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Disposition of Excess Highly Enriched Uranium Status and Update

Lockheed Martin Energy Systems, Inc.
Oak Ridge Y-12 Plant
HEU Disposition Program Office

Prepared by:
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September 1997

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Oak Ridge, Tennessee 37831, managed by
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Oak Ridge Y-12 Plant

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PREFACE

In 1995 President Clinton announced that approximately 200 metric tonnes (t) of fissile material from United States (U.S.) nuclear weapons are excess to national security needs. In response, a program was initiated by the Department of Energy (DOE) to disposition the declared excess fissile material (highly enriched uranium [HEU] and plutonium). This paper presents the status of the DOE program charged with the disposition of the excess HEU portion of the total excess. Included is the up-to-date progress on the identification and characterization of specific batches of excess HEU and plans for its processing into commercial nuclear fuel material or low-level radioactive waste. The resultant quantities of low enriched fuel material expected from this program will be described, as well as the estimated schedule for introducing this material into the commercial reactor fuel market.

1.0 BACKGROUND

The end of the Cold War created a legacy of weapons-capable fissile material. Global stockpiles of this material threaten national and international security through potential proliferation of nuclear weapons and could result in environmental, safety, and health consequences if the material is not properly stored, handled, and managed. Demonstrating a commitment to nonproliferation, President Clinton announced, on March 1, 1995, that approximately 200 t of U.S. fissile material in the weapons stockpile is excess to national security needs. The following year, the Secretary of the DOE announced that as much as 212.5 t of weapons-grade fissile material is excess to national security needs. Included in this amount is approximately 174 t of HEU of varying assays above 20 percent; the remainder being plutonium.

In support of this presidential commitment, DOE sites with historical missions of weapons production began the transition to downsized stockpile maintenance sites and/or environmental cleanup sites. Historically, DOE has dispositioned HEU that was no longer needed for weapons use through transfer to other programmatic uses, such as fuel for research reactors. Currently, the disposition will include only a fraction of the excess HEU being used for low-enriched research reactor fuel. The remainder of the excess 174 t will be dispositioned (through the efforts of this program) as commercial reactor fuel or waste.

Prior to the U.S. announcing its plans to dispose of excess HEU inventory, the U.S. and Russian governments signed an agreement (in 1993) that provided for the conversion of HEU from dismantled Russian weapons into fuel for commercial reactors. As a result of the agreement, the U.S. will purchase 22,250 t of low enriched uranium (LEU) in the form of uranium hexafluoride (UF₆) derived from 500 t of Russian HEU. All down-blending services are being performed in Russia and delivery will take place over a 20-year period (began in 1995). The purchase of Russian LEU is not part of the DOE HEU disposition program, subject of this paper; more information is available through the Energy Information Administration, an independent organization within the DOE.¹

¹ Szymanski, W. N., *The Effects of U.S. and Russian Government Surplus Inventories on the World Uranium Markets*, Energy Information Administration, U.S. Department of Energy, Washington, D.C.

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2.0 INTRODUCTION

The DOE has implemented a program to disposition excess weapons HEU into a non-weapons capable form. The DOE initially screened nine options for this purpose.² Three options were eventually identified as reasonable for further analysis:

- No disposition action (i.e., continued storage)
- Blend HEU to < 5 percent assay LEU for use as reactor fuel
- Blend HEU to 0.9 percent assay LEU waste for disposal

The DOE followed the requirements set forth by the *National Environmental Policy Act of 1969* by evaluating these HEU disposition options in an Environmental Impact Statement. The results of this evaluation are published in the *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement* (HEU-EIS).³

Based on the results of the HEU-EIS, DOE signed a Record of Decision (ROD) on July 29, 1996 stating that the excess HEU will be dispositioned by converting as much as 85 percent of the surplus HEU to commercial-grade reactor fuel material and 15 percent to low level radioactive waste (LLW).⁴ Some HEU in the form of spent fuel may not qualify as LLW and may require another processing or disposal path.

