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SESSION 36 - INFRASTRUCTURE ISSUES IN WASTE MANAGEMENT

ABS #: 805; LEGACY MATERIAL WORK-OFF PROJECT

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ABSTRACT

Los Alamos National Laboratory (LANL), also referred to as "the Laboratory", and its subcontractors recently completed a nine-month legacy material clean-up effort. Legacy materials were defined as chemicals, hazardous, non-hazardous, and both hazardous and radioactive (mixed), that no longer served a programmatic use and had no identified individual owner within the Laboratory.

The resulting Legacy Material Work-Off Project, during field operations, processed more than 22,500 legacy items. Some of these materials were sent into the Laboratory's reuse program, others were shipped offsite for disposal, and the remaining items were sent to the Laboratory's hazardous waste Treatment, Storage, or Disposal Facility (TSDF) for storage.

The project involved the entire Laboratory staff, from the scientists to the upper level managers. The scientists were responsible for identifying and locating legacy material. The division level managers were given the final responsibility to ensure that workspaces were surveyed and legacy chemicals were identified and located. Once personnel identified the legacy materials, the items were transferred to Solid Waste Operation's (EM-SWO) control. Upon completing this process, the responsible division-level manager was required to certify that all non-radioactive hazardous and non-hazardous materials and acceptable mixed legacy materials had been identified and transferred to EM-SWO for proper handling or disposal.

The major expense in this project was the cost of actual chemical and radiological analysis. This expense was the result of items not having an identified individual owner. These costs consumed more than $1.2 million of the total project cost of more than $2.2 million. This total project cost did not include material sampling and hazard categorization testing performed by Hazardous & Solid Waste (ESH-19) personnel, radiological monitoring provided by Radiation Protection (ESH-1) personnel, industrial hygiene monitoring services provided by Industrial Hygiene & Safety (ESH-5) personnel, or project management services provided by EM-SWO. The groups' operating budgets provided the money for these services.

The analytical costs were mainly the result of historical accumulation of chemicals whose individual owners could no longer be identified. On one occasion, three unlabeled one-gallon containers that were sampled and analyzed, at a cost of more than $2,000, were determined to be de-ionized water.

The major benefit of this project is that LANL is now in an excellent position to implement its Integrated Safety Management (ISM) Plan, which requires the implementation of safe work practices, including requirements for removing unused items when vacating workspaces. Effective implementation of ISM will go a long way toward ensuring that legacy materials are no longer an issue at the Laboratory.

INTRODUCTION

The successful completion of this project required the team to overcome several significant issues. The resources provided to complete this project were a project budget of $2,000,000 and

a staffing level of 14 personnel. Project requirements included a performance period of 8.5 months, signed completion certifications from each of the 41 organizational directors/managers, and full compliance with all applicable state and federal regulations, DOE orders, and operational requirements of each individual organization.

The first issue was the physical magnitude of the project. LANL covers a geographic area of approximately 42 square miles and employs 14,000 scientists, engineers and support staff personnel. The facilities range from multistory office and laboratory buildings to remote testing sites in canyons or on mesa tops. The utility infrastructure ranges from complete power, water and communications services to no utilities at all.

The second issue the team addressed was determining the best method to process the data collected from the project. The normal review process for hazardous materials at LANL is lengthy and requires that detailed information be submitted for review, in advance, prior to the actual pick up of any hazardous materials. This process was unsuitable for this project.

The third issue the team addressed was the operating requirements for several of the individual sites. While the normal operation processes contained in the project plan were sufficient for most sites, specific sites required that a much more detailed analysis of the operations be conducted through DOE's "Unresolved Safety Question Determination" (USQD) process.

The final issue the team addressed was how to best handle "unknown" materials. The initial approach was to set up less than 90-day storage area at each location and have the team accept all legacy materials into these storage areas. Known materials would be separated from the unknown material, packaged and sent for reuse, recycle or disposal. Unknown materials were sampled for analysis. This approach required modification when the full extent of sampling required became obvious and sample turn-around times caused regulatory compliance to become a concern.

MAGNITUDE OF THE PROJECT

The first obstacle to the project was the operational area that constitutes LANL. LANL is comprised of 41 operating Divisions, Programs and Offices that occupy an area of 42 square miles and employs approximately 14,000 scientists, engineers and support personnel. Each of these 41 organizations is a relatively independent operation, with joint projects typically handled by Memoranda of Understanding (MOUs) between the respective organizations. The successful completion of the project depended on the cooperation and full support of the entire LANL organizational structure, including the Laboratory Director's office. Attachment 1 refers to each group's responsibility to ensure the success of the project.

