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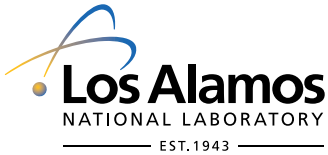
Complex-Wide Representation of Material Packaged in 3013 Containers



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Complex-Wide Representation of Material Packaged in 3013 Containers

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Complex-Wide Representation of Material Packaged in 3013 Containers

by

Joshua E. Narlesky, Larry G. Peppers, and Gary P. Friday

Abstract

The DOE sites packaging plutonium oxide materials packaged according to Department of Energy 3013 Standard (DOE-STD-3013) are responsible for ensuring that the materials are represented by one or more samples in the Materials Identification and Surveillance (MIS) program. The sites categorized most of the materials into process groups, and the remaining materials were characterized, based on the prompt gamma analysis results. The sites issued documents to identify the relationships between the materials packaged in 3013 containers and representative materials in the MIS program. These "Represented" documents were then reviewed and concurred with by the MIS Working Group. However, these documents were developed uniquely at each site and were issued before completion of sample characterization, small-scale experiments, and prompt gamma analysis, which provided more detailed information about the chemical impurities and the behavior of the material in storage. Therefore, based on the most recent data, relationships between the materials packaged in 3013 containers and representative materials in the MIS program been revised. With the prompt gamma analysis completed for Hanford, Rocky Flats, and Savannah River Site 3013 containers, MIS items have been assigned to the 3013 containers for which representation is based on the prompt gamma analysis results. With the revised relationships and the prompt gamma analysis results, a Master "Represented" table has been compiled to document the linkages between each 3013 container packaged to date and its representative MIS items. This table provides an important link between the Integrated Surveillance Program database, which contains information about each 3013 container to the MIS items database, which contains the characterization, prompt gamma data, and storage behavior data from shelf-life experiments for the representative MIS items.

Executive Summary

Each plutonium-oxide-bearing 3013 container (DOE-STD-3013) is represented by one or more Materials Identification and Surveillance (MIS) items that are believed to reasonably predict the behavior of the material in storage for 50 years. The linkages between the 3013 containers and the MIS items were originally defined by the individual sites with MIS Working Group concurrence and documented in "Represented" documents. However, revisions to the linkages between the 3013 containers and the MIS items were needed to address three issues. First, MIS items 011589A and C06032A exhibited unique or bounding behavior in Small-scale, shelf-life experiments. The behavior of the material in these experiments would not be expected in the entire population of 3013 containers that were originally represented by these items. The MIS working group identified through a detailed analysis of the 3013 container data the 3013 containers that have the highest potential to exhibit this behavior in storage. Second, information became available for both 3013 containers in storage and the MIS items that had not been addressed in the original "Represented" documents issued by the sites. This information showed in certain cases that 3013 containers in some process groups should be represented by a different set of MIS items than what was originally documented. The MIS working group compared the process history information and characterization data of the MIS items to the information available for the material packaged in 3013 containers and identified the MIS items most representative of those 3013 containers. Third, the completion of prompt gamma analysis for the items "represented by prompt gamma" allowed these containers to be directly matched to the representative MIS items.

This report documents the changes to representation and provides a Master "Represented" table for all of the 3013 containers packaged to date. This table provides the link between the Integrated Surveillance Program database that contains information for each 3013 container and the MIS Items database that contains storage behavior information on the related representative materials. This allows the immediate matching of a 3013 container to its representative MIS items and their respective storage behaviors from the Shelf-Life Studies. The methodology presented in this document will be used to determine representation of future produced 3013 containers.

Introduction

The Materials Identification and Surveillance (MIS) program[1] was established within the 94-1 Research and development (R&D) Program to ensure that plutonium-bearing materials are stabilized, packaged, and safely stored according to Department of Energy 3013 Standard (DOE-STD-3013)[2] for up to 50 years. As required by the DOE standard, each of the sites was responsible for ensuring that the oxide material packaged in 3013 containers is represented by one or more MIS items. The sites issued "Represented" documents[3-7] to define representative materials for each process group used by the site, which were then reviewed and concurred with by the MIS Working Group. To predict the storage behavior of individual packaged 3013 containers, a linkage to their representative MIS items is required. The majority of containers in the ISP database use process knowledge to determine representation for the 3013 containers. This method of representation links 3013 containers to MIS items provided by the packaging sites that originated in the same or similar process group. A process group is defined as the process in which the plutonium oxide originated (e.g., oxalate precipitation, pyrochemical, dissolution residuals, etc.). The containers without adequate process knowledge and containers within a given process group that have chemical impurities that are uncharacteristic of that process group will be reviewed by the MIS Working Group and may use prompt gamma analysis to define representation.

All of the information available for individual 3013 containers was collected by the sites in electronic form and sent to Los Alamos National Laboratory (LANL) for inclusion into the complex-wide Integrated Surveillance Program (ISP) database[8] (the responsibility for maintaining the ISP was subsequently transferred to Savannah River Site in 2006). Similarly, all characterization and small-scale, shelf-life test data were collected by LANL and entered into the MIS Items database[9] which is maintained by LANL. The "Represented" documents provided the link between the two databases.

The "Represented" documents were issued before completion of sample characterization and small-scale experiments. Additionally, when the represented documents from each site were integrated together, several problems were identified with the linkages between 3013 containers and MIS items. First, two MIS items, 011589A and C06032A, exhibited unique (or bounding) behavior in small-scale, shelf-life studies.[10,11] A comprehensive review of the process history for these items and the process history of the materials stored in 3013 containers showed that these items actually represent fewer 3013 containers than originally presented in the "Represented" documents. Second, revision to linkages between the process groups of 3013 containers and MIS items was needed to incorporate information that was not available when the original "Represented" documents were issued. These data include prompt gamma (PG) analysis, analytical chemistry, Thermogravimetric Analysis (TGA)/Fourier transform infrared spectroscopy (FTIR), and other data for the population of 3013 containers as well as characterization and small-scale, shelf-life data for MIS items. The revisions included the following:

- Linking each process group of 3013 containers to all related items in the MIS inventory,

- Subdividing process groups that were found to be nonhomogeneous,
- Combining process groups of 3013 containers from process groups having similar impurities and showing similar behavior in small-scale, shelf-life experiments, and
- Ensuring that each process group was represented by MIS items that have both analytical chemistry and small-scale, shelf-life data.

Revisions were also made to the linkages between 3013 containers represented by PG analysis and their associated MIS items. These containers were placed into PG groups (PGGs), based on the impurities identified in the PG spectrum. Each PGG was represented by as many as 11 MIS items of varying actinide content. A query was developed in the ISP database to match each 3013 container to the most similar MIS items.

Methodology

As part of the 94-1 R&D program, each DOE site packaging plutonium oxide in 3013 containers selected oxide samples that were believed to be representative of larger populations of material being packaged. Because multiple sites used the same or similar processes, representative MIS materials from one site could be used to represent the same or similar processes from other sites. The MIS items were provided by Rocky Flats Environmental Technology Site (RFETS), Hanford, and LANL and make up the MIS item inventory of representative materials. These samples were shipped to LANL where they became representative MIS items. The MIS items were chemically and physically characterized both before and after stabilization to validate the stabilization process in terms of eliminating the chemical reactivity and reducing the moisture content of the material to below 0.5 wt%. Following characterization, samples of the MIS items were sealed in small-scale test units, and the behavior of the material was monitored over time under 3013 container storage conditions.

All of the current MIS items available for representation are listed in Appendix A grouped according to process. It should be noted that several of the MIS items do not represent any 3013 containers currently in storage. Some MIS items exist in the inventory for research purposes only and were included in the list for completeness. For example, MIS items MISNE2 and MISNE4 were used for moisture and neutron moderation experiments.

Representation of 3013 containers by MIS items is based on one of two criteria. Most containers are represented based on process knowledge, which gives general information as to the impurities that are likely to be present in the material. MIS items in a given group are typical of the 3013 containers in the same process group and provide a starting point for defining representation. For example, all 3013 containers from a burned metal process group would be represented by all MIS items from metal oxidation. Then, adjustments are made to the representation, based on site-specific or process-specific material characteristics. This method of representation was used for most of the 3013 containers. Another method for linking 3013 containers and MIS items into process

groups is through a detailed analysis of 3013 containers and MIS item data resulting in item-to-item linkages. The item-to-item linkages were reserved for identification of containers represented by MIS items with unique or bounding storage behavior (e.g., 3013 containers similar to MIS items 011589A and C06032A). This method of representation was used for only 111 oxide containers out of the total population. Second, for 3013 containers represented by PG analysis in which process history information was not available or suspected to be inaccurate, representation was defined by comparing the PG spectrum of the 3013 container to the PG spectra for the MIS items and defining the "best" matches. This method of representation was used for 296 containers (see Appendix D). Following a consistency review of the process groups, chemical impurities were identified in 33 containers that are uncharacteristic of the process group to which the containers belong. Representative MIS items have been assigned to these 33 containers based on PG analysis (see Appendix E) that will be used for representation since they are uncharacteristic of the original process group they were assigned. The number of containers represented by each method is given below. A discussion of these methods used to define the 3013 container to MIS item linkages is given in the sections that follow.

Process History Total 3,328
- Process Group Linkages..... 3,217
- Item-to-Item Linkages 111

PG Analysis (Appendix D) 296
PG Analysis by Review (Appendix E; also counted in Process History Total)..... 33

3013 Containers Represented by Process Knowledge

Several members of the MIS working group and other subject matter experts conducted a review of the linkages between the 3013 container process groups and the MIS items identified in the "Represented" documents provided by the sites.[3-7] The goal of the review was to ensure that each process group is represented by all related MIS items and to create a combined master representation table. As part of the review, each of the MIS items was first classified into a process group, based on its process history, characterization data, and the results from small-scale, shelf-life experiments. Eleven process groups were identified as part of the classification process and are shown in Table 1. Each process group was then given an identification code called the MIS taxon.

Table 1. MIS Process Groups

Group ID	Process Group	MIS Taxon*
01	Oxalate Precipitation	OxlPPt
02	Peroxide Precipitation	PeroxPPt
03	Magnesium Hydroxide Precipitation	MgOHPPt
04	Metal Oxidation	MetalOx
05	Hydride Oxidation	HydroOx
06	Pu/U Oxides	PuUOx
07	Dissolution Residues	DisResd
08	Oxide Screenings	OxScrns
09	Pyrochemical Oxide	PyroOx
10	Scrap Oxide	ScrapOx
11	Miscellaneous Oxide	MiscOx

*The word *taxon* here is used as a name applied to a taxonomic group in a formal system of nomenclature.

In order to assign individual 3013 containers to a process group, it was noted that many of the process groups contained subgroups. When a process existed at more than one site, material generated by that process at each site was viewed as a distinct subgroup (e.g., oxide from oxalate precipitation generated at Hanford vs. oxide generated at LANL or Savannah River Site (SRS) from oxalate precipitation). In some cases, oxide from the same process group and site was generated from different feed sources or at different times that resulted in variations in the purity of the oxide or introduced different impurities within the process group (e.g., oxide from oxalate precipitation generated at LANL from chloride solution vs. nitrate solution). The 11 groups in Table 1 were expanded to accommodate site-specific subpopulations within some groups and to indicate the packaging site. This combination then becomes the 3013 process group as shown in Table 2.

Each process group in Table 2 was given a unique identification code called the 3013 taxon. This identification code consists of a root and several suffixes. The root corresponds with the MIS process group that represents the material, and the suffixes are used to indicate the site and other site-specific information.

Table 2. 3013 Container Process Groups

Process Group	Packaging Site	Site Specific Information	3013 Taxon
Oxalate Precipitation	Hanford	From impure solutions	OxlPPt-HN-Impure
		From pure mixed Pu/U solutions	OxlPPt-HN-MixedPure
		From sources	OxlPPt-HN-Sources
		Product oxide	OxlPPt-HN
	Los Alamos	From chloride line	OxlPPt-LA-Cl
		From nitrate line	OxlPPt-LA-NO3
	Savannah River	Product oxide	OxlPPt-SR
Peroxide Precipitation	Rocky Flats	Product oxide	PeroxPPT-RF
Magnesium Hydroxide Precipitation	Hanford		MgOHPPt-HN
	Rocky Flats		MgOHPPt-RF
Metal Oxidation	Hanford		MetalOx-HN
	Los Alamos		MetalOx-LA
	Rocky Flats		MetalOX-RF
	Savannah River	Produced at Lawrence Livermore	MetalOx-SR-LL
		Produced at Rocky Flats	MetalOx-SR-RF
			MetalOx-SR
Hydride Oxidation	Rocky Flats		HydroOx-RF
Pu/U Oxides	Hanford	From alloy oxidation	PuUOx-HN-Alloy
		From oxalate precipitation	PuUOx-HN-Misc
	Los Alamos		PuUOx-LA
	Rocky Flats		PuUOx-RF
	Savannah River	From alloy oxidation	PuUOx-SR-Alloy
		From Hanford	PuUOx-SR-HN
		From oxalate precipitation	PuUOx-SR-Misc
Dissolution Residues	Los Alamos		DisResd-LA
	Rocky Flats		DisResd-RF
Oxide Screenings	Rocky Flats		OxScrns-RF
Pyrochemical Oxide	Hanford	From Rocky Flats	PyroOx-HN-RF-ERScrap
			PyroOx-HN-RF-FndryOX
			PyroOx-HN-RF-MiscOx
	Los Alamos		PyroOx-LA
	Rocky Flats		PyroOx-RF
Scrap Oxide	Hanford		ScrapOx-HN-Hi
			ScrapOx-HN-Lo
Miscellaneous Oxide	Hanford	From polycubes	MiscOx-HN-PC
	Los Alamos		MiscOx-LA

MIS items were then assigned to each of the process groups in Table 2 so that each 3013 process group is represented by all applicable MIS items that match the group. A list of the process groups and their associated MIS items is shown in Appendix B. The 3013 process groups were compared to their respective MIS process groups, based on their assay values and impurities. MIS items having impurities or properties different from those in the process group of 3013 containers were removed from the list. MIS items from other process groups having a similar assay and impurities were added to the list in some cases. For example, 3013 containers with metal oxidation material generated at Hanford was greater than 71 wt% actinide and did not have chloride or fluoride detected by PG. As shown in Appendix C; Metal Oxidation at Hanford, this material was originally represented by 011589A, 011608, and TS707001. MIS item 011589A was removed because the unique behavior observed in MIS item 011589A is associated with chlorides, and PG did not detect chloride in this process group. MIS items 07221730 and

ARF-102-85-114-1 were added because they contain high-purity plutonium oxide generated from metal oxidation.

During the review, 3013 containers in some process groups were found by PG analysis to have chemical impurities that are uncharacteristic of the MIS items representing that process group. These containers are considered to be outliers and are listed in Appendix E. PG analysis can be used to better match these containers to MIS items having similar impurities.

Upon completion of the review, the updated linkages between 3013 process groups and MIS items were combined into the master represented table, which is found in Appendix B. The changes to the original "Represented" linkages were documented and are included in Appendix C. The taxons in the master-represented table provide a method for implementing the complex linkages between the ISP database and the MIS items database and allow for generating queries between the two databases. Through the 3013 taxon, each 3013 container can be matched to the MIS process group that represents it, the specific MIS items within the process group that represent the 3013 container, and the characterization and shelf-life data for the MIS items that represent the 3013 container.

3013 Containers Represented by MIS Items Showing Unique or Bounding Behavior

In the small-scale, shelf-life studies, 10-gram samples of the MIS items are placed in sealed, instrumented test containers with a gas mixture of mainly helium with some air to represent actual containers. In order to examine the boundary conditions allowed by the 3013 Standard, the materials are prepared so that the total moisture content is approximately 0.5 wt%. The sealed containers are then placed in an array heated to 55ºC, and the pressure and gas composition are monitored over time. Two MIS items (011589A and C06032A) exhibited unique or bounding behavior during these experiments, which led to concerns about the materials represented by these items. The data for the affected 3013 containers were reviewed, and it was found that only a subset of those containers have material that could potentially have conditions like those observed in the small-scale, shelf-life studies.

MIS Item 011589A

MIS item 011589A is an oxide produced before 1990 at Rocky Flats in Building 707 and is associated with plutonium foundry processing. The oxide material was received at LANL as part of the MIS Program in 1997. The chemical and physical properties of the material were characterized upon receipt by LANL. The material was stabilized for two hours at 950ºC. After stabilization, the material was 90 wt% plutonium oxide and approximately 2 wt% soluble salt components (magnesium, calcium, sodium, potassium, chlorine, and fluorine) with the remainder made up of insoluble metal oxides. The gas pressure within the test unit loaded with 011589A material at 0.5 wt% moisture reached a maximum pressure of 225 kPa (32.6 psia) at approximately one year, at which time it contained a mixture of 46% H_2 and 14% O_2 with the remaining being nonflammable

gases. At 3.4 years, the total corrected pressure had decreased to 203 kPa (29 psia) with 44% H_2 and 11% O_2.[12] No other test unit approaches this combination of flammability and pressure.

Based on the original "Represented" documents, 011589A (in conjunction with other MIS items) represented 611 plutonium oxide-bearing 3013 containers from Hanford, Rocky Flats, and SRS as shown below.[10]

Hanford metal oxidation..... 106
Hanford impure and scrap mixed
oxides from alloy oxidation 12
RFETS metal oxidation..... 364
RFETS Oxides at SRS 72
Metal oxidation from Livermore at SRS..... 35
SRS metal oxidation..... 5
SRS impure / scrap mixed oxides from alloy oxidation.... 17

Because of the large number of containers represented by 011589A, a review was done to identify the 3013 containers that are "most similar" to 011589A. Upon conclusion of the review, 17 containers were identified as "most similar" to 011589A, and 31 containers were identified as being "potentially similar" to 011589A. These containers are listed in Tables 3 and 4 and are now the only containers represented by 011589A.

Table 3. Plutonium Oxide-Bearing 3013 Containers Identified as "Most Similar" to MIS Item 011589A

Hanford Containers (8)				
H002447	H002809	H002866	H003077	H003343
H003931	H003989	H004233		
RFETS Containers (2)				
R600793	R602498			
SRS Containers (7)				
S001105	S002117	S002139	S002187	S002221
S002251	S002277			

Table 4. Plutonium Oxide-Bearing 3013 Containers Identified as "Potentially Similar to MIS Item 011589A

Hanford Containers (11)				
H002391	H002410	H002474	H002657	H002767
H003367	H003413	H003748	H003774	H003940
H004156				
RFETS Containers (13)				
R600060	R600142	R600151	R600178	R600234
R600718	R601558	R601611	R601793	R602012
R602245	R602787	R611398		
SRS Containers (7)				
S002121	S002125	S002136	S002157	S002203
S002284	S002286			

MIS Item C06032A

MIS item C06032A also originated at Rocky Flats and was identified as material from oxide screenings.[11] Oxide screenings was a broad category that included solid chunks of material removed from plutonium oxide during foundry operations and packaging. In foundry operations, solid chunks were separated from the bulk material and calcined in air at 500ºC to convert any plutonium metal to oxide. Any remaining solids were calcined again. Any remaining solids after the second calcination, which may include tantalum metal, steel, and crucible pieces, were collected and placed in containers designated as oxide screenings (RFETS Item Description Code 159). Oxide screenings generated in packaging operations consisted of solid chunks removed from chloride-bearing plutonium oxides that were packaged for off-site shipment. The specific process history information for C06032A indicates that the oxide screenings were generated from oxides at Rocky Flats packaged for off-site shipment, based on the high chloride content of the material and the building in which it was generated.

The oxide material was received at LANL as part of the MIS Program in 1997, and the chemical and physical properties of the material were characterized upon receipt. During the characterization, the material was split into separate portions so that characterization data could be obtained for the material under different conditions. After stabilization, the milled portion was 74 wt% plutonium oxide and approximately 24% soluble salt components (magnesium, calcium, sodium, chloride and fluoride) with the remainder made up of insoluble metal oxides. The gas pressure within the test unit loaded with C06032A material at 0.5 wt% moisture reached a pressure of 415 kPa (60.1 psia) at approximately one year, at which time it contained a mixture of 65% H_2 with the remaining being nonflammable gases. At 3.8 years, the total corrected pressure had increased to 545 kPa (79.1 psia) with 77% H_2. No other test unit approaches this pressure.

Based on the original "Represented" documents, C06032A (in conjunction with other MIS items) represents oxide screenings from Rocky Flats, impure and scrap oxides from Hanford with 30–80 wt% plutonium from the Plutonium Finishing Plant (PFP) and impure and scrap mixed oxides from Hanford alloy oxidation. In the subsequent review

of the ISP database, it was confirmed that C06032A does represent the Rocky Flats oxide screenings material (63 containers). All of these containers are high in chloride as confirmed by PG analysis. Four of these containers have greater than 0.1% moisture and were identified as being "most similar" to C06032A. However, C06032A does not represent the 185 Hanford containers. Hanford process history states that these groups contain screenings from metal and alloy oxidation, which has considerably lower chloride content as shown by PG analysis. MIS item C06032A is high in chloride, and is therefore not representative of Hanford oxide screenings. The 63 RFETS containers are now the only containers represented by C06032A.

