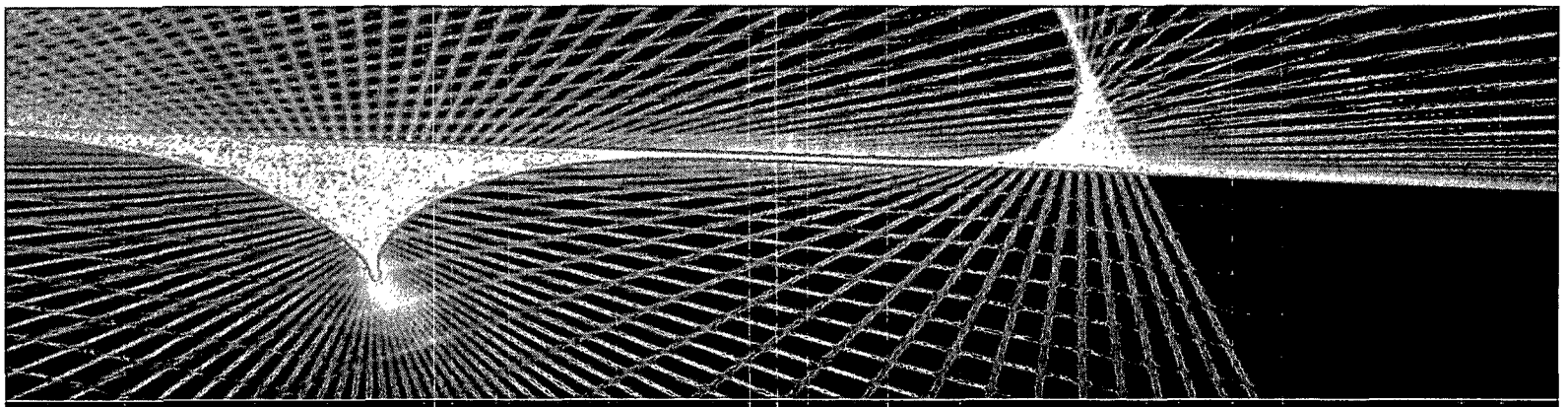

April 2009 | Public Information

GLE Commercial Facility License Application

Public Submittal – Volume 2

Enclosed within:

- Public Decommissioning Funding Plan (DFP), Revision 0
- Quality Assurance Program Description (QAPD), Revision 1

Prepared by:
GE-Hitachi Global Laser Enrichment LLC
3901 Castle Hayne Road
Wilmington, NC 28401

HITACHI

Global Laser Enrichment

DECOMMISSIONING FUNDING PLAN

FOR THE

GE-HITACHI GLOBAL LASER ENRICHMENT LLC COMMERCIAL FACILITY

Revision 0

May 2009

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DECOMMISSIONING FUNDING PLAN
FOR THE
GE-HITACHI GLOBAL LASER ENRICHMENT LLC
COMMERCIAL FACILITY

Revision 0

Reviewed by:

Albert E. Kennedy, GLE Licensing — 5/13/09 Date

Approved by:

Troy D. Randolph, GLE Finance — 13 MAY 09 Date

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REVISION LOG

Rev.	Effective Date	Affected Chapters/Pages	Revision Description
0	05/13/2009	ALL	Initial revision.

TABLE OF CONTENTS

TABLES

ACRONYMS

CFR	Code of Federal Regulations
CPI	Consumer Price Index
DFP	Decommissioning Funding Plan
DUF_6	Depleted Uranium Hexafluoride
DOE	U.S. Department of Energy
FY	Fiscal Year
GLE	GE-Hitachi Global Laser Enrichment LLC
GNF-A	Global Nuclear Fuel-Americas
LA	License Application
NRC	U.S. Nuclear Regulatory Commission
NUREG	nuclear regulation
SWU	separative work units
UF_6	uranium hexafluoride

1. INTRODUCTION

GE-Hitachi Global Laser Enrichment LLC (GLE) hereby submits, pursuant to the provisions of the Atomic Energy Act of 1954, as amended, and the rules and regulations of the U.S. Nuclear Regulatory Commission (NRC), its Decommissioning Funding Plan (DFP) for the GLE Commercial Facility in Wilmington, North Carolina. This DFP sets forth the information required by 10 CFR 70, *Domestic Licensing of Special Nuclear Material (Ref. 1),* regarding GLE's plans for funding the decommissioning of the GLE Commercial Facility and disposition of depleted uranium generated as a result of GLE Commercial Facility operations.

As indicated below, GLE presently intends to provide for decommissioning funding through a Surety Instrument in accordance with applicable requirements of 10 CFR 70. However, GLE may later choose to utilize alternate financial assurance methods. Alternate funding methods, if chosen, will be prepared using the guidance provided in (NUREG)-1757, Volume 3, *Consolidated NMSS Decommissioning Guidance – Financial Assurance, Recordkeeping, and Timeliness (Ref. 2)*, Appendix A and will satisfy the requirements of 10 CFR 70. The actual funding instruments to be used will be executed prior to the commencement of enrichment operations. In the interim, appropriate model documentation for the Surety Instrument funding method is provided in Appendix A and B of this plan. Upon execution of the funding instruments, GLE will supplement this portion of its application.

2. GENERAL INFORMATION

2.1 GLE Commercial Facility Description

The GLE Commercial Facility is located at the existing Global Nuclear Fuel-Americas, LLC (GNF-A) property near Wilmington, North Carolina. The GLE Commercial Facility encompasses the construction, start-up, operation, and maintenance of a uranium enrichment plant using laser--based technology that will produce six million separative work units (SWU) annually at full capacity. GLE License Application (LA) Chapter 1, *General Information*, provides further information regarding the various facilities associated with the GLE Commercial Facility.

2.2 Licensed Material

The GLE LA seeks authorization to operate a uranium enrichment facility to enrich uranium hexafluoride (UF_6) using a laser-based technology. Uranium enriched in the ^{235}U isotope up to the licensed limit of eight weight percent ^{235}U will be withdrawn and shipped from the facility. Material depleted in the ^{235}U isotope (UF_6 tails) will also be withdrawn and stored onsite pending further disposition. As a uranium enrichment facility, the GLE Commercial Facility requires a DFP pursuant to 10 CFR 70.25(a)(1), *Financial Assurance and Recordkeeping for Decommissioning (Ref. 3)*.

2.3 Schedule

Construction of the GLE Commercial Facility will commence following the issuance of a license by the NRC.

2.4 Period of Operation

The LA seeks authorization to operate for a period of 40 years.

2.5 Decommissioning Costs

GLE has prepared a site-specific decommissioning cost estimate for the decommissioning of the GLE Commercial Facility and disposition of the UF_6 tails. This cost estimate utilizes current information regarding the proposed activities and associated costs of decommissioning the six million SWU facility.

The cost estimate and associated funding mechanisms will be adjusted over time in accordance with the applicable provisions of 10 CFR 70, as described in Section 5 of this plan.

2.6 Decommissioning Funding

As set forth in this DFP, GLE presently intends to utilize a Surety Instrument to provide reasonable assurance of the availability of decommissioning funds when needed. This funding mechanism is in accordance with the provisions of 10 CFR 70 with respect to decommissioning financial assurance for license applicants. However, as described in Section 1 of this plan, GLE may choose to utilize alternate financial assurance methods, subject to review and approval by the NRC.

As described in Section 4 and requested in GLE LA Chapter 1, GLE is requesting an appropriate exemption to incrementally fund the disposition of UF_6 tails. Under the proposed exemption, financial assurance will be available when needed and will be made available as the decommissioning liability is incurred.

3. DECOMMISSIONING COST ESTIMATE

Pursuant to 10 CFR 70.25(e) and the guidance provided in NUREG-1757, GLE has evaluated the estimated costs of decommissioning the GLE Commercial Facility. These estimated costs involve facility decommissioning costs and UF_6 tails disposition costs.

3.1 Facility Decommissioning Cost Estimate

The GLE Commercial Facility will be decommissioned such that the facilities can be released for unrestricted use. The estimated costs for decommissioning are patterned after NRC guidance in NUREG-1757, Volume 3, Appendix A, as set forth in the tables contained in Appendix C of this DFP and as noted below:

NOTE: To maintain consistent table sequence numbers with those presented in NUREG-1757, Volume 3, Appendix A, Tables 3.1 through 3.3 are not used.)

- Facility Description Summary (Table C3.4),
- Number and Dimensions of Facility Components (Table C3.5),
- Planning and Preparation (Table C3.6),
- Decontamination or Dismantling of Radioactive Facility Components (Table C3.7),
- Restoration of Contaminated Areas on Facility Grounds (Table C3.8),
- Final Radiation Survey (Table C3.9),
- Site Stabilization and Long-Term Surveillance (Table C3.10),
- Total Work Days by Labor Category (Table C3.11),
- Worker Unit Cost Schedule (Table C3.12),
- Total Labor Costs by Major Decommissioning Task (Table C3.13),
- Packaging, Shipping, and Disposal of Radioactive Wastes (Table C3.14),
- Equipment/Supply Costs (Table C3.15),
- Laboratory Costs (Table C3.16),
- Miscellaneous Costs (Table C3.17),
- Total Decommissioning Costs (Table C3.18), and
- Total Labor Distribution (Table C3.20).

GLE LA Chapter 10, *Decommissioning*, describes specific features that simplify the eventual facility decommissioning and minimize worker exposure by minimizing the level and potential spread of radioactive contamination during operation. The estimated decommissioning costs are based on decontaminating the GLE Commercial Facility to the radiological criteria for unrestricted use in 10 CFR 20.1402, *Radiological Criteria for Unrestricted Use (Ref. 4)*. The total estimated cost of facility decommissioning in fiscal year (FY) 2009 dollars, including a 25% contingency but excluding tails disposition costs, is $186.9 million (see Table C3.18). GLE plans to provide financial assurance for the full facility decommissioning costs at startup. The assumptions utilized in the decommissioning cost estimate are listed in Table C3.21 of Appendix C.

3.2 UF_6 Tails Disposal Cost Estimate

Cost estimates to dispose of UF_6 tails generated during GLE Commercial Facility operation are presented in Tables C3.19 and C3.19a. As requested in GLE LA Chapter 1, GLE plans to incrementally fund that portion of its total decommissioning costs associated with the disposition of UF_6 tails generated by facility operation. Specifically, GLE will provide financial assurance for the disposition of UF_6 tails based on the expected amount of UF_6 tails to be generated annually, in a forward-looking manner. At full capacity, the GLE Commercial Facility will generate approximately 10,500 MT of UF_6 tails annually. GLE estimates that it will take approximately six years for the GLE Commercial Facility to ramp up to the full capacity of six million SWU per year. Table C3.19 provides detailed information about the projected UF_6 tails generated during each of the first six years of operation and the expected per year UF_6 tails generated each year thereafter.

GLE has developed a UF_6 tails disposal cost estimate for the GLE Commercial Facility based on the U.S. Department of Energy's (DOE's) estimated cost of disposal provided in DOE's April 23, 2009 letter to GLE (see Appendix E). That letter estimates that the cost of DOE converting and disposing of GLE's projected UF_6 tails inventory would range from $3.76 to $5.764 per kg of UF_6 tails in FY 2007 dollars. To determine a per kg of UF_6 tails cost, GLE: (1) conservatively used DOE's maximum cost of $5.64 per kg; (2) escalated that amount to FY 2009 dollars using the Consumer Price Index (CPI) All Urban Consumers, U.S. City Average, All Items; (3) added transportation costs from the GLE Commercial Facility to the DOE facility in Piketon, Ohio (expressed in FY 2009 dollars); and (4) added a 25% contingency. As a result, GLE conservatively estimates that UF_6 tails disposal costs for the GLE Commercial Facility will be $7.75/kg UF_6 tails (Table C3.19a).

However, it is important to note that this estimate depends on a number of factors and assumptions. Some variables include: location(s) for processing GLE depleted uranium, transportation costs, escalation rate(s) of various construction cost components; de-escalation rate(s) of future operating costs (to present day dollars); volume of tails disposed; revenue/avoided disposal cost from sale of conversion products (for example, hydrogen fluoride) or higher assay tails (tail stripping); construction and operations budget contingencies; and DOE oversight costs.

The ultimate means of disposition of UF_6 tails is to be determined. GLE intends to evaluate possible commercial uses of UF_6 tails. UF_6 tails that are not commercially reused will be converted to a stable form at DOE's depleted uranium hexafluoride (DUF_6) conversion facilities and/or other licensed facilities. After conversion, the more stable form will be disposed of in accordance with applicable statutory authorizations and requirements. UF_6 tails are stored in steel cylinders until they can be processed in accordance with the disposal strategy established and selected by GLE. Depending on technological developments and the existence of facilities available prior to GLE Commercial Facility shutdown, the tails may have commercial value and may be marketable for further enrichment or other processes. However, for the purposes of calculating the UF_6 tails disposition costs, GLE assumes that the total quantity of tails generated during GLE Commercial Facility operation are processed by the DOE DUF_6 conversion facility in Piketon, Ohio.

During the first year of operation, the GLE Commercial Facility will produce approximately 1.74 million kgs of UF_6 tails. As discussed above, GLE conservatively estimates the disposal cost for the UF_6 tails to be $7.75 per kg UF_6 (which includes 25% contingency). Accordingly, GLE conservatively estimates that it will cost approximately $13.5 million to dispose of the UF_6 tails from that first year of production. GLE projects that the GLE Commercial Facility will generate approximately 391.5 million kgs of UF_6 tails over its 40 year operating life. Accordingly, GLE conservatively estimates that the total cost to dispose of UF_6 tails generated over the life of the GLE Commercial Facility is $3.03 billion.

3.3 Total Decommissioning Cost Estimates

GLE will provide financial assurance instruments for NRC review six months in advance of startup that total approximately $200.4 million ($186.9 million to provide financial assurance for full facility decommissioning + $13.5 million to provide financial assurance for the first year's generation of UF_6 tails). GLE's total decommissioning liability is the sum of the total facility decommissioning costs and the tails disposition costs for all years. GLE's total liability for decommissioning the GLE Commercial Facility, including applicable contingencies, is $3.22 billion.

4. DECOMMISSIONING FUNDING MECHANISM

GLE presently intends to utilize a Surety Instrument to provide reasonable assurance of decommissioning funding, pursuant to 10 CFR 70.25(f). Accordingly, GLE provides with this application model documentation related to the use of the surety instrument method of providing decommissioning financial assurance.[1] However, as described in Section 1 of this plan, GLE may choose to utilize alternate financial assurance methods. At least six months prior to startup, GLE will provide NRC the financial assurance instrument that GLE intends to execute. Upon finalization of the specific funding instruments to be utilized, and at least 21 days prior to the commencement of enrichment operations, GLE will supplement its application to include the signed, executed documentation.

GLE's surety bond will provide an ultimate guarantee that decommissioning costs will be paid in the unexpected event that GLE is unable to meet its decommissioning obligations at the time of decommissioning. A copy of a model surety bond is provided in Appendix A of this plan. GLE describes below the particular attributes it presently anticipates including in the surety bond.

With respect to the surety bond, GLE presently anticipates providing for the following attributes

(1) A company that is listed as a qualified surety in the U.S. Department of Treasury's most-recent edition of Circular 570 for the State where the surety was signed with an underwriting limitation greater than or equal to the level of coverage specified in the bond will issue the bond.

(2) The bond will be written for a specified term and will be renewable automatically unless the issuer serves notice at least 90 days prior to expiration of intent not to renew. Such notice must be served upon the NRC, the trustee of the external or standby trust, and GLE. Further, in the event GLE is unable to provide an acceptable replacement within 30 days of such notice, the full amount of the bond will be payable automatically, prior to expiration, without proof of forfeiture.

The surety bond will require that the surety company deposit any funds paid under its terms directly into either an external trust or a standby trust. A copy of a model standby trust is provided as Appendix B of this plan.

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[1] The model documentation is derived from NUREG-1757, Volume 3, Appendix A.9.

5. ADJUSTING DECOMMISSIONING COSTS AND FUNDING

Pursuant to 10 CFR 70.25(e), GLE will update the decommissioning cost estimate for the GLE Commercial Facility and the financial assurance over the life of the facility. Table 5-1, *GLE Anticipated Financial Assurance Events*, summarizes GLE's anticipated financial assurance events, the costs provided for at the time of that financial assurance event, and the various deadlines to provide information to the NRC. As shown on the last row of Table 5-1, GLE will periodically adjust its decommissioning estimates, at a minimum, every three years, consistent with the requirements of 10 CFR 70.25(e) and the NRC final rule 68 FR 57327, *Financial Assurance for Materials Licensees – Parts 30, 40, 70 (Ref. 5)*. The method for adjusting the cost estimate will consider the following:

- Changes in general inflation (for example, labor rates, consumer price index),
- Changes in price of goods (for example, packing materials),
- Changes in price of services (for example, shipping and disposal costs),
- Changes in facility condition or operations, and
- Changes in decommissioning procedures or regulations.