One key step to insure project success was the direct involvement of the operating organizations' management (Division directors). This was accomplished through a certification that the Division level manager was required to sign. This certification contained the following text:

"I certify that all non-radioactive and acceptable mixed Legacy Materials have been identified, removed from all spaces in the above Tech Area(s) and FMU(s), and delivered to EM-SWO's Legacy Materials Work-Off Team for management.

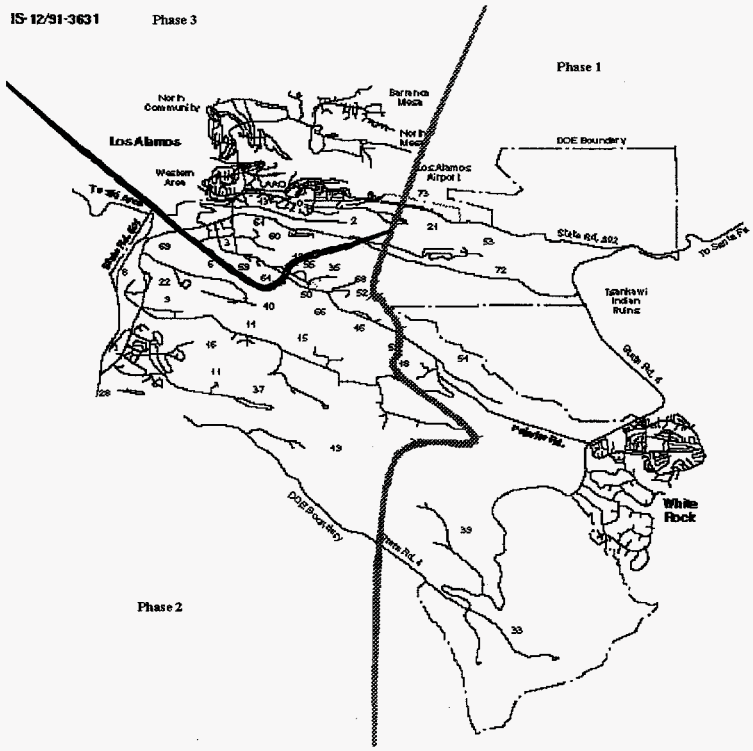
Furthermore, all current and future material and chemical purchases will be appropriately handled and managed in compliance with all applicable regulations."

The Division directors and group leaders also notified generators of when the team would be arriving at the facility. The generators were responsible for locating and identifying legacy items and for delivering the items to the team's storage area.

A second obstacle that the team encountered was the geographical diverseness of LANL. As stated previously, LANL occupies as 42 square mile area. The large area posed logistical concerns that needed to be addressed before performing the work. These were addressed by:

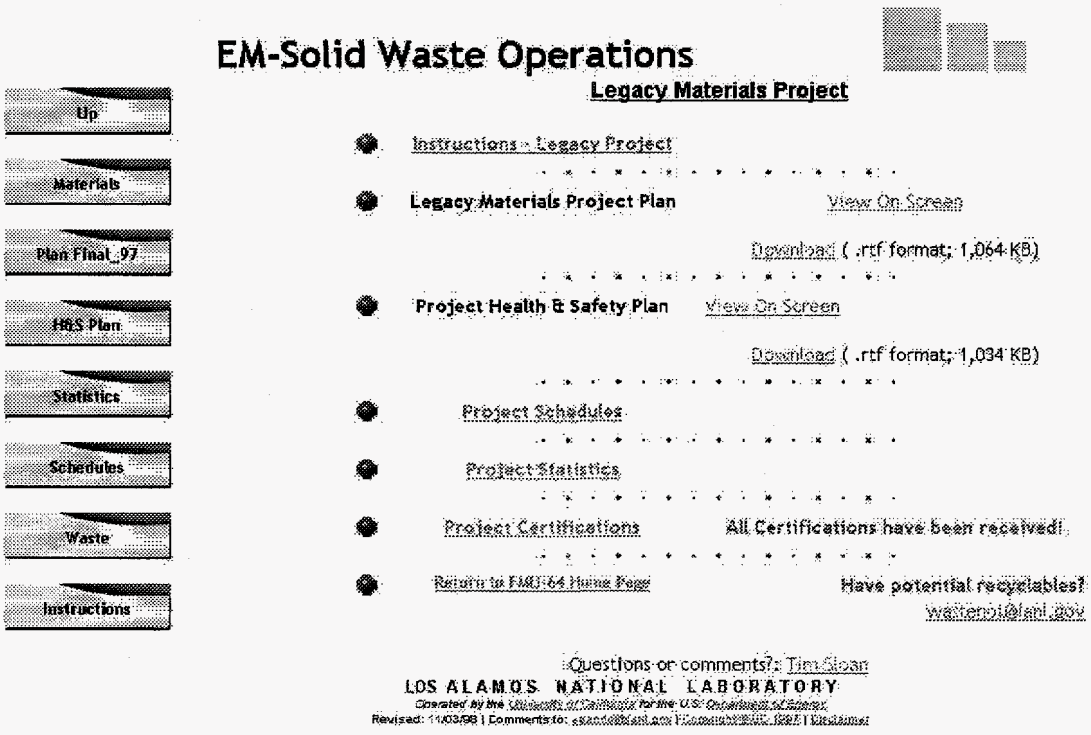
1. Dividing the 42 square mile facility into three "phases" (Figure 1.)
2. Further dividing each "phase" to assign work to each of the two project teams.
3. Defining the division of responsibilities between team members and generator personnel (see Attachments 1 and 2.)
4. Scheduling the work.
5. Supplying each team with contact lists, a vehicle, movable buildings, communications equipment, spill kits, fire extinguishers, eye wash stations, packaging supplies, etc.

