The key events, actions and activities to be documented will be specified in the treatment plan. These records will be updated on a daily basis and be available to NMED for inspection.

V. Immediate Actions for Unremediated Nitrate Salt –Bearing Waste Containers

There are currently 29 unremediated nitrate salt-bearing waste containers at LANL. The Permittees validated this number through review of data from the WCATS database and a field walk-down verification. Below is a description of the activities DOE/LANS have implemented and intend to implement to address isolating, securing, and/or treating the unremediated nitrate salt-bearing waste containers.

1) The 29 unremediated containers are currently in isolated storage in Dome 230 at TA-54, Area G, which has an active fire protection system. This dry-pipe fire protection system is not included within the Permit Contingency Plan as it was inoperable during the re-

application process for the Permit. This system became operable in November 2011, and currently the Permittees have chosen not to credit this system as fire control equipment in the Contigency Plan.

Additionally, as described in Permit Attachment A.4.5 and Attachment D, TA-54 Area G, Table D-2, fire control equipment is located throughout Area G, including Dome 230. This equipment includes ABC-rated or BC-rated fire extinguishers and several fire hydrants. These fire hydrants will supply water at an adequate volume and pressure to satisfy the requirements of 40 CFR 264.32(d).

2) The Permittees will move all unremediated nitrate salt-bearing waste containers to the Permacons in Domes 375 and/or 231. As described in Permit Attachment A.4.5 and Attachment D, TA-54 Area G, Table D-2, fire control equipment is located throughout Area G, including Domes 231 and 375. This equipment includes ABC-rated or BC-rated fire extinguishers and several fire hydrants. These fire hydrants will supply water at an adequate volume and pressure to satisfy the requirements of 40 CFR 264.32(d).

   The LAFD is manned and available 24-hours a day. They are able to utilize fire hydrants in the event of a fire or reaction. Additionally, the LANL emergency management organization is also on call 24-hours a day, and will respond promptly.

   The Permacon in Dome 375 and the Permacon in Dome 231, as part of permitted units, are authorized under the LANL Permit for storage of mixed TRU wastes. These dry-pipe fire protection systems are not included within the Permit Contingency Plan as the Permacons have been generally used of processing waste containers. A process that requires added safety / emergency controls above and beyond those of normal waste storage. Therefore, currently the Permittees have chosen not to credit these systems as fire control equipment in the Contigency Plan.

   Pre-action FSSs were installed in the Permacon within Dome 231 in November 2012, and in the Permacon within Dome 375 in February 2013. The FSSs are designed as an ordinary group 2 pre-action sprinkler system to protect the moderate hazard operations in the Permacon. Drawings of these FSSs are found in *TA-54 Area G Nitrate Salt Waste Container Response Instructions,* EP-AREAG-PLAN-1248, R.0, LA-UR-14-23795 (Attachment 4). This system uses water for fire suppression, which is compatible with the nitrate salt waste. Should the fire suppression system activate, Pad 9 has a fire water collection system that would contain water from the 231 Permacon FSS. Dome 375 has curbing that provides approximately 49,000 gallons of retention capacity.

   The sprinkler system pre-action valve is automatically activated by a combination of any 2 of 3 types of electronic initiating devices located in the Dome or the Permacon: smoke

detection, heat detection, or fire alarm pull stations. During an event, fire alarm pull stations can be accessed and manually activated by staff. Pull stations are located in accordance with National Fire Protection Association standards, and are in both Domes and both Permacons. Also, access is facilitated by maintaining emergency egress aisles with a minimum aisle space of two feet in the Domes and the Permacons. Further, in compliance with Permit Section 3.5.1(1), the Permittees maintain adequate aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment within the 231 and Domes and Permacons. Finally, in the event of an abnormal condition, staff will evacuate quickly and will promptly report to 911, the operations center or the shift manager. Should an abnormal condition be observed, the Permittees will implement their emergency response plan and provide notice to NMED within 24 hours.

The Permacons are constructed of stainless steel frame and sheeting. They are contamination-control structures that are temperature-controlled and equipped with a HEPA filtration and fire suppression systems. The Permacons are also maintained at negative pressure. Additionally, the unremediated drums have been overpacked into 85-gallon drums of good integrity. While the energy of the WIPP event in Panel 7, Room 7 has not been determined at this time, should an event occur, the 231 and 375 Permacons are designed to contain a radiological release.

