Preparing Los Alamos National Laboratory's Waste Management Program for the Future - 12175

Scotty W. Jones, Alison M. Dorries, Steven Singledecker
Los Alamos National Laboratory
PO Box 1663, Los Alamos, NM 87545

George Henckel, Los Alamos Site Office, MS-A316, Los Alamos, NM 87544

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ABSTRACT:

The waste management program at Los Alamos National Laboratory (LANL) is undergoing significant transition to establish a lean highly functioning waste management program that will succeed the large environmental cleanup waste management program. In the coming years, the environmental cleanup activities will be mostly completed and the effort will change to long-term stewardship. What will remain in waste management is a smaller program focused on direct off-site shipping to cost-effectively enable the enduring mission of the laboratory in support of the national nuclear weapons program and fundamental science and research.

INTRODUCTION:

Over the last several years, a large centralized environmental cleanup effort has been the focus of the waste management program at LANL. In contrast, waste management activities supporting the enduring mission waste generators have been mostly decentralized. Due to the secure nature and remote location of much of the work, LANL research facilities evolved independently leading to waste management processes that also evolved independently. A mix of deployed waste management professionals and laboratory staff has performed various aspects of the waste management process using local procedures and requirements. The work up-stream in supporting waste generators in planning, compliance, waste minimization, and alternate waste management strategies was also mostly decentralized.

Key challenges and actions during this change include:

- Establishing a capable lean waste management organization,
- Improving the expertise of waste management staff,
- Ensuring regulatory compliance through early planning,
- Supporting the shift to off-site disposal of low-level waste (LLW),
- Establishing a robust waste data management program,
- Establishing an appropriate budget mechanism to support the program, and,
- Managing with data and metrics.

DISCUSSION

A Review of the Driving Forces for Transition

The first driver for transition is that the completion of major environmental cleanup activities is in sight. For several years, LANL's waste management program has been integrated as a function of the environmental cleanup effort. The environmental cleanup program managed most waste management staff, facilities, disposal access and processes. The environmental cleanup program has successfully cleaned up large numbers of legacy facilities and lands including facilities dating back to the Manhattan era nuclear weapons program. For example, in 2010 and 2011, the legacy nuclear and support facilities at TA-21 have been characterized, demolished, and disposed of, leaving behind open land for future use by the Department of Energy or local community. The TA-21 cleanup also included remediation of an early disposal facility that was excavated, waste removed and repackaged for disposal. While the environmental cleanup program proceeded, it also supported the balance of waste management activities supporting enduring laboratory activities.

The second driver for transition is the looming closure of nearly all LLW disposal capability on-site. LANL has an onsite disposal facility at Technical Area 54 (TA-54) with capability to dispose of LLW, classified waste, and some high activity waste. Also the permitted facilities to manage mixed waste, chemical waste as well as repackage TRU waste for shipment to the Waste Isolation Pilot Plant (WIPP) reside at TA-54, or adjacent areas. In compliance with agreements with the State of New Mexico, the main disposal area, Area G, will be closed and the activities relocated. While the exact date of closure is to be determined, plans are in development assuming the last gate time for LLW at TA-54 will occur as early as 2013. After that date, limited ability to dispose some waste will continue, but the majority of LLW will no longer be disposed of onsite.

The third driver for transition is budget pressure. With tightening budgets in most LANL programs, there is significant pressure to operate the waste management program in the most efficient manner possible. The completion of environmental cleanup will shrink the base to distribute cost of the core waste management program over, shifting those cost to enduring mission waste generators and/or LANL institutional operating costs.

Establishing a Capable Lean Centralized Waste Management Organization

In early 2010, the organization responsible for LANL environmental cleanup activities, the Associate Director for Environmental Programs (ADEP), began the process of reorganizing the core elements of the LANL waste management program.

The first phase of transition was to realign the LANL Division that would eventually be the home for the enduring waste management function, Waste and Environmental Services (WES), into the Associate Directorate for Environmental, Safety, Health and Quality. (ESHQ). The purpose for this change was to realign the WES into a Directorate with an enduring mission that would be a strong supporter for the enduring waste management mission and would be able to implement a compliant program. Consideration was initially given to move WES into the Operations Directorate that operates nuclear and non-nuclear facilities, but the final choice resulted in WES realigning into ESHQ in March 2010, where it remains today.

