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#### Material Disposal Area G, 33 Shafts

## Environmental Protection Agency

April 16, 2013



#### **Executive Summary**

Due to extended drought conditions, northern New Mexico is at high risk for wildfires. Major wildfires burned large areas near Los Alamos National Laboratory (LANL) in 2000 and 2011.

In 2011, the Las Conchas Fire came within about 3.5 miles of Technical Area 54 (TA-54) Material Disposal Area G (MDA-G or Area G), where LANL manages its solid radioactive waste. The fire and the resulting news coverage heightened public concern and attention on transuranic (TRU) waste storage at Area G. Following the fire, New Mexico Governor Susana Martinez asked the U.S. Department of Energy (DOE) to provide sufficient funding for cleanup of defense legacy wastes from LANL and for TRU waste disposal at WIPP.

The primary regulatory driver for environmental cleanup at LANL is the Compliance Order on Consent, a 2005 agreement between LANL and the New Mexico Environment Department (NMED) that contains specific requirements and schedules for cleaning up historical contamination of the LANL site, and has a final deliverable date of December 2015.

The Compliance Order on Consent does not address requirements and deliverables for removing TRU waste from the LANL site, but removal of TRU waste stored at MDA-G is required before a remedy for cleanup of MDA-G can be implemented. After the Las Conchas Fire, discussions were held with NMED about accelerating the removal of TRU waste stored above ground at Area G.

In January 2012, the DOE National Nuclear Security Administration (DOE/NNSA) and NMED announced a *Framework Agreement: Realignment of Environmental Priorities* that includes commitments by DOE/NNSA to further accelerate TRU waste disposition at LANL.

Commitments under the Framework Agreement include:

- Removal of all non-cemented above-ground TRU waste stored at Area G as of October 1, 2011, by no later than June 30, 2014. This inventory was defined as 3,706 cubic meters (m<sup>3</sup>) of material;
- Removal of all newly-generated TRU waste received in Area G during fiscal years (FY) 2012 and 2013 by December 31, 2014;
- Development by December 31, 2012, based on projected funding profiles, of a schedule with pacing milestones for disposition of below-ground TRU waste requiring retrieval at Area G; and
- Removal of the above-ground cemented TRU waste in an efficient and effective manner protective of human health and the safety of workers and the public.

Within the schedule for disposition of below-ground TRU waste submitted to NMED in December 2012, DOE/NNSA determined that there are seven below-ground waste unit categories within Area G that potentially contain TRU waste that may require retrieval.

These seven categories were identified as 1) trenches A-D, 2) pit 9, 3) corrugated metal pipes, 4) hot cell liners, 5) tritium packages, 6) 17<sup>th</sup> RH canister, and 7) the 33 shafts. The seven categories have an approximate total volume of 2,399 m<sup>3</sup> and approximate material at risk (MAR) of 110,751 plutonium-239 equivalent curies (PE-Ci).

Of these seven categories, approximately 99.86% of the waste volume and approximately 99.9% of the MAR is contained within the first six categories. DOE/NNSA concluded that these first six categories may include below-ground TRU waste that requires retrieval. For the remaining category, the 33 shafts (which have an approximate volume of 3.4 m<sup>3</sup> and MAR of 97 PE-Ci), additional evaluation is warranted.

DOE/NNSA committed to disposition of the below-ground TRU waste in the first six categories no later than September 30, 2018, and will work to meet cumulative pacing milestones to disposition 250 m<sup>3</sup> by September 30, 2015; 1,000 m<sup>3</sup> by September 30, 2016; 1,750 m<sup>3</sup> by September 30, 2017; and 2,395 m<sup>3</sup> by September 30, 2018.

For the 33 shafts, DOE/NNSA will complete (1) a determination as to whether this category contains TRU waste that requires retrieval; and (2) to the extent necessary, its decision process under the National Environment Policy Act regarding retrieval, by no later than September 30, 2015.

