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Fissile Material Disposition Program

MOX Irradiation, Feedstock, and Transportation

ARIES Oxide Production Program Legacy Risk Reduction Project

Prepared by Mary Ann Stroud, MET-1 Engineering Lead

PARTS, SUPPLIES, AND EQUIPMENT ASSESSMENT 2015 REPORT

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PURPOSE

The Advanced Recovery and Integrated Extraction System (ARIES) program at the Los Alamos National Laboratory (LANL) has developed and demonstrated the processes for pit disassembly and conversion of the excess nuclear weapons stockpile. Over the past 20 years, this program has generated excess parts, supplies, and equipment (PSE) in the Plutonium Facility, building 4 (PF-4) gloveboxes and laboratories, controlled storage areas, and other locations.

The ARIES legacy risk reduction (ALRR) effort was initiated in FY14. A goal of this effort is to significantly eliminate the inventory of excess PSE by 2019. In addition, the ALRR team is tasked with capturing the documents and procedures developed during the demonstration and testing campaigns. In accordance with PA-PLAN-01094, *ARIES Oxide Production Program Legacy Inventory Risk Reduction Plan*, the ALRR PSE assessment team works closely with the other ARIES teams to define the PSE that can be dispositioned and subsequently transferred, salvaged, or discarded as waste.

OVERVIEW

In FY14, the ALRR team followed a process of taking data from six institutional databases to create a baseline list of ARIES PSE. Details of the creation of the baseline PSE list are discussed in PA-PLAN-01094. The ALRR team performed field assessments of these baseline PSE items with subject matter experts (SMEs), ARIES process engineers (PrEs), or PSE owners to confirm the existence and location of the items and to determine recommended paths forward. Once the field assessments were complete, the data were uploaded into the ARIES Legacy Program Support (ALPS) database. Reports with recommendations are being generated and the ALRR team will present the recommendations to the ARIES review board for concurrence and additional recommendations. Following the review board's decisions, the ALRR team will disposition nonessential PSE. A complete description of this ALRR process is detailed in PA-PLAN-01094.

METHODOLOGY

The primary focus of the PSE assessment was to identify nonessential ARIES PSE and recommend a disposition path. The initial list of PSE previously identified, although not comprehensive, served as a good baseline for the assessments. The list of PSE resided on the ALPS database, a classified Microsoft ACCESS database. After careful review by derivative classifiers, the unclassified controlled nuclear information was transferred to a Microsoft Excel spreadsheet residing in the unclassified ARIES engineering share drive. Assessors easily accessed, sorted, filtered, shared, and updated the data on the more familiar Excel platform.

Assessments were organized by item ownership and location. Item owners were contacted to obtain their recommendation for their items. For some items, if the item owner was no longer working with ARIES and the item was associated with a process, then the appropriate PrE was contacted for a recommendation. Most assessments occurred in the field. The ALRR team and owner determined if the item still existed. If the item could not be located, the item was assessed as "Discarded." Next, if the

owner or PrE determined an item was necessary to complete the ARIES mission, then the essential item was assessed as “Keep.” Items identified as nonessential to the ARIES program were placed into the “Excess” category. The “Excess” category contains three subcategories: “Transfer, Waste, or Salvage.” Transfer items will be assigned to an already identified non-ARIES program/owner. Waste items are no longer valuable such as broken items or expired chemicals that will be dispositioned as Waste. Salvage items are valuable items that will be sent to the LANL Property Management Group where they will be processed in accordance with federal disposition options. Items will be advertised internally and externally for reuse prior to being sold to the public. Listed below are brief definitions for the disposition paths and subcategories.

- Discarded: Item no longer exists
- Keep: Item will be kept by ARIES
- Excess: Item is of no use to ARIES
 - Transfer: Item will be assigned to a non-ARIES program/owner
 - Waste: Item will be sent to waste
 - Salvage: Item will be sent to salvage

In addition, the ALRR team asked owners to identify any additional Excess ARIES items not on the baseline list that should be dispositioned. Because of the high value of PF-4 glovebox space, owners, PrEs and SMEs were also asked if there were any “abandoned” items in PF-4 gloveboxes that affected workers’ ability to complete their ARIES mission. These items were added to the ARIES PSE list as Excess items for presentation to the ARIES review board.

