INEL-95/0576

November 1995

Idaho National Engineering Laboratory

Idaho National Engineering Laboratory Materials in Inventory Natural and Enriched Uranium Management and Storage Costs

Lockheed
Idaho Technologies Company

INEL-95/0576

Idaho National Engineering Laboratory Materials in Inventory Natural and Enriched Uranium Management and Storage Costs

R. L. Nebeker

Published November 1995

Idaho National Engineering Laboratory
Lockheed Idaho Technologies Company
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Assistant Secretary for Environment Management
Under DOE Idaho Operations Office
Contract DE-AC07-94ID13223

CONTENTS

TABLES

ACRONYMS

ADS	Activity Data Sheet
ANL	Argonne National Laboratory
ARMF	Advanced Reactivity Measurement Facility
ATR	Advanced Test Reactor
B&W	Babcock and Wilcox
CPP	Chemical Processing Plant
DOE	Department of Energy
DP	Defense Programs
EM	Environmental Management
ER	Environmental Restoration
ETR	Engineering Test Reactor
GETR	General Electric Test Reactor
IFSF	Irradiated Fuel Storage Facility
INEL	Idaho National Engineering Laboratory
LANL	Los Alamos National Laboratory
MIN	Materials In Inventory
NBS	National Bureau of Standards
NE	Nuclear Energy
NMIS	Nuclear Materials Inspection and Storage
NR	Naval Reactors
ORNL	Oak Ridge National Laboratory
PBF	Power Burst Facility

PWR	Pressurized Water Reactor
RW	Office of Civilian Radioactive Waste Management
TRA	Test Reactor Area
UA1	Uranium Aluminide

INTRODUCTION

On July 13, 1994, the Office of Environmental Management (EM) was requested to develop a planning process that would result in management policies for dealing with nuclear materials in inventory. In response to this request, EM launched the Materials In Inventory (MIN) Initiative. A Headquarters Working Group was established to develop the broad policy framework for developing MIN management policies. MIN activities cover essentially all nuclear materials within the DOE complex, including such items as spent nuclear fuel, depleted uranium, plutonium, natural and enriched uranium, and other materials.

In August 1995, a report discussing the natural and enriched uranium portion of the MIN Initiative for the Idaho National Engineering Laboratory (INEL) was published. That report, "Idaho National Engineering Laboratory Materials-in-Inventory, Natural and Enriched Uranium".[1] identified MIN under the control of Lockheed Idaho Technologies Company at the INEL. Later, additional information related to the costs associated with the storage of MIN materials was requested to supplement this report.

This report provides the cost information for storing, disposing, or consolidating the natural and enriched uranium portion of the MIN materials at the INEL. The information consists of eight specific tables which detail present management costs and estimated costs of future activities.

Current Management Costs

Current Inventory and Current Management Practices

Natural and enriched uranium materials which are managed by Lockheed Idaho Technologies Company are shown in Table 1 (all tables appear following the body of the report). These materials have been identified previously in Reference 1. Where the information is available, the containment method, in terms of the primary container, is shown and the material is described in terms of its physical description or matrix. The material in Table 1 is not classified as spent nuclear fuel because it has either been generated from past fuel processing activities, is material that was planned to be used in reactors in the future, or consists of samples or other miscellaneous material. Most of the material is unirradiated, although some of it may have been irradiated slightly as shown in the table. A few of the items may be slightly contaminated, also as noted. The quantity of material, in terms of kilograms of uranium, is also shown in the table. The majority of the material listed in Table 1 is stored in either the Unirradiated Fuel Storage Facility (CPP-651), the Nuclear Material Inspection and Storage Building (NMIS, TRA-621), and, to a lessor extent, the Irradiated Fuel Storage Facility (IFSF, CPP-603). These facilities and the current management practices related to their operation have been described in Reference 1. The remainder of the material is in other INEL facilities or in off-site facilities under contract with the INEL.