The 33 shafts are comprised of MDA-G shafts 200-232, which received remote-handled waste from 1979 to 1987. Waste in all but four of the shafts (shafts 224, 228, 231, 232) was emplaced before the effective date of 40 CFR 191 Subpart B, *Environmental Standards for Disposal*. The shafts have been identified as the "lined shafts" because waste was placed inside metal pipes that stand vertically within the shafts. The shafts were constructed by auguring a vertical hole into the ground surface (reported as about 3 feet in diameter and about 18 feet deep).

Waste placed in 32 of the 33 shafts was generated in hot cell operations at the LANL Chemistry and Metallurgy Research (CMR) facility that involved examination of irradiated fuels from the DOE Liquid Metal Fast Breeder Reactor program and other advanced-fuel efforts, including the ROVER space propulsion program.

Information for a single waste package in one shaft indicates that materials from the Three Mile Island facility may also have been examined. Generator records indicate the CMR waste packages contain residual samples, spent equipment, and waste materials typical of hot cell operations such as spent plastic bottles, glassware, towels, polishing cloths and paper. Shaft 212 contains the reactor vessel from a small research reactor called the Los Alamos Molten Plutonium Reactor Experiment (LAMPRE).

Waste packages were placed into the 33 shafts in three different configurations, identified as configurations A, B and C. Configurations A and B, which apply to 24 of the 33 shafts, have waste packages encased in concrete inside metal pipes that are too large to be shipped to WIPP. These shafts contain about 93% of the waste volume and 83% of the MAR for the 33 shafts.

Because the waste in the 33 shafts is remote-handled waste, retrieval and processing of the waste have a high risk in terms of technical complexity and estimated cost. Worker risk for retrieval and processing of the 33 shafts category is highly uncertain until specific work activities and controls are defined, but is of concern because of the very high radiation levels of waste packages placed into the 33 shafts (some calculated to be up to 569,000 millirem per hour when decayed to 2009).

DOE/NNSA is evaluating alternatives that range from leaving all or some subset of shafts in place at MDA-G to retrieval, processing, characterization, and shipping of all or some subset of the waste within the 33 shafts to WIPP.

Information is being compiled to support the evaluation of alternatives and analysis of regulatory paths forward for the 33 shafts. The historical data includes a form completed by waste generators for each waste package that included a waste description and estimates of Pu-239, U-235 and mixed fission products.

Tables of data were developed by waste package during a review of historical documents performed in 2005. Radiological data were coupled with material-type data to estimate the initial isotopic content of

each waste package, and an Oak Ridge National Laboratory computer code was used to calculate 2009 decay levels.

Other sources include a waste disposal logbook for the 33 shafts, reports that summarize remote-handled waste generated at the CMR facility and placement of waste in the 33 shafts, a report on decommissioning of the LAMPRE reactor, interviews with a manager and employee involved in placing waste in the 33 shafts, and photographs obtained during a field survey of several shafts in 2007.

Overall, the content and accuracy of the data are typical for legacy waste generated from 1979 to 1987. Waste information during this period has gaps and is sometimes inconsistent between various records and reports. Where data was inconsistent, information from generators was judged to be more reliable with regard to waste packages and content, while information from TA-54 operators was judged to be more reliable with regard to shaft configuration and placement of waste packages into the shafts.

Waste data fact sheets for the 33 shafts were prepared using information judged to be the most reliable and accurate available. These include a summary fact sheet and a specific fact sheet for each of the 33 shafts. The specific fact sheets include a short description of shaft contents and configuration, figures of shaft configuration and location, and tables with more detailed data on waste packages and content of each shaft, including available data on radiation levels of waste packages.



# **33 Shafts**

Environmental Protection Agency April 16, 2013

Dan Cox Deputy Associate Director Environmental Programs Dave Nickless Legacy Waste Manager for Environmental Projects Los Alamos Field Office



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## Risk

Cerro Grande fire in May 2000

- Began preliminary discussions with NMED shortly after New Mexico's administration change in January 2011
  - Las Conchas fire, which began June 26, 2011, highlighted the need to remove TRU waste from Area G
  - Drought conditions continue



#### Letter to DOE Secretary Steven Chu\*

 Governor Martinez urged DOE to provide sufficient funding for:

 Cleanup of defense legacy wastes from LANL and

TRU waste disposal at WIPP.