A record of the updating effort and results will be retained for review (see further discussion regarding record keeping below).

6. RECORD KEEPING PLANS RELATED TO DECOMMISSIONING FUNDING

Pursuant to 10 CFR 70.25(g), GLE will keep records of information that could have a material effect on the ultimate costs of decommissioning until termination of the license. Information maintained in these records includes:

- Records of spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site. Records of spills or other unusual occurrences may be limited only to instances when contamination remains after any cleanup procedures or when there is reasonable likelihood that contaminants may have spread to inaccessible areas as in the case of possible seepage into porous materials such as concrete. These records will include any known information on identification of involved radionuclides, quantities, forms, and concentrations;
- As-built drawings and modifications of structures and equipment in areas where radioactive materials are used and/or stored, including locations that possibly could be inaccessible (for example, buried pipes which may be subject to contamination); and
- A list contained in a single document that is updated, at a minimum, every two years and includes the following:

  (1) Areas designated and formerly designated as Restricted Areas as defined under 10 CFR 20.1003, *Definitions (Ref. 6)*,

  (2) Areas outside of Restricted Areas that require documentation under 10 CFR 70.25(g)(1),

  (3) Areas outside of Restricted Areas where current and previous wastes have been buried as documented under 10 CFR 20.2108, *Records of Waste Disposal (Ref. 7)*,

  (4) Areas outside of Restricted Areas that contain material such that, if the license expired, GLE would be required to either decontaminate the area to meet the criteria for decommissioning in 10 CFR 20, Subpart E, *Radiological Criteria for License Termination (Ref. 8)*, or would apply for NRC approval for disposal under 10 CFR 20.2002, *Method for Obtaining Approval of Proposed Disposal Procedures (Ref. 9)*.

- Records of the cost estimate performed for the DFP, and records of the funding method used for assuring funds, including a copy of the financial assurance mechanism and any supporting documentation.

7. REFERENCES

1. 10 CFR 70, *Domestic Licensing of Special Nuclear Material,* U.S. Nuclear Regulatory Commission, 2008.

2. NUREG-1757, Volume 3, *Decommissioning NMSS Funding Guidance – Financial Assurance, Recordkeeping, and Timeliness*, U.S. Nuclear Regulatory Commission, September 2003.

3. 10 CFR 70.25, *Financial Assurance and Recordkeeping for Decommissioning*, U.S. Nuclear Regulatory Commission, 2008.

4. 10 CFR 20.1402, *Radiological Criteria for Unrestricted Use*, U.S. Nuclear Regulatory Commission, 2008.

5. 68 FR 57327, *Financial Assurance for Materials Licensees – Parts 30, 40, 70*, U.S. Nuclear Regulatory Commission, 2008.

6. 10 CFR 20.1003, *Definitions*, U.S. Nuclear Regulatory Commission, 2008.

7. 10 CFR 20.2108, *Records of Waste Disposal*, U.S. Nuclear Regulatory Commission, 2008.

8. 10 CFR 20, Subpart E, *Radiological Criteria for License Termination*, U.S. Nuclear Regulatory Commission, 2008.

9. 10 CFR 20.2002, *Method for Obtaining Approval of Proposed Disposal Procedures*, U.S. Nuclear Regulatory Commission, 2008.

Table 5-1. GLE Anticipated Financial Assurance Events.

Type of Financial Assurance Event	Cost Provided for by Financial Assurance	Deadline to Provide Instrument to NRC	Deadline to Provide Executed Instrument to NRC
Full facility decommissioning – financial assurance	Full facility decommissioning funding Financial Assurance	At least six months prior to startup	At least 21 days prior to startup
Startup UF_6 tails disposition financial assurance	First year of UF_6 tails production	At least six months prior to startup	At least 21 days prior to startup
UF_6 tails production in years 2-40	Annual UF_6 tails production (that is, tails production for the next year)	At least six months prior to beginning new year	At least 21 days prior to beginning new year
Updates to facility decommissioning estimate	Revising facility decommissioning	At least every three years	At least 21 days prior to beginning new year

APPENDIX A – MODEL SURETY BOND

Date bond executed: _____

Effective date: _____

Principal: [*Insert legal name and business address of licensee*]

Type of organization: [*Insert "proprietorship," "partnership," or "corporation"*]

State of incorporation: _____ (if applicable)

NRC license number, name, address of facility, and amount for decommissioning activities guaranteed by this bond: _____

Surety: [*Insert name and business address*]

Type of organization: [*Insert "proprietorship," "partnership," or corporation"*]

State of incorporation: _____ (if applicable)

Surety's qualification in jurisdiction where license facility is located.

Surety's bond number: _____

Total penal sum of bond: $_____

Know all persons by these presents, that we, the Principal and Surety hereto, are firmly bound to the U.S. Nuclear Regulatory Commission (hereinafter called NRC) in the above penal sum for the payment of which we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally; provided that, where the Sureties are corporations acting as co-sureties, we, the Sureties, bind ourselves in such sum "jointly and severally" only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each Surety binds itself, jointly and severally with the Principal, for the payment of such sum only as it is set forth opposite the name of such Surety; but if no limit of liability is indicated, the limit of liability shall be the full amount of the penal sum.

WHEREAS, the U.S. Nuclear Regulatory Commission, an agency of the U.S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I, of the Code of Federal Regulations, Part [*insert 30, 40, 70, or 72*], applicable to the Principal, which require that a license holder or an applicant for a facility license provide financial assurance that funds will be available when needed for facility decommissioning;

NOW, THEREFORE, the conditions of the obligation are such that if the Principal shall faithfully, before the beginning of decommissioning of each facility identified above, fund the standby trust fund in the amount(s) identified above for the facility;

Or, if the Principal shall fund the standby trust fund in such amount(s) after an order to begin facility decommissioning is issued by NRC or a U.S. District Court or other court of competent jurisdiction;

Or, if the Principal shall provide alternative financial assurance, and obtain NRC's written approval of such assurance, within 30 days after the date a notice of cancellation from the Surety is received by both the Principal and NRC, then this obligation shall be null and void; otherwise it is to remain in full force and effect.

The Surety shall become liable on this bond obligation only when the Principal has failed to fulfill the conditions described above. Upon notification by NRC that the Principal has failed to perform as guaranteed by this bond, the Surety shall place funds in the amount guaranteed for the facility into the standby trust fund.

The liability of the Surety shall not be discharged by any payment or succession of payments hereunder, unless and until such payment or payments shall amount in the aggregate to the penal sum of the bond, but in no event shall the obligations of the Surety hereunder exceed the amount of said penal sum.

The Surety may cancel the bond by sending notice of cancellation by certified mail to the Principal and to NRC provided, however, that cancellation shall not occur during the 90 days beginning on the date of receipt of the notice of cancellation by both the Principal and NRC, as evidenced by the return receipts.

The Principal may terminate this bond by sending written notice to NRC and to the Surety 90 days prior to the proposed date of termination, provided, however, that no such notice shall become effective until the Surety receives written authorization for termination of the bond from NRC.

The Principal and Surety hereby agree to adjust the penal sum of the bond yearly so that it guarantees a new amount, provided that the penal sum does not increase by more than 20 percent in any one year and no decrease in the penal sum takes place without the written permission of NRC.

If any part of this agreement is invalid, it shall not affect the remaining provisions that will remain valid and enforceable.

In Witness Whereof, the Principal and Surety have executed this financial guarantee bond and have affixed their seals on the date set forth above.

The persons whose signatures appear below hereby certify that they are authorized to execute this surety bond on behalf of the Principal and Surety.

Principal

[*Signatures*]
[*Names*]
[*Titles*]
[*Corporate Seal*]

Corporate Surety

[*Name and address*]

State of Incorporation:_____

Liability limit: $_____

[*Signatures*]
[*Names and titles*]
[*Corporate Seal*]

[*For every co-surety, provide signatures, names and titles, corporate seal, and other information in the same manner as for the Sureties above*].

Bond Premium: $_____

Model Certification of Financial Assurance

CERTIFICATION OF FINANCIAL ASSURANCE

Principal: [*Legal names and business address of licensee*]
NRC license number, name and address of the facility

Issued to: U.S. Nuclear Regulatory Commission

I certify that [*insert name of licensee*] is licensed to possess the following types of [*insert all that apply: "sealed sources or plated foils with a half-life great than 120 days licensed under 10 CFR Part 30," "unsealed byproduct material with a half-life greater than 120 days licensed under 10 CFR Part 30," "source material in a readily dispersible form licensed under 10 CFR Part 40," and "unsealed special nuclear material licensed under 10 CFR Part 70"*] in the following amounts:

Type of Material	Amount of Material
[*List materials and quantities of materials noted above. For* ***byproduct materials*** *and* ***special nuclear materials,*** *list separately the type and amount of* ***each isotope*** *authorized by the license.]*	

I also certify that financial assurance in the amount of [*insert the total of all prescribed amounts calculated from Checklist 2, or the amount of the site-specific cost estimate, in US dollars*] has been obtained for the purpose of decommissioning as prescribed by 10 CFR Part [*insert 30, 40, or 70*].

[*Signatures and titles of officials of institution*]
[*Corporate seal*]
[*Date*]

APPENDIX B – STANDBY TEST AGREEMENT

TRUST AGREEMENT, the Agreement entered into as of [*insert date*] by and between [*insert name of licensee*], a [*insert name of State*] [*insert "corporation," "partnership," or "proprietorship"*], herein referred to as the "Grantor," and [*insert name and address of a trustee acceptable to NRC*], the "Trustee."

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC), an agency of the U. S. Government, pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974, has promulgated regulations in Title 10, Chapter I of the *Code of Federal Regulations, Part* [*insert 30, 40, 70, 72*]. These regulations, applicable to the Grantor, require that a holder of, or an applicant for, a materials license pursuant to 10 CFR Part [*insert 30, 40, 70, or 72*] provide assurance that funds will be available when needed for required decommissioning activities.

WHEREAS, the Grantor has elected to use a [*insert "letter of credit," "line of credit," "surety bond," "insurance policy," "parent company guarantee," or "self-guarantee"*], to provide [*insert "all" or "part"*] of such financial assurance for the facilities identified herein; and

WHEREAS, when payment is made under a *[insert "letter of credit," "line of credit," "surety bond," "insurance policy," "parent company guarantee," or "self-guarantee"*], this standby trust shall be used for the receipt of such payment; and

WHEREAS, the Grantor, acting through its duly authorized officers, has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee;

NOW, THEREFORE, the Grantor and the Trustee agree as follows:

Section 1. Definitions. As used in this Agreement:

(a) The term "Grantor" means NRC licensee who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the trustee who enters into this Agreement and any successor Trustee.

Section 2. Costs of Decommissioning. This Agreement pertains to the costs of decommissioning the materials and activities identified in License Number [*insert license number*] issued pursuant to 10 CFR Part [*insert 30, 40, 70, 72*], as shown in Schedule A.

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a standby trust fund (the Fund) for the benefit of NRC. The Grantor and the Trustee intend that no third party have access to the Fund except as provided herein.

Section 4. Payments Constituting the Fund. Payments made to the Trustee for the Fund shall consist of cash, securities, or other liquid assets acceptable to the Trustee. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee are referred to as the "Fund," together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible nor shall it undertake any responsibility for the amount of, or adequacy of the Fund, nor any duty to collect from the Grantor, any payments necessary to discharge any liabilities of the Grantor established by NRC.

Section 5. Payment for Required Activities Specified in the Plan. The Trustee shall make payments from the Fund to the Grantor upon presentation to the Trustee of the following:

(a) A certificate duly executed by the Secretary of the Grantor attesting to the occurrence of the events, and in the form set forth in the attached Certificate of Events, and

(b) A certificate attesting to the following conditions;

(1) that decommissioning is proceeding pursuant to an NRC-approved plan;

(2) that the funds withdrawn will be expended for activities undertaken pursuant to that plan; and

(3) that NRC has been given 30 days prior notice of [*insert name of licensee*]'s intent to withdraw funds from the escrow fund.

No withdrawal from the Fund for a particular license can exceed 10 percent of the remaining funds available for that license unless NRC written approval is attached.

In addition, the Trustee shall make payments from the Fund as NRC shall direct, in writing, to provide for the payment of the costs of required activities covered by this Agreement. The Trustee shall reimburse the Grantor or other persons as specified by NRC from the Fund for expenditures for required activities in such amounts as NRC shall direct in writing. In addition, the Trustee shall refund to the Grantor such amounts as NRC specifies in writing. Upon refund, such funds shall no longer constitute part of the Fund as defined herein.

Section 6. Trust Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge its duties with respect to the Fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and which like aims; except that:

(a) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended (15 U.S.C. 80a-2(a)), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(b) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal government, and in obligations of the Federal government such as GNMA, FNMA, and FHLM bonds and certificates or State and Municipal bonds rated BBB or higher by Standard & Poor's or Baa or higher by Moody's Investment Services; and

(c) For a reasonable time, not to exceed 60 days, the Trustee is authorized to hold uninvested cash, awaiting investment or distribution, without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion:

(a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and

(b) To purchase shares in any investment company registered under the Investment Company Act of 1940 (15 U.S.C. 80a-l et seq.), including one that may be created, managed, underwritten, or to which investment advice is rendered, or the shares of which are sold by the Trustee. The Trustee may vote such shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretion conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered;

(a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale, as necessary to allow duly authorized withdrawals at the joint request of the Grantor and NRC or to reinvest in securities at the direction of the Grantor;

(b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted;

(c) To register any securities held in the Fund in its own name, or in the name of a nominee, and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, to reinvest interest payments and funds from matured and redeemed instruments, to file proper forms concerning securities held in the Fund in a timely fashion with appropriate government agencies, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee or such depository with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the U.S. Government, or any agency or instrumentality thereof, with a Federal Reserve Bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund;

(d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal government; and

(e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. After payment has been made into this standby trust fund, the Trustee shall annually, at least 30 days before the anniversary date of receipt of payment into the standby trust fund, furnish to the Grantor and to NRC a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days before the anniversary date of the establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and NRC shall constitute a conclusively binding assent by the Grantor, barring the grantor from asserting any claim or liability against the Trustee with respect to the matters disclosed in the statement.

Section 11. Advice of Counsel. The Trustee may from time to time consult with counsel with respect to any question arising as to the construction of this Agreement or any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting on the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon the writing with the Grantor. (See Schedule C).

Section 13. Successor Trustee. Upon 90 days notice to NRC and the Grantor, the Trustee may resign; upon 90 days notice to NRC and the Trustee, the Grantor may replace the Trustee; but such resignation or replacement shall not be effective until the Grantor has appointed a successor Trustee, the successor accepts the appointment, the successor is ready to assume its duties as Trustee, and NRC has agreed, in writing, that the successor is an appropriate Federal or State government agency or an entity that has the authority to act as a trustee and whose trust operations are regulated and examined by a Federal or State agency. The successor Trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. When the resignation or replacement is effective, the Trustee shall assign, transfer, and pay over to the successor Trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor Trustee or for instructions. The successor Trustee shall specify the date on which it assumes administration of the trust, in a writing sent to the Grantor, NRC, and the present Trustee, by certified mail 10 days before such change becomes effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are signatories to this Agreement or such other designees as the Grantor may designate in writing. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. If NRC issues orders, requests, or instructions to the Trustee these shall be in writing, signed by NRC or its designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or NRC hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or NRC, except as provided for herein.

Section 15. Amendment of Agreement. The Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. All amendments shall meet the relevant regulatory requirements of NRC.

Section 16. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 15, this trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and NRC, or by the Trustee and NRC if the Grantor ceases to exist. Upon termination of the trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor or its successor.

Section 17. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with and act or omission, made in good faith, in the administration of this trust, or in carrying out any directions by the Grantor or NRC issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the trust fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to provide such defense.

Section 18. This Agreement shall be administered, construed, and enforced according to the laws of the State of [*insert name of State*].

Section 19. Interpretation and Severability. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each section of this Agreement shall not affect the interpretation or the legal efficacy of this Agreement. If any part of this agreement is invalid, it shall not affect the remaining provisions which will remain valid and enforceable.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by the respective officers duly authorized and the incorporate seals to be hereunto affixed and attested as of the date first written above.

[*Insert name of licensee (Grantor)*]
[*Signature of representative of Grantor*]
[*Title*]

ATTEST:
[*Title*]
[*Seal*]

[*Insert name and address of Trustee*]
[*Signature of representative of Trustee*]
[*Title*]

ATTEST:
[*Title*]
[*Seal*]

Schedule A

This Agreement demonstrates financial assurance for the following cost estimates or prescribed amounts for the following licensed activities:

U.S. NUCLEAR REGULATORY COMMISSION LICENSE NUMBER(S)	NAME AND ADDRESS OF LICENSEE	ADDRESS OF LICENSED ACTIVITY	COST ESTIMATES FOR REGULATORY ASSURANCES DEMONSTRATED BY THIS AGREEMENT

The cost estimates listed here were last adjusted and approved by NRC on [*insert date*].

