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May 2, 2012

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: *GE-Hitachi Global Laser Enrichment LLC* (GLE Commercial Facility), Docket No. 70-7016-ML

Dear Administrative Judges:

Enclosed are GE-Hitachi Global Laser Enrichment LLC's (GLE) responses to the safety and environmental questions posed by the Atomic Safety and Licensing Board (Board) in its Memorandum and Order (Initial Board Questions and Associated Administrative Directives) (Apr. 4, 2012). In accordance with the Board's direction, GLE has coordinated its answers with the NRC Staff to the extent practicable. As a result, GLE is not providing written answers to all of the Board's questions, some of which are being addressed exclusively by the NRC Staff. The questions not being answered in whole or in part by GLE are identified in the enclosed submittal.

GLE is submitting two versions of this document. The first is the full non-public version that contains proprietary and security-related information that is protected from public disclosure pursuant to 10 CFR 2.390 (as well as public information). The second is the version that may be released to the public because all non-public information has been removed from the document. *See* Answers to FSER Questions 20 & 22 and FEIS Questions 13, 16, & 41. None of GLE's answers (in either submittal) contains Export Controlled Information or Classified Information.

Respectfully submitted,

Executed in accord with 10 C.F.R. § 2.304(d)
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PUBLIC VERSION

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

GE-HITACHI GLOBAL LASER ENRICHMENT
RESPONSES TO INITIAL BOARD QUESTIONS (PUBLIC VERSION)

This proceeding concerns the application of GE-Hitachi Global Laser Enrichment LLC (GLE) for a license to construct and operate a uranium enrichment facility in Wilmington, North Carolina. The Atomic Energy Act (AEA) of 1954, as amended, and 10 CFR Part 70 mandate the conduct of hearing in connection with GLE's License Application (LA). Broadly speaking, the hearing concerns the adequacy of the Nuclear Regulatory Commission (NRC) Staff's safety and environmental reviews of the GLE LA, as documented in the Staff's Safety Evaluation Report (SER) and Final Environmental Impact Statement (FEIS). Both of these documents were issued in February 2012 (as NUREG-2120 and NUREG-1938, respectively).

On April 4, 2012, as part of the mandatory hearing process, the Atomic Safety and Licensing Board overseeing this proceeding issued a "Memorandum and Order (Initial Board Questions and Associated Administration Directives)." In that Memorandum and Order, the

Board issued a series of questions pertaining to the NRC Staff's SER (referred to as the FSER by the Board) and FEIS for the Proposed GLE Facility. The Board stated that "most of the Board's questions are directed primarily to the U.S. Nuclear Regulatory Commission (NRC) Staff. As appropriate, however, answers to the Board's questions should be submitted both by the NRC Staff and by the Applicant. To the extent practicable, the parties are encouraged to coordinate their responses so as to avoid repetition." Memorandum and Order (April 4, 2012) at 3.

In accordance with the Board's direction, GLE has cooperated and coordinated its answers with the NRC Staff to the extent practicable, given the schedule for answers to the Board's questions and the importance of providing the Board with relevant, responsive information. As a result, GLE is not providing written answers to all of the Board's questions. Those questions not being answered in whole or in part by GLE are identified in this submittal.

All of the Board's questions are repeated below, followed by either GLE's answer or a notation that the Staff exclusively is responding to the question. GLE also has identified the individual(s) who are responding on behalf of GLE and provided Affidavits and biographical statements for each of those individuals.

Finally, GLE is submitting two versions of this document. The first is the *full* non-public version that contains both proprietary and security-related information protected from public disclosure pursuant to 10 CFR 2.390, and public information. There is no Export Controlled Information in this document. The second is the version that may be released to the public because all non-public information has been removed from the document. None of GLE's answers contains classified information.

A. FSER-Related Questions

FSER Question No. 1:

Except for the laser-based separations process, much of the proposed facility is similar to previously licensed enrichment plants. While the safety risks may well be dominated by operations outside the cascade area, the understanding and control of these risks is rooted in an extensive operational history in other enrichment facilities. By contrast, there is no full-scale long-term operational experience for the laser-based separations process. Given these circumstances, explain the approach of the NRC Staff in testing the adequacy of the Applicant's safety evaluation related to this unique part of the facility.

Response to FSER Question No. 1:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 2:

Except as already discussed in the FSER or in response to other, more specific questions set forth below, identify any regulatory guides that were either directly or indirectly applicable to the proposed facility and explain how they were applied or adapted to the NRC Staff's review.

Response to FSER Question No. 2:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 3:

Except as otherwise discussed in response to more specific questions set forth below, identify significant issues to which the NRC Staff determined that no regulatory guide applied, and explain how the NRC Staff addressed such issues.

Response to FSER Question No. 3:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 4:

Except as otherwise discussed in response to more specific questions set forth below, describe the process (including timing considerations) by which the NRC Staff ensures that all of the Applicant's commitments, assumptions and procedures regarding the not-as-yet built facility are tracked and how it is determined that the assumptions are verified, commitments have been met, and procedures are in place at the appropriate time prior to facility operation.

Response to FSER Question No. 4:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 5:

What is the rationale for a notice-only license condition for changes made when the Applicant moves to enrichment greater than 5 percent U235 by weight? What recourse would the NRC Staff have if it were concerned about any changes to the facility, equipment, shipments, or operations? (SER, 1-9)

Response to FSER Question No. 5:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 6:

Clarify the scope of the authorization request and license condition in section 1.2.3.7.2. Does this mean that a process within the facility could be modified without prior approval as long as it does not degrade safety? If so, how is this safety determination made, and how does the NRC Staff ensure its accuracy? (SER, 1-12)

Response to FSER Question No. 6:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 7:

Do the exemption that allows incremental decommissioning funding and the associated license condition differ from the arrangements that the NRC Staff approved with respect to the Eagle Rock Enrichment Facility? If so, explain how they differ and the NRC Staff's reasoning. (SER, 1-14 to 1-16)

Response to FSER Question No. 7:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 8:

Did the NRC Staff approve Standard Practice Procedures Plan (SPPP)-03, or is it to be approved when SP-01 and SPPP-03 are combined? (SER, 1-24)

Response to FSER Question No. 8:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 9:

How has the potential impact of tornado winds on the proposed facility been assessed in the absence of a final plant design? Preliminary plans call for large surface areas on the facility. What design evaluations have been done for wind? (SER, 1-34 to 1-35)

Response to FSER Question No. 9:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 10:

Expand on the rationale that a hurricane surge could not reach the site. Does the Regulatory Guide 1.59 methodology consider topographical features? Does the stated surge prediction include significant conservatism? (SER, 1-35, ISAS, 2-26)

Response to FSER Question No. 10:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 11:

Given recent events at Fukushima Daiichi, did the NRC Staff use an increased level of conservatism in evaluating the potential impact of a tsunami on site safety? (SER, 1-39)

Response to FSER Question No. 11:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 12:

What, if any, further tests or evaluations are planned regarding hydrology? (SER, 1-44)

Response to FSER Question No. 12 (Olivier/Alexander):

Hydrology tests and evaluations are both ongoing and planned for the Wilmington Site (as defined in the FEIS) and surrounding areas. Monitoring of (1) surface water quality and (2) groundwater quality and usage are ongoing and will continue as part of GLE's water resource monitoring programs. Surface water and wastewater effluents are sampled for quality from various locations on and near the Wilmington Site, as described in Section 9.2.2.2.2 of the LA (pp. 9-14 to 9-17).

As indicated in Section 9.2.2.1.10 of the LA (p. 9-13), stormwater runoff from the Wilmington Site is monitored in accordance with the National Pollutant Discharge Elimination System (NPDES) stormwater management permit issued by the North Carolina Division of Water Quality.

With respect to surface water usage, surface water is not used for operations at the Wilmington Site; therefore, surface water volumes are not routinely monitored. However, in order to obtain state and local permits for construction of the Proposed GLE Facility (and other Site construction activities), wetland field surveys are performed in areas of the Wilmington site that may be impacted by construction activities (ER Section 4.4.4, pp. 4.4-17 to 4.4-21).

Wilmington Site groundwater quality impacts are described in Section 3.4.1.2.2 of the ER (pp. 3.4-8 to 3.4-10). As indicated in that section, industrial operations at the Wilmington Site over the past 40 years have resulted in several specific and well-understood impacts to groundwater. These impacts are being monitored and remediated as necessary through programs that have been established in coordination with the governing federal and state regulatory agencies. Groundwater usage is also monitored, (ER Section 3.4.5.3, p. 3.4-28). Groundwater levels and pumping well rates are routinely measured and evaluated, and adjustments to pumping well rates are made, as necessary.

As described in Section 2.5.3 of GLE's Integrated Safety Analysis (ISA) Summary, or ISAS (pp. 2-23 to 2-25), conservative flood analyses have been performed, which define the Probable Maximum Flood (PMF) at the Site. GLE determined that potential flooding at the Site from the Probable Maximum Precipitation (PMP), as well as from upstream dam failures, hurricane surges, tsunamis, and seiches, are bounded by the

PMF flood analyses. No additional flood-related tests or evaluations are planned. The NRC Staff reviewed GLE's analyses of hazards from flooding and found them to be acceptable (SER pp. 3-12 to 3-13).

FSER Question No. 13:

The FSER states that the Nuclear Criticality Safety Manager, at a minimum, will have "experience in the understanding, application, and direction of NCS programs." This appears to require no specific education, training or firsthand experience with criticality safety methods, previous criticality events, or performing criticality safety analyses. Explain how the NRC Staff determined this to be an adequate level of qualification. (SER, 2-6)

Response to FSER Question No. 13:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 14:

Will the Industrial Safety Manager be required to have specific training and experience in laser safety? (SER, 2-6)

Response to FSER Question No. 14 (Givens):

GLE addresses laser safety in accordance with Occupational Safety and Health Administration (OSHA) Technical Manual, TED 01-00-015, Chapter 6, *Laser Hazards*, and the ANSI Z136 series of standards, as well as applicable state implementing requirements. The Industrial Safety Manager will have the requisite training in laser safety. As part of GLE's General Employee Training, personnel with unescorted access to laser areas, including the Industrial Safety Manager, receive the requisite laser safety training. LA, Section 11.3.2.3 (pp. 11-15 to 11-16) (public)

Based on these requirements, the Industrial Safety Manager is not required to, but may, have experience in laser safety. However, the Laser Safety Program utilizes an individual assigned as the Laser Safety Officer, who has experience with laser safety, to

provide day-to-day oversight, monitoring, enforcement, and control of laser hazards and related safety procedures.

FSER Question No. 15:

Did NUREG-1520 provide an adequate basis for the NRC Staff to review all aspects of this laser-based facility? Are there areas where the guidance needed to be supplemented? As a specific example, is the guidance adequate to form the basis for reviewing the Applicant's laser safety program? (SER, 3-3)

Response to FSER Question No. 15:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 16:

Regarding potential aircraft crashes at the site: (SER, 3-15 to 3-17)

a. Expand on the NRC Staff's rationale for accepting that crashes by single engine planes could be excluded. Specifically, what is the support for the NRC Staff's conclusions?
b. Were crashes into the tank storage areas considered? If not, why not?

Response to FSER Question No. 16:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 17:

Given that one of the two borings showed at least a marginal risk for liquefaction, why were additional borings not done to test this issue? How do the borings' locations compare to the proposed plant location? How will the Applicant's more detailed evaluation of liquefaction potential alleviate any concerns raised by the borings? (SER, 3-21 to 3-22)

Response to FSER Question No. 17 (Hunt):

The preliminary liquefaction analysis described in the SER was part of a subsurface investigation conducted in December 2007 to provide preliminary information about general site suitability and conceptual foundation and structural design considerations. Given the preliminary nature of this liquefaction analysis and the results obtained, it was not necessary to perform additional borings prior to submitting GLE's license

application. However, GLE committed in LA Section 1.3.5.3 (p. 1-46) and ISAS Section 3.3 (p. 3-13), Structural Design Criteria, to perform additional geotechnical investigation in accordance with NRC-accepted guidelines. This commitment is expressly documented in the SER (pp. 1-42 to 1-43 and 3-22 to 3-23).

As discussed in the SER (pp. 3-21 to 3-22), GLE's preliminary soil liquefaction analysis was based on soil data from two soil borings evaluated as part of the 2007 preliminary subsurface investigation of the GLE Study Area. Certain aspects of that investigation, including GLE's preliminary liquefaction analysis, are described briefly in Section 2.5.1.3 of the ISAS (p. 2-20) and Section 1.3.5.3 of the LA (p. 1-46). More detailed information is presented in Sections 3.3.5, 4.3.2, and Appendix G of GLE's Environmental Report (ER) (pp. 3.3-26 to 3.3-29, 4.3-5, and G-2 to G-4). Appendix G, *Results of the Preliminary Subsurface Investigation*, provides the results of laboratory testing of soils, geotechnical evaluation and analysis, and velocity modeling outputs.

In particular, six widely-spaced borings were drilled over the GLE Study Area between December 17 and 19, 2007. The boring locations were initially established in the field using a Global Positioning System (GPS) unit and were later surveyed more precisely by a registered land surveyor. The borings were advanced to termination depths of 35 to 57 ft (10.7 to 17.4 m) below ground surface by wash boring methods, and standard penetration tests were performed at selected intervals in each of the borings to evaluate the consistency and density of the subsurface soils. Selected soil samples were tested for grain-size distribution, water content, and Atterberg Limits to assist in soil classification and to provide information required for geotechnical seismic analyses. In addition, GLE re-evaluated four 1980 soil borings (and associated monitoring wells LF-1

to LF-4) as part of the 2007 geotechnical investigation. ER Figure 3.3-25 shows the locations of the six 2007 test borings (G-1 to G-6) and the four 1980 test borings (LF-1 to LF-4).

As discussed in Appendix G, Section G.5 (Liquefaction Potential) of the ER (pp. G-2 to G-4), the preliminary soil liquefaction analysis was performed to determine the Factor of Safety (FS) against initiation of liquefaction for the soil profiles encountered in borings G-6 and LF-2, which correspond to the profiles with the highest and lowest potential for liquefaction, respectively, as assessed during the preliminary site subsurface investigation. Tables G-7 and G-8 present the results of the preliminary liquefaction analyses for borings G-6 and LF-2, respectively. *As shown in ER Figure 3.3-25, borings G-6 and LF-2 are located within the footprint of the Proposed GLE Facility.* The assessment results indicated a marginal risk of localized liquefaction at depths of 25 and 40 ft for soils in the G-6 boring, and no liquefaction risk for the soils in the LF-2 boring. Based on its overall assessment, GLE concluded that the soil liquefaction potential is small at the proposed site for the applicable peak horizontal ground acceleration.

As noted above, GLE committed to perform additional geotechnical investigation in accordance with NRC Regulatory Guide 1.132, *Site Investigations for Foundations of Nuclear Power Plants*, Rev. 2 (2003). GLE's response to the Board's SER Question No. 18 provides additional details regarding the specific testing methods for the more detailed site geotechnical investigation.

Based on its review of the preliminary information presented in the LA, ISAS, and ER, and the commitments that GLE has made regarding geotechnical design investigations and evaluations, the Staff concurred with GLE's conclusion that the

potential for liquefaction of soils at the site is unlikely to be a safety concern for the Proposed GLE Facility (SER, pp. 1-42 to 1-43).

FSER Question No. 18:

What additional geotechnical tests will be included in the Applicant's more detailed evaluation of liquefaction potential for the soils at the final structure location of the GLE site? (SER, 3-22)

Response to FSER Question No. 18 (Hunt):

As stated in the response to SER Question No. 17, GLE has made the following commitment in the ISAS, Chapter 3, Section 3.3, *Structural Design Criteria* (p. 3-13) regarding additional geotechnical investigation:

> A geotechnical design investigation to determine the structural in-ground support system necessary to support the estimated heavy loading will be completed prior to commencement of construction. The geotechnical design investigation will be performed using the applicable regulatory guidance in Regulatory Guide 1.132, Site Investigations for Foundations of Nuclear Power Plants (Ref. 3-12).

To satisfy commitments made to the NRC in the LA and the ISAS, the additional soil borings, testing, and detailed geotechnical evaluations (including more detailed analyses of soil liquefaction potential) performed by GLE will comply with Regulatory Guide 1.132*,* and Regulatory Guide 1.198*, Procedures and Criteria for Assessing Seismic Soil Liquefaction at Nuclear Power Plant Sites* (2003).

The field work associated with the geotechnical investigation that GLE committed to perform is complete. Specifically, this field work included Standard Penetration Tests (SPTs) in the borings to obtain blow counts for use in evaluating liquefaction potential (e.g., loose sand zones). In addition, the investigation included soil laboratory testing, down-hole geophysical testing and logging (P-S velocity logging, caliper logging, dual induction logging, borehole deviation surveys), cone penetration testing, dilatometer

testing, refraction microtremor surface geophysical testing, pressuremeter testing, infiltrometer testing, and seasonal high water table evaluations to define the soil properties needed for further liquefaction evaluations and foundation design. These additional geotechnical tests are defined as applicable tests for liquefaction evaluation in the Regulatory Guides 1.132 and 1.198. The appropriate type of in-ground support system to be used to address liquefaction potential and support structure loads is under evaluation.

FSER Question No. 19:

In the absence of the geotechnical report needed to assess problems with settlement and soil capacity, why did the NRC Staff conclude the Applicant's analysis of hazards from seismic events was acceptable? (SER, 3-22 to 3-23)

Response to FSER Question No. 19 (Hunt):

As discussed in the responses to SER Questions No. 17 and No. 18, GLE made a commitment to conduct a geotechnical investigation in accordance with Regulatory Guide 1.132. The Regulatory Guide 1.132 geotechnical investigation includes analysis of hazards from seismic events, will meet the applicable NRC guidance, and uses industry-accepted methods as recommended in NUREG-1520.

The results of the geotechnical investigation are to be used to evaluate the settlement and soil capacity. This information, in turn, will be used to finalize the design of the proposed facility and to establish the management measures associated with the items relied on for safety (IROFS) to address seismic risk to the level credited in the ISA.

FSER Question No. 20:

There appear to be no fire events postulated for the cascade region of the facility. Was this area also evaluated, and if so what were the conclusions? If not, why not? (SER, 3-40 to 3-41, 7-8)

Response to FSER Question No. 20 (Lee):

As discussed in the SER (SER p. 3-37 (public)), GLE provided a Fire Hazards Analysis (FHA) to evaluate credible fire scenarios with respect to their potential to result in high- or intermediate-consequence events per 10 CFR 70.61. The FHA includes fire events for the cascade region. **[INFORMATION WITHHELD FROM PUBLIC DISCLOSURE PER 10 CFR 2.390.]**

The ISAS, Chapter 4, Section 4.18 *did evaluate* fire scenarios in the cascade region, which resulted in the identification of two IROFS necessary to satisfy the performance requirements of 10 CFR 70.61: IROFS CFS-01, "Fire Protection Program, Combustible Control," and IROFS CFS-02, "Fire Protection Program, Automatic Fire Suppression Systems." The ISAS concluded that no credible fire event in the facility exceeds the performance requirements of 10 CFR 70.61 with the application of the designated IROFS. As discussed above, GLE's FHA evaluated fire events in the cascade region, among other areas of the proposed facility. Various sections of the FHA discussed the cascade region and fire events associated with the cascade region, including Sections 2.3.6 (pp. 13 to 14), 2.7.5 (p. 25), and 5.1.4.5 (pp. 71 to 72). In particular, Section 5.1.4.5 considered the worst case fire event postulated in the cascade region (i.e., the ignition of combustible material).

FSER Question No. 21:

What is the definition for "extremely unlikely" in item 2 in Section 3.3.16.1? (SER, 3-43)

Response to FSER Question No. 21 (Enos):

The term "extremely unlikely" is used to indicate a likelihood of occurrence less frequent than "Highly Unlikely" (see SER Section 3.3.16.3, p. 3-44) and comparable to events

occurring once in a million years or events that have never occurred in any fuel cycle facility. In the context of accident sequences, the term "extremely unlikely" is one of several criteria presented in NUREG-1520, Rev. 0, Section 3.4.3.2(9), page 3-24 to determine if a hypothetical accident sequence is credible or not.

FSER Question No. 22:

How did the NRC Staff assure itself that the analytical methods used to evaluate the criticality hazard associated with the cascade region met regulatory requirements in terms of their experimental validation? Does the NRC Staff retain a copy of the Applicant's Validation Report? (SER, 5-18)

Response to FSER Question No. 22 (Painter):

GLE submitted a copy of the validation report in response to a request for information (Letter from Albert E. Kennedy, GLE, to Brian Smith, NRC, Response to Request for Additional Information Dated December 4, 2009 for Global Laser Enrichment License Application – Non-Public Responses, January 13, 2010). The NRC Staff reviewed the document. **[INFORMATION WITHHELD FROM PUBLIC DISCLOSURE PER 10 CFR 2.390.]**

FSER Question No. 23:

With respect to the Applicant's Criticality Accident Alarm System (CAAS) exemption request: (SER, 5-32 to 5-33)

a. Do other enrichment facilities licensed in the United States have CAAS coverage in the areas that are included in this exemption?
b. What is the basis for the statement in the fourth full paragraph on page 5-32 that "a criticality accident is highly unlikely?"
c. While the possibility of heavy rainfall in conjunction with a tank breach was discussed in the fifth full paragraph on page 5-32, was the possibility of a flood also considered?
d. Part of the argument supporting the CAAS exemption is that maintenance personnel could be subjected to criticality accident doses. Could not the presence of CAAS help other employees avoid exposure from a criticality accident? Expand on how the NRC Staff balanced the advantages and disadvantages in granting this exemption.

