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Title: LARGE-SCALE DEMONSTRATION AND DEPLOYMENT PROJECT AT LOS ALAMOS NATIONAL LABORATORY

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LARGE-SCALE DEMONSTRATION AND DEPLOYMENT PROJECT AT LOS ALAMOS NATIONAL LABORATORY*

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Abstract

Established by the U.S. Department of Energy (DOE) Environmental Management program through its Office of Science and Technology, the Deactivation and Decommissioning Focus Area is developing answers to the technological problems that hinder Environmental Management's extensive cleanup efforts. The optimized application of technologies to ongoing nuclear facility decontamination and dismantlement is critical in meeting the challenge of decommissioning approximately 9,000 buildings and structures within the DOE complex. The significant technical and economic concerns in this area underscore a national imperative for the qualification and timely delivery of cost-reduction technologies and management approaches to meet federal and private needs.

At Los Alamos National Laboratory (LANL), a Large-Scale Demonstration and Deployment Project (LSDDP) has been established to facilitate demonstration and deployment of technologies for the characterization, decontamination, and volume reduction of oversized metallic waste, mostly in the form of gloveboxes contaminated with transuranic radionuclides. The LANL LSDDP is being managed by an integrated contractor team (ICT) consisting of IT Corporation, ICF Incorporated, and Florida International University and includes representation from LANL's Environmental Management Program Office. The ICT published in the *Commerce Business Daily* a solicitation for interest for innovative technologies capable of improving cost and performance of the baseline process. Each expression of interest response was evaluated and demonstration contract negotiations are under way for those technologies expected to be capable of meeting the project objectives. This paper discusses management organization and approach, the results of the technology search, the technology selection methodology, the results of the selection process, and future plans for the program.

Introduction

The Los Alamos National Laboratories (LANL) has recently initiated the retrieval of oversized transuranic (TRU) metallic waste from storage in order to decontaminate and segregate into TRU and low-level waste categories. The segregated or concentrated TRU waste will be packaged and certified for shipment to the DOE's Waste Isolation Pilot Plant (WIPP). The low-level waste portion will be volume-reduced and disposed of at LANL's solid waste disposal area. Most of this waste is in the form of gloveboxes contaminated with TRU elements. These gloveboxes

represent a fraction of the TRU-contaminated gloveboxes in the DOE complex. Figure 1 .depicts an example of a typical LANL glovebox.

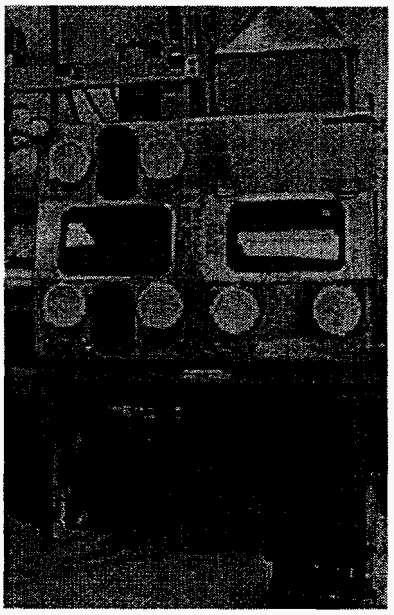

Fig. 1. Los Alamos Glovebox

The contaminated glovebox disposal problem is common to many DOE sites. The Rocky Flats site is currently in closure and addressing approximately 8,000 cubic meters (m^3) of TRU gloveboxes. Some crated TRU gloveboxes were sent to Idaho National Engineering and Environmental Laboratory from Rocky Flats Environmental Technology Site and will be retrieved and processed for compliance with the WIPP requirements. LANL is retrieving approximately 2,400 m^3 of oversized metallic waste (gloveboxes) for this project; in addition 3,000 m^3 are expected from future decontamination and decommissioning operations. Other DOE sites that have contaminated gloveboxes include Savannah River and Hanford.