\*April 19, 2011



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### **Regulatory Drivers-Consent Order**

#### **Compliance Order on Consent**

- 2005 agreement between LANL and the New Mexico **Environment Department**
- Includes requirements and schedules for cleaning up LANL
- Final deliverable is December 2015

STATE OF NEW MEXICO ENVIRONMENT DEPARTMENT	
IN THE MATTER OF:	
THE UNITED STATES DEPARTMENT ) OF ENERGY AND THE REGENTS OF THE) UNIVERSITY OF CALIFORNIA	COMPLIANCE ORDER ON CONSENT

RESPONDENTS

#### PROCEEDING UNDER THE NEW MEXICO LOS ALAMOS NATIONAL LABORATORY LOS ALAMOS COUNTY, NEW MEXICO, ACT 8 74-4-10 AND THE NEW MEXICO SOLID WASTE ACT § 74-9-36(D)

MARCH 1, 2005 (Revised June 18, 2008)



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## **Regulatory Drivers-Framework Agreement**

- Reschedule activities based on risk: focus on TRU
  - Combustible/dispersible waste (~3,700 cubic meters)
  - New-gen waste
  - Below-grade waste
  - Stable-form waste
- 3706 campaign: Above-ground TRU waste to WIPP by June 30, 2014 and new-gen waste to WIPP by December 31, 2014
- Develop plan for below-ground TRU waste by December 31, 2012
- Milestones and quarterly progress review
- Annual evaluation of plans (six-month planning for FY 13)





### **Regulatory Drivers-Below Grade Retrieval Plan**

Framework agreement December deliverable Below ground removal

STATE OF NEW MEXIC Environment Department Harold Runnels Building 1190 Saint Francis Drive, PO Box 5461 3747 West Jemez Road Alamos, New Mexico 8 Senta Fe, New Mexico 87502-54

LOS ALAMOS NATIONAL LABORATORY

FRAMEWORK AGREEMENT

REALIGNMENT OF ENVIRONMENTAL PRIORITIES

The purpose of this Framework Agreement is to set forth the agreement of the Department of Energy/National Nuclear Security Administration (DOE/NNSA) and the New Mexico EnergyNational Nuclear Security Administration (DOE/NNSA) and the New Mexico Environment Dopartment (NMEI) to address the highest relia, above ground manuarite watare currently located within Technical Area 54 at Los Alamos National Laboratory (the Laboratory or LANI) and to establish an action-crientical approach that makes optimum use of available resources. This Framework Agreement is a non-budding agreement in principle entered into volumity by both usios. DOE/NNSA and NMED ages that they will most at appeopriate time to consider changes to the Compliance Order on Consent

 DOE/NNSA commits to continue to accelerate the rate of removal of above ground transmarie waster (TRU) at TA-54, Arras G, and to focus its efforts to achieve disposition of this TRU waste at the artistic families them. Over the last year, DOE/NNSA has accelerated the pace of TRU shipments to the Waste kolation Filde/Entr (WIPP) and agrees with New Medico Governor Sunan Marinten that this centinus to be the imperative priority at LANL

- a. DOE/NNSA commits to demonstrating continued progress by increasing shipments of TRU, and thereby achieving decreasing amounts of radioactivity (Pu equivalent Ci) and volume (cubic meters). DOE/NNSA commits to submit to MED quarterly reports showing this continued progress.
- b. DOE/NNSA commits to the complete removal of all non-cemented above-ground EM Legacy TRU and newly generated TRU currently-stored at Area G as of October 1, 2011, by no later than June 30, 2014. This inventory of above-ground TRU is defined as 3706 cubic meters of material. c. DOE/NNSA commits to the complete removal of all newly generated TRU
- received in Area G during FY 2012 and 2013 by no later than December 31 2014
- d. Based on projected funding profiles, DOE/NNSA will develop by December 31 2012, a schedule, including pacing milestones, for disposition of the below-
- ground TRU requiring retrieval at Area G. As part of DOE/NNSA's overall commitment to long-term stewardship and protection of human health and the environment, DOE/NNSA will subsequently complete the removal of the above-ground cemented EM Legacy TRU in an

