**Characterization Analysis
Database System (CADS)**

A System Overview

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Highly Enriched Uranium
Disposition Program Office

December 1997

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Prepared by the
Oak Ridge Y-12 Plant
managed by
Lockheed Martin Energy Systems, Inc.
for the
U.S. Department of Energy
under contract DE-AC05-84OR21400

MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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LIST OF ACRONYMS

ASTM	American Society for Testing and Materials
CADS	Characterization Analysis Database System
COEI	composition of ending inventory
DBMS	database management system
DOE	Department of Energy
DOE HQ	Department of Energy Headquarters
DOT	Department of Transportation
DP	Defense Programs
EDI	electronic data interchange
EM	Environmental Management
HDPO	Highly Enriched Uranium Disposition Program Office
HEU	highly enriched uranium
ILDB	item-level database
LEU	low-enriched uranium
LMES	Lockheed Martin Energy Systems, Inc.
LOC	location
MD	Materials Disposition
MTC	material type code
NE	Nuclear Energy
NMC&A	Nuclear Materials Control and Accountability
NMMSS	Nuclear Materials Management and Safeguards System
NN	Nonproliferation and National Security
NRC	Nuclear Regulatory Commission

PC	personal computer
PFD	process flow diagram
ppm	parts per million
RD	Restricted Data
RIS	reporting identification symbol
TVA	Tennessee Valley Authority
USEC	United States Enrichment Corporation

PREFACE

The purpose of this document, *Characterization Analysis Database System (CADS), A System Overview, Y/ES-240*, is to provide an informational overview of the CADS database, its evolution, and its current capabilities. The CADS database was developed as a Department of Energy (DOE) complex-wide item-level material database to provide consistent and accurate data throughout the process of the disposition of surplus highly enriched uranium (HEU). This document describes the purpose of CADS, the system requirements it fulfills, the database structure, and the operational guidelines of the system.

1.0 INTRODUCTION

The CADS database is a standardized, quality-assured, and configuration-controlled data management system developed to assist in the task of characterizing the DOE surplus HEU material. Characterization of the surplus HEU inventory includes identifying the specific material; gathering existing data about the inventory; defining the processing steps that may be necessary to prepare the material for transfer to a blending site; and, ultimately, developing a range of the preliminary cost estimates for those processing steps.

Characterization focuses on producing commercial reactor fuel as the final step in material disposition. Based on the project analysis results, the final determination will be made as to the viability of the disposition path for each particular "item" of HEU.

The data specific to the identified surplus HEU exist in various levels of detail on different computer systems at each site. The official DOE system, the Nuclear Materials Management and Safeguards System (NMMSS), contains all nuclear material at a summary level. Each summary-level record in NMMSS can represent thousands of individual items in a site Nuclear Materials Control and Accountability (NMC&A) database. The site NMC&A systems were developed to meet specific requirements of a particular site and/or mission and do not contain all the necessary attributes to characterize the surplus HEU. The CADS will transfer from the site NMC&A systems such attributes as material form, quantity, and location. However, for most items of surplus HEU, important analytical data,

such as isotopic content and trace element impurities, are generally insufficient for characterization. This type of characterization data are often found in many different formats, both electronic and hard copy, often using varying units of measure.

2.0 PURPOSE OF CADS

The basic mission of the CADS database is to provide electronic access to surplus HEU item-level data in a consistent and documented format that is easily and efficiently storable and retrievable. The CADS database was designed to use existing data from sources such as NMMSS, NMC&A site-level systems, various analytical laboratory systems, and hard copy reports. Following technical review by the characterization team, the data are augmented and refined for use in a standard, reliable, complex-wide implementation.

The objectives of CADS include:

1. Maintain complete, consistent, and fully qualified data as to the usability of the surplus HEU material;
2. Provide easy access to the HEU data to support the disposition planning, analysis, and decision-making process;
3. Facilitate the importing, analysis, and reporting of data;
4. Minimize uncertainties associated with data, data products, and interpretation of results by controlling data input and revisions; and,
5. Minimize redundancy and duplicative costs to DOE for data collection and analysis.