Schedule B

DOLLAR AMOUNT _____
AS EVIDENCED BY _____

Schedule C

[*Insert name, address, and phone number of Trustee.*]
Trustee's fees shall be $_____ per year.

Model Specimen Certificate of Events

[*Insert name and address of trustee*]

Attention: Trust Division

Gentlemen:

In accordance with the terms of this Agreement with you dated _____, I, _____, Secretary of [*insert name of licensee*], hereby certify that the following events have occurred:

1. [*Insert name of licensee*] is required to commence the decommissioning of its facility located at [*insert location of facility*] (hereinafter called the decommissioning).

2. The plans and procedures for the commencement and conduct of the decommissioning have been approved by the United States Nuclear Regulatory Commission, or its successor, on _____ (copy of approval attached).

3. The Board of Directors of [*insert name of licensee*] has adopted the attached resolution authorizing the commencement of the decommissioning.

_____
Secretary of [*insert name of licensee*]

_____
Date

Model Specimen Certificate of Resolution

I, _____, do hereby certify that I am Secretary of [*insert name of licensee*], a [*insert State of incorporation*] corporation, and that the resolution listed below was duly adopted at a meeting of this Corporation's Board of Directors on _____, 20____.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed the seal of this Corporation this _____ day of _____, 20____.

_____
Secretary

RESOLVED, that this Board of Directors hereby authorizes the President, or such other employee of the Company as he may designate, to commence decommissioning activities at [*insert name of facility*] in accordance with the terms and conditions described to this Board of Directors at this meeting and with such other terms and conditions as the President shall approve with and upon the advice of Counsel.

Model Letter of Acknowledgment

STATE OF _____

To Wit:_____

CITY OF _____

On this ____ day of _____, before me, a notary public in and for the city and State aforesaid, personally appeared _____ and she/he did depose and say that she/he is the [*insert title*] of _____ [if applicable, insert *",national banking association"* or *", State banking association"*], Trustee, which executed the above instrument; that she/he knows the seal of said association; that the seal affixed to such instrument is such corporate seal; that it was so affixed by order of the association; and that she/he signed her/his name thereto by like order.

_____

[Signature of notary public]

My Commission Expires: _____

[*Date*]

Model Power of Attorney

[*Insert Name of Issuing Company*]
Principal Bond Office: [*Insert Business Address of Issuing Company*]

KNOW ALL MEN BY THESE PRESENTS:

That [*Insert Name of Issuing Company*] does hereby appoint

[*Insert Names of Attorney(s)-in-Fact*]

its true and lawful Attorney(s)-in-Fact, with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, [*Insert Name of Issuing Company*] have executed these presents [*Affix Company Seal*] this [*Insert Date*] day of [*Insert Month/Year*]

_____
[*Insert Name of Company Official/Title*]

STATE OF [*Insert State*] }
COUNTY OF [*Insert County*] } ss.

On this [*Insert Date*] day of [*Insert Month*], 200[*Insert Year*], before me came the above named officer of [*Insert Issuing Company*], to me personally known to be the individual and officer described herein, and acknowledged that he executed the foregoing instrument and affixed the seals of said corporations thereto by authority of his office.

_____
[*Insert Notary Name*] Notary

CERTIFICATE

Excerpts of Resolutions adopted by the Boards of Directors of [*Insert Issuing Company Name*] on [*Insert Date of Resolutions*]:

"RESOLVED, that the Chairman of the Board, the President, or any Vice President be, and hereby is, authorized to appoint Attorneys-in-Fact to represent and act for and on behalf of the Company to execute bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, and to attach thereto the corporate seal of the Company, in the transaction of its surety business;

"RESOLVED, that the signatures and attestations of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or Certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed with respect to any bond, undertaking, recognizance or other contract of indemnity or writing obligatory in the nature thereof;

"RESOLVED, that any such Attorney-in-Fact delivering a secretarial certification that the foregoing resolutions still be in effect may insert in such certification the date thereof, said date to be not later than the date of delivery thereof by such Attorney-in-Fact."

I, [*Insert Name*], Secretary of [*Insert Name of Issuing Company*] do hereby certify that the foregoing excerpts of Resolutions adopted by the Boards of Directors of this corporation, and the Powers of Attorney issued pursuant thereto, are true and correct, and that both the Resolutions and the Powers of Attorney are in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of each corporation

[*Affix Company Seal*] this [*Insert Date*] day of [*Insert Month/Year*]

_____

[*Name of Issuing Company*] Secretary

APPENDIX C– DECOMMISSIONING COST ESTIMATE TABLES

Table C3.4. Facility Description Summary.

NRC License Number and Types 10 CFR Part 40 and 70 – to construct and operate a uranium enrichment facility
Types and quantities of materials under the licenses listed above 140,000,000 kg of natural/depleted UF_6 2,600,000 kg of enriched UF_6
Description of How Licensed Materials Are Used The facility enriches uranium for use in the manufacturing of nuclear fuel used in commercial power plants. The process feeds natural uranium to a laser-based enrichment cascade. The final products are enriched uranium and depleted uranium, which are temporarily and safely stored onsite.
Description of Facility, Including Buildings, Rooms, Grounds, and Description of Where Particular Types of Material Are Used The Operations Building includes the following process and support areas: Cylinder Shipping and Receiving Area – Receive cylinders from offsite; weigh cylinders; provide interim storage of cylinders inside the Operations Building; prepare cylinders and transfer them to onsite transfer vehicles for transfer between the Operations Building and the UF_6 Cylinder Pads; provide interim storage of product, feed, and sample/blend cylinders; prepare cylinders and transfer to other process areas within the Operations Building; prepare product cylinders for offsite shipment and intra-site transfer; and prepare 48-inch tails and heel cylinders for offsite shipment. UF_6 Feed and Vaporization Area – Receive UF_6 feed cylinders from the Cylinder Shipping and Receiving Area; purge the light gases contained within the feed cylinders; capture the light gases for disposal; vaporize the UF_6 contained within the feed cylinders; feed the vaporized UF_6 to the feed header between the vaporization area and the separation unit within the Operations Building; maintain design basis UF_6 feed rates to the feed header within the design basis temperature and pressure range; and recover residual UF_6 from the feed cylinders to meet U.S. Department of Transportation (DOT) offsite cylinder shipping requirements for empty cylinders. Product Withdrawal Area - Receive empty UF_6 cylinders from interim storage within the Cylinder Shipping and Receipt Area; maintain design basis UF_6 product withdrawal rates from the enrichment system main discharge header; separate the light gases from the UF_6 for disposal; and provide filled 30- and 48-inch cylinders with ≤ 8.00 wt% ^{235}U for interim storage and later disposition.

Tails Withdrawal Area – Receive empty UF_6 cylinders from interim storage within the Cylinder Shipping and Storage Area; maintain design-basis UF_6 tails withdrawal rates from the enrichment system main discharge header; separate the light gases from the UF_6 for disposal; and provide filled UF_6 cylinders with ≤ 0.72 wt% ^{235}U for interim storage and later disposition.

Cascade/Gas Handling Area – Contains the equipment necessary to perform the laser enrichment process.

Blending Area – Receive 30- or 48-inch donor cylinders from interim storage within the Cylinder Shipping and Receiving Area; purge the light gases contained within the cylinders; capture the light gases for disposal; vaporize the UF_6 contained within the donor cylinders; feed the vaporized UF_6 to receiver cylinders; recover residual UF_6 from the donor cylinders to meet DOT cylinder shipping requirements for empty cylinders; and provide empty donor cylinders and filled receiver cylinders for interim storage.

Sampling Area – Receive filled UF_6 cylinders from interim storage within the Cylinder Shipping and Receipt Area; purge the light gases contained within the cylinders; capture the reactive light gases for disposal and vent the nonreactive light gases; homogenize and sample the UF_6 contained within the cylinders; and maintain design basis UF_6 cylinder rates to support a six million SWU facility.

Decontamination/Maintenance Area – Provides a place for personnel to remove contamination from, and make repairs to, equipment and process components used in UF_6 systems, waste handling systems, and other areas of the facility.

Laboratory Area – Mass spectroscopy equipment, wet chemistry activities, safety and regulatory testing and analysis, standard analytical laboratory equipment, and fume collection and exhaust hoods.

Laser Area – Operate the laser systems that are part of the laser-based technology; and produce the specific wavelength of light required to affect the uranium isotope necessary for the enrichment process.

UF_6 Cylinder Pads – Tails Pad – Storage of depleted UF_6 cylinders; Product Pad – Storage of enriched uranium cylinders; and In-process Pad – Storage of feed material, cylinders containing heels, and empty cylinders.

Administrative Buildings – Two of the administrative buildings primarily contain office space for the GLE support staff and conference rooms. The third administrative building contains the personnel Entry Control Facility that is designed to facilitate and control the passage of authorized facility personnel and visitors.

Waste Storage Buildings – Used to store solid low-level radioactive waste. The waste is packaged in transportation containers and surveyed prior to being stored in the warehouse.

Quantities of Materials or Waste Accumulated Before Shipping or Disposal

See Tables C3.5

Table C3.5. Number and Dimensions of Facility Components (Total Volume).

[This table contains Proprietary and Security-Related Information and is withheld from public disclosure per 10 CFR 2.390.]

Table C3.6. Planning and Preparation (Work Days).

Activity	Project Mgt	Health Physics	Eng	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
Planning and design of site characterization								
Administrative activities								
Prepare for decommissioning phase								
Decommissioning planning and design								
Prepare integrated work sequence and schedule								
Prepare activity specifications								
Prepare detailed work procedures								
Prepare decommissioning plan								
NRC review period								
Perform site characterization survey								
Design and specify equipment, special items, and materials								
Procure non-engineered standard equipment								
Final status survey plan preparation and NRC review								
Other (specify)								
TOTALS =								
NOTE: Numbers are based on an 8-hour work day.								

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.7. Decontamination and/or Dismantling of Radioactive Facility Components (Work Days).

[This table contains Proprietary and Security-Related Information and is withheld from public disclosure per 10 CFR 2.390.]

Table C3.8. Restoration of Contaminated Areas on Facility Grounds (Work Days).

Activity	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
(Note 1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL =	0	0	0	0	0	0	0	0

Note 1: No facility grounds contamination is anticipated because routine radiological surveys will detect any contamination and remove it. If an accidental release of radiological material was to occur, and the facility grounds were contaminated, the DFP will be updated to include any remediation costs to be incurred during final decommissioning.

Table C3.9. Final Radiation Survey (Work Days).

Activity	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
Final Status Survey of Structures								
Final Status Survey of Site								
Final Status Survey Report ORISE verification and NRC Review								
Total =								
NOTE 1. Health Physics days includes Health Physics project oversight and contracted staff for final status survey (FSS) survey.								
NOTE 2. Planning for FSS is done during planning and prep period.								
NOTE 3: Numbers are based on an 8-hour workday.								

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.10. Site Stabilization and Long-Term Surveillance (Work Days).

Activity	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
(Note 1)	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL =	0	0	0	0	0	0	0	0

NOTE 1. Site stabilization and long-term surveillance (that is, institutional controls) will not be required because the site will be released for unrestricted use. osts associated with maintaining site controls after GLE Commercial Facility operations cease, but before license termination, are contained in FTE and Total Labor Costs Tables. These costs include critical programs such as Nuclear Criticality Safety, Radiation Protection, Environmental Monitoring, Material Control and Accountability, and Items Relied For Safety (IROFS) maintenance.

Table C3.11 Total Work Days by Labor Category.

Activity	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
Planning and preparation								
Decontamination and dismantling of radioactive facility components								
Restoration of contaminated areas on facility grounds								
Final radiation survey								
Site stabilization and long term surveillance								
Total =								

NOTE 1: Numbers are based on an 8-hour workday.

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.12. Worker Unit Cost Schedule.

Labor Cost Component	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
Avg Salary & Fringe ($/year)								
Avg. Cost Per Day								
Total Person Days Worked								

NOTE 1: Based on 2080 hrs per year and an 8-hour workday.

NOTE 2: Salary and fringe costs include 15% contractor overhead and profit.

NOTE 3: Salary, fringe, and cost per day are the average rates for numerous positions in each labor category.

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.13. Total Labor Costs by Major Decommissioning Task.

Task	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision	TOTAL
Planning and Preparation									
Decontamination and Dismantling of Radioactive Facility Components									
Restoration of Contaminated Areas on Facility Grounds									
Final Radiation Survey									
Site Stabilization and Long Term Surveillance									
TOTALS =									

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.14. Packaging, Shipping, and Disposal of Radioactive Wastes.

PACKAGING MATERIAL COSTS				
Waste Type	**Volume (ft3)**	**Number of Containers**	**Type of Container**	**Total Packaging Costs**
Class A				
Class A - Oversized				
DAW				
Macroencapsulation				
Classified Processing - Contaminated				
Classified Processing - Clean				
TOTAL =				

SHIPPING COSTS				
Waste Type	**Volume / Weight**	**Unit Cost**	**Distance Shipped (miles)**	**Total Shipping Costs**
Class A				
Class A - Oversized				
DAW				
Macroencapsulation				
Classified Processing - Contaminated				
Classified Processing - Clean				
TOTAL =				
NOTE 1: Assume all shipments are going to Energy Solutions				

[The contents of this table contain Proprietary and Security-Related Information and are withheld from public disclosure per 10 CFR 2.390.]

WASTE DISPOSAL COSTS			
Waste Type	**Disposal Volume (ft3)**	**Unit Cost ($/ft3)**	**Total Disposal Costs**
Class A			
Class A - Oversized			
DAW			
Macroencapsulation			
TOTAL =			
NOTE 1. Assumed all shipments are going to Energy Solutions			
NOTE 2. Macroencapsulation disposal of gloveboxes			

WASTE PROCESSING COSTS				
Waste Type	**Disposal Volume (ft3)**	**Disposal Weight (lbs)**	**Unit Cost ($/lb)**	**Total Disposal Costs**
Classified Processing - Contaminated				
Classified Processing - Clean				
TOTAL =				

[The contents of this table contain Proprietary and Security-Related Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.15. Equipment/Supply Costs.

Equipment/Supplies	Quantity	Unit Cost	Total Equipment/ Supply Cost
Non Engineered Standard Equipment			
Small Tools			
D&D Equipment			
FSS Equipment			
HP Supplies			
Safety Equipment			
TOTAL =			

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.16. Laboratory Costs.

Activity	Total Cost
Sampling	
Transport of Samples	
Testing & Analysis	
Other (specify)	
TOTAL =	
NOTE 1. Assumed mobile lab on site.	

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.17. Miscellaneous Costs.

Activity	Total Cost
Fees	
Insurance	
Utilities	
Taxes	
Supplies & Services	
Security	
Training Costs	
TOTAL =	

NOTE 1. Fees include NRC Annual Inspection Fees ($708,333), NRC FSS Review fees ($71,400), and ORISE fees for FSS ($573,075).

NOTE 2. Mean Tails disposition cost from "Analysis of the DOE Cost to Disposition GE-Hitachi Nuclear Energy Depleted Uranium Hexaflouride" dated March 2008

NOTE 3. Tails disposition costs escalation to FY09 from average of 2008 US Dept of Labor BLS, CPI All Urban Consumers, US City Average, All Items

NOTE 4. Supplies and services includes miscellaneous costs like phones, office supplies, computers, etc.

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.18. Total Decommissioning Costs.

Task/Component	Cost ($000)	Percentage
Planning and Preparation	$5,484	3.9%
Decontamination and Dismantling of Radioactive Facility Components	$26,186	18.6%
Restoration of Contaminated Areas on Facility Grounds	$0	0.0%
Final Radiation Survey	$9,441	6.7%
Site Stabilization and Long Term Surveillance	$0	0.0%
Packing Material Costs	$139	0.1%
Shipping Costs	$13,053	3.2%
Waste Disposal Costs	$65,508	46.5%
Equipment/Supply Costs	$13,121	9.3%
Laboratory Costs	$689	0.5%
Misc. Costs	$15,913	11.3%
SUBTOTAL =	$149,534	100.0%
25% Contingency (facility)	$37,384	
TOTAL =	**$186,918**	
UF_6 Tails Disposal =	$2,427,25	
25% Contingency (tails)	$606,815	
UF_6 Tails Disposal Total =	**$3,034,073**	
GRAND TOTAL =	**$3,220,991**	

Table C3.19. Estimated Volume of Annual Depleted Uranium Generated

Operating Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7 (and annually thereafter)
MSWU generated	1	2	3	4	5	6	6+
DUF_6 generated (kg)	1,739,970.39	3,479,940.78	5,219,911.17	6,959,881.56	8,699,851.95	10,439,822.34	10,439,822.34
Number of 48Y cylinders of DUF_6 generated	140	280	420	560	700	840	840
DUF_6 disposal cost without 25% contingency	$10,787,816.42	$21,575,632.83	$32,363,449.25	$43,151,265.66	$53,939,082.08	$64,726,898.49	$64,726,898.49
DUF_6 disposal cost with 25% contingency	$13,484,770.52	$26,969,541.04	$40,454,311.56	$53,939,082.08	$67,423,852.60	$80,908,623.12	$80,908,623.12
40 years TOTAL with 25% contingency							**$3,034,073,366.86**

NOTE 1: Kg DUF_6 is based on the assumption that the operating feed assay is 0.71%, the operating product assay is 4.95%, and the operating tails assay is 0.25%.