Page 1 of 3

ste volumes determined to be the schedule and pacing milestones above

4. All TRU waste retrieved from Area G will meet the Waste Isolation Pilot Plant's Waste Acceptance Criteria.

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### **Risk-Based Approach**



Annual Targets: FY12-FY14 "3706 Campaign"; FY15-FY18 "Below-Ground" (6 waste streams)

LA-UR-12-26765

## LANL Technical Area 54, Area G



## Locations of Below-Ground TRU at Area G





#### **Overview of BG TRU Waste Categories**

Category	General Description	Approximate Volume (m <sup>3</sup> )	Percentage Total Volume	Approximate MAR (PE-Ci)	Percentage Total MAR	Estimated Cost <sup>1</sup>	Worker Risk <sup>2</sup>	Technical Execution Complexity <sup>3</sup>
Trenches A–D	720 30-gal. drums in 4 trenches	335	14.0	93,870	84.8	Medium	Defined Risk with Known Controls	Medium
Pit 9	3,881 30-gal., 55-gal., and 85-gal. drums, and 197 Fiberglass- reinforced plywood boxes	1,560	65.0	6,019	5.4	Medium .	Defined Risk with Known Controls	Medium
Corrugated Metal Pipes (CMPs) above Pit 29	158 CMPs, each ≈ 30 in. diameter x 20 ft long	442	18.4	10,775	9.7	Medium	Defined Risk with Known Controls	Medium
Hot Cell Liners (Remote-handled [RH] waste)	5 shafts with glovebox liners from hot cells, each in a steel box 6 ft x 6 ft x 10 ft long (shafts 302–306)	51	2.1	0.5	0.0005	Medium	Defined Risk with Known Controls	Medium
Tritium Packages	4 tritium packages, each containing 3 55-gal. drums, and one tritium tank that is 20 ft long (shafts 262–266)	6.7	0.3	8	0.01	Low	Defined Risk with Known Controls	Medium
17 <sup>th</sup> RH Canister	Canister containing 3 55-gal. drums (shaft 235)	1	0.04	1.5	0.001	Low	Defined Risk with Known Controls	Low
33 Shafts (RH waste)	32 lined shafts with pipes containing 1-gal. cans of hot-cell debris; 1 shaft with reactor vessel (shafts 200–232)	3.4	0.14	97	0.09	Very High	Risks Currently Highly Uncertain	Very High
Total		2,399	100%	110,751	100%			

Footnotes:

- 1. Estimated Cost for retrieval and processing. These estimates were developed based on the information and assumptions set out in this Plan. They are preliminary and are presented for comparison purposes only.
- 2. Worker Risk associated with project retrieval and processing activities. For all projects, appropriate hazard controls will be implemented to protect workers, the public and the environment.
- 3. Technical Execution Complexity associated with project execution. Higher complexity projects may require new and innovative technologies to complete.

## Schedule for Below-Ground TRU Waste

- Disposition all except 33 shafts
   (99.9% of MAR & 99.86% of volume):
  - 250 m<sup>3</sup> by September 2015
  - 1,000 m<sup>3</sup> by September 2016
  - 1,750 m<sup>3</sup> by September 2017
  - 2,395 m<sup>3</sup> by September 2018
  - For 33 shafts, by September 2015:
    - Determination whether 33 shafts require retrieval
    - Complete NEPA decision process



## **Shaft Field for 33 Shafts**



### **Surface Views of 33 Shafts**

33 shafts

#### Surface above 33 shafts

### **CMR Hot Cells Waste Packaging**



#### Shafts 200-211 and 213-223





#### **CMR Hot Cells Waste Containers**



Metal paint cans used as internal container for all CMR hot cells waste packages placed in Shafts 200-211 and 213-232



Steel can and plastic liner used as outer containers for waste packages placed in Shafts 224-232



### **LAMPRE Reactor Cask**





## Placing RH Waste into 33 Shafts



#### Shafts 200-211 and 213-232

#### Shaft 212

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## **Shaft Configurations within the 33 Shafts**



