Exelon Generation

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Proprietary Information – Withhold from Public Disclosure Under 10 CFR 2.390

RS-12-184

10 CFR 50.90

October 11, 2012

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

LaSalle County Station, Unit 2
Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Request to Revise Technical Specification 2.1.1.2 for Minimum Critical Power Ratio Safety Limit – LaSalle County Station, Unit 2, Cycle 15

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC, (EGC) requests an amendment to Appendix A, Technical Specifications (TS), of Facility Operating License No. NPF-18 for LaSalle County Station (LSCS), Unit 2. The proposed change revises the LSCS, Unit 2 minimum critical power ratio safety limit (MCPR SL) in TS Section 2.1.1, "Reactor Core SLs."

This change is required to support the upcoming LSCS, Unit 2, Cycle 15 operation. Cycle 15 will be the first reload of Global Nuclear Fuel (GNF) GNF2 for LaSalle Unit 2.

The proposed amendment reflects an increase of the two recirculation loop MCPR SL limit from ≥ 1.11 to ≥ 1.14 and an increase in the single recirculation loop MCPR SL from ≥ 1.12 to ≥ 1.17. The proposed change has been evaluated in accordance with 10 CFR 50.91(a)(1) using the criteria in 10 CFR 50.92(c), and it has been determined that the change does not involve a significant hazards consideration. The bases for these determinations are included in the attached submittal.

The attached amendment request is subdivided as follows:

- Attachment 1 provides an evaluation of the proposed change.
- Attachment 2 provides the current TS page with the proposed change indicated for LaSalle Station.
- Attachment 3 provides the "clean" TS page that includes the proposed change.

- Attachment 4 provides an affidavit from GNF supporting the request to withhold proprietary information from public disclosure in accordance with 10 CFR 2.390 and 10 CFR 9.17.

- Attachment 5 provides GNF Additional Information Regarding the Requested Changes to the TS MCPR SL for LSCS, Unit 2, Cycle 15 (Proprietary).

- Attachment 6 provides Supplemental LSCS, Unit 1, RAI Responses Applied to LSCS, Unit 2, Cycle 15 (Proprietary).

- Attachment 7 provides GNF Additional Information Regarding the Requested Changes to the TS MCPR SL for LSCS, Unit 2, Cycle 15 (Non-Proprietary).

- Attachment 8 provides Supplemental LSCS, Unit 1, RAI Responses Applied to LSCS, Unit 2, Cycle 15 (Non-Proprietary).

- Attachment 9 provides a Supplemental LSCS, Unit 1, RAI Response Applied to LSCS, Unit 2, Cycle 15 and the LSCS, Unit 2, Cycle 14 and Expected Cycle 15 Power-to-Flow Map.

Attachment 5 (i.e., letter from C. F. Lamb (GNF) to J. Fisher (EGC) dated October 4, 2012) specifies the new MCPR SLs for LSCS, Unit 2, Cycle 15. Attachments 5 and 6 contain proprietary information as defined by 10 CFR 2.390. GNF, as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was provided to Exelon Nuclear in a GNF transmittal that is referenced by the affidavit. The proprietary information has been faithfully reproduced in the enclosed document such that the affidavit remains applicable. Accordingly, it is respectfully requested that the enclosed proprietary information be withheld from public disclosure in accordance with 10 CFR 2.390 and 10 CFR 9.17. Attachments 7 and 8 contain non-proprietary versions of Attachments 5 and 6, respectively.

EGC requests approval of the proposed amendment by February 7, 2013, to support the upcoming refueling outage. Once approved, the amendment shall be implemented after Cycle 14 is completed and prior to the operation of Cycle 15.

The proposed amendment has been reviewed by the LSCS Plant Operations Review Committee and approved by the Nuclear Safety Review Board in accordance with the requirements of the EGC Quality Assurance Program.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), EGC is notifying the State of Illinois of this application for a change to the TS by transmitting a copy of this letter and its attachments to the designated State Official.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Lisa A. Simpson at (630) 657-2815.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 11th day of October 2012.