For the material that will take the path of commercial reactor fuel, the down-blended product provided as feed material to commercial fuel fabricators could be provided in several forms including UF₆, uranyl nitrate, and uranium oxides (techniques discussed below). The HEU that cannot be made into acceptable reactor fuel will be down blended to 0.9 percent assay for disposal as LLW, or will

² Office of Fissile Materials Disposition, *Summary Report of the Screening Process*, DOE/MD-0002, U.S. Department of Energy, Washington, D.C., March 29, 1995.

³ Office of Fissile Materials Disposition, *Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement*, DOE/EIS-0240, U.S. Department of Energy, Washington, D.C., June 1996.

⁴ Office of Fissile Materials Disposition, *Record of Decision for the Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement*, U.S. Department of Energy, Washington, D.C., July 1996 (61 Fed. Reg. 40619).

remain as spent fuel for possible disposition as high-level waste in a repository or alternative pursuant to the *Nuclear Waste Policy Act of 1982*.

Planning for the disposition of HEU is the responsibility of the DOE Office of Fissile Materials Disposition (OFMD). Last year, the OFMD issued a program plan that described the goals and major objectives of the program.⁵ As directed by the OFMD, the Oak Ridge Operations (ORO) office and the DOE Y-12 Plant Site Office have programmatic responsibility and oversight for implementing much of the HEU disposition program. The Lockheed Martin Energy Systems, Inc. Y-12 Plant HEU Disposition Program Office (HDPO) has been assigned the primary responsibility for planning and coordinating implementation of tactical activities necessary to ensure the safe, secure, environmentally-sound, and timely disposition of the excess HEU inventory. To this end, the HDPO has prepared a more detailed program plan⁶ and prepares annual implementation plans.

The excess HEU is currently stored at many sites across the DOE weapons complex (Figure 1). As such, the programmatic efforts by the HDPO are being augmented by support efforts from other DOE sites.

FIGURE 1. Locations of Excess HEU

⁵ Office of Fissile Materials Disposition, *Highly Enriched Uranium Disposition Plan*, Rev. 0, U.S. Department of Energy, Washington, D.C., September 1996.

⁶ HEU Disposition Program Office, *Surplus Highly Enriched Uranium Disposition Program Plan*, Y/ES-162, Rev. 1, Lockheed Martin Energy Systems, Inc., Oak Ridge, Tennessee, September 1997.

3.0 DISPOSITION OF EXCESS HEU

Any enriched uranium with an assay above 20 percent is considered to be HEU and could theoretically be used in nuclear weapons. Individual batches within the excess HEU inventory have assays ranging from 20 percent to over 90 percent.

The disposition options evaluated in the HEU-EIS and approved in the ROD will render the excess HEU non-weapons capable through blending operations that would irreversibly dilute its enrichment. Independent of the ^{235}U assay of either the excess HEU or the blend-stock (diluent) uranium, the various uranium isotopes in the down-blended LEU product must be thoroughly mixed, making isotope separation and enrichment possible only by using uranium enrichment technologies. Therefore, only those blending process technologies that mix uranium isotopes at the molecular level were considered by DOE for evaluation in the HEU-EIS.

Most of the excess material can be down blended efficiently. Some HEU will be difficult to down blend to reactor quality fuel because of impurities or isotopic composition. After down blending to LEU, DOE is planning to introduce this LEU into the commercial reactor fuel market to the maximum extent possible, with the non-useable portion disposed of as waste. From much of the excess HEU, a down-blended LEU product at ~4.5 percent assay could be provided to fuel fabricators in several forms, including UF_6 , uranyl nitrate hexahydrate (UNH) crystals, and uranium oxides. The HEU that cannot be made into acceptable commercial-grade fuel material, because of impurities or the concentration of minor uranium isotopes, will be down blended to 0.9 percent assay for disposal as LLW, or remain as spent fuel for disposal.

An essential part of the disposition decision is the establishment of criteria by the reactor industry for acceptance of down-blended LEU. The American Society for Testing and Materials (ASTM) has considered the issues and created two new standards that will cover the down-blended material from this program that is not in the form of UF_6 .

