

LA-UR-04-7125

Approved for public release:
distribution is unlimited.

Title: An Evalutaion of LANL's Future TRU Waste Management Needs After Project 2010

Author(s): Jene Vanca, Vance and Associates

Submitted to: Craig Bachmeier, RTBF Program



Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

Form 836 (8/00)

**An Evaluation of LANL's Future TRU Waste Management Needs After Project
2010**

**Prepared by:
Vance & Associates**

**Prepared for:
Los Alamos National Laboratory**

An Evaluation of LANL's Future TRU Waste Management Needs After Project 2010

Introduction

The mission of LANL's Project 2010 is to ultimately retrieve, characterize and ship LANL's entire legacy TRU waste, currently in storage, to WIPP for disposal by the year 2010. At the end of Project 2010, newly generated TRU waste will continue to be generated and will require similar, but not exact, functions of characterization, packaging, certification and shipment to WIPP.

It is expected that TRU waste will continue to be generated by TA-55, CMR and the RLWTF after 2010. There is also a possibility that TRU waste could also be generated by ER and D&D projects, although the likelihood seems small. The projection of the generation rates for newly generated TRU waste is somewhat difficult, due to changes in laboratory missions, mission priorities and funding levels. However, estimates have been made¹ of the expected generation rates that indicate that the generation rate may be in the range of 800 to 1,000 drums per year. This generation rate is considerably smaller the work off rate of 6,000 drums required for Project 2010. In addition, in the post-2010 period it is expected that there will still be a need to decontaminate and size reduce large items for packaging for shipment to WIPP, much the same as the DVRS function that is currently operating at Area G. However, with the closure of Area G, it is probable that the DVRS facility will be dismantled and the operations terminated.

After the completion of 2010 and the closure of Area G, there will be a need for TRU waste management activities to support ongoing laboratory missions. For planning purposes, this evaluation is aimed at identifying the expected nature of future TRU management activities, where these activities should take place and whether or not new facilities are required to house the activities. It is intended that this evaluation provide direction in future planning documents.

Key Assumptions

As with most planning efforts, it is important to identify major assumptions that impact the planning process or could potentially affect the outcome of the planning process. For this evaluation, the following identifies the key assumptions that bear on the planning process for future TRU management needs.

- TRU Legacy and MLLW operations will be complete by 2010.
- Closure of Areas G and L will be complete 2015.
- Current lab missions will remain unchanged.

¹ "Program Plan for Waste Management-Fiscal Years 2003 to 2013", dated June 2003

- Current characterization requirements for newly generated TRU will change significantly.
- Storage would be required for one year's worth of generation (~1000 drums) in the event shipments to WIPP are interrupted.

Schedule Considerations

There are several schedule assumptions listed above that have the potential to affect some of the planning efforts. The completion date is governed by the retrieval of TRU waste from the pits, trenches and shafts at Area G and the schedule of the funding provided for the retrieval efforts. If the funding is not provided as required to meet 2010 there could be a slippage in this date. Environmental Restoration staff has indicated that although the closure of Area G could be accomplished over a one year period, planning efforts are aimed at 5 to 6 phases over a 4-5 year period. The phased approach is based primarily on the anticipated protracted funding schedule for the closure effort. It is possible to plan the closure phases such that the area where the DVRS facility is located would be in the final closure phase, some 4 years after the start of the closure activities. This means that a replacement facility for the DVRS function will not likely be required until the 2014 time frame.

Current Legacy TRU Waste Management Capabilities

As a basis for looking forward to 2010, it is important to identify LANL's current capability with respect to legacy TRU waste management, since this would be the point of transition to a strategy for new generated waste. The management of LANL's legacy TRU waste requires characterization, certification, packaging and shipping. The LANL capabilities related to these functions are as follows:

Characterization

Before TRU waste can be shipped to WIPP for disposal, the waste must meet the WIPP WAC. The WIPP WAC requires that the waste be characterized in accordance with LANL procedures that have been approved by DOE CFBO. Legacy TRU waste typically requires:

- Real-time radiography (RTR) to identify any prohibited items that must be mitigated before shipment
- Non-destructive Assay (NDA) to determine the radioactive contents of the package
- Headspace gas sampling (HGAS) and analysis to ensure that gases are below established limits
- Visual Examination/Repackaging (VE/RPK) of a statistical subset of drums when drums are found to contain prohibited items or when drums exceed the wattage limit established for the TRUPACT-II shipping container
- Drum coring of homogeneous drums to conduct measurements of hazardous constituents

LANL currently has the capability to perform all of the characterization functions with the exception of the the drum coring and hazardous constituent analyses. These functions are currently being performed at INEEL in Idaho. .