---

1. Lockheed Idaho Technologies Company, Idaho National Engineering Laboratory Materials-in-Inventory Natural and Enriched Uranium, Report INEL-95/0308, (August 1995)

History of Ownership

Much of the INEL funding presently comes from the DOE-EM organization. Other DOE organizations, including Defense Programs (DP), Nuclear Engineering (NE), Naval Reactors (NR), Environmental Restoration (ER), the Office of Civilian Radioactive Waste Management (RW) and occasionally others have funded and continue to fund other activities at the INEL. Most of the enriched and depleted uranium covered by this report and presently stored in CPP-651 and TRA-621 were recovered for or used by DP. Some of the material stored in TRA-621 [Engineering Test Reactor (ETR)/General Electric Test Reactor (GETR), Advanced Reactivity Measurement Facility (ARMF), etc.] was intended for use in test reactors and is owned by NE.

This report lists only those materials managed by the Department of Energy Idaho Operations Office (DOE-ID). The Argonne National Laboratory-West (ANL-W) area, which is also located at the INEL but which is not managed by DOE-ID, is not included in this report nor is other material at the INEL which is controlled by other off-site DOE organizations.

Annual Cost of Managing MIN

The annual cost of managing the INEL natural and enriched MIN is shown in Table 2. Since the majority of the MIN covered by this report is located at two INEL facilities, the operation of these facilities accounts for the majority of the costs associated with the MIN. These facilities are the Unirradiated Fuel Storage Facility at the Idaho Chemical Processing Plant (CPP-651) and the NMIS Facility at the Test Reactor Area (TRA-621). Some MIN also is stored at the ICPP IFSF where it is awaiting shipment to another location, and minor amounts are retained at other locations where it typically is used for testing or research applications. Costs for the present storage of MIN for CPP-651 and TRA-621 were obtained from the budget activity data sheets (ADS) where these costs are identified. The cost of storing MIN at the IFSF is based on the calculated cost of storage for each storage location. Costs at other storage facilities are minor because of the minor quantities stored and their association with other programs. Annual costs consist of facility operation, safeguard activities, security, and related activities. Costs for special activities, such as inventories, are not included.

It is difficult to summarize costs in a table format since the costs vary with time and the activities anticipated or being conducted. Also, in a period of intense budget restrictions, it becomes necessary to postpone activities which are thought to be useful and cost effective because the funding for the activities simply is not available. The costs for the facilities shown in Table 2 are therefore minimal operating costs based on past or expected future budgets. The costs for CPP-651 include basic costs for surveillance and maintenance, which are required regardless of the activities being conducted at the facility. They are incurred even if no fuels are moved into or out of the facility. These costs typically include items such as operations surveillance, instrument calibrations, inventories, safety document preparation, general maintenance, preventive maintenance checks, and alarm checks. These activities are required regardless of whether material movements are occurring within the facility.

Costs for the TRA-621 facility also are the minimum costs for operation of the facility and include items such as radiation control support, accountability, building checks, custodial service, security checks, and similar items. Costs for management of materials used in experimental programs are typically minor and are covered by the program that uses them.

Costs for the IFSF include only the storage costs associated with MIN storage in an operating fuel storage facility.

One-Time and Recurring Capital Costs

The data call requested that one-time costs be included in Table 3. Because of the extreme shortage of funds presently in force throughout the DOE complex, no major upgrades or one-time funding requirements pertaining directly to MIN have been identified that are expected to have funding for completion. However, some funding has been provided to change the security profile at specific ICPP facilities, including CPP-651, and these activities will indirectly affect the storage of MIN.

Cost of Disposition Options

Cost to implement Potential Disposition Options

Some of the materials shown previously in Table 1 have been identified for dispositioning to other locations. The dispositioning options are shown in Table 4 for the materials which have been identified as eligible for dispositioning to other locations. The weight of uranium in each batch of material also is shown along with the required activities and, where available, the costs of implementing the activities. Shipment of material to other sites is dependent on the ability of that site to accept the material and on the availability of funds to pay for the transfer. In many cases, neither the funding nor the permission to ship is presently available.