### Timeline



1970 1973 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1990 1991 1992 1994 1999



#### **Summary of Waste Content for 33 Shafts**

		Shafts 200-211 & 213-223	Shaft 212	Shafts 225-227 & 229-230	Shafts 224, 228, 231, 232 *	All 33 Shafts	X
Volume		271 gallons (1.02 m³)	75 ft <sup>3</sup> (2.12 m <sup>3</sup> )	39 gal (0.15 m³)	27 gal (0.10 m3)	3.39 m <sup>3</sup>	* Waste in these shaft
Weight (total pounds)		16,279 **	16,000	1,137	815	34,231	after effec
Shaft fill dates	Start	1979	1980	1984	1985	1979	CFR 191
	Finish	1983	1980	1984	1987	1987	Subpart B
At Disposal:				4 X	1 XC		** Reporte
Total Ci		3,656	42	114	149	3,847	weights for
Contact Dose (mRem/hr)	Max	1,200,000	1,750	400,000	500,000	1,200,000	<ul> <li>packages</li> <li>within 3 sh</li> </ul>
	Min	Not Available	1,750	10,000	3,000	NA	are questionab because th
Decayed to 2009	+		210V	1 All	VI-	1	packages
Total Ci		1,868	13	64	70	2,015	tons while
PE-Ci		66	12	7.4	8.5	93.9	similar packages i
Contact Dose (mRem/hr)	Мах	569,000	40	212,000	543,000	569,000	other shafts
	Min	NA	40	5,300	NA	NA	about 100 pounds per
Dose at 1 m (mRem/hr)	Max	~ 4,000	~ 0	~ 1,500	~3,800	~ 4,000	shaft
	Min	~ 0	~ 0	~ 40	NA	NA	11 42

### **Activities Planned for 33 Shafts**

- 40 CFR 191 modeling / analysis to evaluate consequences if 33 shafts left in place
- NEPA process to evaluate alternatives
  - Evaluation expected to bound alternatives from no action to retrieve, process, and ship to WIPP
- Federal decision point for 33 shafts
- Capital project CD1, 2, and 3 (if needed)



#### **Summary**

 LANL is continuing with due diligence on characterizing and document reviews of the 33 shafts

NEPA process in planning

Working to decision point in 2015









DEPARTMENT OF ENERGY NATIONAL NUCLEAR SECURITY ADMINISTRATION Los Alamos Site Office 3747 West Jemez Road Los Alamos, New Mexico 87544 STATE OF NEW MEXICO ENVIRONMENT DEPARTMENT Harold Runnels Building 1190 Saint Francis Drive, PO Box 5469 Santa Fe, New Mexico 87502-5469

#### LOS ALAMOS NATIONAL LABORATORY

#### FRAMEWORK AGREEMENT:

#### **REALIGNMENT OF ENVIRONMENTAL PRIORITIES**

The purpose of this Framework Agreement is to set forth the agreement of the Department of Energy/National Nuclear Security Administration (DOE/NNSA) and the New Mexico Environment Department (NMED) to address the highest risk, above ground transuranic waste currently located within Technical Area 54 at Los Alamos National Laboratory (the Laboratory or LANL) and to establish an action-oriented approach that makes optimum use of available resources. This Framework Agreement is a non-binding agreement in principle entered into voluntarily by both sides. DOE/NNSA and NMED agree that they will meet at an appropriate time to consider changes to the Compliance Order on Consent.

