LOS ALAMOS NATIONAL LABORATORY TRITIUM TECHNOLOGY DEPLOYMENTS LARGE SCALE DEMONSTRATION AND DEPLOYMENT PROJECT

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ABSTRACT

This paper describes the organization, planning and initial implementation of a DOE OST program to deploy proven, cost effective technologies into D&D programs throughout the complex. The primary intent is to accelerate closure of the projects thereby saving considerable funds and at the same time being protective of worker health and the environment. Most of the technologies in the "toolkit" for this program have been demonstrated at a DOE site as part of a Large Scale Demonstration and Deployment Project (LSDDP). The Mound Tritium D&D LSDDP served as the base program for the technologies being deployed in this project but other LSDDP demonstrated technologies or ready-for-use commercial technologies will also be considered. The project team will evaluate needs provided by site D&D project managers, match technologies against those needs and rank deployments using a criteria listing. After selecting deployments the project will purchase the equipment and provide a deployment engineer to facilitate the technology implementation. Other cost associated with the use of the technology will be borne by the site including operating staff, safety and health reviews etc. A cost and performance report will be prepared following the deployment to document the results.

INTRODUCTION

The Los Alamos National Laboratory (LANL) organized an Integrating Contractor Team (ICT) to manage a Large-Scale Demonstration and Deployment Project (LSDDP) to respond to the need to deploy innovative technologies in the characterization, deactivation, decontamination and decommissioning of DOE's tritium facilities. This LSDDP was funded in late FY01 for organizational setup and received FY02 funding in January 2002. The LSDDP includes representatives for all of DOE's active tritium operations with the intent to deploy demonstrated technologies across the DOE complex. The ICT members include: LANL, the host site; the IT Corporation (IT), the administrating contractor, with deployment technology support from Florida International University's Hemispheric Center for Environmental Technologies (FIU-HCET), WPI, the Mound Site, Savannah River Site, Princeton Plasma Physics Laboratory (PPPL), Rocky

Flats Environmental Technology Site (RFETS) and Lawrence Livermore National Laboratory (LLNL). In addition, the Joint European Torus (JET) organization has indicated an interest in participating.

This LSDDP can support the EM Science and Technology objectives as the ICT already encompasses a multidisciplinary hands-on team from industry, academia, and DOE sites with expertise in tritium facility D&D. This in-place team is composed of experienced tritium D&D managers, who can consult or assist in almost any tritium D&D question. The Mound Site is well represented on this team with both a contractor representative and the Mound tritium LSDDP manager. This close connection with Mound postures this LSDDP for technical support question at that key DOE closure site. Secondly, RFETS recently identified tritium contaminated equipment requiring D&D, and has been invited to joint the ICT. Again, this in-place LSDDP team is well postured to identify the issues with D&D of the Rocky Flats equipment and support dispositioning the item.

The original proposal for this LSDDP meets the intent of identifying alternative approaches to high cost/high risk baselines. The carefully selected members of this ICT include internationally recognized leaders in tritium facility operations, research and D&D. This team is an in-place core competency for DOE. The team is currently focused on deployment of previously demonstrated cost/risk reduction D&D technologies at all of the involved locations. Through the efforts of this LSDDP, many of the previously demonstrated innovative technologies are expected to become baseline technologies. Additionally, the ICT is knowledgeable and capable of supporting EM's interest in identification of high cost/high risk baselines where investment is likely to provide a high payback. As a team composed of representatives of 5 DOE facilities and three commercial entities, a very broad knowledge base of DOE closure site problems is accessible for both problem identification and option review.

ORGANIZATION

The objective of the Los Alamos tritium technology deployment LSDDP is reduction of cost, risk, and schedule for the deactivation, decontamination, and decommissioning of DOE's tritium facilities through the deployment of previously demonstrated innovative technologies. It is the goal of the LSDDP to identify, select and deploy technologies that can be deployed at multiple sites, proposing over 20 deployments. In fact, at this point in the project, 40 deployment opportunities have been identified at the 6 potential sites.

These current deployment opportunities are being reviewed to provide a quantifiable return on investment to DOE. A second agenda item under consideration is identification of high cost/high risk problems at Mound, RFETS, and all other involved sites.

Figure 1 is a simple representation of the overall technical approach for technology selection and deployment.