Response to FSER Question No. 23:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 24:

The NRC Staff points out that the safety evaluation it carried out "was based on the current facility design." (SER, 5-37, 11-6, 11.A-8)

a. Are there areas in the proposed facility design, such as the separations cascade, where the design is still evolving? If so, how can the NRC Staff assert that the design can and will meet regulatory requirements while important process steps are still changing? Has a baseline cascade design been established that is subject to the formal change control process?
b. The NRC Staff states in the last paragraph of page 1-3 that the Applicant provided adequate information to understand the processes at the facility. Does the NRC Staff consider the product collection process in the cascade region as something that needs to be understood? If yes, what are the sources of information used by the NRC Staff, and what criteria are used to judge the adequacy of the information?

Response to FSER Question No. 24:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 25:

Does the statement in the second paragraph on page 5-38 "Any increase in reflection conditions due to flooding is already accounted for since the CSAs [criticality safety analyses] use conservative reflection conditions" mean there are no arrangements of intact product tanks that if flooded would lead to criticality? If not, how are flooding and snow accumulation considered in the criticality evaluation of the product handling and storage areas? (SER, 5-38)

Response to FSER Question No. 25 (Painter):

GLE understands the quoted NRC Staff statement (SER p. 5-38) to mean that there are no credible arrangements of intact product tanks that, if flooded, would lead to criticality as a result of added reflection from flooding or snow. In particular, the specific product cylinder configurations considered by GLE in the CSAs conservatively represent worst-case conditions on reflection and interaction spacing, such that any impacts resulting from changes in reflection or spacing caused by heavy rain, snowfall, or flooding are

adequately accounted for in those analyses. In other words, the occurrence of flooding does not represent a unique accident sequence that requires further evaluation by GLE or the NRC Staff.

Specifically, GLE evaluated numerous configurations of Model 30B (UF_6 product) and Model 48Y (UF_6 feed) cylinders stacked in a single layer, in a double layer, and in infinite, triangular pitched arrays, with optimal interspersed water moderation between cylinders and full water-equivalent reflection above/below cylinder arrays (i.e., concrete below and full density water above). Both full cylinders and empty "heel" cylinders (emptied feed cylinders containing residual UF_6) were evaluated. GLE identified enrichment and moderation as NCS controlled parameters. It did not identify reflection or interaction spacing as controlled parameters. (Additionally, geometry was not identified as a controlled parameter, nor was mass in the full cylinders.) The analyses demonstrated that fissile material processes remain subcritical and that an adequate margin of safety is maintained even under these worst-case (i.e., fully-flooded) conditions for reflection and interaction spacing, in accordance with the performance requirements of 10 CFR 70.61.

FSER Question No. 26:

With respect to the unique Cascade/Gas Handling (Node 4600) area, how did the NRC Staff ensure that all of the significant accident sequences had been identified and their probabilities of occurrence were conservatively estimated (given the lack of operational experience to draw upon)? (SER, 5-37 to 5-38, A-10)

Response to FSER Question No. 26 (Painter):

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 27:

Are there any chemical release scenarios in the cascade region that the NRC Staff would consider to be unique to the laser-based process? For example, does the NRC Staff see any chemical release scenarios that would differ significantly from those in a gas centrifuge plant? (SER, 6-8)

Response to FSER Question No. 27:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 28:

Aside from the Cascade/Gas Handling (Node 4600) and the Laser System (Node 5500) areas, are there any operations or design approaches that differ significantly from those found at existing enrichment facilities? If yes, what parts of the facility or operations are significantly different? In particular, are there significant differences in those nodes that involve transferring UF6 to and from storage tanks? (SER, 6-8, A-10)

Response to FSER Question No. 28:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 29:

Expand on how the Applicant will ensure that off-site fire departments (especially those using volunteers) will not use water-based fire suppression in areas that are inappropriate from a criticality safety viewpoint. (SER, 7-7 to 7-10)

Response to FSER Question No. 29 (Lee):

The public version of the SER Section 7.3.3, "Facility Design," presents the following discussion involving off-site fire departments (SER p. 7-7).

> Where water-based fire suppression is undesirable due to nuclear criticality safety concerns, redundant fire protection features are provided to ensure effective mitigation, including clean agent suppression, automatic detection, fire barriers, ignition controls, combustible loading controls, and emergency response activities. When called upon, the fire brigade or *responding offsite fire departments typically extinguish fire in these areas with the use of portable and wheeled dry chemical fire extinguishers.*

Emphasis added. As discussed in SER pages 1-34 and 7-9, the offsite fire responders may be provided by the New Hanover County and the Castle Hayne Volunteer Fire Departments.

GLE's Radiological Contingency and Emergency Plan (RC&EP) (Section 5.1, p. 5-1) establishes, among other things, the processes to address fire-based events, including the support of off-site fire departments. When responding to a fire-based event, trained and qualified site personnel acting as On-Scene Incident Commanders and/or Emergency Directors control the actions of personnel, including on-site and off-site individuals. Part of their responsibilities will include, by procedure, ensuring that off-site fire departments do not use water-based fire suppression where use of water-based systems would create a nuclear criticality concern. Pre-Fire Plans will identify criticality safety areas where the use of water-based fire suppression is inappropriate (LA Section 7.6.3, p. 7-24).

FSER Question No. 30:

No criticality accidents directly related to the cascade area are included in the accident discussions in the Accident Analysis Appendix (see Tables A.4-2 and A.6-1). How did the NRC Staff assure itself that potential criticality accidents in the cascade region (for example, in the product collection process) present an acceptably low level of risk? (SER, A-10, A-28)

Response to FSER Question No. 30:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 31:

What was the basis for choosing the wind speed assumed in the consequence assessment described in the first paragraph of page A-16?

Response to FSER Question No. 31:

To avoid duplication, only the NRC Staff is responding to this question.

FSER Question No. 32:

What activates the door interlock discussed in the sixth paragraph on page A-23?

Response to FSER Question No. 32:

To avoid duplication, only the NRC Staff is responding to this question.

B. FEIS-Related Questions

FEIS Question No. 1:

Explain the measures taken to verify the accuracy of GE-Hitachi Global Laser Enrichment LLC's (GLE) 2008 Environmental Report to the extent it has been relied on as a primary source for the NRC Staff's analysis.

Response to FEIS Question No. 1:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 2:

Why is the Applicant requesting authorization to enrich up to 8% U235? Has the NRC previously authorized enrichment up to 8% U235 at another facility? Does GLE, 2009j at 1 indicate that safety has been confidently demonstrated at U235 enrichment levels of only up to 5%? (EIS, 1-2)

Response to FEIS Question No. 2:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 3:

Does 10 C.F.R. § 50.68(b)(7) limit Part 52 reactor license holders from using fuel assemblies enriched at levels above 5%? Does the NRC Staff expect a change to 10 C.F.R. § 50.68(b)(7)? From where does GLE expect demand for fuel enriched above 5%? (EIS, 1-2)

Response to FEIS Question No. 3 (Enos):

GLE is responding only to the Board's third question.

Regarding expected demand for fuels with ^{235}U enrichment above 5 wt%, higher enrichment fuels would allow for the extension of commercial power reactor refueling

cycles, reduction of the space requirements for spent fuel, and reduction of disposal costs. While GLE is not currently aware of a utility that presently plans to utilize fuel with enrichments in excess of 5 wt% ^{235}U, GLE believes it is prudent to design the facility, which will be licensed for a 40-year term, for higher enrichments. Furthermore, the increased enrichment level provides a margin for credible enrichment upset conditions.

FEIS Question No. 4:

> Why are the forecasts for annual demand for enrichment services based on 2003 projections? Given the economic turmoil of the past few years, does the NRC Staff believe those forecasts are accurate? Does the NRC Staff expect domestic and international demand for low enriched uranium (LEU) to be affected by the Fukushima Daiichi accident and the international economic downturn? (EIS, 1-6 to 1-8)

Response to FEIS Question No. 4 (Schwartz):

While the FEIS does reference a U.S. Energy Information Administration (EIA) 2010 report, for electricity produced by way of nuclear power plants, the 2010 report did not include a forecast of demand for enrichment services. The 2003 EIA report did contain such information. To the best of GLE's knowledge, the U.S. government discontinued preparing enrichment services demand forecasts after 2003. We presume this was the reason that the NRC Staff used the 2003 data for this purpose.

Assessments of current and future requirements for enrichment services prepared by the Organization for Economic Cooperation and Development (OECD)/Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA) dated 2010 or earlier do not reflect the impact of recent developments such as the international economic downturn or the effect of the March 11, 2011 earthquake and tsunami on the Fukushima Daiichi Power Plant. The recent international economic downturn would be expected to reduce demand for energy and thus requirements for uranium enrichment

services for a period of years. However, in the long-term, recovery would be expected as the economies of the world recover.

The immediate shutdown of a significant number of operating units in Japan and Germany was a direct effect of the Fukushima event. According to Energy Resources International, Inc. (ERI), that event reduced installed world nuclear generating capacity by about 3.5% during 2011. Schwartz, M., "An Updated Assessment of the Adequacy of Nuclear Fuel Supply", p. 3, presented at the Nuclear Energy Institute's Nuclear Fuel Supply Forum, Washington, DC, January 24, 2012. The future world impact is estimated by ERI to be a 4.6% reduction by 2020, growing to a 7.9% reduction by 2030. This is equivalent to a two to three-year slippage from pre-Fukushima numbers in 2020, and as much as a four year slippage by 2030.

It is important to note that while there will be a reduction in installed nuclear generation due to the Fukushima accident, an increase of 47% in net installed nuclear generation capacity – from 371 GWe at the end of 2011 to 545 GWe by the end of 2030 – is still expected over the next 19 years. In the U.S., ERI expects net installed nuclear generation to increase from 102 GWe at the end of 2011 to 110 GWe by the end of 2030. Energy Resources International, Inc., "2011 Nuclear Fuel Cycle Supply and Price Report – Update", Section 3: Status and Prospects for Nuclear Power, ERI-2006-1102, Sections 6.1, 6.2 and 6.3, Table 6.1, November 2011.

ERI's Reference Nuclear Power Growth forecast of installed nuclear generation, which is the basis for the information provided above, is slightly lower than the post-Fukushima forecasts published by the DOE EIA and World Nuclear Association (WNA). U.S. DOE EIA, "International Energy Outlook 2011", DOE/EIA-0484(2011), p. 255,

Table F.5 September 2011; World Nuclear Association, "The Global Nuclear Fuel Market – Supply and Demand 2011-2030, Table I-1, September 2011. The difference between the ERI 2030 forecast of installed world nuclear generation (i.e., 545 GWe) and the average of the EIA and WNA forecasts for the world (i.e., 603 GWe and 614 GWe, respectively) is 10%. The difference between the ERI 2030 forecast of installed U.S. nuclear generation (i.e., 110 GWe) and the average of the EIA and WNA forecasts for the U.S. (i.e., 111 GWe and 116 GWe, respectively) is only 3%.

ERI's corresponding forecast of world annual requirements for enrichment services grows from present requirements of about 41.9 million SWU to 68.4 million SWU per year by 2030, which is an increase of 63% over this period. For the U.S., ERI forecasts that annual requirements for enrichment services will grow from 14.5 million SWU at present to 18.3 million SWU per year by 2030, which is an increase of 26%. Energy Resources International, Inc., "2011 Nuclear Fuel Cycle Supply and Price Report – Update", Section 6. Enrichment Services Market, ERI-2006-1102, Sections 6.1, 6.2 and 6.3, Table 6.1, November 2011. (Enrichment requirements presented above have been averaged over a three-year period and for 2030 values adjusted to the currently expected future transaction tails of 0.23 weight percentage (w/o) U^{235}.)

The WNA forecast of annual world enrichment services in 2030 is 83.6 million SWU, and its corresponding forecast for the U.S. is 18.5 million SWU per year. These forecasts are generally consistent with the ERI forecast for annual world requirements in 2030, which is about 18% lower than that published by WNA, as well as the ERI forecast for the U.S., which is about 1% lower than that published by WNA. World Nuclear

Association "The Global Nuclear Fuel Market-Supply and Demand 2011-2030," Table IV.1, September 2011.

These more recent forecasts of future world and U.S. requirements for enrichment services, which take into account the impact of recent developments such as the international economic downturn and the March 11, 2011 events at the Fukushima Daiichi Power Plant, confirm the reasonableness of the forecasts cited by the NRC Staff in the FEIS, pp. 1-6 to 1-8.

FEIS Question No. 5:

Provide any updated information the NRC Staff has on the status of the National Enrichment Facility, American Centrifuge Plant, and Eagle Rock Enrichment Facility. How would any updated output projections impact the NRC Staff's needs analysis and Table 1-1? (EIS, 1-7 to 1-8)

Response to FEIS Question No. 5 (Schwartz):

Updated information concerning the other enrichment facility projects cited above supports the Staff's conclusion that there is a need for the additional enrichment capacity to be provided by the Proposed GLE Facility. In January 2012, Urenco reported that it had increased its annual worldwide enrichment capacity during 2011 by 12.3% to 14.6 million SWU, and that it was on track to achieve enrichment capacity of 18 million SWU by 2015. Urenco Trading Update for 2011, January 26, 2012, http://www.urenco.com/print/content/448/ urenco-trading-update-for-2011.aspx .With regard to the Urenco USA enrichment facility (which had previously been referred to as the National Enrichment Facility) in New Mexico, Urenco reported that it had reached an annual enrichment capacity of 400,000 SWU as of the end of 2011, following a slower than expected start up process. Phil Chaffee, "Urenco USA Production a Year Behind Schedule", *Nuclear Intelligence Weekly*, p. 3, January 30, 2012.

During 2011, the American Centrifuge Plant (ACP) project continued to experience delays in obtaining financing, and USEC has indicated that it is in a period of uncertainty since it cannot continue to fund the project on its own. USEC Inc., 10-K Annual Report for the Period Ending December 31, 2011, p. 5, March 14, 2012. DOE also has raised additional concerns about a number of aspects of the project. As a result, instead of issuing the conditional loan guarantee that USEC had sought, DOE proposed a two-year cost share research, development and demonstration program for the project "to enhance the technical and financial readiness of the centrifuge technology for commercialization." However, DOE's share of the funding, which is expected to be capped at $300 million, has not yet been provided and the source for such funding is uncertain. However, in March 2012 DOE entered into an agreement with USEC that enabled it to provide $44 million in interim funding. *Id*. at 15.

On December 13, 2011, AREVA announced that it was cutting jobs and suspending projects around the world, including the Eagle Rock Enrichment Facility (EREF) in the U.S., as part of a five-year strategic action plan that would allow it to recover from massive losses in 2011 and allow it to return to profit. AREVA Strategic Action Plan – 2012-2016, p. 45, December 13, 2011. It was reported in January 2012 that AREVA was planning to begin construction on the EREF in 2013, instead of 2012 as had originally been planned; or possibly as late as 2014 if it could not secure an investment partner for the project. *Idaho Business Review*, Associated Press, January 31, 2012, http://idahobusinessreview.com/2012/01/31/areva-could-begin-work-on-eagle-rock-plant-in-2013/. However, in February 2012, URS Nuclear LLC, the Procurement and Construction Manager for the EREF, notified all of its subcontractors that the

"project has been placed on indefinite suspension until further notice." URS Nuclear LLC Letter to Subcontractors, February 27, 2012.

Following a slow start up, Urenco USA is now viewed as moving forward with installation of additional increments of enrichment capacity on schedule. However, the level of uncertainty associated with the ACP and EREF enrichment projects has increased significantly during the past year.

The NRC Staff's need analysis, as presented in the FEIS pages 1-7 to 1-8 and Table 1-1, is conservative in that it assumes each of these three projects will be completed successfully and will reach its anticipated annual enrichment capacity. In combination with GLE, total annual capacity will be 22.3 million SWU per year for these four enrichment facilities, which will be located in the U.S.

The NRC Staff appropriately acknowledges that even though this may result in enrichment capacity that would exceed projected annual requirements, there are uncertainties in the proposed projects, and that "extra capacity would provide needed assurance that enriched uranium would be reliably available when needed for domestic nuclear power production." FEIS, p. 1-8. The updated information provided above regarding the status of the ACP, EREF and Urenco USA reconfirms that there is some level of uncertainty associated with new enrichment projects.

In addition, the market for uranium enrichment services is an international market in which facilities sited in the U.S. sell and deliver enriched uranium to customers outside of the U.S., and operators of nuclear power plants in the U.S. purchase and receive deliveries of enriched uranium from sources that are located outside the U.S.

When analyzed on a world basis over the 2021 to 2030 period, if the ACP, EREF and proposed GLE Facility are all built and operating at their respective design capacities, then average annual supply would exceed ERI's Reference Nuclear Power Growth forecast of world requirements (Energy Resources International, Inc., "2011 Nuclear Fuel Cycle Supply and Price Report – Update", Section 6. Enrichment Services Market, ERI-2006-1102, Sections 6.1, 6.2 and 6.3, Table 6.1, November 2011). Enrichment requirements presented above have been averaged over a three-year period and for 2030 values adjusted to the currently expected future transaction tails of 0.23 w/o U^{235} by almost 10 million SWU per year, but would be *short* of the WNA forecast of world requirements by 4.3 million SWU per year. However, without the combined 10.4 million SWU year enrichment capacity of the ACP and EREF (EIS, Table 1-1) – the two U.S. projects presently facing uncertainty – world enrichment supply would be short by between 0.8 million SWU and 14.7 million SWU per year relative to world requirements during that period based upon the ERI and WNA reference forecasts, respectively. The ongoing uncertainty in these projects and potential for a shortfall in supply further highlight the need for the proposed GLE Facility.

FEIS Question No. 6:

Under what conditions and timeline could the levels of LEU supplied to United States Enrichment Corporation under the TENEX agreement equal current levels under the Megatons-to-Megawatts Program? (EIS, 1-7) Does the NRC Staff expect other LEU imports to remain constant in future years? (EIS, 1-7) What are the relative costs of domestic production at currently operating and projected facilities (including GLE) versus importation? (EIS, 1-7 to 1-8) If domestic production were to increase, would foreign suppliers be able to undercut domestic prices?

Response to FEIS Question No. 6 (Schwartz):

USEC executed an agreement with TENEX on March 23, 2011, which became effective in December 2011, for a 10-year supply of Russian low enriched uranium (LEU), extending from 2013 through 2022. Under the terms of the agreement, the enrichment services component of the LEU will increase until it reaches a level in 2015 that includes a quantity of enrichment services (SWU) equal to approximately one-half of the level currently supplied by TENEX to USEC under the Megatons to Megawatts program. "Beginning in 2015, TENEX and USEC also may mutually agree to increase the purchases and sales of SWU by certain additional optional quantities of SWU up to an amount equal to the amount USEC now purchases each year under the Megatons to Megawatts program." USEC Inc., 10-K Annual Report for the Period Ending December 31, 2011, p. 13, March 14, 2012. However, as noted in the agreement (USEC Inc., 10-Q Quarterly Report for the Period Ending March 31, 2011, Exhibit 10.3, "Enriched Product Transitional Supply Contract", dated March 23, 2011), its implementation must be carried out in a manner that is consistent with the limitations under the Russian Uranium Suspension Agreement and the Domenici Amendment (Provisions of U.S. law added by Section 8118 of the Consolidated Security, Disaster Assistance and Continuing Appropriations Act, 2009). The implication of this limitation is that the total amount of Russian-origin SWU entering the U.S. annually between 2014 and 2020 is set at an amount equal to about 20% of projected U.S. annual requirements. Any SWU purchased by USEC from TENEX under the March 2011 agreement for use in U.S. nuclear power plants during the period 2014 through 2020 must fall within this 20% limit. Therefore, any enrichment services that are purchased by USEC under this March 2011 agreement

with TENEX that are in excess of the portion of the quota that TENEX is making available to USEC under their agreement must be sold by USEC to its foreign customers.

It is reasonable to expect that operators of U.S. nuclear power plants will continue to purchase their enrichment services in a manner that results in diversification among suppliers. For example, if there are four or five commercially competitive suppliers, it would be reasonable to assume that, on average, operators of U.S. nuclear power plants would purchase approximately 20% to 25% of their requirements for enrichment services from each of these suppliers. If Urenco, via Urenco USA, and AREVA, via the EREF, are offering enrichment services, then it is likely that much of the Urenco and AREVA enrichment services that are supplied to the U.S. would come from these U.S. facilities rather than be imported from Europe. Furthermore, Russian enrichment services would be expected to account for about 20% of annual U.S. requirements, as a result of the quota. As a result, imports of LEU and enrichment services will certainly decrease from current levels, which have averaged in excess of 80% during the last several years (U.S. DOE EIA, "2010 Uranium Marketing Annual Report", Table 16, May 27, 2011), as these new U.S. enrichment facilities come into operation and ramp up to their licensed production capacities.

The centrifuge and laser enrichment technologies that have been deployed to date or which are presently being developed by AREVA, GLE, Russia, Urenco and USEC for deployment in the U.S., are generally expected to be commercially competitive with each other and with foreign sources of enrichment services. Since diversity of supply is an important factor in the purchase of enrichment services, it is not anticipated that any one

of these sources of enrichment services will have such a significant economic advantage as to completely overwhelm diversity of supply as a factor in selecting a supplier.