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4.0 TECHNIQUES FOR CONVERTING HEU TO LEU

The disposition option to down blend HEU to less than 5 percent assay LEU for sale as reactor fuel feed material requires that the down-blended product be in a form acceptable to the reactor fuel fabrication industry. The material UF_6 has long been the enriched uranium product from domestic enrichment facilities and thus it is the standard form of LEU accepted by commercial fuel fabricators. The ammonium diuranate (ADU) conversion process has been used at fuel fabrication facilities to convert the UF_6 into fuel grade uranium dioxide (UO_2). This process is also used to purify dissolved recycle and scrap material, and precipitate it into fuel grade UO_2 . Most fuel fabricators in the U.S. either have or are in the process of converting from the ADU process to the "dry" process for UF_6 to UO_2 conversion to avoid the nitrate waste problem. This transition will result in considerable ADU processing capability becoming available to process non- UF_6 feed streams at the fabricator. The availability of the ADU process at fabricators will allow alternate forms of LEU feed expected from the disposition program, such as UNH crystals, triuranium octaoxide (U_3O_8) and uranium trioxide (UO_3).

The disposition option to down blend HEU to 0.9 percent assay LEU for disposal requires that the down-blended product be in a form acceptable for disposal as LLW. Being an environmentally stable compound, U_3O_8 is a preferred LEU form for disposal as waste. The HEU-EIS evaluated disposal options for down-blended LEU in the form of U_3O_8 .

In reviewing down-blending techniques, DOE considered many techniques to render the HEU non-weapons capable. The result was three very good candidate processes that could create a usable LEU product or, for some of the HEU, a waste. These are:

- Blending as UF_6 -- considered appropriate only for the disposition of HEU that is currently in the form of UF_6 . This is the preferred method because of fuel fabrication capabilities. For HEU in non- UF_6 forms, there are currently no facilities available to convert production volumes [of metal or oxide] to UF_6 .
- Blending as molten uranium metal -- considered appropriate for the disposition option that would produce an LEU material suitable for fuel or disposal as LLW. Most of the excess HEU is in metal form and molten metal blending may well offer significant economic advantages, but the fuel fabrication industry has no capability to

process large quantities of uranium metal, nor convert it to UF_6 . Oxidation of LEU metal, at the time of down blending, would be the most reasonable route for using this method.

- Blending as uranyl nitrate (UN) solution -- considered appropriate for the disposition options of LEU fuel material or waste. Fuel grade material would be in the form of UNH crystals or U_3O_8 . These can be converted to UO_2 by the ADU process. Waste would be in the form of U_3O_8 .

5.0 DISPOSITION PROGRAM ACTIVITIES

In addition to program management responsibilities, the HDPO has a technical function in the disposition program. At the current time, HDPO is engaged in several technical studies that support the program objectives. Four of the current activities are:

- HEU Characterization
- Commercial Fuel Market Applications
- Off-spec Commercial Fuel Demonstration
- Transfer HEU to the United States Enrichment Corporation (USEC)

5.1 HEU CHARACTERIZATION

Characterization of the excess HEU inventory is essential to determine its attractiveness as commercial nuclear reactor fuel and to make a final determination of whether specific inventories can be down blended for commercial nuclear reactor fuel or must be dispositioned as waste. The inventory characterization process is complex because some attributes of the material that are important to the fuel industry were of little interest in weapons production, and consequently, detailed data are not available. Investigation into historical records may yield some of the required characterization; however, additional sampling and analysis will be required.

Characterization of the HEU includes identification of the specific material; gathering existing data about the inventory, identifying tests necessary for some material before final characterization can be completed, defining the processing steps necessary to prepare the material for transfer to a down-blending site and estimating the cost of the processing steps. The HEU inventory item-level data will include attributes such as material quantity, form, location, isotopic and analytical data, packaging configurations and processing issues. All data must be traceable and reconcilable with inventory quantities in the Nuclear Materials Management and Safeguard System (NMMSS). The major task of characterizing the excess HEU inventory has been assigned to the Y-12 Plant. Identification and characterization of potential blend-stocks will also be performed under this program.

The information derived from the characterization efforts will support the DOE in the following manner -- Once a customer is identified and the desired product characteristics and delivery dates are known, the characterization data base can be used to identify the preferred HEU batch.