FIGURE 1. "Phasing" of LANL Facilities



A third item that was important to the success of the project was communication about the project and its goal. A number of presentations were made to LANL groups, informing the personnel of the scope and purpose of the project (Attachment 3). The presentations also outlined the roles and responsibilities of each person and defined legacy material. Among the attending groups were the Operations Working Group (OWG), comprised of LANL upper management, the LANL Facility Managers, and the LANL Waste Management Coordinators (WMCs). Upper management and facility managers were responsible for allocating personnel for the project and for ensuring that legacy materials were identified. The WMCs acted as liaisons between generators and the legacy team. In addition to the presentations, an internal LANL web page was set up that contained the legacy material work-off project plan, the current project schedules, instructions for generators, project work flow diagrams, project statistics and the current organization certification status (Figure 2.)

Figure 2. Legacy Material Work-Off Project Web Page



DATA MANAGEMENT

The existing Oracle waste management database at LANL is an internally designed, rigid system. This system requires that all materials be fully characterized before acceptance. This lengthy process made it unsuitable for use as the sole data management system in this project. Instead, a customized database was developed for use in this project. Use of this customized database allowed entry and tracking of legacy materials that were not yet fully characterized. It also allowed field entry of information by multiple personnel, tracking of quantities by location, generation of item listings for potential reuse and support for management reporting functions.

In addition to these "up front" uses of the database, a custom interface was developed for electronically transferring this data into the main LANL waste management database.

Even with the customized systems, there were still major issues that arose in data management. The main database system used by waste management has its roots in the late 1980s and early 1990s. As a result, the front-end programming that allows user interface with the database was not designed with today's needs in mind. This led to the unforeseen situation where information had to be processed in smaller batches than anticipated. This set the project's review schedule back several weeks. Once this issue was identified, the database was modified to allow the transferal of smaller, 200 to 250 item batches rather than the anticipated 1,000+ item batches of information for processing. Once we began transferring the smaller information batches into the main waste management database, the review process proceeded normally, with two people being brought in specifically for this project.

However, data management issues did not end with the hardware and software issues. Project staff turnover approximately two-thirds of the way into the project and significantly larger than expected quantities of materials severely impacted the project's ability to process the required quantities of material.

At the inception of the project, it was estimated that approximately 12,000 to 13,000 items would be collected during the project. In reality, more than 22,500 items were collected. This represents approximately five times LANL's typical annual quantity of individual collected items. Even though the total volume represented by these items was only a small fraction of LANL's annual waste generation, the effort required to process these items was many times the availability of manpower to the project. This situation seriously threatened the success of the project.

Many options were considered to address this situation. Among those considered were to add labor to the existing system or to utilize a commercial vendor to perform the classification and packaging tasks that were currently being done in-house. The addition of more workers to the current system was determined to be impractical due to the lack of time for personnel training on the LANL waste management database system. This left the option of utilizing an outside vendor to perform the characterization and packaging tasks. A vendor was brought in under a subcontract. Its personnel characterized, packaged and shipped off-site approximately one-third of the total number of items handled by the project.

SITE OPERATING REQUIREMENTS

The site operations proved to be a challenge. Attachment 4 outlines the flow procedure for which the legacy team processed the material. Site collection involved the following personnel: a waste management coordinator, two support personnel, and a Radiation Control Technician (RCT) for radiological concerns. The collection process required the RCT to monitor each item for surface contamination, the waste management coordinator to determine whether the material met the project criteria, and the support personnel to assist in characterization and classification of the material. Based upon this initial characterization, the team segregated, packaged, and stored the material in <90 day storage areas.

