ABSTRACT

This paper describes the analyses performed to determine whether or not the eleven major Department of Energy sites had adequate planning and resources available to implement their shipping baselines. The study covers only Environmental Management off-site shipments using Type B and Type A-Fissile packaging. The time frame evaluated is from 2001 – 2010. The results indicate issues with respect to having certified packaging for planned shipments, the packaging inventory available to support schedules, and the material sufficiently characterized to enable package selection.

INTRODUCTION

The Department of Energy (DOE) Environmental Management Program (EM) is tasked with cleaning up 53 sites within the nuclear weapons complex. The cleanup and closure mission involves activities such as characterization, treatment, packaging, storing, shipping, and disposition. Packaging and transporting wastes and materials to their disposition destinations are complex functions that warrant careful management and planning, especially when dealing with the magnitude of the transportation activities projected over the life cycle of the cleanup mission. In October 2000, the Idaho National Engineering and Environmental Laboratory (INEEL) developed a corporate transportation baseline for the EM cleanup and closure activities. This baseline is a planning tool that was to be updated annually based on data collected through the Integrated Planning, Accountability and Budgeting System (IPABS). The baseline identifies waste and material types, quantities to be moved by year, number of shipments per year, and packages to be used by type per year.

During 2002, the INEEL improved upon this transportation baseline through data analyses and developed a method to manage shipments of radioactive materials requiring Type B and Type A-Fissile packaging. The method and analyses results were documented in the EM Transportation Forecast for the DOE complex. This Transportation Forecast focused on transportation related activities for the following eleven major DOE sites:

- Fernald Environmental Management Project, Ohio
- Hanford Site, Washington
- Idaho National Engineering and Environmental Laboratory, Idaho
- Los Alamos National Laboratory, New Mexico
- Nevada Test Site, Nevada
- Oak Ridge National Laboratory, Tennessee
- Rocky Flats Environmental Technology Site, Colorado
- Savannah River Site, South Carolina
- Sandia National Laboratories, New Mexico
- West Valley Demonstration Project, New York
- Waste Isolation Pilot Plant, New Mexico.

The Forecast focused on off-site transportation activities planned as part of the EM cleanup mission. In addition to the off-site transportation, some analysis of planned on-site shipping was considered to determine their impact on resources needed for off-site shipments. The waste and material types included are: low-level radioactive waste (LLW), mixed low-level radioactive waste (MLLW), transuranic waste (TRU), nuclear material (NM), high-level waste (HLW) and spent nuclear fuel (SNF). Transportation activities pertaining to the Weapons and Naval Nuclear Propulsion Programs are excluded.
The development of this report was approached in two phases: (1) data gathering and enhancement and (2) data analyses and presentation. As a result of the data gathering efforts, four sets of updated and enhanced data were generated and are presented in this report for each of the eleven sites:

- **Enhanced Baseline** - updates and fills gaps in the existing database information (IPBAS);
- **Type B and Type A-Fissile Packaging Baseline** - updates and fills gaps in the October 9, 2001 Type B and Type A Fissile Packaging Report; and
- **Planned vs. Actual FY 2001 Shipments** - contains information concerning shipments, requiring Type B packaging, planned for FY 2001 as compared with those actually made;
- **Baseline Transportation Barriers** - a compilation of anticipated barriers to shipping activities. The barriers were compiled from those reported in the gaps analysis report of March 2002 and from discussion with site personnel.