Certification

Certification includes a number of non-routine activities and a larger number of production-related activities. The non-routine activities include:

- Preparation and maintenance of an acceptable knowledge information summaries
- An annual calculation of a miss-certification rate
- Completion of quarterly reviews of randomly selected subset of batch data reports
- Preparation of an acceptable knowledge accuracy report
- A summary of LANL's TRU waste in a baseline inventory report every five years

The production-related activities include:

- Preparation and review of batch data reports
- Reconciliation of each characterization step using acceptable knowledge
- Demonstration that the characterization of each container meets data quality objectives
- Entry of characterization data into the WIPP certification database

TRUPACT-II Loading and Shipping

The TRUPACT-II loading is currently performed in the high bay area of the RANT facility. This involves the loading of the waste containers into the TRUPACT-II shipping containers and loading these containers onto the truck trailers for shipment.

Future Newly Generated TRU Waste Management Requirements

Similar to legacy waste, the management of newly generated TRU waste requires characterization, certification, packaging and shipping. However, some of the characterization requirements are different and it is likely that other changes will be implemented in the future making them even more dissimilar. For example, CBFO is pursuing initiatives to reduce or eliminate NDA measurements and instead rely on statistical sampling or measurements made for safeguards and accounting reasons and also eliminate the need for headspace gas analyses. If these initiatives are successful, then the characterization effort would be reduced which affects future TRU

management strategies. The following discusses the options and evaluations on the basis that characterization requirements would take place after 2010.

The waste management activities projected for newly generated TRU waste are as follows:

Characterization

Characterization requirements for newly generated TRU waste are expected to change to eliminate NDA measurements and use statistical sampling or allow the use of the safeguards and security assay. RTR is required and statistical VE is required. It is expected that headspace gas sampling and analysis will be eliminated.

TWPF
✓

Certification

Much of the certification activities identified for legacy waste will still be required for newly generated waste. There is, however, a current effort to reduce the number of waste streams from 125 to a significantly smaller number of waste streams (fewer than 10) that will greatly reduce certification efforts. Waste Stream quantities have already been reduced to approximately 20.

TRUPACT-II Loading and Shipping

The TRUPACT-II loading and shipping functions will remain the same for newly generated TRU waste. Approximately 3,000 ft² is required for the loading of TRUPACT-II's and equipment will include loading platforms, 5-Ton capacity overhead crane, ACGLF and leak test equipment.

TWPF

Decontamination and Size Reduction

Large contaminated items, such as gloveboxes, etc., will require decontamination and size reduction activities similar to the ones conducted in the DVRS. DVRS personnel have estimated that approximately 5000 ft² would probably be adequate for future decontamination and size reduction activities for large waste items.

TWPF

Storage

A waste storage capability of one year is required as a matter of prudence to essentially eliminate the potential impact of lab missions if for unspecified reasons WIPP is temporarily unable to receive LANL's waste. It is estimated that approximately 3,000 ft² would be required for this storage function.

TWPF

Future Options

To aid in the identification of a set of future options to be evaluated, discussions were conducted with several LANL and DOE individuals involved in the management of TRU waste. The interviews were informal and were designed to explore possible options and identify pros and cons

associated with each option. Common to all options was the requirement to provide a drum storage facility to store up one year's generation of drums (1000 to 1200 drums). Also common to all options is the potential need for decontamination and size reduction functions to accommodate the management of large waste items. The following identifies the four major options developed out of the discussions:

Option 1 TA-54 West

In this option, the storage and the decontamination and size reduction functions would be provided in a new structure constructed at TA-54 West. The floor area of the new structure would be approximately 9,000 ft². NDA and RTR activities would be conducted at TA-55 in existing facilities. Loading and shipping activities would remain at RANT. A modular unit may be required for any routine VE/repackaging activities. The staffing levels for all activities would be reduced corresponding to the reduction in the expected annual volume of drums to be shipped for disposal after the legacy workoff.