The CADS database is used in the project analysis process. Once the surplus HEU is identified by site, it is divided by form (e.g., oxide) and sub-form (e.g., U_3O_8). For each specific form of material, information is gathered, (e.g., quantity of uranium by isotopic content, major chemical constituents, and gross weight of surplus HEU), and linked with "existing" representative analytical

data. These attributes are assessed and disposition paths are determined by specific groupings of materials, potential customers, required processing steps, and availability. Once a disposition path is established, project planning tasks begin including scope and objective planning, cost estimating, and schedule development.

Figure 1 illustrates the various participants associated with the disposition program. The site item-level input data are reviewed, verified, and transferred into the system. Characterization reports (output) are produced and distributed to project managers and DOE Headquarters (DOE HQ). The project managers and DOE represent the program's primary customers, as illustrated in Figure 1. However, the CADS information is used by, and is of interest to, numerous secondary parties. The project analysis process includes review of Department of Transportation (DOT) shipping requirements, review of Nuclear Regulatory Commission (NRC) regulatory requirements, and analysis of other critical information necessary to determine the viability of a given disposition path.

The CADS characterization and project analysis process is graphically depicted in Figure 2. The right side of the graphic illustrates the information input into the CADS database. The site item-level database (ILDB) information is validated and transferred into CADS via electronic data interchange (EDI) or, on occasion, manually. The CADS database compares the item-level input data to both existing data and supporting data already in CADS that must be linked to the input data. The characterization team analyzes the information, reconciles discrepancies, and produces characterization reports. The physical and chemical form of surplus HEU dictates which processes can convert it into the chemical form acceptable for transportation and for subsequent blending

Figure 1. Material Disposition Participants.

Figure 2. CADS Project Analysis Process.

operations. Characterization reports are used for analysis and modeling, to produce process flow diagrams (PFD) for the disposition path, and to perform cost analyses. These primary and secondary outputs are depicted on the left side of Figure 2.

The CADS database is an important tool used in establishing and maintaining disposition projects. A disposition project is developed to implement the disposition path of the targeted surplus HEU with the goal of producing fuel. The project manager assigned to a given project becomes a customer of the characterization team. Information requests generated by the project manager will be prioritized and queries generated using CADS data for analysis by the characterization and project teams. Some resulting "project" data will be retained in the database, depicted by the "project attributes" feeding into the CADS system on the left side of Figure 2.

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3.0 SYSTEM REQUIREMENTS

Identifying system requirements is a critical step in developing a system that fulfills user expectations. Generally, customer requirements are established through an understanding of all aspects of the current job. Determining what the customer does today identifies short-term needs and forms the foundation for long-term planning and system enhancements. Questions needed to identify requirements are:

- Who uses the data?
- What do users do with the data?
- Where do the data originate?
- When are the data needed?
- Why are the data used?

The system requirements of CADS are:

1. The system must collect, filter, and store site item-level surplus HEU characterization data for the DOE complex.
2. The system must link disposition attributes, isotopic, analytical, and other support data to item-level data.
3. The system must provide selected attributes electronically for appropriate analyses, modeling, and data manipulation.
4. The system must have the capability to generate standard and custom reports for internal and external customers.
5. The system must provide reliable, consistent data.

The CADS database is capable of analyzing and storing the necessary attributes from DOE HEU site item-level systems to characterize the surplus HEU material. In addition to storing the item-level data, the database contains descriptive, qualifier data to aid in the documentation of data quality and enable the end user to analyze the appropriateness of the data for secondary uses. The database utilizes reference tables and attributes to document assay ranges, specific locations, material descriptions, and the source of isotopic and analytical information. These reference tables provide data consistency checks and analytical capabilities on the contents of the complete database. The reference tables also optimize storage space and decrease the execution time of database queries.