With the initial realignment of WES into ESHQ, only a few elements of the enduring waste management process moved - and the rest remained aligned with ADEP. The elements of the program that did move with WES initially included the deployed Waste Management Coordinators (WMC) who service the enduring mission's laboratories and facilities, the waste data management system, and the team responsible for the Radioactive Waste Management

Basis. Shortly after realignment into ESHQ, WES reorganized the staff performing waste management activities into a new group, Waste Generator Services (WGS). WGS was further reorganized into two teams: (1) Waste Generator Interface Team with the mission to manage the deployed WMCs and provide services to generators and facilities, and (2) the Waste Compliance Team with the mission to manage the compliance, certification, and assessing activities. Subsequently, key management positions were filled; resulting in the management team as it currently exists.

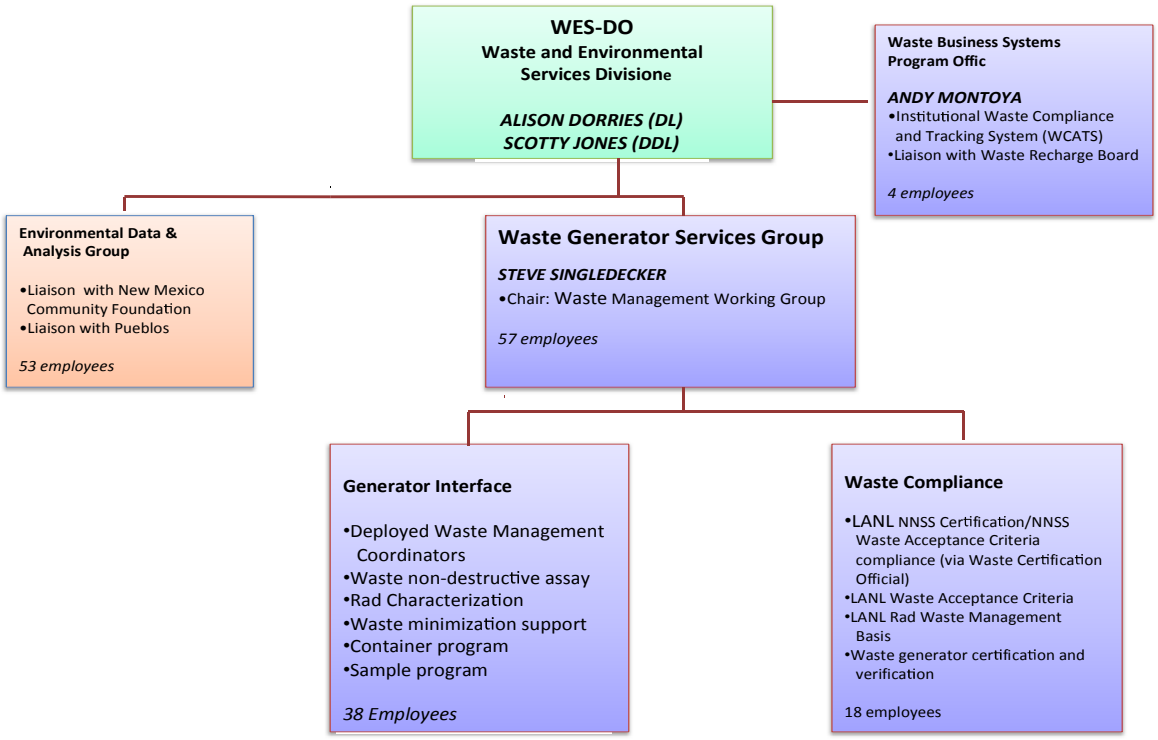

Figure 1. Waste and Environmental Services Division Organization

Following WES' realignment to ESHQ, transition plans and project management schedules developed to manage the transition of the remaining elements of the enduring waste management process. The high-level work breakdown structure follows:

1. Business and budget alignment
2. Contracts
3. Establish governance and oversight model
4. Customer service and communication
5. Organizational structure and alignment
6. Policies and procedures
7. Authorized release limits
8. Background study

9. Improving acceptable knowledge packages
10. Improving waste profiles
11. Direct off-site shipment
12. Waste management facilities
13. Improving support to Project Management Division for early planning
14. Training and qualification of staff
15. Waste generator certification using facility waste management plans
16. Emergency and on-call program

Improving the Expertise of Waste Management Staff

At LANL, the WMC is the key waste personnel working on the floor in laboratories and facilities assisting generators on a day-to-day basis. The WMC working closely with the generator is critical to the successful planning and management of waste.