Using these four basic data sets, enhanced data presentations were developed and analyses were carried out with the aim of assessing the feasibility of executing planned shipping activities. These products are included for each of the eleven major sites:

- **Transportation Baseline Summary** - consisting of one chart for each waste and material type, showing annual quantities to be transported through 2010 (inclusive). This was intended to be a ten-year rolling window to be updated annually.
- **Type B and Type A-Fissile Packaging Needs Assessment** - detailing the identity and number of packagings that will be required to carry out planned shipping activities. This summary was developed through analysis of the Transportation Activity Maps in comparison with the Packaging Baseline.
- **Transportation Activity Maps** - a highly detailed view of each planned transportation activity for the years 2001 through 2010.
- **Type B Package Certification Schedule** - listing early and late dates, as determined by analysis of the Transportation Barriers, required for certification of packagings needed to execute planned shipments.
- **Transportation Data Reported From Shipper and Receiver** - comparing the packaging and transportation data as reported by the shippers and receivers of EM waste and material. This data was compiled from the enhanced transportation baseline data and the Type B and Type A-Fissile Packaging Report.
- **Conclusions** - reached through analysis of anticipated packaging needs, current packaging inventory, barriers, baseline assumptions, and other information to determine the feasibility of executing planned Site shipping activities.

It is the intent of this Forecast to communicate to EM management those areas of concern needing immediate attention. The transportation activities that are associated with meeting regulatory or state agreements will logically be given a high priority.

**ENHANCED TRANSPORTATION BASELINE DATA**

This section discusses the updated and enhanced data sets obtained through the data gathering activities.

**Enhanced Baseline**

In an effort to make the IPABS transportation data more accurate and complete, the INEEL staff requested updated information from the eleven major DOE sites and worked face-to-face with two of the eleven to obtain the necessary information. The transportation data from the IPABS 8/28/01 dataset was subsequently provided to the sites for verification and completion of empty data fields.

Prior to working with the sites, the transportation data in IPABS was marginally populated. After working with the sites, the data was updated with current planning. The enhancements are discussed in the following paragraphs to give the reader an indication of the data improvements made through the data enhancement efforts.
First, all the transportation data elements in IPABS were compared before and after the data enhancement effort. The data elements included were: packaging name identified, number of packagings to be used, number of shipments, and the mode of transportation. A summary comparison of the data elements illustrated that the resulting enhancements from working with the sites reduced the empty data fields by 31%.

Next, the packaging elements (i.e., name of packaging and number of packagings needed) that were in IPABS before and after the transportation data enhancement were considered. This consideration showed there were 20% less empty data fields related to packaging than with the August 2001 IPABS dataset.

Lastly, a comparison of the transportation campaigns from the August 2001 IPABS dataset with those after the data enhancement was made. These transportation campaigns were divided into 3 sections:

1. Incomplete Campaigns – where none of the transportation data fields had information entered;
2. Partially Complete Campaigns – where one or more of the fields had transportation data entered; and
3. Totally Complete Campaigns – where all of the transportation data fields had data entered.

Analyses of the two transportation campaign datasets indicated that an additional 8% of the transportation campaigns now have complete data. Also, the transportation campaigns having no data were reduced from 49% to 28%.

As a result of the site data reviews, the sites were able to focus management attention on problem areas. The sites expressed that the increased visibility on the transportation details was instrumental in making needed planning decisions. These planning decisions have been included in the EM Transportation Forecast, Gaps Analysis, and Type B and Type A-Fissile Packaging Report.

As illustrated in the paragraphs above, the transportation data is improving; however, discrepancies between site baseline plans and IPABS data still exist and there are yet many data fields that are not populated. These facts confirm the need for an improved methodology for collecting and reporting transportation data.

**Type B and Type A-Fissile Packaging Baseline**

The Type B and Type A-Fissile Packaging Baseline updates and fills gaps in the site data from the October 9, 2001 Type B and Type A-Fissile Packaging Report. The packaging data was presented from the shipper’s perspective.

There are other programs, in addition to EM, planning to use Type B and Type A-Fissile packaging. Although non-EM transportation activities were beyond the scope of this Forecast, the packagings planned for use through 2010 for the non-EM programs should be considered as they plan to use similar transportation and packaging resources.

