

DOE/NTP-96-1204  
Revision 2

# National TRU Waste Management Plan



U.S. Department of Energy  
Carlsbad Field Office

001232.5



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Specific changes from Revision 1 of the National TRU Waste Management Plan have not been highlighted or otherwise marked in this Revision 2 because the entire document has been rewritten.




December 2000



\_\_\_\_\_  
Manager, Carlsbad Field Office

Date: 1-4-01



\_\_\_\_\_  
Deputy Assistant Secretary for Integration  
and Disposition

Date: 12-22-00

Prepared by the  
U.S. Department of Energy, Carlsbad Field Office  
Carlsbad, New Mexico



# Executive Summary



## EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is committed to honoring the federal government's obligation to clean up "legacy" waste at sites across the nation that supported the production and testing of nuclear weapons. The objective of DOE Order 435.1, "Radioactive Waste Management," is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment. The Assistant Secretary for Environmental Management (EM-1) is responsible for establishing and maintaining integrated complexwide radioactive waste management programs. The Deputy Assistant Secretary for Integration and Disposition (EM-20) is responsible for developing, implementing, and maintaining integrated complexwide radioactive waste management program plans. Each plan shall, at the DOE complexwide level, describe the functional elements, organizations, responsibilities, and activities that comprise the system needed to store, treat, and dispose of waste. In addition, the Deputy Assistant Secretary is responsible for establishing and maintaining a system to compile waste generation projection data and other information concerning waste management facilities, operations, and activities. The issuance of the National Transuranic (TRU) Waste Management Plan, Revision 2, fulfills the obligation of the Deputy Assistant Secretary to develop a systemwide program plan for TRU waste.

The DOE created the Carlsbad Field Office (CBFO) National TRU Program Office to serve as the focal point and lead the nation's TRU waste management efforts. One of the CBFO's major milestones achieved toward the goal of national cleanup was the Waste Isolation Pilot Plant (WIPP) becoming operational in March of 1999.

The National TRU Waste Management Plan (the Plan) addresses the management and disposal of TRU waste for the DOE TRU waste system. The Plan was revised to acknowledge completion of major milestones by the DOE since the last revision in 1997 and to reflect new operating philosophies and direction currently being initiated.

The Plan contains a vision, mission, and detailed goals and objectives for the TRU waste system that support the commitment to clean up post-cold-war DOE sites for closure and return them to the public sector for private use, where appropriate.

The Plan is different from previous versions in both form and management. The Plan reflects information contained in the DOE's Integrated Planning, Accountability, and



# EEG

*Numerous organizations are involved in the WIPP program, including the U.S. Environmental Protection Agency (EPA), which is responsible for certifying whether radioactive disposal requirements are met; the state of New Mexico, which regulates the handling of the hazardous components of mixed waste (waste that contains both radioactive and hazardous materials); and the Environmental Evaluation Group, an independent technical oversight group.*



Budgeting System (IPABS) approved fiscal year (FY) 2000 life-cycle planning data as of July 26, 2000. This information is supplemented with input from the DOE TRU program and TRU waste managers. The IPABS is a DOE planning and budget tool used by sites to input their waste type and volumes, specify technology and infrastructure needs, forecast shipping schedules, and identify funding requirements. The Plan also contains a section highlighting technical and programmatic issues and concerns voiced by the National Academy of Sciences/National Research Council, representatives of the Western Governors' Association, governor-appointed representatives in southern states, national laboratories, contractors, and the DOE. The section provides discussion relevant to the issues, as well as current DOE plans for issue resolution.

The Plan presents baseline information, or a snapshot of the TRU waste system as it currently exists. The baseline reflects waste shipping schedules, each site's current waste inventory knowledge, and budgetary information. It also provides accountability through use of performance indicators for waste characterization, transportation, and disposal operations.

The Plan is a dynamic document that integrates TRU waste sites' characterization, transportation, and disposal needs and accommodates changes to the TRU waste system as priorities shift. It is published as a bound document with separate supplements planned to be issued quarterly to update the status of the system against current schedules and to highlight major items of concern that may have an impact on the overall TRU waste system. The quarterly supplement will also roll variances from site schedules into overall system performance indicators that will be analyzed for impact to the overall TRU waste system schedules. Ultimately, the performance indicators may be used to adjust budget allocation to meet TRU waste system goals and priorities.

The Plan will be revised annually showing new schedules provided by the sites' TRU program and TRU waste managers with updated performance indicators based on the schedules. Variances from the previous year's schedules having an impact on out-year system capabilities will be addressed. Finally, an update to the baseline will be performed when a major initiative is implemented that has an effect on system performance (e.g., a change to characterization methodologies that decreases required activity levels and allows increased shipping/disposal rates).

Waste in the DOE TRU waste system follows a basic process for disposal. Figure ES-1 is a simplified flowchart of the TRU waste management process. To begin, stored and projected waste volumes are reported by the TRU waste generator sites. Disposition is based on whether the waste has a clear path for disposal, has a plan for disposal, or is without a current plan for disposal.



Waste with a clear path for disposal is waste that can readily be certified for disposal under the current regulatory framework and that has the associated infrastructure in place for its disposition.

Waste with a plan for disposal is waste with an associated need that must be fulfilled prior to the generator site being able to certify the waste for disposal. These needs are primarily in terms of infrastructure (e.g., planned waste repackaging or treatment facilities), technology needs (e.g., development of a hydrogen gettering device to remove excess hydrogen from waste packages), and regulatory issues (e.g., WIPP requires a change to allow disposal of PCB contaminated waste). The DOE has plans in place for the funding and construction of the required infrastructure as well as for the development and implementation of the required technologies and regulatory change. The plans are represented in the site-specific portions of Appendix 1.

Waste without a current plan for disposal is TRU waste that is either prohibited from disposal at WIPP or will be generated after the end of WIPP's planned operational life. Although a small amount, the waste of primary concern is that prohibited from disposal at WIPP by current legislation, such as waste contaminated with reactive or corrosive substances, and TRU waste generated from nondefense activities. The remainder of the waste is waste projected to be generated after the end of WIPP's planned operational life. WIPP's planned operational life is based on its being used as a disposal facility for 35 years. At some point close to the end of the assumed operational lifetime, the facility will be evaluated to determine if it is technically and economically feasible to continue operations. The cost of continued operations will be compared with the cost of building an alternative facility or other means of waste disposal. The over-arching concern will be to ensure the waste has a disposal path.

Issues associated with waste in the "with a plan for disposal" and in the "without a current plan for disposal" categories will be resolved using one of the following solutions:

- Administrative change/operational efficiency;
- Regulatory change;
- Technology implementation; and
- Research, development, and deployment.

Issues are identified as barriers to disposal within the IPABS.

As solutions to the needs are identified, funded, and implemented, the appropriate waste volume is moved into the "clear path for disposal" category. Changes will be reflected in the next annual revision of the Plan.

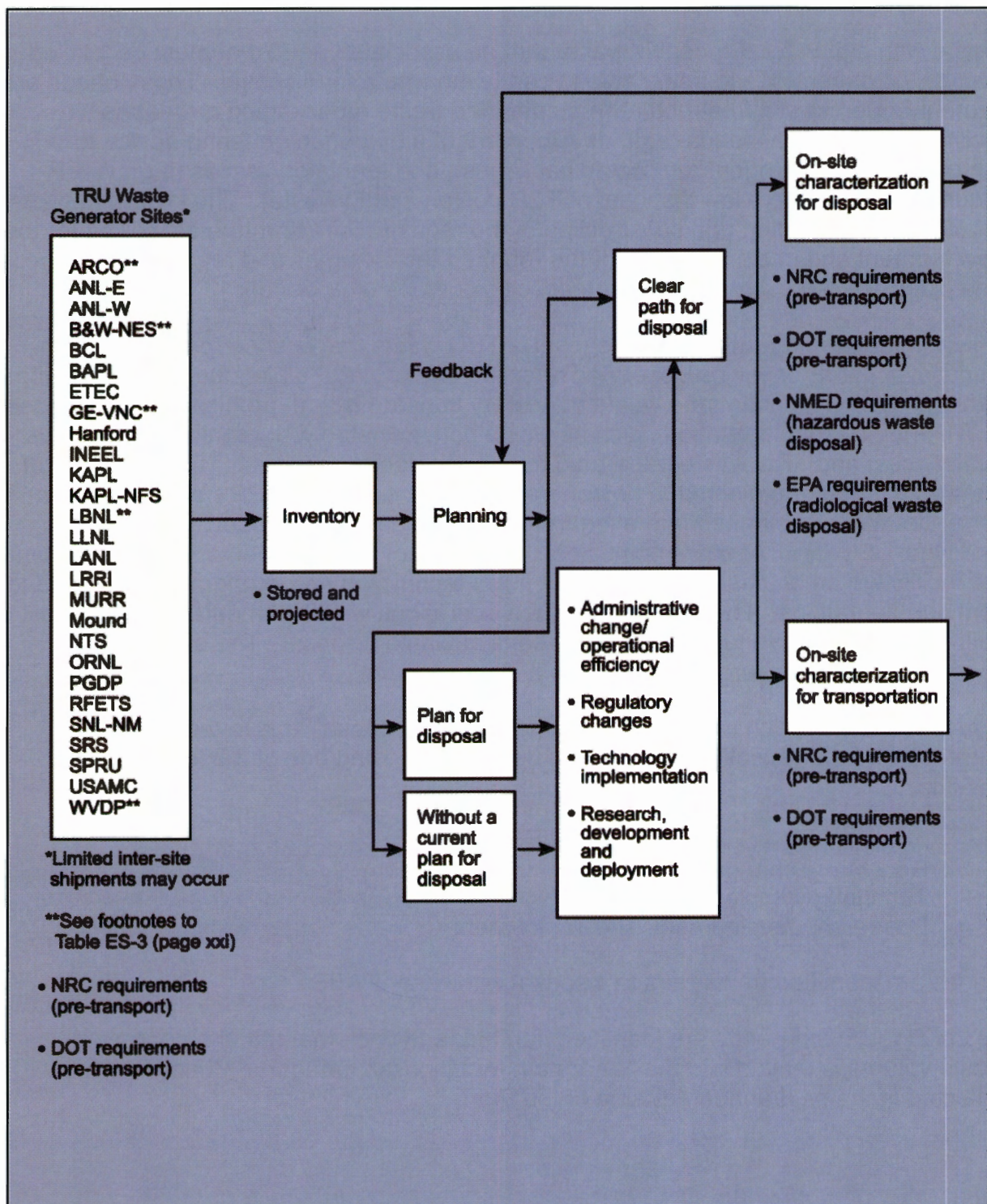


Figure ES-1 - The TRU Waste Management Process



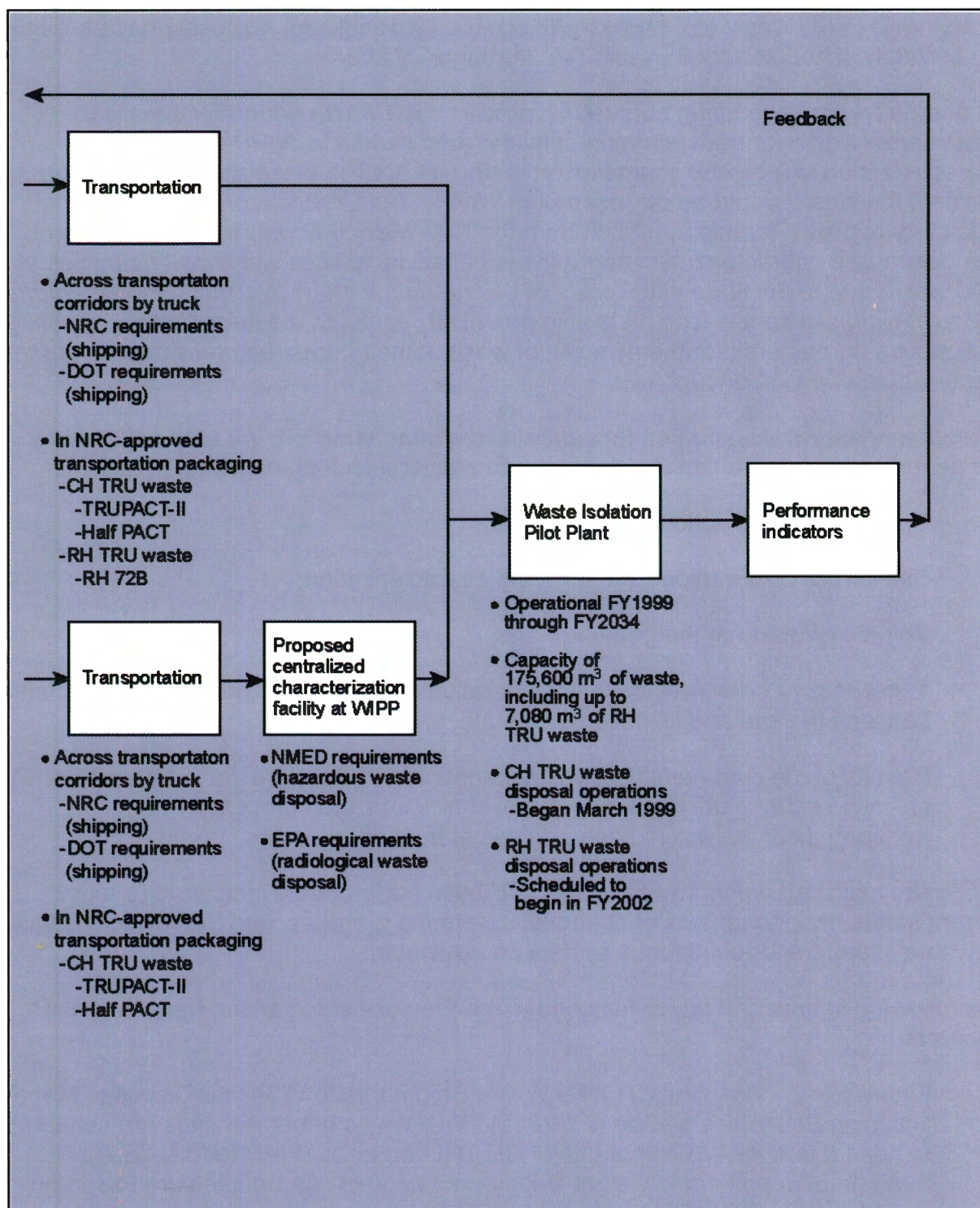


Figure ES-1 - The TRU Waste Management Process (Continued)



The current baseline for TRU waste of defense origin is to characterize for both transportation and disposal at the waste generator facility and ship to WIPP for disposal. The WIPP facility began receiving CH TRU waste in March 1999; plans are to begin receiving RH TRU waste in FY 2002. As previously discussed, disposal phase activities are currently scheduled for 35 years (i.e., through FY 2034).

An alternative strategy being pursued for smaller TRU waste generator sites is to characterize waste for transportation only and then send it to WIPP for disposal characterization in a central characterization facility (CCF). Once characterized and certified, the waste would be disposed of in WIPP. The DOE is currently requesting regulatory approval for this approach from the New Mexico Environment Department. The centralized characterization approach is beneficial to sites with small quantities of TRU waste due to the large initial costs of setting up the characterization infrastructure and achieving site certification. It is also potentially useful to aid larger sites in meeting their state's agreements for the disposal of waste if their infrastructure is insufficient to certify waste at a high enough rate.

If regulatory approval is granted for centralized characterization, the path selected by the generator sites will ultimately depend upon several factors including:

1. Desired shipping schedule;
2. Site infrastructure to perform disposal characterization;
3. Volume of waste at the generator site;
4. Timeliness of each method in consideration of compliance orders or agreements between the site and its associated state; and
5. Results of the cost-benefit analyses conducted to compare costs associated with selecting either certifying the disposal characterization process or the transportation characterization process at the site.

Finally, as indicated in Figure ES-1, the DOE uses performance indicators to report current status, monitor effects of changes, determine progress, and to provide feedback to system planners for continuous system improvement.

The following figures and tables included in the Plan are summarized here for quick reference.

- Figure ES-2 – Baseline CH TRU Waste Shipments to WIPP for Disposal, Monthly Shipping Schedules by Site (FY 2001): Five waste generator sites are scheduled to send a total of 403 shipments of CH TRU waste to WIPP for disposal, an average of approximately eight shipments per week. Schedules are based on input from site DOE TRU program and TRU waste managers to ensure that the CBFO uses the latest information to plan activities to support demand.



- Figure ES-3 – Baseline CH TRU Waste Shipments to WIPP for Disposal, Monthly Shipping Schedules by Site (FY 2002): Seven waste generator sites are scheduled to send a total of 864 shipments to WIPP for disposal, an average of approximately 17 shipments per week. Schedules are based on input from site DOE TRU program and TRU waste managers.
- Figure ES-4 – Baseline CH TRU Waste Shipments to WIPP for Disposal, Annual Shipping Schedules (FY 2003 Through FY 2034): IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000, are used as the basis for projected shipping schedules. Shipments in FY 2003 (774) are less than in FY 2002 (864). Shipments peak in FY 2005 at 1,293. During the next five-year period, shipments vary within the 811 to 935 range. The database lists shipments beyond FY 2010 in five-year increments; for planning purposes, it is assumed that the number of shipments will be uniform during each year. An annual average of 824 shipments will be made to WIPP during FY 2011 through FY 2015; an annual average of 411 during FY 2016 through 2020; an annual average of 246 during FY 2021 through FY 2025; an annual average of 220 during FY 2026 through 2030; and an annual average of 80 during FY 2031 through FY 2034. Disposal operations at WIPP are planned to occur over the 35-year period that began in 1999. The WIPP disposal phase is projected to end in FY 2034.
- Table ES-1 – Baseline CH TRU Waste Shipments to WIPP for Disposal, Annual Shipping Schedules by Site (FY 2001 Through FY 2034): A total of 17,577 shipments to WIPP are projected during FY 2001 through FY 2034. Idaho National Engineering and Environmental Laboratory (INEEL) is scheduled to make 55 percent of the shipments; Rocky Flats Environmental Technology Site (RFETS), 12 percent; Savannah River Site (SRS), 11 percent; Hanford, 10 percent; and Los Alamos National Laboratory (LANL), 10 percent. Other sites listed in the table will ship the remaining 2 percent of the total.

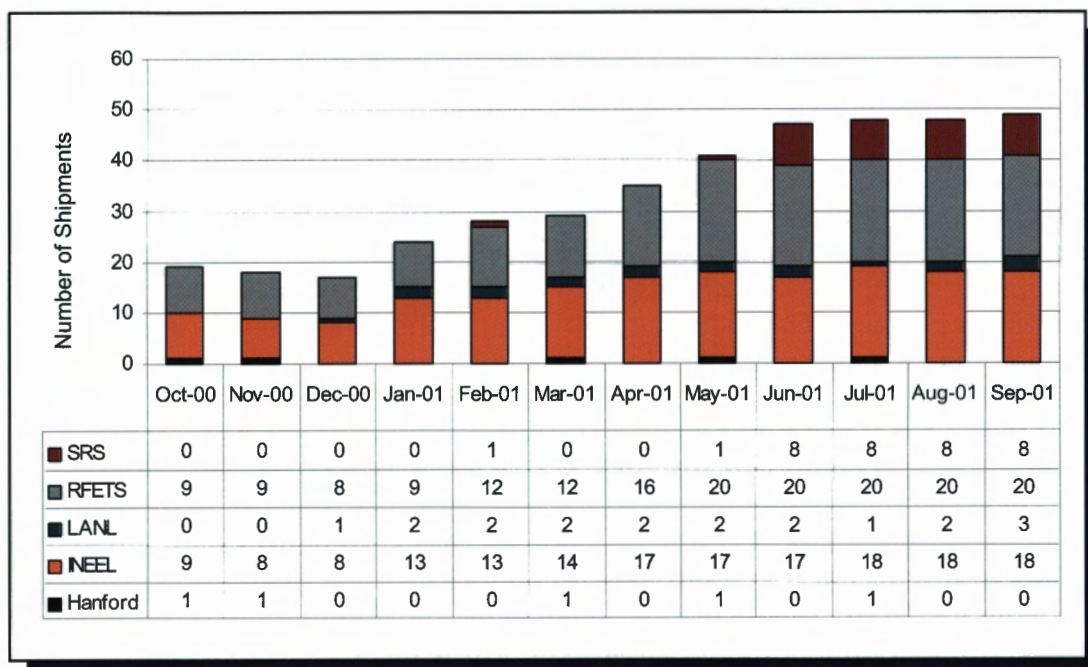


Figure ES-2 - Baseline CH TRU Waste Shipments to WIPP for Disposal Monthly Shipping Schedules by Site (FY 2001)

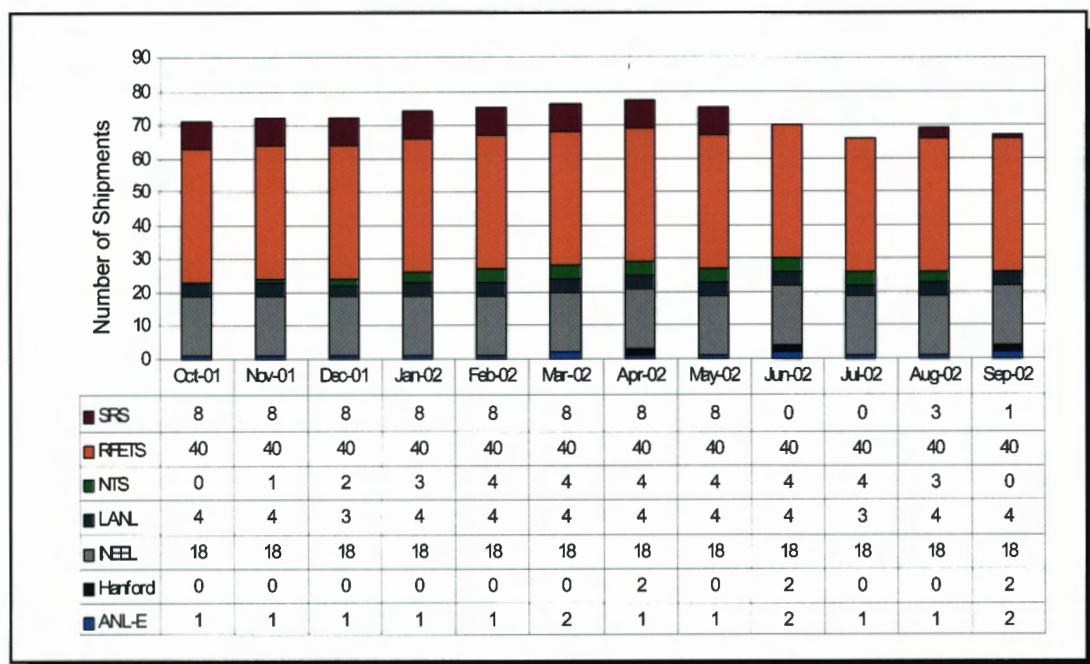


Figure ES-3 - Baseline CH TRU Waste Shipments to WIPP for Disposal Monthly Shipping Schedules by Site (FY 2002)



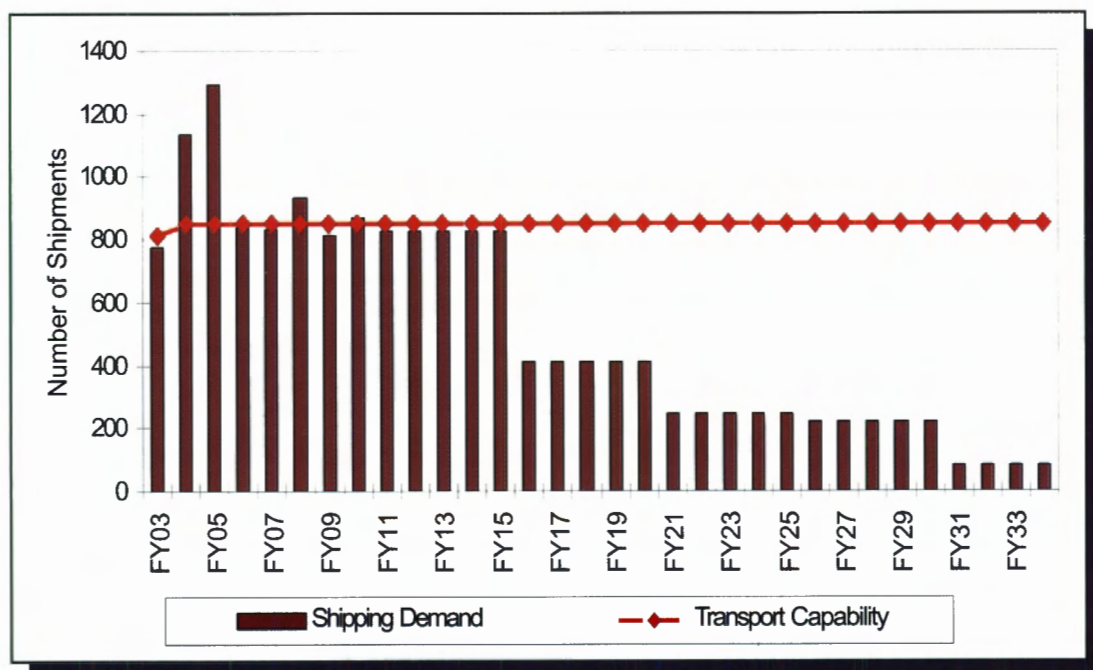


Figure ES-4 - Baseline CH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules (FY 2003 Through FY 2034)

Table ES-1 - Baseline CH TRU Shipments to WIPP for Disposal  
Annual Shipping Schedules by Site (FY 2001 Through FY 2034)<sup>(1)</sup>

| FISCAL YEAR | SHIPPING SITES (Number of Shipments) |         |       |       |      |       |     |      |       |       | TOTAL  |
|-------------|--------------------------------------|---------|-------|-------|------|-------|-----|------|-------|-------|--------|
|             | ANL-E                                | Hanford | INEEL | LANL  | LLNL | Mound | NTS | ORNL | RFETS | SRS   |        |
| 2001        | 0                                    | 5       | 170   | 19    | 0    | 0     | 0   | 0    | 175   | 34    | 403    |
| 2002        | 15                                   | 6       | 216   | 46    | 0    | 0     | 33  | 0    | 480   | 68    | 864    |
| 2003        | 0                                    | 22      | 199   | 61    | 0    | 0     | 0   | 0    | 480   | 12    | 774    |
| 2004        | 0                                    | 48      | 408   | 91    | 13   | 30    | 0   | 56   | 480   | 12    | 1,138  |
| 2005        | 0                                    | 61      | 508   | 122   | 7    | 0     | 71  | 32   | 480   | 12    | 1,293  |
| 2006        | 0                                    | 63      | 501   | 161   | 7    | 0     | 0   | 3    | 90    | 12    | 837    |
| 2007        | 0                                    | 58      | 570   | 177   | 10   | 0     | 0   | 3    | 0     | 12    | 830    |
| 2008        | 0                                    | 59      | 685   | 168   | 8    | 0     | 0   | 3    | 0     | 12    | 935    |
| 2009        | 0                                    | 60      | 565   | 162   | 3    | 0     | 8   | 1    | 0     | 12    | 811    |
| 2010        | 3                                    | 60      | 623   | 166   | 3    | 0     | 0   | 1    | 0     | 12    | 868    |
| 2011-15     | 0                                    | 454     | 3,427 | 114   | 11   | 0     | 0   | 5    | 0     | 108   | 4,119  |
| 2016-20     | 4                                    | 411     | 1,211 | 114   | 11   | 0     | 0   | 5    | 0     | 300   | 2,056  |
| 2021-25     | 0                                    | 304     | 317   | 114   | 11   | 0     | 0   | 5    | 0     | 480   | 1,231  |
| 2026-30     | 4                                    | 144     | 221   | 114   | 11   | 0     | 0   | 5    | 0     | 600   | 1,099  |
| 2031-34     | 0                                    | 46      | 0     | 114   | 11   | 0     | 0   | 5    | 0     | 143   | 319    |
| Total       | 26                                   | 1,801   | 9,621 | 1,743 | 106  | 30    | 112 | 124  | 2,185 | 1,829 | 17,577 |

<sup>(1)</sup> This table includes only TRU waste generator sites with defined shipping schedules. When shipping schedules are determined for sites with small quantities of waste, the information will be added to the table.

- Figure ES-5 – Baseline RH TRU Waste Shipments to WIPP for Disposal, Quarterly Shipping Schedules by Site (FY 2002): RH TRU waste shipments to WIPP are scheduled to begin in January 2002. Generator site shipping schedules are based on input from the site DOE TRU program and TRU waste managers. A total of 46 shipments will be received from Battelle Columbus Laboratories (BCL) and Energy Technology Engineering Center (ETEC) during the first year of RH TRU waste receipt.
- Figure ES-6 – Baseline RH TRU Waste Shipments to WIPP for Disposal, Annual Shipping Schedules (FY 2003 Through FY 2034): IPABS data continue to be used as the basis for projected shipping schedules. Shipments more than double from FY 2002 (46) to FY 2003 (99). In FY 2004, shipments increase further to 126 before dropping to 33 in FY 2005 and FY 2006. During the next four-year period, shipments vary within the 46 to 70 range. The database lists shipments beyond 2010 in five-year increments; for planning purposes, it is assumed that the number of shipments will be uniform during each year. An annual average of 70 shipments will be made to WIPP during FY 2011 through FY 2015; an annual average of 62 during FY 2016 through FY 2020; an annual average of 56 during FY 2021 through FY 2025; an annual average of 62 in FY 2026 through FY 2030; and an annual average of 22 during FY 2031 through FY 2034.
- Table ES-2 – Baseline RH TRU Waste Shipments to WIPP for Disposal, Annual Shipping Schedules by Site (FY 2002 Through FY 2034): A total of 1,914 shipments to WIPP are projected during FY 2002 through FY 2034. Hanford is scheduled to make 48 percent of the shipments; ORNL, 25 percent; INEEL, 13 percent; LANL, 6 percent; ANL-E, 6 percent; and BCL and ETEC, 2 percent.



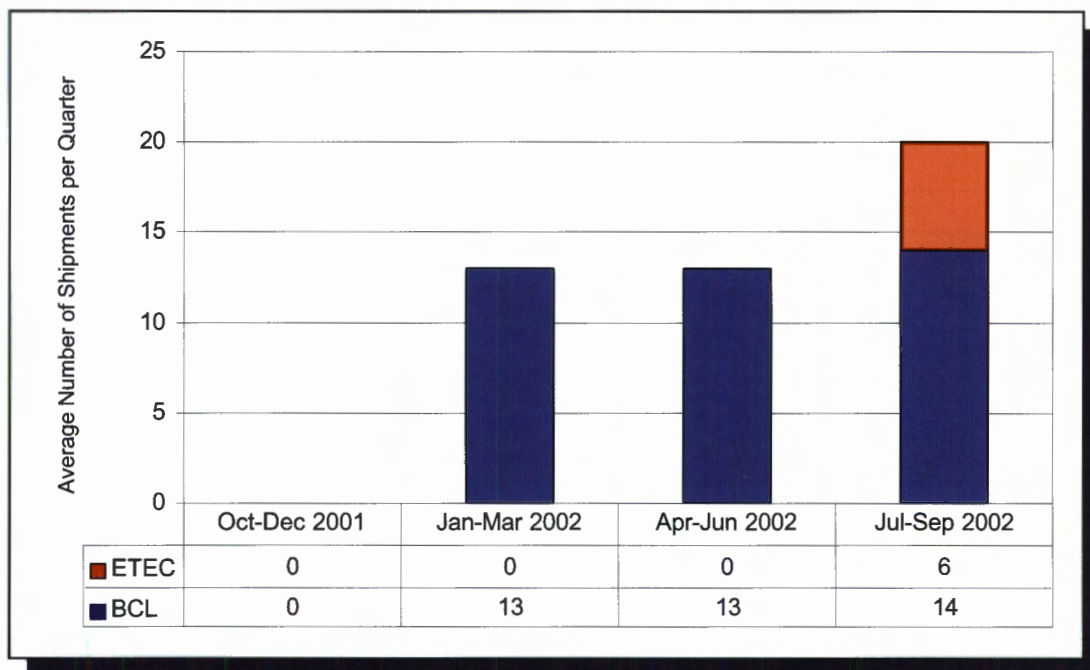


Figure ES-5 - Baseline RH TRU Waste Shipments to WIPP for Disposal  
Quarterly Shipping Schedules by Site (FY 2002)

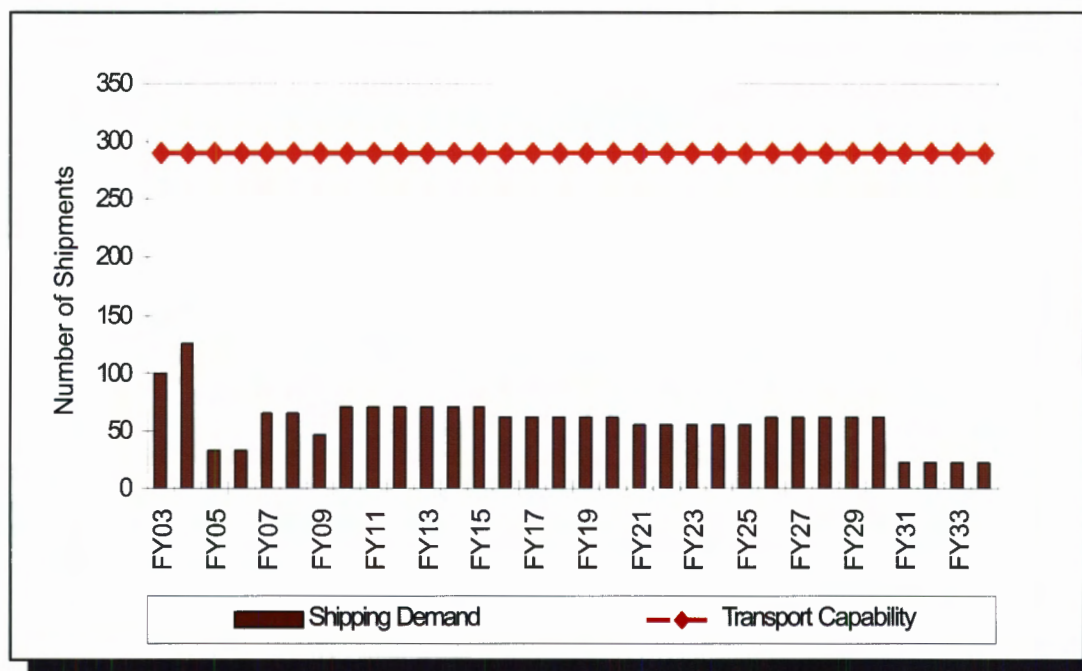


Figure ES-6 - Baseline RH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules (FY 2003 Through FY 2034)

**Table ES-2 - Baseline RH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules by Site (FY 2002 Through FY 2034)<sup>(1)</sup>**

| FISCAL<br>YEAR | SHIPPING SITES (Number of Shipments) |     |      |         |       |      |      | TOTAL |
|----------------|--------------------------------------|-----|------|---------|-------|------|------|-------|
|                | ANL-E                                | BCL | ETEC | Hanford | INEEL | LANL | ORNL |       |
| 2002           | 0                                    | 40  | 6    | 0       | 0     | 0    | 0    | 46    |
| 2003           | 28                                   | 0   | 0    | 0       | 0     | 0    | 71   | 99    |
| 2004           | 0                                    | 0   | 0    | 0       | 0     | 0    | 126  | 126   |
| 2005           | 0                                    | 0   | 0    | 0       | 0     | 0    | 33   | 33    |
| 2006           | 0                                    | 0   | 0    | 0       | 0     | 0    | 33   | 33    |
| 2007           | 0                                    | 0   | 0    | 0       | 33    | 0    | 33   | 66    |
| 2008           | 0                                    | 0   | 0    | 0       | 41    | 0    | 24   | 65    |
| 2009           | 0                                    | 0   | 0    | 0       | 41    | 0    | 5    | 46    |
| 2010           | 21                                   | 0   | 0    | 0       | 41    | 0    | 8    | 70    |
| 2011-15        | 0                                    | 0   | 0    | 110     | 99    | 111  | 28   | 348   |
| 2016-20        | 30                                   | 0   | 0    | 250     | 0     | 0    | 28   | 308   |
| 2021-25        | 0                                    | 0   | 0    | 250     | 0     | 0    | 28   | 278   |
| 2026-30        | 30                                   | 0   | 0    | 250     | 0     | 0    | 28   | 308   |
| 2031-34        | 0                                    | 0   | 0    | 60      | 0     | 0    | 28   | 88    |
| TOTAL          | 109                                  | 40  | 6    | 920     | 255   | 111  | 473  | 1,914 |

<sup>(1)</sup> This table includes only TRU waste generator sites with defined shipping schedules. When shipping schedules are determined for sites with small quantities of waste, the information will be added to the table.

- Table ES-3 – Stored, Projected, and Disposal Volumes of CH TRU Waste by Site: The total volume of CH TRU waste managed by the DOE (stored and projected) is estimated to be 167,411.7 m<sup>3</sup>. A portion of this waste will be treated or repackaged prior to disposal. The volume to be disposed of at WIPP (Disposed [Actual] plus to be Disposed) is 107,562.1 m<sup>3</sup>. Assuming 168,520 m<sup>3</sup> of the WIPP capacity is used for CH TRU waste disposal, this volume fills approximately 64 percent of the WIPP CH TRU waste capacity.
- Table ES-4 – Stored, Projected, and Disposal Volumes of RH TRU Waste by Site: The total volume of RH TRU waste managed by the DOE (stored and projected) is estimated to be 4,027.3 m<sup>3</sup>. A portion of this waste will be treated or repackaged prior to disposal. The volume to be disposed of at WIPP is 1,816.2 m<sup>3</sup>. Assuming 7,080 m<sup>3</sup> of the WIPP capacity is used for RH TRU waste disposal, this volume fills approximately 26 percent of the WIPP RH TRU waste capacity.