Respectfully,

David M. Gullott
Manager – Licensing
Exelon Generation Company, LLC

Attachments:

1. Evaluation of Proposed Change
2. Proposed Technical Specifications Changes – Marked-up TS Page
3. Proposed Technical Specifications Changes – Clean TS Page
4. Global Nuclear Fuel Affidavit Supporting Request to Withhold from Public Disclosure Under 10 CFR 2.390 and 10 CFR 9.17
5. Global Nuclear Fuel Additional Information Regarding the Requested Changes to the Technical Specification MCPR SL for LaSalle County Station, Unit 2, Cycle 15 (Proprietary)
6. Supplemental LaSalle Unit 1 RAI Responses Applied to LaSalle County Station, Unit 2, Cycle 15 (Proprietary)
7. Global Nuclear Fuel Additional Information Regarding the Requested Changes to the Technical Specification MCPR SL for LaSalle County Station, Unit 2, Cycle 15 (Non-Proprietary)
8. Supplemental LaSalle Unit 1 RAI Responses Applied to LaSalle County Station, Unit 2, Cycle 15 (Non-Proprietary)
9. Supplemental LaSalle Unit 1 RAI Response Applied to LaSalle County Station, Unit 2, Cycle 15 and the LaSalle County Station, Unit 2, Cycle 14 and Expected Cycle 15 Power-to-Flow Map

cc: Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT 1

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Evaluation of Proposed Change

ATTACHMENT 1
Evaluation of Proposed Change

Subject: Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

1.0 SUMMARY DESCRIPTION

The proposed change would revise the LaSalle County Station (LSCS), Unit 2 Technical Specifications (TS) Section 2.1.1, "Reactor Core SLs." Specifically, the proposed change modifies the LSCS, Unit 2 Minimum Critical Power Ratio Safety Limits (MCPR SLs) for both two loop and single loop recirculation operation in TS Section 2.1.1.2. The change to TS Section 2.1.1.2 is necessary as a result of LSCS, Unit 2, Cycle 15 cycle-specific analyses.

The analyses performed to support the proposed cycle-specific MCPR SL changes utilized NRC-approved methodologies.

The proposed change is described in detail in Section 2.0 of this attachment.

The requested approval date of February 7, 2013, will allow time for the LSCS, Unit 2 Core Operating Limits Report (COLR) to be prepared prior to LSCS, Unit 2, Cycle 15 operation.

2.0 DETAILED DESCRIPTION

The proposed change involves revising the MCPR SLs contained in TS Section 2.1.1.2 for both two loop and single recirculation loop operation for LSCS, Unit 2. Analysis determined that LSCS, Unit 2 MCPR SL value for two recirculation loop operation requires revision from ≥ 1.11 to ≥ 1.14. Additionally, the LSCS, Unit 2 MCPR SL value for single recirculation loop operation requires revision from ≥ 1.12 to ≥ 1.17. The major contributors to these revisions are discussed in Attachment 5, Section 2.1, "Major Contributors to SLMCPR Change."

3.0 TECHNICAL EVALUATION

LSCS, Unit 2, Cycle 15 will be the first reload of Global Nuclear Fuel (GNF) GNF2 fuel. The current Cycle 15 core design consists of 304 fresh GNF2 bundles and 460 reloaded ATRIUM-10 bundles. While Exelon Generation Company, LLC, (EGC) does not expect this to change, any final core design changes will be evaluated to confirm that the proposed TS changes remain valid. The design record file for the LSCS, Unit 2, Cycle 15 core loading pattern is included in Attachment 5, Figure 1, "Current Cycle Core Loading Diagram."

The proposed MCPR SL values for the upcoming operating Cycle 15 were developed with GNF's NRC-approved MCPR SL methodology. The methodology used is found in NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II)." Cycle 15 is the first reload of GNF2 for LSCS, Unit 2. NRC-approved methodologies have been used to analyze similar core designs as discussed in the referenced letters in Section 4.2 below. A discussion justifying that the results are conservative related to the methodology deviations, penalties, and/or uncertainties is provided in the Monte Carlo two loop operation and single loop recirculation operation results listed in Attachment 5, Table 3. Attachment 5, Section 2.2 provides a discussion of deviations from the NRC-approved values. There are no 10 CFR Part 21 issues associated with the LSCS, Unit 2, Cycle 15 analysis.

EGC is proposing that the LSCS, Unit 2 Operating License be amended to modify the MCPR SLs reported in TS 2.1.1.2. The proposed change is necessary in order to reflect the safety limit changes for the Cycle 15 core.

