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PRELIMINARY

NONRADIONUCLIDE INVENTORY DATABASE

May 1989 Rev. 0

The enclosed printout represents a complete data listing of the Nonradionuclide Inventory Database (NID), Rev. 0. It was formatted and printed from a dBase III Plus database file, using a set of print programs and subroutines designed for this file. This set of print routines is in a preliminary stage of development. Therefore, not all variations in amount and type of data reported by the generator sites have been accounted for in the format (eg., pagination, margins, etc.). However, all the data reported is included in this printout.

For each waste form reported, there are a minimum of two pages representing data reported on Table A of the questionnaire sent to each generator/shipping site. Most waste forms have two additional pages representing information reported on Table B or Table C of the questionnaire.

The information has been divided by generator/shipping site and by content code within each site. The sites are those which are currently storing waste and/or will, in the next 25 years, generate waste which will be stored at the WIPP.

THIS PRINTOUT IS ACCOMPANIED BY A COVER LETTER AND A LETTER REPORT ENTITLED PRELIMINARY NONRADIONUCLIDE INVENTORY FOR CH-TRU WASTE (International Technology, May 1989). **NO ATTEMPT TO INTERPRET THE DATA PRESENTED HEREIN SHOULD BE MADE BEFORE FIRST STUDYING THE ABOVE-MENTIONED DOCUMENTS.**

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WPO 42228

INTERNATIONAL TECHNOLOGY CORPORATION

May 9, 1989

Project No. 301192.88.01

Dr. L. Brush
Sandia National Laboratories
Division 6334
P. O. Box 5800
Albuquerque, NM 87185

Preliminary Nonradionuclide Inventory of CH-TRU Waste

Dear Dr. Brush:

Attached is a preliminary report on the status of the Nonradionuclide Inventory Database and detailed tabulations of waste materials as requested in the last amendment to the IT Sandia Support contract. I am sorry for the slight delay in completing the report, but the CH-TRU generator/storage sites were late in their responses and the process of tabulating the appropriate data proved to be a difficult task. Part of the difficulty has to do with the slight variations in the way the sites report data.

Listed below is the information contained in this package:

- Report entitled: "Preliminary Nonradionuclide Inventory for CH-TRU Waste." The report includes a description of how the data was collected from the CH-TRU waste generator/storage sites, a description of the database used to compile the data, and examples of how the calculations were made including any limitations (Item 7 in Statement of Work).

- Table 3-5 in the report summarizes the total quantity of combustible materials in the waste, including cellulosics, plastics and other combustibles (Item 3 in Statement of Work).

  Although only total cellulosics were requested, data on plastics and other combustibles were also tabulated, anticipating their eventual need to support the Performance Assessment program.

- Table 3-5 in the report estimates the quantity of various types of cellulosic materials in the total cellulosic inventory (Item 4 in Statement of Work).

  A breakdown of the various types of plastic and rubber materials has also been provided in Table 3-5. Caution is advised in the interpretation of the plastics in the tables, since two sites choose to report the weight of plastic bagging and rigid liners as part of the waste totals.

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- Table 3-6 in the report estimates the total quantity of metals in the CH-TRU waste and also provides a breakdown of the various types of metals in the waste (Item 5 in Statement of Work).

  Caution is advised in the interpretation of this table, since two sites choose to report the amount of metal in the waste packaging as part of the waste contents in this table. I have no way of separating out the weight of the waste cannister from the database at this time.

  In an attempt to provide a complete inventory (including waste packaging), Table 3-8 provides a preliminary estimate of the amount of plastic and other internal packaging in addition to an estimate of the metal included in the waste. Variations in the method of packaging from site to site have been accounted for in the tabulation of the data.

- Table 3-7 in the report estimates the total quantity of nitrates and total inorganic carbon (TIC) in the waste (Items 2 and 6 in Statement of Work). Graphite or charcoal is not considered part of this summary, only inorganic carbonate.

- Table 4-2 in the report lists quantitative information on selected chelating agents that occur in the waste. All chelating agents requested in your statement of work (Item 1) have been included plus any additional chelating agents that have been reported by the sites.

- Printouts for each generator/storage site that represent complete data dumps of the Nonradionuclide Inventory Database (Item 7 of Statement of Work).

- Floppy disks containing all the dBASE files for the database. An explanation of the files is provided in Appendix 2.0 of the report (Item 7 of Statement of Work).

I am very pleased to transmit this preliminary report on the Nonradionuclide Inventory Database to you. This database is important step towards an understanding of the composition and quantities of CH-TRU waste to be emplaced in WIPP. This is a "living" database that should be updated periodically as more precise information is provided by the CH-TRU waste generator/storage sites.

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Do not hesitate to contact me at 262-8800 if you need any clarification of the data contained in this packet of information. Pamela James (262-8800) can provide any information about the structure and output of the database.

Sincerely,

Paul E. Drez

Paul E. Drez
Senior Technical Associate

Enclosures

cc: M. Devarakonda, IT-Albuquerque (report only)
P. James, IT-Albuquerque (report only)
J. Myers, IT-Albuquerque (report only)

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PRELIMINARY NONRADIONUCLIDE INVENTORY FOR CH-TRU WASTE

Paul E. Drez

and

Pamela James-Lipponer

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May, 1989

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1.0 EXECUTIVE SUMMARY

The summary of the nonradionuclide inventory for the contact-handled transuranic waste included in this report represents the first comprehensive attempt to quantify the waste to be transported and stored in the Waste Isolation Pilot Plant.

Data requests were sent to transuranic waste generator/storage sites for quantitative estimates of the major, minor and trace nonradionuclide components in the waste. Information has been entered in a relational database management system for rapid computations of constituents in the waste.

The numbers reported within this report represent the results of the first round of data requests with several follow-ups to verify provided information and/or request additional information on specific topics of interest.

The reader should be aware of the many assumptions and limitations of the database before using the information in calculations or estimations of waste. Even with the database limitations, this first nonradionuclide inventory compilation is the best information on the composition of transuranic waste to date.

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2.0 INTRODUCTION

The Inventory/Source Term Committee was formed by the U. S. Department of Energy (DOE) to address problems associated with defining and verifying radionuclide and nonradionuclide inventories for the Waste Isolation Pilot Plant (WIPP). The task of compiling the first nonradionuclide inventory was defined as a major task of the Inventory/Source Term Committee. The author was designated as the task leader for the nonradionuclide inventory which was funded through an existing contract with Sandia National Laboratory.

The main focus of inventory calculations for WIPP had been on the radionuclide inventory that is updated yearly in the Integrated Data Base (U.S. DOE, 1988). The nonradionuclide part of the inventory had been given a lower priority in recent years. One of the primary parameters for the Performance Assessment (PA) is the amount of gas that might be generated from:

- Radiolytic interactions between the nonradionuclide part of the waste and the radionuclides present.
- Biological degradation of cellulosics and other organic materials in the waste. Conversion of nitrate to nitrogen gas by anaerobic bacteria.
- Corrosion of metals and waste canisters by brine that might be present in the repository.

All of these mechanisms for gas generation are dependent on the nonradionuclide constituents of the waste. The need for accurate information on the nonradionuclide waste was foreseen by this committee to be a major input in the PA calculations to meet 40 CFR 191.

Section 3.0 describes: 1) the methodology behind the determination of the nonradionuclide inventory; 2) sources of information; 3) the database used to compile the information supplied by the waste generating/storage sites; 4) computational methods employed to compile the data; and 5) a summary of the data presented in tabular format.

Section 4.0 describes specific information on possible chelating agents requested by the Sandia PA team members to support estimates for radionuclide solubility. The structure of the section is similar to that for Section 3.0.

Section 5.0 provides a summary and interpretation of the data, plus a discussion of the limitations of the data.

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3.0 NONRADIONUCLIDE INVENTORY

3.1 METHODOLOGY OF INVENTORY DETERMINATION

A search of available literature and discussions with DOE, WIPP and site personnel for information on the nonradioactive constituents of contact-handled transuranic (CH-TRU) waste demonstrated that very little information existed, and that which did exist was very general (U.S. DOE, 1986) or site-specific (Clements and Kudera, 1985):

- Nonradionuclide information in U.S. DOE (1986) is nonspecific, classifying stored waste in volume percent for the general categories. The information required to compile a nonradionuclide inventory would include the knowledge of the minor amounts of a waste that could be included in a major waste form (e.g., amount of plastic packaging in the glass waste form). The general waste categories in U.S. DOE (1986) were:
  - Absorbed liquids or sludges
  - Combustibles
  - Concreted or cemented sludges
  - Dirt, gravel or asphalt
  - Filters or filter media
  - Glass
  - Metal
  - Other
  - Unknown
- The information from Clements and Kudera (1985) was very similar to the information needed for PA, but was specific for only Rocky Flats waste shipped to Idaho National Engineering Laboratory (INEL) for temporary storage and did not contain any information on chemistry of the waste (i.e., chemicals associated with combustibles, metals, etc.). Information included in the INEL study for retrievably-stored Rocky Flats waste included but was not limited to the following information:
  - Age of waste.
  - Gas composition of drum headspace.
  - Drum pressure.

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- Drum void volume.
- Assay information.
- Weight of major and minor solid phases, including:
    - o Glass.
    - o Metals (i.e., tantalum, steel, stainless steel, and other).
    - o Combustibles (i.e., gloves, paper, cloth, plastic, rubber, and other).
    - o Miscellaneous (i.e., other organics, other inorganics, leaded rubber, cemented resin, molds and crucibles, firebrick, and salts).
    - o Absorbents (i.e., concrete, vermiculite, oil-dri, portland cement, and other).
    - o Net weight.
    - o Presence of free liquids (i.e., type, volume, and pH).
    - o Presence of sludge (i.e., type, components, and pH).
    - o Total weight of organics.