3013 Containers Represented by PG Analysis

PG analysis offers a powerful and simple semiquantitative analysis of a 3013 container after packaging. In 3013 containers, alpha-particle-induced PG analysis provides an indication of certain major impurities and approximate concentration. Alpha-particle-induced PG analysis is sensitive to aluminum, beryllium, boron, chlorine, fluorine, potassium, phosphorous, magnesium, and sodium. However, there are some impurities, such as calcium, that are not sensitive to PG or have interferences, such as silicon, that make them impossible to detect by PG analysis. The sensitive elements were used to identify groups of containers that have similar prompt gamma signatures and are assumed to have similar behavior in storage. These groups are called prompt gamma groups (PGGs). The PGGs include materials with chloride (PGCl), materials with high concentrations of fluoride without chloride (PGFHi), materials with low concentrations of fluoride without chloride (PGFLo), materials with impurities other than chloride or fluoride (PGMisc), and materials without any impurities detected by PG (PGNoImp). In the ISP database, the PG analysis data can be used to quickly group 3013 containers by impurities present through the assigned PGG. In addition, the PG analysis data are used to determine approximate levels of various chemicals in the containers and to help clarify which process groups to put the 3013 container in.

The 3013 containers without process history information are considered to be "represented by PG analysis," which is defined as the following: "An item is represented by PG analysis if an MIS item exists with the same positive identification for the sensitive elements or if it falls within a specific category (PGG) by impurity content."[13] The path between 3013 containers represented by PG analysis and the representative MIS items consists of two segments. One segment was created by assigning MIS items to a PGG, based on its PG signature. The other segment was created by assigning each 3013 container to a PGG, based on its PG signature. The PGGs and associated MIS items are shown in Table 5. All MIS items in this table have been characterized by PG analysis and analytical chemistry and tested in small-scale surveillance experiments.

Table 5. Linkage of PGGs to Representative MIS Items

PGG	Impurities Detected		Representative MIS Items
PGCl	"ER Scrap"	Cl (0.8%), F, Mg, Na	07032282A
		Cl (6.5%), Mg, K, Na	ARF-102-85-223
		Cl (3.0%), F, Mg, K, Na	ARF-102-85-295
		Cl (1.0%), F, Mg, Na	ARF-102-85-355
		Cl (1.8%), Be, Mg, Na	C00024A
		Cl (5.0%), Mg, K, Na	C00695
		Cl (3.4%), Mg, K, Na	CLLANL025
		Cl (6.0%), K, Na	PMAXBS
	Non "ER Scrap"	Cl (3.3%), Al, Be, F, Mg, Na	053038
		Cl (2.6%), F, Mg, K, Na	ARF-102-85-365
		Cl (0.2%), F, Mg, Na	TS707001
PGFHi		F (1.2%), Al, Mg, Na	07242201A
		F (0.2%), Al, Mg, Na	64-85-12-1858*
		F (11%), Mg, Na	PuF4-1
PGFLo		F (0.10%), Be, Na	07161856
		F (0.04%), Al, Mg, Na	07242165A
		F (0.66%), Na	07242141A
		F (0.45%), Al, Mg, Na	41-85-08-1379
		F (0.58%), Al, Mg, P, Na	63-88-06-121
		F (0.2%), Al, Mg, Na	64-85-12-1858*
PGMisc		Mg (14.7%), Al, P, Na	66-00-11-355
		Mg (3.3%)	66-01-01-439
		Be, Na	5501407
		Be, Na	669194
		Be, Na	ARF-102-85-114-1
		Be	CAN92
		Na	BLO-39-11-14-004
		Na	MT1490
		Na	PBO-47-09-012-023
		Na	PPSL-365
		Na	PSU-84-06-05
PGNoImp		None Detected	5501579
		None Detected	PEOF1
		None Detected	SCP711-56

*Note: MIS item 64-85-12-1858 was used to represent both PGFHi and PGFLo. Although the fluorine content best matches PGFLo, this item was added to PGFHi after sorting the 3013 containers because of the similarity of the impurities detected in this item and the impurities detected in the 3013 containers assigned to this group.

Based on the linkages in Table 5, 3013 containers in certain PGGs would be represented by as many as 11 MIS items. The MIS items within a particular PGG may have originated in a variety of processes, have different levels of chemical impurities, and behave differently under storage conditions. Therefore, it is important to link each 3013 container to the most representative MIS items within each PGG. This was accomplished using queries to match each 3013 container to the most similar MIS items, based on the concentration of the chemical impurities as determined by PG analysis and the concentration of the actinides in the material. These queries are discussed in the next sections. The results of the matching are shown in Appendix D.

3013 Containers Represented by PGCl

Group PGCl includes 11 MIS items and was matched to 49 packaged 3013 containers, which have a PG analysis indicating the presence of chloride. Estimates for the 3013 container chlorine concentrations range from 0.2 to 8.3 wt%, and the actinide concentrations range from 34.8 to 82.5 wt%. This group can be subdivided, based on the type of chloride that is present in the material. It has been shown that the Na:Cl and Mg:Na peak area ratios from PG analysis can be used to distinguish ER scrap from other chloride-bearing plutonium oxides such as foundry oxides.[10,14] ER scrap materials are expected to have some amount of chloride salt from the salt matrix used in the ER process (equimolar NaCl/KCl with 5% $MgCl_2$). The ER scrap materials have Na:Cl peak area ratios with a mean of 12.0 and a range of 9.5 to 15.5 and Mg:Na peak area ratios less than 0.25. Foundry oxides may be contaminated with chloride salts. The chloride salts originated from skins on the surface of metal buttons that were brushed or burned to oxide and also from occlusions of salt inside buttons. These foundry oxides may also contain varying amounts of Mg and Ca chloride salts from Molten Salt Extraction (MSE) and Direct Oxide Reduction (DOR) processes. As shown by small-scale, shelf-life studies, chloride-bearing foundry oxides such as 011589A behave differently in storage from the ER salts because of the higher concentration of alkaline earth chloride, which absorbs moisture at very low relative humidities. Therefore, Na:Cl and Mg:Na peak ratios and the chlorine concentration were used as criteria to match each 3013 container to the three most similar MIS items according to the decision tree in Figure 1. Based on the Na:Cl and Mg:Na peak ratios, ten of the 49 containers appear to have a salt composition similar to that of ER scrap material, and the remaining containers originated in other processes.

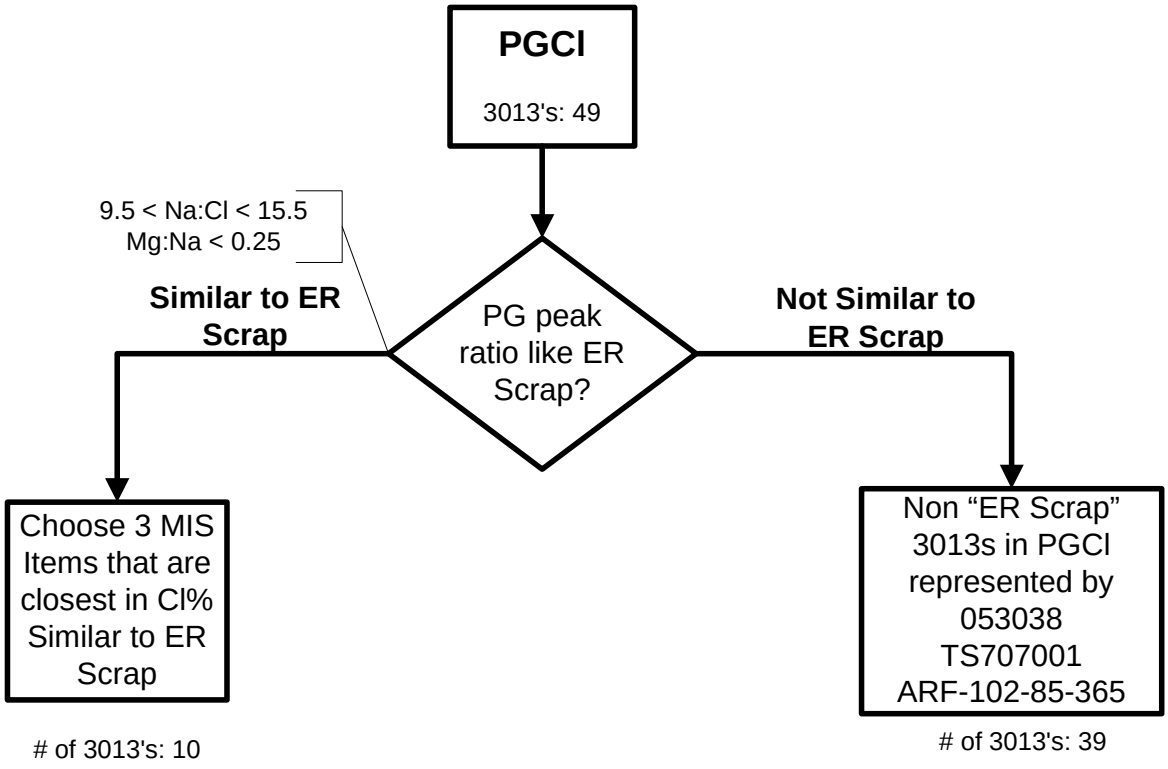

Figure 1. Decision Tree for Matching 3013 Containers in PGCl to the Three Most Similar MIS Items.

Table 6 shows an example of two 3013 containers in PGCl and the respective MIS items that are most similar by this decision tree. The 3013 container H000808 has peak ratios indicating a salt composition similar to that of ER scrap. Based on the decision tree in Figure 1, the three most similar MIS items were chosen according to the chlorine concentration. The peak ratios for H000817 indicate that the salt composition is unlike that of ER scrap; therefore, this container is matched to MIS items 053038, ARF-102-85-365, and TS707001, which have chlorine but do not have peak ratios like those of ER scrap.

Table 6. Example Showing That Two 3013 Containers in PGCl Matched the Most Similar MIS Items Shown Below as Shaded

PGG	3013 ID	Pyro	Act%	PredCl%	Item ID	ER	Representative	Act% (MIS)	Cl% (MIS)
PGCl	H000808	Pyro	69.72	2.78	CLLANL025	ER	TRUE	77.7	3.37
PGCl	H000808	Pyro	69.72	2.78	C00024A	ER	TRUE	74.3	1.79
PGCl	H000808	Pyro	69.72	2.78	07032282A	ER	FALSE	67.9	0.8
PGCl	H000808	Pyro	69.72	2.78	ARF-102-85-365	Non-ER	FALSE	68.4	2.63
PGCl	H000808	Pyro	69.72	2.78	ARF-102-85-223	ER	FALSE	70.9	6.5
PGCl	H000808	Pyro	69.72	2.78	TS707001	Non-ER	FALSE	87	0.18
PGCl	H000808	Pyro	69.72	2.78	C00695	ER	FALSE	74.1	4.95
PGCl	H000808	Pyro	69.72	2.78	ARF-102-85-355	ER	FALSE	65.6	0.96
PGCl	H000808	Pyro	69.72	2.78	053038	Non-ER	FALSE	64.1	3.28
PGCl	H000808	Pyro	69.72	2.78	PMAXBS	ER	FALSE	71.9	6.02
PGCl	H000808	Pyro	69.72	2.78	ARF-102-85-295	ER	TRUE	39.6	2.99
PGCl	H000817	Non-Pyro	72.22	2.38	CLLANL025	ER	FALSE	77.7	3.37
PGCl	H000817	Non-Pyro	72.22	2.38	PMAXBS	ER	FALSE	71.9	6.02
PGCl	H000817	Non-Pyro	72.22	2.38	07032282A	ER	FALSE	67.9	0.8
PGCl	H000817	Non-Pyro	72.22	2.38	ARF-102-85-223	ER	FALSE	70.9	6.5
PGCl	H000817	Non-Pyro	72.22	2.38	C00695	ER	FALSE	74.1	4.95
PGCl	H000817	Non-Pyro	72.22	2.38	ARF-102-85-295	ER	FALSE	39.6	2.99
PGCl	H000817	Non-Pyro	72.22	2.38	C00024A	ER	FALSE	74.3	1.79
PGCl	H000817	Non-Pyro	72.22	2.38	053038	Non-ER	TRUE	64.1	3.28
PGCl	H000817	Non-Pyro	72.22	2.38	ARF-102-85-365	Non-ER	TRUE	68.4	2.63
PGCl	H000817	Non-Pyro	72.22	2.38	ARF-102-85-355	ER	FALSE	65.6	0.96
PGCl	H000817	Non-Pyro	72.22	2.38	TS707001	Non-ER	TRUE	87	0.18

3013 Containers Represented by PGFHi

Group PGFHi is for items with greater than or equal to 0.8 wt% fluorine. The 0.8 wt% cutoff value was chosen, based on the detection limit of chloride with PG analysis. Twenty-two packaged 3013 containers were matched to PGFHi and are represented by two MIS items. The estimated fluorine concentration in the 3013 containers ranges from 0.8 to 4.8 wt%, and the actinide concentration ranges from 35.8 to 81.2 wt%. The two MIS items in PGFHi, PuF4-1 and 07242201A, have actinide concentrations of 72.7 and 63.3 wt% respectively. To better bound the actinide concentration, MIS item 64-85-12-1858, which has 32.7 wt% actinide, was assigned to PGFHi to represent the low purity material (particularly those from Hanford); although its fluorine concentration is 0.2 wt%, which is below the 0.8 wt% cutoff value. With this item included in PGFHi, the actinide and fluoride concentrations for the materials packaged in 3013 containers are bounded by those of the MIS items, which are designated as representative of all 3013 containers in this group.

3013 Containers Represented by PGFLo

Group PGFLo is for items with less than 0.8 wt% fluorine and includes six MIS items. Forty-five packaged 3013 containers were matched to this group. The estimated fluorine concentration in the 3013 containers ranges from 0.02 to 0.8 wt%, and the actinide concentration ranges from 33.6 to greater than 85 wt%. As done previously for PGCl, each 3013 container was matched to the three most similar MIS items in this group. Each 3013 container was matched first to the MIS item closest in actinide concentration and to two other MIS items that are closest in fluoride concentration. An example is shown in Table 7. Here, container R610475 is first matched to MIS item 07161856, based on actinide content, followed by 41-85-08-1379 and 64-85-12-1858, based on the concentration of fluoride.

Table 7. Example Showing a 3013 Container in PGFLo Matched the Most Similar MIS Items Shown Below as Shaded

PGG	3013 ID	Act%	Pred F%	Pred Be%	Item ID	Representative	Act% (MIS)	F% (MIS)	Be% (MIS)	Level
PGFLo	R610475	76.67	0.33	0.56	07242165A	FALSE	34.1	0.04		
PGFLo	R610475	76.67	0.33	0.56	63-88-06-121	FALSE	35.7	0.58		
PGFLo	R610475	76.67	0.33	0.56	41-85-08-1379	TRUE	34.1	0.45		PGFLo-2-F%
PGFLo	R610475	76.67	0.33	0.56	64-85-12-1858	TRUE	32.7	0.21		PGFLo-3-F%
PGFLo	R610475	76.67	0.33	0.56	07242141A	FALSE	43.1	0.66		
PGFLo	R610475	76.67	0.33	0.56	07161856	TRUE	84.2	0.1	0.04	PGFLo-1-Act%

3013 Containers Represented by PGMisc

Group PGMisc includes materials without chloride or fluoride. Eleven MIS items and 159 miscellaneous 3013 containers were assigned to this group. The actinide concentration of the 3013 containers in this group ranges from 30 to greater than 85 wt%. Uranium is found in many of the containers in concentrations as high as 81 wt%. The MIS items representing this group range from low-purity materials from the magnesium hydroxide precipitation process to high-purity plutonium and mixed plutonium/uranium oxides. None of the materials in this group are significant gas generators in the small-scale, shelf-life studies.

The 3013 containers in this group are expected to be fairly innocuous in their behavior because they are relatively free of chloride salts and other metal impurities. The impurities allowed in this group that PG analysis can detect (aluminum, beryllium, magnesium, phosphorus, sodium) do not have a major effect on the behavior of the material. Although the presence of magnesium and sodium may suggest that chloride salts are present in small amounts, chloride salts at concentrations below the PG detection limit of 0.8 wt% are generally not of concern for pressurization or corrosion. In some cases, PG analysis provides only limited information because the materials contain impurities that PG analysis cannot detect; however, these impurities are considered to be innocuous.

Because of the limited information from PG analysis for the materials in this group, matching of 3013 containers to the “most similar” MIS items was based primarily on other data in the ISP database. The criteria for matching included the actinide concentration, the uranium concentration (if present), the presence of beryllium (if present), and the ^{240}Pu isotopic concentration. Matching was accomplished using the decision tree in Figure 2.

Examples of the 3013 container to MIS item matching are shown in Table 8. In the first example, ISP data show that 3013 container L000205 is weapons-grade oxide with about 56% actinide, a small amount of uranium, and no beryllium. The first matching MIS item (CAN92) was chosen, based on the uranium concentration. The second MIS item (66-01-01-439) was chosen, based on the actinide concentration, and the third matching MIS item (5501407) was chosen because it is the next closest in actinide concentration. In the second example, H003601 has an actinide concentration of 86.75 wt%, with no uranium or beryllium, and is high in ^{240}Pu. Based on the decision tree in Figure 2, this container is

represented by ARF-102-85-114-1 and PBO-47-09-012-023, based on its actinide concentration and the absence of uranium and beryllium, and BLO-39-11-14-004, based on its ^{240}Pu content. In the third example, R610497 has an actinide concentration of 83.76 wt%, and the concentrations of uranium and beryllium in the material are 17.08 wt% and 0.35 wt%, respectively. Based on the decision tree in Figure 2, this container is represented by 5501407, based on the uranium concentration, CAN92, based on the actinide concentration and the presence of uranium, and ARF-102-85-114-1 because it is a weapons-grade oxide with beryllium.

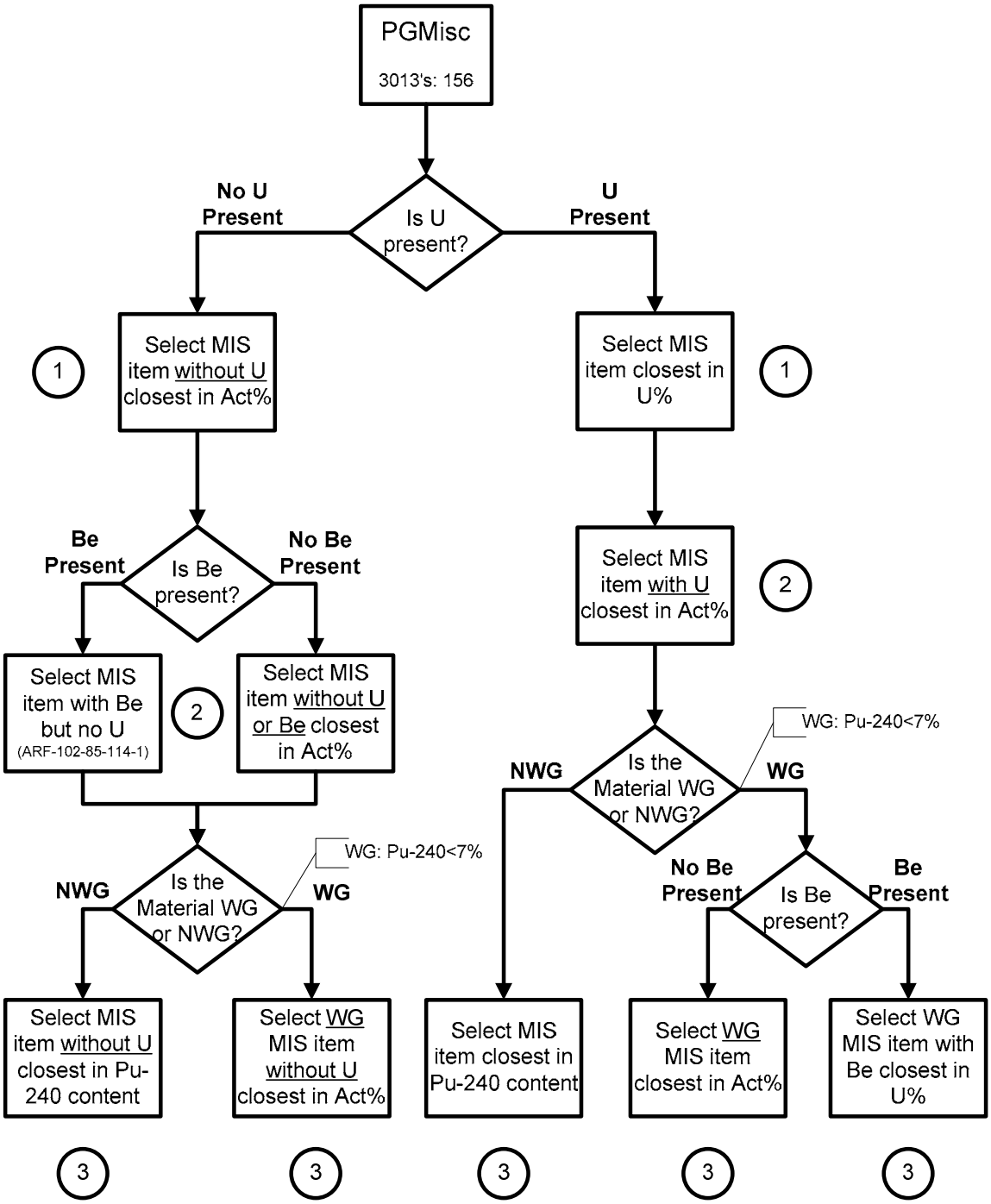

Figure 2. Decision Tree for Matching 3013 Containers in PGMisc to the Three Most Similar MIS Items.