The <90 day storage areas consisted of portable 10' by 10' metal buildings or 24' straight trucks. The amount of material expected at each site determined whether metal buildings or the trucks would be used. The team stored the waste in DOT-approved drums on secondary containment pallets and labeled the drums appropriately. At the start of the project, the location of the storage areas was not a major concern. Facility personnel were aware of the location of the storage and brought the material to the team.

However, the location of the storage areas became a concern for specific facilities. An example of this concern involved one of the first nuclear facilities the team serviced. The facility management was not made aware of the collection site. However, when they became aware of the site, they issued an immediate stop work order. Prior to restarting activities, the DOE Unresolved Safety Question Determination process was required to be performed to determine the impacts project activities could have on that facility's operational safety envelope. Upon DOE approval, project activities were allowed to restart once the storage building and truck were moved a specified minimum distance from the building perimeter. The team used this experience to improve the way facilities were serviced later in the project and required facility manager written approval for location of the <90 storage areas.

Another operational challenge the team had to overcome was communication problems with the generators. Although the facility managers and division directors were aware of the project, the team found that generators and area waste management coordinators were not aware of the collection schedule. The legacy team modified the process for scheduling a facility to include a meeting with potential generators and area waste management coordinators. At these meetings, the team covered the project description, responsibilities, completion of the paper work, criteria for legacy material, and location of the collection and storage area. As the project progressed, most generators knew about the schedule and were able to dispose of their materials in accordance with the plan.

A third challenge the team had to overcome was how to get the material from the generator's workspace to the collection and storage area. The movement of material had to be done safely and carefully. The legacy team attempted to set the collection and storage areas in a centralized location within each facility. The team provided a cart for the generators to move chemicals from their areas to the collection site. The cart provided secondary containment for the material and was easily handled. Generators also provided their own carts and chemical carriers to move material safely. Later in the project, to minimize the potential for environmental damage, the team also had generators set the material on spill containment pallets located at the collection table. Out of 22,500 items collected, the team had only one spill due to a defective container.

A fourth challenge the team had was handling radioactive material. The project allowed for collection of mixed materials (radiological and hazardous components) in addition to hazardous materials. The volume for mixed waste was limited to a quart or less. If the generator had mixed material larger than a quart or did not have a hazardous component, the team rejected the material. The generator had to manage those wastes through the normal processes. The team had to ensure that proper procedures were followed for release of material from a Radiological Controlled Area (RCA) and that the items were properly tagged. Once the team identified a

mixed item, a RCA was set up and defined in the storage area. In one facility, mixed materials could not be removed from the building to the team's <90 day storage area; therefore, the team had to establish a separate collection and storage area for the mixed waste inside the building until the materials could be transferred to LANL's RCRA permitted TSDF facilities.

A final challenge the team managed was "unknown" material. Unknown material is defined as a chemical in hand-labeled bottle, vial, or 'non-original' container or a container that had some other issue that cast doubt on the contents. If a bottle was not labeled at all, emergency response actions were taken for the safety of personnel. If a container had some sort of label present, the item was scanned for radioactivity. The RCT verified that the material did not have any external contamination before releasing it for further chemical and radiological analyses.

Materials declared non-radioactive, but coming from areas in which radioactive materials were handled or processed, were verified by one of two methods. The first method was to analyze the item through the "Rad-Van," if the area handled alpha or beta-emitting materials only. The second method was to analyze multiple items simultaneously using a High-Purity Germanium Detector (HPGe) to identify the gamma radiation from alpha/beta/gamma emitting materials. Materials that failed either of these screening analyses were handled as low-level mixed waste if they met the hazardous component criteria. If analytical results proved the material was radioactive and did not have a hazardous component, the team returned the material to the generator for disposition through the normal processes.

After radioactivity screening, 'unknowns' were then analyzed for RCRA chemical constituents. In the event the item was one quart or less in volume, characteristics would be identified through the HAZ-CAT method. If the material volume was greater than one quart in volume (limited to non-radioactive materials only), it was sampled and sent to an analytical laboratory for full TCLP analysis and, in some cases, flash-point analysis.

Initially, the project was accepting "unknown" materials into the <90-day storage area, segregating them on individual spill containment units, sampling them, sending the samples out for analysis, and then characterizing and packaging them as the results came in. Unfortunately, due to the large numbers of samples (over 2,400) and slower-than-expected sample turnarounds, the 90-day storage limitations were becoming a significant issue. As a result, unknown items were no longer accepted into the <90-day storage areas early in the project. Instead, they were identified, sampled in place, and a satellite accumulation area established for them. Upon receipt of the analytical results, the 'unknown' was characterized, packaged and transported for disposal.

