# APPENDIX O

# WASTE INVENTORY

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# WASTE INVENTORY

## 1.0 INTRODUCTION

The U.S. Department of Energy (DOE) has initiated a cost benefit study to provide a technical basis for the selection and rejection of engineered alternatives (EAs) for the Waste Isolation Pilot Plant (WIPP) should it be determined that additional barriers are desirable. The EAs are analyzed with respect to the following eight factors:

- Effects of EAs impact on long-term performance of the disposal system
- Worker and public exposures
- Impact on removing waste from the repository
- Risk of transportation
- Impact on uncertainty in compliance assessment
- Impact on public confidence in performance of the repository
- Impact on total system cost and schedule
- Impact on other waste disposal programs.

Processed waste masses and volumes are used to support the analyses associated with many of these factors.

The purpose of this appendix is to describe the methodology used in determining final waste form masses and volumes for the baseline and each of the EAs in greater detail than provided in the report.

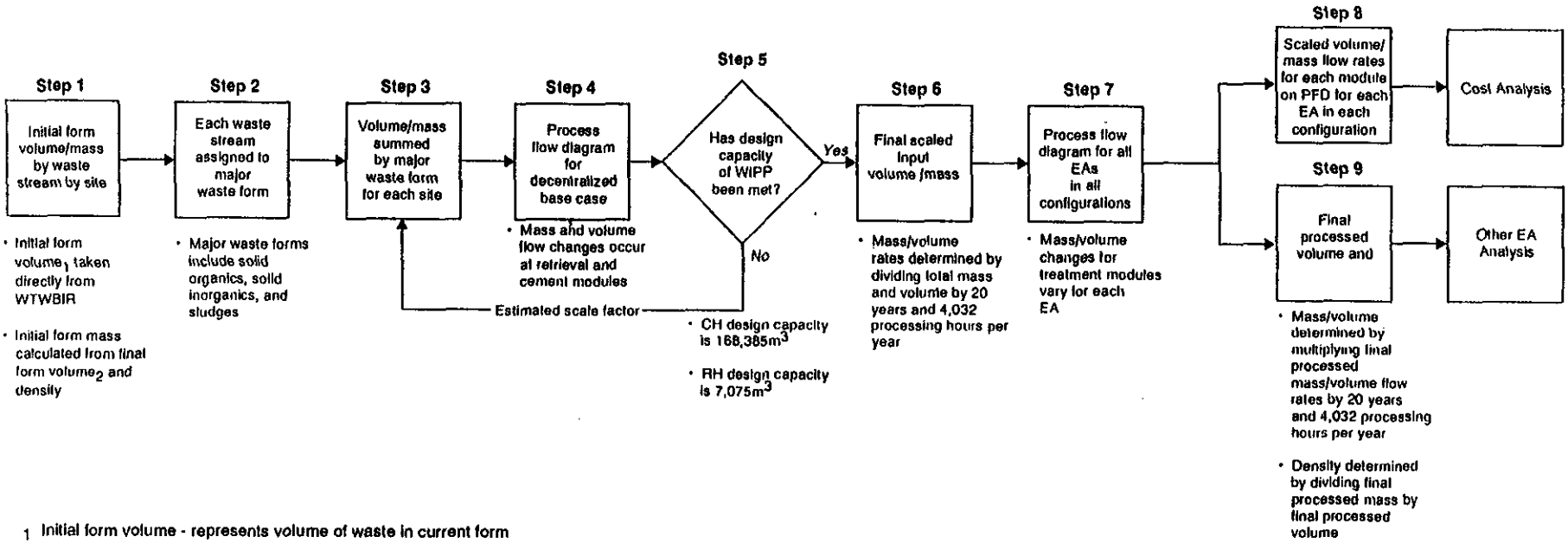
## 2.0 METHODOLOGY

The methodology for determining final processed masses and volumes for the WIPP inventory is depicted in Figure O-1. Each step is described in the following subsections.

### 2.1 STEP 1: WASTE STREAM-SPECIFIC MASS AND VOLUME

Initial waste stream-specific volumes (i.e., pre-processed volumes) were obtained from the Waste Isolation Pilot Plant Transuranic Waste Baseline Inventory Report (WTWBIR), CAO-94-1005, Revision 1, February 1995. The WTWBIR contained two types of waste volumes: (1) the "initial" volume, which represents the volume of the waste in its current form and (2) the final form volume, which represents the volume of the final form of the waste for shipment to WIPP. The initial volumes were used in this methodology. The following data were obtained from the waste stream profile:

- Site name
- WIPP ID
- Handling (i.e., contact-handled [CH] or remote-handled [RH])
- Waste type (i.e., transuranic [TRU] or TRU mixed [TRUM])
- Waste matrix code group




1 Initial form volume - represents volume of waste in current form
2 Final form volume - represents volume of waste in final form for shipment to WIPP

## Figure O-1
## Methodology for Determining Final Processed Mass and Volume of WIPP Inventory

- Volume of retrievable waste (stored inventory)
- Volume of projected waste (projected inventory).

Mass data were not provided in the WTWBIR; masses were obtained by multiplying the volume of each waste stream by an average density for the waste matrix code group associated with that waste stream. The average densities are shown in Table O-1 for CH waste and Table O-2 for RH waste. The WTWBIR includes waste material parameters, in terms of kilograms per cubic meter, for iron-based, aluminum-based, other metals, other inorganics, cellulose, rubber, plastics, solidified inorganic material, and solidified-organic material constituents for both CH and RH waste. These parameters were summed to obtain the density for the waste matrix code group. However, these densities represent the final form waste densities. Therefore, the final form waste volume was multiplied by the sum of the material parameters to calculate final form mass. As a simplifying assumption, it was assumed that the initial form and final form masses for the stored sludges, solid organics, and solid inorganics were equal. However, for projected sludges, it was assumed that the final form mass represented the initial form mass plus the cement added to the sludges in grouting; as a result, the contribution of cement was subtracted from the final form masses of the projected sludges to obtain the initial form mass. The average weight percent of cement in grouted sludge was calculated at approximately 62 percent, based upon a memo from E.R. Naimon to A.E. Whiteman (Naimon, 1988), thus the final form projected sludge mass was multiplied by (1-0.62) to obtain the initial form of the sludge mass.

## 2.2 STEP 2: ASSIGNMENT OF MAJOR WASTE FORM TO WASTE STREAMS

As shown in step 2 of Figure 1, the waste streams were assigned to three major waste form categories: sludges, solid organics, and solidified inorganics, based on waste matrix code group. The correlation between waste matrix code group and the major waste forms was obtained from the Final Report on Cost and Schedule of Selected Engineered Alternatives, IT Corporation, September 27, 1994, and is presented in Table O-3.

## 2.3 STEP 3: SUMMATION BY MAJOR WASTE FORM

As shown in step 3 of Figure 1, waste streams were summed by site by major waste form category. Initial masses for CH and RH waste are shown in Tables O-4 and O-5, respectively. Initial volumes for CH and RH waste are shown in Tables O-6 and O-7.

Mass and volume flow rates were calculated assuming a 20-year inventory processing period and 4,032 hours of operation per year (three 8-hour shifts, 240 days per year at 70 percent availability). Initial mass rates for CH and RH waste are shown in Tables O-8 and O-9, respectively. Initial volume rates for CH and RH waste are shown in Tables O-10 and O-11.

## 2.4 STEP 4: APPLICATION OF MASSES AND VOLUMES TO THE PROCESS FLOW DIAGRAM FOR THE DECENTRALIZED BASELINE

The mass and volume flow rates were applied to the process flow diagrams for the decentralized baseline for CH waste (Figure O-2) and RH waste (Figure O-3), respectively. The modules included in Figure O-2 and Figure O-3 are discussed in more detail in Section 2.7. The process flow diagrams are based on the DOE Evaluation of the Effectiveness and Feasibility of the Waste Isolation Pilot Plant Engineered Alternatives: Final Report of the Engineered Alternatives Task

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## TABLE O-1

## SUM OF WASTE MATRIX CODE GROUP PARAMETERS FOR CH WASTE

| Final Waste Form | Sum of Waste Matrix Code Group Parameters ($kg/m^3$) |
|---|---|
| Combustible | 463.24 |
| Filter | 171.75 |
| Graphite | 245.90 |
| Heterogeneous | 691.59 |
| Inorganic Nonmetal | 274.57 |
| Lead/Cadmium Metal Waste | 336.76 |
| Salt Waste | 270.81 |
| Soils | 688.04 |
| Solidified Inorganics | 769.98 |
| Solidified Organics | 776.93 |
| Uncategorized Metal | 328.56 |
| Unknown | 000.00 |

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## TABLE O-2

## SUM OF WASTE MATRIX CODE GROUP PARAMETERS FOR RH WASTE

| Final Waste Form | Sum of Waste Matrix Code Group Parameters ($kg/m^3$) |
|---|---|
| Combustible | 354.10 |
| Filter | 241.30 |
| Heterogeneous | 239.74 |
| Lead/Cadmium Metal Waste | 344.04 |
| Salt Waste | 270.81 |
| Solidified Inorganics | 793.27 |
| Uncategorized Metal | 519.14 |
| Unknown | 000.00 |

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## TABLE O-3

## CORRELATION BETWEEN WASTE MATRIX CODE GROUP AND MAJOR TRU WASTE FORMS

| Waste Matrix Code Group | Major Waste Form |
|---|---|
| Combustible Waste | Solid Organics |
| Filter Waste | Solid Organics |
| Graphite Waste | Solid Inorganics |
| Heterogeneous Waste | Solid Organics |
| Inorganic Nonmetal Waste | Solid Inorganics |
| Lead/Cadmium Metal Waste | Solid Inorganics |
| Salt Waste | Solid Inorganics |
| Soil | Solid Inorganics |
| Solidified Inorganic Waste | Sludges |
| Solidified Organic Waste | Solid Organics |
| Unspecified Metal Waste | Solid Inorganics |

## TABLE O-4

## CH SITE-SPECIFIC MASS
## (IN KILOGRAMS)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Retrievable | Projected | Projected |
| AMES | 0 | 29 | 0 | 0 | 0 | 0 | 0 | 0 |
| ANL-E | 17,744 | 328 | 19 | 0 | 2,000 | 184 | 0 | 0 |
| ANL-W | 0 | 0 | 0 | 2,324 | 7 | 835 | 0 | 0 |
| BT | 0 | 0 | 0 | 85,630 | 0 | 0 | 0 | 0 |
| ETEC | 0 | 0 | 1,148 | 3,596 | 71 | 0 | 0 | 0 |
| HANFORD | 2,256 | 922,709 | 6,174,947 | 6,478,969 | 133,813 | 4,759,249 | 0 | 0 |
| INEL | 9,366,245 | 0 | 7,748,875 | 692 | 2,943,209 | 0 | 0 | 0 |
| KAPL | 0 | 0 | 1,660 | 0 | 0 | 0 | 0 | 0 |
| LANL | 3,733,153 | 602,456 | 819,162 | 1,141,703 | 1,433,799 | 1,087,211 | 0 | 0 |
| LBL | 0 | 0 | 581 | 3,057 | 0 | 0 | 0 | 0 |
| LLNL | 10,243 | 19,354 | 25,501 | 178,078 | 47,589 | 81,944 | 0 | 0 |
| MOUND | 5,605 | 0 | 3,318 | 0 | 134,721 | 0 | 0 | 0 |
| MU | 0 | 0 | 41 | 1,109 | 0 | 0 | 0 | 0 |
| NTS | 0 | 0 | 428,439 | 0 | 0 | 0 | 0 | 0 |
| ORNL | 26,888 | 0 | 465,426 | 182,510 | 0 | 0 | 0 | 0 |
| PA | 2,656 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PANTEX | 0 | 0 | 432 | 0 | 0 | 0 | 0 | 0 |
| RFETS | 176,040 | 874,298 | 337,402 | 781,162 | 109,011 | 296,437 | 0 | 0 |
| SNL/NM | 0 | 0 | 5,560 | 4,841 | 0 | 0 | 0 | 0 |
| SRS | 31 | 0 | 9,205,766 | 7,501,480 | 0 | 0 | 0 | 0 |

## TABLE O-5

## RH SITE-SPECIFIC MASS
## (IN KILOGRAMS)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| ANL-W | 0 | 0 | 356 | 523 | 3,723 | 830 | 0 | 0 |
| BCLDP | 0 | 0 | 0 | 17,021 | 0 | 0 | 0 | 0 |
| BT | 0 | 0 | 0 | 373 | 0 | 0 | 0 | 0 |
| HANFORD | 0 | 0 | 7,950 | 712,915 | 0 | 0 | 0 | 0 |
| INEL | 1,666 | 0 | 3,269 | 671 | 2,134 | 5,592 | 0 | 0 |
| KAPL | 0 | 0 | 2,692 | 6,049 | 0 | 0 | 0 | 0 |
| LANL | 0 | 0 | 5,255 | 1,119 | 39,694 | 41,272 | 0 | 0 |
| ORNL | 153,869 | 52,451 | 91,775 | 43,800 | 0 | 0 | 0 | 0 |
| SRS | 0 | 0 | 0 | 15,324 | 0 | 0 | 0 | 0 |

## TABLE O-6

## CH SITE-SPECIFIC VOLUME (IN CUBIC METERS)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| AMES LAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ANL-E | 23 | 1 | 0 | 0 | 6 | 1 | 0 | 0 |
| ANL-W | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 |
| BT | 0 | 0 | 0 | 123 | 0 | 0 | 0 | 0 |
| ETEC | 0 | 0 | 2 | 5 | 0 | 0 | 0 | 0 |
| HANFORD | 3 | 3,154 | 7,798 | 13,557 | 259 | 14,147 | 0 | 0 |
| INEL | 18,150 | 0 | 11,043 | 0 | 8,752 | 0 | 1,252 | 0 |
| KAPL | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| LANL | 4,848 | 2,059 | 1,768 | 2,465 | 4,244 | 3,151 | 0 | 0 |
| LBL | 0 | 0 | 1 | 4 | 0 | 0 | 0 | 0 |
| LLNL | 13 | 66 | 66 | 405 | 145 | 250 | 0 | 0 |
| MOUND | 7 | 0 | 7 | 0 | 249 | 0 | 0 | 0 |
| MU | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| NTS | 0 | 0 | 613 | 0 | 0 | 0 | 0 | 0 |
| ORNL | 110 | 0 | 673 | 264 | 0 | 0 | 0 | 0 |
| PA | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PANTEX | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| RFETS | 188 | 1,346 | 533 | 1,684 | 341 | 972 | 0 | 0 |
| SNL/NM | 0 | 0 | 8 | 7 | 0 | 0 | 0 | 0 |
| SRS | 0 | 0 | 9,336 | 13,365 | 0 | 0 | 0 | 0 |

## TABLE O-7

## RH SITE-SPECIFIC VOLUME (IN CUBIC METERS)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| ANL-W | 0 | 0 | 1 | 2 | 7 | 2 | 0 | 24 |
| BCLDP | 0 | 0 | 0 | 71 | 0 | 0 | 0 | 0 |
| BT | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| HANFORD | 0 | 0 | 32 | 2,974 | 0 | 0 | 0 | 0 |
| INEL | 2 | 0 | 14 | 3 | 4 | 6 | 11 | 0 |
| KAPL | 0 | 0 | 11 | 25 | 0 | 0 | 0 | 0 |
| LANL | 0 | 0 | 15 | 3 | 76 | 80 | 0 | 0 |
| ORNL | 611 | 174 | 383 | 183 | 0 | 0 | 0 | 0 |
| SRS | 0 | 0 | 0 | 32 | 0 | 0 | 0 | 0 |

## TABLE O-8

## INITIAL MASS RATES FOR CH WASTE
## (kg/hr)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| AMES LAB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ANL-E | < 1 | < 1 | < 1 | 0 | < 1 | < 1 | 0 | 0 |
| BT | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| ETEC | 0 | 0 | < 1 | < 1 | < 1 | 0 | 0 | 0 |
| HANFORD | < 1 | 11 | 77 | 80 | 2 | 59 | 0 | 0 |
| INEL/ANL-W | 116 | 0 | 96 | < 1 | 36 | < 1 | 0 | 0 |
| KAPL | 0 | 0 | < 1 | 0 | 0 | 0 | 0 | 0 |
| LANL | 46 | 7 | 10 | 14 | 18 | 13 | 0 | 0 |
| LBL | 0 | 0 | < 1 | < 1 | 0 | 0 | 0 | 0 |
| LLNL | < 1 | < 1 | < 1 | 2 | < 1 | 1 | 0 | 0 |
| MOUND | < 1 | 0 | < 1 | 0 | 2 | 0 | 0 | 0 |
| MU | 0 | 0 | < 1 | < 1 | 0 | 0 | 0 | 0 |
| NTS | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 |
| ORNL | 1 | 0 | 6 | 2 | 0 | 0 | 0 | 0 |
| PANTEX | 0 | 0 | < 1 | 0 | 0 | 0 | 0 | 0 |
| PA | < 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RFETS | 2 | 11 | 4 | 10 | 1 | 4 | 0 | 0 |
| SNL/NM | 0 | 0 | < 1 | < 1 | 0 | 0 | 0 | 0 |
| SRS | < 1 | 0 | 114 | 93 | 0 | 0 | 0 | 0 |

