



Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

TVA-BFN-TS-416

March 15, 2002

10 CFR 50.90
10 CFR 2.790

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop OWFN, P1-35
Washington, D.C. 20555 - 0001

Gentlemen:

In the Matter of)
Tennessee Valley Authority)

Docket No. 50-296

**BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 3 - TECHNICAL SPECIFICATIONS
(TS) CHANGE 416 - REVISED SAFETY LIMIT MINIMUM CRITICAL POWER RATIO
(SLMCPR) - RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
(TAC NO. MB3485)**

- Reference:
1. NRC Letter to TVA dated February 8, 2002, Request for Additional Information to Technical Specification Revision for Browns Ferry Nuclear Plant, Unit 3 (TAC NO. MB3485)
 2. TVA Letter to NRC dated November 1, 2001, Browns Ferry Nuclear Plant, Unit 3 Technical Specifications (TS) Change 416, Revised Safety Limit Minimum Critical Power Ratio (TAC NO. MB3485)
 3. NRC Letter to TVA dated March 13, 2001, Browns Ferry Nuclear Plant, Unit 2 - Issuance of Amendment Regarding Safety Limit Minimum Critical Power Ratio (TAC NO. MB0436)

The purpose of this letter is to respond to the NRC staff's request for additional information (reference 1) regarding TVA's proposed Technical Specification Change for the Browns Ferry Nuclear Plant Unit 3 safety limit minimum critical power ratio (reference 2). Based on the staff's request for additional information and subsequent analysis by TVA and its fuel supplier, Global Nuclear Fuel (GNF), TVA is changing the proposed Reactor Core Safety Limit MCPR in TS Section 2.1.1.2 from 1.07 to 1.08 for two reactor recirculation loop operation and from 1.09 to 1.10 for single loop operation. The present MCPR in the BFN Unit 3 TS is 1.10 for two loop operation and 1.12 for single loop operation.

This letter contains proprietary information

DO 30

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TVA has reviewed the previously submitted (reference 2) no significant hazards consideration determination for this TS change and concluded that it remains valid. In addition, the categorical exemption from environmental review continues to be valid for the proposed change. The BFN Plant Operations Review Committee and the BFN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of BFN Unit 3 in accordance with the proposed change will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Alabama State Department of Public Health.

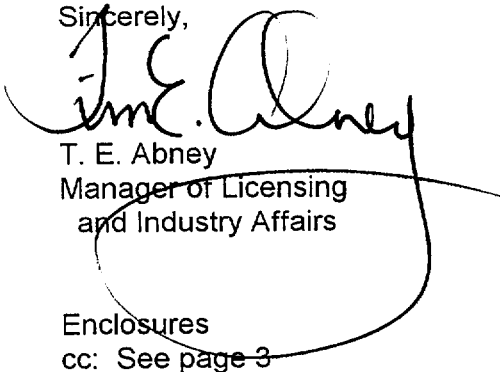
Enclosure 1 to this letter lists the specific NRC questions and provides TVA's responses which includes material deemed proprietary by GNF. GNF has requested that the proprietary information be withheld from public disclosure pursuant to 10 CFR 2.790. Accordingly, an application and affidavit, as required by 10 CFR 2.790(b)(1), is also contained in Enclosure 1. Enclosure 2 provides a non-proprietary version of TVA's response to the NRC request for additional information. Enclosure 3 provides a revised description and evaluation of the proposed change. Enclosures 4 and 5 contain marked up and revised replacement pages, respectively, for the applicable TS section for the proposed change.

TVA requests that the proposed TS change be issued by April 5, 2002, and that the revised TS be made effective within 30 days of NRC approval. This letter does not contain any new commitments.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 15, 2002.

If you have any questions about this change, please telephone me at (256) 729-2636.

