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10-00163

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*Title:* Enabling Completion of the Material Disposition Area G Closure at the Los Alamos National Laboratory

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*Intended for:* WM2010 Conference, 7-11 March 2010, Phoenix, AZ



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**Enabling Completion of the Material Disposition Area G Closure at the Los Alamos National Laboratory - 10515**

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**ABSTRACT**

Los Alamos National Security, LLC (LANS) and the Los Alamos Site Office (LASO) have developed and are implementing an integrated strategy to accelerate the disposition of Los Alamos National Laboratory (LANL) legacy transuranic waste inventory currently stored in Technical Area 54, Material Disposition Area (MDA) G. As that strategy has been implemented the easier waste streams have been certified and shipped leaving the harder more challenging wastes to be dispositioned. Lessons learned from around the complex and a partnership with the National Transuranic Program located in Carlsbad, New Mexico, are enabling this acceleration. The Waste Disposition Program is responsible for the removal of both the above ground and below grade, retrievably stored transuranic waste in time to support the negotiated consent order with the State of New Mexico which requires closure of MDA G by the year 2015. The solutions and strategy employed at LANL are applicable to any organization that is currently managing legacy transuranic waste.

**BACKGROUND**

The Los Alamos National Laboratory is an existing site administered by the National Nuclear Security Administration (NNSA) within the U.S. Department of Energy (DOE) and operated by LANS. Operations at LANL began in 1943. Area G is the primary site for storing mixed low-level, hazardous and transuranic wastes and disposing of low level waste generated at the laboratory. Low level waste disposal areas include pit and shafts, while transuranic and mixed low level waste storage is on pads covered with metal framed, membrane dome structures. Operations at Area G for waste management have been on-going since 1957 and are scheduled to cease before 2015.

LANL is located at an altitude ranging from 1,800 meters to 2,500 meters (6,000 to 8,000 feet) on the eastern slopes of the Jemez Mountains. TA-54 is located atop Mesita del Buey, a narrow mesa that is approximately 3 kilometers long and 0.4 kilometers wide. The mesa surface slopes from an altitude of 2,100 meters (6,900 feet) to 2,000 meters (6,600 feet). The mesa is bounded on two sides by canons that cut the surface of the mesa and form vertical or near vertical cliffs. The waste storage areas within TA-54 are 8 kilometers from the Los Alamos town site and 1,600 meters from the White Rock town site. The northern boundary of TA-54 and the LANL site boundary are the same, with the land immediately adjacent to this boundary belonging to the San Ildefonso Pueblo.

The Waste Isolation Pilot Plant is the DOE's first deep geological repository for the permanent disposal of transuranic waste. Transuranic waste was generated and retrievably stored at 39 sites across the U.S. Transuranic waste is defined as waste with a radionuclide concentration equal to or greater than 100 nanocuries per gram consisting of radionuclides with half-lives greater than 20 years and with an atomic mass greater than uranium.

The Waste Disposition Program at LANL is responsible for the removal of prohibited items, size reduction, repackaging, venting, retrieval, characterization and shipping of approximately 6,900 cubic meters of above grade transuranic waste and approximately 2,500 cubic meters of below grade, retrievably stored transuranic waste (volumes as of 1 October 2008). The material at risk (MAR) of the above grade waste, as of 1 October 2008, was approximately 125,000 plutonium equivalent curies (PECi), while the below grade waste contained another 100,000 PECi of material.

In the first year of acceleration, the program reduced the above grade container count by almost 25% and reduced the volume by approximately 15%. The above grade MAR inventory was reduced by over 15% in the same period. This was accomplished by introducing a new processing line for drums which tripled the drum remediation rate and allowed an increase in contact handled shipments from an average of one to two per week to an average of five shipments a week by the end of FY09. The Waste Disposition Project also successfully completed its high activity venting and shipping campaign designed to reduce the above grade MAR and had a highly successful Remote Handled waste retrieval and shipping campaign.

FY2010 activities include the addition of two new drum debris processing lines, the addition of a drum venting capability, a cemented waste processing line and a box repackaging and size reduction capability. Other activities in FY2010 include the planning for a second box repackaging and size reduction line and the preparation for retrieval operations, both scheduled to commence in FY2011.

Most of the remaining above grade transuranic waste containers have been characterized as having one or more of the following technical challenges; high activity, high radiation, remote handled, classified, questionable container integrity, packaged in non-standard containers, containing prohibited items or requiring repackaging and size reduction to meet transportation requirements. The retrievably stored, below grade waste exhibits similar challenges and is unvented as well.

