531324

Estimate of Cellulosics, Plastics, and Rubbers in a Single Panel in the WIPP Repository In Support of AP-107
Supercedes ERMS#530959

Revision 1

ERMS 531324
September 4, 2003

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1. INTRODUCTION

In 1996, the U.S. Department of Energy (DOE) completed a performance assessment (PA) for the Waste Isolation Pilot Plant (WIPP). The PA was part of the Compliance Certification Application (CCA) submitted to the Environmental Protection Agency (EPA) to demonstrate compliance with the radiation protection regulations of 40 CFR 191 (Subparts B and C) and 40 CFR 194. As required by the WIPP Land Withdrawal Act (Public Law 102-579), DOE is required to submit documentation to EPA for the recertification of the WIPP every five years following the first receipt of waste. This will require that a Compliance Recertification Application (CRA) be prepared and submitted to the EPA no later than March 26, 2004. The DOE expects to provide the CRA to the EPA during November 2003.

In December 2002, DOE submitted an impact assessment to EPA describing the effect on repository performance of supercompacted debris wastes from the Advanced Mixed Waste Treatment Project (AMWTP) (DOE 2002). The impact assessment began with a review of features, events, and processes (FEPs) associated with the waste. The review concluded that the FEPs addressed in PA were adequate for supercompacted debris wastes, but that an impact assessment should be conducted to examine any effects on repository performance due to the supercompacted debris waste. Accordingly, DOE used reasoned arguments to prepare an impact assessment for supercompacted debris waste. EPA found the reasoned arguments inadequate and requested additional information and technical analyses in order to more fully assess the effects of the AMWTP waste on repository performance. (EPA 2003)

AP-107 (Hansen et al. 2003) describes the analyses that Sandia National Laboratories (SNL) will conduct in response to EPA's request. These analyses are designed to determine the effects on PA results of the emplacement of supercompacted debris wastes. In the course of these analyses, SNL will address a broader question, namely, what is the effect on PA results of assumptions about waste heterogeneity. The results of these analyses will be documented in analysis packages and included in the CRA, if appropriate.

This analysis supports Task 2 of AP-107. Task 2 explores the potential chemical conditions in the repository given that waste from the generator sites will not be placed homogeneously throughout the repository. Specifically, this analysis provides information about possible loadings of cellulosics, plastics and rubbers in a single panel of the repository. This analysis was performed in accordance with the SNL Quality Assurance Program and was prepared as prescribed by the SNL NWMP Procedure, NP 9-1, *Analyses*.

1.1 ACRONYMS

AP	Analysis Plan
AMWTP	Advanced Mixed Waste Treatment Program
AMWTF	Advanced Mixed Waste Treatment Facility
CFR	Code of Federal Regulations
CCA	Compliance Certification Application
CRA	Compliance Recertification Application
CH	contact handled

DOE	Department of Energy
ERMS	Electronic Records Management System
EPA	Environmental Protection Agency
FEP	feature, event or process
INEEL	Idaho Engineering and Environmental Laboratories
LANL	Los Alamos National Laboratory
NP	NWMP procedure
NWMP	Nuclear Waste Management Program
PA	performance assessment
RH	remote handled
RFETS	Rocky Flats Environmental Technology Site
SNL	Sandia National Laboratory
SWB	standard waste box
TP	technical procedure
TDOP	ten-drum overpack
TRU	transuranic
WIPP	Waste Isolation Pilot Plant

1.2 DEFINITIONS

Disposal Inventory – The inventory volume defined for WIPP emplacement to be used for PA calculations is the "disposal inventory." The LWA defines the total amount of TRU waste allowed in the WIPP as 6,200,000 cubic feet (approximately 175,540 cubic meters) (Public Law, 1992). The "Agreement for Consultation and Cooperation" (C&C Agreement) limits the RH-TRU inventory to 250,000 cubic feet (approximately 7,079 cubic meters) (DOE and State of New Mexico, 1981). Therefore by difference, the CH-TRU inventory is limited to 5,950,000 cubic feet (approximately 168,480 cubic meters).

Waste Mix - all waste from sites other than INEEL which is assumed to be in 55-gallon drums for the purposes of this calculation plus all 55-gallon drums from INEEL.

Panel X - Panel X is defined as a panel in the WIPP repository that is preferentially loaded with supercompacted debris waste from the Idaho National Environmental and Engineering Laboratory Advanced Mixed Waste Treatment Facility (INEEL AMWTF).

Waste - This calculation refers only to contact-handled (CH) waste. All references made below to "waste" are for CH waste and do not include remote-handled (RH) waste.

1.3 SYMBOLS

$(m_{cellulosics})_{100\text{-Gallon Drums}}$	Mass of cellulosics in a 100-gallon drum in Panel X (kg)
$(m_{plastics})_{100\text{-Gallon Drums}}$	Mass of plastics waste material in a 100-gallon drum in Panel X (kg)
$(m_{rubbers})_{100\text{-Gallon Drums}}$	Mass of rubbers in a 100-gallon drum in Panel X (kg)
$(m_{pkgplastics})_{100\text{-Gallon Drums}}$	Mass of plastics packaging material in a 100-gallon drum in Panel X (kg)

$(m_{cellulosics})_{TDOPs}$	Mass of cellulosics in a TDOP in Panel X (kg)
$(m_{plastics})_{TDOPs}$	Mass of plastics waste material in a TDOP in Panel X (kg)
$(m_{rubbers})_{TDOPs}$	Mass of rubbers in a TDOP in Panel X (kg)
$(m_{pkgplastics})_{TDOPs}$	Mass of plastics packaging material in a TDOP in Panel X (kg)
$(m_{cellulosics})_{SWBs}$	Mass of cellulosics in a SWB in Panel X (kg)
$(m_{plastics})_{SWBs}$	Mass of plastics waste material in a SWB in Panel X (kg)
$(m_{rubbers})_{SWBs}$	Mass of rubbers in a SWB in Panel X (kg)
$(m_{pkgplastics})_{SWBs}$	Mass of plastics packaging material in a SWB in Panel X (kg)
$(m_{cellulosics})_{Drums}$	Mass of cellulosics in a 55-gallon drum in Panel X (kg)
$(m_{plastics})_{Drums}$	Mass of plastics waste material in a 55-gallon drum in Panel X (kg)
$(m_{rubbers})_{Drums}$	Mass of rubbers in a 55-gallon drum in Panel X (kg)
$(m_{pkgplastics})_{Drums}$	Mass of plastics packaging material in a 55-gallon drum in Panel X (kg)
$(\rho_{cellulosics})_{100\text{-Gallon Drums}}$	Density of cellulosics in a 100-gallon drum in Panel X (kg/m^3)
$(\rho_{plastics})_{100\text{-Gallon Drums}}$	Density of plastics waste material in a 100-gallon drum in Panel X (kg/m^3)
$(\rho_{rubbers})_{100\text{-Gallon Drums}}$	Density of rubbers in a 100-gallon drum in Panel X (kg/m^3)
$(\rho_{pkgplastics})_{100\text{-Gallon Drums}}$	Density of plastics packaging in a 100-gallon drum in Panel X (kg/m^3)
$(\rho_{cellulosics})_{TDOPs}$	Density of cellulosics in a TDOP in Panel X (kg/m^3)
$(\rho_{plastics})_{TDOPs}$	Density of plastics waste material in a TDOP in Panel X (kg/m^3)
$(\rho_{rubbers})_{TDOPs}$	Density of rubbers in a TDOP in Panel X (kg/m^3)
$(\rho_{pkgplastics})_{TDOPs}$	Density of plastics packaging material in a TDOP in Panel X (kg/m^3)
$(\rho_{cellulosics})_{SWBs}$	Density of cellulosics in a SWB in Panel X (kg/m^3)
$(\rho_{plastics})_{SWBs}$	Density of plastics waste material in a SWB in Panel X (kg/m^3)
$(\rho_{rubbers})_{SWBs}$	Density of rubbers in a SWB in Panel X (kg/m^3)
$(\rho_{pkgplastics})_{SWBs}$	Density of plastics packaging material in a SWB in Panel X (kg/m^3)
$(\rho_{cellulosics})_{Drums}$	Density of cellulosics in a 55-gallon drum in Panel X (kg/m^3)
$(\rho_{plastics})_{Drums}$	Density of plastics waste material in a 55-gallon drum in Panel X (kg/m^3)
$(\rho_{rubbers})_{Drums}$	Density of rubbers in a 55-gallon drum in Panel X (kg/m^3)
$(\rho_{pkgplastics})_{Drums}$	Density of plastics packaging material in a 55-gallon drum in Panel X (kg/m^3)