Option 2— Centralize at Major Generator Facility (TA-55) in an Existing Facility

In this option, RTR and any NDA activities would be conducted at TA-55. The storage, loading and decontamination and size reduction functions would potentially be housed in an existing facility, such as, RAMROD. The floor space at RAMROD is approximately 10,000 ft², which is right at or slightly less than the minimum required floor space that is projected for the three functions. The RAMROD facility has four separate rooms that could be used to house the three functions of storage, loading and decontamination and size reduction. There is a high bay with a bridge crane that could be used for loading the TRUPACT-II containers. A detailed study of the layout requirements for the DVRS function is required to determine if the existing space and configuration is adequate for this function. If it is determined that the space is not adequate a new smaller facility may be required for the DVRS function.

A conceptual plan for upgrading the seismic capability of the facility was performed for the RAMROD facility in 1992. This plan called for several modifications to strengthen the seismic capability to achieve a PC-2 designation. A second study was completed in 1995 and reviewed again in 2001. The objective of the 1995 assessment was to determine what, if any, structural modifications would be necessary to upgrade the structure from a PC-2 seismic structure to a PC-3 seismic structure. The studies identified 4 modifications that would need to be made to the structure to meet the PC-3 seismic requirements. The costs for these modifications would seem to be relatively modest and would likely be less than a new facility. Without completing a safety assessment, it isn't clear that a PC-3 facility is required and, in fact, a PC-2 facility may be acceptable for the planned future TRU activities expected to be conducted in the facility. However, because the seismic upgrade modifications are relatively modest it would seem prudent to plan for a PC-3 seismic upgrade.

Option 3—Centralize at Major Generator Facility (TA-55) for LANL Site in New Facilities

Characterization activities such as NDA and RTR would be located at TA-55 in existing facilities. A new facility for the storage, loading and decontamination and size reduction functions would be added to the TA-55 complex. A modular unit may be required for routine or statistical VE/repackaging, which would be located at TA-55. PM-1 has suggested three locations that could be considered for the TRU management facility. One location west of the existing TA-55 complex is shown in the following aerial photo in figure 1 in the location designated as a "Potential TRU Facility Site". This location would not require any road closures and could be staffed with waste management personnel from TA-55. The second and third potential locations suggested by PM-1 for the new facility would be in TA-50, in space southeast of the existing RAMROD facility and in space south west of the MDA-C area. These areas are also marked on the aerial photo in Figure 1. Figure 2 shows the footprint of a 15,000 sq ft building located in the vicinity of the RAMROD facility that was supplied by PM-1. The figure also shows to locations for new facilities associated with the Radioactive Liquid Waste Treatment Facility further to the east of RAMROD.

NMT also suggested that the space occupied by the WCRRF facility could potentially be used after the razing the WCRRF facility and perhaps some of the modules in this area. In any case, a detailed siting study would need to be performed to select the most appropriate site in the TA-55/50 area. This potential site would then be compared with the space west of TA-55. A minor road closure would also be required for this new TRU facility in the TA-50 area, much the same as that described for the RAMROD facilities described above.

As with the above options the Projcet 2010 and other personnel would be reduced accordingly with the reduction in the quantity of TRU waste to be shipped.