The Los Alamos National Laboratory Waste Disposition Project is partnering with multiple businesses to develop and implement innovative solutions to retrieve, package and characterize its remaining transuranic waste inventory. The Central Characterization Project has been an essential partner in the development and implementation of these solutions. The project team has utilized a disciplined, problem solving technique to clearly identify issues, assess hazards and develop solutions.

The TRU waste program at Los Alamos is supported by both Environmental Management (EM) and NNSA programs. The objectives of the program are to disposition the legacy TRU waste in storage and to continue to support the safe, compliant disposition of newly generated TRU waste

from on-going missions. Additionally, the TRU waste program supports the national off-site source recovery program.

The inventory in storage in Area G consists of both newly generated TRU waste, (generated after 1998), and legacy TRU waste. The management and disposition of the stored legacy TRU waste is an EM responsibility, while the management and disposition of all newly generated TRU waste is an NSSA responsibility. The Waste Disposition Program is responsible to both EM and NSSA for the disposition of all TRU waste at the site. The distribution of stored TRU waste is approximately two thirds legacy and one third new generation. The annual forecast for newly generated TRU waste is approximately seven hundred and fifty 55-gallon drum equivalents a year. A significant volume of newly generated waste could be introduced as the plutonium processing facilities at Los Alamos undertake actions to reduce inventory and begin to de-inventory their storage vaults of plutonium materials.

The LANS team has developed an aggressive plan to disposition all of the above grade TRU waste in storage as well as any new receipts and OSRP containers within the next five years, pending funding availability. The plan also includes contact handled and remote handled TRU waste retrieved from various locations in Area G, in the same five year period. The above grade inventory includes drums, boxes and miscellaneous containers. The drum population consists primarily of 55-gallon drums and overpacked 55-gallon drums in 85-gallon drums. There are four primary categories of waste in drums; sludge, debris, cemented monoliths and cemented cans. Above grade boxes and miscellaneous containers in storage consist of standard waste boxes, fiberglass reinforced wood boxes, metal boxes and crates, and Bolas Grande spheres.

The retrievable below grade inventory includes drums, boxes and miscellaneous containers. The retrievable TRU waste inventory includes Pit 9, Trenches A through D, 33 shafts, corrugated metal pipes and Hot Cell Liners.

The above-grade, below-grade and newly generated TRU waste must be removed from MDA G by the end of FY2013 to enable the closure of the area by 2015 in accordance with the consent order agreement with the New Mexico Environmental Department.

## **ENABLING TRANSURANIC ACCELERATION AND MDA G CLOSURE**

To accomplish closure, waste retrieval, processing, characterization and shipping will be consolidated to the center of the MDA G site. The closure of the area is depicted in Figure 1 and will be accomplished in three phases, with closure of the first phase starting in FY12. Closure of the second phase will be completed in FY14 and the third and final phase will be completed in 2015. As inventory is removed from MDA G, the facilities and structures will be removed in preparation for closure activities.