The ALRR team also updated item ownership to ensure completeness and accuracy. Other PSE information such as the system the PSE will support or the management level was also updated if the information was readily available. Assessors ensured that items outside of the glovebox that will remain part of the ARIES program were labeled with a bar code to aid in future identification. Photographs were taken of items to aid disposition.

RESULTS

Six-hundred and sixty-two ARIES items were assessed. Six-hundred and twenty one items were from the baseline PSE list. Forty-one additional items were identified during the assessment. The newly identified items were primarily equipment at Technical Area 60 (TA-60) associated with the FS65 and FS47 containers used to store fuel rods.

PSE Locations

ARIES PSE is located at TA-55, TA-46, TA-50, TA-60, TA-35, and the Chemistry and Metallurgy Research (CMR) building (TA-3, SM-29). Figure 1 and Table 1 provide detailed information on item location. Sixty-eight percent of ARIES PSE is located at TA-55.

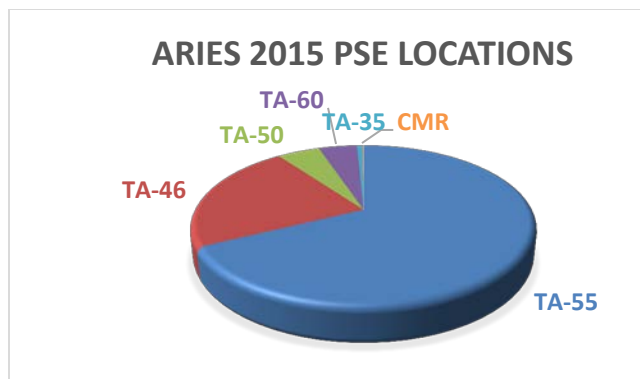


Figure 1. Pie chart of PSE locations

Table 1. PSE Locations

ARIES PSE		
Location	# of Items	%
TA-55	448	68
TA-46	148	22
TA-50	32	5
TA-60	29	4
TA-35	4	1
CMR	1	0
Total	662	100

Figure 2 and Table 2 provide detailed information on the location of items at TA-55. Most of those items are located in PF-4 and the PF-5 warehouse.

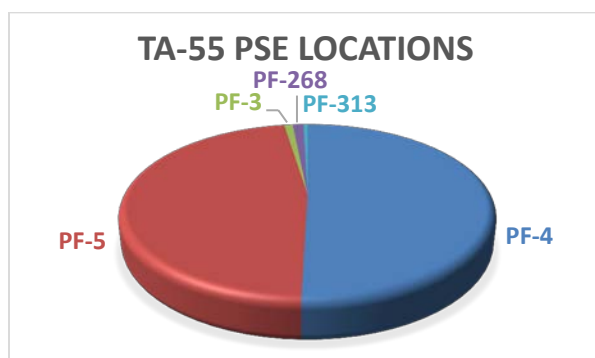


Figure 2. Pie chart of PSE locations at TA-55

Table 2. PSE Locations at TA-55

TA-55		
Location	# of Items	%
PF-4	226	50
PF-5	211	47
PF-3	4	1
PF-268	5	1
PF-313	2	0
Total	448	100

Assessment PSE Recommendations

The assessment team is recommending that 71% of the identified ARIES PSE items be kept and 29% of the items have either been discarded or will be dispositioned as Excess (Transfer, Waste, or Salvage). Details of the recommendations are summarized in Figure 3 and Table 3.