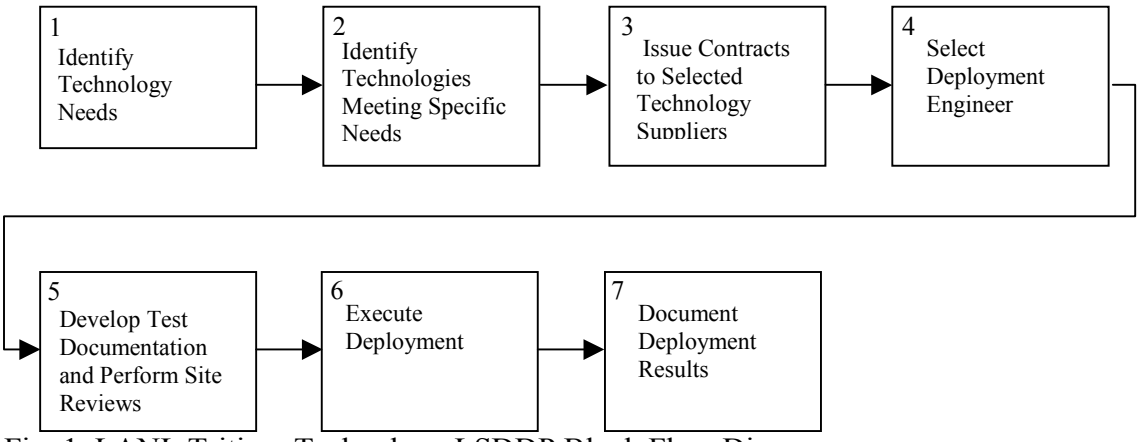

Fig. 1, LANL Tritium Technology LSDDP Block Flow Diagram

Block 1—Identify Technology Needs
Two separate and distinct needs identification activities are ongoing. First, in order to accelerate the project schedule, the ICT identified "quick win" deployments that rely on known technologies with an emphasis on those demonstrated in the Mound LSDDP. The needs identification for these quick wins is simply based on an opportunity to apply an innovative technology and thereby reduce the cost and risk of current activities. Second, the formal technology needs identification process will be conducted by problem "owners," i.e., representatives of LANL and other DOE sites with tritium facilities. This formal identification process will be based on OST guidance in looking for opportunities to address high cost/high risk baseline opportunities in DOE's closure sites and tritium facilities.

Block 2—Identify Technologies Meeting Specific Needs
As stated above, the quick win identification process reflects that this LSDDP is an extension of the current Mound LSDDP into the deployment phase. The deployment selection will be based on the potential for risk reduction and cost savings via multiple deployments at a given sites or selection of a high return single deployment site. Note that the LSDDP issued a Call for Proposals in September 2001 for risk and cost reduction technologies supporting the DOE tritium site closure. A very limited response resulted from this general announcement.

The process for technology selection addressing high cost/high risk baseline areas at closure sites may be considerably more complex. The ICT will first identify those areas and then the technology selection may involve another Federal Business Opportunities (FBO) announcement, recommendation of implementation of known technologies, implementation of modified technologies, or recommendation of basic research for development of totally new technologies.

Block 3—Negotiate Terms and Issue Contracts to Selected Technology Suppliers
In many cases the quick win technology selection simplifies the deployment process to purchase of the selected technology and empowering the host site, TSTA or other ICT

member, to conduct the deployment and capture the reporting data. In general, the ICT administrating manager will either purchase the required systems or subcontract the service in compliance with health, safety, and procurement guidelines of the host site.

Block 4—Select Deployment Engineer
Block 5—Develop Test Documentation and Perform Site Reviews
Block 6—Execute Deployment
In this LSDDP, a deployment engineer will be selected either from experienced ICT test engineers, or the host site. The selected deployment engineer will be responsible for project deployment authorization, execution, and documentation.

Block 7—Document Deployment
Upon completion of each technology deployment, the performance of the technology will be documented to provide confirmation of previous data, such as that published in and Innovative Technology Summary Report, or independent data will be developed. The anticipated format will be a Cost and Performance Report (CPR). The CPRs are deliverables under the project.

As a deployment focused LSDDP, deployment selection will be on technologies that 1) have already been demonstrated in DOE and have completed Innovative Technology Summary Reports, or 2) commercial technologies with documented performance. In all cases, the technologies demonstrated will have prior documentable performance in full-scale operations.

Closure Site Support –

The Introduction to this summary indicated that both Mound and RFETS are involved and targeted for deployment of cost saving and risk reduction technologies. In addition, this ICT, composed of tritium D&D experts from across the DOE Complex, is uniquely postured to provide technology guidance and recommendations on virtually any closure problems those sites present. Note also that this LSDDP has invited the Japanese Atomic Energy Research Institute (JAERI) and the JET project to participate as members of the Deployment Team. JET representatives have indicated a willingness to participate.

Alternative approaches to accomplish EM Cleanup

Representatives from Mound, LANL, PPPL, LLNL, RFETS, and SRS have agreed to participate in D&D needs evaluation and technology implementation in this LSDDP. Specific facilities represented include:

- The LANL Tritium Systems Test Assembly, currently in deactivation
- The SRS 232H building, scheduled for deactivation in 2004.
- The PPPL, with current D&D activities on-going
- LLNL
- RFETS, Building 776, currently in decontamination and decommissioning.