Conversations with waste operations personnel at the CH-TRU waste generating/storage sites indicated that information on the nonradioactive constituents of the waste could be compiled if a request was made of the sites for the information.

A questionnaire was developed based on the anticipated types of waste found in drums from the INEL study (Clements and Kudera, 1985), discussions with site personnel and informational needs for the PA calculations. A formal presentation was given to site representatives on the proposed questionnaire at the second RCRA Interface Working Group meeting held in Denver, Colorado on March 21, 1988. The questionnaire for the nonradionuclide constituents was revised based on site comments and sent to the 12 U.S. DOE CH-TRU waste generating/storage sites (Table 3-1). The inventory for the remote-handled (RH) TRU waste has not been included in this database.

Appendix 1.0 presents the questionnaire that was sent to all sites for characterization of the CH-TRU waste for the nonradionuclide inventory. The objectives of the questionnaire were:

- o To obtain enough general information on the nonradionuclide constituents of the waste so that bounding calculations could be made on different parameters to ascertain which parameters were dominant for the PA effort to meet 40 CFR 191.

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- Parameters crucial to the calculations would be resubmitted to the sites for additional quantification of the information. This approach would minimize the manpower impact on the sites.

3.2 SOURCES OF INFORMATION

The dominant source of information for the nonradionuclide inventory is the responses from the 10 CH-TRU shipping sites to the questionnaire (Appendix 1.0). The questionnaire was divided into three sets of tables to obtain the waste characterization information needed for PA purposes. Table 3-2 is a sample questionnaire filled out for newly-generated combustible waste at the Rocky Flats Plant for Tables A and B (This is an example of an original form filled out by Rocky Flats, and the data may or may not be current depending upon revisions). A brief discussion of the information requested in each table is included below:

3.2.1 Information Requested in Table A

Table A (see Table 3-2 for Rocky Flats example) requested general information on the waste to provide a method of classifying the waste and estimates of the amount of waste at each site by waste type. The specific information requested was: waste type, generator and storage (if applicable) sites, any previously-used names or number codes for the waste, type of container, presence of moisture in waste, average void volume, presence and type of rigid liner, quantity of drums/boxes in storage (if applicable) and information on the expected quantity of drums and/or boxes to be produced on a yearly average for 5-year periods until 2013.

If the waste type was made up of several individual content codes or identification codes, then the site was requested on page two of the Table A form to provide information of the relative proportion of drums and boxes in each content code or identification code.

Finally, the site was requested to list the method of information that was used for obtaining the information provided on the form.

3.2.2 Information Requested in Table B

The purpose of Table B (Table 3-2 and Appendix 1.0) was to obtain quantitative information on the solid inorganic and organic components of the waste (everything except sludges). Each site was requested to estimate the total weight (in kg) of each major type in the waste form and the concentration of organic solvents and alcohols in a drum/box of the waste form. For the solid inorganic and organic components, an estimate of the minimum, average and maximum was asked for each waste type and the components. The information on maximum and minimum was requested for PA sensitivity studies on worst case scenarios. A coding system, used to estimate quantities of trace components in the waste, is listed at the bottom of each page of Table B (Table 3-2 and Appendix 1.0). The waste types for which information was requested on are listed below:

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- Combustibles
- Glass
- Metals
- Filters
- Resins
- Graphite
- Other inorganic solids
- Organic waste
- Solvents
- Alcohols

For each waste type, the sites were asked to further estimate the percentage of individual wastes in that waste type. For example, for metals, the sites were asked the weight percent of each type of metal [i.e., tantalum, stainless steel, iron, copper, aluminum, tungsten, lead, beryllium, paints cans, lithium (in batteries)] that comprise the overall weight of metals in the waste form. If their waste contained a metal that was known but not listed, the sites were asked to identify the component and estimate the percentage of its weight for the total weight of metals in the waste form.

3.2.3 Information Requested in Table C

Table 3-3 (Appendix 1.0) was used to collect information on the composition and preparation of sludges. An example of information provided from Rocky Flats for an inorganic sludge is presented in Table 3-3 (Tables A and C only). The first information requested in the form is the major components of the immobilized sludge in the drum. The information included:

- Weight of sludge (added to final mixture in drum)
- Weight of water added (if water was needed to mix cement)
- Type and weight of cement used (usually Portland)
- Type and weight of any additives used
- Type and weight of any absorbents added to drum for excess liquids

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The second page of Table C requested information on the chemistry of the sludge that was added to the drum, that is, the composition of the sludge prior to any mixing of cement or any other additives. A list of the most common cations and anions to be found in sludges was provided and the sites were requested to list any other ions that were known to occur in the sludge.

Page 3 of Table C (Table 3-3 and Appendix 1.0) requested estimates of the pH of the sludge and the amount of water trapped in the sludge matrix. This would be water that could be released upon heating of the sludge in an oven (bound or sorbed). An estimation of any chelating agents, which could cause increased solubility of radionuclides in solutions or brines, was asked for the sludges. Finally, at the bottom of page three, an estimation of the amount of oil that might occur in an organic sludge was requested.

Page 4 of Table C requested estimates of the organic solvents and alcohols that might occur in an inorganic or organic sludge. This information was needed to estimate the quantities of volatile organic compounds (VOCs) available in the waste that might diffuse from the containers in storage (health and safety concerns). In addition, the VOCs are a potential substrate for microorganisms. Information was also requested on any emulsifiers, surfactants and detergents that might occur in the sludges.

3.3 GENERAL LIMITATIONS OF INFORMATION

3.3.1 Process Knowledge versus Analysis of Waste

Almost all the information from the DOE sites is based on process knowledge, which is a mass balance on a particular waste stream. That is, what goes in the waste stream or process must be accounted for in the waste. The reason for relying on process knowledge is that analysis of the vast majority of the waste is not reasonable or feasible for the following reasons:

- Analysis of combustibles or metals for trace quantities of VOCs would be impossible, since the proper preparation of a "statistically valid" sample would bias the volatilization of the VOCs that would be analyzed for in the sample.

- The preparation of the individual waste container of metals analysis would provide some detailed numbers on the individual container, but the variation in composition of the waste from one container to another within a waste form would be so large that a better estimate could be arrived at by knowing the overall quantity of metals in a waste stream and then averaging over the number of drums.

- Waste streams that produce sludges or the precipitated sludges are the only waste forms that are easily sampled and analyzed quantitatively for constituents.

- The radiological hazard to a worker during sampling of TRU waste is "real" and the benefits of sampling must be carefully weighed against the potential for worker exposure.

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3.3.2 Limitations of Process Knowledge

Some of the general limitations on process knowledge are:

- Weights of internal packaging and containers (drums or boxes) were not specified for all waste forms from sites. Weight estimates were made for the large drum liner bags that were reported in the database based on the weight of similar bags at Rocky Flats Plant. Weights for drums, boxes and liners (either rigid plastic or wooden) used in the database for all sites were based on data provided by Rocky Flats Plants.

  Future revisions will incorporate more detailed packaging information (number of layers of plastic) from the TRUCON (U.S. DOE, 1989) document and weights of packaging materials and external containers will be requested from individual sites.

- Weight of lead liners had to be estimated.

- Sites reported the total weight of leaded rubber gloves. No attempts were made to separate the gloves into percentages of hypalon, neoprene and lead. Later revisions of the database will include this detail.

  Sites also reported leaded glass. No attempt was made to separate the percentage of lead from the leaded glass total.

- Table 3-4 lists the number of drums and boxes by sites that no waste information is available on at this time. Information on these waste forms should become available in future revisions of this database as sampling plans are established at sites for retrievable waste.

- Sites have provided estimates of future production rates based on current plans for production through 2013.

- Information for newly-generated waste from Rocky Flats Plant assumes supercompaction of waste at currently projected volumes.

- Lead appears in the database as metal (non-liner), as liner material, in leaded rubber gloves and in leaded glass. The calculation of total lead includes the addition of all four categories. The weight of the glass in leaded glass and the weight of the rubber in leaded rubber gloves is included in the total lead number. Therefore, the total lead number is conservative (too high). A finer breakdown of lead in materials will be requested in the next revision.

- The original request form asked for concentrations of metals and nonmetals in volume percent. To permit global calculations in the database, concentrations were converted to percentages based on a density of 1.0 for sludges. Information on the density of sludges was requested from the sites, but arrived too late for incorporation into this version of the database.

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The use of 1.0 for the density of the sludges results in a nonconservative (low) estimate of the mass of metals and nonmetals in the sludges. Corrections for the density of the sludges will be incorporated into the next version of the database.-

3.4 NONRADIONUCLIDE INVENTORY DATABASE

The information on the nonradionuclide inventory for CH-TRU waste is compiled in a set of files in dBASE III Plus, Version 1.1. dBase III Plus, a product of Ashton-Tate Corporation, is a relational database management system and includes a programming language.

The main database file was structured to mimic the data request forms (Tables A, B and C in Appendix 1.0) which were sent to the generator/storage sites. The database is approximately 6 megabytes in size at present. Where data was not reported by the generator/storage site, blank fields were left in the files based on the assumption that additional information will become available in the future and the files should be updated with minimal disturbance to the database structure.

Some simple programs have been written to access specific data in the files. Appendix 2.0 contains a listing of all field names used in the database, the type of character and a short description of the field. However, when data needs and uses are more clearly defined, an integrated data retrieval system could be established using dBASE's programming and relational capabilities so that persons unfamiliar with dBASE could access information easily.

The information in the Nonradionuclide Inventory Database has been totally quality-checked against the submittals by the generator/storage sites. Complete records of all telephone and written updates have been added to the quality assurance files. Copies of these files are available upon request.