NOTE 2: The number of cylinders of DUF6 is equal to the kg DUF_6 divided by the maximum capacity of a 48Y cylinder (12501 kg).

NOTE 3: Estimated tails disposition costs is from Table C3.19a

APPENDIX C– DECOMMISSIONING COST ESTIMATE TABLES

Table C3.19a Total Disposal Cost Per Kilogram of UF_6 Tails.

DOE Estimate based on Letter from F. Marcinowski to A. Kennedy, dated April 23, 2009 (Maximum Value)	$5.64 per kg UF_6 Tails
Escalate to FY 2009 dollars	4.06%
DOE Estimate (Maximum Value) in FY 2009 dollars	$5.87 per kg UF_6 Tails
Transportation Costs from GLE Commercial Facility to Piketon, Ohio (in FY 2009 dollars)	$0.33 per kg UF_6 Tails
Total Disposal Cost per kg of UF_6 Tails Without Contingency	$6.20 per kg UF_6 Tails
Contingency Percentage (over and above Contingency Applied by DOE)	25%
Total Disposal Cost per kg of UF_6 Tails With Contingency	$7.75 per kg UF_6 Tails

Table C3.20. Total Labor Distribution

Activity	Project Management	Health Physics	Engineering	Chem/Lab	Clerical	Laborer	Craft Labor	Supervision
Planning and Preparation								
Decontamination and Dismantling of Radioactive Facility Components								
Restoration of Contaminated Areas on Facility Grounds								
Final Radiation Survey								
Site Stabilization and Long Term Surveillance								
Total FTE's (Full Time Equivalents) =								

NOTE 1: Based on an 8-hour workday

[The contents of this table contain Proprietary Information and are withheld from public disclosure per 10 CFR 2.390.]

Table C3.21. Assumptions.

1. The Commercial Facility will be decommissioned such that the facilities can be released for unrestricted use. The estimated costs for decommissioning are presented in accordance with NRC guidance in NUREG-1757, Volume 3, Appendix A.

2. Decommissioning costs are calculated in FY 2009 dollars.

3. Costs are not included for the removal or disposal of non-radioactive structures, areas and materials beyond that necessary to terminate the NRC license and release the site for unrestricted use.

4. Overhead and profit on contractor labor is assumed to be 15%.

5. Decommissioning planning and preparations occur prior to facility shutdown.

6. Security, fees, insurance, taxes, and utilities costs incurred during the planning and preparations period are considered to be an operational cost and are not included in this estimate.

7. Assumed contingency rate of 25% is applied.

8. This estimate's material inventory is based on the site drawings and information furnished by GEH.

9. Restoration of contaminated areas on facility grounds and site stabilization are assumed to not be required. Long Term Surveillance of site will not be required.

10. The site surrounding the Operations Building, the UF_6 Cylinder Pads, and lagoons are assumed to be clean. All UF_6 cylinders are assumed to have been removed from site at the time of facility shutdown. UF_6 cylinder cradles are assumed to be clean and are left in place.

11. Disposal rates were calculated using the rates listed in Addendum 10 of the "GEH Waste Disposal Agreement" with EnergySolutions, LLC. Disposal rates were escalated by 4.06% to FY 2009 dollars using the US Department of Labor BLS, Consumer Price Index (CPI) All Urban Consumers, US City Average, All Items.

12. All Class A waste is assumed to be disposed of at Energy*Solutions*' facility in Clive, Utah, in accordance with the existing Waste Disposal Agreement between Energy*Solutions* and GEH. The following FY 2009 disposal rates will be applied: **[Proprietary Information has been redacted and withheld from public disclosure per 10 CFR 2.390.]**

13. Classified components are to be processed offsite at the Energy*Solutions'* Bear Creek facility.

14. Assumed mode of transportation for waste is by truck.

15. Sealand containers are rented at a cost of $450/month each.

16. Clean scrap metal is assumed to be recycled at no cost to the project by metal recycler. Concrete debris is assumed to be processed by size reduction, with removal of structural reinforcing steel, and used on site as engineered fill for voids. All other demolition debris is removed from the site and disposed of at a local offsite construction landfill.

17. This estimate does not include credit for material scrap value.

18. **[Security-Related Information has been redacted and withheld from public disclosure per 10 CFR 2.390]**

19. **[Security-Related Information has been redacted and withheld from public disclosure per 10 CFR 2.390]**

20. **[Security-Related Information has been redacted and withheld from public disclosure per 10 CFR 2.390]**

21. **[Security-Related Information has been redacted and withheld from public disclosure per 10 CFR 2.390]**

22. Existing decontamination stations and liquid effluent systems are used during dismantling and decommissioning.

23. Work will be performed on eight-hour shifts, five days per week. No overtime hours have been included.

24. Cascade and Vaporization area decommissioning and decontamination activities occur in parallel.

25. Cascade area decommissioning and decontamination work is to be done with 2 shifts per day.

26. Assumed that 10% of overall floor area will be Class I for MARSSIMS survey.

27. Assumed that 5% of total cylinder pads will be Class II areas for MARSSIMS survey.

28. Assumed that 2-Acre Holding Lagoon will be Class II area for MARSSIMS survey and soil of lagoons will undergo soil sampling to verify as clean.

29. Assumed that GLE will purchase the approximately 200-acre facility of the Wilmington site from GE.

30. Annual insurance cost during decommissioning of $1,250,000.

31. Annual property tax cost during decommissioning of $22,500.

32. Annual NRC Inspection fee during decommissioning of $200,000.

33. Laboratory equipment costs for performing the decommissioning sampling analysis is included in the "D&D equipment" costs listed in the Table 12.0 – Equipment/Supply Costs.

34. Craft labor rates were taken from RS Means and professional labor rates provided by GEH and from EnergySolutions data.

35. Assumed "cleared" worker labor rate increase of approximately 22% over un-cleared worker rate.

36. The total estimated volume of UF6 tails requiring disposition, following 40 years of facility operations is 391,493,338 kg.

37. UF_6 tails are assumed shipped to Piketon, Ohio for processing. After processing, it is assumed that the original cylinder is used to ship material for final disposition. No additional purchase of cylinders will be required.

38. It is assumed that the decommissioning work is managed and performed by professional consulting engineering.

39. The size of the staff varies in each period in accordance with the requirements of the work activities.

40. Contamination is limited to localized low-levels of radioactivity incidental to routine activities. There is no subsurface or widespread contamination. Characterization surveys will be conducted prior to remediation, decontamination, and/or disposal.

APPENDIX D – DOE UF_6 TAILS DISPOSAL COST ESTIMATE

Department of Energy
Washington, DC 20585

March 17, 2008

Mr. Al Kennedy
Facility Licensing Manager
GE Hitachi Nuclear Energy
3901 Castle Hayne Road
Wilmington, NC 28402

Dear Mr. Kennedy:

This is in response to your November 30, 2007, letter requesting whether the Department of Energy (DOE) would accept for conversion and disposal the depleted uranium hexafluoride (DUF_6) product to be generated by GE-Hitachi Global Laser Enrichment (GLE) proposed laser-based enrichment facility, and if so, the anticipated costs of providing such services.

The Department would accept, upon request, such DUF_6 for conversion and disposal (or reuse) pursuant to authorities granted to the Department under the Atomic Energy Act. The Department's acceptance of such material would be contingent upon the negotiation of an agreement for conversion and disposal services that would include full cost recovery of the Department's expenses.

As requested, DOE prepared a cost estimate for providing DUF_6 conversion and disposal services to GLE. The cost estimate is based on GLE's projection that it would generate approximately 7,100 metric tons of DUF_6 annually for 40 years, beginning in 2010.

The Department estimates that the cost of converting and disposing of GLE's projected DUF_6 inventory would range from $3.84 to $5.72 per kilogram of DUF_6 in FY07 dollars. This estimated price reflects the following costs: design and construction (capital costs); DUF_6 conversion (Operating & Cylinder Management); transportation of conversion products to a disposal site (rail to a transload facility then truck shipments); disposal of the conversion products as Low Level Radioactive Waste; and decontamination and decommissioning of the conversion facility. For illustrative purposes, the Department has used transportation and disposal at the Nevada Test Site in the attached analysis. Final determinations of waste disposal are subject to regulatory changes and the Department's alternative site selections.

The following is a cost estimate range with a break-out of the four principal cost components:

	MIN	MAX
Capital Costs	$0.49	$0.52
Conversion (Operating & Cylinder Management)	$2.49	$4.35
Transportation & Disposal	$0.65	$0.65
Decontamination & Decommissioning	$0.20	$0.20
TOTAL	**$3.84**	**$5.72**

The Department's cost estimate assumes that the DUF_6 would be converted and disposed consistent with the terms and conditions of the Department's current contract for the construction and operation of the conversion facilities at the Portsmouth and Paducah Gaseous Diffusion Plants. The Department's cost estimate takes into account the conversion and disposal of GLE's projected inventory as well as the Department's current inventory of DUF_6. If the Department were to convert and dispose of additional inventories of DUF_6, then the Department anticipates that the estimated unit cost (set forth above) would likely decrease.

The Department's cost estimate is a long-term forecast that is subject to considerable uncertainties and change as the Department receives actual cost and performance data from the conversion process.

If you have any further questions, please contact Mr. Frank Marcinowski, Deputy Assistant Secretary for Regulatory Compliance, at (202) 586-0370.

Sincerely,

Inés R. Triay

Inés R. Triay
Principal Deputy Assistant Secretary
for Environmental Management

Enclosure

Analysis of the Department of Energy Cost to Disposition GE-Hitachi Nuclear Energy Depleted Uranium Hexafluoride

BACKGROUND

In 2002, the Department of Energy (DOE) awarded a contract to Uranium Disposition Services, LLC (UDS) to design and construct facilities, and perform initial operations to convert Depleted Uranium Hexafluoride (DUF_6) into a more stable chemical form for beneficial reuse or disposal. UDS is in the process of completing construction of the conversion facilities at Portsmouth, Ohio, and Paducah, Kentucky (Portsmouth and Paducah respectively). One of the Project's primary goals is to safely convert the Department's entire inventory within 25 years. By processing DUF_6 at the contract target production rate of 31,500K kg per year, UDS would eliminate Paducah's inventory in approximately 23.4 years, and Portsmouth's in about 18.2. Once the facilities are complete and the Authorization Authority has granted approval to begin conversion operations, UDS will begin to process DOE's inventory of DUF_6 generated as a result of previous enrichment operations and currently stored on-site.

DOE is aware that several different companies plan to seek authorization from the U.S. Nuclear Regulatory Commission (NRC) to build and operate uranium enrichment facilities in the United States. As a condition of applying for a license to operate the proposed enrichment facilities, the NRC requires the applicant to provide a Decommissioning Funding Plan (DFP) which must include an estimate of the cost of dispositioning DUF_6 generated as a byproduct of enrichment operations.

Per 42 USC 2297h-11, DOE is authorized to accept, upon request by an NRC-licensed generator, the resulting DUF_6 for disposal. In addition, by law, a company must "reimburse the Secretary for the disposal of the depleted uranium... in an amount equal to the Secretary's costs, including a pro rata share of any capital costs." Therefore, DOE must determine the appropriate price to charge for its acceptance of the DUF_6.

As a result of requests from several companies for disposal cost information, DOE has analyzed costs associated with accepting and processing additional material for disposition, and developed a cost per kilogram (kg) to compensate DOE for providing this service.

COST ANALYSIS CONDITIONS AND ASSUMPTIONS

It is assumed that DOE will continue to process existing and any new DUF_6 through its contract with UDS or its successor. It is also assumed that DOE will process the additional DUF_6 at the Portsmouth or Paducah sites. The Portsmouth and Paducah conversion facilities will be decontaminated and decommissioned (D&D) at the end of processing DOE's backlog and company provided DUF_6.

Elements comprising this cost estimate include:

- Capital costs associated with building the conversion facilities;
- Cylinder management and conversion operations;
- Plant Management and Administration;
- Management reserve;
- Fee earned by the contractor performing the conversion and disposal activities;

- DOE contingency;
- DOE direct support (integrated project team);
- Packaging (current cylinders used for storage);
- Transportation;
- Disposal; and,
- Decontamination and decommissioning

SUMMARY FOR GE-HITACHI NUCLEAR ENERGY SYSTEMS (GLE)

It is assumed that DOE will start to accept additional DUF_6 from GLE in 2010 at a rate of 7,100 metric tons annually until 2052. This analysis calculated processing an additional 284,000 metric tons of DUF_6 provided by GLE. See the Appendix for further assumptions regarding this analysis.

This analysis utilizes the UDS provided November 2007 Draft Operations Baseline and contract DE-AC05-02OR22717 for calculating a cost range ($/kg min – $/kg max) for processing DUF_6 material. In January 2008, UDS informed DOE that their construction baseline cost of $429.6M will not be met. UDS did not provide the exact amount of the deviation, but did provide a range of the increase ($56M-$76M). This increase has been incorporated into the capital cost calculation provided below. It is assumed that Operations costs and DOE Directs costs remain constant whether the minimum or maximum numbers of kilograms are produced annually. The resulting cost range is **$3.78/kg - $5.64/kg**. The resulting rates are in FY07 dollars; therefore, this rate should be appropriately escalated to the year in which additional DUF_6 is received.

This estimated price reflects the following costs: design and construction (capital costs); DUF_6 conversion (Operating & Cylinder Management); transportation of conversion products to a disposal site (NTS or Energy*Solutions*); disposal of the conversion products as Low Level Radioactive Waste; and decontamination and decommissioning (D&D) of the conversion facility.

Cost Element Analysis:

Capital Cost

Capital costs are costs associated with the design, construction and pre-operational aspects of preparing the conversion facilities for operation.

Table 1 provides a breakdown of cost elements included in defining the capital investment. These elements reflect both Portsmouth and Paducah costs. Utilizing both facilities costs allows for access to both processing facilities. The capital cost component is presented as a range (minimum - maximum) based on the projected cost increase provided by UDS in January 2008. The capital cost component is amortized over the entire volume of DOE and GLE material (984K metric tons).

Table 1. Capital Costs for DOE's DUF_6 Conversion Project

Cost Category	Minimum Cost ($M)	Maximum Cost ($M)
Design	$41	$41
Construction	$324	$324
Fee	$5	$5
DOE Contingency	$12	$12
DOE Directs (Integrated Project Team)	$28	$28
Pre-Ops OPC	$5	$5
Pre-Ops fee	$1	$1
Pre-Ops DOE Directs	$13.6	$13.6
Estimated Cost Increase (1/2008)	$56	$76
Total	**$485.6**	**$505.6**

Capital cost amortized over the life of conversion operations (DOE & GLE material) - $485.6M ÷ 984K metric tons (700K metric tons DOE inventory + 284K metric tons GLE inventory) = **$.49/kg**.
Capital cost amortized over the life of conversion operations (DOE & GLE material) - $505.6M ÷ 984K metric tons (700K metric tons DOE inventory + 284K metric tons GLE inventory) = **$.51/kg**

Operations Cost
DOE will extend the operating period at the Portsmouth and Paducah plants to process DOE backlog and additional DUF_6 accepted material. DOE estimates the plants will operate for ~43 years starting in 2009 with the existing and additional DUF_6 treated concurrently. It is assumed that D&D occurs in 2052.

Table 2 summarizes estimated annual operations costs. This analysis is based on costs provided by UDS in their November 2007 Operations Baseline update. This draft Ops Baseline captures the first phase (Initial Operations) of the Project. For the purposes of this cost analysis, it will be assumed that both Portsmouth and Paducah will operate for 33 months. It is assumed that the same amount of Production costs, PM&I, Management Reserve and DOE Direct support will be required whether producing the minimum or maximum number of kgs. While the first six months of initial operations are considered ramp-up months (operating at a reduced 50% operating capacity), the minimum and maximum numbers of kilograms used to calculate cost per kg were derived from Table 4. *Number of Kilograms Processed – Incentive Table* in the current contract, Mod A002. Minimum and maximum numbers of kgs were utilized to help provide a cost range.