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## TABLE O-9

## INITIAL MASS RATES FOR RH WASTE
## (kg/hr x $10^{-5}$)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| BCLDP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BT | 0 | 0 | 0 | 463 | 0 | 0 | 0 | 0 |
| HANFORD | 0 | 0 | 9,859 | 884,071 | 0 | 0 | 0 | 0 |
| INEL/ANL-W | 2,066 | 0 | 4,495 | 1,482 | 7,263 | 7,964 | 0 | 0 |
| KAPL | 0 | 0 | 3,339 | 7,501 | 0 | 0 | 0 | 0 |
| LANL | 0 | 0 | 6,516 | 1,388 | 49,223 | 51,181 | 0 | 0 |
| ORNL | 601,051 | 65,043 | 113,808 | 54,316 | 0 | 0 | 0 | 0 |
| SRS | 0 | 0 | 0 | 19,003 | 0 | 0 | 0 | 0 |

## TABLE O-10

## INITIAL VOLUME RATES FOR CH WASTE
## (cu. m/hr x $10^{-5}$)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| AMES LAB | 0 | < 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| ANL-E | 29 | 1 | < 1 | 0 | 8 | < 1 | 0 | 0 |
| BT | 0 | 0 | 0 | 153 | 0 | 0 | 0 | 0 |
| ETEC | 0 | 0 | 2 | 6 | < 1 | 0 | 0 | 0 |
| HANFORD | 4 | 3,911 | 9,670 | 16,812 | 322 | 17,543 | 0 | 0 |
| INEL/ANL-W | 22,508 | 0 | 13,694 | 4 | 10,853 | 2 | 1,553 | 0 |
| KAPL | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| LANL | 6,012 | 2,553 | 2,193 | 3,056 | 5,263 | 3,907 | 0 | 0 |
| LBL | 0 | 0 | 1 | 5 | 0 | 0 | 0 | 0 |
| LLNL | 16 | 82 | 81 | 502 | 180 | 310 | 0 | 0 |
| MOUND | 9 | 0 | 8 | 0 | 309 | 0 | 0 | 0 |
| MU | 0 | 0 | < 1 | 2 | 0 | 0 | 0 | 0 |
| NTS | 0 | 0 | 760 | 0 | 0 | 0 | 0 | 0 |
| ORNL | 136 | 0 | 835 | 327 | 0 | 0 | 0 | 0 |
| PANTEX | 0 | 0 | < 1 | 0 | 0 | 0 | 0 | 0 |
| PA | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RFETS | 234 | 1,670 | 661 | 2,088 | 423 | 1,206 | 0 | 0 |
| SNL/NM | 0 | 0 | 10 | 9 | 0 | 0 | 0 | 0 |
| SRS | < 1 | 0 | 11,577 | 16,573 | 0 | 0 | 0 | 0 |

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## TABLE O-11

## INITIAL VOLUME RATES FOR RH WASTE
## (cu. m/hr x $10^{-5}$)

| | Sludges | | Solid Organics | | Solid Inorganics | | Unknown | |
|---|---|---|---|---|---|---|---|---|
| Site | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected | Retrievable | Projected |
| BCLDP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BT | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| HANFORD | 0 | 0 | 40 | 3,688 | 0 | 0 | 0 | 0 |
| INEL/ANL-W | 3 | 0 | 19 | 6 | 14 | 9 | 14 | 29 |
| KAPL | 0 | 0 | 14 | 31 | 0 | 0 | 0 | 0 |
| LANL | 0 | 0 | 18 | 4 | 95 | 99 | 0 | 0 |
| ORNL | 758 | 216 | 475 | 227 | 0 | 0 | 0 | 0 |
| SRS | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 |

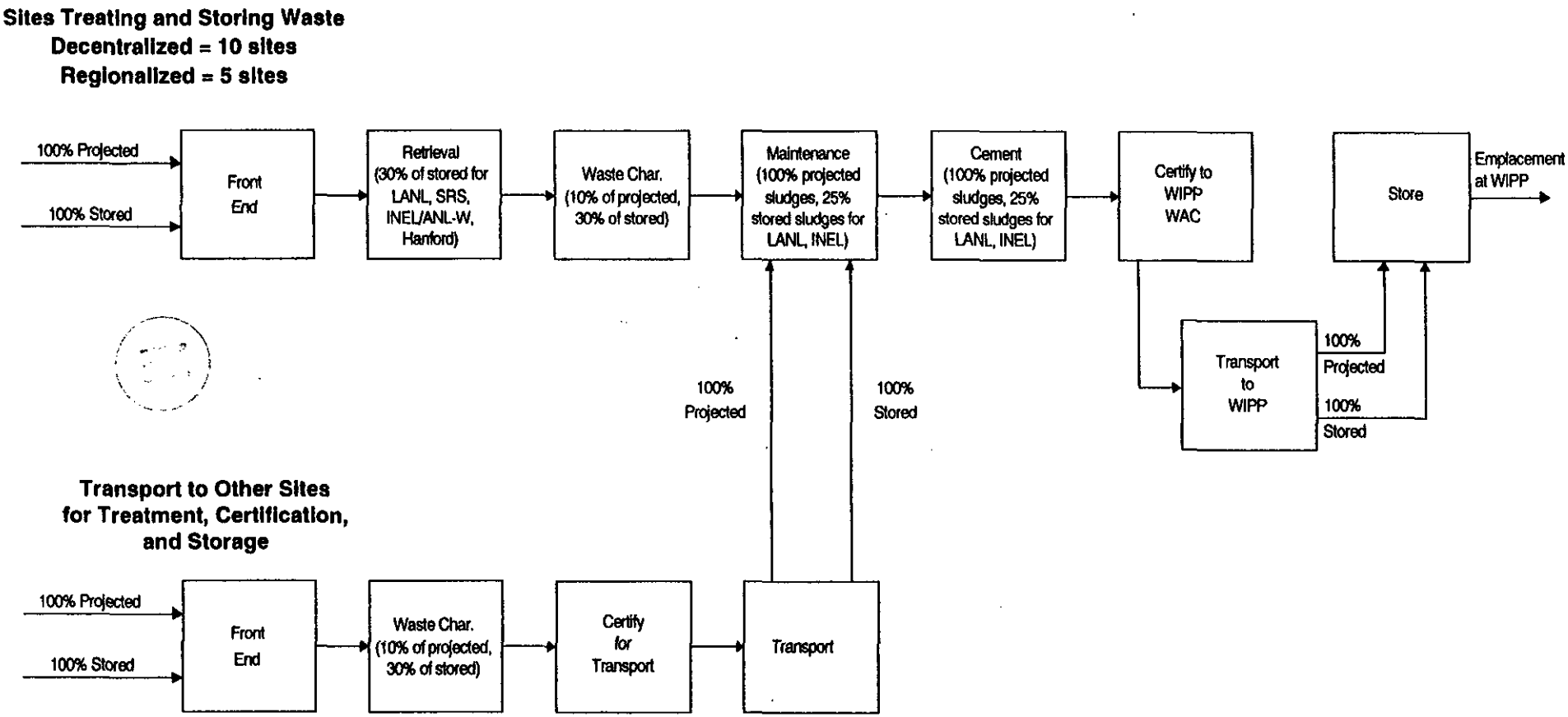






**Figure O-2**

**Decentralized and Regionalized Base Cases and Alternative ID #s 33, 35(a&b), 83, and 111 Contact Handled**

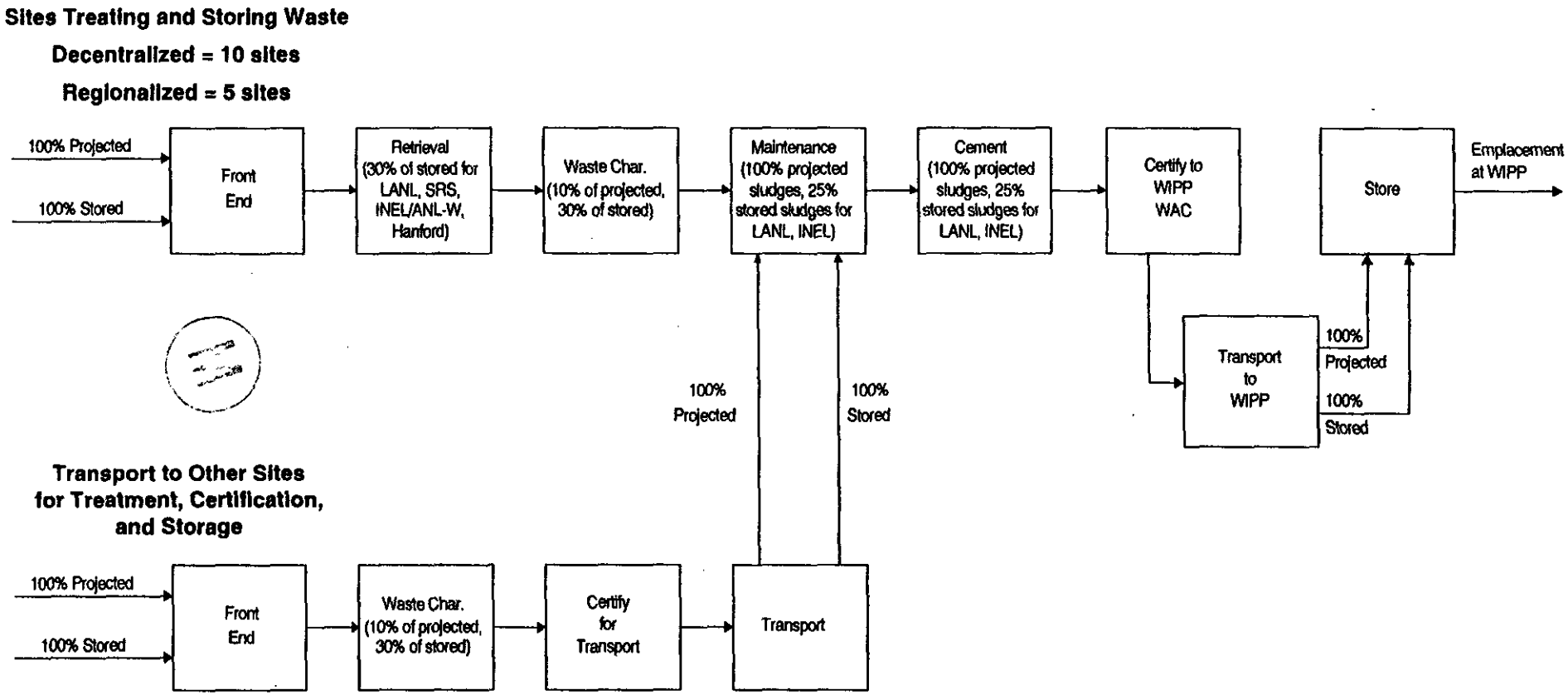






**Figure O-3**
**Decentralized and Regionalized Base Cases Remote Handled**

Force (DOE, 1991), the draft Environmental Management Programmatic Environmental Impact Statement (EM-PEIS) report (DOE, 1995b), and the Waste Management Facility Cost Information for Transuranic Waste (WMFCITRUW) report (Feizollahi and Shropshire, 1994). Information from these sources was used to correct each of the modules and to construct a visual description of mass and volume flow through each treatment process. The process flow diagrams were designed mostly in accordance with the EM-PEIS and the WMFCITRUW report; however, not every module recommended in the WMFCITRUW report was included in this study. The reasons for deviating from the recommended WMFCITRUW guidance include (1) minimizing the costs of duplicate equipment contained in more than one module and (2) more accurately representing the functions in existing and planned TRU waste facilities.

For the decentralized baseline, mass and volume changes result from both the retrieval and grouting modules. The results of applying the process flow diagram to the initial mass and volume flow rates are new flow rates that represent the final processed waste. Changes to mass and volume are discussed further in Section 2.7.

## 2.5 STEP 5: DETERMINATION OF WHETHER WIPP DESIGN CAPACITY HAS BEEN REACHED

The final processed flow rates were multiplied by 20 years and 4,032 working hours per year to determine the final processed masses and volumes. The final processed volume was compared against the design capacity of WIPP. For the purposes of this study, the design capacity of WIPP was considered to be 168,385 cubic meters for CH waste and 7,075 cubic meters for RH waste.

If the final processed volume was less than the design capacity of WIPP, a scale factor was estimated and applied to the mass and volume flow rates in Step 3 for projected waste. Steps 4 and 5 were then repeated until the final processed volume was slightly less than or equal to the design capacity of WIPP. The final scale factor for CH waste was determined to be 1.296775896, and the final scale factor for RH waste was calculated to be 1.537947416.

## 2.6 STEP 6: DETERMINATION OF FINAL SCALED INPUT MASS AND VOLUMES

As shown in Figure O-1, after the initial masses and volumes have been scaled to the design capacity of WIPP for the decentralized baseline, these scaled initial masses and volumes were used as inputs for each of the EAs in each of the configurations. In other words, the same scale factor developed for CH waste in the baseline was applied to each of the EAs for CH waste. The scaled initial mass and volume flow rates were calculated assuming a 20-year inventory processing period and 4,032 hours of operation per year (three 8-hour shifts, 240 days per year at 70 percent availability).

## 2.7 STEP 7: APPLICATION OF PROCESS FLOW DIAGRAM TO EACH ALTERNATIVE IN EACH CONFIGURATION

Ten EAs were considered in addition to the baseline. Table O-12 shows treatment options for sludges, solid organics, and solid inorganics for each EA. Processing schemes for EAs 33, 35(a-b), 83, and 111 are identical to the processing schemes for the baseline for each of the configurations; therefore, mass and volume changes are assumed to be identical to the mass and volume changes for the baseline. The processing scheme for EA 77(a-d) is the same as the

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## TABLE O-12

## WIPP ENGINEERED ALTERNATIVES

| | Waste Type | | |
|---|---|---|---|
| ID Number | Sludges | Solid Organic | Solid Inorganic |
| #1 | Baseline | Supercompact | Supercompact |
| #6 | Baseline | Shred and compact | Shred and compact |
| #10 | Plasma | Plasma | Plasma |
| #33 | Baseline | Baseline | Baseline |
| #35 (a and b) | Baseline | Baseline | Baseline |
| #77 (a–d) | Baseline | Supercompact | Supercompact |
| #83 | Baseline | Baseline | Baseline |
| #94 (a–f) | Enhanced cement | Shred and add clay | Shred and add clay |
| #111 | Baseline | Baseline | Baseline |

processing scheme for EA 1 for each of the configurations; therefore, its mass and volume changes are assumed to be equal to those of EA 1. EA 33, 35(a-b), 77(a-d), 83, and 111 are omitted from further discussion in this section because they are not unique with respect to mass and volume.

Additionally, each EA is defined in Section 2.2.1, Engineered Alternative Definition. Each EA was also considered with respect to three configurations: decentralized, regionalized, and centralized. Table O-13 indicates which sites send waste to other sites to be processed and/or stored for each configuration.

Waste flow diagrams for each EA are shown in Figures O-4 through O-12. Figures O-4 through O-7 represent both the decentralized and regionalized configurations for EAs 1, 6, 10, and 94 for CH waste, including sites that treat and store waste and sites that ship pre-processed waste to other sites for treatment and storage. Figures O-8 through O-12 represent the centralized configuration for CH waste, which includes shipment of pre-processed waste to WIPP for treatment, storage, and disposal.

### 2.7.1 Front End Module

Front-end support facilities consist of all administrative and laboratory buildings required for the waste management support functions. Front-end support functions include security, personnel decontamination (radioactive and hazardous), maintenance of noncontaminated areas and equipment, health physics, radiation badges, facility access control, sanitary facilities, work control and personnel support, internal and external communications, spill or emergency response provisions (radioactive and hazardous), analytical laboratory, environmental field sampling, environmental regulatory reporting, and records management. Front-end support facilities include all administrative and laboratory buildings required for the waste management support functions.

### 2.7.2 Waste Retrieval Module

This module consists of all-weather excavation, inspection, and repackaging of bermed waste. The module includes three principal unit operations: earthen cover extraction and decontamination, waste container retrieval and inspection, and packaging and staging for shipment.

### 2.7.3 Waste Characterization Module

This module is a self-contained facility in which waste characterization is performed. Activities include extracting physical samples of waste; conducting chemical, physical, and radiological sampling of waste; and repackaging drums and boxes to remove and stabilize noncompliant waste.

### 2.7.4 Maintenance Module

A maintenance facility is used in conjunction with treatment facilities. It consists of a failed equipment receiving and repair building housing machinery and tools.