As required by the DOE Order 426.2, Personnel Selection, Qualification, Training and Certification Requirements for Nuclear Facilities and LANL's Conduct of Training Manual, P781-1, training of WMCs is formalized in a qualification standard. Included in this qualification standard are the following requirements:

<table>
<tr><th colspan="2">Qualification Requirements</th></tr>
<tr><td>Entry Level Education</td><td>High School Diploma or equivalent-per Group Leader</td></tr>
<tr><td>Entry Level Experience</td><td>2 years work related-per Group Leader</td></tr>
<tr><td colspan="2">Training Requirements</td></tr>
<tr><td>Facility-specific Training</td><td>Facility-specific unescorted access training varies per facility. Facility Training Coordinator or RLM needs to assign and maintain.</td></tr>
<tr><td>Required Reading:
• P 313 Roles, Responsibilities, Authorities, and Accountabilities (previously was IMP 313)
• P 322 Issues and Corrective Action Management
• P 330-6 Non-Conformance Reporting
• P 409 Waste Management (now includes LIG 404-00-05)
• P 930-1 LANL Waste Acceptance Criteria
• P 930-2 Waste Certification Program
• P 930-3 Off-Site Shipment of Chemical, Hazardous, or Radioactive Waste

These documents are institutional and have been put into Training Plan #10396 (see below)
<u>Training Plans</u>

Job-specific Institutional core training:
115 Radiological Worker II Training Requirements
117 Beryllium Worker Training Requirements
135 Waste Management Requirements
256 RCRA Hazardous/Mixed Waste Worker Training
1471 HMPT Shipper: HAZMAT/RAM/WASTE
2294 Asbestos Training Requirements
2302 Gas Cylinders Hazards Requirements
2304 Lead Hazards Training</td><td>Examinations:

<u>Course Numbers and Title</u>
12909 RAD Worker II Exam

27917 HMPT: Introduction (Test)
27919 HMPT: Identification of Hazardous Materials (Test)
27921 HMPT: Preparing Shipments (Test)
27923 HMPT: Movement by Highway (Test)
30463 HMPT: Basic RAD Material Transportation (Test) (formerly Course #27925)
30465 HMPT: Advanced RAD Material Transportation (Test) (formerly Course #27927)
27929 HMPT: Hazardous Waste</td></tr>
</table>

Requirements	Transportation (Test)
# 2810 Hazardous Waste Generator #10396 Waste Management Coordinator Required Reading #10506 Waste Item Inventory and Waste Disposal Request forms	49149 OJT for WII and WDR forms

Figure 2. WMC Qualification Requirements

In addition to the WMC qualification standard, a program of Continuing Training for WMCs was developed and implemented. The purpose of waste management continuing training is to provide monthly training to WMCs and other interested staff on emerging issues, lessons learned, and to reinforce fundamental concepts of waste management and to further develop those topics. WM Continuing Training is typically 90 minutes per session. Each WMC is required to participate in at least eight continuous training sessions in a 12-month period in order to retain their qualification under the LANL WMC qualification standard.

The following is a list of recent topics covered, or to be covered, in Waste Management Continuing Training:

Topic	**Course**
Nevada Test Site Waste Acceptance Review	55396
Attention to Detail QA/QC Peer Review Introduction Radiological Spreadsheet & Conversion Tool Review of Fundamentals Mathematics Parts I and II Review of Fundamental Radiological Characterization	55404
Basic Elements of Waste Characterization: Acceptable Knowledge / Process Knowledge	55532
NTS Waste Acceptance Criteria and Customer Service Support	56134
WPF Cost Codes in Support of Waste Recharge RCRA Permit – new permit overview and requirements	56450
NNSS Profile Training WES-WGS Support of LANL Strategic Goals	56780
Waste Cost Recovery Recharge Model	56947
P2/Waste Min/RCRH Findings Overview, WDP Q&A	
Commercial TSD overview:	
10 CFR 61 and Federal and State Licensing of Radioactive Materials	
The Type A & Type B shipping packaging	
A review of nuclear materials accidents with lessons learned	

Figure 3: Waste Management Continuing Training

Another key waste management position where LANL improved the expertise of our staff is the Waste Characterization Engineer. In 2010, the Health Physicists responsible for waste characterization issues received training on Multi-Agency Radiation Survey and Assessment of

Materials and Equipment (MARSAME) and Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and the Visual Sampling Protocol (VSP) sample strategy to enhance their training on waste characterization strategies and systems.