Table 2. Operations Costs

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
Portsmouth & Paducah Operations	$168.44	$168.44
PM&I	$18.39	$18.39
Management Reserve	$17.2	$17.2
Fee	$22.64	$11.52
DOE Contingency	$0	$30.36
DOE Directs (Integrated Project Team)	$3.85	$3.85
Total	**$230.52**	**$249.76**
Number of kgs produced in contract period	**57,420,000**	**92,614,870**

Minimum Operations cost per kg - $230.52M ÷ 92.61M kg = **$2.49/kg.**
Maximum Operations cost per kg - $252.52M ÷ 57.420M kg = **$4.35/kg.**

1. Ops and Cylinder Management costs are taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal. Ports & Pad Ops cost - $240.36M - $18.39M (PM&I) = $221.97M - $53.53M (Transportation and Disposal costs) = $168.44M.
2. PM&I cost is taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal = $18.39M.
3. Management Reserve costs are taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal = $17.2M.
4. Max Fee is a percentage of contract's original 60 months operations period maximum fee available - $41.165M ÷ 60 months (original contract ops period) = $686.08K/month x 33 months operations = $22.64M.
5. Minimum Fee is a percentage of contract's original 60 months operations period minimum fee available - $20.944 ÷ 60 months (original contract ops period) = $349.07/month x 33 months operations = $11.52M.
6. DOE Contingency is factored at $0 Contingency expended in the Minimum Ops Cost calculation, and a percentage of contract's original 60 months operations period maximum Contingency available - $55.2M ÷ 60 months (original ops period) = .92M/mo x 33 months operations = $30.36M.

Phase 1 of the contract with UDS defines minimum and maximum annual throughput of 22,000,000kg and 35,300,000kg, respectively. Based on minimum throughput, the minimum amount of material that could be processed by the end of UDS's current contract is 57,420Kkg. (104,400,000kg (min # of kgs processed in Table 4. *Number of Kilograms Processed – Incentive Table*) ÷ 60 months operations = 1,740,000kg/month x 33 months available operations = 57,420,000kg to be processed during the remaining contract period.)
Based on maximum throughput, the maximum amount of material that could be processed by the end of UDS's current contract is 92,615Kkg. (168,390,667kg (max # of kgs processed in Table 4. *Number of Kilograms Processed – Incentive Table*) ÷ 60 months operations = 2,806,511kg/month x 33 months available operations = 92,614,867kg to be processed during the remaining contract period.)

Transportation and Disposal Costs
Transportation and disposal costs are based on the updated November 2007 Operations Baseline submittal, the transportation and disposal costs are defined in Table 3.

Component costs for transportation are comprised of two project control accounts; *Waste Management & Transportation, and Waste Transportation.* Component costs for disposal are comprised of two control accounts; *Waste Sampling, and Waste Disposal.* The November submittal provides cost estimates for transportation and disposal based on target throughput. However, this cost estimate uses maximum throughput in an effort to bound the Department's liability.

Transportation and Disposal costs per kg remain constant even though the total cost increases significantly ($60.25M vice $37.35M) when processing the maximum number of kgs allowed in the contract.

Table 3. Transportation and Disposal Costs

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
Transportation	$45.57	$28.25
Disposal	$14.68	$9.1
Total	$60.25	$37.35

Minimum Ops Cost/kg for Transportation and Disposal - $60.25M ÷ 92.615Kkg = **$.65/kg.**
Maximum Ops Cost/kg for Transportation and Disposal - $37.35 ÷ 57.42Kkg = **$.65/kg**

1. The UDS Operations Baseline cost estimate defined transportation costs at target production levels (31,500K kg/yr or 82,290K kg during the initial operations period) as $40.48M and disposal costs as $13.04M. However, to provide a range, the minimum and maximum amounts allowed in the contract to be produced by UDS are used (minimum – 31,500K kg/yr or 57,420K kg during the initial operations period; maximum – 35,300K kg/yr or 92.615M kg during the initial operations period). If UDS, or subsequent contractor, generates maximum throughput per year, the project would incur additional transportation and disposal costs. (Transportation - $40.487M ÷ 82.29M kg (target production rate) = $.492/kg x 57.42M kg processed min = $28.25M; Disposal - $13.04 ÷ 82.29M kg processed target = $.1584/kg x 57.42M kg processed min = $9.1M). (Transportation - $40.487M ÷ 82.29M kg (target production rate) = $.49/kg x 92.615M kg processed max = $45.57M; Disposal - $13.04 ÷ 82.29M kg processed target = $.15.84/kg x 92.615M kg processed max = $14.68M).

Decontamination and Decommissioning (D&D)
D&D activities will take place following completion of conversion operations (estimated to be in 2052). D&D of the DUF_6 facilities is estimated to cost $200M.

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
D&D	$200M	$200M
Total	**$200M**	**$200M**

Minimum D&D Cost/kg for Transportation and Disposal - $200M ÷ 984Mkg = **$.20/kg.**
Maximum D&D Cost/kg for Transportation and Disposal - $200M ÷ 984Mkg = **$.20/kg**

TOTAL COST

For purposes of this cost estimate, it will cost GLE between **$3.78/kg** and **$5.64 per kg** (FY07 dollars) for DOE to process this additional DUF_6. The costs are summarized in Table 4. The Department's cost estimate assumes that the DUF_6 will be converted and disposed of consistent with the terms and conditions of the Department's current contract for construction and operation of the conversion facilities.

Table 4. Cost to DOE of Processing Additional DUF_6

FULL OPERATIONS MIN COST/kg; INCLUDING GLE MATERIAL

Principal Components	***Cost ($ in M)***	***Cost/kg - incl. GLE DUF_6***
Capital – *Design*	$41.00	$0.04
Capital - *Construction*	$324.00	$0.33
Design and Construction Fee	$5.00	$0.01
DOE Contingency	$12.00	$0.01
DOE Directs - Design & Construction	$28.00	$0.03
Pre-Ops OPC	$5.00	$0.01
Pre-Ops Fee	$1.00	$0.00
Pre-Ops DOE Directs	$13.60	$0.01
Proposed Cost Increase	$56	$0.06
Capital Subtotal	**$485.60**	**$0.50**
Ops/Cylinder Management (incl. Reserve)	$204.03	$2.20
Fee	$22.64	$0.24
DOE Contingency	$0.00	$0.00
DOE Directs	$3.85	$0.04
Ops/Cylinder Management Subtotal	**$230.52**	**$2.49**
Transportation	$45.57	$0.49
Disposal	$14.68	$0.16
Transportation & Disposal Subtotal	**$60.25**	**$0.65**
D&D	$200.00	$0.20
D&D Subtotal	**$200.00**	**$0.20**
TOTAL	**$920.37**	**$3.84**

FULL OPERATIONS MAX COST/kg; INCLUDING GLE MATERIAL

Principal Components	***Ratio ($ in M)***	***Cost/kg - incl. GLE DUF_6***
Capital - *Design*	$41.00	$0.04
Capital - *Construction*	$324.00	$0.33
Design and Construction Fee	$5.00	$0.01
DOE Contingency	$12.00	$0.01
DOE Directs - Design & Construction	$28.00	$0.03
Pre-Ops OPC	$5.00	$0.01
Pre-Ops Fee	$1.00	$0.00
Pre-Ops DOE Directs	$13.60	$0.01
Proposed Cost Increase	$76	$0.08
Capital Subtotal	**$429.60**	**$0.52**
Ops/Cylinder Management (incl. Reserve)	$204.03	$3.55
Fee	$11.52	$0.20
DOE Contingency	$30.36	$0.53
DOE Directs	$3.85	$0.07
Ops/Cylinder Management Subtotal	**$249.76**	**$4.35**
Transportation	$28.25	$0.49
Disposal	$9.10	$0.16
Transportation & Disposal Subtotal	**$37.35**	**$0.65**
D&D	$200.00	$0.20
D&D Subtotal	**$200.00**	**$0.20**
TOTAL	**$916.71**	**$5.72**

Note: Totals may not equal the sum of individual numbers due to rounding.

Assumptions for Analysis

- DOE accepts 7,100 metric tons of DUF_6 (equivalent to ~ 4,800 metric tons of uranium) annually for 40 years starting in 2012 (284,000 metric tons total).
- DOE processes the additional DUF_6 under its current contract with UDS, or a successor firm, under current terms and conditions.
- Assumes processing efficiencies are attainable to enable UDS, or a successor firm, to complete processing additional GE DUF_6 by 2052.
- The contract with UDS, or a successor firm, will require modification to allow for increased maximum conversion throughput necessary to process GE DUF_6 by 2052.
- The cost estimate does **not** include the cost to transport the DUF_6 to the processing site(s) (Paducah or Portsmouth). This transportation cost will be the responsibility of the enrichment company requesting conversion.
- Capital costs are amortized over both the DOE inventory and the enrichment company's inventory combined (~700,000 metric tons + 284,000 metric tons = 984,000 metric tons total).
- Equipment replacement costs are not included in this estimate (conversion unit replacement costs are estimated at ~$300K/unit).
- There are two conversion units per line of operations.
- Converted depleted uranium oxide is classified as class A waste and qualifies for disposal at either NTS or EnergySolutions without any additional processing.
- Escalation for out-year pricing is not included.
- Transportation method is rail to a transload facility then trucked to NTS for disposal.
- Assumes GE provides UDS, or a successor firm, DOT compliant cylinders for use as packaging converted oxide for transportation to disposal facility.
- Disposal at NTS. Alternate transportation and disposal at EnergySolutions would result in higher disposal cost, but lower transportation cost. For estimation purposes, the cost difference would have minimal impact on the cost per kg estimate. No decision has been made as to disposal at either NTS or Energy Solutions.
- Costs are shown in FY07 dollars unless otherwise specified.
- Cost includes contractor management reserve and min/max fee range.
- The existing DOE inventory of DUF_6 and the additional GE DUF_6 are processed concurrently.
- Decontamination and decommissioning cost of the conversion facilities is $200M.
- D&D occurs following completion of processing additional DUF_6 (2038).
- Paducah operates four conversion lines and Portsmouth operates three conversion lines.
- Minimum amount of DUF_6 to be processed per Table 4. *Number of Kilograms Processed – Incentive Table* in the current contract with UDS is 8,640,625 + 20,571,875 + 22,000,000 + 22,000,000 + 22,000,000 + 9,187,500 = **104,400,000kg.**
- Maximum amount of DUF_6 to be processed per Table 4. *Number of Kilograms Processed – Incentive Table* in the current contract with UDS is 14,826,317 + 32,956,017 + 35,300,000 + 35,300,000 + 35,300,000 + 14,708,333 = **168,390,667kg.**
- Assumes labor rate/needs are constant from processing DOE to GE inventory.
- Assumes use of all Management Reserve.
- Assumes UDS operates until August 2011.

APPENDIX E – REVISED DOE UF_6 TAILS DISPOSAL COST ESTIMATE

Department of Energy
Washington, DC 20585

APR 23 2009

Mr. Al Kennedy
Facility Licensing Manager
GE Hitachi Nuclear Energy
3901 Castle Hayne Road
Wilmington, NC 28402

Dear Mr. Kennedy:

This is in response to your March 18, 2009, letter requesting whether the Department of Energy (DOE) would accept for conversion and disposal the depleted uranium hexafluoride (DUF_6) product to be generated by GE-Hitachi Global Laser Enrichment (GLE) proposed laser-based enrichment facility, and if so, the anticipated costs of providing such services.

DOE would accept, upon request, such DUF_6 for conversion and disposal (or reuse) pursuant to authorities granted to DOE under the Atomic Energy Act. DOE's acceptance of such material would be contingent upon the negotiation of an agreement for conversion and disposal services that would include full cost recovery of the DOE's expenses.

As requested, DOE prepared a cost estimate for providing DUF_6 conversion and disposal services to GLE. The cost estimate is based on GLE's projection that it would generate approximately 10,500 metric tons of DUF_6 annually for forty years.

DOE estimates that the cost of converting and disposing of GLE's projected DUF_6 inventory would range from $3.76 to $5.64 per kilogram of DUF_6. This estimated price reflects the following costs: design and construction (capital costs); DUF_6 conversion (Operating & Cylinder Management); transportation of conversion products to a disposal site (rail to a transload facility then truck shipments); disposal of the conversion products as Low Level Radioactive Waste (at Nevada Test Site per the Baseline); and decontamination and decommissioning of the conversion facility. Additionally, this cost estimate includes estimated minimum/maximum capital cost increases provided by the design and construction contractor (Uranium Disposition Services) in January 2008.

The following is a break-out minimum and maximum cost estimate of the four principal cost components:

	MIN	MAX
Capital Costs	$0.44	$0.46
Conversion (Operating & Cylinder Management)	$2.49	$4.35
Transportation & Disposal	$0.65	$0.65
Decontamination & Decommissioning	$0.18	$0.18
TOTAL	**$3.76**	**$5.64**

DOE's cost estimate assumes that the DUF_6 would be converted and disposed of consistent with the terms and conditions of DOE's current contract for the construction and operation of the conversion facilities at the Portsmouth and Paducah Gaseous Diffusion Plants. DOE's cost estimate takes into account the conversion and disposal of GLE's projected inventory as well as DOE's current inventory of DUF_6. If DOE were to convert and dispose of additional inventories of DUF_6, DOE anticipates that the estimated unit cost (set forth above) would likely decrease.

DOE's cost estimate is a long-term forecast that is subject to considerable uncertainties. The cost estimate is subject as assumptions and circumstances change and as DOE receives actual cost and performance data from the conversion process.

If you have any further questions, please contact me at (202) 586-0370 or Ross Bradley, Office of Regulatory Compliance, at (301) 903-7646.

Sincerely,

Frank Marcinowski
Deputy Assistant Secretary for
Regulatory Compliance

Enclosure

Analysis of the Department of Energy's Cost to Disposition
GE Hitachi Nuclear Energy Depleted Uranium Hexafluoride

BACKGROUND

In 2002, the Department of Energy (DOE) awarded a contract to Uranium Disposition Services, LLC (UDS) to design and construct facilities, and perform initial operations to convert Depleted Uranium Hexafluoride (DUF_6) into a more stable chemical form for beneficial reuse or disposal. UDS is in the process of completing construction of the conversion facilities at Portsmouth, Ohio, and Paducah, Kentucky (Portsmouth and Paducah respectively). One of the Project's primary goals is to safely convert the DOE's entire inventory within 25 years. By processing DUF_6 at the contract target production rate of 31,500K kilogram (kg) per year, UDS would eliminate Paducah's inventory in approximately 23.4 years, and Portsmouth's in about 18.2 years. Once the facilities are complete and the Authorization Authority has granted approval to begin conversion operations, UDS will begin to process DOE's inventory of DUF_6 generated as a result of previous enrichment operations and currently stored on-site.

The DOE is aware that several different companies plan to seek authorization from the U.S. Nuclear Regulatory Commission (NRC) to build and operate uranium enrichment facilities in the United States. As a condition of applying for a license to operate the proposed enrichment facilities, the NRC requires the applicant to provide a Decommissioning Funding Plan (DFP) which must include an estimate of the cost of dispositioning DUF_6 generated as a byproduct of enrichment operations.

Per Section 3113 of 42 USC 2297H, DOE is authorized to accept, upon request by an NRC-licensed generator, the resulting DUF_6 for disposal. In addition, by law, a company must "reimburse the Secretary for the disposal of the depleted uranium... in an amount equal to the Secretary's costs, including a pro rata share of any capital costs." Therefore, DOE must determine the appropriate price to charge for its acceptance of the DUF_6.

As a result of requests from several companies for disposal cost information, DOE has analyzed costs associated with accepting and processing additional material for disposition, and developed a cost per kg to compensate DOE for providing this service.

COST ANALYSIS CONDITIONS AND ASSUMPTIONS

It is assumed that DOE will continue to process existing and any new DUF_6 through its contract with UDS or its successor. It is also assumed that DOE will process the additional DUF_6 at the Portsmouth or Paducah sites. The Portsmouth and Paducah conversion facilities will be decontaminated and decommissioned (D&D) at the end of processing DOE's backlog and company provided DUF_6.

Elements comprising this cost estimate include:

- Capital costs associated with building the conversion facilities;
- Cylinder management and conversion operations;
- Plant Management and Administration;
- Management reserve;
- Fee earned by the contractor performing the conversion and disposal activities;
- DOE contingency;
- DOE direct support (integrated project team);
- Packaging (current cylinders used for storage);
- Transportation;
- Disposal; and
- D&D.

SUMMARY FOR GE HITACHI NUCLEAR ENERGY SYSTEMS (GE)

It is assumed that DOE will start to accept additional DUF_6 from GE in 2010 at a rate of 10,500 metric tons annually until 2050. This analysis calculated processing an additional 391,500 metric tons of DUF_6 provided by GE. See the Appendix for further assumptions regarding this analysis.