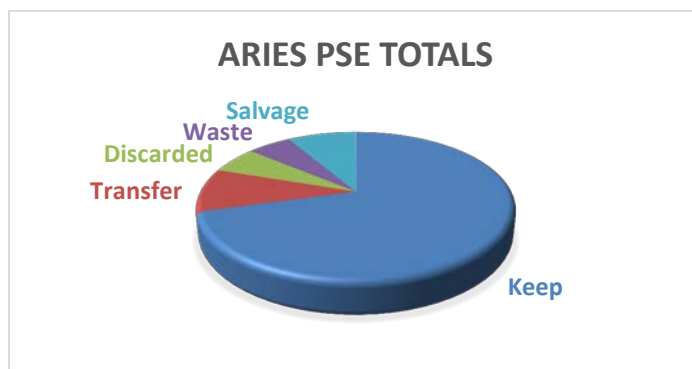


Figure 3. Pie chart of Recommendations for all ARIES PSE

Table 3. Summary of Recommendations

ARIES PSE		
Path Forward	# of items	%
Keep	468	71
Transfer	63	10
Discarded	39	6
Waste	36	5
Salvage	56	8
Total	662	100

The baseline PSE inventory identified 216 ARIES items in PF-4. Many additional ARIES items that were not part of the baseline inventory were located in PF-4. The omissions are due, in part, to the fact that property-numbered items are removed from the property inventory prior to being brought into PF-4. Ten of the additional PF-4 items were assessed as Excess. Only these Excess items were added to the ARIES inventory at this time because the primary purpose of the assessment was to identify excess ARIES PSE. Figure 4 and Table 4 summarize the recommendations for the 226 identified PF-4 items.

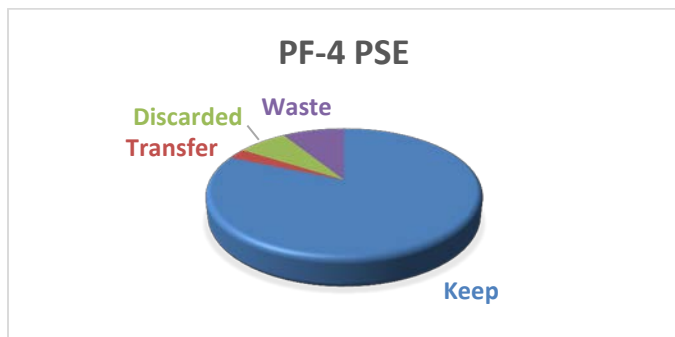


Figure 4. Pie chart of PF-4 PSE recommendations

Table 4. PF-4 PSE Recommendations

PF-4		
Path Forward	# of Items	%
Keep	184	81
Transfer	6	3
Discarded	16	7
Waste	20	9
Salvage	0	0
Total	226	100

The assessment team is recommending that 81% of the identified PF-4 PSE be kept and 19% of the PF-4 PSE be dispositioned as Excess. This includes 20 items recommend for disposition as Waste. Eleven of the items (9 pieces of equipment and 2 chemicals) that are located in gloveboxes will be dispositioned transuranic (TRU) waste. Most of these items, such as the direct metal oxidation (DMO) furnace tubes, augers, and basket shown in Figure 5 need to be size-reduced prior to disposition.



Figure 5. DMO furnace tubes, augers, and basket

A furnace in an ARIES material characterization glovebox that has not been used for over five years, Figure 6, was also identified for disposition as TRU Waste. The furnace will need to be size-reduced prior to disposition.



Figure 6. Abandoned furnace in ARIES glovebox

Nine PF-4 items identified for disposition as Waste are located outside of the glovebox. This includes equipment installed for the part sanitization and two Dri-Train systems, Figure 7, with their associated piping that have not been used in a decade.



Figure 7. Dri-Train in PF-4

Figure 8 and Table 5 summarize the results of the assessment of the 211 new items located at the PF-5 controlled storage area.