Ensuring Regulatory Compliance Through Early Planning

Early planning for waste management strategies is critical. Due to the history of decentralized mode of waste operations at LANL, it had often proven difficult to plan effectively for waste management early enough in the business cycle of a project or activity. This had sometimes led to cost overruns, schedule challenges, and compliance problems.

This problem was especially apparent in the area of project management and to a lesser degree in the area of facility maintenance. In comparison, routine facility or laboratory generated waste tend to have a longer history of waste management allowing the issues to be resolved.

At LANL, Project Management Division (PM) manages numerous projects of all sizes and complexities across the laboratory. Examples of projects include roof removal and replacement on nuclear and non-nuclear facilities, small facility refurbishment, road and grounds work, excavations, improvements, and in some instances large facility decontamination and demolition. Project Managers were not always versed in how to best plan for waste management in their projects. Sometimes, waste management was considered well into the project execution phase leading to many missed opportunities to be efficient and in some cases compliance issues.

With the formation of WES WGS, WES identified the need to significantly improve the prior planning for projects across LANL. While the Projects Requirements Identification (PRID) system (an automated planning system) did exist with many environmental considerations, it was not adequate in considering waste management issues. The WGS Group Leader was tasked to establish strong relationships with PM Division Office leading to briefings with Project Managers and further engagement. Ultimately, a Senior WMC was assigned to work closely with Project Managers in early planning and in work execution. Through active engagement with PM Division Project Managers, WGS has proven the value of their services to Project Managers and prior planning for waste management has improved significantly.

Supporting the Shift to Off-site Disposal of LLW

With the planned closure of onsite disposal capability for most LLW, WES has been actively working to establish the conditions to allow direct off-site shipping of waste.

Historically, most LLW waste at LANL was disposed of at TA-54. Having an onsite disposal capability simplifies the waste management process. For example, the waste is generated onsite, the waste profile is prepared and reviewed onsite, and the reviews and approvals for disposal are performed onsite. Problems with waste are simpler to remedy and the ability to control access to disposal is more certain.

With the planned closure of TA-54 area G, most LLW waste will be shipped to Nevada Nuclear Security Site (NNSS), (the former Nevada Test Site). In limited cases and with approved exemptions, some waste may be shipped to commercial disposal facilities. NNSS waste requirements are codified in the NNSS Waste Acceptance Criteria (WAC). The NNSS WAC is substantial and contains many specific requirements that must be followed. In addition, the

program for complying with the NNSS WAC is required to be formal including the establishment of the onsite NNSS compliance organization. A key role is the Waste Certification Official (WCO), Alternate WCO as needed, and Waste Package Certifiers (WPC). All the WAC and WCO program requirements are auditable and receive oversight from the NNSS Radioactive Waste Acceptance Program (RWAP) organization and the State of Nevada.

At LANL, the NNSS program was initially established and approved under the control of ADEP in support of shipping environmental cleanup waste to NNSS. Recently, the NNSS program and WCO have transferred to WES.

The next challenge is to establish the conditions at all LANL's enduring mission facilities and laboratories to support direct shipping of waste to NNSS. Waste must be prepared in accordance with the NNSS WAC, inspected by the NNSS WPCs, and approved for shipment by the NNSS WCO. Changes in acceptable waste type and forms as well as changes to approved waste containers must be addressed.

Establishing a robust waste data management program

The legacy waste data and tracking systems were contained in five legacy systems that have been in operation for 12-plus years. Many of these systems were rapidly approaching end-of-life and no longer meeting business rules nor customer's requirements. Due to aging architecture and the number of databases being supported, these systems posed a greater security risk of cyber attacks, as well as inherently higher total cost of ownership. This led to investigation into the feasibility of developing a new system.