Table ES-3 - Stored, Projected, and Disposal Volumes of CH TRU Waste by Site

| SITE NAME   | ABBREVIATION | LOCATION         | CH TRU Waste Volume (m <sup>3</sup> ) |                  |           |                             |                          |
|---|--------------|------------------|---------------------------------------|------------------|-----------|-----------------------------|--------------------------|
|   |              |                  | Stored<br>(1)                         | Projected<br>(2) | Total     | Disposed<br>(Actual)<br>(3) | To Be<br>Disposed<br>(4) |
| ARCO Medical Products Co. (5)                           | ARCO         | West Chester, PA | 0.1                                   | 0.0              | 0.1       | 0.0                         | 0.0                      |
| Argonne National Laboratory - East                      | ANL-E        | Argonne, IL      | 95.0                                  | 151.0            | 246.0     | 0.0                         | 150.6                    |
| Argonne National Laboratory - West                      | ANL-W        | Idaho Falls, ID  | 0.0                                   | 0.0              | 0.0       | 0.0                         | 0.0                      |
| Babcock & Wilcox - NES (6)                              | B&W-NES      | Lynchburg, VA    | 18.1                                  | 0.0              | 18.1      | 0.0                         | 18.1                     |
| Battelle Columbus Laboratories                          | BCL          | Columbus, OH     | 0.0                                   | 4.2              | 4.2       | 0.0                         | 4.2                      |
| Bettis Atomic Power Laboratory                          | BAPL         | West Mifflin, PA | 17.6                                  | 0.0              | 17.6      | 0.0                         | 17.6                     |
| Energy Technology Engineering Center                    | ETEC         | Santa Susana, CA | 2.3                                   | 0.0              | 2.3       | 0.0                         | 2.3                      |
| General Electric-Vallecitos Nuclear Center (6)          | GE-VNC       | Pleasanton, CA   | 9.0                                   | 0.0              | 9.0       | 0.0                         | 9.0                      |
| Hanford Reservation                                     | Hanford      | Richland, WA     | 16,100.0                              | 15,900.0         | 32,000.0  | 36.0                        | 13,600.0                 |
| Idaho National Engineering and Environmental Laboratory | INEEL        | Idaho Falls, ID  | 64,878.0                              | 12,590.3 (7)     | 77,468.3  | 205.0                       | 44,461.3                 |
| Knolls Atomic Power Laboratory                          | KAPL         | Niskayuna, NY    | 0.0                                   | 0.0              | 0.0       | 0.0                         | 0.0                      |
| Knolls Atomic Power Lab-Nuclear Fuel Services           | KAPL-NFS     | Erwin, TN        | 5.0                                   | 208.0            | 213.0     | 0.0                         | 213.0                    |
| Lawrence Berkeley National Laboratory (5)               | LBNL         | Berkeley, CA     | 1.1                                   | 0.0              | 1.1       | 0.0                         | 0.0                      |
| Lawrence Livermore National Laboratory                  | LLNL         | Livermore, CA    | 295.0                                 | 1,220.0          | 1,515.0   | 0.0                         | 971.0                    |
| Los Alamos National Laboratory                          | LANL         | Los Alamos, NM   | 9,212.6                               | 13,643.9         | 22,856.5  | 190.0                       | 14,888.9                 |
| Lovelace Respiratory Research Institute (8)             | LRRI         | Albuquerque, NM  | 5.7                                   | 14.2             | 19.9      | 0.0                         | 0.0                      |
| Missouri University Research Reactor                    | MURR         | Columbia, MO     | 1.4                                   | 0.0              | 1.4       | 0.0                         | 1.4                      |
| Mound Plant   | Mound        | Miamisburg, OH   | 247.0                                 | 0.0              | 247.0     | 0.0                         | 247.0                    |
| Nevada Test Site  | NTS          | Mercury, NV      | 665.0                                 | 0.0              | 665.0     | 0.0                         | 720.0                    |
| Oak Ridge National Laboratory                           | ORNL         | Oak Ridge, TN    | 963.0                                 | 519.6            | 1,482.6   | 0.0                         | 542.2                    |
| Paducah Gaseous Diffusion Plant (9)                     | PGDP         | Paducah, KY      | 11.7                                  | 0.0              | 11.7      | 0.0                         | 0.0                      |
| Rocky Flats Environmental Technology Site               | RFETS        | Golden, CO       | 5,307.0                               | 10,557.0         | 15,864.0  | 508.0                       | 14,749.0                 |
| Sandia National Laboratories-New Mexico (8)             | SNL-NM       | Albuquerque, NM  | 24.6                                  | 63.9             | 88.5      | 0.0                         | 0.0                      |
| Savannah River Site                                     | SRS          | Aiken, SC        | 10,991.0                              | 3,244.0          | 14,235.0  | 0.0                         | 15,975.0                 |
| Separations Process Research Unit                       | SPRU         | Schenectady, NY  | 0.0                                   | 470.0            | 470.0     | 0.0                         | 50.0                     |
| U.S. Army Material Command                              | USAMC        | Rock Island, IL  | 2.5                                   | 0.0              | 2.5       | 0.0                         | 2.5                      |
| West Valley Demonstration Project (5)                   | WVDP         | West Valley, NY  | 73.0                                  | 20.0             | 93.0      | 0.0                         | 0.0                      |
| Total Waste Volumes (10)                                |              |                  | 108,883.7                             | 58,528.0         | 167,411.7 | 939.0                       | 106,623.1                |



Footnotes for Table ES-3

- (1) The collection and management of waste for the purposes of awaiting treatment or disposal capability, in such a manner as to not constitute disposal of the waste.
- (2) The part of the inventory that has not been generated but is currently estimated to be generated at some time in the future.
- (3) Volume disposed of at WIPP as of December 31, 2000.
- (4) Volume to be disposed of at WIPP. The quantities reflect any volumetric expansion or reduction that would occur during waste processing.
- (5) Waste is of commercial origin and does not meet the Land Withdrawal Act (LWA) requirement for disposal at WIPP.
- (6) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (7) The original projected volume of 111,221.3 m<sup>3</sup> listed in the IPABS included 5,000 m<sup>3</sup> of TRU waste from the high-level waste (HLW) program and 106,221.3 m<sup>3</sup> from environmental restoration activities. Of this volume, 72,832 m<sup>3</sup> is contaminated soils that will result in 4,823 m<sup>3</sup> of waste following treatment; 33,389 m<sup>3</sup> is contaminated debris that will result in 2,767.3 m<sup>3</sup> of waste following treatment. The TRU waste from HLW and environmental restoration activities total 12,590.3 m<sup>3</sup>, the amount projected.
- (8) Waste from LRRRI is shipped to SNL-NM for subsequent shipment with SNL-NM waste to LANL. LRRRI and SNL-NM total waste volumes of 19.9 m<sup>3</sup> and 88.5 m<sup>3</sup>, respectively, are included in the LANL total waste volume.
- (9) Waste from PGDP will be shipped to ORNL for subsequent shipment to WIPP for disposal. PGDP total waste volume of 11.7 m<sup>3</sup> is included in the ORNL total waste volume.
- (10) The total waste volume to be disposed of differs slightly from the 106,387 m<sup>3</sup> cited in the Revision to the Record of Decision for the DOE's Waste Management Program: Treatment and Storage of Transuranic Waste, published in the *Federal Register* on December 29, 2000. The change (236 m<sup>3</sup>) is due to subsequent clarifications of: (1) the amount of waste to be shipped from RFETS in FY 2005 (an additional 295 m<sup>3</sup>); and (2) the amount of waste from LRRRI and SNL-NM to be shipped to LANL before the end of FY 2034 (a decrease of 59 m<sup>3</sup>). It should be noted that the total waste volume shown in the table remains significantly below the 113,592 m<sup>3</sup> originally evaluated in the Waste Management Programmatic Environmental Impact Statement (DOE/EIS-0200-F, May 1997).

Table ES-4 - Stored, Projected, and Disposal Volumes of RH TRU Waste by Site

| SITE NAME   | ABBREVIATION | LOCATION         | RH TRU Waste Volume (m <sup>3</sup> ) |                  |         |                          |
|---|--------------|------------------|---------------------------------------|------------------|---------|--------------------------|
|   |              |                  | Stored<br>(1)                         | Projected<br>(2) | Total   | To Be<br>Disposed<br>(3) |
| ARCO Medical Products Co.                               | ARCO         | West Chester, PA | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Argonne National Laboratory - East                      | ANL-E        | Argonne, IL      | 1.0                                   | 76.0             | 77.0    | 36.7                     |
| Argonne National Laboratory - West                      | ANL-W        | Idaho Falls, ID  | 24.1                                  | 30.4             | 54.5    | 54.5                     |
| Babcock & Wilcox - NES                                  | B&W-NES      | Lynchburg, VA    | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Battelle Columbus Laboratories                          | BCL          | Columbus, OH     | 0.0                                   | 20.8             | 20.8    | 20.8                     |
| Bettis Atomic Power Laboratory                          | BAPL         | West Mifflin, PA | 3.0                                   | 0.0              | 3.0     | 3.0                      |
| Energy Technology Engineering Center                    | ETEC         | Santa Susana, CA | 8.7                                   | 0.0              | 8.7     | 5.5                      |
| General Electric-Vallecitos Nuclear Center (4)          | GE-VNC       | Pleasanton, CA   | 11.8                                  | 0.0              | 11.8    | 11.8                     |
| Hanford Reservation                                     | Hanford      | Richland, WA     | 200.0                                 | 700.0            | 900.0   | 800.0                    |
| Idaho National Engineering and Environmental Laboratory | INEEL        | Idaho Falls, ID  | 85.0                                  | 0.0              | 85.0    | 85.0                     |
| Knolls Atomic Power Laboratory                          | KAPL         | Niskayuna, NY    | 3.7                                   | 6.8              | 10.5    | 10.5                     |
| Knolls Atomic Power Lab-Nuclear Fuel Services           | KAPL-NFS     | Erwin, TN        | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Lawrence Berkeley National Laboratory                   | LBNL         | Berkeley, CA     | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Lawrence Livermore National Laboratory                  | LLNL         | Livermore, CA    | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Los Alamos National Laboratory                          | LANL         | Los Alamos, NM   | 99.4                                  | 24.1             | 123.5   | 120.0                    |
| Lovelace Respiratory Research Institute                 | LRRI         | Albuquerque, NM  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Missouri University Research Reactor                    | MURR         | Columbia, MO     | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Mound Plant   | Mound        | Miamisburg, OH   | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Nevada Test Site  | NTS          | Mercury, NV      | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Oak Ridge National Laboratory                           | ORNL         | Oak Ridge, TN    | 1,342.0                               | 911.5            | 2,253.5 | 668.4                    |
| Paducah Gaseous Diffusion Plant                         | PGDP         | Paducah, KY      | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Rocky Flats Environmental Technology Site               | RFETS        | Golden, CO       | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Sandia National Laboratories (5)                        | SNL-NM       | Albuquerque, NM  | 1.4                                   | 24.1             | 25.5    | 0.0                      |
| Savannah River Site                                     | SRS          | Aiken, SC        | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Separations Process Research Unit                       | SPRU         | Schenectady, NY  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| U.S. Army Material Command                              | USAMC        | Rock Island, IL  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| West Valley Demonstration Project (6)                   | WVDP         | West Valley, NY  | 467.0                                 | 12.0             | 479.0   | 0.0                      |
| Total Waste Volumes                                     |              |                  | 2,245.7                               | 1,781.6          | 4,027.3 | 1,816.2                  |

Footnotes for Table ES-4

- (1) The collection and management of waste for the purposes of awaiting treatment or disposal capability, in such a manner as to not constitute disposal of the waste.
- (2) The part of the inventory that has not been generated but is currently estimated to be generated at some time in the future.
- (3) Volume to be disposed of at WIPP. The quantities reflect any volumetric expansion or reduction that would occur during waste processing.
- (4) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (5) Waste from SNL-NM is shipped to LANL. SNL-NM total waste volume of 25.5 m<sup>3</sup> is included in the LANL total waste volume.
- (6) Waste is of commercial origin and does not meet the LWA requirement for disposal at WIPP.



The TRU Waste System Optimization Plan (the Optimization Plan), to be published in FY 2001, is a companion plan and will contain the elements and initiatives to move the TRU waste system to an optimized condition. The Optimization Plan will reflect recommendations made during a recent reengineering effort to identify changes required to the TRU waste system to fully use its capability and to make it more efficient. Additional needs, issues, and ideas are being identified from other sources, including reviews of site inventory data and follow-on interviews designed to fully understand the TRU waste inventory and the challenges associated with its final disposal. The Optimization Plan will present the methods to improve, or optimize, the system in terms of characterization, transportation, and disposal with sub-tiered categories of administrative change/operational efficiency, regulatory change, technology implementation, and research, development, and deployment.

The National TRU Waste Management Plan takes a proactive approach to integrating needs and issues from throughout the DOE TRU waste system, including its oversight groups and stakeholders. It presents information in a dynamic format that accommodates change and keeps pace with new TRU system priorities. Finally, it provides accountability to the public for the management of the national TRU waste cleanup effort.



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## ACRONYMS AND ABBREVIATIONS

|         |   |
|---------|---|
| AEC     | Atomic Energy Commission  |
| Am-241  | americium-241   |
| AMWTF   | Advanced Mixed Waste Treatment Facility   |
| ANL-E   | Argonne National Laboratory-East, Argonne, IL                                     |
| ANL-W   | Argonne National Laboratory-West, Idaho Falls, ID                                 |
| ARCO    | ARCO Medical Products Company, West Chester, PA                                   |
| B&W-NES | Babcock & Wilcox – Nuclear Engineering Services, Lynchburg, VA                    |
| BAPL    | Bettis Atomic Power Laboratory, West Mifflin, PA                                  |
| BCL     | Battelle Columbus Laboratories, Columbus, OH                                      |
| CAO     | U.S. Department of Energy Carlsbad Area Office (now the Carlsbad Field Office)    |
| CBFO    | U.S. Department of Energy Carlsbad Field Office                                   |
| CCA     | WIPP Compliance Certification Application   |
| CCF     | central characterization facility   |
| CCP     | Centralized Characterization Project  |
| CEMRC   | Carlsbad Environmental Monitoring & Research Center (New Mexico State University) |
| CFR     | <i>Code of Federal Regulations</i>  |
| CH      | contact-handled   |
| CID     | Central Internet Database   |
| CNS     | Chem-Nuclear Systems (now GTS Duratek)  |
| DOE     | U.S. Department of Energy   |
| DOE/EM  | U.S. Department of Energy/Environmental Management                                |
| DOE-HQ  | U.S. Department of Energy – Headquarters  |
| DOT     | U.S. Department of Transportation   |
| EEG     | Environmental Evaluation Group  |
| EPA     | U.S. Environmental Protection Agency  |
| ETEC    | Energy Technology Engineering Center, Santa Susana, CA                            |
| FR      | <i>Federal Register</i>   |
| FY      | fiscal year   |
| GE-VNC  | General Electric – Vallecitos Nuclear Center, Pleasanton, CA                      |
| GFS/I   | Government Furnished Services/Items   |



|                |  |
|----------------|--|
| Hanford        | Hanford Reservation, Richland, WA  |
| HLW            | high-level waste   |
| HWFP           | WIPP Hazardous Waste Facility Permit                                       |
| ICV            | Inner Containment Vessel   |
| INEEL          | Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID   |
| IPABS          | Integrated Planning, Accountability, and Budgeting System                  |
| KAPL           | Knolls Atomic Power Laboratory, Niskayuna, NY                              |
| KAPL-NFS       | Knolls Atomic Power Laboratory-Nuclear Fuel Services, Inc., Erwin, TN      |
| LANL           | Los Alamos National Laboratory, Los Alamos, NM                             |
| LBNL           | Lawrence Berkeley National Laboratory, Berkeley, CA                        |
| LLNL           | Lawrence Livermore National Laboratory, Livermore, CA                      |
| LLW            | low-level waste  |
| LRRI           | Lovelace Respiratory Research Institute, Albuquerque, NM                   |
| LWA            | WIPP Land Withdrawal Act   |
| m <sup>3</sup> | cubic meters   |
| Mound          | Mound Plant, Miamisburg, OH  |
| MURR           | Missouri (University of) Research Reactor, Columbia, MO                    |
| NCT            | National Certification Team  |
| NMED           | New Mexico Environment Department  |
| NRC            | Nuclear Regulatory Commission  |
| NTP Office     | Office of National TRU Program, Carlsbad Field Office                      |
| NTS            | Nevada Test Site, Mercury, NV  |
| ORNL           | Oak Ridge National Laboratory, Oak Ridge, TN                               |
| PGDP           | Paducah Gaseous Diffusion Plant, Paducah, KY                               |
| ppm            | parts per million  |
| Pu-239         | plutonium-239  |
| RCRA           | Resource Conservation and Recovery Act                                     |
| RFETS          | Rocky Flats Environmental Technology Site, Golden, CO                      |
| RH             | remote-handled (waste)   |
| RTF            | Remote Treatment Facility  |
| SARP           | Safety Analysis Report for Packaging (for the TRUPACT-II Shipping Package) |
| SCDHEC         | South Carolina Department of Health and Environmental Control              |

|            |  |
|------------|--|
| SEIS       | Supplemental Environmental Impact Statement        |
| SNL-NM     | Sandia National Laboratories, Albuquerque, NM      |
| SPRU       | Separations Process Research Unit, Schenectady, NY |
| SRS        | Savannah River Site, Aiken, SC                     |
| SWB        | standard waste box                                 |
| TDOP       | ten-drum overpack                                  |
| TRAMPAC    | TRUPACT-II authorized methods for payload control  |
| TRU        | transuranic  |
| TRUPACT-II | Transuranic Package Transporter, Model II          |
| TSCA       | Toxic Substances Control Act                       |
| TSD        | treatment, storage, and disposal (facility)        |
| TWBIR      | TRU Waste Baseline Inventory Report                |
| TWRF       | TRU Waste Remediation Facility                     |
| USAMC      | U.S. Army Material Command, Rock Island, IL        |
| WAC        | Waste Acceptance Criteria                          |
| WAP        | Waste Analysis Plan                                |
| WIPP       | Waste Isolation Pilot Plant, Carlsbad, NM          |
| WRAP       | Waste Receiving and Processing (Facility)          |
| WVDP       | West Valley Demonstration Project, West Valley, NY |

# Chapter 1.0

## Introduction



## 1.0 INTRODUCTION

The U.S. Department of Energy (DOE) is committed to honoring the federal government's obligation to clean up "legacy" waste at sites across the nation that supported the production and testing of nuclear weapons. The objective of DOE Order 435.1, "Radioactive Waste Management," is to ensure that all DOE radioactive waste is managed in a manner that is protective of worker and public health and safety, and the environment. The Assistant Secretary for Environmental Management (EM-1) is responsible for establishing and maintaining integrated complexwide radioactive waste management programs. The Deputy Assistant Secretary for Integration and Disposition (EM-20) is responsible for developing, implementing, and maintaining integrated complex-wide radioactive waste management program plans. Each plan shall, at the DOE complexwide level, describe the functional elements, organizations, responsibilities, and activities that comprise the system needed to store, treat, and dispose of waste. In addition, the Deputy Assistant Secretary is responsible for establishing and maintaining a system to compile waste generation projection data and other information concerning waste management facilities, operations, and activities. The issuance of the National Transuranic (TRU) Waste Management Plan, Revision 2, fulfills the obligation of the Deputy Assistant Secretary to develop a systemwide program plan for TRU waste.

The DOE created the Carlsbad Field Office (CBFO) Office of National TRU Program (NTP Office) to serve as the focal point and lead the nation's TRU waste management efforts. One of the CBFO's major milestones achieved toward the goal of national cleanup was the Waste Isolation Pilot Plant (WIPP) becoming operational in March of 1999.

The National TRU Waste Management Plan (the Plan) addresses the management and disposal of TRU waste to clean up, and in some cases close, sites under the DOE's control. The Plan should be viewed as part of an ongoing process that will continue to evolve in response to stakeholder comments, programmatic decisions, changing circumstances, and future budgets. This revision, which replaces all previous versions, details the following:



*Transuranic waste consists of clothing, tools, rags, debris, and other such items contaminated with small amounts of radioactive elements - mostly plutonium. These elements are radioactive, and man-made, and have an atomic number greater than ("trans") uranium.*



*Located in southeastern New Mexico, WIPP is designed for the safe, permanent disposal of transuranic radioactive waste left from the production of nuclear weapons. Project facilities include excavated rooms 2,150 feet underground in an ancient, stable salt formation.*

*As of December 31, 2000, WIPP has received 128 transuranic waste shipments*

| Site    | Shipments | Volume (m <sup>3</sup> ) |
|---------|-----------|--------------------------|
| INEEL   | 30        | 205                      |
| LANL    | 17        | 190                      |
| RFETS   | 76        | 508                      |
| Hanford | 5         | 36                       |
| Totals  | 128       | 939                      |

- The vision, mission, goals, and objectives of the National TRU Program,
- The status of TRU waste management activities throughout the DOE TRU waste system, including cost projections,
- The path forward for disposition of the nation's TRU waste, and
- The performance indicators used to monitor progress with respect to established schedules.

### **1.1 Generation of Transuranic Waste**

TRU waste generation began with the manufacture of nuclear weapons in the 1940s. Research and development efforts at laboratories around the country, as well as weapons production, account for the majority of TRU waste in today's inventory. Additional waste will be generated as many DOE sites make the transition from nuclear weapons production to environmental restoration and decommissioning.

The use of the term "transuranic" as a type of waste is relatively new. Prior to 1970, the DOE disposed of waste as it was generated, typically on the site at which the waste was generated. Since 1970, with a change in regulatory framework, the waste classified as TRU has had different disposal requirements and caused the DOE to seek alternative methods for disposal. Figures 1.1-1 and 1.1-2 show the location and relative quantities of TRU waste in the DOE TRU waste system.



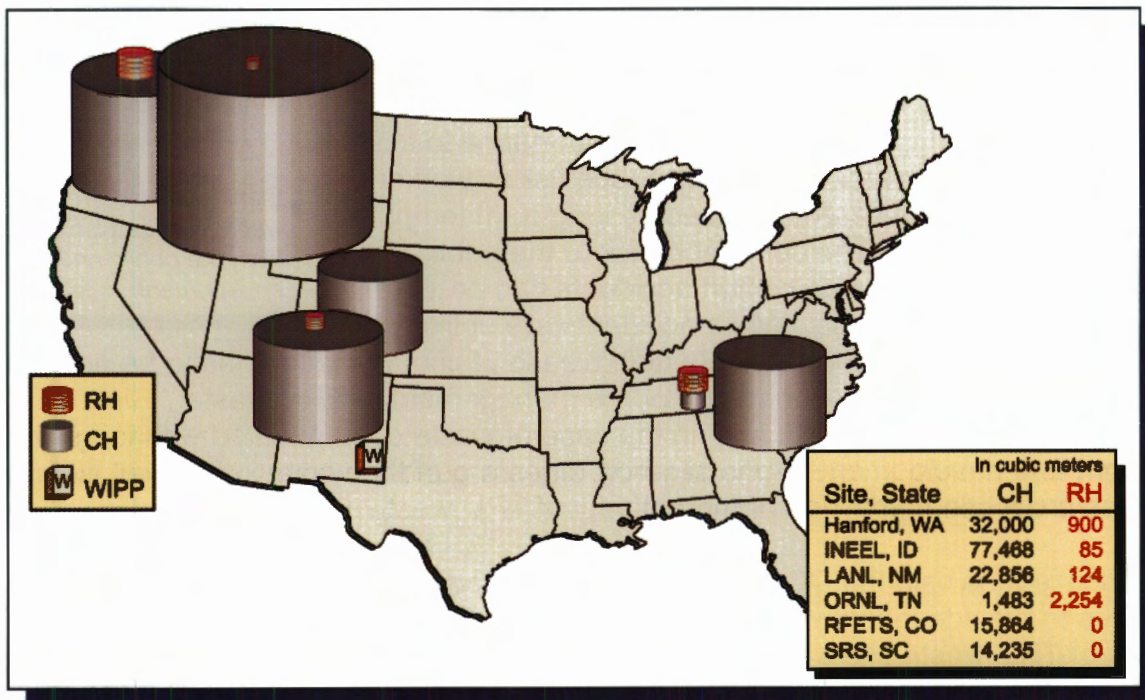


Figure 1.1-1 - Location and Relative Quantities of TRU Waste. Six sites manage 97 percent of the stored and projected volumes of TRU waste.

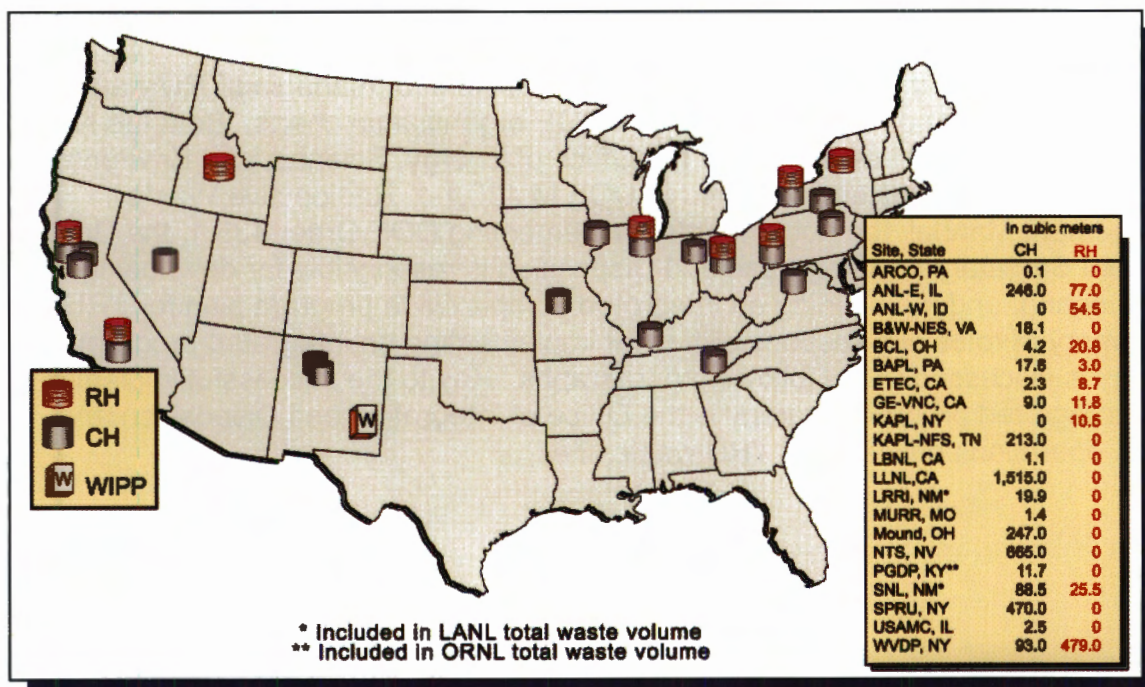


Figure 1.1-2 - Location and Relative Quantities of TRU Waste. Twenty-one sites manage 3 percent of the stored and projected volumes of TRU waste.



## 1.2 Protecting the Public and the Environment

The DOE inherited the mission to create and maintain the U.S. nuclear arsenal in 1977 from the Energy Research and Development Administration. Of primary importance to this mission is the DOE's responsibility to reduce risk to workers, the public, and the environment posed by long-term temporary storage of TRU waste. The concept of risk to the public is a result of the probability of how often accidents can occur and the consequence of release. While accidents are unlikely to occur, the risk associated with a potential release of contamination has to be addressed by those in positions of responsibility for the management of TRU waste. Eliminating the hazard also eliminates risk and, in the case of waste contaminated with long-lived radioactive elements, involves permanently disposing of the waste in facilities isolated from public access and the environment.



*Eliminating risk from TRU waste requires isolating it from the public and the environment.*

To further reduce risk, the DOE recently implemented contract and management reform initiatives to provide incentives for safe and early cleanup and, where appropriate, closure of TRU waste sites. The DOE and the management and integrating contractor at RFETS, for example, signed a cost plus incentive fee contract to safely close the site as early as December 15, 2006. An added benefit to accelerated cleanup and closure is an anticipated reduction of costs associated with continued long-term management of TRU waste.

## 1.3 Organizations and Responsibilities

Figure 1.3-1 shows the DOE organizations responsible for managing TRU waste. This chart is a composite of sections of various DOE organization charts. Both the National Nuclear Security Administration and the Office of Energy, Science, and Environment have these responsibilities. As noted in DOE M 435.1-1, Radioactive Waste Management Manual, the document for implementing DOE Order 435.1, the Deputy Assistant Secretary for Integration and Disposition is responsible for developing, implementing, and maintaining an integrated complexwide program plan for TRU waste. A summary of roles and responsibilities for implementing an integrated program strategy is discussed in the following paragraphs. Key to the successful implementation of the integrated program strategy is the Office of Integration and Disposition, the CBFO, operations offices, and TRU waste sites.

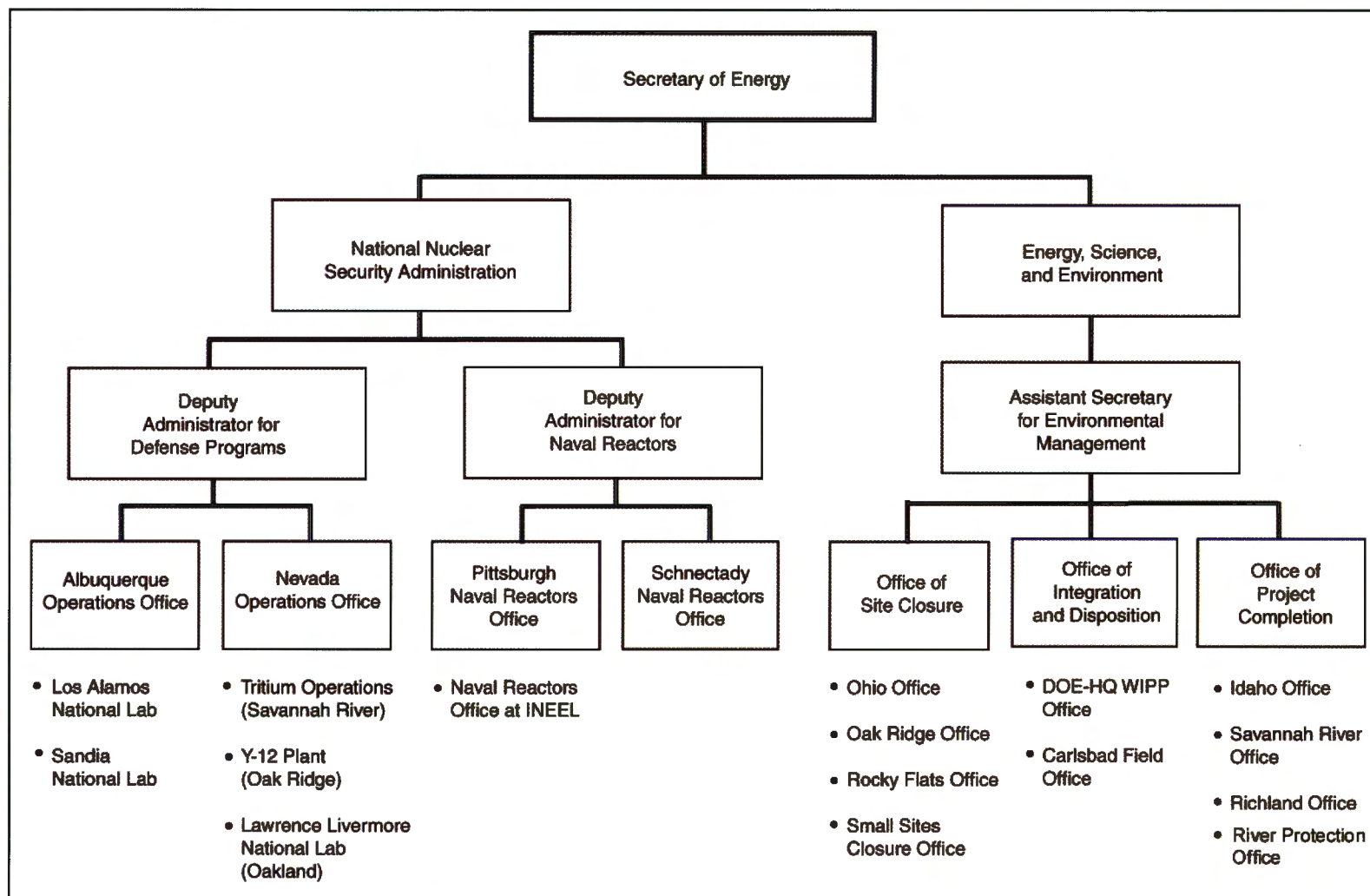


Figure 1.3-1 - DOE Organizations with Responsibility for TRU Waste Management

### **1.3.1 Office of Integration and Disposition**

The Office of Environmental Management's (DOE-EM) Office of Integration and Disposition (EM-20) is responsible for promoting, enabling and expediting site closure and project completion. Reporting to this Office is the Headquarters WIPP Office (EM-23) and the CBFO. DOE-EM provides guidance to facilitate the coordinated, timely, safe, and cost-effective disposition of nuclear materials and waste. Key functions of the EM-20 Office are to:

- Develop Headquarters policy, program guidance and direction to achieve an effective, efficient, technically sound, safe, and environmentally acceptable waste treatment, storage and disposal system. This office also approves technical, cost and schedule baselines, and reviews and approves major changes as appropriate.
- Promote integration and coordination of TRU waste treatment, storage, transportation, and disposal activities with the TRU waste sites.
- Develop strategies, options, analyses, and recommendations in support of policy development, long-range planning and cost effectiveness.
- Formulate waste management budget requirements and allocations, as well as associated justification, documentation, and testimony for the program. This also includes reviews of site requests and development of independent recommendations of waste management resource requirements and funding levels based on site and national policies and plans.

### **1.3.2 Carlsbad Field Office**

The mission of the CBFO is to protect human health and the environment by safely disposing of defense-related TRU waste at WIPP and by establishing an effective system of management of TRU waste from generation to disposal. The CBFO develops and directs implementation of the National TRU Programs, assesses compliance with the program guidance, and ensures the commonality of activities and assumptions among all TRU waste sites.

The CBFO Office of the National TRU Program is responsible for development and management of a comprehensive waste management strategy. The Office of the National TRU Program:

- Works with operations offices to coordinate and integrate the various program elements (TRU waste inventory, transportation, waste characterization, TRU waste characterization process certification, WIPP disposal and system integration) carried out across the DOE TRU waste system.
- Assesses efficiency and effectiveness of TRU waste systems operations.



- Develops guidance for long-term storage and disposal options for all TRU waste (defense and nondefense) and for the development of TRU waste treatment technologies to ensure compatibility and compliance with applicable requirements.
- Evaluates the impact of policies and criteria on the TRU waste sites' operations and institutional programs and develops and implements plans, policies, and guidance documents so that programmatic efforts comply in a timely and cost-effective manner.
- Provides technical guidance to develop and implement TRU waste characterization programs and information systems to support requirements that govern the collection of TRU waste characterization data.
- Manages TRU waste transportation system and shipping corridors; provides training programs for interested state, tribal, and local emergency responders.

### **1.3.3 DOE Operations Offices/TRU Waste Sites**

TRU waste sites are responsible for integrating elements of the program strategy into their planning and budget requests to support TRU waste disposal. Sites are also responsible for ensuring that the schedules contained in the Plan are consistent with the specific details of state compliance orders and regulatory agreements.

## **1.4 Implementation**

The CBFO has involved other DOE sites, contractors, the scientific community, and other stakeholders to develop strategic and operational plans for management of TRU waste. The basis for development of the Plan is a thorough understanding of:

- The federal and state regulatory framework governing DOE operations,
- Commitments made by the DOE to federal, state, and tribal governments,
- Technology needs to enable sites to repackage, treat, characterize, transport, and dispose of waste,
- Existing DOE infrastructure, and
- Budgetary constraints.

The Plan contains both strategic and operational planning elements required to dispose of TRU waste. It integrates site-specific waste management planning with requirements for treatment, characterization, transportation, and disposal and provides operational plans against which budget needs can be developed. The Plan also provides a vision for the end state of sites throughout the DOE TRU waste system responsible for managing TRU waste and discusses the needs and path to achieve that state. Finally,

it provides accountability to DOE management and the public by providing a means to monitor performance against schedule.

One of the tools used by the DOE to integrate this Program is a centralized database that DOE TRU waste system participants use to report programmatic plans and budget requests. The database, called the Integrated Planning, Accountability, and Budgeting System (IPABS), is used to compile schedules, volumes of waste in the inventory, and budget needs of the individual sites. Using the IPABS data input from the sites to develop revised projections, the Plan provides consistent planning assumptions and is one of the key changes incorporated into this revision. The IPABS was selected because it is the tool being used by the DOE to perform both strategic and programmatic National TRU planning. The values found in the Plan differ slightly from the current version of the IPABS database as well as other databases used by the DOE to track and manage waste inventory information. The differences are due primarily to changes directed by the DOE TRU program and TRU waste management as a result of their review and comment on the Plan's content. A task team has been formed to devise methods to keep the IPABS current and to keep the multiple inventory information databases consistent.

The Plan contains operational plans using an update to the baseline information regarding TRU waste disposition for the DOE TRU waste system. In addition to this introductory chapter, the Plan contains:

- Chapter 2.0 -- Vision, mission, goals, and objectives; integrated program strategy and implementation; issues as identified by stakeholders and key personnel; waste projections; and life-cycle waste planning
- Chapter 3.0 -- Baseline, including shipping/disposal schedules; management of WIPP-acceptable waste; and performance metrics
- Chapter 4.0 -- Baseline cost estimates
- Chapter 5.0 -- Path forward for the DOE TRU waste system
- Appendix 1 -- Site-specific planning summaries
- Appendix 2 -- Primer on waste packaging
- Appendix 3 -- Primer on waste containers
- Appendix 4 -- Configuration management
- Appendix 5 -- Related readings

The TRU Waste System Optimization Plan, to be published in FY 2001, will be a companion to the National TRU Waste Management Plan and will contain a plan to

reach the DOE's vision of the end state of the TRU waste system. The Optimization Plan will contain:

- An introduction to the TRU optimization effort and decision modeling;
- A prioritized list of issues/needs;
- Research and development plans and schedules;
- Project Plans;
- A synopsis of each recommendation and detailed analysis of each issue or need using a prescribed decision model. The analyses will include options, cost-benefit analyses, prioritization, contingency planning, and recommendations; and
- Cost and anticipated savings as a result of the TRU system optimization effort.

### **1.5 Improvements to the Plan**

The Plan is being managed differently from Revision 1. Revision 2 of the Plan is a dynamic document that will accommodate changes to the TRU waste system as needs and priorities shift. It is published as a bound document with separate supplements currently planned to be issued quarterly to update the system status against planned schedules.

Shipping/disposal schedules for FY 2001 and FY 2002 are based on input from site DOE TRU programs and TRU waste managers to ensure that the CBFO has available the latest information to plan activities to support demand. Schedules for FY 2003 and beyond are based on site input to the IPABS approved FY 2002 life-cycle planning data as of July 26, 2000. The FY 2001 and FY 2002 schedules are planned on a monthly basis; schedules for FY 2003 and beyond are planned annually.