Table 8. Example Showing Three 3013 Containers in PGMisc Matched the Most Similar MIS Items Shown Below as Shaded

PGG	3013 ID	Act%	U%	PredBe%	Pu-240 (%)	Item ID	Representative	Act% (MIS)	U% (MIS)	Be% (MIS)	Pu-240% (MIS)
PGMisc	L000205	56.01	0.04		6.9882	ARF-102-85-114-1	FALSE	86.30	0.00	0.12	5.8176
PGMisc	L000205	56.01	0.04		6.9882	5501407	TRUE	76.70	10.90	0.05	5.8115
PGMisc	L000205	56.01	0.04		6.9882	BLO-39-11-14-004	FALSE	85.20	0.00		18.8438
PGMisc	L000205	56.01	0.04		6.9882	669194	FALSE	83.00	69.20	0.31	4.2964
PGMisc	L000205	56.01	0.04		6.9882	PPSL-365	FALSE	83.40	0.00		6.0355
PGMisc	L000205	56.01	0.04		6.9882	66-01-01-439	TRUE	63.13	0.00		5.7306
PGMisc	L000205	56.01	0.04		6.9882	MT1490	FALSE	85.60	0.00		5.9240
PGMisc	L000205	56.01	0.04		6.9882	PBO-47-09-012-023	FALSE	87.50	0.00		12.6022
PGMisc	L000205	56.01	0.04		6.9882	PSU-84-06-05	FALSE	78.50	65.10		8.5417
PGMisc	L000205	56.01	0.04		6.9882	66-00-11-355	FALSE	29.19	0.00		5.8041
PGMisc	L000205	56.01	0.04		6.9882	CAN92	TRUE	83.90	2.30	0.20	5.9480
PGMisc	H003601	86.75	0.00		21.4068	669194	FALSE	83.00	69.20	0.31	4.2964
PGMisc	H003601	86.75	0.00		21.4068	66-00-11-355	FALSE	29.19	0.00		5.8041
PGMisc	H003601	86.75	0.00		21.4068	PBO-47-09-012-023	TRUE	87.50	0.00		12.6022
PGMisc	H003601	86.75	0.00		21.4068	66-01-01-439	FALSE	63.13	0.00		5.7306
PGMisc	H003601	86.75	0.00		21.4068	CAN92	FALSE	83.90	2.30	0.20	5.9480
PGMisc	H003601	86.75	0.00		21.4068	PPSL-365	FALSE	83.40	0.00		6.0355
PGMisc	H003601	86.75	0.00		21.4068	BLO-39-11-14-004	TRUE	85.20	0.00		18.8438
PGMisc	H003601	86.75	0.00		21.4068	PSU-84-06-05	FALSE	78.50	65.10		8.5417
PGMisc	H003601	86.75	0.00		21.4068	5501407	FALSE	76.70	10.90	0.05	5.8115
PGMisc	H003601	86.75	0.00		21.4068	MT1490	FALSE	85.60	0.00		5.9240
PGMisc	H003601	86.75	0.00		21.4068	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610497	83.76	17.08	0.35	5.5599	5501407	TRUE	76.70	10.90	0.05	5.8115
PGMisc	R610497	83.76	17.08	0.35	5.5599	669194	FALSE	83.00	69.20	0.31	4.2964
PGMisc	R610497	83.76	17.08	0.35	5.5599	CAN92	TRUE	83.90	2.30	0.20	5.9480
PGMisc	R610497	83.76	17.08	0.35	5.5599	66-01-01-439	FALSE	63.13	0.00		5.7306
PGMisc	R610497	83.76	17.08	0.35	5.5599	PPSL-365	FALSE	83.40	0.00		6.0355
PGMisc	R610497	83.76	17.08	0.35	5.5599	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610497	83.76	17.08	0.35	5.5599	BLO-39-11-14-004	FALSE	85.20	0.00		18.8438
PGMisc	R610497	83.76	17.08	0.35	5.5599	MT1490	FALSE	85.60	0.00		5.9240
PGMisc	R610497	83.76	17.08	0.35	5.5599	PBO-47-09-012-023	FALSE	87.50	0.00		12.6022
PGMisc	R610497	83.76	17.08	0.35	5.5599	66-00-11-355	FALSE	29.19	0.00		5.8041
PGMisc	R610497	83.76	17.08	0.35	5.5599	PSU-84-06-05	FALSE	78.50	65.10		8.5417

3013 Containers Represented by PGNoImp

Group PGNoImp includes materials in which the PG analysis did not detect impurities. This group includes 21 packaged 3013 containers. The actinide concentration for the 3013 containers is 80 wt% or higher, which shows that these materials are fairly pure. Most of the 3013 containers have uranium present. Three MIS items 5501579, PEOF1, and SCP711-56 represent all 3013 containers in this group. All three of these items are greater than 85% actinide and have uranium concentrations of 0.1, 0.0, and 70 wt%, respectively.

3013 Containers Represented by PG Analysis without a PG Measurement

One 3013 container from Rocky Flats (R610887) was represented by PG analysis but did not receive a PG analysis. The ISP data for this container were reviewed, and it was found that this container was from a batch of material that had been split into ten 3013 containers. The relevant data for the other nine 3013 containers is shown in Table 9. The actinide concentration of the material in R610887 is 81.31 wt%, which is within the range of the other nine containers. The PG results for the other nine 3013 containers was similar to those of R610887 in that beryllium was detected in all nine containers, but chlorides and fluorides were not detected in the PG analysis. Therefore, it was assumed that the material in R610887 would not differ significantly from the material in the other nine containers, and the PGMisc decision tree was used to match this container to the most similar MIS items. Based on the PGMisc decision tree, R610887 is represented by MIS items 5501407, ARF-102-85-114-1, and CAN92, all of which originated at Rocky Flats.

Table 9. Comparison of R610887 with the Nine Related Containers with Material from the Same Input Batch. (Shaded Items Were Selected for Representation.)

PGG	3013 ID	Act%	U%	PredBe%	Pu-240 (%)	Item ID	Representative	Act% (MIS)	U% (MIS)	Be% (MIS)	Pu-240% (MIS)
PGMisc	R610752	83.54	0.00	1.45	5.8720	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610752	83.54	0.00	1.45	5.8720	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R610752	83.54	0.00	1.45	5.8720	PPSL-365	TRUE	83.40	0.00		6.0355
PGMisc	R601843	80.18	0.00	1.31	6.3113	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R601843	80.18	0.00	1.31	6.3113	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R601843	80.18	0.00	1.31	6.3113	PPSL-365	TRUE	83.40	0.00		6.0355
PGMisc	R610847	87.53	0.00	1.30	5.8720	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610847	87.53	0.00	1.30	5.8720	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R610847	87.53	0.00	1.30	5.8720	PBO-47-09-012-023	TRUE	87.50	0.00		12.6022
PGMisc	R610874	74.78	1.07	0.89	6.2819	5501407	TRUE	76.70	10.90	0.05	5.8115
PGMisc	R610874	74.78	1.07	0.89	6.2819	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610874	74.78	1.07	0.89	6.2819	CAN92	TRUE	83.90	2.30	0.20	5.9480
PGMisc	R610888	91.13	0.00	1.57	5.5798	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610888	91.13	0.00	1.57	5.5798	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R610888	91.13	0.00	1.57	5.5798	PBO-47-09-012-023	TRUE	87.50	0.00		12.6022
PGMisc	R601928	83.76	0.00	1.35	5.8720	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R601928	83.76	0.00	1.35	5.8720	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R601928	83.76	0.00	1.35	5.8720	PPSL-365	TRUE	83.40	0.00		6.0355
PGMisc	R610951	82.68	1.58	1.42	6.4735	669194	TRUE	83.00	69.20	0.31	4.2964
PGMisc	R610951	82.68	1.58	1.42	6.4735	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R610951	82.68	1.58	1.42	6.4735	CAN92	TRUE	83.90	2.30	0.20	5.9480
PGMisc	R611320	74.72	0.00	1.23	6.5979	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R611320	74.72	0.00	1.23	6.5979	MT1490	TRUE	85.60	0.00		5.9240
PGMisc	R611320	74.72	0.00	1.23	6.5979	PPSL-365	TRUE	83.40	0.00		6.0355
PGMisc	R611424	72.30	0.00	1.75	7.5962	66-01-01-439	TRUE	63.13	0.00		5.7306
PGMisc	R611424	72.30	0.00	1.75	7.5962	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGMisc	R611424	72.30	0.00	1.75	7.5962	PBO-47-09-012-023	TRUE	87.50	0.00		12.6022
PGNoPG	R610887	81.31	0.00	NM	5.8720	5501407	TRUE	76.70	10.90	0.05	5.8115
PGNoPG	R610887	81.31	0.00	NM	5.8720	66-00-11-355	FALSE	29.19	0.00		5.8041
PGNoPG	R610887	81.31	0.00	NM	5.8720	66-01-01-439	FALSE	63.13	0.00		5.7306
PGNoPG	R610887	81.31	0.00	NM	5.8720	669194	FALSE	83.00	69.20	0.31	4.2964
PGNoPG	R610887	81.31	0.00	NM	5.8720	ARF-102-85-114-1	TRUE	86.30	0.00	0.12	5.8176
PGNoPG	R610887	81.31	0.00	NM	5.8720	BLO-39-11-14-004	FALSE	85.20	0.00		18.8438
PGNoPG	R610887	81.31	0.00	NM	5.8720	CAN92	TRUE	83.90	2.30	0.20	5.9480
PGNoPG	R610887	81.31	0.00	NM	5.8720	MT1490	FALSE	85.60	0.00		5.9240
PGNoPG	R610887	81.31	0.00	NM	5.8720	PBO-47-09-012-023	FALSE	87.50	0.00		12.6022
PGNoPG	R610887	81.31	0.00	NM	5.8720	PPSL-365	FALSE	83.40	0.00		6.0355
PGNoPG	R610887	81.31	0.00	NM	5.8720	PSU-84-06-05	FALSE	78.50	65.10		8.5417

Conclusion

The “Represented” linkages between 3013 containers and MIS items have been revised, based on a review by several members of the MIS working group and other subject matter experts. The revision was needed to address three issues: (1) unique or bounding behavior was observed in MIS items 011589A and C06032A under storage conditions that would not be expected in the entire population of 3013 containers that were originally represented by these items; (2) new information was available for both 3013 containers in storage and the representative MIS items that had not been addressed in the original “Represented” documents issued by the sites; and (3) the completion of PG analysis for the items “represented by PG analysis.” A complete list of MIS Representation linkages has been compiled to create a Master “Represented” table for all of the 3013 containers for all sites. The Master Represented table links the MIS items database to the ISP database and allows the immediate matching of 3013 containers to its representative MIS items and their respective gas-generation data from small-scale, shelf-life studies. The linked databases are necessary for field surveillance destructive evaluations, nondestructive evaluations, and 3013 storage activities when the sites need to trace the 3013 containers back to the representative items and data. In addition, the linked databases will enable the sites to simultaneously query data for 3013 containers and MIS items to identify potentially problematic containers. These methodologies will also be applied to demonstrating representativeness for future produced containers as done for the LANL processing groups in Appendix B and C.

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Appendix A: MIS Items

Table A-1. MIS Items Data, (Columns 1 through 7)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	SOURCE SITE	ORIGINATION PROCESS	COMMENTS
Oxalate Precipitation		1	BLO-39-11-14-004	HANFORD	Continuous Oxalate Precipitation/Calcination	Converted from purified nitrate/PFP RMA Line
Oxalate Precipitation		1	CXLNM1	LANL	LANL Chloride line	Pure Pu oxide produced from oxalate precipitated from chloride solution
Oxalate Precipitation		1	MISSTD-1	LANL	Precipitation and Calcination of oxalate	Batch oxalate (III) precipitation from nitrate solution and ion-exchange feed.
Oxalate Precipitation		1	MISSTD-2	LANL	Precipitation and Calcination of oxalate	Batch oxalate (III) precipitation from nitrate solution and ion-exchange feed
Oxalate Precipitation		1	PBO-47-09-012-023	HANFORD	Continuous Oxalate Precipitation/Calcination	Converted from purified nitrate/PUREX N-cell
Oxalate Precipitation		1	PEOF1	LANL	Precipitation and Calcination of Oxalate	Batch oxalate (III) precipitation from nitrate solution and ion-exchange feed. Obtained from parent PEOFRBJSTD calc at 975 for 4 hours.
Oxalate Precipitation		1	PEOR3258	LANL	Precipitation and Calcination of Oxalate	Batch oxalate (III) precipitation from nitrate solution and ion-exchange feed. Pure Pu oxide standard.
Oxalate Precipitation		1	CXLOX091802	LANL	Precipitation and Calcination of Oxlate	Pure Pu oxide produced from oxalate precipitated from chloride solution
Oxalate Precipitation		1	CXLPROD091901	LANL	Precipitation and Calcination of Oxlate	Pure Pu oxide produced from oxalate precipitated from chloride solution
Oxalate Precipitation		1	CXLPROD021202	LANL	Precipitation and Calcination of Oxlate	Pure Pu oxide produced from oxalate precipitated from chloride solution
Peroxide Precipitation		2	07161856	RFETS	Precipitation and Calcination of Peroxide	Calcination, Building 771, Room 114
Peroxide Precipitation		2	1000089	RFETS	Precipitation and Calcination of Peroxide	Precipitation/Calcination, Building 371, Room 3511
MgOH Precipitation		3	39-01153A	RFETS	By-product Oxide from Hydroxide Precipitation	Caustic Waste Treatment, Building 371, Room 1115
MgOH Precipitation		3	66-00-11-355	HANFORD	Mg(OH)2 Precipitation/Calcination	From Impure Nitrate (Concentrated Filtrate)
MgOH Precipitation		3	66-01-01-439	HANFORD	Mg(OH)2 Precipitation/Calcination	From Purified Nitrate
Metal Oxidation		4	011589A	RFETS	Metal Oxidation	Thermal Stabilization, Building 707, J-Module Before 1990
Metal Oxidation		4	011608	RFETS	Metal Oxidation	Thermal Stabilization, Building 707, J-Module Before 1990
Metal Oxidation		4	07221730	RFETS	Metal Oxidation	Metal and Chip Burning, Building 771, Room 114
Metal Oxidation		4	101707001	RFETS	Metal Oxidation	Foundry Oxide
Metal Oxidation		4	ARF-102-85-114-1	HANFORD	Metal Oxidation	WG Foundry Oxide received from Rocky Flats
Metal Oxidation		4	MT1490	RFETS	High-Purity Plutonium Oxide Bearing Np	Plutonium Metallurgy R&D, Building 771, Room 182

Table A-1. MIS Items Data, (Columns 1 through 7)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	SOURCE SITE	ORIGINATION PROCESS	COMMENTS
Metal Oxidation		4	TS707001	RFETS	Metal Oxidation	Thermal Stabilization, Building 707, J-Module After 1995
Metal Oxidation		4	TS707013	RFETS	Metal Oxidation	Thermal Stabilization, Building 707, J-Module After 1996
Hydride Oxidation		5	5501407	RFETS	Hydride Oxide / By-product Plutonium-Uranium Oxide	Hydride Operations Building 779, Rooms 152A / 160A
Hydride Oxidation		5	5501579	RFETS	Hydride Oxide / By-product Plutonium-Uranium Oxide	Hydride Operations Building 779, Rooms 152A / 160A
Hydride Oxidation		5	669194	RFETS	By-product Plutonium-Uranium Oxide	Special Assembly Projects, Building 777
Pu/U Oxide	**Misc Pu/U Oxides**	6	053038	RFETS	By-product Plutonium-Uranium Oxide	Hydroxide Precipitation, Building 771
Pu/U Oxide	**Misc Pu/U Oxides**	6	CAN92	RFETS	By-product Plutonium-Uranium Oxide	Analytical Lab Production Support, Building 559
Pu/U Oxide	**Misc Pu/U Oxides**	6	MISNE2	LANL	Mix of 7221730, TS707001, 11608, and 62750	MISNE2 post neutron moderation. Contains borax and gypsum.
Pu/U Oxide	**Misc Pu/U Oxides**	6	PuUOXBC05	LANL	Unknown	Impure Pu/U oxide originally packaged Nov 1983; High Ca, Mg, K, Na
Pu/U Oxide	**MOX Fuel**	6	MOXSCP-COM	LANL	Calcined MOX	MOX fuel pellets and powder
Pu/U Oxide	**MOX Fuel**	6	SCP711-46	LANL	Hot Plate Oxidation	Fuel Pellets and powder
Pu/U Oxide	**MOX Fuel**	6	SCP711-56	LANL	Hot Plate Oxidation	Fuel Pellets and powder
Pu/U Oxide	**MOX Fuel**	6	1685	LANL	Misc.	Depleted Uranium Oxide
Pu/U Oxide	**MOX Fuel**	6	BMU	LANL	By-product uranium oxide	Burned uranium metal
Pu/U Oxide	**Pu/U Mixture**	6	BMUCXL70-30	LANL	Mixture of 70% BMU (EU) and 30% CXL (PuO2)	Pu/U mixture
Pu/U Oxide	**Pu/U Mixture**	6	BMUCXL93-7	LANL	Mixture of 93% BMU (EU) and 7% CXL (PuO2)	Pu/U mixture
Pu/U Oxide	**Pu/U Mixture**	6	CXL1685	LANL	Mixture of CXL and 1685	Pu/U mixture
Pu/U Oxide	**Pu/U Mixture**	6	CXLBMU70-30	LANL	Mixture of 70% CXL (PuO_2) and 30% BMU (EU)	Pu/U mixture
Pu/U Oxide	**Pu/U Mixture**	6	CXLBMU93-7	LANL	Mixture of 93% CXL (PuO_2) and 7% BMU (EU)	Pu/U mixture
Pu/U Oxide	**Polycube Oxide**	6	PSU-84-06-05	HANFORD	Recovery from Pyrolytic Processing	Mixed Oxide recovered from polycube/PFP
Dissolution Residuals		7	07032282A	RFETS	Dissolution Residuals (from foundry scrap oxide)	Oxide Dissolution, Building 771, Room 114
Dissolution Residuals		7	07242165A	RFETS	Dissolution Residuals (from foundry scrap oxide)	Residue Dissolution, Building 771, Room 149, Line 24
Dissolution Residuals		7	07242201A	RFETS	Dissolution Residuals (from foundry scrap oxide)	Residue Dissolution, Building 771, Room 149, Line 24.
Dissolution Residuals		7	07242243A	RFETS	Dissolution Residuals (from foundry scrap oxides)	Low Purity Heel
Dissolution Residuals		7	07242326A	RFETS	Dissolution Residuals (from foundry scrap oxides)	Dissolution Heel

Table A-1. MIS Items Data, (Columns 1 through 7)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	SOURCE SITE	ORIGINATION PROCESS	COMMENTS
Dissolution Residuals		7	62750	RFETS	By-product Plutonium-Uranium Oxide	Dissolution, Building 371, Room 1115
Dissolution Residuals		7	ARF-102-85-355	HANFORD	Oxide from Residue Processing	WG Oxide received from Rocky Flats
Oxide Screenings		8	07242141A	RFETS	Screenings from Oxide packaged for off-site shipment	Unknown origin
Oxide Screenings		8	C06032A	RFETS	Screenings from Oxide packaged for off-site shipment	Split Can, Calcined then stored in the B371 S/R.
Pyrochemical Oxide		9	520610020	RFETS	Oxide from Pyrochemical Processes	Pyrochemistry Technology Development, Building 779
Pyrochemical Oxide		9	ARF-102-85-223	HANFORD	Scrap Oxide from Pyrochemical Process	WG Oxide received from Rocky Flats
Pyrochemical Oxide		9	ARF-102-85-295	HANFORD	Scrap Oxide from Pyrochemical Process	WG Oxide received from Rocky Flats
Pyrochemical Oxide		9	ARF-102-85-365	HANFORD	Scrap Oxide from Pyrochemical Process	WG Oxide received from Rocky Flats
Pyrochemical Oxide		9	ATL27960	LANL	From advanced testing line for actinide separation (ATLAS)	Washed Pyrochemical Salt
Pyrochemical Oxide		9	C00024A	RFETS	Oxide from Pyrochemical Processes. IDC defined as LOI reject uncertain source	Calcined then stored in the B371 S/R at one time
Pyrochemical Oxide		9	C00695	RFETS	Oxide from Pyrochemical (ER tilt pour) Processes	ER tilt pour operations, Building 371. Calcined and stored in the B371 S/R at one time
Pyrochemical Oxide		9	CLLANL025	RFETS	Oxide from Pyrochemical (ER tilt pour) Processes	ER tilt pour operations, Building 371
Pyrochemical Oxide		9	PMAXBS	LANL	Oxide from Pyrochemical Process	Mixture of anode heels and ER salts
Scrap Oxide		10	41-85-08-1379	HANFORD	Scrap WG oxide from analytical laboratories	Impure oxide (scrap and returns from analytical lab)
Scrap Oxide		10	63-88-06-121	HANFORD	Calcined PRF Scrap Oxide	Scrap oxide from aqueous recovery
Scrap Oxide		10	64-85-12-1858	HANFORD	Calcined C-Line Scrap Oxide	Scrap oxide for metal reduction (oxalate precipitation/ hydrofluorination/reduction to metal)
Misc. Oxides	**Direct Denitration**	11	PPSL-365	HANFORD	Direct denitration	Converted from nitrate in the Plutonium Process Support Laboratory (PPSL) calciner at PFP
Misc. Oxides	**Pu Fluoride**	11	PuF4-1	LANL	PuF_4 Precipitation	PuF_4 Line from DP (LANL)
Misc. Oxides	**Pu Fluoride**	11	YBG2-NRDL-4	LANL	Standard from the Navy	Unknown origin
Misc. Oxides		11	MISNE4	LANL	Mix of 520610020, 11589, C06032A, TS707013, 1000089, and 39-01153	Impure items (Mg and Ca) combined, V-blended, gypsum added and calcined numerous times