The new system, the Waste Compliance and Tracking System (WCATS) acceptability could only be accomplished if the development involved the end-users and stakeholder of the application. The system was designed from the point of view of the generator rather than from a facility aspect. The new system has tools to help track waste items from cradle to grave, and fits the business cost recovery model used at Los Alamos. The project team and the user community collaborated to build a leaner system with better-defined processes while reducing the level of effort needed to manage the waste streams.

In addition, the application supports the characterization and management of the entire range of hazardous, radioactive, and industrial wastes (transuranic [TRU], mixed transuranic [MTRU], low-level waste [LLW], mixed LLW [MLLW], and hazardous waste) that might be co-located or processed at a permitted facility.

The WCATS system uses a modern database application server and application developer's framework. Field operations are conducted on a mobile computer. The embedded database, a "Smart Client" approach, allows the introduction of mobile devices in secure facilities where previous solutions required prohibited wireless technologies.

Other unique capabilities not found in traditional management systems include user-defined tank systems for liquid waste, user-defined work paths (i.e., sequence of operations), and an equipment subsystem for tracking the calibration, maintenance, and inspection of tools used to process waste, such as torque wrenches, scales, pH probes, etc.

Establishing an appropriate budget mechanism and funding to support the program

Over the life of the facility, LANL has utilized different budget strategies for paying for waste management and the waste management core program.

In 2011, LANL adopted a waste recharge mechanism in an effort to centralize the approach to paying for waste management, provide transparency, and to provide oversight for the process. Waste generators are assessed a charge per unit of waste to pay for disposal as well as for funding the core waste management program. The cost per unit of waste is published in a rate table that is organized by waste category.

The waste recharge is overseen and managed by a Waste Recharge Board comprised of Senior Managers representing waste generators, waste program and facilities, and financial managers. The implementation of the waste recharge is auditable by the Department of Energy.

The current WM recharge is stable and has been accepted by waste generators. That said, there are major challenges that must be addressed and the future of the waste recharge is not certain. A six-sigma process improvement project has been chartered by the Chairperson of the WM Recharge Board and led by a certified Black Belt six-sigma practitioner. Key issues being considered include:

- Not all waste costs are captured in the current WM recharge. Some are paid for directly by large program sponsors. Some are paid for by other direct means such as the G&A fund.
- The size and complexity of the enduring WM program, post environmental cleanup, is not yet certain.
- The type of funding mechanism may impact the ability to consistently fund a compliant WM oversight program. (For example, direct funding versus indirect or recharge mechanisms.)
- High waste costs are a problem for small-scale science projects that are core mission for a national laboratory.

Use of Metrics

WES relies on data and metrics as a management tool. All WES managers manage budgets, as well as scope and schedules and are owners of the financial work packages for their areas. Monthly, reports are generated with key metrics and data that are presented by the Work Package owner to the assembled WES Management Team.

Examples of metric being tracked for waste management include:

- Financial Work Package performance
- Number of waste items prepared for shipment
- Waste cubic feet ready to ship
- Waste cubic feet disposed of
- Waste reduction volumes
- Waste reduction cost savings by waste stream
- Waste help tickets status

