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Overview of the De-Inventory Effort at Lawrence Livermore National Laboratory

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Executive Summary

The removal of Security Category I/II materials from Lawrence Livermore National Laboratory (LLNL) was initiated by the Department of Energy (DOE)-National Nuclear Security Administration's (NNSA's) goal of "Complex Transformation". In early 2007, NNSA established a completion date of FY2014 for the conversion of LLNL from Security Category I to Security Category III. In late 2007, that completion date was accelerated to FY2012. To achieve this objective the following activities needed to be completed:

1. Security Category I/II material removal
    a. process and package material for shipment or for discard and
    b. shipment of Security Category I/II materials off site.
2. Transfer LLNL Security Category I/II operations
    a. establish capabilities at other Security Category I sites,
    b. train LLNL staff for other sites, and
    c. begin operations at other sites.
3. Transition the LLNL site to Security Category III operations
    a. establish Strategic Rollup Areas (SRAs) at LLNL,
    b. stand up all security requirements for SRAs,
    c. move materials to SRAs to meet Security Category III material limits, and
    d. perform Security Category III operations within the established SRA limits.

This report covers LLNL's efforts for each of the above activities. This effort required the help and support from several DOE sites including: Savannah River Site (SRS), Oakridge Y-12 National Security Complex (Y-12), Los Alamos National Laboratory (LANL), Nevada National Security Site (NNSS), Idaho National Laboratory (INL), and Pantex Plant. Waste produced during processing of this material is in storage awaiting repackaging to meet Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC). The processing of the waste will be performed over the next several years.

Although LLNL's capabilities were stretched to meet the FY2012 timeline, the removal of Security Category I/II materials and conversion to Security Category III operations was completed on schedule by the end of FY2012.

Background

The removal of Security Category I/II materials from LLNL was initiated by the DOE–NNSA's goal of "Complex Transformation". "Complex Transformation" is NNSA's vision for a smaller, safer, more secure, and less expensive nuclear weapons complex that leverages the scientific and technical capabilities of the workforce and meets national security requirements. Complex Transformation includes decreasing the number of Security Category I/II operations to a minimum number of sites. In early 2007, NNSA established a completion date of FY2014 for the conversion of LLNL from Security Category I/II to Security Category III. In Late 2007, that completion date was accelerated to FY2012.

Overview

The transformation from Security Category I operations to Security Category III operations required the completion of several activities. This integrated effort required significant coordination and effort from

a large number of people inside and outside of LLNL. To achieve this objective the following activities needed to be completed:

1. Security Category I/II material removal
    a. process and package material for shipment or for discard and
    b. shipment of Security Category I/II materials off site.
2. Transfer LLNL Security Category I/II operations
    a. establish capabilities at other Security Category I sites,
    b. train LLNL staff for other sites, and
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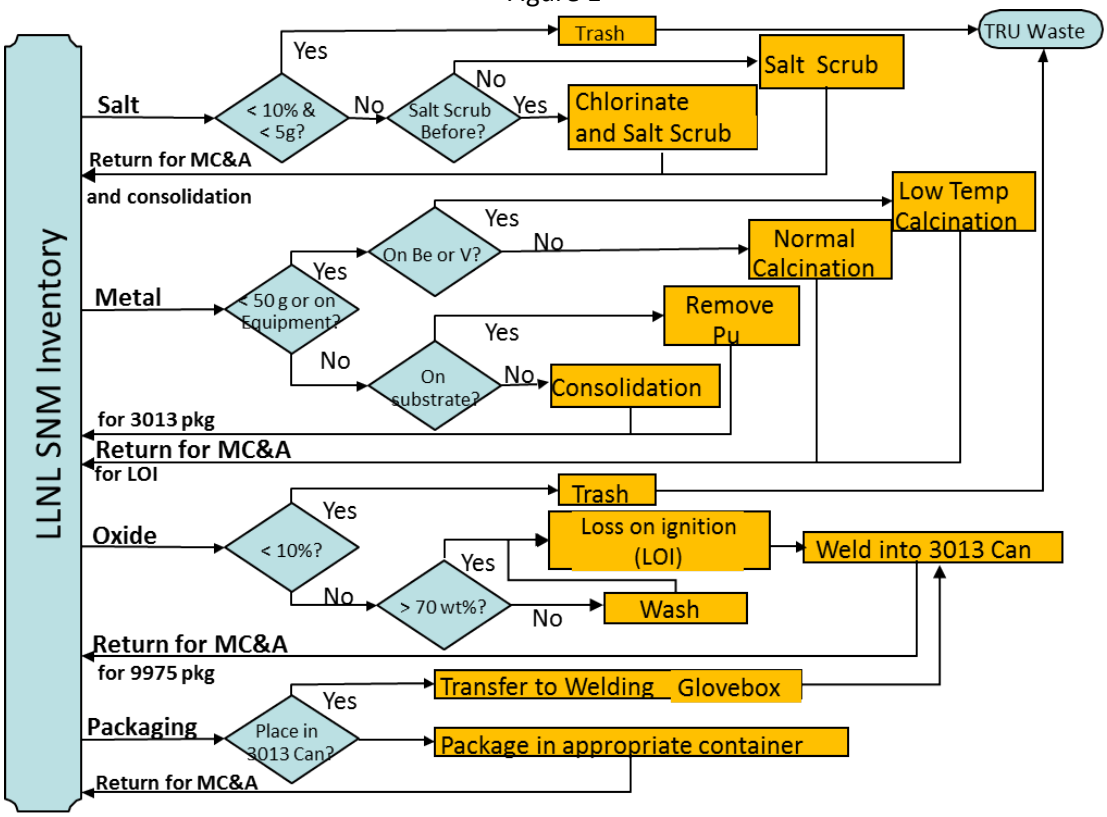
3. Transition the LLNL site to Security Category III operations
    a. establish Strategic Rollup Areas (SRAs) at LLNL,
    b. stand up all security requirements for SRAs,
    c. move materials to SRAs to meet Security Category III material limits, and
    d. perform Security Category III operations within the established SRAs.