Table A-1. MIS Items Data, (Columns 1 through 4 and 8 through 16)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	Pu%	U%	Pu+U	Small / Large Scale	Surface Area / Density	Chem	Prompt Gamma	Major Impurities (<1 wt%)	Sample Available
Oxalate Precipitation		1	BLO-39-11-14-004	85.2	0	85.2	Y	Y	Y	Y	None	N
Oxalate Precipitation		1	CXLNM1	87.3	0	87.3	N	Y	N	N	Unknown	Y
Oxalate Precipitation		1	MISSTD-1	86	0	86	Y	Y	Y	N	None	Y
Oxalate Precipitation		1	MISSTD-2	87.3	0	87.3	N	N	N	N	Unknown	Y
Oxalate Precipitation		1	PBO-47-09-012-023	87.5	0	87.5	Y	Y	Y	Y	None	Y
Oxalate Precipitation		1	PEOF1	87.5	0	87.5	Y	Y	Y	Y	None	Y
Oxalate Precipitation		1	PEOR3258	87.8	0	87.8	N	Y	Y	N	None	N
Oxalate Precipitation		1	CXLOX091802	76.6	0	76.6	Y	Y	Y	N	None	Y
Oxalate Precipitation		1	CXLPROD091901	87.6	0	87.6	Y	Y	Y	N	None	Y
Oxalate Precipitation		1	CXLPROD021202	87.8	0	87.8	Y	Y	Y	N	None	Y
Peroxide Precipitation		2	07161856	84.2	0	84.2	Y	Y	Y	Y	None	Y
Peroxide Precipitation		2	1000089	84.5	0	84.5	Y	Y	Y	N	None	Y
MgOH Precipitation		3	39-01153A	7.7	0	7.7	N	Y	Y	N	Cl, Fe, Mg	
MgOH Precipitation		3	66-00-11-355	29	0	29	Y	Y	Y	Y	Al, Mg, P	Y
MgOH Precipitation		3	66-01-01-439	63.1	0	63.1	Y	Y	Y	Y	Mg, P	Y
Metal Oxidation		4	011589A	77.7	0	77.7	Y	Y	Y	Y	Cl, Mg	Y
Metal Oxidation		4	011608	84.5	0	84.5	N	Y	Y	N	None	N
Metal Oxidation		4	07221730	85.8	0	85.8	N	Y	Y	N	None	
Metal Oxidation		4	101707001	19.6	NM	?	N	N	N	Y	Cl, Na	Y
Metal Oxidation		4	ARF-102-85-114-1	86.3	0	86.3	Y	Y	Y	Y	None	Y
Metal Oxidation		4	MT1490	85.6	0	85.6	Y	Y	Y	Y	None	Y

Table A-1. MIS Items Data, (Columns 1 through 4 and 8 through 16)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	Pu%	U%	Pu+U	Small / Large Scale	Surface Area / Density	Chem	Prompt Gamma	Major Impurities (<1 wt%)	Sample Available
Metal Oxidation		4	TS707001	87	0	87	Y	Y	Y	Y	None	Y
Metal Oxidation		4	TS707013	69.8	0	69.8	Y	Y	Y	N	Cl, Fe, Mg, K, Na	Y
Hydride Oxidation		5	5501407	65.8	10.9	76.7	Y	Y	Y	Y	S	Y
Hydride Oxidation		5	5501579	85.1	0.1	85.2	Y	Y	Y	Y	Ga	Y
Hydride Oxidation		5	669194	13.8	69.2	83	Y	Y	Y	Y	None	Y
Pu/U Oxide	**Misc Pu/U Oxides**	6	053038	60.4	3.7	64.1	Y	Y	Y	Y	Cl, Ca, Cr, Fe, K, Na, Zn	Y
Pu/U Oxide	**Misc Pu/U Oxides**	6	CAN92	81.6	2.3	83.9	Y	Y	Y	Y	None	Y
Pu/U Oxide	**Misc Pu/U Oxides**	6	MISNE2	84.6	2	86.6	N	Y	Y	Y	None	Y
Pu/U Oxide	**Misc Pu/U Oxides**	6	PuUOXBC05	36.1	14.7	50.8	N	Y	Y	Y	F, Ca, Cu, Mg, Zn	Y
Pu/U Oxide	**MOX Fuel**	6	MOXSCP-COM	4.9	81.6	86.5	N	N	N	N	Unknown	
Pu/U Oxide	**MOX Fuel**	6	SCP711-46	6.2	78.3	84.5	N	Y	Y	Y	C	Y
Pu/U Oxide	**MOX Fuel**	6	SCP711-56	17.5	70	87.5	Y	Y	Y	Y	None	Y
Pu/U Oxide	**MOX Fuel**	6	1685	NM	NM	?	N	Y	N	N	Unknown	Y
Pu/U Oxide	**MOX Fuel**	6	BMU	0	84.3	84.3	N	Y	N	N	Unknown	Y
Pu/U Oxide	**Pu / U Mixture**	6	BMUCXL70-30	23.8	58.3	82.1	N	N	N	N	Unknown	Y
Pu/U Oxide	**Pu / U Mixture**	6	BMUCXL93-7	6.1	78.5	84.6	N	N	N	N	Unknown	Y
Pu/U Oxide	**Pu / U Mixture**	6	CXL1685	6	79.9	85.9	N	Y	Y	N	None	Y
Pu/U Oxide	**Pu / U Mixture**	6	CXLBMU70-30	59.9	23.7	83.6	N	N	N	N	Unknown	Y
Pu/U Oxide	**Pu / U Mixture**	6	CXLBMU93-7	80.8	5.9	86.7	N	N	N	N	Unknown	Y
Pu/U Oxide	**Polycube Oxide**	6	PSU-84-06-05	13.4	65.1	78.5	Y	Y	Y	Y	None	Y
Dissolution Residuals		7	07032282A	67.9	0	67.9	Y	Y	Y	Y	F, Ca, C,	Y
Dissolution Residuals		7	07242165A	34.1	0	34.1	Y	Y	Y	Y	C	Y
Dissolution Residuals		7	07242201A	63.3	0	63.3	Y	Y	Y	Y	Cl, F, C, Ni, K, S	Y
Dissolution Residuals		7	07242243A	24.6	NM	?	N	N	N	Y	F	Y
Dissolution Residuals		7	07242326A	15.7	NM	?	N	N	N	Y	F	Y

Table A-1. MIS Items Data, (Columns 1 through 4 and 8 through 16)

PROCESS GROUP	SubCategory	Group ID	MIS SAMPLE	Pu%	U%	Pu+U	Small / Large Scale	Surface Area / Density	Chem	Prompt Gamma	Major Impurities (<1 wt%)	Sample Available
Dissolution Residuals		7	62750	85.9	0.5	86.4	N	Y	Y	N	None	
Dissolution Residuals		7	ARF-102-85-355	65.6	0	65.6	Y	Y	Y	Y	Cl, F, C	Y
Oxide Screenings		8	07242141A	43.1	0	43.1	Y	Y	Y	Y	Fe	Y
Oxide Screenings		8	C06032A	65.9	0	65.9	Y	Y	Y	N	Cl, Mg, K, Na	Y
Pyrochemical Oxide		9	520610020	33.7	0	33.7	Y	Y	Y	N	Cl, Al, Ca, Mg, Ni, K, Na	Y
Pyrochemical Oxide		9	ARF-102-85-223	70.9	0	70.9	Y	Y	Y	Y	Cl, K, Na	Y
Pyrochemical Oxide		9	ARF-102-85-295	39.6	0	39.6	Y	Y	Y	Y	Cl, Fe, Mg, Ni, K, Na	Y
Pyrochemical Oxide		9	ARF-102-85-365	68.4	0	68.4	Y	Y	Y	Y	Cl, Mg, K, Na	Y
Pyrochemical Oxide		9	ATL27960	74.2	0	74.2	N	Y	Y	N	C, K, Na	N
Pyrochemical Oxide		9	C00024A	74.3	0	74.3	Y	Y	Y	Y	Cl, Ga, Mg, K, Na	Y
Pyrochemical Oxide		9	C00695	74.1	0	74.1	Y	Y	Y	Y	Cl, Mg, K, Na	Y
Pyrochemical Oxide		9	CLLANL025	77.7	0	77.7	Y	Y	Y	Y	Cl, K, Na	Y
Pyrochemical Oxide		9	PMAXBS	71.9	0	71.9	Y	Y	Y	Y	Cl, Ga, K, Na	Y
Scrap Oxide		10	41-85-08-1379	34.1	0	34.1	Y	N	N	Y	Al, F, Mg, Na	Y
Scrap Oxide		10	63-88-06-121	35.7	0	35.7	Y	Y	Y	Y	F, Al, Ca, C, Fe, Mg, Na	Y
Scrap Oxide		10	64-85-12-1858	32.7	0	32.7	Y	Y	Y	Y	Ca, Fe	Y
Misc. Oxides	**Direct Denitration**	11	PPSL-365	83.4	0	83.4	N	Y	Y	Y	None	Y
Misc. Oxides	**Pu Fluoride**	11	PuF4-1	72.7	0	72.7	Y	Y	Y	Y	Cl, F	Y
Misc. Oxides	**Pu Fluoride**	11	YBG2-NRDL-4	77.5	0	77.5	N	N	N	Y	F	Y
Misc. Oxides		11	MISNE4	66.8	0	66.8	N	Y	Y	Y	Cl, Ca, Fe, Mg	Y

Appendix B: Master “Represented” Table by Process

	3013 Taxon	MIS Group	Number of 3013 Containers	Assay Range [8]	Process History [3]		MIS items
HANFORD	MetalOx-HN	1A	106	Pu:64.6 – 89.6 wt% U: none Act: 71.6 – 91.9 wt%	Product quality Pu oxides from metal oxidation, metal brushing and burning, and stored product oxides from these processes	Metal oxidation	011608 07221730 ARF-102-85-114-1 TS707001
	OxlPPt-HN	1B	518	Pu:73.2 – 89.1 wt% U: none Act: 79.5 – 90.9 wt%	Product quality oxides from oxalate precipitation—(Stored product, typically BLO-, PBO-, LAO-, DZO-, GEO-, and others >85% assay)	Oxalate precipitation/calcination	PEOF1 BLO-39-11-14-004 PBO-47-09-012-023
		1C	111	Pu:82.7 – 90.2 wt% U: none Act: 83.0 – 90.7 wt%	Product quality Pu oxides from oxalate precipitation (recently generated from solutions via oxalate precipitation from product nitrate feed)	Oxalate precipitation/calcination	PEOF1 BLO-39-11-14-004 PBO-47-09-012-023
	MiscOx-HN-PC	1D	28	Pu:12.2 – 89.5 wt% U: 32.6 – 63.9 wt% Act: 58.7 – 89.5 wt%	Product quality oxide recovered from polycubes, from current and past operations, Pu and Pu/DU oxides (PS-, and PSU-)	Recovery from pyrolytic processing of very pure material derived from oxalate precipitation and metal oxidation	PSU-84-06-05
	PyroOx-HN-RF-FndryOX	1E	17	Pu:50.0 – 83.0 wt% U: none Act: 50.1 – 83.2 wt%	Impure and scrap oxides from Rocky Flats	Scrap oxide from pyrochemical process, calcination and precipitation of peroxide, and residue processing.	011589A‡ ARF-102-85-114-1 ARF-102-85-223 ARF-102-85-295 ARF-102-85-355 ARF-102-85-365
	PyroOx-HN-RF-ERScrap	1E	293	Pu:47.1 – 80.6 wt% U: 5.5 wt% (1 item) Act: 47.2 – 80.6 wt%	Impure and scrap oxides from Rocky Flats	Scrap oxide from pyrochemical process, calcination and precipitation of peroxide, and residue processing.	ARF-102-85-114-1 ARF-102-85-223 ARF-102-85-295 ARF-102-85-355 ARF-102-85-365
	PyroOx-HN-RF-MiscOx	1E	122	Pu:44.7 – 87.1 wt% U: 14.5 wt% (1 item) Act: 44.8 – 87.2 wt%	Impure and scrap oxides from Rocky Flats	Scrap oxide from pyrochemical process, calcination and precipitation of peroxide, and residue processing.	011589A‡ ARF-102-85-114-1 ARF-102-85-223 ARF-102-85-295 ARF-102-85-355 ARF-102-85-365
	MgOHPPt-HN	1F	121	Pu:18.8 – 68.0 wt% U: <18.9 wt% Act: 30.4 – 68.3 wt%	Impure and scrap oxides from solutions (recently produced via $Mg(OH)_2$ precipitation from impure feeds)	$Mg(OH)_2$ precipitation/calcination	66-00-11-355 66-01-01-439
	OxlPPt-HN-Impure	1F	54	Pu:33.3 – 77.2 wt% U: 4.0 wt% (1 item) Act: 33.4 – 77.4 wt%	Impure and scrap oxides from solutions (recently produced via oxalate precipitation from impure feeds)	Oxalate precipitation/calcination	66-00-11-355 66-01-01-439 BLO-39-11-14-004 PBO-47-09-012-023
	OxlPPt-HN-MixedPure	1G	52	Pu:14.1 – 85.2 wt% U: <60.9 wt% Act: 71.1 – 90.1 wt%	Product quality mixed oxide from CML solutions (recently produced from solutions via oxalate precipitation of pure mixed nitrate feeds)	Oxalate precipitation/calcination, Pu/U oxides	669194 BLO-39-11-14-004 CAN92 PBO-47-09-012-023
	ScrapOx-HN-Hi	2A	32	Pu:75.8 – 84.5 wt% U: 4.7 wt% (1 item) Act: 80.0 – 84.4 wt%	Impure and scrap Pu oxides with 80-85 wt% Pu from PFP and 300 area	May be represented as fairly pure oxide from: a) oxalate precipitation, b) direct denitration, c) metal oxidation	TS707001 011608 07221730 ARF-102-85-114-1 BLO-39-11-14-004 PBO-47-09-012-023 PPSL-365
	ScrapOx-HN-Lo	2B	173	Pu:25.0 – 79.3 wt% U: <25.6 wt% Act: 34.2 – 80.5 wt%	Impure and scrap Pu oxides with 30–80 wt% Pu PFP generated scrap Oxides-scrap from PRF (aqueous recovery process) and RMC (hydroflorination line)	Scrap from aqueous recovery, oxalate precipitation and hydroflorination	07032282A 07242165A 07242201A 41-85-08-1379 63-88-06-121 64-85-12-1858 PPSL-365
	OxlPPt-HN-Sources	2C	7	Pu:72.1 – 86.8 wt% U: none Act: 72.4 – 87.3 wt%	Impure and scrap Pu oxides from PFP fabricated NDA sources	"Certified" material in an inert matrix, most oxide is oxalate derived	BLO-39-11-14-004 PEOF1 PBO-47-09-012-023
	PuUOx-HN-Misc	2D	231	Pu:0.7 – 79.6 wt% U: 2.5 – 90.0 wt% Act: 59.3 – 96.6 wt%	Mixed oxides: a) product quality (high purity greater than or equal to 85 wt% Pu + U), b) impure <85 wt% Pu + U	Source oxide is oxalate derived, mostly pure product. Building 308 source material is primarily product quality material	5501407 669194 CAN92 CXL1685 SCP711-46 SCP711-56
	PuUOx-HN-Alloy	2E	12	Pu:9.5 – 28.4 wt% U: 25.4 – 55.4 wt% Act: 39.0 – 78.5 wt%	Impure and scrap mixed oxides from alloy oxidation	Metal oxidation screenings and Pu/U oxides.	07242141A 5501407 669194

‡Applies only to certain 3013 Containers that are identified as being “most similar” or “potentially similar”

Site	3013 Taxon	MIS Group	Number of 3013 Containers	Assay Range [8]	Process History [4]		MIS items
ROCKY FLATS	PeroxPPT-RF	1A	44	Pu:47.0 – 88.4 wt% U: 43.8 wt% (1 item) Act: 65.1 – 91.0 wt%	Process oxides	Peroxide precipitation/calcination	07161856 1000089
	MetalOx-RF	1B	364	Pu:56.2 – 87.8 wt% U: <45.7 wt% Act: > 59.2 wt%	Process oxides	Metal oxidation	011589A‡ 011608 07221730 ARF-102-85-114-1 TS707001 TS707013
		1C	39	Pu:41.5 – 87.3 wt% U: <39.1 wt% Np: <3.3 wt% Act:44.9 – 90.0 wt%	Process oxides	Metal oxidation Pu/Np	MT1490
	PuUOx-RF	2A	279	Pu:3.7 – 86.6 wt% U: 0 – 94 wt% Act: > 43.2 wt%	By-product oxides	Pu/U oxide	053038 62750 669194 CAN92 CXL1685 SCP711-46 SCP711-56
	PyroOx-RF	2B	160	Pu:13.1 – 91.8 wt% U: <52.5 wt% Act: > 43.6 wt%	By-product oxides	Pyrochemical	520610020 ARF-102-85-223 ARF-102-85-295 ARF-102-85-365 C00024A C00695 CLLANL025
	DisResd-RF	2C	37	Pu:46.0 – 84.4 wt% U: <36.3 wt% Act: 56.0 – 84.6 wt%	By-product oxides	Dissolution residuals	07032282A 07242165A 07242201A
	HydrOx-RF	1D	31	Pu:71.6 – 86.8 wt% U: <1.4 wt% Act: 71.7 – 86.9 wt%	Process oxides	Hydride oxidation	5501579
		2D	55	Pu:4.6 – 86.7 wt% U: <82.5 wt% Act: > 51.3 wt%	By-product oxides	Hydride oxidation	5501407 669194
	OxScrns-RF	2E	63	Pu:34.0 – 70.2 wt% U: <16.2 wt% Act: 34.0 – 70.3 wt%	By-product oxides	Screenings from Pu oxidation	07242141A C06032A
	MgOHPPt-RF	2F	81	Pu:19.8 – 74.6 wt% U: <66.2 wt% Act: 33.4 – 92.6 wt%	By-product oxides	Hydroxide precipitation/calcination	39-01153A 66-00-11-355 66-01-01-439
‡Applies only to certain 3013 Containers that are identified as being “most similar” or “potentially similar”							

Site	3013 Taxon	MIS Group	Number of 3013 Containers	Assay Range [8]	Process History [5]		MIS items
SAVANNAH RIVER	MetalOx-SR-RF	1A	72	Pu:17.0 – 88.9 wt% U: <77.3 wt% Act: 75.1 – 94.2 wt%	Metal oxidation from Rocky Flats (foundry oxide, 80-85 %)	Metal oxidation	011589A ‡ 011608 07221730 ARF-102-85-114-1 TS707001
	OxlPPt-SR	1C	112	Pu: 85.1 – 95.0 wt% U: none Act: 85.1 – 95.0 wt%	Product quality oxides from oxalate precipitation from HB-Line and Hanford	Oxalate precipitation/calcination	BLO-39-11-14-004 PBO-47-09-012-023 PEOF1
	MetalOx-SR-LL	1D	35	Pu: 10.5 – 90.8 wt% U: <75.5 wt% Act: 66.9 – 90.8 wt%	Burned metal oxides from Livermore (> 80 %), some chlorine possible	Metal oxidation	011608 CXL1685 MT1490 07221730 ARF-102-85-114-1 TS707001
	MetalOx-SR	1E	5	Pu: 71.0 – 86.6 wt% U: 0.26 wt% (1 item) Act: 71.0 – 86.6 wt%	Metal brushings (>70 %), from pure metal	Metal oxidation	011608 07221730 ARF-102-85-114-1 TS707001
	PuUOx-SR-HN	1F	30	Pu: 16.6 – 33.8 wt% U: 47.1 – 83.3 wt% Act: >80.9 wt%	FFTF mixed oxides (Pu + U) (HUA-12, HUA-15 and HUA-21)	Source oxide is oxalate derived, mostly pure product. Building 308 (Hanford) source material is primarily product quality material	5501407 669194 CAN92 CXL1685 SCP711-46 SCP711-56
	PuUOx-SR-Alloy	2A	17	Pu: 11.2 – 32.5 wt% U: 46.7 – 85.5 wt% Act: 64.2 – 96.7 wt%	Impure scrap and mixed oxides (Pu + U) from alloy oxidation (Argonne East [CZA] with Mo, Zr, and C impurities)	Alloy oxidation	5501407 669194 CXL1685 SCP711-46 SCP711-56
	PuUOx-SR-Misc	2B	27	Pu: 7.5 – 83.7 wt% U: <85.2 wt% Act: >57.1 wt%	Scrap mixed oxides - a) AUA-265 (CaF, LANL, HRA), b) ORNL, c) Misc. Sources most > 80 % Pu + U, d) SRTC returns	Oxalate precipitation	5501407 669194 CAN92 CXL1685 SCP711-46 SCP711-56
‡Applies only to certain 3013 Containers that are identified as being “most similar” or “potentially similar”							