3.5 CALCULATIONS

Tables 3-5, 3-6, 3-7 and 3-8 present total amounts of materials in CH-TRU waste (including containers) that were requested in the amendment to the contract. Table 3-5 presents total amounts of the following materials in the waste:

- An estimate of the total quantity of combustible materials in CH-TRU waste.
- An estimate of the quantity of each of the various types of cellulosic plastic and other combustible materials in the CH-TRU waste.

Table 3-6 presents the total amounts of the following materials in the waste:

- An estimate of the total quantity of metals in CH-TRU waste.
- An estimate of the quantity of each of the various types of metals in the CH-TRU waste.

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Table 3-7 presents total amounts of the following materials in the waste:

- An estimate of the total quantity of inorganic carbon (as carbonate) in the CH-TRU waste.
- An estimate of the total quantity of nitrates in the CH-TRU waste.

Table 3-8 presents the total amount of materials to be add to the WIPP in the form of waste containers, liners and major plastic bags. Listed below is a summary of the information provided in Table 3-8:

- Weight of steel in drums and boxes to be shipped to WIPP
- Weight of fiberboard, wooden and 90-mil high density polyethylene liners used in drums and boxes

The total amount of cellulosics and metals, and the quantities of various types of materials in these categories, were calculated from the main body of the database. Most of the database has been through two updates from the generator/storage sites since the data from the original questionnaire submission was received. The calculations for Tables 3-5 and 3-6 are as follows:

- Calculations for a constituent (e.g., paper) in CH-TRU waste:
  - The average amount of a constituent in a drum, box or bin was multiplied by the total number of drums, boxes or bins in that particular waste form/content code to obtain the total amount of the constituent in the waste form/content code. The total number of drums, boxes or bins were calculated by adding up all the projected generation rates (for newly generated waste) or by using the reported quantity of drums, boxes or bins for retrievably stored waste.
  - For each site, the total amount of a constituent was obtained by adding the amounts of a constituent from each of the wasteforms/content codes at the site.
  - The total amount of a constituent in CH-TRU waste was obtained by adding together the amounts of the constituent from all sites.
- The total amount of a major category of waste materials for CH-TRU waste was calculated as follows:
  - The total amount of a major category of waste materials (e.g., combustibles) was determined by summing the total amount of each individual constituent (e.g., paper, cloth, etc.) in the major waste category.

The generator/storage sites were recently requested to submit the additional information on total nitrates and total inorganic carbon (TIC) in CH-TRU waste. The sites were permitted to report the amount of nitrate and TIC either as an average concentration (g/kg) or total amount (kg) for a specific waste form/content code,

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or total amount per content code per year. The total amount of nitrate of TIC was calculated as follows:

- If the generator/storage site reported average concentrations of nitrate or TIC in a content code/waste form, the concentration was multiplied by the total number of drums, boxes or bins to obtain the total amount of nitrate or TIC for a waste form/content code.

  The total number of drums, boxes or bins were calculated by adding up all the projected generation rates (for newly generated waste) or by using the reported quantity of drums, boxes or bins for retrievably stored waste.

- For each site, the total amount of nitrate or TIC was obtained by adding the amounts of nitrate or TIC from each of the wasteforms/content codes at the site.

- The total amount of nitrate or TIC in CH-TRU waste was obtained by adding together the amounts of nitrate or TIC from all the sites.

The amount of metal, wood, fiberboard and plastic bagging materials used to contain the waste in drums and boxes are included in Table 3-8, except for information submitted by INEL and Los Alamos National Laboratory (LANL). Both sites included the weight of packaging and waste container materials (metals and combustibles) in the waste inventory. The next update of the database will request a breakdown of waste and nonwaste materials from LANL and INEL.

Calculations of the average weight of waste per drum or box can be made by dividing the weight data presented in Tables 3-5, 3-6, 3-7, and 3-8 by the total number of drums reporting waste characterization information (Table 3-10). If calculations are desireable, use the second set of numbers in the tables for total number of drums and boxes for which waste characterization information is available.

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Table 3-1. U.S. DOE CH-TRU Waste Generating/Storage Sites which will Ship Waste to WIPP.*

Site Name	Site Identifier Code
Argonne National Laboratory (East)	AE
Idaho National Engineering Laboratory	IN
Los Alamos National Laboratory	LA
Lawrence Livermore National Laboratory	LL
Lovelace**	
Mound	MD
Nevada Test Site	NT
Oak Ridge National Laboratory	OR
Rocky Flats Plant	RF
Richland Hanford	RH
Sandia**	
Savannah River Site and Laboratory	SR

* Reference:

** Lovelace and Sandia will not ship waste directly to WIPP, but to Los Alamos. The waste characterization is not complete at present and is not included in this report. The volumes of waste from Lovelace and Sandia are very small (<<1 volume %).

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TABLE 3-2

ROCKY FLATS EXAMPLE FOR INFORMATION REQUESTED TO COMPLETE TABLES A AND B IN INVENTORY REQUEST

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

General Information

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

CH or RH Waste CH Storage Site Idaho National Engr. Lab.

Previously used numbers for Content Code/Waste Form/IDC Number [if a particular code has been replaced with a new code, indicate for each code; e.g., new code (old code) or 113 (004)].

Waste Form Number 116, New IDC 831, Old IDC 330

Type of Container (Drum/Box) Drum

Contents Wet (Yes/No) No Average Void Volume 5-94 %

Type of Liner 90 mil HDPE liner
One or two Poly or PVC Bags

Stored Waste

Number of Drums in Storage (10/1/88) None

Number of Boxes in Storage (10/1/88) None

Newly-Generated Waste

Number of Drums/Boxes Produced (Yearly Average) -

	Drums	Boxes
10/1-12/31/88	460	---
1989-1993	650	---
1994-1998	525	---
1999-2003	525	---
2004-2008	525	---
2009-2013	525	---

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TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

If more than one IDC is included under a content code, indicate the percentage of drums or boxes for each code that will be produced (stored/newly-generated):

STORED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
		N/A			

NEWLY-GENERATED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
831	100% Drums				

****

Indicate the Method of Waste Characteization:

(Enter A if knowledge of the Waste)

(Enter B if knowledge of Process Generating Waste)

(Enter C is Analyses of Waste)

Data Source for Information on Combustibles, Metals, Glass, Filters, Resins, Graphite, and other Inorganic Solids A, B

Data Source for Information on Sludges _____

Information Only

TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Combustibles (Total Weight Kg)	8	200	164
Polyethylene (Weight %)	A	10	F
PVC	A	10	F
Teflon	A	A	A
Surgeon's Gloves	A	10	F
Paper/Kimwipes	A	100	75
Cloth	A	100	20
Rubber			
Neoprene	A	E	C
Hypalon	A	E	C
Other (Specify) _____			
_____			
Leaded Gloves	A	A	A
Lumber (untreated)	A	F	D
Lumber (treated)	A	A	A
Plywood	A	A	A
Other (Specify) _____			
_____			

*Coding for trace quantities: "A" = NOT PRESENT; "B" = <10 PPM; "C" = 10 - 100 PPM; "D" = 100 - 1000 PPM; "E" = 1000 PPM - 1%; "F" = 1 - 5%

SPA:192-TABLE/3

Information Only

TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR
NONRADIONUCLIDE INVENTORY

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Glass (Total Weight Kg)	A	A	A
Raschig Rings (Weight %) (unleached)			
Raschig Rings (leached)			
Borosilicate			
Non-borosilicate			
Ceramic Crucibles			
Leco Crucibles			
Leaded			
Other (Specify) _____			
_____			
Metals (Total Weight Kg)	A	A	A
Tantalum (Weight %)			
Stainless Steel			
Iron			
Copper			
Aluminum			
Tungsten			
Lead (do not include liners)			

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

SPA:192-TABLE/4

Information Only

TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR
NONRADIONUCLIDE INVENTORY

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Metals (Continued)			
Beryllium (Weight %)			
Paint Cans			
Lithium (Batteries)			
Other (Specify) _____			
_____			
Filters (Total Weight Kg)	A	A	A
HEPA (Weight %)			
Ful-Flo			
Other (Specify) _____			
_____			
Resins (Total Weight Kg)			
Anionic (Weight %)	A	A	A
Brand Name _____			
Cationic			
Brand Name _____			
Other (Specify) _____			

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

SPA:192-TABLE/5

Information Only

TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR
NONRADIONUCLIDE INVENTORY

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

		MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Graphite (Total Weight Kg)				
Molds (Weight %)		A	A	A
Crucibles				
Other (Specify)				
Inorganic Solids				
Ash (Weight Kg)		A	A	A
Concrete (Waste)				
Firebrick				
Lead Oxide				
Oil Dri				
Sand				
Slag				
Soot				
Other (Specify)				

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

SPA:192-TABLE/6

Information Only

TABLE 3-2
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR
NONRADIONUCLIDE INVENTORY

Waste Form Dry Combustibles Generator Site Rocky Flats Plant

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
-Organic Waste			
Oils			
Type Texaco R & O	A	D	B
Type			
-Solvents			
1,1,1 Trichloroethane	A	E	C
Trichlorotrifluoroethane (Freon)	A	E	C
Trichloroethylene	A	A	A
Xylene	A	A	A
Cyclohexane	A	A	A
Carbon Tetrachloride	A	D	B
Methylene Chloride	A	D	B
Acetone	A	A	A
Other (Specify)			
-Alcohols			
Methanol	A	A	A
Ethanol	A	A	A
Isopropanol	A	A	A
Butanol	A	A	A
Other (Specify)			

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

Information Only

TABLE 3-3

ROCKY FLATS EXAMPLE FOR INFORMATION REQUESTED TO COMPLETE TABLES A AND C IN INVENTORY REQUEST

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

General Information

Waste Form Solidified Sludge Generator Site Rocky Flats Plant

CH or RH Waste CH Storage Site Idaho National Engr. Lab.