**Planned vs. Actual FY 2001 Shipments**

Actual numbers of shipments made during 2001 in Type B or Type A-Fissile packaging, as provided by Hanford and INEEL personnel, were compared with those entered as planned for 2001 in the IPABS database. The purposes of the comparisons were to gauge the success of executing plans, to investigate methods to improve planning, and to determine whether key cleanup and closure milestones were being threatened. Included were some non-EM shipments and receipts. The non-EM shipments were included for information; given they have the minimum potential to impact EM transportation resources.

In the comparison of the planned vs. actual shipments for the two sites named above, there doesn’t appear to be a problematic backlog of shipments. However, the effectiveness of planning and executing shipments will be better understood as the remainder of the sites is included in the analysis.

**Baseline Transportation Barriers**

Transportation barriers have been documented complex-wide for each DOE-EM site. The barriers were captured for a five-year window (2002 – 2006) and focused on those barriers that were specifically related to Type B and Type
A-Fissile packaging. A summary of the barriers is found below in Table I with greater details found in the Gaps Analysis Report of March 2002.

The barriers listed in Table I could be categorized as follows:
- Insufficient Material Characterization – The lack of characterization has prevented the selection of packaging, number of shipments, and shipping dates.
- Package Certification – A packaging has been identified, but a Safety Analysis Report for Packaging revision is required for the package to be certified for the intended contents.
- Special Case Shipment – A special circumstance is required, such as an out-of-commerce shipment.

### Table I. Summary Transportation Barriers from Gaps Analysis Report

<table>
<thead>
<tr>
<th>Site</th>
<th>Packaging</th>
<th>Material</th>
<th>Barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fernald</td>
<td>TBD</td>
<td>NM</td>
<td>Insufficient material characterization. No packaging or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>Type A - 7A,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type AF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(SBWSC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hanford</td>
<td>S-100</td>
<td>NM</td>
<td>The S-100 Pipe Overpack is being developed by OSRP (Rev. 21), and is intended to be used for this shipping campaign.</td>
</tr>
<tr>
<td>INEEL</td>
<td>HFEF-6</td>
<td>SNF</td>
<td>Out of Commerce shipment, requires closure of a state highway.</td>
</tr>
<tr>
<td>NAC-LWT</td>
<td></td>
<td>SNF</td>
<td>NAC-LWT is not certified for all INEEL fuel types.</td>
</tr>
<tr>
<td>Peach Bottom</td>
<td></td>
<td>SNF</td>
<td>No destination identified for the transportation campaign.</td>
</tr>
<tr>
<td>6M</td>
<td></td>
<td>NM</td>
<td>No shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>Los Alamos</td>
<td>S-100</td>
<td>NM</td>
<td>The S-100 Pipe Overpack is being developed by OSRP (Rev. 21), and is intended to be used for this shipping campaign.</td>
</tr>
<tr>
<td>NTS</td>
<td>S-100</td>
<td>NM</td>
<td>The S-100 Pipe Overpack is being developed by OSRP (Rev. 21), and is intended to be used for this shipping campaign.</td>
</tr>
<tr>
<td>TBD</td>
<td>TRU</td>
<td></td>
<td>Insufficient characterizing, sampling, and repackaging resources. No destination, packaging, or shipping date identified for the transportation campaign.</td>
</tr>
<tr>
<td>TBD</td>
<td>TRU</td>
<td></td>
<td>Insufficient sanitization and repackaging resources. No packaging or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>ORNL</td>
<td>5320</td>
<td>NM</td>
<td>No destination or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>S-100</td>
<td></td>
<td>NM</td>
<td>The S-100 Pipe Overpack is being developed by OSRP (Rev. 21), and is intended to be used for this shipping campaign.</td>
</tr>
<tr>
<td>TBD</td>
<td></td>
<td>NM</td>
<td>No destination, packaging, shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>TBD</td>
<td>LLW</td>
<td></td>
<td>No packaging identified for the transportation campaign.</td>
</tr>
<tr>
<td>Rocky Flats</td>
<td>Self-contained</td>
<td>NM</td>
<td>No destination identified for the transportation campaign.</td>
</tr>
<tr>
<td>TBD</td>
<td></td>
<td>NM</td>
<td>No packaging or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>IP</td>
<td></td>
<td>NM</td>
<td>No destination or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>ES-2100</td>
<td></td>
<td>NM</td>
<td>ES 2100 as a suggested container. It is available but not certified. This is part of the LLW Stream.</td>
</tr>
<tr>
<td>Site</td>
<td>Packaging</td>
<td>Material</td>
<td>Barrier</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>SRS</td>
<td>Type 7A</td>
<td>NM</td>
<td>No shipping date identified for the transportation campaign.</td>
</tr>
<tr>
<td></td>
<td>6M or ES-2100</td>
<td>NM</td>
<td>No shipping data identified for the transportation campaign. ES-2100 is available but not certified.</td>
</tr>
<tr>
<td></td>
<td>IP</td>
<td>NM</td>
<td>No destination or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>Sandia</td>
<td>TBD</td>
<td>SNF</td>
<td>No packaging or shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td></td>
<td>IP</td>
<td>NM</td>
<td>No shipping data identified for the transportation campaign.</td>
</tr>
<tr>
<td>WVDP</td>
<td>TN-BRP/REG</td>
<td>SNF</td>
<td>No shipping date identified for the transportation campaign.</td>
</tr>
</tbody>
</table>