With the exception of Russian enrichment services, the other foreign suppliers are also working to build and operate enrichment facilities in the U.S., as previously discussed. It is unlikely that a foreign supplier (i.e., AREVA or Urenco) would attempt to undercut its U.S. sited facilities with enrichment services from its foreign facilities. Furthermore, having endured the results of an anti-dumping case in the U.S. and the limitations of the Russian Uranium Suspension Agreement under which it has been doing business in the U.S. for more than a decade, and with a decade yet to go, experience indicates that Russia would continue to be careful that it does not undercut domestic prices in the U.S.

FEIS Question No. 7:

> As support for the need for a domestic supply of LEU, the FEIS offers evidence from 2002 and 2010 that a domestic supply of LEU is an issue of national energy security. Is there more recent support for the proposition that a domestic supply of LEU is a priority as a matter of public policy? (EIS, 1-8 to 1-9)

Response to FEIS Question No. 7 (Schwartz):

Consistent with the discussion in the GLE ER and FEIS, the need for diverse, reliable sources of domestic enrichment services to provide LEU for domestic uses has been recognized in several prior enrichment facility licensing proceedings. *See AREVA Enrichment Servs.,* LLC (Eagle Rock Enrichment Facility), LBP-11-26, 74 NRC __, slip op. 30-31 (Oct. 7, 2011); *USEC, Inc.* (American Centrifuge Plant), LBP-07-6, 65 NRC 429, 473 (2007); *La. Energy Servs., L.P.* (National Enrichment Facility), LBP-05-13, 61 NRC 385, 443, *petition for review denied*, CLI-05-28, 62 NRC 721, 726 (2005). Very recent statements made by DOE to Congress indicate that meeting this need remains an

important U.S. energy and national security policy objective. For example, on December 31, 2011, DOE issued its annual report to Congress on the effect of the U.S.-Russia Highly Enriched Uranium Agreement (HEU Agreement) on the domestic uranium enrichment, conversion, and mining industries. *See* U.S. Department of Energy, *Report on the Effect the Low Enriched Uranium Delivered Under the Highly Enriched Uranium Agreement Between the Government of the United States of America and the Government of the Russian Federation had on the Domestic Uranium Mining, Conversion, and Enrichment Industries and the Operation of the Gaseous Diffusion Plant During 2010*, Dec. 31, 2011, http://www.ne.doe.gov/pdfFiles/EXEC-2011-008436_HEUReport_final.pdf. The report, which is submitted on behalf of the President, is required by Section 3112(b)(10) of the USEC Privatization Act (42 U.S.C. § 2297h-10(b)(10)). *See id.* at 1. The report states: "Recognizing the vital importance of the nuclear fuel cycle to U.S. energy markets and national security, Congress, DOE, and industry have worked diligently in an effort to avoid any adverse effects of the HEU Agreement deliveries upon commercial nuclear fuel markets." *Id.* at 10.

Further, in February 2012, DOE requested $150 million to support continued domestic uranium enrichment research, development and demonstration (RD&D) over the next two years. The DOE's FY 2013 budget justification states that domestic uranium enrichment RD&D supports having a domestic enrichment capability, the benefits of which DOE describes as follows:

- Allowing the U.S. to discourage the unnecessary spread of enrichment technology by contributing directly to sustained confidence in the international commercial enrichment market.

- Providing the U.S. an unencumbered source of enriched uranium, critical in the near-term for the national security tritium production mission.
- Providing a U.S. capability to enrich uranium to make fuel, critical in the long-term for meeting demand for defense-related research reactors and for naval nuclear propulsion reactors.
- Allowing the U.S. to better detect, deter, and assess potential proliferation of new uranium enrichment programs around the world.
- Helping to preserve the technical knowledge base and the supply chain needed to support uranium enrichment capabilities needed by the U.S. government for the foreseeable future.

Department of Energy, National Nuclear Security Administration, Office of Chief Financial Officer, *FY 2013 Congressional Budget Request: Office of the Administrator, Weapons Activities, Defense Nuclear Nonproliferation, Naval Reactors* (DOE/CF-0071), Vol. 1 at 376 (Feb. 2012), http://www.cfo.doe.gov/budget/13budget/content/volume1.pdf.

During a related February 19, 2012, hearing before the Senate Energy and Natural Resources Committee, Secretary of Energy Steven Chu reaffirmed the need to deploy new U.S. enrichment technology to support national security and other policy objectives:

> **Sen. Rob Portman (R-Ohio):** With regard to enriched uranium, if you could talk about for a moment why you think it is so important. Obviously we need it for our nuclear power plants. At one point we had a majority of the enriched uranium in the world produced by the United States. I think we're down to about 25 percent of the worlds' supply of enriched uranium now. Maybe the place to start is where do we get it now in that we aren't producing nearly as much as we used to?
>
> **Secretary Chu:** There are two parts to this. One is the military side, the security side. We have international treaties which we want to abide by, nonproliferation treaties which say that the uranium used for nuclear security purposes actually has to be indigenous to that country. It's a very

> wise treaty because you don't want one country using technology of another country to enrich uranium that they can turn into weapons. So, *we need our own indigenous sources of uranium to maintain our stockpile*; also uranium that we need to produce tritium for that stockpile. Then there's a larger issue about the civilian nuclear side, much larger amounts of uranium. We think that if the United States – certainly the United States will be a player, the United States is well respected for its safety record, for its care in the way it handles its own civilian nuclear industry and for the technologies that it has developed at companies like GE, Westinghouse. *It would also benefit if we had a homegrown, new technology for enriching uranium*, again so that we can offer for sale to other countries, other developing countries.

See Frank Lewis, *Chu, Portman discuss uranium enrichment*, PORTSMOUTH DAILY TIMES, Feb. 19, 2012, http://www.portsmouth-dailytimes.com/view/full_story/17581986/article-Chu--Portman-discuss-uranium-enrichment?instance=popular (emphasis added). Notably, former U.S. government and military officials familiar with national security matters have publicly expressed support for DOE's enrichment RD&D funding request and elaborated on the public policy objectives underlying that request. *See* Retired Gen. James L. Jones, *US must remain leader in nuclear enrichment*, THE HILL, Jan. 17, 2012), http://thehill.com/opinion/op-ed/204711-us-must-remain-leader-in-nuclear-enrichment-; Retired Lt. Gen. Edward Rowny, *Safe Uranium Enrichment Should Be a U.S. Priority*, ROLL CALL, Mar. 29, 2012, http://www.rollcall.com/issues/57_118/edward-rowny-safe-uranium-enrichment-should-be-us-priority-213505-1.html

FEIS Question No. 8:

> Except as already discussed in the FEIS, identify any regulatory guides that were either directly or indirectly applicable to the proposed facility and explain how they were applied or adapted to the NRC Staff's review.

Response to FEIS Question No. 8:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 9:

Identify any significant issues to which the NRC Staff determined that no regulatory guide applied, and explain how the NRC Staff addressed such issues.

Response to FEIS Question No. 9:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 10:

On page 2-3, in the last paragraph, the FEIS states, "The primary facilities include…six cylinder storage pads…" On page 2-7, the FEIS states, "There would be three UF6 Cylinder Pads at the proposed GLE facility…" What are the other three cylinder pads referred to on page 2-3?

Response to FEIS Question No. 10:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 11:

Is the fresh water that could be potentially needed for cooling tower make up, as discussed on page 2-11, included in the 75,000 gal/day mentioned on page 4-27? If not, where is the impact of this make up water evaluated (if it is ultimately needed)?

Response to FEIS Question No. 11 (Olivier):

Yes, the cooling tower make up water is included in the 75,000 gal/day mentioned in the FEIS, page 4-27. The cooling tower make up water is estimated to be 70,000 gal/day (replacing 30,000 gal/day bleed off and 40,000 gal/day evaporative loss). The remaining 5,000 gal/day is used for decontamination and radioactive waste treatment activities.

FEIS Question No. 12:

Are GLE's detailed construction plans available? Has preconstruction begun? Explain how construction phasing will work so that operations can begin in 2014. (EIS, 2-18)

Response to FEIS Question No. 12 (Givens):

GLE has not yet prepared detailed construction plans nor initiated preconstruction activities. Construction activities will be conducted in a phased manner and tied to completion of the detailed facility design and fulfillment of relevant LA commitments.

LA Section 1.1.3.1 (pp. 1-16 to 1-17, non-public submittal) contains an overview of GLE's phased approach to construction/initial operations. As stated therein, the initial construction plan includes building the Operations Building and equipping it with the necessary equipment to operate at a capacity of one million SWU. Thus, during the first year, while the facility is operating at this startup capacity, continued equipment/ component installation would occur simultaneously. In accordance with Section 193(c) of the AEA as amended, and related NRC regulations, the NRC will perform an operational readiness review prior to authorizing the start of facility operations that includes review of GLE's phased construction plans. *See, e.g.*, 10 CFR 70.32(k) ("No person may commence operations of a uranium enrichment facility until the Commission verifies through inspection that the facility has been constructed in accordance with the requirements of the license."). Finally, the 2014 operations date was the best estimate at the time the ER was prepared, but is subject to reevaluation. At present, no alternative operations date has been established.

FEIS Question No. 13:

In evaluating the No-Action Alternative, the impacts in Table 2-3 do not appear to include electricity consumption. Did the NRC Staff consider the impact of electrical energy consumption (with its associated environmental impact)? In particular, if the separative work units were produced at other gas centrifuge facilities in the no-action case, was the potential difference in electrical energy usage considered? (EIS, 2-20 to 2-41)

Response to FEIS Question No. 13 (Givens):

The table below provides GLE's assessment of the environmental impact of electrical energy consumption.

Affected Environment	**Proposed Action:** **GLE would construct, operate, and decommission the proposed GLE Facility in Wilmington, North Carolina.**	**No-Action Alternative:** **The proposed GLE Facility would not be constructed.**
Electrical Energy Consumption	SMALL. **[INFORMATION WITHHELD FROM PUBLIC DISCLOSURE PER 10 CFR 2.390.]** Based on initial discussions with Progress Energy, the electrical utility that provides electrical energy to the GE Wilmington site, the existing electrical utility lines will support this demand, without significantly impacting their operations.	SMALL. The energy consumption for the Wilmington site is provided by existing infrastructure; therefore, there is no impact to the utility provider if there is no change to the demand. The majority of electrical energy consumption used by an enrichment facility occurs during the isotopic separation process. In general, the environmental impacts associated with electrical energy consumption are proportional to the amount of electrical energy consumed. Based on preliminary conservative calculations, GLE concluded that electrical energy consumption and the associated environmental impacts will be no greater than, and likely less than, those for gas centrifuge technology.

FEIS Question No. 14:

How did GLE's panel of experts assess the weighting factors that are given to each criterion for the alternative sites analysis? (EIS, 2-45, 2-48)

Response to FEIS Question No. 14 (Guthrie/Marimpietri):

As summarized in ER Section 2.2.3.1 (p. 2-15) and FEIS, Section 2.3.1 (p. 2-43), the GLE site-selection process involved multiple steps. Those steps included: (1)

identification of candidate sites, (2) initial screening, (3) coarse screening, (4) site reconnaissance visits, (5) fine screening, and (6) qualitative cost-benefit analysis. These steps are summarized in ER Figure 2.2-1 and FEIS, Figure 2-4.

As background, the process began with the identification of candidate sites for the GLE project. The identified candidate sites were subjected to an initial screening step that eliminated those sites located in areas of significant seismic, tectonic, and flood hazards. Sites that passed the initial screening step entered the coarse-screening step, which considered criteria related to property size requirements or potential impediments to the transfer of property ownership. Sites that failed one or more of these criteria were eliminated from further consideration. At that point, reconnaissance visits to the remaining sites were conducted to identify potential issues beyond the initial and coarse screening sites that passed the reconnaissance step entered a fine-screening step, which considered detailed criteria that addressed public health and safety; community and environmental impacts; and engineering, stakeholder, cost, and schedule considerations. Criteria were considered for each lifecycle phase of the project (i.e., preconstruction, construction, operation-production, and decommissioning), as applicable. *See* ER, Section 2.2.3.1.1 (p. 2-15).

The development of the weighting factors discussed on pages 2-45 and 2-48 of the FEIS was performed for each criterion used in the alternative sites analysis as part of the fine-screening step (the fifth step in the six-step process summarized above). Specifically, the determination of weights was part of a multi-criteria decision analysis methodology referred to as the Analytic Hierarchy Process (AHP). The AHP process is especially suited for group decision making and was selected so that value decisions and

expert judgments of the scientists, engineers, and project administrators on the expert panel could be incorporated into the weighting and scoring of criteria identified as important to site selection. GLE's panel of experts followed defined procedures of the AHP methodology and used a software tool (Expert Choice Desktop) specifically designed for such analyses. The AHP and Expert Choice Desktop software were chosen based on related precedent involving similar NEPA project decisions made by the NRC, National Aeronautic and Space Administration (NASA), U.S. Department of Agriculture (USDA), and other federal agencies.

The three principal steps in the AHP are: (1) building the criteria hierarchy, (2) criteria weighting, and (3) site ranking. ER Section 2.2.3.1.6.2 (pp. 2-19 to 2-26) provides a detailed overview of each of these steps. As discussed in the ER and FEIS, the fine-screening criteria were grouped around four general clusters that represent the goals of the decision process: Minimizing Impact to Time and Cost (Cluster I), Minimizing impacts to the Facility (Cluster II), Minimizing impacts to the Environment (Cluster III), and Project Support (Employment and Stakeholders Cluster IV). Criteria clusters are the highest level of the hierarchy. Each criteria cluster was supported by multiple subordinate criteria that are collectively referred to as the criteria groups and represent the second level of the hierarchy. Typically, a criterion at the group level was further supported by subordinate criteria at lower levels of the hierarchy. For example, the criterion at the group level that is listed as "water resources" under Cluster III was supported by three additional criteria that included physical surface water impacts, water quality impacts, and water quantity impacts.

With regard to the Board's specific question, the site-selection panelists developed weighting factors by considering the set of subcriteria for each of the four clusters. Specifically, the panelists performed a series of pairwise comparisons between criteria at each level of the hierarchy to establish criteria weights. The process referred to on Page 2-45 of the FEIS is explained below in a stepwise manner.

1. Each criterion in the hierarchy was well defined so that panel members had a common frame of reference.
2. Each panel member independently performed a series of pairwise comparisons in which every combination of the criteria was evaluated using the *Fundamental Scale of the AHP* (Saaty, 1996), which is a key component of the AHP method. The scale of intensity factors used for the AHP are shown in the table below. Pairwise comparisons were made between criteria within each level of the hierarchy, but not between criteria at different levels. While making comparisons between criteria at a given level within the hierarchy, the panelists considered each criterion's importance with regard to the higher parent levels. As specified by the AHP method, intensity of importance values were used for the pairwise comparisons and are defined in the table below.

Intensity of Importance	**Definition**	**Explanation**
1	Equal importance	Two activities contribute equally to the objective
3	Moderate importance	Experience and judgment slightly favor one activity over another
5	Strong importance	Experience and judgment strongly favor one activity over another

7	Very strong or demonstrated importance	An activity is favored very strongly over another or its dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2, 4, 6, 8	For compromise between the above values	Can be used by each panelist during their independent study to interpolate judgments numerically

3. The panel members conducted a consensus process in a series of meetings to facilitate reaching consensus on the pairwise comparisons. These meetings were facilitated by one of the panelists, who introduced pairwise comparisons and moderated the discussion towards a consensus. For each pairwise comparison, the following steps were followed:
   a) For each pairwise comparison, the facilitator introduced the criteria comprising the pair.
   b) Panelists confirmed their understanding of the criteria and obtained clarifications as needed.
   c) Panelists shared their pairwise comparison judgments.
   d) The facilitator invited discussion among the panelists.
   e) Panelists deliberated until either they (1) reached consensus or (2) decided to retain individual judgments about the intensity of importance number.
4. A single intensity of importance number was entered into the Expert Choice Desktop software for those pairwise comparisons on which the panelists reached consensus. If consensus was not reached, then the panel members' individual importance of intensity numbers were entered into the Expert Choice Desktop software.

5. The Expert Choice Desktop software produced a criterion weight using the intensity of importance numbers entered (see step 4) and an algorithm specifically designed for determining numeric weights for this type of decision framework. Expert Choice Desktop software also has tools that allowed the panel members to identify logical inconsistencies and perform sensitivity analyses across the hierarchy. This information was used by the panel members to validate the process and accept the weights produced by the software.

The process described above was followed for each level of the decision criteria hierarchy, including the top level for which weights are reported on Page 2-48 of the FEIS.

FEIS Question No. 15:

Why did the NRC Staff not consider electrical energy consumption in its comparisons between the laser-based and centrifuge technologies on Table 2-6 (or in another appropriate location)? (EIS, 2-55 to 2-64)

Response to FEIS Question No. 15 (Givens):

The table below provides GLE's comparison between electrical energy consumed by laser-based and gas centrifuge technologies:

Resource Area	Laser-Based Technology (proposed action)	Gas Centrifuge Technology	Greater Impact
Electrical Energy Consumption	GLE has conservatively calculated that the energy consumption from the use of its laser-based enrichment technology will be *no greater than* that of gas centrifuge technology. However, as discussed in response to FEIS Question Number 13, GLE expects that its laser-based technology will likely result in less electrical energy consumption than gas centrifuge technology.	GLE estimated that the electrical energy consumption of gas centrifuge technology will be greater than or equal to its laser-based technology.	Similar

FEIS Question No. 16:

In the Waste Management area of Table 2-6, the FEIS states "the amount of waste generated by a gas centrifuge facility during operations is estimated to be considerably less than the proposed GLE Facility. The potential difference could be on the order of a factor of two for LLW [low-level waste] and hazardous waste, and a factor of five or six for solid non-radioactive/nonhazardous waste." What are the primary reasons for the increased generation of waste in the GLE facility as compared to a gas centrifuge facility? (EIS, 2-62)

Response to FEIS Question No. 16 (Olivier):

[INFORMATION WITHHELD FROM PUBLIC DISCLOSURE PER 10 CFR 2.390.]

FEIS Question No. 17:

On page 4-99 under the first bullet under "Mitigation Measures Identified by GLE," the FEIS states, "Select the laser enrichment process over…gas centrifuge technologies, which would reduce the amount of waste generated for production of the same amount of enriched product." This seems to contradict the statement on page 2-62 referred to in the previous question. Explain this apparent conflict. (EIS, 2-62, 4-99)

Response to FEIS Question No. 17 (Olivier):

In addition to the NRC Staff's response to this question, GLE concluded, after considering all waste streams, that the uranium laser enrichment technology is expected to produce a total amount of waste – including depleted UF_6 tails – lower than that generated for production of the same amount of enriched product at a gas centrifuge facility.

FEIS Question No. 18:

Downblended highly enriched uranium (HEU) is eliminated in the NRC Staff's analysis as a source of enrichment services for reasons of viability, reliability, and competition. In the Shaw AREVA MOX Services (Mixed Oxide Fuel Fabrication Facility) case, the NRC Staff supported an application for a facility producing downblended HEU. Explain why downblending HEU is not considered a viable or reliable alternative and is not considered in the alternatives analysis. (EIS, 2-50)

Response to FEIS Question No. 18:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 19:

Regarding the groundwater contamination discussed on pages 3-41 to 3-43, what was the most recent discovery of contamination on the site? Have contamination levels of all compounds declined since monitoring began? Are there any concerns about undiscovered groundwater contamination? In what ways could GLE construction and operation exacerbate existing problems? Specifically, what will be the effects of increased groundwater usage on groundwater quality? Will greater groundwater use affect the natural attenuation that is helping to clean up existing groundwater contamination? (EIS, 3-41 to 3-43)

Response to FEIS Question No. 19 (Stahl/Alexander):

Sub-question 19-1: What was the most recent discovery of contamination on the site?

The most recent such discovery was as follows: Beginning in 2005, the routine monitoring program established for the East/Central Site organic compound contamination (described in ER Section 3.4.1.2.2) identified, in one monitoring

well, some volatile organic compounds (VOCs) not typical of nearby plumes, located within the Wilmington site boundary. The well is located within the capture zone of the existing hydraulic-containment/process-water pumping well system, and GE voluntarily expanded the routine monitoring program to track this contamination as it is drawn to and recovered by the hydraulic-containment/process-water pumping wells. As explained further below, groundwater quality variations are anticipated along some flow paths as groundwater is drawn toward the pumping wells.

Sub-question 19-2: Have contamination levels of all compounds declined since monitoring began?

Most groundwater monitoring locations across the Wilmington Site show stable or decreasing contaminant concentration trends. However, in areas with active, ongoing remediation, the general plume-containment and recovery strategy focuses on pumping from selected wells at the downgradient edge of known groundwater plumes to draw the contaminants in consistent directions and to decrease cleanup times. As such, increasing contaminant concentration trends are occurring, as expected, along some flow paths as zones of variable concentration levels are drawn toward the pumping wells.

In addition, in areas in which natural attenuation mechanisms are relied on as a form of corrective action, chemical degradation reactions transform more complex compounds into smaller, simpler compounds. Therefore, increasing contaminant concentration trends for the smaller, simpler compounds are

occurring, as expected, in some locations as degradation of the more complex compounds occurs.

Sub-question 19-3: Are there any concerns about undiscovered groundwater contamination?