Previously used numbers for Content Code/Waste Form/IDC Number [if a particular code has been replaced with a new code, indicate for each code; e.g., new code (old code) or 113 (004)].

Waste Form Number 111, IDC 800

Type of Container (Drum/Box) Drum

Contents Wet (Yes/No) Yes Average Void Volume 5-75 %

Type of Liner 90 mil HDPE liner
With one PVC and/or Polyethylene Bag

Stored Waste

Number of Drums in Storage (10/1/88) None

Number of Boxes in Storage (10/1/88) None

Newly-Generated Waste

Number of Drums/Boxes Produced (Yearly Average) -

	Drums	Boxes
10/1-12/31/88	150	---
1989-1993	675	---
1994-1998	675	---
1999-2003	675	---
2004-2008	675	---
2009-2013	675	---

SPA:192-TABLE/1

Information Only

TABLE 3-3
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

If more than one IDC is included under a content code, indicate the percentage of drums or boxes for each code that will be produced (stored/newly-generated):

STORED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
____	_____	N/A	_____	____	_____
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____

NEWLY-GENERATED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
800	100% Drums	____	_____	____	_____
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____

****

Indicate the Method of Waste Characteization:

(Enter A if knowledge of the Waste)

(Enter B if knowledge of Process Generating Waste)

(Enter C is Analyses of Waste)

Data Source for Information on Combustibles, Metals, Glass, Filters, Resins, Graphite, and other Inorganic Solids _____

Data Source for Information on Sludges A, B, C

Information Only

TABLE 3-3
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR
NONRADIONUCLIDE INVENTORY

Waste Form 111 Solidified Aqueous Waste IDC 800 Generator Site Rocky Flats Plant

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(ABSORBED, SOLIDIFIED, AND CONCRETED)

****SLUDGE INFORMATION SHOULD BE PROVIDED BY IDC ONLY****

COMPONENT	MINIMUM	MAXIMUM	AVERAGE
Volume of Sludge (**Weight in Kg**)	36	110	83
Water Added (Weight in Kg)			
Cement Type Portland			
Cement Weight (in Kg)	18	55	41
Cement Type			
Cement Weight (in Kg)			
Additive Diatomite			
Additive Weight (in Kg)	18	55	41
Additive			
Additive Weight (in Kg)			
Additive			
Additive Weight (in Kg)			
Absorbent			
Absorbent Weight (in Kg)			
Absorbent			
Absorbent Weight (in Kg)			

SPA:192-TABLE/8

Information Only

TABLE 3-3
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form 111 IDC 800 Generator Site Rocky Flats Plant

Solidified Aqueous Waste

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
-Inorganic			
-Cations			
Al	10	10	10
Ca	J	J	J
Fe	20	30	25
K	50	100	75
Mg	L	30	18
Mn	I	I	I
Na	L	150	100
Si	J	20	10
Sr	G	G	G
Ti	J	J	J
Other (Specify)			
-Anions			
Cl	G	I	I
CO_3			see below
F	G	I	I
NO_3			see below
PO_4	G	I	I
SO_4	70	170	120
Other (Specify) NO_3/CO_3	18	23	20

*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

Information Only

TABLE 3-3
(Continued)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form 111 IDC 800 Generator Site Rocky Flats Plant

Solidified Aqueous Waste AVERAGE WEIGHT AND COMPOSITION OF SLUDGES (CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
Chemical Components of Sludges (Continued)			
-Inorganic (Continued)			
-Other Inorganics and Parameters			
pH#	10	12	11
H_2O	3.33×10^5	3.33×10^5	3.33×10^5
-Complexation Chemicals			
EDTA (Versene)	G	G	G
DPTA	G	G	G
Tributyl Phosphate	G	H	G
Citric Acid	G	G	G
8-Hydroxyquinoline (Oxime)	G	G	G
Acetic Acid	G	G	G
Other (Specify) _____			
_____			
_____			
-Organic	N/A		
Oils Type _____			
Type _____			

pH before solidification or addition of concrete.

*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

SPA:192-TABLE/10

Information Only

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form 111 IDC 800 Generator Site Rocky Flats Plant

Solidified Aqueous Waste

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
-Organic			
-Solvents			
1,1,1 Trichloroethane	G	I	H
Trichlorotrifluoroethane (Freon)	G	I	H
Trichloroethylene	G	G	G
Xylene	G	I	H
Cyclohexane	G	G	G
Carbon Tetrachloride	G	I	H
Methylene Chloride	G	J	H
Acetone	G	G	G
Other (Specify) _____			
_____			
_____			
-Alcohols			
Methanol	G	I	H
Ethanol	G	H	H
Isopropanol	G	H	H
Butanol	G	I	H
Other (Specify) _____			
_____			
-Emulsifier	N/A		
Type _____			
Type _____			
-Surfactant	N/A		
Type _____			
Type _____			
-Detergents	N/A		
Type _____			
Type _____			

*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

Information Only

TABLE 3-4. Approximate Quantities of CH-TRU Drums, Boxes and Bins With No Waste Characterization Information Currently Available

Storage Site	Generator Site	Number of Drums	Number of Boxes/Bins
Richland Hanford	Richland Hanford	36,700	1140
Idaho National Engineering Laboratory	Argonne East	304*	15*
" "	Mound	1524*	21*
" "	Bettis	131*	0*
" "	INEL	43*	40*
" "	Rocky Flats Plant	11,188*	15*
TOTAL		49,890	1231

* Approximately 55% of containers retrieved from storage are classified as CH-TRU waste. The numbers reported include only 55% of the available inventory for each generator site.

Information Only

Table 3-5. Total Quantity of CH-TRU Combustible Waste to be Shipped to WIPP

Waste Material	Weight (Kilograms)
COMBUSTIBLES	
-Cellulosics	
-Paper/Kimwipes	3,890,000*
-Cloth	226,000
-Other Paper	51
-Lumber (untreated)	73,100
-Lumber (treated)	36,700
-Plywood	98,400
-Other Wood (rulers)	<1
-Other Wood (all types)	23,700
-Other Cellulose (with phenolic binder)	1,720
-Cellulosics Subtotal	4,350,000

* All numbers, including totals, rounded off to a maximum of three significant number.

Information Only

Table 3-5. Total Quantity of CH-TRU Combustible Waste to be Shipped to WIPP (Continued)

Waste Material	Weight (Kilograms)
COMBUSTIBLES	
-Plastics	
-Polyethylene	1,540,000*
-Polyvinyl Chloride	1,040,000
-Surgeon's Gloves (latex)	582,000
-Leaded Rubber Gloves (Lead-Hypalon-Neoprene)	596,000
-Hypalon	114,000
-Neoprene	129,000
-Viton	133
-Teflon	41,000
-Plexiglas (including Lucite)	18,900
-Styrofoam	330
-Plastic Prefilters (polypropylene?)	33,600
-Polystyrene	2,560
-Conwed Pads (plastic fibers)	2,030
-Other Plastic	75,500
-Other Rubber (Kalrez)	<1
-Other Rubber (undefined)	7,530
-Plastics Subtotal	4,180,000

* All numbers, including totals, rounded off to a maximum of three significant number.

Information Only

Table 3-5. Total Quantity of CH-TRU Combustible Waste to be Shipped to WIPP (Continued)

Waste Material	Weight (Kilograms)
COMBUSTIBLES	
-Other	
-Blacktop	18,800*
-Other	41,700
-Other Subtotal	60,500
-Cellulosics Subtotal	4,350,000
-Plastics Subtotal	4,180,000
-Other Subtotal	60,500
COMBUSTIBLES TOTAL IN CH-TRU WASTE	8,590,000

* All numbers, including totals, rounded off to a maximum of three significant number.

Information Only

Table 3-6. Total Quantity of CH-TRU Metal Waste to be Shipped To WIPP

Waste Material	Weight (Kilograms)
Metals	
-Aluminum	666,000*
-Beryllium	8,640
-Cadmium	5
-Chromium	5
-Copper	300,000
-Iron	2,620,000
-Lead	
- Metallic	513,000
- Glass (includes weight of glass)	1,120,000#
- Gloves (includes weight of gloves)	596,000#
-Lithium (batteries)	1,030
-Mercury	120
-Paint Cans	547,000
-Platinum	1,500
-Selenium	5
-Silver	5

* All numbers, including totals, rounded off to a maximum of three significant number.

The reported weights for lead include the weight of the matrix, therefore, the values are conservative (too high).

Information Only

Table 3-6. Total Quantity of CH-TRU Metal
Waste to be Shipped To WIPP (Continued)

Waste Material	Weight (Kilograms)
Metals	
-Steel (including stainless, crushed drums inner drums, carbon steel, etc.)	9,170,000*#
-Shipping Cans	217
-Tantalum	125,000
-Tungsten	20,000
-Other	146,000
Total Metals	15,800,000

* All numbers, including totals, rounded off to a maximum of three significant number.

The weight of steel quoted in the table includes the weight of the waste containers (drums and boxes) for INEL and LANL.

Information Only

TABLE 3-7

TOTAL NITRATES AND INORGANIC CARBON IN CH TRU WASTE

TO BE SHIPPED TO WIPP

REPORTING SITE	INORGANIC NITRATES (Kg)	INORGANIC CARBON (As Carbonate) (Kg)
Lawrence Livermore National Laboratory	215[1]	53.75
Argonne National Laboratory-East	6600.5[2]	25.80
Richland-Hanford	27.26	2.60
Rocky Flats Plant	83,221[3]	17.07
Oak Ridge National Laboratory	7.31	1.63
Savannah River Plant	81,398[4]	406,991
TOTALS	**171,469.07**	**407,091.85**

Notes:

[1]Lawrence Livermore National Laboratory reported this as residual nitrate in waste used per year at site.