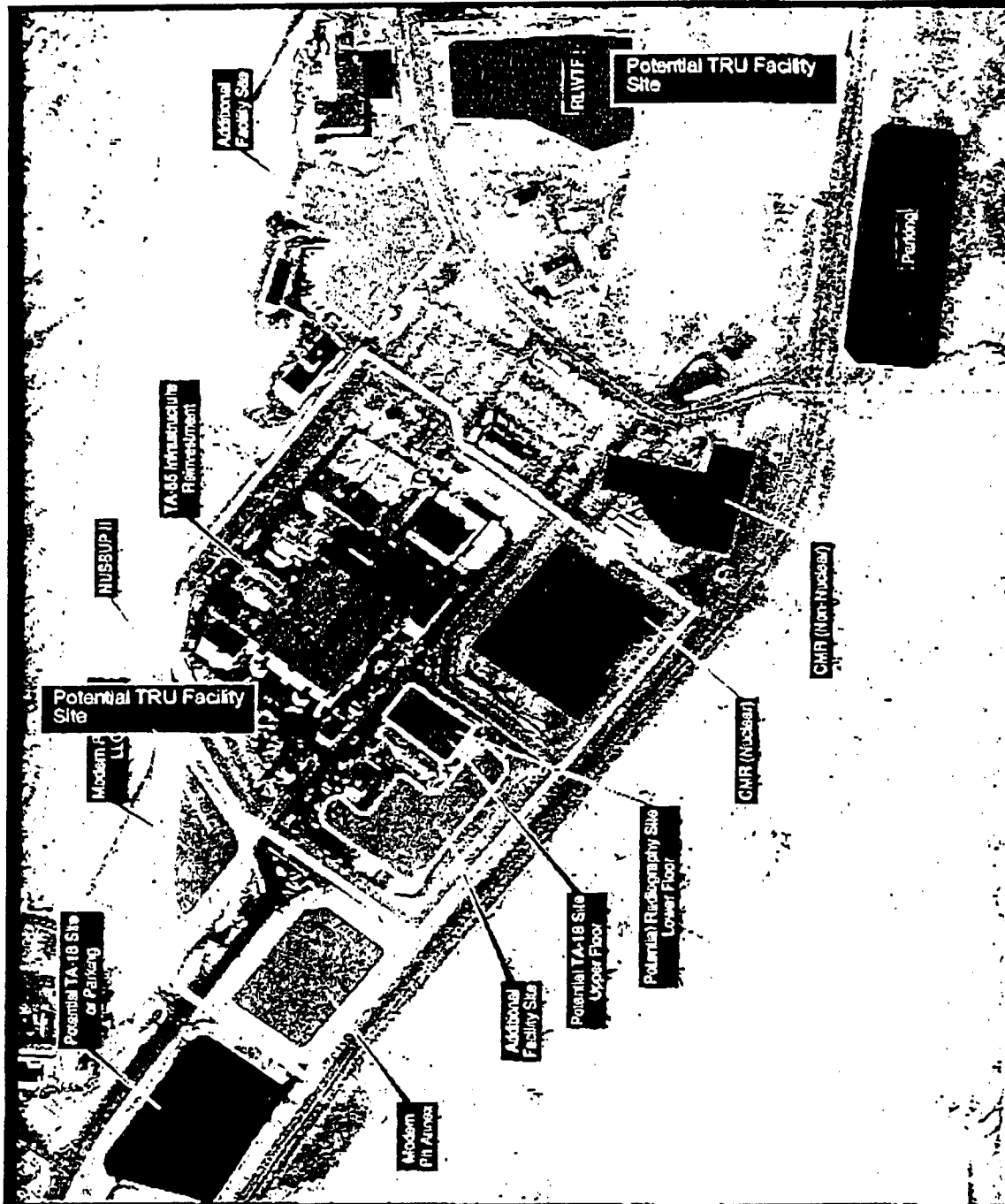




Figure 2

Option 4—CCP at TA-54 West

In this option, LANL or CBFO would contract with CCP for characterization, certification, packaging and shipping responsibilities. In this option it is assumed that CCP will continue to offer these services after 2010, CCP would provide a certified program and LANL would provide the equipment and facilities for headspace gas sampling and analysis, NDA, RTR VE/repackaging, and TRUPACT-II loading and shipping. The activities would be located at TA-54 West. LANL would also be responsible for drum storage and drum movement activities. The activities associated with characterization, certification, TRUPACT-II loading and shipping could be a continuous activity throughout the year or it may be on a campaign basis a few times per year, depending on the ultimate quantity of TRU drums generated in the future. Audits would have to be performed during the drum processing campaign.

Table 1 summarizes the major features of the four options.