Preliminary characterization efforts have identified the forms of the excess HEU by location throughout the DOE complex (shown on Figure 1). These preliminary data are given in Table 1. The current schedule for characterization specifies that a final report on characterization of the entire excess HEU inventory be completed by fall of 1998.

TABLE 1. Location and Form of Excess HEU^a
(data in metric tons)

Location	Metal	Oxides	Unirradiated fuel	Irradiated fuel	Other forms	Total
Oak Ridge Y-12 Plant, K-25 Site, Oak Ridge National Laboratory	63.1	2.7	10.6	0.6	7.9	84.9
Idaho National Engineering Laboratory Site	1.6	1.7	2.8	16.6	0.6	23.4
Portsmouth Gaseous Diffusion Plant	-	7.3	-	-	15.2	22.5
Savannah River Site						22.0
Pantex Plus Planned Dismantlements	16.7	-	-	-	-	16.7
Rocky Flats Site	1.9	<0.1	0.6	-	0.4	2.8
Hanford Site	<0.1	0.1	0.1	0.3	0.1	0.6
Los Alamos National Laboratory	<0.1	0.3	0.1	<0.1	0.1	0.5
Brookhaven National Laboratory	-	-	-	0.2	<0.1	0.3
Sandia National Laboratories	<0.1	0.1	<0.1	0.1	<0.1	<0.5
Other Sites	<0.1	0.2	0.2	<0.1	<0.1	<0.5
Total						174.3

a Values are from the Secretary of Energy's 1996 announcement based on September 30, 1994 inventory data.

5.2 COMMERCIAL FUEL MARKET APPLICATIONS

In the past, down-blended LEU has not been used as feed for commercial fuel fabrication, and therefore, fuel cycle standards did not exist. The unique distribution of uranium isotopes and potential for the presence of other radionuclides in this LEU, not typically existing in fresh LEU supplies, has made it imperative to develop standards that can be used for the supplies of down-blended LEU.

In response to the planned introduction of down-blended LEU into the commercial fuel industry, the ASTM Committee C-26⁷ was alerted to the need for appropriate industry standards. After much standards work, Subcommittee C-26.02 held a seminar in July of 1996⁸ to review issues related to the adequacy of the ASTM standards process for meeting the industry needs for down-blended LEU feed material.

Included in this seminar were descriptions of the Russian and U.S. HEU disposition efforts, an update on implementation of the Russian program, concerns over disposal of LLW generated by these programs, and a discussion of fuel fabricators' issues and concerns on the down blending and fuel conversion processes. Information pertinent to the disposition efforts and related ASTM activities exchanged at the seminar was as follows :

1. The Russian disposition implementation is proceeding well. The UF_6 received by USEC from Russia was well within the limits of ASTM C-996. The Russians used 1.5 percent assay uranium down-blend stock that was obtained by stripping their tails material. The advantage to this blend stock is that it is relatively low in the minor uranium isotopes (^{234}U and ^{236}U).
2. The U.S. disposition effort will likely produce LEU product in a variety of forms. These include UF_6 , UNH crystals, and U_3O_8 powder. Most of the U.S. HEU, blended down with appropriate blend stock (typically natural uranium), will produce LEU that will meet the limits of the ASTM standards as appropriate. Some of the HEU may contain chemical impurities from prior processing steps that can be removed by conventional purification techniques at the fuel fabricating plant. For HEU above about 80 percent assay, a slightly enriched blend stock (in the range of 1.5 percent assay) may be required to meet the ASTM standards for minor uranium isotopes.

⁷ The ASTM Committee C-26 on the Nuclear Fuel Cycle is responsible for generating and maintaining standard specifications needed by the nuclear fuel industry to measure and certify properties, performance, and quality of nuclear fuels and related materials.

⁸ At the Summer 1996 meeting of ASTM Committee C-26 in Baltimore, Maryland.