- 1. DOE/NNSA commits to continue to accelerate the rate of removal of above ground transuranic waste (TRU) at TA-54, Area G, and to focus its efforts to achieve disposition of this TRU waste at the earliest feasible time. Over the last year, DOE/NNSA has accelerated the pace of TRU shipments to the Waste Isolation Pilot Plant (WIPP) and agrees with New Mexico Governor Susana Martinez that this continues to be the imperative priority at LANL.
  - a. DOE/NNSA commits to demonstrating continued progress by increasing shipments of TRU, and thereby achieving decreasing amounts of radioactivity (Pu equivalent Ci) and volume (cubic meters). DOE/NNSA commits to submit to NMED quarterly reports showing this continued progress.
  - b. DOE/NNSA commits to the complete removal of all non-cemented above-ground EM Legacy TRU and newly generated TRU currently-stored at Area G as of October 1, 2011, by no later than June 30, 2014. This inventory of above-ground TRU is defined as 3706 cubic meters of material.
  - c. DOE/NNSA commits to the complete removal of all newly generated TRU received in Area G during FY 2012 and 2013 by no later than December 31, 2014.
  - d. Based on projected funding profiles, DOE/NNSA will develop by December 31, 2012, a schedule, including pacing milestones, for disposition of the below-ground TRU requiring retrieval at Area G.
  - e. As part of DOE/NNSA's overall commitment to long-term stewardship and protection of human health and the environment, DOE/NNSA will subsequently complete the removal of the above-ground cemented EM Legacy TRU in an

efficient and effective manner protective of the health and safety of workers and the public. (For purposes of this provision, the bolas grandes are considered to be cemented TRU.)

- 2. DOE/NNSA commits to the continued protection of groundwater and drinking water.
  - a. DOE/NNSA will continue to perform groundwater monitoring under the annual Interim Facility-Wide Groundwater Monitoring Plan required by the Consent Order. Groundwater monitoring provides for the identification of potential new contaminants and the characterization of fate and transport of known contaminants, if any, to water-supply wells. Monitoring also supports a determination of the effectiveness of corrective action remedies. The results of groundwater monitoring as provided by the Interim Plan will be reported to NMED and made publicly available.
  - b. As required by the Laboratory's NPDES Individual Storm Water Permit (No. NM0030759), DOE/NNSA will conduct storm water monitoring at 250 site-specific locations; implement erosion and sediment controls; and install control measures to minimize storm water pollutant discharges at 406 individual locations identified in the permit.
  - c. DOE/NNSA will continue to maintain large-scale mitigations that have been implemented in the canyons under the Consent Order to provide protection of surface water quality, including the source water utilized by the City of Santa Fe's Buckman Direct Diversion Project.
- 3. DOE/NNSA and NMED agree that in order to achieve the most rapid progress feasible in completing the highest priority activities at the Laboratory, planning, characterization and implementation activities for all remediation actions must be carried out in a cost effective and efficient way that provides full protection of human health and the environment and takes advantage of lessons learned both from previous work performed at the site and nationally.
  - a. NMED will require the collection and reporting of characterization and monitoring data which is necessary and sufficient to assure protection of human health and the environment. NMED will reduce the frequency of data collection and reporting where prior results indicate very low or no risk (e.g., no results above applicable standards).
  - b. DOE/NNSA and NMED agree to cooperatively engage in effective planning of activities to avoid unnecessary de-mobilization and re-mobilization of manpower, equipment, and other resources.
  - c. NMED and DOE/NNSA agree to use input from a variety of sources to make cleanup activities efficient while maintaining the protection of human health and the environment. These efficiencies include, but are not limited to:
    - Re-evaluating the number of wells necessary for the protection of human health and the environment;
    - Working to reduce the volume of paperwork required under the Consent Order;