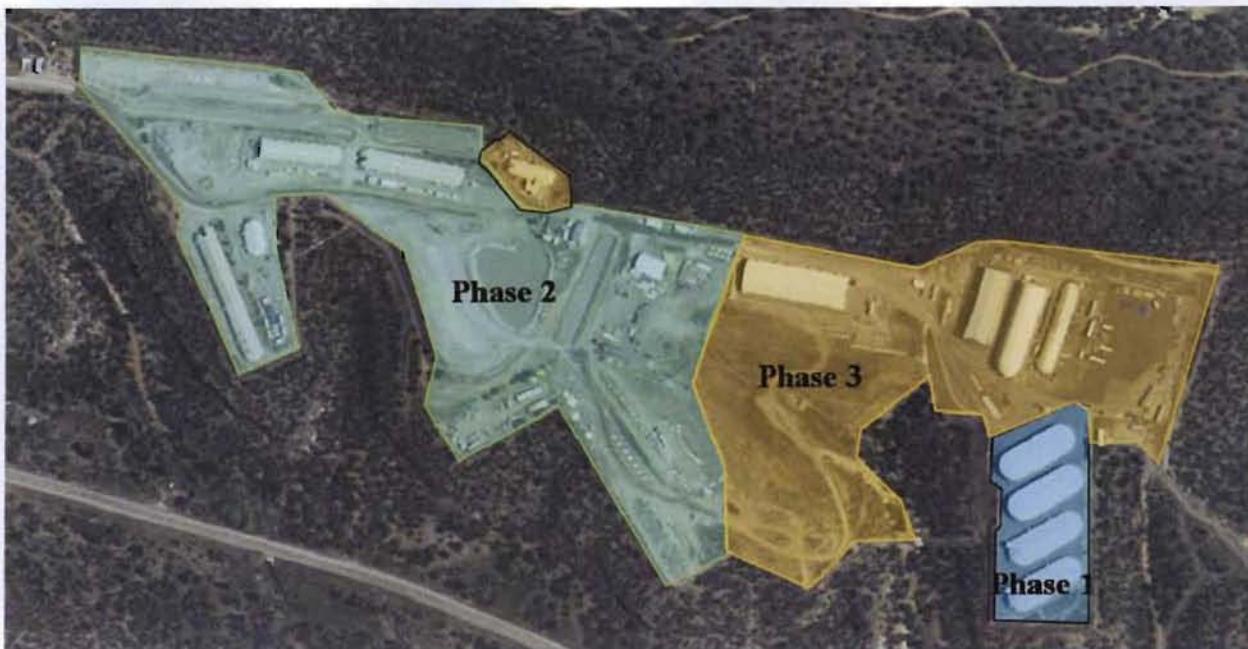


Fig. 1. Picture of Area G, showing the three phase closure of Material Disposition Area G.

To facilitate removal of TRU waste from MDA G, a number of process lines will be developed to support the time line. The process lines and the key planning considerations for each are shown in Figure 2. Process lines will be designed as temporary capabilities, for specific waste streams and phased into operations in accordance with the LANS TRU acceleration strategy. Capability will include drum processing and drum venting, box repackaging and size reduction, and retrieval operations.

## DRUM PROCESSING

Debris drums will continue to be remediated to remove prohibited items at the Waste Characterization, Reduction and Repackaging Facility (WCRRF). In addition, two temporary debris process lines have been installed in Area G to process approximately 1500 drums with less than hazard category three quantities. One process line consists of a soft-sided glovebag installed in the existing Permacon structure on Dome 231. The second process line is a containment hut with a soft-sided glovebag installed inside building 412. Both of these process lines are radiological operations which focus primarily on contamination control. The safety basis requirements for these processes are covered by the existing safety basis. The process lines are expected to run for the duration of FY10. At the end of FY10, the debris line in building 412 will be configured to operate as a hazard category three debris process and will operate through FY11 to process an additional 750 drums after a checklist CRA is conducted. Debris processing includes mating a drum to the glovebag, transferring the contents of the drum onto the glovebag sorting table, removing (by bagging out) or remediating prohibited items and repackaging the waste into a daughter drum mated on the opposite end of the glovebag.

Process	Hot Operations	Start-Up	Safety Basis	Procurement	Fire Protection	Regulatory	Location
231 Debris Line (Rad)	30 Oct 2009	Line Management Assessment	None	Complete	None	Air	Dome 231 Permacon
412 Debris Line (Rad)	15 Nov 2009	Line Management Assessment	None	Complete	FP not required inside hut, building FP credited to minimize spread	Air	Building 412
412 Debris Line (HC3)	30 Aug 2010	CRA	TSR page change	Complete	FP not required inside hut, building FP credited to minimize spread	Air	Building 412
Transportainers	28 Feb 2010	Checklist RA	None	Complete	None	None	Pad 10
Drum Venting (HC2)	30 Mar 2010	CRA	TSR page change	Award 1QFY10	FP not required on equipment, Dome FP credited to minimize spread	Air	Dome 33
MOVER (HC3)	30 Sep 2010	RA	Area G BIO Addendum	CCP	FP provided on glovebox and inside trailer	Air	Pad 10
Cemented Can Line (231) (HC3)	30 Aug 2010	CRA	TSR page change	Task Order	None – noncombustible waste form	None	Dome 231 Permacon
Box Repackaging (Rad)	30 Jul 2010	Line Management Assessment	SSSR TSR page change	Self Perform or Task Order	FP not required inside hut, building FP credited to minimize spread Huts – TBD	RCRA	Building 412 and huts in various locations
Box Repackaging (HC3)	30 Sep 2010	RA	Area G BIO Upgrade	Award 3QFY10	FP on process line	RCRA	Pad 226 (Permacon)
High Energy RTR	30 Apr 2010	Checklist RA	TSR Page Change	CCP	TBD	RCRA	Pad 226
Pit 9 Retrieval	1 Oct 2010	CRA	Area G BIO Upgrade	Award 3QFY10	None – open air retrieval	Air and stormwater	Pit 9
Drum Washing (if required)	1 Oct 2010	CRA	TSR page change	Award 3QFY10	None – open air retrieval	RCRA	TBD
CMPs Retrieval	1 Oct 2011	CRA	Area G BIO Upgrade	Award 4QFY10	None – open air retrieval	Air and stormwater	Pit 27