GLE believes that there are no concerns about undiscovered groundwater contamination on or near the GLE site. The GLE Study Area is adjacent to known contamination-impacted areas (Northwest Site Area to the west and the Waste Treatment Area to the east); however, groundwater-flow patterns prevent migration of contaminants from these impacted areas into the GLE Study Area. Furthermore, the Site groundwater remediation system maintains eastward groundwater gradients in the eastern portion of the GLE Study Area, thereby containing the existing impacts to the Eastern Site Sector.

GE has entered into a voluntary cleanup program under the Inactive Hazardous Sites Response Act (N.C. Gen. Stat. §130A-310, et seq.). Through this program, GE submitted a *Phase 1 Remedial Investigation Work Plan – Eastern Site Area* (RI Work Plan) to the current state groundwater regulator, the Inactive Hazardous Sites Branch (IHSB) of the North Carolina Department of Environment and Natural Resources (NCDENR), in 2011. The IHSB approved the Phase 1 RI Work Plan, and GE is currently implementing the Plan, which includes evaluation of specific areas in the Eastern Site Sector (the sector that contains the developed manufacturing area of the Wilmington Site). Following the Phase 1 RI work, GE will prepare a Phase 2 RI Work Plan to be implemented in the other sectors of the Wilmington Site that are undeveloped and which

include the GLE Study Area. The Phase 2 RI is expected to be conducted before the proposed GLE Facility is constructed. Should groundwater contamination be discovered as part of the Phase 2 RI or other investigations on or near the GLE Study Area, appropriate measures would be taken by GLE to assess the extent of contamination above relevant standards, and evaluate whether remedial action is necessary.

Sub-question 19-4: In what ways could GLE construction and operation exacerbate existing problems?

The areas with existing contamination described in FEIS Section 3.7.4.3 and ER Section 3.4.1.2.2 are outside of the GLE Study Area, except for the access road to the Proposed GLE Facility. Construction and operation of the Proposed GLE Facility, including its access road, will not exacerbate these existing conditions. Construction and operation will not disturb any subsurface materials with known existing contamination. In addition, GLE has taken measures to prevent inadvertent groundwater contamination as described in the ER Section 4.4.1.2 (pp. 4.4-1 to 4.4-3).

No new pumping wells will be installed and operated as part of the Proposed Action (i.e., construction and operation of the Proposed GLE Facility). Therefore, the Proposed Action will not alter existing groundwater flow directions.

Sub-question 19-5: Specifically, what will be the effects of increased groundwater usage on groundwater quality?

The general plume-containment and recovery strategy focuses on pumping from selected wells at the downgradient edge of known groundwater plumes to draw the contaminants in consistent directions and to minimize cleanup times. The pumped groundwater is treated and used to meet the Wilmington Site process-water demand. The existing hydraulic containment/process-water pumping well system will have the capacity to meet increased demand from operation of the Proposed GLE Facility. Therefore, increased pumping associated with the Proposed Action will have the beneficial impact of reducing the time required for groundwater cleanup because groundwater requiring remediation will be pumped and treated at a faster rate.

Sub-question 19-6: Will greater groundwater use affect the natural attenuation that is helping to clean up existing groundwater contamination?

An area with known contaminant impacts, the Northwest Site Area, is adjacent to the GLE Study Area to the west. The increased groundwater use from the Proposed GLE Facility should have no effect on the natural attenuation processes occurring in the Northwest Site Area. The contaminant sources in that area have degraded naturally or have been removed via remediation processes, and continued natural attenuation of any remaining groundwater contamination that exceeds the project action levels is expected**.** The action levels applicable to the project are the North Carolina Groundwater Standards (15A NCAC 2L .0202) for parameters other than uranium, which is not listed in the standards. A groundwater monitoring guideline value (GMGV) of 0.045 mg/L was established for uranium on this project. The action levels were presented in the *Corrective*

Action Plan for the Northwest Site Area that was submitted to and approved by the (former) groundwater regulator, the NCDENR Division of Water Quality, in 1999. On-going monitoring shows that contamination is attenuating as predicted. Even with the increased pumping that will be required once the Proposed GLE Facility becomes operational, the Northwest Site Area is well outside the hydraulic reach of the Wilmington Site groundwater withdrawal pumping wells, all of which are east of the Proposed GLE Facility.

FEIS Question No. 20:

Explain how the NRC Staff derived the assumption that the contributions to impacts are 50 percent during preconstruction and 50 percent during construction. (EIS, 4-3 to 4-4)

Response to FEIS Question No. 20:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 21:

The assumption that a licensing decision will be made by June 2012 is no longer realistic. Discuss what, if any, consequences result from a later licensing decision. (EIS, 4-2)

Response to FEIS Question No. 21:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 22:

Twenty-four hour concentrations of particulate matter are predicted to exceed air quality standards during preconstruction and construction phases. How widespread will this decrease in air quality be? What effects are expected on the residents of the Wooden Shoe residential subdivision? (EIS, 4-13)

Response to FEIS Question No. 22 (Peterson):

GLE believes that potential air quality impacts resulting from increased particulate matter (PM) concentrations during preconstruction and construction activities will not be widespread or adversely affect the health of residents of the Wooden Shoe subdivision.

As a threshold matter, the National Ambient Air Quality Standard (NAAQS) issued by the U.S. Environmental Protection Agency (EPA) and adopted by the State of North Carolina for PM_{10} (see FEIS Table 3-5, p. 3-24) is not intended to be used for direct assessment of localized ambient air pollutant concentrations from temporary emission sources such as construction projects. Rather, the comparison of predicted air dispersion modeling ambient concentrations with applicable NAAQS is intended to provide an order-of-magnitude measure of the potential incremental contribution to ambient pollutant levels and resulting air quality impact in the vicinity of the Proposed GLE Facility from on-site preconstruction and construction activities. The 24-hour average federal NAAQS for PM_{10} is 150 micrograms per cubic meter ($\mu g/m^3$) not to be exceeded more than once per year on average over 3 years. Compliance with the NAAQS is determined by *long-term* ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the EPA.

Further, the fugitive dust emissions from the Proposed GLE Facility site were estimated using site-specific assumptions and standard fugitive dust emissions factors for construction activities, as described in ER Appendix Q, *Air Emissions from Proposed GLE Facility Construction Sources* (ER, Section 4.6.2.1.1.1, p. 4.6-2). The magnitude and duration of the *actual* effects of fugitive dust emissions caused by activities at the Proposed GLE Facility site would depend on site-specific meteorological conditions (e.g., moisture content of the soil from recent precipitation events, wind speed and direction) and the mitigation practices applied at the time of the preconstruction or construction activity. The actual fugitive dust emissions from preconstruction and construction activities are expected to be *lower* than the predicted PM concentration

levels due, in part, to natural mitigation afforded by the high annual precipitation at the Wilmington Site. In addition, GLE intends to use fugitive-dust suppression practices (see answer to Question FEIS-23) in addition to any mitigation factors assumed in the modeling analysis performed to predict ground-level ambient air PM concentrations. The use of such practices (e.g., water spray trucks) would further mitigate fugitive dust emissions at the Proposed GLE Facility site and the associated environmental and human health impacts. See ER Section 4.6.2.1.1.1 (p. 4.6-2); FEIS Section 4.2.4.1 (pp. 4-15 to 4-16).

The most likely effects of fugitive dust emissions on the Wooden Shoe subdivision would be *temporary* dust nuisance effects and aesthetic impacts (e.g., soiling of clean surfaces and reduced visibility). Adverse health impacts are not expected because potential exposures of subdivision residents to PM concentrations exceeding the applicable NAAQS would be limited in number and short in duration. For example, the highest levels of fugitive dust emissions from construction activities typically occur during the initial stages of a project when heavy off-road construction equipment operate at a site to clear and grade the site, prepare roadways and parking areas, construct structure foundations, and install underground utilities. Fugitive dust emissions from the later stages of project construction involving erection of structures and equipment installation typically are lower because these activities do not involve disturbing the soil and site roadways and other open areas may be paved.

As stated above, any adverse air quality impacts are not expected to be widespread. GLE's air quality modeling results indicate that predicted 24-hour average PM concentration levels continually decrease (due to particulate deposition) with distance

in the downwind direction relative to those points along the fence line at which the maximum PM concentrations were predicted to occur. The predicted 24-hour average PM concentration decreased to below the 150 $\mu g/m^3$ NAAQS level at distances in the range of approximately 0.5 miles (0.8 kilometers) from the Proposed GLE Facility site fence line. Thus, the air quality impacts from the fugitive dust emissions created during the preconstruction and construction phases would be localized and confined to areas immediately adjacent to the Proposed GLE Facility site, and would not extend to regional or other local areas in the vicinity of the site.

FEIS Question No. 23:

> On page 4-18, the NRC Staff recommends that "best available practices should be implemented" in order "to minimize potential air quality impacts." What are these practices? What will the impacts be if GLE does not institute these practices? (EIS, 4-18)

Response to FEIS Question No. 23 (Peterson):

Fugitive dust emissions generated by preconstruction and construction activities at the Proposed GLE Facility site have been determined to potentially create MODERATE air quality impacts of short duration (EIS, p. 4-18). These impacts would be localized and confined to areas immediately adjacent to the Proposed GLE Facility site, and would not extend to regional or other local areas in the vicinity of the site (see answer to FEIS Question 22). Implementation of best management practices (BMPs) for controlling fugitive dust emissions at construction sites would significantly mitigate the potential for, and the magnitude of, fugitive dust emissions from the Proposed GLE Facility site.

Pages 4-18 and 4-19 in the FEIS list mitigation measures identified by GLE and the NRC Staff for implementation at the Proposed GLE Facility site to minimize potential air quality impacts from preconstruction and construction activities. This list of

mitigation measures includes fugitive dust emission BMPs that have been widely adopted for use at numerous types of large construction sites.

GLE is committed to implementing fugitive dust emission BMPs, as appropriate, during the Proposed GLE Facility preconstruction and construction phases to the maximum extent practicable, taking into account the site-specific conditions encountered at the time of preconstruction and construction activities. The fugitive dust emission BMPs assumed for the 24-hour average PM concentration levels predicted by GLE's air quality modeling for the Wilmington Site boundary and the nearby Wooden Shoe residential subdivision (see answers to FEIS Question 22) included the spraying of water on disturbed soil and unpaved roads twice per day, and the paving of access roads before the construction phase begins. The use of only a subset of the BMPs appropriate for implementation at the Proposed GLE Facility during the preconstruction and construction phases might create the potential for actual fugitive dust emissions to reach the 24-hour average PM concentration levels predicted by GLE's air quality modeling for the nearby Wooden Shoe residential subdivision. This, in turn, might increase the potential for temporary dust nuisance effects and aesthetic impacts to the residents living in the subdivision. As stated above, however, GLE is committed to implementing BMPs for controlling fugitive dust emissions as practical and appropriate for the site-specific conditions encountered during preconstruction and construction.

FEIS Question No. 24:

If preconstruction has begun, what air quality impacts have been witnessed thus far? What "aggressive dust control" measures have been taken in the preconstruction phase? How effective have they been?

Response to FEIS Question No. 24 (Olivier):

No preconstruction activities have been conducted at the Proposed GLE Facility site to date. Therefore, there presently are no associated air quality impacts or bases for evaluating the actual efficacy of proposed dust control measures.

FEIS Question No. 25:

Clarify in more detail the significance of Table 4-5. In particular, explain the relationships of the columns with one another. (EIS, 4-31)

Response to FEIS Question No. 25:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 26:

Was there any investigation of how GLE construction and operation may affect active nearby red-cockaded woodpecker (RCW) groups beyond habitat protection? For example, will they be harmed by noise, dust, and other increased human activity in the area? How would the generalized discussion of dust impacts to wildlife translate to the woodpecker groups neighboring the site and the well-documented responses of birds to disturbances generally? (EIS, 4-35 to 4-36) If so, can anything be done to mitigate impacts?

Response to FEIS Question No. 26:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 27:

Did the NRC Staff consider how noise from preconstruction and construction activities may impact the threatened, endangered, and other special status species relevant to this site? (EIS, 4-36 to 4-37, 4-40 to 4-48)

Response to FEIS Question No. 27:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 28:

In Appendix B, Fish and Wildlife Service agrees that impacts can be mitigated on RCWs by engaging in a tree mitigation program and their agreement to finding no adverse impacts on RCWs seems conditioned on the implementation of this program. (EIS, B-103) Why is this program only being "considered" by GLE, and what is the status of GLE's consideration? (EIS, 4-55)

Response to FEIS Question No. 28 (Matthews):

The mitigation measure referenced in FEIS, p. 4-55, and ER, p. 5-7, to compensate for impacts to large trees is required by the New Hanover County Ordinance, Section 67 (http://www.nhcgov.com/PlanInspect/Documents/Feb%202012%20Finalv2_hyperlinks.pdf , which is a zoning ordinance intended to address new development that supports the preservation of mature trees. GLE did not intend for this mitigation measure to be a "tree mitigation program" for RCW foraging (feeding) habitat, as discussed in the letter from the U.S. Department of Interior, Fish and Wildlife Service (FWS) (EIS, Appendix B, p. B-103).

RCWs forage in pine forests with trees over 30 years of age and at least 25.4 cm (10 in) diameter at breast height (dbh) or larger and nest (breed) in trees over 60 years of age (USFWS, 2003). As discussed in response to FEIS Question B-26, the GLE Study Area does not contain suitable trees for RCW foraging or nesting. Furthermore, the FWS "concur[ed] that current forest conditions on the GLE Site are not suitable for RCW nesting."

The status of GLE's consideration of this program is as follows: before beginning construction, GLE will conduct surveys for the presence of RCW foraging trees in accordance with the protocols approved by the FWS (FEIS, p. 4-47; http://www.fws.gov/rcwrecovery/files/RecoveryPlan/survey_protocol.pdf). If suitable

foraging habitat is found and will be impacted, then GLE will conduct further surveys to identify potential nesting habitat within 0.5 miles of the suitable RCW foraging habitat. Should this occur, GLE would consult with the FWS and consider implementing mitigation measures associated with the impacts on the RCW habitat.

FEIS Question No. 29:

The FEIS discusses noise level impacts in terms of decibels above ambient levels. Is there any machinery anticipated to be used during the construction or operation of GLE likely to produce an impact of sound in frequencies outside the range of human hearing such that it would cause discomfort/disruption to humans and/or wildlife? (EIS, 4-57 to 4-62)

Response to FEIS Question No. 29:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 30:

Page 4-68 refers to "empty cylinders with tails…" Elsewhere in the FEIS, "tails" refers to the depleted UF6 from the separations process. Is it correct to assume in this case that the FEIS is referring to empty cylinders with the residual feed (natural UF6) not removed when the tanks were emptied? (EIS, 4-68)

Response to FEIS Question No. 30:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 31:

In evaluating worker radiological safety, the NRC Staff accepts General Electric-Hitachi's assumption that the new GLE facility will have UF6 release levels similar to a gas centrifuge plant. Part of this assumption is that releases in the separations area will be much smaller than those associated with connecting and disconnecting UF6 tanks. Did the NRC Staff attempt to validate (even qualitatively) whether or not the releases from the laser-based separations process will indeed be similar to those in a gas centrifuge process? If yes, what is the logic that supported the validity of the assumption? (EIS, 4-77)

Response to FEIS Question No. 31:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 32:

Are there situations where the high-efficiency particulate air filters and/or carbon beds associated with the main ventilation stack can be bypassed? If so, what controls will be in place to guard against inappropriate bypass? (EIS, 4-79)

Response to FEIS Question No. 32 (Enos):

No. The design of the emission control system does not include ducting allowing the gases captured by the building ventilation system to bypass (i.e., be routed around) either the High-Efficiency Particulate Arresting (HEPA) filter section or the activated carbon bed section (ISAS, Chapter 4, Section 4.10, Figure 4.10-2, Monitored Central Exhaust System (MCES) Schematic).

FEIS Question No. 33:

What is the logic behind using the data from the FMO (Fuel Manufacturing Operation) vents to approximate what would be expected for the GLE facility? Did the NRC Staff compare this data with that from an operating gas centrifuge facility? (EIS, 4-81)

Response to FEIS Question No. 33:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 34:

Why was the wind speed data used to calculate potential radiation emissions/dosages to the public from 1988 to 1992? Has the NRC Staff ascertained the availability of more recent data? Have there been any changes in local weather patterns in recent years that could influence results? (EIS, 4-82)

Response to FEIS Question No. 34 (Andrews):

In addition to NRC's response to this question, GLE acknowledges the existence of wind data that are more recent than the 1988 to 1992 data used to calculate radiation doses to the public. GLE did not use more recent meteorological data because, as explained in Appendix S to the ER, the XOQDOQ code used by GLE requires that meteorological input data be input as a joint frequency distribution for wind speed and

direction by stability class. To generate this model input distribution, GLE used meteorological data collected at the Wilmington International Airport meteorological station for the years 1988 through 1992. These data were gathered in Met144 format and converted to CD144 format using the EPA's MET144 program. This data conversion was necessary to make the data compatible with EPA's Stability Array (STAR) program, which generates the necessary joint frequency distribution. The most recent data that could be found in the correct format for use with the STAR program were for calendar years 1988-1992. Neither the Met144 processing software nor the STAR program has been upgraded to accommodate more recent data formats. Thus, although more recent meteorological data are available, those data are not in formats compatible with EPA-endorsed software programs mentioned above.

FEIS Question No. 35:

On page 4-86, the FEIS states that the public dose estimates are based on conservative assumptions. What is the basis for the NRC Staff's understanding that using the FMO source terms is indeed conservative?

Response to FEIS Question No. 35:

To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 36:

Will all of the mitigation measures proposed by GLE in Table 5-1 be implemented? What processes will GLE use to decide which of the NRC-recommended mitigation measures in Table 5-2 will ultimately be implemented? Will the NRC Staff have any ongoing role in monitoring implementation?

Response to FEIS Question No. 36 (Olivier):

The FEIS summarizes the nature and extent of the NRC Staff's consideration of mitigation measures as follows:

> Within each resource area, mitigation measures identified by GLE and U.S. Nuclear Regulatory Commission (NRC) staff are disclosed. While the NRC cannot impose mitigation outside its regulatory authority under the Atomic Energy Act, a discussion of mitigation measures is presented in this chapter. For the purposes of the National Environmental Policy Act (NEPA) per the U.S. Code of Federal Regulations (CFR) Title 10, "Energy," 10 CFR 51.71(d), the NRC is disclosing mitigation measures that could reduce or avoid environmental effects of the proposed action. Mitigation measures identified by GLE in its Environmental Report (GLE, 2008) and factored into the NRC's environmental impact analysis are presented in Table 5-1. Additional mitigation measures identified by the NRC are presented in Table 5-2. These mitigation measures are not requirements being imposed upon GLE. (FEIS, p. 4-1)

GLE will implement the majority of the mitigation measures listed in Table 5-1 of the FEIS. GLE will implement other mitigation measures from Table 5-1 of the FEIS as well as those identified by the NRC listed in Table 5-2 of the FEIS based upon the following factors:

- Regulation or ordinances that require implementation of specific mitigation measures (e.g., construction BMPs per New Hanover County Erosion and Sedimentation Control Ordinance).
- Availability of the mitigation measure (e.g., low-sulfur fuel oil and ultra-low sulfur diesel fuel).
- The potential for conflict between mitigation measures (e.g., conducting soil-disturbing activities during favorable meteorological conditions versus timing activities to reduce noise and traffic impacts).
- Overall feasibility with respect to project schedule.
- Cost-benefit analysis.

Some mitigation measures are subject to inspection and reporting requirements by the applicable federal, state, and local regulatory authorities (e.g., application of personal

protective equipment reviewed by OSHA). To the extent required or otherwise practicable, GLE will keep records of the mitigation procedures implemented and can make these records available to the regulators upon request.

FEIS Question No. 37:

Explain how the NRC Staff's overall assessment that environmental impacts are SMALL would be impacted if GLE only implemented the mitigation measures proposed in Table 5-1. How would overall impacts change if GLE only implemented mandatory mitigation measures? (EIS, 2-65, Table 5-1, Table 5-2)

Response to FEIS Question No. 37 (Olivier):

The Staff is responding to this question with a description of new mitigation measures that were considered in the analyses presented in the FEIS. In addition, GLE notes that the assessments of environmental impacts presented in Chapter 4 of the ER were conducted without consideration of the lessening of impacts from the implementation of all but a few of the mitigation measures proposed in FEIS Table 5-1 (e.g., fugitive dust modeling did consider water spraying for dust suppression). Therefore, implementation of additional mitigation measures (mandatory or voluntary) listed in Table 5-1 would decrease the environmental impacts of the Proposed Action as compared to the anticipated impacts presented in Chapter 4 of the ER. Similarly, implementation of only mandatory mitigation measures (i.e., required by other agencies) would decrease the environmental impacts of the Proposed Action as compared to the anticipated impacts presented in Chapter 4 of the ER.

FEIS Question No. 38:

Except as already explicitly specified, how often will GLE conduct each type of monitoring outlined on pages 6-4 to 6-11?