3. The LEU derived from HEU that has been irradiated and recycled is considered off-specification and will likely remain outside the range of ASTM specifications for minor uranium isotopes (even after down blending). This material may be used as fuel by special arrangements between the user and supplier. See discussion below on Off-spec Commercial Fuel Demonstration.
4. Fuel fabricators and utilities discussed their concerns about the chemical purity, uranium isotopic content, and technetium-99 (^{99}Tc) values in the down-blended LEU. Discussions and conclusions from this seminar indicated that the standards process, leading up to the revised version of ASTM C-996 as well as the increased scope of the two new standards (ASTM C-1334-96 and ASTM C-1348-96), has worked well in providing standards that will address concerns of fabricators and utility users in relation to the HEU disposition program.

5.3 OFF-SPEC COMMERCIAL FUEL DEMONSTRATION

Commercial nuclear reactors in the U.S. currently use LEU fuel, made from virgin uranium, that meets requirements in ASTM Specification C-996-96 for up to a 5 percent assay fuel product. Approximately 41 t of the excess HEU in the disposition program cannot be down blended into LEU that will meet the ASTM specification because of the concentration of minor isotopes of uranium, specifically ^{232}U , ^{234}U , and ^{236}U . The ^{232}U and ^{234}U isotopes are undesirable as they pose a radiation exposure hazard during handling. The ^{236}U isotope is undesirable as it is a neutron poison that can effect reactor performance. Fuel with high ^{236}U requires greater enrichment levels to counteract the poison effect. Material with undesirable quantities of minor uranium isotopes is considered "off-spec" material.

The presence and amounts of undesirable isotopes depends on the source of the HEU and previous processing steps. Although it may not meet ASTM specifications, down-blended HEU can still be used in commercial power reactors. To make use of this significant amount of excess HEU, DOE has initiated a project to find a use for this material.

The Tennessee Valley Authority (TVA) has expressed interest in utilizing the down-blended LEU product from off-spec HEU to produce fuel for their reactors. A Memorandum of Understanding (MOU) between DOE and TVA was signed in January 1997 to establish the transfer of at least 30 t of the off-spec HEU to TVA. Before any HEU transfers to TVA could take place, TVA has proposed a demonstration of off-spec fuel performance in their operating reactors. The demonstration would also be an element of the Nuclear Regulatory Commission (NRC) licensing requirements. For this proposed demonstration, small amounts of excess HEU and blend stock will be deeded to TVA at no cost. The DOE and TVA will share in the down blending and assembly

fabrication costs and conversely share any cost savings that may be realized from the use of the demonstration fuel assemblies.

The schedule for this program specifies loading of the off-spec demonstration assemblies in two TVA reactors by early 1999. Upon completion of the demonstration, excess HEU would be blended to commercial fuel for TVA reactors. Reactor reloads with this material may begin around 2002. The quantity of off-spec material under the disposition program represents up to about 550 t of down-blended LEU fuel material, or about 16 reactor reloads. Not all of the 41 t of excess HEU will necessarily be acceptable for fuel. Unacceptable material would be dispositioned as waste.

5.4 TRANSFER HEU TO USEC

This activity provides technical and logistical support for the transfer of 50 t of the excess HEU to USEC pursuant to the *USEC Privatization Act*. Specific functions include selecting the most appropriate materials, scheduling the transfers, containerization and shipment of the materials, estimation of cost and arranging reimbursement of costs for transfers. Planning and scheduling for out-year transfers are also provided under this project.

Issues within this project that are currently being addressed include:

- Finalizing the Memorandum of Agreement between OFMD and USEC
- Selecting/designating the 50 t inventory for transfer
- Finalizing the delivery schedule
- Compiling/reporting (to USEC) the chemical/isotopic characterization data
- Assisting USEC in its efforts to procure down-blending services
- Implementing a methodology for the funding and reimbursement of USEC-reimbursable activities

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6.0 ALLOCATION OF HEU UNDER THIS PROGRAM

The breakdown of the declared excess HEU has been evolving since 1996. At the present time, a relatively small portion of the material has been positively allocated. The remainder of the material is still being planned.