- Reviewing the characterization efforts undertaken to date pursuant to the Consent Order to identify those sites where the nature and extent of contamination has been adequately characterized, and then shifting efforts to cleanup for those sites;
- Providing flexibility to conduct voluntary corrective actions;
- Eliminating DOE/NNSA investigation and remediation of non-LANL constituents; and
- Exploring collaborative, real-time data-sharing capabilities.
- 4. NMED commits to follow pertinent EPA guidance except where such guidance is not supported by sound science.
- 5. DOE/NNSA and NMED agree to collaborative regular, periodic reviews of environmental remediation and clean-up practices at the Laboratory with an eye towards utilizing sound science and protecting the public interest. In furtherance of this and other objectives, DOE/NNSA and NMED commit to employ an Annual Planning Process, in order to assess and to refocus the environmental remediation and clean-up work at the Laboratory to ensure alignment with the Governor's priorities, consider input from the public, and find efficiencies that maximize the use of available federal funds.
- 6. DOE/NNSA and NMED recognize the annual need to prioritize and dedicate available funding to the Governor's highest environmental priorities, as laid out above, and recognize that this will require that some lower priority cleanup work cannot be completed (under current budget conditions) as currently scheduled in the Consent Order. DOE/NNSA and NMED will continue to re-evaluate the sequencing of, and if possible, accelerate, cleanup activities, as the work progresses and as the funding situation changes.
- 7. In order to meet Governor Martinez's request that DOE/NNSA and NMED allocate sufficient funding to accelerate the removal of above ground TRU inventory and continue DOE's stewardship of water resources at LANL, NMED will expeditiously consider DOE/NNSA's requests for necessary extensions of near term milestones and, in doing so, will consider Congressional funding limitations.
- 8. In the interest of transparency, DOE/NNSA and NMED commit to apprise the public of progress in connection with their re-alignment process. DOE/NNSA and NMED also commit to seek input from the public to inform the Annual Planning Process.

#### LOS ALAMOS NATIONAL LABORATORY

#### Schedule for Disposition of Below-Ground Transuranic Requiring Retrieval

In the January 5, 2012, Framework Agreement between the Department of Energy/National Nuclear Security Administration (DOE/NNSA) and the New Mexico Environment Department (NMED), DOE/NNSA committed to providing a schedule, with pacing milestones, for disposition of the below-ground transuranic (TRU) waste requiring retrieval at Area G at Los Alamos National Laboratory.

DOE/NNSA has determined that there are seven below-ground waste unit categories within Area G that potentially contain TRU waste that may require retrieval. These are summarized in the attached Table 1. The information and quantities in the table are estimated based on currently available data. Additionally, the volume estimates represent the current understanding of the amount of below-ground TRU waste that may require retrieval, but some of this waste volume may later be determined to be low-level waste (LLW) that would not require retrieval.

Of these seven categories, approximately 99.9% of the Material at Risk (MAR) and approximately 99.86% of the waste volume is contained in the first six categories: Trenches A through D, Pit 9, Corrugated Metal Pipes, Hot Cell Liners, Tritium Packages, and the 17<sup>th</sup> RH Canister.

Based on additional reviews of these seven categories, DOE/NNSA has concluded that these first six categories may include below-ground TRU waste that requires retrieval. For the remaining category, the 33 Shafts, additional evaluation is warranted.

#### Schedule and Pacing Milestones:

The following is the schedule and pacing milestones for the disposition of below-ground TRU waste that may require retrieval.

- Trenches A-D, Pit 9, Corrugated Metal Pipes, Hot Cell Liners, Tritium Packages, and the 17<sup>th</sup> RH Canister:
  - a. DOE/NNSA will disposition the below-ground TRU waste no later than September 30, 2018.

- b. DOE/NNSA will work to meet the following pacing milestones. Note these volumes represent the total estimated volume for these six waste categories, and the pacing milestone for each year is a cumulative total.
  - i. Disposition of 250 m<sup>3</sup> by September 30, 2015.
  - ii. Disposition of 1000 m<sup>3</sup> by September 30, 2016.
  - iii. Disposition of 1750 m<sup>3</sup> by September 30, 2017.
  - iv. Disposition of 2,395 m<sup>3</sup> by September 30, 2018.

As part of the implementation of these disposition milestones, the DOE/NNSA will perform the retrieval of below-ground TRU waste in a manner reasonably designed to minimize the accumulation of MAR above-ground.

#### 2. The 33 Shafts:

DOE/NNSA will complete: (1) a determination as to whether this category contains TRU waste that requires retrieval; and (2) to the extent necessary, its decision process under the National Environmental Policy Act regarding retrieval, by no later than September 30, 2015. Should extrinsic factors, such as public participation or other statutory / regulatory requirements, impact this date, DOE/NNSA will promptly inform NMED of a revised milestone date.

Additionally, a graphical representation of the approach for the disposition of TRU waste at TA-54 Area G is attached for informational purposes.