Response to FEIS Question No. 38 (Olivier):

In addition to the monitoring frequencies specified in FEIS pages 6-4 to 6-11, GLE offers the following clarifications and details:

- Physiochemical measurements for treated process-water effluent monitoring at NPDES Outfall 001 are discussed in the third paragraph of FEIS Section 6.2.1.1. Table A(2) of NPDES permit NCS0001228 provides the effluent limitations and monitoring requirements specifically for when the GLE process is added. Table A(2) includes monitoring frequencies. Depending on the parameter, monitoring frequencies are continuous, weekly, monthly, or quarterly.
- Physiochemical measurements for treated sanitary wastewater effluent monitoring at NPDES Outfall 002 are discussed in the fourth paragraph of FEIS Section 6.2.1.1. Table A(3) of NPDES permit NCS0001228 provides the effluent limitations and monitoring requirements, including monitoring frequencies. For situations where all effluent is not re-used as process water and discharges do occur, monitoring frequencies are continuous, weekly, monthly, or quarterly, depending on the parameter.
- Surface water physiochemical monitoring is discussed in the sixth paragraph of Section 6.2.1.1 of the EIS. This monitoring is conducted by the Lower Cape Fear River (LCFR) Association of which GE is a participating member. The program implemented by the LCFR Association includes monthly sampling and analysis of river water for physiochemical parameters (i.e., the same frequency as specified in FEIS Section 6.1.4 and Table 6-1 for surface water radiological monitoring implemented by GE).

- Ecological monitoring is discussed in FEIS Section 6.2.2. GE's current forestry management plan does not include a routine program. Rather, monitoring and evaluations are conducted on an as-needed basis as required for planning considerations and other activities. In the future, GLE may choose to implement routine ecological monitoring at specified frequencies.
- Indoor air quality and workplace noise monitoring are discussed in FEIS Section 6.2.3. This monitoring will be established as part of GE's Industrial Hygiene Program, and monitoring frequencies will be established for that program prior to implementation.
- Surveillance and monitoring of depleted UF_6 cylinders is discussed in FEIS Section 6.2.4. As stated, the cylinders will undergo an initial inspection upon placement on the storage pad and will be inspected prior to their transportation.

FEIS Question No. 39:

> Will all gaseous diffusion enrichment operations in the United States have ceased operation by the end of 2012? (EIS, 7-13)

Response to FEIS Question No. 39:

> To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 40:

> The NRC Staff comments on the laser-based separations technology by stating "GE-Hitachi expects it to offer certain advantages over both the gaseous diffusion and gas centrifuge processes." From an environmental perspective, what are the advantages that are expected over the gas centrifuge process? (EIS, 7-13)

Response to FEIS Question No. 40:

> To avoid duplication, only the NRC Staff is responding to this question.

FEIS Question No. 41:

Explain why no surveys of the project area associated with the site security fence have been conducted. (H-7)

Response to FEIS Question No. 41 (Olivier/Jenny):

No surveys have been performed because GLE needs to obtain a license prior to constructing the fence. The purpose of this security fence is to control access to the perimeter of the Wilmington Site (also referred to as the Owner Controlled Area). In a letter to the NRC dated November 5, 2009, GLE committed to perform surveys prior to the construction of the fence. Once the license is granted, and GLE is ready to finalize the design for the fence, GLE will consult with the NRC Staff to determine the optimal location and characteristics of the fence.

[INFORMATION WITHHELD FROM PUBLIC DISCLOSURE PER 10 CFR 2.390.]

FEIS Question No. 42:

Why does the proposed license condition identified in Section 4.2.2.2 only require consultation regarding mitigation rather than the implementation of any mitigation measures given the likelihood that known archaeological sites may be impacted? (H-7 to H-8, EIS 4-6)

Response to FEIS Question No. 42:

To avoid duplication, only the NRC Staff is responding to this question.

Respectfully submitted,

/s/ Donald J. Silverman
Donald J. Silverman, Esq.
Martin J. O'Neill, Esq.
Charles B. Moldenhauer, Esq.
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COUNSEL FOR GLE

Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of William Joseph Alexander

I, William Joseph Alexander, do hereby affirm:

1. I am Senior Research Geologist, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question No. 12 and FEIS Question No. 19.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

William Joseph Alexander
Senior Research Geologist
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Paul Raymond Andrews

I, Paul Raymond Andrews, do hereby affirm:

1. I am Research Environmental Scientist, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the response to the following Atomic Safety and Licensing Board question: FEIS Question No. 34.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Paul Raymond Andrews
Research Environmental Scientist
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andrewsp@rti.org

Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Christopher Carter Enos

I, Christopher Carter Enos, do hereby affirm:

1. I am Senior Safety Analysis/Chemical Safety, Sadim, Inc. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question No. 21 and FEIS Question Nos. 3 and 32.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Christopher Carter Enos
Senior Safety Analyis Chemical
Safety
Sadim, Inc.
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865-276-1824
chris.enos@oref-msn.com

Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Kenneth Ross Givens

I, Kenneth Ross Givens, do hereby affirm:

1. I am Acting Integrated Safety Analysis Manager, GLE. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question No. 14 and FEIS Question Nos. 12, 13, and 15.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Kenneth Ross Givens
Acting Integrated Safety Analysis Manager
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
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In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Scott A. Guthrie

I, Scott A. Guthrie, do hereby affirm:

1. I am Research Geologist, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's question: FEIS Question No. 14.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Scott A. Guthrie
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Roy Joe Hunt

I, Roy Joe Hunt, do hereby affirm:

1. I am Structural and Natural Phenomena Engineering Consultant, Fairfield Services Group. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question Nos. 17 and 19.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Roy Joe Hunt
Structural and Natural Phenomena
Engineering Consultant
Fairfield Services Group
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
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In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Patricia Colleen Jenny

I, Patricia Colleen Jenny, do hereby affirm:

1. I am Security Manager, GE Global Laser Enrichment. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board question: FEIS Question No. 41.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Patricia Colleen Jenny
Security Manager
GE Global Laser Enrichment
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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Dr. Michael O. Garcia

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GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Steven Edwin Lee

I, Steven Edwin Lee, do hereby affirm:

1. I am Principal Engineer, Safemark, LLC. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question Nos. 20 and 29.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Steven Edwin Lee
Principal Engineer
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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In the Matter of	)	Docket No. 70-7016-ML
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Affidavit of Anthony Berardino Marimpietri

I, Anthony Berardino Marimpietri, do hereby affirm:

1. I am Senior Director, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's question: FEIS Question No. 14.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Anthony Berardino Marimpietri
Senior Director
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
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Affidavit of Kimberly Yandora Matthews

I, Kimberly Yandora Matthews, do hereby affirm:

1. I am Research Environmental Scientist, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's question: FEIS Question No. 28.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Kimberly Yandora Matthews
Research Environmental Scientist
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
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Affidavit of Julie Anne Olivier

I, Julie Anne Olivier, do hereby affirm:

1. I am Licensing and Regulatory Affairs Manager, GE-GLE. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question No. 12 and FEIS Question Nos. 11, 16, 17, 24, 36, 37, 38 and 41.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Julie Anne Olivier
Licensing and Regulatory Affairs Manager
GE-GLE
Global Laser Enrichment
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Julie.Olivier@GE.com

Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
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Affidavit of Steven Marcus Painter

I, Steven Marcus Painter, do hereby affirm:

1. I am GLE ISA Team Member/Lead, Nuclear Safety Associates. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: SER Question Nos. 22 and 25.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

*Executed in accord with 10 C.F.R. § 2.304(d_*

Steven Marcus Painter
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
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Paul S. Ryerson, Chairman
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Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Paul Robert Peterson

I, Paul Robert Peterson, do hereby affirm:

1. I am Senior Research Environmental Engineer, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: FEIS Question Nos. 22 and 23.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Paul Robert Peterson
Senior Research Environmental Engineer
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Michael H. Schwartz

I, Michael H. Schwartz, do hereby affirm:

1. I am Chairman of the Board, ERI International, Inc. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's questions: FEIS Question Nos. 4, 5, 6 and 7.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Michael H. Schwartz
Chairman of the Board
ERI International, Inc.
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Dated in Washington, DC
This 2nd day of May, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

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GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

Affidavit of Andrew David Stahl

I, Andrew David Stahl, do hereby affirm:

1. I am Senior Research Geologist, RTI International. A statement of my professional qualifications is attached.
2. I am responsible for the responses to the following Atomic Safety and Licensing Board's question: FEIS Question No. 19.
3. I hereby certify, under penalty of perjury, that those responses are true and correct to the best of my knowledge, information and belief, support them as my own, and endorse their introduction in the record of this proceeding.

Executed in accord with 10 C.F.R. § 2.304(d)

Andrew David Stahl
Senior Research Geologist,
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Dated in Washington, DC
This 2nd day of May, 2012

W. Joseph Alexander

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Education

MS, Geology (concentration in Hydrogeology/Engineering Geology), Northern Arizona University (1974)
BS, Geology, East Carolina University (1972)

Professional Registration

Professional Geologist, State of North Carolina, No. 1314 (1994 to date)
Professional Geologist, State of Georgia, No. 559 (1979 to date)
Professional Geologist, State of Tennessee, No. 3696 (1995-2001)
Professional Geologist, State of Delaware, No. 403 (1988-2000)

Professional Experience

RTI International, Research Triangle Park, NC (1984 to present)

Senior Geologist and Project Director (2003 to present)

- Directed rapid-response project following the impacts of the March 11, 2011 earthquake and tsunami on the Fukushima Daiichi Power Plant. Project included deployment and maintenance of a comprehensive radiological database, GIS mapping, and evaluation. Served as member of client's Radiological Oversight Committee and worked with health physicists to help address numerous questions that ensued in the first two months following the event. The database used for this project is being leveraged by the U.S. nuclear industry for other applications.
- Directed a large multidisciplinary environmental assessment team to develop a comprehensive environmental report in support of a license application for a uranium enrichment project (Global Laser Enrichment). Report was prepared in compliance with guidelines established by the Nuclear Regulatory Commission (NRC) and the National Environmental Policy Act (NEPA). Project included a robust site-selection process employing a multi-criteria decision analysis approach.
- Directed a multidisciplinary team to prepare a site characterization report for evaluation of a site in Illinois by the U.S. Department of Energy (DOE) as part of the Global Nuclear Energy Partnership (GNEP).
- Directed a large multidisciplinary team in a fast-paced, shallow-soil remedial project to achieve a "no further action" (NFA) letter for a commercial client in California. A related groundwater remedial evaluation project included four concurrent pilot tests to determine whether density-driven convection was a technically viable and cost-effective in-situ remedial technology for controlling contamination near source areas in a complicated pattern of alluvial sediments.

- Provided senior technical reviews of draft environmental reports (including hydrogeology, geology, and seismology) for proposed Nuclear Power Plant complex in the UAE for the Environment Agency – Abu Dhabi, UAE.

Research Director, RTI Center for Geosciences (2001-2003)

- Directed integrated programs in hydrogeology, remedial technology, geochemistry, geographic information systems (GIS), 3-D scientific visualization, brownfields redevelopment, and economic development.

Senior Program Director/Manager, RTI Geosciences Department (1996-2001)

- Provided technical oversight to hydrogeology, remedial technology, geochemistry, GIS, brownfields redevelopment, economic development, and smart growth programs.
- Served as Project Supervisor for contamination assessments and corrective action plans.
- Led brownfields redevelopment forums, training programs, and community outreach.

Senior Research Hydrogeologist/Manager, RTI Geosciences Department (1984-1996)

- Led DOE research project that included the laboratory formulation of latex polymers for a novel in-situ barrier to remediate contaminated groundwater.
- Led groundwater contamination assessments (enriched uranium and volatile organic compounds), compliance monitoring programs, and remediation implementations for commercial clients.
- Served as Project Leader for groundwater contamination studies at U.S. Air Force bases under the Department of Defense's (DoD's) Installation Restoration Program.
- Served as Project Leader on a work assignment with EPA's Office of Solid Waste (OSW) to provide technical support to resolve hydrogeologic issues for siting guidelines.

Law Environmental Waste Management Program, Marietta GA (1979-1984)

Senior Hydrogeologist

- Conducted aquifer tests and dispersion testing for hydraulic characterization of contaminated sites at DOE's Y-12 facility.
- Conducted groundwater contamination evaluations of landfills, land treatment areas, spill sites, underground storage tanks, waste pits, ponds, and lagoons.
- Designed and implemented recovery, containment, and monitoring systems to remediate petroleum products released in a variety of hydrogeological settings.
- Led environmental surveys.

Soil & Material Engineers, Raleigh NC (1977-1979)

Engineering Geologist/Hydrogeologist

- Managed a variety of hydrogeological, geotechnical, and engineering geology projects.

- Evaluated contaminated groundwater sites and designed and implemented remedial systems.

Law Engineering, Water Resources Department, Marietta, GA (1974-1977)

Staff Hydrogeologist

- Prepared the groundwater geology sections of Preliminary Safety Analysis Reports (PSAR) for proposed nuclear power and fuel reprocessing plants. PSAR writing assignments included regional and site geology, groundwater use conditions, aquifer delineations, well inventories, groundwater flow and quality, and transport of potential nuclear releases under accident scenarios. Worked closely with a team of other geologists, seismologists, geotechnical engineers, environmental scientists, and ecologists responsible for other key elements of the PSAR-siting studies.
- Conducted feasibility studies for groundwater supplies and evaporation-percolation ponds, and groundwater investigations for pollution control facilities and coal-gasification plants. Conducted geophysical and seismic studies.

Department of Geology, Northern Arizona University, Flagstaff, AZ (1972-1974)

Graduate Teaching Assistant

- Instructed courses and led related field trips for engineering geology, physical geology, and physical science laboratory courses.

- Worked part time for a registered hydrogeologist conducting aquifer tests in municipal well fields, performing geologic mapping, and conducting geomagnetic investigations in northern Arizona.

Paul R. Andrews

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Education

BS, Meteorology, The Pennsylvania State University (1992)

Professional Experience

RTI International, Research Triangle Park, NC (1997 to present)

Research Environmental Scientist 1 (2005 to present)

- Provides air dispersion modeling, meteorological, and climatology support.
- Writes environmental reports for facility site selection, meteorological and climate regime, and air quality impacts due to fugitive dust, vehicle exhaust, and radioisotope releases.
- Coordinated data gathering efforts for rapid-response project following the impacts of the March 11, 2011 earthquake and tsunami on the Fukushima Daiichi Power Plant. Task included coordination of team activities in acquiring, processing, and uploading data to database. Wrote, maintained and updated Quality Assurance Project Plan and Standard Operating Procedures.
- Leads training on and provides technical support for STORET/WQX, STORET for the BEACH Program, and Reach Indexing of location data to the NHD.
- Writes training and protocol documents for STORET/WQX and Air Dispersion Modeling.

Environmental Scientist 3 (2001-2005)

- Provided siting recommendations for meteorological instrumentation packages for National Aeronautics and Space Administration project related to the Titan II launch vehicle. Instrumentation would provide inputs for the Fifth-Generation National Center for Atmospheric Research/Penn State Mesoscale Model (MM5).
- Managed reach indexing and water quality georeferencing projects.
- Served as QC Coordinator for a major contract with AWPD-NWPP.
- Led National Hydrography Dataset (NHD) migration, georeferencing, and technical support tasks.

Environmental Scientist 2 (1997-2001)

- Provided air dispersion modeling support for health risk assessment of pollutants using ISCST3 and other EPA models. Provided meteorological advice for decision making.
- Planned and implemented meteorological data collection
- Led technical support, georeferencing, and reach indexing tasks.

- Served as detailed production coordinator of the RF3 to NHD indexing migration project.

US Air Force, Pope Air Force Base, NC (1992-1996)

Wing Weather Officer

- Provided aviation weather support for 23rd Wing, Pope Air Force Base, NC.
- Analyzed weather charts and satellite imagery. Issued 24-hour and long-range forecasts.
- Briefed base decision makers and pilots on weather.
- Provided on-call severe weather support for the protection of $1.04 billion in resources and 4,800 base personnel.
- Used Doppler Weather Radar. Modeled atmospheric effects on electro-optical weapons systems.
- Deployed to field environments as officer in charge of weather team.
- Supported flying operations in field environment.
- Instructed pilots on weather phenomena, climatology, and weather station operating procedures.
- Served as liaison to flying customers and civilian contractors.

CHRISTOPHER C. ENOS

Sadim, Inc.
Oak Ridge Engineering Facility
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Office: (865) 276-1824, (865) 269-4158, or (865) 803-8790
E-mail: chris.enos@oref-msf.com

Education

B.S., Chemical Engineering Pennsylvania State University (May 1978)
Senior Reactor Operator (SRO) Certification (General Electric, 12/1983) (Limerick Generating Station site, 3/1985)

Professional Experience

Sadim, Inc. (11/1995 to Present) (Provided Listed Services as a Consultant)

Merrick Oak Ridge Facility (MORF)/Oak Ridge Engineering Facility (OREF) (2/2009 to Present)

- Senior Operations/Start-up Test Engineer – Supported Manufacturing Support Facility activities in expanding the procedure development process to include standard and abnormal operating procedures, and wrote, reviewed, and verified documents under this process. Developed test procedures and conducted equipment final acceptance testing for various utilities and support equipment.
- ISA Team Member (Senior Safety Analysis/Chemical Safety) – Developed process to generate and maintain Integrated Safety Analysis (ISA) Summary, and supporting documents to meet License Application NRC requirements (e.g., 10CFR70) for GE-Hitachi Global Laser Enrichment proposed facility. Developed and/or independently reviewed various documents, including probabilistic risk assessments and analyses. Performed research in support of event probabilities, natural phenomena hazards, and equipment reliability to establish industry based risk analyses.

Y-12 Plant (5/2001 to 3/2010)

- Senior Safety Analyst – Supported BWXT/Babcock &Wilcox Y-12 personnel to develop process to upgrade safety basis (SB) documents to meet DOE requirements (e.g., 10 CFR 830) for Documented Safety Analysis (DSA)/Safety Analysis Report (SAR) and produce SB document upgrades for documents originally written to meet DOE requirements for Basis for Interim Operations (BIO). Upgrades included development and documenting risk assessments, conducting calculations. Supported SB change implementation (e.g. procedure development/review, design changes, and technical document updates). Supported DOE National Nuclear Security Administration and external review organizations (e.g., DNFSB, DOE-HQ) meetings.

Pantex Plant (9/1997 to 5/2001)

- Senior Safety Analyst – Supported Mason and Hanger/BWXT personnel to formalize the process by which Weapon Programs documents, equivalent to SB documents, are generated concurrent

with producing documents under this process. Generated Hazards Assessment Reports (HAR), analyses to support the HAR, including probabilistic risk assessments, and Activity Based Control Documents (ABCD) on various Weapon Programs. The ABCDs connect the HAR identified safety requirements to floor level procedures and controls.

Savannah River Site (11/1995 to 4/1997)

- Radiological Safety Engineer (11/1995 to 2/1996) – Developed and managed training program to prepare personnel at the Defense Waste Processing Facility (DWPF) for the introduction of radioactive material. Managed the shift team to perform baseline assessments of radiological practices, define areas of weakness, develop and implement corrective actions. Coordinated mentoring of DWPF shift personnel (Operations, Maintenance, Laboratory and Radiological Control managers, supervisors, technicians, and inspectors).
- Senior Safety Analyst (6/1996 to 4/1997) – Same as below (Savannah River Site, Senior Safety Analyst).

Cenos, Inc. (Provided Listed Services as a Consultant)

Savannah River Site 5/1990 to 6/1996)

- Senior Safety Analyst – Assisted DOE to upgrade the SB documents for Production Reactor, Fissile Material Processing, and Storage Facilities. Managed the DOE site inspection and review process of SB documents generated by operating contractor. Led review teams on SARs, BIO, Technical Safety Requirements (TSR) & Technical Specifications. Reviewed historical information (initial design documents, modifications, calculations, etc.); reviewed generated technical material (criticality safety analyses, accident frequency calculations, probabilistic risk assessments); coordinated comment resolution; drafted Safety Evaluation Reports, and approval/rejection letters. Reviewed and verified Nuclear Criticality Safety Evaluations, Double Contingency Analyses, and the controls which implemented the limits defined. Researched, reviewed, and assisted in processing NEPA documents (Environmental Impact Statements and Environmental Assessments).
- Safety Program Developer/Compliance Engineering Consultant – Assisted DOE to develop and implement the DOE Standards for SB documents and Nuclear Safety. Developed the site inspection process of the Operating Contractor to verify implementation of the DOE Orders and Standards on Nuclear Safety. Reviewed BIOs (to address limitations and operations with non-compliant nuclear safety documents) for various facilities.
- Safety Analyst/Facility Representative Mentor – Assisted DOE personnel to implement various DOE Orders covering SB documentation, Unreviewed Safety Questions, and Nuclear Safety. Developed and managed the DOE Order compliance program and program personnel training. Reviewed SAR revisions needed in response to abnormal operating events. Provided on shift support to train and assess DOE Facility Representatives.
- Regulatory/Compliance Engineer – Assisted DOE personnel in reviewing and coordinating responses to draft DOE Rules and draft DOE Orders which cover DOE Nuclear activities. Assisted DOE in defining, developing, writing supporting procedures, and maintaining an issues

management program. Developed and implemented the Database used to track and trend the issues.

Limerick Generating Station (7/1987 to 5/1990)

- Consultant Regulatory Engineer – Assisted the Station Regulatory Engineer to define, establish, and implement the Compliance organization; directed Plant Staff in Licensing and Regulatory Compliance activities. Prepared and reviewed Licensee Event Reports (LER), Violation Responses, Special and Routine Reports to the NRC. Assessed Operating Incidents for Compliance/Reportable concerns. Formalized the site written non-routine reporting process.
- Unit 2 Test Review Board Member – Assisted in developing the Review Program for Preoperational Tests. Conducted technical reviews, design verifications, and approved Preoperational Test Procedures and Test Results. Participated in review groups for 20 System Tests. Reviewed and approved the results for all system cleanliness Flush Procedures. Assisted in developing and maintaining various computer databases to track test completion, deferred items, and system interfaces to ensure the Test Program integrity.