In addition to the barriers of the Gaps Analysis Report, INEEL personnel documented barriers identified during the site visits to Hanford and the INEEL. The barriers and consequences captured during the site visits were documented as well.

**ENHANCED BASELINE ANALYSIS**

The data products presented above were processed and analyzed in ways intended to facilitate long-range planning and evaluate the feasibility of planned shipping activities. Analysis was based on assessment of the validity of appropriate Transportation Baseline Attributes. These attributes are listed below, followed by the data analysis and processing products.

**Transportation Baseline Attributes**

The following are baseline attributes that must be validated in order for DOE sites to execute off-site transportation activities for wastes and materials. The focus is on those streams that must be shipped in Type B or Type A-Fissile packaging.

- **Characterization** – It is assumed that waste streams are adequately characterized to satisfy transportation regulations and disposal site waste acceptance criteria, or can be so characterized in time to carry out the planned transportation activity.

  For already-characterized waste, it is further assumed that:

  - Transportation regulations and disposal site waste acceptance criteria will not change prior to completion of shipping and,
  - Characteristics of the waste will not change during the time between characterization and shipping in such a manner as to fall outside regulatory or criteria limits.

  For uncharacterized waste (including waste to be generated), it is further assumed that:

  - Adequate characterization is technically achievable in time to carry out the planned transportation activity and,
  - Adequate characterization can be carried out in a timely manner within the constraints of budget and safety requirements.

  For waste requiring treatment to meet characteristics requirements:

  - Treatment capability will be available and have sufficient capacity for the need for as long as necessary and,
Waste in current form can be transported, if necessary, to the treatment facility in time to carry out the planned transportation activity. If the treatment is to prepare the material for transport, the treatment facility must be on site. Off-site treatment to meet waste acceptance criteria is acceptable.

- **Quantity** – It is assumed that:
  - For existing wastes, the actual quantity (in terms of volume, weight, activity, etc.) does not greatly exceed that which has been measured or estimated.
  - For wastes to be generated, the actual quantity will not greatly exceed that which is predicted.

- **Package Availability** - It is assumed that sufficient numbers of appropriate Type B packagings will be available to meet the shipping schedule.
  
  For currently existing packagings, this further assumes that:
  - Other uses such as storage or other unanticipated shipping activities will not interfere with planned shipping use,
  - Packagings will be maintained in shippable condition,
  - Necessary certification renewals will be obtained in a timely manner and,
  - Regulatory changes will not prohibit use of the packaging.