The involvement of this Complex-Wide D&D expertise facilitates identification of high cost/high risk opportunities for technology deployment.

Table I lists the technology needs identified in DOE's tritium facilities during the development of this LSDDP.

Table I. Potential TSTA Shutdown Technology Needs

Technology Need	Technology Need Description	Potential Cost Savings Benefit
Decontaminating and Disposing of Tritium-Contaminated Pump Oil and Organic waste	A need for a technology for decontamination and disposal of tritium-contaminated pump oil and organic waste.	Elimination of the waste would reduce the costs and risk of storing the waste on site.
Quantitation of Tritium on volumetrically contaminated surfaces	A need for technologies to provide accurate and consistent results for the quantitation of tritium in volumetrically contaminated materials	The quick turn-around time, portability, and ease of use of a real-time surface tritium monitor will reduce costs and schedule delays associated with characterization. This reduces the waste associated with swipes, scintillation cocktails and vials.
Tritium removal to remove tritium on difficult access interior contamination	A need for evaluation of remote-operated laser to volatilize and collect tritium during D&D activities	Separation of tritium from gloveboxes and equipment will greatly reduce the volume of radiologically contaminated waste and reduce the cost of waste disposal.
Detritiation of water	A technology need to safely remove tritium activity from water in a cost effective manner	Detritiation of water will reduce the volume of waste and yield a solid waste form that does not require the application of a solidification technology.
Decontamination Techniques for Tritiated Gloveboxes and contaminated equipment, components, and surfaces	A decontamination technology for tritium contaminated gloveboxes that remove the tritium to a release level or reduced to a level to minimize the chances of a release or worker contamination	The use of decontamination technologies will eliminate the labor intensive and costly baseline of hand cleaning glovebox surfaces
Method of Controlling Off-Gassing and Removable of Contamination from Tritium Piping	A technology need for effectively controlling removable contamination or eliminating off-gassing from tritium process piping during decommissioning	Operation times for decommissioning activities will be shortened due to operating in lower levels of PPE.
Dismantlement of Concrete-Encased Piping	Need is for a technology that will dismantle small bore ancillary piping from gloveboxes and equipment encased in concrete.	The cost of PPE and the cost of PPE disposal can be eliminated. Cost savings can also be realized by reducing the need of temporary enclosures. Risk reduction is also a benefit.
Improved Worker protection Equipment	Need is for providing worker protective personal equipment that is safe and comfortable for performing D&D operations.	Incorporating safe and comfortable PPE accompanied by real-time monitoring will increase labor production and eliminate down time. Additionally, worker protection keeps injury rates down.

The Los Alamos TSTA is actively in stabilization (deactivation) and will continue through FY03 with decontamination and decommissioning. Figure 2 shows the schedule for ongoing and future stabilization and decommissioning activities. Note that the addition of the LSDDP funding supports concurrent D&D of the facility along beside the

planned stabilization. Other involved deployment opportunities include numerous Mound applications and the Rocky Flats Building 776 tritium contaminated equipment.

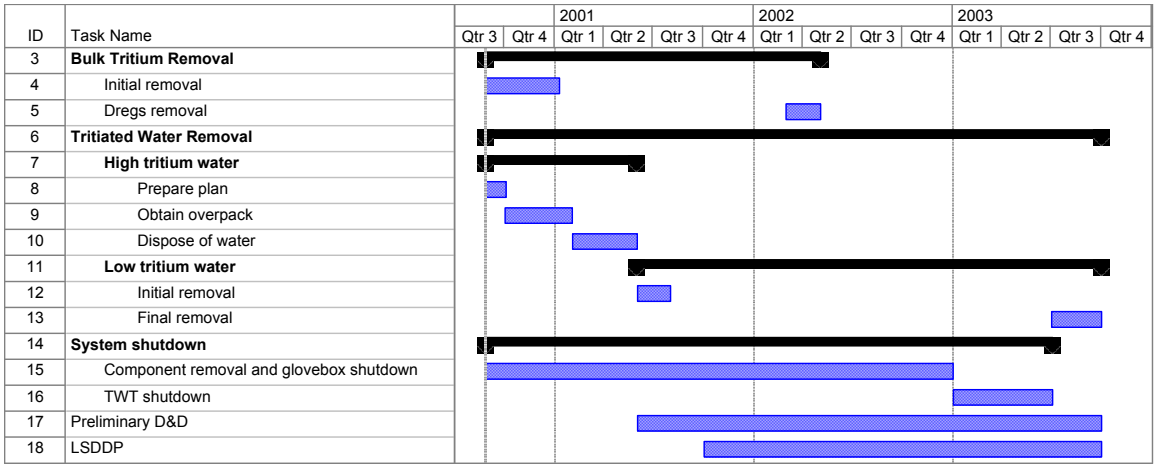

Fig. 2 LANL TSTA Deactivation and Decommisining

The selected demonstrations were, with one exception, developed commercial technologies. Although most demonstrations pointed to potential improvements in the specific technologies, no development work was recommended.