Site	3013 Taxon	MIS Group	Number of 3013 Containers	Assay Range [7]	Process History [7]		MIS items
LOS ALAMOS	OxlPPt-LA-Cl	N/A	116 est.	Pu: 58 – 88 wt%	Oxide from aqueous chloride -oxalate precipitation	Mostly from newly generated oxide but also includes items from historical aqueous chloride processes	CXLOX091802
							CXLPROD091901
							CXLPROD021202
							CXLNM1
	OxlPPt-LA-NO3	N/A	25 est.	Pu: 64 – 88 wt%	Oxide from aqueous nitrate -oxalate precipitation	Mostly from newly generated oxide but also includes items from historical aqueous nitrate processes	PEOF1
							PEOR3258
							BLO-39-11-14-004
							PBO-47-09-012-023
	DisResd-LA	N/A	6 est.	Pu: 30 – 88 wt%	Dissolution residuals from aqueous nitrate or aqueous chloride processing	Includes newly generated and historical items generated from the aqueous nitrate or aqueous chloride process	62750
							07032282A
							07242201A
							07242165A
							ARF-102-85-355
							New Sample
	MetalOx-LA	N/A	42 est.	Pu: 30 – 88 wt%	Metal Oxidation	Metal oxidation from ER, Pu/Np, Pyrochemical (nonspecific), Site Return, and unknown source (off-site) metal items	MT1490
							011608
							07221730
							ARF-102-85-114-1
							TS707001
							TS707013
	PuUOx-LA	N/A	12 est.	Pu: 10 – 79 wt% U: 0 – 73 wt%	Pu/U mixed oxide	Uranium mixed with both WR and non-WR plutonium	SCP711-46
							PuUOXBC05
							SCP711-56
	PyroOx-LA	N/A	9 est.	Pu: 80 – 88 wt%	Pyrochemical oxide	Anode heal, ER, and pyrochemical oxide from unknown sources	ATL27960
							C00695
							CLLANL025
							PMAXBS
							520610020
							C00024A
							ARF-102-85-223
							ARF-102-85-295
							ARF-102-85-365

Appendix C: Evaluation of Process Groups

Metal Oxidation at Hanford

- 3013 Taxon: MetalOx-HN
- Formerly: Hanford 1A
- Number of 3013 Containers: 106
- Representation in MIS:

Original	Add/Remove/Keep	Current
011589A	Remove	
011608	Keep	011608†
TS707001	Keep	TS707001*†
	Add	07221730†
	Add	ARF-102-85-114-1*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of containers consists of product quality oxides from metal oxidation, brushing and burning at Hanford.[3]
- The assay values for this group range from 71.6 to 91.9 wt% actinide.[8] The plutonium assay ranges from 64.6 to 89.6 wt%, and the Am concentration ranges from 1.0 to 8.0 wt%. None of the containers have uranium.
- PG analysis was completed for each 3013 container in this process group. Chloride and fluoride were not detected. Prompt gamma did not detect impurities, in 75 containers, and the remaining 31 containers have "other impurities," including magnesium, phosphorus, and sodium. Beryllium was not detected in any containers.
- With the exception of 011589A, the original MIS items representing this group are from the metal oxidation process and provide a good match in both impurities and actinide concentration. MIS items 07221730 and ARF-102-85-114-1 were added because they have the same process of origin and similar actinide content.
- MIS items considered but not used for representation:

MIS Item	Reason not used
011589A	Chloride is present in 011589A, but no chloride detected in the 3013 containers by PG analysis. In addition, this MIS item exhibited unique behavior in small-scale, shelf-life experiments that is not considered likely in these materials.
101707001	This MIS item contains less than 30 wt% actinide. This item was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
MT1490	This item originated in R&D operations at RFETS and has a considerable amount of neptunium present.
TS707013	This Item is high in chloride and is outside the range of actinide concentration.

Oxalate Process Product at Hanford

- 3013 Taxon: OxlPPt-HN
- Formerly: Hanford 1B and 1C
- Number of 3013 Containers: 629 (518 from 1B & 111 from 1C)
- Representation in MIS:

Original	Add/Remove/Keep	Current
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
	Add	PEOF1*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group is a combination of two groups of containers consisting of product quality oxides from oxalate precipitation.[3] The original groups had two major differences: ^{241}Am concentration and ^{240}Pu content. The portion of the containers from Hanford 1B were a stored product with significant amounts of ^{241}Am that has grown in over time; whereas the portion from Hanford 1C were "recently generated" and had much lower ^{241}Am concentrations. In addition, the containers from Hanford 1B had isotopic composition with greater than 10% ^{240}Pu; whereas Hanford 1C had isotopic compositions with less than 10% ^{240}Pu. However, it was agreed that both groups of materials would have the same behavior in storage regardless of the ^{241}Am or ^{240}Pu content.
- The assay values for this group range from 79.5 to 90.9 wt% actinide. The plutonium assay ranges from 73.2 to 90.2 wt%, and the Am concentration ranges from 0.14 to 8.2 wt%. None of the containers have uranium.[8]
- PG analysis has been completed for each 3013 container in this process group. Chlorine was found in nine containers and ranges in concentration from 0.9 to 6.7 wt%. Fluorine (without chlorine) was found in 21 containers and ranges in concentration from 0.01 to 2.7 wt%. Prompt gamma did not detect impurities in 322 containers, and the remaining 277 containers have "other impurities," including aluminum, beryllium, magnesium, phosphorus, and sodium. Beryllium was found in six containers and ranges from 0.02 to 0.6 wt%.
- The original MIS items (PBO-47-09-012-023 and BLO-39-11-14-004) provide a good match for representation, based on the process of origin, assay, and the isotopic compositions. MIS item PEOF1 contains high purity plutonium oxide from the oxalate precipitation process at LANL. It was added to the list of MIS items representing this group, based on process similarity and assay.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MISSTD-1	This MIS item was not stabilized at 950ºC and has a high surface area, which is not expected to be representative of these materials.
MISSTD-2	This MIS item was not characterized and was not included in small-scale, shelf-life experiments.
CXLNM1	This MIS item was not characterized and was not included in small-scale, shelf-life experiments. In addition, the material in this sample was precipitated from chloride instead of nitrate.
PEOR3258	This MIS item has limited characterization data and was not included in small-scale, shelf-life experiments.

Oxide Recovered from Polycubes at Hanford

- 3013 Taxon: MiscOx-HN-PC
- Formerly: Hanford 1D
- Number of 3013 Containers: 28
- Representation in MIS:

Original	Add/Remove/Keep	Current
PSU-84-06-05	Keep	PSU-84-06-05*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group of containers consists of product-quality plutonium and plutonium/depleted uranium oxides recovered from polycubes by pyrolytic processing.[3] The original material was very pure and was derived from oxalate precipitation and metal oxidation.
- The assay values for this group range from 58.7 to 89.5 wt% actinide.[8] The plutonium assay ranges from 12.2 to 89.5 wt%. Uranium is present in six containers and is found in concentrations ranging from 32.6 to 63.9 wt%. Analysis of the data in the ISP database shows two distinct subgroups within this group. One subgroup is relatively pure plutonium oxide (>80 wt% actinide) with an isotopic composition showing high ^{240}Pu (>18 wt%). The other type of material is mixed plutonium oxide and depleted uranium oxide (30–65 wt% uranium) with assays in the range of 58–79 wt% actinide. However, it was agreed that both groups of materials would have the same behavior in storage.
- PG analysis has been completed on all 28 containers. Chlorine and fluorine were not detected in this material. Prompt gamma did not detect any impurities in 17 containers, and the remaining 11 have other impurities, aluminum, beryllium, magnesium, and sodium. Beryllium was detected in one container at 0.2 wt%.
- MIS item PSU-84-06-05 represents this group, based on the process of origin and assay (65.1 wt% uranium, 13.4 wt% plutonium with 9.1% ^{240}Pu). The materials in this group are from a specialized process, and although other mixed oxide

samples are available in the MIS inventory, it was decided that only MIS item PSU-84-06-05 would be used for representation.

Rocky Flats Foundry Scrap Oxide at Hanford

- 3013 Taxon: PyroOx-HN-RF-FndryOx
- Formerly: Subset of Hanford 1E
- Number of 3013 Containers: 17
- Representation in MIS:

Original	Add/Remove/Keep	Current
ARF-102-85-114-1	Keep	ARF-102-85-114-1*†
ARF-102-85-223	Keep	ARF-102-85-223*†
ARF-102-85-295	Keep	ARF-102-85-295*†
ARF-102-85-355	Keep	ARF-102-85-355*†
ARF-102-85-365	Keep	ARF-102-85-365*†
	Add	011589A*†‡

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.
‡Applies only to certain 3013 Containers that are identified as being most similar.

- This group of containers is the subgroup of the Hanford "ARF" material, which includes chloride-bearing Rocky Flats foundry oxide material that was sent to Hanford for recovery. These containers were identified as foundry oxide material, based on the PG peak area ratios for Na:Cl and Mg:Na (Na:Cl< 9.5 or >15.5 and Mg:Na >0.25). [10,14]
- The assay values for this group range from 50.1 to 83.2 wt% actinide.[8] The plutonium assay ranges from 50.0 to 83.0 wt%. None of the containers have uranium present.
- The PG analysis was completed for all 17 containers in this group. The results for this group show that all 17 containers have a chloride salt composition similar to that of foundry oxide. The chlorine concentration ranges from 0.4 to 4.9 wt%. Beryllium is present in seven containers and ranges in concentration from 0.05 to 0.4 wt%. Nine containers in this group are expected to have a chloride salt composition similar to that of 011589A. Eight of the containers with this salt composition have a moisture content of 0.1 wt% or greater, and are considered "most similar to" 011589A.[10] The ninth container is not represented by 011589A because the moisture content is less than 0.1 wt%.
- This group is represented by the five Hanford ARF samples in the MIS program in addition to MIS item 011589A, which represents the eight containers that are "most similar" to it, based on PG and moisture.

Rocky Flats ER Scrap Oxide at Hanford

- 3013 Taxon: PyroOx-HN-RF-ERScrap
- Formerly: Subset of Hanford 1E
- Number of 3013 Containers: 293

- Representation in MIS:

Original	Add/Remove/Keep	Current
ARF-102-85-114-1	Keep	ARF-102-85-114-1*†
ARF-102-85-223	Keep	ARF-102-85-223*†
ARF-102-85-295	Keep	ARF-102-85-295*†
ARF-102-85-355	Keep	ARF-102-85-355*†
ARF-102-85-365	Keep	ARF-102-85-365*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group of containers is the subgroup of the Hanford "ARF" material, which includes chloride-bearing Rocky Flats ER scrape-out material that was sent to Hanford for recovery. These containers were identified as foundry oxide material, based on the PG peak area ratios for Na:Cl and Mg:Na ($9.5 \leq$ Na:Cl ≤ 15.5 and Mg:Na ≤ 0.25).[10,14]
- The assay values for this group range from 47.2 to 80.6 wt% actinide.[8] The plutonium assay ranges from 47.1 to 80.6 wt%. Uranium was found in one container at a concentration of 5.5 wt%.
- PG analysis was completed for all 293 containers in this group. The results show that all 293 containers have a chloride salt composition similar to that of ER scrap. The chlorine concentration for the materials in this group range from 2.2 to 10.6 wt%. Beryllium is present in 23 containers and ranges in concentration from 0.02 to 0.74 wt%. None of the containers in this group are "potentially similar" or "most similar" to MIS item 011589A.
- This group is represented by the five Hanford ARF samples in the MIS program. MIS item 011589A does not represent any containers in this group, based on the results from PG analysis.

Rocky Flats Miscellaneous Scrap Oxide at Hanford

- 3013 Taxon: PyroOx-HN-RF-MiscOx
- Formerly: Subset of Hanford 1E
- Number of 3013 Containers: 122
- Representation in MIS:

Original	Add/Remove/Keep	Current
ARF-102-85-114-1	Keep	ARF-102-85-114-1*†
ARF-102-85-223	Keep	ARF-102-85-223*†
ARF-102-85-295	Keep	ARF-102-85-295*†
ARF-102-85-355	Keep	ARF-102-85-355*†
ARF-102-85-365	Keep	ARF-102-85-365*†
	Add	011589A*†‡
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc. ‡Applies only to certain 3013 Containers identified as being similar.		

- This group of containers is the subgroup of the Hanford "ARF" material, which includes Rocky Flats material at Hanford with and without chlorine. The portion

with chlorine has a composition unlike that of both ER scrap and foundry oxide, based on the PG peak area ratios for Na:Cl and Mg:Na. These materials may include burnt anode heel and other impure plutonium oxides.

- The assay values for this group range from 44.8 to 87.2 wt% actinide.[8] The plutonium assay ranges from 44.7 to 87.1 wt% actinide. Uranium was found in one container at 14.5 wt%.
- PG analysis was completed on all 122 containers. Chloride was detected in 49 containers and ranges in concentration from 0.3 to 8.5 wt%. Fluorine (without chlorine) was found in 45 containers and ranges in concentration from 0.3 to 2.4 wt%. Prompt gamma did not detect impurities in six containers, and the remaining 22 containers have "other impurities," including aluminum, beryllium, magnesium, phosphorus, and sodium. Beryllium was found in 46 containers and ranges from 0.02 to 1.7 wt%. The chloride-bearing containers in this group do not match either the ER scrap or foundry oxide material, based on the Na:Cl and Mg:Na peak area ratios. Eleven containers in this group are "potentially similar" to 011589A because they have a salt composition unlike that of ER scrap, and they have a moisture concentration of 0.1 wt% or higher.
- This group is represented by the five Hanford ARF samples in the MIS program in addition to MIS item 011589A, which represents the 11 containers that are "potentially similar" to it, based on PG and moisture.[10]

Magnesium Hydroxide Precipitation at Hanford

- 3013 Taxon: MgOHPPt-HN
- Formerly: Subset of Hanford 1F
- Number of 3013 Containers: 121
- Representation in MIS:

Original	Add/Remove/Keep	Current
66-00-11-355	Keep	66-00-11-355*†
66-01-01-439	Keep	66-01-01-439*†
ATL27960	Remove	
BLO-39-11-14-004	Remove	
PBO-47-09-012-023	Remove	

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group contains impure and scrap plutonium oxides "recently produced" from magnesium hydroxide precipitation.[3] The primary material type of the input items as recorded in the ISP database is "MGO," which indicates the magnesium-hydroxide precipitation process.
- The assay values for this group range from 30.4 to 68.3 wt% actinide.[8] The plutonium assay ranges from 18.8 to 68.0 wt%. Uranium is present in 21 containers and is found in concentrations up to 18.9 wt%.
- PG analysis was completed for all 121 containers and shows that the magnesium hydroxide precipitate and the oxalate precipitate materials are distinguishable by the concentration of magnesium and sodium and the Na:Mg ratio. The magnesium hydroxide precipitate materials typically have less than 1 wt% sodium, greater

than 3 wt% magnesium, and may contain phosphorus. By Na:Mg ratio, the magnesium hydroxide precipitate materials have ratios of less than 0.1. Chloride was not detected by PG analysis for any of the containers in this group. Fluorine was detected in 16 containers and ranges from 0.03 up to about 0.2 wt%. The estimated magnesium concentrations range from less than the detection limit of 0.1 to 52 wt%. Beryllium was not detected in any of the containers in this group.

- MIS items 66-00-11-355 and 66-01-01-439 were produced by the magnesium hydroxide precipitation process at Hanford and represent all 121 containers in this group.
- MIS items considered but not used for representation:

MIS Item	Reason not used
39-01153A	This MIS item has an assay value well below 30 wt% actinide, which was the minimum actinide concentration allowed in a 3013 container. In addition, this MIS item was not included in the small-scale, shelf-life experiments.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory.
BLO-39-11-14-004	This MIS item was produced through oxalate precipitation. It lacks the major impurities found in oxide produced through magnesium hydroxide precipitation. The actinide concentration is also out of the range for this group.
PBO-47-09-012-023	This MIS item was produced through oxalate precipitation. It lacks the major impurities found in oxide produced through magnesium hydroxide precipitation. The actinide concentration is also out of the range for this group.

Oxalate Precipitation of Impure Plutonium Nitrate Solutions at Hanford

- 3013 Taxon: OxlPPt-HN-Impure
- Formerly: Subset of Hanford 1F
- Number of 3013 Containers: 54
- Representation in MIS

Original	Add/Remove/Keep	Current
66-00-11-355	Keep	66-00-11-355*†
66-01-01-439	Keep	66-01-01-439*†
ATL27960	Remove	
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group contains impure and scrap plutonium oxides recently produced from oxalate precipitation.[3] The primary material type of the input items as recorded in the ISP database is "OX," and the secondary material type is either "F" or "C&D." This indicates that the plutonium oxide was produced from the oxalate precipitation process from filtrate and "cats and dogs."
- The assay values for this group range from 33.4 to 77.4 wt% actinide.[8] The plutonium assay ranges from 33.3 to 77.2 wt%. Uranium is present in one container at 4 wt%.
- PG analysis has been completed for all 54 containers. Chloride was not detected in any containers. Fluorine (without chlorine) was found in 52 containers and ranges in concentration from 0.05 wt% to 0.75 wt%. The remaining two containers have "other impurities," including aluminum, magnesium, phosphorus, and sodium. Beryllium was not detected in any of the containers in this group. The concentration of magnesium in the material in this group ranges from 0.2 to 38 wt%, with only 11 containers greater than 3 wt% magnesium. The sodium concentration ranges from 0.3 to 12 wt%. Fifty containers have a sodium concentration greater that 2.4 wt%. The magnesium hydroxide precipitate and the oxalate precipitate materials are distinguishable by the concentration of magnesium and sodium and the Na:Mg ratio. The magnesium hydroxide precipitate materials typically have less than 1 wt% sodium and greater than 3 wt% magnesium. By Na:Mg ratio, the magnesium hydroxide precipitate materials have ratios less than 0.1.
- MIS items BLO-39-11-14-004 and PBO-47-09-012-023 represent this material, based on their process of origin; although, their actinide concentration is higher than the material in this group. MIS items 66-00-11-355 and 66-01-01-439 also represent these materials, based on the impurities present in the feed and the low actinide concentrations.
- MIS items considered but not used for representation:

MIS Item	Reason not used
39-01153A	This MIS item has an assay value well below 30 wt% actinide, which was the minimum actinide concentration allowed in a 3013 container. In addition, this MIS item was not included in the small-scale, shelf-life experiments.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory.

Oxalate Precipitation of Pure Mixed Uranium/Plutonium Nitrate Solutions at Hanford

- 3013 Taxon: OxlPPt-HN-MixedPure
- Formerly: Hanford 1G
- Number of 3013 Containers: 52

- Representation in MIS

Original	Add/Remove/Keep	Current
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†
ATL27960	Remove	
669194	Keep	669194*†
CAN92	Keep	CAN92*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group contains product quality mixed oxides recently produced from pure mixed uranium/plutonium nitrate feeds.[3] The primary material type of the input items as recorded in the ISP database is "OX," and the secondary is material type is "CML." This indicates that the material was produced by oxalate precipitation of solutions from the critical mass laboratory.
- The assay values for this group range from 71.1 wt% to 90.1 wt% actinide.[8] The plutonium assay ranges from 14.1 to 85.2 wt%. Uranium is present in all 52 containers and is found in concentrations up to 60.9 wt%.
- PG analysis was completed on all 52 containers. Chlorine and fluorine were not detected in any of the containers. Prompt gamma did not detect impurities in 13 containers, and the remaining containers have low concentrations (less than 1 wt%) of aluminum, magnesium, and sodium. Beryllium was not detected in any of the containers in this group.
- MIS items BLO-39-11-14-004 and PBO-47-09-012-023 represent this material, based on their process of origin; although their actinide concentration is higher than some of the materials in this group. It was decided that MIS items 669194 and CAN92 also represent this material because they are high-purity mixed oxides.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MISSTD-1	This MIS item was not stabilized at 950ºC and has a high surface area, which is not expected to be representative of these materials.
MISSTD-2	This MIS item was not characterized and was not included in small-scale, shelf-life experiments.
CXLNM1	This MIS item was not characterized and was not included in small-scale, shelf-life experiments. In addition, the material in this sample was precipitated from chloride instead of nitrate.
PEOR3258	This MIS item has limited characterization data and was not included in small-scale, shelf-life experiments.
PEOF1	This MIS item, although produced through oxalate precipitation, was produced at LANL and is not a mixed oxide.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory.

Impure and Scrap Plutonium Oxides 80–85 wt% from Hanford PFP and 300 Area

- 3013 Taxon: ScrapOx-HN-Hi
- Formerly: Hanford 2A
- Number of 3013 Containers: 32
- Representation in MIS

Original	Add/Remove/Keep	Current
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†
011608	Keep	011608†
PPSL-365	Keep	PPSL-365*†
	Add	TS707001*†
	Add	07221730†
	Add	ARF-102-85-114-1*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group contains impure and scrap plutonium oxides from PFP and the 300 area.[3]
- The assay values for this group range from 80.0 to 84.8 wt% actinide.[8] The plutonium assay ranges from 75.8 to 84.5 wt%. Uranium is present in one container at 4.7 wt%.
- PG analysis was completed for all 32 containers. Chlorine was found in two containers at concentrations of 1.3 and 3.0 wt%. Fluorine (without chlorine) was

found in 12 containers and ranges in concentration from 0.02 to 3.0 wt%; however, only one container has fluorine above 0.8 wt%. Prompt gamma did not detect impurities in three containers, and the remaining 15 containers have "other impurities," including aluminum, beryllium, magnesium, phosphorus, and sodium. Beryllium was detected in two containers at 0.03 wt%.