[2]Argonne National Laboratory-East reported Kg/yr per content code, and residual nitrate in waste used per year at site.

[3]Rocky Flats Plant reported concentration in g/Kg per content code for all sludges.

[4]Savannah River Plant reported concentrations as g/Kg in waste. Total mass of inorganic nitrates and inorganic carbon was calculated from total mass of waste and constituent concentration.

Information Only

Table 3-8. Total Quantity of Metal and Combustible Packaging in CH-TRU Waste to be Shipped to WIPP*#

Container Type	Packaging Material	Weight (Kilograms)
Drums	Steel	8,295,000
4x4x7 Boxes	Steel	365,000
Standard Waste Boxes	Steel	2,380,000
	Total Steel	11,000,000
Drums	Polyethylene Rigid Liners	1,550,000
Drums	Fiberboard Liners	21,000
4x4x7 Boxes	Fiberboard Liners	0
	Total Fiberboard Liners	21,000
4x4x7 Boxes	Wood/Plywood	1,470,000
4x4x7 Boxes	Polyvinyl Chloride Liners	29,600
Standard Waste Boxes	Polyvinyl Chloride Liners	35,000
	Total Polyvinyl Chloride Liners	64,600
Drums	Polyvinyl Chloride/Polyethylene Drum Liner Bags	246,000

* Estimates based on the weights supplied by Rocky Flats Plant for individual items as noted in Table 3-9.

\# The weight of the drums, boxes and packaging materials for INEL and LANL were included in the waste contents in Tables 3-5 and 3-6.

Information Only

Table 3-9. Average Weights Used for Calculation of Container and Packaging Materials

Type of Packaging Material	Weight (Kilograms)
Drums -	
Weight of 17C drum	29.5*
Weight of 90-mil high-density polyethylene liner	6.8
Weight of Polyvinyl Chloride drum liner bag	0.7
Weight of Polyethylene drum liner bag	0.7
Weight of Fiberboard liner for 55 gallon drum	2.0
4x4x7 Boxes -	
Weight of 4x4x7 metal box	217.7
Weight of Plywood liner for 4x4x7 metal box	175.5
Weight of PVC liner bag for 4x4x7 box	5.0
Weight of fiberboard liner for 4x4x7 box	11.8
Weight of wooden 4x4x7 box	208.7
Weight of fiberglass reinforced wooden box	322.0
Standard Waste Boxes -	
Weight of Standard Waste Box	310.7#
Weight of PVC liner bag	4.0

* All weights are based on containers and packaging materials used at the Rocky Flats Plant, except for the weight of the Standard Waste Box.

Trupact-II Safety Analysis Report, Appendix 1.3.4, Revision 0, 1989.

Information Only

Table 3-10. Current Estimate of Total Number of Drums and Boxes to be Shipped to WIPP

Current Estimate of Total Number of Drums and Boxes*

Drums	333,188
Boxes	
- 4x4x7	6,772
- SWB	9,502

Total Number of Drums and Boxes to be Used in Calculation of Waste Averages

Drums	283,298
Boxes	
- 4x4x7	5,541
- SWB	9,502

* These totals include drums and boxes for which no waste characterization information exists. THESE NUMBERS SHOULD NOT BE USED TO CALCULATE AVERAGE WEIGHTS OF WASTE IN DRUMS OR BOXES.

Information Only

4.0 SPECIAL ESTIMATE OF CHELATING AGENTS PRESENT IN CH-TRU WASTE

4.1 METHODOLOGY FOR CHELATING AGENT ESTIMATIONS

Chelating agents present in the waste could form stable aqueous complexes with radionuclides and other elements in any fluids that might exist in the waste or result from seepage of brine into the repository. An estimation of the total amount of chelating agents that could form potential complexes with any radionuclides is an important input parameter to the Performance Assessment.

An initial list of potential chelating agents in the waste was compiled from two sources:

- The initial submittal of the nonradionuclide inventory by the sites.
- Chemical lists provided as part of the chemical compatibility studies in support of the Safety Analysis Report for Packaging (SARP) for the TRUPACT-II shipping package.

The list of chemicals in CH-TRU waste (Table 4-1) was submitted to Sandia National Laboratory for a radionuclide transport consultant to estimate which potential chelating agents could have an effect on the radionuclide inventory in a saturated brine similar to that expected in the repository. Those chemicals indicated with an asterisk (Table 4-1) are the most important potential chelating agents in the CH-TRU nonradionuclide inventory (Brush, 1989).

4.2 Sources of Information

Based on the potentially important chelating agents identified Brush (1989), a letter was transmitted to the 10 generator/storage sites requesting that the site representatives contact the individual generators within each site for quantitative information on the chemicals list.

The sites were also provided, in the above letter, with a list of the potential chelating agents previously submitted by the sites (Table 4-1) that Greg Choppin did not consider major contributors to increased radionuclide solubility and quantitative information was not needed at present. The sites were asked to list and obtain quantitative information on any other potential chelating agents that their individual generators had not reported before and did not appear on the list (Table 4-1).

The sites were given several options for reporting the quantity of a potential chelating agent that was used at a site on a per year basis:

- Provide information on the concentration of a chemical in a particular waste stream (content code), or
- Total quantity of a chemical used/year for a waste stream, or
- Total quantity of a chemical used/year for an entire site.

Information Only

TABLE 4-1

COMPOSITE LIST OF ORGANIC CHEMICALS IN TRU WASTE*

Group 3 (Acids, Organic)

Ascorbic Acid
Acetic Acid
Oxalic Acid
-Hydroxy Isobutyric Acid
Acetic Acid
Di(2-ethylhexyl)-phosphoric Acid
Lactic Acid
Citric Acid

Group 4 (Alcohols and Glycols)

Butanol
Ethanol
Glycerin
Isopropanol
Methanol
2-Ethyl-1-Hexanol
Polyethylene Glycol

Group 5 (Aldehydes)

Formaldehyde

Group 6 (Amides)

Acetamide

Group 7 (Amines, Aliphatic and Aromatic)

Hydroxylamine
Adogen-364-hp(tri-laurylamine)

Group 8 (Azo Compounds, Diazo Compounds and Hydrazines)

Hydrazine
Hydrazine Mononitrate

Group 13 (Esters)

Amyl Acetate

* A majority of these chemicals are present in only trace amounts in the waste.

Information Only

TABLE 4-1 (CONTINUED)

Group 16 (Hydrocarbons, Aromatic)

- Toluene
- Xylene
- Diethyl Benzene (DEB)
- Diisopropylbenzene
- Ethyl Benzene

Group 17 (Halogenated Organics)

- 1,1,2-Trichloro-1,2,2-Trifluoroethane
- Carbon Tetrachloride
- Chloroform
- Trichloroethylene
- Bromoform
- Dichloroethane
- Trichloroethane
- Methylene Chloride
- Tetrachloroethylene
- 1,1,1-Trichloroethane

Group 18 (Isocyanates)

- Ammonium Thiocyanate

Group 19 (Ketones)

- Acetone
- Methyl Acetone
- Methyl Isobutyl Ketone
- Thenoylfluoro-acetone (TFA)
- 2-5-di-tert-butyl-hydroquinone (DBHQ)
- Methyl Ethyl Ketone

Group 27 (Nitro Compounds)

- Nitrocellulose
- Urea Nitrate

Group 28 (Hydrocarbons, Aliphatic, Unsaturated)

- Butadiene
- Styrene

Information Only

TABLE 4-1 (CONTINUED)

Group 29 (Hydrocarbons, Aliphatic, Saturated)

Decane
Hexane
Kerosene
Nonane
Pentane
Petroleum Ether
n-dodecane
Oils (C6 to C20)
Octane

Group 31 (Phenols, Cresols)

Picric Acid

Group 32 (Organophosphates, Phosphothioates, Phosphodithioates)

Tributyl Phosphate
Tri-n-octyl phosphine oxide (TOPO)

Group 103 (Polymerizable Compounds)

Epoxy

Information Only

4.3 General Limitations on Information

The major limitations of the quantities of potential chelating agents reported in this section are:

- Estimates are probably conservative, since some chelating agents may end up in equivalent low-level waste from the same waste stream. This limitation is not necessarily true for every waste stream or every site.

- The sites are basing the information on present consumption rates. Some estimates have been made where processes have changed in the past, to correct for past consumption rates. Future generation rates depend on several variables, and extrapolation of the consumption rates into the future are estimates, at best.

- For stored waste, the present-day consumption rates were used to estimate quantities in retrievably-stored waste to be shipped to WIPP (back to approximately 1970).

4.4 Database

Due to the minimal amount of time between site submittal of the data and presentation of the data in this report, calculations for the chelating agents were done "by hand" and the amounts are not included in the current revision (Rev. 0) of the database. The information will be included in future revisions of the database.

4.5 Calculations

The quantities of chelating agents reported in the waste were calculated using several different methods depending upon how the information was reported:

- If data was reported in concentration units within a waste stream, the concentration was multiplied by the weight in an average drum or box to obtain a quantity per drum or box. The resulting number would then be multiplied by the number of drums and/or boxes generated per year (newly-generated waste) or the total in storage (retrievably-stored waste). The amount calculated would be summed until the year 2013. This would give a total amount of a potential chelating agent in a waste stream (content code) for the lifetime of that particular waste process.

- If the data was reported as a total quantity of potential chelating agents per waste stream (content code), then the data per waste stream was multiplied by the appropriate number of years (for present and/or past consumption) to obtain a total for a waste stream (content code) for the lifetime of that particular waste process.

- The information calculated for each waste stream at a site (the result of either calculation method above) was then summed with other waste streams (content codes) at a site to provide a total amount of a potential chelating at a site. Lastly, quantities of each potential chelating agent from each site was summed to provide an overall estimate in kilograms for each potential chelating agent (Table 4-2).