CONCLUSION:

The legacy material work-off project was a success. The team collected, processed, and disposed of over 22,500 items in 8.5 months at an operating cost of $2.2 million dollars. The success of the project depended upon several key factors. One such factor was the planning of the project. Taking into consideration the size of LANL property, number of people to service, and amount of material to process and dispose, the project required good planning and organizational skills. Breaking LANL into three phases allowed for the teams to operate efficiently and to effectively service generators.

Another important factor for the success of the project was adequate resources. Many divisions and groups contributed to the project. This support allowed the project to remain within budget guidelines and to be completed on schedule. Other resources, which contributed to the success, were regulatory, information (MSDS), and transportation support.

A third factor contributing to the project success was the process definition. Without having this well-defined process of collection and storage of materials, the teams could have been placed in potentially unsafe situations. Also, because of the process, potential releases of radioactivity were avoided throughout the project.

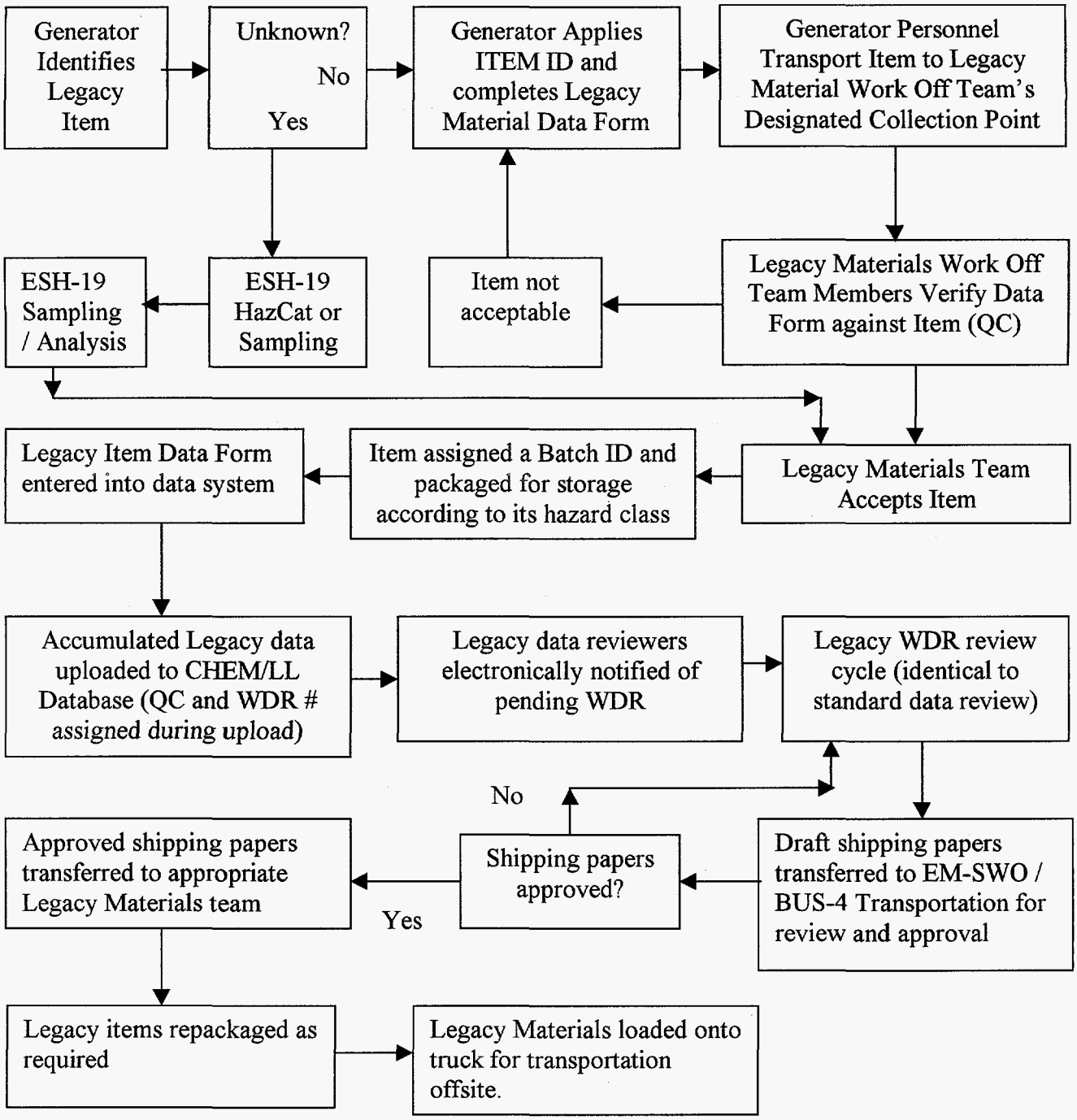
The major benefit of this project is that LANL is now in an excellent position to implement its Integrated Safety Management (ISM) Plan, which requires the implementation of safe work practices, including requirements for vacating workspaces. Effective implementation of ISM will go a long way toward ensuring that legacy materials are no longer an issue at the Laboratory.