- These materials are represented by MIS items from oxalate precipitation (PBO-47-09-012-023 and BLO-39-11-14-004), direct denitration (PPSL-365), and metal oxidation (011608). Additional metal oxidation MIS items from RFETS and Hanford (TS707001, 07221730 and ARF-102-85-114-1) were added, based on process similarity. MIS item TS707001 also provides a match for the materials with detectable chloride.
- MIS items considered but not used for representation:

MIS Item	Reason not used
011589A	The chloride-bearing containers in this group were not found to be "similar" in salt composition or moisture to this sample.
101707001	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
MT1490	This MIS item originated in R&D operations at RFETS and has a considerable amount of neptunium present.
TS707013	This MIS item is high in chloride and outside of the range of actinide concentration.
MISSTD-1	This MIS item was not stabilized at 950ºC and has a high surface area, which is not expected to be representative of these materials.
MISSTD-2	This MIS item was not characterized and was not included in small-scale, shelf-life experiments.
CXLNM1	This MIS item was not characterized and was not included in small-scale, shelf-life experiments. In addition, the material in this sample was precipitated from chloride instead of nitrate.
PEOR3258	This MIS item has limited characterization data and was not included in small-scale, shelf-life experiments.

Impure and Scrap Oxides 30–80 wt% from Aqueous Recovery, Oxalate Precipitation, and Hydrofluorination from Hanford

- 3013 Taxon: ScrapOx-HN-Lo
- Formerly: Hanford 2B
- Number of 3013 Containers: 173

- Representation in MIS

Original	Add/Remove/Keep	Current
07032282A	Keep	07032282A*†
07242201A	Keep	07242201A*†
07242165A	Keep	07242165A*†
ATL27960	Remove	
PPSL-365	Keep	PPSL-365*†
C06032A	Remove	
07242141A	Remove	
	Add	41-85-08-1379*†
	Add	63-88-06-121*†
	Add	64-85-12-1858*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The materials in this group are low purity (less that 80% plutonium) scrap oxides that originated in PFP from aqueous recovery, oxalate precipitation, and hydrofluorination.[3]
- The assay values for this group range from 34.2 to 80.5 wt% actinide.[8] The plutonium assay ranges from 25.0 to 79.3 wt%. Uranium is present in 25 containers and is found in concentrations up to 25.6 wt%.
- PG analysis was completed for all 173 containers in this group. Chlorine was found in 28 containers and ranges in concentration from 0.3 to 7.5 wt%. Fluorine (without chloride) was found in 120 containers and ranges from 0.01 to 7.7 wt%. Most of the containers with fluoride also have aluminum and magnesium as impurities. Prompt gamma did not detect impurities in five containers, and the remaining 20 containers have “other impurities” including aluminum, beryllium, phosphorus, magnesium, sodium. Beryllium was detected in 31 containers and ranges in concentration from 0.02 to 0.3 wt%.
- These materials are primarily represented by scrap oxide samples (41-85-08-1379, 63-88-06-121, 64-85-12-1858) from PFP. These MIS items were included in the MIS program after the original represented document for Hanford was completed. In addition, several RFETS MIS items from dissolution residuals (07032282A, 07242201A, and 07242165A) were selected for representation along with Hanford scrap oxides and one MIS item from direct denitration (PPSL-365). These are appropriate, based on process similarity and impurities. PPSL-365 (direct denitration) is appropriate because it represents oxides produced by calcining nitrate.

- MIS items considered but not used for representation:

MIS Item	Reason not used
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory.
C06032A	This MIS item was removed from the list because Rocky Flats oxide screenings material does not represent this group of material.
07242141A	This MIS item was removed from the list because Rocky Flats oxide screenings material does not represent this group of material.
07242326A	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
07242243A	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
62750	The assay value for this MIS item is outside of the range for this group.

Oxide from PFP NDA Sources at Hanford

- 3013 Taxon: OxlPPt-HN-Sources
- Formerly: Hanford 2C
- Number of 3013 Containers: 7
- Representation in MIS

Original	Add/Remove/Keep	Current
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†
PSU-84-06-05	Remove	
	Add	PEOF1*†

- The materials in this group are impure and scrap plutonium oxides from PFP fabricated NDA sources.[3] The material is in an inert matrix, and most of the oxide was produced from oxalate precipitation.
- The assay values for this group range from 72.4 to 87.3 wt% actinide.[8] The plutonium assay ranges from 72.1 to 86.8 wt%. None of the containers have uranium.
- PG analysis was completed for all seven containers, and the results do not indicate chloride or fluoride in any containers. Prompt gamma did not detect impurities in one container, and the remaining six containers had “other impurities,” including aluminum, magnesium, and sodium. Beryllium was not detected in any of the containers in this group.

- These materials are represented by BLO-39-11-14-004, PBO-47-09-012-023, and PEOF1, based on the assay and process history of these samples.
- MIS items considered but not used for representation:

MIS Item	Reason not used
MISSTD-1	This MIS item was not stabilized at 950ºC and has a high surface area, which is not expected to be representative of these materials.
MISSTD-2	This MIS item was not characterized and was not included in small-scale, shelf-life experiments.
CXLNM1	This MIS item was not characterized and was not included in small-scale, shelf-life experiments. In addition, the material in this sample was precipitated from chloride instead of nitrate.
PEOR3258	This MIS item has limited characterization data and was not included in small-scale, shelf-life experiments.
PSU-84-06-05	This MIS item was not produced in the same process. In addition, this material contains uranium, which is not present in the materials in this group.

High Purity Mixed Oxides at Hanford

- 3013 Taxon: PuUOx-HN-Misc
- Formerly: Hanford 2D
- Number of 3013 Containers: 231
- Representation in MIS

Original	Add/Remove/Keep	Current
SCP711-46	Keep	SCP711-46†
SCP711-56	Keep	SCP711-56*†
MOXSCP-COM	Remove	
669194	Keep	669194*†
CAN92	Keep	CAN92*†
5501407	Keep	5501407*†
	Add	CXL1685†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The material in this group originated in oxalate precipitation process and included pure and impure mixed oxides.[3]
- The assay values for this group range from 59.3 to 96.6 wt% actinide.[8] The plutonium assay ranges from 0.7 to 79.6 wt%. Uranium is present in all of the containers and ranges in concentration from 2.5 to 90 wt%.
- PG analysis was completed for all 231 containers. Chlorine was detected in 3 containers at concentrations of 0.2, 1.5, and 8.4 wt%. Fluorine (without chlorine) was found in five containers and ranges in concentration from 0.02 to 4.6 wt%. Prompt gamma did not detect impurities in 125 containers, and the remaining 98

containers have "other impurities," including aluminum, magnesium, and sodium. Beryllium was not detected in any of the containers in this group.

- The materials in this group are represented by mixed plutonium/uranium oxides selected from the LANL and RFETS MIS items. MIS item CXL1685 was added to the list because it is plutonium oxalate mixed with depleted uranium.
- MIS items considered but not used for representation:

MIS Item	Reason not used
MOXSCP-COM	This MIS item, although similar in actinide content, was not included because it was not characterized and not included in small-scale, shelf-life experiments.
PuUOXBC05	This MIS item, although a mixed oxide, is below the assay range for this group. In addition, this sample is not completely characterized, and its process history is unknown. Further, this sample was not included in small-scale, shelf-life experiments.
1685	This MIS item is depleted uranium oxide that does not contain plutonium. In addition, this sample was not characterized and not included in small-scale, shelf-life experiments.
BMU	This MIS item is enriched uranium oxide that does not contain plutonium. In addition, this sample was not characterized and not included in small-scale, shelf-life experiments.

Mixed Oxides from Alloy Oxidation at Hanford

- 3013 Taxon: PuUOx-HN-Alloy
- Formerly: Hanford 2E
- Number of 3013 Containers: 12
- Representation in MIS

Original	Add/Remove/Keep	Current
5501407	Keep	5501407*†
011589A	Remove	
C06032A	Remove	
07242141A	Keep	07242141A*†
	Add	669194*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The materials in this group consist of screenings removed from impure and mixed oxides originating in the metal oxidation process.[3]
- The assay values for this group range from 39.0 to 78.5 wt% actinide.[8] The plutonium assay ranges from 9.5 to 28.4 wt%. Uranium is present in all 12 containers and is found in concentrations ranging from 25.4 to 55.4 wt%.
- PG analysis was completed for all 12 containers. Prompt gamma did not detect chlorine. Fluorine was found in one container at 0.2 wt%. Prompt gamma did not

detect impurities in two containers, and the remaining nine containers have "other impurities," including aluminum, magnesium, and sodium. Beryllium was not detected in any containers.

- The MIS items that represent this group were chosen from mixed Rocky Flats plutonium/uranium oxides (5501407 and 669194) and oxide screenings from foundry operations at Rocky Flats (07242141A). MIS item C06032A is also considered oxide screenings material from Rocky Flats, but high chloride content of C06032A shows that this MIS item may have originated in one of the Rocky Flats molten salt purification processes. However, the impurities found in 07242141A show that those oxide screenings likely originated in the foundry and are therefore representative of this material.
- MIS items considered but not used for representation:

MIS Item	Reason not used
011589A	Chloride is present in 011589A, but no chloride is detected in the 3013 containers by PG analysis. In addition, this MIS item exhibited unique behavior in small-scale, shelf-life experiments that is not considered likely in these materials.
C06032A	The high-chloride content of this MIS item clearly shows that this MIS item has a different origin and is therefore not representative of the materials in this group.

Peroxide Precipitation/Calcination at Rocky Flats

- 3013 Taxon: PeroxPPT-RF
- Formerly: Rocky Flats 1A
- Number of 3013 Containers: 44
- Representation in MIS

Original	Add/Remove/Keep	Current
1000089	Keep	1000089*†
07161856	Keep	07161856*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The materials in this process were produced by peroxide precipitation from nitrate solution at Rocky Flats.[4]
- The assay values for this group range from 65.1 to 91.0 wt% actinide.[8] The plutonium assay values range from 47.0 to 88.4 wt%. Uranium is present in one container at a concentration of 43.8 wt%.
- PG analysis was completed for 43 containers. Chlorine was found in two containers at concentrations around 1.0 wt%. Fluorine (without chlorine) was found in 22 containers and ranges in concentration from 0.2 to 3.4 wt%. Prompt gamma did not detect impurities in ten containers, and the remaining nine containers have "other impurities," including beryllium, magnesium, and sodium. Beryllium was detected in one container at about 0.3 wt%.

- The materials in this group are represented by MIS items from the peroxide precipitation process. The representation for this group remains unchanged.
- MIS items considered but not used for representation: none.

Process Oxides from Metal Oxidation at Rocky Flats

- 3013 Taxon: MetalOx-RF
- Formerly: Rocky Flats 1B & 1C
- Number of 3013 Containers: 403
- Representation in MIS

Original	Add/Remove/Keep	Current
TS707001	Keep	TS707001*†
011608	Keep	011608†
011589A	Keep	011589A*†‡
MT1490	Keep	MT1490*†
	Add	TS707013*†
	Add	07221730†
	Add	ARF-102-85-114-1*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.
‡Applies only to certain 3013 Containers identified as being similar.

- The material in this group originated as plutonium metal that was calcined in air to oxidize the metal to oxide for aqueous recovery.[4] This group also includes oxide that was brushed from metal. Also added to this group was the mixed plutonium-neptunium oxide produced from the oxidation of plutonium-neptunium alloy, because the presence of neptunium will not change the behavior of this material.
- The assay values show that the materials in this group are greater than 44.9 wt% actinide.[8] The plutonium assay ranges from 41.5 to 87.8 wt%. Uranium is present in 33 containers and is found in concentrations of up to 45.7 wt%. The neptunium ranges in concentration from 0.01 to 3.33 wt% and is present in materials from both 1B and 1C.
- PG analysis was completed for 391 containers. Chlorine was found in 27 containers and ranges in concentration from 0.25 to 6.6 wt%. Fluorine (without chlorine) was found in 140 containers and ranges in concentration from 0.05 to 2.4 wt%. Prompt gamma did not detect impurities in 94 containers, and the remaining 130 containers have “other impurities,” including aluminum, beryllium, magnesium, and sodium. Beryllium was found in 11 containers and ranges from 0.002 to 0.5 wt%.
- The original MIS items representing this group are from the metal oxidation process and provide a good match in both impurities and actinide concentration. MIS items TS707013 and 07221730 were added, based on their process history and assay values. TS707013 represents the containers that have high chloride concentrations. MIS item 07221730 was added because of process similarity and assay. ARF-102-85-114-1 was a Hanford MIS item consisting of Rocky Flats material believed to be from metal oxidation. This MIS item is representative of

the high assay containers with beryllium. MIS item 011589A represents two containers that are believed to be "most similar" to 011589A and 12 containers that are believed to be "potentially similar" to 011589A.[10] (The 13th potentially similar container R611398 is represented by PG).

- MIS items considered but not used for representation:

MIS Item	Reason not used
101707001	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.

Byproduct Plutonium/Uranium Mixed Oxides at Rocky Flats

- 3013 Taxon: PuUOx-RF
- Formerly: Rocky Flats 2A
- Number of 3013 Containers: 279
- Representation in MIS

Original	Add/Remove/Keep	Current
62750	Keep	62750†
CAN92	Keep	CAN92*†
669194	Keep	669194*†
053038	Keep	053038*†
	Add	CXL1685†
	Add	SCP711-46†
	Add	SCP711-56*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The materials in this group are mostly Rocky Flats plutonium/uranium mixed oxides considered to be byproduct material, based on various information including the item description code (IDC), material balance area (MBA), and item name.[4]
- The assay values show that the materials in this group are greater than 43.2 wt% actinide.[8] The plutonium assay ranges from 3.7 to 86.6 wt%. Uranium is present in 257 containers and is found in concentrations up to 94.0 wt%.
- PG analysis was completed for 255 containers. Chlorine was found in three containers and ranges in concentration from 1.2 to 2.6 wt%. Fluorine (without chlorine) was found in six containers and ranges in concentration from 0.04 to 2.4 wt%. Prompt gamma did not detect impurities in 148 containers, and the remaining 98 containers have "other impurities" including aluminum, beryllium, magnesium, and sodium. Beryllium was found in 47 containers and ranges in concentration from 0.01 to 1.6 wt%.
- This group was originally represented by four mixed-oxide MIS items in the MIS inventory from Rocky Flats, and the impurities sensitive to PG analysis are covered by these MIS items. In addition, three mixed-oxide MIS items from the MIS inventory were added to this group (CXL1685, SCP711-46, and SCP711-

56). These MIS items have low-plutonium and high-uranium content and better represent the containers in this group that are mostly uranium oxide.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MOXSCP-COM	This MIS item, although similar in actinide content, was not included because it was not characterized and not included in small-scale, shelf-life experiments.
CXL-BMU Mixtures (1685, BMU, BMUCXL70-30, BMUCXL93-7, CXL1685, CXLBMU70-30, and CXLBMU93-7)	These MIS items were used for neutron moderation and moisture experiments and not intended for representation. Therefore, they were not characterized and not included in small-scale, shelf-life experiments.
PSU-84-06-05	The material in this sample is considered specific to pyrolytic processing of polycubes and is not considered representative of this material.
MISNE2	This MIS item is a mixture of Rocky Flats items from various processes, which may have introduced impurities that are not representative of this process. In addition, gypsum and borax were added to this material for neutron moderation experiments.
PuUOXBC05	This MIS item, although a mixed oxide, is not completely characterized, and its process history is unknown. This sample was also not included in small-scale, shelf-life experiments.

Oxide from Pyrochemical Processes at Rocky Flats

- 3013 Taxon: PyroOx-RF
- Formerly: Rocky Flats 2B
- Number of 3013 Containers: 160
- Representation in MIS

Original	Add/Remove/Keep	Current
CLLANL025	Keep	CLLANL025*†
C00695	Keep	C00695*†
C00024A	Keep	C00024A*†
TS707013	Remove	
520610020	Keep	520610020*†
	Add	ARF-102-85-223*†
	Add	ARF-102-85-295*†
	Add	ARF-102-85-365*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of materials originated in pyrochemical processes.[4] Most of the materials contain chloride salt impurities and came from the oxidation of scrape-out residuals from electrorefining.
- The assay values show that the materials in this group are greater than 43.6 wt% actinide.[8] The plutonium assay ranges from 13.1 to 91.8 wt%. Uranium is present in 29 containers and is found in concentrations up to 52.5 wt%.
- PG analysis was completed for 156 containers. Chlorine was found in 112 containers and ranges from 1.0 to 8.4 wt%. Fluorine (without chlorine) was found in 13 containers and ranges in concentration from 0.07 to 2.8 wt%. Prompt gamma did not detect impurities in 12 containers, and the remaining containers have "other impurities," including aluminum, beryllium, magnesium, and sodium. Beryllium was detected in nine containers and ranges from 0.08 to 1.0 wt%.
- These containers were originally represented by four pyrochemical MIS items in the MIS inventory from Rocky Flats and one metal oxidation MIS item TS707013. Although it has a high chloride content, TS707013 was removed from the list because it originated in a metal oxidation process. Three additional samples from the MIS inventory were added to the MIS items that represent this group. These are Hanford samples consisting of Rocky Flats material believed to be from the same pyrochemical processes because of the high chloride content. Although other items in the MIS inventory have high chloride concentrations (053038, PMAXBS, etc.), it was decided that they do not represent this group because they are not specifically from Rocky Flats pyrochemical processing.
- MIS items considered but not used for representation:

MIS Item	Reason not used
053038	Based on the chemical characterization, this material has impurities that are unlike those found in other MIS items in this group.
PMAXBS	This is a LANL-generated material produced by mixing anode heel with ER salt, and may have different impurities from those expected for this group.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory.
TS707013	This material originated in the metal oxidation process.

Oxide Residue from Dissolution at Rocky Flats

- 3013 Taxon: DisResd-RF
- Formerly: Rocky Flats 2C
- Number of 3013 Containers: 37

- Representation in MIS

Original	Add/Remove/Keep	Current
07032282A	Keep	07032282A*†
07242165A	Keep	07242165A*†
07242201A	Keep	07242201A*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- These materials consist of the insoluble materials (high-fired oxide, carbon, and tantalum oxides) that remained after the dissolution process.[4]
- The assay values for this group range from 56.0 to 84.6 wt% actinide.[8] The plutonium assay ranges from 46.0 to 84.4 wt%. Uranium is present in 29 containers and is found in concentrations of up to 36.3 wt%.
- PG analysis was completed for all 37 containers. Chlorine was found in one container at 0.7 wt%. Fluorine (without chlorine) was found in 33 containers and ranges in concentration from 0.08 to 1.4 wt%. Prompt gamma did not detect impurities in one container, and the remaining two containers have "other impurities," including aluminum, magnesium, and sodium. Beryllium was found in one container and ranges from 0.02 wt%.
- This group is represented by three residue samples from oxide dissolution at Rocky Flats. The chloride and fluoride impurities are covered by the MIS items in this group. No changes to representation were made.
- MIS items considered but not used for representation:

MIS Item	Reason not used
07242326A	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
07242243A	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
62750	Process history documentation indicates that this material is a dissolution residue. However, this MIS item has an actinide assay of 86.4 wt%, which is outside of the actinide assay range for the 3013 containers in this group.

Hydride Oxide from Rocky Flats

- 3013 Taxon: HydrOx-RF
- Formerly: Rocky Flats 1D & 2D
- Number of 3013 Containers: 86 (31 1D & 55 2D)

- Representation in MIS

Original	Add/Remove/Keep	Current
5501579	Keep	5501579*†
5501407	Keep	5501407*†
	Add	669194*†
*Small-Scale Surveillance †Full Characterization including chemistry, surface area, density, etc.		

- This group of materials consists of oxide from hydride oxidation.[4] This process was used to separate plutonium and uranium metals. The oxides in this group range from low plutonium/high uranium to high-plutonium/low-uranium oxides. The hydride material was originally split, based on whether the material was listed in the inventory as a product or a byproduct. The assay values from both groups show a large overlap; therefore, the groups were combined.
- The assay values show that the materials in this group are greater than 51.3 wt% actinide.[8] The plutonium assay ranges from 4.58 to 86.8 wt%. Uranium is present in 57 containers and is found in concentrations of up to 82.5 wt%.
- PG analysis was completed for 83 containers. Chlorine was found in two containers at concentrations of 0.4 and 1.6 wt%. Fluorine (without chlorine) was found in six containers ranges in concentration from 0.02 to 0.6 wt%. Prompt gamma did not detect impurities in 53 containers, and the remaining 22 containers have "other impurities," including aluminum, beryllium, magnesium, and sodium. Beryllium was found in ten containers and ranges from 0.01 to 1.2 wt%.
- The product and byproduct hydride oxide groups were combined, and the original MIS items were kept for representation. In addition, Rocky Flats sample 669194 was added, based on its process history, which states that it originated in special assembly projects. Materials from special assembly were generally sent for hydriding, and it is likely that this material is also a hydride oxide. In addition, it represents the material with higher concentrations of uranium oxide present.
- MIS items considered but not used for representation: None

Screenings from Plutonium Oxidation at Rocky Flats

- 3013 Taxon: OxScrns-RF
- Formerly: Rocky Flats 2E
- Number of 3013 Containers: 63
- Representation in MIS

Original	Add/Remove/Keep	Current
07242141A	Keep	07242141A *†
C06032A	Keep	C06032A *†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- The material in this group consists of solid material chunks that were screened out of oxide powder.[4] The material has multiple origins that include (1) glovebox floor sweepings, (2) oxide screenings following metal-to-oxide conversion at temperatures above 500ºC, and (3) screenings from chloride-bearing oxides that were being packaged for shipment to Hanford in the 1980s for recovery.