4.0 CADS STRUCTURE

A general understanding of the structure of CADS is useful in providing the capabilities of the system to a prospective user. The CADS database is executed on an IBM-compatible personal computer (PC) platform with integrated commercial and customized database software. The CADS uses a relational database management system (DBMS), Microsoft Access, to organize, store, retrieve, sort, analyze, and report the DOE surplus HEU information. The database tools offer powerful query capabilities, providing timely access through the use of indexed searching and reducing redundancy through the use of linked tables. The data are manipulated and stored in a consistent and compact fashion to provide timely, dependable access to the information, and the capability to produce standard and customized reports.

The CADS database is currently comprised of eleven linked tables. The three primary tables require input data from each site; the other eight tables have been populated with predefined values or are populated with site input. Figure 3 illustrates the manner in which the tables are related. Each table contains a number of records consisting of fields (or attributes). The table format is consistent, with each attribute defined as follows:

1. Field Name (or attribute name)
2. Required ("Y" indicating a required field, if applicable, and "N" indicating the field is not required; a required field may be populated with site input or generated by the characterization team)
3. Type (alphanumeric, text, integer number, etc.)

Figure 3. CADS Table Relationship Diagram.

4. Size (number of bytes)
5. Units of measure (specified where applicable)
6. Description (brief description of the attribute)

This section will discuss the three primary tables and their attributes. Those tables are: Site Item-Level (Table A-1), Site Item-Level Support (Table A-2), and the Isotopic and Analytical (Table A-3). These tables are populated with input from the individual sites. The characterization team requests site input using the input tables shown in Figures 4 and 5. These consolidated spreadsheets include all attributes for which site input is required. However, all attributes will not be completed for each item of material.

Site Item-Level Table

Table A-1 illustrates the fields in the site item-level table. Each site is requested to provide input to this table, which contains the necessary information about the surplus HEU material at that particular site. Each record of the site item-level table corresponds to an identifiable amount of material that the site has chosen to uniquely identify and track. The sum of all the material in the records of the site item-level table defines all the surplus HEU material at that site. This information is of the type generally found in a typical NMC&A site-level system.

Site Item-Level Support Table

Additional characterization information is necessary in the project analysis process. Table A-2 shows the fields for the additional information necessary to help characterize the surplus material. Each site provides input for this table, with some of the fields being populated during the characterization task. As necessary, the characterization team contacts the sites for confirmation of data.

Item Number	Project Number	LOC	LOC_Desc	COEI	grms_u_g	Net wt (gms)	Elem wt (gms)	Assay	Gms U235	Rec_Date	Category
		Yr_available	Block_ID	Disp_Path	RIS	MTC	InCont_Code	InCont_Desc	OutCont_Code	OutCont_Desc	Matl_Grp
		Add_Info									

Figure 4. Site Item-Level and Support Attributes Input Table.

Item Number	Rpt Date	²³² U	²³³ U	²³⁴ U	²³⁵ U	²³⁶ U	²³⁸ U	G/G	C	Ag	Al	As	Au	B	Ba	Be	Bi	Br	Ca	Cd
		Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	Ir	K	Li	Mg	Mn	Mo	Na	Nb	Ni
		Np	Os	P	Pb	Po	Pt	Pu	Rb	Re	Rh	Ru	S	Sb	Sc	Se	Si	Sn	Sr	Ta
		Te	Th	Tl	Tl	U	V	W	Y	Zn	Zr	Cl	F	I	Pa	Am	Cm	Ce	Dy	Er
		Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Tb	Tm	Yb								
Isotopics and material purity (first 7 columns) are percentages Element data (all others) are in parts per million (ppm) units																				

Figure 5. Element Attributes Input Table.

Isotopic and Analytical Table

This table, as shown in Table A-3, links the results of analytical laboratory samples to a material item. It is understood that each material item has not been sampled or analyzed for all of the elements listed in the Element Attributes Input Table (Figure 5). The characterization team requests that the site populate the input data with the most complete information available. For some groups of material, analyses or representative samples taken from the group have been used to characterize the entire group. Other data gaps have been filled by inference, meaning that material with the same form and processing history as other materials with known characteristics has been assigned those characteristics in the absence of some analytical data. The CADS has the ability to distinguish between actual and inferred data. Inferred or representative data must be confirmed in the future by sampling and laboratory analysis prior to actual material disposition.