Each site that has planned activity in FY 2001 has performance indicators based on its volume and shipment schedule. Quarterly supplements will:

- Plot actual performance against the schedules provided for inclusion in the Plan by each site's TRU program and TRU waste managers;
- Highlight major items of concern that may have an impact on the overall TRU waste system; and
- Status progress toward resolving technical and programmatic issues, including recommendations made in the recent National Academy of Sciences report entitled, "Improving Operations and Long-Term Safety of the Waste Isolation Pilot Plant."



The quarterly supplement also will roll variances from site schedules into an overall system performance indicator. Variances will be analyzed for impact on system schedules. Ultimately, the performance indicators will be used to evaluate progress, identify problems, and adjust the program to meet system goals and priorities. In addition, the quarterly supplement will contain updates of optimization activities and performance measures as discussed in the Optimization Plan.

The Plan will be revised annually, showing new schedules provided by each site's TRU program and TRU waste managers with updated performance indicators based on the schedules. Variances from the previous year's schedules having an impact on out-year system capabilities will be addressed. Finally, an update to the baseline will be performed when a major initiative is implemented that has an effect on system performance (e.g., a change to characterization methodologies that decreases required activity levels and allows increased shipping/disposal rates).

# Chapter 2.0

DOE

National TRU Program

## 2.0 DOE NATIONAL TRU PROGRAM

This chapter presents the vision, mission, goals, and objectives of the DOE National TRU Program. The concept of an integrated program strategy to optimize the TRU waste system is introduced. Technical and programmatic issues that impact the successful integration of the system are discussed.

### 2.1 Vision and Mission

The *vision* of the National TRU Program (the Program) is that each site with current or future inventory of TRU waste reaches its desired end state. At sites scheduled for cleanup and closure, the desired end state is the removal of all TRU waste from temporary storage for permanent disposal at an approved facility. At sites with ongoing missions, the desired end state is not only removal of TRU waste from temporary storage but also planned removal of newly generated waste.

The *mission* of the Program is to implement a DOE TRU waste system that will safely and cost-effectively achieve the desired end state at each site.

### 2.2 Goals and Objectives

The DOE has established and prioritized the following goals and objectives to achieve the Program mission:

**Goal 1: Maintain compliance with environmental, safety and other regulatory requirements, agreements and orders.**

#### **Objectives:**

1. Comply with federal and state environment, safety and health regulations and orders. (*Responsibility: All Program participants*)
2. Operate within the bounds of applicable federal and state permits, rules, and orders. (*Responsibility: All Program participants*)
3. Comply with agreements made between the DOE and federal, state, and tribal agencies. (*Responsibility: All Program participants*)

#### **End State**

*A site is considered "complete" (or at its "end state") when . . .*

*. . . deactivation or decommissioning of all facilities currently in the cleanup program have been completed, excluding any long-term surveillance and monitoring;*

*. . . all releases to the environment have been cleaned up in accordance with agreed-upon cleanup standards;*

*. . . groundwater contamination has been contained, or long-term treatment or monitoring is in place;*

*. . . "legacy" waste (waste produced by past nuclear production activities, except high-level waste) has been disposed of in an approved manner;*

*. . . waste is continuously removed and disposed of from sites with ongoing missions.*



**Goal 2: Operate an integrated system to dispose of the DOE's TRU waste.**

**Objectives - Inventory:**

1. Maintain an accurate inventory of TRU waste forms and quantities. *(Responsibility: TRU waste sites. Note CBFO responsibility for data compilation.)*
2. Identify alternatives for TRU waste that has an associated need that must be fulfilled prior to disposal or has no current plan for disposal. *(Responsibility: All Program participants. Note CBFO responsibility for National TRU Waste System Optimization Plan.)*

**Objectives - Treatment, Characterization, Transportation and Disposal:**

1. Characterize waste in accordance with disposal facilities' waste analysis plans and waste acceptance criteria (WAC). *(Responsibility: TRU waste sites)*
2. Maintain transportation and disposal capability to meet or exceed waste shipper demand. *(Responsibility: CBFO)*
3. Modify the WIPP Hazardous Waste Facility Permit (HWFP) to dispose of RH TRU waste. *(Responsibility: CBFO)*
4. Make efficient use of treatment, characterization, transportation and disposal resources to maximize system capability. *(Responsibility for treatment and characterization: TRU waste sites. Responsibility for transportation and disposal: CBFO)*
5. Manage the TRU waste system by integrating waste shipper demand with transportation and disposal capability. *(Responsibility: CBFO)*

**Goal 3: Optimize TRU waste system operations.**

**Objectives:**

1. Eliminate waste characterization requirements for disposal at WIPP which lack a technically derived legal or safety basis, and which are not supported by the Performance Assessment of the repository. *(Responsibility: CBFO)*
2. Minimize waste generator characterization requirements at small-quantity sites by providing centralized disposal characterization activities at WIPP. *(Responsibility: CBFO)*
3. Identify and evaluate alternatives to current treatment, characterization, transportation and disposal methods and issues (e.g., centralized disposal characterization at WIPP). Develop and implement a plan to optimize the TRU

waste system by increasing operational efficiency, seeking regulatory change, implementing technology, and implementing a research development and deployment program. (*Responsibility: EM-20 and CBFO*)

4. Track and report project costs and cost savings and avoidances resulting from implementation of the TRU waste system optimization plan. (*Responsibility: CBFO*)
5. Evaluate options for TRU waste not currently acceptable at WIPP. (*Responsibility: EM-20 working with all program participants*)

### **2.3 Integrated Program Strategy**

The DOE *Status Report on Paths to Closure* (DOE/EM-0526, March 2000) states that an estimated range of life-cycle costs yet to be incurred (or remaining life-cycle costs) of \$151 to \$195 billion will be incurred to address the environmental legacy of nuclear weapons research, production, and testing and of DOE-funded nuclear energy and basic science research in the United States. Emphasis is being placed on finding cost-effective implementation strategies, continuing to use the best available science and technology, and working more closely with federal and state regulators, tribal nations, local governments, and citizens. The Office of Integration and Disposition and the CBFO are working with representatives of stakeholder groups, the scientific community, contractors, and other DOE sites to develop strategic and operational plans to reduce the costs associated with the TRU waste management portion of this financial burden while accelerating closure of certain sites whose only current function is to manage existing waste and infrastructure. Cost data in Chapter 4.0, Baseline Cost Estimates, indicate that TRU waste management activity will account for approximately \$16 billion, or about 10 percent of the remaining life-cycle costs.

To prepare this revision of the National TRU Waste Management Plan, the CBFO used a strategic planning process as a framework to restructure its Plan and to put in place performance indicators to evaluate progress toward meeting established goals. The CBFO has assessed the DOE TRU waste system needs; assessed waste treatment, packaging, transportation, and waste disposal capabilities; developed a vision and mission; and developed goals, objectives, and projected schedules to achieve that mission. Progress toward meeting established goals and objectives will be measured and the Plan will be revised, as indicated earlier in the document.

Successful integration of site-specific waste management planning with treatment, packaging, transport, and disposal resources, and improving upon this integration (optimizing), depends on favorable resolution of technical and programmatic issues. The Integrated Program Strategy, designed to improve the DOE TRU waste system, involves a phased approach to transition the system from the baseline to an optimal state. This strategy will be accomplished in three steps:



- Maximize TRU waste disposal by taking actions that can be readily accomplished and will have a significant, positive impact on the ability of the TRU waste system to characterize, transport, and dispose of waste.
- Achieve economies and efficiencies by implementing recommendations including those from the reengineering processes. This effort also includes resolution of needs associated with the disposal of certain waste forms across the TRU waste system.
- Ease the characterization responsibilities of small-quantity TRU waste generators, to the maximum extent possible, by utilizing a centralized characterization facility to perform the required analysis to certify wastes to be disposed of at WIPP.

The Plan represents the baseline, or current state of the National TRU System. As indicated in Chapter 3, 105,200 m<sup>3</sup> or 61.4 percent of the total stored and projected volume of TRU waste has associated needs that must be fulfilled prior to waste disposal at WIPP. Resolution of the needs is a key component of the process to optimizing the National TRU System. Some of the issues were identified during a recent reengineering effort and solutions are currently being developed and implemented including:

- A central waste characterization facility is being proposed to accelerate closure and reduce costs associated with waste removal from small-quantity sites.
- Alternatives to shipping waste to WIPP using the TRUPACT-II/truck combination (e.g., rail transport, large Type B packaging) are being reviewed to allow large pieces of equipment/material to be shipped to WIPP without requiring waste generator sites to reduce material size or repackage.

#### **TRU Waste Definition and Classifications**

*Transuranic (TRU) waste is defined by the WIPP Land Withdrawal Act (LWA) as: "waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste with half-lives greater than 20 years, except for (A) high-level radioactive waste, (B) waste that the Secretary has determined, with concurrence of the U.S. Environmental Protection Agency (EPA) Administrator, does not need the degree of isolation required by the disposal regulations, or (C) waste that the Nuclear Regulatory Commission has approved for disposal on a case-by-case basis in accordance with part 61 of Title 10, Code of Federal Regulations (CFR)."*

*TRU waste is classified as contact-handled (CH) TRU or remote-handled (RH) TRU. According to the LWA, CH TRU waste has radioactivity levels that are low enough to permit workers to directly handle the containers in which the waste is kept (not greater than 200 millirem per hour at the outside surface of the container). RH TRU waste has a surface dose rate of greater than 200 millirem per hour, so workers use remote handling equipment to move containers of RH TRU waste.*

*TRU waste is further classified as TRU waste or mixed TRU waste. Mixed TRU waste contains both radioactive and hazardous chemical compounds.*



- Changes are being sought to the WIPP HWFP and other authorization basis documents to ease restrictions associated with the treatment, characterization, transportation, and disposal of TRU waste destined for WIPP.
- Equipment is being developed to allow the DOE to perform radioassay of large waste containers which will allow waste generator sites to certify large containers without repackaging.

Other issues are being identified, prioritized, and funded as a result of a gap analysis. The CBFO will present the results of this analysis in the Optimization Plan, due for publication in FY 2001. The Optimization Plan will provide a roadmap for the National TRU System to achieve the optimal state and will plan, execute and track projects in terms of administrative change and operational efficiency, regulatory change, technology implementation, and research, development and deployment.

The advantages of an integrated program strategy based on system-wide needs are:

- TRU waste management planning across the DOE TRU waste system is integrated, optimized, and matched with the transportation and disposal capability of WIPP;
- Site-specific requirements necessary to achieve system-wide compliance with federal and state regulations and DOE Orders are identified and visible;
- Knowledge about the development and use of technologies and management practices, which can increase efficiency in managing TRU waste, is readily available and lessons learned are shared; and
- Knowledge about quantities of TRU waste that currently have no current plan for disposal is collected and strategies for disposal are implemented.

### **2.3.1 Technical and Programmatic Issues**

During the development of the Plan, the CBFO interfaced with the Western Governors' Association, governor-appointed representatives in southern states, national laboratories, contractors, and other parts of the DOE to identify key areas of concern. The issues, or concerns, as well as a brief discussion of the current DOE strategies for resolution, are discussed in this section. Each of these issues are captured in detail in the Optimization Plan.

#### **2.3.1.1 Alpha Low-Level Waste**

In 1970, the Atomic Energy Commission (AEC), the predecessor agency of the Energy Research and Development Administration and the DOE, required sites to segregate waste with known or detectable TRU contamination in retrievable storage pending permanent disposal. The AEC defined TRU waste as having activities greater than

10 nanocuries per gram of waste. In 1982, the DOE revised the definition of TRU waste as having activities greater than 100 nanocuries per gram of waste.

This redefinition created an inventory of low-level waste (LLW), mixed LLW, TRU waste, and mixed TRU waste stored at the same locations. Collectively, the waste has different disposal requirements, but no efficient, cost-effective means to differentiate between low-level and TRU waste containers exists. For this reason, the LLW contaminated with alpha-emitters (alpha LLW) is managed as if it were TRU waste. The fraction of currently stored TRU waste in the DOE TRU waste system that may be alpha-contaminated LLW is estimated to be between 10 percent and 30 percent of the estimated TRU volume, or between 11,000 m<sup>3</sup> and 33,000 m<sup>3</sup>.

Some DOE sites that stored mixed TRU waste prior to 1982 have identified inventories of mixed alpha LLW. Under the current regulatory framework, sites will be required to establish a treatment process to comply with the Resource Conservation and Recovery Act (RCRA) or transport the waste to another site for treatment.

Alternatives for the disposal of this waste are being considered. For example, mixed alpha LLW could be separated and treated to land disposal restriction standards, or be processed with higher activity TRU waste to produce waste that meets the established WIPP WAC. The issue of alpha LLW will be explored in the Optimization Plan.

#### 2.3.1.2 Asbestos-Contaminated TRU Waste

Recently, WIPP received authorization to accept TRU waste containing regulated asbestos containing material. All forms of asbestos waste can be disposed of without seeking approval from WIPP. An appropriate change is being made to the WIPP WAC to remove the requirement for generators to obtain WIPP approval to ship asbestos-contaminated waste.

#### 2.3.1.3 Classified Materials Disposition

TRU contaminated classified materials (e.g., molds and shapes used in weapons production) do not have a current plan for disposal under current security requirements of the DOE. WIPP disposal of these materials could help the DOE:

- Meet agreements with various regulatory agencies,
- Reduce costs of continued storage, and
- Reduce the risks of chemical and/or radiological exposure to workers and the public.

A DOE-sponsored working group is evaluating options for the disposal of classified TRU-contaminated parts and process equipment. Evaluations should be completed and recommendations published by the end of FY 2001.



#### 2.3.1.4 Commercial TRU Waste

Very little of the TRU waste in the inventory reported in the Plan is classified as commercial waste. It is estimated that less than 900 m<sup>3</sup> of the waste is commercial. The West Valley Demonstration Project (WVDP), for example, reports an as-generated volume of approximately 572 m<sup>3</sup> of commercial TRU waste, most of which is expected to be classified as RH TRU waste. WVDP participants currently expect that the material will either be stored on site until it is transferred to a federal repository or transferred off site to facilitate accelerated site cleanup activities. Future revisions of the Plan will update developments in this area and address disposal of commercial TRU waste, as appropriate.

#### 2.3.1.5 Defense/Nondefense Waste

The *WIPP Land Withdrawal Act of 1992*, as amended, limits the waste that can be accepted for disposal at WIPP to TRU waste generated by atomic energy defense activities. Material that is solely nondefense TRU waste, which is in relatively small quantities at several sites, is, therefore, prohibited from being disposed of at WIPP.

The strategic approach to address this waste involves identifying the inventory (volumes and locations, stored and projected) and then identifying and evaluating various disposal options (e.g., deep bore hole disposal, co-disposal with defense waste in WIPP). Disposal options will be evaluated based on legal and regulatory requirements and constraints, cost, public health and safety, environmental factors, institutional concerns, and other factors.

#### 2.3.1.6 Generation of New Waste

Characterization of TRU waste accounts for the majority of the cost associated with the TRU Program. Significant cost savings can be achieved with a slight alteration of the waste generation process. Waste that has already been generated must undergo extensive characterization to meet the requirements of the WIPP Waste Analysis Plan to meet certification requirements for disposal (i.e., headspace gas sampling, nondestructive examination, RCRA constituent sampling, analysis of homogeneous waste, and visual examination). Waste that has to be repackaged or is being generated from a process line or decontamination/decommissioning can be generated in a way that supports disposal. Generating the data to support waste disposal to meet quality assurance requirements (i.e., two operators involved in data generation per process line; one to produce data and the other to validate) negates the need for nondestructive examination.

Selection of the proper waste container will also reduce cost. Generators should use the largest container possible when generating waste for disposal (e.g., standard waste boxes or ten drum overpack containers) because of relative characterization costs. The cost to characterize a large container is approximately the same as the cost to characterize a drum. The large container, however, holds a larger volume of waste. A standard waste box, for example, has nine times the capacity of a drum. Waste



generators can reduce characterization and total disposal costs for new waste by packaging the waste into the largest approved container. This approach also will improve the efficiency of the transportation system by maximizing the use of the internal volume of the TRUPACT-II or other waste packaging.

### 2.3.1.7 High Wattage Waste (Plutonium-238 and Americium-241)

The CH TRU waste in the DOE waste inventory is predominantly contaminated with plutonium (Pu)-239. However, a significant amount of the total radioactivity of the waste comes from the presence of either Pu-238 or americium (Am)-241. Both Pu-238 and Am-241 have a much higher specific activity than Pu-239 (17.3 curies per gram [Ci/g] versus 0.063 Ci/g, and 0.573 watt/gram versus 0.002 watt/gram; and 3.4 Ci/g versus 0.063 Ci/g, and 0.113 watt/gram versus 0.002 watt/gram, respectively).

Nuclear Regulatory Commission limits for gas generation significantly restrict the amount of Pu-238 and Am-241 waste that can be shipped in a TRUPACT-II. For example, the maximum allowable wattage for Waste Material Type III.1 (solid organic waste) packaged in two bags (shipping category III.1A2 with one inner bag and one liner bag) is 0.0434 watt per drum, which is equivalent to only 0.075 gram of Pu-238 or 0.38 gram of Am-241. The cost associated with packaging, transport, and disposal of Pu-238 or Am-241 in these quantities is prohibitive.

The decay heat limits must be increased significantly, or a means to reduce hydrogen concentration must be developed, for the efficient shipment of Pu-238- or Am-241-contaminated waste to WIPP. These needs present an excellent opportunity to integrate with the Office of Science and Technology's (EM-50) "needs" process. The hydrogen buildup problem is extensive enough that the CBFO is requesting a "Basic Science Call" for gas generation science research through the TRU and Mixed Waste Focus Area. It is anticipated that this call will be done in FY 2001.

#### **High Wattage Waste**

*The overall design wattage limit for the TRUPACT-II package is 40 watts, which, for a payload of 14 drums, averages to 2.86 watts per drum, or 5 grams of Pu-238 per drum, or 25 grams of Am-241 per drum. The ability to ship these amounts per drum for Waste Material Type III.1 (solid organic material) is, for example, a reasonable and appropriate goal for a TRUPACT-II payload of 14 55-gallon drums.*

*The strategy for shipping greater amounts of TRU waste per drum is as follows:*

- *Reduction in Bounding G-Values - A factor of 3 reduction of gas generation potential can be achieved by taking credit for matrix depletion (Revision 19 of the Safety Analysis Report for Packaging [SARP] for the TRUPACT-II Shipping Package submitted April 2000).*
- *Suitable Waste Packaging Configuration - Use of high-diffusivity filters in bags and drums to facilitate hydrogen release from waste containers (Revision 19 of the TRUPACT-II SARP submitted April 2000), which would require repackaging of old waste.*
- *Reduction of Hydrogen in the TRUPACT-II Inner Containment Vessel (ICV) - Use of a hydrogen gas getter, which chemically reacts with hydrogen gas to reduce hydrogen concentration in the TRUPACT-II ICV to zero (Revision 20 of the TRUPACT-II SARP is projected to be submitted after the Nuclear Regulatory Commission (NRC) approves Revision 19, which could be as early as January 2001).*

### **2.3.1.8 Intersite Shipments**

In the past, an option has been to consolidate small volumes of waste at larger sites to take advantage of existing infrastructure and waste handling experience. This option has been constrained by state equity issues, site schedules driven by compliance issues, and permit limitations. The option is further constrained by a limited number of approved shipping packaging (TRUPACT-IIs). The Super Tiger shipping packaging and the ATMX-600 Series railcar were used in the past for intersite shipments, although the packagings are now considered for use only in limited, special circumstances.

The Super Tiger is an NRC-certified Type B packaging; each can transport up to sixteen 55-gallon drums. Large equipment items having a configuration that does not allow packaging in 55-gallon drums may be shipped inside the Super Tiger in plywood boxes configured as specified in the Certificate of Compliance. There is no identified waste in the DOE TRU waste system that can be shipped in the Super Tiger without repackaging to meet the authorized contents of the Certificate of Compliance. The 100-ton ATMX railcar has a capacity of 140 55-gallon drums, or twenty-four 4-ft by 4-ft by 7-ft rectangular boxes, up to 101,000 pounds net weight per carload. However, the ATMX is a conveyance (not a packaging) and does not meet NRC requirements for Type B packaging. Its use relies on a DOT exemption from the requirements in 10 CFR § 71. Therefore, the ATMX does not meet the LWA requirement for NRC-certified packaging and may not be used for WIPP shipments. The DOT has been willing to grant limited exemptions to its requirements in cases where an overall reduction in risk can be demonstrated. For example, the Mound site has shown that transporting Pu-238 TRU waste in its original large boxes in the ATMX railcar to the Savannah River Site for processing with their similar inventory of PU-238 TRU waste poses a lower risk than constructing and operating a repackaging facility at Mound. The DOT has subsequently agreed to allow the Mound site to use the ATMX railcars for limited (up to five) shipments.

The DOE may pursue a similar approach for other intersite shipments when it is not practical to prepare the waste on-site for direct shipment to WIPP or when studies can show that the overall risk is reduced. A risk analysis and cost/benefit analysis will be performed to determine the appropriate packaging.

### **2.3.1.9 Mode of Waste Transport**

The majority of the TRU waste sites will use the TRUPACT-II, HalfPACT, or RH-72B shipping casks for transporting TRU waste to WIPP or for intersite shipments. When the Nuclear Regulatory Commission (NRC) approves the CNS (Chem-Nuclear Systems [now GTS Duratek]) 10-160B cask, it may also be used to ship TRU waste to WIPP. NRC-approved Type B transportation packaging must be used for shipments to WIPP. Any site wishing to use a configuration that deviates from the TRUPACT-II, HalfPACT, RH-72B, or CNS 10-160B will have to identify the need to the CBFO so that WIPP can be reconfigured to allow its receipt, subsequent to a favorable cost- and risk-based analysis. As discussed in Section 2.3.1.8, limited intersite shipments may be necessary. The DOE's preference is to use Type B packaging for intersite transport,



when possible. Shipping the waste to WIPP by rail is under active consideration. Use of rail in conjunction with a new larger Type B packaging is believed to have potentially significant cost and schedule benefits.

#### **2.3.1.10 Non-Standard TRU Waste Containers**

The integrated program strategy indicates the need for the development of a new NRC Type B packaging (TRUPACT-III) to accommodate existing oversized waste containers. A new packaging also may be required in the future to ship large parts and process equipment from decontamination and decommissioning activities that do not fit, or cannot easily be cut into pieces to fit, into standard waste containers. Oversized containers, those larger than 6 feet in diameter and 6 feet in height, will not fit inside a TRUPACT-II.

A new shipping packaging will have to be designed, tested, certified, and manufactured, considering:

- Design (size, weight, and contents);
- Costs (design, testing, certification, fabrication, and transportation); and
- Exposure risk (repackaging and transportation).

In some cases, the information known about the content of oversized waste containers is adequate for shipping and may be sufficient for disposal. Transporting the waste to WIPP without additional repackaging is an attractive option if waste contents can be certified without opening the container. The cost and potential risk of repackaging this waste makes the evaluation of additional waste container and packaging alternatives desirable.

A final strategy will be developed for disposing of waste contained in oversized boxes once the conceptual design of a new transportation packaging has been developed. The conceptual design will be completed in FY 2001.

#### **2.3.1.11 Polychlorinated Biphenyls-Contaminated Waste**

Polychlorinated biphenyls (PCB) are a subset of the man-made organic chemicals known as chlorinated hydrocarbons and are regulated under the Toxic Substances Control Act (TSCA).

The TSCA regulates PCB-contaminated waste disposal in concentrations equal to or greater than 50 parts per million (ppm). The WIPP HWFP mirrors this limit and allows disposal of TRU waste containing PCBs in concentration of less than 50 ppm. The DOE TRU waste inventory, however, includes PCB-contaminated waste at levels well above 50 ppm.

The CBFO is pursuing PCB disposal authorization through the EPA so all PCB-contaminated TRU waste can be disposed of at WIPP. A risk assessment is being prepared, based upon inventory information provided by the TRU waste sites, to



demonstrate that the disposal of PCB-contaminated TRU waste can be accomplished while continuing to protect worker safety, human health, and the environment.

A favorable outcome of the risk assessment would be used to:

- Support a determination by the EPA Region 6 for PCB-contaminated TRU waste disposal authorization,
- Support preparation of a supplement analysis to revise the Record of Decision to allow for disposal of PCB-contaminated waste,
- Request a modification to the WIPP HWFP to dispose of PCB-contaminated TRU waste containing PCBs greater than 50 ppm, and
- Notify EPA headquarters of the change to dispose of PCB-contaminated TRU waste containing PCBs greater than 50 ppm.

Regulatory approvals are being aggressively pursued and could come as early as mid FY 2001.

#### 2.3.1.12 Prohibited Waste

Waste allowed for disposal at WIPP is listed in the WIPP HWFP, Module II, Table II.C.4, Permitted TRU Mixed Waste. The list contains U.S. EPA Hazardous Waste Codes limiting the disposal to the waste forms that can be compatibly disposed (most of the remaining EPA codes are associated with liquid waste that is prohibited at WIPP).

States may assign a code to waste that is different from the EPA code (i.e., the state assigns a different code for the same waste or the state classifies a waste as hazardous that the EPA has not defined as hazardous under RCRA rules). Waste with such codes exists in the DOE TRU waste system. These wastes can be disposed of at WIPP as long as the waste does not have a corresponding EPA code that is prohibited from disposal at WIPP. Sites must communicate this need to the CBFO so that a RCRA permit modification can be processed to notify the New Mexico Environment Department (NMED) that the state code will be applied to waste being disposed of at WIPP.

Another category of TRU waste exists that contains hazardous constituents that are unallowable at WIPP per WIPP HWFP Table II.C.4. Sites with these wastes must either have the prohibited item removed prior to disposal at WIPP or request a modification to the HWFP. This modification would require additional compatibility studies, and if favorable, a modification request to the NMED seeking to dispose of these additional types of waste at WIPP. The modification would require four to eighteen months to achieve, depending upon the significance of the change.

### 2.3.1.13 RH TRU Waste

The following issues were raised relative to the effect RH packaging limitations and variations in RH TRU inventory volume would have on WIPP's ability to dispose of RH TRU waste.

#### 2.3.1.13.1 Packaging

The integrated program strategy calls for disposal of RH TRU waste at WIPP. The current shipping strategy includes the use of the RH-72B cask for transporting RH TRU waste. Evaluation of the inventory in storage, however, has identified some RH TRU waste that is not amenable to transport in the RH-72B cask. For example, some waste contains neutron-emitting material that will require additional shielding in the packaging for protection of workers and the public. Although multiple options exist (e.g., new packaging, modifications to payload requirements of the RH-72B), the preferred strategy is to modify the existing shipping packaging by adding appropriate shielding. In this way, TRU waste that exhibits dose rates on the surface of the package that are typically consistent with RH TRU waste can be assembled in CH TRU waste packaging (i.e., surface dose rates will be less than or equal to 200 millirem per hour for transport and safe handling).

Analytical evaluations and design studies are under way in anticipation that a proposed revision to the TRUPACT-II SARP will be submitted to the NRC in the near term. In addition, this option may be a possible solution for excess inventory as described in Section 2.3.1.13.2.

#### 2.3.1.13.2 RH Inventory

By agreement with the state of New Mexico and reaffirmed in the DOE's Record of Decision for WIPP (63 *Federal Register* [FR] 3623), up to 7,080 cubic meters of RH TRU waste can be disposed of in WIPP. However, the ongoing inventory assessments indicate that RH TRU waste in excess of this limit may be available (stored and newly generated) for disposal during the operational life of WIPP. This "excess" waste is a result of ongoing site characterization programs that provide an improved understanding of the characteristics of TRU waste in storage and ongoing decontamination and decommissioning programs. In addition, newly generated waste will accrue from new program missions at selected sites.

Of further concern is an element of the integrated program strategy that requires the disposal of RH TRU waste in the walls of the rooms in advance of receipt of CH TRU waste. Under this strategy, RH TRU waste disposal capacity may be reduced (from 7,080 cubic meters) because the first shipments are not scheduled to begin until the second quarter of FY 2002 and disposed-of CH waste is already covering potential RH disposal areas.

As discussed in Section 3.2.1.1, Optimization of CH and RH Disposal Capabilities, current inventory projections do not indicate that this will be an issue. Should it be



determined that "excess" RH TRU waste becomes available, the DOE may be required to initiate discussions to raise the disposal limits. Such a strategy will require additional National Environmental Policy Act activity, legal and regulatory changes, and technical changes in agreements with the state of New Mexico and the EPA.

#### **2.3.1.14 TRU Waste Inventory Uncertainty**

For the Plan, waste volume and cost data were derived from information reported by the sites in the IPABS and subsequently clarified in discussions with the waste generator sites. Though several other sources of TRU waste data exist, the IPABS data are considered the most current and are intended to be internally consistent with regard to waste volumes, site infrastructure, plans, programs, and anticipated budgets.

Other sources of data reviewed in preparation of the Plan included the TRU Waste Baseline Inventory Report (TWBIR) and the Central Internet Database (CID):

- The TWBIR data were compiled in 1995 based on extensive discussions with the TRU waste sites and were used to provide the basis for the WIPP Compliance Certification Application (CCA). The CCA was prepared to satisfy WIPP's requirement to demonstrate compliance with the disposal standards of 40 CFR § 191, "Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Waste." The basic purpose of the TWBIR was to describe the wastes to be managed and disposed of at WIPP. The waste descriptions include the definition, sources, types, components, and characteristics of the TRU waste for emplacement. These data addressed only the physical characteristics that would affect the ability to dispose of this waste and therefore provide the basis for waste acceptance. Shipping schedules and associated budgets were not part of this process.
- The CID was developed by the DOE to store data on waste management and cleanup activities at DOE sites across the country and make these data available to the general public. The CID obtains its information from the IPABS database.

While several sources of TRU waste data exist, the IPABS is considered the most consistent source. In using these data, however, the degree of uncertainty associated with the data must be recognized. This uncertainty causes the estimate of TRU waste in storage and projected to change on a frequent basis as site activities proceed. Much of the data are dependent on historical waste disposal records at the sites, historical waste generation records, previous program mission information, or expectations of future program missions for projected waste volumes. The data are based on approximations or expectations of the waste volumes. Also, since only disposition streams that are currently recognized have been identified in the reported data, sites may identify additional waste streams in the future. Environmental restoration projects and decontamination and decommissioning activities have very broad levels of uncertainty associated with them and can result in highly variable estimates of waste volumes. Future DOE missions may also create additional waste streams with large



uncertainties in waste volume estimates. It should also be noted that other sites with small amounts of TRU waste may be identified in the future. Though containing uncertainties, the data generally provide a good baseline estimate for evaluating resource requirements for the disposal of TRU waste.

Table 2.3.1.14-1 provides a summary comparing the data used in the Plan with that contained in the current IPABS. The Plan data reflects changes and modifications provided directly by the sites during the third and fourth quarters of FY 2000. As noted in the table, the volume reported in the IPABS is approximately 50 percent more than the volume reported in the Plan. The major differences between IPABS and the Plan are:

- Approximately 3,400 m<sup>3</sup> from Hanford that reflects a reduction in their volumes over that reported in the IPABS;
- The INEEL original projected volume of 111,221.3 m<sup>3</sup> CH TRU waste listed in the IPABS included 5,000 m<sup>3</sup> of TRU waste from the HLW program and 106,221.3 m<sup>3</sup> from environmental restoration activities. Of this volume, 72,832 m<sup>3</sup> is contaminated soils that will result in 4,823 m<sup>3</sup> of waste following treatment; 33,389 m<sup>3</sup> is contaminated debris that will result in 2,767.3 m<sup>3</sup> of waste following treatment. The TRU waste from HLW and environmental restoration activities total 12,590.3 m<sup>3</sup>, the amount projected;
- Approximately 3,100 m<sup>3</sup> from LANL that reflects a volume increase due to a reevaluation of LANL waste;
- The 1,550 m<sup>3</sup> for ORNL that considers volume reduction over the volume included in the IPABS; and
- Approximately 10,200 m<sup>3</sup> from RFETS, which constitute volumes already considered dispositioned and estimated volumes to be generated during future decontamination and decommissioning activities (i.e., environmental restoration).

The remaining differences are small.

To minimize differences in the data and subsequently improve consistency in the reporting of TRU waste data, the CBFO has initiated a campaign to improve DOE TRU waste inventory knowledge. The CBFO's initiative will focus on centralizing the routine update of the sites' TRU waste information at WIPP. Key to this update will be the ability to correlate changes in the data with changes in DOE policies, regulatory changes, site programmatic changes, intersite shipments, disposal of waste, and improvements or changes in the sites' waste characterization processes. These controlled, routine updates will be maintained under a configuration management program and will form the basis of TRU waste information coordinated in the IPABS with the site budget forecasts. This information will also form the building blocks of the TWBIR and the CID to assure consistency in the use and presentation of these data for these interrelated programs, as well as other programs as additional needs are

identified. To satisfy certain needs, such as to support the CCA through the TWBIR, more detailed physical form information will be required, but the basic TRU waste volume information will be consistent with that used in the IPABS and the CID. Personnel will be working through early calendar year 2001 to better define the reporting and general understanding of TRU waste forms and volumes and any needs associated with disposal. This information will be the basis for the Optimization Plan and future revisions of the National TRU Waste Management Plan.



**Table 2.3.1.14-1 - Comparison of NTWMP Waste Volumes and Current IPABS Estimates**

| SITE NAME   | Abbreviation | CH TRU Waste Volume (m <sup>3</sup> ) |               |                    | RH TRU Waste Volume (m <sup>3</sup> ) |               |                    | Totals               |                | IPABS     | Difference  |
|---|--------------|---------------------------------------|---------------|--------------------|---------------------------------------|---------------|--------------------|----------------------|----------------|-----------|-------------|
|   |              | Stored (1)                            | Projected (2) | To Be Disposed (3) | Stored (1)                            | Projected (2) | To Be Disposed (3) | Stored and Projected | To Be Disposed | Totals    | IPABS-NTWMP |
| ARCO Medical Products Co. (5)                           | ARCO         | 0.1                                   | 0.0           | 0.0                | 0.0                                   | 0.0           | 0.0                | 0.1                  | 0.0            | NR (4)    |             |
| Argonne National Laboratory - East                      | ANL-E        | 95.0                                  | 151.0         | 150.6              | 1.0                                   | 76.0          | 36.7               | 323.0                | 187.3          | 354.0     | 31.0        |
| Argonne National Laboratory - West                      | ANL-W        | 0.0                                   | 0.0           | 0.0                | 24.1                                  | 30.4          | 54.5               | 54.5                 | 54.5           | 14.0      | -40.5       |
| Babcock & Wilcox - NES (6)                              | B&W-NES      | 18.1                                  | 0.0           | 18.1               | 0.0                                   | 0.0           | 0.0                | 18.1                 | 18.1           | NR (4)    |             |
| Battelle Columbus Laboratories                          | BCL          | 0.0                                   | 4.2           | 4.2                | 0.0                                   | 20.8          | 20.8               | 25.0                 | 25.0           | 31.0      | 6.0         |
| Bettis Atomic Power Laboratory                          | BAPL         | 17.6                                  | 0.0           | 17.6               | 3.0                                   | 0.0           | 3.0                | 20.6                 | 20.6           | NR (4)    |             |
| Energy Technology Engineering Center                    | ETEC         | 2.3                                   | 0.0           | 2.3                | 8.7                                   | 0.0           | 5.5                | 11.0                 | 7.8            | 11.0      | 0.0         |
| General Electric-Vallecitos Nuclear Center (6)          | GE-VNC       | 9.0                                   | 0.0           | 9.0                | 11.8                                  | 0.0           | 11.8               | 20.8                 | 20.8           | 20.0      | -0.8        |
| Hanford Reservation                                     | Hanford      | 16,100.0                              | 15,900.0      | 13,600.0           | 200.0                                 | 700.0         | 800.0              | 32,900.0             | 14,400.0       | 36,299.0  | 3,399.0     |
| Idaho National Engineering and Environmental Laboratory | INEEL        | 64,878.0                              | 12,590.3      | 44,461.3           | 85.0                                  | 0.0           | 85.0               | 77,553.3             | 44,546.3       | 171,280.0 | (7)         |
| Knolls Atomic Power Laboratory                          | KAPL         | 0.0                                   | 0.0           | 0.0                | 3.7                                   | 6.8           | 10.5               | 10.5                 | 10.5           | NR (4)    |             |
| Knolls Atomic Power Lab-Nuclear Fuel Services           | KAPL-NFS     | 5.0                                   | 208.0         | 213.0              | 0.0                                   | 0.0           | 0.0                | 213.0                | 213.0          | NR (4)    |             |
| Lawrence Berkeley National Laboratory (5)               | LBNL         | 1.1                                   | 0.0           | 0.0                | 0.0                                   | 0.0           | 0.0                | 1.1                  | 0.0            | 2.0       | 0.9         |
| Lawrence Livermore National Laboratory                  | LLNL         | 295.0                                 | 1,220.0       | 971.0              | 0.0                                   | 0.0           | 0.0                | 1,515.0              | 971.0          | 1,714.0   | 199.0       |
| Los Alamos National Laboratory                          | LANL         | 9,212.6                               | 13,643.9      | 14,888.9           | 99.4                                  | 24.1          | 120.0              | 22,980.0             | 15,008.9       | 19,944.0  | -3,036.0    |
| Lovelace Respiratory Research Institute (8)             | LRRI         | 5.7                                   | 14.2          | 0.0                | 0.0                                   | 0.0           | 0.0                | 19.9                 | 0.0            | 15.0      | -4.9        |
| Missouri University Research Reactor                    | MURR         | 1.4                                   | 0.0           | 1.4                | 0.0                                   | 0.0           | 0.0                | 1.4                  | 1.4            | NR (4)    |             |
| Mound Plant   | Mound        | 247.0                                 | 0.0           | 247.0              | 0.0                                   | 0.0           | 0.0                | 247.0                | 247.0          | 247.0     | 0.0         |
| Nevada Test Site  | NTS          | 665.0                                 | 0.0           | 720.0              | 0.0                                   | 0.0           | 0.0                | 665.0                | 720.0          | 666.0     | 1.0         |
| Oak Ridge National Laboratory                           | ORNL         | 963.0                                 | 519.6         | 542.2              | 1,342.0                               | 911.5         | 668.4              | 3,736.1              | 1,210.6        | 5,288.0   | 1,551.9     |
| Paducah Gaseous Diffusion Plant (9)                     | PGDP         | 11.7                                  | 0.0           | 0.0                | 0.0                                   | 0.0           | 0.0                | 11.7                 | 0.0            | 5.0       | -6.7        |
| Rocky Flats Environmental Technology Site               | RFETS        | 5,307.0                               | 10,557.0      | 14,749.0           | 0.0                                   | 0.0           | 0.0                | 15,864.0             | 14,749.0       | 5,620.0   | -10,244.0   |
| Sandia National Laboratories-New Mexico (8)             | SNL-NM       | 24.6                                  | 63.9          | 0.0                | 1.4                                   | 24.1          | 0.0                | 114.0                | 0.0            | 124.0     | -10.0       |
| Savannah River Site                                     | SRS          | 10,991.0                              | 3,244.0       | 15,975.0           | 0.0                                   | 0.0           | 0.0                | 14,235.0             | 15,975.0       | 14,033.0  | -202.0      |
| Separations Process Research Unit                       | SPRU         | 0.0                                   | 470.0         | 50.0               | 0.0                                   | 0.0           | 0.0                | 470.0                | 50.0           | 470.0     | 0.0         |
| U.S. Army Material Command                              | USAMC        | 2.5                                   | 0.0           | 2.5                | 0.0                                   | 0.0           | 0.0                | 2.5                  | 2.5            | NR (4)    |             |
| West Valley Demonstration Project (5)                   | WVDP         | 73.0                                  | 20.0          | 0.0                | 467.0                                 | 12.0          | 0.0                | 572.0                | 0.0            | 572.0     | 0.0         |
| Totals  |              | 108,883.7                             | 58,528.0      | 106,623.1          | 2,245.7                               | 1,781.6       | 1,816.2            | 171,439.0            | 108,439.3      | 256,709.0 | -----       |



Footnotes for Table 2.3.1.14-1

- (1) The collection and management of waste for the purposes of awaiting treatment or disposal capability, in such a manner as to not constitute disposal of the waste.
- (2) The part of the inventory that has not been generated but is currently estimated to be generated at some time in the future.
- (3) Volume to be disposed of at WIPP. The quantities reflect any volumetric expansion or reduction that would occur during waste processing.
- (4) Not reported.
- (5) Waste is of commercial origin and does not meet the Land Withdrawal Act (LWA) requirement for disposal at WIPP.
- (6) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (7) The original projected volume of 111,221.3 m<sup>3</sup> listed in the IPABS included 5,000 m<sup>3</sup> of TRU waste from the high-level waste (HLW) program and 106,221.3 m<sup>3</sup> from environmental restoration activities. Of this volume, 72,832 m<sup>3</sup> is contaminated soils that will result in 4,823 m<sup>3</sup> of waste following treatment; 33,300 m<sup>3</sup> is contaminated debris that will result in 2,767.3 m<sup>3</sup> of waste following treatment. The TRU waste from HLW and environmental restoration activities total 12,590.3 m<sup>3</sup>, the amount projected.
- (8) Waste from LRRRI is shipped to SNL-NM for subsequent shipment with SNL-NM waste to LANL. LRRRI and SNL-NM waste total waste volumes of 19.9 m<sup>3</sup> and 88.5 m<sup>3</sup>, respectively, are included in the LANL total waste volume.
- (9) Waste from PGDP will be shipped to ORNL for subsequent shipment to WIPP for disposal.