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# TABLE O-13

## TRANSFER OF WASTE FOR THE DECENTRALIZED, REGIONALIZED, AND CENTRALIZED CONFIGURATIONS

| Decentralized | | | Regionalized | | | Centralized | | |
|---|---|---|---|---|---|---|---|---|
| Site | CH | RH | Site | CH | RH | Site | CH | RH |
| ANL-E* | WIPP | ORNL+ | ANL-E | SRS | ORNL | ANL-E | WIPP | WIPP |
| AMES | ANL-E# | | AMES | SRS | | AMES | WIPP | |
| BCLDP | | ORNL+ | BCLDP | | ORNL | BCLDP | | WIPP |
| BT | MOUND | ORNL+ | BT | SRS | ORNL | BT | WIPP | WIPP |
| ETEC | NTS | | ETEC | INEL/ANL-W | | ETEC | WIPP | |
| INEL/ANL-W* | WIPP | WIPP | INEL/ANL-W* | WIPP | HANFORD | INEL/ANL-W | WIPP | WIPP |
| KAPL | MOUND | ORNL+ | KAPL | SRS | ORNL | KAPL | WIPP | WIPP |
| LANL* | WIPP | WIPP | LANL* | WIPP | HANFORD | LANL | WIPP | WIPP |
| LBL | (LLNL) | | LBL | HANFORD | | LBL | WIPP | |
| LLNL* | WIPP | | LLNL | HANFORD | | LLNL | WIPP | |
| MOUND* | WIPP | | MOUND | SRS | | MOUND | WIPP | |
| MU | ANL-E# | | MU | SRS | | MU | WIPP | |
| NTS* | WIPP | WIPP | NTS | INEL/ANL-W | HANFORD | NTS | WIPP | WIPP |
| ORNL* | WIPP | WIPP | ORNL* (rh) | SRS | WIPP | ORNL | WIPP | WIPP |
| PA | ORNL | | PA | SRS | | PA | WIPP | |
| PANTEX | LANL | | PANTEX | LANL | | PANTEX | WIPP | |
| RFETS* | WIPP | | RFETS* | WIPP | | RFETS | WIPP | |
| HANFORD* | WIPP | WIPP | HANFORD* | WIPP | WIPP | HANFORD | WIPP | WIPP |
| SNL/NM | LANL | | SNL/NM | LANL | | SNL/NM | WIPP | |
| SRS* | WIPP | WIPP | SRS* | WIPP | ORNL | SRS | WIPP | WIPP |

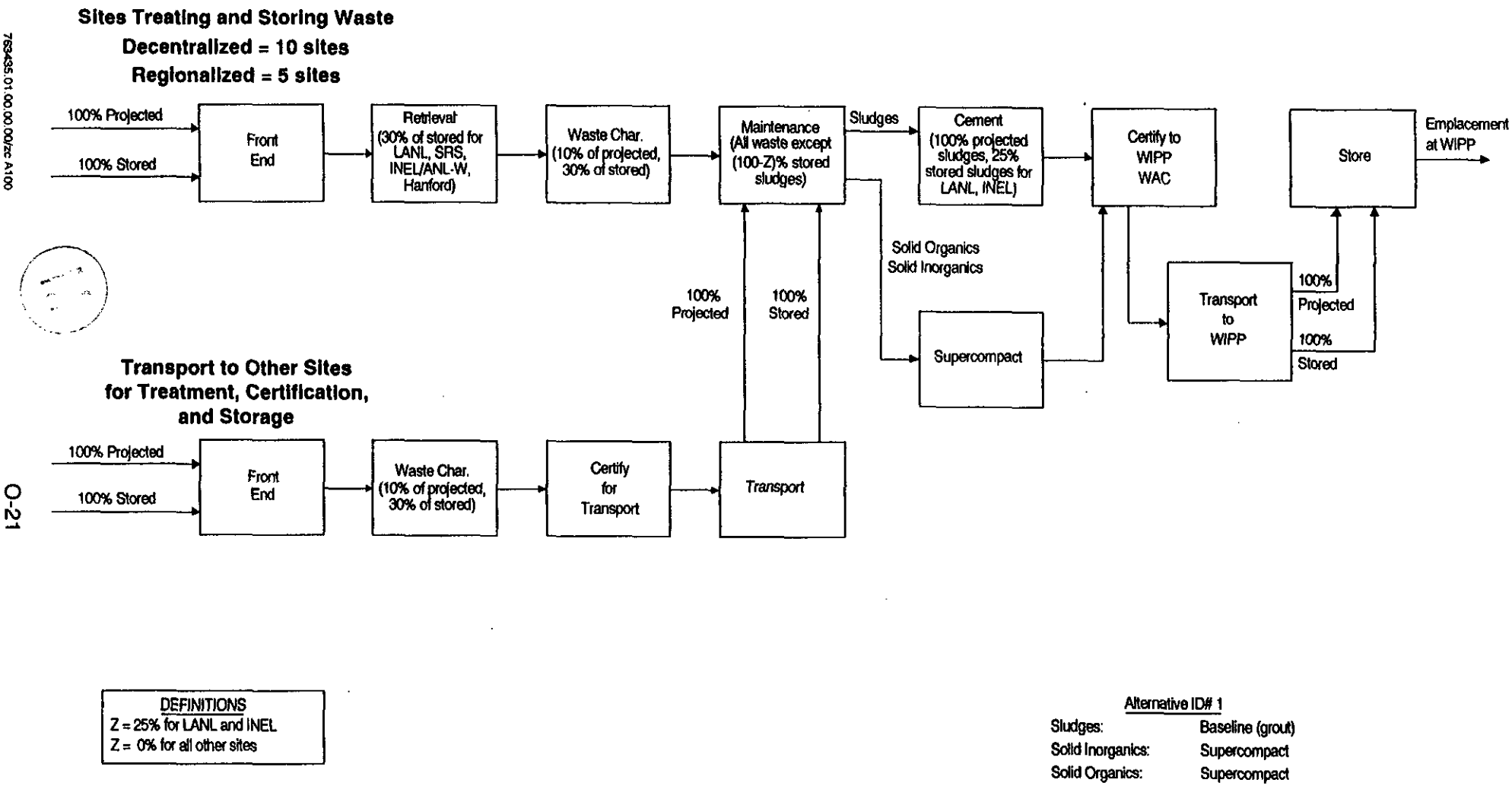
Notes:

* Denotes a processing site.

ORNL+ Remote handled wastes from BCLDP, BT, KAPL, (these are not discussed in the EM-PEIS) and ANL-E should be processed at ORNL instead of Mound because Mound currently does not process or store RH waste.

ANL-E# The EM-PEIS discusses that ANL-E will process and ship its own CH waste but does not cover Ames and MU which are closer to ANL-E than ORNL.

(LLNL) EM-PEIS indicates LBL waste will be shipped to Hanford. LBL waste should be shipped to LLNL because it is much closer.




DEFINITIONS
Z = 25% for LANL and INEL
Z = 0% for all other sites

Alternative ID# 1

| | |
|---|---|
| Sludges: | Baseline (grout) |
| Solid Inorganics: | Supercompact |
| Solid Organics: | Supercompact |





**Figure O-4**

**Decentralized and Regionalized Alternative ID #s 1 and 77(a-d) Contact Handled**

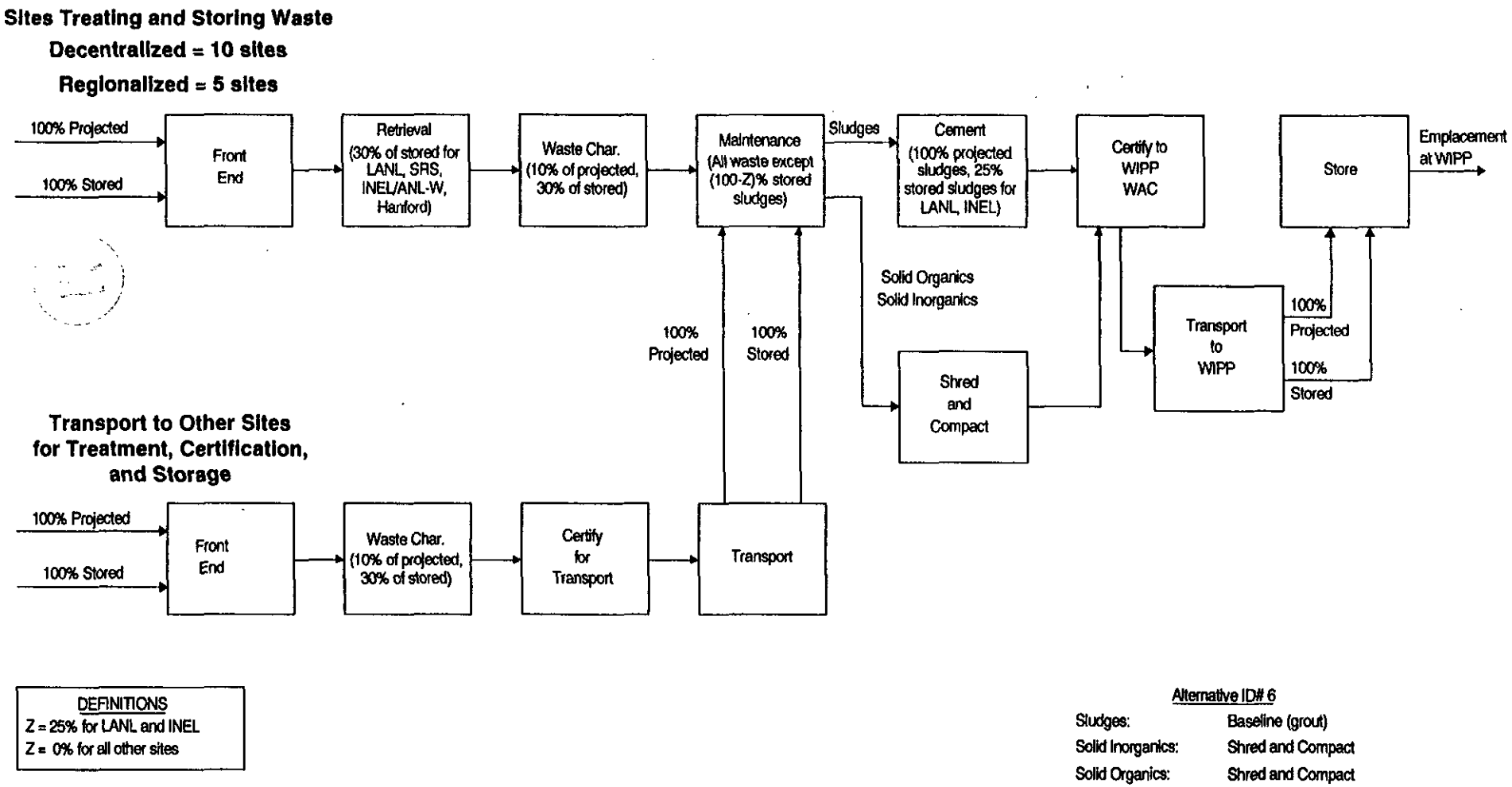
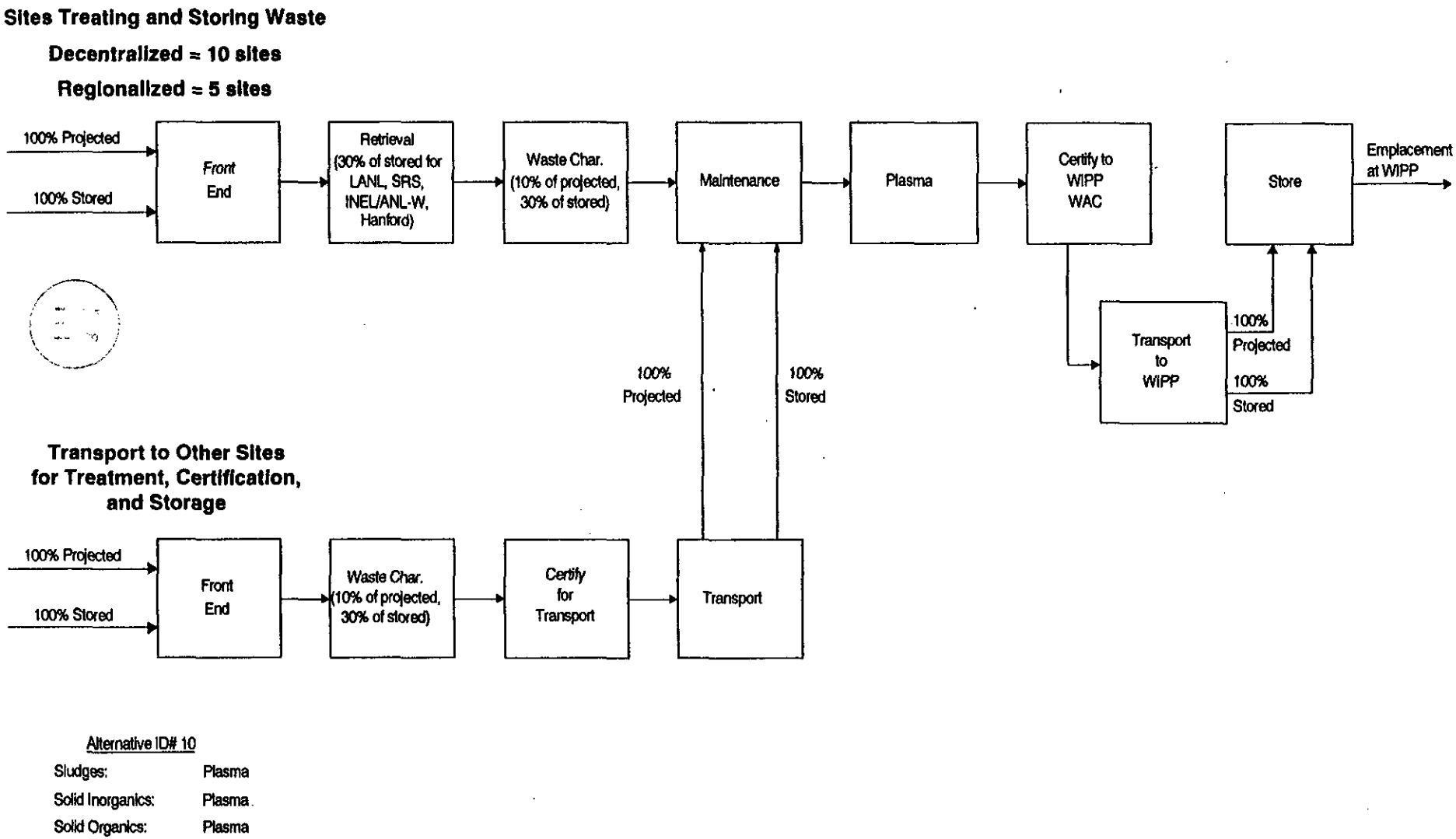







**Figure O-5**

**Decentralized and Regionalized Alternative ID# 6 Contact Handled**




Alternative ID# 10

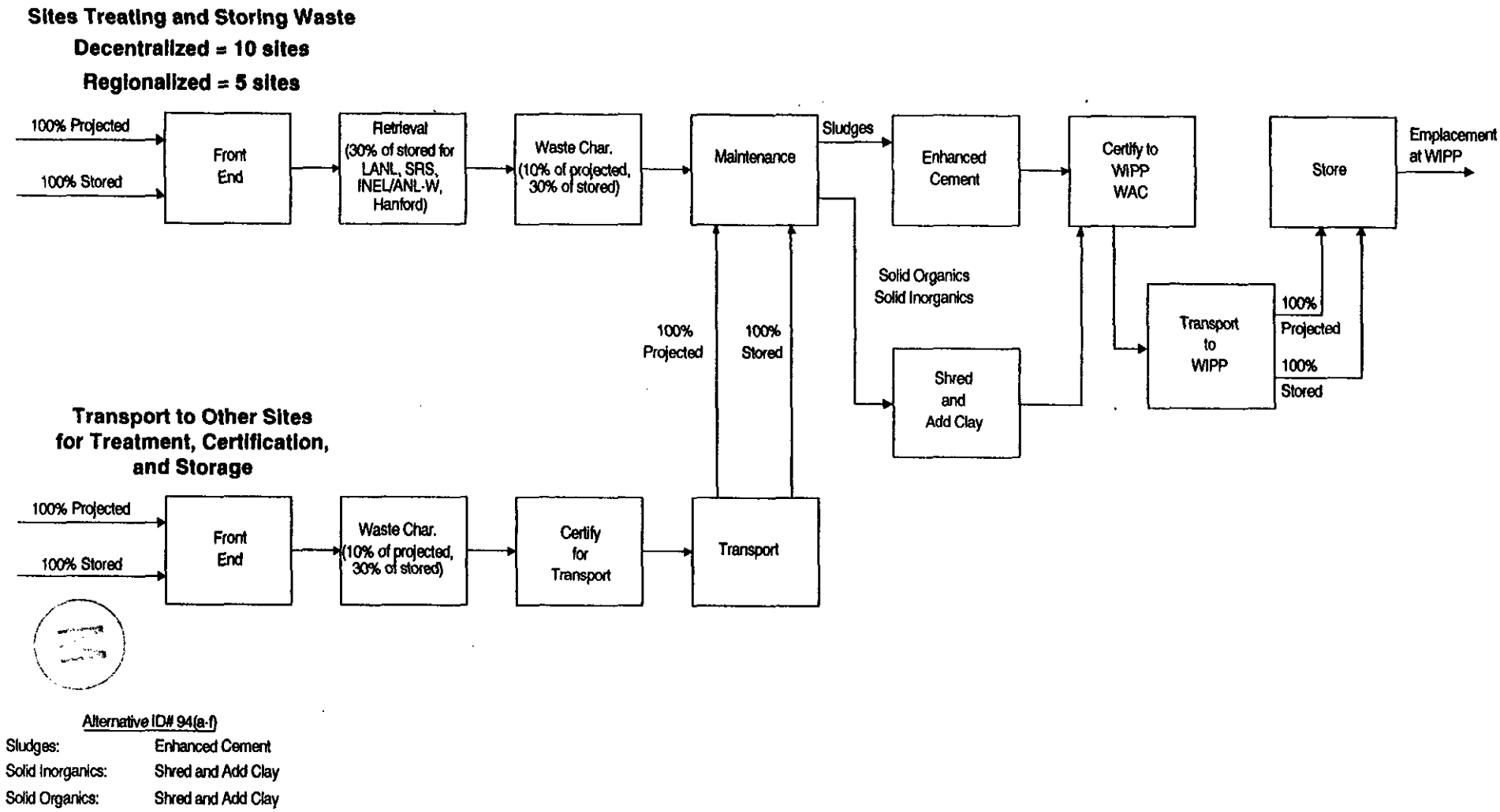
| | |
|---|---|
| Sludges: | Plasma |
| Solid Inorganics: | Plasma |
| Solid Organics: | Plasma |