  For new packaging designs, this further assumes that:
  - Timely certification will be obtained,
  - Fabrication of the required number of new packagings can be accomplished in time to carry out the planned transportation activity.

- **Disposal Site Availability** – It is assumed that disposal sites will:
  - Become or continue to be operational within the constraints of regulatory, stakeholder, and other requirements,
  - Provide waste acceptance criteria to sites in time to meet characterization needs,
  - Have sufficient capacity for the planned waste disposition,
  - Have the ability to accept waste at the planned time (assumes coordination with other sites and adequate interim storage capacity where necessary),
  - Continue or begin to accept waste having the characteristics of the planned stream and,
  - Be accessible using the planned transportation mode.

- **Mode and Carrier** – It is assumed that:
  - Appropriate transportation infrastructure exists, or can be provided in a timely manner, and will continue to exist as long as necessary for the planned transportation mode and,
  - Adequate carrier capacity will be available.

- **Regulations and Agreements** – It is assumed that:
  - Applicable regulations and agreements will not be changed in such a way as to preclude or significantly delay the shipping schedule,
  - Planned regulatory changes can be achieved and needed agreements can be negotiated in time to carry out the planned transportation activity.

- **Classification** – For classified wastes and materials, it is assumed that:
  - Required classified shipping capability will be available and/or,
Required declassification capacity will be available.

- **Budget** - It is assumed that sufficient funding will be allocated to carry out those activities upon which successful execution of the transportation activity depends.

**EM Transportation Baseline Summary**

The Transportation Baseline Summary section provides the reader with an indication of the volume of shipments, when they are being shipped, what the material is, and what packaging is planned for use. This, along with the detailed view provided by the Transportation Activity Maps, is the basis for determining if the transportation systems, packages, and schedules can accommodate the Transportation Forecast.

The Transportation Baseline Summary depicts MLLW, LLW, TRU, and SNF volumes involved in transportation events for all EM sites. NM data is not shown due to classification and HLW is not planned for shipment before 2010. Figure 1 depicts a summary of the annual SNF volumes of all EM shipments. In this figure, the quantity of material that does not have complete transportation data is shown in yellow. This is material that has a reported volume but has no associated package type, number of shipments, transportation mode, etc. This same information was displayed for each waste or material stream listed above. The volumes being shipped into and out of the major eleven sites were also compared.

![Figure 1. Quantity of SNF to be shipped by year through 2010](image-url)
Figure 2 shows the Type B packaging required for pre-disposal (i.e., treatment) for all EM sites. This same depiction was generated for disposal activities, illustrating the dual role transportation may play in the disposition of waste and material. Some waste/material streams must be transported to an off-site facility for treatment, returned to the site for packaging, and finally shipped to a permanent disposal facility.

![Graph](image)

**Figure 2.** Number of Type B packages to be used for pre-disposal activities.
Figure 3 provides an annual depiction of all EM shipments to be made by rail, truck, or intermodal.

![Figure 3. Number of shipments by mode for all major sites](image)

In reviewing this ten-year window of transportation activities, the peak numbers of shipments and packagings required occur within the first four years. This peak appears to be the result of plans to accelerate cleanup. After this time period, the numbers are reduced to nearly half of the previous years. It appears a cost analysis would be warranted to determine the impacts of level-loading the shipments over time. Cleanup and closure milestones as well as other commitments would need to be considered, but as it stands, a cursory view indicates it would be more cost effective to require a reduced inventory of packagings and transportation resources. Additionally, the out-years need to be considered to determine if a similar peak inventory would be required at a later time.

### Type B and Type A-Fissile Packaging Needs Assessment

Packaging and transportation data were extracted from the enhanced baseline transportation data and the Type B and Type A-Fissile Packaging Report to develop a table of packaging needs for each site to execute their transportation baseline.