Function	Option-1 TA-54 West	Option-2 Centralized at TA-55/50 Existing Facilities	Option-3 Centralized at TA-55/50 New Facilities	Option-4 Commercial Entity at TA-54 West
Head Space Gas Analysis	Not Required	Not Required	Not Required	Not Required
NDA	If required, conducted at TA-55	If required, conducted at TA-55	If required, conducted at TA-55	If required, conducted at TA-55
RTR	located at TA-55	located at TA-55	located at TA-55	located at TA-55
Certification	Reduced certification personnel as appropriate for reduced volumes of waste.	Reduced certification personnel as appropriate for reduced volumes of waste.	Reduced certification personnel as appropriate for reduced volumes of waste.	Vendor responsible for certification and AK related activities
TRUPACT-II Loading	LANL responsibility No change. Located at TA-54 West/RANT.	LANL responsibility Use existing facilities in Tech Areas adjacent to TA-55 such as RAMROD	LANL responsibility. Add a new loading facility at TA-55.	Vendor responsible for providing a certified program and using a permanent loading facility located at TA-54 West
Storage	Add a new storage facility located at TA-54 West/RANT	Used existing facilities in Tech Areas adjacent TA-55 such as RAMROD	Add storage at TA-55.	LANL responsibility in a new facility located at TA-54 West
Decontamination and Size Reduction	Add a new facility at TA-54 West	Provide capability in an existing facility in a Tech Area adjacent TA-55 such as RAMROD or a new facility.	Add a new facility at TA-55	LANL responsibility in a new facility located at TA-54 West
VE/Repackaging	LANL responsibility. Add modular unit at TA-54 West.	Located at TA-54 West/RANT	LANL responsibility. Located at TA-55	Vendor responsible for program. LANL install modular unit

				for VE/RPK. Located at TA-54 West.
--	--	--	--	--

Evaluation of Options

The overall objective of a future TRU waste management strategy is to ensure that LANL has access to a certified waste management program (provided by CCP) that can characterize, certify and ship TRU waste to WIPP for disposal at minimal cost and with minimum liability to the laboratory. This objective leads to the primary considerations of cost and cost efficiencies, program viability and regulatory liabilities. Other considerations that directly relate to this objective are such things as; space availability for the proposed location(s) of the activities, funding sources, road closures, maintenance of adequate staff and flexibility to accommodate future missions.

The following summarizes the evaluations for each of the options.

Option-1 TA-54 West

The advantages of this option are:

- There is adequate space at TA-54 West to accommodate a new storage and decontamination and size reduction facility.
- It provides the potential for efficient use of waste management personnel to perform TRU and other waste management functions throughout the year.
- It allows for the continued use of the RANT facility for loading, which reduces the required size of a new storage and decontamination and size reduction facility.
- It is unlikely that the proposed space at TA-54 West would be used for some other non-waste related activity in the future.

The disadvantages of this option are:

- Road closures would still be required to transport the waste from the TA-55 and TA-50 complexes down the mesa to TA-54 West.
- Construction of one or more new facility(s) is required for the storage and decontamination and size reduction requirements.

Option-2 Centralized at TA-55 in Existing Facilities

The advantages of this option are:

- It allows the major generators (TA-55) to take responsibility for all of the waste management functions under a CCP Certified Program and, in some measure, control their own destiny regarding the management of their TRU waste.
- It allows the use of an existing facility in the TA-55/TA-50/TA-35 complex, thus potentially eliminating the need for or at minimum reducing the size of new facility construction.
- It provides the generators with the potential for efficiency gains (or losses) in the use of personnel to perform the waste management functions.
- It would eliminate road closures on Pajarito Road, but may require lesser road closure activities, such as simple gates, on Pecos road.

The disadvantages of this option are:

- Road closures would still be required even though they would have a lesser impact.
- The existing space in the RAMROD facility is marginally acceptable for the three proposed functions and the space configuration is less than optimum for the intended functions.
- All of the costs and the extent of the modification to the RAMROD facility to accommodate the proposed activities have not been studied in detail and could be extensive.
- A new DVRS facility is likely to be required to be constructed in the TA-55/50 area, if the space and/or configuration in the RAMROD facility proves to be insufficient to house the DVRS function.

Option-3 Centralized at TA-55 in New Facilities

The advantages of this option are:

- It allows TA-55 to take responsibility for all of the waste management functions under a CCP Certified Program and, in some measure, control their own destiny regarding the management of their TRU waste.
- It provides the generators with the potential for efficiency gains (or losses) in the use of personnel to perform the waste management functions. (Cross-training may be possible to maximize the use of personnel).
- It would eliminate or minimize road closure impacts.
- The new facility would be specifically designed to accommodate the intended functions with regard to design basis, configuration and design features.

The disadvantages associated with this option are:

- Would require the construction of a new facility that could accommodate storage, TRU loading and decontamination and size reduction functions at TA-55.

