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A Joint Venture of GE, Toshiba, & Hitachi

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Andy Lingenfelter
Manager, Engineering

Proprietary Notice

This letter transmits proprietary information in accordance with 10CFR2.390. Upon removal of Enclosure 1, the balance of the letter may be considered non-proprietary.

proj 712

FLN-2006-018
May 11, 2006

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to NRC Request for Additional Information Regarding Amendment 28 to GESTAR II (TAC NO. MC3559)

Reference 1 from the NRC provided requests for additional information regarding Amendment 28 to GESTAR II. This letter responds to those questions.

Enclosure 1 contains proprietary information as defined by 10CFR2.390. GNF customarily maintains this information in confidence and withholds it from public disclosure. A non-proprietary version of Enclosure 1 is provided in Enclosure 2. The affidavit in Enclosure 3 identifies that the designated information in Enclosure 1 has been handled and classified as proprietary to GNF. GNF hereby requests the information of Enclosure 1 be withheld from public disclosure in accordance with the provisions of 10CFR2.390 and 9.17.

If you have any questions about the information provided here, please contact me at (910) 675-5954 or Jim Harrison at (910) 675-6604.

Sincerely,

Andrew A. Lingenfelter
Manager, Engineering
Global Nuclear Fuel – Americas, LLC

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Project No. 712

References

1. Letter from Michelle C. Honcharik, (US NRC) to Andrew A. Lingenfelter, (GNF), Subject: Request For Additional Information (RAI) Regarding The Global Nuclear Fuel (GNF) Topical Report (TR) GESTAR II Amendment 28, "Misloaded Fuel Bundle Event Licensing Basis Change To Comply With Standard Review Plan 15.4.7" (TAC NO. MC3559), April 19, 2006.

Enclosures

1. RAI Responses – Proprietary
2. RAI Responses – Non-Proprietary
3. Affidavit, Jens G. M. Andersen, dated May 11, 2006

cc: LM Quintana, GE/Wilmington,
JF Harrison (GE/Wilmington)
JF Klapproth (GE/Wilmington)
GB Stramback (GE/San Jose)
MC Honcharik, USNRC
eDRF Section 0000-0046-7227

ENCLOSURE 2 – REDACTED AND NON-PROPRIETARY INFORMATION

FLN-2006-018

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION REGARDING AMENDMENT 28 TO GESTAR II (TAC NO. MC3559)

NON-PROPRIETARY INFORMATION NOTICE

This is a non-proprietary version of Enclosure 1, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed double square brackets as shown here [[ ]]

NRC Question

1. For accident Scenario 1, GNF assumed that fission products from all fuel rods in five failed fuel assemblies were released to the turbine and condensers based on a power level of 5.75 per bundle. Please provide the fission product source term after applying a safety factor of 1.4 and a radial peaking factor of 2.5 as you proposed. State if you assumed the same source term for accident Scenario 2.

GE Response

The fission product source term (before applying any of the release fractions in Attachment B Table B-1) is provided below:

Table 1 – Scenario 1 and 2 Fission Product Source Term

Isotope	Source Term (Ci)
I-128	3.26E+04
I-129	1.00E-01
I-130	8.61E+04
I-131	2.64E+06
I-132	3.81E+06
I-133	5.42E+06
I-134	5.96E+06
I-135	5.07E+06
Kr-83m	3.37E+05
Kr-85	3.34E+04
Kr-85m	7.18E+05
Kr-87	1.38E+06
Kr-88	1.95E+06
Kr-89	2.39E+06
Kr-90	2.36E+06
Kr-91	1.75E+06
Kr-92	8.47E+05
Xe-131m	2.94E+04
Xe-133	5.43E+06
Xe-133m	1.69E+05
Xe-135	1.84E+06
Xe-135m	1.05E+06
Xe-137	4.73E+06
Xe-138	4.50E+06
Xe-139	3.53E+06

The source term in the table above is the same source term that was used for Scenario 2.

NRC Question

2. For accident Scenario 2, please provide the amount of fission products released from the offgas system, resulting doses, and relevant dose calculations for several representative charcoal holdup times in Figures B-2, B-3, B-5, and B-6 of Attachment B.

GE Response

As discussed in Attachment B Section B.4.2.2, iodine is not considered in Scenario 2 due to the retention in the offgas charcoal beds. The remaining fission products available at the inlet to the offgas system are as follows:

Table 2 – Scenario 2 Fission Product Source Term at Offgas System Inlet

Isotope	Source Term (Ci)
Kr-83m	3.37E+04
Kr-85	3.34E+03
Kr-85m	7.18E+04
Kr-87	1.38E+05
Kr-88	1.95E+05
Kr-89	2.39E+05
Kr-90	2.36E+05
Kr-91	1.75E+05
Kr-92	8.47E+04
Xe-131m	2.94E+03
Xe-133	5.43E+05
Xe-133m	1.69E+04
Xe-135	1.84E+05
Xe-135m	1.05E+05
Xe-137	4.73E+05
Xe-138	4.50E+05
Xe-139	3.53E+05

A sample calculation is provided to show how the curves in Attachment B Figures B-2 and B-3 were generated. The dose conversion factors that were used are as follows:

Table 3 – Scenario 2 Dose Conversion Factors (DCFs)