Attachment 1: Roles and Responsibilities

RESPONSIBILITIES

LANL Director	▪ Authorize the allocation of institutional funding for this project. ▪ Ensure Division and Line Management give appropriate priority to this project.
Division Directors	▪ Ensure appropriate personnel, facility and infrastructure allocations are made to support the project's objective. ▪ Ensure the provision of the annual chemical inventories of each facility. ▪ Ensure that only true legacy materials are identified in this project **(programmatic materials must be handled through existing EM-SWO procedures.)** ▪ Certify the completion of non-radioactive legacy material removal through signature of the Division Director Legacy Certification form (attached.)
Generator Personnel	▪ Identify all Legacy Materials in the spaces following the attached Legacy Material Guidance. ▪ Attach an item ID barcode label to, and complete the Legacy Materials Data Form attached to this plan for each Legacy Materials item. ▪ Deliver all Legacy Material items and associated data forms to the Legacy Work-Off Team at the time scheduled and at the predetermined location designated for your area. ▪ Ensure that Legacy Material items are **not abandoned** at the drop point. The Legacy Work-Off Team must accept these materials.
Group Leaders/ Facility Managers	▪ Allocate appropriate personnel to support the project's objective. ▪ Ensure RCT support is available for support of this project. ▪ Allocate appropriate work site(s), facilities and other required infrastructure to ensure the success of this project. ▪ Ensure that Group personnel cooperate and give appropriate priority to this project. ▪ Ensure that only true legacy materials are identified in this project **(programmatic materials must be handled through existing EM-SWO procedures.)**
EM-SWO Hazardous and Chemical Project Lead	▪ Develop the initial TA scheduling plan (Attachment 2.0). ▪ Agree on specific siting location and dates with responsible Division Director(s) or designee(s) not less than two weeks prior to visiting the site. ▪ Ensure the performance and efficient operation of the project. ▪ Prepare monthly progress reports for management.
EM-SWO Legacy Materials Field Team Lead	▪ Field Point-of-Contact (POC) with Group Leaders/Facility Managers and Generator Personnel. ▪ Coordinate project field support. ▪ Scheduling. ▪ Pre-site evaluation. ▪ Reports to EM-SWO Hazardous and Chemical Project Lead.
EM-SWO Legacy Materials Team Personnel	▪ Assist generator personnel in the documentation (CWDR and WPF) of legacy material. ▪ Assist generator personnel in the characterization and classification of legacy materials. ▪ Accept legacy materials from generator personnel for packaging and disposal. ▪ Schedule materials for shipment through EM-SWO. ▪ Maintain and inspect the temporary legacy material storage areas.
ESH-1 Personnel	▪ Assist the project in radiation safety and legacy material release issues.
ESH-5 Personnel	▪ Assist the project in industrial hygiene and worker safety issues.
ESH-19 Personnel	▪ Assist the project in legacy material generation and operations compliance issues. ▪ Assist the project in legacy material sampling, analysis and characterization. ▪ Assist in the performance of "Haz-Cats" on small quantity unknowns.

Attachment 2: Workflow Diagram



Attachment 3: Scope And Purpose

Purpose

This project plan documents a path forward to achieve Laboratory Director Browne's target completion of addressing and resolving the status of non-radioactive legacy materials at Los Alamos National Laboratory within a nine month accelerated time frame.

For this project to be successful, the following points are crucial:

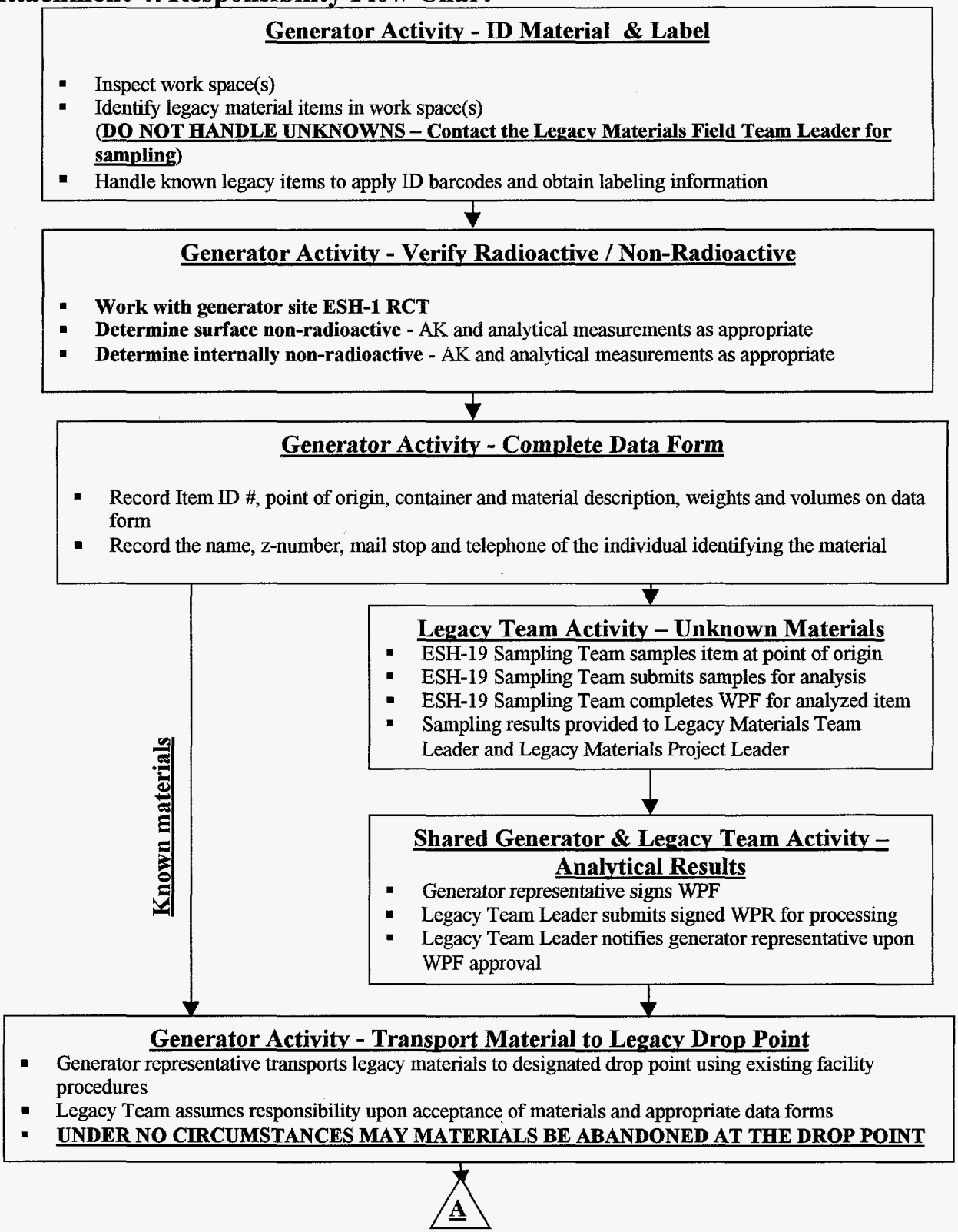
- Generators must be prepared in advance. EM-SWO's Legacy Work-Off Team will be scheduled for a fixed time at each site.
- Generator sites shall provide temporary-working locations for efficient handling of the materials, i.e., there must be truck access and forklift support, if required.
- Materials must not be "dumped" at the collection site - they must be accepted by the Legacy Work-Off Team.
- Non-legacy materials must be handled through the normal EM-SWO channels. There is neither time nor funding in the Legacy Work-Off Project to address routine materials.
- Limited quantities of mixed legacy materials (radioactive and hazardous components, not to exceed 1 quart in volume) will be addressed in this project; larger volumes must be handled through existing processes.