#### **2.3.1.15 WIPP Panel Closure**

To comply with the RCRA air pathway requirements, each waste disposal panel, or hazardous waste disposal unit, must be closed when filled, or when no longer in use and the next panel is being filled. The original design of the panel closures was to reduce the potential releases of volatile organic compounds from exceeding health-based limits. The current design for panel closure, however, may significantly exceed the required performance level and, if so, can be modified without impacting human health or the environment.

WIPP developed performance-based design criteria with different levels of rigor (i.e., options) to provide closure based upon:

- The condition of the panel opening, and
- The length of time the repository is scheduled to remain open after the panel is closed.

These performance-based design criteria, as well as the design to meet the criteria, were submitted to the NMED and to the EPA to satisfy regulatory requirements.

The EPA directed that only the most robust option be used for closure rather than allowing WIPP to exercise options based upon factors such as ground conditions. In addition, the EPA specified that Salado Mass Concrete be used as a medium to build the closure versus regular Portland cement or salt-saturated concrete. The NMED mirrored the EPA rulemaking and directed the selection of the most robust option.

The DOE believes there may be a more cost-effective method to achieve the closure requirements mandated by the regulatory agencies. As such, the CBFO is developing a performance-based panel closure specification and design that would continue to ensure protection of human health and the environment. The new specification is being designed to meet the requirements of both RCRA and EPA and still be made from Portland or salt-saturated concrete.

The performance-based approach and any proposed modifications to the panel closure system design will be completed for submission to the EPA and the NMED in FY 2001.

#### **2.3.1.16 WIPP Recertification**

The WIPP Land Withdrawal Act of 1992 requires the EPA to regulate, or set standards, for the storage and disposal of TRU waste. WIPP is required to recertify to these standards within the first five years after initial waste receipt and once every five years thereafter until disposal operations conclude. To date, the strategy of the recertification process is to demonstrate continued compliance with the original certification.

Since the original certification compliance decision, the DOE is developing a revised strategy that will continue to protect human health and the environment, provide



operational flexibility, and focus on implementing performance-based waste characterization requirements. The strategy is dependent on the determination of operational, design, or other changes as "nonsignificant" or "significant."

Nonsignificant changes could be made to the certification basis provided that the change does not differ significantly from the original certification. Nonsignificant changes may be implemented, but must be reported to the EPA annually along with a justification describing why the change is not significant. In some instances, these types of changes may require EPA approval prior to implementation depending on the potential impact they may have on the original certification.

Planned changes that differ significantly from activities and conditions pertaining to the disposal system described in the compliance certification application may be implemented provided the EPA concurs with the DOE's justification that the changes do not lead to noncompliance with the disposal standards. Planned or unplanned changes that differ significantly from what was indicated in the most recent compliance application may be subject to a modification of the certification decision. These proposed changes would require a public notification, public comment period, and rulemaking prior to approval by the EPA.

#### 2.3.1.17 Improving Operations and Long-Term Safety of WIPP

The National Research Council, organized by the National Academy of Sciences to provide services to the federal government, convened a committee of experts to advise the DOE on the operation of WIPP. The committee was asked to provide recommendations on two issues: (1) a research agenda to enhance confidence in the long-term performance of WIPP; and (2) increasing the throughput, efficiency, and cost-benefit without compromising safety of the National TRU Program for characterizing, certifying, packaging, and shipping waste to WIPP. In its interim report, the committee provided the DOE with recommendations on several issues that the committee believes merit immediate consideration and action. In developing their report, the committee was guided by the principle of "reasonableness" with respect to risks, costs, and the ALARA (as low as reasonably achievable) principle.

The CBFO adopted the Council's recommendations as part of its planning to bring WIPP to its full potential. The recommendations are listed in the following text. A brief summary of the CBFO response follows each recommendation.

- Plan to sample oil-field brines, petroleum, and solids associated with current hydrocarbon production to assess the magnitude and variability of naturally occurring radioactive material (NORM) in the vicinity of the WIPP site. *CBFO Response: The New Mexico State University Carlsbad Environmental Monitoring & Research Center (CEMRC) has undertaken a project to carry out the recommended assessment, as part of CERMRC's ongoing WIPP Environment Monitoring project.*



- Eliminate self-imposed waste characterization requirements that lack a legal or safety basis. *CBFO Response: The DOE has developed and begun the implementation of a strategy to systematically improve the Waste Analysis Plan by reducing the frequency of waste characterization and implementing methods that make characterization simpler, less expensive, and, above all, safer.*
- Derive a more realistic radiolytic gas generation model. *CBFO Response: An application for Revision 19 of the TRUPACT-II Safety Analysis Report was submitted to the Nuclear Regulatory Commission in April 2000. Among other things, the application addresses this recommendation.*
- Perform a safety analysis to determine the concentration and quantity of hydrogen that, upon ignition, could damage the seals of the TRUPACT-II shipping container. *CBFO Response: The following steps will be pursued to respond to this recommendation:*
  - *Perform a safety analysis to determine whether WIPP could unload drums of waste that contained flammable gas;*
  - *Assess packaging suitability for macro-encapsulation to contain potential deflagration events;*
  - *Determine the incremental quantity of waste that could benefit from implementation of this recommendation, assuming the current application for Revision 19 to the TRUPACT-II Safety Analysis Report is approved (see report entitled "CH TRU Waste Inventory Analysis: Waste Requiring Path Forward After Approval of Revision 19 of the TRUPACT-II SAR," to be completed in February 2001);*
  - *Perform the recommended analysis; conduct testing, if warranted;*
  - *Evaluate the results of the previous actions and, if necessary, prepare an application and submit it to the NRC for review; and*
  - *Seek DOT concurrence.*
- Consider technical approaches for reducing hazards from hydrogen generation. *CBFO Response: The DOE is actively pursuing several alternative technologies such as hydrogen "getters."*
- Reevaluate the technical and regulatory feasibility of shipping high-wattage TRU waste using a railcar shipping system. *CBFO Response: The following steps will be pursued to respond to this recommendation:*
  - *Determine the incremental inventory of TRU waste that could benefit from rail shipment;*

- *Evaluate and compare the benefits and regulatory difficulty of two packaging options;*
- *Make a decision based on information obtained; and*
- *Proceed with the chosen option.*
- Consider cost-effective ways to improve the reliability and ease of use of the TRANSCOM system, either by improving or replacing it. *CBFO Response: The DOE has been working toward this effort since mid-1998. In September 2000, the DOE National Transportation Program-Albuquerque presented a response to the interim report to attending committee members. The presentation reviewed improvements to the present TRANSCOM system and demonstrated the new web-based TRANSCOM2000 system.*
- Explore with states and other interested parties how to develop processes and tools for maintaining up-to-date spatial information on the location, capabilities, and contact information of responders, medical facilities, recovery equipment, regional response teams, and other resources that might be needed to respond to a WIPP transportation incident. *CBFO Response: The DOE will work with the regional, state, and Indian tribal governments with whom it has cooperative agreements to respond, analyze, and develop a path forward on this recommendation.*

The committee will provide a more comprehensive response to its task statement in the final report, scheduled for completion in the spring of 2001. As discussed in Section 1.5, Improvements to the Plan, the quarterly supplement to the Plan will provide a status of the progress being made concerning these recommendations.

### **2.3.2 Life-Cycle Waste Management Planning**

Life-cycle planning is a collection of generally sequential project phases whose name and number are determined by the control needs of the organization(s) involved in the project. Life-cycle waste management planning requires an understanding of the volumes and characteristics of TRU waste in storage and projected to be generated, the availability and need for waste management facilities, and an approach for assessing program progress and compliance with elements of the program strategy. The development of the integrated program strategy is based on an understanding of the life-cycle waste management planning across the DOE TRU waste system and recognizes the vision of achieving the desired end state. Achieving this end state generally requires the integration of TRU waste inventory knowledge (in storage and to be generated) with life-cycle waste management planning to create a systemwide configuration. It also requires:

- Identifying and prioritizing site-specific waste management programs and projects necessary to achieve the desired systemwide configuration and to comply with applicable regulations and orders,



- Integrating site-specific waste management planning across the TRU waste system with the transportation system and disposal capabilities,
- Improving current and developing new technologies to affect an improvement in public health and safety, and efficiency in managing TRU waste, and
- Identifying and evaluating potential strategies for the disposal of TRU waste that currently cannot be accepted for disposal at WIPP.

Assessing progress in the course of implementing the integrated program strategy also is a key component of life-cycle planning. The DOE Office of Integration and Disposition and the CBFO will assess the status of compliance with the objectives, and determine the need for reassessing or modifying the integrated program strategy. This assessment will require activities such as self-assessments, oversight assessments, progress tracking and reporting, and management reviews.

### **2.3.3 Waste Minimization and Pollution Prevention**

The DOE Pollution Prevention Program is required by several internal and external drivers. In addition to specific regulatory requirements in the Resource Conservation and Recovery Act (RCRA), two Executive Orders (13101 and 13148) require the DOE to recycle and reduce wastes and control toxic chemical releases. Internal directives include DOE Order 435.1 and DOE Order 5400.1 for waste generators. DOE Order 5400.1 requires all sites to complete a site pollution prevention (P2) plan update every three years that provides details of their current and future program actions to reduce waste. Sites must outline their plans to comply with complexwide waste reduction goals issued by the Secretary.

In November 1999, the Secretary of Energy issued complexwide waste reduction goals to be achieved by the end of 2005. The goals require the DOE to reduce the generation of TRU waste from routine operations, such as equipment maintenance, by 80 percent compared to a 1993 baseline. In addition, there is an annual requirement to reduce all waste resulting from cleanup, stabilization, and decommissioning activities by 10 percent. This annual 10 percent goal includes TRU waste from environmental restoration, deactivation and decommissioning activities. Site project managers are required to evaluate their project activities to determine if cost-effective pollution prevention techniques can be applied to reduce waste and disposal cost. Operations and Field Offices managers are required to set goal targets for waste reduction (based on planned restoration and decontamination and decommissioning activities) each fiscal year as part of the EM management commitment process.

Visit the DOE EM-22 Pollution Prevention Team's web site(s) (<http://www.em.doe.gov/wastemin> or <http://twilight.saic.com/wastemin>), for links to ongoing projects, including data from the Annual Report of Waste Generation and Pollution Prevention Progress and the Pollution Prevention Progress Reports (quarterly reports).



### **2.3.4 Implementation of DOE Order 435.1**

DOE Order 435.1, "Radioactive Waste Management," was issued on July 9, 1999. The Order applies to all new and existing radioactive waste management facilities, operations, and activities. Requirements are to be implemented as soon as possible, with compliance to be achieved within one year of issuance. If compliance with this Order cannot be achieved within one year of its issuance, the Field Element Manager must request approval to extend the compliance date to no later than October 1, 2001, from the cognizant Program Secretarial Officer (EM-1). The issuance of Revision 2 of the Plan fulfills the obligation of the Deputy Assistant Secretary for Integration and Disposition to develop a systemwide program plan for TRU waste.

# Chapter 3.0

## The TRU Waste System Baseline Plan



### 3.0 THE TRU WASTE SYSTEM BASELINE PLAN

As identified in earlier sections, there are 27 DOE TRU waste sites, each having the similar goal of removal of TRU wastes from its facility. The activities required to meet this goal differ greatly among the sites. This chapter of the Plan integrates those activities and details the methods for measuring and reporting progress.

#### 3.1 Management of DOE TRU Waste

The NTP Office is responsible for the disposition of all DOE TRU waste. As stated in Chapter 2, the mission of the program is to implement a TRU waste system that achieves the desired end state at each site. Key to achieving the end state is the understanding of the types and quantity of waste that must be disposed of. The TRU waste sites provided volume information in the IPABS management tool. The information was compiled and used in this document as a basis for planning. In addition, the TRU waste sites provided information on the characteristics of the TRU waste and how these characteristics may affect the manner in which the waste is managed.

The total volume of TRU waste currently managed by the DOE (stored and projected) is estimated to be 171,439 m<sup>3</sup> of which 167,412 m<sup>3</sup> is CH TRU and 4,027 m<sup>3</sup> is RH TRU waste. A portion of this waste will be treated or repackaged prior to disposal, and the reported volumes may change depending on the selected treatment or repackaging methodology. The volume to be disposed of at WIPP is 108,439 m<sup>3</sup>, of which 106,623 m<sup>3</sup> is CH TRU, and 1,816 m<sup>3</sup> is RH TRU waste. WIPP's total capacity for both CH TRU waste and RH TRU waste is set at 175,600 m<sup>3</sup> by the Land Withdrawal Act, with the total volume of RH TRU waste not exceeding 7,080 m<sup>3</sup>. Table 3.1-1 shows stored, projected, and disposal volumes of CH TRU waste by site; Table 3.1-2 shows the same information for RH TRU waste by site.

Table 3.1-1 - Stored, Projected, and Disposal Volumes of CH TRU Waste by Site

| SITE NAME   | ABBREVIATION | LOCATION         | CH TRU Waste Volume (m <sup>3</sup> ) |                  |                  |                             |                          |
|---|--------------|------------------|---------------------------------------|------------------|------------------|-----------------------------|--------------------------|
|   |              |                  | Stored<br>(1)                         | Projected<br>(2) | Total            | Disposed<br>(Actual)<br>(3) | To Be<br>Disposed<br>(4) |
| ARCO Medical Products Co. (5)                           | ARCO         | West Chester, PA | 0.1                                   | 0.0              | 0.1              | 0.0                         | 0.0                      |
| Argonne National Laboratory - East                      | ANL-E        | Argonne, IL      | 95.0                                  | 151.0            | 246.0            | 0.0                         | 150.6                    |
| Argonne National Laboratory - West                      | ANL-W        | Idaho Falls, ID  | 0.0                                   | 0.0              | 0.0              | 0.0                         | 0.0                      |
| Babcock & Wilcox - NES (6)                              | B&W-NES      | Lynchburg, VA    | 18.1                                  | 0.0              | 18.1             | 0.0                         | 18.1                     |
| Battelle Columbus Laboratories                          | BCL          | Columbus, OH     | 0.0                                   | 4.2              | 4.2              | 0.0                         | 4.2                      |
| Bettis Atomic Power Laboratory                          | BAPL         | West Mifflin, PA | 17.6                                  | 0.0              | 17.6             | 0.0                         | 17.6                     |
| Energy Technology Engineering Center                    | ETEC         | Santa Susana, CA | 2.3                                   | 0.0              | 2.3              | 0.0                         | 2.3                      |
| General Electric-Vallecitos Nuclear Center (6)          | GE-VNC       | Pleasanton, CA   | 9.0                                   | 0.0              | 9.0              | 0.0                         | 9.0                      |
| Hanford Reservation                                     | Hanford      | Richland, WA     | 16,100.0                              | 15,900.0         | 32,000.0         | 36.0                        | 13,600.0                 |
| Idaho National Engineering and Environmental Laboratory | INEEL        | Idaho Falls, ID  | 64,878.0                              | 12,590.3 (7)     | 77,468.3         | 205.0                       | 44,461.3                 |
| Knolls Atomic Power Laboratory                          | KAPL         | Niskayuna, NY    | 0.0                                   | 0.0              | 0.0              | 0.0                         | 0.0                      |
| Knolls Atomic Power Lab-Nuclear Fuel Services           | KAPL-NFS     | Erwin, TN        | 5.0                                   | 208.0            | 213.0            | 0.0                         | 213.0                    |
| Lawrence Berkeley National Laboratory (5)               | LBL          | Berkeley, CA     | 1.1                                   | 0.0              | 1.1              | 0.0                         | 0.0                      |
| Lawrence Livermore National Laboratory                  | LLNL         | Livermore, CA    | 295.0                                 | 1,220.0          | 1,515.0          | 0.0                         | 971.0                    |
| Los Alamos National Laboratory                          | LANL         | Los Alamos, NM   | 9,212.6                               | 13,643.9         | 22,856.5         | 190.0                       | 14,888.9                 |
| Lovelace Respiratory Research Institute (8)             | LRRI         | Albuquerque, NM  | 5.7                                   | 14.2             | 19.9             | 0.0                         | 0.0                      |
| Missouri University Research Reactor                    | MURR         | Columbia, MO     | 1.4                                   | 0.0              | 1.4              | 0.0                         | 1.4                      |
| Mound Plant   | Mound        | Miamisburg, OH   | 247.0                                 | 0.0              | 247.0            | 0.0                         | 247.0                    |
| Nevada Test Site  | NTS          | Mercury, NV      | 665.0                                 | 0.0              | 665.0            | 0.0                         | 720.0                    |
| Oak Ridge National Laboratory                           | ORNL         | Oak Ridge, TN    | 963.0                                 | 519.6            | 1,482.6          | 0.0                         | 542.2                    |
| Paducah Gaseous Diffusion Plant (9)                     | PGDP         | Paducah, KY      | 11.7                                  | 0.0              | 11.7             | 0.0                         | 0.0                      |
| Rocky Flats Environmental Technology Site               | RFETS        | Golden, CO       | 5,307.0                               | 10,557.0         | 15,864.0         | 508.0                       | 14,749.0                 |
| Sandia National Laboratories-New Mexico (8)             | SNL-NM       | Albuquerque, NM  | 24.6                                  | 63.9             | 88.5             | 0.0                         | 0.0                      |
| Savannah River Site                                     | SRS          | Aiken, SC        | 10,991.0                              | 3,244.0          | 14,235.0         | 0.0                         | 15,975.0                 |
| Separations Process Research Unit                       | SPRU         | Schenectady, NY  | 0.0                                   | 470.0            | 470.0            | 0.0                         | 50.0                     |
| U.S. Army Material Command                              | USAMC        | Rock Island, IL  | 2.5                                   | 0.0              | 2.5              | 0.0                         | 2.5                      |
| West Valley Demonstration Project (5)                   | WVDP         | West Valley, NY  | 73.0                                  | 20.0             | 93.0             | 0.0                         | 0.0                      |
| <b>Total Waste Volumes (10)</b>                         |              |                  | <b>108,883.7</b>                      | <b>58,528.0</b>  | <b>167,411.7</b> | <b>939.0</b>                | <b>106,623.1</b>         |

Footnotes for Table 3.1-1

- (1) The collection and management of waste for the purposes of awaiting treatment or disposal capability, in such a manner as to not constitute disposal of the waste.
- (2) The part of the inventory that has not been generated but is currently estimated to be generated at some time in the future.
- (3) Volume disposed of at WIPP as of December 31, 2000.
- (4) Volume to be disposed of at WIPP. The quantities reflect any volumetric expansion or reduction that would occur during waste processing.
- (5) Waste is of commercial origin and does not meet the LWA requirement for disposal at WIPP.
- (6) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (7) The original projected volume of 111,221.3 m<sup>3</sup> listed in the IPABS included 5,000 m<sup>3</sup> of TRU waste from the HLW program and 106,221.3 m<sup>3</sup> from environmental restoration activities. Of this volume, 72,832 m<sup>3</sup> is contaminated soils that will result in 4,823 m<sup>3</sup> of waste following treatment; 33,389 m<sup>3</sup> is contaminated debris that will result in 2,767.3 m<sup>3</sup> of waste following treatment. The TRU wastes from HLW and environmental restoration activities total 12,590.3 m<sup>3</sup>, the amount projected.
- (8) Waste from LLRI is shipped to SNL-NM for subsequent shipment with SNL-NM waste to LANL. LLRI and SNL-NM total waste volumes of 19.9 m<sup>3</sup> and 88.5 m<sup>3</sup>, respectively, are included in the LANL total waste volume.
- (9) Waste from PGDP will be shipped to ORNL for subsequent shipment to WIPP for disposal. PGDP total waste volume of 11.7 m<sup>3</sup> is included in the ORNL total waste volume.
- (10) The total waste volume to be disposed of differs slightly from the 106,387 m<sup>3</sup> cited in the Revision to the Record of Decision for the DOE's Waste Management Program: Treatment and Storage of Transuranic Waste, published in the *Federal Register* on December 29, 2000. The change (236 m<sup>3</sup>) is due to subsequent clarifications of: (1) the amount of waste to be shipped from RFETS in FY 2005 (an additional 295 m<sup>3</sup>); and (2) the amount of waste from LLRI and SNL-NM to be shipped to LANL before the end of FY 2034 (a decrease of 59 m<sup>3</sup>). It should be noted that the total waste volume shown in the table is still significantly below the 113,592 m<sup>3</sup> originally evaluated in the Waste Management Programmatic Environmental Impact Statement (DOE/EIS-0200-F, May 1997).



Table 3.1-2 - Stored, Projected, and Disposal Volumes of RH TRU Waste by Site

| SITE NAME   | ABBREVIATION | LOCATION         | RH TRU Waste Volume (m <sup>3</sup> ) |                  |         |                          |
|---|--------------|------------------|---------------------------------------|------------------|---------|--------------------------|
|   |              |                  | Stored<br>(1)                         | Projected<br>(2) | Total   | To Be<br>Disposed<br>(3) |
| ARCO Medical Products Co.                               | ARCO         | West Chester, PA | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Argonne National Laboratory - East                      | ANL-E        | Argonne, IL      | 1.0                                   | 76.0             | 77.0    | 36.7                     |
| Argonne National Laboratory - West                      | ANL-W        | Idaho Falls, ID  | 24.1                                  | 30.4             | 54.5    | 54.5                     |
| Babcock & Wilcox - NES                                  | B&W-NES      | Lynchburg, VA    | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Battelle Columbus Laboratories                          | BCL          | Columbus, OH     | 0.0                                   | 20.8             | 20.8    | 20.8                     |
| Bettis Atomic Power Laboratory                          | BAPL         | West Mifflin, PA | 3.0                                   | 0.0              | 3.0     | 3.0                      |
| Energy Technology Engineering Center                    | ETEC         | Santa Susana, CA | 8.7                                   | 0.0              | 8.7     | 5.5                      |
| General Electric-Vallecitos Nuclear Center (4)          | GE-VNC       | Pleasanton, CA   | 11.8                                  | 0.0              | 11.8    | 11.8                     |
| Hanford Reservation                                     | Hanford      | Richland, WA     | 200.0                                 | 700.0            | 900.0   | 800.0                    |
| Idaho National Engineering and Environmental Laboratory | INEEL        | Idaho Falls, ID  | 85.0                                  | 0.0              | 85.0    | 85.0                     |
| Knolls Atomic Power Laboratory                          | KAPL         | Niskayuna, NY    | 3.7                                   | 6.8              | 10.5    | 10.5                     |
| Knolls Atomic Power Lab-Nuclear Fuel Services           | KAPL-NFS     | Erwin, TN        | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Lawrence Berkeley National Laboratory                   | LBNL         | Berkeley, CA     | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Lawrence Livermore National Laboratory                  | LLNL         | Livermore, CA    | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Los Alamos National Laboratory                          | LANL         | Los Alamos, NM   | 99.4                                  | 24.1             | 123.5   | 120.0                    |
| Lovelace Respiratory Research Institute                 | LRRI         | Albuquerque, NM  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Missouri University Research Reactor                    | MURR         | Columbia, MO     | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Mound Plant   | Mound        | Miamisburg, OH   | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Nevada Test Site  | NTS          | Mercury, NV      | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Oak Ridge National Laboratory                           | ORNL         | Oak Ridge, TN    | 1,342.0                               | 911.5            | 2,253.5 | 668.4                    |
| Paducah Gaseous Diffusion Plant                         | PGDP         | Paducah, KY      | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Rocky Flats Environmental Technology Site               | RFETS        | Golden, CO       | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Sandia National Laboratories (5)                        | SNL-NM       | Albuquerque, NM  | 1.4                                   | 24.1             | 25.5    | 0.0                      |
| Savannah River Site                                     | SRS          | Aiken, SC        | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| Separations Process Research Unit                       | SPRU         | Schenectady, NY  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| U.S. Army Material Command                              | USAMC        | Rock Island, IL  | 0.0                                   | 0.0              | 0.0     | 0.0                      |
| West Valley Demonstration Project (6)                   | WVDP         | West Valley, NY  | 467.0                                 | 12.0             | 479.0   | 0.0                      |
| Total Waste Volumes                                     |              |                  | 2,245.7                               | 1,781.6          | 4,027.3 | 1,816.2                  |

Footnotes for Table 3.1-2

- (1) The collection and management of waste for the purposes of awaiting treatment or disposal capability, in such a manner as to not constitute disposal of the waste.
- (2) The part of the inventory that has not been generated but is currently estimated to be generated at some time in the future.
- (3) Volume to be disposed of at WIPP. The quantities reflect any volumetric expansion or reduction that would occur during waste processing.
- (4) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (5) Waste from SNL-NM is shipped to LANL. SNL-NM total waste volume of 25.5 m<sup>3</sup> is included in the LANL total waste volume.
- (6) Waste is of commercial origin and does not meet the LWA requirement for disposal at WIPP.

The total stored and projected volumes were segregated into three categories to enable site TRU program and TRU waste managers and the CBFO to develop operational and strategic plans for managing TRU waste. Figure 3.1-1 presents the following three categories and associated volumes. (Note: volumes are rounded to the nearest hundred for data presentation.)

|   |                        |
|---|------------------------|
| TRU waste with a clear path for disposal      | 46,300 m <sup>3</sup>  |
| TRU waste with a plan for disposal            | 105,200 m <sup>3</sup> |
| TRU waste without a current plan for disposal | 19,900 m <sup>3</sup>  |
| Total   | 171,400 m <sup>3</sup> |

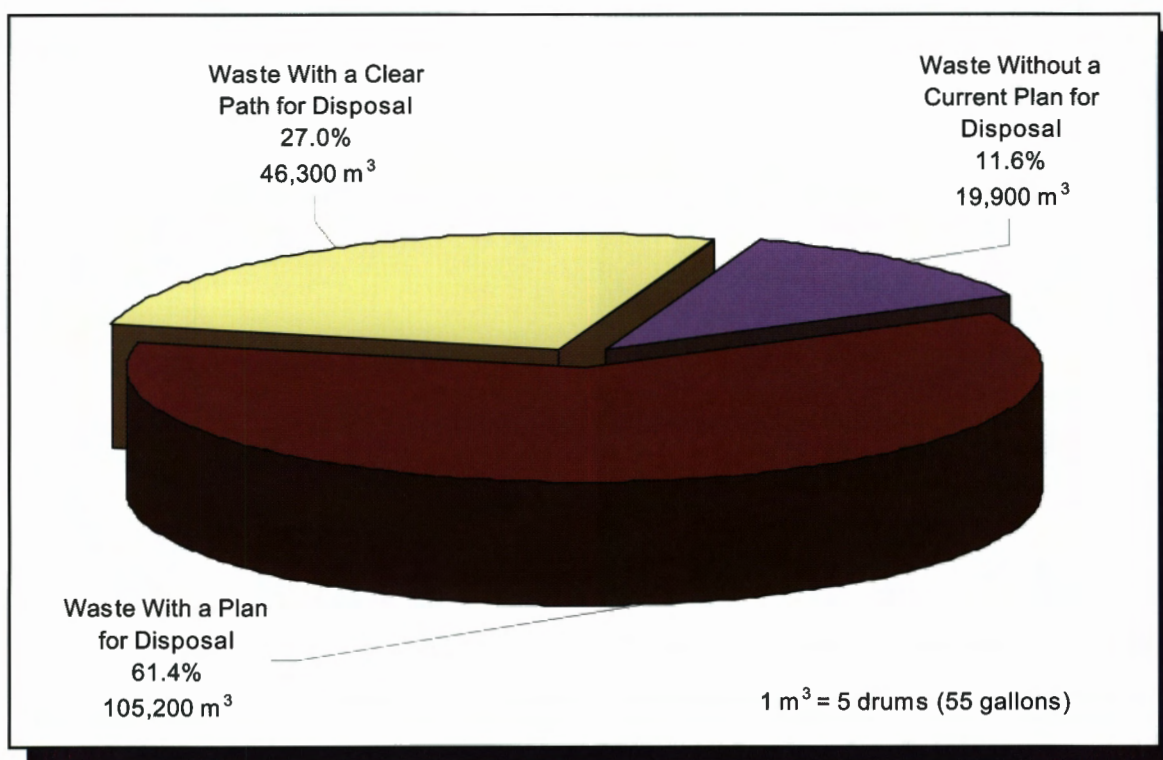


Figure 3.1-1 - TRU Waste Managed by the DOE

### 3.1.1 TRU Waste with a Clear Path for Disposal

WIPP is the DOE's only permitted TRU waste disposal facility. Currently, the only TRU waste with a clear path for disposal is that waste destined for WIPP. Waste with a clear path for disposal is waste that can readily be certified for disposal under the current regulatory framework and that has the associated infrastructure in place for its disposition. WIPP-acceptable waste is defined as defense-generated TRU waste that can conform to the requirements of the WIPP WAC and the WIPP HWFP. As shown in



Figure 3.1-1, 27.0 percent, or 46,300 m<sup>3</sup>, of the TRU waste managed by the DOE has a clear path for disposal, most of which resides at Hanford, LANL, and RFETS.

### 3.1.2 TRU Waste with a Plan for Disposal

Waste with a plan for disposal is waste with an associated need that must be fulfilled prior to the generator site being able to certify the waste for disposal. As shown in Figure 3.1.2-1, these needs are primarily in terms of infrastructure (e.g., planned waste repackaging or treatment facilities), technology needs (e.g., development of a hydrogen gettering device to remove excess hydrogen from waste packages), and regulatory issues (e.g., WIPP requires a change to allow disposal of PCB contaminated waste). The DOE has plans in place for the funding and construction of the required infrastructure as well as for the development and implementation of the required technologies and regulatory change. The plans are represented in the site-specific portions of Appendix 1.

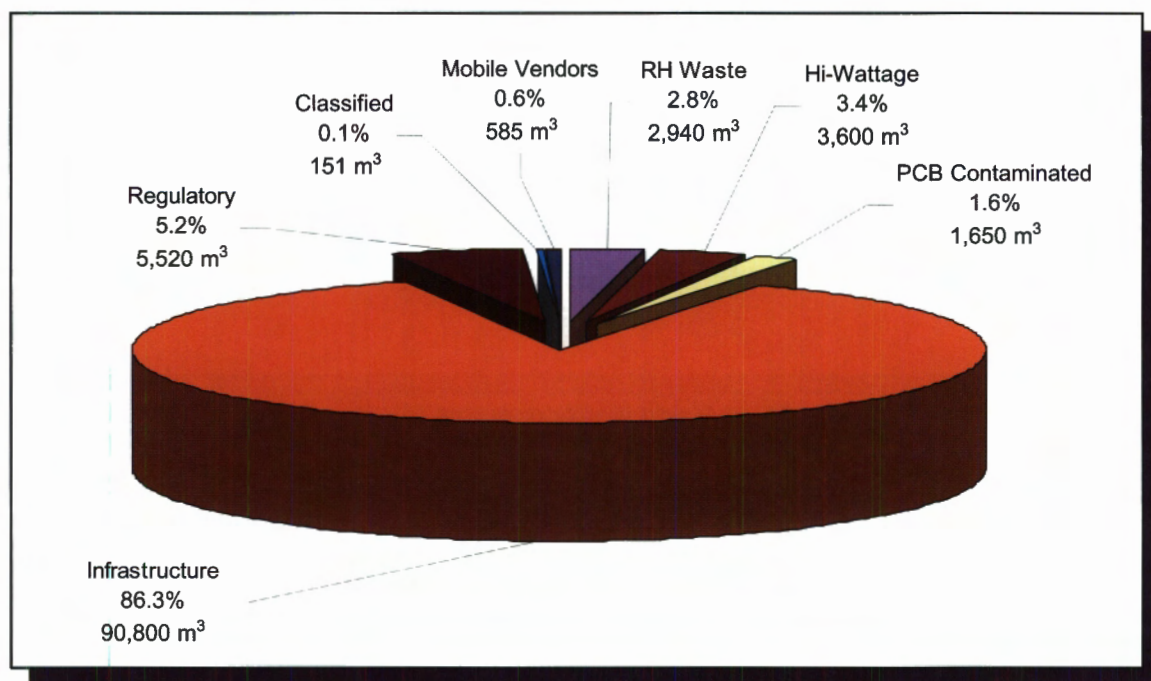


Figure 3.1.2-1 - Associated Needs That Must Be Fulfilled Prior to TRU Waste Disposal at WIPP

### 3.1.3 TRU Waste Without a Current Plan for Disposal

Waste without a current plan for disposal is TRU waste that is either prohibited from disposal at WIPP or will be generated after the end of WIPP's planned operational life. Although a small amount, the waste of primary concern is that prohibited from disposal at WIPP by current legislation, such as waste contaminated with reactive or corrosive substances, and TRU waste generated from nondefense activities (see Figure 3.1.3-1). The remainder of the waste is waste projected to be generated after the end of WIPP's planned operational life. WIPP's planned operational life is based on its being used as a disposal facility for 35 years. At some point close to the end of the assumed

operational lifetime, the facility will be evaluated to determine if it is technically and economically feasible to continue operations. The cost of continued operations will be compared with the cost of building an alternative facility or other means of waste disposal. The over-arching concern will be to ensure the waste has a disposal path. According to DOE Order 435.1, "Radioactive Waste Management," the DOE is responsible for disposition of all categories of TRU waste under its control.

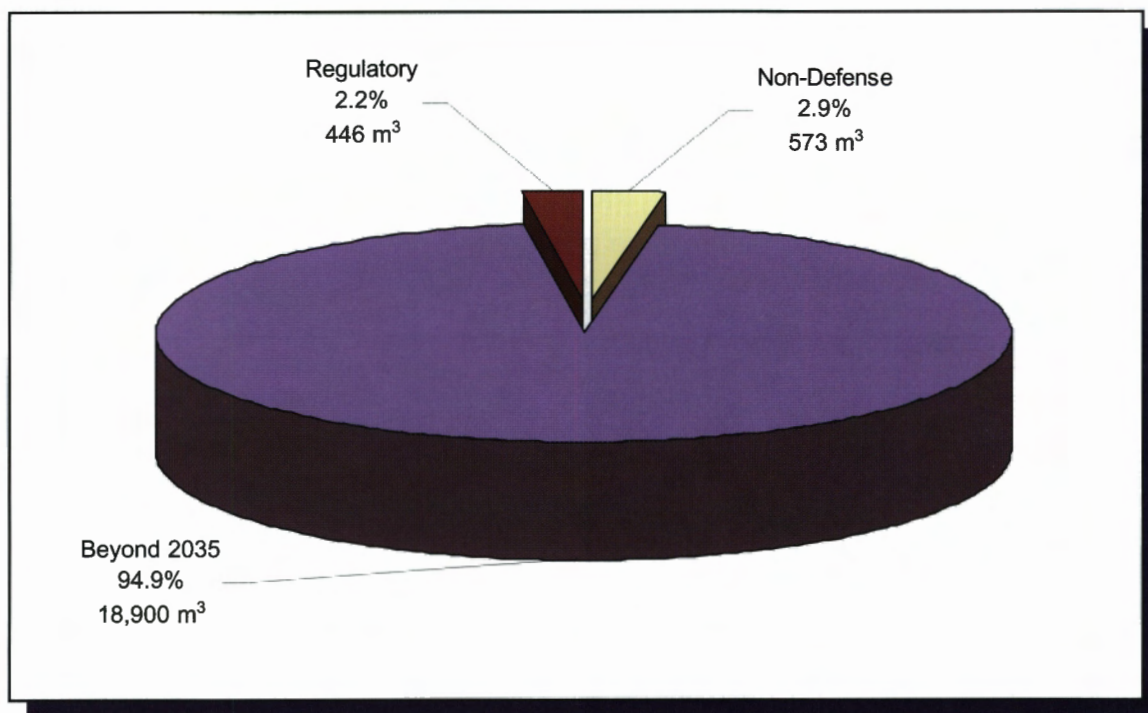


Figure 3.1.3-1 - TRU Waste Not Acceptable for Disposal at WIPP

### 3.2 Management of WIPP-Acceptable Waste

WIPP-acceptable waste includes both waste with a clear path for disposal and waste with a plan for disposal. For planning purposes, sites provided information regarding when associated needs would be resolved and the rates at which waste would be available for disposal. The issues discussed in general terms in Chapter 2 are specifically addressed in the context of the National TRU Waste System Optimization Plan to be published in FY 2001.