***Figure O-6***

**Decentralized and Regionalized Alternative ID# 10 Contact Handled**




Alternative ID# 94(a-f)

| | |
|---|---|
| Sludges: | Enhanced Cement |
| Solid Inorganics: | Shred and Add Clay |
| Solid Organics: | Shred and Add Clay |





**Figure O-7**

**Decentralized and Regionalized Alternative ID# 94(a-f) Contact Handled**

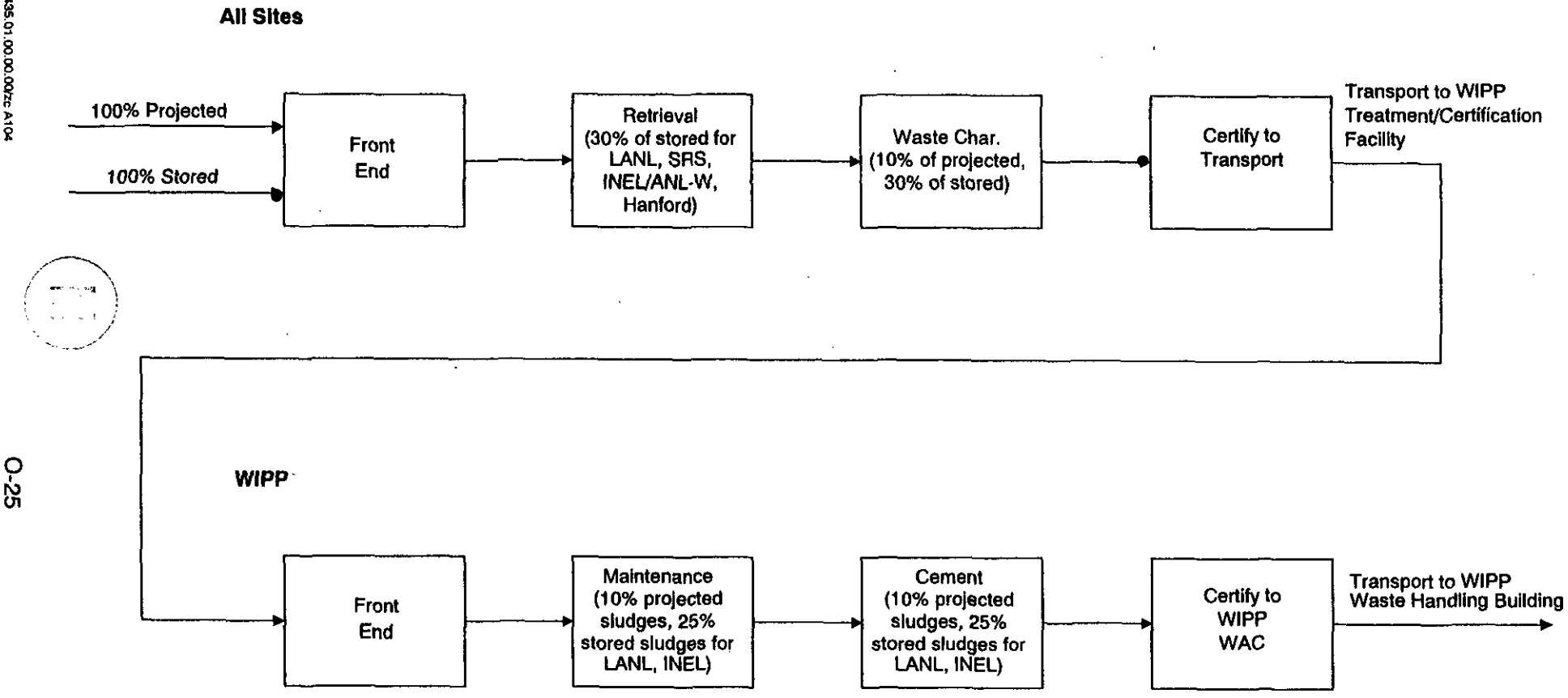







**Figure O-8**

**Centralized Base Case and Alternative ID #s 33, 35(a&b), 83, and 111 Contact Handled**

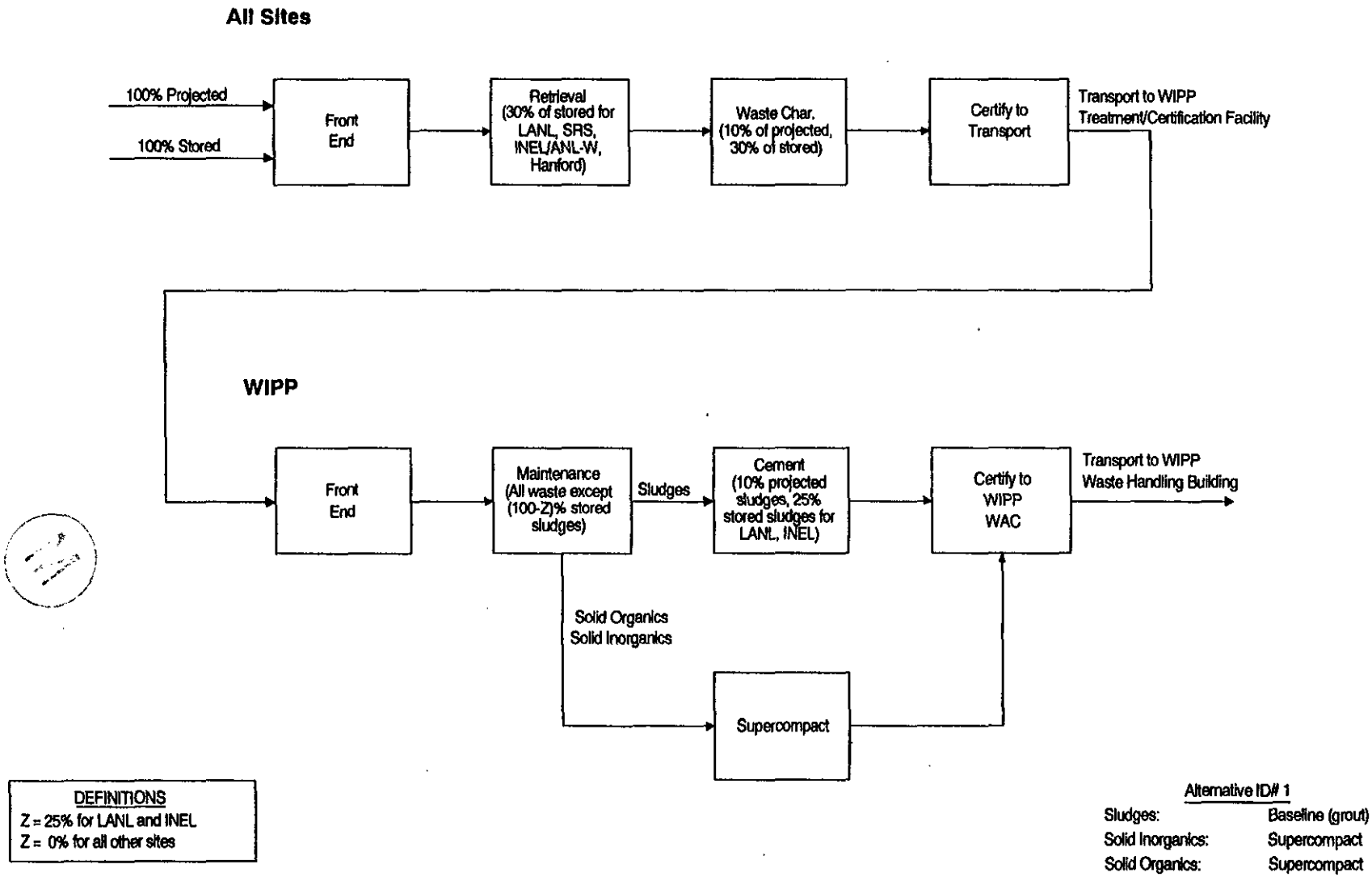







**Figure O-9**

**Centralized Alternative ID#s 1 and 77(a-d) Contact Handled**

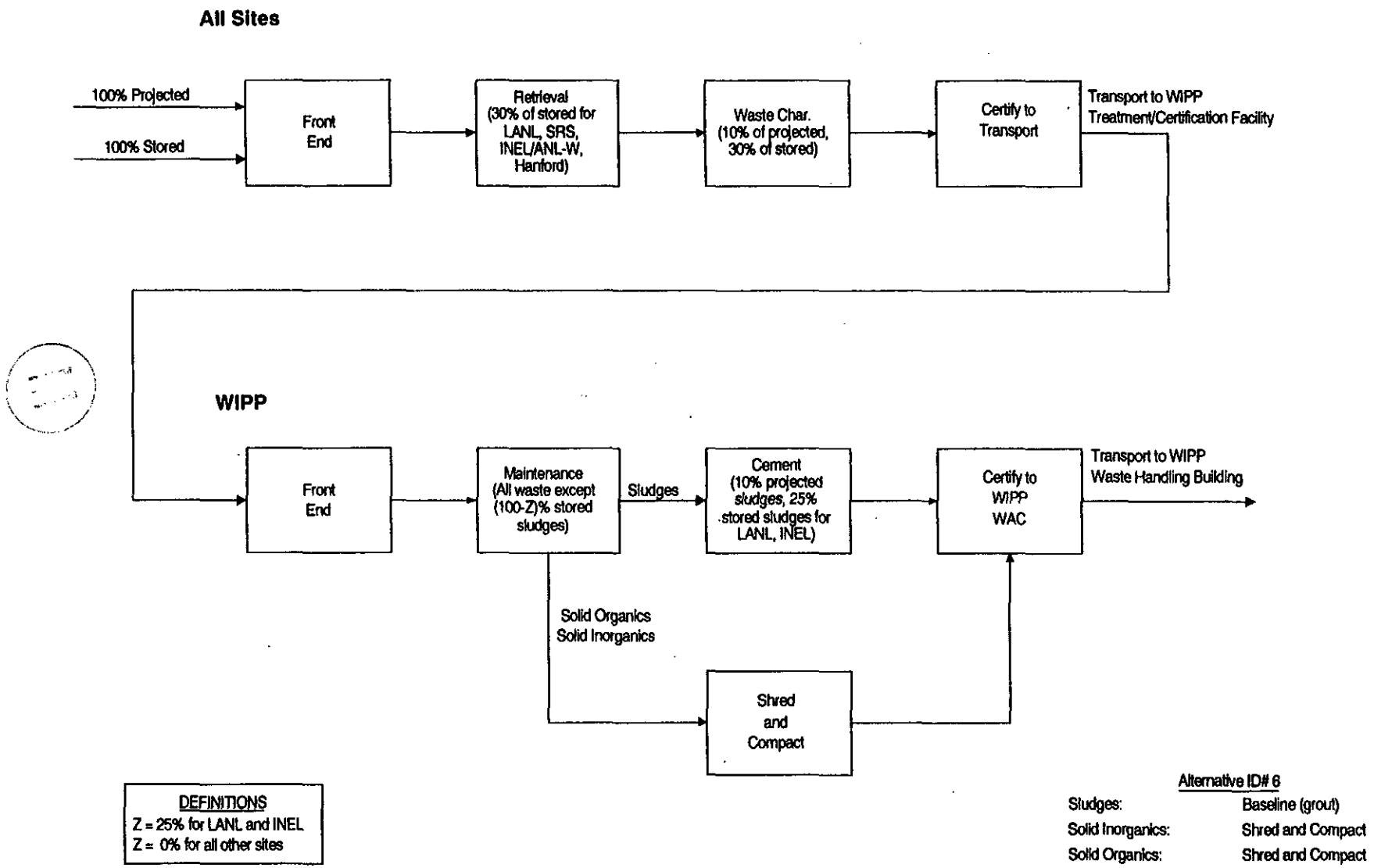
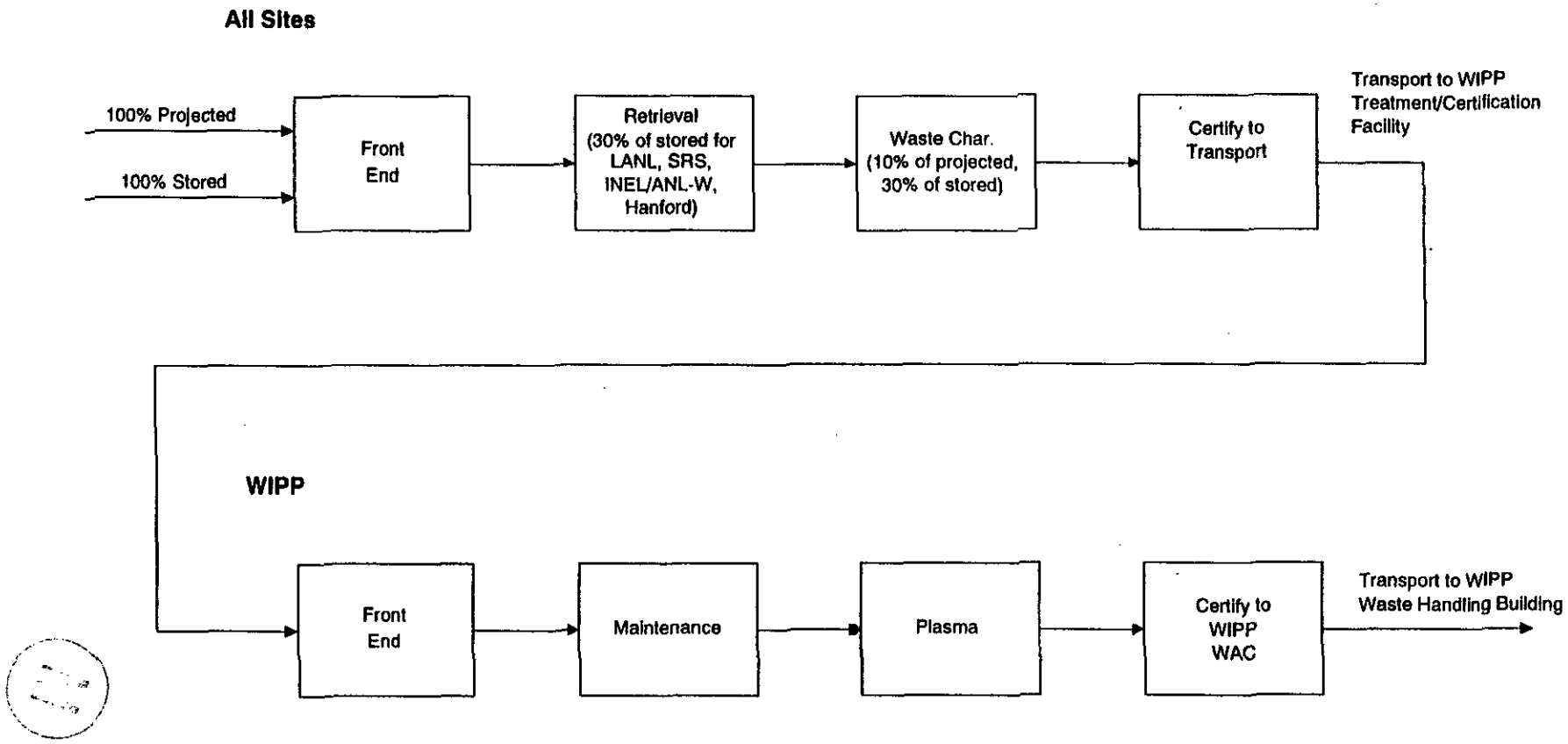







**Figure O-10**
**Centralized Alternative ID# 6 Contact Handled**




Alternative ID# 10

| | |
|---|---|
| Sludges: | Plasma |
| Solid Inorganics: | Plasma |
| Solid Organics: | Plasma |

**Figure O-11**

**Centralized Alternative ID# 10 Contact Handled**

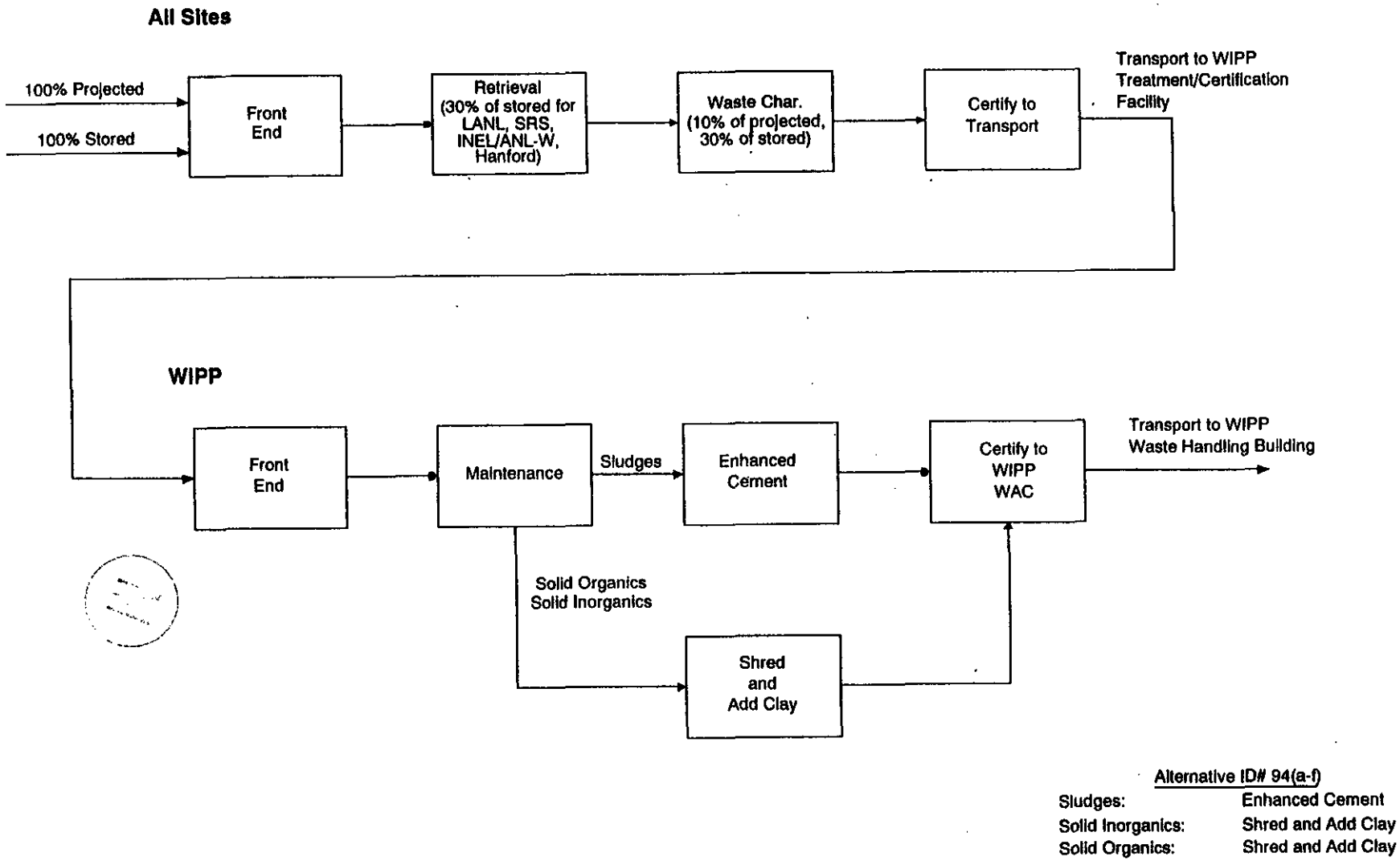







**Figure O-12**
**Centralized Alternative ID# 94(a-f)**

### 2.7.5 Treatment Module

The treatment module varies based on the EA being considered. Treatment options include grouting, supercompacting, shredding and compacting, plasma melting, enhanced- cement processing, and shredding and adding clay.