The following is the most current breakdown of the excess HEU:

1. Transfer 13 t of excess HEU in the form of UF_6 to USEC pursuant to the *Energy Policy Act of 1992* for conversion to commercial reactor fuel material. This transfer was completed in 1993.
2. Transfer 50 t of excess HEU to the USEC to be down blended and dispositioned as LEU for commercial nuclear reactor fuel. This transfer should be complete around 2003. Commercial sale of this material will take place over the next 11 years pursuant to the *USEC Privatization Act*.
3. Disposition of about 41.5 t of off-spec HEU. At least 30 t will be transferred to TVA and possibly most of it. This transfer will take place over the next 15 years. Some of this material may not be useable and will be dispositioned as waste.
4. About 16.3 t of HEU in the form of spent fuel that can not be down blended to LEU for fuel will likely take the path of high-level waste in the time frame of 10 to 20 years.
5. About 1.1 t of the HEU has a high ^{233}U content will likely take the path of waste in the time frame of 10 to 20 years .
6. The remaining 52.4 t of HEU will be potentially available for down blending to commercial fuel in the time frame of 5 to 20 years. Some of this material may not meet specifications for fuel and will be dispositioned as waste.

These inventory values are being brought to the attention of the commercial uranium industry as an indicator of the amount of LEU this program will produce. Data on final quantities of LEU are only preliminary because it depends on many factors which have not yet been finalized, including identification of specific HEU batches that make up the excess, enrichment of blend-stock used (diluent), and required enrichment of the final LEU product. With certain assumptions relative to

these factors, Table 2 presents the excess inventory of HEU in this program and approximate quantities of LEU expected to be derived from this material.

7.0 DISPOSITION SCHEDULE

The schedule for HEU disposition is preliminary. Characterization of all the material must be completed before firm schedules and materials availability can be developed. The projected disposition of the excess HEU to LEU reactor fuel is depicted graphically on Figure 2.

In general, the current planning schedule is as follows:

- USEC: Transferred 13 t in 1993. Commercially available now. Transfer 50 t over the next 6 years. LEU from 50 t may be commercially available in the time frame of 2000 to 2011.
- TVA: Transfer about 30t and possibly more by 2011. LEU from as much as 41.5 t may be used in TVA reactors through the year 2015.
- Other Commercial: Market 52 t for down blending for fuel. Resultant LEU may be commercially available in the time frame of 2003 to about 2019.
- Non-Commercial: About 17 t for waste disposal to be dispositioned over the next 20 years.

Down blending for waste disposal will likely not occur until late in the overall disposition program. Processing options must be identified and evaluated long before the actual down blending and disposal are scheduled to take place, such as waste form and disposal location.

TABLE 2. Estimated Quantities of LEU from Disposition Program

HEU Form	HEU Quantity	Planned Disposition Path	Disposition Form	Estimated LEU Quantity ^a
UF ₆	13 t	Transfer to USEC	LEU for commercial fuel	169 t
Metal and oxides	43 t	Transfer to USEC	LEU for commercial fuel	559 t
Oxides	7 t	Transfer to USEC	LEU for commercial fuel	91 t
Metal and oxides	41.5 t	Off-spec material transfer to TVA	LEU for TVA fuel or waste	540 t
Spent fuel	16.3 t	Waste	NA	NA
Assorted forms with ²³³ U	1.1 t	Waste	NA	NA
Assorted forms	52.4 t	Potential down blend to LEU	LEU for commercial fuel or possible waste	681 t
Totals	174.3 t			2040 t

a Quantities based on the following assumptions: average assay of HEU is 50%; average assay of LEU is 4.5%; average assay of blend stock is 0.711%.

FIGURE 2. Projected Disposition of Excess HEU

Assumptions: Quantities shown do not include 13 t of HEU that were transferred to USEC in 1994 pursuant to the *Energy Policy Act of 1992*.

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8.0 SUMMARY

8.1 SUMMARY OF DISPOSITION PATH FORWARD

The OFMD and the HDPO are engaged in many planning and implementation activities as discussed in this paper. The road ahead is somewhat uncertain because of the lack of final HEU characterization. However, the mission is sound and there are firm programmatic objectives that support the mission.