Site waste characterization processes are audited by the CBFO to determine compliance with permits, regulations, and procedures. Site-specific planning summaries contained in Appendix 1 list state regulatory agreements with which TRU waste sites must comply, where applicable. The NMED must approve the CBFO's final audit report; and the EPA must inspect and approve of characterization processes.

When a site is prepared to have its waste characterization processes audited, the site requests an audit by the CBFO. The CBFO provides assistance on a prioritized basis.



The order in which sites are audited and certified to ship waste to WIPP is based upon the following criteria:

- Site readiness/ability to characterize and ship waste for disposal;
- State agreements and consent orders (Appendix 1);
- Environmental compliance; and
- Program budget constraints.

Prior to generator sites shipping waste to WIPP, the corridors (or routes) over which the waste will be transported must be "opened." The opening of a shipping corridor includes informing the general public and the elected officials of the associated risk and effectively responding to their concerns. State and tribal governments require emergency preparedness training, training exercises, and hospital-based training to ensure that any accident that may occur can be managed locally. A corridor is considered open when, prior to the announced generator site shipping date, all requests for training and exercises have been completed to the satisfaction of the state or tribal government. Some cities have imposed restrictions on the time of day WIPP shipments may pass through their areas. The purpose of this action is to prevent trucks carrying TRU waste to WIPP from entering into metropolitan areas during traffic congestion. City officials believe the restrictions improve public safety. Transportation corridors from generator sites to WIPP are shown in Figure 3.2-1; corridors from Hanford, INEEL, RFETS, LANL, and SRS to WIPP are open. Proposed transportation corridors from small-quantity sites to WIPP are shown in Figure 3.2-2. The CBFO consults with affected state and tribal governments when proposing and implementing an addition of a route or a modification of an existing route.



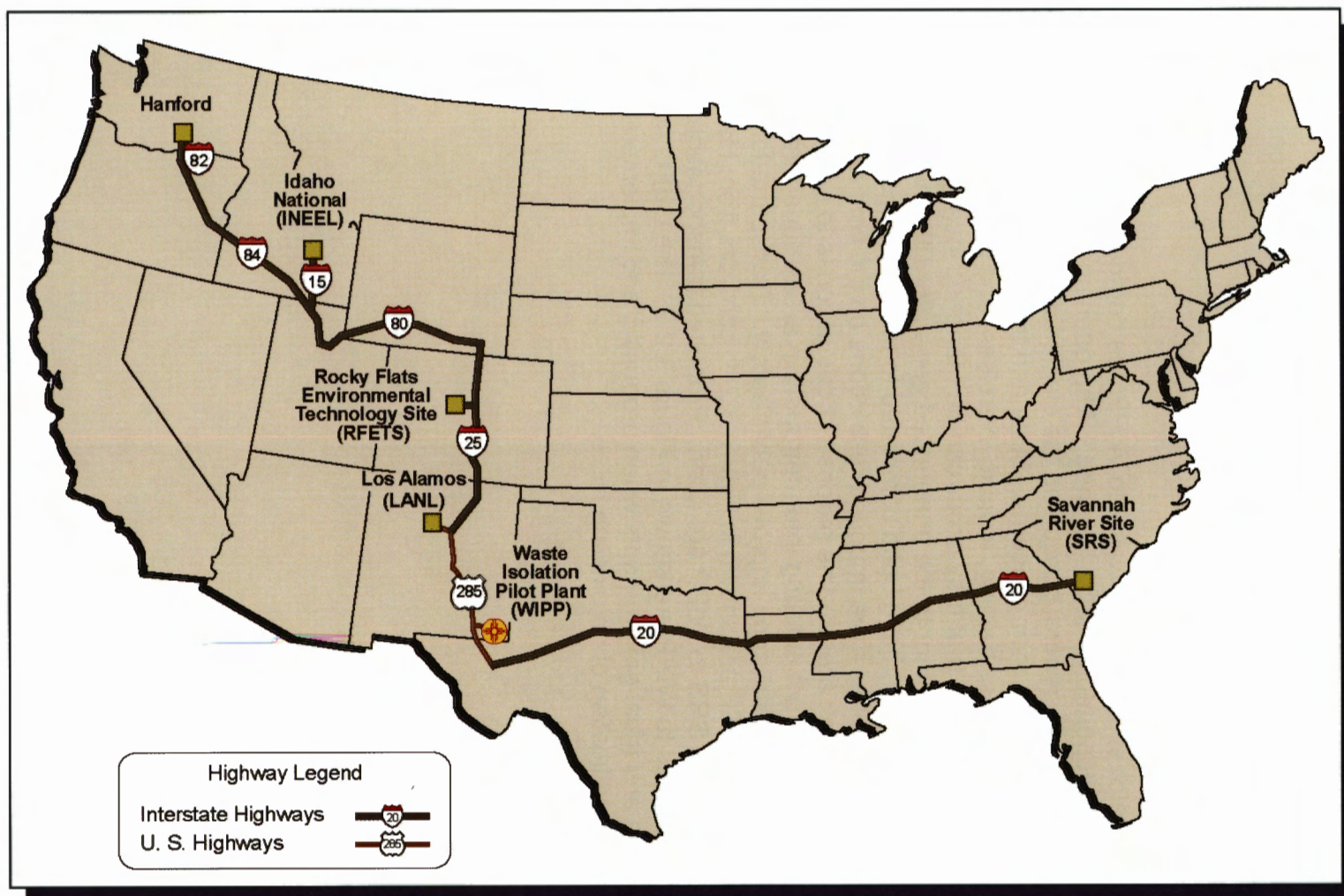


Figure 3.2-1 - Open TRU Waste Transportation Corridors from Generator Sites to WIPP



Figure 3.2-2 - Proposed TRU Waste Transportation Corridors from Small-Quantity Generator Sites to WIPP



Waste in the DOE TRU waste system follows a basic process for disposal. Figure 3.2-3 is a simplified flowchart of the TRU waste management process. To begin, stored and projected waste volumes are reported by the TRU waste generator sites. Disposition is based on whether the waste has a clear path for disposal, has a plan for disposal, or is without a current plan for disposal. Sections 3.1.1 through 3.1.3 contain detailed discussions of each category.

Issues associated with waste in the "with a plan for disposal" and in the "without a current plan for disposal" categories will be resolved using one of the following solutions:

- Administrative change/operational efficiency;
- Regulatory change;
- Technology implementation; and
- Research, development, and deployment.

Issues are identified as barriers to disposal within the IPABS.

As solutions to the needs are identified, funded, and implemented, the appropriate waste volume is moved into the "clear path for disposal" category. Changes will be reflected in the next annual revision of the Plan.

The current baseline for TRU waste of defense origin is to characterize for both transportation and disposal at the waste generator facility and ship to WIPP for disposal. The WIPP facility began receiving CH TRU waste in March 1999; plans are to begin receiving RH TRU waste in FY 2002. As previously discussed, disposal phase activities are currently scheduled for 35 years (i.e., through FY 2034).

An alternative strategy being pursued for smaller TRU waste generator sites is to characterize waste for transportation only and then send it to WIPP for disposal characterization in a central characterization facility (CCF). Once characterized and certified, the waste would be disposed of in WIPP. DOE is currently requesting regulatory approval for this approach from the New Mexico Environment Department. The centralized characterization approach is beneficial to sites with small quantities of TRU waste due to the large initial costs of setting up the characterization infrastructure and achieving site certification. It is also potentially useful to aid larger sites in meeting their state's agreements for the disposal of waste if their infrastructure is insufficient to certify waste at a high enough rate.

If regulatory approval is granted for centralized characterization, the path selected by the generator sites will ultimately depend upon several factors including:

1. Desired shipping schedule;
2. Site infrastructure to perform disposal characterization;
3. Volume of waste at the generator site;



4. Timeliness of each method in consideration of compliance orders or agreements between the site and its associated state; and
5. Results of the cost-benefit analyses conducted to compare costs associated with selecting either certifying the disposal characterization process or the transportation characterization process at the site.

Finally, as indicated in Figure 3.2-3, the DOE uses performance indicators to report current status, monitor effects of changes, determine progress, and to provide feedback to system planners for continuous system improvement.

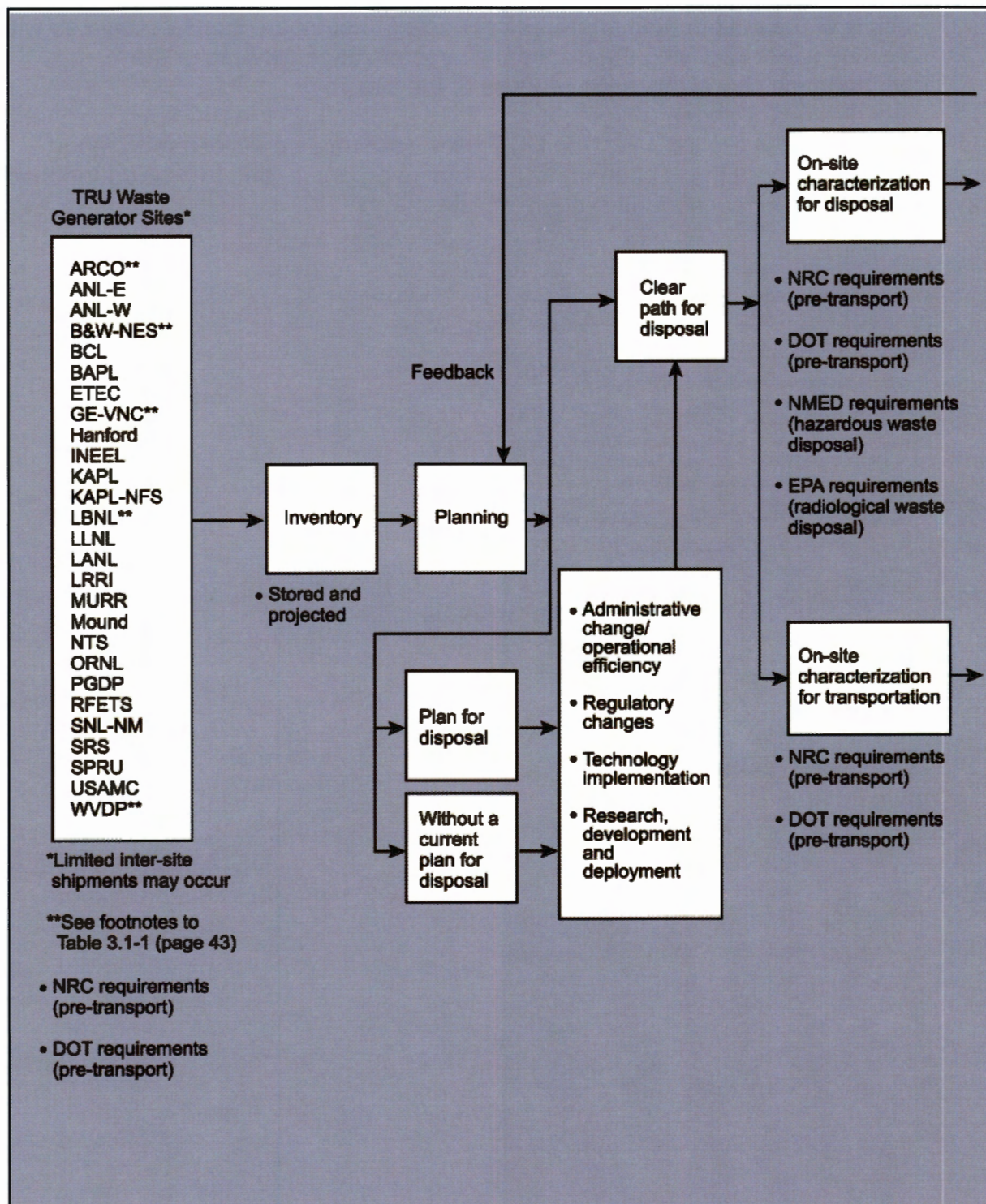


Figure 3.2-3 - The TRU Waste Management Process



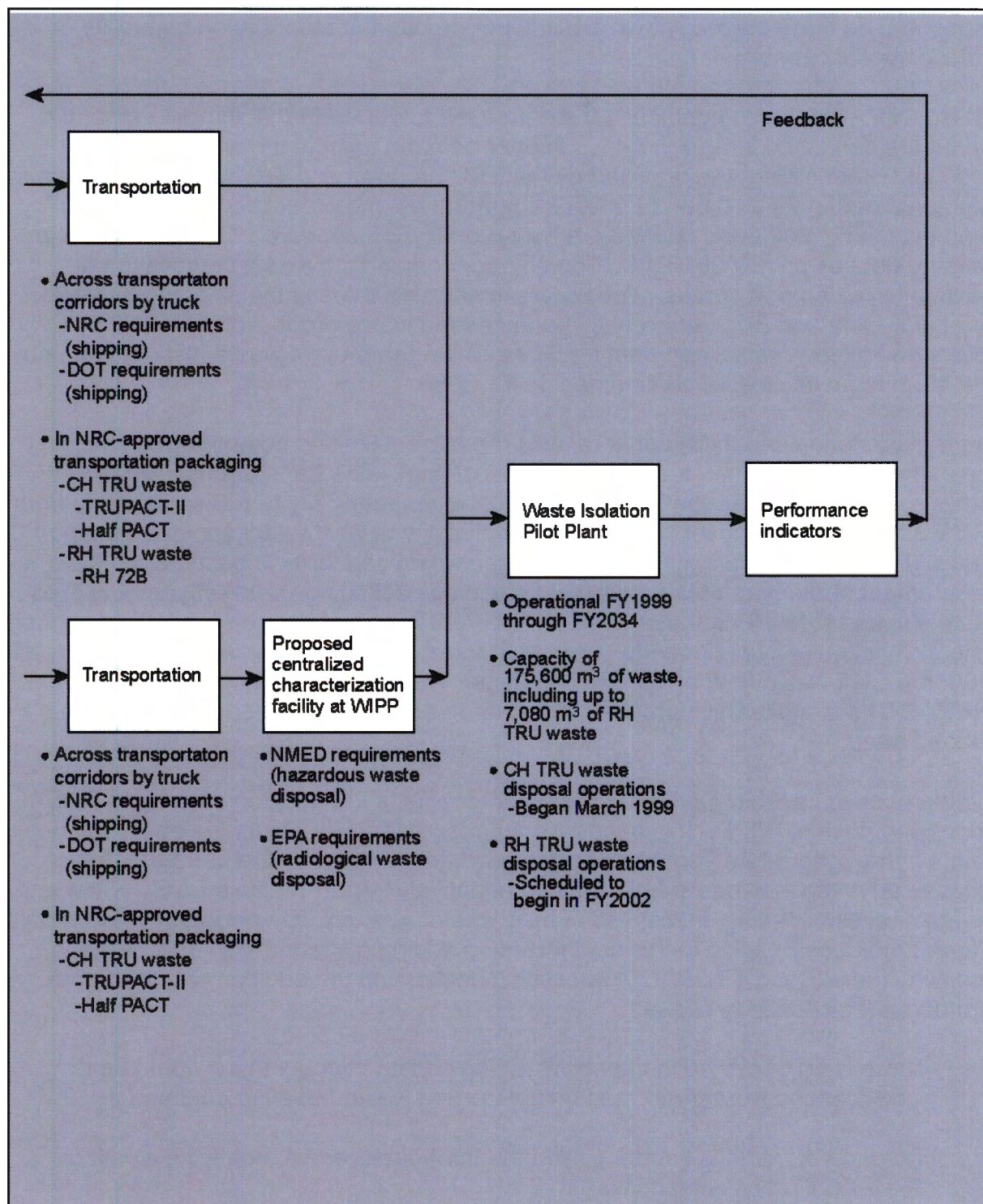


Figure 3.2-3 - The TRU Waste Management Process (Continued)



### 3.2.1 Integrated Schedule

Figure 3.2.1-1 represents the aggregate baseline CH TRU waste shipments to WIPP for disposal. The three curves shown are shipper demand, transportation capability, and WIPP disposal capability.

Site-specific summaries containing the data used to generate the shipper demand curves are contained in Appendix 1. Shipper demand reflects the anticipated start dates and production rates provided by the TRU program and TRU waste managers for shipments during FY 2001 and FY 2002. Start dates and production rates for shipments in FY 2003 and beyond are based on IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000. The shipper demand curve is a compilation of individual site demand curves. The spikes in shipping rates in the shipping demand curve (FY 2004 and FY 2005) reflect the increased waste production from INEEL's Advanced Mixed Waste Treatment Facility and the ramp-up of waste disposal rates by RFETS to meet its closure commitment in FY 2006.

The transportation capability curve reflects the current limiting component of the transportation system (i.e., transportation packaging). The transportation system consists of both a carrier contract delineating the responsibility to transport waste from TRU waste sites to disposal sites and the availability of waste packaging to transport waste. The curve indicating increased transportation capability is based upon the procurement strategy to obtain additional shipping packaging. Currently, all CH TRU waste shipped to WIPP is transported in TRUPACT-IIs, by truck, on specially designed trailers. The trailer is designed to carry up to three TRUPACT-IIs. As of December 31, 2000, the DOE has a fleet of 19 TRUPACT-IIs. The procurement of additional TRUPACT-IIs is an iterative process based upon actual system performance versus planned need.

The increase in capability in the disposal curve reflects the addition of a third TRUPACT processing dock at WIPP. It is necessary to ensure that WIPP has the ability to maintain throughput rates equal to, or greater than, demand by the generator sites because anything less has the potential to negatively impact multiple DOE TRU waste generator sites capability to dispose of their waste. A study was performed to compare different methods to achieve this goal including adding a second shift of operations, modifying the existing TRUPACT processing docks, and the addition of a third dock. A third dock was chosen because:

- There is no decrease in capability during construction as there would be if modifications were performed on the current waste handling equipment.
- The time duration is shorter to add the third dock versus modifying existing TRUPACT processing docks.
- The addition of the third dock and its requisite operating staff on a single shift basis versus using the existing infrastructure during a second shift saves approximately \$2.7 million per year of operation.

An additional benefit of the third dock includes the ability to accommodate greater numbers of shipments for short durations during times of peak throughput, although the current definition of maximum (continuous) throughput is 17 shipments per week.

To save operating costs, WIPP performs a quarterly system performance review and staffs only to the level necessary to accommodate the planned incoming waste receipt rate. The disposal capability curve reflects the rate associated with a seven day per week, single shift schedule with all three TRUPACT processing docks operating at capacity. Actual capacity values vary and typically track changes as required by the TRU generator site demand.

As previously indicated, the shipping demand curve is a compilation of all sites needs. Several options are available when shipping demand exceeds transportation capability:

- Optimize system use by giving priority to sites with closure and regulatory milestones (i.e., RFETS, INEEL, and certain small-quantity sites) and planning other sites shipments when transportation capability exceeds shipping demand.
- Generator sites can certify and store waste until waste can be removed by the transportation system.
- Additional shipping packaging (TRUPACTs and HalfPACTs) can be procured to meet demand.

The DOE is closely monitoring actual system performance and will select the appropriate option, or combination of options, as conditions warrant.

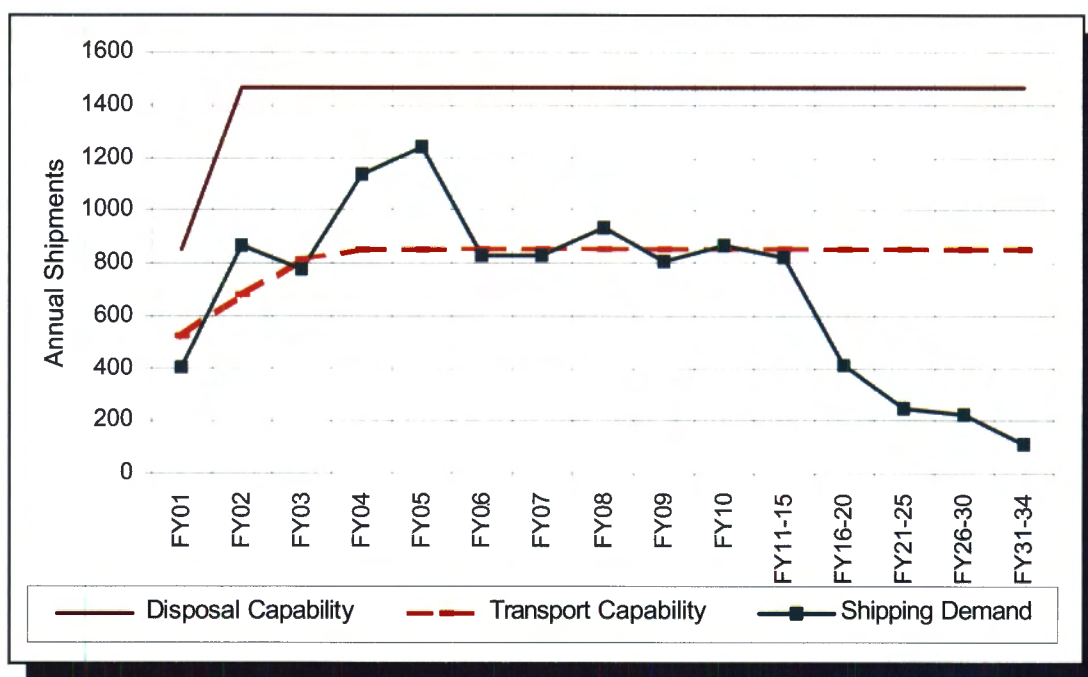


Figure 3.2.1-1 - Baseline CH TRU Waste Shipments to WIPP for Disposal (FY 2001 Through FY 2034)



### ***The Effect of High Wattage Waste on the Integrated Schedule***

Shipments in the TRUPACT-II are currently limited to relatively low wattage due to concerns with gas generation. For this reason, sites such as SRS and LANL may have to repackage their waste in a manner to reduce gas generation. Repackaging is volumetrically inefficient because only minute amounts of this waste form can be shipped which results in significant increases in the number of shipments to WIPP. These significant increases result in the perceived need for greater shipping and disposal capability. The resultant shipping rates are depicted graphically in the following curve. As illustrated in the curve, the number of shipments to accommodate the volume expansion would quickly overcome the National TRU system's capability and would result in excessive expenditures, both in terms of transportation media and WIPP infrastructure to receive and dispose of waste. As such, volume expansion is not a viable option for the shipment of high-wattage waste.

The DOE is pursuing both technical and regulatory means to efficiently ship high wattage waste inside TRUPACT-II as discussed in Section 2.3.1.7. Because the DOE will not ship high wattage waste as shown in the following curve, the system curves in Figure 3.2.1-1 represent the TRU waste generator sites shipping demand with the high wattage waste shipped in the form projected with the technical and regulatory changes fully implemented.

Detailed discussions regarding the technical changes, with implementation schedules, will be presented in the National TRU System Optimization Plan, planned to be published in FY 2001.

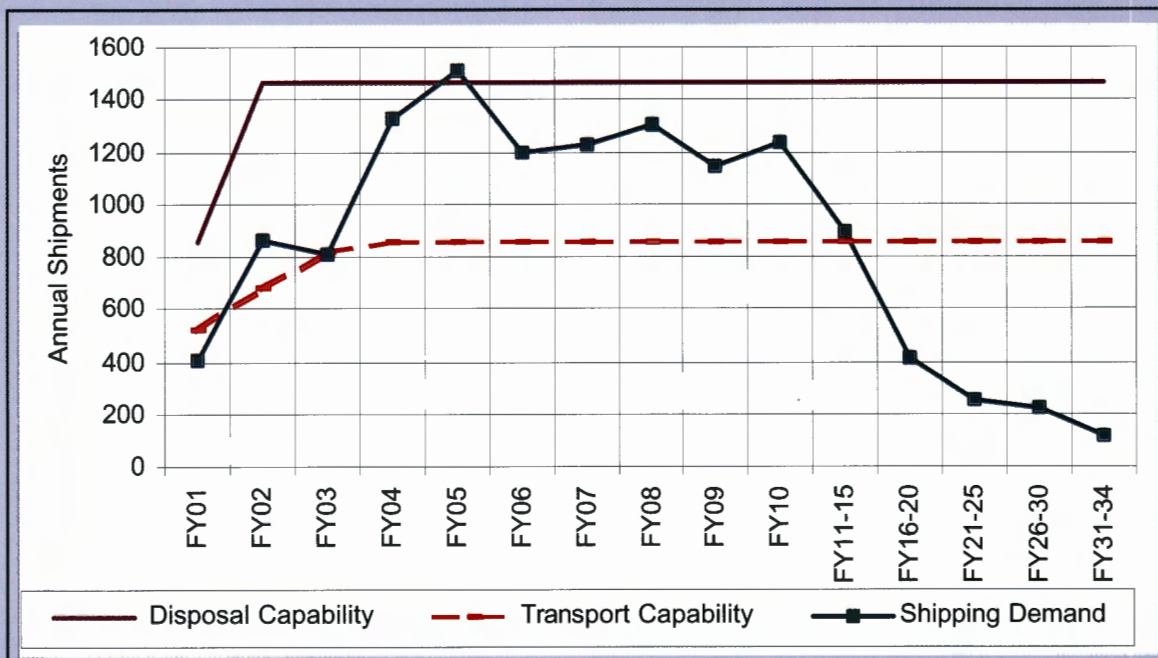


Figure 3.2.1-2 represents the aggregate baseline RH TRU waste shipments to WIPP for disposal. The three curves shown are shipper demand, transportation capability, and WIPP disposal capability.

Site-specific summaries containing the data used to generate the shipper demand curves are contained in Appendix 1. Start dates and production rates for shipments in FY 2002 and beyond are based on IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000.

The transportation capability curve assumes that the appropriate number of RH-72B shipping casks have been procured prior to startup of RH operations. The NRC issued a Certificate of Compliance for the cask on March 3, 2000. The initial contract awards to fabricate a total of 12 casks were placed in August 2000. The casks are scheduled for delivery by June 2002.

The disposal capability curve shows excess capacity provided by the WIPP site infrastructure. Excess capacity exists because WIPP chose to modify existing RH equipment rather than build new facilities. Modifications to existing equipment are less costly and can be completed faster than building new facilities. The disposal capability curve reflects the rate associated with a seven-day-per-week, single-shift schedule and the system operating at capacity. Actual capacity values vary and typically track changes as required by the TRU generator site demand.

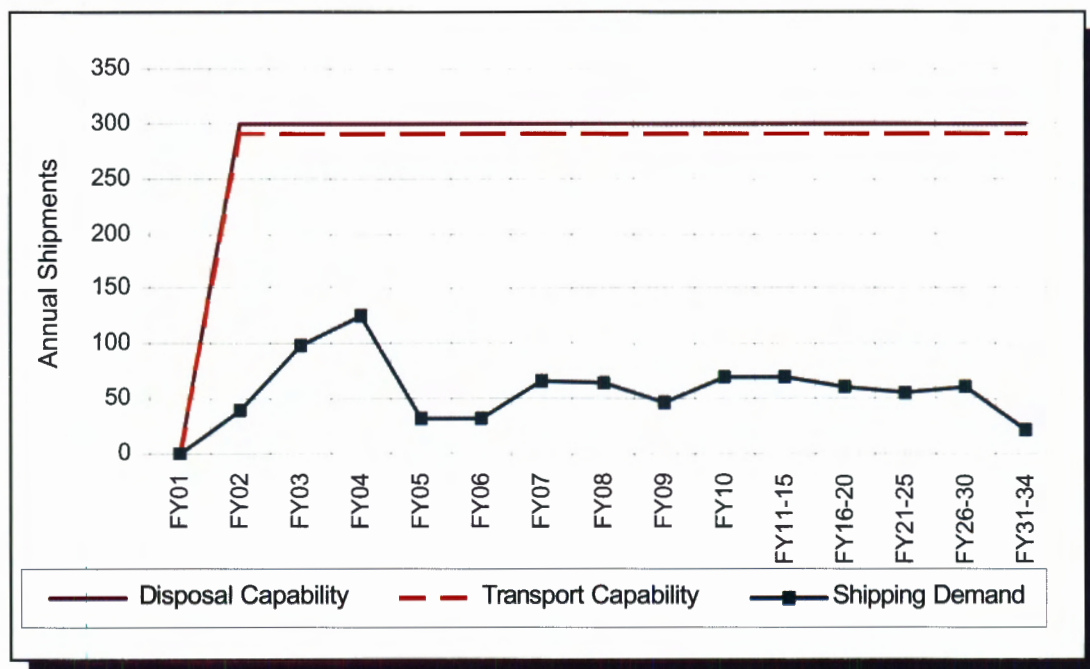


Figure 3.2.1-2 - Baseline RH TRU Waste Shipments to WIPP for Disposal (FY 2001 Through FY 2034)



Figure 3.2.1-3 represents CH TRU waste monthly shipping schedules by site for FY 2001. The DOE site TRU program and TRU waste managers provided these schedules to ensure up-to-date information is used by the CBFO to plan activities to support demand.

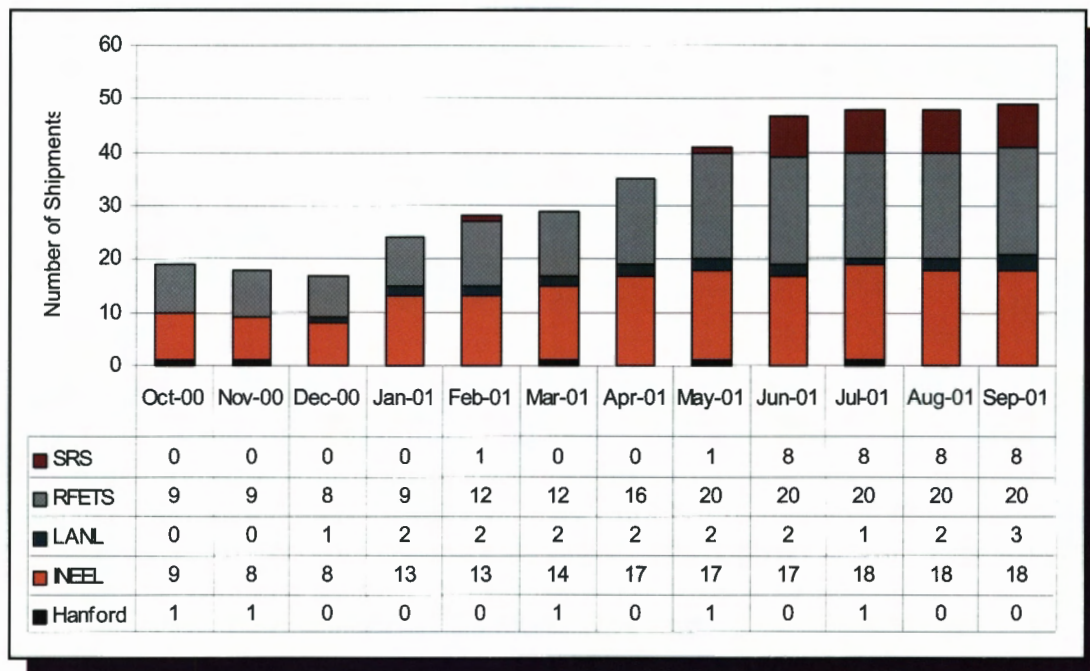


Figure 3.2.1-3 - Baseline CH TRU Waste Shipments to WIPP for Disposal  
Monthly Shipping Schedules by Site (FY 2001)

Monthly CH TRU waste shipping schedules for FY 2002 (shown in Figure 3.2.1-4) were also provided by DOE site TRU program and TRU waste managers. Annual CH TRU waste shipping schedules for FY 2003 through FY 2034 (shown in Figure 3.2.1-5) are based on IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000. These figures will be updated during future annual revisions to the Plan to reflect the most current information being used for planning purposes.

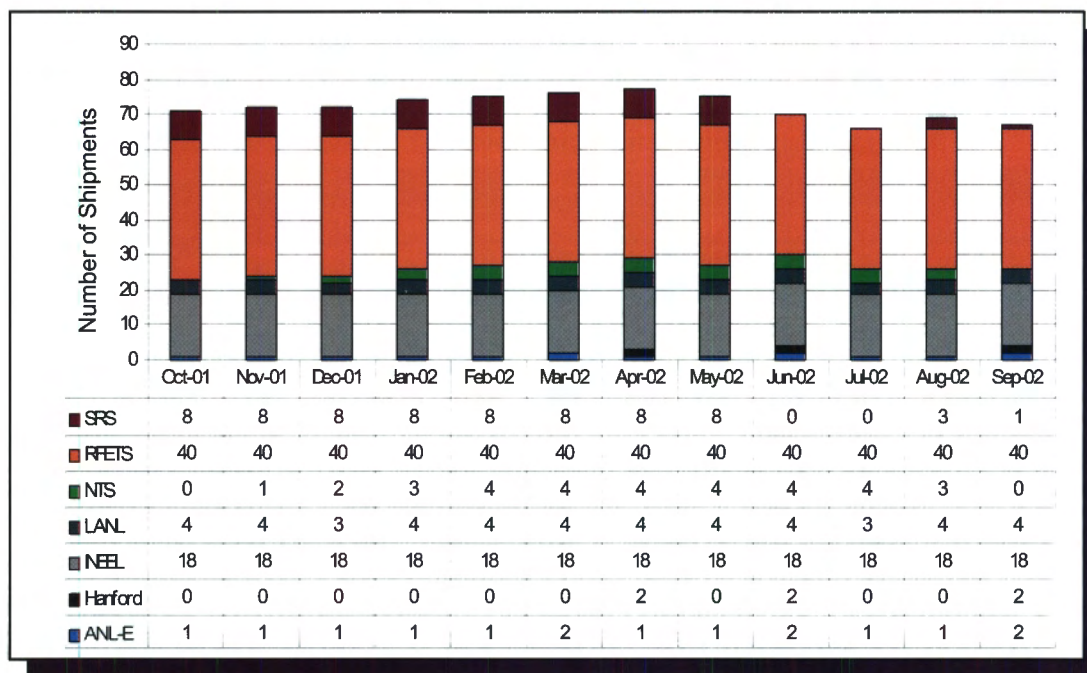


Figure 3.2.1-4 - Baseline CH TRU Waste Shipments to WIPP for Disposal  
Monthly Shipping Schedules by Site (FY 2002)

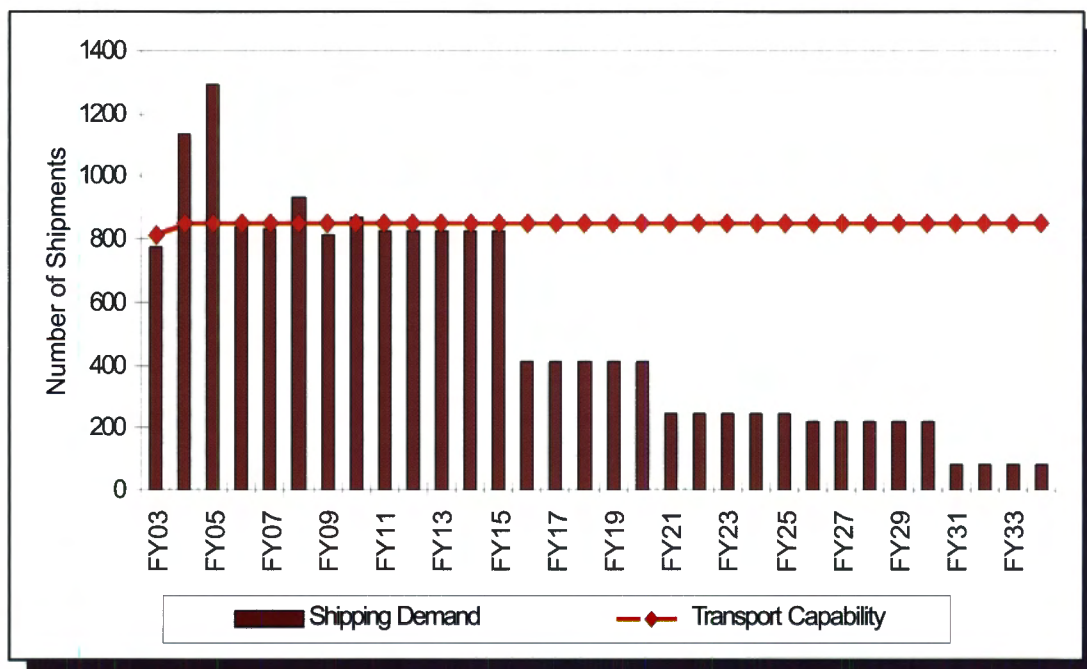


Figure 3.2.1-5 - Baseline CH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules (FY 2003 Through FY 2034)



Table 3.2.1-1 shows the CH TRU shipping schedules used to prepare Figures 3.2.1-3, 3.2.1-4, and 3.2.1-5.

**Table 3.2.1-1 - Baseline CH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules by Site (FY 2001 Through FY 2034)<sup>(1)</sup>**

| FISCAL<br>YEAR | SHIPPING SITES (Number of Shipments) |         |       |       |      |       |     |      |       |       | TOTAL  |
|----------------|--------------------------------------|---------|-------|-------|------|-------|-----|------|-------|-------|--------|
|                | ANL-E                                | Hanford | INEEL | LANL  | LLNL | Mound | NTS | ORNL | RFETS | SRS   |        |
| 2001           | 0                                    | 5       | 170   | 19    | 0    | 0     | 0   | 0    | 175   | 34    | 403    |
| 2002           | 15                                   | 6       | 216   | 46    | 0    | 0     | 33  | 0    | 480   | 68    | 864    |
| 2003           | 0                                    | 22      | 199   | 61    | 0    | 0     | 0   | 0    | 480   | 12    | 774    |
| 2004           | 0                                    | 48      | 408   | 91    | 13   | 30    | 0   | 56   | 480   | 12    | 1,138  |
| 2005           | 0                                    | 61      | 508   | 122   | 7    | 0     | 71  | 32   | 480   | 12    | 1,293  |
| 2006           | 0                                    | 63      | 501   | 161   | 7    | 0     | 0   | 3    | 90    | 12    | 837    |
| 2007           | 0                                    | 58      | 570   | 177   | 10   | 0     | 0   | 3    | 0     | 12    | 830    |
| 2008           | 0                                    | 59      | 685   | 168   | 8    | 0     | 0   | 3    | 0     | 12    | 935    |
| 2009           | 0                                    | 60      | 565   | 162   | 3    | 0     | 8   | 1    | 0     | 12    | 811    |
| 2010           | 3                                    | 60      | 623   | 166   | 3    | 0     | 0   | 1    | 0     | 12    | 868    |
| 2011-15        | 0                                    | 454     | 3,427 | 114   | 11   | 0     | 0   | 5    | 0     | 108   | 4,119  |
| 2016-20        | 4                                    | 411     | 1,211 | 114   | 11   | 0     | 0   | 5    | 0     | 300   | 2,056  |
| 2021-25        | 0                                    | 304     | 317   | 114   | 11   | 0     | 0   | 5    | 0     | 480   | 1,231  |
| 2026-30        | 4                                    | 144     | 221   | 114   | 11   | 0     | 0   | 5    | 0     | 600   | 1,099  |
| 2031-34        | 0                                    | 46      | 0     | 114   | 11   | 0     | 0   | 5    | 0     | 143   | 319    |
| TOTAL          | 26                                   | 1,801   | 9,621 | 1,743 | 106  | 30    | 112 | 124  | 2,185 | 1,829 | 17,577 |

<sup>(1)</sup> This table includes only TRU waste generator sites with defined shipping schedules. When shipping schedules are determined for sites with small quantities of waste, the information will be added to the table.