### 2.7.6 Storage Module

This module consists of a Resource Conservation and Recovery Act compliant storage building sized to accommodate an accumulation of waste from treatment modules for a maximum of 20 years. Storage area features include spill collection, sloping floors, sumps, and concrete berms. Monitoring is included for both gamma and alpha radiation control.

### 2.7.7 Certification and Shipping Module

Certification and shipping consists of storage of incoming material, assay and certification, and truck loading. The facility is equipped with a bridge crane and a forklift. It is assumed that certification and shipping operations will take place indoors.

### 2.7.8 Transportation Module

Transportation consists of truck shipments, including a tractor and trailer transporting three Transuranic Package Transporter-IIs (TRUPACT-IIs) for CH waste or one RH-72B cask (a cylinder consisting of a separate inner vessel within an outer cask protected by impact limiters at each end) for RH waste.

Mass and volume changes occur in the retrieval module and the treatment modules. Table O-14 summarizes these changes. Several other assumptions were made in addition to the mass and volume changes:

- All waste within a major waste form category (i.e., sludges, solid organics, solid inorganics) can be treated using a selected technology.

- The volume of waste categorized as "unknown" in the WTWBIR is processed the same as solid organics and inorganics. However, the mass of unknown waste is assumed to be zero because no information was available regarding the density of the unknown waste and the volume of this waste is small compared to the total volume of waste destined for WIPP.

- All projected sludges were grouted in the baseline. In general, stored sludges were not treated in the baseline because they were assumed to have been grouted previously; however, 25 percent of the stored sludges from Los Alamos National Laboratory (LANL) and the Idaho National Engineering Laboratory (INEL) were regrouted and all of the stored sludges at Oak Ridge National Laboratory (ORNL) were grouted.

- All sludges, including stored, are treated in the enhanced-cement treatment option.

- All sludges, solid organics, and solid inorganics are treated in the plasma melter.

## TABLE O-14

## MASS AND VOLUME CHANGES FOR WASTE TREATMENT/PROCESSING MODULES

| Module | Mass Ratio (Output/Input) | Volume Ratio (Output/Input) |
|---|---|---|
| Front End | 1.00[1] | 1.00[2] |
| Retrieval | 1.10[1] | 1.10[2] |
| Waste Characterization | 1.00[2] | 1.00[2] |
| Maintenance | 1.00[2] | 1.00[2] |
| Grout | 3.15[1] | 2.50[2] |
| Supercompact | 1.10[1] | 0.35[2] |
| Shred and Compact | 1.10[1] | 0.76[2] |
| Shred and Add Clay | 2.35[2] | 1.00[2] |
| Plasma | 1.00[1] | 0.33[2] |
| Certification and Shipping | 1.00[2] | 1.00[2] |
| Storage | 1.00[2] | 1.00[2] |

[1]Source (Feizollahi and Shropshire, 1994)
[2]Values derived from engineering calculations

- Ten percent of projected waste and 30 percent of stored waste requires characterization.

- Thirty percent of stored waste from LANL, Savannah River Site (SRS), INEL/Argonne National Laboratory-West (ANL-W), and Hanford requires retrieval.

## 3.0 RESULTS

Tables O-15 through O-30 show the mass and volume processing rates (i.e., inputs) to each of the modules for each of the EAs in each of the configurations that were calculated based on the methodology and assumptions provided previously in this appendix. These flow rates were then used to calculate the costs associated with each module. The cost analysis is described in Section 3.7 and Appendix P of this report.

Tables O-31 and O-32 show final treated mass and volume by EA and primary waste form for each EA, for CH waste and RH waste, respectively. The final mass and volume do not differ by configuration, because the same amount of waste is treated regardless of the site at which the waste is treated. The treated volume of waste for EA 94 exceeds the design capacity of WIPP; it is assumed that this waste would have to be managed in some other way when the WIPP reaches full capacity.

The final processed mass and volume were used as inputs to other EA analyses.

## TABLE O-15

## INPUTS TO MODULES FOR THE CONTACT-HANDLED WASTE DECENTRALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.01 | 0.01 | 0.28 | 1.80 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 14.83 | 14.83 | 307.90 | 2720.79 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 29.91 | 29.91 | 320.57 | 2369.50 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 21.60 | 21.60 | 168.55 | 1351.17 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.31 | 0.31 | 6.25 | 64.66 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 4.37 | 35.92 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.39 | 31.06 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.33 | 0.33 | 9.79 | 56.35 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 14.05 | 14.05 | 69.29 | 443.31 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 1346.67 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.93 | 0.00 |

## TABLE O-16

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.03 | 0.01 | 0.03 | 0.29 | 1.51 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 1.51 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.08 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 275.99 | 14.83 | 261.16 | 334.01 | 1284.39 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 166.54 | 29.91 | 136.63 | 334.23 | 1664.74 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.19 | 21.60 | 64.59 | 175.03 | 912.85 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.40 | 0.31 | 5.08 | 6.76 | 30.03 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.71 | 0.00 | 1.71 | 4.80 | 12.96 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 5.92 | 10.87 |
| ORNL | 9.04 | 0.00 | 2.12 | 9.04 | 0.33 | 8.70 | 10.66 | 23.37 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 303.03 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.16 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 261.93 | 471.34 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.21 | 0.00 |

## TABLE O-17

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.03 | 0.01 | 0.03 | 0.29 | 1.69 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 1.51 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.08 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 275.99 | 14.83 | 261.16 | 334.01 | 2190.43 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 166.54 | 29.91 | 136.63 | 334.23 | 2109.28 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.19 | 21.60 | 64.59 | 175.03 | 1189.33 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.40 | 0.31 | 5.08 | 6.76 | 51.87 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.71 | 0.00 | 1.71 | 4.80 | 27.44 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 5.92 | 23.61 |
| ORNL | 9.04 | 0.00 | 2.12 | 9.04 | 0.33 | 8.70 | 10.66 | 44.17 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 391.52 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.16 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 261.93 | 1023.47 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.21 | 0.00 |

## TABLE O-18

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Plasma Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.25 | 0.25 | 0.27 | 0.55 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 1.38 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.07 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 276.02 | 276.02 | 276.02 | 796.72 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 256.26 | 256.26 | 256.26 | 666.26 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 121.96 | 121.96 | 122.11 | 348.95 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.52 | 5.52 | 5.58 | 19.22 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.78 | 1.78 | 4.37 | 11.85 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 5.31 | 5.39 | 10.25 |
| ORNL | 9.75 | 0.00 | 2.34 | 9.75 | 9.75 | 9.79 | 18.60 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.03 | 0.03 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 39.08 | 39.08 | 103.11 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.15 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 238.12 | 238.12 | 444.40 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-19

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.25 | 0.23 | 0.03 | 0.82 | 3.53 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 3.24 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.17 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 276.02 | 14.86 | 261.16 | 661.29 | 2721.02 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 256.26 | 119.63 | 136.63 | 698.32 | 3421.07 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.05 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 121.96 | 57.36 | 64.59 | 333.03 | 1632.08 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.13 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.52 | 0.44 | 5.08 | 13.48 | 65.66 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.78 | 0.07 | 1.71 | 10.38 | 36.81 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.04 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 12.67 | 31.06 |
| ORNL | 9.75 | 0.00 | 2.34 | 9.75 | 1.05 | 8.70 | 23.89 | 64.76 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.03 | 0.03 | 0.00 | 0.10 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 16.23 | 22.85 | 104.90 | 457.44 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.35 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 560.28 | 1346.67 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## TABLE O-20

## INPUTS TO MODULES FOR REGIONALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grout Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 15.14 | 15.14 | 314.14 | 2785.45 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 29.91 | 29.91 | 325.95 | 2400.56 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 21.60 | 21.60 | 168.55 | 1351.17 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 14.05 | 14.05 | 69.29 | 443.31 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.34 | 0.34 | 252.57 | 1440.74 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-21

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.44 | 15.14 | 266.30 | 340.77 | 1314.42 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 171.92 | 29.91 | 142.02 | 340.15 | 1675.61 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.35 | 21.60 | 64.74 | 175.03 | 912.85 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 303.03 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 251.47 | 0.34 | 251.13 | 277.68 | 509.17 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-22

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | CERT & SHIP MASS (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.44 | 15.14 | 266.30 | 340.77 | 2242.30 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 171.92 | 29.91 | 142.02 | 340.15 | 2132.89 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.35 | 21.60 | 64.74 | 175.03 | 1169.33 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 391.52 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 251.47 | 0.34 | 251.13 | 277.68 | 1096.77 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-23

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | PLASMA MASS (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.60 | 281.60 | 281.60 | 815.94 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 261.65 | 261.65 | 261.65 | 676.51 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 122.11 | 122.11 | 122.11 | 348.95 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 39.08 | 39.08 | 103.11 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 252.56 | 252.56 | 252.56 | 475.40 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-24

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.60 | 15.29 | 266.3045 | 674.77 | 2786.67 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 261.65 | 119.63 | 142.0159 | 711.00 | 3452.13 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 122.11 | 57.36 | 64.74 | 333.03 | 1632.08 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 16.23 | 22.85 | 104.90 | 457.44 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 252.56 | 1.42 | 251.13 | 595.37 | 1451.77 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-25

## INPUTS TO MODULES FOR CENTRALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grout Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 81.04 | 81.04 | 1130.50 | 323.89 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-26
## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 828.08 | 81.04 | 747.05 | 1205.21 | 181.35 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-27

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 828.08 | 81.04 | 747.05 | 1205.21 | 271.26 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-28

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Plasma Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 941.53 | 0.00 | 0.00 | 956.99 | 956.99 | 956.99 | 93.07 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-29

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 941.53 | 0.00 | 0.00 | 956.99 | 209.94 | 747.05 | 2419.07 | 376.16 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-30

## INPUTS TO MODULES FOR REMOTE-HANDLED WASTE BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| BCLDP | 0.32 | 0.00 | 0.03 | 0.00 | 0.00 | 0.32 | 0.00 |
| BT | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| HANFORD | 13.70 | 0.03 | 1.39 | 0.00 | 0.00 | 13.70 | 230.32 |
| INEL/ANL-W | 0.28 | 0.04 | 0.06 | 0.01 | 0.01 | 0.30 | 4.85 |
| KAPL | 0.15 | 0.00 | 0.02 | 0.00 | 0.00 | 0.15 | 0.00 |
| LANL | 1.37 | 0.17 | 0.25 | 0.00 | 0.00 | 1.38 | 11.07 |
| ORNL | 4.88 | 0.00 | 1.10 | 2.91 | 2.91 | 11.62 | 105.27 |
| SRS | 0.29 | 0.00 | 0.03 | 0.00 | 0.00 | 0.29 | 2.46 |

# TABLE O-31

## CH SUMMARY
## MASS AND VOLUME OUTPUT
## WIPP ENGINEERED ALTERNATIVES
## JULY 1995

| | Sludges | | | Solid Organics | | | Solid Inorganics | | |
|---|---|---|---|---|---|---|---|---|---|
| Case # | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) |
| Baseline | 30,921,720 | 54,389 | 569 | 47,234,933 | 74,339 | 635 | 13,007,073 | 38,396 | 339 |
| Alternative 1 | 30,921,720 | 54,389 | 569 | 51,958,427 | 26,019 | 1,997 | 14,307,781 | 13,438 | 1,065 |
| Alternative 6 | 30,921,720 | 54,389 | 569 | 51,958,427 | 56,498 | 920 | 14,307,781 | 29,181 | 490 |
| Alternative 10 | 16,929,945 | 10,767 | 1,572 | 47,234,933 | 24,532 | 1,925 | 13,007,073 | 12,671 | 1,027 |
| Alternative 94 | 53,329,327 | 81,566 | 654 | 69,576,926 | 74,339 | 936 | 19,159,383 | 38,396 | 499 |

## TABLE O-32

## RH SUMMARY, RH MASS, AND VOLUME OUTPUT WIPP ENGINEERED ALTERNATIVES JULY 1995

| Baseline | Sludges | Solid Organics | Solid Inorganics |
|---|---|---|---|
| Total Mass (kg) | 741,427 | 1,338,770 | 120,268 |
| Total Volume (cu. m) | 1,283 | 5,524 | 224 |
| Density (kg/cu. m) | 578 | 242 | 537 |

processing scheme for EA 1 for each of the configurations; therefore, its mass and volume changes are assumed to be equal to those of EA 1. EA 33, 35(a-b), 77(a-d), 83, and 111 are omitted from further discussion in this section because they are not unique with respect to mass and volume.

Additionally, each EA is defined in Section 2.2.1, Engineered Alternative Definition. Each EA was also considered with respect to three configurations: decentralized, regionalized, and centralized. Table O-13 indicates which sites send waste to other sites to be processed and/or stored for each configuration.

Waste flow diagrams for each EA are shown in Figures O-4 through O-12. Figures O-4 through O-7 represent both the decentralized and regionalized configurations for EAs 1, 6, 10, and 94 for CH waste, including sites that treat and store waste and sites that ship pre-processed waste to other sites for treatment and storage. Figures O-8 through O-12 represent the centralized configuration for CH waste, which includes shipment of pre-processed waste to WIPP for treatment, storage, and disposal.

### 2.7.1 Front End Module

Front-end support facilities consist of all administrative and laboratory buildings required for the waste management support functions. Front-end support functions include security, personnel decontamination (radioactive and hazardous), maintenance of noncontaminated areas and equipment, health physics, radiation badges, facility access control, sanitary facilities, work control and personnel support, internal and external communications, spill or emergency response provisions (radioactive and hazardous), analytical laboratory, environmental field sampling, environmental regulatory reporting, and records management. Front-end support facilities include all administrative and laboratory buildings required for the waste management support functions.

### 2.7.2 Waste Retrieval Module

This module consists of all-weather excavation, inspection, and repackaging of bermed waste. The module includes three principal unit operations: earthen cover extraction and decontamination, waste container retrieval and inspection, and packaging and staging for shipment.

### 2.7.3 Waste Characterization Module

This module is a self-contained facility in which waste characterization is performed. Activities include extracting physical samples of waste; conducting chemical, physical, and radiological sampling of waste; and repackaging drums and boxes to remove and stabilize noncompliant waste.

### 2.7.4 Maintenance Module

A maintenance facility is used in conjunction with treatment facilities. It consists of a failed equipment receiving and repair building housing machinery and tools.