The following sections of this report cover LLNL's efforts for each of the above activities.

Process material for shipment or for discard

LLNL started with about 1700 items that required processing and packaging to be moved off site to reach Security Category III mass limits. Almost every item needed to be processed and stabilized to meet shipping requirements. The effort required the involvement and cooperation of many DOE and NNSA sites to find homes for these materials. Each of these sites had different requirements for how the material had to be stabilized and packaged. The receiving site requirements were important in determining how material was processed. Some of the processing steps for different materials are shown in Figure 1.

Figure 1



Most of the material was shipped to SRS. SRS was designated by DOE as the material consolidation site. Because the length of time the material would be stored at SRS was not known, the material was processed and packaged into DOE-STD-3013 cans for shipment (Figure 2). All of this processing was performed while maintaining programmatic operations at LLNL.

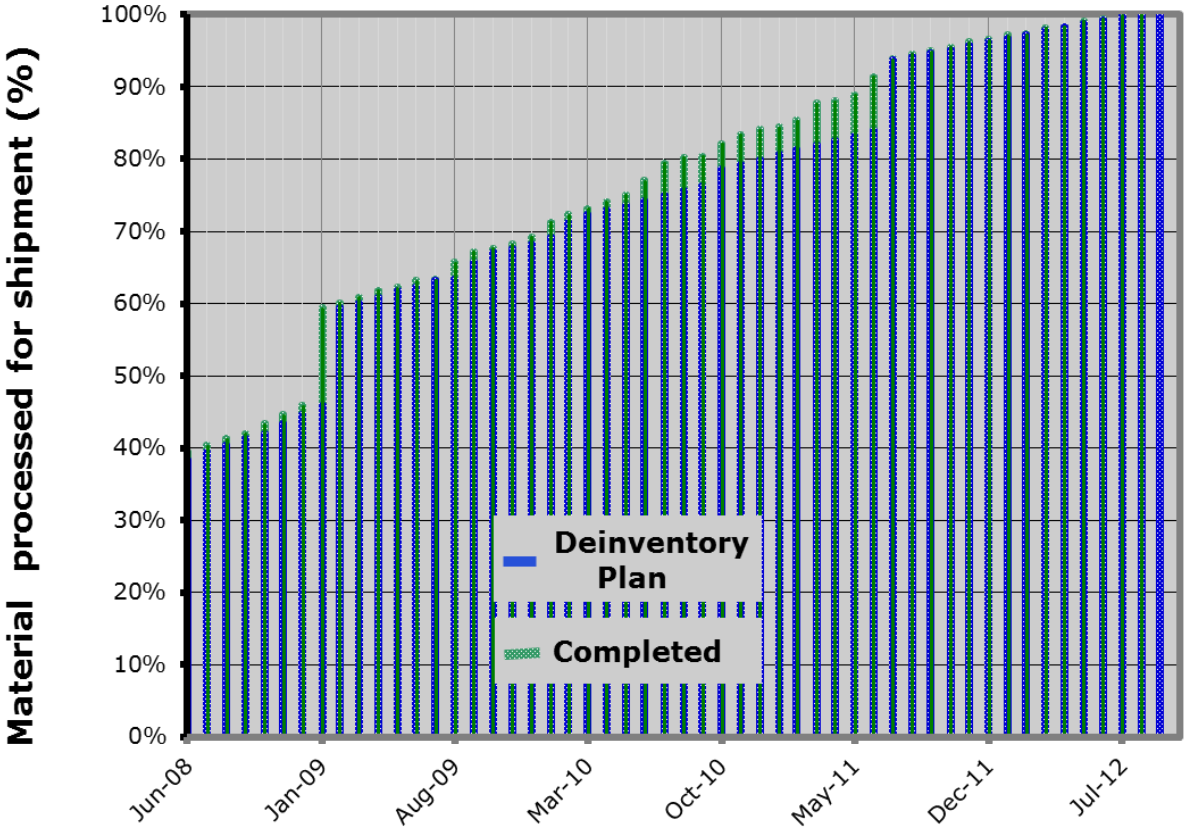
Shipment of Security Category I/II materials off site