2. PROBLEM DESCRIPTION

As part of the work being performed in support of AP-107, SNL will be conducting a performance assessment that models the WIPP repository with one panel preferentially loaded with supercompacted debris waste from the Idaho National Engineering and Environmental Laboratory Advanced Mixed Waste Treatment Facility (INEEL AMWTF). Throughout the remainder of this document, this panel will be referred to as Panel X. The rest of the repository will be modeled using a homogeneous emplacement assumption (i.e., waste that is not in Panel X is distributed evenly throughout the rest of the repository).

In order to conduct this performance assessment, SNL needs to know the masses of cellulosics, plastics, and rubbers in the panel that is preferentially loaded with INEEL supercompacted debris waste (Panel X) and the mass of cellulosics, plastics, and rubbers that is in the rest of the repository.

3. ANALYSIS

Calculation of the mass of cellulosics, plastics, and rubbers in Panel X depends on the assumptions one makes about the loading of waste in Panel X. In this calculation, two loading assumptions are examined. The first loading assumption is a realistic assumption and the second assumption is a conservative assumption. They are discussed in Section 3.1.

Once the loading of waste in Panel X has been assumed, the mass of cellulosics, plastics, and rubbers can be calculated from waste material densities reported by the TRU waste generator sites in the LANL (2003). The waste material densities are discussed in Section 3.2. Section 3.3 shows the calculation of the masses of cellulosics, plastics, and rubbers in Panel X. Section 3.4 shows the calculation of the masses of cellulosics, plastics, and rubbers in the rest of the repository.

3.1 WASTE LOADING ASSUMPTIONS FOR PANEL X

3.1.1 The Realistic Case

The realistic case for loading supercompacted debris waste in a panel has been defined by using an analogy to the loading that has taken place in Panel 1. Panel 1 is an example of a panel that has been loaded with waste from a number of different waste streams. The largest waste stream present in Panel 1 is the RF 118.01 – "Incinerator Ash and Process Residue" waste stream from RFETS (see Attachment A for Panel 1 data). This waste stream occupies 13.5% of Panel 1 by waste volume.

If for Panel X an analogy is made between the RF 118.01 in Panel 1 and IN-BN-510 (the supercompacted debris waste stream from the INEEL AMWTF) in Panel X, one would assume that waste from IN-BN-510 would occupy 13.5% by waste volume of Panel X. The other INEEL waste streams would also occupy space in Panel X in the ratios that they exist at INEEL which are represented here in terms of container type ratios. INEEL has a number of container types that they are and will be shipping to WIPP including: 100-gallon drums filled with supercompacted debris waste from the AMWTF, TDOPs and SWBs filled with uncompacted, uncompacted nondebris waste from the AMWTF, and SWBs and 55-gallon drums filled with waste that will be shipped to WIPP without processing in the AMWTF. Mathematically, this analogy can be formulated as shown in the following algebraic equation:

$$(0.379e)/(0.208a + 4.79b + 1.89c + 0.208d + 0.379e) = 0.135 \qquad (1)$$

where a is the number of 55-gallon drums (0.208 m^3 each) from other sites in Panel X, b is the number of TDOPs (4.79 m^3 each) in Panel X (assume all from INEEL), c is the number of SWBs (1.89 m^3 each) in Panel X (assume all from INEEL), d is the number of 55-gallon drums (.208 m^3 each) from INEEL in Panel X, and e is the number of 100-gallon drums (0.379 m^3 each) in Panel X (assume all from INEEL). Container volumes are given in NRC (2003) and DOE (1995).

Of these container types, INEEL is planning to ship 52,440 100-gallon drums (Leigh and Lott 2003a), 7138 TDOPs (Leigh and Lott 2003b), 3573 SWBs (Leigh and Lott 2003b; Fox and Lott 2003), and 650 55-gallon drums (LANL 2003) to WIPP. Therefore, the percentages of INEEL containers that can be expected in Panel X are: 82% 100-gallon drums, 11% TDOPs, 6% SWBs and 1% 55-gallon drums. Mathematically, this analogy can be formulated as shown in the following algebraic equations:

$$e/(b+c+d+e) = 0.82 \quad (2)$$

$$b/(b+c+d+e) = 0.11 \quad (3)$$

$$c/(b+c+d+e) = 0.06 \quad (4)$$

Finally, the number of containers that can be placed in a panel depends on the "footprint" of the containers in a panel. The Technical Procedure (TP) for CH waste processing at WIPP (WRES 2002) indicates that a seven pack of 55-gallon drums, a three pack of 100-gallon drums, an SWB, and 1/3 of a TDOP (one TDOP takes up the space allocated for 3 seven-packs of 55-gallon drums) are equivalent when placed in the repository. In addition, for the purposes of performance assessment, a panel accommodates 17,591.4 m^3 of CH waste (Lappin et al 1989) which is equivalent to 84,574 55-gallon drums or 12,082 seven–packs of 55-gallon drums. Mathematically, a panel filled with 100-gallon drums, TDOPs, SWBs, and 55-gallon drums (some from INEEL and some from other sites) can be formulated as shown in Equation 5.

$$a/7 + 3b + c + d/7 + e/3 = 12{,}082 \quad (5)$$

Solving Equations 1 through 5 for the values of a, b, c, d, and e indicates that:

a = 49,285 55-gallon drums from other sites

b = 834 TDOPs from INEEL

c = 455 SWBs from INEEL

d = 76 55-gallon drums from INEEL

e = 6,219 100-gallon drums from INEEL

This is the loading of Panel X for the realistic case.

3.1.2 The Conservative Case

The conservative case for loading supercompacted debris waste in a panel has been defined by using an analogy to the loading that has taken place in Panel 1. Panel 1 is an example of a panel that has been preferentially loaded with waste from one site, the Rocky Flats Environmental Technology Site (RFETS). Since the opening of WIPP, RFETS has been steadily processing their waste, sending it to WIPP in order to fulfill their goal of closing RFETS in 2006. As a result, 54% of the containers in Panel 1 were shipped to WIPP from RFETS (see Attachment A for Panel 1 data).