Quarterly RH TRU waste shipping schedules for FY 2002, shown in Figure 3.2.1-6, and annual RH TRU waste shipping schedules for FY 2003 through FY 2034, shown in Figure 3.2.1-7, are based on IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000. These figures will be updated during the future annual revisions to the Plan to reflect the most current information being used for planning purposes.

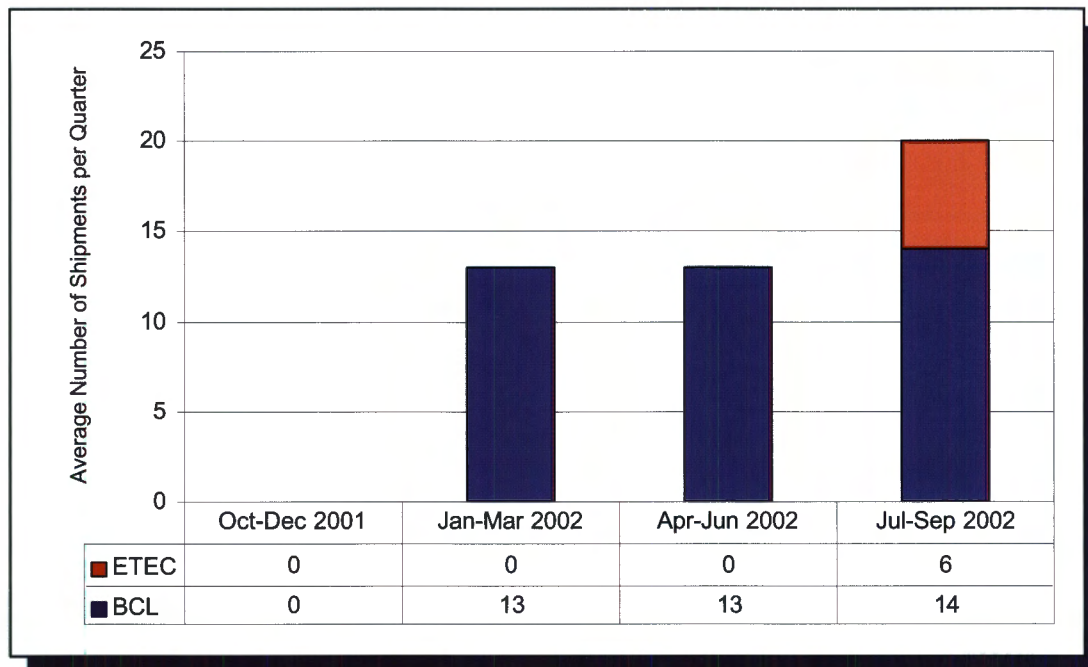


Figure 3.2.1-6 - Baseline RH TRU Shipments to WIPP for Disposal  
Quarterly Shipping Schedules by Site (FY 2002)

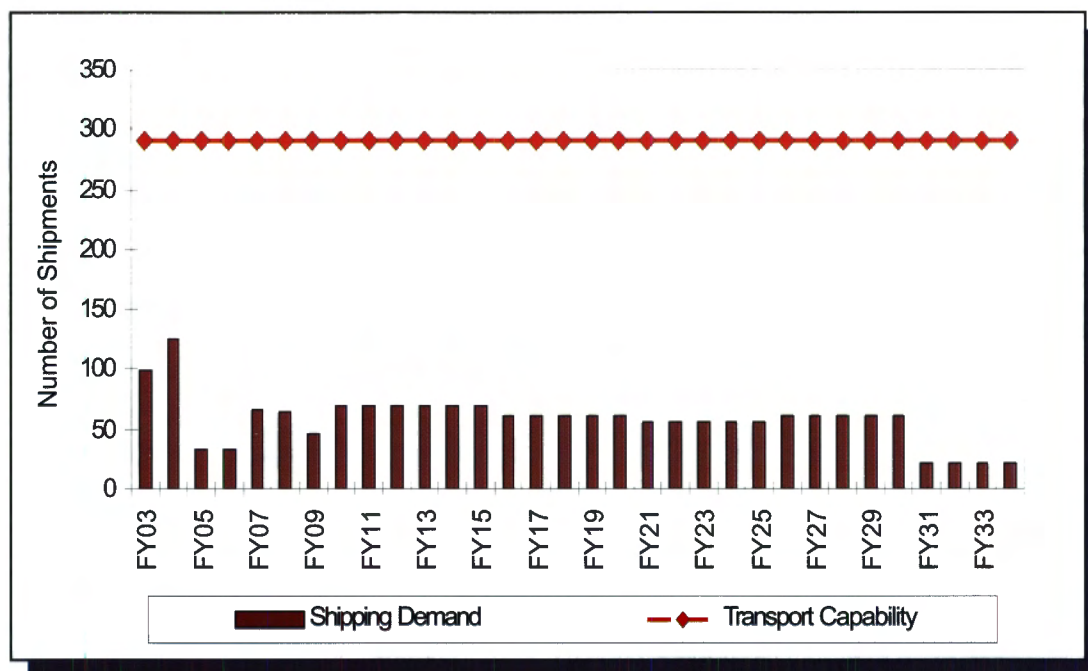


Figure 3.2.1-7 - Baseline RH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules (FY 2003 Through FY 2034)



Table 3.2.1-2 shows the RH TRU shipping schedules used to prepare Figure 3.2.1-6 and Figure 3.2.1-7.

**Table 3.2.1-2 - Baseline RH TRU Waste Shipments to WIPP for Disposal  
Annual Shipping Schedules by Site (FY 2002 Through FY 2034)<sup>(1)</sup>**

| FISCAL<br>YEAR | SHIPPING SITES (Number of Shipments) |     |      |         |       |      |      | TOTAL |
|----------------|--------------------------------------|-----|------|---------|-------|------|------|-------|
|                | ANL-E                                | BCL | ETEC | Hanford | INEEL | LANL | ORNL |       |
| 2002           | 0                                    | 40  | 6    | 0       | 0     | 0    | 0    | 46    |
| 2003           | 28                                   | 0   | 0    | 0       | 0     | 0    | 71   | 99    |
| 2004           | 0                                    | 0   | 0    | 0       | 0     | 0    | 126  | 126   |
| 2005           | 0                                    | 0   | 0    | 0       | 0     | 0    | 33   | 33    |
| 2006           | 0                                    | 0   | 0    | 0       | 0     | 0    | 33   | 33    |
| 2007           | 0                                    | 0   | 0    | 0       | 33    | 0    | 33   | 66    |
| 2008           | 0                                    | 0   | 0    | 0       | 41    | 0    | 24   | 65    |
| 2009           | 0                                    | 0   | 0    | 0       | 41    | 0    | 5    | 46    |
| 2010           | 21                                   | 0   | 0    | 0       | 41    | 0    | 8    | 70    |
| 2011-15        | 0                                    | 0   | 0    | 110     | 99    | 111  | 28   | 348   |
| 2016-20        | 30                                   | 0   | 0    | 250     | 0     | 0    | 28   | 308   |
| 2021-25        | 0                                    | 0   | 0    | 250     | 0     | 0    | 28   | 278   |
| 2026-30        | 30                                   | 0   | 0    | 250     | 0     | 0    | 28   | 308   |
| 2031-34        | 0                                    | 0   | 0    | 60      | 0     | 0    | 28   | 88    |
| TOTAL          | 109                                  | 40  | 6    | 920     | 255   | 111  | 473  | 1,914 |

<sup>(1)</sup> This table includes only TRU waste generator sites with defined shipping schedules. When shipping schedules are determined for sites with small quantities of waste, the information will be added to the table.

### 3.2.1.1 Schedule Issues

Many factors will have an effect on the Plan as new programs mature and changes are made to achieve the DOE's stated mission. Several of the key factors are discussed in the following paragraphs.

*Centralized Characterization Facility (CCF):* As will be detailed in the Optimization Plan (to be published in FY 2001), the CBFO plans to use a multiphased process to reach the vision of operating a CH TRU waste CCF at WIPP. This revision of the National TRU Waste Management Plan deviates from assumptions contained in Revision 1. Since Revision 1 was published in 1997, a modified approach has been formed as the TRU waste system gained experience and now knows that the process to meet characterization requirements for disposal under the WIPP Waste Analysis Plan (WAP) are significantly greater than the requirements to characterize for transportation.

The current HWFP does not require sampling and analysis at WIPP for the purpose of waste characterization verification. Instead, the HWFP requires the DOE to implement a rigorous oversight process at waste generating facilities. The oversight process

includes site certification audits designed to ensure that the WAP is implemented in waste characterization activities. This is different from the standard treatment, storage, and disposal (TSD) facility model used to satisfy the RCRA requirement to verify generator waste characterization. The DOE chose the nonstandard approach because:

- The WIPP facility design and operations did not include equipment (e.g., plutonium-handling infrastructure such as glove boxes) or personnel to perform confirmation activities.
- Much of the characterization is required prior to transportation in TRUPACT-IIs, thereby necessitating characterization activities at the generator site.
- An audit program for ensuring generator site compliance with the WAP was envisioned to be a small addition to the DOE's established practice of auditing sites for compliance with the WIPP WAC and the TRUPACT-II authorized methods for payload control (TRAMPAC).
- Developing the audit program was considered to be more efficient to implement than constructing a separate facility to allow verification at WIPP.

Experience at the large-quantity sites over the past year using the audit process established under the HWFP demonstrates that implementation of this process at the 17 small-quantity sites may not be feasible. For example, the costs for establishing an audit process at each site are estimated at \$3 million to \$5 million for each waste summary category. Once established, an additional estimate of \$1 million to \$2 million per site is required on an annual basis to maintain certification. This estimate does not include the infrastructure, personnel, and equipment to actually collect the data and characterize waste, but only the record keeping and infrastructure to document the quality assurance program. While these costs may appear reasonable for the large-quantity sites with long-term production or remediation missions, the costs quickly become untenable when multiplied by the 17 small-quantity sites.

The CBFO is proposing a multistage approach to resolving this issue. During the *initial stage*, the DOE will contract with mobile TRU waste characterization vendors and begin characterizing waste for disposal at the small-quantity sites. At this stage, an audit of the mobile vendor occurs at each small-quantity site, even though the vendors are working for a central authority, using standardized procedures. The equipment is designed for easy assembly and disassembly and can be transported from site to site. In *intermediate stages*, less waste confirmation is performed at the small-quantity sites by the mobile vendors and more is performed at a centralized facility located at WIPP, thereby avoiding duplicating costs at each small-quantity site. Equipment costs will be incurred once at the beginning of the project. In the *final stage*, the verification program at WIPP will serve as an independent check of incoming waste, using a combination of existing characterization technologies (radiological, physical and chemical). Similar to other TSD facility programs and in accordance with 40 CFR § 264.13, WIPP will perform verification activities on a statistically representative population of containers. These verification activities will replace most of the WAP requirements for initial and



annual audits at the generator sites along with duplicative quality assurance requirements. More importantly, the verification program moves the emphasis towards checking waste instead of checking documents.

To implement the small-quantity site initiative described in the previous paragraph, the DOE will seek permit modifications to remove the practice of auditing a National Certification Team (NCT) and mobile vendors at each site and institute a single audit of the NCT and mobile vendors. To support the final stage, the DOE will subsequently pursue permit modifications that will allow for waste verification at the WIPP facility and will include any other changes necessary to safely and compliantly implement a comprehensive, performance-based verification program at WIPP.

The Savannah River Site (in a quid pro quo arrangement to remove waste from the Mound facility) and the ANL-E are the first sites scheduled to use mobile characterization vendor systems to characterize waste for disposal. The use of mobile characterization systems to characterize waste for disposal will continue until the CCF at WIPP is permitted. Until the facility is permitted, the small-quantity sites will be served by the mobile systems as required to meet their individual closure plans and Consent Orders/Agreements.

Other sites that are considering the use of the CCF are listed in Table 3.2.1.1-1 and noted in the individual sites' information in Appendix 1.

**Table 3.2.1.1-1 - Small-Quantity Sites and Associated Waste Volumes**

| SMALL-QUANTITY SITES | CH (cubic meters) | CH (drum equivalent) |
|----------------------|-------------------|----------------------|
| ANL-E                | 246.0             | 1,183                |
| B&W-NES (1)          | 18.1              | 88                   |
| BCL                  | 4.2               | 21                   |
| BAPL                 | 17.6              | 85                   |
| ETEC                 | 2.3               | 11                   |
| GE-VNC (1)           | 9.0               | 44                   |
| KAPL-NFS             | 213.0             | 1,025                |
| LLNL                 | 1,515.0           | 7,284                |
| LRRI (2)             | 19.9              | 97                   |
| MURR                 | 1.4               | 7                    |
| MOUND                | 247.0             | 1,188                |
| NTS (3)              | 665.0             | 3,462                |
| ORNL (4)             | 1,482.6           | 2,608                |
| PGDP (5)             | 11.7              | 57                   |
| SNL-NM (2)           | 88.5              | 425                  |
| SPRU                 | 50.0              | 240                  |
| USAMC                | 2.5               | 13                   |
|                      | -----             | -----                |
| Small Site Total     | 4,593.8           | 17,838               |

- (1) Waste may not be of defense origin; compliance with LWA requirement will need to be demonstrated prior to disposal at WIPP.
- (2) Waste from LRRI will be shipped to SNL-NM for subsequent shipment with SNL-NM waste to LANL.
- (3) Drum equivalents based on anticipated shipping volume of 720 m<sup>3</sup> (665 m<sup>3</sup> plus volume expansion of 55 m<sup>3</sup> due to repackaging).
- (4) Drum equivalents based on anticipated shipping volume of 542 m<sup>3</sup>. Of the 1,482.6 m<sup>3</sup>, approximately 175 m<sup>3</sup> are generated after 2034; the remainder will be reduced in volume to the anticipated shipping volume.
- (5) Waste from PGDP will be shipped to ORNL for subsequent shipment to WIPP for disposal.

A more complete discussion of the Centralized Characterization Project (CCP) and associated schedules for full implementation is contained in the Optimization Plan. The status of the CCP implementation will be reported in the quarterly updates to the National TRU Waste Management Plan. The Management Plan will be updated with schedules and revised budget information once the CCF is fully permitted by the NMED.

*Optimization of RH and CH disposal capabilities:* Figure 3.2.1.1-1 through Figure 3.2.1.1-3 show various views of the WIPP underground. Figure 3.2.1.1-1 shows an isometric view. Project facilities include excavated rooms 2,150 feet (almost one-half mile) underground in an ancient stable salt formation. Figure 3.2.1.1-2 shows a plan view of a section of a typical underground disposal area. Current waste emplacement



plans dictate that RH TRU waste is disposed of in the walls, or ribs, of the WIPP underground disposal rooms. Contact-handled TRU waste normally follows RH TRU waste disposal because the emplacement of CH TRU blocks access to the disposal room walls. Figure 3.2.1.1-3 is a photographic view of drums and standard waste boxes emplaced in an underground disposal area in WIPP.

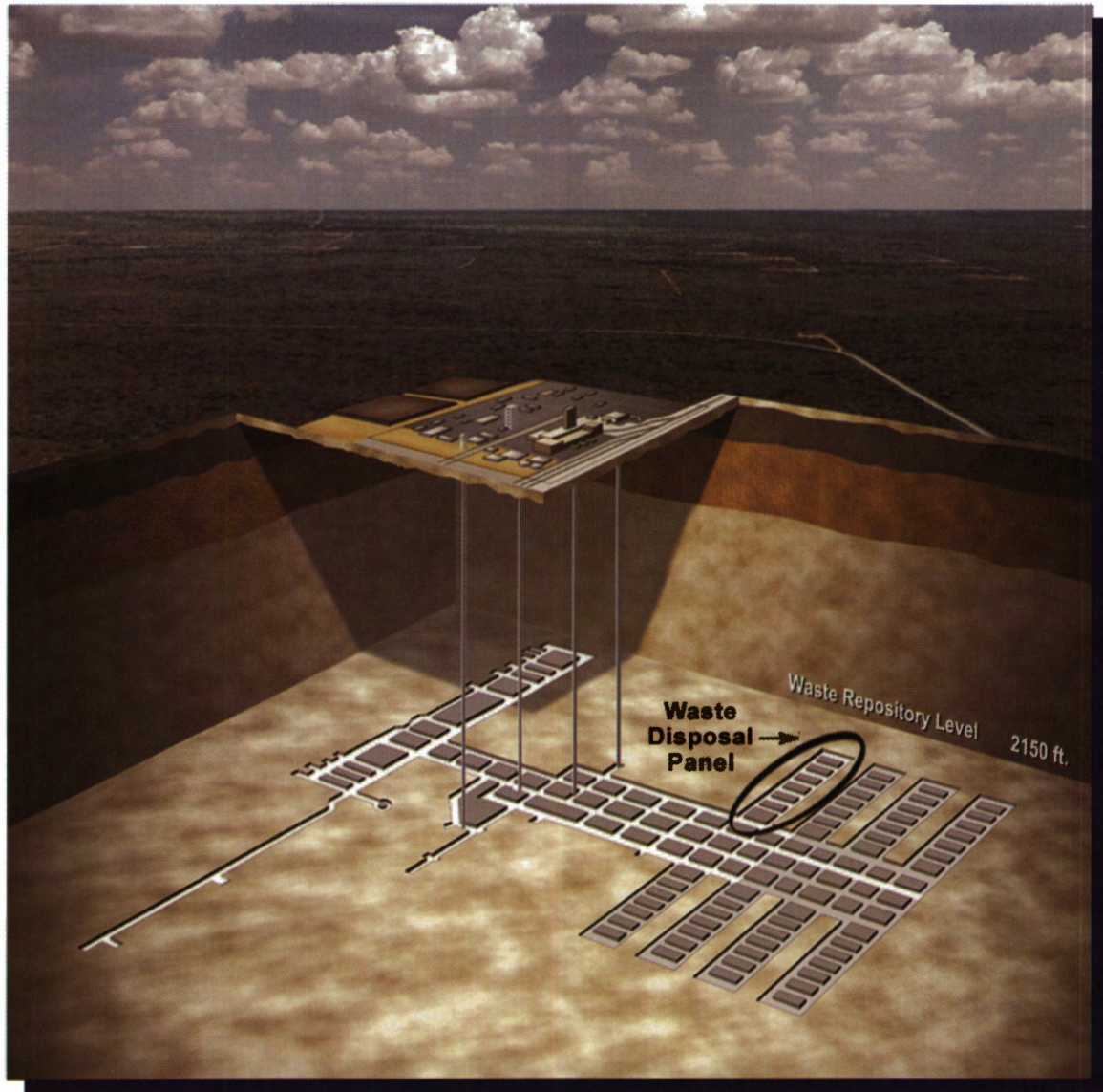


Figure 3.2.1.1-1 - Isometric View of the WIPP Underground



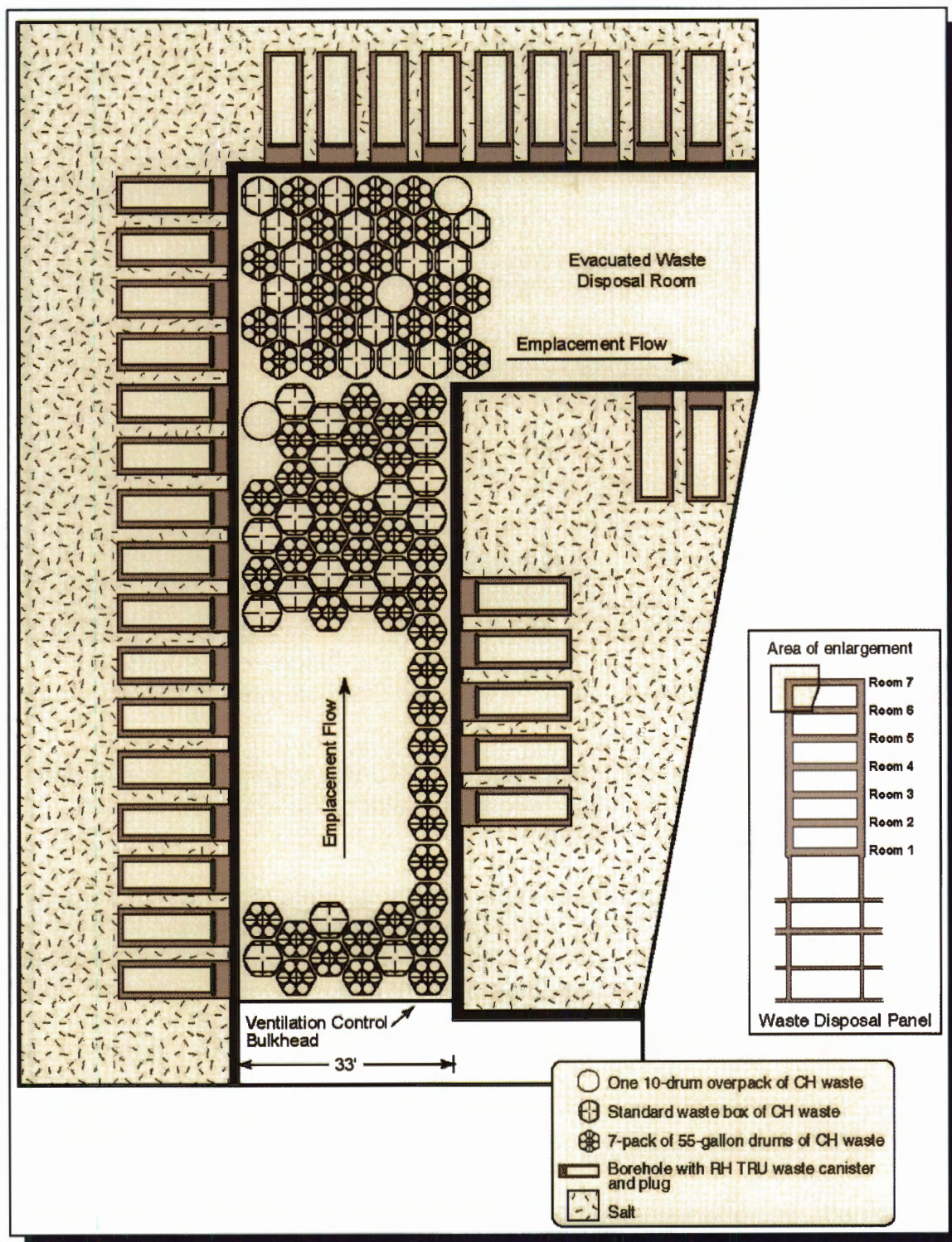


Figure 3.2.1.1-2 - Plan View of a Section of a Typical Underground Disposal Area Showing CH TRU and RH TRU Waste Emplacement





Figure 3.2.1.1-3 - Photographic View of Drums and Standard Waste Boxes Emplaced in an Underground Disposal Area at WIPP

Maintaining a balance between CH TRU and RH TRU waste disposal rates and the WIPP underground mining rate is an important consideration when creating an integrated system plan for waste disposal.

The current defined WIPP disposal capability is 17 shipments of CH waste per week (average of 35 drums per shipment). At this rate, it takes approximately 30 months to fill a WIPP waste disposal panel. Historically, it is also true that it takes approximately 30 months to mine and prepare a new disposal panel for waste emplacement (single-shift, five-day-per-week operation). RH waste must be disposed of at a rate of approximately 6 canisters per week to keep pace with CH and disposal panel mining.

Receiving waste shipments at rates other than 17 CH TRU per week or 6 RH TRU per week will, therefore, have an adverse impact on RH TRU waste disposal capacity. A CH TRU rate that exceeds RH TRU will mean CH TRU emplacement would overtake RH TRU and result in less volume available for RH TRU disposal. An RH TRU rate that exceeds CH TRU would mean that it would be necessary to accelerate panel mining schedules, extending the period of time that panel openings must be maintained. Extending panel life beyond its design will incur unplanned, additional expenses to safely compensate for the natural deterioration of the mined openings.

Some RH TRU disposal volume has and will continue to be lost due to CH TRU waste disposal operations being permitted prior to the expected startup of RH TRU waste

disposal operations in FY 2002 and the current estimated shipping rate of four RH canisters per week. Figure 3.2.1.1-4 shows a cumulative loss of approximately 2,200 RH disposal positions under the current disposal schedule and strategy. Based upon RH inventory projections provided by the sites, there is sufficient capacity to dispose of all of the projected RH waste even with the loss of the RH disposal positions.

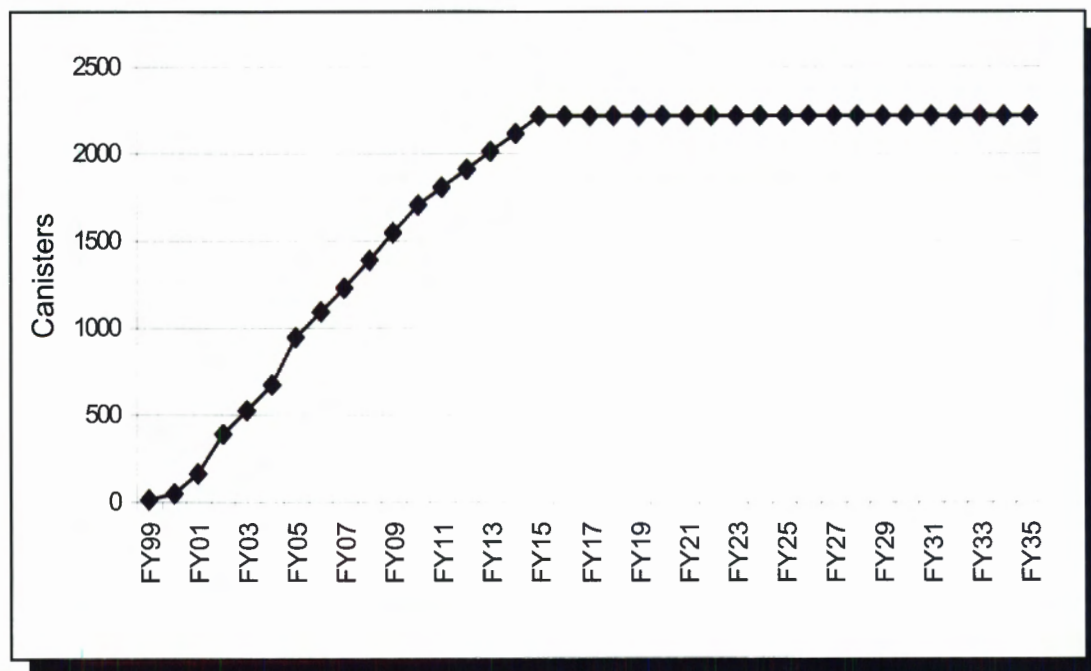


Figure 3.2.1.1-4 - Estimated Cumulative Loss of RH TRU Capacity

As discussed, a variance in any of the rates (i.e., CH, RH, or mining) has an impact on the integrated plan. Any deviation of one of the three elements from the optimal design rate will require an adjustment in the other two or the implementation of other compensatory measures. Some of these measures are listed below and described in more detail in other areas of the Plan:

- Determine impact of slightly different rates. There may be no impact if WIPP disposal capacity exceeds projected volumes for disposal.
- Develop shielded waste containers so RH TRU waste can be disposed of as CH TRU waste.
- Alter the disposal design to emplace additional RH TRU waste in the remainder of the available disposal area.
- Reduce waste volumes at the point of generation to decrease volume of waste disposed of and to provide flexibility in variable disposal rates.

While these measures have been discussed, a cost benefit analysis will have to be performed to determine the course of action, if required.



*TRU system optimization:* The TRU system optimization effort is designed to make immediate changes to allow a rapid increase in activity to make the system work at capacity, effect changes to improve efficiency and solve technical issues, and implement strategies to construct and operate a CCF. The effort will impact all four elements (i.e., treatment, characterization, transportation, and disposal capabilities) of the system creating a need for continuous update of the Plan. Each change, as it is planned and executed, will be assessed for impact to the system and reflected in the Plan, as required.

### **3.3 Performance Indicators**

The DOE uses performance indicators to measure the progress and success of the many activities within the national TRU system that contribute toward the ultimate goal of TRU waste disposal. Performance indicators are sets of tailored metrics that are used to report current status, monitor the effects of changes, determine progress, and provide feedback for continuous system improvement.

Many benefits are derived by properly formatting and reporting meaningful performance indicators:

- Performance indicators provide accountability. Federal employees and contractors are accountable to the taxpayer regarding stewardship of monetary resources by showing progress toward national goals.
- Performance indicators help validate programs and their costs. The public, Congress, and the Office of Management and Budget are increasingly taking a more results-oriented look at government programs. In an era of shrinking federal budgets, demonstration of good performance and sustainable public impacts with positive results help validate programs and their costs.
- Performance indicators provide trend analysis to determine the need to implement contingency planning. The management and delivery of products and services can be improved by analyzing trends and focusing resources.
- Performance indicators improve communications. Collecting and processing accurate information for performance indicators facilitates communications regarding mission-critical activities.

Performance measurement is mandated by the Government Performance and Results Act of 1993. In addition, DOE Order 435.1, "Radioactive Waste Management," requires that the goals of all DOE waste management programs be measurable to support periodic assessment of the program's progress.

Performance indicators serve four basic functions within the DOE TRU waste system:

- To provide measurable results so the National TRU Waste Program administrators can demonstrate progress towards goals and objectives. The

progress of individual elements is demonstrated by providing specific measurement results that aggregate to systemwide measures.

- Determine the effectiveness of each element of the program. Performance indicators show how well each element is meeting its goals and objectives.
- To characterize the performance of the DOE TRU waste system as a system. System impacts caused by a variance from an individual site's planned schedule can be assessed.
- Program successes can be assessed and resources can be reallocated to projects where they have the most positive impact to system performance.

Performance indicators within the DOE TRU waste system support completion dates listed in the Status Report on *Paths to Closure* (DOE/EM-0526, March 2000), Appendix B - Estimated Completion Dates and Field-Generated Project Cost Estimates.

Each site that has activity planned in FY 2001 (see Figures 3.3-1 through 3.3-10) has performance indicators based on:

- Volume shipped (actual versus planned) (cumulative)
- Number of shipments (actual versus planned) (cumulative)

The schedule, once published, is frozen until the next update to the Plan. Performance indicators are also established for transportation, disposal operations, and the TRU waste system. Actual performance will be plotted against the planned schedule and published in quarterly supplements to the Plan.