Unofficial cost estimates are available only for the major materials selected for transfer. These cost estimates are in some cases several years old and are being updated. Some estimates are recognized as likely being low because of uncertainties regarding the availability of shipping and storage containers as well as other uncertainties such as the time and labor required to prepare a shipment. Various considerations may limit the time that workers can spend in certain areas, thus limiting the productive time available for preparing materials for shipment.

The PARKA and LANL estimates include the cost of obtaining the 6M drums anticipated to be used for shipping the material to Oak Ridge National Laboratory (ORNL). These drums (110 gal) cost approximately $1100 each. About 195 drums will be required for the Los Alamos National Laboratory (LANL) shipments and 136 drums will be needed to ship PARKA material. Costs are also included for the return of the drums. Labor costs are extremely dependent on the time required to prepare the shipment, which may be longer than anticipated in the original estimates. The costs in Table 4 therefore are the minimal shipping costs based on extremely preliminary data.

Costs for shipping the ETR and GETR materials include the costs of purchasing the shipping containers, packaging the fuel, paying for the shipment and the return of the containers, and support for project management and safeguards and security. The costs are dependent on whether new 6M drums are needed or if the ETR shipping containers are acceptable. ETR shipping containers are used in the Table 4 costs.

Cost estimates for transfers of other, smaller quantities of materials are not available. The costs shown in Table 4 are essentially ratioed from the LANL costs on the basis of the weight of material to be shipped and costs for shipping and returning the drums, and disregard the economies of scale derived from the large number of containers being shipped in the LANL case. These costs are therefore less firm than the other reported costs, and are probably too low.

Revenue From Sale of MIN

Table 5 requests information on revenue from the sale of MIN. No sales of MIN have been identified at the INEL for the material covered by this report.

Savings Associated with Managing Decreased Volumes of MIN

Since the majority of the MIN at the INEL is stored in major facilities at the site, there is no significant decrease in costs if part of the inventory is disposed. Unless an entire facility is emptied so the facility can be totally shut down, the costs to operate and manage the facilities remain. A slight decrease in cost could conceivably be realized, but there is no firm data showing cost savings. The activities presently included in the operating costs, i.e., preventive maintenance, custodial services, radioactive contamination control, instrument and alarm calibration and maintenance, and similar activities that continue regardless of the quantity of material in storage. Only if the storage facility is completely emptied do some of these costs no longer apply and, even in that case, some costs remain unless the facility is completely surplused. Consequently, the savings associated with managing decreased volumes of MIN, shown in Table 6, indicate no reductions in cost until the entire inventory is removed. Even in this case, some costs would remain in maintaining the empty facility or in preparing the facility for decommissioning.

Savings Associated with Consolidating Material

As stated in the previous section, cost savings can only be effected through the removal of all material from a major facility. Consolidating material in one, rather than two, major facilities could result in some cost savings. In 1994, a task team was formed to evaluate the consolidation of TRA and ICPP special nuclear materials. The team determined that savings would accrue if the material presently stored in TRA-621 were to be transferred to CPP-651, but that the cost of moving the material would also be relatively high.[2]

Although initial costs (estimated to be about $1.4 million at the time of the team's evaluation) would be incurred to transfer and store the material in CPP-651, savings would accrue over the following years, predominantly because of a reduction in the personnel needed for operations, safeguards, and physical security. A decrease of over 11 full-time employees was estimated to be possible if this change occurred. A net present value (NPV) of over $4.6 million

2. Task Team Report, Consolidation of TRA and ICPP Special Nuclear Materials in CPP-651, (February 1994).

in savings was calculated over the next 20 years for the consolidation case. These costs and savings are shown in Table 7. Presently, because of plans to eventually dispose of much of the material to Y-12 and because of the difficulty in obtaining funding for the initial cost of transferring the material, the move to CPP-651 is not anticipated. No studies are available regarding the savings that could occur from consolidating the MIN at fewer DOE sites; however, the present plans are to move much of the existing INEL material to Y-12 or other locations where it may be effectively recycled. Moving all INEL MIN to another site for consolidation is not considered practical considering the large quantity of MIN presently located at the INEL, the uncertainty in the DOE disposition plans, and the present condition of the CPP-651 facility, which is one of the most modern security storage areas in the DOE complex.