If for Panel X an analogy is made between the RFETS waste in Panel 1 and the INEEL waste in Panel X, one would assume that 54% of the containers in Panel X would originate from INEEL. INEEL has a number of container types that they are and will be shipping to WIPP including: 100-gallon drums filled with supercompacted debris waste from the AMWTF, TDOPs and

SWBs filled with uncompacted nondebris waste from the AMWTF, and SWBs and 55-gallon drums filled with waste that will be shipped to WIPP without processing in the AMWTF. Mathematically, this analogy can be formulated as shown in the following algebraic equation:

$$(b+ c+ d +e)/(a+b+c+d+e) = 0.54 \qquad (6)$$

where a is the number of 55-gallon drums from other sites in Panel X, b is the number of TDOPs in Panel X (assume all from INEEL), c is the number of SWBs in Panel X (assume all from INEEL), d is the number of 55-gallon drums from INEEL in Panel X, and e is the number of 100-gallon drums in Panel X (assume all from INEEL).

Of these container types, INEEL is planning to ship 52,440 100-gallon drums (Leigh and Lott 2003a), 7138 TDOPs (Leigh and Lott 2003b), 3573 SWBs (Leigh and Lott 2003b; Fox and Lott 2003), and 650 55-gallon drums (LANL 2003) to WIPP. Therefore, the percentages of INEEL containers that can be expected in Panel X are: 82% 100-gallon drums, 11% TDOPs, 6% SWBs and 1% 55-gallon drums. Mathematically, this analogy can be formulated as shown in the following algebraic equations:

$$e/(b+c+d+e) = 0.82 \qquad (7)$$

$$b/(b+c+d+e) = 0.11 \qquad (8)$$

$$c/(b+c+d+e) = 0.06 \qquad (9)$$

Finally, the number of containers that can be placed in a panel depends on the "footprint" of the containers in a panel. The Technical Procedure (TP) for CH waste processing at WIPP (WRES 2002) indicates that a seven pack of 55-gallon drums, a three pack of 100-gallon drums, an SWB, and 1/3 of a TDOP (one TDOP takes up the space allocated for 3 seven-packs of 55-gallon drums) are equivalent when placed in the repository. In addition, for the purposes of performance assessment, a panel accommodates 17,591.4 m^3 of CH waste (Lappin et al 1989) which is equivalent to 84,574 55-gallon drums or 12,082 seven–packs of 55-gallon drums. Mathematically, a panel filled with 100-gallon drums, TDOPs, SWBs, and 55-gallon drums (some from INEEL and some from other sites) can be formulated as shown in Equation 10.

$$a/7 + 3b + c + d/7 + e/3 = 12{,}082 \qquad (10)$$

Solving Equations 1 through 5 for the values of a, b, c, d, and e indicates that:

a = 13,054 55-gallon drums from other sites

b = 1,691 TDOPs from INEEL

c = 922 SWBs from INEEL

d = 154 55-gallon drums from INEEL

e = 12,603 100-gallon drums from INEEL

This is the loading of Panel X for the conservative case.

3.2 CONCENTRATIONS OF CELLULOSICS, PLASTICS, AND RUBBERS

3.2.1 Cellulosics, Plastics and Rubbers in 100-Gallon drums from INEEL

The 100-gallon drums that are coming from INEEL will contain supercompacted debris waste that has been identified as waste stream IN-BN-510. The concentrations of cellulosics, plastics, and rubbers have been calculated for this waste stream in Leigh and Lott (2003a). The values are:

$(\rho_{cellulosics})_{100\text{-Gallon Drum}} = 302.67 \text{ kg/m}^3$

$(\rho_{plastics})_{100\text{-Gallon Drum}} = 204.54 \text{ kg/m}^3$

$(\rho_{rubbers})_{100\text{-Gallon Drum}} = 79.91 \text{ kg/m}^3$

$(\rho_{pkgplastics})_{100\text{-Gallon Drum}} = 0.00 \text{ kg/m}^3$

Since the volume of a 100-gallon drum is 0.379 m^3, each 100-gallon drum contains:

$(m_{cellulosics})_{100\text{-Gallon Drum}} = 302.67 \times 0.379 = 114.71$ kg/container

$(m_{plastics})_{100\text{-Gallon Drum}} = 204.54 \times 0.379 = 77.52$ kg/container

$(m_{rubbers})_{100\text{-Gallon Drum}} = 79.91 \times 0.370 = 30.29$ kg/container

$(m_{pkgplastics})_{100\text{-Gallon Drum}} = 0.00 \times 0.370 = 0.00$ kg/container

3.2.2 Cellulosics, Plastics and Rubbers in TDOPs from INEEL

The TDOPs that are coming from INEEL will contain uncompacted nondebris waste from the AMWTF. The concentrations of cellulosics, plastics, and rubbers have been calculated for these waste streams in Leigh and Lott (2003b). Table 1 shows the uncompacted nondebris AMWTF waste streams, the number of TDOPs per waste stream, the volume in TDOPs for each waste stream, the density of cellulosics, plastics, and rubbers in each waste stream, and the masses of cellulosics, plastics, and rubbers in each waste stream. The total mass of cellulosics in TDOPs for all of the waste streams is 9.18×10^4 kg. The total mass of plastics in TDOPs for all of the waste streams is 1.21×10^5 kg. The total mass of rubbers in TDOPs in all of the waste streams is 3.16×10^2 kg. Since the total volume in TDOPs for these waste streams is 3.42×10^4 m^3, the density of cellulosics, plastics and rubbers in a TDOP from INEEL is:

$(\rho_{cellulosics})_{TDOP} = 9.18 \times 10^4 \text{ kg} / 3.42 \times 10^4 \text{ m}^3 = 2.68 \text{ kg/m}^3$

$(\rho_{plastics})_{TDOP} = 1.21 \times 10^5 \text{ kg} / 3.42 \times 10^4 \text{ m}^3 = 3.55 \text{ kg/m}^3$

$(\rho_{rubbers})_{TDOP} = 3.16 \times 10^2 \text{ kg} / 3.42 \times 10^4 \text{ m}^3 = 0.01 \text{ kg/m}^3$

$(\rho_{pkgplastics})_{TDOP} = 6.53 \times 10^5 \text{ kg} / 3.42 \times 10^4 \text{ m}^3 = 19.11 \text{ kg/m}^3$

Since the volume of a TDOP is 4.79 m^3, the mass of cellulosics, plastics and rubbers in a TDOP is:

$(m_{cellulosics})_{TDOP} = 2.68 \times 4.79 = 12.86$ kg/container

$(m_{plastics})_{TDOP} = 3.55 \times 4.79 = 16.99$ kg/container

$(m_{rubbers})_{TDOP} = 0.01 \times 4.79 = 0.04$ kg/container

$(m_{pkgplastics})_{TDOP} = 19.11 \times 4.79 = 91.55$ kg/container

3.2.3 Cellulosics, Plastics and Rubbers in SWBs from INEEL

The SWBs that are coming from INEEL will mostly contain uncompacted nondebris waste from the AMWTF although some SWBs will contain waste that does not need to be processed in the AMWTF. The concentrations of cellulosics, plastics, and rubbers have been calculated for the waste streams that will be shipped in SWBs in Leigh and Lott (2003b) and Fox and Lott (2003). Table 2 shows these waste streams, the number of SWBs per waste stream, the volume in SWBs of each waste stream, the density of cellulosics, plastics, and rubbers in each waste stream, and the masses of cellulosics, plastics, and rubbers in SWBs for each waste stream. The total mass of cellulosics in SWBs for all of the waste streams is 1.85×10^4 kg. The total mass of plastics in SWBs for all of the waste streams is 2.40×10^4 kg. The total mass of rubbers in SWBs in all of the waste streams is 6.83×10^1 kg. Since the total volume in SWBs for these waste streams is 6.75×10^3 m^3, the density of cellulosics, plastics and rubbers in a SWB from INEEL is:

$(\rho_{cellulosics})_{SWB} = 1.85 \times 10^4 \text{ kg} / 6.75 \times 10^3 \text{ m}^3 = 2.73 \text{ kg/m}^3$

$(\rho_{plastics})_{SWB} = 2.40 \times 10^4 \text{ kg} / 6.75 \times 10^3 \text{ m}^3 = 3.56 \text{ kg/m}^3$

$(\rho_{rubbers})_{SWB} = 6.83 \times 10^1 \text{ kg} / 6.75 \times 10^3 \text{ m}^3 = 0.01 \text{ kg/m}^3$

$(\rho_{pkgplastics})_{SWB} = 16 \text{ kg/m}^3$ (Leigh and Lott 2003b indicates that all SWBs have this density)

Table 1. Calculation of Cellulosics, Plastics and Rubbers Masses for INEEL Waste in TDOPs

Waste Stream ID	Number of TDOPs[a]	Volume of Waste in TDOPs[a]	Density of Cellulosics (kg/m^3)[a]	Density of Plastics (kg/m^3)[a]	Density of Rubbers (kg/m^3)[a]	Density of Plastics Packaging (kg/m^3)[a]	Mass of Cellulosics (kg)[b]	Mass of Plastics(kg)[c]	Mass of Rubbers (kg)[d]	Mass of Plastics Packaging (kg)[e]
IN-W157.144	130	6.23×10^{2}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	1.47×10^{4}
IN-W163.1007	2	9.58×10^{0}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	2.27×10^{2}
IN-W164.153	1	4.79×10^{0}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	1.13×10^{2}
IN-W167.149	67	3.21×10^{2}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	7.60×10^{3}
IN-W174.154	75	3.59×10^{2}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	8.50×10^{3}
IN-W177.156	140	6.71×10^{2}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	1.59×10^{4}
IN-W179.158	348	1.67×10^{3}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	3.95×10^{4}
IN-W181.162	14	6.71×10^{1}	30.25	8.18	0.00	32.13	2.03×10^{3}	5.49×10^{2}	0.00	2.16×10^{3}
IN-W188.160	26	1.25×10^{2}	6.62	4.10	0.00	23.67	8.24×10^{2}	5.10×10^{2}	0.00	2.96×10^{3}
IN-W216.98	2222	1.06×10^{4}	0.00	6.00	0.00	23.67	0.00	6.38×10^{4}	0.00	2.51×10^{5}
IN-W218.909	363	1.74×10^{3}	0.00	6.00	0.00	23.67	0.00	1.04×10^{4}	0.00	4.12×10^{4}
IN-W220.114	330	1.58×10^{3}	0.00	6.00	0.00	23.67	0.00	9.48×10^{3}	0.00	3.74×10^{4}
IN-W221.927	7	3.35×10^{1}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	7.93×10^{2}
IN-W222.116	45	2.16×10^{2}	0.26	26.56	0.00	23.67	5.65×10^{1}	5.72×10^{3}	0.00	5.11×10^{3}
IN-W228.101	1406	6.73×10^{3}	0.10	1.99	0.00	23.67	6.88×10^{2}	1.34×10^{4}	0.00	1.59×10^{5}
IN-W240.931	69	3.31×10^{2}	191.07	0.70	0.00	23.67	6.31×10^{4}	2.30×10^{2}	0.00	7.83×10^{3}
IN-W243.808	135	6.47×10^{2}	0.00	14.37	0.48	16.07	0.00	9.29×10^{3}	3.13×10^{2}	1.04×10^{4}
IN-W245.301	131	6.27×10^{2}	14.49	5.06	0.00	23.67	9.09×10^{3}	3.17×10^{3}	0.00	1.48×10^{4}
IN-W247.810	133	6.37×10^{2}	15.05	6.57	0.00	23.67	9.59×10^{3}	4.19×10^{3}	0.00	1.51×10^{4}
IN-W249.527	1	4.79×10^{0}	0.00	20.30	0.68	23.67	0.00	9.72×10^{1}	3.28×10^{0}	1.13×10^{2}
IN-W263.520	49	2.35×10^{2}	16.82	0.00	0.00	32.13	3.95×10^{3}	0.00	0.00	7.55×10^{3}
IN-W267.1005	2	9.58×10^{0}	4.44	6.03	0.00	23.45	4.25×10^{1}	5.77×10^{1}	0.00	2.25×10^{2}
IN-W309.609	1348	6.46×10^{3}	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00
IN-W315.601	6	2.87×10^{1}	69.92	0.53	0.00	23.45	2.01×10^{3}	1.53×10^{1}	0.00	6.73×10^{2}
IN-W319.584	1	4.79×10^{0}	0.00	8.15	0.00	0	0.00	3.90×10^{1}	0.00	0.00
IN-W321.1023	2	9.58×10^{0}	0.00	14.54	0.00	0	0.00	1.39×10^{2}	0.00	0.00
IN-W332.661	1	4.79×10^{0}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	1.13×10^{2}
IN-W347.818	27	1.29×10^{2}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	3.05×10^{3}
IN-W348.1012	4	1.92×10^{1}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	4.54×10^{2}
IN-W357.1022	1	4.79×10^{0}	5.03	0.78	0.00	23.45	2.41×10^{1}	3.76×10^{0}	0.00	1.12×10^{2}
IN-W361.1021	2	9.58×10^{0}	5.84	0.91	0.00	23.45	5.60×10^{1}	8.73×10^{0}	0.00	2.25×10^{2}
IN-W362.1020	8	3.83×10^{1}	6.01	0.94	0.00	23.45	2.30×10^{2}	3.59×10^{1}	0.00	8.98×10^{2}
IN-W363.1019	1	4.79×10^{0}	6.73	1.05	0.00	23.45	3.22×10^{1}	5.03×10^{0}	0.00	1.12×10^{2}
IN-W364.1011	1	4.79×10^{0}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	1.13×10^{2}
IN-W365.1010	2	9.58×10^{0}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	2.27×10^{2}
IN-W366.841	3	1.44×10^{1}	0.00	0.00	0.00	23.67	0.00	0.00	0.00	3.41×10^{2}
IN-W375.1096	35	1.68×10^{2}	0.00	0.00	0.00	23.45	0.00	0.00	0.00	3.94×10^{3}
Total	---	3.42×10^{4}	---	---	---	---	9.18×10^{4}	1.21×10^{5}	3.14×10^{2}	6.53×10^{5}

[a]From Leigh and Lott 2003b; [b]Calculated as the volume in Column 3 times the density in Column 4; [c]Calculated as the volume in Column 3 times the density in Column 5; [d]Calculated as the volume in Column 3 times the density in Column 6; [e]Calculated as the volume in Column 3 times the density in Column 7.