- The assay values for this group range from 34.0 to greater than 70.3 wt% actinide.[8] The plutonium assay ranges from 34.0 to 70.2 wt%. Uranium is present in 11 containers and is found in concentrations of up to 16.2 wt%.
- PG analysis was completed for all 63 containers. Chlorine was detected in all 63 containers and ranges in concentration from 2.0 to 7.3 wt%. Fluoride and beryllium are also present in a significant number of the chlorides with 19 containers having fluoride and 24 having beryllium present. The fluorine concentration ranges from 0.1 to 1.1 wt%, and the beryllium concentration ranges from 0.03 to 0.4 wt%.
- These materials are represented by two Rocky Flats oxide screenings samples: MIS items 07242141A and C06032A. MIS item 07242141A likely originated as glovebox floor sweepings and oxide screenings from metal-to-oxide conversion. MIS item C06032A likely originated in pyrochemical operations. The PG results for the materials packaged in 3013 container shows that all of the containers have chloride bearing oxide, which is likely because of the mixing of multiple items during 3013 packaging.
- MIS items considered but not used for representation: none.

Oxide from Hydroxide Precipitation Rocky Flats

- 3013 Taxon: MgOHPPt-RF
- Formerly: Rocky Flats 2F
- Number of 3013 Containers: 81
- Representation in MIS

Original	Add/Remove/Keep	Current
39-01153A	Keep	39-01153A †
	Add	66-00-11-355 *†
	Add	66-01-01-439 *†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group consists of plutonium and uranium oxides that were produced from the magnesium hydroxide precipitation process.[4] This process was used to process plutonium and uranium solutions as well as holdup solutions in tanks and pipes during cleanup operations.
- The assay values for this group range from 33.4 to 92.6 wt% actinide.[8] The plutonium assay ranges from 19.8 to 74.6 wt%. Uranium is present in ten containers and is found in concentrations of up to 66.2 wt%.
- PG analysis was completed for all 81 containers. All 81 containers are classified "other impurities," including aluminum, beryllium, magnesium, and sodium. Magnesium is the largest impurity and ranges in concentration from 1.4 to 22.6 wt%. Beryllium was found in one container at 0.08 wt%.
- The only MIS item from Rocky Flats (39-01153A) intended to represent this group has only 7.7 wt% plutonium with no uranium, and is not very representative of this material. Therefore, Hanford samples from the same process were included to represent this material.
- MIS items considered but not used for representation: None.

Rocky Flats Oxide from Metal Oxidation at Savannah River

- 3013 Taxon: MetalOx-SR-RF
- Formerly: Savannah River 1A
- Number of 3013 Containers: 72
- Representation in MIS

Original	Add/Remove/Keep	Current
TS707001	Keep	TS707001*†
011608	Keep	011608†
011589A	Keep	011589A*†‡
ARF-102-85-114-1	Keep	ARF-102-85-114-1*†
	Add	07221730†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.
‡Applies only to certain 3013 Containers identified as being similar.

- This group of containers consists of Rocky Flats material that is mostly foundry oxide sent to Savannah River Site for recovery during the 1980s.[5] This group also includes plutonium/uranium oxides from hydride oxidation or residue processing and from the decontamination of metal parts.
- The assay values for this group range from 75.1 to 94.2 wt% actinide.[8] The plutonium assay ranges from 17.0 to 88.9 wt%. Uranium is present in 12 containers and ranges in concentration of up to 77.3 wt%.
- PG analysis was completed for 71 containers. Chlorine was found in 16 containers and ranges in concentration from 0.25 to 1.2 wt%. Fluorine (without chlorine) was found in 36 containers and ranges in concentration from 0.02 to 1.4 wt%. Prompt gamma did not detect impurities in ten containers, and the remaining nine containers have "other impurities," including aluminum, beryllium, magnesium, and sodium. Beryllium was found in ten containers, and ranges from 0.02 to 0.9 wt%.
- Three Rocky Flats samples and one Rocky Flats metal-oxidation sample from Hanford were originally selected for representation. MIS item 011589A represents only certain containers determined to be either potentially (7) or most similar (7). MIS Item 07221730, a Rocky Flats sample from metal oxidation was added to the group because it is a high-purity oxide that originated in metal oxidation at Rocky Flats.

- MIS items considered but not used for representation:

MIS Item	Reason not used
053038	Based on the chemical characterization, this material has impurities that are unlike those found in other MIS items in this group.
PMAXBS	This is a LANL-generated material produced by mixing anode heel with ER salt, and may have different impurities from those expected for this group.
101707001	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
TS707013	This Rocky Flats metal-oxidation sample is high in chloride and outside the range of actinide concentration.
ARF-102-85-223 ARF-102-85-295 ARF-102-85-355 ARF-102-85-365	These MIS items of Rocky Flats material at Hanford are high in chloride and outside the range of actinide concentration.

Oxide from Oxalate Precipitation at Savannah River

- 3013 Taxon: OxlPPt-SR
- Formerly: Savannah River 1C
- Number of 3013 Containers: 112
- Representation in MIS

Original	Add/Remove/Keep	Current
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
	Add	PEOF1*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group of containers consists of high purity oxide from oxalate precipitation from purified nitrate from HB-Line and Hanford.[5]
- The assay values for this group are all greater than 85 wt% actinide.[8] The plutonium assay ranges from 85.1 to 95 wt%. Uranium is not found in any containers.
- PG analysis was completed for 89 containers. Chlorine was not detected in any containers. Fluorine was found in two containers around 0.2 wt%. Prompt gamma did not detect impurities in 63 containers, and the remaining 24 containers have only low concentrations of sodium (< 0.02 wt%). Beryllium was not detected in any containers.
- All three samples representing this group are high-purity samples from oxalate precipitation. MIS item PEOF1 was added because it was generated by the same process and has a similar assay to the materials in this group.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MISSTD-1	This MIS item was not stabilized at 950ºC and has a high surface area, which is not expected to be representative of these materials.
MISSTD-2	This MIS item was not characterized and was not included in small-scale, shelf-life experiments.
CXLNM1	This MIS item was not characterized and was not included in small-scale, shelf-life experiments. In addition, the material in this sample was precipitated from chloride instead of nitrate.
PEOR3258	This MIS item has limited characterization data and was not included in small-scale, shelf-life experiments.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory. In addition, this MIS item has an assay value outside of the range for this group.

LLNL Metal Oxidation at Savannah River

- 3013 Taxon: MetalOx-SR-LL
- Formerly: Savannah River 1D
- Number of 3013 Containers: 35
- Representation in MIS:

Original	Add/Remove/Keep	Current
TS707001	Keep	TS707001*†
011608	Keep	011608†
011589A	Remove	
MT1490	Keep	MT1490*†
	Add	CXL1685†
	Add	07221730†
	Add	ARF-102-85-114-1*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of containers consists of plutonium metal from LLNL that had been burned to metal.[5]
- The assay values for this group range from 66.9 to 90.8 wt% actinide.[8] The plutonium assay ranges from 10.5 to 90.8 wt%. Uranium is found in five containers and ranges from 27.1 to 75.5 wt%.
- PG analysis was completed for 32 containers. One container has chlorine at 2 wt%, and two containers have fluorine at 0.02 and 0.2 wt%. Prompt gamma did not detect impurities in 24 containers, and the remaining five containers have "other impurities" including aluminum and sodium. Beryllium was not detected in any containers.

- This group is represented by pure metal oxidation items from Rocky Flats. MIS item 011589A does not represent any containers in this group, based on the process history.[10] MIS item CXL1685 was included to represent those containers with high uranium concentrations, and MIS items 07221730 and ARF-102-85-114-1 were added because they consist of high-purity oxide from metal oxidation.
- MIS items considered but not used for representation:

MIS Item	Reason not used
101707001	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
TS707013	This Rocky Flats metal oxidation sample is high in chloride and is outside the range of actinide concentration.
011589A	This MIS item exhibited unique behavior in small-scale, shelf-life experiments that is not considered likely in these materials, based on process history.

Oxide from Metal Brushings at Savannah River

- 3013 Taxon: MetalOx-SR
- Formerly: Savannah River 1E
- Number of 3013 Containers: 5

Representation in MIS:

Original	Add/Remove/Keep	Current
TS707001	Keep	TS707001*†
011608	Keep	011608†
011589A	Remove	
	Add	07221730†
	Add	ARF-102-85-114-1*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- The materials in this group consist of metal brushings that were generated during the packaging of metal in 3013 containers.[5]
- The actinide and plutonium assay values for this group range from 71.0 to greater than 86.6 wt% actinide.[8] The plutonium assay ranges from 71.0 to 86.6 wt%. Uranium is present in one container at 0.26 wt%.
- PG analysis was completed for all five containers. All five containers show fluoride and magnesium without chloride. The fluorine concentration ranges from 0.3 to 3.9 wt%, and the magnesium concentration ranges from 0.04 to 0.4 wt%. Beryllium was not detected in any containers.
- This group is represented by pure metal oxidation items from Rocky Flats. MIS item 011589A does not represent any containers in this group because chloride was not detected. MIS items 07221730 and ARF-102-85-114-1 were added because they consist of high-purity oxide from metal oxidation.

- MIS items considered but not used for representation:

MIS Item	Reason not used
101707001	This MIS item contains less than 30 wt% actinide. This sample was also not characterized in the MIS program and is not included in small-scale, shelf-life experiments.
TS707013	This Rocky Flats metal oxidation sample is high in chloride and outside the range of actinide concentration.
011589A	This MIS item exhibited unique behavior in small-scale, shelf-life experiments that is not considered likely in these materials, based on process history and lack of chloride.

Hanford Mixed Oxides at Savannah River

- 3013 Taxon: PuUOx-SR-HN
- Formerly: Savannah River 1F
- Number of 3013 Containers: 30
- Representation in MIS:

Original	Add/Remove/Keep	Current
SCP711-46	Keep	SCP711-46†
SCP711-56	Keep	SCP711-56*†
MOXSCP-COM	Remove	
	Add	5501407*†
	Add	669194*†
	Add	CAN92*†
	Add	CXL1685†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of containers consists of mixed reactor fuel product. The plutonium oxide was oxalate derived.[5]
- The assay values show that the materials in this group are greater than 80.9 wt% actinide.[8] The plutonium assay ranges from 16.6 to 33.8 wt%. Uranium is found in all 30 containers and ranges from 47.1 to 83.3 wt%.
- A PG analysis was completed for all 30 containers. Chlorine, fluorine, and beryllium were not detected. Eleven containers have “other impurities,” including aluminum, magnesium, and sodium; and the remaining 19 containers have no impurities detected.
- This group is represented by pure mixed plutonium/uranium oxides from LANL. Other mixed oxides from RFETS and LANL, including 5501407, 669194, CAN92, and CXL1685, were added to this group, based on process similarities.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MOXSCP-COM	This MIS item, although similar in actinide content, was not included because it was not characterized and not included in small-scale, shelf-life experiments.
CXL-BMU Mixtures (1685, BMU, BMUCXL70-30, BMUCXL93-7, CXLBMU70-30, and CXLBMU93-7)	These MIS items were used for neutron moderation and moisture experiments and were not intended for representation. Therefore, they were not characterized and not included in small-scale, shelf-life experiments.
Pure uranium oxide items: 1685 and BMU	These MIS items were used for neutron moderation experiments and not intended for representation. Therefore, they were not included in small-scale surveillance experiments.
PSU-84-06-05	The material in this sample is considered specific to pyrolytic processing of polycubes and is not considered representative of this material.
MISNE2	This MIS item is a mixture of Rocky Flats items from various processes, which may have introduced impurities that are not representative of this process. In addition, gypsum and borax were added to this material for neutron moderation experiments.
053038	This MIS item has a high chloride content, but chloride is not present in these materials.
PuUOXBC05	This MIS item, although a mixed oxide, is not completely characterized, and its process history is unknown. This sample was also not included in small-scale, shelf-life experiments.

Mixed Oxides from Alloy Oxidation at Savannah River

- 3013 Taxon: PuUOx-SR-Alloy
- Formerly: Savannah River 2A
- Number of 3013 Containers: 17
- Representation in MIS:

Original	Add/Remove/Keep	Current
5501407	Keep	5501407*†
011589A	Remove	
	Add	669194*†
	Add	CXL1685†
	Add	SCP711-46†
	Add	SCP711-56*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of containers consists of oxide produced from the oxidation of Pu/EU, Pu/DU/Mo, and Pu/EU/Zr alloys from Argonne.[5]
- The assay values for this group range from 64.2 to 96.7 wt% actinide.[8] The plutonium assay ranges from 11.2 to 32.6 wt%. Uranium is present in all 17 containers and ranges from 46.7 to 85.5 wt%.
- A PG analysis was completed for all 17 containers. Chlorine was not detected in these materials. One container has fluorine at 0.3 wt%. Six containers have "other impurities," which include aluminum, magnesium, and sodium, and the remaining ten containers have no impurities detected.
- This group was originally represented by MIS items 5501407, a mixed oxide from Rocky Flats, and 011589A. MIS item 011589A does not represent any containers in this group because chloride was not detected. Additional MIS items, including 669194, CXL1685, SCP711-46, and SCP711-56, were matched to this group, based on their composition and plutonium and uranium assay ranges.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MOXSCP-COM	This MIS item, although similar in actinide content, was not included because it was not characterized and not included in small-scale, shelf-life experiments.
CXL-BMU Mixtures (1685, BMU, BMUCXL70-30, BMUCXL93-7, CXLBMU70-30, and CXLBMU93-7)	These MIS items were used for neutron moderation and moisture experiments and were not intended for representation. Therefore, they were not characterized and not included in small-scale, shelf-life experiments.
Pure uranium oxide items: 1685 & BMU	These MIS items were used for neutron moderation experiments and not intended for representation. Therefore, they were not included in small-scale surveillance experiments.
PSU-84-06-05	The material in this sample is considered specific to pyrolytic processing of polycubes and is not considered representative of this material.
MISNE2	This MIS item is a mixture of Rocky Flats items from various processes, which may have introduced impurities that are not representative of this process. In addition, gypsum and borax were added to this material for neutron moderation experiments.
053038	This MIS item has a high chloride content, but chloride is not present in these materials.
PuUOXBC05	This MIS item, although a mixed oxide, is not completely characterized, and its process history is unknown. This sample was also not included in small-scale, shelf-life experiments.
CAN92	The uranium concentration is below the range for this group of material. In addition, this MIS item contains beryllium, but beryllium was not detected in any 3013 containers in this group.
011589A	This MIS item exhibited unique behavior in small-scale, shelf-life experiments that is not considered likely in these materials, based on process history and lack of chloride.

Scrap Mixed Oxides at Savannah River

- 3013 Taxon: PuUOx-SR-Misc
- Formerly: Savannah River 2B
- Number of 3013 Containers: 27

- Representation in MIS:

Original	Add/Remove/Keep	Current
62750	Remove	
CAN92	Keep	CAN92*†
669194	Keep	669194*†
053038	Remove	
5501407	Keep	5501407*†
ATL27960	Remove	
CXL1685	Keep	CXL1685†
	Add	SCP711-46†
	Add	SCP711-56*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of containers consists of plutonium oxide and mixed plutonium/uranium oxides from various sites, including LANL, Hanford, SRS, Oak Ridge National Laboratory (ORNL).[5] This group may contain co-precipitated material produced through the Kerr-McGee process.
- The assay values show that the materials in this group are greater than 57.1 wt% actinide.[8] The plutonium assay ranges from 7.5 to 83.7 wt%. Uranium is present in 16 containers and is found in concentrations ranging from 1.4 to 85.3 wt%.
- PG analysis was completed for 26 containers. One container has chlorine at 0.7 wt%. Fluorine (without chlorine) was found in ten containers and ranges in concentration from 0.06 to11.7 wt%. Prompt gamma did not detect impurities in eight containers, and the remaining seven containers have "other impurities," including aluminum, beryllium, magnesium, and sodium. Beryllium was detected in three containers and ranges from 0.05 to 0.1 wt%.
- This group is represented by mixed plutonium/uranium oxides from Rocky Flats and LANL. MIS items selected include mixed plutonium/uranium oxides that match the respective plutonium and uranium assay ranges. Additional MIS items, including SCP711-46, and SCP711-56, were matched to this group, based on their composition and plutonium and uranium assay ranges.

- MIS items considered but not used for representation:

MIS Item	Reason not used
MOXSCP-COM	This MIS item, although similar in actinide content, was not included because it was not characterized and not included in small-scale, shelf-life experiments.
CXL-BMU Mixtures (1685, BMU, BMUCXL70-30, BMUCXL93-7, CXLBMU70-30, and CXLBMU93-7)	These MIS items were used for neutron moderation and moisture experiments and not intended for representation. Therefore, they were not characterized and not included in small-scale, shelf-life experiments.
Pure uranium oxide items: 1685 & BMU	These MIS items were used for neutron moderation experiments and not intended for representation. Therefore, they were not included in small-scale surveillance experiments.
PSU-84-06-05	The material in this sample is considered specific to pyrolytic processing of polycubes and is not considered representative of this material.
MISNE2	This MIS item is a mixture of Rocky Flats items from various processes, which may have introduced impurities that are not representative of this process. In addition, gypsum and borax were added to this material for neutron moderation experiments.
053038	This MIS item has high chloride content, but chloride is not present in high concentrations in these materials.
PuF4-1	PuF4-1 was considered for representation because of the high fluoride concentrations found in some 3013 containers in this group. However, the material is not from the same process and may not be in the same chemical form.
62750	This MIS item is outside of the range for uranium, and this material is a dissolution residue, which is not expected to be representative of this material.
ATL27960	This MIS item was not well characterized by process history or analytical chemistry, and material is no longer available in the MIS inventory. In addition, this MIS item has an assay value outside of the range for this group.

Oxide Precipitation from Chloride Solution at LANL

- 3013 Taxon: OxlPPt-LA-Cl
- Formerly: N/A
- Number of 3013 Containers: 116 estimated

- Represented in MIS:

Original	Add/Remove/Keep	Current
CXLOX091802	Keep	CXLOX091802**††
CXLPROD091901	Keep	CXLPROD091901**††
CXLPROD021202	Keep	CXLPROD021202**††
	Add	CXLNM1

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.
**Small-Scale Surveillance planned
††Full Characterization, including chemistry, surface area, density, etc. (planned)

- This group of materials was generated by the oxalate precipitation process from aqueous chloride solutions.[7] Most of the material is newly generated oxide, but this group also includes material from historical aqueous chloride processes.
- The plutonium assay for these materials is expected to range from 58 to 88 wt%. Most of the material is in the range from 75 to 88 wt% plutonium. Significant quantities of uranium are not expected in these materials.
- The MIS items representing this group were produced by the oxalate precipitation process from aqueous chloride solutions. The impurities in these materials are expected to be different than those found in material generated by oxalate precipitation from nitrate solutions. The difference in the items with the prefix CXLOX and CXLPROD is that the CXLPROD materials underwent solvent extraction before oxalate precipitation and are higher in purity than the CXLOX materials.

Oxide Precipitation from Nitrate Solutions at LANL

- 3013 Taxon: OxlPPt-LA-NO3
- Formally: N/A
- Number of 3013 Containers: 25 estimated
- Represented in MIS

Original	Add/Remove/Keep	Current
PEOF1	Keep	PEOF1*†
PEOR3258	Keep	PEOR3258†
BLO-39-11-14-004	Keep	BLO-39-11-14-004*†
PBO-47-09-012-023	Keep	PBO-47-09-012-023*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group of materials was generated by the oxalate precipitation process from aqueous nitrate solutions.[7] Most of the material is newly generated oxide, but this group also includes material from historical aqueous nitrate processes.
- The plutonium assay for these materials is expected to range from 64 to 88 wt%. Most of the material is in the range from 75 to 88 wt% plutonium. Significant quantities of uranium are not expected in these materials.
- The MIS items representing this group were produced by the oxalate precipitation process from aqueous nitrate solutions at LANL and Hanford.

Dissolution Residues at LANL

- 3013 Taxon: DisResd-LA
- Formally: N/A
- Number of 3013 Containers: 6 estimated
- Represented in MIS:

Original	Add/Remove/Keep	Current
62750	Keep	62750†
07032282A	Keep	07032282A*†
07242201A	Keep	07242201A*†
07242165A	Keep	07242165A*†
ARF-102-85-355	Keep	ARF-102-85-355*†
New Sample	To be added	New Sample
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group consists of insoluble materials remaining after dissolution in the aqueous nitrate and chloride processes.[7] This group includes both newly generated and historical materials from this process.
- The plutonium assay is expected to range from 30 to 88 wt%.
- MIS items representing this group include Rocky Flats dissolution residues from the aqueous nitrate process and a new MIS item from chloride dissolution that will be added to the inventory.