After the materials were stabilized for shipment, the materials were packaged into shipping packages and shipped off-site. Most of the shipping packages were 9975s (Figure 3) and 9977s. Because so many shipping packages were being used, a 9975 and 9977 shipping package maintenance capability was established at LLNL. Some of the other shipping packages used were FLs, DPP-2s, and ES-3100s.

Material was shipped to many different sites which required a significant amount of coordination. A multi-site teleconference was held once a month to coordinate between LLNL, receiving sites, shipping package approval authorities, and the NNSA shipping group. The majority of the material was shipped to SRS, Y-12, LANL, NNSS, INL, and Pantex Plant.

The effort of processing, packaging and shipping the Security Category I/II material from LLNL was performed over a five year period. A plan was updated in 2008 to meet the NNSA desired completion date of FY2012. During this five year period LLNL and the other sites meet the plan objectives every month as shown in Figure 4.

Figure 4



Establish capabilities at other Security Category I sites

While material was being processed to decrease the LLNL inventory. LLNL was continuing to support NNSA nuclear material needs for Stockpile Stewardship. It was determined that these nuclear material needs would be required post 2012 and that to support these needs LLNL would have to do Security Category III work at LLNL and Security Category I/II work at other sites. LLNL Programs that continued to require nuclear material operations include:

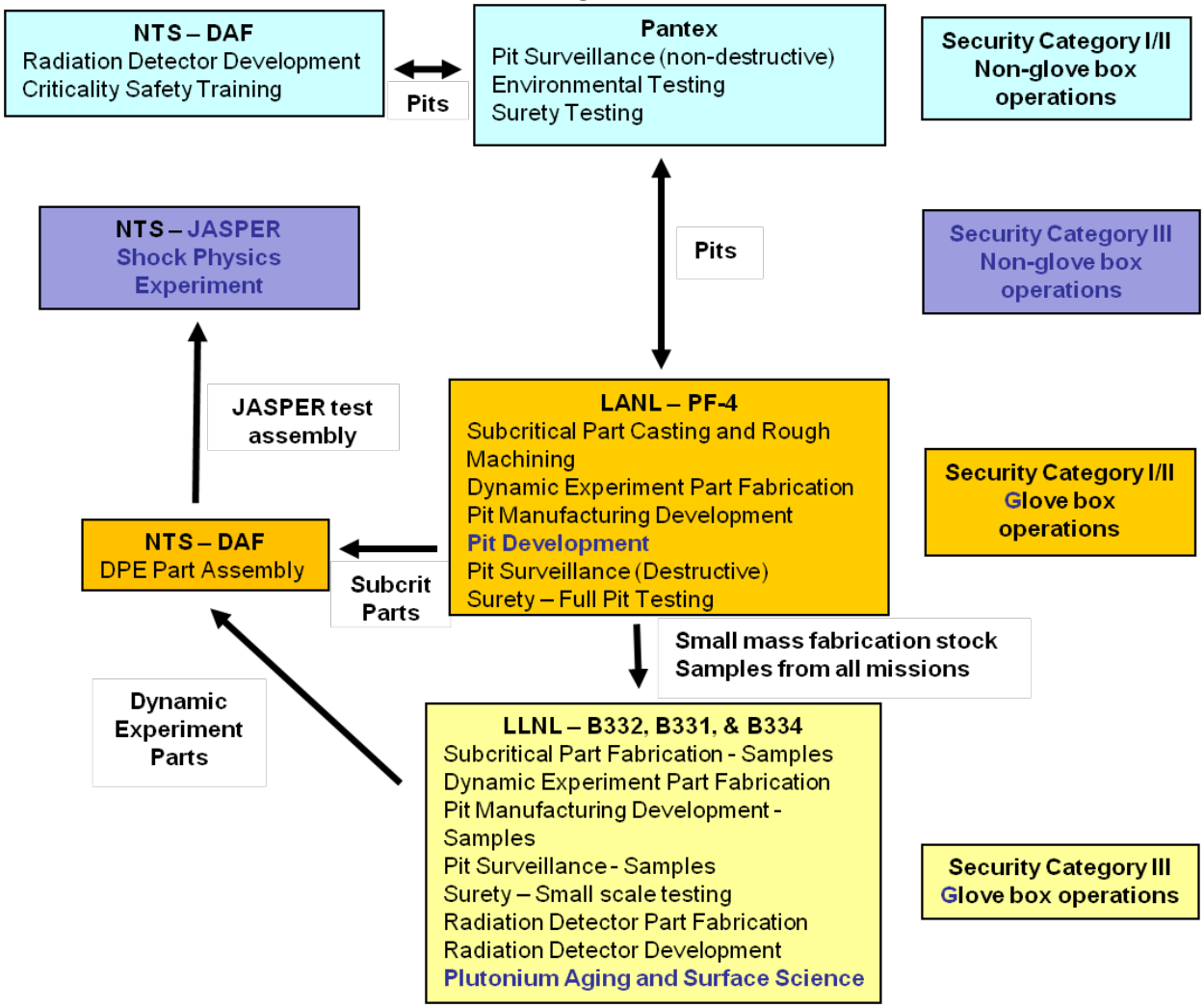
- Weapons and Complex Integration (WCI) Principal Directorate
  - Nuclear Weapons Assessment and Certification
  - Pit Surveillance
  - Plutonium Aging and Surface Science
  - Surety Technology Development
  - W87 Pit Manufacturing Design Agency Activities
  - LEP Pit Certification and Surety Efficacy Testing
  - Pit Reuse Development
  - Pit Manufacturing Development
  - Tritium Recovery and NIF Support
  - Criticality Safety Training