Since the volume of a SWB is 1.89 m^3, the mass of cellulosics, plastics and rubbers in a SWB is:

$(m_{cellulosics})_{SWB} = 2.73 \times 1.89 = 5.17$ kg/container

$(m_{plastics})_{SWB} = 3.56 \times 1.89 = 6.72$ kg/container

$(m_{rubbers})_{SWB} = 0.01 \times 1.89 = 0.02$ kg/container

$(m_{pkgplastics})_{SWB} = 16.00 \times 1.89 = 30.24$ kg/container

3.2.4 Cellulosics, Plastics and Rubbers in 55-Gallon Drums from INEEL

For the purposes of this calculation, the 55-gallon drums from INEEL will be grouped with the waste from the other sites. The mass of cellulosics, plastics, and rubbers per drum is calculated in Section 3.2.5.

3.2.5 Cellulosics, Plastics and Rubbers in 55-Gallon Drums from Other Sites

For the purposes of this calculation it is assumed that the waste from other sites that will be placed in Panel X will be in 55-gallon drums and will have the average waste characteristics of a mix of waste from the other sites plus the waste in 55-gallon drums from INEEL.

The concentrations of cellulosics, plastics, and rubbers have been calculated for a mix of all waste coming to (and emplaced in) WIPP and reported in Lott (2003). The average density of cellulosics in all CH waste is 58 kg/m^3 (Lott 2003). The average density of plastics in all CH waste is 42 kg/m^3 (Lott 2003). The average density of rubbers in CH waste is 14 kg/m^3 (Lott 2003). The average density of plastics packaging in all CH waste is 16 kg/m^3. These values are for all waste at all of the sites. In order to determine the average concentration of cellulosics, plastics, and rubbers in a mix of waste that excludes the 100-gallon drums, TDOPs and SWBs from INEEL, the mass of cellulosics, plastics, and rubbers from 100-gallon drums, TDOPs and SWBs at INEEL must be subtracted from the values reported in Lott 2003. Table 3 shows this calculation.

Table 2. Calculation of Cellulosics, Plastics and Rubbers Masses for INEEL Waste in SWBs

Waste Stream ID	Number of SWBs	Volume of Waste in SWBs (m^3)	Density of Cellulosics (kg/m^3)[a]	Density of Plastics (kg/m^3)[a]	Density of Rubbers (kg/m^3)[a]	Mass of Cellulosics (kg)[b]	Mass of Plastics(kg)[c]	Mass of Rubbers (kg)[d]
IN-W157.144	65	1.23×10^2	0.00	0.00	0.00	0.00	0.00	0.00
IN-W163.1007	1	1.89×10^0	0.00	0.00	0.00	0.00	0.00	0.00
IN-W167.149	33	6.24×10^1	0.00	0.00	0.00	0.00	0.00	0.00
IN-W174.154	38	7.18×10^1	0.00	0.00	0.00	0.00	0.00	0.00
IN-W177.156	70	1.32×10^2	0.00	0.00	0.00	0.00	0.00	0.00
IN-W179.158	174	3.29×10^2	0.00	0.00	0.00	0.00	0.00	0.00
IN-W181.162	7	1.32×10^1	30.25	8.18	0.00	3.99×10^2	1.08×10^2	0.00
IN-W188.160	13	2.46×10^1	6.62	4.10	0.00	1.63×10^2	1.01×10^2	0.00

Table 2. Calculation of Cellulosics, Plastics and Rubbers Masses for INEEL Waste in SWBs (continued)

Waste Stream ID	Number of SWBs	Volume of Waste in SWBs (m^3)	Density of Cellulosics (kg/m^3)[a]	Density of Plastics (kg/m^3)[a]	Density of Rubbers (kg/m^3)[a]	Mass of Cellulosics (kg)[b]	Mass of Plastics(kg)[c]	Mass of Rubbers (kg)[d]
IN-W216.98	1111	2.10×10^3	0.00	6.00	0.00	0.00	1.26×10^4	0.00
IN-W218.909	182	3.44×10^2	0.00	6.00	0.00	0.00	2.06×10^3	0.00
IN-W220.114	165	3.12×10^2	0.00	6.00	0.00	0.00	1.87×10^3	0.00
IN-W221.927	3	5.67×10^0	0.00	0.00	0.00	0.00	0.00	0.00
IN-W222.116	23	4.35×10^1	0.26	26.56	0.00	1.13×10^1	1.16×10^3	0.00
IN-W228.101	703	1.33×10^3	0.10	1.99	0.00	1.33×10^2	2.65×10^3	0.00
IN-W240.931	35	6.62×10^1	191.07	0.70	0.00	1.26×10^4	4.63×10^1	0.00
IN-W243.808	67	1.27×10^2	0.00	14.37	0.48	0.00	1.82×10^3	6.10×10^1
IN-W245.301	66	1.25×10^2	14.49	5.06	0.00	1.81×10^3	6.33×10^2	0.00
IN-W247.810	66	1.25×10^2	15.05	6.57	0.00	1.88×10^3	8.21×10^2	0.00
IN-W249.527	1	1.89×10^0	0.00	20.30	0.68	0.00	3.84×10^1	1.29×10^0
IN-W263.520	24	4.54×10^1	16.82	0.00	0.00	7.64×10^2	0.00	0.00
IN-W267.1005	1	1.89×10^0	4.44	6.03	0.00	8.39×10^0	1.14×10^1	0.00
IN-W309.609	674	1.27×10^3	0.00	0.00	0.00	0.00	0.00	0.00
IN-W315.601	3	5.67×10^0	69.92	0.53	0.00	3.96×10^2	3.01×10^0	0.00
IN-W321.1023	1	1.89×10^0	0.00	14.54	0.00	0.00	2.75×10^1	0.00
IN-W347.818	13	2.46×10^1	0.00	0.00	0.00	0.00	0.00	0.00
IN-W348.1012	2	3.78×10^0	0.00	0.00	0.00	0.00	0.00	0.00
IN-W361.1021	1	1.89×10^0	5.84	0.91	0.00	1.10×10^1	1.72×10^0	0.00
IN-W362.1020	4	7.56×10^0	6.01	0.94	0.00	4.54×10^1	7.11×10^0	0.00
IN-W365.1010	1	1.89×10^0	0.00	0.00	0.00	0.00	0.00	0.00
IN-W366.841	1	1.89×10^0	0.00	0.00	0.00	0.00	0.00	0.00
IN-W375.1096	17	3.21×10^1	0.00	0.00	0.00	0.00	0.00	0.00
IN-W219.914	1	1.89×10^0	5.02	3.11	0	9.49×10^0	5.88×10^0	0.00
IN-W322.851	1	1.89×10^0	0	0	0	0.00	0.00	0.00
IN-W323.562	1	1.89×10^0	70.39	7.03	0.79	1.33×10^2	1.33×10^1	1.49×10^0
IN-W337.957	1	1.89×10^0	0	0	0	0.00	0.00	0.00
IN-W341.954	1	1.89×10^0	0	0	0	0.00	0.00	0.00
IN-W342.652	1	1.89×10^0	0	0	0	0.00	0.00	0.00
IN-W358.854	1	1.89×10^0	26.71	21.43	2.41	5.05×10^1	4.05×10^1	4.55×10^0
IN-W372.832	1	1.89×10^0	0	0	0	0.00	0.00	0.00
Total	3573	6.75×10^3	---	---	---	1.85×10^4	2.40×10^4	6.83×10^1

[a]From Leigh and Lott 2003b and Fox and Lott 2003; [b]Calculated as the volume in Column 3 times the density in Column 4; [c]Calculated as the volume in Column 3 times the density in Column 5; [d]Calculated as the volume in Column 3 times the density in Column 6.