Determine Cost of Addressing Potential Vulnerabilities

Table 8 requests information related to reducing and correcting vulnerabilities at the site. The only vulnerability identified at the INEL for MIN material involves the PARKA fuel which is presently stored in CPP-603 IFSF. This fuel is stored in cardboard tubes, and concerns have been raised concerning the fire hazard of storing the material in these containers. The IFSF electrical utilities had earlier been identified as less than adequate. During an extended downtime, elevated temperatures of the materials could have potentially occurred because of the decay heat from the spent nuclear fuel inventory in the proximity of the cardboard tubes, thus creating a fire hazard. The IFSF electrical utilities have been upgraded to resolve this vulnerability. It is intended that the PARKA fuel be sent to Y-12, and the cost for this transfer is shown as a one-time cost on Table 8. This is the same cost as that shown previously in Table 4 for dispositioning of that material, and the same comments concerning the appropriateness of the cost estimate apply in Table 8.

Table 1. INEL MIN

Material (Type)	Facility/Building Where Stored/Managed	Stored/Managed Inside or Outside?	Containment Method	Phase/Matrix	Rad. Contaminated (Yes/No)	Quantity in Inventory (Kgs)
Enriched Uranium-CPP Area						
PARKA Rods	IFSF, CPP-603	Inside	Vaults/Tubes	Graphite	Slightly	147.976
ANL-W Scrap	CPP-651	Inside	Drums	Metal	No	51.294
LANL Material	CPP-651	Inside	Cans/Racks	Graphite, Ash	Slightly	256.039
UO3 Custom Product	CPP-651	Inside	Cans	Powder	No	25.155
Custom Process Samples	CPP-651	Inside	Drums	Powder	No	1.583
Fluorinel Scrap	CPP-651	Inside	Drums/Cans, etc.	U-Zr Metal	No	179.272
UO3 Samples	CPP-651	Inside	Cabinet	Powder	No	0.094
Fermi Pin	CPP-627	Inside	Drum	UO2 Solid	Yes	0.132
Custom Dissolver Solids	CPP-627	Inside	Drum	Solid	Yes	0.262
PWR Pieces	CPP-637	Inside	Cabinet	U-Zr Metal	No	0.17
Samples	CPP-627	Inside	Drum	Solid	Yes	0.078
Rover Material	CPP-640	Inside	Process Vessel	Graphite Ash	No	159.201
ETRC Pieces	CPP-637	Inside	Cabinet	UAlx metal	Yes	0.548
Tory-II-A	CPP-627	Inside	Drum	Solid	Yes	0.116
Metal Pellets	CPP-602	Inside	Cabinet	Pellets	NA	0.742
SPERT WAPD	CPP-637	Inside	Cabinet	Solid	No	0.17
Fluorinel Scrap	CPP-637	Inside	Cabinet	U-Zr Metal	No	0.075
Metal Standard Brick	CPP-651	Inside	Drum	Solid	Yes	0.831
ANL-W Scrap	CPP-651	Inside	Drums, Cans	Vycor Glass, misc.	No	6.912
UO3 Product	CPP-651	Inside	Cans	Powder	No	1,343.62
UO3 Product	CPP-651	Inside	Cans	Powder	No	15.375
FAST Standards	CPP-651	Inside	Cans	Solid	No	1.477
Fluorinel Scrap	CPP-651	Inside	Drums	U-Zr Metal	No	11.634
University Rtrs	CPP-651	Inside	Drums	UAlx Metal	No	0.604
ANL-E Foils, etc.	CPP-651	Inside	Drums	Powder, Other	Yes	62.322
UO3	CPP-651	Inside	Bottles/Drums	Powder	No	4.494