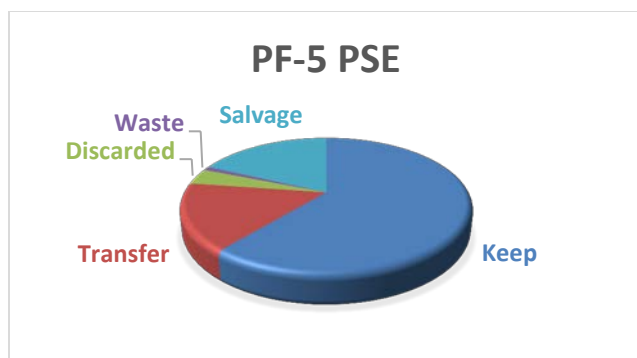


Figure 8. Pie chart of PF-5 PSE recommendations

Table 5. PF-5 PSE Recommendations

PF-5 PSE		
Path Forward	# of Items	%
Keep	129	61
Transfer	34	16
Discarded	8	4
Waste	2	1
Salvage	38	18
Total	211	100

The assessment team is recommending that 61% of the identified PF-4 PSE be kept and 39% of the PF-5 PSE be dispositioned as Excess. Thirty-four items are recommended for Transfer primarily to the Pit Surveillance and the Special Recovery Line programs. The two items recommended for Waste are expired chemicals.

Five ARIES items were originally in PF-268 (the Casino). Four of the items were gloveboxes that were assessed as part of the FY14 effort. All four of the Excess gloveboxes have been successfully transferred to new owners including: two ARIES highly enriched uranium gloveboxes to the Inorganic Isotope & Actinide Chemistry Group at LANL (TA-48), one glovebox to the Waste Isolation Pilot Plant (WIPP) (Figure 9), and one glovebox transferred to the New Mexico Institute of Mining and Technology. The fifth and final ARIES item in the Casino, a furnace procured for the part sanitization effort, is recommended for Salvage.



Figure 9. Glovebox sent to WIPP

Two dose-reduction boxes constructed to shield radiation from PuO₂ in DMO-3 “milk bottles,” which are currently located in PF-313, are recommended for Salvage. There are also four identified items in PF-3 labs that will be kept.

The results of the assessment of the 148 PSE items at TA-46 are summarized in Figure 10 and Table 6.

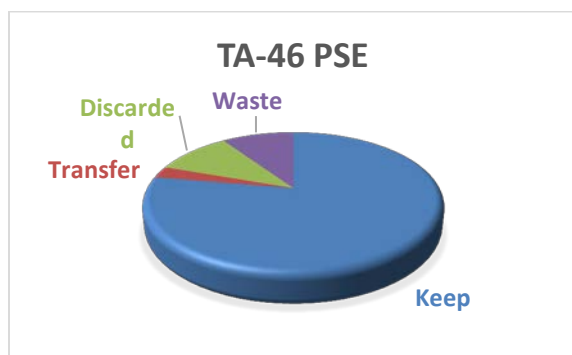


Figure 10. Pie chart of TA-46 PSE recommendations

Table 6. TA-46 PSE Recommendations

TA-46		
Path Forward	# of Items	%
Keep	115	78
Transfer	4	3
Discarded	15	10
Waste	14	9
Salvage	0	0
Total	148	100

The majority of ARIES items at TA-46 are chemicals. Seventy-eight percent of the items will be kept. Four pieces of equipment are recommended for Transfer to the Process Automation and Control Group (AET-5), and 29 of the items are chemicals that have been consumed or are recommended for disposition as Waste.

Figure 11 and Table 7 summarize the recommended paths forward for the 32 items located in the controlled storage area at TA-50.

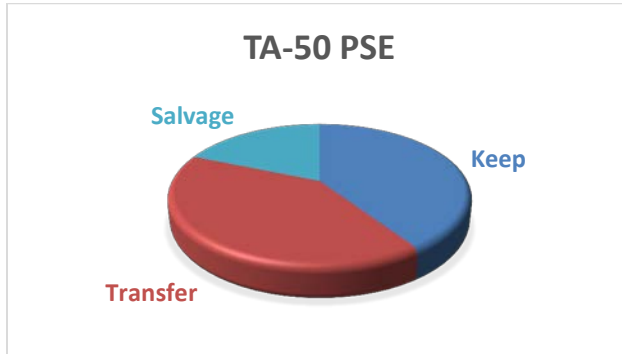


Figure 11. Pie chart of TA-50 PSE recommendations

Table 7. TA-50 PSE Recommendations

TA-50		
Path Forward	# of Items	%
Keep	13	41
Transfer	13	41
Discarded	0	0
Waste	0	0
Salvage	6	19
Total	32	100

Thirteen of the 32 items at TA-50, which tend to be larger items like furnaces or microscopes, will be kept. Thirteen items are recommended for Transfer, primarily to the Pit Surveillance Program.