The LANL metallic waste currently in storage was generated through decontamination and decommissioning activities of plutonium-processing facilities during the late 1970s and early 1980s. This waste is contained in fiberglass-reinforced plywood crates and consists primarily of gloveboxes (some with lead shielding); but the waste also includes piping, ducting, fume hoods, and similar metallic items (i.e., equipment, pumps, etc.). The majority of this metal is stainless steel, with the exception of the piping and some equipment. Initial characterization information provided by the generator is limited but indicates that the waste is primarily contaminated with TRU isotopes.

The LANL gloveboxes are commonly 7-gauge 304L stainless steel with windows of plexiglass or leaded glass. Some gloveboxes have lead shielding as lead sandwiched in stainless steel or simply attached externally. Each glovebox work station is commonly 80 centimeters (cm) wide and most gloveboxes have two or more work stations. The gloveboxes are either 70 or 150 cm deep, depending on whether they are accessed from work stations on one side or two. Single-

station gloveboxes are commonly 80 cm high, whereas the tall gloveboxes are 110 cm high.

The LANL Large Scale Demonstration and Deployment Project (LSDDP) project is seeking to demonstrate and deploy technologies that provide a cost or risk performance advantage over the planned "baseline" system. The baseline is in a separate confinement dome at the LANL solid waste disposal area and is funded as an accelerated site technology deployment project (ASTD) and uses the following steps or processes:

- Assay of packaged waste
- Manual opening of the plywood/fiberglass reinforced boxes
- Manual removal and disposal of packaging materials and equipment packed in the gloveboxes
- Manual size reduction
- Manual shielding removal
- Manual gross decontamination as required prior to entry into the baseline process chambers
- Decontamination for removal of plutonium holdup and minimization of TRU waste disposal volumes
- High-capacity mechanical volume reduction for waste minimization
- Final packaging and manifesting of end product waste materials for disposal at WIPP or at LANL.

The ASTD process is considered a state-of-the-art integrated project; however, many manual operations are included in the handling operations.

Because there is a backlog of several years of operation at LANL in coping with the entire volume of material, successful LSDDP demonstrations are expected to be deployed quickly in the ASTD process.

Program Plan to Address Problem

Recognizing the potential for benefit to the DOE complex, a group of companies and organizations initiated the development of an Integrated Contractor Team (ICT) to address the need for cost-effective and reduced-risk technologies for the glovebox problem in the DOE complex. This group of companies and organizations has evolved into what is referred to as the LANL ICT. The ICT companies include IT Corporation, ICF Incorporated, and Florida International University and includes representation from LANL's Environmental Management Program Office. The ICT has also solicited cooperation from AEA Technologies; BNFL, Inc.; and Nuclear Fuel Services for identification and selection of technologies. Figure 2 is the organization chart for the LANL LSDDP.

This ICT proposed to the Deactivation and Decommissioning Focus Area an LSDDP for oversized TRU metal objects. The project was selected for funding and is now in the early demonstration stage.

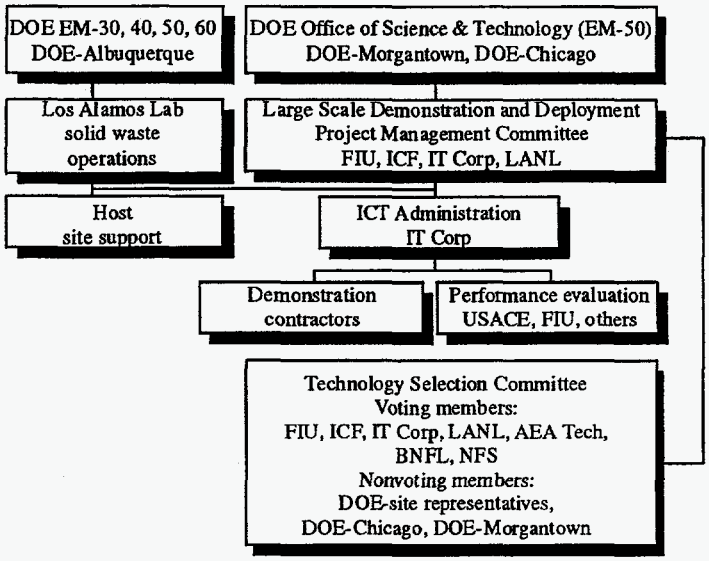

Fig. 2. Organizational Approach for LANL for LSDDP

The major objectives of this LSDDP are as follows:

- To identify technologies that are ready for deployment for the characterization, decontamination, and volume reduction of TRU waste/TRU contaminated materials
- To demonstrate those technologies with potential to reduce cost, risk, and schedule as well as those that are amenable for direct field application at LANL and elsewhere in the DOE complex
- To the extent possible, to compare technologies "side by side" with baseline approaches to evaluate their advantages (cost, risk, schedule) and to refine/validate baseline assumptions
- To capitalize on the combined corporate management and technical strength of private industry, the government, and academia
- Through partnering, to demonstrate a leveraged funding pool of federal and private monies via cost sharing to address issues of national importance
- To facilitate deployment of the technologies through an aggressive communication program.

The technical approach to achieve the project goals and vision involves the steps shown on Figure 3.

Description of Project Steps from Figure 3

The following is a narrative description of the current status of the LANL LSDDP based on the project steps shown in Figure 3.

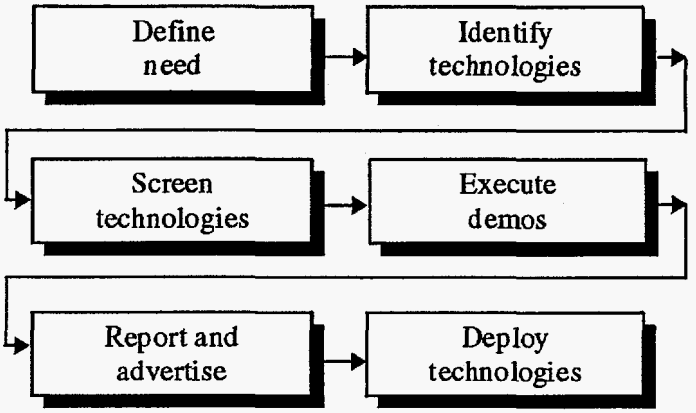

Fig. 3. Project LSDDP Activities in Los Alamos

Definition of project needs: LANL's waste management operations staff reviewed the ASTD plans and identified existing areas of opportunity for cost reduction or risk reduction. This review resulted in a list of needs as shown in Table I. The list shown in this table continues to serve as the basis for identifying technologies for demonstration and has been distributed with TRU gloveboxes to other DOE sites to solicit input.

Table I. Compilation of Project Needs for the LANL Large-Scale Demonstration and Deployment Project

Priority	LANL Project Need
1	Method for removal of foam that was injected into the gloveboxes before crating
2	Systems/equipment for removal of both sandwiched and external lead shielding
3	Small tools for cutting glovebox legs and attachments without creating cutting fines
4	Methods for removing gloves and windows
5	Personnel protective equipment that improves worker comfort (e.g., improvements over ice-vests used for cooling)
6	Equipment for hot spot characterization and decontamination (knowledge of isotopics not required)
7	Method for opening the plywood crates and fiberglass reinforced plastic covering without the loss of particulates in the crates and without the generation of saw chips
8	Method for handling decontamination liquids within the gloveboxes
9	Systems/equipment for removal of any equipment or waste from the gloveboxes
10	Systems/equipment for removal of packing material
11	Systems for x-ray tomography of the crated gloveboxes to determine contents
12	Method for dealing with contaminated painted components
13	Systems for material tracking
14	Systems for project documentation and record keeping
15	Filtration technologies for the recycled decontamination water to minimize secondary waste generation
16	Gas sampling equipment for identifying loose particulates or volatile organics in the crates

Identification of technologies: The technology selection process is a two-step process. In the first step, the needs were identified and a broadcast CBD announcement was issued for expressions of interest (EOI) from the commercial sector. Twenty-four EOIs were received. Table II indicates the areas of the EOIs. Because some needs were not addressed by EOIs, a focused search continues in identifying demonstration opportunities that meet these specialized needs.