Table 3. Calculation of Cellulosics, Plastics, and Rubbers Masses in the Waste Mix[j]

	Volume (m^3)	Mass of Cellulosics (kg)	Mass of Plastics (kg)[b]	Mass of Rubbers (kg)	Mass of Plastics Packaging (kg)[d]
All DOE Generator/Storage Sites	1.69×10^5	[a]9.77×10^6	[b] 7.08×10^6	[c] 2.36×10^6	[d]2.70×10^6
100-gallon drums with Supercompacted Debris Waste from the AMWTF	[e]1.99×10^4	[f]6.02×10^6	[g]4.07×10^6	[h]1.59×10^6	0.00
TDOPs with Nondebris Waste from the AMWTF (from Table 1 Section 3.2.2)	3.42×10^4	9.18×10^4	1.21×10^5	3.14×10^2	6.53×10^5
All SWBs from INEEL (from Section 3.2.3)	6.75×10^3	1.85×10^4	2.40×10^4	6.83×10^1	[i]1.08×10^5
55-gallon drums From INEEL and Waste From All Other Sites	1.08×10^5	3.64×10^6	2.87×10^6	7.70×10^5	1.94×10^6

[a]Calculated as 58 kg/m^3 times 168,480 m^3; [b]Calculated as 42 kg/m^3 times 168,480 m^3; [c]Calculated as 14 kg/m^3 times 168,480 m^3; [d]Calculated as 16 kg/m^3 times 168,480 m^3; [e]Calculated as 52,440 drums times 0.379 m^3; [f]Calculated as 52,440 drums times 114.71 kg/container; [g]Calculated as 52,440 drums times 77.52 kg/container; [h]Calculated as 52,440 drums times 30.29 kg/container; [i]Calculated as 3573 SWBS times 30.24 kg/container; [j]all waste from sites other than INEEL which is assumed to be in 55-gallon drums for the purposes of this calculation plus all 55-gallon drums from INEEL.

Table 3 shows the masses of cellulosics, plastics, and rubbers for five categories of waste: all of the CH waste expected to be emplaced (or already emplaced) in the repository, the supercompacted debris waste that is expected to come to WIPP from the AMWTF (in 100-gallon drums), the uncompacted nondebris waste expected to come to WIPP from the AMWTF (in TDOPs), the INEEL waste expected to come to WIPP in SWBs, and the waste mix (all waste from sites other than INEEL plus all 55-gallon drums from INEEL).

The masses of cellulosics, plastics, and rubbers for the waste mix are calculated by subtracting the INEEL 100-gallon drum (Row 3 in Table 3), TDOP (Row 4 in Table 3), and SWB (Row 5 in Table 3) masses of cellulosics, plastics, or rubbers from the total CH waste masses in Row 1 of Table 3.

Therefore the density of cellulosics, plastics and rubbers in the waste mix is:

$$(p_{cellulosics})_{Drums} = 3.64 \times 10^6 \text{ kg} / 1.08 \times 10^5 \text{ m}^3 = 33.65 \text{ kg/m}^3$$

$$(p_{plastics})_{Drums} = 2.87 \times 10^6 \text{ kg} / 1.08 \times 10^5 \text{ m}^3 = 26.49 \text{ kg/m}^3$$

$$(p_{rubbers})_{Drums} = 7.70 \times 10^5 \text{ kg} / 1.08 \times 10^5 \text{ m}^3 = 7.12 \text{ kg/m}^3$$

$$(p_{pkgplastics})_{Drums} = 1.94 \times 10^6 \text{ kg} / 1.08 \times 10^5 \text{ m}^3 = 17.93 \text{ kg/m}^3$$

Since the volume of a 55-gallon drum is 0.208 m^3, the mass of cellulosics, plastics and rubbers in a 55-gallon drum filled with the waste mix is:

$$(m_{cellulosics})_{Drums} = 33.87 \times 0.208 = 7.00 \text{ kg}$$

$$(m_{plastics})_{Drums} = 26.63 \times 0.208 = 5.51 \text{ kg}$$

$(m_{rubbers})_{Drums} = 7.16 \times 0.208 = 1.48$ kg

$(m_{pkgplastics})_{Drums} = 17.93 \times 0.208 = 3.73$ kg

3.3 MASS OF CELLULOSICS, PLASTICS, AND RUBBERS IN PANEL X

Given the number of containers calculated for Panel X in Section 3.1 and the density of cellulosics, plastics, and rubbers in each container type calculated in Section 3.2, the mass of cellulosics, plastics, and rubbers in Panel X can be calculated.

3.3.1 The Realistic Case

Table 4 shows the calculation of masses of cellulosics, plastics, and rubbers in Panel X for the realistic case.

3.3.2 The Conservative Case

Table 5 shows the calculation of the masses of cellulosics, plastics, and rubbers in Panel X for the conservative case.

3.4 MASS OF CELLULOSICS, PLASTICS AND RUBBERS IN THE REST OF REPOSITORY

The masses of cellulosics, plastics, and rubbers in the rest of the repository (excluding Panel X) can be calculated by subtracting the Panel X values from the total values.

3.4.1 The Realistic Case

Table 6 shows the calculation of the masses of cellulosics, plastics, and rubbers for the rest of repository (excluding Panel X) for the realistic case.

Table 4. Calculation of Cellulosics, Plastics, and Rubbers Masses in Panel X for the Realistic Case

Container Type	Number of Containers in Panel X[a]	Mass of Cellulosics per Container (kg)	Mass of Plastics Per Container (kg)	Mass of Rubbers Per Container (kg)	Mass of Plastics Packaging Per Container (kg)	Mass of Cellulosics in Panel X (kg)[f]	Mass of Plastics in Panel X (kg)[g]	Mass of Rubbers in Panel X (kg)[h]	Mass of Plastics Packaging in Panel X (kg)[g]
55-Gallon Drums With Waste Mix	49,285	[b]7.00	[b]5.51	[b]1.49	3.73	3.45×10^5	2.72×10^5	7.34×10^4	1.84×10^5
TDOPs from INEEL	834	[c]12.86	[c]16.99	[c]0.04	91.55	1.07×10^4	1.42×10^4	3.34×10^1	7.64×10^4
SWBs from INEEL	455	[d]5.17	[d]6.72	[d]0.02	30.24	2.35×10^3	3.06×10^3	9.10×10^0	1.38×10^4
55-Gallon Drums from INEEL	76	[b]7.00	[b]5.51	[b]1.49	3.73	5.32×10^2	4.19×10^2	1.13×10^2	2.83×10^2
100-gallon Drums from INEEL	6,219	[e]114.71	[e]77.52	[e]30.29	0.00	7.13×10^5	4.82×10^5	1.88×10^5	0.00
Total Mass in Panel X (kg)						1.07×10^6	7.71×10^5	2.62×10^5	2.74×10^5

[a]From Section 3.1.2; [b]from Section 3.2.5; [c]From Section 3.2.2; [d]From Section 3.2.3; [e]From Section 3.2.1; [f]Calculated as the number of containers from Column 2 times the mass of cellulosics per container from Column 3; [g]Calculated as the number of containers from Column 2 times the mass of plastics per container from Column 4; [h]Calculated as the number of containers from Column 2 times the mass of rubbers from Column 5.