Benefit:

Cost Savings achieved?
Schedule reduction predictable?
Risk reduction achieved?

Feasibility:

Cost within LSDDP budget allowances?
Host site cost sharing?
Fits within the overall site schedule?
Site resources available?
Acceptable, given the status of the site authorization basis?

Appropriateness:

Previously demonstrated?
Performance matches the need?
Multi-site interest in this technology?
Commercially available?

Technologies demonstrated and documented under the ITSR guidance typically address specific safety issues, frequently with International Union of Operating Engineers review. Most deployments will require review and approval of authorization basis and safey procedures on any site. These reviews will ensure that site specific safety issues are addressed.

The ICT provides Closure site support with Complex-Wide expertise. The deployment technology selection criteria listed above show that the deployments will be selected to reduce the cost and risk of site closure as all of the ICT member sites.

The mechanism for adoption of a technology as baseline is one of acceptance of the technology by facility D&D managers who, in turn, identify the technology in subsequent D&D costing estimates. The data and experience gained at each site in deployment of these new technologies will provide documentable support to the involved managers that the innovative technologies are worthy of baseline status. FY01 funding was made available late in the FY and milestones for project documents and deployment selection criteria were met.

When the FY02 project funding became available in January subcontracts were placed for the ICT members and teleconferences were initiated for needs identification and deployment selection. Progress to date is limited to identification of 42 potential cost and risk reducing deployments. Support to RFETS was recently initiated as ICT members discussed the characterization and decontamination needs of a piece of equipment that was recently identified as requiring D&D.

The FY01 milestones of project documents and selection criteria were met. The FY02 progress has been limited due to funding delays, but the identification of numerous quick win opportunities is expected to allow completion of at least eight deployments this FY.

Stakeholder involvement for the LANL TSTA D&D was addressed. The TSTA is located in LANL Technical Area 21, which is one of the ten parcels of land that have been identified by the DOE for conveyance and transfer at LANL under Public Law 105-119. This highly publicized transfer of land to Los Alamos County from the laboratory would highlight the fact that the DDFA has invested in deploying improved, demonstrated technologies that would speed up the transfer. The potential land use is commercial and industrial development for the purpose of economic diversification.

There are many stakeholders interested in implementing the most cost effective, safest method of decommissioning the TSTA. These stakeholders include county residents, adjoining Native American landholders, various DOE offices, the New Mexico Environmental Department, U.S. Environmental Protection Agency, and many Divisions at LANL.

Stakeholder input from other DOE deployment sites will be solicited as the project proceeds. The currently identified deployment activities generally involve application of demonstrated commercial systems. A few items, such as the tritium cart, involve simple non-commercial specialty systems that are unlikely candidates for commercialization.

Table II identifies potential deployments identified by ICT members. These opportunities will be reviewed and a path forward will be identified by the ICT.

Table II Potential LSDDP Technology Deployments

Technology	LANL	SRS	PPPL	LLNL	Mound	Other
Lumi-Scint Portable Liquid Scintillation Counter	X	X	X			LANL/IT
Waterworks Crystals Superabsorbent Polymer (WWC)					X	
NOCHAR Petrobond® oil solidification polymer	X	X				
Burndy Hydraulic Crimper	X			X		
LLNL Tritium Clean-up Cart	X	X			X	
Rad Elec passive tritium air & surface monitor	X	X	X	X		
SAMMS heavy metals removal from liquids		X				LANL/IT RFETS
TMS-2000 Direct reading surface tritium monitor	X	X	X			LANL/IT
TechXTract Tritium Decontamination System (or EAI System)	X		X		X	RFETS
Barter Process for Recycling Equipment Into the Commercial Sector						
WIC® Waste Isolation composite for solidifying high activity tritium					X	
Vial Crusher					X	
Concrete Characterization Hammer Drill		X		X	X	RFETS
Chuck-o-lator		X	X			
DBATS				X		
Ozone decon			X			
Strippable Coating			X			
Evolution 180 Saw	X					Battelle RFETS
Race Scan	X	X				RFETS

CONCLUSION

The Los Alamos Tritium LSDDP is a recently initiated project that provides an in-place vehicle supporting the new thrusts of EM Science and Technology. The preliminary results of the organization and implementation phases of the project reveal that significant opportunity exists for the deployment of multiple cost saving technologies at DOE D&D sites.