Table II. Summary of the EOIs received by the LANL LSDDP

Technical Area of EOI	Number of EOIs
Characterization	6
Decontamination	10
Material tracking	1
Metal cutting tools	2
Robotic manipulators for deactivation and decommissioning tools	3
Complete glovebox systems addressing all elements of the ASTD baseline	2

Screening technologies: The EOIs were evaluated by an invited panel of deactivation and decommissioning experts, who were selected to represent a broad interest in DOE, in the industrial community, and in academia. Table III indicates the background of the technology selection committee reviewers.

Table III. Technology Selection Committee Makeup

Representatives	Number Represented	Number of Voting Members
DOE site contractors	3	1
Industrial firms	5	5
Universities	1	1
DOE field offices	2	0

The first order of business of the technology selection committee was to establish the selection criteria. These criteria (selected and weighted prior to the meeting) included both "constraints" that must be met for a technology to be considered and "scored" criteria that presents a ranked list of potential demonstrations. Table IV lists the constraints and Table V lists the scored criteria.

Table IV. Constraints for Technology Evaluation

Criteria
Technology meets innovative/improved technology definition.
Technology is capable of being transported to the LANL site.
Technology offers a potential solution to a LANL need.
Technology is "field test ready."
Vendor has demonstrated willingness to share cost in the demonstration.
Technology vendor is capable of meeting LANL schedule requirements.
Technology is compatible with the LANL safety analysis and authorization basis.

Note: *All* of these criteria must be met in order to proceed with the remainder of the screening form.

Criteria
Technology offers the potential for performance improvement over the baseline
Technology offers potential for a cost reduction as compared to the baseline.
Technology use can reduce the risk to the public, the workers, and/or the environment.

Note: *At least one* of the above three criteria must be met in order to proceed with the remainder of the screening form.

Table V. Scored Criteria for Technology Evaluation

Criteria	Descriptions
Complexwide need	Technology is capable of addressing a complexwide need.
Cost/benefit	Cost to deploy technology realizes significant benefits/cost savings.
Risk reduction	Technology provides a reduction in the risk to the public, workers, and/or the environment.
Waste generation	Technology provides the potential to reduce the generation of waste (including secondary waste).
RAM improvement	Technology provides an improvement in ease of operation, reliability, and maintenance requirements.
Quantitative measures	Technology provides for quantitative performance measures by which it can be evaluated during the demonstration.

As expected, the EOIs did not address all areas where cost, schedule, and risk issues could benefit from new approaches or technologies. Because the LANL glovebox program is an extended one and the LSDDP is a 2-year program, the opportunity for consideration will remain open for some time. With that, the technical project needs are listed in Table I for those who may have new technologies that will be available within the project time frame.

Commencing demonstrations: Negotiations are actively under way for the fiscal year 1999 (FY-99) demonstrations with targeted demonstration windows of May/June 1999. These demonstrations will address the initial characterization and box-opening operations of the baseline process. This will support an expected July startup of the baseline ASTD process.

Reporting: No results from the demonstrations are available to report at this time. Demonstration results will be posted on the LANL LSDDP website: http://www-emtd.lanl.gov/lsddp/ddtech.

Deployment: The ultimate objective of the LSDDP is deployment. The ICT administrator is retaining a clause in each demonstration contract that will include deployment of the technology at LANL. The intent of this clause is to facilitate rapid procurement and implementation of the technology, as warranted.

Path Forward

The LANL LSDDP is actively negotiating with the technology firms that have been selected by the technology selection committee for demonstration. Based on these negotiations, test planning will be initiated for FY-99 demonstrations that are expected to be performed during the summer of 1999. Because of the schedule for completion of the baseline program, the FY-99 demonstrations will emphasize the front-end characterization and crate-opening technologies. Concurrently, the project is reviewing the technology options available for FY-00 to identify new options and represent improved cost, schedule, and risk over the previously evaluated technologies.

The technologies identified appear to offer real potential for improving the performance and reducing costs to the DOE for the deactivation and decommissioning of contaminated gloveboxes.

Footnote

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