ARIES owns four large items at the TA-35 storage area. Two furnaces as well as the Dri-Train system shown in Figure 12 are recommended for Salvage. One Dri-Train system is recommended for Transfer to Pu-238 operations.



Figure 12. Excess Dri-Train system located at TA-35

The one piece of identified ARIES equipment at CMR, which is part of an electro dialysis system, is recommended for Transfer to AET-5.

Figure 13 and Table 8 summarize the recommended path forward for the 29 ARIES items located at TA-60 that were identified during the assessment.

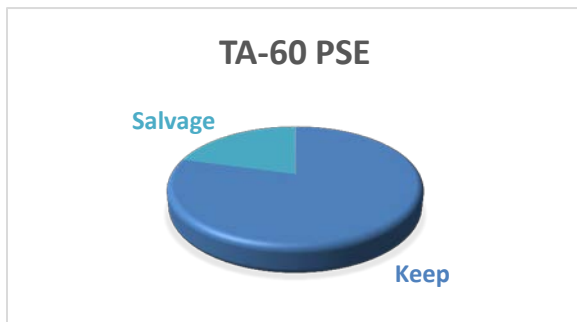


Figure 13. Pie chart of TA-60 PSE recommendations

Table 8. TA-60 PSE Recommendations

TA-60		
Path Forward	# of Items	%
Keep	23	79
Transfer	0	0
Discarded	0	0
Waste	0	0
Salvage	6	21
Total	29	100

The equipment, which is currently stored outside or in Conex boxes, is shown in Figures 14 and 15. This equipment is associated with the FS65 and FS47 containers used to store fuel rods. ARIES no longer has FS47 containers in use, so the six pieces of equipment associated with these containers are recommended for Salvage. Equipment needed for the FS65 containers will be kept until the fuel rods are dispositioned. Efforts are under way to improve the storage conditions for the equipment that will be kept to ensure it is in working order when needed.



Figure 14. FS65 and FS47 equipment at TA-60



Figure 15. Conex boxes at TA-60

There were 11 “orphaned” items where an ARIES owner, a PrE, or a SME could not be identified. A list of these items was sent to the ARIES operations lead, the ARIES technical project lead (TPL), and ARIES engineers. As a result, the assessment team was still unable to attain disposition recommendations for 9 items. For those 9 items, the 4 items outside of the glovebox were recommended for Salvage. The 5 items inside the glovebox, which were all chemicals, were recommended as Waste. The numbers reported above include the “orphaned” items.

The initial list of PSE included 31 owners, 18 of whom were no longer working on ARIES projects. In addition, there were 25 items with no owner assigned. The assessment team ensured that all PSE that will be retained by the ARIES program has an assigned owner who is currently working for the ARIES program. After reassignment of ownership and disposition of Excess items, ownership will be reduced to 16 people, primarily the Actinide Engineering and Science Group PrEs. Most ARIES PSE is purchased to support a particular ARIES system such as DMO or the robotic lathe. The assessment team worked to associate PSE with the ARIES system it was intended to support. Tracking PSE by ARIES system and ownership will make future assessments easier as owners leave the ARIES program for other assignments. The TA-55 warehousing and controlled storage personnel are also beginning to track new PSE by ARIES system and owner.

After the assessments were complete, the ALRR data lead uploaded the Excel spreadsheet used during the assessment to the classified ALPS database. An independent verifier reviewed database updates for completeness and accuracy.

Recommended disposition paths for all PSE are subject to review by the ARIES review board. The board consists of the ARIES program director, program manager, operations lead, and TPLs. The ARIES legacy program manager, engineering lead, and data lead prepare disposition packages to present to the board. The board can accept the recommendation of the ALRR team, can create a new option, or table an item pending receipt of additional information.