#### Assumptions:

The following are the primary assumptions used in the development of this schedule. Failure of any of these assumptions may necessitate changes to the schedule and/or pacing milestones set out above.

- Pursuant to the terms of the Framework Agreement, this schedule and its pacing milestones are based on projected funding profiles. This profile is \$188M for Fiscal Year 2013, and \$239M for Fiscal Years 2014 and beyond.
- 2. The schedule and pacing milestones assume that NMED and NNSA/DOE will continue the Annual Planning Process set out in the Framework Agreement.
- 3. The schedule and pacing milestones assume that the waste volumes determined to be LLW will not be removed, but will be considered to be dispositioned for the purpose of the schedule and pacing milestones above.
- 4. All TRU waste retrieved from Area G will meet the Waste Isolation Pilot Plant's Waste Acceptance Criteria.

- 5. The schedule and pacing milestones set out above, assume NMED approval of a Corrective Measures Evaluation and Corrective Measures Implementation Plan for Material Disposal Area G that are consistent with the commitments set forth in this deliverable.
- 6. DOE/NNSA may suspend retrieval operations if DOE/NNSA determines that retrieval or removal of portions of the retrievable TRU waste:
  - a. Presents a substantial danger to workers or public safety or to the environment;
  - b. Is cost prohibitive relative to risk reduction benefits; or
  - c. Implicates national security issues involving classified information.

#### Conclusion:

This Plan, including its schedule and pacing milestones, reflects DOE/NNSA's commitment to the principles set out in the Framework Agreement, including risk reduction and continued partnership with the state of New Mexico.

#### Table 1. Overview of Waste Categories

Category	General Description	Approximate Volume (m <sup>3</sup> )	Percentage Total Volume	Approximate MAR (PE-Ci)	Percentage Total MAR	Estimated Cost <sup>1</sup>	Worker Risk <sup>2</sup>	Technical Execution Complexity <sup>3</sup>
Trenches A–D	720 30-gal. drums in 4 trenches	335	14.0	93,870	84.8	Medium	Defined Risk with Known Controls	Medium
Pit 9	3,881 30-gal., 55-gal., and 85-gal. drums, and 197 Fiberglass- reinforced plywood boxes	1,560	65.0	6,019	5.4	Medium	Defined Risk with Known Controls	Medium
Corrugated Metal Pipes (CMPs) above Pit 29	158 CMPs, each ≈ 30 in. diameter x 20 ft long	442	18.4	10,775	9.7	Medium	Defined Risk with Known Controls	Medium
Hot Cell Liners (Remote-handled [RH] waste)	5 shafts with glovebox liners from hot cells, each in a steel box 6 ft x 6 ft x 10 ft long (shafts 302–306)	51	2.1	0.5	0.0005	Medium	Defined Risk with Known Controls	Medium
Tritium Packages	4 tritium packages, each containing 3 55-gal. drums, and one tritium tank that is 20 ft long (shafts 262–266)	6.7	0.3	8	0.01	Low	Defined Risk with Known Controls	Medium
17 <sup>th</sup> RH Canister	Canister containing 3 55-gal. drums (shaft 235)	1	0.04	1.5	0.001	Low	Defined Risk with Known Controls	Low
33 Shafts (RH waste)	32 lined shafts with pipes containing 1-gal. cans of hot-cell debris; 1 shaft with reactor vessel (shafts 200–232)	3.4	0.14	97	0.09	Very High	Risks Currently Highly Uncertain	Very High
Total		2,399	100%	110,751	100%		Contraction and a	

Footnotes:

- 1. Estimated Cost for retrieval and processing. These estimates were developed based on the information and assumptions set out in this Plan. They are preliminary and are presented for comparison purposes only.
- 2. Worker Risk associated with project retrieval and processing activities. For all projects, appropriate hazard controls will be implemented to protect workers, the public and the environment.
- 3. Technical Execution Complexity associated with project execution. Higher complexity projects may require new and innovative technologies to complete.



\* Annual Targets: FY12-FY14 "3706 Campaign"; FY15-FY18 "Below-Ground" (6 waste streams).