Table 5. Calculation of Cellulosics, Plastics, and Rubbers Masses in Panel X for the Conservative Case

Container Type	Number of Containers in Panel X[a]	Mass of Cellulosics per Container (kg)	Mass of Plastics Per Container (kg)	Mass of Rubbers Per Container (kg)	Mass of Plastics Packaging Per Container (kg)	Mass of Cellulosics in Panel X (kg)[f]	Mass of Plastics in Panel X (kg)[g]	Mass of Rubbers in Panel X (kg)[h]	Mass of Plastics Packaging in Panel X (kg)[g]
55-Gallon Drums With Waste Mix	13,054	[b]7.00	[b]5.51	[b]1.49	3.73	9.14×10^4	7.19×10^4	1.95×10^4	4.87×10^4
TDOPs from INEEL	1,691	[c]12.86	[c]16.99	[c]0.04	91.55	2.17×10^4	2.87×10^4	6.76×10^1	1.55×10^5
SWBs from INEEL	922	[d]5.17	[d]6.72	[d]0.02	30.24	4.77×10^3	6.20×10^3	1.84×10^1	2.79×10^4
55-Gallon Drums from INEEL	154	[b]7.00	[b]5.51	[b]1.49	3.73	1.08×10^3	8.49×10^2	2.29×10^2	5.7×10^2
100-gallon drums from INEEL	12,603	[e]114.71	[e]77.52	[e]30.29	0.00	1.45×10^6	9.77×10^5	3.82×10^5	0.00
Total Mass in Panel X (kg)						1.56×10^6	1.08×10^6	4.02×10^5	2.32×10^5

[a]From Section 3.1.1; [b]from Section 3.2.5; [c]From Section 3.2.2; [d]From Section 3.2.3; [e]From Section 3.2.1; [f]Calculated as the number of containers from Column 2 times the mass of cellulosics per container from Column 3; [g]Calculated as the number of containers from Column 2 times the mass of plastics per container from Column 4; [h]Calculated as the number of containers from Column 2 times the mass of rubbers from Column 5.

Table 6. Calculation of Cellulosics, Plastics, and Rubbers Masses in the Rest of Repository for the Realistic Case

	Volume (m^3)	Mass of Cellulosics (kg)	Mass of Plastics (kg)	Mass of Rubbers (kg)	Mass of Plastics Packaging (kg)
All DOE Generator/Storage Sites	[a]1.69×10^5	[c]9.77×10^6	[c]7.08×10^6	[c]2.36×10^6	2.70×10^6
Panel X	[b]1.75×10^4	[b]1.07×10^6	[b]7.71×10^5	[b]2.62×10^5	2.74×10^5
Rest of Repository	1.52×10^5	8.70×10^6	6.31×10^6	2.10×10^6	2.43×10^6

[a]From the definition of disposal volume; [b]From Section 3.3.1; [c]From Table 3 Section 3.2.5

The masses of cellulosics, plastics, and rubbers for rest of the repository are calculated by subtracting the Panel X values (Row 3 in Table 6) from the total CH waste values in Row 2 of Table 6.

3.4.2 The Conservative Case

Table 7 shows the calculation of the masses of cellulosics, plastics, and rubbers for the rest of repository (excluding Panel X) for the conservative case.

Table 7. Calculation of Cellulosics, Plastics, and Rubbers Masses in the Rest of Repository for the Conservative Case

	Volume (m^3)	Mass of Cellulosics (kg)	Mass of Plastics (kg)	Mass of Rubbers (kg)	Mass of Plastics Packaging (kg)
All DOE Generator/Storage Sites	[a]1.69×10^5	[c]9.77×10^6	[c]7.08×10^6	[c]2.36×10^6	2.70×10^6
Panel X	[b]1.76×10^4	[b]1.56×10^6	[b]1.08×10^6	[b]4.02×10^5	2.32×10^5
Rest of Repository	1.51×10^5	8.21×10^6	6.00×10^6	1.96×10^6	2.47×10^6

[a]From the definition of disposal volume; [b]From Section 3.3.2; [c]From Table 3 Section 3.2.5

The masses of cellulosics, plastics, and rubbers for the rest of the repository are calculated by subtracting the Panel X values (Row 3 in Table 7) from the total CH waste values in Row 2 of Table 7.

4. RESULTS

Table 8 shows the masses of cellulosics, plastics, and rubbers in Panel X and the rest of the repository.

Table 8. Cellulosics, Plastics, and Rubbers Masses in Panel X and the Rest of Repository

	Volume (m^3)	Mass of Cellulosics (kg)	Mass of Plastics (kg)	Mass of Rubbers (kg)	Mass of Plastics Packaging (kg)
Realistic Case					
Panel X	1.75×10^4	1.07×10^6	7.71×10^5	2.62×10^5	2.74×10^5
Rest of Repository	1.52×10^5	8.70×10^6	6.31×10^6	2.10×10^6	2.42×10^6
Conservative Case					
Panel X	1.76×10^4	1.56×10^6	1.08×10^6	4.02×10^5	2.32×10^5
Rest of Repository	1.51×10^5	8.21×10^6	6.00×10^6	1.96×10^6	2.47×10^6

5. RELEVANT PROCEDURES AND REFERENCES

5.1 PROCEDURES

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5.2 REFERENCES

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ATTACHMENT A
Panel 1 Data from the WIPP Waste Information System