3) The Permittees are monitoring, on a daily basis, the temperature of the 85-gallon overpacks that contain unremediated nitrate salt-bearing waste drums. Daily temperature measurements are taken of the external surface of the 85-gallon overpack using a calibrated infrared thermometer. The target temperature at which the nitrate salt-bearing waste containers are maintained in both the 375 and 231 Permacons is less than 90°F.

   The Permittees are also performing visual inspections of these containers on an hourly basis, 24 hours per day, to identify abnormal conditions (e.g., signs of smoking and fire, evidence of deterioration, bulging). These activities will be performed in accordance with LANL's Procedure on *Nitrate Salt-bearing TRU Waste Container Monitoring,* EP-AREAG-FO-DOP-1246, R.0, LA-UR-23822 (Attachment 5).

   The Permittees will maintain records of all such monitoring. (see Attachment 5) These records will be updated on a daily basis and be available to NMED for inspection.

   Additionally, the Permittees are using continuous air monitors (CAMs) with alarm capability, and will continue their use until further notice. There are CAMs in place in the 375 Permacon, two of which have remote alarm notification capability. These two remotely monitored CAMs provide remote notification if there is a significant airborne release (the 375 Permacon currently contains the LANL remediated nitrate salt-bearing

waste). Additionally, there are CAMs in place in the 231 Permacon. Lastly, the Emergency Response/Hazardous Materials organization has been briefed on the storage configuration.

Action levels have been established and response instructions prepared. These are contained in LANL's Procedure on *Nitrate Salt-bearing TRU Waste Container Monitoring,* EP-AREAG-FO-DOP-1246, R.0 (Attachment 5). Should an abnormal condition be observed, the Permittees will implement its emergency response plan and provide notice to NMED within 24 hours. Area G's building emergency plan is found at Attachment 6, and associated procedures are found at Attachments 7, 8 and 9.

4) Unremediated nitrate salt-bearing containers will be spaced an adequate distance apart to limit any potential interactions with other containers. This distance has been determined to be 2 feet between containers. This distance is based on the Permittees' review of evidence from the event at WIPP, a calculation on the heat transfer from an SWB undergoing a similar reaction, and a review of fire protection and Permit requirements.

   The Permittees have reviewed photographs of the impacted drum in WIPP Room 7, Panel 7 and the adjacent containers. From the photographs, the adjacent drum and the adjacent SWB appear to have minimal damage and no release. The adjacent drums are in contact with the impacted drum and the adjacent SWBs are within inches of the impacted drum.

   The Permittees have performed a preliminary calculation on the minimum separation distance between SWBs to ensure that an incident in one SWB will not impact an adjacent SWB. Assuming the offending SWB reaches a maximum temperature of approximately 1100°F and that the adjacent SWB does not to exceed 200°F, the heat generated from the offending SWB drops off to below 200°F within 1 inch. The 2 foot spacing in use provides additional assurance that the adjacent SWBs will not be impacted by the heat generated during an exothermic event in a single SWB. The use of fire curtains in between SWBs will not provide a measurable reduction in the thermal conductivity across the 24 inches but does provide protection from flame impingement.

   SWBs will be placed in rows that allow for emergency egress and that have Permit compliant spacing between each row. When used, the fire curtains will be placed within a row (that is, between the adjacent SWBs in that row) to mitigate the potential for interaction between adjacent SWBs. While the temperatures of the event in Panel 7 have not been determined at this time, the Permittees are procuring fire curtains that are rated to a continuous temperature of 1800°F and intermittent temperatures of 2500°F.

The NFPA consensus standards were also reviewed and NFPA 211 provided the most similar type of control. NFPA 211 covers the installation of chimney pipes and stoves and the distance recommended between the pipe and unprotected combustibles is 18 inches. There are no unprotected combustibles in the Permacons is Domes 231 and 375.

This 2 foot distance also meets the requirements in Permit Section 3.5.1(1). This section requires the Permittees to maintain adequate aisle space to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment within the 231 and 375 Domes and Permacons.