This analysis utilizes the UDS provided November 2007 Draft Operations Baseline and contract DE-AC05-02OR22717 for calculating a cost range ($/kg min – $/kg max) for processing DUF_6 material. In January 2008, UDS informed DOE that their construction baseline cost of $429.6M will not be met. UDS did not provide the exact amount of the deviation, but did provide a range of the increase ($56M-$76M). This increase has been incorporated into the capital cost calculation provided below. It is assumed that Operations costs and DOE Directs costs remain constant whether the minimum or maximum numbers of kilograms are produced annually. The resulting cost range is **$3.76/kg - $5.64/kg**. The resulting rates are in FY 2007 dollars; therefore, this rate should be appropriately escalated to the year in which additional DUF_6 is received.

This estimated price reflects the following costs: design and construction (capital costs); DUF_6 conversion (Operating & Cylinder Management); transportation of conversion products to a disposal site (NTS or Energy*Solutions*); disposal of the conversion products as Low Level Radioactive Waste; and D&D of the conversion facility.

Cost Element Analysis:

Capital Cost

Capital costs are costs associated with the design, construction and pre-operational aspects of preparing the conversion facilities for operation.

Table 1 provides a breakdown of cost elements included in defining the capital investment. These elements reflect both Portsmouth and Paducah costs. Utilizing both facilities costs allows for access to both processing facilities. The capital cost component is presented as a range (minimum - maximum) based on the projected cost increase provided by UDS in January 2008. The capital cost component is amortized over the entire volume of DOE and GE material (1,091.5K metric tons).

Table 1. Capital Costs for DOE's DUF_6 Conversion Project

Cost Category	Minimum Cost ($M)	Maximum Cost ($M)
Design	$41	$41
Construction	$324	$324
Fee	$5	$5
DOE Contingency	$12	$12
DOE Directs (Integrated Project Team)	$28	$28
Pre-Ops OPC	$5	$5
Pre-Ops fee	$1	$1
Pre-Ops DOE Directs	$13.6	$13.6
Estimated Cost Increase (1/2008)	$56	$76
Total	**$485.6**	**$505.6**

Capital cost amortized over the life of conversion operations (DOE & GE material) - $485.6M + 1,091.5K metric tons (700K metric tons DOE inventory + 391.5K metric tons GE inventory) = **$.44/kg.**
Capital cost amortized over the life of conversion operations (DOE & GE material) - $505.6M + 1,091.5K metric tons (700K metric tons DOE inventory + 391.5K metric tons GE inventory) = **$.46/kg**

Operations Cost

DOE will extend the operating period at the Portsmouth and Paducah plants to process DOE backlog and additional DUF_6 accepted material. DOE estimates the plants will operate for ~41 years starting in 2009 with the existing and additional DUF_6 treated concurrently. It is assumed that D&D occurs in 2050.

Table 2 summarizes estimated annual operations costs. This analysis is based on costs provided by UDS in their November 2007 Operations Baseline update. This draft Ops Baseline captures the first phase (Initial Operations) of the Project. For the purposes of this cost analysis, it will be assumed that both Portsmouth and Paducah will operate for 33 months. It is assumed that the same amount of Production costs, Project Management and Integration (PM&I), Management Reserve and DOE Direct support will be required whether producing the minimum or maximum number of kgs. While the first six months of initial operations are considered ramp-up months (operating at a reduced 50 percent operating capacity), the minimum and maximum numbers of kg used to calculate cost per kg were derived from *Table 4 Number of Kilograms Processed – Incentive Table* in the current contract, Mod A002. Minimum and maximum numbers of kgs were utilized to help provide a cost range.

Table 2. Operations Costs

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
Portsmouth & Paducah Operations	$168.44	$168.44
PM&I	$18.39	$18.39
Management Reserve	$17.2	$17.2
Fee	$22.64	$11.52
DOE Contingency	$0	$30.36
DOE Directs (Integrated Project Team)	$3.85	$3.85
Total	**$230.52**	**$249.76**
Number of kgs produced in contract period	**92,614,870**	**57,420,000**

Minimum Operations cost per kg - $230.52M ÷ 92.61M kg = **$2.49/kg.**
Maximum Operations cost per kg - $252.52M ÷ 57.420M kg = **$4.35/kg.**

1. Ops and Cylinder Management costs are taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal. Ports & Pad Ops cost - $240.36M - $18.39M (PM&I) = $221.97M - $53.53M (Transportation and Disposal costs) = $168.44M.
2. PM&I cost is taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal = $18.39M.
3. Management Reserve costs are taken from page 3, Table 1-1 of UDS's November 2007 Ops Baseline submittal = $17.2M.
4. Max Fee is a percentage of contract's original 60 months operations period maximum fee available - $41.165M ÷ 60 months (original contract ops period) = $686.08K/month x 33 months operations = $22.64M.
5. Minimum Fee is a percentage of contract's original 60 months operations period minimum fee available - $20.944 ÷ 60 months (original contract ops period) = $349.07/month x 33 months operations = $11.52M.
6. DOE Contingency is factored at $0 Contingency expended in the Minimum Ops Cost calculation, and a percentage of contract's original 60 months operations period maximum Contingency available - $55.2M ÷ 60 months (original ops period) = .92M/mo x 33 months operations = $30.36M.

Phase 1 of the contract with UDS defines minimum and maximum annual throughput of 22,000,000kg and 35,300,000kg, respectively. Based on minimum throughput, the minimum amount of material that could be processed by the end of UDS's current contract is 57,420Kkg. (104,400,000kg (min # of kgs processed in *Table 4. Number of Kilograms Processed – Incentive Table*) ÷ 60 months operations = 1,740,000kg/month x 33 months available operations = 57,420,000kg to be processed during the remaining contract period.)

Based on maximum throughput, the maximum amount of material that could be processed by the end of UDS's current contract is 92,615kg (168,390,667kg (max # of kgs processed in *Table 4. Number of Kilograms Processed – Incentive Table*) ÷ 60 months operations = 2,806,511kg/month x 33 months available operations = 92,614,867kg to be processed during the remaining contract period.)

Transportation and Disposal Costs

Transportation and disposal costs have changed considerably since DOE's initial cost per kg analysis was performed. The preferred alternative in the baseline has changed from rail shipment to EnergySolutions (formerly Envirocare of Utah) to rail shipments to a transload facility and truck shipments to the Nevada Test Site (NTS) for disposal. Several factors caused this change. The two biggest factors are DOE direct funding NTS operations and utilizing a transload facility to help reduce the original straight truck shipment transportation option. Based on the updated November 2007 Operations Baseline submittal, the transportation and disposal costs are defined in Table 3.

Component costs for transportation are comprised of two project control accounts; *Waste Management & Transportation, and Waste Transportation.* Component costs for disposal are comprised of two control accounts; *Waste Sampling, and Waste Disposal.* The November submittal provides cost estimates for transportation and disposal based on target throughput. However, this cost estimate uses maximum throughput in an effort to bound DOE's liability.

Transportation and Disposal costs per kg remain constant even though the total cost increases significantly ($60.25M vice $37.35M) when processing the maximum number of kgs allowed in the contract.

Table 3. Transportation and Disposal Costs

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
Transportation	$45.57	$28.25
Disposal	$14.68	$9.1
Total	$60.25	$37.35

Minimum Ops Cost/kg for Transportation and Disposal - $60.25M ÷ 92.615Kkg = **$.65/kg.**
Maximum Ops Cost/kg for Transportation and Disposal - $37.35 ÷ 57.42Kkg = **$.65/kg**

1. The UDS Operations Baseline cost estimate defined transportation costs at target production levels (31,500K kg/yr or 82,290K kg during the initial operations period) as $40.48M and disposal costs as $13.04M. However, to provide a range, the minimum and maximum amounts allowed in the contract to be produced by UDS are used (minimum – 31,500K kg/yr or 57,420K kg during the initial operations period; maximum – 35,300K kg/yr or 92.615M kg during the initial operations period). If UDS, or subsequent contractor, generates maximum throughput per year, the project would incur additional transportation and disposal costs. (Transportation - $40.487M ÷ 82.29M kg (target production rate) = $.492/kg x 57.42M kg processed min = $28.25M; Disposal - $13.04 ÷ 82.29M kg processed target = $.1584/kg x 57.42M kg processed min = $9.1M). (Transportation - $40.487M ÷ 82.29M kg (target production rate) = $.49/kg x 92.615M kg processed max = $45.57M; Disposal - $13.04 ÷ 82.29M kg processed target = $.1584/kg x 92.615M kg processed max = $14.68M).

Decontamination and Decommissioning (D&D)

D&D activities will take place following completion of conversion operations (estimated to be in 2050). D&D of the DUF_6 facilities is estimated to cost $200M.

Cost Category	Cost ($M) (Min Ops Cost/kg)	Cost ($M) (Max Ops Cost/kg)
D&D	$200M	$200M
Total	**$200M**	**$200M**

Minimum D&D Cost/kg for Transportation and Disposal - $200M + 1091.5Mkg = **$.18/kg**.
Maximum D&D Cost/kg for Transportation and Disposal - $200M ÷ 1091.5Mkg = **$.18/kg**

TOTAL COST

For purposes of this cost estimate, it will cost GE between **$3.84/kg** and **$5.72/kg** (FY07 dollars) for DOE to process this additional DUF_6. The costs are summarized in Table 4. The Department's cost estimate assumes that the DUF_6 will be converted and disposed of consistent with the terms and conditions of the Department's current contract for construction and operation of the conversion facilities.

Table 4. Cost to DOE of Processing Additional UF_6

FULL OPERATIONS MIN COST/kg; INCLUDING GE MATERIAL

Principal Components	*Cost ($ in M)*	*Cost/kg - incl. GE DUF_6*
Capital - *Design*	$41.00	$0.04
Capital - *Construction*	$324.00	$0.30
Design and Construction Fee	$5.00	$0.01
DOE Contingency	$12.00	$0.01
DOE Directs - Design & Construction	$28.00	$0.03
Pre-Ops OPC	$5.00	$0.01
Pre-Ops Fee	$1.00	$0.00
Pre-Ops DOE Directs	$13.60	$0.01
Proposed Cost Increase	$56	$0.05
Capital Subtotal	**$485.60**	**$0.44**
Ops/Cylinder Management (incl. Reserve)	$204.03	$2.20
Fee	$22.64	$0.24
DOE Contingency	$0.00	$0.00
DOE Directs	$3.85	$0.04
Ops/Cylinder Management Subtotal	**$230.52**	**$2.49**
Transportation	$45.57	$0.49
Disposal	$14.68	$0.16
Transportation & Disposal Subtotal	**$60.25**	**$0.65**
D&D	$200.00	$0.18
D&D Subtotal	**$200.00**	**$0.18**
TOTAL	**$920.37**	**$3.76**

FULL OPERATIONS MAX COST/kg; INCLUDING GE MATERIAL

Principal Components	***Ratio ($ in M)***	***Cost/kg - Incl. GE DUF_6***
Capital - *Design*	$41.00	$0.04
Capital - *Construction*	$324.00	$0.30
Design and Construction Fee	$5.00	$0.01
DOE Contingency	$12.00	$0.01
DOE Directs - Design & Construction	$28.00	$0.03
Pre-Ops OPC	$5.00	$0.01
Pre-Ops Fee	$1.00	$0.00
Pre-Ops DOE Directs	$13.60	$0.01
Proposed Cost Increase	$76	$0.07
Capital Subtotal	**$429.60**	**$0.46**
Ops/Cylinder Management (incl. Reserve)	$204.03	$3.55
Fee	$11.52	$0.20
DOE Contingency	$30.36	$0.53
DOE Directs	$3.85	$0.07
Ops/Cylinder Management Subtotal	**$249.76**	**$4.35**
Transportation	$28.25	$0.49
Disposal	$9.10	$0.16
Transportation & Disposal Subtotal	**$37.35**	**$0.65**
D&D	$200.00	$0.18
D&D Subtotal	**$200.00**	**$0.18**
TOTAL	**$916.71**	**$5.64**

Note: Totals may not equal the sum of individual numbers due to rounding.

Assumptions for Analysis

- DOE accepts 10,500 metric tons of DUF_6 annually for 40 years starting in 2010 (391,500 metric tons total).
- DOE processes the additional DUF_6 under its current contract with UDS, or a successor firm, under current terms and conditions.
- Assumes processing efficiencies are attainable to enable UDS, or a successor firm, to complete processing additional GE DUF_6 by 2050.
- The contract with UDS, or a successor firm, will require modification to allow for increased maximum conversion throughput necessary to process GE DUF_6 by 2050.
- The cost estimate does **not** include the cost to transport the DUF_6 to the processing site(s) (Paducah or Portsmouth). This transportation cost will be the responsibility of the enrichment company requesting conversion.
- Capital costs are amortized over both the DOE inventory and the enrichment company's inventory combined (~700,000 metric tons + 391,500 metric tons = 1,091,500 metric tons total).
- Equipment replacement costs are not included in this estimate (conversion unit replacement costs are estimated at ~$300K/unit).
- There are two conversion units per line of operations.
- Converted depleted uranium oxide is classified as class A waste and qualifies for disposal at either NTS or EnergySolutions without any additional processing.
- Escalation for out-year pricing is not included.
- Transportation method is rail to a transload facility then trucked to NTS for disposal.
- Assumes GE provides UDS, or a successor firm, DOT compliant cylinders for use as packaging converted oxide for transportation to disposal facility.
- Disposal at NTS. Alternate transportation and disposal at EnergySolutions would result in higher disposal cost, but lower transportation cost. For estimation purposes, the cost difference would have minimal impact on the cost per kg estimate.
- Costs are shown in FY07 dollars unless otherwise specified.
- Cost includes contractor management reserve and min/max fee range.
- The existing DOE inventory of DUF_6 and the additional GE DUF_6 are processed concurrently.
- Decontamination and decommissioning cost of the conversion facilities is $200M.
- D&D occurs following completion of processing additional DUF_6 (2050).
- Paducah operates four conversion lines and Portsmouth operates three conversion lines.
- Minimum amount of DUF_6 to be processed per Table 4. *Number of Kilograms Processed – Incentive Table* in the current contract with UDS is 8,640,625 + 20,571,875 + 22,000,000 + 22,000,000 + 22,000,000 + 9,187,500 = **104,400,000kg.**
- Maximum amount of DUF_6 to be processed per Table 4. *Number of Kilograms Processed – Incentive Table* in the current contract with UDS is 14,826,317 + 32,956,017 + 35,300,000 + 35,300,000 + 35,300,000 + 14,708,333 = **168,390,667kg.**
- Assumes labor rate/needs are constant from processing DOE to GE inventory.
- Assumes use of all Management Reserve.
- Assumes UDS operates until August 2011.

HITACHI

Global Laser Enrichment

NEDE-33451
Rev 1
Class I
April 2009

QUALITY ASSURANCE PROGRAM DESCRIPTION

FOR THE

GE-HITACHI GLOBAL LASER ENRICHMENT LLC COMMERCIAL FACILITY

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QUALITY ASSURANCE PROGRAM DESCRIPTION
FOR THE
GE-HITACHI GLOBAL LASER ENRICHMENT LLC
COMMERCIAL FACILITY

Revision 1

Reviewed by:

Albert E. Kennedy, Licensing — 3/31/09 Date

For: Dave Hamilton

David W. Hamilton, Quality Assurance — 4/2/09 Date

Kenneth R. Givens, Commercial Facility — 3/31/09 Date

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Tammy G. Orr, President/CEO of GLE — 4/2/09 Date

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REVISION LOG

Rev.	Effective Date	Affected Chapters/Pages	Revision Description
0	01/26/2009	ALL	Initial revision.
1	04/02/2009	Pg 3	Revision to the organization chart.

TABLE OF CONTENTS

FIGURES

ACRONYMS

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
CEO	Chief Executive Officer
CFPM	Commercial Facility Project Manager
CFR	Code of Federal Regulations
CM	Configuration Management
EHS	Environmental, Health, and Safety
GLE	GE-Hitachi Global Laser Enrichment LLC
IROFS	Items Relied on for Safety
ISA	Integrated Safety Analysis
M&TE	Materials and Testing Equipment
NQA	Nuclear Quality Assurance
NRC	U.S. Nuclear Regulatory Commission
QA	Quality Assurance
QAPD	Quality Assurance Program Description
QL	Quality Level
SSC	Structures, Systems, and Components

1. INTRODUCTION

GE-Hitachi Global Laser Enrichment LLC (GLE) maintains full responsibility for ensuring the GLE Commercial Facility is designed, constructed, operated, and decommissioned in conformance with applicable regulatory requirements, specified design requirements, applicable industry standards, and good engineering practices in a manner to protect the health and safety of the workers and the public. Application of the program is mandatory for items (structures, systems, components [SSCs], equipment, and activities) identified as items relied on for safety (IROFS) in accordance with 10 Code of Federal Regulations (CFR) 70.4, *Definitions (Ref. 1)*, 10 CFR 70.61, *Performance Requirements (Ref. 2)*, and 10 CFR 70.64, *Requirements for New Facilities or New Processes at Existing Facilities (Ref. 3)*.