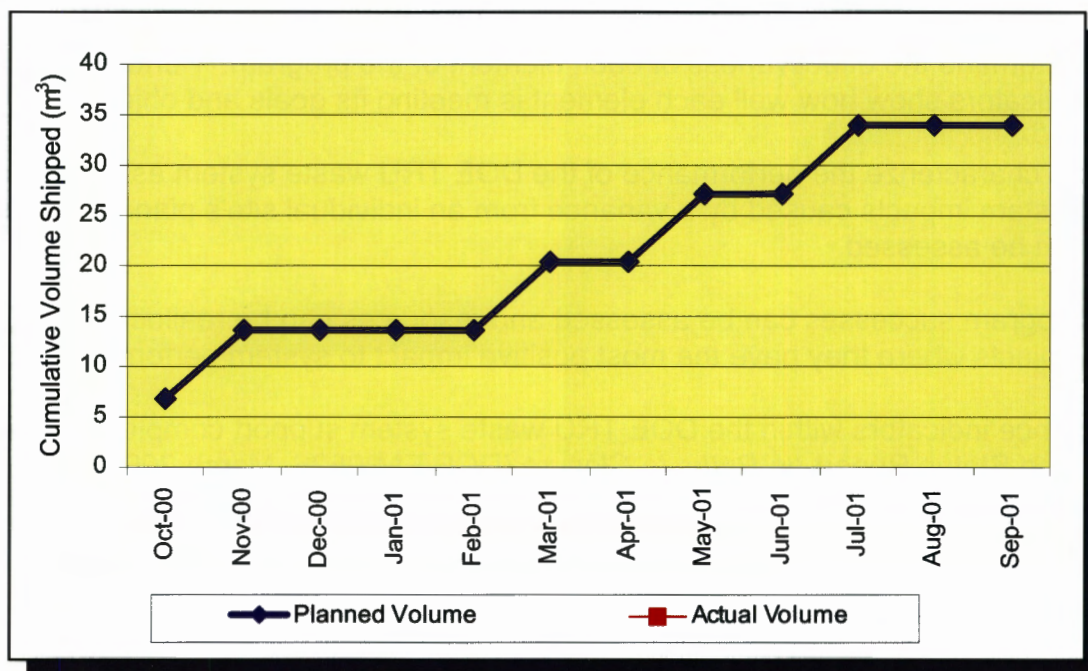


Figure 3.3-1 - Hanford Volume Performance Indicator

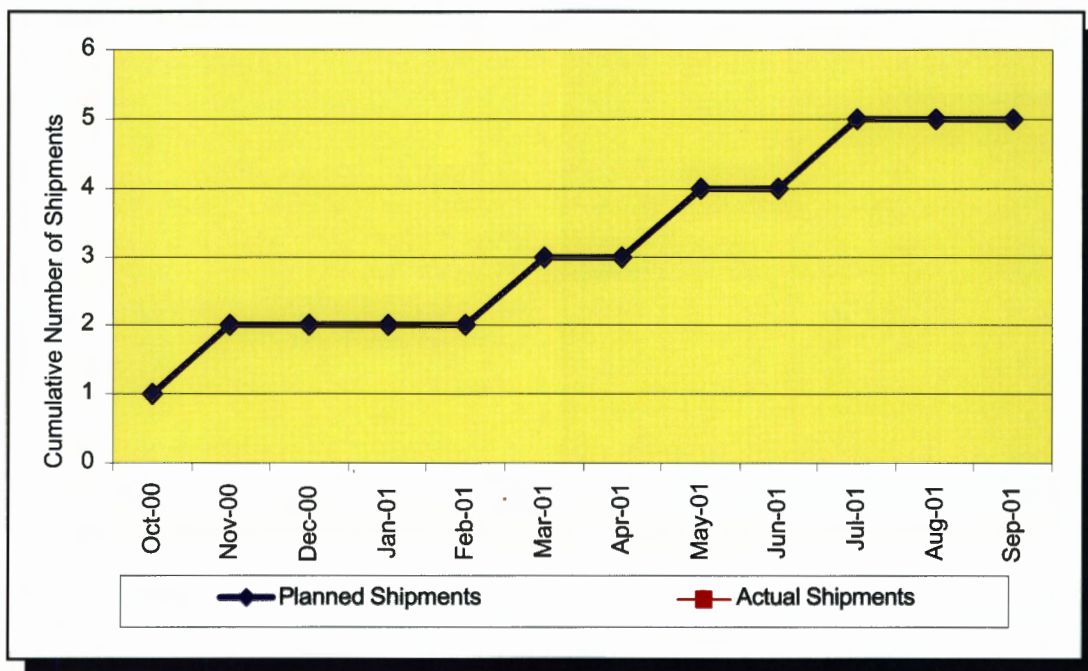


Figure 3.3-2 - Hanford Shipment Performance Indicator

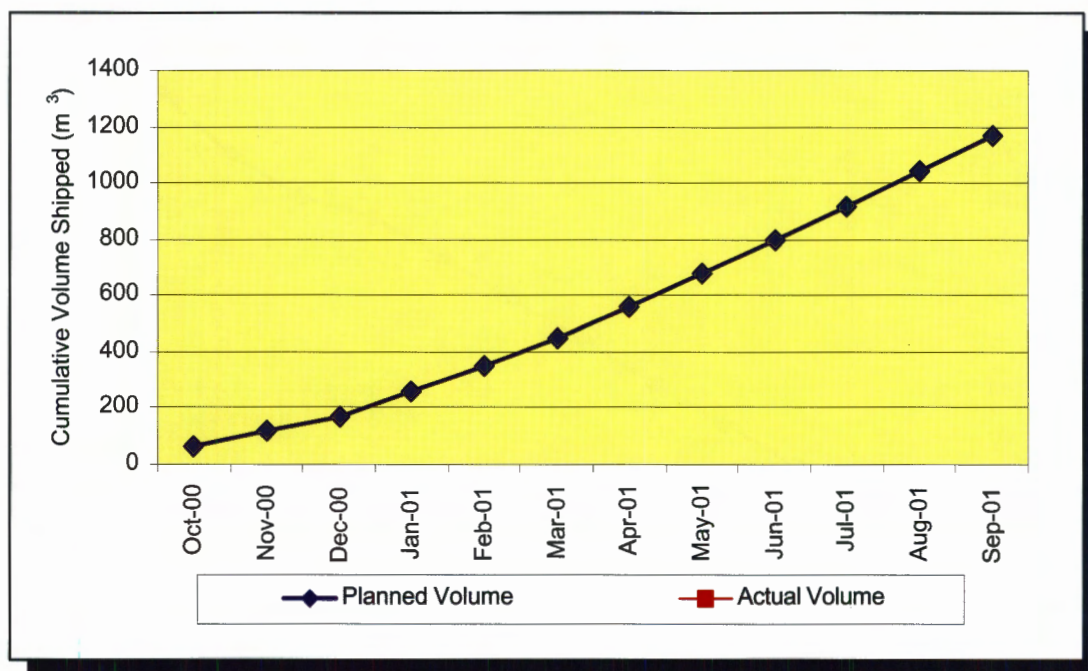


Figure 3.3-3 - INEEL Volume Performance Indicator

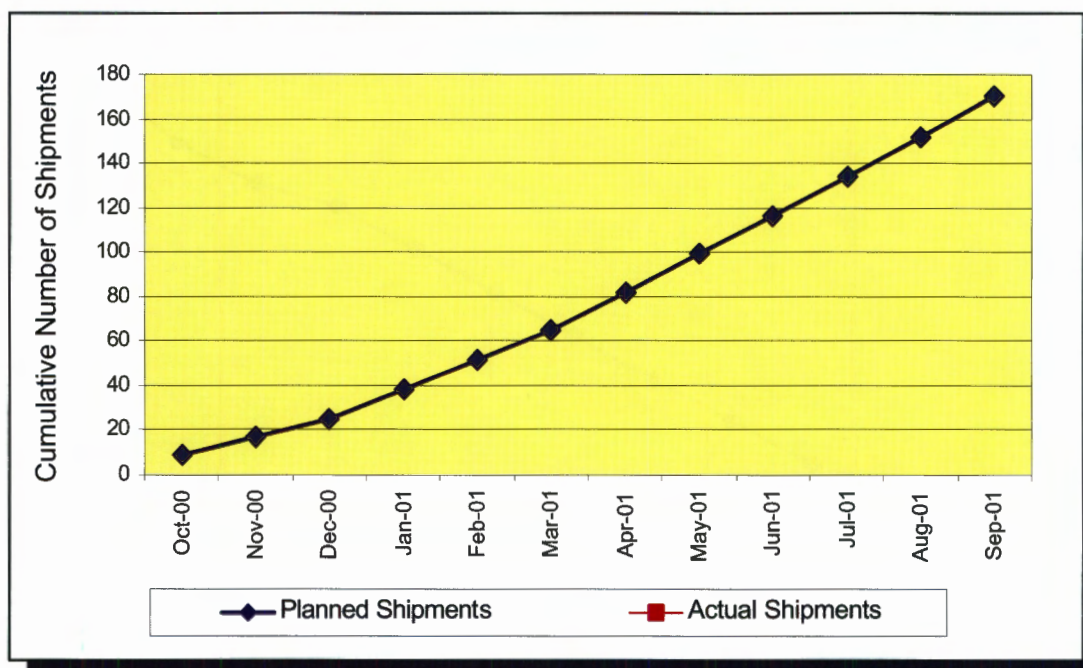


Figure 3.3-4 - INEEL Shipment Performance Indicator



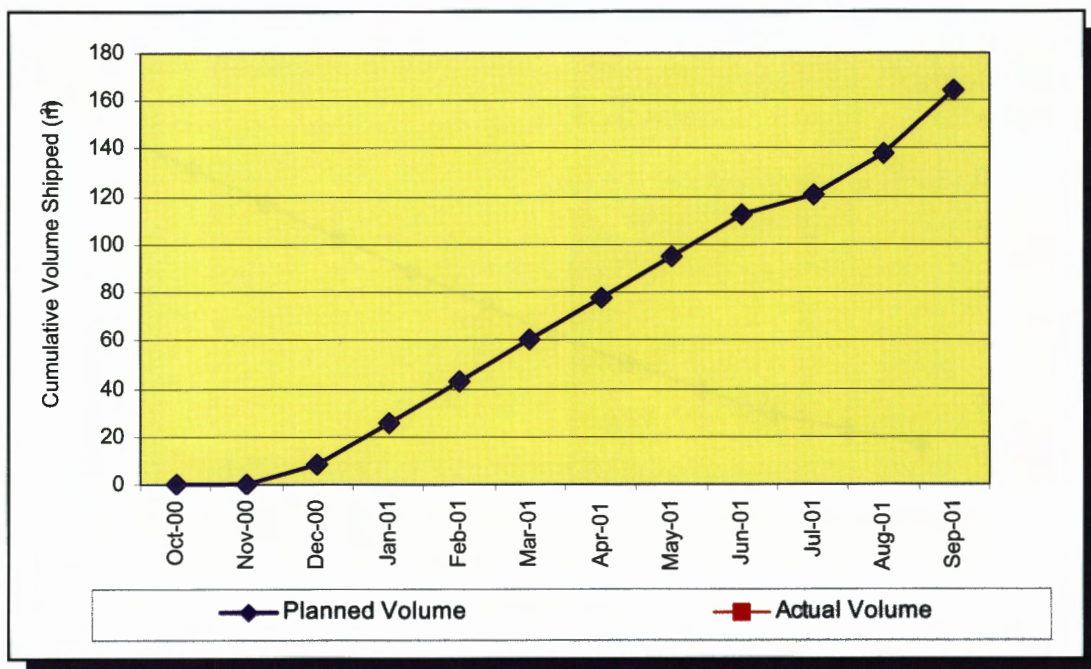


Figure 3.3-5 - LANL Volume Performance Indicator

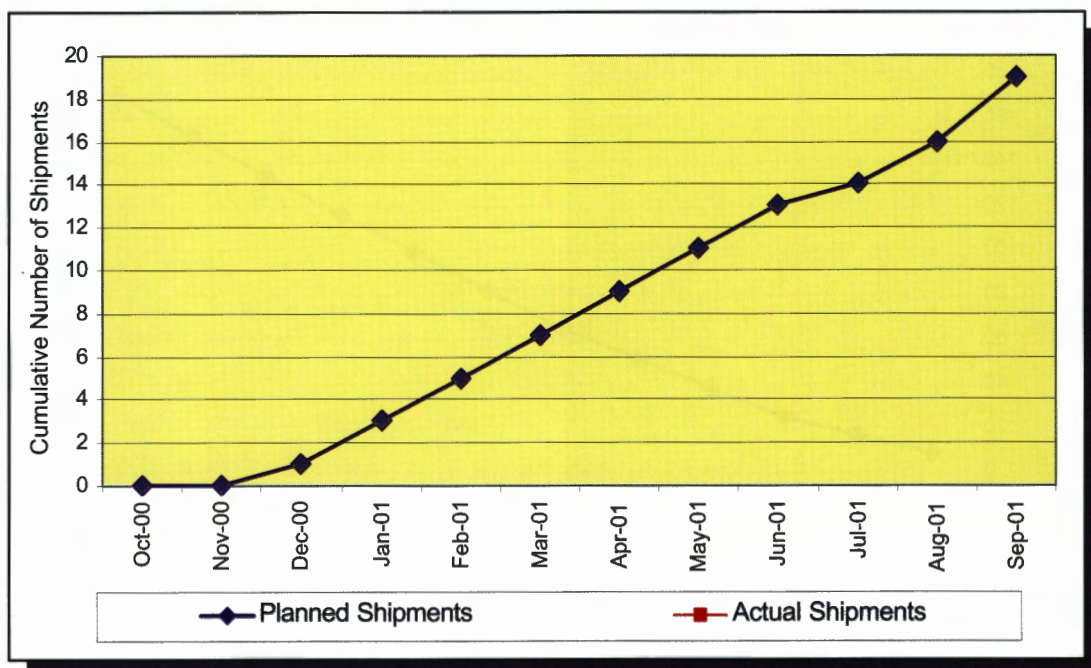


Figure 3.3-6 - LANL Shipment Performance Indicator

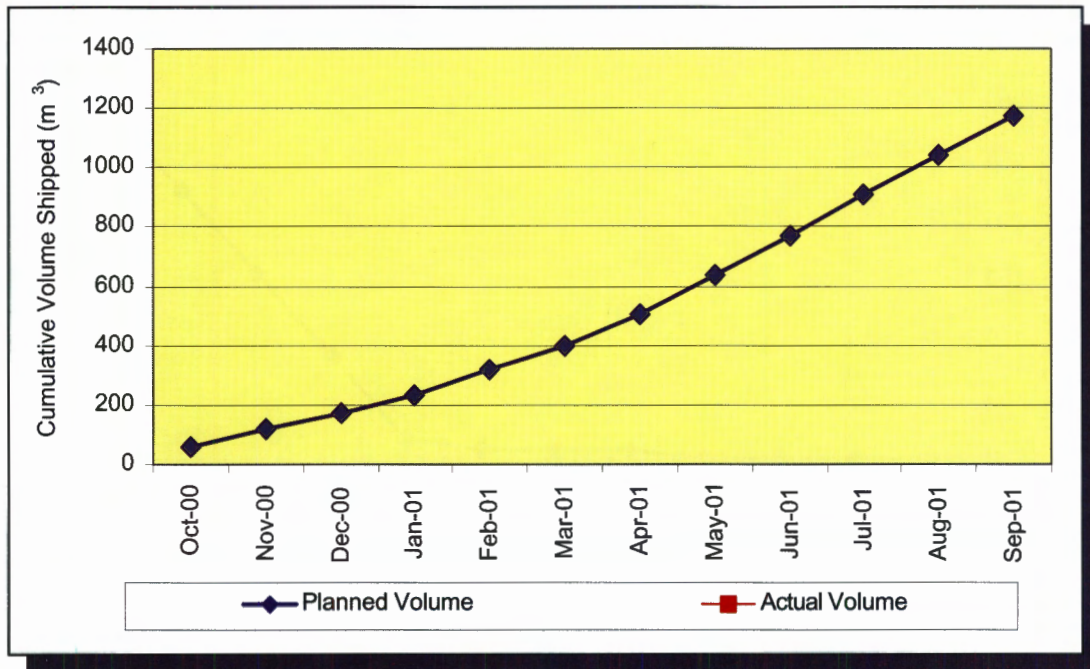


Figure 3.3-7 - RFETS Volume Performance Indicator

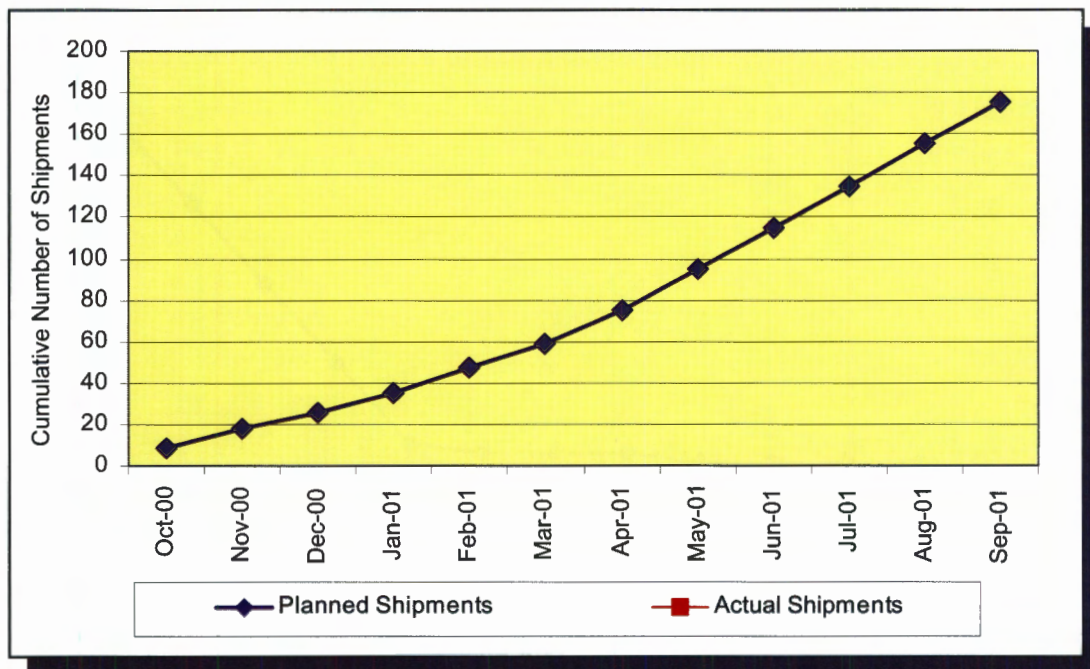


Figure 3.3-8 - RFETS Shipment Performance Indicator



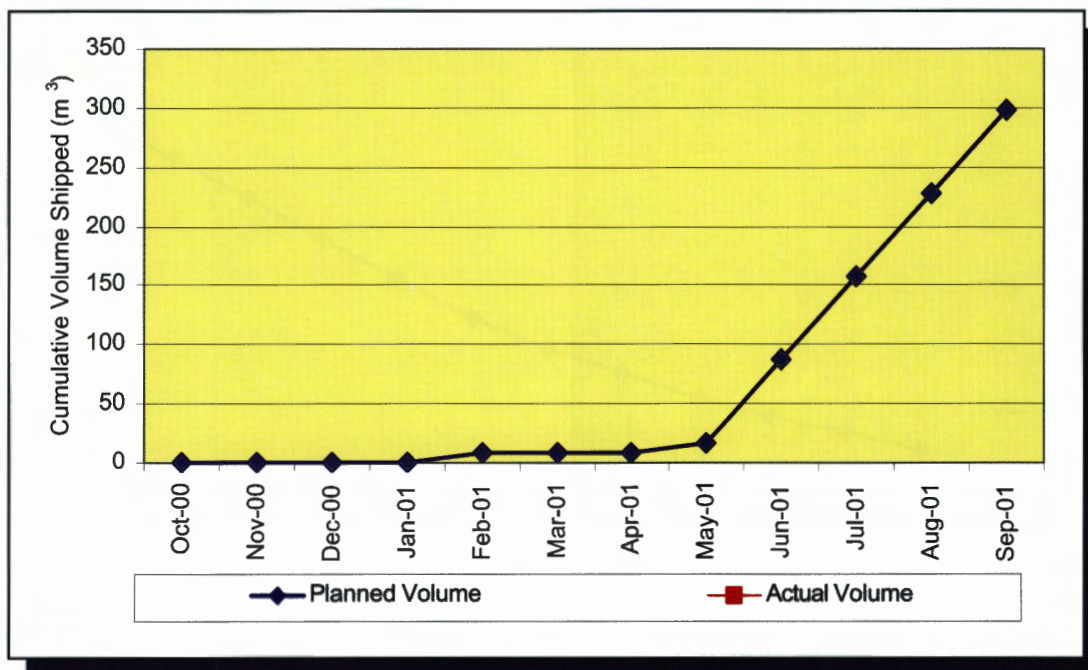


Figure 3.3-9 - SRS Volume Performance Indicator

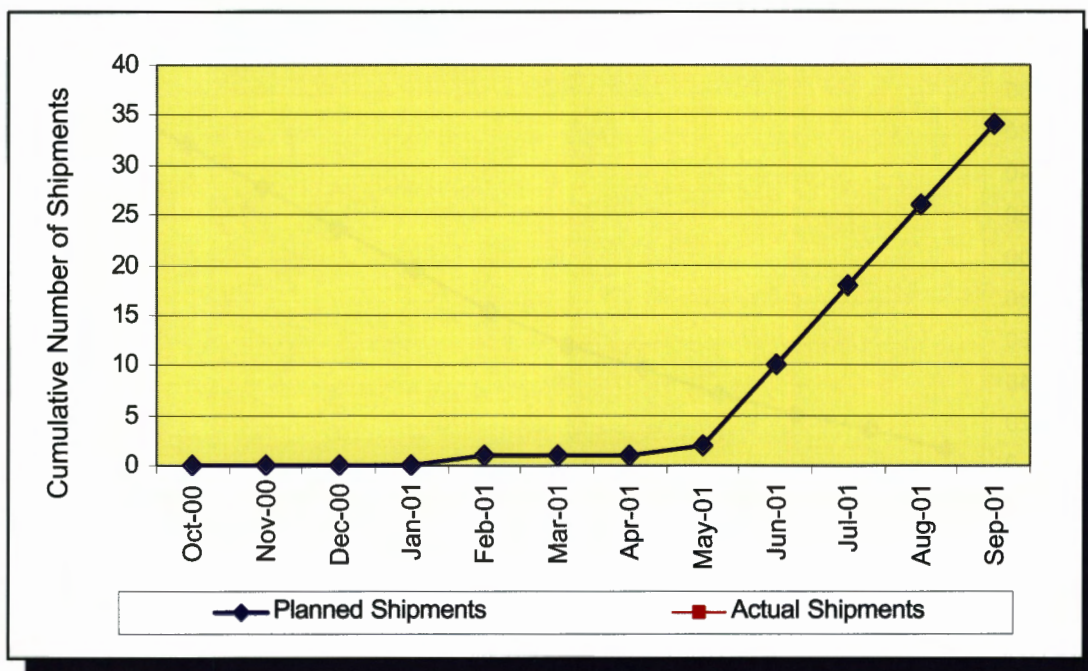


Figure 3.3-10 - SRS Shipment Performance Indicator

The performance indicator for the transportation system is shown in Figure 3.3-11.

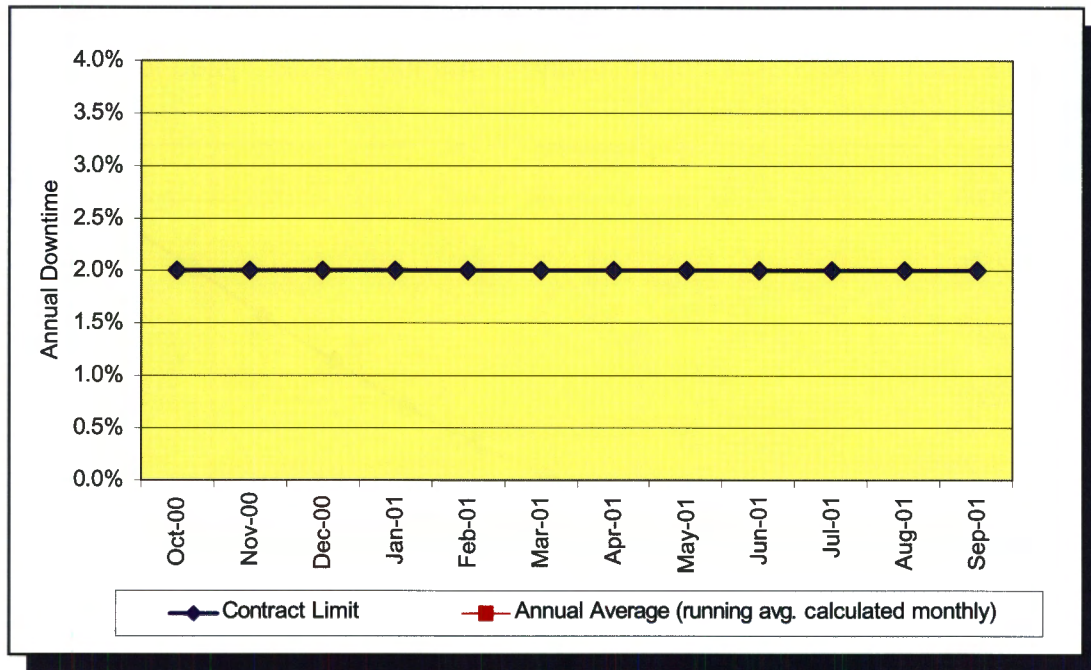


Figure 3.3-11 - Transportation Performance Indicator

The disposal site performance indicator, shown in Figure 3.3-12, graphically tracks on-time TRUPACT-II turnaround (in percent). This performance indicator shows whether disposal operations are able to turn around packaging to maintain the shipping schedule.

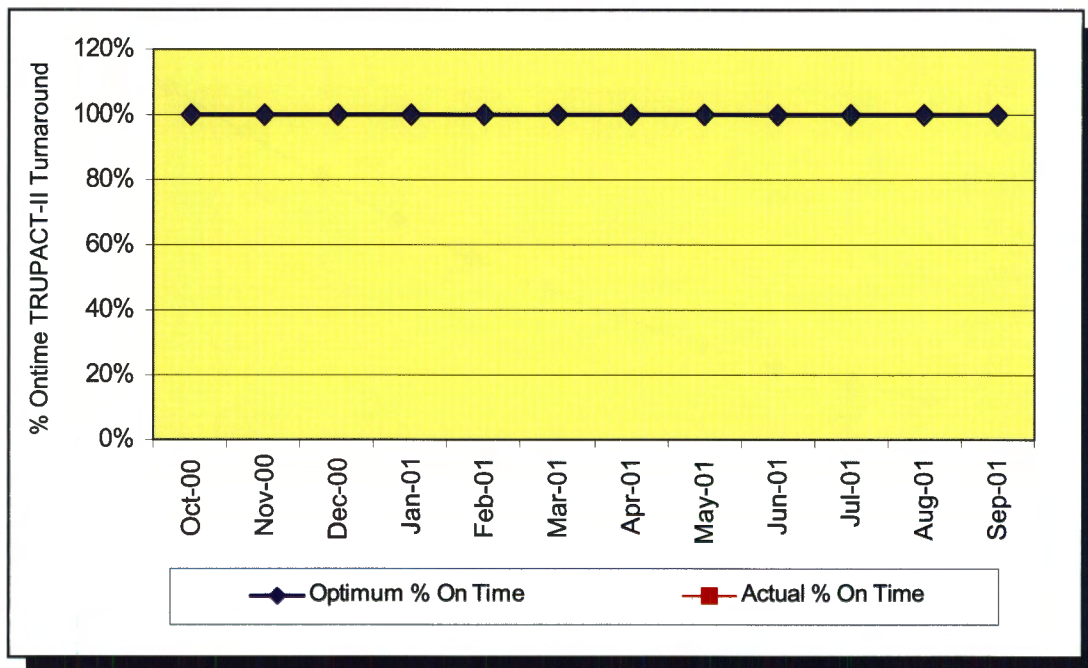


Figure 3.3-12 - Disposal Operations Performance Indicator



The individual TRU waste generator site data are compiled into overall system performance indicators and plotted to indicate planned versus actual volume (cumulative) and planned versus actual shipper demand (cumulative) as shown in Figure 3.3-13 and Figure 3.3-14, respectively. Variances are analyzed for impact to overall system schedules and efficiencies.

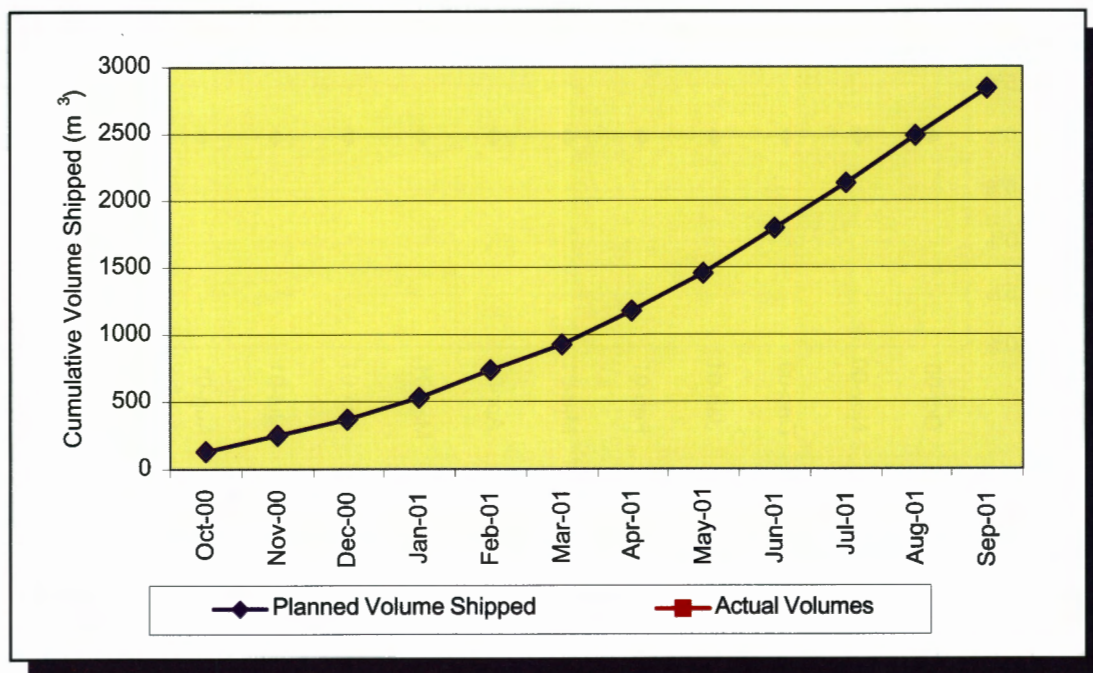


Figure 3.3-13 - TRU Waste System Volume Performance Indicator

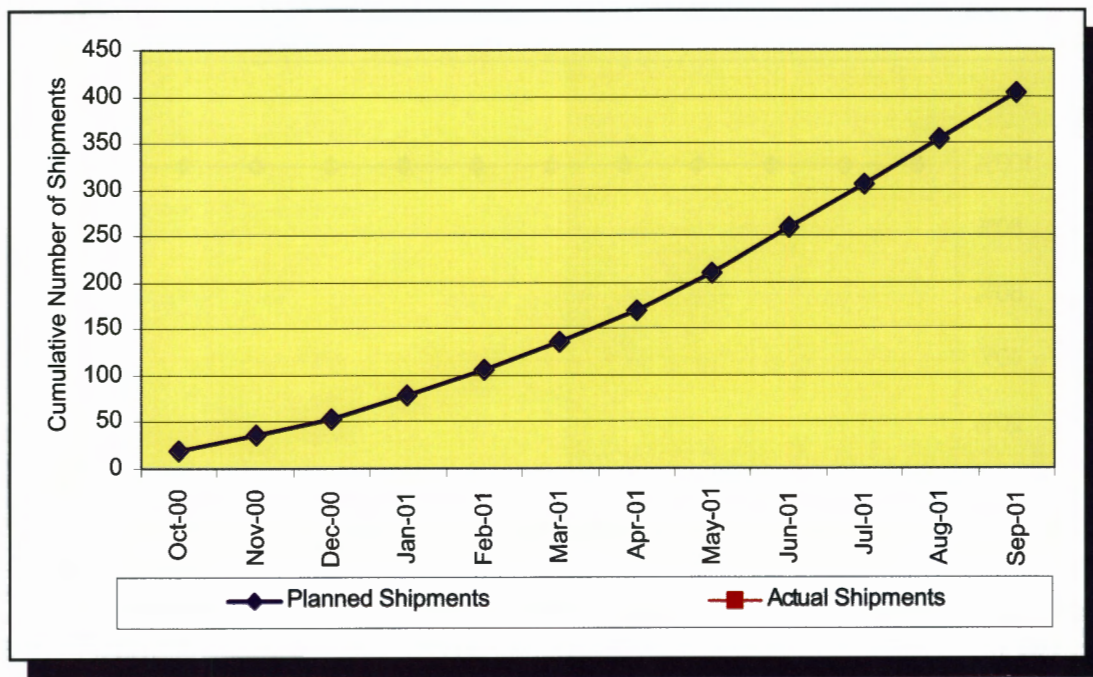


Figure 3.3-14 - TRU Waste System Shipment Performance Indicator

A quarterly supplement is planned to report on the each site's performance indicators and indicators for transportation, disposal operations, and system performance. The Plan will be revised annually showing updated schedules provided by the site's TRU program and TRU waste managers. Performance measures will be developed to track closure of small-quantity sites when the CCF is approved. New performance indicators will be developed based on the updated schedules. Variances from previous year's schedules having an impact on out-year system capabilities will be addressed.

In addition, data will be compiled for two future performance indicators:

- (1) Transportation delay time at each generator site will be gathered for the first year of operation to develop a baseline to which future operations will be compared; and
- (2) A graph depicting generator total pretreatment volume reduction as waste is shipped from each individual site.

Five additional graphics will be considered:

- (1) A graph depicting each individual site's transportation delay time versus the established system average;
- (2) Total pretreatment volume removed;
- (3) Progress toward applicable compliance orders or agreements;
- (4) A system performance indicator depicting system performance regarding average generator site transportation delay versus the established system average; and
- (5) A total system performance indicator showing TRU system progress toward completing its vision (reduction of pretreatment waste volumes).



# Chapter 4.0

## Baseline Cost Estimates

## **4.0 BASELINE COST ESTIMATES**

The cost baseline for the Plan has been developed from the cost estimates identified in the IPABS with additional information from the sites.

To support the evaluation of the proposed program improvements and system optimization to be described in the Optimization Plan, the generator sites provided additional information including waste quantities expressed as shippable containers (i.e., drums and standard waste boxes). The sites also were requested to break down the annual costs provided in IPABS into specific cost categories of:

- Storage;
- Waste characterization and certification;
- Loading, including package assembly and transportation certification;
- Treatment;
- Fixed/overhead cost such as security, facility operation and maintenance, and health and safety; and
- Capital costs for waste characterization buildings and major equipment purchases.

The cost baseline assumes full compliance with environmental, safety and other regulatory requirements, agreements and orders. This section will be rebaselined as major changes that impact the current TRU waste system are implemented.

### **4.1 Generator Site Baseline**

A major portion of each site's cost is for waste characterization and certification. Although these costs vary from site to site, they generally constitute about 50 percent of the total site budget. This cost component is the driver for the detailed evaluation of potential efficiency improvements in the characterization and certification process to be presented in the Optimization Plan. The baseline assumes that each major site will characterize, certify, and load its own waste in preparation for transportation to and disposal in the WIPP facility.

### **4.2 Carlsbad Field Office Operations Cost Baseline**

Carlsbad Field Office Operations include cost for the DOE, the WIPP facility, and support contractors. These costs are subdivided into transportation, disposal, and other mission-critical cost categories to facilitate the program improvement evaluations to be described in the Optimization Plan.



*Transportation Costs*

Transportation costs are derived from the IPABS data for the Carlsbad Field Office Operations as Projects CAO-#03 (Transportation) and CAO-#06 (Privatization), plus the New Mexico Impact Assistance portion of Project CAO-#01, which amounts to more than \$20 million per year for the improvement of highways in New Mexico. The Transportation Project, CAO-#03, includes:

- Transportation of TRU waste to WIPP and selected intersite shipments;
- The TRUPACT II and HalfPACT fabrication contracts;
- Trailers for shipping both CH TRU and RH TRU waste;
- Opening and maintaining transportation corridors;
- Emergency response training along transportation corridors; and
- Other critical transportation support operations at WIPP and the CBFO.

The Privatization Project, CAO-#06, covers the RH 72-B Fabrication Contract awarded during calendar year 2000 for a total of \$15.5 million and extends for five years.

*Disposal Costs*

Disposal Costs include the following IPABS data:

- WIPP surface facilities, including utilities, waste handling systems, and plant operations;
- WIPP underground facilities, including hoisting, ground control, mining, underground utilities, operations support, and maintenance;
- Safety and health; and
- Other activities, including specific mining and readiness initiatives.

*Other Mission-Critical Activities*

- The remaining costs are associated with security, quality assurance, permitting, regulatory compliance, and other related functions.

#### **4.3    Baseline Cost Data**

Table 4.3-1 presents the program cost baseline for the period FY 2001 through FY 2034. The baseline is identified on an annual basis through FY 2010 and in five-year increments thereafter consistent with the IPABS long-term planning cycle. Table 4.3-1 is based on IPABS data as of July 26, 2000, supplemented by inputs from individual sites provided in response to questionnaires and teleconferences.



**Table 4.3-1 - Baseline Cost Data<sup>(1)</sup>**  
**(Current Year Dollars in Thousands)**

| SITE - DATA SOURCE/FISCAL YEAR                                  | 2001           | 2002           | 2003           | 2004           | 2005           | 2006           | 2007           | 2008           | 2009           | 2010           |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <b>GENERATOR SITES</b>  |                |                |                |                |                |                |                |                |                |                |
| Argonne National Laboratory - East -- Site Data                 | 7,100          | 8,450          | 9,450          | 700            | 700            | 700            | 700            | 700            | 700            | 2,700          |
| Argonne National Laboratory - West                              |                |                |                |                |                |                |                |                |                | 1,276          |
| ARCO- Extrapolated - Note (3)                                   |                |                |                |                | 23             |                |                |                |                |                |
| Babcock & Wilcox-NES - Extrapolated - Note (3)                  |                |                | 4,163          |                |                |                |                |                |                |                |
| Battelle Columbus Laboratories - Extrapolated - Note (3)        |                | 6,716          |                |                |                |                |                |                |                |                |
| Bettis Atomic Power Laboratory - Note (2)                       | 0              |                |                |                |                |                |                |                |                |                |
| Energy Technology Engineering Center - Site Data                | 730            | 660            | 555            | 1,330          |                |                |                |                |                |                |
| GE-Vallecitos Nuclear Center - Extrapolated - Note (3)          |                |                |                | 1,196          | 1,196          | 1,196          | 1,196          |                |                |                |
| Hanford Site - Site Data Escalated at 2.1%                      | 26,340         | 30,424         | 36,260         | 49,153         | 52,656         | 53,762         | 47,778         | 45,593         | 46,344         | 53,219         |
| Idaho National Engineering and Environmental Laboratory - IPABS | 50,863         | 46,810         | 54,876         | 148,772        | 217,712        | 214,559        | 167,600        | 43,500         | 31,600         | 46,600         |
| Knolls Atomic Power Laboratory - Note (2)                       | 0              |                |                |                |                |                |                |                |                |                |
| Knolls Atomic Power Laboratory - Nuclear Fuel Services          |                | 14,090         | 14,385         | 12,239         | 10,747         |                |                |                |                |                |
| Lawrence Berkeley National Laboratory - Note (3)                | 253            |                |                |                |                |                |                |                |                |                |
| Lawrence Livermore National Laboratory - IPABS, Note (4)        | 3,956          | 3,996          | 3,000          | 2,979          | 2,579          | 2,579          | 2,579          | 2,299          |                |                |
| Los Alamos National Laboratory - IPABS                          | 18,951         | 23,487         | 32,429         | 50,562         | 51,673         | 50,209         | 50,969         | 52,140         | 53,335         | 54,555         |
| Lovelace Respiratory Research Institute - IPABS                 | 5              |                |                |                |                |                |                |                |                |                |
| Mound - Site Data   | 4,385          | 4,385          | 4,385          | 4,385          | 2,500          |                |                |                |                |                |
| Missouri University Research Reactor - Note (2)                 | 0              |                |                |                |                |                |                |                |                |                |
| Nevada Test Site - IPABS  | 6,224          | 6,394          | 6,287          | 5,050          | 5,275          | 2,750          | 4,059          | 5,007          | 3,082          |                |
| Oak Ridge National Laboratory - IPABS                           | 8,161          | 7,545          | 73,868         | 69,154         | 28,084         | 15,350         | 14,714         | 9,473          | 2,996          | 2,487          |
| Paducah Gaseous Diffusion Plant - IPABS                         | 693            | 1,784          | 59             |                |                |                |                |                |                |                |
| Rocky Flats Environmental Technology Site - IPABS               | 47,144         | 46,767         | 52,915         | 51,122         | 25,499         | 10,316         | 14             |                |                |                |
| Savannah River Site - Site Data                                 | 12,993         | 17,734         | 26,244         | 18,942         | 14,047         | 37,872         | 39,127         | 40,794         | 16,226         | 79,133         |
| Separation Process Research Unit                                |                |                |                |                |                |                |                |                | 2,716          | 2,773          |
| U.S. Army Material Command - Note (2)                           | 0              |                |                |                |                |                |                |                |                |                |
| West Valley Demonstration Project                               |                |                |                |                |                | 20,414         | 20,843         | 21,281         | 21,729         | 22,185         |
| <b>SUBTOTAL, Generator Sites</b>                                | <b>187,798</b> | <b>219,242</b> | <b>318,876</b> | <b>415,584</b> | <b>412,691</b> | <b>409,707</b> | <b>349,579</b> | <b>220,787</b> | <b>178,728</b> | <b>264,928</b> |
| <b>CARLSBAD OPERATIONS - Note (5)</b>                           |                |                |                |                |                |                |                |                |                |                |
| Transportation - Note (6)                                       | 56,190         | 64,136         | 58,437         | 56,324         | 57,766         | 59,192         | 60,666         | 57,667         | 64,090         | 64,079         |
| Disposal - Note (7)   | 45,568         | 50,142         | 54,275         | 54,147         | 56,706         | 55,545         | 57,109         | 60,218         | 60,076         | 62,915         |
| Remaining Mission-Critical Activities - Note (8)                | 92,740         | 84,063         | 93,368         | 96,256         | 96,798         | 101,035        | 102,625        | 106,473        | 105,198        | 107,411        |
| <b>SUBTOTAL, Carlsbad Operations</b>                            | <b>194,498</b> | <b>198,341</b> | <b>206,080</b> | <b>206,727</b> | <b>211,270</b> | <b>215,772</b> | <b>220,400</b> | <b>224,358</b> | <b>229,364</b> | <b>234,405</b> |
| <b>GRAND TOTAL</b>  | <b>382,296</b> | <b>417,583</b> | <b>524,956</b> | <b>622,311</b> | <b>623,961</b> | <b>625,479</b> | <b>569,979</b> | <b>445,145</b> | <b>408,092</b> | <b>499,333</b> |

|               |   |
|---------------|---|
| <b>NOTES:</b> |   |
| (1)           | Cost data are based on budget planning levels. Near-term fiscal year target levels are achieved when planning level data are validated.   |
| (2)           | "0" in FY 2001 for small-quantity site indicates that site costs for waste removal are either insignificant or will be funded from non-EM source.   |
| (3)           | Cost for small-quantity sites with no IPABS or questionnaire cost data (ARCO, BCL, B&W, GE, and LBNL) are estimates using the weighted average cost/cubic meter calculated from ANL-E and ETEC cost and volume data to be \$230K/m <sup>3</sup> . |
| (4)           | Cost for only one of two LLNL waste streams is currently available. The second waste stream is from long-term site operations extending through FY 2034; costs will be added during an update when data are available.                            |

Table 4.3-1 - Baseline Cost Data (Continued)  
(Current Year Dollars in Thousands)

| SITE - DATA SOURCE / FISCAL YEAR                                | 2011-2015 | 2016-2020 | 2021-2025 | 2026-2030 | 2031-2034 | TOTAL      |
|---|-----------|-----------|-----------|-----------|-----------|------------|
| <b>GENERATOR SITES</b>  |           |           |           |           |           |            |
| Argonne National Laboratory - East -- Site Data                 | 700       | 4,000     | 1,000     | 4,000     | 1,000     | 42,600     |
| Argonne National Laboratory - West                              | 14,453    |           |           |           |           | 15,729     |
| ARCO - Extrapolated - Note (3)                                  |           |           |           |           |           | 23         |
| Babcock & Wilcox-NES - Extrapolated - Note (3)                  |           |           |           |           |           | 4,163      |
| Battelle Columbus Laboratories - Extrapolated - Note (3)        |           |           |           |           |           | 6,716      |
| Bettis Atomic Power Laboratory                                  |           |           |           |           |           | 0          |
| Energy Technology Engineering Center - Site Data                |           |           |           |           |           | 3,275      |
| GE-Vallecitos Nuclear Center - Extrapolated - Note (3)          |           |           |           |           |           | 4,784      |
| Hanford Site - Site Data Escalated at 2.1%                      | 274,210   | 201,948   | 204,695   | 187,237   | 54,713    | 1,364,332  |
| Idaho National Engineering and Environmental Laboratory - IPABS | 155,800   | 22,700    |           |           |           | 1,201,392  |
| Knolls Atomic Power Laboratory                                  |           |           |           |           |           | 0          |
| Knolls Atomic Power Laboratory - Nuclear Fuel Services          |           |           |           |           |           | 51,461     |
| Lawrence Berkeley National Laboratory - Note (3)                |           |           |           |           |           | 253        |
| Lawrence Livermore National Laboratory - IPABS - Note (4)       |           |           |           |           |           | 23,967     |
| Los Alamos National Laboratory - IPABS                          | 118,134   |           |           |           |           | 556,444    |
| Lovelace Respiratory Research Institute - IPABS                 |           |           |           |           |           | 5          |
| Miamisburg Environmental Management Project - Site Data         |           |           |           |           |           | 20,040     |
| Missouri University Research Reactor                            |           |           |           |           |           | 0          |
| Nevada Test Site - IPABS  |           |           |           |           |           | 44,128     |
| Oak Ridge National Laboratory - IPABS                           | 10,178    |           |           |           |           | 242,010    |
| Paducah Gaseous Diffusion Plant - IPABS                         |           |           |           |           |           | 2,536      |
| Rocky Flats Environmental Technology Site - IPABS               |           |           |           |           |           | 233,777    |
| Savannah River Site - Site Data                                 | 421,199   | 297,163   | 336,797   | 385,168   | 444,584   | 2,188,023  |
| Separations Process Research Unit                               | 8,672     |           |           |           |           | 14,161     |
| U.S. Army Material Command                                      |           |           |           |           |           | 0          |
| West Valley Demonstration Project                               | 49,719    |           |           |           |           | 156,171    |
| <b>SUBTOTAL, Generator Sites</b>                                | 1,053,065 | 525,811   | 542,492   | 576,405   | 500,297   | 6,175,990  |
| <b>CARLSBAD OPERATIONS - Note (5)</b>                           |           |           |           |           |           |            |
| Transportation - Note (6)                                       | 328,368   | 364,324   | 404,217   | 448,479   | 497,588   | 2,641,523  |
| Disposal - Note (7)   | 349,023   | 387,241   | 429,643   | 476,689   | 528,887   | 2,728,184  |
| Remaining Mission-Critical Activities - Note (8)                | 569,380   | 631,004   | 703,660   | 780,717   | 753,569   | 4,424,297  |
| <b>SUBTOTAL, Carlsbad Operations</b>                            | 1,246,771 | 1,382,569 | 1,537,520 | 1,705,885 | 1,780,044 | 9,794,004  |
| <b>GRAND TOTAL</b>  | 2,299,836 | 1,908,380 | 2,080,012 | 2,282,290 | 2,280,341 | 15,969,995 |

NOTES:

- (5) The Carlsbad Operations costs for transportation, disposal, and other mission-critical activities from FY 2008 through 2034 are estimated based on FY 2003-2007 escalated by 2.1% for inflation.
- (6) Transportation includes CBFO projects #03, Transportation, and #06, Privatization, plus NM Impact Assistance from Project #01. The privatization figure represents budget outlay, not budget authorized, for RH TRU cask procurement of \$15,513 million during FY 2001-2003.
- (7) Disposal includes underground facilities, surface facilities, safety and health, and mining and readiness initiatives.
- (8) Disposal is not a stand-alone activity. It also requires other mission critical activities, including security, quality assurance, permitting, regulatory compliance, and other related functions. Line items under review (e.g., \$20 million for additional waste shaft and hoist in FY 2003) are not included.