The analytical laboratory information is very important in the project analysis process. Due to the differing methods of laboratory sampling and analysis, consistency within the database is paramount. The unit of measure for the analytical data is parts per million (ppm). If the site input is not represented in ppm, the characterization team will work with the site to convert the site data to the appropriate units.

The eight remaining tables are shown in Tables A-4 through A-11. Tables A-12 through A-14 illustrate valid values for three attributes.

5.0 CADS OPERATIONS

Efficient and reliable operation of the CADS system is critical in providing internal and external customers the information needed to accomplish the mission of the Surplus HEU Characterization Project. Information management including data input, validation, output, and change control processes are important elements for efficient operations.

The Highly Enriched Uranium Disposition Program Office (HDPO) has overall responsibility for the Surplus HEU Characterization Project. The project office, located at the Y-12 Plant, is responsible for the characterization effort and is the point of contact for inquiries. The office may be contacted as follows:

Lockheed Martin Energy Systems, Inc. (LMES)
HDPO
PO Box 2009
Mail Stop 8207
Oak Ridge, TN 37831-8207
Phone: (423) 576-8258
Fax: (423) 576-7891

As discussed in Section 4, the characterization team requests input from the sites using the format provided in Figures 4 and 5. These data requests are issued to the Nuclear Material Manager at each site holding surplus HEU. The data received from each site will be reconciled to NMMSS and/or to the approved Inventory Assessment Report prepared by the site for that same time period. The characterization team uses the database to analyze and verify the site data. The team will resolve discrepancies between the site data and

NMMSS and/or the Inventory Assessment Report and reconcile missing or unclear data with assistance from site personnel. Any new information requirements necessary for characterization are defined and the information is collected and stored in the CADS database. Finally, the characterization team analyzes and assigns appropriate criteria for determining potential disposition paths for the surplus HEU. These disposition paths are provided to the appropriate site via reports and feedback to the associated Nuclear Material Manager.

The CADS database will be kept current with site item-level changes as required. The coordinator for reconciling annual site item-level data with NMMSS and/or Inventory Assessment Reports will maintain a log, by fiscal year, of the differences in the surplus HEU inventory at the sites.

The characterization team will determine appropriate criteria for making changes to the CADS database. Data modifications will be recorded in a "CADS Data Modification Log," shown in Figure 6.

The steps in requesting changes to the database are as follows:

1. Determine appropriate criteria for making a change. This entails understanding why the current data are incorrect and the modifications necessary to remedy the discrepancy.
2. Document the change with an entry in the CADS Data Modification Log.
3. Incorporate the data change, with approval.
4. As necessary, notify affected users of the change.

The output products from the CADS database are standard and custom reports that are tailored to the varying needs of the CADS customers. The characterization team queries, analyzes, and assembles the necessary output from the database and writes reports to meet the defined needs. Upon release

Figure 6. CADS Data Modification Log.

of a report, a copy of the production database is frozen and archived to support that particular report.

Information requests from customers will be submitted to the surplus HEU characterization team. The current production version of the database will generally be used to answer requests for information. If a subsequent request is made for information from an archived version of the database, the production version of the database, in conjunction with the CADS Data Modification Log entries since the archive, will be used to answer the request. If this approach is inadequate, the characterization team will determine the viability of reloading the archived database.

To ensure reliability and repeatability, the CADS database is backed up using the following criteria:

- Following any significant additions and/or modifications,
- Prior to the release of all characterization reports, or
- Minimally on a bi-weekly basis.

An entry in the backup log will be completed each time the CADS database is backed up. The entry will allow the appropriate personnel to locate the desired version of the database. The backup log will capture the date of the backup, database name, backup device, backup name, who performed the backup, and the reason for the backup.

The backups will be stored in a secure location and will be maintained for the duration of the project. The backups performed as a result of issuance of a characterization report will be retained indefinitely until written permission from the database manager is given to remove the files from archive.