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Process	Hot Operations	Start-Up	Safety Basis	Procurement	Fire Protection	Regulatory	Location
CMP Size Reduction (Note1)	1 Nov 2011	CRA	Area G BIO Upgrade	Self perform or Task Order	None – noncombustible waste form	Air, RCRA and Stormwater	Vicinity Pit 27
Trench A-D Retrieval	1 Oct 2011	RA	Area G BIO Upgrade	Award 4QFY10	None – open air retrieval	Air and stormwater	Trenches A-D
Hot Cell Liner Retrieval	1 Oct 2012	Line Management Assessment	None	Self perform or Task Order	None- open air retrieval	Air and stormwater	Vicinity Pit 22
33 Shafts Retrieval and processing	30 Mar 2013 Note 3	RA	Area G BIO Addendum	Award Phase 1 3QFY10	None required on retrieval FP required on processing	Air, RCRA and NEPA	33 Shafts Processing - TBD

Fig. 2. Table showing the key processes and planning considerations to support LANL TRU acceleration.

The debris processing line in the 231 Permacon will be replaced at the end of FY10 with a cemented can processing line. There are approximately 1900, 55-gallon drums that contain cans of cemented waste. Each drum contains 35 one-gallon containers stacked in five layers of seven. The drum configuration also includes a lead liner. The waste inside the drums was solidified when generated, however, the water in some of the cemented cans has started to leach out of the matrix. The drums must be opened and the individual 1-gallon containers removed. The lids on the inner cans will be removed and the contents visually inspected for the presence of free liquids. Free liquids will be absorbed and the cans repacked into new 55-gallon drums in a configuration that can be certified using Real Time Radiography systems provided by the Central Characterization Project. The facility will be limited to 2.5 combustible equivalent PECi, but because the waste stream is a solidified non-combustible concrete matrix with water, the drums may contain significantly higher activity. There are also a number of inner 1-gallon cans that have contact radiation doses that meet the definition of remote handled TRU waste. Therefore, the process line will segregate contact handled cans for packaging in 55-gallon drums and remote handled cans for packaging in a shielded container. The parent drum and lead liner will be size reduced and dispositioned as mixed low level waste. There are no new controls required for this operation. The process primarily relies on MAR inventory controls and the radiation protection program (for contamination controls and radiation exposure controls). The process line is considered a Hazard Category 3, nuclear operation and will require a contractor readiness assessment. Operations will commence no later than 4QFY10 and continue for approximately two years.

There are approximately 650 concrete monolith drums that will be processed in FY11. Due to the procedures used to generate these drums, the reject rate for prohibited items is expected to be quite low. The Central Characterization Project is pursuing the acquisition of a high energy Real Time Radiography (RTR) unit that can inspect these monoliths without processing. These drums will be sorted into two lots, one with lead liners and one without and the representative core samples taken to support characterization, certification and shipment. There are no new safety

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basis controls anticipated for the high-energy RTR equipment, but radiography standards for operating the 6 MeV source will be required (i.e. shielding, access control, emergency stops and warning lights and audible alarms). A checklist readiness assessment will be conducted to ensure that industry standards for radiography equipment are properly implemented.

Additional characterization equipment will be provided by CCP throughout the life of the project. This equipment is procured and maintained in accordance with quality assurance programs administered and maintained by CCP and the Carlsbad Field Office. Characterization equipment does not introduce new hazards and is considered primarily to be a container handling operation. As such, TSR page changes may be required to update descriptive sections of the safety basis, but no new controls other than those required to mitigate standard industrial hazards and radiological exposures are required. Line management assessments or checklist readiness assessments will be conducted to bring new characterization equipment into operations.