1

# TABLE O-13

## TRANSFER OF WASTE FOR THE DECENTRALIZED, REGIONALIZED, AND CENTRALIZED CONFIGURATIONS

| Decentralized | | | Regionalized | | | Centralized | | |
|---|---|---|---|---|---|---|---|---|
| Site | CH | RH | Site | CH | RH | Site | CH | RH |
| ANL-E* | WIPP | ORNL+ | ANL-E | SRS | ORNL | ANL-E | WIPP | WIPP |
| AMES | ANL-E# | | AMES | SRS | | AMES | WIPP | |
| BCLDP | | ORNL+ | BCLDP | | ORNL | BCLDP | | WIPP |
| BT | MOUND | ORNL+ | BT | SRS | ORNL | BT | WIPP | WIPP |
| ETEC | NTS | | ETEC | INEL/ANL-W | | ETEC | WIPP | |
| INEL/ANL-W* | WIPP | WIPP | INEL/ANL-W* | WIPP | HANFORD | INEL/ANL-W | WIPP | WIPP |
| KAPL | MOUND | ORNL+ | KAPL | SRS | ORNL | KAPL | WIPP | WIPP |
| LANL* | WIPP | WIPP | LANL* | WIPP | HANFORD | LANL | WIPP | WIPP |
| LBL | (LLNL) | | LBL | HANFORD | | LBL | WIPP | |
| LLNL* | WIPP | | LLNL | HANFORD | | LLNL | WIPP | |
| MOUND* | WIPP | | MOUND | SRS | | MOUND | WIPP | |
| MU | ANL-E# | | MU | SRS | | MU | WIPP | |
| NTS* | WIPP | WIPP | NTS | INEL/ANL-W | HANFORD | NTS | WIPP | WIPP |
| ORNL* | WIPP | WIPP | ORNL* (rh) | SRS | WIPP | ORNL | WIPP | WIPP |
| PA | ORNL | | PA | SRS | | PA | WIPP | |
| PANTEX | LANL | | PANTEX | LANL | | PANTEX | WIPP | |
| RFETS* | WIPP | | RFETS* | WIPP | | RFETS | WIPP | |
| HANFORD* | WIPP | WIPP | HANFORD* | WIPP | WIPP | HANFORD | WIPP | WIPP |
| SNL/NM | LANL | | SNL/NM | LANL | | SNL/NM | WIPP | |
| SRS* | WIPP | WIPP | SRS* | WIPP | ORNL | SRS | WIPP | WIPP |

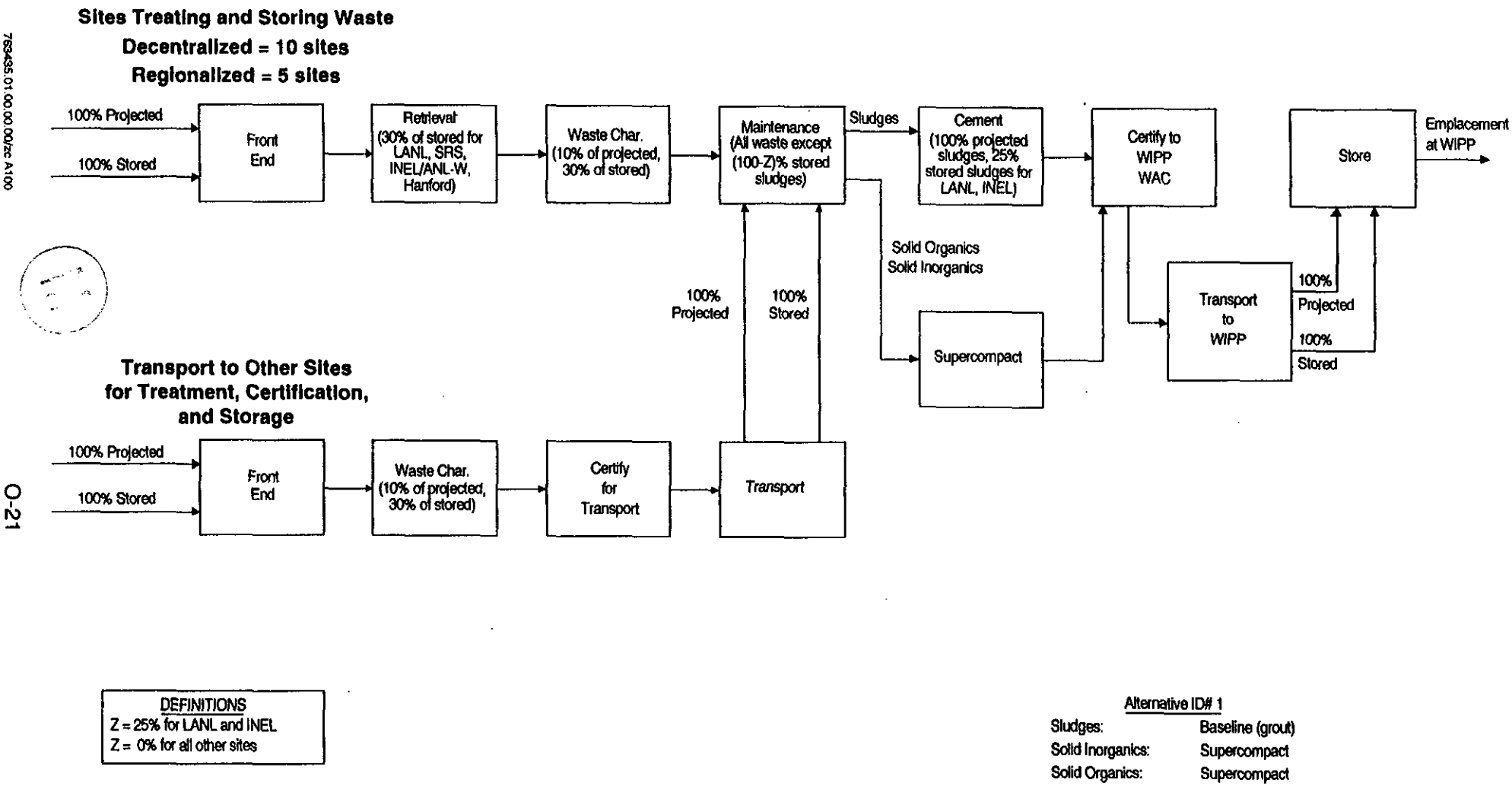
Notes:

* Denotes a processing site.

ORNL+ Remote handled wastes from BCLDP, BT, KAPL, (these are not discussed in the EM-PEIS) and ANL-E should be processed at ORNL instead of Mound because Mound currently does not process or store RH waste.

ANL-E# The EM-PEIS discusses that ANL-E will process and ship its own CH waste but does not cover Ames and MU which are closer to ANL-E than ORNL.

(LLNL) EM-PEIS indicates LBL waste will be shipped to Hanford. LBL waste should be shipped to LLNL because it is much closer.




DEFINITIONS
Z = 25% for LANL and INEL
Z = 0% for all other sites

Alternative ID# 1

| | |
|---|---|
| Sludges: | Baseline (grout) |
| Solid Inorganics: | Supercompact |
| Solid Organics: | Supercompact |





**Figure O-4**

**Decentralized and Regionalized Alternative ID #s 1 and 77(a-d) Contact Handled**

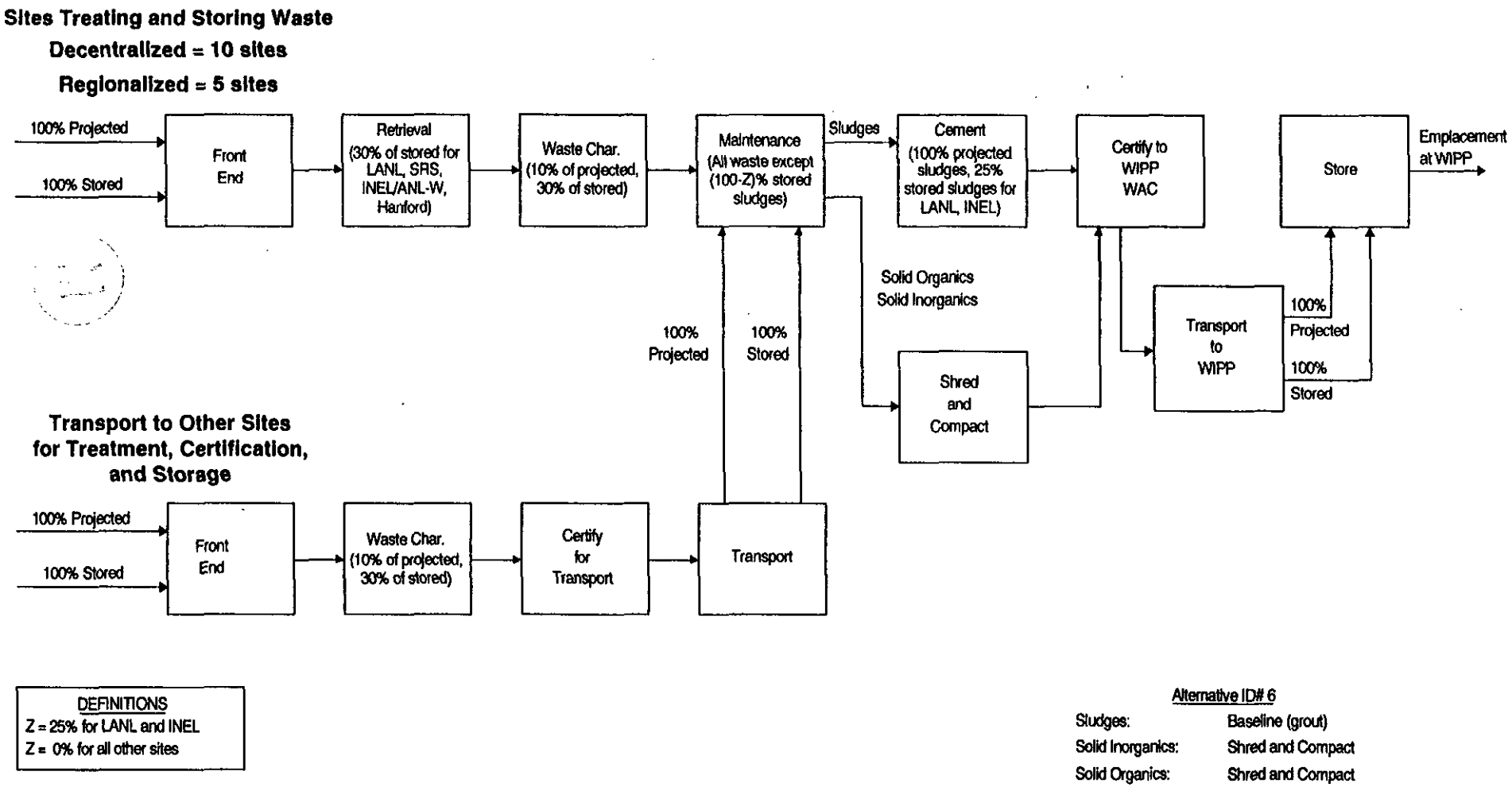
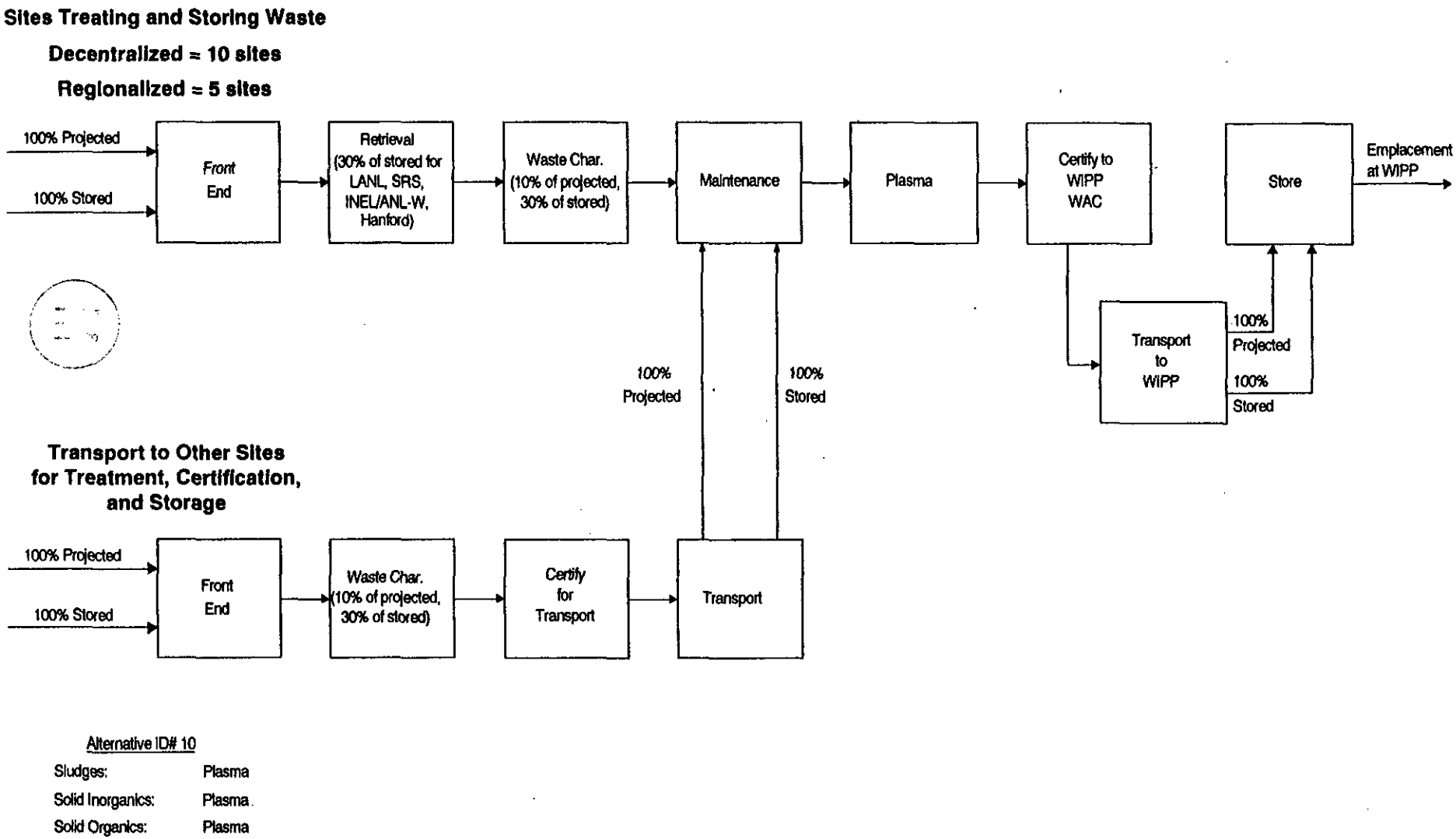







**Figure O-5**

**Decentralized and Regionalized Alternative ID# 6 Contact Handled**




Alternative ID# 10

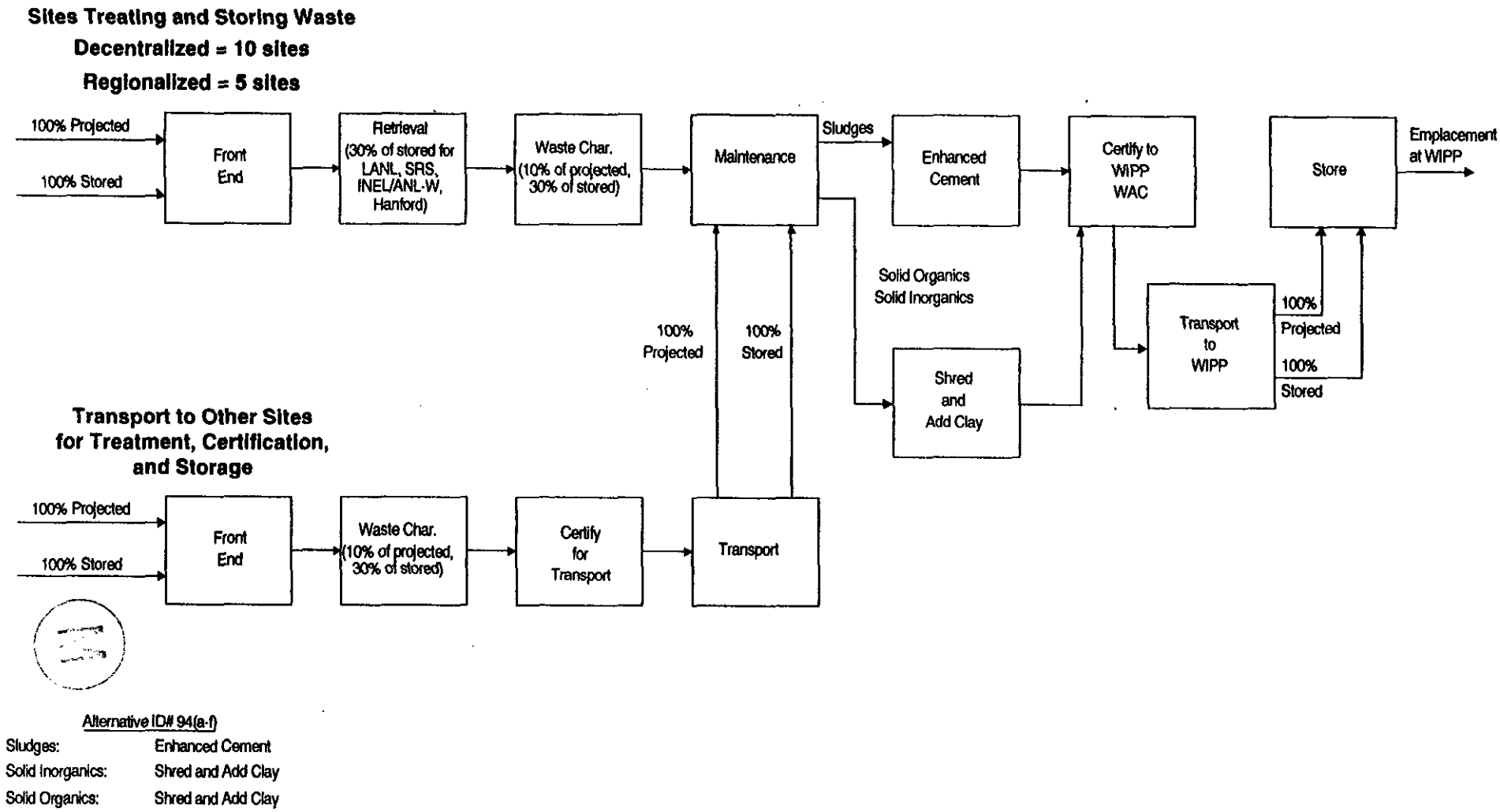
| | |
|---|---|
| Sludges: | Plasma |
| Solid Inorganics: | Plasma |
| Solid Organics: | Plasma |