Sincerely,



T. E. Abney
Manager of Licensing
and Industry Affairs

Enclosures

cc: See page 3

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Enclosures

cc (Enclosures):

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

(Via NRC Electronic Distribution)

Mr. Kahtan N. Jabbour, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint, North
(MS 08G9)
11555 Rockville Pike
Rockville, Maryland 20852-2739

Mr. Paul E. Fredrickson, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Resident Inspector
Browns Ferry Nuclear Plant
P.O. Box 149
Athens, Alabama 35611

ENCLOSURE 2

**TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3**

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-416

**NRC REQUEST FOR ADDITIONAL INFORMATION
TVA RESPONSE**

Non-Proprietary Version

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-416

NRC REQUEST FOR ADDITIONAL INFORMATION TVA RESPONSE

The Nuclear Regulatory Commission (NRC) staff has reviewed the November 1, 2001, TVA submittal regarding changes to the Browns Ferry Nuclear Plant, Unit 3 Safety Limit Minimum Critical Power Ratios (SLMCPRs) and has the following questions and comments concerning Enclosure 5 of the submittal:

NRC Question No. 1

The NRC staff had found discrepancies in data bases while conducting an audit of General Electric's GEXL14 correlation analysis. Please provide justification regarding the applicability of the overall GEXL14 uncertainty to Browns Ferry Unit 3. Please discuss the impact on the safety limit minimum critical power ratio (SLMCPR) calculation due to these discrepancies.

TVA Response

In a meeting with the NRC staff on February 11, 2002 (Reference 1) [[

.]] To evaluate the impact on SLMCPR, the process described in Reference 1 was applied to Browns Ferry Unit 3, Cycle 11. The results are shown in Table 1.

TABLE 1						
Net Adjustment to SLMCPR [[to account for Top-peaked Power Shapes]]		Dual Loop Ops.			Single Loop Ops.	
		BOC	MOC	EOC	MOC	EOC
	Submitted SLMCPR	1.07	1.07	1.07	1.09	1.09
Step	Calculated M/C SLMCPR	[[]]
1	Margin to Submitted SLMCPR	[[]]
2,3		[[]]
4	Credit for Reduced Uncertainties	[[]]
		[[]]
	Net unrounded change	[[]]
	Adjusted SLMCPR with rounding	1.04	1.07	1.08	1.09	1.10
	Revised SLMCPR for Tech Specs	DLO 1.08			SLO 1.10	
Step 5 credit applies only for OLMCPR and is not relevant for Tech Specs under review.						
* SLO value at EOC conservatively estimated by applying delta determined from MOC calculation.						

A SLMCPR penalty of 0.01 was assessed for both DLO and SLO [[

]] for Browns Ferry Unit 3, Cycle 11 because the following process revealed that such a penalty is applicable. [[

]] For

Browns Ferry Unit 3, Cycle 11, [[

]] the SLMCPR penalty does apply. The details for the cycle-specific assessment that was performed for Browns Ferry Unit 3, Cycle 11 are documented in Reference 2.

[[

]]

Therefore, as indicated in Table 1, a change is needed in the requested values for the Dual Loop Operation (DLO) and Single Loop Operation (SLO) Technical Specification SLMCPRs for Browns Ferry Unit 3, Cycle 11. The requested DLO and SLO Technical Specification SLMCPR values are revised to become 1.08 and 1.10, respectively.

Reference 1: G.A. Watford (GNF) letter J.E. Donohue (NRC), Final Presentation Material for GEXL Presentation - February 11, 2002;FLN-2002-004; February 12, 2002.

Reference 2: GNF-A design record file (DRF) J11-03963-06 titled "SLMCPR."

Reference 3: *Methodology and Uncertainties for Safety Limit MCPR Evaluations*, NEDC-32601P-A, August 1999.

NRC Question No. 2

It appears that the proposed Technical Specification (TS) SLMCPR value for two-recirculation-loop operation based on the calculated SLMCPR given in Table 2 of Enclosure 5 should be 1.08 in conjunction with the contributor from Question 1. Please provide a justification for the proposed TS SLMCPR value of 1.07.

TVA Response

The 1.07 value originally requested was based on rounding the calculated value [[]]. The results in Table 1 show that the 1.07 value for DLO at MOC will not change [[]]. Nevertheless, the results in Table 1 also show that the adjusted SLMCPR at EOC has become more limiting [[]] and that a 1.08 value for two recirculation loop operation (dual loop operation, DLO) is appropriate. For similar reasons, the requested SLMCPR value for single loop operation (SLO) has increased by 0.01 from 1.09 to 1.10.

The results from Table 1 in response to question 1 reveal that the requested changes in the Tech Spec SLMCPR values for DLO and SLO need to be amended to become 1.08 and 1.10, respectively.