There are approximately 250 drums in above grade storage that require venting. These drums are 55-gallon or 85-gallon drums, or overpacked 55-gallon drums. Because of the potential for hydrogen generation in TRU waste containers, a venting capability has been obtained that safely penetrates the drums, obtains and analyzes a sample of the headspace and installs a Waste Isolation Pilot Plant approved and Department of Transportation certified filter vent. After the drums have been vented and headspace samples have been analyzed; drums that have hydrogen gas concentrations above the lower flammability limit are placed into storage to allow the drums to come to equilibrium. Drums with acceptable headspace gas concentrations continue through the drum processing, characterization, certification and shipping processes. In addition to the above grade inventory, there are approximately 4500 drums to be retrieved that are unvented. The drum venting system will be started up as a hazard category 2 process and will be located on Dome 33 which is both heated and has a fire suppression system.

The Drum Venting System operations will use existing unvented drum controls. However, it is expected that the system will have credited design features such as the blast chamber, the blast deflector and the High Efficiency Particular Air train. The drum venting operation is a hazard category 2 nuclear operation and a contractor readiness assessment will be conducted to place the unit in operation in FY10. It is expected that the system will operate through FY13 to support Pit 9 and Trenches A-D retrieval operations.

The final drum remediation and processing capability to support the TRU acceleration process is a mobile glovebox capability being provided by the Central Characterization Project. The glovebox is housed in a trailer and will be operated as a hazard category 3 nuclear operation. This capability will allow drums to be remediated in Area G and will minimize the number of drums to be processed at the WCRR facility. Minimizing the use of WCCRF limits the risk associated with transporting waste to and from the facility. The mobile glovebox is expected to be located in the vicinity of Pad 10. The glovebox and trailer will be equipped with fire suppression systems.

The Mobile Glovebox is anticipated to have controls similar to those used for the WCRR Facility glovebox. Additionally, the mobile glovebox is expected to have MAR inventory controls and lighting protection and fire protection requirements. It is also anticipated that some

of the glovebox design features may be credited such as the glovebox itself and the glovebox fire suppression system. A readiness assessment is the recommended start-up level for the mobile glovebox. The glovebox will be placed into operation in FY11 and will operate through FY13 to support Pit 9 and Trenches A-D retrieval operations and could process up to 2000 drums.

Figure 3, illustrates the various drum processing capabilities and their proposed locations to support both above grade and below grade drum processing.

## **NON-DRUM PROCESSING**

There are approximately 280 fiberglass reinforced wood boxes, wood crates and metal boxes in above-grade storage. The volume of these containers is approximately 33% of the above grade inventory but less than 4% of the current above grade MAR. Fifty percent of these containers contain less than 0.47 PECi each, with 90% of the remaining 50% containing less than 56 PECi each. All of the containers are non-compliant and require either repackaging or size reduction. It is estimated that up to 50% of the volume in these containers is void space. To the extent possible, all waste boxes will be repackaged into Standard Waste Boxes to increase disposal efficiency at the Waste Isolation Pilot Plant repository.

It is unknown how many of the boxes contain prohibited items and will require remediation, but based on historical data from the drum population, it is assumed that 40% will contain prohibited items that will need to be dispositioned at the time of repackaging or size reduction. It is also estimated that up to 50% of the containers with less than 0.47 PECi will be mixed low level waste after repackaging and treating to meet waste acceptance criteria void space requirements. Finally there are an unknown number of boxes whose condition may have degraded to the point where it will be unsafe to lift and move without compensatory actions.

A radiological box processing line is being designed and will be installed in building 412 which provides containment, fire suppression, heat and cooling, and power requirements. This process line will focus on contamination control and will include characterizing and removing mixed low level candidates, identification and removal of higher activity components, opening and size reducing boxes, and size reducing and repacking waste into Standard Waste Boxes. The operation is primarily a manual evolution using box handling lifts, small cranes and portable tools to open, segregate and size reduce. Based on airborne activity levels, operators will either be in respirators or plastic suits to complete the work. Due to the process being radiological, there are no additional safety basis requirements and a line management assessment will be utilized to support start-up. Characterization activities will commence in 4QFY10 and size reduction and repackaging capabilities will commence soon after. There are an additional 191 boxes to be retrieved from Pit 9 in FY11, of which 50% are expected to be less than 0.47 PECi and candidates for processing in this process line. This process line is expected to operate through FY13.