***Figure O-6***

**Decentralized and Regionalized Alternative ID# 10 Contact Handled**




Alternative ID# 94(a-f)

| | |
|---|---|
| Sludges: | Enhanced Cement |
| Solid Inorganics: | Shred and Add Clay |
| Solid Organics: | Shred and Add Clay |





**Figure O-7**

**Decentralized and Regionalized Alternative ID# 94(a-f) Contact Handled**

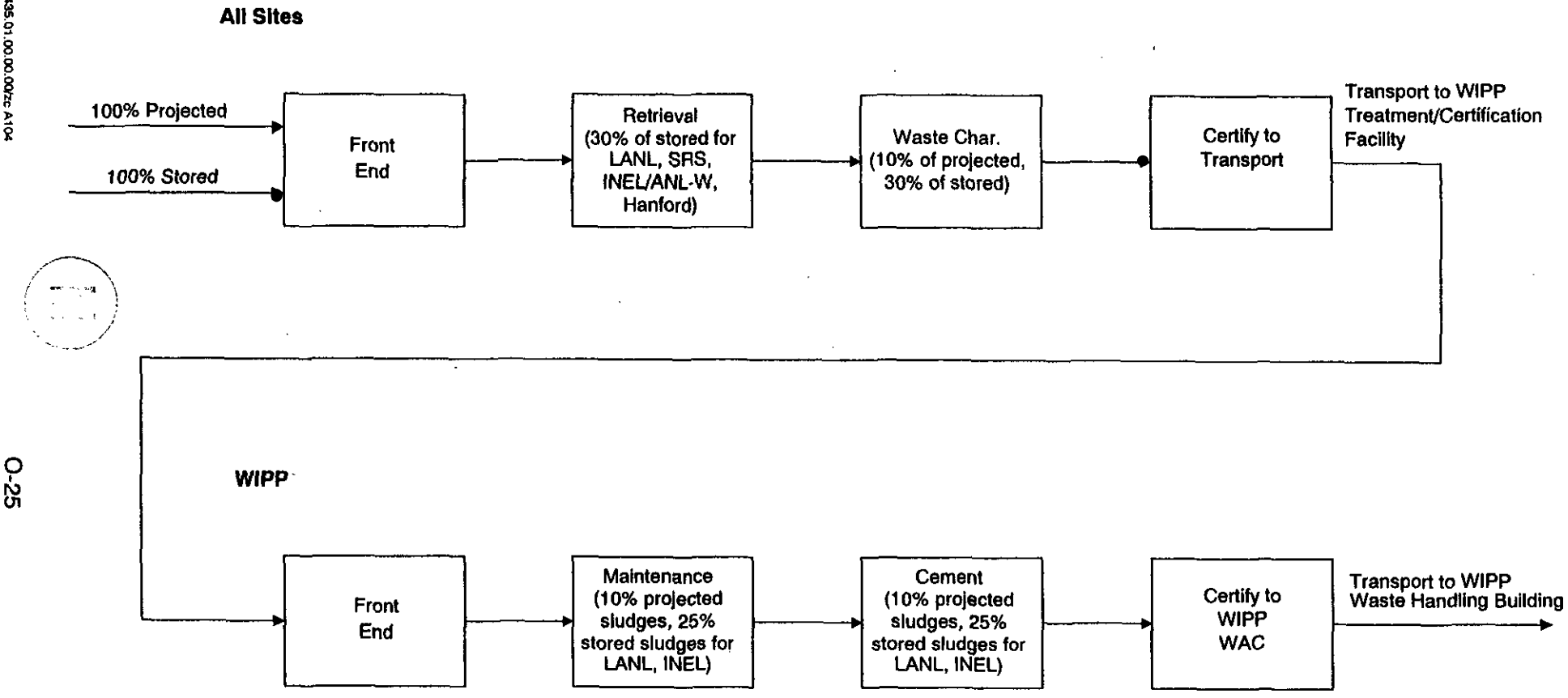







**Figure O-8**

**Centralized Base Case and Alternative ID #s 33, 35(a&b), 83, and 111 Contact Handled**

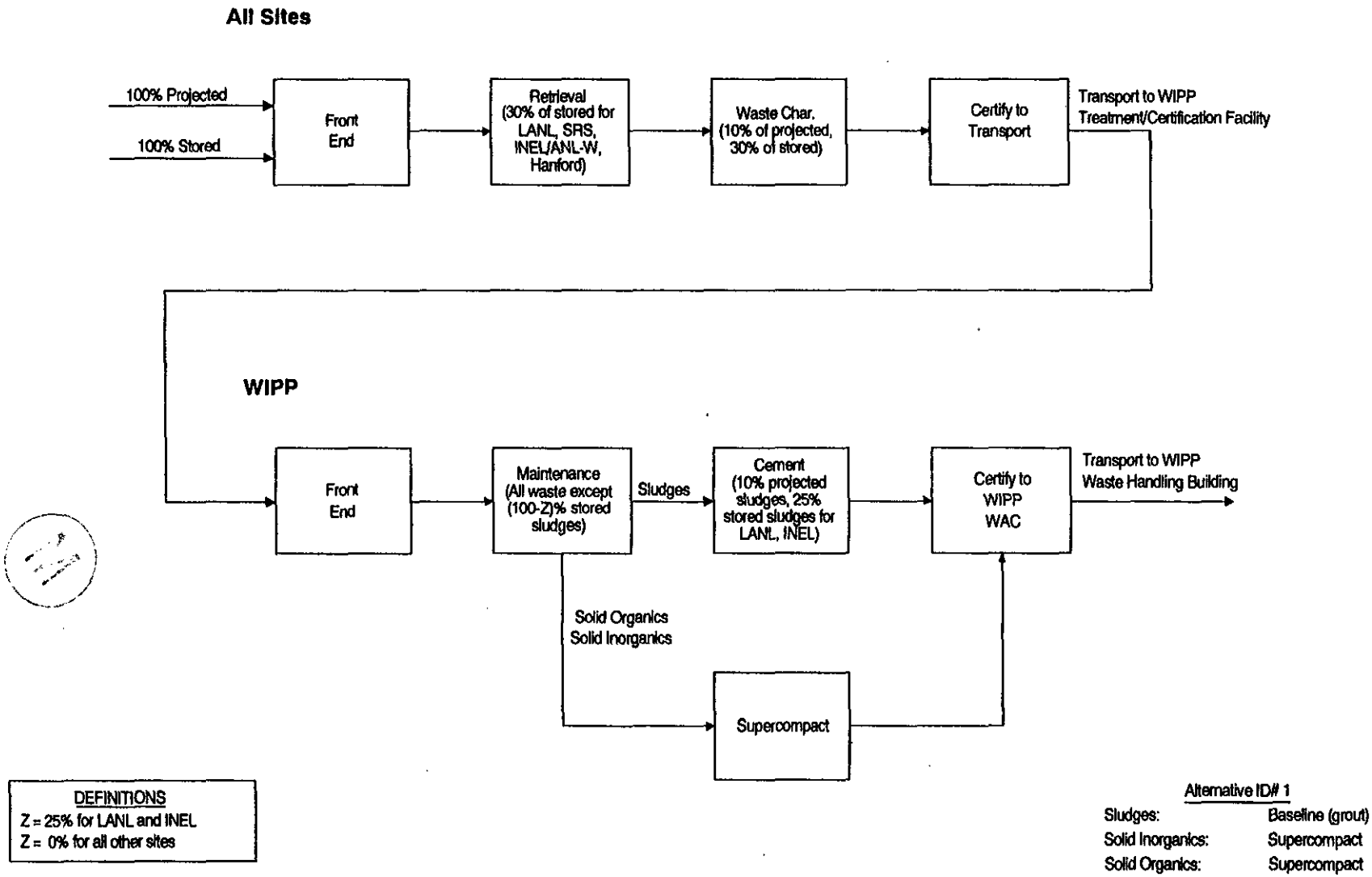







**Figure O-9**

**Centralized Alternative ID#s 1 and 77(a-d) Contact Handled**

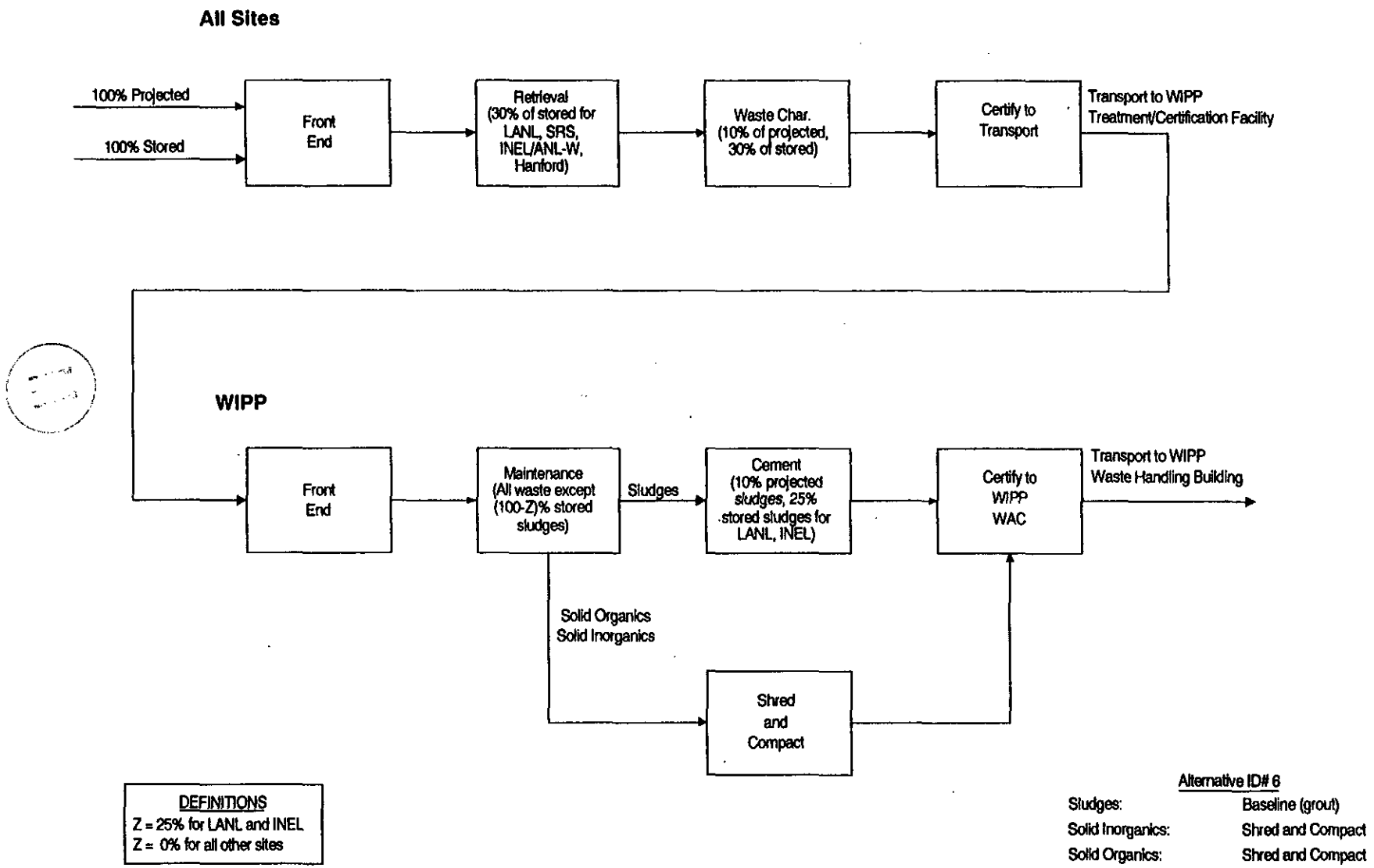
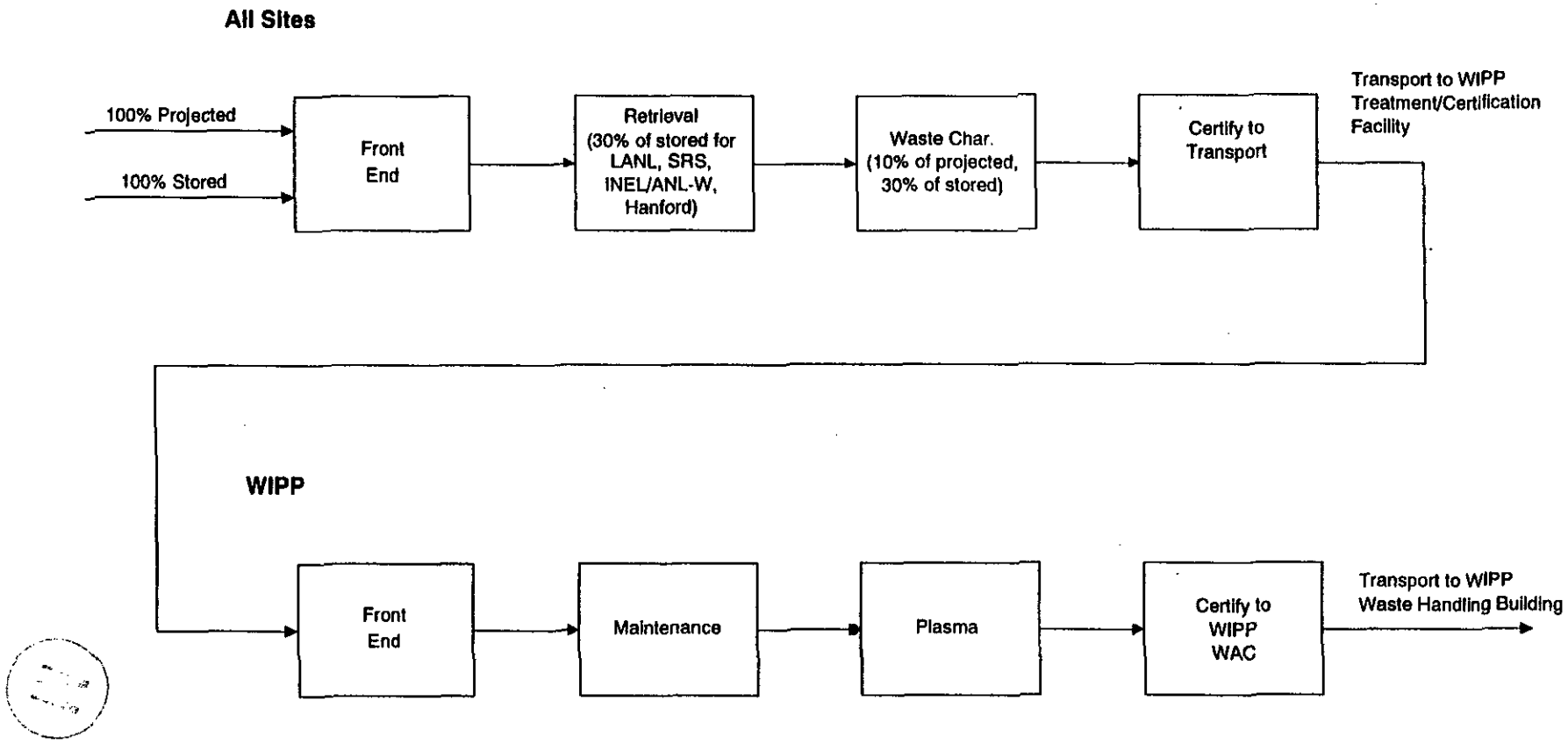







**Figure O-10**
**Centralized Alternative ID# 6 Contact Handled**




Alternative ID# 10

| | |
|---|---|
| Sludges: | Plasma |
| Solid Inorganics: | Plasma |
| Solid Organics: | Plasma |

**Figure O-11**

**Centralized Alternative ID# 10 Contact Handled**

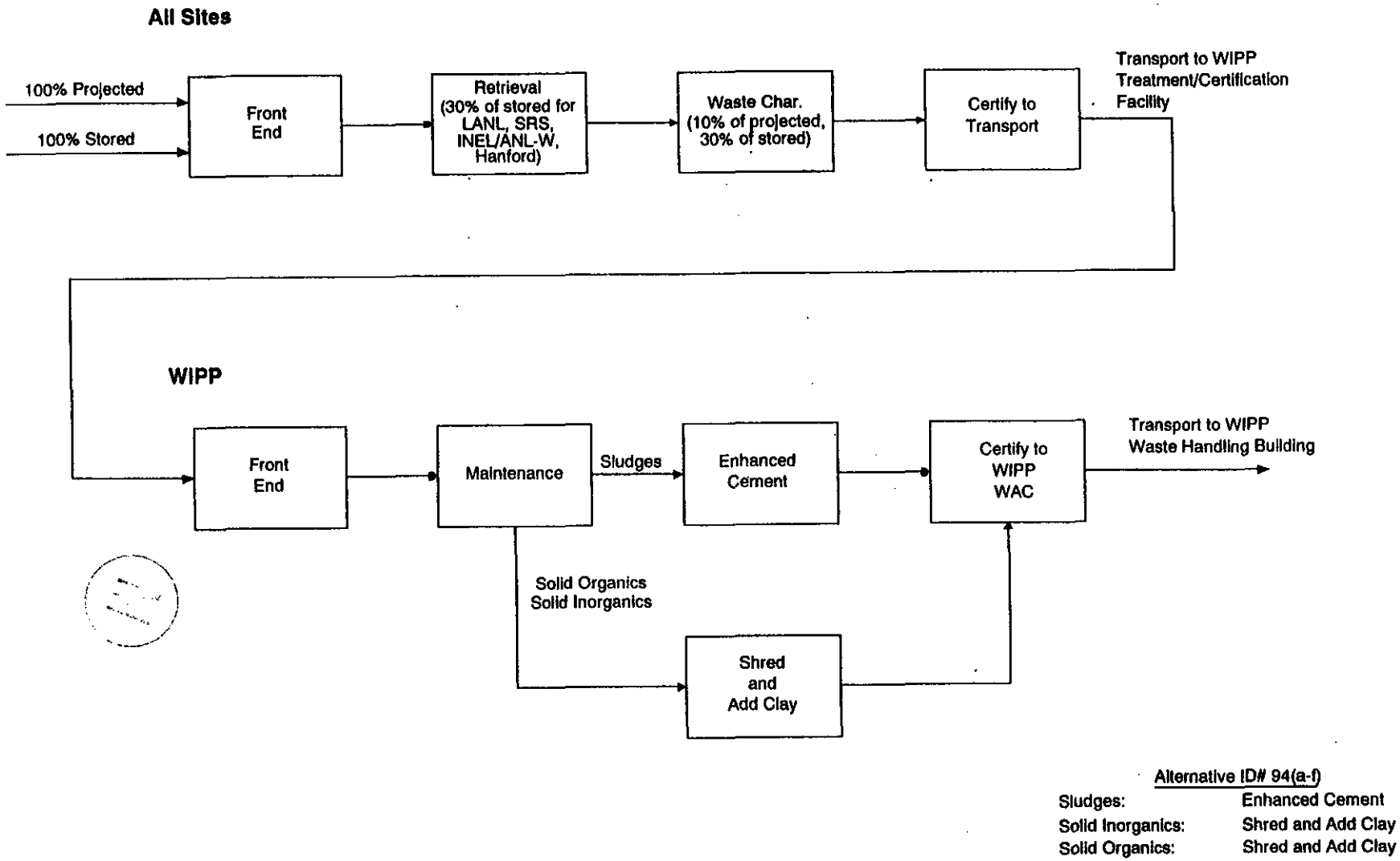







**Figure O-12**
**Centralized Alternative ID# 94(a-f)**

### 2.7.5 Treatment Module

The treatment module varies based on the EA being considered. Treatment options include grouting, supercompacting, shredding and compacting, plasma melting, enhanced- cement processing, and shredding and adding clay.