Once the board has rendered a disposition determination the results are captured in the ALPS database. These determination results greatly influence future work scope as the entire LANL ARIES program management chain will have agreed to the disposition path.

FY16 PSE DISPOSITION GOALS

After receiving direction from the ARIES review board, the ALRR team will begin to disposition designated PSE. The goal for FY16 is to complete disposition of all Excess PSE outside of PF-4. PSE outside of PF-4 designated as waste can be dispositioned relatively quickly. More valuable Excess items will be advertised to see if other ARIES staff or ADPSM programs could use the items before working with LANL property management and salvage to disposition the items. After ensuring necessary documentation is in place and signed by both ARIES and the receiving program, ownership of PSE designated for Transfer will be updated. Most PSE will remain in the same location after the transfer.

Of all ARIES PSE, items in PF-4 and in particular those in PF-4 gloveboxes, pose the greatest risk and liability to the ARIES program. These items occupy valuable space that could be used for other programmatic needs. Disposition of items in PF-4, especially those either in or connected to a glovebox, can be a complex, costly, and time-consuming process. In addition, there are currently limitations on TRU waste generation at TA-55. Historically, TRU waste generated in PF-4 has been sent to WIPP for permanent disposition. WIPP is currently not accepting waste and it may be quite some time before shipments of radioactive waste from LANL are resumed. The ALRR team anticipates TRU waste generation in PF-4 will continue to be restricted in 2016. Limited resources are being allocated in FY16 for disposition of PSE in PF-4.

RECOMMENDATIONS

The 2015 assessment was the initial effort to reduce excess ARIES PSE. A major goal for FY16 is to develop a long-term strategy for a continual effort to minimize buildup of excess ARIES assets and ensuring prompt disposition of unneeded PSE.

Ongoing education and motivation of ARIES staff about the importance of the ALRR effort should be a program priority. Including a task in annual performance goals to identify and disposition excess assets or setting a performance-based incentive would add visibility and support to the effort. Ensuring continuing management support for the ALRR effort is also essential.

Developing a long-term plan for managing ARIES spare parts would also benefit the ALRR effort. The majority of the ARIES items recommended for disposition are located in TA-55 controlled storage locations. Specific suggestions include:

- ensure all ARIES systems have an updated detailed spare parts list;
- work with ARIES PrEs, TA-55 warehousing and controlled storage personnel, and ARIES database managers to develop a plan for maintaining and reviewing ARIES spare parts per the spare parts list;

- ensure all ARIES assets in TA-55 controlled storage are identified and tied to the ARIES system they support where applicable;
- ensure ARIES staff reviews the list of ARIES assets in TA-55 and controlled storage on an annual basis and identifies excess items; and
- obtain samples of metal from the DMO furnace tube and basket prior to disposition.

Although review of ARIES assets in all locations is essential, particular attention should be given to PSE in PF-4 because these items pose a greater risk to the ARIES program than PSE located elsewhere. It is recommended that a documented walkdown of ARIES PF-4 space with ARIES PrEs, TPL, operations lead, and ALRR staff occur annually to identify excess PSE. The ALRR team should also work with ARIES staff to determine the obstacles to PSE disposition and help to minimize or eliminate these barriers. For example, many of the items slated for disposition from PF-4 gloveboxes are too large to be bagged out. The ARIES material characterization PrE requested size-reduction of an item more than three years ago. Size reduction in a glovebox is inherently dangerous and there are a limited number of trained personnel available to complete the task. Improving the process for size reduction of items in PF-4 gloveboxes and/or developing an alternate strategy for item removal is needed.

PROGRAM IMPACT

Reducing the number of excess ARIES assets will free up valuable space and may reduce program costs for controlled storage. Table 9 summarizes the effect of the FY15 assessment at the six technical areas if all recommendations are accepted as proposed. The table reflects all PSE at the site, both in controlled storage and laboratories.