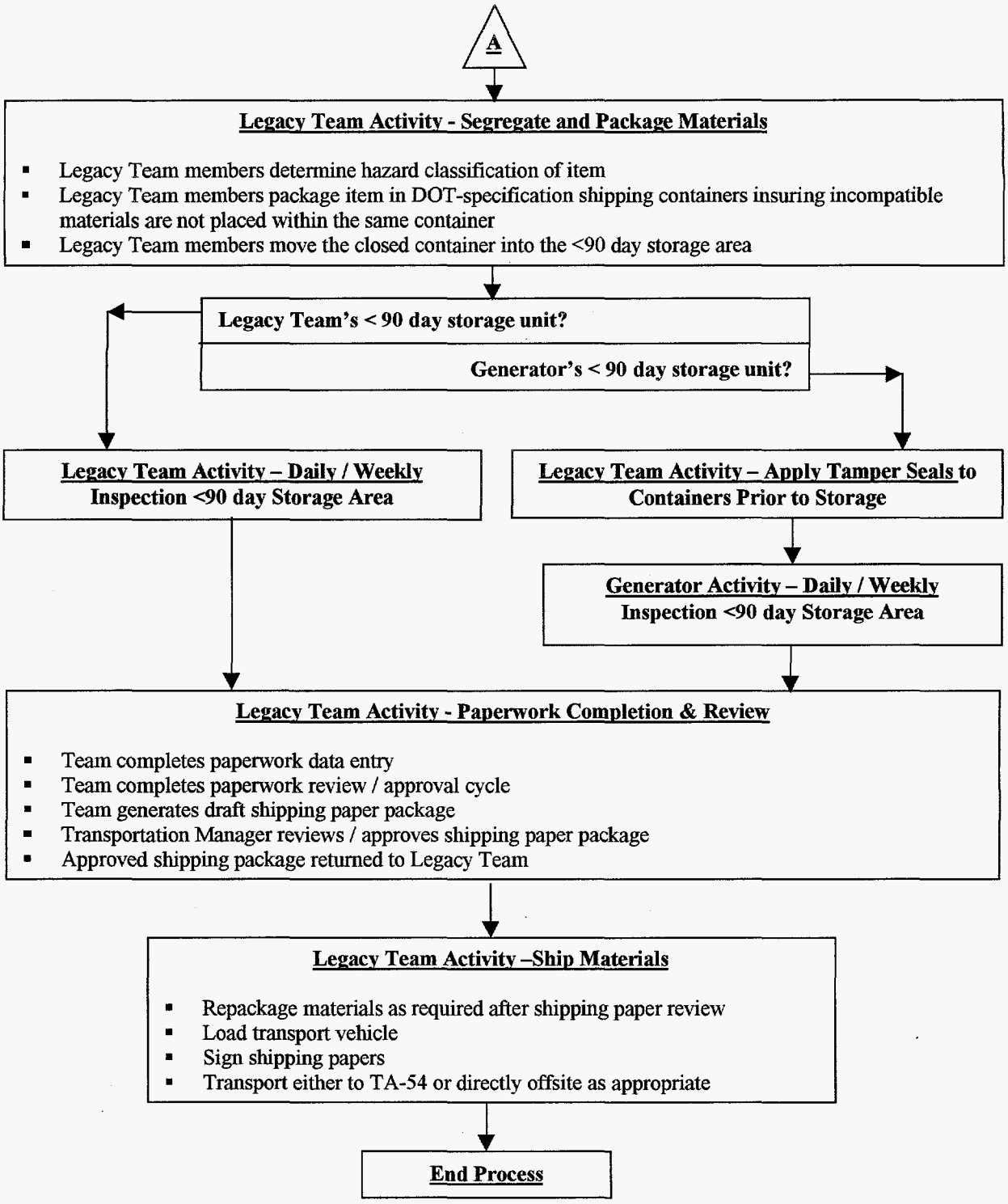
Scope

The scope of this project is to identify and manage all **chemical and hazardous legacy materials and all acceptable mixed legacy materials** that are the result of past activities at LANL. This project **does not** include materials that are radioactive only.

THESE LEGACY MATERIALS SHALL NOT BE FROM KNOWN ACTIVITIES OR CURRENT ACTIVITIES WHEN A CURRENT OWNER CAN BE IDENTIFIED. ROUTINE OPERATIONAL MATERIALS MUST BE HANDLED THROUGH THE NORMAL PROCESSES AT ENVIRONMENTAL MANAGEMENT - SOLID WASTE OPERATIONS (EM-SWO).

Attachment 4: Responsibility Flow Chart

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Legacy Team Activity - Segregate and Package Materials
Legacy Team members determine hazard classification of item
Legacy Team members package item in DOT-specification shipping containers insuring incompatible materials are not placed within the same container
Legacy Team members move the closed container into the <90 day storage area
Legacy Team's < 90 day storage unit?
Generator's < 90 day storage unit?
Legacy Team Activity – Daily / Weekly Inspection <90 day Storage Area
Legacy Team Activity – Apply Tamper Seals to Containers Prior to Storage
Generator Activity – Daily / Weekly Inspection <90 day Storage Area
Legacy Team Activity - Paperwork Completion & Review
Team completes paperwork data entry
Team completes paperwork review / approval cycle
Team generates draft shipping paper package
Transportation Manager reviews / approves shipping paper package
Approved shipping package returned to Legacy Team
Legacy Team Activity –Ship Materials
Repackage materials as required after shipping paper review
Load transport vehicle
Sign shipping papers
Transport either to TA-54 or directly offsite as appropriate
End Process