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TABLE 4-2

COMPLEXING AGENTS PRESENT IN CH TRU WASTE

REPORTING SITE	∝-HYDROXY ISOBUTYRIC ACID (Kg)	ASCORBIC ACID (Kg)	ACETIC ACID (Kg)	CITRIC ACID (Kg)	LACTIC ACID (Kg)	OXALIC ACID (Kg)	8-HYDROXY QUINOLINE (Kg)	1,10 PHENAN-THROLINE (Kg)	DHDECMP (Kg)
Lawrence Livermore National Laboratory	0	0	43[1]	21.5[1]	86[1]	21.5[1]			
Argonne National Laboratory-East	0	4.3[1]	10.75[1]	43[5]	0	10.75[1]			
Richland-Hanford	0[6]	0[6]	0[6]	0[6]	0[6]	0[6]			
Rocky Flats Plant	0	193.5[1]	2030.8[1,7]	755.4[1,8]	0	193.5[1]	98.9[1]	0.52	156.8[1,2]
Oak Ridge National Laboratory	0.26[3]	0.043[3]	0.043[3]	0.043[3]	0	0.32[3]			
Savannah River Plant	0	11,181.1[4]	447.2[4]	0	0	4916.7[4]			
TOTALS	**0.26**	**11,378.9**	**2531.8**	**819.9**	**86**	**5142.8**	**98.9**	**0.52**	**156.8**

[1]Reported Kg/yr used at site; assumed 100% will eventually end up in waste.

[2]DHDECMP = dihexyl-n, n-diethylcarbam yl methyl phosphonate.

[3]Oak Ridge National Laboratory reported Kg/yr per waste generated.

[4]Savannah River Plant reported concentrations as g/Kg in waste. Total mass of agents were calculated from total mass of waste and agent concentration.

[5]Argonne National Laboratory-East reported "Radiawash" decon. solution which may contain citric acid and EDTA. Assumed ~10% of solution waste was citric acid.

[6]Richland-Hanford reported "N/A" for these agents; assume total usage is 0.

[7]Includes acetic acid and sodium acetate converted to acetic acid.

[8]Includes citric acid and sodium citrate converted to citric acid.

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5.0 SUMMARY OF INVENTORY

This database represents the first attempt to quantify the amount and type of CH-TRU waste that will be shipped in TRUPACT-II and placed underground in WIPP. This is a "living" database that has undergone several minor revisions with the generator and storage sites in order to better define some of the variables.

There are several limitations to the database as noted in previous sections. However, this database represents the best estimates of the nonradionuclide inventory for Performance Assessment calculations because the data was supplied by the actual sites that generator and/or store the waste prior to shipment.

DOE has requested that an effort be made during 1989 to combine the Nonradionuclide Inventory Database with two similar databases: the TRUPACT-II Chemical Database and the TRU-Mixed Waste Characterization Database. The three databases will be combined into one large dBASE III file and resubmitted to the sites to rectify any internal inconsistencies that exist between similar data reported in more than one database. This combined database will also be made internally consistent with the Integrated Data Base (U. S. DOE, 1988).

Information Only

6.0 REFERENCES

Brush, L., 1989, Personal Communication, Sandia National Laboratory.

Clements, T. L. and Kudera, D. E., Tru Waste Sampling Program: Volume 1 -- Waste Characterization, EGG-WM-6503, September, 1985.

U.S. DOE, 1986, Integrated Data Base for 1986: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, DOE/RW-0006, Rev. 2.

U.S. DOE, 1988, Integrated Data Base for 1988: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics, DOE/RW-0006, Rev. 4.

U.S. DOE, 1989, TRUPACT-II Content Codes (TRUCON), DOE/WIPP 89-004, May 1989, Rev. 1.

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APPENDIX 1.0
NONRADIONUCLIDE INVENTORY QUESTIONNAIRE SENT TO CH-TRU WASTE GENERATING/STORAGE SITES

Information Only

DOE F 1325.8

United States Government

memorandum

RECEIVED
MAY 10 1988
IT CORP.-ALBUQUERQUE

Department of Energy
Albuquerque Operations Office
Waste Isolation Pilot Plant
Carlsbad, New Mexico 88221

DATE: MAY 05 1988

REPLY TO ATTN OF: WIPP:HJD 88-0679

SUBJECT: Generator Input to the Preparation of the Nonradionuclide Inventory for the WIPP Performance Assessment

TO:
John Warren, Los Alamos
Barry Fritz, Argonne
Darrell Hinkley, Idaho
Mike Thompson, Hanford
Carroll Nix, Oak Ridge
Susie Jackson, LLNL
Art Vollmer, NTS
Charles Wickland, Rocky Flats
Gloria Millard, SNL
Jim Thompson, ITRI, Lovelace
Dick Blauvelt, Mound
Phil Brandt, Savannah River

The second meeting of the RCRA Interface Working Group (RIWG) was held March 21 and 22 in Denver, Colorado. The meeting included a presentation on the information requirements for the Performance Assessment (PA) as required under 40 CFR Part 191.

During this presentation, a draft entry form for submittal to WIPP of generator site waste information was reviewed and discussed. Enclosed is the revised nonradionuclide inventory data entry form that is required to be completed by each facility which plans to send TRU waste to the WIPP.

Data furnished by the sites as part of this request will be used to compile the first nonradionuclide inventory for all waste to be shipped to WIPP during the operational lifetime of the repository. This information is crucial baseline data to initiate the derivation of the source term for the performance assessment calculations to satisfy the EPA requirements for repositories (40 CFR 191). The information requested needs to be derived from existing analyses of the waste, process knowledge and history, and discussions with site personnel to make best estimates of the type and concentration of materials found in the waste.

All data from facilities that plan to send TRU waste to the WIPP should be submitted to this office (Attention: Tom Lukow) and one copy should be forwarded to:

IT Corporation
Attention: Paul Drez
2340 Alamo Street, SE, Suite 306
Albuquerque, NM 87106

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These data are requested no later than June 1, 1988. For further assistance in completing this report, please contact Tom Lukow at FTS 571-2108 or (505) 887-8108.

Jack B. Tillman
Project Manager

Attachment

cc w/attachment:
Lisa Blanchfield, INEL
Tom Clements, EG&G Idaho/INEL
Ralph Ditch, ANL-E
Ray Borkowski, ORNL-HAZWRAP
Kaye Sigman, ORNL-HAZWRAP
Mary T. Acock, LLNL
Ed Taylor, LLNL
Jeff Paynter, Rocky Flats
Peggy McCarthy, Hanford
Mike Brown, W-Hanford
Glenn Pierce, F. M. Stoller
Sam Sufferin, Oak Ridge
Jim Smith, Oak Ridge
Paul Drez, IT
Bill Coons, IT
Kim Wierzbicki, Savannah River
Jim White, LANL
Sharla Bertram Howery, SNL
Larry Brush, SNL
Fil Fong, DOE/San Francisco
Charlene Experza-Baca, DOE/AL
John Mathur, DOE/HQ
Tom Lukow, DOE/WIPP
Wayne Walker, DOE/WIPP
Hal Davis, DOE/WIPP
Mike McFadden, DOE/WIPP
Tim Campbell, WID
J. E. Johnson, WID
Larry Patrick, WID
Bob Kehrman, WID

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WIPP PERFORMANCE ASSESSMENT ACTIVITIES
NONRADIONUCLIDE INVENTORY DATA FORM INSTRUCTIONS

The following information is requested of facilities planning to send TRU waste to the WIPP. The purpose of this information request is to prepare the nonradionuclide inventory to be used in calculations for the long-term performance assessment at the WIPP.

Generators should report all contact handled (CH) and remote handled (RH) wastes to be sent to the WIPP. Generators should not include wastes which are or will be shipped to other DOE installations for treatment or temporary storage. These wastes should be listed and described by the DOE facility which will be shipping the wastes to the WIPP. All waste should be described in the final form to be shipped to WIPP (e.g. cemented).

GENERAL INFORMATION
TABLE A

- TABLE A SHOULD BE COMPLETED FOR EACH WASTE FORM.
- List the waste form and indicate whether this is CH or RH waste.
- Specify the original generator site and the temporary storage site for the waste.
- Indicate if this waste previously was identified by other content codes or IDC numbers.
- List the type of container(s) (Drum/Box).
- Indicate if the contents is wet and estimate the void volume (%) in the container.
- List the type of liner(s) (examples: lead, 90 ml polyethylene, wood).

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- List quantities in storage through October 1, 1988 for drums and boxes and estimate quantities of this waste to be produced in the future through 2013.

- Indicate the percentage of drums and boxes for each IDC included in the stored and/or newly generated wastes.

- Indicate the method of waste characterization and sources of information for the various waste constituents.

WASTE FORM INFORMATION

TABLE B

- TABLE B SHOULD BE COMPLETED FOR ALL WASTE FORMS EXCEPT SLUDGES.

- If a constituent is not present enter N/A.

- List the total weight (Kg) for each waste type (combustibles, glass etc.).

- Estimate the minimum, maximum, and average quantity (weight %) of each constituent listed under that waste type. If the quantity is greater than 5 percent, then give the estimated value. If the quantity is less than 5 percent, then indicate the appropriate code for trace quantities as follows:

"A" = NOT PRESENT
"B" = less than 10 ppm
"C" = 10 - 100 ppm
"D" = 100 - 1000 ppm
"E" = 1000 ppm - 1 percent
"F" = 1 - 5 percent

Specify any other constituents that should be included under the waste type.