Since some of the information associated with the surplus HEU is classified Secret-Restricted Data (RD), the CADS workstation must be configured and approved for classified use at the Secret-RD level. The DOE requirements for classified use must be met at all times, with compliance subject to audit. Appropriate approvals by classification and computer security personnel must be obtained before loading any classified data on a workstation.

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Appendix

Table A-1. Fields in the Site Item-Level Table

Field Name	Required	Type	Size (bytes)	Units	Description
Project Number	Y	Alphanumeric	15	-	DOE assigned number - a derivative of budget and reporting codes
ITMB	N	Alphanumeric	4	-	First four characters of batch number
Item Number (key)	Y	Alphanumeric	30	-	A "number" assigned to a discrete item of accountable material. See associated Tables A-2 and A-3
ITYP	N	Text	1	-	Item type (P=Part, C=Component)
LOC	Y	Alphanumeric	5	-	Identification of location. A specific part of the site where accountable materials are processed and stored. (The first character is a site identifier whose valid values are listed in Table A-12.) See associated Table A-8.
COEI	Y	Alphanumeric	3	-	Composition of ending inventory (NMMSS Material Forms). See associated Table A-7
AIDN	N	Alphanumeric	10	-	Y-12 site code that identifies an associated item number
Cycle	N	Alphanumeric	2	-	Y-12 site code to designate a material form or specific assay range within a material form. See associated Table A-11.
Mat'l Form	N	Alphanumeric	2	-	Y-12 site code that indicates the physical form of the material. See associated Table A-10.
Reqn	N	Alphanumeric	10	-	Requisition number for analysis
Net wt	Y	Real	8	grams	Total net weight of item
grms_u_9	Y	Real	8	grams U per grams total	Purity of item (between 0.0 and 1.0)
Elem wt (gms)	Y	Real	8	grams	Uranium weight
Assay	Y	Real	8	wgt %	Weight of U235 divided by weight of U times 100 (between 20.0 and 100.0)
Gms U235	Y	Real	8	grams	Uranium 235 weight
S741	N	Text	10	-	DOE/NRC Form 741 transaction number

Table A-2. Fields in the Site Item-Level Support Table

Field Name	Required	Type	Size (bytes)	Units	Description
Rec_Date	Y	Date/Time	8	-	Date of material inventory (i.e. September 30, 1997)
Category	Y	Text	3	-	National Security Material (NS) or Material Excess to National Security (ENS)
Item Number (key)	Y	Alphanumeric	30	-	A "number" assigned to a discrete item of accountable material. See associated Tables A-1 and A-3
Add_Info	Y	Text	255	-	Comments for additional information concerning this batch of material
Yr_available	Y	Alphanumeric	15	-	Date available for disposition
Block_ID	Y	Integer	4	-	Characterization code that indicates the physical form and sub-form of the material. Valid values are listed in Table A-14. See associated Table A-4.
Disp_Path	Y	Alphanumeric	10	-	Potential disposition path. Valid values are listed in Table A-13.
Isotelem_code	Y	Integer	4	-	Code to link isotopic and trace element data with discrete items of material. See Associated Tables A-3 and A-9
RIS	Y	Text	3	-	Reporting identification symbol. See associated Table A-5
DOE_Comp	N	Alphanumeric	25	-	HQ (NMMSS) roll-up of material form
MTC	Y	Text	2	-	Material Type Code See associated Table A-6
InCont_Code	Y	Text	5	-	Site code to represent inner container of material
InCont_Desc	Y	Text	25	-	Description of inner container
OutCont_Code	Y	Text	5	-	Site code to represent outer container of material
OutCont_Desc	Y	Text	25	-	Description of outer container
Matl_Grp	Y	Text	25	-	Reference name given to a group of similar material