Site	Waste Stream	Description	Volume of Emplace Waste (m^3)	% of Total Emplaced Waste by Site
HANF	RLMPDT.001	HETEROGENEOUS DEBRIS	7.35E+00	---
	RLNPDT.002	DEBRIS WASTES - PLASTICS	1.08E+02	---
	Total Hanford:	---	1.16E+02	1.10E+00
INEEL	INW161.001	FIREBRICK DEBRIS	1.83E+01	---
	INW169.001	COMBUSTIBLE DEBRIS WASTE	1.93E+01	---
	INW198.001	PLASTICS DEBRIS	4.94E+01	---
	INW211.001	FILTER DEBRIS WASTE	3.04E+02	---
	INW216.001	SOLIDIFIED SLUDGE	1.23E+03	---
	INW218.001	SLUDGE - BLDG. 374	1.06E+03	---
	INW222.001	MISC. CEMENTED SLUDGES	3.38E+01	---
	INW243.001	GLASS DEBRIS	7.50E+01	---
	INW247.001R1	RASHIG RINGS - GLASS DEBRIS	1.16E+02	---
	INW276.001	GRAPHITE MOLDS DEBRIS	1.03E+01	---
	INW276.002	GRAPHITE MOLDS DEBRIS	1.62E+01	---
	INW276.003	GRAPHITE WASTE DEBRIS	1.87E+02	---
	INW276.004	GRAPHITE WASTE DEBRIS	4.73E+01	---
	INW296.001	METAL DEBRIS	9.79E+01	---
	Total INEEL:	---	3.27E+03	3.11E+01
LANL	LA-TA-55-19.01	COMBUSTIBLE WASTE, MIXED DEBRIS	8.11E+01	---
	LA-TA-55-19.02	MIXED COMBUSTIBLE DEBRIS	5.60E+01	---
	LA-TA-55-43.01	COMBUSTIBLE DEBRIS WASTE	1.90E+02	---
	Total LANL:	---	3.27E+02	3.12E+00
RFETS	RF001.01	CLOTH/PAPER DEBRIS FROM GLOVEBOX CLEANUP	5.51E+02	---
	RF002.01	METAL AND HEAVY METAL DEBRIS (NON-SS)	5.86E+02	---
	RF003.01	GRAPHITE DEBRIS WASTE	2.70E+02	---
	RF004.01	GLASS DEBRIS WASTE	2.02E+01	---
	RF005.01	STABILIZED PYROCHEMICAL SALTS	1.21E+02	---
	RF005.02	STABILIZED PYROCHEMICAL SALTS	7.90E+01	---
	RF006.01	MAGNESIUM OXIDE & LECO CRUCIBLES DEBRIS	2.23E+02	---
	RF008.01	INORGANIC NONMETAL DEBRIS /CERAMICS	8.09E+01	---
	RF009.01	REPACKAGED PYROCHEMICAL SALTS	1.30E+03	---
	RF010.01	TRU FILTER DEBRIS (NON-MIXED)	1.23E+02	---
	RF029.01	HETEROGENEOUS DEBRIS	8.78E+02	---
	RF101.30	COMBUSTIBLE DEBRIS	8.19E+00	---
	RF118.01	INCINERATOR ASH & PROCESS RESIDUES	1.42E+03	---

Site	Waste Stream	Description	Volume of Emplace Waste (m^3)	% of Total Emplaced Waste by Site
	RF124.01	LEADED RUBBERS GLOVES DEBRIS	1.66E+01	---
	RF128.01	TRM PU FLOURIDE (SOLIDIFIED INORGANICS)	9.58E+01	---
	RF129.05	TRM HETEROGENEOUS DEBRIS (D008)	1.97E+02	---
	Total RFETS:	---	5.97E+03	5.69E+01
SRS	SR-W027-221F-HETA	HETEROGENEOUS DEBRIS	4.18E+02	---
	SR-W027-FB-PRE86-C	ORGANIC DEBRIS	2.68E+02	---
	SR2001.001.00	NON-HAZ DEBRIS WASTE 221FBL	6.17E+01	---
	SR2002.002.00	HETEROGENEOUS DEBRIS	7.06E+01	---
	Total SRS:	---	8.18E+02	7.79E+00
WIPP	WI-RF002.01	SITE DERIVED DEBRIS WASTE FROM RF CONTAINER DECON	2.10E-01	---
	Total WIPP:	---	2.10E-01	2.00E-03
	Total Panel 1:	---	1.05E+04	---

Site	Waste Stream	Description	Volume of Emplace Waste (m^3)	% of Total Emplaced Waste for Largest Waste Stream
HANF	RLMPDT.001	HETEROGENEOUS DEBRIS	7.35E+00	---
	RLNPDT.002	DEBRIS WASTES - PLASTICS	1.08E+02	---
	Total Hanford:	---	1.16E+02	---
INEEL	INW161.001	FIREBRICK DEBRIS	1.83E+01	---
	INW169.001	COMBUSTIBLE DEBRIS WASTE	1.93E+01	---
	INW198.001	PLASTICS DEBRIS	4.94E+01	---
	INW211.001	FILTER DEBRIS WASTE	3.04E+02	---
	INW216.001	SOLIDIFIED SLUDGE	1.23E+03	---
	INW218.001	SLUDGE - BLDG. 374	1.06E+03	---
	INW222.001	MISC. CEMENTED SLUDGES	3.38E+01	---
	INW243.001	GLASS DEBRIS	7.50E+01	---
	INW247.001R1	RASHIG RINGS - GLASS DEBRIS	1.16E+02	---
	INW276.001	GRAPHITE MOLDS DEBRIS	1.03E+01	---
	INW276.002	GRAPHITE MOLDS DEBRIS	1.62E+01	---
	INW276.003	GRAPHITE WASTE DEBRIS	1.87E+02	---
	INW276.004	GRAPHITE WASTE DEBRIS	4.73E+01	---
	INW296.001	METAL DEBRIS	9.79E+01	---
	Total INEEL:	---	3.27E+03	---
LANL	LA-TA-55-19.01	COMBUSTIBLE WASTE, MIXED DEBRIS	8.11E+01	---
	LA-TA-55-19.02	MIXED COMBUSTIBLE DEBRIS	5.60E+01	---
	LA-TA-55-43.01	COMBUSTIBLE DEBRIS WASTE	1.90E+02	---
	Total LANL:	---	3.27E+02	---

Site	Waste Stream	Description	Volume of Emplace Waste (m^3)	% of Total Emplaced Waste for Largest Waste Stream
RFETS	RF001.01	CLOTH/PAPER DEBRIS FROM GLOVEBOX CLEANUP	5.51E+02	---
	RF002.01	METAL AND HEAVY METAL DEBRIS (NON-SS)	5.86E+02	---
	RF003.01	GRAPHITE DEBRIS WASTE	2.70E+02	---
	RF004.01	GLASS DEBRIS WASTE	2.02E+01	---
	RF005.01	STABILIZED PYROCHEMICAL SALTS	1.21E+02	---
	RF005.02	STABILIZED PYROCHEMICAL SALTS	7.90E+01	---
	RF006.01	MAGNESIUM OXIDE & LECO CRUCIBLES DEBRIS	2.23E+02	---
	RF008.01	INORGANIC NONMETAL DEBRIS /CERAMICS	8.09E+01	---
	RF009.01	REPACKAGED PYROCHEMICAL SALTS	1.30E+03	---
	RF010.01	TRU FILTER DEBRIS (NON-MIXED)	1.23E+02	---
	RF029.01	HETEROGENEOUS DEBRIS	8.78E+02	---
	RF101.30	COMBUSTIBLE DEBRIS	8.19E+00	---
	RF118.01	INCINERATOR ASH & PROCESS RESIDUES	1.42E+03	1.35E-01
	RF124.01	LEADED RUBBERS GLOVES DEBRIS	1.66E+01	---
	RF128.01	TRM PU FLOURIDE (SOLIDIFIED INORGANICS)	9.58E+01	---
	RF129.05	TRM HETEROGENEOUS DEBRIS (D008)	1.97E+02	---
	Total RFETS:	---	5.97E+03	---
SRS	SR-W027-221F-HETA	HETEROGENEOUS DEBRIS	4.18E+02	---
	SR-W027-FB-PRE86-C	ORGANIC DEBRIS	2.68E+02	---
	SR2001.001.00	NON-HAZ DEBRIS WASTE 221FBL	6.17E+01	---
	SR2002.002.00	HETEROGENEOUS DEBRIS	7.06E+01	---
	Total SRS:	---	8.18E+02	---
WIPP	WI-RF002.01	SITE DERIVED DEBRIS WASTE FROM RF CONTAINER DECON	2.10E-01	---
	Total WIPP:	---	2.10E-01	---
	Total Panel 1:	---	1.05E+04	---