Table 1. INEL MIN

Material (Type)	Facility/Building Where Stored/Managed	Stored/Managed Inside or Outside?	Containment Method	Phase/Matrix	Rad. Contaminated (Yes/No)	Quantity in Inventory (Kgs)
Uranyl Nitrate	CPP-602	Inside	Bottle	Liquid		0.07
NBS Isotopic SRM	CPP-602	Inside				0.008
NBS Isotopic SRM	CPP-602	Inside				0.011
NBS Isotopic SRM	CPP-602	Inside				0.001
U-235 Metal Pellets	CPP-602	Inside		Metal		0.005
Process Control	CPP-602	Inside				0.001
Misc.	CPP-602	Inside				0.004
Test Specimens	CPP-602	Inside			Yes	0.018
U-235	CPP-602	Inside				0.001
U-235 Oxide	CPP-602	Inside		Oxide		0.001
Lab Standards	CPP-Pad	Outside	Bottles/Waste Box			0.019
Fuel Dissolution Studies	CPP-Pad	Outside	Waste Box			0.005
B&W Sample	CPP-602	Inside		Zircaloy		0.001
Ref for can 652	CPP-602	Inside		Powder		0.006
UZr Hydride	CPP-Pad	Outside	Pail/Waste Box			0.027
UCO Compacts	CPP-637	Inside			No	0.004
PNR and ANP	CPP-637	Inside		Metal	No	0.038
Crushed Test Samples	CPP-637	Inside	Drum		No	0.016
Graphite Fuel Compacts	CPP-637	Inside		Graphite	No	0.039
UCO Compacts	CPP-637	Inside			No	0.004
UAlx samples	CPP-Pad	Inside	Waste Box	UAlx		0.002
Reject Pellets	CPP-627	Inside		Pellets		0.019
Solids from Custom	CPP-627	Inside		Misc. Solids		0.008
UAl4 Powder	CPP-627	Inside	Plastic Bottle	Powder		0.006
U-235 Oxide	CPP-Pad	Outside	Waste Box	Powder		0.002
NBS Isotopic SRM	CPP-602	Inside		Powder		0.007
Total Weight						2270.501

Table 1. INEL MIN

Material (Type)	Facility/Building Where Stored/Managed	Stored/Managed Inside or Outside?	Containment Method	Phase/Matrix	Rad. Contaminated (Yes/No)	Quantity in Inventory (Kgs)
Enriched Uranium-Non ICPP Locations						
ETR/GETR elements	TRA-621	Inside	Fuel Rack	UAlx metal	No	172.004
PWR Standard	TRA-621	Inside			No	0.551
ARMF Plates	TRA-621	Inside	Fuel Rack	UAlx Metal	No	0.13
ARMF Capsules	TRA-621	Inside	55-gal 6M Drum	UAlx Metal	No	0.351
Safeguards Standards	TRA-621	Inside	Trays and Drums		No	24.755
PBF Rod Standard	TRA-621	Inside		Powder, Capsule	No	0.621
Foils	TRA-621	Inside	Can	Metal Foils	No	0.055
Pellets	TRA-621	Inside	Can	Pellets	No	0.284
Pellet Capsule, other	TRA-660	Inside				0.011
ATR Plates and Pieces	TRA-621	Inside	Fuel Storage Rack	UAlx Metal	No	0.071
ELAF Plates	TRA-670	Inside	ATR Canal		Yes	0.177
Standards	TRA-621	Inside	Fuel Storage Racks		No	1.846
Lead Wires	TRA-621	Inside	Trays		No	0.009
Hot Frits MultiMW	TRA-632	Inside				0.004
Safeguards Standards	TRA-621	Inside	Trays		No	32.881
Safeguards Standards	TRA-621	Inside	Trays		No	0.819
Fission Chambers	PBF-620	Inside				0.025
PBF Rods	TRA-621	Inside	Trays		No	137.123
PBF Scrap	TRA-621	Inside	Bottles		No	0.745
Fission Counter	PBF-620	Inside	Canal			0.001
MIT/LEAF plates	TRA-621	Inside	Tray/Storage Rack	Metal Plates	No	0.081
Total Weight						372.544