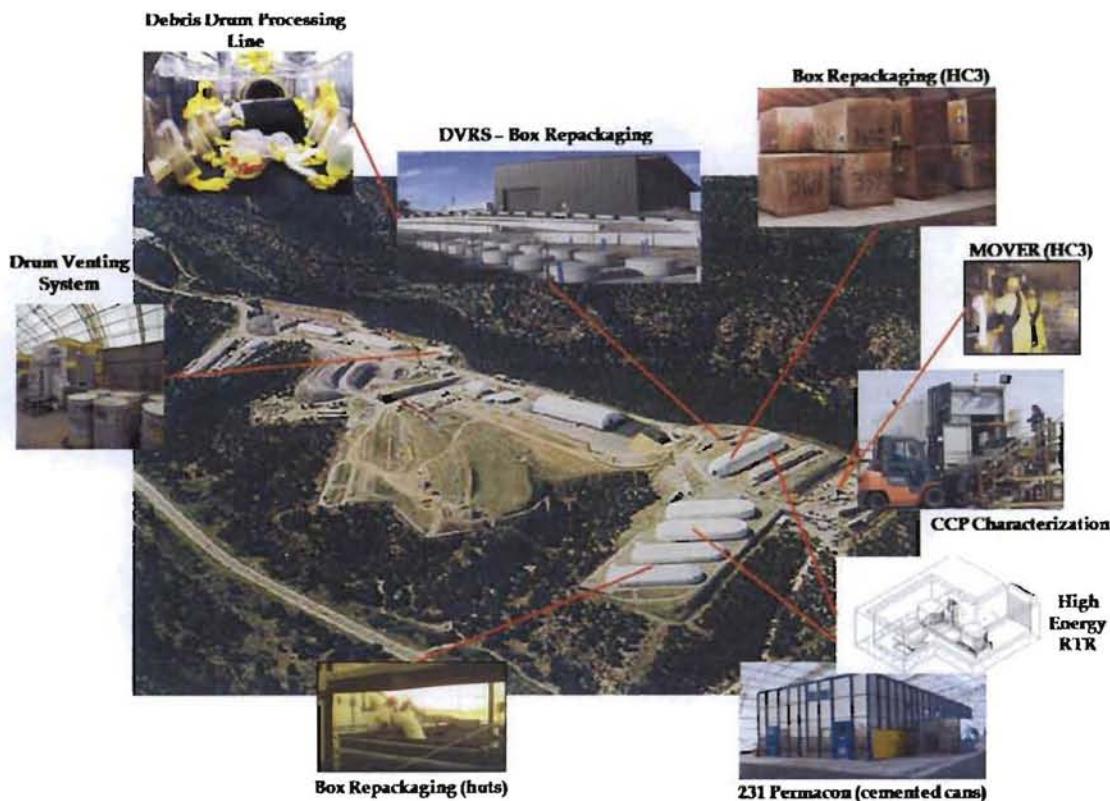


Fig. 3. Picture of Area G showing the proposed drum processes and locations.

A more robust box processing line is being designed and will be installed on the open 226 pad. This process line will provide containment and fire protection and will be operated as a hazard category three nuclear operation. The techniques and processes are very similar to those proposed for the radiological line, but there will also be remote size reduction tools available. The box repackaging line is expected to utilize existing safety basis controls for sorting, segregating and size reduction processing. The MAR limits will be increased as operational experience and confidence are obtained and after some of the process line systems are credited (such as MAR inventory controls and fire protection). A readiness assessment is the recommended start-up level for this process line which is scheduled to commence operations no later than 1QFY11 and is expected to operate approximately 36 months. In addition to the above grade boxes, there are an additional 191 boxes to be retrieved from Pit 9 in FY11, of which 50% are expected to be greater than 0.47 PECi but less than 56 PECi. The box repackaging line could also be used to break up concrete monolith drums that have prohibited items.

There are 158 corrugated metal pipes (CMPs) that will be retrieved in FY12 that will require cutting to fit into Standard Waste Boxes that could either be processed in the box repackaging line or processed at the retrieval site using a simple contamination control hut, handling equipment and a saw to cut the 30 inch diameter pipes into sections. Most of the CMPs are cemented monoliths and are expected to be processed using existing sorting, segregation and size reduction safety basis controls. The waste and packaging is non-combustible and non-

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dispersible in a concrete matrix. The biggest challenge will be dust control during cutting and size reduction activities. A contractor readiness assessment is the recommended start-up level for CMP processing (a hazard category 2 nuclear operation with limited risk) which is expected to operate in FY12 for approximately 24 months.