Enercon, Inc

Perry Nuclear Power Plant (3/1986 to 6/1987)

- Compliance Engineer – Assisted the Regulatory Engineer in defining and establishing the Compliance organization. Assisted Plant Staff with Licensing and Regulatory Compliance activities to include prepared and reviewed LERs, License Amendment Requests, Violation Responses, Special and Routine Reports to the NRC. Assessed Operating Incidents for Compliance/Reportable concerns. Refined site procedures for immediate NRC notification and reportable determination.

General Electric Company

Limerick Generating Station (10/1985 to 3/1986)

- Startup Test Operations Engineer – Provided shift technical direction to Operations Personnel during Power Ascension Testing and initial commercial operation of Unit 1. Performed technical reviews of System Operating and Technical Specification Surveillance Procedures. Directed and performed power ascension tests.

Peach Bottom Atomic Power Station (6/1985 to 10/1985)

- Outage Engineer – Conducted design reviews and installation of Unit 3 NRC Appendix R requirements (Safe Shutdown Modification to NSSS/BOP systems). Prepared, performed, and tracked acceptance tests.

Hope Creek Generating Station (3/1985 to 6/1985)

- Startup Engineer – Conducted Preoperational Test reviews, corrections, and system design verifications. Functioned as a member of the Test Review Board in the initial Preoperational procedure reviews.

Limerick Generating Station (2/1984 to 3/1985)

- Startup Engineer – Performed design reviews, testing, and turnover to Plant Staff for a myriad of systems (site Responsible Engineer). Wrote and performed Preoperational Tests on NSSS and BOP systems. Supported NRC and Test Review Board reviews and resolutions of Preoperational Test development and test results.

U. S. Navy, Submarine Service (1978 to 1983)

- Reactor Controls Assistant – Responsible for the operation, testing, and maintenance of naval nuclear reactor instrumentation, controls and safety equipment.
- Quality Assurance/Damage Control Assistant – Developed, implemented, and maintained all aspects of the ship's Quality Assurance Program. Included training and certification of Quality Assurance Workers/Inspectors, procedures preparation, review, retention, and material control.

Scott A. Guthrie

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Research Triangle Park, NC 27709
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Education

Certificate in Groundwater Resources Planning, J. Sargeant Reynolds Community College, 1985
BS, Geology, Marshall University, 1984

Professional Experience

RTI International, Research Triangle Park, NC (1986 to present)

Research Geologist 1 (1993 to date)

- Currently provides support to environmental risk assessment studies for US EPA associated with various industry sectors including the mining and mineral processing industry, nanomaterials, and others.
- Also provides support to the Environmental Agency of Abu Dhabi, UAE, for technical and regulatory review of environmental studies (ES and EIA) as it pertains to impacts of groundwater, surface water, soil, geology and ecological impacts associated with proposed industrial, commercial, and municipal facilities, as well as other land-use activities (e.g., multi-use developments). Part of a multidisciplinary team to assist in reviewing EIA documents and associated baseline studies and plans related to a proposed Braqa Nuclear Power Station.
- Supports EPA's Office of Resource Conservation and Recovery (ORCR) in the development of human and ecological risk assessment methodologies as they apply to hard rock mine flow facilities, and supports work for EPA's National Exposure Research Laboratory to develop open-source software that will allow the evaluation of watershed impacts from mountaintop mining in the Appalachian Basin.
- Part of a team to prepare a site characterization report for evaluation of a site in Illinois by the U.S. Department of Energy (DOE) as part of the Global Nuclear Energy Partnership (GNEP).
- Also assists in the preparation of environmental guidance documents, for use by regulators in UAE, that outline details for EIS, baseline document preparation, and the review and design of environmental monitoring systems.
- Provided task management and technical support for geologic characterization, groundwater assessment and monitoring programs, wastewater system monitoring, including the National Pollutant Discharge Elimination Standard permitting performed for a commercial client.
- Configured sample and data collection systems, compiled and evaluated monitoring and assessment data, and assisted with reporting. This work involved assessment, monitoring, and

remedial action for organic and inorganic (including radionuclides) contaminants in support of environmental compliance.

- Provided support to NEPA-related reporting for proposed industrial facilities. Developed environmental report chapters relating to geological and water resources impacts and provided key technical support for the application of multicriteria decision support tools (i.e., Analytic Hierarchy Process) used for site selection.
- Led task to perform a groundwater resource assessment for the desert area located west of An Najaf, Iraq, and other areas in southern Iraq. This task was part of a USAID reconstruction and city planning initiative. As part of this effort, groundwater harvesting methods were reviewed and soil and groundwater salinity were evaluated using reported data and satellite imagery to assess the potential for sustaining agricultural activity and groundwater supply. Provided general assistance for task management and contributed to planning support for other hydrogeological assessments both in the United States and internationally.
- Assisted with compiling datasets and creating databases that contain national hydrogeologic and geologic data and with the development of Web-based tools to display subsurface data for EPA's OGWDW, and are used to track information and programs under the Clean Water Act.
- Also assisted with the review of 305(b) state water-quality assessment reports for groundwater and summarized state information for the development of the groundwater quality chapter for the Report to Congress: National Water Quality Inventory during most reporting years (e.g., 1994 through 2000).
- Worked with analytical chemists to develop methodologies and innovative apparatus used for the measurement of lead concentrations in soils. This work supported a U.S. Department of Housing and Urban Development (HUD) initiative to economically evaluate risks associated with older established properties.
- Performed hydrogeologic/hydrologic parameter estimation for risk assessment modeling in support of multiple projects for EPA's OSW, including data collection efforts for EPA's HWIR multimedia, multipathway national assessment and models used to support efforts to list wastes associated with the process streams of dye and pigment facilities and facilities using high-temperature metals removal processes.

Hydrogeologist 3 (1990 to 1993)

- Provided task management and planning for both inorganic and organic groundwater and soil assessment activities.
- Identified and worked directly with multiple contractors to install two large compliance well networks. Acting field team leader providing oversight to three drill crews and responsible for sample collection, tracking, and management of laboratory data from multiple laboratories.
- Provided support for the reporting of monitoring and assessment activities.
- Performed rapid response assessment in complex aquifer setting to track release of radionuclides in groundwater and soil, and designed defensible monitoring network based on statistical analysis for presentation to state, NRC and DOE offices.

Hydrogeologist 2 (1986 to 1990)

- Assisted with development and review of EPA guidance documents pertaining to the design and installation of groundwater monitoring networks, monitoring wells, and remedial technologies.
- Performed desktop modeling using DRASTIC scheme for the Aquifer Determination Study as part of EPA's pilot for the National Pesticide Survey and collected well water samples from domestic and community supply wells in multiple states across all U.S. hydrogeologic regions.
- Performed groundwater vulnerability assessments in 72 counties in 32 states across the United States for Monsanto Corporation's National Alachlor Water Well Survey.
- Performed numerous environmental assessments in complex hydrogeologic settings.
- In support of EPA OGWDW, assisted reporting requirements and determination of water quality indicator parameters for inclusion in the Report to Congress: National Water Quality Inventory.
- Provided support to RTI's Bulk Asbestos Laboratory and also RTI's Electron Microscopy Laboratory as part of EPA's laboratory accreditation programs.
- Provided support to EPA's Radon Laboratory Proficiency Testing Program and assisted in the national delineation and compilation of maps showing areas of risk of radon exposure.

Hydrogeologist 1 (1986)

- Provided in-field oversight to environmental assessments performed during base installation and restoration projects at Seymour Johnson Air Force Base, Goldsboro, NC.
- Provided oversight to all drilling activities and installation of monitoring well networks.
- Collected environmental samples, including groundwater, surface water, soils, and sediment.
- Assisted with implementation of electromagnetic surveys to detect buried drums.

HANDEX Corporation, Baltimore, MD. (1984 to 1986)

Project Hydrogeologist

- Assisted with implementation of Phase I and Phase II hydrogeologic assessments.
- Installed and tracked performance of groundwater remedial systems.
- Provided oversight at a RCRA facility to track environmental monitoring operations, and
- Performed inspections of procedures for groundwater monitoring systems.

Self-employed, Huntington, WV (1984 to 1985)

Geological Consultant

- Provided expertise in groundwater resource development.
- Provided technical support for an agricultural cooperative.

Kenneth Givens

GE-Hitachi Global Laser Enrichment, LLC
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Oak Ridge, TN 37830
Office: (865) 276-1805 E-mail: Kenneth.givens@ge.com

EDUCATION

1993, BSCHE, University of California-San Diego
2000, MSCHE, University of Tennessee, Knoxville

PROFESSIONAL REGISTRATION

Professional Engineer, State of Tennessee, No. 104111
Professional Engineer, State of North Carolina, No. 035410

CERTIFICATIONS

1993, Hazardous Waste Management

PROFESSIONAL EXPERIENCE

Over 28 years of experience in nuclear/chemical operations, environmental engineering, programmatic assessments, engineering design and management, start-up readiness reviews, D&D project management and planning, and operational readiness assessments.

- Integrated Safety Manager for development, management, and submittal of the GE laser uranium enrichment license to the Nuclear Regulatory Commission.
- D&D project manager for demolition of a Category II nuclear facility.
- Operations/Startup Manager in designing, constructing, and performing the start-up of a chemical nuclear waste treatment plant.
- Technical manager for the uranium-233 repository responsible for development and implementation of Conduct of Operations, Conduct of Maintenance, the TSR and SAR of a Category II nuclear facility.
- Design, implementation, and maintenance of key programs necessary to the safe operation of the uranium-233 national repository, such as conduct of operations, preventive maintenance, training, health and safety, and quality control.

- Oak Ridge National Laboratory instructor for facility technical safety requirement (TSR) development, Safety Analysis Report (SAR) development and implementation for process safety management.
- Project engineer of establishing designs to ensure technical feasibility and nuclear criticality safety for treatment, storage, and disposal of enriched uranium packages.
- Hazardous waste and facility characterization for D&D activities.

GE-Hitachi - Global Laser Enrichment 2008 - Present

Acting Integrated Safety Analysis Manager, Oak Ridge, TN

- Acting Integrated Safety Analysis (ISA) Manager for ISA development and NRC License Application.
- Established GLE 10CFR70.72 process for GLE
- Established initial point design for GLE and governing safety basis to meet 10CFR70.
- Acting Configuration Manager for commercial laser enrichment program.
- Established cost and schedule development for GE-Hitachi commercial laser enrichment activities.
- Engineering Manager overseeing a 70+ engineering and technology professionals dedicated to engineering design/build projects, nuclear processing, and security.
- Developed business strategies for deploying laser uranium enrichment technologies.
- Established engineering and project management systems that provided earned value management tracking of laser enrichment programs.

MS Technology, Inc., Oak Ridge, Tennessee

Chief Operating Officer **2004 – 2008**

- Supervise an 80+ engineering and technology professionals dedicated to engineering design/build projects, and developing state-of-the-art technologies for nuclear processing and security.
- Successfully developed and implemented a strategic growth plan that doubled the company's revenues in eighteen months.
- Established an international commercial business venture for microwave processing of metal and ceramics to support the following industries:
    - Uranium processing and boron carbide sintering
    - Titanium melting and casting
    - Rapid aluminum melting and casting

- Secured strategic partnerships with critical academic, government, and commercial companies to establish a global position in microwave melting and processing.
- Developed and patented a modular thermal processing system using microwave heating which is now the cornerstone for future uranium processing.
- Organized business plans for implementing new technologies at the Y-12 National Security Complex to support the future Uranium Process Facility.
- Established engineering and project management systems that provided earned value management tracking of nuclear projects.

MedActinium, Inc., Knoxville, Tennessee

President/Chief Operating Officer **2000 – 2004**

- Spearheaded startup of a multi-million dollar biotech manufacturing and research facility to be used in the development and commercialization of a novel medical cancer treatment using alpha particle immunotherapy.
- Established international research and business development units in Europe and Australia.
- Perform financial management, personnel oversight, strategic planning, contract management, business development, research, and cGMP operations in areas including:
    - Quality assurance/quality control program
    - cGMP facility design and production layout
    - Research and drug formulation
    - Aseptic manufacturing
    - Training program
    - Active ingredient manufacturing
    - Radiopharmaceutical clinical trial oversight
    - Maintenance program
    - Health and safety program
- Designed and implemented critical Strategic Plan for deployment of multiplatform application of alpha particle immunotherapy treatment of acute myeloid leukemia, prostate cancer, melanoma, and non-Hodgkin's Lymphoma.
- Negotiated and closed critical licensing deals to provide intellectual property control of alpha particle immunotherapy applications.
- Filed ten patent applications for inventions related to the commercial deployment of alpha particle immunotherapy and other radioimmunotherapeutic applications.

Advanced Integrated Management Services, Inc., Oak Ridge, Tennessee

Vice President Business Development **1999 - 2000**

- Designed progressive business development strategy for a small nuclear/environmental services company with revenues of $12M and ~150 employees.
- Provided oversight of business activities in Tennessee, Colorado, Idaho, and Washington. Implemented strategic alliances to increase overall revenue by 25% in one year.
- Performed “hands-on” technical support in the areas of decontamination and dismantlement, construction, plant startup, and design/process engineering.
- Established senior advisory board.
- Develop strategic plans for diversifying company into commercial and government sectors.

Decon and Recovery Services, LLC, Oak Ridge, Tennessee

Senior Project Manager **1998 - 1999**

- Developed operational and management infrastructure for a Category II nuclear facility to support construction, decontamination and dismantlement.
- Performed and managed sampling and characterization of multiple hazardous waste streams and uranium recovery operations.
- Provided engineering support for development of work control packages, construction, hazardous waste storage areas, hazardous material transfer, engineering design, and engineering review of decontamination technologies.
- Designed and operated an electrical motor windings recycle program to reclaim $13M of copper from a legacy waste stream saving the U.S. Government millions in disposal costs.

M4 Environmental/MMT Inc., Oak Ridge, Tennessee

Senior Operations Manager **1996 - 1998**

- Senior Operations Manager responsible for the start-up of a $120 million state-of-the-art radiological chemical recycle processing unit, which included procedural development, hazardous operations evaluations, process flow diagrams and plant and instrument diagrams.
- Project Manager for the conceptual design, engineering, and construction of a $15 Million solid radiological waste processing unit.
- Senior operations engineer responsible for oversight and management of over 50+ construction and engineering contractors. Process Safety Team Leader responsible for the safety review of key plant systems to meet OSHA 1910 standards for Process Safety Management.

- Engineering business development support for design and delivery of marketing presentations and client interface.

Lockheed Martin Energy Research, Inc. (ORNL), Oak Ridge, Tennessee

Facility Technical Manager/Research & Developmental Engineer **1993 - 1996**

- Managed a multi-million dollar research project for the recovery and use of bismuth-213 as a medical isotope for the treatment of cancer and blood-borne tumors.
- Process design for medical isotope separation (uranium/thorium) from laboratory to full-scale operation meeting ISO 9000 standards.
- Primary responsibilities included design, implementation, and maintenance of key programs necessary to the safe operation of the Uranium-233 National repository, such as: conduct of operations, preventative maintenance, training, health and safety, quality control.
- Provided oversight and technical direction for $57M capital improvement projects such as: ventilation, roofing, and facility structure.
- Project Manager for facility condition assessment program to establish long-term economical facility preservation plan.
- Oak Ridge National Laboratory instructor for Facility Technical Safety Requirements (TSRs) development and implementation for process safety management.
- Project engineer of establishing designs to ensure technical feasibility and nuclear criticality safety for treatment, storage, and disposal, of enriched uranium packages at ORNL.
- Directed batch equilibrium isotherm studies for multi-component ion exchange systems to develop distribution coefficients and separation factors for radioactive thorium and uranium.

Benmol Corporation; University of California; General Atomics, Inc., San Diego, CA

Lead Environmental Engineer/Research Assistant **1989 - 1993**

- Lead environmental consultant at the U.S. Naval Air Base, Coronado, California in restructuring of the hazardous waste monitoring and disposal plans.
- Verified Material Safety Data Sheets, hazardous waste packaging and shipping containers, compliance with DOT, RCRA, EPA, and CAL EPA shipping requirements.
- Directed sampling program for hazardous waste streams to investigate types and toxicity of process waste.
- Established program for on-site recycling of various chemicals used throughout the Naval Air Base.

- Senior Health Physicist with General Atomics for tritium production project. In addition, provided support decommissioning of the General Atomics High Temperature Gas Reactor fuel producing plant.
- Collaborated on cutting edge research in the field of fluorescent microscopy and silicon wafer design at the University of California – San Diego with forefront research in the area of sub-micron particle migration and separation.

United States Navy Nuclear Power Program

Engineering Laboratory Technician **1983 - 1989**

- Ship Alterations and Construction – Lead in supporting nuclear ship alterations on nuclear cruisers, carriers, and submarines. Received Navy Achievement medal for outstanding performance in the development and implementation of key measures for nuclear ship alterations.
- Assisted in planning and performance of radioactive hot spot decontamination, contaminated lagging/insulation disposal, contaminated paint removal and bonding, tool decontamination, personnel decontamination; various methods used such as tape press, EDTA wash, ultrasonic, strippable coatings.
- Radioactive Material Shipping Supervisor for over four years and through two Naval commands. Performed various radioactive material shipments from Radioactive III and II source shipments to disposal of thousands of pounds of radioactive material generated from nuclear maintenance jobs. Experienced in numerous methods of material packaging including waste compaction, radioactive liquid solidification, LSA 55-gallon drum preparation, B-25 shipping boxes, radioactive instruments and articles.
- Senior Dosimetry Technician for over two years with significant knowledge in thermo luminescent dosimetry and administration of personnel exposure and environmental monitoring programs.
- More than four years experience performing pre-job surveys, radiological exposure estimates, temporary shielding design and installation, construction and establishment of radiological containments and radiological controls areas, on-job surveys, establishment of production work, decontamination, and post-completion surveys.

Joe Hunt

Fairfield Services Group
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Oak Ridge, TN 37930
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EDUCATION

1967, BSCE, University of Tennessee, Knoxville
1973, MSCE, University of Tennessee, Knoxville

PROFESSIONAL REGISTRATION

Professional Engineer, State of Tennessee, No. 8584
Professional Engineer, State of Ohio, No. 60806

PROFESSIONAL SOCIETIES

American Society of Civil Engineers (ASCE)
Earthquake Engineering Research Institute (EERI)

PROFESSIONAL EXPERIENCE

Fairfield Services Group, Oak Ridge TN

Structural and Natural Phenomena Engineering Consultant (7/10 to Present)

- Responsible for providing structural and natural phenomena engineering services.

B&W Y-12 L.L.C., Oak Ridge, TN

Chief CSA Engineer, Nuclear Project & Design Engineering (4/05 to Present)

- Responsible for the technical oversight of all CSA activities including natural phenomena engineering performed at the Department of Energy Y-12 National Security Complex.

BWXT Y-12 L.L.C., Oak Ridge, TN

Senior Staff Engineer, Civil/Structural Engineering Group (8/01 to 4/05)

- Responsible for the technical oversight of all natural phenomena related activities performed at the Department of Energy Y-12 National Security Complex.

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

Director of the Center for Natural Phenomena Engineering (1/95 to 8.01)

- Responsible for the management and technical oversight of all natural phenomena related activities performed or directed by the Center for Natural Phenomena Engineering (CNPE) at the Department of Energy (DOE) Oak Ridge Operations (ORO) sites. Activities performed by the CNPE include: DOE order and Executive Order implementation at all DOE-ORO sites, natural phenomena hazards definition, structural analyses, rehabilitation of facilities, piping and equipment qualification, and related research and development projects, preparing safety analysis reports, and presenting the results to senior management, DOE, Defense Nuclear Facilities Safety Board, public hearings, and other regulatory agencies.

Martin Marietta Energy Systems, Inc., Oak Ridge, TN

Engineering Specialist (9/89 to 1/95)

- Responsible for establishing natural phenomena criteria (seismic, wind, and flood) for DOE-ORO sites and facilities. Responsible for performing the natural phenomena evaluations of the Paducah and Portsmouth Gaseous Diffusion Plants facilities for the Nuclear Regulatory Commission certification of the facilities. Served as a technical advisor with various programs to define appropriate criteria and scopes of work for engineering personnel in-house and subcontractors.

Tennessee Valley Authority, Knoxville, TN

Civil Engineer, Civil Engineering Branch (6/68 to 9/89)

- Worked in a range of positions from Civil Engineer, Civil Engineer Section Supervisor, Principal Civil Engineer, Manager of Geology & Geotechnical Engineering Group, Assistant Watts Bar Nuclear Plant Lead Civil Engineer, to Senior Civil Engineer. In these positions performed or directed civil engineering work on fossil, hydro, and nuclear power plant facilities specializing in earthquake engineering of these facilities.