Isotope	Whole Body DCF (Rem-m^3/Ci-sec)	TEDE DCF (Sv-m^3/Bq-sec)
Kr-83m	6.44E-04	1.50E-18
Kr-85	5.58E-04	1.19E-16
Kr-85m	3.94E-02	7.48E-15
Kr-87	1.98E-01	4.12E-14
Kr-88	4.89E-01	1.02E-13
Kr-89	4.59E-01	N/A
Kr-90	3.18E-01	N/A
Kr-91	1.81E-01	N/A
Kr-92	1.88E-01	N/A
Xe-131m	5.03E-03	3.89E-16
Xe-133	1.13E-02	1.56E-15
Xe-133m	1.04E-02	1.37E-15
Xe-135	6.20E-02	1.19E-14
Xe-135m	1.08E-01	2.04E-14
Xe-137	4.69E-02	N/A
Xe-138	2.82E-01	5.77E-14
Xe-139	2.32E-01	N/A

The Attachment B Figure B-2 and B-3 whole body doses are calculated using the following formula:

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The following table provides a sample calculation for the krypton whole body dose, assuming a X/Q of 1.0E-04 sec/m^3 and an offgas holdup time of 40 hours:

Table 4 – Attachment B Figure B-2 Sample Calculation

Isotope	λ (sec^{-1})	Whole Body Dose (Rem)
Kr-83m	1.035E-04	7.284E-10
Kr-85	2.047E-09	1.865E-04
Kr-85m	4.298E-05	5.811E-04
Kr-87	1.520E-04	8.553E-10
Kr-88	6.876E-05	4.771E-04
Kr-89	3.656E-03	0.0
Kr-90	2.146E-02	0.0
Kr-91	7.967E-02	0.0
Kr-92	3.767E-01	0.0
	Total	1.24E-03

The resulting Kr whole body dose for a X/Q of 1.0E-04 sec/m^3 and an offgas holdup time of 40 hours is 1.24E-03 Rem, which is consistent with the applicable curve in Attachment B Figure B-2.

The following table provides a sample calculation for the xenon whole body dose, assuming a X/Q of 3.0E-04 sec/m^3 and an offgas holdup time of 40 days:

Table 5 – Attachment B Figure B-3 Sample Calculation

Isotope	λ (sec^{-1})	Whole Body Dose (Rem)
Xe-131m	6.691E-07	4.383E-04
Xe-133	1.517E-06	9.758E-03
Xe-133m	3.598E-06	2.088E-07
Xe-135	2.100E-05	1.044E-31
Xe-135m	7.551E-04	0.0
Xe-137	3.008E-03	0.0
Xe-138	8.136E-04	0.0
Xe-139	1.716E-02	0.0
	Total	1.02E-02

The resulting Xe whole body dose for a X/Q of 3.0E-04 sec/m^3 and an offgas holdup time of 40 days is 1.02E-02 Rem, which is consistent with the applicable curve in Attachment B Figure B-3.

The Attachment B Figure B-5 and B-6 TEDE doses are calculated using the following formula:

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The following table provides a sample calculation for the krypton TEDE dose, assuming a X/Q of 1.0E-04 sec/m^3 and an offgas holdup time of 40 hours:

Table 6 – Attachment B Figure B-5 Sample Calculation

Isotope	λ (sec^{-1})	TEDE Dose (Rem)
Kr-83m	1.035E-04	6.280E-12
Kr-85	2.047E-09	1.472E-04
Kr-85m	4.298E-05	4.079E-04
Kr-87	1.520E-04	6.576E-10
Kr-88	6.876E-05	3.684E-04
Kr-89	3.656E-03	0.0
Kr-90	2.146E-02	0.0
Kr-91	7.967E-02	0.0
Kr-92	3.767E-01	0.0
	Total	9.24E-04

The resulting Kr TEDE dose for a X/Q of 1.0E-04 sec/m^3 and an offgas holdup time of 40 hours is 9.24E-04 Rem, which is consistent with the applicable curve in Attachment B Figure B-5.

The following table provides a sample calculation for the xenon TEDE dose, assuming a X/Q of 3.0E-04 sec/m^3 and an offgas holdup time of 35 days:

Table 7 – Attachment B Figure B-6 Sample Calculation

Isotope	λ (sec^{-1})	Whole Body Dose (Rem)
Xe-131m	6.691E-07	1.676E-04
Xe-133	1.517E-06	9.578E-03
Xe-133m	3.598E-06	4.832E-07
Xe-135	2.100E-05	6.448E-28
Xe-135m	7.551E-04	0.0
Xe-137	3.008E-03	0.0
Xe-138	8.136E-04	0.0
Xe-139	1.716E-02	0.0
	Total	9.75E-03

The resulting Xe TEDE dose for a X/Q of 3.0E-04 sec/m^3 and an offgas holdup time of 35 days is 9.75E-03 Rem, which is consistent with the applicable curve in Attachment B Figure B-6.

ENCLOSURE 3

FLN-2006-018

AFFIDAVIT

Affidavit

I, Jens G. M. Andersen, state as follows:

(1) I am Consulting Engineer, Thermal-Hydraulic Methods, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of FLN-2006-018, Andrew A. Lingenfelter (GNF) to Document Control Desk (USNRC), *Response to NRC Request for Additional Information Regarding Amendment 28 to GESTAR II (TAC NO. MC3559),* dated May 11, 2006. The proprietary information in Enclosure 1, *Response to NRC Request for Additional Information Regarding Amendment 28 to GESTAR II (TAC NO. MC3559),* is delineated by enclosure inside double square brackets. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation[3] refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b., above.

(5) To address the 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A's

comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC–approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A or its licensor.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina this 11th day of May 2006.

Jens G. M. Andersen
Global Nuclear Fuels – Americas, LLC