Metal Oxidation at LANL

- 3013 Taxon: MetalOx-LA
- Formally: N/A
- Number of 3013 Containers: 42 estimated
- Represented in MIS:

Original	Add/Remove/Keep	Current
MT1490	Keep	MT1490*†
011608	Keep	011608†
07221730	Keep	07221730†
ARF-102-85-114-1	Keep	ARF-102-85-114-1*†
TS707001	Keep	TS707001*†
TS707013	Keep	TS707013*†
*Small-Scale Surveillance †Full Characterization, including chemistry, surface area, density, etc.		

- This group consists of oxide produced in metal oxidation processes.[7] Alloyed and unalloyed metal items from various processes, including electrorefining, pyrochemical, and unknown sources, will be burned to oxide.
- The plutonium assay is expected to range from 30 to 88 wt%.
- This group is represented by metal oxidation items from Rocky Flats.

Plutonium/Uranium Oxide at LANL

- 3013 Taxon: PuUOx-LA
- Formally: N/A
- Number of 3013 Containers: 12 estimated
- Represented in MIS:

Original	Add/Remove/Keep	Current
SCP711-46	Keep	SCP711-46†
PuUOXBC05	Keep	PuUOXBC05
SCP711-56	Keep	SCP711-56*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group consists of mixed oxides of plutonium and uranium.[7]
- The plutonium assay is expected to range from 10 to 79 wt%, and the uranium assay is expected to range from 0 to 73 wt%.
- This group is represented by mixed oxides of plutonium and uranium produced at LANL.

Pyrochemical Oxides at LANL

- 3013 Taxon: PyroOx-LA
- Formally: N/A
- Number of 3013 Containers: 9 estimated
- Represented in MIS:

Original	Add/Remove/Keep	Current
ATL27960	Keep	ATL27960
C00695	Keep	C00695*†
CLLANL025	Keep	CLLANL025*†
PMAXBS	Keep	PMAXBS*†
520610020	Keep	520610020*†
C00024A	Keep	C00024A*†
ARF-102-85-223	Keep	ARF-102-85-223*†
ARF-102-85-295	Keep	ARF-102-85-295*†
ARF-102-85-365	Keep	ARF-102-85-365*†

*Small-Scale Surveillance
†Full Characterization, including chemistry, surface area, density, etc.

- This group consists of plutonium oxide from pyrochemical processes at LANL.[7] The materials consist of anode heel, electrorefining scrap, and other pyrochemical oxide from unknown sources.
- The plutonium assay is expected to range from 80 to 88 wt%.
- This group is represented by pyrochemical materials generated at Rocky Flats and LANL.

Appendix D: Master PG Represented Table

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
H000808	PGCL-1-Cl%	ARF-102-85-295
	PGCL-2-Cl%	CLLANL025
	PGCL-3-Cl%	C00024A
H000817	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
H000849	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
H000913	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
H000914	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
H000929	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
H000937	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
H003556	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
H003589	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
L000076	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
L000155	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
L000167	PGCL-1-Cl%	PMAXBS
	PGCL-2-Cl%	ARF-102-85-223
	PGCL-3-Cl%	C00695
L000181	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
L000204	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
L000214	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
L000217	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
L000223	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
R610121	PGCL-1-Cl%	C00695
	PGCL-2-Cl%	PMAXBS
	PGCL-3-Cl%	ARF-102-85-223
R610169	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610410	PGCL-1-Cl%	ARF-102-85-355
	PGCL-2-Cl%	07032282A
	PGCL-3-Cl%	C00024A
R610416	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610474	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610476	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610478	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610488	PGCL-1-Cl%	CLLANL025
	PGCL-2-Cl%	ARF-102-85-295
	PGCL-3-Cl%	C00695
R610492	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	TS707001
	PGCL-3-Cl%	053038
R610541	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610563	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610573	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610575	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610578	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610585	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610644	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610691	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610751	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610764	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610765	PGCL-1-Cl%	C00695
	PGCL-2-Cl%	CLLANL025
	PGCL-3-Cl%	PMAXBS
R610770	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610776	PGCL-1-Cl%	PMAXBS
	PGCL-2-Cl%	ARF-102-85-223
	PGCL-3-Cl%	C00695
R610785	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610806	PGCL-1-Cl%	ARF-102-85-365
	PGCL-2-Cl%	053038
	PGCL-3-Cl%	TS707001
R610830	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R610841	PGCL-1-Cl%	CLLANL025
	PGCL-2-Cl%	ARF-102-85-295
	PGCL-3-Cl%	C00695
R610930	PGCL-1-Cl%	ARF-102-85-295
	PGCL-2-Cl%	CLLANL025
	PGCL-3-Cl%	C00024A
R610940	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
R611108	PGCL-1-Cl%	PMAXBS
	PGCL-2-Cl%	ARF-102-85-223
	PGCL-3-Cl%	C00695
R611265	PGCL-1-Cl%	053038
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	TS707001
R611370	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
R611398	PGCL-1-Cl%	TS707001
	PGCL-2-Cl%	ARF-102-85-365
	PGCL-3-Cl%	053038
H000790	PGFHi	07242201A 64-85-12-1858 PuF4-1
H000847	PGFHi	07242201A 64-85-12-1858 PuF4-1
H003571	PGFHi	07242201A 64-85-12-1858 PuF4-1
H003651	PGFHi	07242201A 64-85-12-1858 PuF4-1
H003713	PGFHi	07242201A 64-85-12-1858 PuF4-1
L000177	PGFHi	07242201A 64-85-12-1858 PuF4-1
L000179	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610305	PGFHi	07242201A 64-85-12-1858 PuF4-1

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610412	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610434	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610438	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610451	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610584	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610595	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610599	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610611	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610625	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610642	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610668	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610676	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610758	PGFHi	07242201A 64-85-12-1858 PuF4-1
R610886	PGFHi	07242201A 64-85-12-1858 PuF4-1
H000598	PGFLo-1-Act%	07161856
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	07242141A
H000623	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121
H000862	PGFLo-1-Act%	07161856
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	41-85-08-1379
H002716	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H002721	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
H003398	PGFLo-1-Act%	07161856
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	41-85-08-1379
H003570	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003647	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003654	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003662	PGFLo-1-Act%	07161856
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	41-85-08-1379
H003675	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121
H003682	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003880	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003975	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H004333	PGFLo-1-Act%	07161856
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	07242165A
L000157	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	07161856
L000158	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	63-88-06-121
L000169	PGFLo-1-Act%	07161856
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	41-85-08-1379
L000178	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	63-88-06-121
L000180	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	07161856
L000182	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	07161856
	PGFLo-3-F%	07242165A
L000184	PGFLo-1-Act%	07242165A
	PGFLo-2-F%	07161856
	PGFLo-3-F%	64-85-12-1858
L000185	PGFLo-1-Act%	63-88-06-121
	PGFLo-2-F%	07161856
	PGFLo-3-F%	64-85-12-1858
L000186	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	41-85-08-1379

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
L000220	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
L000227	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	07161856
L000228	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	07161856
	PGFLo-3-F%	64-85-12-1858
R601284	PGFLo-1-Act%	07161856
	PGFLo-2-F%	64-85-12-1858
	PGFLo-3-F%	07242165A
R601456	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
R610263	PGFLo-1-Act%	07161856
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	64-85-12-1858
R610319	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	41-85-08-1379
R610428	PGFLo-1-Act%	07161856
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	07242141A
R610430	PGFLo-1-Act%	07161856
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	63-88-06-121
R610432	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	41-85-08-1379
R610475	PGFLo-1-Act%	07161856
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	64-85-12-1858
R610548	PGFLo-1-Act%	07242141A
	PGFLo-2-F%	41-85-08-1379
	PGFLo-3-F%	63-88-06-121
R610552	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121
R610564	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121
R610576	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
R610580	PGFLo-1-Act%	07161856
	PGFLo-2-F%	63-88-06-121
	PGFLo-3-F%	07242141A
R610582	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
R610622	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121
R610685	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242141A
	PGFLo-3-F%	63-88-06-121

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610891	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H003951	PGFLo-1-Act%	07161856
	PGFLo-2-F%	07242165A
	PGFLo-3-F%	64-85-12-1858
H000806	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
H000823	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
H000921	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-WG	ARF-102-85-114-1
H002129	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-NWG	PBO-47-09-012-023
H002173	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002300	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002366	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	PPSL-365
H002373	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-WG	PPSL-365
H002389	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-NWG	PSU-84-06-05
H002400	PGMisc+U-1-U%	669194
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002401	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-WG	ARF-102-85-114-1
H002409	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	PPSL-365
H002412	PGMisc+U-1-U%	669194
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002489	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002504	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002505	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002537	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
H002540	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002541	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002561	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002627	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
H002632	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
H002676	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-NWG	PBO-47-09-012-023
H002683	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	PBO-47-09-012-023
H002710	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PBO-47-09-012-023
H002718	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	BLO-39-11-14-004
H002733	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
H003347	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PPSL-365
H003359	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-NWG	PBO-47-09-012-023
H003386	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	PBO-47-09-012-023
H003388	PGMisc+U-1-U%	669194
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-NWG	PBO-47-09-012-023
H003446	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PPSL-365
H003530	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-NWG	BLO-39-11-14-004
H003562	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
H003601	PGMisc-NoU-1-Act%	ARF-102-85-114-1
	PGMisc-NoU-2b-NoBe-Act%	PBO-47-09-012-023
	PGMisc-NoU-NWG	BLO-39-11-14-004
H003628	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-NWG	PBO-47-09-012-023

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
H003633	PGMisc-NoU-1-Act%	MT1490
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
H003641	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	PBO-47-09-012-023
H003684	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-NWG	BLO-39-11-14-004
H003723	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-NWG	PBO-47-09-012-023
H003733	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PBO-47-09-012-023
H003787	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-NWG	PPSL-365
H003845	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-WG	66-01-01-439
H003903	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	PPSL-365
H003967	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-NWG	PBO-47-09-012-023
H004409	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PSU-84-06-05
L000058	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000071	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-WG	PPSL-365
L000072	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-WG	66-01-01-439
L000073	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-WG	PPSL-365
L000074	PGMisc+U-1-U%	669194
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-WG	MT1490
L000075	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000077	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-WG	669194
L000151	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-WG	669194
L000152	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
L000153	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
L000156	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000159	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000162	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
L000163	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000164	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000165	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
L000166	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-WG	66-01-01-439
L000170	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-WG	66-01-01-439
L000171	PGMisc-NoU-1-Act%	66-00-11-355
	PGMisc-NoU-2b-NoBe-Act%	66-01-01-439
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000172	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PBO-47-09-012-023
L000173	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-WG	MT1490
L000174	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
L000175	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000176	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
L000191	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PSU-84-06-05
L000194	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000195	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000196	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
L000199	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PPSL-365
L000202	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PSU-84-06-05
L000203	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000205	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-WG	66-01-01-439
L000206	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-NWG	PPSL-365
L000207	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000209	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
L000211	PGMisc-NoU-1-Act%	66-00-11-355
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000212	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000219	PGMisc-NoU-1-Act%	66-00-11-355
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000221	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
L000224	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PSU-84-06-05
L000225	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	66-01-01-439
L000226	PGMisc-NoU-1-Act%	66-00-11-355
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
R600760	PGMisc-NoU-1-Act%	ARF-102-85-114-1
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-WG	PPSL-365
R601365	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-WG	PPSL-365
R601385	PGMisc-NoU-1-Act%	BLO-39-11-14-004
	PGMisc-NoU-2b-NoBe-Act%	MT1490
	PGMisc-NoU-WG	PPSL-365
R610056	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610207	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-WG	PPSL-365

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610286	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610307	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610315	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610394	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610402	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610470	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610473	PGMisc-NoU-1-Act%	66-00-11-355
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	66-01-01-439
R610482	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610497	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610515	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610526	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610528	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610544	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-WG	MT1490
R610553	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610559	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610561	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610569	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610583	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610597	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610601	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610609	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610614	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2b-NoBe-Act%	BLO-39-11-14-004
	PGMisc-NoU-WG	MT1490
R610619	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610620	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610621	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610636	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610649	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	PSU-84-06-05
	PGMisc+U-3-Be-WG	CAN92
R610665	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	66-01-01-439
R610675	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610690	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610738	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610752	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610809	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2b-NoBe-Act%	PPSL-365
	PGMisc-NoU-WG	MT1490
R610843	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610846	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610847	PGMisc-NoU-1-Act%	PBO-47-09-012-023
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610848	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610870	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R610874	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610876	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610878	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610879	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
R610888	PGMisc-NoU-1-Act%	PBO-47-09-012-023
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610890	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R610897	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	66-01-01-439
R610907	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610922	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610923	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610928	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R610929	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610951	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	669194
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610952	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R610984	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R611007	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R611042	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R611080	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365
R611103	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	PPSL-365

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
R611284	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R611305	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-WG	669194
R611320	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490
R611379	PGMisc+U-1-U%	5501407
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-WG	MT1490
R611419	PGMisc+U-1-U%	CAN92
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-Be-WG	ARF-102-85-114-1
R611424	PGMisc-NoU-1-Act%	66-01-01-439
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-NWG	PBO-47-09-012-023
H002453	PGMisc+U-1-U%	PSU-84-06-05
	PGMisc+U-2-Act%	5501407
	PGMisc+U-3-NWG	PBO-47-09-012-023
S002173	PGMisc+U-1-U%	669194
	PGMisc+U-2-Act%	CAN92
	PGMisc+U-3-NWG	PSU-84-06-05
H000771	PGNoImp	5501579
		PEOF1
		SCP711-56
H000799	PGNoImp	5501579
		PEOF1
		SCP711-56
H000807	PGNoImp	5501579
		PEOF1
		SCP711-56
H000841	PGNoImp	5501579
		PEOF1
		SCP711-56
H000904	PGNoImp	5501579
		PEOF1
		SCP711-56
H000922	PGNoImp	5501579
		PEOF1
		SCP711-56
H002293	PGNoImp	5501579
		PEOF1
		SCP711-56
H002485	PGNoImp	5501579
		PEOF1
		SCP711-56
H002655	PGNoImp	5501579
		PEOF1
		SCP711-56
H002714	PGNoImp	5501579
		PEOF1
		SCP711-56
H002730	PGNoImp	5501579
		PEOF1
		SCP711-56

3013 Container	MIS Represented Item Selection Order	MIS Represented Item
L000062	PGNoImp	5501579
		PEOF1
		SCP711-56
L000063	PGNoImp	5501579
		PEOF1
		SCP711-56
L000154	PGNoImp	5501579
		PEOF1
		SCP711-56
L000193	PGNoImp	5501579
		PEOF1
		SCP711-56
H001960	PGNoImp	5501579
		PEOF1
		SCP711-56
H002227	PGNoImp	5501579
		PEOF1
		SCP711-56
H002360	PGNoImp	5501579
		PEOF1
		SCP711-56
S001736	PGNoImp	5501579
		PEOF1
		SCP711-56
S002204	PGNoImp	5501579
		PEOF1
		SCP711-56
S002237	PGNoImp	5501579
		PEOF1
		SCP711-56
R610887	PGMisc-NoU-1-Act%	PPSL-365
	PGMisc-NoU-2a-Be	ARF-102-85-114-1
	PGMisc-NoU-WG	MT1490

Appendix E: 3013 Container Outliers

The 3013 containers listed below are identified as outliers because chlorine was detected by PG analysis. These materials are not expected to have chlorine as an impurity, based on process history.

3013 Taxon	Old MIS Represented Code	Material Description	3013 Container ID	PG Result	Pu wt%	U wt%	Actinide wt%	Cl wt% (est.)	H_2O wt%	Moisture Method	MIS Represented Items
OxlPPt-HN	Hanford-1B	Product quality oxides from oxalate precipitation - (stored product)	H002543	Chloride	86.0	0.0	86.8	0.9	0.19	TGA	053038, TS707001, ARF-102-85-365
			H002777	Chloride	84.2	0.0	84.8	1.5	0.04	TGA	053038, TS707001, ARF-102-85-365
			H002863	Chloride	82.6	0.0	86.1	6.7	0.07	TGA	CLLANL025, C00695, ARF-102-85-295
			H002864	Chloride	86.3	0.0	87.4	1.4	0.01	TGA	053038, TS707001, ARF-102-85-365
			H003014	Chloride Containing Be & F	82.3	0.0	85.6	1.6	0.05	TGA	053038, TS707001, ARF-102-85-365
			H004033	Chloride Containing F	86.0	0.0	87.1	3.9	0.02	TGA	ARF-102-85-223, PMAXBS, CLLANL025
			H004150	Chloride Containing Be & F	86.5	0.0	87.3	2.4	0.02	TGA	053038, TS707001, ARF-102-85-365
			H004206	Chloride Containing F	78.0	0.0	85.8	1.8	0.04	TGA	053038, TS707001, ARF-102-85-365
			H004309	Chloride Containing Be & F	82.7	0.0	86.7	5.4	0.11	TGA	ARF-102-85-223, PMAXBS, CLLANL025
PuUOx-HN-Pure	Hanford-2D	Mixed oxides: product quality and impure	H002195	Chloride	21.0	62.3	84.2	1.5	0.11	TGA	053038, TS707001, ARF-102-85-365
			H002812	Chloride Containing F	20.7	64.8	85.8	8.4	0.14	TGA	CLLANL025, C00695, ARF-102-85-295
			H003057	Chloride	24.9	56.3	81.4	0.2	0.13	TGA	07032282A, ARF-102-85-365, C00024A
ScrapOx-HN-Hi	Hanford-2A	Impure and scrap Pu oxides with 80-85 wt% Pu from PFP and 300 area	H002673	Chloride	81.5	0.0	81.7	1.3	0.06	TGA	053038, TS707001, ARF-102-85-365
			H002886	Chloride Containing F	82.8	0.0	83.6	3.0	0.09	TGA	053038, TS707001, ARF-102-85-365
HydrOx-RF	RFETS-2D	By-product hydride oxidation	H000857	Chloride	7.6	66.2	74.0	1.6	0.01	FTIR	053038, TS707001, ARF-102-85-365
PeroxPPT-RF	RFETS-1A	Peroxide precipitation/ calcination	R610836	Chloride Containing F	83.7	0.0	83.9	0.9	0.03	TGA	053038, TS707001, ARF-102-85-365
MetalOx-SR-LL	SRS-1D	Burned metal oxides from LLNL >80%	S001721	Chloride Containing F	84.3	0.0	84.3	2.0	0.21	TGA	053038, TS707001, ARF-102-85-365
PuUOx-SR-Misc	SRS-2B	Scrap mixed Pu/U oxides (Other sources)	S002147	Chloride Containing F	74.4	0.0	74.4	0.7	0.20	TGA	053038, TS707001, ARF-102-85-365

The 3013 containers listed below are identified as outliers because fluorine was detected by PG analysis in concentrations greater that 0.8 wt%. These materials are not expected to have fluorine as an impurity at these concentrations, based on process history. Based on the PG representation, the containers in this table would be represented by 07242201A, 64-85-12-1858, and PuF4-1.

3013 Taxon	Old MIS Represented Code	Material Description	3013 Container ID	PG Result	Pu wt%	U wt%	Actinide wt%	F wt% (est.)	H_2O wt%	Moisture Method
OxlPPt-HN	Hanford-1B	Product quality oxides from oxalate precipitation - (Stored product)	H002801	Strong Fluoride	84.8	0.0	87.1	2.7	0.02	TGA
			H003153	Strong Fluoride	85.1	0.0	87.4	2.4	0.03	TGA
			H003157	Strong Fluoride	81.1	0.0	85.0	1.1	0.19	TGA
			H004009	Strong Fluoride	80.4	0.0	80.6	1.6	0.20	TGA
			H004175	Strong Fluoride	86.5	0.0	87.3	1.8	0.02	TGA
PuUOx-HN-Pure	Hanford-2D	Mixed oxides: product quality and impure	H002862	Strong Fluoride	19.2	66.1	85.6	4.6	0.14	TGA
			H003107	Strong Fluoride	69.3	17.3	87.6	3.5	0.14	TGA
ScrapOx-HN-Hi	Hanford-2A	Impure and scrap Pu oxides with 80-85 wt% Pu from PFP and 300 area	H003314	Strong Fluoride	80.1	0.0	80.9	3.0	0.09	TGA
PuUOx-SR-Misc	SRS-2B	Scrap mixed oxides - a) AUA-265 (CaF, LANL, HRA), b) ORNL, c) Misc. Sources most > 80 % Pu + U, d) SRTC returns	S002105	Strong Fluoride	81.3	0.0	81.3	1.0	0.14	TGA
			S002110	Strong Fluoride	57.1	0.0	57.1	1.9	0.39	TGA
			S002220	Strong Fluoride	12.9	74.4	87.3	11.7	0.38	TGA
			S002222	Strong Fluoride	40.3	24.9	65.2	1.6	0.18	TGA
			S002238	Strong Fluoride	76.0	1.4	77.5	2.2	0.18	TGA
			S002250	Strong Fluoride	60.6	0.0	60.6	6.0	0.16	TGA
			S002276	Strong Fluoride	37.3	27.1	64.5	1.8	0.33	TGA


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