Table 9. Percent Decrease in PSE by TA Location

LOCATION	FY15 ASSM.	%
TA-55	Decrease	29%
TA-50	Decrease	59%
TA-35	Decrease	100%
CMR	Decrease	100%
TA-46	Decrease	22%
TA-60	Decrease	21%
Overall decrease		29%

Assuming assessment recommendations are accepted, the greatest space recovery will occur in the TA-55 controlled storage areas (TA-55 PF-5 and PF-268; TA-50; and TA-35). Forty-four percent of the identified ARIES inventory in TA-55 controlled storage areas (110 items) will be dispositioned as Excess. The biggest impact will be at PF-5 where 82 ARIES items are Excess. An advantage of seeing a 41 % decrease in the number of ARIES PSE at PF-5 is that mission essential equipment can be moved to more readily accessible locations. In addition, the TA-50 inventory will be reduced by almost 60% to 13 items. There will be no identified ARIES items in PF-268 (the Casino) or TA-35, eliminating the ARIES footprint in

these locations. The advantage of seeing a reduction to zero or no equipment at PF-268 and TA-35 is that it is likely personnel will no longer be required to maintain those locations on behalf of ARIES. In addition, there will be no identified ARIES items at the CMR building and a significantly reduced footprint at TA-46 and TA-60.

It is also expected that the removal of unneeded program assets, particularly in PF-4, will result in production efficiencies. Consolidating ARIES equipment to 16 owners all currently working with ARIES will also improve efficiency.

SUMMARY

During FY15, more than 600 previously identified ARIES items and 41 newly identified items were assessed to determine whether they were needed by the ARIES program. One hundred and ninety-four items or 29% of the identified ARIES inventory is recommended for Excess. Figure 16 summarizes the current identified ARIES inventory by location and the inventory after disposition of items recommended for Excess. The majority of these items recommended for Excess are new items located in TA-55 controlled storage areas.

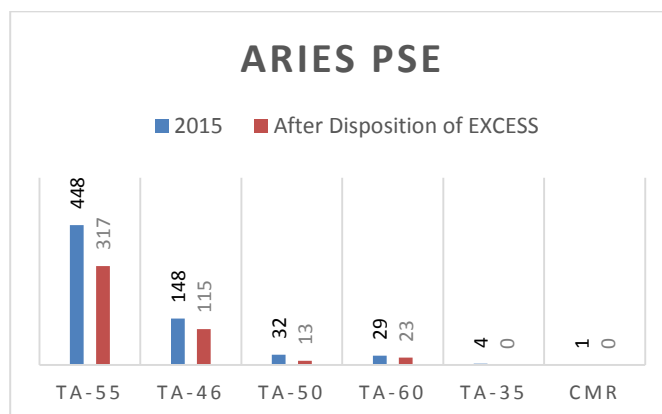


Figure 16. ARIES PSE in 2015 and after disposition of items recommended for Excess

In addition, four gloveboxes were removed from controlled storage and transferred to new owners and 21 Excess chemicals were dispositioned as Waste.

In FY16, the ALRR PSE team will focus on dispositioning nonradioactive Excess PSE and developing an integrated strategy for managing ARIES spare parts to minimize future buildup of excess PSE.

ACKNOWLEDGEMENTS

The ALRR PSE team included Scott Breshears, Ted Partch, Larry Peppers, Tracy Wenz, and Mary Ann Stroud.

DEFINITIONS AND ACRONYMS

Term	Definition
AET-5	Process Automation and Control Group
ALPS	Aries Legacy Program Support database
ALRR	ARIES legacy risk reduction
ARIES	Advanced Recovery and Integrated Extraction System
CMR	Chemistry and Metallurgy Research (building)
Discarded	Item no longer exists
DMO	direct metal oxidation
Excess	Item is of no use to ARIES
FY	fiscal year
Keep	Item will be kept by ARIES
PF-4	Plutonium Facility, building 4
PrEs	process engineers
PSE	Parts, supplies, and equipment
Salvage	Item will be sent to salvage
SMEs	subject matter experts
TA	Technical Area
TPL	technical project lead
Transfer	Item will be assigned to a non-ARIES program/owner
TRU	transuranic
Waste	Item will be discarded as waste
WIPP	Waste Isolation Pilot Plant