Below in Table II, Type B/Type A-Fissile Packaging and Shipping Suite, is a summary of the packagings and shipments needed to carry out the EM Transportation Baseline. The summary is an annual depiction of the packagings needed by year, with the number of packagings required and number of shipments shown below the packaging (i.e., number of packagings/number of shipments). Question marks “?” after the packaging indicate the numbers were unknown at the time of the report. A to-be-determined (TBD) designation is used when the packaging or shipping date is unknown.
### Table II. Type B / Type A-Fissile Packaging and Shipping Suite

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12/1</td>
<td>55/?</td>
<td>NAC-LWT ??/?</td>
<td>LWT 2/11</td>
<td>HFEF-6 1/6</td>
<td>HFEF-6 1/6</td>
<td>HFEF-6 1/6</td>
<td>HFEF-6 1/5</td>
<td>Peach Bottom 1/3</td>
<td>HFEF-6 1/1</td>
<td>6M ??/?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE-2000 Cask 13/13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002-2004</td>
<td>12/1</td>
<td>T-2 or NAC-LWT 1/1</td>
<td>NAC-LWT ??/?</td>
<td>LWT 1/18</td>
<td>LWT 1/18</td>
<td>LWT 2/19</td>
<td>LWT 2/24</td>
<td>6M 110 gal 35/1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>105/105</td>
<td>PKG/TBD 167/167</td>
<td>NAC-LWT ??/?</td>
<td>NAC-LWT ??/?</td>
<td>Peach Bottom 1/2</td>
<td>Peach Bottom 1/2</td>
<td>Peach Bottom 1/2</td>
<td>Peach Bottom 1/2</td>
<td>Peach Bottom 1/3</td>
<td>DC-1 ??/?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>105/105</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005-2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year TBD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Transportation Activity Maps

The enhanced data, previously addressed, was organized into Transportation Activity Maps. For the purposes of this report, a transportation activity is defined as a movement or set of movements from origin to destination, of a specific waste/material stream, in a specific year, in a specific packaging type. Transportation Activity Maps may be used to analyze transportation activities in detail to ensure that sufficient information has been gathered to determine if the activity can be executed. The Annotated Transportation Activity Map in Figure 4 explains the features of the Transportation Activity Maps. Transportation Activity Maps were developed for the sites using the baseline data changes.

Figure 4. Annotated Transportation Activity Map
Type B Package Certification Schedule

The Type B Package Certification Schedule was developed to assist in the coordination of packages being certified. By being cognizant of what revisions are needed, EM can better work with the certifying agencies’ schedules and coordinate the submittals to allow time for the reviews and certification to be obtained to meet key clean-up and closure milestones.

A table was developed for each site from transportation information extracted from the enhanced baseline data and the Type B and Type A-Fissile Packaging Report. From this information, an early and late need date was extrapolated for meeting the Enhanced Baseline.

Analysis of the individual certification schedules indicated that careful consideration of key milestones must be taken into account. The success of meeting some EM cleanup and closure milestones is dependent upon having packages certified and ready for transportation. Additionally, in-commerce shipments are generally supported with a wide range of available package designs and transportation service providers. An NRC, or a combination of an NRC and a DOE certificate already supports most of the packages for DOE shipments. This situation will result in the least impact to the NRC if/when the EM certification efforts are transitioned to them.

Transportation Data Reported From Shipper and Receiver

A comparison of the enhanced IPABS transportation data as reported by the shipper and receiver was assembled in a table to find discrepancies in the data. The table was grouped by waste and material stream; showing the quantity, number of shipments, and the number of packages needed for the shipper and receiver. In some cases, only one of the entities reported transportation data; therefore, no comparison was made.

Analysis of this comparison indicated there are few instances where the shipper and receiver transportation data is the same. The data differences are in the areas of quantities and number of shipments and packages. These differences may be attributed to a lack of reconciliation of detail planning between the shipper and receiver for out-year shipments. However, there were several that had similar data, but the conclusion is the majority diverge enough to recommend the shipper and receiver initiate a dialogue to resolve the discrepancies in their transportation data.