# Chapter 5.0

## Path Forward for the TRU Waste System





## 5.0 PATH FORWARD FOR THE TRU WASTE SYSTEM

Substantial progress has been made across the TRU waste system since the last revision of the Plan was issued in December 1997. During this period, WIPP has begun to dispose of CH TRU waste from LANL, INEEL, RFETS, and Hanford. Significant advancements in the planning for production-level treatment facilities have occurred at INEEL and ORNL. The DOE continues working toward improving TRU waste system operations.

### *Reengineering*

The CBFO, in an effort to ensure that all issues with TRU waste management were being addressed, began what is known as the reengineering effort in October 1999. The reengineering effort assembled over 100 members from the TRU waste system into technical teams to evaluate and make suggestions to improve characterization, transportation, and disposal activities. In addition, an executive team comprised of DOE TRU waste management and DOE-HQ officials was convened to review the issues presented by the technical teams.

In addition to separating issues by functionality, the teams also separated recommendations into time segments. Phase I consists of recommendations that can be implemented within 6 months; Phase II, implementation within 18 months; and Phase III, implementation within 36 months. The recommendations were compiled, prioritized, edited for clarity by the Executive Team, and presented to the CBFO Manager for inclusion in the reengineering effort report. Details of implementation activities are presented in the Optimization Plan to be published in FY 2001.

### *Optimization*

TRU waste system optimization involves a phased approach to transition the DOE TRU waste system from the baseline to an optimal state. The strategy can be stated in three steps:

1. Maximize TRU waste disposal by taking actions that can readily be accomplished and will have a significant, positive impact on the ability of the TRU waste system to characterize, transport, and dispose of waste.
2. Achieve economies and efficiencies by implementing recommendations including those from the reengineering processes. This effort also includes resolution of needs associated with the disposal of certain waste forms across the TRU waste system.
3. Ease the characterization responsibilities of small-quantity TRU waste generators, to the maximum extent possible, by utilizing a CCF to perform the required analysis to certify wastes to be disposed of at WIPP.



The notion of optimization is complex and requires a holistic approach to address the challenge of changing the way the TRU system is currently managed. Change to the TRU system is driven by establishing new goals and objectives for the future, working closely with regulators, state and local officials, tribal nations, regional groups, and interested members of the public. A strategic plan for implementation will be presented in the Optimization Plan. The progress of optimization activities is integrated into quarterly supplements and evaluations of the Plan to anticipate and reflect changes or the need to update the baseline.

**Project Approach**  
**Benefits and Methodology**

*Activity associated with each of the optimization steps is currently under way. Many of the activities are as a direct result of the reengineering effort. It was recognized early in the process by the CBFO, however, that without a single focus, or project approach, the effort could easily become fragmented and project participants could lose sight of the vision. A project approach is able to focus the efforts to optimize characterization, transportation, and disposal operations by planning and implementing system activities. While the intent of the reengineering effort was to fill the pipeline, the project approach adds the element of direction to ensure sites that have near-term goals and milestones receive priority. Some of the key benefits of the project approach are:*

- Identification of functional responsibilities to ensure that all activities are accounted for, regardless of personnel turnover;*
- Minimize the need for continuous reporting by multiple organizations to the CBFO;*
- Identification of time limits associated with administrative change/operational efficiency; regulatory change; technology implementation; and research, development, and deployment to meet specific goals;*
- Identify and develop priorities and plans to effect closure of small-quantity sites.*
- Identification of a methodology for trade-off analysis, or contingency planning;*
- Measurement of accomplishment against plans;*
- Early identification of problems so that corrective action may follow;*
- Improved estimating capability for future planning; and*
- Knowing when objectives cannot be met or will be exceeded.*

*Issues are compiled for each of the three categories and assessments of each possible solution relative to need, impact, cost, schedule and priority are performed using a decision model with specific criteria. Once compiled, the issues and respective solutions are evaluated as a set, or group, against system need and priority and a proposed schedule and cost matrix is provided for review. A final plan is implemented by assigning activities to sub-tiered project leads. Appropriate performance measures are built and tracked to provide feedback to the project manager and DOE management. Contingency planning, and in some cases, parallel efforts are conducted for high-risk activities requiring success in a finite period of time. Decision points are built into appropriate places in the plan to continue, redirect or stop work when a trend can forecast the outcome of an activity/project.*



# Appendix 1

## Site-Specific Planning Summaries





## APPENDIX 1 - SITE-SPECIFIC PLANNING SUMMARIES

Site-specific planning summaries, listed in alphabetical order, are contained in this appendix. A representative at each TRU waste site provided this information regarding the plans to reach the site's desired end state; specifically, the site's objectives, inventory, infrastructure, regulatory compliance, and shipping schedules. Information on issues and alternatives was also provided.

- TRU waste inventory data (i.e., stored and projected waste volumes) represent the best available information. Additional needs, issues, and ideas are being identified from other sources, including reviews of site inventory data and follow-on interviews designed to fully understand the TRU waste inventory and the challenges associated with its final disposal. Revised data will be used for the next annual update of the Plan.
- The WIPP Supplemental Environmental Impact Statement (SEIS) II was performed based on a preferred alternative that included a 35-year operating period. The WIPP disposal phase is, therefore, assumed to end in FY 2034. Waste to be shipped after FY 2034 has no current plan for disposal. Site-specific projected schedules for shipping volumes of TRU waste include shipments through FY 2070, the planning period covered by the IPABS.
- As used in the Plan, "infrastructure" refers to major elements of the basic framework required to retrieve, treat, repackage, characterize, and transport TRU waste.

The baseline plan is presented first; alternatives being proposed or pursued, if any, are then discussed. The level of detail reported is directly related to the amount of inventory on site, the site's infrastructure, and the Consent Orders/Agreements under which the site is regulated. A summary of all Consent Orders/Agreements milestones is presented in Table A1.29-1 at the end of this appendix. Data, in general, are based on IPABS-approved FY 2000 life-cycle planning data as of July 26, 2000. The data for FY 2001 and FY 2002, however, were subsequently discussed with the site's representative and updated, as requested. The site's TRU program and TRU waste managers endorse the shipment schedules, assuming sufficient funds are available.

### A1.1 - ARCO Medical Products Company, West Chester, PA

ARCO has 0.1 m<sup>3</sup> of CH TRU waste in storage. This volume is categorized as TRU waste without a current plan for disposal. No additional generation of CH TRU waste is projected. ARCO has no RH TRU waste inventory; none is projected. The small amount of inventory is identified as commercial waste and, as such, is not currently eligible for disposal at WIPP. No Consent Orders/Agreements milestones exist for the site.

### A1.2 - Argonne National Laboratory-East, Argonne, IL

#### Objectives

Argonne National Laboratory-East (ANL-E) plans to have its CH TRU waste characterization process certified by April 2002, its transportation corridor open in FY 2002, and its current inventory shipped to WIPP for disposal by the end of FY 2002. ANL-E has a small volume of RH TRU waste planned for shipment in FY 2003.

#### Inventory

ANL-E must manage the volumes of CH TRU and RH TRU waste listed in Table A1.2-1. The site's assessment of whether the waste has a clear path for disposal, a plan for disposal, or is without a current plan for disposal is also shown.

**Table A1.2-1 - Volume of CH TRU and RH TRU Waste To Be Managed at ANL-E**

| Waste Type | Stored (m <sup>3</sup> ) | Projected (m <sup>3</sup> ) | Total (m <sup>3</sup> ) | Clear Path (m <sup>3</sup> ) | Plan for Disposal (m <sup>3</sup> ) | Without a Current Plan (m <sup>3</sup> ) |
|------------|--------------------------|-----------------------------|-------------------------|------------------------------|-------------------------------------|--|
| CH         | 95                       | 151                         | 246                     | 151                          | 0                                   | 95                                       |
| RH         | 1                        | 76                          | 77                      | 0                            | 37                                  | 40                                       |
| Total      | 96                       | 227                         | 323                     | 151                          | 37                                  | 135                                      |

#### Infrastructure

ANL-E has some of the facilities and equipment that are necessary for characterizing CH TRU waste for disposal at WIPP. Information regarding the site's planned infrastructure is listed in Table A1.2-2.

**Table A1.2-2 - Planned Infrastructure at ANL-E**

| Function            | Facility/Activity       | Completed | In Process | Planned Start |
|---------------------|-------------------------|-----------|------------|---------------|
| CH Characterization | Mobile Characterization |           |            | 2001          |
| CH Transportation   | Mobile Loading          |           |            | 2002          |
| CH Certification    | Certification Authority |           |            | 2002          |
| Transportation      | Open Corridor           |           |            | 2002          |



Regulatory Compliance

ANL-E prepared a Site Treatment Plan in 1995 to comply with provisions of the Federal Facility Compliance Agreement. The Illinois Environmental Protection Agency is the regulator for mixed TRU waste. A Consent Order has not been issued. The State Attorney General has indicated that no enforcement action will be taken with respect to storing or generating mixed waste as long as the terms of the Site Treatment Plan are met.

Projected Shipping Schedules

Projected schedules for shipping volumes of CH TRU and RH TRU waste to WIPP for disposal are shown in Table A1.2-3. By the end of FY 2003, ANL-E will have shipped all legacy TRU waste. The laboratory has ongoing missions that generate small quantities of waste. Rather than maintaining an open shipping corridor route over a prolonged period of time, shipping only a few shipments per year, ANL-E intends to accumulate newly generated waste until a shipping campaign is viable. A campaign is projected to begin in FY 2010 and occur every five to ten years thereafter. ANL-E's last shipments to WIPP are scheduled in the FY 2026 through FY 2030 time frame.

**Table A1.2-3 - Projected Schedules for Shipping Volumes of CH TRU and RH TRU Waste from ANL-E**

| <b>Fiscal Year</b> | <b>CH TRU<br/>Volume<br/>(cubic meters)</b> | <b>CH TRU<br/>Number of<br/>Shipments</b> | <b>RH TRU<br/>Volume<br/>(cubic meters)</b> | <b>RH TRU<br/>Number of<br/>Shipments</b> |
|--------------------|---|---|---|---|
| 2001               | 0   | 0   | 0   | 0   |
| 2002               | 95  | 15  | 0   | 0   |
| 2003               | 0   | 0   | 10  | 28  |
| 2004               | 0   | 0   | 0   | 0   |
| 2005               | 0   | 0   | 0   | 0   |
| 2006               | 0   | 0   | 0   | 0   |
| 2007               | 0   | 0   | 0   | 0   |
| 2008               | 0   | 0   | 0   | 0   |
| 2009               | 0   | 0   | 0   | 0   |
| 2010               | 16  | 3   | 7   | 21  |
| 2011-2015          | 0   | 0   | 0   | 0   |
| 2016-2020          | 20  | 4   | 10  | 30  |
| 2021-2025          | 0   | 0   | 0   | 0   |
| 2026-2030          | 20  | 4   | 10  | 30  |
| 2031-2035          | 0   | 0   | 0   | 0   |
| 2036-2070          | 95*   |   | 40*   |   |

\* This waste has no current plan for disposal because the WIPP disposal phase is projected to end in FY 2034.

Issues and Alternatives

*Inventory*

ANL-E expects to generate about 95 m<sup>3</sup> of CH TRU waste during the FY 2036 through FY 2070 time frame, after the scheduled closure of WIPP. This waste, which is without a current plan for disposal, will be stored in the Radioactive Waste Storage Facility and remain there until a suitable disposal plan is available.

Most of the RH TRU waste can be shipped to WIPP after the disposal facility begins RH TRU waste disposal operations in FY 2002. ANL-E expects to generate 40 m<sup>3</sup> of RH TRU waste after the scheduled closure of WIPP.

*Associated Needs*

ANL-E has equipment that could be used for processing and/or characterizing its CH TRU waste inventory for disposal at WIPP. Principal uncertainties surrounding this infrastructure issue are the level of effort required to bring the equipment up to standard and the funding level necessary to have the personnel on staff to complete the task. A net cost/benefit analysis is being conducted because of the uncertainties relative to the amount of waste that requires processing. One option being considered is to have a qualified contractor demonstrate the equipment's performance and perform the work using the site's equipment and the contractor's program. The agreed, preferred option, however, is the placement of contracts with mobile service vendors for the characterization of the inventory.

As an alternative to the current infrastructure plans, ANL-E is a candidate for participating in the CH TRU waste centralized characterization initiative discussed in Section 3.2.1.1. The cost to construct and operate a laboratory-based processing facility on the required schedule may be offset by shipping waste to this centralized facility for characterization and certification to the WIPP WAC.

The infrastructure necessary for characterizing RH TRU waste and loading the waste into a shipping cask will need to be constructed. Mobile vendors for RH TRU processing are not available at this time; the technology is still under development.

**A1.3 - Argonne National Laboratory-West, Idaho Falls, ID**

Argonne National Laboratory-West (ANL-W) is designing the Remote Treatment Facility (RTF) Annex to segregate, characterize, treat, and repackage RH TRU waste. As listed in Table A1.3-1, startup of the RTF is planned for 2009. A majority of this waste is currently stored in a silo-type complex. Of the 1,350 silos (approximately 0.5 m<sup>3</sup> of waste per silo), 600 will need to be interrogated for RH TRU waste. A majority of the 24.1 m<sup>3</sup> of RH TRU waste currently on site is dispersed throughout these silos. An additional 30.4 m<sup>3</sup> is projected to be created by the year 2012. This volume is categorized as TRU waste with a plan for disposal. The Idaho Settlement Agreement requires all TRU waste, including RH, to be removed from the state of Idaho by 2018.



In addition, the permits for the silo area require the RTF Annex to be constructed to allow for a path forward for this RH TRU waste. Consent Orders/Agreements milestones for this site are listed in Table A1.29-1.

**Table A1.3-1 - Planned Infrastructure at ANL-W**

| Function            | Facility/Activity | Completed | In Progress | Planned Start |
|---------------------|-------------------|-----------|-------------|---------------|
| RH Segregation      | ANL-W RTF         |           |             | 2009          |
| RH Characterization | ANL-W RTF         |           |             | 2009          |
| RH Repackaging      | ANL-W RTF         |           |             | 2009          |
| RH Treatment        | ANL-W RTF         |           |             | 2009          |
| RH Transportation   | ANL-W RTF         |           |             | 2009          |

#### **A1.4 - Babcock & Wilcox Nuclear Engineering Services, Lynchburg, VA**

Babcock & Wilcox Nuclear Engineering Services, Lynchburg (B&W-NES) has 18.1 m<sup>3</sup> of CH TRU waste in storage. This volume is categorized as TRU waste with a plan for disposal. No additional generation of CH TRU waste is projected. B&W-NES may have some on-site capabilities for processing, characterizing, packaging, and shipping CH TRU waste. This small inventory, however, may make B&W-NES a candidate for the centralized characterization initiative discussed in Section 3.2.1.1. The company has no RH TRU waste inventory; none is projected. No Consent Orders/Agreements milestones exist for this site.

#### **A1.5 - Battelle Columbus Laboratories, Columbus, OH**

Battelle Columbus Laboratories (BCL) is currently in the process of treating and repackaging stored waste. The laboratories project that 4.2 m<sup>3</sup> of CH TRU and 20.8 m<sup>3</sup> of RH TRU waste must be managed. These volumes are categorized as TRU waste with a plan for disposal. The DOE-Ohio Field Office's Strategic Plan requires that "any radioactive contamination associated with activities of the BCL prior to 1986 must be cleaned up by the end of 2005." The schedule for closure at the West Jefferson Site requires BCL to begin shipping RH TRU waste by early calendar year 2001 to support the 2005 committed closure date; waste must be removed to allow characterization, decontamination, and demolition of site buildings. Since WIPP is not scheduled to begin receiving RH TRU waste until the second quarter of FY 2002, it may become necessary to ship the BCL RH TRU waste to a temporary storage location with subsequent shipment to WIPP for disposal. The small volume of CH TRU waste makes BCL a candidate for the centralized characterization initiative discussed in Section 3.2.1.1.

#### **A1.6 - Bettis Atomic Power Laboratory, West Mifflin, PA**

Bettis Atomic Power Laboratory (BAPL) has 17.6 m<sup>3</sup> of CH TRU waste in storage; no additional generation of CH TRU waste is projected. The laboratory has 3.0 m<sup>3</sup> of RH TRU in storage; no additional generation of RH TRU waste is projected. The stored volumes are categorized as TRU waste with a plan for disposal. BAPL, as a

small-quantity generator without a WIPP TRU waste characterization infrastructure, is a candidate for the CH TRU waste centralized characterization initiative discussed in Section 3.2.1.1. No Consent Orders/Agreements milestones exist for this site.

#### **A1.7 - Energy Technology Engineering Center, Santa Susana, CA**

The ETEC has 2.3 m<sup>3</sup> of CH TRU waste and 8.7 m<sup>3</sup> of RH TRU waste in storage. These volumes are categorized as TRU waste with a plan for disposal. No additional generation of waste is projected. The DOE and Boeing Canoga Park, the management and operating contractor for the ETEC, have signed an agreement to close the site in 2007. Removal of all TRU waste by October 2002 is required in order to meet this closure date. The ETEC's CH TRU waste is a candidate for the central characterization initiative discussed in Section 3.2.1.1. If the facility is not expected to be on-line before FY 2002, the ETEC may use mobile vendors to characterize waste for disposal at WIPP or move their waste to a large-quantity site. Current expectations are that the ETEC's RH TRU waste will be able to comply with WIPP's RH WAP, a document currently under regulatory review, and the site will ship its RH TRU waste to WIPP in FY 2002. A fallback position may be to send the RH TRU waste to a large-quantity site for certification. The two Consent Orders/Agreements milestones for this site are listed in Table A1.29-1.

#### **A1.8 - General Electric Vallecitos Nuclear Center, Pleasanton, CA**

The General Electric Vallecitos Nuclear Center (GE-VNC) has 9 m<sup>3</sup> of CH TRU waste in storage and has a stored RH TRU waste inventory of 11.8 m<sup>3</sup>. These volumes are categorized as TRU waste with a plan for disposal. No additional generation of waste is projected. The small inventory of CH TRU waste and the lack of waste characterization infrastructure make GE-VNC a candidate for the centralized characterization initiative discussed in Section 3.2.1.1. No Consent Orders/Agreements milestones exist for this site.

#### **A1.9 - Hanford Reservation, Richland, WA**

##### Objectives

As of December 31, 2000, a total of five shipments (approximately 36 m<sup>3</sup>) have been received at WIPP. The first shipment of RH TRU waste is now scheduled for FY 2013. Shipments of both CH and RH TRU waste will continue until WIPP's expected closing date in FY 2034.

##### Inventory

Hanford must manage the volumes of CH TRU and RH TRU waste listed in Table A1.9-1. The site's assessment of whether the waste has a clear path for disposal, has a plan for disposal, or is without a current plan for disposal is also shown.



**Table A1.9-1 - Volume of CH TRU and RH TRU Waste To Be Managed at Hanford<sup>(1)</sup>**

| Waste Type | Stored (m <sup>3</sup> ) | Projected (m <sup>3</sup> ) | Total (m <sup>3</sup> ) | Clear Path (m <sup>3</sup> ) | Plan for Disposal (m <sup>3</sup> ) | Without a Current Plan (m <sup>3</sup> ) |
|------------|--------------------------|-----------------------------|-------------------------|------------------------------|-------------------------------------|--|
| CH         | 16,100                   | 15,900                      | 32,000                  | 13,600                       | 8,100 <sup>(2)</sup>                | 10,300                                   |
| RH         | 200                      | 700                         | 900                     | 0                            | 800                                 | 100                                      |
| Total      | 16,300                   | 16,600                      | 32,900 <sup>(3)</sup>   | 13,600                       | 8,900                               | 10,400                                   |

<sup>(1)</sup> Numbers rounded to nearest hundred.

<sup>(2)</sup> Includes 73 m<sup>3</sup> of waste containing over-limit PCBs and 2 m<sup>3</sup> of waste with high Pu-238 activity that are not included in IPABS data.

<sup>(3)</sup> Includes the volumes of CH TRU and RH TRU waste that will be generated during retrieval of waste from the 618-10 and 618-11 burial grounds. Recovery of waste from these burial grounds is currently not planned until 2037, after WIPP is closed.

### Infrastructure

The Waste Receiving and Processing (WRAP) facility is currently being used to characterize and process TRU waste for shipment to WIPP. However, the WRAP facility will not be able to handle all of the repackaging needs for the Hanford Reservation. A large box facility will be constructed or an existing facility will be modified; operations are planned to begin in FY 2013. This facility will size-reduce large containers containing both CH TRU and RH TRU waste. (Alternatively, a large TRUPACT-II-type packaging could be developed and used to address the oversize waste issue.) The TRUPACT-II loading facility for Hanford is located inside the WRAP facility. The infrastructure for RH TRU waste processing needs to be constructed. Hanford's transportation corridor is currently open for shipping waste to WIPP. Information regarding the site's existing and planned infrastructure is listed in Table A1.9-2.

**Table A1.9-2 - Existing and Planned Infrastructure at Hanford**

| Function            | Facility/Activity                | Completed | In Process | Planned Start |
|---------------------|----------------------------------|-----------|------------|---------------|
| CH Retrieval        | Phase I and II Retrieval         |           | X          |               |
| RH Retrieval        | Alpha Caisson Retrieval          |           |            | 2013          |
| CH Characterization | Waste Receiving and Processing I | X         |            |               |
| CH/RH Repackaging   | CH/RH Large Box Facility         |           |            | 2013          |
| RH Characterization | Processing Facility              |           |            | 2013          |
| CH Transportation   | Loading Facility                 | X         |            |               |
| RH Transportation   | Loading Facility                 |           |            | 2013          |
| Certification       | Certification Authority          | X         |            |               |
| Transportation      | Open Corridor                    | X         |            |               |

TRU waste at Hanford is stored at either the Central Waste Complex or in the 200 Area burial grounds. TRU waste that is currently in the 200 Area burial grounds must be retrieved before it can be characterized and sent to WIPP for disposal. Retrieval of the TRU waste in the burial grounds will be conducted in two phases. Phase I retrieval operations started in FY 1999 and are scheduled to be completed in FY 2004. However, TRU retrieval operations are not funded through FY 2002. Other activities may or may not be funded depending on the Hanford Site Integrated Priority List. Phase II retrieval operations include RH TRU waste retrieval and will begin in FY 2004, with all retrieval operations.

TRU waste contained in a burial ground not located in the 200 Area is to be retrieved as part of the Environmental Restoration Program. This burial ground, known as 618-11, has in the baseline a retrieval start date of 2037.

Waste retrieved during the initial phase of the TRU waste retrieval activities will be placed in aboveground storage, or disposed of at WIPP. A new processing facility (M-91) planned for RH TRU and mixed RH TRU will be in the final design and initial construction stages in FY 2012. Processing of RH wastes will begin in FY 2013. The WRAP facility will continue to be operated and maintained. Processing equipment and computer interface equipment will be upgraded, as necessary, to meet throughput requirements. The WRAP facility will continue processing CH post-1970 TRU/TRU mixed waste from the following anticipated waste streams: newly generated on site; retrieved suspect TRU; and off-site TRU waste requiring WIPP certification.

### Regulatory Compliance

Because of other existing agreements, Hanford was not required to prepare a Site Treatment Plan to comply with provisions of the Federal Facility Compliance Agreement. Regulatory agreements for the Hanford Reservation are established by the Hanford Tri-Party Agreement among the DOE, the Environmental Protection Agency, and the state of Washington. The regulator for mixed TRU waste at Hanford is the Washington State Department of Ecology. The Tri-Party Agreement establishes the following milestones associated with TRU and mixed TRU waste (completed milestones are preceded by a check mark [✓]).

- ✓ Initiate processing of CH TRU/mixed TRU waste at the Waste Receiving and Processing Facility by December 1998.
- ✓ Complete construction of small-container CH TRU/mixed TRU waste retrieval facility (Project W-113) and initiate retrieval of small-container TRU/mixed TRU waste from the 200 Area by September 2000.
- Award necessary privatized contracts for processing RH TRU and large-size TRU/mixed TRU waste by September 2003.
- Complete Phase I retrieval of post-1970 CH TRU/mixed TRU waste associated with project W-113 by 2004.



- Complete construction and initiate operations of RH TRU and large-size TRU/mixed TRU waste by June 2005.

The Tri-Party Agreement milestones for RH TRU waste are currently being discussed. A proposed revision was included in the Project Management Plan submitted to the Washington Department of Ecology and the EPA in June 2000.

Projected Shipping Schedules

Projected schedules for shipping volumes of CH TRU and RH TRU waste to WIPP for disposal are shown in Table A1.9-3. *Quantities reflect any volumetric expansion or reduction that would occur during waste processing.*

**Table A1.9-3 - Projected Schedules for Shipping Volumes of CH TRU and RH TRU Waste from Hanford**

| Fiscal Year | CH TRU<br>Volume<br>(cubic meters) | CH TRU<br>Number of<br>Shipments | RH TRU<br>Volume<br>(cubic meters) | RH TRU<br>Number of<br>Shipments |
|-------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|
| 2001        | 34                                 | 5                                | 0                                  | 0                                |
| 2002        | 41                                 | 6                                | 0                                  | 0                                |
| 2003        | 165                                | 22                               | 0                                  | 0                                |
| 2004        | 359                                | 48                               | 0                                  | 0                                |
| 2005        | 462                                | 61                               | 0                                  | 0                                |
| 2006        | 479                                | 63                               | 0                                  | 0                                |
| 2007        | 442                                | 58                               | 0                                  | 0                                |
| 2008        | 444                                | 59                               | 0                                  | 0                                |
| 2009        | 449                                | 60                               | 0                                  | 0                                |
| 2010        | 447                                | 60                               | 0                                  | 0                                |
| 2011-2015   | 3,435                              | 454                              | 100                                | 110                              |
| 2016-2020   | 3,110                              | 411                              | 225                                | 250                              |
| 2021-2025   | 2,295                              | 304                              | 225                                | 250                              |
| 2026-2030   | 1,087                              | 144                              | 225                                | 250                              |
| 2031-2035*  | 351                                | 46                               | 55                                 | 60                               |
| 2036-2070   | 10,293**                           |                                  | 94**                               |                                  |

\* Although IPABS data are presented in five-year increments, it is assumed that all waste will be shipped to WIPP during FY 2031 through FY 2034.

\*\* This waste has no current plan for disposal because the WIPP disposal phase is projected to end in FY 2034.

Issues and Alternatives

*Inventory*

Hanford expects to generate about 10,293 m<sup>3</sup> of CH TRU waste and 94 m<sup>3</sup> of RH TRU waste that would be scheduled for shipment during the FY 2036 through FY 2070 time frame, after WIPP is scheduled for closure. This waste, which would have no plan for disposal, would be stored until a suitable disposal plan is available.

*Associated Needs*

Of the waste that cannot be disposed of without overcoming associated needs, 7,872 m<sup>3</sup> will require processing that is not currently available at the site. Hanford has no current processing capability for large CH TRU containers (6,946 m<sup>3</sup>), for high Pu-238 activity (2 m<sup>3</sup>), and for RH TRU waste (924 m<sup>3</sup>). The particular processing capabilities that are lacking are RH assay, remote processing for nondestructive examination, size reduction, visual examination, packaging, and headspace gas sampling for RH TRU waste. Hanford expects to modify existing facilities in FY 2013 to accommodate these processes. The site also has 73 m<sup>3</sup> of TRU waste that has PCBs greater than 50 ppm.

**A1.10 - Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID**

Objectives

The first shipment of CH TRU waste from the Idaho National Engineering and Environmental Laboratory (INEEL) to WIPP was made in April 1999. As of December 31, 2000, a total of 30 shipments (205 m<sup>3</sup>) from INEEL have been received at WIPP. Shipments are scheduled to be completed during the FY 2026 through FY 2030 time frame. The laboratory plans to send its first shipment of RH TRU waste in FY 2007. Shipments of RH TRU waste will be completed in the FY 2011 through FY 2015 interval.



Inventory

INEEL must manage the volumes of CH TRU and RH TRU waste listed in Table A1.10-1. The site's assessment of whether the waste has a clear path for disposal, has a plan for disposal, or is without a current plan for disposal is also shown.

**Table A1.10-1 - Volume of CH TRU and RH TRU Waste To Be Managed at INEEL**

| Waste Type | Stored (m <sup>3</sup> ) | Projected (m <sup>3</sup> ) | Total (m <sup>3</sup> ) | Clear Path (m <sup>3</sup> ) | Plan for Disposal (m <sup>3</sup> ) | Without a Current Plan (m <sup>3</sup> ) |
|------------|--------------------------|-----------------------------|-------------------------|------------------------------|-------------------------------------|--|
| CH         | 64,878                   | 12,590*                     | 77,468                  | 2,194                        | 75,248                              | 26                                       |
| RH         | 85                       | 0                           | 85                      | 0                            | 85                                  | 0  |
| Total      | 64,963                   | 12,590*                     | 77,553                  | 2,194                        | 75,333                              | 26                                       |

\* The original projected volume of 111,221.3 m<sup>3</sup> listed in the IPABS included 5,000 m<sup>3</sup> of TRU waste from the (HLW) program and 106,221.3 m<sup>3</sup> from environmental restoration activities. Of this volume, 72,832 m<sup>3</sup> is contaminated soils that will result in 4,823 m<sup>3</sup> of waste, following treatment; 33,389 m<sup>3</sup> is contaminated debris that will result in 2,767.3 m<sup>3</sup> of waste, following treatment. The TRU waste from HLW and environmental restoration activities total 12,590.3 m<sup>3</sup>, the amount projected.

Infrastructure

INEEL is targeting retrieval of waste from accessible storage for early certification and shipment to WIPP to meet an upcoming milestone specified in the Laboratory's Settlement Agreement with the state of Idaho. By December 31, 2002, no fewer than 3,100 m<sup>3</sup> (15,000 55-gallon drum equivalents) of TRU waste must be shipped out of the state of Idaho. This waste is being characterized at the Stored Waste Examination Pilot Plant (SWEPP) and at ANL-W. Additional characterization capabilities are being implemented to augment the existing SWEPP facility to increase the throughput of waste in the characterization process. Implementation of a complete mobile vendor characterization system to augment the SWEPP line is also under evaluation. An additional TRUPACT-II loading capability is planned to be added in FY 2001, with a maximum of two loading areas operating multiple shifts.

After meeting the milestone, the remaining CH TRU waste will be treated in the Advanced Mixed Waste Treatment Facility (AMWTF). The AMWTF will be constructed and be in operation by March 31, 2003, as required by the Settlement Agreement. This facility will be financed and operated by the private sector and have sufficient processing capacity to accommodate additional waste volumes from across the DOE TRU waste system.

The design of the AMWTF will not allow for the processing of RH TRU waste. The INEEL is evaluating a strategic approach to implementing RH TRU characterization, certification, and transportation capabilities. The INEEL is evaluating acceleration of the baseline for initiating disposal of stored RH TRU waste. Revised strategy has been developed and will be implemented in FY 2001. Retrieval of RH TRU waste began in August 2000. RH TRU visual examination/repackaging operations (if needed) are expected to be implemented in an existing facility that will be modified for that purpose.

Information regarding the site's existing and planned infrastructure is listed in Table A1.10-2.

**Table A1.10-2 - Existing and Planned Infrastructure at INEEL**

| Function            | Facility/Activity                               | Completed | In Process | Planned Start |
|---------------------|---|-----------|------------|---------------|
| CH Characterization | SWEPP   | X         |            |               |
| CH Characterization | ANL-W   | X         |            |               |
| RH Characterization | RH TRU Repackaging                              |           |            | TBD           |
| CH Treatment        | AMWTF   |           |            | 2003          |
| CH Transportation   | TRUPACT-II Loading Facility                     | X         |            |               |
| Transportation      | Expand TRUPACT-II Loading Capability            |           |            | FY 2001       |
| Transportation      | Open Corridor                                   | X         |            |               |
| Certification       | Certification Authority - Debris waste forms    | X         |            |               |
| Certification       | Certification Authority - Nondebris waste forms |           |            | January 2001  |

### Regulatory Compliance

Regulatory drivers for the INEEL originate from two primary sources. The first source is a settlement agreement among the state of Idaho, the U.S. Department of the Navy, and the DOE that is administered by the state of Idaho Oversight Program. The second source is a Federal Facility Compliance Agreement Consent Order and Site Treatment Plan that was jointly issued in 1995 by the DOE and the Idaho Department of Health and Welfare, Division of Environmental Quality, and is administered by the latter. The following key milestones have been derived from these sources (completed milestones are preceded by a check mark [√]).

- √ Place contract for the construction of an AMWTF for the treatment of TRU wastes.
- √ Initiate shipments of TRU waste to WIPP, or other such facility designated by the DOE, by April 30, 1999.
- By December 31, 2002, ship no fewer than 3,100 m<sup>3</sup> (15,000 55-gallon drum equivalents) of TRU waste out of the state of Idaho.
- Complete construction of the AMWTF by December 31, 2002.
- Begin operation of the AMWTF by March 31, 2003.
- After January 1, 2003, remove no less than a 2,000 m<sup>3</sup> per year running average of TRU waste out of the state of Idaho.



- Ship all TRU waste to WIPP, or other such facility designated by the DOE, by a target date of December 31, 2015, and in no event later than December 31, 2018.

The impact of not meeting these milestones is suspension of DOE spent fuel shipments to the INEEL. The sole storage facility for Department of Defense spent nuclear fuel is currently at the INEEL. Suspending those shipments could severely impact the U.S. Department of Defense Nuclear Program.

### Projected Shipping Schedules

Projected schedules for shipping volumes of CH TRU and RH TRU waste to WIPP for disposal are shown in Table A1.10-3. *The quantities reflect any volumetric expansion or reduction that would occur during waste processing.*

**Table A1.10-3 - Projected Schedules for Shipping Volumes of CH TRU and RH TRU Waste from the INEEL**

| Fiscal Year | CH TRU<br>Volume<br>(cubic meters) | CH TRU<br>Number of<br>Shipments | RH TRU<br>Volume<br>(cubic meters) | RH TRU<br>Number of<br>Shipments |
|-------------|------------------------------------|----------------------------------|------------------------------------|----------------------------------|
| 2001        | 1,160                              | 170                              | 0                                  | 0                                |
| 2002        | 1,483                              | 216                              | 0                                  | 0                                |
| 2003        | 1,082                              | 199                              | 0                                  | 0                                |
| 2004        | 1,817                              | 408                              | 0                                  | 0                                |
| 2005        | 2,238                              | 508                              | 0                                  | 0                                |
| 2006        | 2,210                              | 501                              | 0                                  | 0                                |
| 2007        | 2,502                              | 570                              | 14                                 | 33                               |
| 2008        | 2,984                              | 685                              | 14                                 | 41                               |
| 2009        | 2,480                              | 565                              | 14                                 | 41                               |
| 2010        | 2,723                              | 623                              | 14                                 | 41                               |
| 2011-2015   | 14,954                             | 3,427                            | 28                                 | 99                               |
| 2016-2020   | 5,650*                             | 1,211*                           | 0                                  | 0                                |
| 2021-2025   | 1,670                              | 317                              | 0                                  | 0                                |
| 2026-2030   | 1,508                              | 221                              | 0                                  | 0                                |
| 2031-2035   | 0                                  | 0                                | 0                                  | 0                                |
| 2036-2070   | 0                                  |                                  | 0                                  |                                  |

\* Stored TRU (legacy) waste will be removed from Idaho no later than December 2018. Additional shipments of newly generated waste from the Environmental Restoration Program continue to WIPP past 2018.