ENCLOSURE 3

TENNESSEE VALLEY AUTHORITY BROWNS FERRY NUCLEAR PLANT (BFN) UNIT 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-416 DESCRIPTION AND EVALUATION OF THE PROPOSED CHANGE

I. DESCRIPTION OF THE PROPOSED CHANGE

The proposed change to Unit 3 TS section 2.1.1.2 revises the Reactor Core Safety Limit Minimum Critical Power Ratio (SLMCPR) to 1.08 and 1.10 for dual and single recirculation loop operation, respectively. The specific changes are described below. (Deleted and added text are indicated by ~~strikeouts~~ and ***bold italics***, respectively.)

The current Reactor Core Safety Limit, 2.1.1.2 on page 2.0-1 for Unit 3 is revised to read as follows:

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow $\geq 10\%$ rated core flow:

MCPR shall be \geq ~~1.40~~ ***1.08*** for two recirculation loop operation or \geq ~~1.12~~ ***1.10*** for single loop operation.

II. REASON FOR THE PROPOSED CHANGE

The SLMCPR values for the current BFN Unit 3 fuel cycle are based upon the cycle-specific procedures and analytical methodologies referenced in Global Nuclear Fuels (GNF) licensing document, *General Electric Standard Application for Reactor Fuel (GESTAR-II)*, NEDE-24011-P-A, Revision 13 dated August 1996 and the US Supplement, NEDE-24011-P-A-US, dated August 1996. The reload analysis for the upcoming fuel cycle is based upon updated methodology and procedures which incorporate reduced power distribution uncertainties described in GESTAR-II, Revision 14 (Amendment 25) dated June 2000 and Licensing Topical Reports NEDC-32601P-A, "*Methodology and Uncertainties for Safety Limit MCPR Evaluations*" and NEDC-32694P-A, "*Power Distribution Uncertainties for Safety Limit MCPR Evaluation*" (References 1-3). Application of the updated methodology to the design of Unit 3, Cycle 11 results in a revised TS SLMCPR.

III. SAFETY ANALYSIS

Background

General Design Criterion 10 requires, and SLs ensure, that specified acceptable fuel design limits are not exceeded during steady state operation, normal operational transients, and abnormal operational transients.

ENCLOSURE 3 (continued)

The fuel cladding integrity SL is established such that no fuel damage is calculated to occur if the limit is not violated. Maintaining a MCPR greater than the limit specified in TS 2.1.1.2 represents a conservative margin relative to the conditions required to maintain fuel cladding integrity. The fuel cladding SL is defined with a margin to the conditions that would produce onset of transition boiling (i.e., MCPR = 1.00). These conditions represent a significant departure from the condition intended by design for planned operation. The MCPR fuel cladding integrity SL ensures that during normal operation and during abnormal operational transients, at least 99.9 percent of the fuel rods in the core would not experience transition boiling.

Methodology

The SLMCPR is being revised for BFN Unit 3 because of the core design for the upcoming Cycle 11 operations. The reactor core for Cycle 11 will utilize two GNF fuel bundle designs, containing fresh GE14 type fuel and previously irradiated GE13 type fuel. The current BFN Unit 3 cycle-specific SLMCPR evaluation methodology employs uncertainties associated with the GETAB (Reference 4) thermal analysis basis. In an effort to improve both the economic performance and operational flexibility (i.e., enhanced CPR margin), GNF has developed a revised methodology for applying fuel bundle power uncertainties. GESTAR-II provides the revised methodology for determining the cycle-specific MCPR safety limits. The latest version of GESTAR-II was used for determining the Unit 3, Cycle 11 SLMCPRs. Specifically, Amendment 25 of NEDE-24011-P-A-14, which describes the methodology for determining the SLMCPR, was incorporated in GESTAR-II as of June 2000. The NRC safety evaluation approving Amendment 25 is contained in a letter from the NRC to General Electric dated March 11, 1999 (Reference 5).

The SLMCPRs for Unit 3, Cycle 11 are 1.08 (two-loop operation) and 1.10 (single-loop operation) as shown on the marked up and revised page in Enclosures 2 and 3. Enclosures 4 and 5 contain non-proprietary and proprietary versions of a GNF letter report, *"Additional Information Regarding the Cycle Specific SLMCPR for BFN Unit 3, Cycle 11,"* which provides a results comparison of the cycle 11 analysis utilizing the updated methodology, Cycle 11 utilizing the GETAB methodology, and the previous fuel Cycle 10 GETAB results. These comparisons demonstrate that the differences between the revised methodology and previous GETAB methodology are expected and statistically consistent. This information is provided to address issues which have been raised by NRC during the review of similar amendments at other facilities.