The Permittees may also use fire resistant curtains may be used in lieu of spacing. Containers will be placed in rows that allow for safe egress and that have Permit compliant spacing between each row. When used, the curtains will be placed within a row (that is, between the adjacent containers in that row) to mitigate the potential for interaction between adjacent containers. While the temperatures of the event in Panel 7, Room 7 have not been determined at this time, the Permittees are procuring fire curtains that are rated to a continuous temperature of 1800°F and intermittent temperatures of 2500°F. Prior to using fire resistant curtains, the Permittees will discuss the details of their use with NMED during the daily technical calls established in Section VIII below.

5) The Permittees will protect workers by restricting access to the unremediated nitrate salt-bearing waste containers. Only those personnel performing the ongoing container monitoring activities (e.g., daily temperature monitoring), other sampling / data collection work (e.g., periodic head space gas sampling), and other required inspections (e.g., Permit required inspections) will be allowed into the storage areas. This is documented in Standing Order EP-AREAG-SO-1247,R.0, LA-UR-14-23796 (Attachment 10).

   Additionally, all unremediated nitrate salt-bearing waste is in 55-gallon drums that have been overpacked into 85-gallon containers of good integrity. This waste has been stored above-ground for many years. No other protective shields or barriers are deemed necessary for the protection of workers.

   Furthermore, the ongoing data collection activities provide continuing information on the physical condition of the waste so that appropriate additional worker safety measures can be taken, if required.

   Finally, there will be warning signs posted at the entrance to the Permacons in Domes 231 and 375, stating the following: "Segregation Area – Nitrate Salts Holding Area – Do not move without approval from the Ops. Manager or Shift Ops Manager."

6) Prior to moving nitrate salt-bearing containers, the Permittees will notify the LANL EOC. The EOC will notify the LAFD and other responders, if needed. The Permittees will notify the EOC at the completion of the move. The Permittees do not anticipate that responders will be present during the movement of these containers, or that responders will be present / alerted during other actions.

7) The Permittees are updating all procedures and safety basis documents to convert the processing facilities into storage facilities.

8) The Permittees established a "Remediation Team" to identify a path forward for remediation of these containers as necessary and appropriate.

   Any treatment plans or proposals that are developed by the Remediation Team shall be discussed with NMED. These plans or proposals shall include, but not be limited to, the neutralization steps, the reagents used, the location of the process for treating wastes, and any other key specific information related to treatment and neutralization. Any treatment plans that are developed shall detail which characteristic (toxicity, reactivity, ignitability, corrosivity) mixed TRU wastes the Permacons (or other locations) are authorized to treat. Permittees shall discuss with NMED any permit modifications or authorizations that may be necessary for treatment of the nitrate salt-bearing wastes.

   The Permittees will maintain records of all key events, actions and activities related to the disposition of the unremediated nitrate salt-bearing waste as documented in the treatment plan (e.g. safe storage configuration, the neutralization steps, the reagents used, the location of the process for treating drums). The key events, actions and activities to be documented will be specified in the treatment plan. These records will be updated on a daily basis and be available to NMED for inspection.

VI. Cemented Legacy and Newly Generated Cemented Nitrate Salt-Bearing Waste

Since 1991, the nitrate salt waste stream generated from the evaporator process at TA-55 has been sent to cement fixation immediately upon generation. Remediated and unremediated nitrate salt-bearing waste containers generated at TA-55 prior to 1991 are discussed above. There are approximately 378 containers of post-1991 cemented nitrate salt containers within the LANL Area G inventory.

The cementation process removes characteristics of ignitability and reactivity from the nitrate salt waste stream. Nitrate salt waste containers generated at TA-55 after 1991 have been cemented and are therefore not ignitable per the definition in 40 CFR §264.21 (Characteristic of Ignitability) or reactive per the definition in §264.23 (Characteristic of Reactivity).

The waste characterization by Acceptable Knowledge used at TA-55 to demonstrate that the cement from the stabilization process meets the waste acceptance criteria at WIPP was centered around two primary elements (1) no free liquids were present in the cemented waste and 2) the Portland cement created an inert solid monolith. These elements support the determination that the waste does not exhibit the characteristics of ignitability and reactivity.