Table A-3. Fields in the Isotopic and Analytical Table

Field Name	Required	Type	Size (bytes)	Units	Description
Isoelem_code (key)	Y	Integer	4	-	Code to link isotopic and trace element data with discrete items of material. See associated Tables A-2 and A-9
Item Number	Y	Alphanumeric	30	-	A "number" assigned to a discrete item of accountable material. See associated Tables A-1 and A-2
Rpt Date	Y	Date/Time	8	-	Date associated with isotopic or trace element analysis
232U	N	Real	8	wgt %	Isotopic analysis for U232 (between 0.0 and 80.0)
233U	N	Real	8	wgt %	Isotopic analysis for U233 (between 0.0 and 80.0)
234U	N	Real	8	wgt %	Isotopic analysis for U234 (between 0.0 and 80.0)
235U	N	Real	8	wgt %	Isotopic analysis for U235 (between 20.0 and 100.0)
236U	N	Real	8	wgt %	Isotopic analysis for U236 (between 0.0 and 80.0)
238U	N	Real	8	wgt %	Isotopic analysis for U238 (between 0.0 and 80.0)
G/G	N	Real	8	grams U per grams total	Purity (between 0.0 and 1.0)
C	N	Real	8	ppm	Analytical laboratory results for Carbon
Ag	N	Real	8	ppm	Analytical laboratory results for Silver
Al	N	Real	8	ppm	Analytical laboratory results for Aluminum
As	N	Real	8	ppm	Analytical laboratory results for Arsenic
Au	N	Real	8	ppm	Analytical laboratory results for Gold
B	N	Real	8	ppm	Analytical laboratory results for Boron
Ba	N	Real	8	ppm	Analytical laboratory results for Barium
Be	N	Real	8	ppm	Analytical laboratory results for Beryllium
Bi	N	Real	8	ppm	Analytical laboratory results for Bismuth
Br	N	Real	8	ppm	Analytical laboratory results for Bromine
Ca	N	Real	8	ppm	Analytical laboratory results for Calcium
Cd	N	Real	8	ppm	Analytical laboratory results for Cadmium
Co	N	Real	8	ppm	Analytical laboratory results for Cobalt
Cr	N	Real	8	ppm	Analytical laboratory results for Chromium

Table A-3. Fields in the Isotopic and Analytical Table

Cs	N	Real	8	ppm	Analytical laboratory results for Cesium
Cu	N	Real	8	ppm	Analytical laboratory results for Copper
Fe	N	Real	8	ppm	Analytical laboratory results for Iron
Ga	N	Real	8	ppm	Analytical laboratory results for Gallium
Ge	N	Real	8	ppm	Analytical laboratory results for Germanium
Hf	N	Real	8	ppm	Analytical laboratory results for Hafnium
Hg	N	Real	8	ppm	Analytical laboratory results for Mercury
In	N	Real	8	ppm	Analytical laboratory results for Indium
Ir	N	Real	8	ppm	Analytical laboratory results for Iridium
K	N	Real	8	ppm	Analytical laboratory results for Potassium
Li	N	Real	8	ppm	Analytical laboratory results for Lithium
Mg	N	Real	8	ppm	Analytical laboratory results for Magnesium
Mn	N	Real	8	ppm	Analytical laboratory results for Manganese
Mo	N	Real	8	ppm	Analytical laboratory results for Molybdenum
Na	N	Real	8	ppm	Analytical laboratory results for Sodium
Nb	N	Real	8	ppm	Analytical laboratory results for Niobium
Ni	N	Real	8	ppm	Analytical laboratory results for Nickel
Np	N	Real	8	ppm	Analytical laboratory results for Neptunium
Os	N	Real	8	ppm	Analytical laboratory results for Osmium
P	N	Real	8	ppm	Analytical laboratory results for Phosphorus
Pb	N	Real	8	ppm	Analytical laboratory results for Lead
Po	N	Real	8	ppm	Analytical laboratory results for Polonium
Pt	N	Real	8	ppm	Analytical laboratory results for Platinum
Pu	N	Real	8	ppm	Analytical laboratory results for Plutonium
Rb	N	Real	8	ppm	Analytical laboratory results for Rubidium
Re	N	Real	8	ppm	Analytical laboratory results for Rhenium
Rh	N	Real	8	ppm	Analytical laboratory results for Rhodium
Ru	N	Real	8	ppm	Analytical laboratory results for Ruthenium
S	N	Real	8	ppm	Analytical laboratory results for Sulfur
Sb	N	Real	8	ppm	Analytical laboratory results for Antimony
Sc	N	Real	8	ppm	Analytical laboratory results for Scandium
Se	N	Real	8	ppm	Analytical laboratory results for Selenium
Si	N	Real	8	ppm	Analytical laboratory results for Silicon
Sn	N	Real	8	ppm	Analytical laboratory results for Tin