The GLE Quality Assurance (QA) Program covers design, construction (including preoperational testing), operation (including testing), maintenance, modification, and decommissioning of the facility. This Quality Assurance Program Description (QAPD) describes the requirements applied to those SSCs and activities designated as Quality Level (QL)-1 or QL-2. The QLs are described in Section 3, Quality Assurance Program.

2. ORGANIZATION

GLE maintains overall responsibility for design, construction, operation, maintenance, modification, testing, and decommissioning of the GLE Commercial Facility. The organization of the GLE Project is shown in Figure 1. Listed below is a description of project personnel and key positions within the GLE organization as related to QA.

2.1 Global Laser Enrichment President and Chief Executive Officer

The GLE President and Chief Executive Officer (CEO) establishes the basic policies of the QA Program. The policies described in this QAPD are transmitted to all levels of management, and implemented through approved written polices, plans, and procedures.

2.2 Global Laser Enrichment Quality Assurance and Infrastructure Manager

The GLE QA and Infrastructure Manager is responsible for the QA Program and has direct access to the GLE President and CEO. The GLE QA Manager has the authority, access to work areas, and organizational independence to ensure the requirements of this QAPD are properly implemented.

2.3 Engineering Manager

The Engineering Manager is responsible for developing the conceptual design for the GLE Commercial Facility, to include, but not limited to, development of design requirements, design bases, and design criteria for the enrichment process and supporting systems.

2.4 Commercial Facility Project Manager

The Commercial Facility Project Manager (CFPM) is responsible for managing the design, construction, initial startup, and procurement activities. In addition to managing contracts, the CFPM also manages a group of Project Managers, the Project Controls Manager, the Configuration Management (CM) Manager, and the Integrated Safety Manager (ISA) Manager. The Project Managers are responsible for Procurement, Construction, Engineering, Project Engineering, Project Controls, and Startup.

2.5 Integrated Safety Analysis Manager

The ISA Manager is responsible for the conduct and maintenance of the ISA.

2.6 Configuration Management Manager

The CM Manager is responsible for the conduct and maintenance of the CM Program.

2.7 Procurement Manager

The Procurement Manager is responsible for procurement and providing procurement material control services, to include, but not limited to, supplier qualification coordination, purchasing, and contracting. The Procurement Manager is also responsible for supply strategy and development of qualified long-lead-time and complex-system suppliers.

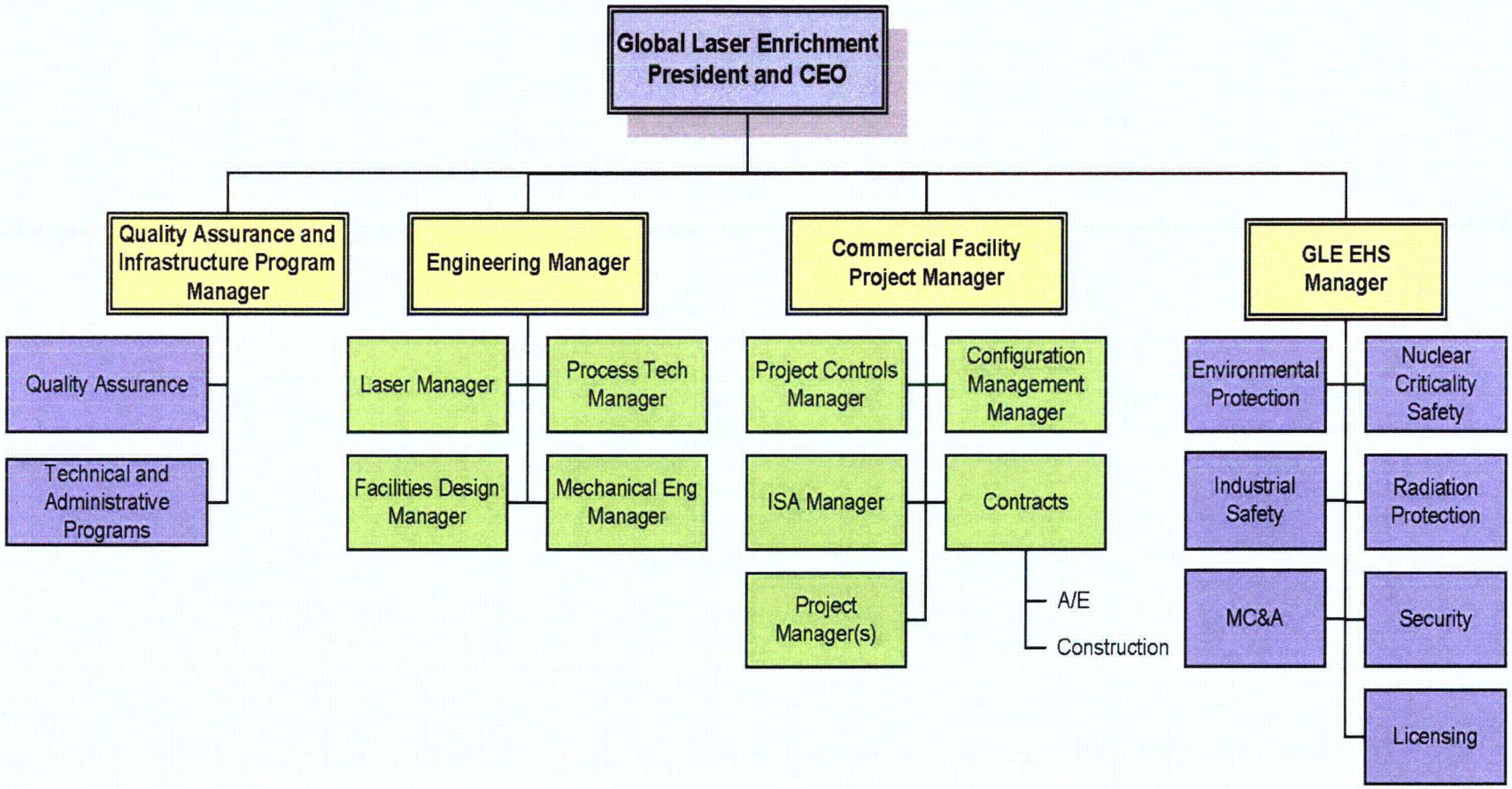
2.8 Global Laser Enrichment Environmental, Health, and Safety Manager

The GLE Environmental, Health, and Safety (EHS) Manager is responsible for Environmental Protection, Industrial Safety, Material Control and Accounting, Nuclear Criticality Safety, Radiological Protection, Security, and Licensing.

2.9 General Worker Responsibilities

Every individual working on the GLE project, to include contractor personnel, is responsible for quality. Each worker has an obligation to identify concerns using the corrective action process with respect to work within their scope of responsibility whenever the health and safety of the workers, the public, or the environment is involved; or when continued work will produce results that are not in compliance with the QA Program. This corrective action process is controlled by approved written policies, plans, and/or procedures that apply to all GLE personnel. The authority and responsibility for stopping work, the criteria and documentation required to process the stop work, and the actions required before work may resume, are detailed in approved written policies, plans, and/or procedures. This process ensures safety-related activities are controlled until the deficiency or unsatisfactory condition has been resolved.

Figure 1. Global Laser Enrichment Project Design and Construction Phase Organization Chart.



3. QUALITY ASSURANCE PROGRAM

The GLE QA Program applies to all workers at all levels of the organization, to include contractor personnel, who perform quality-affecting activities associated with safety-related aspects of the facility. While this QAPD document is formatted following the 18 elements of American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1, *Quality Assurance Program Requirements for Nuclear Facilities (Ref. 4)*, the QA Program is risk-informed and utilizes only those elements and principles appropriate for assuring the quality-related aspects of the fuel cycle facility.

The QAPD states GLE policies, assigns responsibilities, and specifies requirements governing implementation of the QA Program for the design, construction, operation, and decommissioning of the GLE Commercial Facility. Specific processes and controls, which implement the provisions of the QA Program, are delineated in approved written policies, plans, and/or procedures. When work cannot be accomplished as specified in implementing QA policies, plans, and/or procedures, or accomplishment of such work would result in an unsafe condition, work is stopped until proper corrective action is taken. If a procedure cannot be used as written, then work is stopped until the procedure is changed.

The QA Program is applied to the design, fabrication, testing, operation, procurement, inspection, maintenance, and modification of IROFS and activities affecting those IROFS. The QA Program, in addition to other management measures, ensures IROFS are available and reliable to perform safety functions when needed. The QA Program is applied in a graded approach based on an item's importance to safety.

Personnel performing or managing activities affecting quality are indoctrinated or trained on the QA Program and appropriate QA implementing policies, plans, and/or procedures. Each manager is responsible for the applicable indoctrination, training, and qualification of their personnel. Line management, of those organizations implementing the QA Program or portions thereof, regularly assesses the adequacy of the program for which they are responsible through an appropriate combination of reviews, approvals, self-assessments, or audit processes; thereby, assuring its effective implementation. Responsible senior managers regularly assess the adequacy and effective implementation of the QA Program through methods such as review meetings and by reviewing audit and corrective action reports.

Three QA Levels have been established and apply throughout the life of the GLE Commercial Facility from design and construction through testing, startup, operation, maintenance, modification, and decommissioning. The three QA levels are as follows:

QL-1 – Applied to single (sole) IROFS preventing or mitigating a high consequence event. All QA Program requirements are applied to QL-1 IROFS.

QL-2 – Applied where two or more IROFS are credited to prevent or mitigate a high consequence event, or any single (sole) IROFS preventing or mitigating an intermediate consequence event. QA Program requirements are applied to QL-2 IROFS using a graded approach. The graded approach is implemented through approved written policies, plans, and/or procedures, taking into consideration the following:

- Risk significance,
- Applicable regulations, industry codes, and standards,
- Complexity or uniqueness of an item or activity, in addition to the environment in which it has to function,
- Quality history of the item in service or activity,
- Degree to which functional compliance can be demonstrated or assessed by test, inspection, or maintenance methods,
- Anticipated life span,
- Degree of standardization,
- Importance of data generated, and
- Reproducibility of results.

By appropriately balancing considerations of importance and process capability, an appropriate level of quality is achieved commensurate with the item's importance to safety. The results of the application of the graded approach to quality are incorporated into design requirement documents, specifications, policies, plans, procedures, instructions, drawings, inspection plans, test plans, procurement documents, and any other document that establishes the requirements for items or activities.

QL-3 – Covers items that are not QL-1 and QL-2. QL-3 items are controlled in accordance with standard commercial practice and do not require the maintenance of quality records.

4. DESIGN CONTROL

Design management utilizes approved written policies, plans, and/or procedures to control the design process including inputs, analysis, outputs, reviews/checks/approvals, change control, technical interfaces, and administrative activities. Design policies, plans, and/or procedures assure applicable requirements are correctly translated into design documents.

Design is based upon sound engineering judgment, scientific principles, applicable codes, and standards. Design management ensures that design documents are prepared, reviewed, checked, and approved by qualified individuals. Design documents include requirement documents, drawings, reports, criteria, specifications, analysis, computer programs, system descriptions, technical reports, and the ISA. Work scope and responsibilities between design groups and disciplines are defined. Design management includes the following:

- Organizations in which the Design Control System is to be implemented;
- Design interface responsibilities between internal and external organizations;
- Exchange of technical information between internal and external organizations;
- Use of implementing design policies, plans, and/or procedures;
- Establishment of technical requirements and design standards;
- Selections and performance of design practices, to include review methods;
- Preparation of design documents;
- Extent of design reviews, to include technical reviews, peer reviews, modeling, and alternate calculations, as appropriate;
- Design output document control, to include review, approval, release status identification, distribution, and revision of documents;
- Determination and specification of acceptance criteria, required tests and inspections, and program requirements for records;
- Maintenance and retention of design documents; and
- Controls for design change.

Determination of the required rigor of design control is based upon the design phase and the ISA performed in compliance with 10 CFR 70, *Domestic Licensing of Special Nuclear Material (Ref. 5)*. The ISA establishes the identification and functions of IROFS and the significance to safety of functions performed by those IROFS.

The design of SSCs, involving a higher than normal level of risk, including those SSCs designated as IROFS, are subject to a greater degree of design control and verification. Design output documents for IROFS such as specifications, system descriptions, and drawings contain requirements for appropriate inspections, testing, and maintenance. Useful life expectancy is a design consideration to facilitate development of facility decommissioning, disassembly, and disposal plans.

Software used to produce or manipulate data directly used in the design, analysis, and operation of SSCs relied on for safety are developed, validated, and controlled per approved written policies, plans, and/or procedures. Commercially available software is not validated but the results are independently reviewed and verified.

Records of the design process are maintained as discussed in Section 7, Document Control, and Section 18, Quality Assurance Records. The details and implementation of requirements pertaining to design control are performed in accordance with applicable approved written engineering and design policies, plans, and/or procedures.

5. PROCUREMENT CONTROL

Provisions for control of the procurement process (sourcing), procurement documents, and procured materials, components, and services are described in approved written procurement policies, plans, and/or procedures. Design bases and other requirements necessary to provide reasonable assurance of quality are included or referenced in documents for procurement of items or services relied on for safety. Procurement documents for QL-1 items or services include, as appropriate for the item or service being procured, the following:

- Scope of work;
- Basic technical requirements including drawings, specifications, codes, and industrial standards with applicable revision data, test and inspection requirements, special processes, and special requirements for tasks such as designing, fabricating, cleaning, identification marking, erecting, packaging, handling, shipping, and storage;
- QA requirements, to include requirements for the supplier to have an acceptable QA Program or a system of management measures consistent with the applicable portions of the GLE QA Program. The extent of the required program is dependent upon the type and use of the item or services being procured;
- Requirements for the control of nonconformances and changes, including provisions to control and report nonconformance and changes to products being delivered;
- Requirements on sub-tier suppliers including the specification of procurement requirements on sub-tier suppliers, if applicable;
- Documentation requirements, to include requirements identifying documents to be submitted for information, review, or approval, instructions on record retention, turnover and disposition, and the requirements for delineating the technical and quality data required for ordering recommended spare and replacement parts and assemblies.

Requirements are established in approved written policies, plans, and/or procedures for content, review, approval, and change of procurement documents. Changes to the procurement documents shall be subject to the same degree of control as was utilized in the preparation of the original procurement document.

QL-1 and QL-2 items may be procured as commercially available items provided that the item is subjected to a dedication process. Items and services not relied on for safety may be designated as QL-2 or QL-3 and may be procured as commercially available items.

6. INSTRUCTIONS, PROCEDURES, AND DRAWINGS

Activities affecting the availability or reliability of IROFS are prescribed by, and accomplished in accordance with, documented specifications, requirements, policies, plans, procedures, instructions, and drawings of a type appropriate to the circumstance. These documents include or reference appropriate acceptance criteria for determining prescribed activities have been satisfactorily accomplished. Standard guidelines for the format, content, review, and approval processes for GLE documents are established in approved written policies, plans, and/or procedures.

GLE uses a hierarchy of plans, policies, and procedures to implement the requirements established for the GLE Project. Policies establish senior management expectations with regard to quality and safety. Implementing policies, plans, and procedures provide specific instructions to workers performing quality-affecting activities associated with safety-related aspects of the GLE Commercial Facility. Policy, plan, and/or procedure preparation, review, and approval are the responsibility of the manager of each functional area. The QA function reviews QA implementing policies, plans, and procedures for compliance and consistency with the QA Program and to ensure the provisions of the QA Program are effectively incorporated into the implementing policies, plans, and procedures. Adherence to policies, plans, and procedures is mandatory. In the case of conflict or error involving a policy, plan, and/or procedure, the activity in question shall be placed in a safe condition and the policy, plan, and/or procedure shall be corrected or changed before proceeding to implementation. Activities that require skills normally possessed by qualified personnel do not require detailed step-by-step delineation in a policy, plan, or procedure. These activities are performed in accordance with documents of a type appropriate to the circumstance such as planning sheets, job descriptions, external manuals, or other applicable form.

7. DOCUMENT CONTROL

GLE documents, and changes to documents, prescribing or specifying quality requirements or activities affecting the availability and/or reliability of IROFS, are controlled in a manner to ensure the use of the correct document. Such documents, including changes thereto, are reviewed for adequacy and approved for release in accordance with a defined, management-approved process. Policies, plans, procedures, and instructions ensure documents are: (1) prepared and reviewed for adequacy, correctness, and completeness by a qualified individual; (2) approved for release; and (3) used appropriately in performing the activity. Obsolete or superseded documents are removed or appropriately identified. Policies, plans, and procedures identify documents to be controlled, responsibility for preparing, reviewing, approving, and issuing documents to be used, and require the establishment of current and updated distribution lists. Policies, plans, and procedures are maintained under revision control.