Table 1. INEL MIN

Material (Type)	Facility/Building Where Stored/Managed	Stored/Managed Inside or Outside?	Containment Method	Phase/Matrix	Rad. Contaminated (Yes/No)	Quantity in Inventory (Kgs)
Enriched Uranium-Off-Site						
Foils and Tubes	U of Florida	Inside			Some of Each	0.069
SPERT Fuel Pins	U of Florida	Inside		UO2 Pins		3,041.64
Fuel Plates	Iowa State U	Inside		UAlx Plates		0.669
Pathfinder	Penn State	Inside		UO2 Pellets		900.677
Total Weight						3943.055
Normal Uranium- Non CPP Items						
Cylindrical Piece	604 Lab 112	Inside	Safe			1
Total Weight						1
Normal Uranium- CPP						
Rover Sim Ash	CPP	Inside	Waste Box	Ash Powder		2
KB NAT-10	CPP	Inside	Waste Box			13
AH-NAT-1,etc	CPP	Inside	Waste Box			1
Total Weight						16
Normal Uranium-Off Site						
FBBR Rods	Purdue U	Inside		Rods		10,240
Total Weight						10,240
Grand Total						16,843

Table 2. MIN Costs

MIN Management Activity	How were MIN Management Costs Estimated? As a Portion of Cost of An Activity			Annual Cost ($K) Associated with Managing MIN
	Description of MIN Management	Cost of Management Activity	Estimated % Applicable to MIN	
CPP-651 Operation	Facility Operation	$852K	100%	$852K
TRA-621 Operation	Facility Operation	$160K	100%	$160K
CPP-IFSF	Facility Operation	$1800K	5%	$100K
Misc. Management Operations	Facility Operation	Negligible		Negligible

Notes:

Costs for TRA-621 include RadCon support, accountability, building checks, custodian service, security, etc.

Costs for CPP-651 vary depending on planned activities, but include surveillance and maintenance, fuel project maintenance and support, and safety analysis and operational readiness.

Costs are based on budgeted numbers for past years and vary from year to year.

Costs for IFSF are based on cost per storage position times number of positions.

Table 3. MIN Activities

Activity	Planned One-Time Activities		Recurring Activities	
	Costs, $K	When Could Activities Occur (Fiscal Year)	Costs	Frequency
No one-time activities identified in near-term future.				

Table 4. Disposition Activities

Potential Identified Disposition Option	Amount (wt.) of MIN that could be Dispositioned	Specific Activities Required for Disposition of MIN	Cost, by Activity	Total Cost to Implement Disposition Option
Ship PARKA Rods to Y-12	147.976	Repackage, Transport	See Notes	$700K
Ship ANL Scrap to Y-12	51.294	Repackage, Transport	See Notes	$260K
Ship LANL Graphite to Y-12	256.039	Repackage, Transport	See Notes	$786K
Ship UO3 Product from Custom to Y-12	25.155	Repackage, Transport	See Notes	$125K
Ship UO3 Product from Custom to Y-12	1.583	Repackage, Transport	See Notes	$5K
Package and ship Metal Standard Brick	0.831	Repackage, Transport	See Notes	$5K
Package and ship FAST standards	1.477	Repackage, Transport	See Notes	$5K
Package and ship university material	0.604	Repackage, Transport	See Notes	$5K
Ship ETR and GETR elements to ORNL	172.004	Repackage, Transport	See Notes	$706K
Ship PWR Rod Standard to CSMO	0.551	Repackage, Transport	See Notes	$5K
Package and ship ARMF Plates	0.13	Repackage, Transport	See Notes	$5K
Package and ship ARMF Capsules	0.351	Repackage, Transport	See Notes	$5K
Package and ship safeguards standards	24.755	Repackage, Transport	See Notes	$120K
Package and ship safeguards standards	0.621	Repackage, Transport	See Notes	$5K
Package and ship MIT, LEAF Plates	0.081	Repackage, Transport	See Notes	$5K
Package and ship foils and tubes	0.069	Repackage, Transport	See Notes	$5K
Package and ship SPERT Fuel Pins	3,041.64	Repackage, Transport	See Notes	NA
Package and ship UAlx plates	0.669	Repackage, Transport	See Notes	$5K
Return Pathfinder assemblies to Y-12	900.677	Repackage, Transport	See Notes	NA