- Nuclear Counter Terrorism (joint WCI and GS)

- Global Security (GS) Principal Directorate
  - Nuclear Counter Terrorism (Joint WCI and GS)
  - Arms Control and Safeguards Radiation Detection
  - Nuclear Forensics (P4 Mission)
  - Nuclear Emergency Response Training (JTOT)

To continue supporting the NNSA nuclear material needs, LLNL developed a model for using a combination of both Security Category I/II facilities and Security Category III facilities. Agreements and capabilities were developed at LANL, NNSS, and INL Security Category I/II facilities and LLNL staff was trained for operations at these sites. Figure 5 shows how LLNL supports NNSA nuclear material work using the capabilities at the various sites. The facilities at the LLNL site are required, operating under Security Category III, to meet ongoing NNSA nuclear material needs.

Figure 5



Transition the LLNL site to Security Category III operations

Working with NNSA, six Strategic Rollup Areas (SRAs) were established at the LLNL site. The SRAs limits have been set to meet programmatic needs and security requirements allowing each area to operate at Security Category III amounts while maintaining the site wide inventory below Security Category II. Use of multiple SRAs enables programs to maximize the use of the various nuclear materials facilities at LLNL.

Once the SRAs were established and approved by NNSA, the nuclear materials that were to remain at LLNL were placed into the appropriate SRA areas to meet the final SRA mass limits. Also personnel were trained and required security systems were put in place. Prior to the switch over to Security Category III, all operations in the facilities were operated using the SRA rules while still under Security Category I. This allowed management to assure that systems and personnel were completely trained and fully functional prior to implementing Security Category III operations.

Upon completion of trial operations and approval of NNSA, LLNL declared conversion to Security Category III operations at the end of FY2012 and has been executing the LLNL Security Category III operation plan.

As part of the SRA change over, LLNL has put in place the Nuclear Material Transfer Committee. The purpose of this committee is to examine desired moves between SRAs and the transfer of material from off-site to ensure it will not exceed the SRA limits. The Committee consists of:

a) the Chairman who is responsible for the operation of the SRA vaults,
b) a representative from Materials Control and Accountability (MC&A), and
c) the program leads.

Each proposed move is checked using the SRA roll up calculator. This calculator helps determine if the move is compatible with SRA mass limits. Once the moves are confirmed to maintain the SRA limits the moves are authorized. If a move cannot be made then material is processed or moved to allow the proposed move to go forward. This committee also looks forward in time to proposed shipments to determine what needs to be done to allow them to come in.

Conclusion

LLNL has transformed from a Security Category I site to a Security Category III site. This transformation occurred within the Complex Transformation schedule determined by NNSA. LLNL continues to use other sites and LLNL nuclear material facilities to meet NNSA nuclear materials needs. LLNL has been successfully operating in this manor for about 10 months.

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