SUMMARY AND CONCLUSIONS

The data set presented and analyzed in the Forecast is a compilation of the data from the following sources: 1) The 2001 Integrated Planning, Accountability, and Budgeting System (IPBAS) database, 2) The National TRU Program databases, and 3) The Type B and Type A-Fissile Packaging Report. The Forecast encompasses offsite transportation activities planned for the next ten years as a part of the EM mission. Data for transportation activities beyond the ten years was not analyzed in the Forecast Report; however, it was the intent for each subsequent version of the Report to analyze a ten-year rolling window.

The waste and material streams analyzed are: low-level radioactive waste (LLW), mixed low-level radioactive waste (MLLW), Transuranic waste (TRU), nuclear material (NM), high-level waste (HLW) and spent nuclear fuel (SNF). The analyses produced the following products:

1) Transportation Baseline – The schedule and quantities of all planned EM shipments through 2010;
2) Type B and Type A-Fissile Packaging Baseline – Consists of a certification schedule and identifies the packaging required to meet the transportation baseline through 2010;
3) Enhanced Data – An improvement to the transportation data from IPABS. The existing data was modified to reflect the site baseline shipping plans and missing data was provided to fill many of the gaps up through 2010; and
4) Barriers Analysis – The documentation of the barriers to execution of the transportation baseline.

These various products resulting from the analyses were included in the EM Transportation Forecast.
The key aspect of the data analyses was carried out with the objective of determining if transportation activities can be executed as planned and the nature and magnitude of any barriers to planned execution. The major packaging issues are having: (1) a package certified for the planned shipments, (2) the packaging inventory available to support the schedules, and (3) the material sufficiently characterized to enable package selection. At the time of the analyses, indications were that planned transportation activities for DOE shipments in Type B packaging could be executed if funding and packagings were made available, and if the barriers identified were resolved as planned. The exception to this is the packaging for the Non-Actinide Isotopes and Sealed Sources. Packaging has not been identified for all of this material; however, several programs are working jointly to resolve this issue.

During the data gathering process, it became apparent that comprehensive transportation and packaging information does not reside with any single organization at the sites. In order to build an accurate and comprehensive dataset, it is necessary to confer with personnel from various site organizations who both have access to, and a thorough knowledge of their specific data subsets. Future data collection could be streamlined through centralizing the management of transportation data at the individual sites. By working with the sites, significant data improvements were made by updating existing data and filling in missing data. However, it should be noted that although contact has been made with the major eleven sites to update transportation plans and data, the quality of data and understanding to perform the necessary analyses does not compare with conducting site visits to accurately capture the data and issues.

As analyses of complex-wide shipping activities continue, the interrelationships between the sites utilization of common transportation resources (e.g., packaging, carriers) need to be better evaluated. The data, at the time of the study, was not sufficient to make an accurate determination of potential conflicts in resource utilization. Additionally, the INEEL recommends further analyses be performed to include other DOE programs, beyond EM, that may be planning to utilize the same transportation resources. It is also recommended that cost analyses be performed to explore opportunities for cost sharing and savings.

Current packaging and transportation policies and procedures should be reviewed for improved methods to remove materials from sites (including intermodal transportation), resulting in decreased costs, risk reduction, and increased success in meeting planned cleanup and closure milestones. Furthermore, analyses indicated a better approach to packaging procurement and certification should be developed, including both EM internal actions and improved coordination with other involved parties. Since the identification of the need for an improved approach to packaging procurement and certification, DOE has initiated work towards this end.

**Footnotes**

---

a A transportation activity is defined as a movement or set of movements from origin to destination, of a specific waste/material stream, in a specific year, in a specific packaging type.

b A transportation campaign is discreet set of the four data elements represented in Figure 1. They are: 1) packaging name, 2) number of packagings needed, 3) number of shipments, and 4) mode of transportation. If any one of these elements changes for a particular stream, it is considered a new transportation campaign.