Patricia Jenny

Global Laser Enrichment
Wilmington, NC 28401
Office: 910-819-7447 E-mail: Pat.Jenny@GE.com

EDUCATION

1981 B.S. Nuclear Engineering, Texas A&M University
1982 INPO Radiation Protection Fellowship
1982 M.S. Nuclear Engineering w/ Radiation Protection Engineering Option

PROFESSIONAL EXPERIENCE

Global Laser Enrichment, Wilmington NC

Security Manager (03/10 to Present)

- Responsible for Physical Protection and Information Security Programs

Security Specialist (06/09 to 3/10)

- Responsible for specific aspects of the Physical Protection and Information Security Programs

United States Enrichment Corporation (USEC)

Security Manager (2000 to 2009)

- Responsible for Protective Force and Information Security Program at the Paducah Gaseous Diffusion Facility

Health Physics Manager (1999 to 2000)

- Responsible for Radiation Protection Program at the Paducah Gaseous Diffusion Facility

Corrective Actions Manager (1997 to 1999)

- Responsible for the Corrective Action Program at the Paducah Gaseous Diffusion Facility

Progress Energy

Nuclear Assessment Sector Inspector (1995-1997)

- Responsible for Security, Spent fuel Shipment, Operations, Fire Protection, and Records Management/Document Control at H.B. Robinson nuclear plant

Emergency Preparedness Manager (1993 to 1995)

- Responsible for Emergency Preparedness Program at H.B. Robinson nuclear plant

Shift Outage Manager (1991 to 1993)

- Responsible for outages – turbine replacement and design basis reconstitution at H.B. Robinson nuclear plant

Licensing Engineer (1990-1991)

- Responsible for Design Basis Reconstitution at H.B. Robinson nuclear plant
- Senior Reactor Operator qualified

Radiation Protection Manager (1985 to 1990)

- Responsible for Radiation Protection Program at H.B. Robinson nuclear plant

Radiation Protection Specialist (1982 to 1985)

- Responsible for Radiation Protection Instrumentation and Dose Calculations at H.B. Robinson nuclear plant

Steven E. Lee, FPE

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EDUCATION

Bachelor of Science in Architectural Engineering
Kansas University, Lawrence, Kansas, 1986

PROFESSIONAL INVOLVEMENT

National Fire Protection Association
Member Society of Fire Protection Engineers
Member American Council of Engineering Companies

REGISTRATION

Professional Engineer, Fire Protection, Georgia (20388), 1993
Professional Engineer, Fire Protection, Mississippi (15727), 2002
Professional Engineer, Fire Protection, Tennessee (108273), 2003
Professional Engineer, Fire Protection, South Carolina (24528), 2005
Professional Engineer, Fire Protection, Alabama (27237), 2006
Professional Engineer, Fire Protection, Colorado (40026), 2006
Professional Engineer, Fire Protection, Ohio (01796), 2007
Professional Engineer, Fire Protection, California (FP1681), 2008
Professional Engineer, Fire Protection, Texas (101698), 2008
Professional Engineer, Fire Protection, North Carolina (037663), 2011
Professional Engineer, Fire Protection, New York (090084-1), 2011

PROFESSIONAL EXPERIENCE

SafeMark, LLC, Atlanta GA (Principal Engineer)

Fire Protection Engineer/Subject Matter Expert (2/2010 to Present)

- Performed graded fire hazards analysis (FHAs) for portions of GE-Global Nuclear Fuel facility, Wilmington, NC. Work included hazards analysis of electrical fires, combustible liquid fires, transient combustible fires and hydrogen gas accidents that could lead to a chemical, radiological or criticality related loss event. Served as Integrated Safety Analysis (ISA) Team Member.

Fire Protection Engineer/Subject Matter Expert (3/2009 to Present)

- Performed fire hazards analysis (FHA) and Quantitative Risk Assessments (QRAs) for GLE Commercial Enrichment Facility. Hazards analyzed include electrical fires, combustible liquid fires, transient combustible fires and hydrogen gas accidents. Served as Integrated Safety Analysis (ISA) Team Member. Developed responses to NRC requests for additional information regarding the License Application and ISA documents. Received training in Probabilistic Risk Analysis (PRA) by attending GEH workshop.

Fire Protection Engineer (12/2003 to Present)

- Performed design of fire protection systems as well as construction phase services for Verizon Wireless critical infrastructure projects in Georgia, New Jersey and New York. Fire protection systems met Verizon Wireless critical infrastructure requirements for 99.999% reliability.
- Performed design of fire protection systems as well as construction phase services for Federal Aviation Administration (FAA) Air Traffic Control Towers (ATCTs) at the following locations: KOA, SPI, UGN, DPA, AMA, ANN, ARR, CAK, CGF, DTW, EVV, HUF, MDW, MSP, RFD, TOL, ATW, FAR, FCM, GFK, GRR, LAN, YIP, ALB, PIT, ROC & SNA.
- Performed Fire Safety Analysis Surveys for Centers for Disease Control facilities at the following locations: Roybal campus (Atlanta, GA), Chamblee campus (Chamblee, GA), Lawrenceville Campus (Lawrenceville, GA), Spokane Research Laboratory (Spokane WA), Reardon Site (Reardon, WA), Taft Laboratory (Cincinnati, OH) Hamilton Facility (Cincinnati, OH) and Bruceton Research Facility (Pittsburgh, PA).

Fire Protection Engineer (12/2002 to 11/2003)

- Performed Fire Hazards Analysis for DOE hazard category 2 critical buildings located at the Y-12 Plant Oak Ridge Tennessee. Work included hazards analysis of electrical fires, chemical reactions, combustible liquid fires and transient combustible fires that could lead to a chemical, radiological or criticality related loss event.
- Performed Fire Hazards Analysis for Theragenics New manufacturing Facility in Buford, Georgia. Work included hazards analysis of electrical fires, combustible liquid fires and transient combustible fires that could lead to a radiological related loss event.

Fire Protection Engineer (12/1999 to 11/2002)

- Performed Fire Hazards Analysis for critical buildings located at the Fernald Environmental management Project (FEMP) in, Fernald, OH. Work included hazards analysis of electrical fires, combustible liquid fires and transient combustible fires that could lead to a radiological related loss event.

Fire Protection Engineer (4/1996 to 11/2002)

- Performed design of fire protection systems as well as construction phase services for hazardous material storage facility for Lockheed Martin Aeronautical Systems in Atlanta, GA. Hazardous materials included solvents, flammable liquids, water reactives and composite materials.
- Performed design of fire protection and security systems as well as construction phase services for FAA Air Route Traffic Control Centers (ARTCs) and Terminal Radar Approach Control (TRACONs) at the following locations: Atlanta ARTC, Jacksonville ARTC, Miami ARTC, San Juan CERAP and Atlanta TRACON.

Parsons Corp., Charlotte, NC

Fire Protection Engineer (2/1994 to 4/1996)

- Performed design of fire protection and security systems as well as construction phase services for the Federal Aviation Administration (FAA) at the Atlanta ARTC.
- Performed Fire Hazards Analysis for DOE hazard category 2 critical buildings (including the Main Laboratory) located at Savannah River Site, Aiken SC. Work included hazards analysis of electrical fires, chemical reactions, combustible liquid fires and transient combustible fires that could lead to a chemical, radiological or criticality related loss event.

Harrington Group Inc., Atlanta, GA

Fire Protection Engineer (2/1993 to 2/1994)

- Performed life safety and Fire Hazards Analysis for DOE hazard category 2 critical buildings located at Savannah River Site, Aiken SC.
- Performed design of fire alarm and detection systems as well as construction phase services for Turner Broadcast Systems in Atlanta, GA.
- Performed life safety surveys for 8 million SF aircraft manufacturing facility for Lockheed Martin Aeronautical Systems in Atlanta, GA.

Fire Protection Designer (10/1991 to 2/1993)

- Performed design of fire water sprinkler systems as well as construction phase services for St. Joseph's Hospital in Atlanta, GA.
- Performed design of fire water sprinkler systems as well as construction phase services for Grady Hospital in Atlanta, GA.

Kimberly Y. Matthews

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Education

MS, Natural Resources (concentration in Watershed Hydrology), North Carolina State University (2003)
BA, Biology, Wittenberg University (1996)

Professional Experience

RTI International, Research Triangle Park, NC (2006 to present)

Research Environmental Scientist 2 (2008 to present)

- Provides technical oversight on the development of the data management system created for DoD-funded research program and provides quality control on uploaded data. Conducted a literature review to assess the impacts of military training on the various ecosystems and in combination with real-time use data and spatial data determined an index of military training impacts.
- Coordinated project to predict the geographic location of isolated wetlands in the coastal plain of North and South Carolina. Evaluated existing geodata and remote sensing imagery to develop the initial population frame and provided expertise on the ranking candidate wetlands. Provided quality assurance on field data collection efforts and made recommendations for model improvements.
- Managed project that created a workgroup for state wetland scientist for in EPA Region 4 (Southeast US). Designed and maintained website, facilitated web-based training opportunities, provided field-based training, and promoted communication among participants.
- Managed various projects for EPA to conduct sampling of impaired for water quality, habitat, and macroinvertebrate conditions and determine cause of impairment to streams and wetlands.

Research Environmental Scientist 1 (2006 to 2008).

- Provides support for water quality and ecological projects involving investigations of streams, wetlands, and terrestrial resources, conducting water quality assessments, and preparing environmental impact reports.
- Provides technical over site for multi-year DoD-funded research program at Camp Lejeune including reviewing research results, submitting quarterly and annual reports, and organizing meetings. Facilitated preparation of Strategic Plan, Monitoring Plan, and Research Plan.
- Conduct literature review and assessment of military training impacts as well as ecosystem indicators of nitrogen and sulfur oxide deposition.
- Provide technical knowledge relating to the stormwater quality, protected species, and monitoring and research methods for natural resources assessment.

Arcadis Geraghty & Miller of North Carolina, Raleigh, NC. (2002-2006)

Biologist

- Conducted wetland and stream delineations, surveyed for federally and state listed protected species and performed natural community classifications for federal, state, and local agencies throughout North Carolina.
- Prepared natural resource technical reports, NEPA documents, and CWA Section 401/404 permits.
- Analyzed hydrologic, benthic, and water quality data for various projects and conducted feasibility studies and monitoring of stream and wetland mitigation projects.
- Managed projects, including client negotiations, scoping, budgeting, and invoicing. Participated in concurrence and public involvement meetings for transportation projects.

City of Greensboro, Greensboro, NC. (1996-2000)

Water Quality Monitoring Technician

- Sampled and analyzed water from stormwater runoff, streams, and lakes during varying weather conditions to determine ambient water quality and pollutant loading.
- Implemented benthic invertebrate sampling program to assess instream water quality across the City.
- Assisted in developing a Water Quality Index to visually display and interpret water quality data for public use and developed a biological monitoring program.
- Conducted maintenance inspections of on-site stormwater best management practices (BMPs) and conducted comparative studies for the removal efficiencies of selected BMPs.

Julie Olivier

Global Laser Enrichment
Wilmington, NC 28401
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EDUCATION

1992, BS Chemistry, University of New Orleans
1993, MS Environmental Science and Engineering, Virginia Tech
Post-Graduate Doctoral Courses, Environmental Systems Engineering, Clemson University

PROFESSIONAL EXPERIENCE

Global Laser Enrichment, Wilmington NC

Licensing and Regulatory Affairs Manager (4/10 to Present)

- Responsible for managing the Federal, State, and Local government interactions
- Responsible for obtaining a license from the Nuclear Regulatory Commission to construct and operate the commercial laser enrichment facility
- Technical lead for environmental issues

Senior Licensing Professional (10/07 to 4/10)

- Technical lead for preparing and submitting the Global Laser Enrichment License Application to the Nuclear Regulatory Commission
- Author of chemical safety, environmental protection, decommissioning, management measures, and administration chapters of the License Application
- Interface between design and safety analysis teams

Nuclear Regulatory Commission, Rockville, MD

Senior Project Manager (10/6 to 10/07)

- Project Manager for Category I fuel fabrication facility
- Project Manager for gas centrifuge facility
- Acted as the Section Chief from 08/01/05 to 10/14/05
- Senior environmental reviewer, which includes preparation of documentation (e.g., Environmental Assessments, Categorical Exclusions) to ensure compliance with the National Environmental Policy Act (NEPA)

- Senior analyst for evaluations involving decommissioning of fuel conversion and fabrication facilities
- Senior technical reviewer for licensing actions involving chemical safety
- Prepared budget for the branch to be used in strategic planning

Special Assistant to the Chairman for Materials and Security (10/05 to 10/06)

- Reviewed and evaluated Commission papers, and provided recommendations to the Chairman regarding technical and policy decisions
- Prepared Congressional correspondence from the Chairman regarding security and nuclear materials issues.
- Represented the Chairman in meetings with staff and industry

Project Manager (5/99 to 10/05)

- Project manager for four fuel fabrication facilities
- Lead environmental reviewer for the fuel manufacturing section, which included preparation of documentation (Environmental Assessments, Categorical Exclusions) to ensure compliance with the National Environmental Policy Act (NEPA)
- Lead analyst for evaluations involving decommissioning of fuel conversion and fabrication facilities
- Technical reviewer for licensing actions involving chemical safety

Dames and Moore, Orchard Park, NY

Engineering Specialist (4/97 to 4/99)

- Technical lead for field laboratory chemical analyses performed on soil and water samples for a chemical landfill remediation project at the U.S. Department of Energy's Brookhaven National Laboratory
- Project manager and lead author of the multi-volume West Valley Safety Analysis Reports, the primary document required by the Department of Energy to ensure safe operation and deactivation of nuclear facilities
- Lead analyst for all safety evaluations involving chemical reactions including the use of acids to clean out underground radioactive waste tanks, and the generation of oxides of nitrogen gases in process test facilities
- Authored extensive documentation including hazards assessments, facility deactivation plans, process safety requirements, procedural checklists, and position papers to demonstrate compliance with Department of Energy regulations and to ensure the safety of client activities
- Provided engineering calculations and technical guidance for Department of Energy contractors to ensure compliance with state emissions laws and reportable quantities of hazardous chemicals

Steven M. Painter

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EDUCATION

Bachelor of Science, Physics, California State Polytechnic University, 1984
Bachelor of Science, Applied Mathematics, California State Polytechnic University, 1984

PROFESSIONAL EXPERIENCE

Nuclear Safety Associates, Oak Ridge, TN

ISA Team Member/Lead, Global Laser Enrichment, Wilmington, NC / Oak Ridge Engineering Facility, Oak Ridge, TN (9/08 to Present)

- Providing Integrated Safety Analysis support, including Criticality Safety and Safety Analysis, for the licensing of the GE-Hitachi Global Laser Enrichment plant.
- In this role, he has been managing changes to the Integrated Safety Analysis Summary, a key licensing document; responding to the U.S. Nuclear Regulatory Commission's (NRC) Requests for Information; and interfacing with NRC staff during license application review activities.

Science Applications International Corporation (SAIC) Oak Ridge, TN [1998 – 2008]

Nuclear Criticality Safety Engineer, Oak Ridge National Security Complex, Oak Ridge, TN (4/08 to 9/08)

- Supported the Safety Analysis Engineering Department at the Y-12 National Security Complex by writing revisions to existing Criticality Safety Evaluations to support movement of fissile material between complex facilities.

Nuclear Material Control and Accountability (NMC&A) Technical Specialist, East Tennessee Technology Park (ETTP), Oak Ridge, TN (4/06 to 4/08)

- Supported Decontamination and Decommissioning (D&D) of the ETTP site. Supervised nine NMC&A staff members; developed program plans and procedures; reviewed and provided input into development of work packages; wrote program reports; and provided direct field support of Operations during the D&D of various buildings at ETTP and Oak Ridge National Laboratory (ORNL).
- During this period also provided peer review services for supporting Safety Analysis upgrade work for the Waste Isolation Pilot Project (WIPP) facility located in New Mexico.

NCS Evaluation Upgrades Work, Oak Ridge National Security Complex, Oak Ridge, TN (6/05 to 4/06)

- Worked on upgrading and revising the evaluation of a fissile material operation to the new site NCS evaluation standard. Completed a validation study to allow use of the newest MCNP software code for criticality calculations. Modeled special components in MCNP to support a developing measurement technology.
- During this period also supported work on dose reconstruction in support of a Defense Threat Reduction Agency program to compensate veterans for disabilities from nuclear weapons radiation exposure in the Pacific Proving Grounds.
- Additionally, supported the Safety Analysis Report for Packaging (SARP) upgrade work for the WIPP facility by performing a criticality safety evaluation for plutonium shipment casks designed for plutonium contaminated waste shipment.

NCS Engineering Support, British Nuclear Fuels (BNFL), ETTP, Oak Ridge, TN (3/01 to 4/05)

- Provided NCS Engineering Support during D&D of three of the site gaseous diffusion buildings. In this capacity, wrote several Nuclear Criticality Safety Evaluations, provided technical oversight and surveillance activities during operations, and upgraded the site SCALE 4.4 Validation Report to cover 1-100 wt% U-235 enrichments.
- Completed a validation report for Pu, U, and U-233 fissile isotopes using the methodologies recommended in DOE and NRC guideline and good practice documents. As part of the validation report effort, provided part time support to SARP upgrade work for the WIPP facility. This work has involved evaluating plutonium/beryllium waste matrixes for shipment in a certified waste shipment package.

NCS Engineer, Paducah Gaseous Diffusion Plant, Paducah, KY (6/98 to 3/01)

- Provided full-time staff augmentation support to upgrade site specific Nuclear Criticality Safety Evaluations to approve higher assay operations. This effort has included writing and revising evaluations to support operations at the higher assay, providing assistance in answering NRC requests for additional information, and providing other administrative support as directed. Completed a SCALE 4.4 Validation Report for low-enriched uranium modeling calculations performed by BNFL at ETTP. Later modified the validation report to validate an SAIC workstation for both low-enriched uranium and plutonium system calculations.

NCS Engineer, Portsmouth Gaseous Diffusion Plant, Piketon, OH (9/98 to 6/99)

- Evaluated the implementation of NCS requirements as these requirements relate to the Waste Management Program and developed programmatic improvements to facilitate the implementation of NCS program elements by the Waste Management organization managed by the United States Enrichment Corporation. Additionally, he provided calculations and revised evaluations for on-site operations regulated by the DOE.

M4 Environmental, LLC / Molten Metal Technology, Inc. [6/96 to 9/98]

Operations Engineer

- Responsible for preparation of engineering change requests, procedures, and test plans for the start-up and operation of a molten metal chemical reactor using Catalytic Extraction Process technology to destroy the hazardous constituent of commercial and government mixed waste. Qualified as a control room operator with progress toward Shift Supervisor. At the company's primary facility, briefly responsible for managing a wastewater treatment and solidification process to dispose of secondary wastewater from the process.

Lockhead Martin Energy Systems, Inc. [1995 to 1996]

Nuclear Criticality Safety Engineer, Y-12, Oak Ridge, TN

- Responsible for completing assigned NCS engineer duties as assigned. Conducted initial program development groundwork for new Criticality Safety Requirements process for documenting NCS requirements for field implementation. Conducted extensive NCS facility walk-downs to identify and correct compliance deficiencies as part of a plant restart effort. Responded to the scene of off-normal NCS abnormalities and provided written corrective action to resolve the non-compliance. Completed training on the use of Scale 4.2 and the KENO V.a module provided by Oak Ridge National Laboratory (ORNL). Prepared NCS Evaluations and wrote the accompanying NCS Approvals for safe operation of fissile material activities at the plant.

Lockhead Martin Utility Services [1989 to 1995]

Paducah Gaseous Diffusion Plant, Various Staff Positions and Titles

Tasked by management to perform several duties at the Gaseous Diffusion Plant including those listed below:

- Lead Quality Assurance Auditor. Instrumental in initiating the use of performance based quality assurance audits at the plant. Under this process, quality performance was measured not only through examination of quality assurance records, but through actual observation of the activities in the field and identification of ineffective work practices.
- Editing the plant's NRC certification application under 10 CFR 76 by compiling all inputs from the various plant authors and fabricating the initial drafts of the document for submittal to NRC. Specifically, worked with both Paducah Gaseous Diffusion Plant and Portsmouth Gaseous Diffusion Plant representatives to write the program description for the Nuclear Criticality Safety Program.
- Procedure Specialist. Responsible for providing procedure writing services to the Health Physics, NCS, Facility Safety, Quality Assurance, and Waste Management organizations. Provided significant contributions in the development of the core programs in all of these areas as a preliminary to writing the procedures.
- Health Physics Technician Supervisor. Responsible for supervising the plant's Health Physics technicians following the untimely dismissal of the original supervisor. Contributed significantly to the reorganization of the section to provide better plant support. Wrote several needed procedures for the effective operation of the section.
- Facility Safety Engineer (back up NCS Engineer). Responsible for the initial development and implementation of a facility safety program at the plant. Wrote many of the initial program implementing procedures and implemented an extensive surveillance program. Trained as a back-up NCS Engineer to help with the work load that was developing because of the increased expectations of DOE and of significant plant upgrades projects that was in process.

U.S. Navy [1984 to 1989]

Navy Nuclear Propulsion Officer

- Responsible for performing duties of a navy watch officer on a new-construction navy nuclear submarine. These duties included standing watch as an Engineering Officer of the Watch and Engineering Duty Officer during the three years of pre-commissioning construction and testing of the nuclear propulsion plant, supervising several of the operating divisions in the engineering department, and qualifying and standing watch as Officer of the Deck and Ship's Duty Officer while underway and in port.