Option-4 CCP

The advantages of this option are:

- It may be more cost-effective if LANL TRU waste can be processed on a campaign basis allowing the CCP staff to work at other DOE sites throughout the year. This conclusion assumes that CCP will still be viable after 2010 and can effectively use their staff throughout the DOE complex on an efficient basis. (LANL would need to provide some staffing unless CCP increases the size of their organization substantially)
- It has the potential for CBFO funding.

The disadvantages of this option are:

- Road closures are still required.
- A storage and decontamination and size reduction facility would need to be constructed at TA-54 West.

In an attempt to quantify the differences between the options a numerical ranking was used. The assigned ranking shown in the table, from one to ten where one is the least and ten the most attractive, represents a judgment on the most attractive option for a given feature. It was assumed that capital cost would include the cost of constructing new facilities or purchasing new equipment or other one-time cost such as modifying a DSA or relocating equipment. The reliability factor indicates a judgment regarding not only the use of an external to perform critical waste management functions, but also a potential split between groups at LANL. Space availability and space utilization represents a judgment on not only the availability of space but also the potential value of the space for future activities. Logistics for drum handling includes road closures and onsite transfers.

Option	Option 1- TA-54 West	Option 2- Centralized at TA-55/50 in Existing Facilities	Option 3- Centralized at TA-55 in New Facilities	Option 4- Commercial Entity at TA-54 West
Capital Cost	7	8	6	7
Ability to Accommodate Intended TRU Functions	10	7	10	10
Processing Cost Efficiency	8	7	7	9
Reliability of Waste	10	10	10	8

Management Activities				
Space availability and space utilization	10	8	8	10
Logistics of Drum Handling and onsite Shipping	5	8	10	5
Total	50	48	51	49

The results show that the differences between the options, as shown, are not large. However, two major themes surfaced in the discussions and in the evaluations. The first is that the TRU management functions should be located, if possible, near the major generators (TA-55, CMR and RLWTF) to eliminate or minimize road closures out into the future. The second theme is that the building should be designed with the configuration and all of the design features and capabilities to qualify for use in the projected activities to be housed in the facility. This theme augurs for a new facility rather than an upgrade of an existing facility such as RAMROD. A new facility in the TA-55/50 area would essentially eliminate the concerns with road closures on Pajarito Road. A new facility could be designed specifically for the TRU waste management functions.

In Option 2, because of the limited space in the RAMROD facility and perhaps a less than optimum configuration to accommodate all of the intended TRU management functions, it is likely that an additional new facility would need to be provided for the DVRS function. In addition, the limited space provides little flexibility to add or accommodate other waste management functions that could arise in the future. This option would be the third choice.

It is estimated that a new facility for the three functions in Option 3 would cost in the range of \$9M-\$10M. Option 1 with the construction of a new TRU waste management facility at TA-54 West would be somewhat less because of the continued use of the RANT facility for loading. Option 2 would involve seismic upgrades to the RAMROD facility to bring it to a PC-3 status for the intended activities in the facility. The required seismic upgrades have been identified in two previous studies and would seem to be relatively modest, with an estimated cost in the range of \$1-3M. This option could also involve the construction of a new DVRS facility in the TA-55/50 area, which would bring the total cost closer to the cost of a new TRU waste management facility.

Options 1 and 4 are also likely to have the lowest processing or operating costs because of the potentially more efficient use of personnel for waste management activities and less duplication of functions.

To provide reliable waste management activities, Options 1,2 and 3 would be favored mainly because all of the waste management functions would reside in a single group. Option 4 using CCP could be less reliable because of the absence of LANL control over the scheduling and performance of an external group, although LANL would need to provide staffing to maintain cost and schedule under the CCP Program. (This is the current method of operation).

Overall, Option 3 is favored over the other options and would seem to be the most attractive future strategy for the management of LANL's TRU waste after Project 2010 is complete. It is recommended that a detailed siting study be undertaken by PM-1 to identify the most appropriate site in the TA-55/50 area for the construction of a new facility with approximately 12,000 sq feet of floor space.

If the siting study is unable to identify an appropriate site in the TA-55/50 area, then a new facility at TA-54 West (Option 1) would offer the advantages of a new facility specifically designed for the waste management functions and would be the second choice. It would, however, involve road closures on Pajarito Road.