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EXAMPLE:

	MINIMUM	MAXIMUM	AVERAGE
Combustibles (Total Weight Kg)	45	216	86
Polyethylene (Weight %)	D	E	E
PVC	A	E	D
Teflon	A	C	B
Surgeon's Gloves	E	20	10

SLUDGE AND CONCRETED WASTE FORM INFORMATION
TABLE C

- TABLE C SHOULD BE COMPLETED FOR ALL SLUDGES AND CONCRETED WASTE FORMS BY IDC NUMBER.

- COMPLETE THIS INFORMATION FOR EACH IDC NUMBER INCLUDED UNDER THE SPECIFIED WASTE FORM.

- List the quantity of sludge only by weight (Kg).

- List the quantity of water added by weight (Kg).

- List the types and quantities (Kg) of cement, additives and absorbents.

CHEMICAL COMPONENTS OF SLUDGES

- **Estimate the minimum**, maximum and average concentration (mg/l) for each component (complexing agent, oil, solvent, etc.) using the trace quantity codes or specifying amounts greater than 5 g/l.

TRACE QUANTITY CODES:

"G" = NOT PRESENT
"H" = less than 10 mg/l
"I" = 10 - 100 mg/l
"J" = 100 - 1000 mg/l

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"K" = 1000 mg/l - 1 g/l

"L" = 1 - 5 g/l

- List the chemical composition or brand name and manufacturer of the emulsifiers, surfactants, detergents or other additives used.

- Provide any information available on the chemistry of all additives in the sludges.

- Analytical data sheets from laboratories can be attached in lieu of completion of Table C for an IDC.

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TABLE A

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

General Information

Waste Form _____ Generator Site _____

CH or RH Waste _____ Storage Site _____

Previously used numbers for Content Code/Waste Form/IDC Number [if a particular code has been replaced with a new code, indicate for each code; e.g., new code (old code) or 113 (004)].

_____

Type of Container (Drum/Box) _____

Contents Wet (Yes/No) _____ Average Void Volume _____ %

Type of Liner _____

Stored Waste

Number of Drums in Storage (10/1/88) _____

Number of Boxes in Storage (10/1/88) _____

Newly-Generated Waste

Number of Drums/Boxes Produced (Yearly Average) -

	Drums	Boxes
10/1-12/31/88	_____	_____
1989-1993	_____	_____
1994-1998	_____	_____
1999-2003	_____	_____
2004-2008	_____	_____
2009-2013	_____	_____

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TABLE A
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

If more than one IDC is included under a content code, indicate the percentage of drums or boxes for each code that will be produced (stored/newly-generated):

STORED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____

NEWLY-GENERATED WASTE (TO BE SHIPPED TO WIPP)

IDC	% Drums/Boxes	IDC	% Drums/Boxes	IDC	% Drums/Boxes
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____
____	_____	____	_____	____	_____

****

Indicate the Method of Waste Characteization:

(Enter A if knowledge of the Waste)

(Enter B if knowledge of Process Generating Waste)

(Enter C is Analyses of Waste)

Data Source for Information on Combustibles, Metals, Glass, Filters, Resins, Graphite, and other Inorganic Solids _____

Data Source for Information on Sludges _____

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TABLE B

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ Generator Site _____

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Combustibles (Total Weight Kg)			
Polyethylene (Weight %)			
PVC			
Teflon			
Surgeon's Gloves			
Paper/Kimwipes			
Cloth			
Rubber			
Neoprene			
Hypalon			
Other (Specify) _____			
_____			
Leaded Gloves			
Lumber (untreated)			
Lumber (treated)			
Plywood			
Other (Specify) _____			
_____			

*Coding for trace quantities: "A" = NOT PRESENT; "B" = <10 PPM; "C" = 10 - 100 PPM; "D" = 100 - 1000 PPM; "E" = 1000 PPM - 1%; "F" = 1 - 5%

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TABLE B
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ Generator Site _____

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Glass (Total Weight Kg)			
Raschig Rings (Weight %) (unleached)			
Raschig Rings (leached)			
Borosilicate			
Non-borosilicate			
Ceramic Crucibles			
Leco Crucibles			
Leaded			
Other (Specify) _____			
_____			
Metals (Total Weight Kg)			
Tantalum (Weight %)			
Stainless Steel			
Iron			
Copper			
Aluminum			
Tungsten			
Lead (do not include liners)			

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

Information Only

TABLE B
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ Generator Site _____

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

	MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Metals (Continued)			
Beryllium (**Weight %**)			
Paint Cans			
Lithium (Batteries)			
Other (Specify) _____			
_____			
Filters (**Total Weight Kg**)			
HEPA (**Weight %**)			
Ful-Flo			
Other (Specify) _____			
_____			
Resins (**Total Weight Kg**)			
Anionic (**Weight %**)			
Brand Name _____			
Cationic			
Brand Name _____			
Other (Specify) _____			

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

Information Only

TABLE B
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ Generator Site _____

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

		MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
Graphite (Total Weight Kg)				
Molds (Weight %)				
Crucibles				
Other (Specify)				
Inorganic Solids				
Ash (Weight Kg)				
Concrete (Waste)				
Firebrick				
Lead Oxide				
Oil Dri				
Sand				
Slag				
Soot				
Other (Specify)				

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

Information Only

TABLE B
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ Generator Site _____

AVERAGE WEIGHT OF WASTE FORMS AND PERCENT CONSTITUENTS
(CONTINUED)

		MINIMUM* (DRUM/BOX)	MAXIMUM* (DRUM/BOX)	AVERAGE* (DRUM/BOX)
-Organic Waste				
Oils				
Type	_____	_____	_____	_____
Type	_____	_____	_____	_____
-Solvents				
1,1,1 Trichlorcethane		_____	_____	_____
Trichlorotrifluoroethane (Freon)		_____	_____	_____
Trichloroethylene		_____	_____	_____
Xylene		_____	_____	_____
Cyclohexane		_____	_____	_____
Carbon Tetrachloride		_____	_____	_____
Methylene Chloride		_____	_____	_____
Acetone		_____	_____	_____
Other (Specify)	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
-Alcohols				
Methanol		_____	_____	_____
Ethanol		_____	_____	_____
Isopropanol		_____	_____	_____
Butanol		_____	_____	_____
Other (Specify)	_____	_____	_____	_____
	_____	_____	_____	_____

*Coding for trace quantities: "A" = NOT PRESENT
"B" = <10 PPM
"C" = 10 - 100 PPM
"D" = 100 - 1000 PPM
"E" = 1000 PPM - 1%
"F" = 1 - 5%

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TABLE C

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ IDC _____ Generator Site _____

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(ABSORBED, SOLIDIFIED, AND CONCRETED)

******SLUDGE INFORMATION SHOULD BE PROVIDED BY IDC ONLY******

COMPONENT	MINIMUM	MAXIMUM	AVERAGE
Volume of Sludge (**Weight in Kg**)	_____	_____	_____
Water Added (Weight in Kg)	_____	_____	_____
Cement Type _____			
Cement Weight (in Kg)	_____	_____	_____
Cement Type _____			
Cement Weight (in Kg)	_____	_____	_____
Additive _____			
Additive Weight (in Kg)	_____	_____	_____
Additive _____			
Additive Weight (in Kg)	_____	_____	_____
Additive _____			
Additive Weight (in Kg)	_____	_____	_____
Absorbent _____			
Absorbent Weight (in Kg)	_____	_____	_____
Absorbent _____			
Absorbent Weight (in Kg)	_____	_____	_____

Information Only

TABLE C
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ IDC _____ Generator Site _____

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
-Inorganic			
-Cations			
Al			
Ca			
Fe			
K			
Mg			
Mn			
Na			
Si			
Sr			
Ti			
Other (Specify) _____			
_____			
_____			
-Anions			
Cl			
CO_3			
F			
NO_3			
PO_4			
SO_4			
Other (Specify) _____			
_____			

*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

Information Only

TABLE C
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ IDC _____ Generator Site _____

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
Chemical Components of Sludges (Continued)			
-Inorganic (Continued)			
-Other Inorganics and Parameters			
pH#			
H_2O			
-Complexation Chemicals			
EDTA (Versene)			
DPTA			
Tributyl Phosphate			
Citric Acid			
8-Hydroxyquinoline (Oxime)			
Acetic Acid			
Other (Specify) _____			
_____			
_____			
-Organic			
Oils			
Type _____			
Type _____			

pH before solidification or addition of concrete.
*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

Information Only

TABLE C
(CONTINUED)

INFORMATION NEEDED ON WASTE FORMS FOR NONRADIONUCLIDE INVENTORY

Waste Form _____ IDC _____ Generator Site _____

AVERAGE WEIGHT AND COMPOSITION OF SLUDGES
(CONTINUED)

Chemical Components of Sludges

COMPONENT	CONCENTRATION (mg/l)* (IN SLUDGE PRIOR TO CEMENTATION) MINIMUM	MAXIMUM	AVERAGE
-Organic			
-Solvents			
1,1,1 Trichloroethane			
Trichlorotrifluoroethane (Freon)			
Trichloroethylene			
Xylene			
Cyclohexane			
Carbon Tetrachloride			
Methylene Chloride			
Acetone			
Other (Specify) _____			
_____			
_____			
-Alcohols			
Methanol			
Ethanol			
Isopropanol			
Butanol			
Other (Specify) _____			
_____			
-Emulsifier			
Type _____			
Type _____			
-Surfactant			
Type _____			
Type _____			
-Detergents			
Type _____			
Type _____			

*Coding for trace quantities: "G" = NOT PRESENT "J" = 100 - 1000 mg/l
"H" = <10 mg/l "K" = 1000 mg/l - 1 g/l
"I" = 10 - 100 mg/l "L" = 1 - 5 g/l