A joint Los Alamos and Carlsbad proposal for recovery act funds could accelerate retrieval of CMPs into FY11 and processing in FY11/12.

As mentioned earlier, there are some containers that have integrity issues that preclude safe handling and movement. Temporary containment huts will be erected over these containers so that they may be processed, size reduced and repackaged where they currently sit. It is not expected that separate start-up activities will be required for these evolutions, but compensatory measures will be required to satisfy fire protection requirements and to manage the MAR contained within the boxes.

## **CONTACT HANDLED RETRIEVAL**

Pit 9 retrieval will commence in 1QFY11. Pit 9 contains approximately 1,562 cubic meters of TRU waste packaged in 517, 30-gallon, 3363, 55-gallon and 3, 85-gallon drums and a 191 fiberglass reinforced boxes. The pit is 400 feet long, 20 feet deep and 30 feet wide. The total activity in the pit is approximately 6,100 PECi. All of the waste in the pit is considered contact handled. The waste was generated over a period spanning from 1974 through 1979. The waste was placed in four cells with fiberglass reinforced wood boxes on the outside and the drums on the inside. There is three feet of tuft between the cells and scaffolding around each cell that will be dismantled and removed. The drums were coated with rust inhibitor before placement in the pit and all are unvented. Retrieval operations include removal of the soil cover, inspection and removal of individual containers, application of unvented drum controls for drums, cleaning/removal of the rust inhibitor (or overpacked in vented drums), radiological surveys and cleaning to remove residual soils and application of appropriate labels and markings prior to placement into storage pending further processing and characterization. Previous inspections of the pit have indicated that the container integrity is high, but in the event a breached container is unearthed, it will be contained and overpacked at the retrieval site before further processing. Drums will be vented using the drum venting process described above and will be remediated, as required, using the mobile glovebox, temporary debris line or WCRR facility. Boxes will be processed through either the radiological or hazard category 3 box repackaging process lines. The primary controls for pit 9 retrieval are contained in the Area G Basis for Interim Operations (BIO) upgrade and include MAR inventory control, limiting fuel pool sources and unvented drum controls for the unvented drums. A contractor readiness assessment is the recommended start-up level for this nuclear operation. Pit 9 retrieval is an open air operation and is expected to commence and complete in FY11.

After completion of Pit 9 retrieval, the corrugated metal pipes near Pit 29 will be retrieved. There are 158 corrugated metal pipes to be retrieved. The pipes are 30 inches in diameter and 20 feet long. The pipes weigh between 10,000 and 14,000 pounds each and were generated between 1976 and 1978. The trench is approximately 100 feet long, 40 feet wide and 9 feet deep. The CMPs were filled with cemented wastewater treatment sludge. The CMPs were vertically filled

and capped on both ends with a non-contaminated 12 inch grout plug. The CMPs were placed on top of Pit 29 in two rows and stacked two layers high. Approximately 4 feet of overburden separates the contents of Pit 29 from the CMPs and there is approximately 4 feet of backfill over the CMPs. The CMPs were originally stored in TA-21, Area T, but were retrieved and placed in the current location at TA-54 in 1986. The total activity in all of the CMPs is approximately 10,755 PECi. Retrieval operations include removal of the soil cover, inspection and removal of individual containers, radiological surveys and cleaning to remove residual soils and application of appropriate labels and markings prior to placement into storage pending further processing and characterization. CMPs that have surface contamination will be painted to fix contamination and wrapped in plastic prior to movement and handling. The CMPs will either be processed in the box repackaging line or may be processed at the retrieval site in a contamination control hut. The CMPs need to be core sampled, and cut into pieces to fit inside Standard Waste Boxes. Because of the low release fraction and dispersability of the concrete waste, the primary controls from the Area G BIO upgrade for CMP retrieval will be MAR controls and limitations on excavation depth to ensure that Pit 29 is not unearthed. A contractor readiness assessment is the recommended start-up level for this nuclear operation. Retrieval of the CMPs is an open air operation and will commence and complete in FY12.

A joint Los Alamos and Carlsbad proposal for recovery act funds could accelerate retrieval of CMPs into FY11 and processing in FY11/12.