Paul R. Peterson

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Education

MS, Engineering (mechanical), University of California at Irvine (1976)
BS, Biological Sciences, University of California at Irvine (1973)
BS, Engineering (civil and environmental), University of California at Irvine (1973)

Professional Registration

Professional Mechanical Engineer, State of California, No. 18826 (1978 to date)

Professional Experience

RTI International, Research Triangle Park, NC (1987 to present)

Senior Research Environmental Engineer

- Industrial Facility Site Selection Study and Environmental Report for License Application. Served as a core project member for the preparation of a site selection study and environmental report to support a U.S. Nuclear Regulatory Commission (NRC) license application for a nuclear fuel enrichment facility. Key participant in the development of methodology and criteria to evaluate alternative sites and select a proposed site. Lead author for Environmental Report (ER) sections on air quality and waste management impacts for proposed project. Lead reviewer and coordinator for ER sections on land use, transportation, and visual/aesthetic impacts for proposed site incorporating work completed by outside consultants. Prepared supplemental documents and performed additional analyses to response to questions and formal requests for additional information (RIAs) from the NRC.
- Air Quality Management. Served as project leader or senior technical expert for numerous projects during the past 24 years related to the development and implementation of U.S. Environmental Protection Agency (EPA) national and regional air programs to improve air quality by decreasing specific criteria pollutant, air toxic, and greenhouse gas (GHG) emissions. Investigated the emission and control of air pollutants from stationary combustion and industrial sources. Tasks include developing industry profiles; identifying specific sources of the air emissions; determining regulatory control options; evaluating control technologies in terms of applicability to affected sources, potential emission reductions achievable, and costs; and estimating environmental and energy impacts related to implementing control options.
- Pollutant Mitigation Measures Evaluations. Performed control technology evaluations to assess the potential to decrease pollutant releases from process and fugitive air emissions sources using regulatory-defined criteria, including best demonstrated technology (BDT), best available control technology (BACT), maximum achievable control technology (MACT), and best management practices (BMPs). Control cost analyses included estimating capital and operating costs for environmental controls, including capture systems, combustion controls, suppression controls, add-on control devices, and work practices. Estimated costs to facility owners and

operators and to government regulators for implementing federal regulatory inspection, monitoring, recordkeeping, and reporting requirements.

- EPA Air Pollutant Regulatory Program Development Support. Provided support to EPA in all aspects of the regulatory development for federal air standards programs, including National Ambient Air Quality Standards (NAAQS); New Source Performance Standards (NSPS); National Emission Standards for Hazardous Air Pollutants (NESHAP) for major and area sources; and air standards for hazardous waste facilities implemented under Resource Conservation and Recovery Act (RCRA) rules. Assessed air emission potential of specific industrial and waste management processes. Evaluated performance, cost-effectiveness, and cross-media impacts of applying air emission control strategies. Estimated costs to industry and regulatory agencies of implementing the different control alternatives. Prepared draft Federal Register notices for proposal and for promulgation of regulations. Drafted regulation language for codification in the Code of Federal Regulations (CFR). Drafted information collection requests (ICRs) for approval by the Office of Management and Budget. Prepared docket indexes and materials for the EPA Air Docket Office. Prepared input for regulatory flexibility analyses, and other required support documentation. Major source categories for which support was provided include electric utility power plants, stationary combustion turbines, coal preparation plants, waste treatment operations, hazardous waste site remediation activities, and primary and secondary copper smelters.
- EPA Mandatory Greenhouse Gas Reporting Program Support. Serve as a senior technical project member to support the EPA with the development and implementation of the mandatory GHG reporting rule for combustion and nonferrous metallurgical source categories. Work performed for individual source categories includes drafting regulation language and preamble rationale for GHG reporting requirements, preparation of training slides presentations, identification of data verification parameters, development of verification algorithms, and preparation of responses to questions from affected facility owners and operators. Additional work is to include verification of GHG emissions information reported to EPA by individual facilities.
- International Environmental Protection Program Support. Serve as senior project member for a 10-year RTI project providing technical assistance to the Environmental Agency–Abu Dhabi (EAD) to achieve its strategic goals and implement its program roles and responsibilities. Provides support for a variety of project task areas including: identification of international BMPs for mitigating air quality and global climate change impacts, preparation of sector reports for specific industrial source categories, development of standardized environmental permit conditions, development of a remote compliance inspection reporting tool for use by EAD facility inspectors, development of stormwater regulations, and preparation of air pollution control training sessions for presentation to EAD technical staff.
- Hazardous Waste Management. Serve as project leader for and participated in numerous EPA projects related to the development and implementation of national standards to control organic and air toxic emissions from hazardous waste management activities for site remediation activities, corrective actions, and RCRA hazardous waste treatment, storage, and disposal facilities (TSDF). Assisted in the preparation of a nationwide hazardous waste TSDF waste characterization database.

State of California Energy Commission, Sacramento, CA (1984-1987)

Energy Specialist

- Provided technical assistance to local governments and companies in California with evaluating the feasibility and potential for site-specific waste-to-energy, biomass, and renewable energy

production projects. Many of these projects involved assessing the potential for building cogeneration projects at sites that would burn alternative fuels, such as refuse, landfill gas, methane generated from sewage sludge or animal waste, and agricultural biomass wastes (e.g., nut shells, fruit pits, cotton gin trash). This work included meeting with local government officials, performing preliminary assessment of the proposed project site, and supervising field engineering and economic feasibility evaluations performed by contractors providing technical assistance to the state office.

- Evaluated technology, air quality energy market, financial, and regulatory issues affecting future project development.
- Assessed role of energy production on a statewide basis for helping to address California's refuse and hazardous waste management problems.

Pacific Environmental Services, Inc., Durham, NC (1977-1984)

Engineer

- Performed air pollution engineering projects conducted for government and industry clients.
- Performed engineering and cost analyses of emission control technologies for combustion, chemical, metallurgical, petroleum, and manufacturing processes.
- Provided regulatory support to the EPA for developing national air emission standards for industrial source categories including glass manufacturing, petroleum refining, and copper smelting.
- Conducted on-site, air permit audit inspections of industrial facilities located throughout the United States in support of EPA compliance and enforcement activities.

University of California, Irvine, CA (1975-1977)

Research Assistant

- Worked in School of Engineering combustion laboratory to complement graduate studies.
- Developed and performed experiments to study air pollutant formation during gas turbine combustion. Designed and installed components for a bench-scale combustor. Analyzed and interpreted data collected from combustor experiments.
- Supported preparation of technical papers for conference presentations and publication.

Bechtel Power Corporation, Norwalk, CA (1973-1975)

Engineer

- Participated in engineering design teams for electric utility coal-fired power plant projects in southwestern United States.
- Performed engineering analyses under direction of senior project engineers to establish plant design criteria, assess environmental impacts for siting studies, define plant layout, and prepare equipment specifications.

Anthony B. Marimpietri

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Education

MRP, Regional Planning (Concentration in Environmental Systems Analysis and Environmental Economics), University of North Carolina at Chapel Hill (1986)
MS, Environmental Engineering, Drexel University (1971)
BS, Mechanical Engineering, Lafayette College (1969)

Professional Experience

RTI International, Research Triangle Park, NC (1997 to present)

Senior Director, Strategic Business Solutions (2007 to present)

- Oversee a staff of scientists and engineers who provide companies with an efficient means of assessing environmental risk and performing environmental and financial analysis for development of risk management strategies associated with asset retirement obligations including legacy industrial properties and off-shore oil and gas production assets.
- Direct programs related to post-Fukushima response incorporating lessons learned related to off-site radiological monitoring, data management, decision support and communications during the event. Apply lessons learned from experience with use of monitoring data and decision support during the months following the Fukushima event including development of a relational database, web interface, and analysis tools (e.g., graphs, maps) for understanding radiological conditions.
- Responsible for managing the development and maintenance of a proprietary, Web-based analysis and modeling system, called SBS Discovery, which enables companies to make decisions and take actions that can turn impaired or underperforming real estate properties into assets.
- Support of large scale environmental assessment for nuclear fuel processing facility including site selection and assessment of alternatives and off-site environmental assessments.

Research Director, Environmental Health and Safety Division (2001 to 2007)

- Managed a multidisciplinary staff of scientists and engineers who conduct work in a wide range of environmental disciplines for a variety of clients. Staff disciplines include water resource management, air quality management, geosciences, human health and ecological risk assessment, pollution prevention, environmental engineering, GIS, and environmental information systems. Clients include EPA, the U.S. Department of Defense (DoD), and various commercial and international clients.
- Scientific, Technical, Research, Engineering, and Modeling Support (STREAMS). Served as the program manager on this task order contract with the EPA Office of Research and Development's National Risk Management Research Laboratory. Evaluated requests for task

order proposals, assembled project teams from our seven subcontractors, developed proposals, and provided technical and financial oversight for ongoing tasks.

- Managed a project to assist with the development of organizational structure and work practices for the new NC EEP, whose mission is to develop wetland mitigation for NC DOT projects. The project had three components: conducting a baseline assessment; developing a Policies, Processes, and Procedures Manual (PPPM) and benchmarking these practices against best management practices and program in other states; and designing an information management system (IMS). For the baseline assessment, evaluated EEP's institutional capacity to carry out its mission, focusing in particular on resources, internal work practices, external stakeholders, and performance metrics.
- Served as work assignment leader for quick-response technical support to provide EPA's National Center for Environmental Assessment (NCEA) with technical advice and analysis in support of the Combustion Technical Assistance Center (CTAC). The CTAC supports states and EPA Regional offices regarding implementation of EPA's guidance entitled *Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities* (EPA530-D-98-001A). Technical areas addressed by the CTAC include all aspects of multipathway risk assessment of emissions from combustion sources that release HAPs.
- Managed several large contracts to provide risk assessment and regulatory support to EPA's program offices. Developed and applied exposure assessment and risk characterization methodologies to support EPA program decisions under the CAA, the RCRA, and the CWA.
- Developed and applied exposure assessment and risk characterization methodologies to support EPA program decisions under the CAA, the RCRA, and the CWA.

Program Director and Department Manager, Environmental Risk Assessment Program (1997 to 2001)

- Managed a multidisciplinary staff that performed human health and ecological risk analysis.
- Served as project leader and technical manager on a variety of projects related to regulatory analysis, environmental fate and transport modeling, exposure analysis, and risk assessment.
- Developed and applied risk characterization methodologies to support EPA in RCRA listing determinations including risk assessment framework for assessing human health risk.

Radian International, Research Triangle Park, NC and Herndon, VA (1984-1997)

Technical Resource Manager (Research Triangle Park, NC, location) (1993 to 1997).

- Managed a multidisciplinary staff of engineers and scientists who performed technical analysis in support of licensing and permitting projects for private sector clients and DoD. These analyses included regulatory analysis under the CAA, human health risk assessment, engineering evaluation of control devices, and other environmental effect analyses. Directed projects involving site selection, environmental impact analysis, risk analysis, air dispersion modeling, engineering evaluation of control, and public hearings and community meetings.

Office Manager/Department Head (Research Triangle Park, NC, location) (1990 to 1993).

- Managed an environmental sciences and engineering department. The projects supported by this department included air dispersion modeling analysis, CAA permitting and compliance support for industrial firms and DoD, regulatory support for EPA's OAQPS for new source performance standards (NSPS) and NESHAPs. Project management involved compliance plans under the CAA for DoD facilities.

- Directed the evaluation of a carbon monoxide air quality plan for consistency with local transportation and residential use plans. Project included a detailed analysis of highway and local traffic patterns using historic, locally collected data, air modeling of streets and intersections, particulate analysis to identify local sources, and evaluation of the effectiveness of the federal motor vehicle emission control program. Also involved in numerous source assessments and standards development projects for EPA's Office of Air Quality Planning and Standards (OAQPS). These included combustion source categories and source category ranking.

HMM Associates, Raleigh, NC (1980-1984)

- Senior Environmental Engineer. Managed projects for public and private clients in the areas of regulatory analysis and compliance management. These included air permitting under the CAA PSD regulations, which involved emissions inventory, regulatory analysis, air dispersion modeling, and best available control technology (BACT) engineering and cost determinations.
- Project Manager. Projects for private electric utilities and state agencies to develop emergency plans under Nuclear Regulatory Commission Regulations for nuclear power generation facilities (NUREG-0654). These included air dispersion modeling and monitoring for predicting exposures to accidental releases of nuclear emissions, protective actions, and evacuation planning.

Acurex Corporation, Raleigh, NC (1978-1980)

- Senior Engineer. Managed a group of environmental engineers to support EPA's OAQPS in the development of NSPSs under the CAA. Work focused on combustion sources, including fossil and nonfossil fuel boilers. This group was responsible for data collection on industrial processes, evaluation of air emission control device performance, and control costs.

Forsyth County Environmental Affairs Department, Winston-Salem, NC (1972-1978)

Assistant Director

- Managed a group of environmental program managers responsible for air pollution control, water quality, and solid waste management programs in Forsyth County, NC. This group was responsible for ensuring that all program operations were in accordance with program plans, developing program plans and strategies in concert with North Carolina and EPA representatives, developing budgets and grants, and reporting.
- Developed Forsyth County's air permitting system in concert with representatives of the State of North Carolina. Also participated in the development of the state air permit system. Reviewed permit applications for compliance with state and federal air quality regulations and reporting requirements.

Michael H. Schwartz

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EDUCATION

1971, BSE, Nuclear Engineering, University of Michigan
1972, MSE, Nuclear Engineering, University of Michigan

PROFESSIONAL REGISTRATION

Professional Engineer, State of California, No. 0618

PROFESSIONAL SOCIETIES

American Nuclear Society (ANS)
American Society of Mechanical Engineers (ASME)

PROFESSIONAL EXPERIENCE

Energy Resources International, Inc.

Chairman of the Board (1/1989 – Present)

- Oversees all consulting services provided to ERI clients, which include electric power companies, private industry, institutions and associations, and government agencies in the United States (U.S.) and abroad.
- Consults with clients regarding market analyses for all components of the nuclear fuel cycle, including uranium supply, conversion services, uranium enrichment services, fuel fabrication, and spent fuel storage and disposal.
- Provides assistance to clients pertaining to strategic planning, and commercial and economic evaluations. In the course of these activities performs viability assessments and due diligence reviews of major fuel supply companies, develops and supports the implementation of fuel procurement strategies, reviews commercial, economic and technical aspects of vendor proposals, and assists clients in contract negotiations; and performs impact assessments of government actions on the commercial industry.
- Prepares assessments of nuclear non-proliferation issues, plutonium disposition options, and utilization in the commercial nuclear fuel cycle of low enriched uranium (LEU) derived from high

enriched uranium (HEU) originally produced as part of Former Soviet Union and U.S. nuclear weapons programs.
- Has supported applicants in both federal and state regulatory proceedings associated with matters such as the need for new uranium enrichment facilities in the U.S., as well as providing expert testimony in litigation related to pricing of uranium enrichment services by the U.S. government.

Pickard, Lowe and Garrick, Inc

Senior Consultant (7/1976 – 1/1989)

- Performed economic analyses and optimization of fuel cycle designs and fuel procurement plans; technical and commercial evaluations of vendor proposals for fuel materials and services; technical, strategic, and policy support for utilities and utility-sponsored organizations in the areas of nuclear fuel and high-level nuclear waste.
- Provided supervision and direction for an in-depth evaluation of the basic causes for the cost increases that occurred during the construction of a commercial nuclear power plant.
- Participated in a multifaceted consequence analysis of the postulated release of radionuclides from an operating nuclear power plant through the liquid pathway.
- Involved in a broad range of power plant technical, managerial, licensing, and risk analysis activities.

General Atomic International

Senior Fuel Application Engineer, 7/1975 – 7/1976

- Responsibilities included guidance of General Atomic's high temperature gas cooled reactor (HTGR) core physics design and fuel management activities in support of international ventures; international development of the direct cycle and process heat HTGR; development of fuel cycle strategies for countries considering introduction of the HTGR; and evaluation of the use of alternative thorium fuel cycles.

General Atomic Company

Engineer, 7/1972 – 7/1975

- Responsibilities included the Peach Bottom end-of-life core physics analysis; a broad range of HTGR physics design activities; evaluation of safety criteria for the HTGR fuel with respect to nuclear criticality; and preparation of the licensing topical report describing technical basis for models used to analyze fission product release from HTGR cores during transient temperature excursions.

Consumers Power Company

Assistant Engineer, Summers 1971 – 1972

- Performed core design and plutonium recycle studies for the Palisades and Big Rock Point nuclear power plants. Expanded capabilities of fuel accountability program and performed a variety of fuel cycle economic studies.

Andrew Stahl

RTI International
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Education

MS, Geology (hydrogeology emphasis), Pennsylvania State University, 1990.
BS, Geology, State University of New York at Binghamton, 1983.
Continuing Education: Course in Environmental/Resources Regulations Concepts, Arizona State University, 1994.

Professional Registration

Professional Geologist, State of North Carolina, No. 1650 (1998 to date)
Certified Professional Geologist, American Institute of Professional Geologists, No. 9070 (1993 to date)
Professional Geologist, State of South Carolina, No. 2224 (2000-2001)
Professional Geologist, State of Arizona, No. 28255 (1994-2000)

Professional Experience

RTI International, Research Triangle Park, NC (1998 to present)

Senior Research Geologist 1 (2002 to date)

- For a rapid-response project following the impacts of the March 11, 2011 earthquake and tsunami on the Fukushima Daiichi Power Plant, played a key role in identifying and evaluating radiological data sources, identifying appropriate units and terms for the data streams, and reconciling data issues and other staff inquiries. The database used for this project is being leveraged by the U.S. nuclear industry for other applications.
- Served as Assistant Project Manager for preparation of a comprehensive NEPA-compliant Environmental Report, a key component of a license application for a uranium enrichment project (Global Laser Enrichment). Responsibilities included project scoping and management, technical coordination, and performing senior report review for numerous environmental disciplines.
- Led the groundwater resource assessment for a detailed characterization report for evaluation of a site in Illinois by the U.S. Department of Energy as part of the Global Nuclear Energy Partnership. Prepared for and participated in a well-attended public meeting in Illinois at the conclusion of the project.
- For a commercial client in California, conducted an Environmental Site Assessment of a 1,600-acre property. Of the 140 developed acres, site features include one active and three inactive nuclear reactors and laboratories specially designed for handling highly radioactive materials.
- Served as the Data Management Process Manager for a large, complex, fast-track brownfields redevelopment, interim remedial measures project in California. The existing industrial facility was demolished, approximately 95,000 cubic yards of contaminated soil were excavated and removed from the site, and a no-further-action letter for shallow soil was awarded by the

regulatory agency. More than 4,800 soil samples were analyzed by 11 subcontracted analytical laboratories, and the resultant 171,300 analytical results and hundreds of maps produced using GIS were made available near real-time to the client and other stakeholders using Geode™, RTI's Web-based data querying and mapping tool.

- For a commercial client in Illinois following the September 11, 2001 attacks, evaluated the adequacy of existing environmental safeguards at a nuclear facility and identified the potential environmental consequences of theoretical terrorist attacks. Identified potential contaminant transport pathways and human and environmental receptors associated with the theoretical attacks.

Research Hydrogeologist 3 (2000 to 2002) and Research Hydrogeologist 2 (1998 to 2000)

- Managed the Hydrogeologic Assessments Program within RTI's Center for Geosciences (2000 to 2002).
- Managed development and implementation of Web-based environmental data management systems.
- Designed and implemented project work plans, sampling and analysis plans, and quality assurance project plans for groundwater and soil contamination investigations and remediation and prepared technical reports and presentations for regulatory approval.
- Provided consultation on waste delineation, characterization, and removal/remediation. Implemented innovative project strategies by integrating geologic, hydrogeologic, geochemistry, GIS, 3-D visualization, modeling, risk evaluation, and regulatory evaluation disciplines.

Dames & Moore, Phoenix, AZ (1993-1997)

Senior/Project Hydrogeologist

- Performed and managed groundwater and soil contamination investigations and remediation, groundwater supply projects, and risk assessments; prepared work plans and sampling and analysis plans.
- Prepared closure plans for RCRA hazardous waste facilities.
- Prepared Arizona aquifer protection permit applications, including hydrogeologic studies, monitoring plans, contingency plans, and closure plans.
- Provided regulatory compliance consultation relating to soil, water, and waste issues.
- Directly supervised six junior- and mid-level professional staff.

Nittany Geoscience, Inc., State College, PA (1987-1993)

Hydrogeologist

- Performed water-supply investigations that resulted in the development, evaluation, and monitoring of several high-capacity municipal well fields.
- Performed and managed groundwater and soil contamination investigations, including a multiyear RCRA Facility Investigation at a pharmaceutical manufacturing facility.

Bucek & Ebaugh Hydrogeologists, Boalsburg, PA (1986-1987)

Hydrogeologic Consultant

- Managed a groundwater contaminant recovery, treatment, and monitoring program at a pharmaceutical manufacturing facility in central Pennsylvania.
- Performed hydrogeologic characterization and assessment projects at various industrial facilities in Pennsylvania, Georgia, and Puerto Rico.

Department of Geosciences, Pennsylvania State University, University Park, PA (1983-1986)

Research and Teaching Assistant

- Conducted several research projects relating to mine drainage issues. Assisted in numerous other field and laboratory hydrogeologic projects.
- Prepared and administered homework problem sets for Introduction to Hydrogeology course. Laboratory instructor for introductory geology courses.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

Paul S. Ryerson, Chairman
Dr. James F. Jackson
Dr. Michael O. Garcia

In the Matter of	)	Docket No. 70-7016-ML
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLB No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	May 2, 2012

CERTIFICATE OF SERVICE

I hereby certify that, on this date, a copy of "GE-Hitachi Global Laser Enrichment Responses to Initial Board Questions (Public Version)" was filed with the Electronic Information Exchange (EIE) in the above-captioned proceeding on the following recipients.

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