Table A-3. Fields in the Isotopic and Analytical Table

Sr	N	Real	8	ppm	Analytical laboratory results for Strontium
Ta	N	Real	8	ppm	Analytical laboratory results for Tantalum
Te	N	Real	8	ppm	Analytical laboratory results for Tellurium
Th	N	Real	8	ppm	Analytical laboratory results for Thorium
Ti	N	Real	8	ppm	Analytical laboratory results for Titanium
Tl	N	Real	8	ppm	Analytical laboratory results for Thallium
U	N	Real	8	ppm	Analytical laboratory results for Uranium
V	N	Real	8	ppm	Analytical laboratory results for Vanadium
W	N	Real	8	ppm	Analytical laboratory results for Tungsten
Y	N	Real	8	ppm	Analytical laboratory results for Yttrium
Zn	N	Real	8	ppm	Analytical laboratory results for Zinc
Zr	N	Real	8	ppm	Analytical laboratory results for Zirconium
Cl	N	Real	8	ppm	Analytical laboratory results for Chlorine
F	N	Real	8	ppm	Analytical laboratory results for Fluorine
I	N	Real	8	ppm	Analytical laboratory results for Iodine
Pa	N	Real	8	ppm	Analytical laboratory results for Protactinium
Am	N	Real	8	ppm	Analytical laboratory results for Americium
Cm	N	Real	8	ppm	Analytical laboratory results for Curium
Ce	N	Real	8	ppm	Analytical laboratory results for Cerium
Dy	N	Real	8	ppm	Analytical laboratory results for Dysprosium
Er	N	Real	8	ppm	Analytical laboratory results for Erbium
Eu	N	Real	8	ppm	Analytical laboratory results for Europium
Gd	N	Real	8	ppm	Analytical laboratory results for Gadolinium
Ho	N	Real	8	ppm	Analytical laboratory results for Holmium
La	N	Real	8	ppm	Analytical laboratory results for Lanthanum
Lu	N	Real	8	ppm	Analytical laboratory results for Lutetium
Nd	N	Real	8	ppm	Analytical laboratory results for Neodymium
Pr	N	Real	8	ppm	Analytical laboratory results for Praseodymium
Sm	N	Real	8	ppm	Analytical laboratory results for Samarium
Tb	N	Real	8	ppm	Analytical laboratory results for Terbium
Tm	N	Real	8	ppm	Analytical laboratory results for Thulium
Yb	N	Real	8	ppm	Analytical laboratory results for Ytterbium

Table A-4. Fields in the Blocks Table

(This table is pre-defined and pre-populated.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
Block_ID (key)	Y	Integer	4	-	Code that indicates the physical form and sub-form of the excess material. See associated Table A-2 and A-14.
Block_Names	Y	Text	25	-	Brief description of the form and sub-form of the material

Table A-5. Fields in the RIS Table

(This table is pre-defined and pre-populated.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
RIS (key)	Y	Text	3	-	Reporting identification symbol. See associated Table A-2.
RIS_Desc	Y	Text	75	-	The description of the site laboratory that corresponds to the RIS
RIS_Short	Y	Text	25	-	An abbreviation of the RIS_Desc

Table A-6. Fields in the MTC Table

(This table is pre-defined and pre-populated.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
MTC (key)	Y	Alphanumeric	2	-	Material Type Code. See associated Table A-2
MTC_Desc	Y	Text	25	-	Assay range description for this material code