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APPENDIX 2.0

LISTING OF ALL FIELD NAMES USED IN NONRADIONUCLIDE INVENTORY DATABASE

DBase III+

Field Name	Type	Description
NAME	Character	Name of site shipping waste to WIPP.
CODE	Character	First or dominant identification code (IDC) of waste form.
RH	Logical	Remote Handled or Contact Handled waste indicator, (Remote Handled -- RH=T, Contact Handled -- RH=F).
FORM	Character	Descriptive name of the waste form.
FORMB1	Character	'Waste group' name which refers to a subset grouping of constituents within a waste form, (eg. Combustibles, Glass, Metals, Filters, Organics, etc.).
FORMB2	Character	'Waste subgroup' name which refers to a further subset grouping of constituents within a waste group, (eg. rubber, wood, plastic, etc. within the combustibles group which would then be specified further into types of rubber or wood in the constituent field -- CONSTIT).
CONSTIT	Character	Name of the individual waste constituent within a waste form. (At the beginning of each waste group, the constituent is replaced with "TOTALS", indicating the total weight (in kg) per drum for that waste group.
DN	Character	A one character code representing the minimum trace quantity of a constituent per drum. For solid, dry waste material (not sludge), the codes used in table B were based on PPM or the percent of the total weight reported for a group of constituents (FORMB1) per drum/box: "A" = Not Present "B" = ≤ 10 PPM or 0.001% "C" = > 10 PPM -- 100 PPM or > 0.001% -- 0.01% "D" = > 100 PPM -- 1000 PPM or > 0.01% -- 0.1% "E" = > 1000 PPM -- 1% "F" = > 1% -- 5%

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		For solidified or cemented sludge the codes used in table C were based on mg/liter or the percent of the total sludge weight per drum/box: "G" = Not Present "H" = ≤ 10 mg/l or 0.001% "I" = > 10 mg/l -- 100 mg/l or > 0.001% -- 0.01% "J" = > 100 mg/l -- 1000 mg/l or > 0.01% -- 0.1% "L" = > 1 g/l -- 5 g/l or 0.1% -- 0.5% If the constituent percentage is greater than the maximum code (5% for table B, 0.5% for table C) then the actual percentage is entered under DMIN and DN is left blank.
DMIN	Numeric	Either the minimum total weight of a waste group per drum (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that minimum total weight for each constituent.
DX	Character	A one character code representing the maximum trace quantity of a constituent per drum. The character codes are the same as those used by DN above.
DMAX	Numeric	Either the maximum total weight of a waste group per drum (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that maximum total weight for each constituent.
DA	Character	A one character code representing the average trace quantity of a constituent per drum. The character codes are the same as those used by DN above.
DAVE	Numeric	Either the average total weight of a waste group per drum (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that maximum total weight for each constituent.
BN	Character	A one character code representing the minimum trace quantity of a constituent per box. The character codes are the same as those used by DN above.

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BMIN	Numeric	Either the minimum total weight of a waste group per box (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that minimum total weight for each constituent.
BX	Character	A one character code representing the maximum trace quantity of a constituent per box. The character codes are the same as those used by DN above.
BMAX	Numeric	Either the maximum total weight of a waste group per box (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that maximum total weight for each constituent.
BA	Character	A one character code representing the average trace quantity of a constituent per box. The character codes are the same as those used by DN above.
BAVE	Numeric	Either the average total weight of a waste group per box (in kg) if constituent (CONSTIT) is "TOTALS", or the percentage of that average total weight for each constituent.
DWTB1	Numeric	(Drum Weight, FORMB1) The average total weight of a waste group per drum (in kg). This is equal to DAVE when CONSTIT = "TOTALS". This field is used to calculate the total weight of each constituent per drum.
BWTB1	Numeric	(Box Weight, FORMB1) The average total weight of a waste group per box (in kg). This is equal to BAVE when CONSTIT = "TOTALS". This field is used to calculate the total weight of each constituent per box.
DWTC	Numeric	(Drum Weight, Constituent) The total weight of each constituent per drum. DWTC = (DAVE/100%) * DWTB1.
BWTC	Numeric	(Box Weight, Constituent) The total weight of each constituent per box. BWTC = (BAVE/100%) * BWTB1.
DSTOR	Numeric	Total number of drums reported in storage for each waste form and site.
BSTOR	Numeric	Total number of boxes reported in storage for each waste form and site.

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D89_93	Numeric	Estimated number of drums to be generated annually between 1/1/89 and 12/31/93 for each waste form and site.
B89_93	Numeric	Estimated number of boxes to be generated annually between 1/1/89 and 12/31/93 for each waste form and site.
D94_98	Numeric	Estimated number of drums to be generated annually between 1/1/94 and 12/31/98 for each waste form and site.
B94_98	Numeric	Estimated number of boxes to be generated annually between 1/1/94 and 12/31/98 for each waste form and site.
D99_03	Numeric	Estimated number of drums to be generated annually between 1/1/99 and 12/31/03 for each waste form and site.
B99_03	Numeric	Estimated number of boxes to be generated annually between 1/1/99 and 12/31/03 for each waste form and site.
D04_08	Numeric	Estimated number of drums to be generated annually between 1/1/04 and 12/31/08 for each waste form and site.
B04_08	Numeric	Estimated number of boxes to be generated annually between 1/1/04 and 12/31/08 for each waste form and site.
D09_13	Numeric	Estimated number of drums to be generated annually between 1/1/09 and 12/31/13 for each waste form and site.
B09_13	Numeric	Estimated number of boxes to be generated annually between 1/1/09 and 12/31/13 for each waste form and site.
D	Numeric	Total number of drums to be shipped to WIPP (drums in storage plus future generation over next 25 years).
B	Numeric	Total number of boxes to be shipped to WIPP (boxes in storage plus future generation over next 25 years).
TOTKGD	Numeric	(Total Kilograms Drums) Total weight (in kg) of each constituent in drummed waste per waste form and site. TOTKGD = DWTC * D.

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TOTKGB	Numeric	(Total Kilograms Boxes) Total weight (in kg) of each constituent in boxed waste per waste form and site. TOTKGB = BWTC * B.
TOTAL	Numeric	Total weight (in kg) of each constituent in all waste (boxes and drums) per waste form and site. TOTAL = TOTKGD + TOTKGB.
GEN1 thru GEN6	Character	Two character codes corresponding to the sites where the waste was generated. The codes used are: AE = Argonne National Laboratory -- East (ANL-E) AW = Argonne National Laboratory -- West (ANL-W) BC = Battelle Columbus Laboratory (BCL) BP = Battelle -- Pacific Northwest Laboratory (PNL) BE = Bettis Atomic Power Laboratory (BET) HF = Hanford (small offsite generators shipping for interim storage) ID = Idaho National Engineering Laboratory (INEL) LA = Los Alamos National Laboratory (LANL) LL = Lawrence Livermore National Laboratory (LLNL) MD = Mound NT = Nevada Test Site (NTS) OR = Oak Ridge National Laboratory (ORNL) RF = Rocky Flats Plant (RFP) RH = Richland Hanford (RH) SR = Savannah River Plant and Laboratory (SRP)

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STORED_AT	Character	Two character code corresponding to the site where the waste is presently stored. The codes used are the same as for the generator sites above.
CONTAINER	Character	Type of container(s) used to ship waste to the WIPP.
LINER	Character	Type of liner(s) used within each container.
WET	Logical	Indicates whether waste is wet or moist (contents wet or moist -- WET = "T", dry -- WET = "F").
VV	Numeric	The void volume (in percent) within the waste container.
VVD	Numeric	The void volume (in percent) within a waste drum.
VVB	Numeric	The void volume (in percent) within a waste box.
CHARMETHOD	Character	Letter codes indicating method of waste characterization. Codes are: A = Knowledge of the waste B = Knowledge of process generating the waste C = Analyses of the waste More than one code can be used for each waste form.
REFS	Memo	References and notes relating to the method of waste characterization.
NOTES_A	Memo	Additional general site and waste information not recorded in other fields. (Recorded from Table A of data received from sites.)
NOTES_B	Memo	Additional information relating to waste constituents not recorded in other fields. (Recorded from Table B of data received from sites.)
NOTES_C	Memo	Additional information relating to waste (sludge) constituents not recorded in other fields. (Recorded from Table C of data received from sites.)
N	Logical	Indicates if information is contained in any of the memo fields listed above (REFS, NOTES_A, NOTES_B, or NOTES_C).

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CATA thru CATC	Character	Shipping categories for the waste as reported in "TRUPACT II Content Codes (TRUCON)," DOE/WIPP 89-004, Rev. 0, Feb. 1989.
C1 thru C15	Character	Content codes and IDCs for the waste as reported in "TRUPACT II Content Codes (TRUCON)," DOE/WIPP 89-004, Rev. 0, Feb. 1989 with associated codes reported by each site.
CERT_STAT	Character	Certification Status of the waste for shipping. Certification codes are: CE = Certifiable without Processing -- Waste containers may require installation of filters, overpacking, etc. to meet the WIPP Waste Acceptance Criteria. CP = Certifiable with Current Processing Capability -- Waste requires change in the waste form before it can be certified. Also assumes that the processing facility exists or that the funding for construction of the processing facility has been allocated. CF = Certifiable with Future Processing Capability (Prior to 2013) -- Waste requires change in the waste form before it can be certified. Assumes the technology exists for processing but the facility construction has not been funded. SC = Special Case -- Waste requires technology development and facilities to make it certifiable.
PROCESS	Character	Treatment process of the waste prior to shipping.
T	Character	Indicates from which table the record information came (A, B, or C).
OT	Logical	Indicates if information for a waste form is reported in both Table B and Table C format. OT = "T" on Table C records only.
UP_DATE	Date	Date of last reported information from site.
CHECK_DATE	Date	Date of last Quality Control check on database information.
QC1 and QC2	Logical	Indicators of Quality Control Level/check status.

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