Retrieval of Trenches A, B, C and D includes the retrieval of 721, 30-gallon drums overpacked in 363 concrete casks (two drums per cask). The waste was generated from 1974 to 1985. The casks were placed in trenches and the cask lids sealed with asphalt material. The casks are 32 inches in diameter and approximately six feet high. A corrugated metal plate was placed on top of the casks before they were buried under four feet of crushed tuft. The trenches are separated from each other by 5 feet of crushed tuft. The total activity in the trenches is approximately 94,000 PECi, with 70% of the drums containing greater than 56 PECi. All of the drums are unvented. Retrieval operations include removal of the soil cover, inspection of individual casks, removal of the cask lid, visual inspection and radiological surveys of the inner 30-gallon drums, and removal of the drums. The 30-gallon drums will be overpacked in vented 55-gallon drums, labeled and placed into storage pending further processing and characterization. If contamination is discovered, a temporary containment structure will be constructed over the affected cask and the waste material retrieved and repackaged. Because of the high individual container MAR; MAR controls, container overpacking, unvented drum controls and restrictions on fuel pool sources and combustible material controls from the Area G BIO upgrade will be utilized. A readiness assessment is the recommended start-up level for this hazard category 2 nuclear operation. Retrieval of trenches A-D will be an open air activity and will commence in FY12 and is expected to take 24 months to complete. Retrieval could be completed in less than 12 months if controls are implemented to segment the MAR in above grade storage (i.e. placing high activity drum in overpacks that either segment or provide a higher degree of protection during safety basis accidents).

The final contact handled retrieval is the retrieval of the Hot Cell Liners which have a volume of approximately 51 cubic meters and a total activity of 0.5 PECi. The waste consists of liners from hot-cell gloveboxes packed in 6ft wide, 6ft high, and 10ft long steel boxes. The items will be

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retrieved, surveyed, cleaned, labeled and moved to the box repackaging and size reduction process lines to open, size reduce, characterize and disposition as either mixed low level waste or TRU waste. The retrieval of the Hot Cell Liners is scheduled to commence and complete in FY13. The retrieval will be an open air retrieval and a line management assessment review is all that is required as the total inventory is radiological.

Figure 4, shows the planned TRU retrieval locations within MDA G.



Fig. 4. Picture of Area G showing the location of below grade TRU to be retrieved to support closure of Material Disposition Area G.

## REMOTE HANDLED RETRIEVAL AND PROBLEMMATIC WASTE

Retrieval of the 33 remote handled shafts is currently undefined. The shaft fields contain 3.4 cubic meters of waste and a total of approximately 97 PECi of activity. 32 of the shafts contain hot cell debris and one contains a sodium cooled experimental reactor vessel. Retrieval is expected to include soil removal, removal of the shafts, transport of the shaft in a shielded cask, removal of the excess dirt and debris from the outside of the shaft followed by cutting the metal shaft and removal of the waste material. As waste is removed it will be characterized, packaged and processed as either contact handled TRU waste in Standard Waste Boxes or remote handled waste packaged into either shielded drums or 72B casks. Individual shafts have inventories less than 56 PECi, and the controls for retrieval and processing will include MAR controls, fuel pool mitigation, combustible material restrictions and vehicle access. A readiness assessment is the

recommended level for start-up for this hazard category 3, nuclear activity. Retrieval operations are currently scheduled to commence in FY13/14.

A joint Los Alamos and Carlsbad proposal for recovery act funds could accelerate retrieval of the 33 shafts into FY11/12 and processing in FY11/12/13.

As the LANL TRU waste inventory is processed and disposed, problematic TRU wastes will be identified, segregated and individual disposition strategies developed. Examples of these disposition strategies include time at risk arguments using existing controls and the use of existing temporary processes with additional administrative compensatory measures for short duration processing.

Current problematic TRU wastes being worked by the LANL team include:

- sodium cooled reactor vessel which contains potentially un-reacted sodium
- 4 tritium torpedoes and one 20 foot long tritium tank contaminated with alpha radionuclides
- approximately 10 boxes with activity levels greater than 56 PECi
- Bolas Grande spheres which require venting, size reduction and disposition
- TRU tank from the radioactive liquid waste facility
- OSRP, Am-241 sources that require a decision or reuse or waste

Some of these problematic wastes may require storage and processing beyond 2013. As a result, storage contingencies are currently being developed that would allow closure of MDA-G in accordance with the consent order timeline.