Implementation of the HEU disposition mission includes the following ongoing and future activities:

- Finalize characterization of entire inventory of excess HEU
- Complete the transfer of HEU to USEC pursuant to the *USEC Privatization Act*
- Demonstrate off-spec fuel in commercial reactors
- Complete the transfer of off-spec HEU to TVA per the MOU
- Down blend HEU to LEU for commercial fuel and return funds to U.S. Treasury
- Down blend HEU (other than spent fuel), unsuitable for commercial fuel, to waste
- Waste disposal

8.2 OTHER DOE URANIUM SALES

In addition to the excess HEU disposition actions that are expected to result in the sale of derived LEU for commercial use, DOE has other stocks of natural and low-enriched uranium, including the natural uranium component of some LEU derived from Russian excess HEU, that are also expected to be sold. This program is managed by DOE's Office of Nuclear Energy, Science and Technology, which in August 1996 issued a draft Environmental Assessment on the likely impacts of such sales, including impacts on domestic uranium mining, conversion and enrichment industries.⁹

⁹ Office of Nuclear Energy, Science and Technology, Draft Environmental Assessment, DOE/EA-1172, U.S. Department of Energy, Washington, D.C., August 1996.

8.3 POINTS OF CONTACT IN PROGRAM

The DOE Headquarters, the DOE-ORO and the Y-12 Plant HDPO have established interface relationships with the relevant DOE and contractor personnel at sites that are holding excess HEU. Table 3 provides points of contact within the program management structure of the responsible DOE and Y-12 Plant organizations. Each organization plays an important role in the successful completion of the HEU disposition program.

Copies of the OFMD HEU Disposition Plan are available for review through OFMD (contact Dean Tousley) or can be downloaded from the OFMD web site at web.fie.com/fedix/fisl.html. Copies of the HDPO Disposition Program Plan are available through the HDPO (contact Ken Williams).

TABLE 3. HEU Disposition Contacts

Representative	Responsibility	Phone/Fax	E-Mail Address
DOE HQ			
Dean Tousley, MD-4	HEU Disposition Project Manager Office of Fissile Materials Disposition	(202) 586-0217 fax (202) 586-4078	dean.tousley@hq.doe.gov
Bill Newton, DP-22	Nuclear Weapons Management Office of Defense Programs	(301) 903-2975 fax (301) 903-5821	john.newton@dp.doe.gov
DOE ORO			
Joe Parks	Asst. Manager, Enrichment Services Primary ORO Contact for Disposition	(423) 576-0892 fax (423) 576-9686	parksjw@oro.doe.gov
Thomas Wynn	Manager, ORO Nuclear Materials Management Program	(423) 576-0630 fax (423) 576-7813	wynnth@oro.doe.gov
Becky Eddy	Nuclear Materials Management Specialist, ORO Defense Programs	(423) 576-4119 fax (423) 576-9852	bgf@ornl.gov
Y-12 PLANT HDPO			
Ken Williams	Manager, HDPO	(423) 576-7850 fax (423) 576-7891	ckw@ornl.gov
Morris Hassler	HEU Characterization and Future Planning	(423) 576-8136 fax (423) 576-7891	h6x@ornl.gov
Keith Pilcher	TVA "Off-Spec" Fuel Program	(423) 576-0233 fax (423) 576-7891	pi2@ornl.gov
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9.0 ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ADU	Ammonium diuranate
ASTM	American Society of Testing and Materials
DOE	Department of Energy
HDPO	Highly Enriched Uranium Disposition Program Office
HEU	highly enriched uranium
HEU-EIS	Highly Enriched Uranium-Environmental Impact Statement
LEU	low enriched uranium
LLW	low-level radioactive waste
MOU	Memorandum of Understanding
NMMSS	Nuclear Materials Management and Safeguard System
NRC	Nuclear Regulatory Commission
OFMD	Office of Fissile Materials Disposition
ORO	DOE Oak Ridge Operations office
ROD	Record of Decision
t	tonnes
⁹⁹ TC	technetium-99
TVA	Tennessee Valley Authority
²³⁵ U	Uranium isotope with atomic weight of 235
UF ₆	uranium hexafluoride
UN	uranyl nitrate
UNH	uranyl nitrate hexahydrate
UO ₂	uranium dioxide
UO ₃	uranium trioxide
USEC	United States Enrichment Corporation
U.S.	United States
U ₃ O ₈	triuranium octaoxide

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