The ignitability characteristic is not a concern for the following reasons: (1) the cement from the stabilization process is a solid and does not meet the definition of a liquid per 40 CFR 261.21(a)(1); (2) the cement has never exhibited the characteristic of an ignitable solid that is capable "under standard temperature and pressure of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard" per 40 CFR 261.21(a)(2); and (3) the cement has never exhibited oxidizing behavior per 40 CFR 261.21(a)(4).

The reactivity characteristic has never been observed regarding cement. The cement has never exhibited the following properties per 40 CFR 261.23: (1) it is normally unstable and readily undergoes violent change without detonating; (2) it reacts violently with water; (3) it forms potentially explosive mixtures with water; (4) when mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment; (5) it is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement; and (6) it is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.

The basis for this determination has been established by direct personnel observations, the facility operating record, and the chemical nature of the Portland cement used in the LANL stabilization process. LANL staff has never observed any ignitable or reactive behavior associated with the cemented waste from the stabilization process. Facility records also confirm that no ignitable or reactive behavior was ever observed from the cemented waste. Lastly, Portland cement by its chemical nature will not react with oxidizers and has no available hydrogen, oxygen, and carbon molecules to help sustain a reaction. In addition, the stabilization process produces a solid monolith, which is an absorber of heat, further reducing any potential for reactive behavior within the cement matrix.

Characterization and stabilization (cementation) treatment of newly generated evaporator bottom waste at TA-55 is conducted in accordance with the Permit as approved. The waste treated at the TA-55 Mixed Waste Stabilization Unit is characterized using the procedure outlined in Permit Attachment C (Waste Analysis Plan), Section C.3.2.4.

Based on the above facts, the Permittees recommend that no further controls be implemented for the cemented legacy and newly generated cemented nitrate salt-bearing waste generated since 1991.

VII. Schedule

Activity	Due Date
Remediated Nitrate Salt-Bearing Waste Containers	
Overpacking (into SWBs) of all nitrate salt-bearing wastes at LANL	Completed 5/18/14
Movement of SWBs to designated areas (e.g., Domes 230, 231 and 375) – (Remediated nitrate salt-bearing drums were in Dome 230, but have been moved to the 375 Permacon)	Move to Dome 230 completed on 5/1/14. All remaining moves complete by 6/3/14
Daily/Hourly monitoring of containers	Daily monitoring began on 5/1/14. Hourly monitoring began on 5/17/14
Appropriate spacing of SWBs	Completed in Dome 230 on 5/1/14. Completed in Dome 375 & 231 Permacons by 6/3/14
Updating procedures/safety basis documents as appropriate	5/30/14
Labels for SWBs (display inner container label)	Completed 5/18/14
Remediation Team kick off	Completed 5/20/14
Unremediated Nitrate Salt-Bearing Containers	
Movement of 85-gallon drums to designated areas (e.g., Domes 230, 231 and 375)	Began in Dome 230 on 5/1/14. All remaining moves complete by 6/3/14
Daily/Hourly monitoring of containers	Daily/Hourly; began on 5/20/14
Appropriate spacing of containers	Completed in Dome 230 on 5/1/14. Completed in Domes 375 and 231 Permacons by 6/3/14
Updating procedures/safety basis documents as appropriate	5/30/14
Remediation Team kick off	Completed 5/20/14

VIII. Daily Updates/Submissions

The Permitees shall provide daily updates to NMED during pre-scheduled technical calls. These updates shall be memorialized in written submissions provided to NMED via electronic mail (email) by close of business (COB) on a daily basis until NMED indicates otherwise.

All submissions related to this Order shall be placed in both the electronic and hard-copy Information Repositories within five (5) working days of submission to NMED.

All procedures and plans attached to this Revised Isolation Plan may be revised by the Permittees as required. Revisions will be submitted to NMED and placed in Information Repositories as required in this Section VIII.

All submissions required by NMED's Order will be sent to the following addresses:

Bureau Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87508-6303

and

Division Director
Environmental Health Division
Harold Runnels Building
1190 Saint Francis Drive, PO Box 5469
Santa Fe, New Mexico 87502-5469