- Cumulative waste reduction cost savings

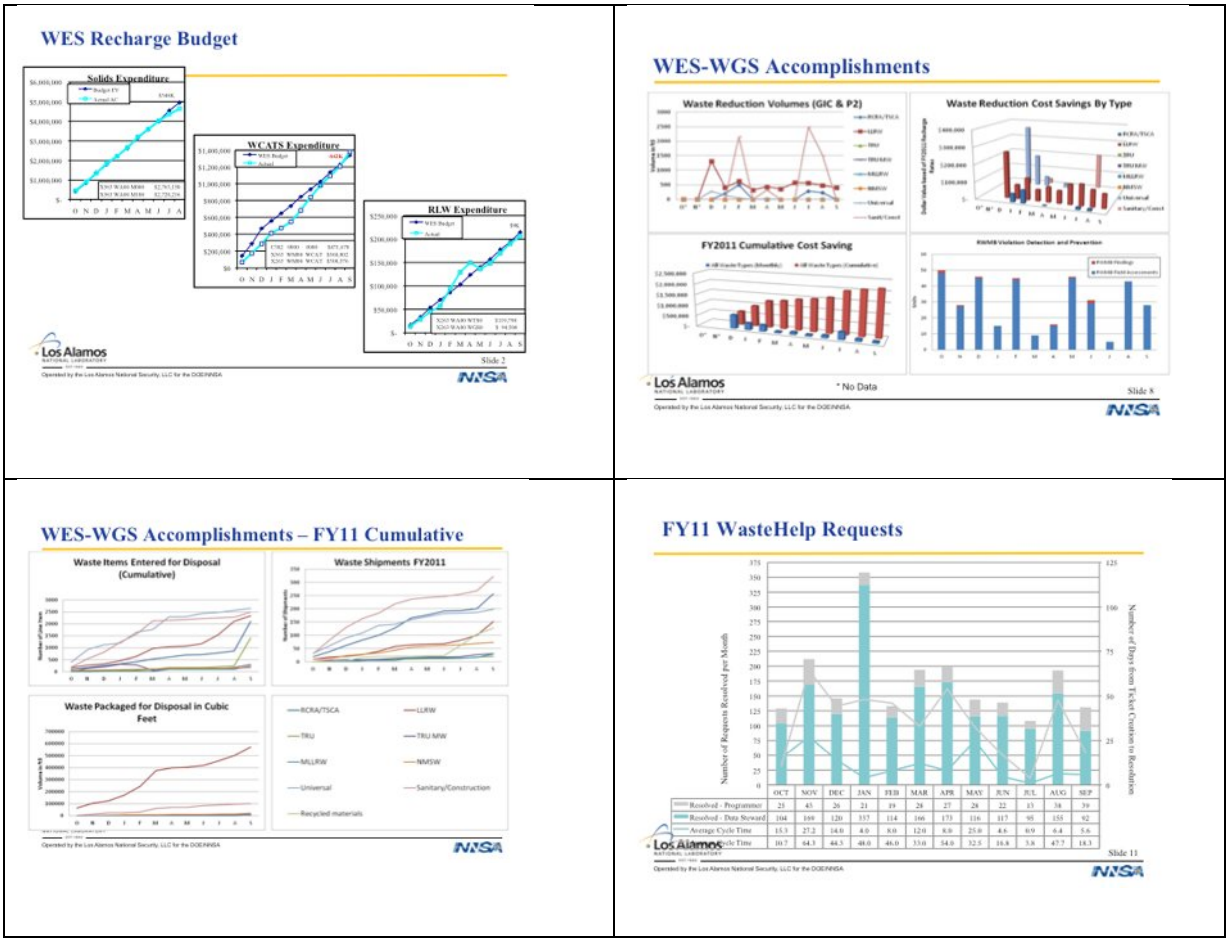

Figure 4. WES Waste Metrics Reports

Other Important Initiatives

In addition to the major program elements noted above that are in transition, several other program elements have been assigned to WES WGS for management:

- The non-destructive assay team.
- The on-site container procurement and distribution program for shipping packagings.
- The hazardous materials sampling team.
- The waste help line.

Conclusion

It is essential that LANL implement a highly functioning efficient waste management program in support of the core missions of the national weapons program and fundamental science and research – and LANL is well on the way to that goal. As LANL continues the transition process, the following concepts have been validated:

- Business drivers including the loss of onsite disposal access and completion of major

environmental cleanup activities will drive large changes in waste management strategies and program.

- A well conceived organizational structure; formal management systems; a customer service attitude; and enthusiastic managers are core to a successful waste management program.
- During times of organizational transition, a project management approach to managing change in a complex work place with numerous complex deliverables is successful strategy.
- Early and effective engagement with waste generators, especially Project Managers, is critical to successful waste planning.
- A well-trained flexible waste management work force is vital. Training plans should include continuous training as a strategy.
- A shared fate approach to managing institutional waste decisions, such as the LANL Waste Management Recharge Board is effective.
- An efficient WM program benefits greatly from modern technology and innovation in managing waste data and reports.
- Use of six-sigma tools can help improve the quality and efficiency of waste management processes.
- A fair, easy to understand, transparent, and well-overseen process for distributing the cost of waste disposal and waste program oversight is essential.

REFERENCES:

1. Alison M. Dorries, Andrew E. Ashbaugh, Andrew J. Montoya (2011). Customer Service Model for Waste Tracking at Los Alamos National Laboratory. Waste Management 2011