Table A-7. Fields in the COEI Table

(This table is pre-defined and pre-populated.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
COEI (key)	Y	Text	5	-	Composition of ending inventory (NIMSS Material Forms). See associated Table A-1
COEI_Desc	Y	Text	120	-	DOE description of COEI code

Table A-8. Fields in the Location Table

(Each site must provide input to this table.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
LOC (key)	Y	Alphanumeric	5	-	Identification of location. A specific part of the site where accountable materials are processed and/or stored. See associated Tables A-1 and A-12.
LOC_Desc	Y	Text	25	-	Short description of location
Description	Y	Text	75	-	Long description of location

Table A-9. Fields in the Element Source Table

(Each site must provide input to this table.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
Isoelem_code (key)	Y	Integer	4	-	Code to link isotopic and trace element data. See associated Tables A-2 and A-3.
Source	Y	Text	25	-	Documents source of element/isotopic data (actual data rather than inferred data)

Table A-10. Fields in the Material Form Table

(This table is pre-populated and applies to the Y-12 Plant only.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
Mat'l Form (key)	Y	Alphanumeric	2	-	Y-12 site code that indicates the physical form of the material. See associated Table A-1
Form_Desc	Y	Text	75	-	Detail description of material sub-form
Mat'l Form_Category	Y	Text	25	-	Primary material form

Table A-11. Fields in the Cycle Code Table

(This table is pre-populated and applies to the Y-12 Plant only.)

<i>Field Name</i>	<i>Required</i>	<i>Type</i>	<i>Size (bytes)</i>	<i>Units</i>	<i>Description</i>
Cycle (key)	Y	Alphanumeric	2	-	Y-12 site code to designate a material form or specific assay range within a material form. See associated Table A-1
Cyc_Desc	Y	Text	50	-	Description of the cycle attribute (field)

Table A-12. Valid Values for First Character of Location

<i>Site</i>	<i>ID Character</i>
ETTP	K
Hanford	H
ICPP	C
INEEL	I
Los Alamos	L
ORNL	X
Other	O
Pantex & Dismantlement	D
PNNL	N
Portsmouth	P
Rocky Flats	R
Sandia	E
Savannah River	S
Y-12	Y

See associated Tables A-1 and A-8.

Table A-13. Valid Values for HEU Disposition Paths

<i>Material Category</i>	<i>CADS Disposition Code</i>
USEC	USEC1
	USEC2
	USEC3
	USEC4
	USEC5
	USEC6
OFF-SPEC	UF6
	TVA 94-1
	TVA-LUA
	TVA Misc
	TVA U-AL
	TVA Metal
	HEU-PU
	PC-OS
POTENTIAL COMMERCIAL USE	PCU
	Active
	Pg Res
SPENT FUEL	SNF
U233	U233
LOW LEVEL WASTE	L-Waste

See associated Table A-2.

Table A-14. Valid Values for HEU Form Criteria

<i>Form Category</i>	<i>Sub-Form Category</i>	<i>Block ID</i>
Metal	Logs	10
	Broken Metal	11
	Piece Parts	12
	Other Piece Parts	13
	Alloyed	14
	Turnings	15
	Foils	16
	Other	19
Oxides	UO ₂	20
	UO ₃	21
	U ₃ O ₈	22
	Other	29
Sources and Standards	Samples	30
	Standards	31
	Sources	32
Compounds	UF ₄	40
	UNH	41
	UF ₆	42
	Other	49
Combustibles	Other	59
Solutions	Aqueous	60
	Organic	61
	PU	62
Miscellaneous	Solids	70
	Laboratory Salvage	71
	Discard	72
	Equipment Holdup	73
	Other	79
Reactor Fuel	Spent Fuel	80
	Fuel Plates	81
	Fuel Elements	82
	Fuel Rods	83
	Irradiated Fuel and Targets	84
	Assemblies	85
Low Level Waste	L-Waste	90

See associated Tables A-2 and A-4.

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