### 2.7.6 Storage Module

This module consists of a Resource Conservation and Recovery Act compliant storage building sized to accommodate an accumulation of waste from treatment modules for a maximum of 20 years. Storage area features include spill collection, sloping floors, sumps, and concrete berms. Monitoring is included for both gamma and alpha radiation control.

### 2.7.7 Certification and Shipping Module

Certification and shipping consists of storage of incoming material, assay and certification, and truck loading. The facility is equipped with a bridge crane and a forklift. It is assumed that certification and shipping operations will take place indoors.

### 2.7.8 Transportation Module

Transportation consists of truck shipments, including a tractor and trailer transporting three Transuranic Package Transporter-IIs (TRUPACT-IIs) for CH waste or one RH-72B cask (a cylinder consisting of a separate inner vessel within an outer cask protected by impact limiters at each end) for RH waste.

Mass and volume changes occur in the retrieval module and the treatment modules. Table O-14 summarizes these changes. Several other assumptions were made in addition to the mass and volume changes:

- All waste within a major waste form category (i.e., sludges, solid organics, solid inorganics) can be treated using a selected technology.

- The volume of waste categorized as "unknown" in the WTWBIR is processed the same as solid organics and inorganics. However, the mass of unknown waste is assumed to be zero because no information was available regarding the density of the unknown waste and the volume of this waste is small compared to the total volume of waste destined for WIPP.

- All projected sludges were grouted in the baseline. In general, stored sludges were not treated in the baseline because they were assumed to have been grouted previously; however, 25 percent of the stored sludges from Los Alamos National Laboratory (LANL) and the Idaho National Engineering Laboratory (INEL) were regrouted and all of the stored sludges at Oak Ridge National Laboratory (ORNL) were grouted.

- All sludges, including stored, are treated in the enhanced-cement treatment option.

- All sludges, solid organics, and solid inorganics are treated in the plasma melter.

## TABLE O-14

## MASS AND VOLUME CHANGES FOR WASTE TREATMENT/PROCESSING MODULES

| Module | Mass Ratio (Output/Input) | Volume Ratio (Output/Input) |
|---|---|---|
| Front End | 1.00[1] | 1.00[2] |
| Retrieval | 1.10[1] | 1.10[2] |
| Waste Characterization | 1.00[2] | 1.00[2] |
| Maintenance | 1.00[2] | 1.00[2] |
| Grout | 3.15[1] | 2.50[2] |
| Supercompact | 1.10[1] | 0.35[2] |
| Shred and Compact | 1.10[1] | 0.76[2] |
| Shred and Add Clay | 2.35[2] | 1.00[2] |
| Plasma | 1.00[1] | 0.33[2] |
| Certification and Shipping | 1.00[2] | 1.00[2] |
| Storage | 1.00[2] | 1.00[2] |

[1]Source (Feizollahi and Shropshire, 1994)
[2]Values derived from engineering calculations

- Ten percent of projected waste and 30 percent of stored waste requires characterization.

- Thirty percent of stored waste from LANL, Savannah River Site (SRS), INEL/Argonne National Laboratory-West (ANL-W), and Hanford requires retrieval.

## 3.0 RESULTS

Tables O-15 through O-30 show the mass and volume processing rates (i.e., inputs) to each of the modules for each of the EAs in each of the configurations that were calculated based on the methodology and assumptions provided previously in this appendix. These flow rates were then used to calculate the costs associated with each module. The cost analysis is described in Section 3.7 and Appendix P of this report.

Tables O-31 and O-32 show final treated mass and volume by EA and primary waste form for each EA, for CH waste and RH waste, respectively. The final mass and volume do not differ by configuration, because the same amount of waste is treated regardless of the site at which the waste is treated. The treated volume of waste for EA 94 exceeds the design capacity of WIPP; it is assumed that this waste would have to be managed in some other way when the WIPP reaches full capacity.

The final processed mass and volume were used as inputs to other EA analyses.

## TABLE O-15

## INPUTS TO MODULES FOR THE CONTACT-HANDLED WASTE DECENTRALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.01 | 0.01 | 0.28 | 1.80 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 14.83 | 14.83 | 307.90 | 2720.79 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 29.91 | 29.91 | 320.57 | 2369.50 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 21.60 | 21.60 | 168.55 | 1351.17 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.31 | 0.31 | 6.25 | 64.66 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 4.37 | 35.92 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.39 | 31.06 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.33 | 0.33 | 9.79 | 56.35 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 14.05 | 14.05 | 69.29 | 443.31 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 1346.67 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.93 | 0.00 |

## TABLE O-16

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.03 | 0.01 | 0.03 | 0.29 | 1.51 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 1.51 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.08 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 275.99 | 14.83 | 261.16 | 334.01 | 1284.39 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 166.54 | 29.91 | 136.63 | 334.23 | 1664.74 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.19 | 21.60 | 64.59 | 175.03 | 912.85 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.40 | 0.31 | 5.08 | 6.76 | 30.03 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.71 | 0.00 | 1.71 | 4.80 | 12.96 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 5.92 | 10.87 |
| ORNL | 9.04 | 0.00 | 2.12 | 9.04 | 0.33 | 8.70 | 10.66 | 23.37 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 303.03 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.16 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 261.93 | 471.34 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.21 | 0.00 |

## TABLE O-17

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.03 | 0.01 | 0.03 | 0.29 | 1.69 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 1.51 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.08 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 275.99 | 14.83 | 261.16 | 334.01 | 2190.43 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 166.54 | 29.91 | 136.63 | 334.23 | 2109.28 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.19 | 21.60 | 64.59 | 175.03 | 1189.33 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.40 | 0.31 | 5.08 | 6.76 | 51.87 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.71 | 0.00 | 1.71 | 4.80 | 27.44 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 5.92 | 23.61 |
| ORNL | 9.04 | 0.00 | 2.12 | 9.04 | 0.33 | 8.70 | 10.66 | 44.17 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 391.52 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.16 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 261.93 | 1023.47 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.21 | 0.00 |

## TABLE O-18

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Plasma Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.25 | 0.25 | 0.27 | 0.55 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 1.38 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.07 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 276.02 | 276.02 | 276.02 | 796.72 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 256.26 | 256.26 | 256.26 | 666.26 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 121.96 | 121.96 | 122.11 | 348.95 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.06 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.52 | 5.52 | 5.58 | 19.22 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.78 | 1.78 | 4.37 | 11.85 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.02 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 5.31 | 5.39 | 10.25 |
| ORNL | 9.75 | 0.00 | 2.34 | 9.75 | 9.75 | 9.79 | 18.60 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.03 | 0.03 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 39.08 | 39.08 | 103.11 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.15 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 238.12 | 238.12 | 444.40 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-19

## INPUTS TO MODULES FOR DECENTRALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.25 | 0.23 | 0.03 | 0.82 | 3.53 |
| BT | 1.38 | 0.00 | 0.14 | 1.38 | 0.00 | 1.38 | 3.24 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.07 | 0.00 | 0.07 | 0.17 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 276.02 | 14.86 | 261.16 | 661.29 | 2721.02 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 256.26 | 119.63 | 136.63 | 698.32 | 3421.07 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.02 | 0.00 | 0.02 | 0.05 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 121.96 | 57.36 | 64.59 | 333.03 | 1632.08 |
| LBL | 0.06 | 0.00 | 0.01 | 0.06 | 0.00 | 0.06 | 0.13 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 5.52 | 0.44 | 5.08 | 13.48 | 65.66 |
| MOUND | 1.78 | 0.00 | 0.53 | 1.78 | 0.07 | 1.71 | 10.38 | 36.81 |
| MU | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.02 | 0.04 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 5.31 | 0.00 | 5.31 | 12.67 | 31.06 |
| ORNL | 9.75 | 0.00 | 2.34 | 9.75 | 1.05 | 8.70 | 23.89 | 64.76 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.03 | 0.03 | 0.00 | 0.10 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 16.23 | 22.85 | 104.90 | 457.44 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.15 | 0.00 | 0.15 | 0.35 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 238.12 | 0.00 | 238.12 | 560.28 | 1346.67 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

## TABLE O-20

## INPUTS TO MODULES FOR REGIONALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grout Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 15.14 | 15.14 | 314.14 | 2785.45 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 29.91 | 29.91 | 325.95 | 2400.56 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 21.60 | 21.60 | 168.55 | 1351.17 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 14.05 | 14.05 | 69.29 | 443.31 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.34 | 0.34 | 252.57 | 1440.74 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-21

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.44 | 15.14 | 266.30 | 340.77 | 1314.42 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 171.92 | 29.91 | 142.02 | 340.15 | 1675.61 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.35 | 21.60 | 64.74 | 175.03 | 912.85 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 303.03 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 251.47 | 0.34 | 251.13 | 277.68 | 509.17 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-22

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | CERT & SHIP MASS (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.44 | 15.14 | 266.30 | 340.77 | 2242.30 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 171.92 | 29.91 | 142.02 | 340.15 | 2132.89 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 86.35 | 21.60 | 64.74 | 175.03 | 1169.33 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 36.90 | 14.05 | 22.85 | 71.57 | 391.52 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 251.47 | 0.34 | 251.13 | 277.68 | 1096.77 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-23

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | PLASMA MASS (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.60 | 281.60 | 281.60 | 815.94 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 261.65 | 261.65 | 261.65 | 676.51 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 122.11 | 122.11 | 122.11 | 348.95 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 39.08 | 39.08 | 103.11 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 252.56 | 252.56 | 252.56 | 475.40 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-24

## INPUTS TO MODULES FOR REGIONALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 281.60 | 15.29 | 266.3045 | 674.77 | 2786.67 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 261.65 | 119.63 | 142.0159 | 711.00 | 3452.13 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 122.11 | 57.36 | 64.74 | 333.03 | 1632.08 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 39.08 | 16.23 | 22.85 | 104.90 | 457.44 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 252.56 | 1.42 | 251.13 | 595.37 | 1451.77 |
| WIPP | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-25

## INPUTS TO MODULES FOR CENTRALIZED BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grout Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 81.04 | 81.04 | 1130.50 | 323.89 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-26
## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 1

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Supercompact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 828.08 | 81.04 | 747.05 | 1205.21 | 181.35 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-27

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 6

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Shred & Compact Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.04 | 0.00 | 2.12 | 0.00 | 0.00 | 0.00 | 9.04 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 940.81 | 0.00 | 0.00 | 828.08 | 81.04 | 747.05 | 1205.21 | 271.26 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-28

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 10

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Plasma Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 941.53 | 0.00 | 0.00 | 956.99 | 956.99 | 956.99 | 93.07 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-29

## INPUTS TO MODULES FOR CENTRALIZED ALTERNATIVE 94

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Enhanced Cement Mass (kg/hr) | Shred & Add Clay Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/2-week period) |
|---|---|---|---|---|---|---|---|---|
| AMES LAB | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ANL-E | 0.25 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.25 | 0.00 |
| BT | 1.38 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 | 1.38 | 0.00 |
| ETEC | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| HANFORD | 273.67 | 23.48 | 43.72 | 0.00 | 0.00 | 0.00 | 276.02 | 0.00 |
| INEL/ANL-W | 248.80 | 74.62 | 76.87 | 0.00 | 0.00 | 0.00 | 256.26 | 0.00 |
| KAPL | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| LANL | 119.73 | 22.27 | 27.49 | 0.00 | 0.00 | 0.00 | 121.96 | 0.00 |
| LBL | 0.06 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 |
| LLNL | 5.52 | 0.00 | 0.76 | 0.00 | 0.00 | 0.00 | 5.52 | 0.00 |
| MOUND | 1.78 | 0.00 | 0.53 | 0.00 | 0.00 | 0.00 | 1.78 | 0.00 |
| MU | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 |
| NTS | 5.31 | 0.00 | 1.59 | 0.00 | 0.00 | 0.00 | 5.31 | 0.00 |
| ORNL | 9.75 | 0.00 | 2.34 | 0.00 | 0.00 | 0.00 | 9.75 | 0.00 |
| PANTEX | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| PA | 0.03 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| RFETS | 39.08 | 0.00 | 5.45 | 0.00 | 0.00 | 0.00 | 39.08 | 0.00 |
| SNL/NM | 0.15 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.15 | 0.00 |
| SRS | 234.70 | 34.25 | 47.33 | 0.00 | 0.00 | 0.00 | 238.12 | 0.00 |
| WIPP | 941.53 | 0.00 | 0.00 | 956.99 | 209.94 | 747.05 | 2419.07 | 376.16 |
| PORTABLE | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.92 | 0.00 |

## TABLE O-30

## INPUTS TO MODULES FOR REMOTE-HANDLED WASTE BASELINE

| Site | Front End Mass (kg/hr) | Retrieval Mass (kg/hr) | Waste Char Mass (kg/hr) | Maintenance Mass (kg/hr) | Grouting Mass (kg/hr) | Cert & Ship Mass (kg/hr) | Storage Volume (cu m/yr.) |
|---|---|---|---|---|---|---|---|
| BCLDP | 0.32 | 0.00 | 0.03 | 0.00 | 0.00 | 0.32 | 0.00 |
| BT | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| HANFORD | 13.70 | 0.03 | 1.39 | 0.00 | 0.00 | 13.70 | 230.32 |
| INEL/ANL-W | 0.28 | 0.04 | 0.06 | 0.01 | 0.01 | 0.30 | 4.85 |
| KAPL | 0.15 | 0.00 | 0.02 | 0.00 | 0.00 | 0.15 | 0.00 |
| LANL | 1.37 | 0.17 | 0.25 | 0.00 | 0.00 | 1.38 | 11.07 |
| ORNL | 4.88 | 0.00 | 1.10 | 2.91 | 2.91 | 11.62 | 105.27 |
| SRS | 0.29 | 0.00 | 0.03 | 0.00 | 0.00 | 0.29 | 2.46 |

# TABLE O-31

## CH SUMMARY
## MASS AND VOLUME OUTPUT
## WIPP ENGINEERED ALTERNATIVES
## JULY 1995

| | Sludges | | | Solid Organics | | | Solid Inorganics | | |
|---|---|---|---|---|---|---|---|---|---|
| Case # | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) | Total Mass (kg) | Total Volume (cu. m) | Density (kg/cu. m) |
| Baseline | 30,921,720 | 54,389 | 569 | 47,234,933 | 74,339 | 635 | 13,007,073 | 38,396 | 339 |
| Alternative 1 | 30,921,720 | 54,389 | 569 | 51,958,427 | 26,019 | 1,997 | 14,307,781 | 13,438 | 1,065 |
| Alternative 6 | 30,921,720 | 54,389 | 569 | 51,958,427 | 56,498 | 920 | 14,307,781 | 29,181 | 490 |
| Alternative 10 | 16,929,945 | 10,767 | 1,572 | 47,234,933 | 24,532 | 1,925 | 13,007,073 | 12,671 | 1,027 |
| Alternative 94 | 53,329,327 | 81,566 | 654 | 69,576,926 | 74,339 | 936 | 19,159,383 | 38,396 | 499 |

## TABLE O-32

## RH SUMMARY, RH MASS, AND VOLUME OUTPUT WIPP ENGINEERED ALTERNATIVES JULY 1995

| Baseline | Sludges | Solid Organics | Solid Inorganics |
|---|---|---|---|
| Total Mass (kg) | 741,427 | 1,338,770 | 120,268 |
| Total Volume (cu. m) | 1,283 | 5,524 | 224 |
| Density (kg/cu. m) | 578 | 242 | 537 |