8. CONTROL OF PURCHASED ITEMS AND SERVICES

The procurement of items and services is controlled to ensure conformance with requirements. The controls provide the following, as appropriate: supplier (source) evaluation and selection; evaluation of objective evidence of quality furnished by the supplier; source inspection; audit; and examination of items or services upon delivery or completion.

Sourcing activities are planned and documented to ensure a systematic approach to the procurement process. The GLE sourcing function is responsible for procurement planning and bid evaluation. The QA function provides procurement QA support, such as verification or surveillance of the suppliers QA Program; receipt inspections; installation inspections; and review of procurement documents during receipt inspections. The design function assists the QA and sourcing functions by performing evaluations of supplier's technical capabilities. The design function is also responsible for determining specific methods of acceptance to be applied to purchased items and reviewing the specific method of acceptance to be applied to services. The design function is also responsible for approval of dispositions and technical evaluation of supplier nonconformances for items and services dispositioned as "repair" or "use-as-is."

Supplier selection is based, in part, on an evaluation of the supplier's capability to provide items or services in accordance with the requirements of sourcing documents. Supplier evaluations may include audits or assessments of the supplier program or system for ensuring quality or an evaluation of the supplier's history of providing an identical or similar product that performs satisfactorily in actual use. Measures are established to interface with the supplier and to verify supplier's performance, as necessary.

A supplier working to the GLE QA Program shall be indoctrinated or trained on the QA Program and the applicable implementing policies, plans, and/or procedures governing the work being performed. Supplier work performed under the GLE QA Program is subject to the same controls implemented for GLE personnel. Supplier-generated documents are reviewed for acceptability. Acceptability verification activities are based on quality level, complexity, and quantity of items or services provided. Technical documents used as input to design processes, such as analyses, calculations, or drawings, require an independent technical review. Supplier furnished material, equipment, or services related to safety are reviewed for acceptability by performing, as appropriate, one or more of the following, to the items or services being procured:

- Monitoring, witnessing, or observing activities performed by the supplier,
- Receiving inspection,
- Post-installation testing.

Supplier nonconformances may be identified either by GLE or by the supplier. Nonconforming items are not released for use until the nonconforming condition is reviewed and accepted by GLE and the implementation of the disposition is verified, except under conditional release provisions. Records of supplier nonconformance are maintained.

9. IDENTIFICATION AND CONTROL OF MATERIALS, PARTS, AND COMPONENTS

Controls are established for QL-1 and QL-2 items and services to ensure only correct and accepted items and services are used or installed. Identification is maintained on the items, in documents traceable to the items, or in a manner that assures identification is established and maintained.

Items are identified and controlled, as necessary, from initial receipt and fabrication of the items, up to and including installation and use, to assure only correct and accepted items are used or installed. Physical identification is used to the maximum extent possible. When physical identification is either impractical or insufficient to control the item, physical separation, procedural controls, or other means are employed. When markings are used, measures are established to ensure the markings are clear, legible, or machine readable, and do not have a detrimental effect on the function or service life of the item. Markings are transferred to each part of an identified item when subdividing and are not to be obliterated by surface treatments or coatings unless other means of identification are provided. Traceability of items to specific records is provided when specified by codes, standards, or specifications. Where specified, items having a limited operating or shelf life are identified and controlled to preclude use of items whose operating or shelf life has expired.

10. CONTROL OF SPECIAL PROCESSES

Special processes affecting quality of items and services are controlled. Policies, plans, procedures, instructions, drawings, checklists, travelers, work orders, or other appropriate means are used to control special processes. These special processes assure special process parameters are controlled and specified environmental conditions are maintained.

Special processes that control or verify quality (that is, those used in welding, heat treating, and nondestructive examination) are performed by qualified personnel using approved written policies, plans, and/or procedures in accordance with specified requirements, codes, or standards. When the outcome of the process is highly dependent on personal skills, such individuals are certified in accordance with specified requirements. When the outcome is highly dependent on control of process parameters, the process and equipment are pre-qualified in accordance with specified requirements. Special process policies, plans, and/or procedures prescribe the necessary equipment, process parameters, calibration, and acceptance criteria. Records are maintained of currently qualified personnel, processes, and equipment for special processes.

11. INSPECTION

Planned inspections are performed, as required, to verify conformance of items or activities to specified requirements. Inspection requirements are specified in approved written policies, plans, and/or procedures, with provisions for documenting and evaluating the inspection results. Personnel performing inspections are qualified based on experience, education, or certification, as appropriate. Personnel other than those who performed or directly supervised the work being inspected perform inspection for acceptance.

Inspection planning may utilize hold points, where applicable, to ensure work does not bypass required inspections. The hold points are established in documents that control the work. Work does not proceed beyond an inspection hold point without specific documented consent of the designated inspection representative.

The planning of inspection activities, methods, and attributes is based on: 1) the importance of the item or activity to be inspected; 2) mandatory inspections required by codes, standards, regulatory requirements, and commitments; 3) the complexity of the item or activity; and 4) the quality history of the process. Inspection planning includes characteristics to be inspected, responsibility, method, measuring and test equipment, acceptance criteria, referenced instructions, and design documents.

When a sample is used to verify acceptability of a group of items, the sampling policy, plan, or procedure is documented and clearly identifies the sampling basis. If inspection of completed work is impossible or disadvantageous, indirect verification by process monitoring is provided. Both inspection and process monitoring are provided, when necessary, to ensure quality. Final inspections include a record review of the results and resolution of any nonconformance(s) identified by prior inspections. Acceptance by final inspection verifies conformance of the item to specified requirements. Modifications, repairs, or replacements of items performed subsequent to final inspection require re-inspection or re-test, appropriate to the circumstances, to verify acceptability. Inspection records contain, as a minimum, the item inspected, date of inspection, inspector, type of observation and inspection plan, results or acceptability, and action taken in connection with any identified nonconformances.

12. TEST CONTROL

Tests required for conformance verification of an item or computer program to specified requirements and to demonstrate satisfactory performance for service are planned and executed. Characteristics to be tested and test methods to be employed are specified. Test results are documented and their conformance with acceptance criteria is evaluated. Tests required to collect data, such as for siting or design input, shall be planned, executed, documented, and evaluated.

Tests include design verification tests, acceptance tests, preoperational and operational tests, and post-maintenance tests. Planning for tests may include mandatory hold points, as required. Test policies, plans, and/or procedures contain the following information, as appropriate:

- Test purpose or objectives, responsibilities, characteristics to be tested, hold points, and test methods to be employed;
- References and related documents;
- Provisions for ensuring prerequisites for a given test have been met, to include, as applicable, calibrated instrumentation, appropriate equipment, trained personnel, condition of test equipment and the item to be tested, and provisions for data acquisition;
- Adequate instrumentation is available and suitable environmental conditions are maintained;
- Provisions for documenting and evaluating the test results for conformance with acceptance criteria; and
- Qualifications for test personnel.

In lieu of test policies, plans, and procedures, appropriate sections of related documents (such as, American Society for Testing and Materials' [ASTM] methods, external manuals, maintenance instructions, approved drawings, or travelers with acceptance criteria) may be used. Such documents must include adequate instructions to ensure the required quality of work. Test records contain the following information: item tested; test date; tester or data recorder; type of observation; test policy, plan, procedure, or reference; results and acceptability; actions taken in connection with any deviations noted; and person evaluating the results.

13. CONTROL OF MEASURING AND TEST EQUIPMENT

Measuring and Test Equipment (M&TE) used in activities affecting the availability or reliability of IROFS are controlled, calibrated, and adjusted at specified intervals to maintain equipment performance within required limits. Policies, plans, and procedures ensure that devices and standards used for measurement, tests, and calibration activities are of the proper type, range, and accuracy. Calibration control is not necessary for rulers, tape measures, levels, and other such devices. A list of devices is established to identify those items within the calibration control system. This identification listing includes, as a minimum, the due date of the next calibration and any use limitations (when calibrated for limited use).

M&TE is calibrated at specified intervals or prior to use against equipment having a known valid relationship to nationally recognized standards. If no nationally recognized standard exists, the basis for calibration is documented. M&TE is properly handled and stored to maintain accuracy. When M&TE is found to be out of calibration, as-found data are recorded, and an evaluation is made and documented as to the validity of previous inspection, test results, and of the acceptability of items previously inspected or tested. Out-of-calibration devices are tagged or segregated and are not used until re-calibrated. When M&TE is consistently found to be out of calibration, it is repaired or replaced. Calibrations are also performed when personnel performing measurements and tests deem the accuracy of the equipment suspect. Records are maintained and equipment is suitably marked or otherwise identified to indicate its calibration status.

14. HANDLING, STORAGE, AND SHIPPING

Material and equipment are handled, stored, and shipped in accordance with design and procurement requirements to protect against damage, deterioration, or loss. Special coverings, equipment, and protective environments are specified and provided where necessary for the protection of particular items from damage or deterioration. When such special protective features are required, their existence is verified and monitored as necessary to ensure they continue to serve the intended function.

Special handling tools and equipment are provided where necessary to ensure items can be handled safely and without damage. Special handling tools and equipment are controlled and maintained in a manner such that they are ready and fit to serve the intended function when needed. Such control includes periodic inspection and testing to verify that special handling tools and equipment have been properly maintained.

Operators of special equipment are experienced or trained as required. Attention is given to marking and labeling items during packaging, shipment, and storage. Additional marking or labeling is provided as necessary to ensure that items can be properly maintained and preserved. This includes indication of the presence of special environments or the need for special control. Special handling, preservation, storage, cleaning, packaging, or shipping instructions are established and used when essential to maintain acceptable quality.

15. INSPECTION, CONTROL, TESTING, AND OPERATING STATUS

Policies, plans, and procedures are established to ensure that the status of inspection and test activities are either marked or labeled on the item or in documents traceable to the item. This activity is required when it is necessary to ensure that required inspections and tests are performed, and to ensure items that have not passed the required inspections and tests are not inadvertently installed, used, or operated.

Status indicators (for example, physical location and tags, markings, work controlling documents, stamps, inspection records, or other suitable means) are utilized when required. This includes indicating the operating status of systems and components (for example, tagging valves and switches) to prevent inadvertent operation. Authority for the application and removal of tags, markings, labels, and stamps is specified.

16. CONTROL OF NONCONFORMING ITEMS

Items and related activities that do not conform to specified requirements are controlled to prevent inadvertent installation or use. Nonconforming items are identified in a manner that does not adversely affect the end use of the item by markings, tagging, and other appropriate methods. Nonconforming items are segregated, when practical, by placing them in a clearly identified and designated area until properly dispositioned. When segregation is impractical or impossible due to physical conditions (for example, size, weight, or access limitations), other measures are employed to preclude inadvertent use of the item.

Nonconforming items are reviewed and dispositioned as "reject," "rework," "repair," or "use-as-is." Further processing, delivery, installation, or use of the nonconforming item is controlled pending an evaluation and approved disposition by personnel as authorized in approved written policies, plans, and/or procedures, and documented notification to affected organizations is provided.

The responsibility and authority for the evaluation and disposition of nonconforming items is defined. The personnel performing evaluations to determine the dispositions have demonstrated competence in the specific area being evaluated, have an adequate understanding of the requirements, and have access to pertinent background information. The disposition of nonconforming items is identified and documented as required to carryout the disposition. Technical justification for the acceptability of nonconforming items dispositioned "repair" or "use-as-is," is documented and subject to design control measures described in Section 4, Design Control. The disposition process includes consideration of the need for design documents to be "as-built" to facilitate operations, maintenance, or modification. The as-built records, if the disposition determines such records to be required, reflect the accepted deviation. Repaired or reworked items are re-examined in accordance with the original acceptance criteria unless the nonconforming item disposition has established alternate acceptance criteria.

Nonconformance documentation identifies the nonconforming item, describes the nonconformance, contains the disposition and any re-inspection requirements, and contains the appropriate signatures approving the disposition.

17. CORRECTIVE ACTIONS

Conditions adverse to quality are identified and corrected as soon as practical. In the case of a significant condition adverse to quality, the cause of the condition is determined, and corrective action is taken to preclude recurrence. Significant conditions, their causes, and corrective actions are documented, reported to appropriate levels of management, and follow-up action is taken to verify implementation of corrective actions.

Approved written policies, plans, and/or procedures specify requirements for identification and classification of conditions adverse to quality, trending of significant conditions adverse to quality, criteria for determining trends, and follow-up action to be taken to verify implementation of corrective action.

18. QUALITY ASSURANCE RECORDS

GLE produced QA records that furnish documentary evidence of quality shall be specified, prepared, and maintained in accordance with applicable regulatory requirements and approved applicable approved written policies, plans, and procedures. QA records shall be legible, identifiable, and retrievable, and shall be protected against damage, deterioration, and loss for the specified record retention duration.

A Records Management Program and Records Center shall be established as early as practicable, consistent with the work activities, and in compliance with QA Program requirements. Specific requirements and responsibilities for generation, classification, retention, receiving, storage, and preserving of QA records are established in approved written policies, plans, and/or procedures.

19. AUDITS

Audits are performed to verify compliance with the QA Program and to determine its effectiveness. Audits of organizations performing quality-affecting activities associated with safety-related aspects of the facility are performed at a frequency commensurate with the status and importance of the activity. Audits are performed on both internal and external organizations providing products or services to the project.

Audits are performed in accordance with policies, plans, procedures, and/or checklists by personnel who do not have direct responsibility for performing the activities being audited. A plan is prepared for each audit to identify the audit scope, requirements, audit personnel, activities to be audited, applicable documents, organizations to be audited, schedule, and policies, plans, procedures, or checklists. Auditors (including technical specialists) have training or experience commensurate with the scope, complexity, or special nature of the audit.

Organizations being audited provide access and assistance to the audit personnel. Objective evidence is examined to determine if the QA Program elements are being implemented effectively. Audit results are discussed with the audited organization's management, and conditions requiring prompt corrective action are reported immediately to the audited organization's management. The audit report includes the following information, as appropriate:

- Description of the audit scope,
- Identification of the auditors,
- Identification of persons contacted during audit activities,
- Summary of audit results, to include a statement on the effectiveness of the QA Program elements audited, and
- Description of each reported adverse audit finding in sufficient detail to enable corrective action taken by the audited organization.

Audit results are documented, reported to, and reviewed by responsible management. Management of the audited organization or activity investigates adverse audit findings, schedules corrective action, including measures to prevent recurrence (if appropriate), and notifies the QA organization of the action taken. Adequacy of audit responses is evaluated by the QA organization and verification of corrective action is documented. Follow-up action is taken to verify the implementation and effectiveness of the corrective action and to determine if repetitive problems require further corrective action. Audit records include audit plans, audit reports, written responses to the audit findings, and the record of completion of corrective action.

20. PROVISIONS FOR CHANGE

The QA Program is reviewed and revised as necessary to reflect any changes that occur during the design, construction, operation, and decommissioning phases. In addition, the QA Program is revised when corrective actions, regulatory, organizational, or work scope changes warrant changes to the QA Program.

The QA Program is maintained current through design, construction, operation, and decommissioning of the facility. The QA Program is kept current as the design, construction, operation, and decommissioning activities progress, and appropriate changes are made based on any of the following:

- Lessons learned from audit and assessment findings;
- Program improvements identified from analysis of trends;
- Changes due to regulations, commitments, re-organizations, revised project schedule, or program improvements from continuous review of assessment results and process improvement initiatives.

QA Program changes are controlled in accordance with the requirements in 10 CFR 70.72, *Plant Changes and Change Process (Ref. 6)*. Changes not requiring U.S. Nuclear Regulatory Commission (NRC) approval prior to implementation are submitted to the NRC annually, in accordance with 10 CFR 70.72.

21. REFERENCES

1. 10 CFR 70.4, *Definitions*, U.S. Nuclear Regulatory Commission, 2008.

2. 10 CFR 70.61, *Performance Requirements,* U.S. Nuclear Regulatory Commission, 2008.

3. 10 CFR 70.64, *Requirements for New Facilities or New Processes at Existing Facilities*, U.S. Nuclear Regulatory Commission, 2008.

4. ANSI/ASME NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities*, American National Standards Institute/American Society of Mechanical Engineers Standard, New York, NY, 1994.

5. 10 CFR 70, *Domestic Licensing of Special Nuclear Material,* U.S. Nuclear Regulatory Commission, 2008.

6. 10 CFR 70.72, *Facility Changes and Change Process,* U.S. Nuclear Regulatory Commission, 2008.