Table 4. Disposition Activities

Potential Identified Disposition Option	Amount (wt.) of MIN that could be Dispositioned	Specific Activities Required for Disposition of MIN	Cost, by Activity	Total Cost to Implement Disposition Option
Send KB NAT to Nevada Test Site	13	Repackage, Transport	See Notes	NA
Place FBBR Rods on excess list or return to SRS	10,240	Repackage, Transport	See Notes	NA
Total Weight	14,880			
Total Percent	88			

Notes

1. PARKA costs include drum return ($2000/shipment), scale at ORNL ($4000), support costs, and eight people to load the material ($2880 per drum). It is assumed that a drum can be loaded in six hours. Drum costs ($1100 each for 136 drums) are assumed.

2. LANL costs include drums, return of drums, and eight people to load the material into the drums. Drum, drum return, and personnel costs are the same as above. Shipment requires 195 drums.

3. The costs for ETR/GETR depend on whether ETR shipping containers or 6M drums are used. Costs include storage racks at ORNL, packaging and loading, safeguards requirements, inspection, and other management/coordination activities.

4. Cost of Using 6M drums instead of ETR Shipping Containers would increase the cost by $245K.

5. No cost estimates exist for fuels such as those stored off-site or to be shipped to the Nevada Test Site.

6. Cost Estimates exist only for PARKA, LANL, and ETR/GETR materials, and even these costs are rough-order of magnitude costs. Other costs are estimated based on quantity of material and published costs for other materials.

Table 5. Sale of MIN

Material	Estimated Saleable Amount of MIN		Estimated cost to prepare for sale	Estimated Marked Price/Unit	Revenue from Sale of Estimated Saleable Amount of MIN
	Amount (Units)	Percentage of Total MIN			
Sale Of MIN Presently not Planned					

Table 6. Cost Reductions

Volume Reduction	Annual Management Cost Reduction (%)	Would One-Time or Recurring Cost Be Incurred? (Yes/No, How Often, When)
25%	0%	Yes
50%	0%	Yes
75%	0%	Yes
100%	NA	Yes
Other	0%	Yes

Notes:

Costs for facility maintenance would continue even with removal of material.

Costs would be incurred to move portions of materials from the facility to reduce volume.

Table 7. MIN Consolidation

Current MIN Storage Site	Potential MIN Consolidation Site	Potential Annual Cost Savings ($K)
TRA-621	CPP-651	$469K

Notes

Costs to implement the move of material from TRA to CPP are estimated to be $1.4M.

Annual Cost Savings vary over the years; a NPV of $4.612M was calculated for the consolidation project.

Table 8. Vulnerabilities

Vulnerability	Activities Required to Address Vulnerability	Required Frequency of Activities	Up-front Costs Associated with New Activities	Annual Costs Associated with New Management Practices
Potential ignition of cardboard containers for PARKA fuel if high-temperature accident occurred	Remove fuel and transfer to Y-12	Once	$700K	None

Notes

See Table 4 concerning items included in cost estimate.

An electrical utility upgrade has recently been completed to resolve the vulnerability.