Precedent exists for the requested change. A similar TS change referencing the NRC approved GESTAR-II, Amendment 25 methodology was issued by NRC for BFN, Unit 2 on March 13, 2001 (Reference 6).

ENCLOSURE 3 (continued)

Conclusion

The revised SLMCPR values in the proposed change to TS 2.1.1.2 have been determined using NRC approved methodologies. The SLMCPR analysis establishes revised SLMCPR values that will continue to satisfy the SLMCPR design basis; that during normal operation and during abnormal operational transients, at least 99.9 percent of the fuel rods in the core do not experience transition boiling. It is therefore concluded that the proposed changes are acceptable.

REFERENCES

1. General Electric Standard Application for Reactor Fuel (GESTAR-II), NEDE-24011-P-A-14, Revision 13 dated June 2000 and the US Supplement, NEDE-24011-P-A-14-US, dated June 2000.
2. Methodology and Uncertainties for Safety Limit MCPR Evaluations, NEDC-32601P-A, August 1999.
3. Power Distribution Uncertainties for Safety Limit MCPR Evaluation, NEDC-32694P-A, August 1999.
4. General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application, NEDO-10958-A, January 1977.
5. Letter from F. Akstulewicz (NRC) to G. A. Watford (GE) dated March 11, 1999, Acceptance for Referencing of Licensing Topical Reports, NEDC-32601P, Methodology and Uncertainties for Safety Limit MCPR Evaluations; NEDC-32694P, Power Distribution Uncertainties for Safety Limit MCPR Evaluation; and Amendment 25 to NEDE-24011-P-A on Cycle-Specific Safety Limit MCPR (TAC Nos. M97490, M99069, and M97491)
6. NRC Letter to TVA dated March 13, 2001, Browns Ferry Nuclear Plant, Unit 2 - Issuance of Amendment Regarding Safety Limit Minimum Critical Power Ratio (TAC NO. MB0436)
7. G. A. Watford (GNF) letter J.E. Donohue (NRC), Final Presentation Material for GEXL Presentation - February 11, 2002; FLN-2002-004; February, 12, 2002.

ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-416
MARKED-UP PAGE

I. AFFECTED PAGE LIST

Unit 3 - page 2.0-1

II. MARKED-UP PAGE

See attached.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be $\leq 25\%$ RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow $\geq 10\%$ rated core flow:

M CPR shall be ≥ 1.08 for two recirculation loop operation or ≥ 1.10 for single loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

ENCLOSURE 5

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-416
REVISED PAGE

I. AFFECTED PAGE LIST

Unit 3 - page 2.0-1

II. REVISED PAGE

See attached.

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow $< 10\%$ rated core flow:

THERMAL POWER shall be $\leq 25\%$ RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow $\geq 10\%$ rated core flow:

MCPR shall be ≥ 1.08 for two recirculation loop operation or ≥ 1.10 for single loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1325 psig.

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With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.



Global Nuclear Fuel

A Joint Venture of GE, Toshiba, & Hitachi

Affidavit

I, Glen A. Watford, being duly sworn, depose and state as follows:

- (1) I am Manager, Fuel Engineering Services, 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 the attachment, “Request/Responses for Additional Information to Support Tech Spec SLMCPR, Browns Ferry Unit 3, Cycle 11,” March 8, 2002.
- (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 2.790(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) 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.

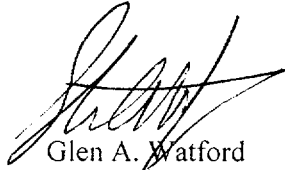
Affidavit

State of North Carolina)
County of New Hanover) SS:

Glen A. Watford, being duly sworn, deposes and says:

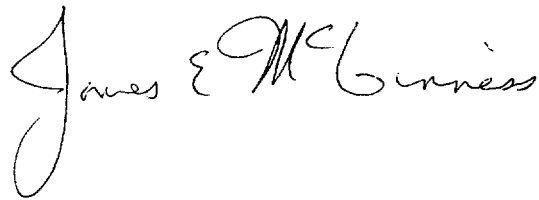
That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 8th day of March, 2002



Glen A. Watford
Global Nuclear Fuel – Americas, LLC

Subscribed and sworn before me this 8 day of MARCH, 2002



Notary Public, State of North Carolina

JAMES E. MCGINNESS

Notary Public, State of North Carolina

My Commission Expires _____

New Hanover County

My Commission Expires 1/23/2006