The MCPR SL is developed to assure compliance with General Design Criterion 10 of 10 CFR 50, Appendix A. The Bases to TS Section 2.1.1.2 states that "The MCPR SL ensures sufficient conservatism in the operating MCPR limit that, in the event of an AOO [Anticipated Operational Occurrence] from the limiting condition of operation, at least 99.9% of the fuel rods in the core would be expected to avoid boiling transition." Attachment 9 provides the EGC response to RAI-07 applied to LaSalle Unit 2 and an updated version of the power-to-flow map for LSCS, Unit 2, Cycle 14 and expected Cycle 15 operation including the stability Option III features of scram region and controlled entry region for backup stability protection.

Information to support the cycle specific MCPR SL is included in Attachment 5. This attachment summarizes the MCPR SL analysis: methodology, inputs, results, and the reasons for the increase in the MCPR SL. The LSCS, Unit 2, Cycle 15 core design consists of 304 bundles of fresh GNF2, 312 bundles of once burned ATRIUM-10, and 148 bundles of twice burned ATRIUM-10 fuel. The COLR references in TS section 5.6.5 reflect the methods and codes that apply to fuel types in the Cycle 15 core.

For two loop operation, a MCPR SL of ≥ 1.14 was demonstrated to be adequate to ensure that 99.9% of the rods in the core avoid boiling transition during the most limiting AOO. For single loop operation, this assurance is provided by a MCPR SL of ≥ 1.17. Attachment 6 provides a discussion and indicates the fuel bundle groups, group exposure, number of bundles, fuel type, and percent contribution to the number of fuel rods that are subjected to boiling transition that depicts the 0.1% of fuel bundles that may experience boiling transition for the limit MCPR SL case in the section entitled, "GNF Response to RAI-01 Applied to LS2."

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed change has been evaluated to determine whether applicable regulations and requirements continue to be met.

10 CFR 50.36, "Technical specifications," defines a safety limit as a limit upon important process variables that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity.

4.2 Precedents

1. Letter from A. Wang (U. S. NRC) to Vice President, Operations (Entergy Operations, Inc.), "Grand Gulf Nuclear Station, Unit 1 – Issuance of Amendment Re: Revise TS Section 2.1.1.2 Reactor Core Safety Limit Minimum Critical Power Ratio (TAC No. ME7531)," dated April 20, 2012 (ADAMS Accession No. ML120720283)

2. Letter from N. DiFrancesco (U. S. NRC) to M. J. Pacilio (Exelon Nuclear), "LaSalle County Station, Unit 1 – Issuance of Amendment Regarding Technical Change for Safety Limit Minimum Critical Power Ratio (TAC No. ME7331)" dated March 1, 2012 (ADAMS Accession No. ML120520606)

4.3 No Significant Hazards Consideration

In accordance with 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," Exelon Generation Company, LLC, (EGC) is requesting a change to the Technical Specifications (TS) of Facility Operating License Nos. NPF-18 for LaSalle County Station (LSCS), Unit 2.

According to 10 CFR 50.92, "Issuance of amendment," paragraph (c), a proposed amendment to an operating license involves no significant hazards consideration if operation of the facility in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

In support of this determination, an evaluation of each of the three criteria set forth in 10 CFR 50.92 is provided below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The Minimum Critical Power Ratio Safety Limit (MCPR SL) is defined in the TS Bases Section B 2.1.1 as that limit "that, in the event of an AOO [Anticipated Operational Occurrence] from the limiting condition of operation, at least 99.9% of the fuel rods in the core would be expected to avoid boiling transition." The MCPR SL satisfies the requirements of General Design Criterion 10 of Appendix A to 10 CFR 50 regarding acceptable fuel design limits. The MCPR SL is reevaluated for each reload using NRC-approved methodologies. The analyses for LSCS, Unit 2, Cycle 15 have concluded that a two recirculation loop MCPR SL of ≥ 1.14, based on the application of Global Nuclear Fuel's

(GNF's) NRC-approved MCPR SL methodology, will ensure that this acceptance criterion is met. For single recirculation loop operation, a MCPR SL of ≥ 1.17 also ensures that this acceptance criterion is met. The MCPR operating limits are presented and controlled in accordance with the LSCS, Unit 2 Core Operating Limits Report (COLR).

The requested TS change does not involve any plant modifications or operational changes that could affect system reliability or performance or that could affect the probability of operator error. The requested changes do not affect any postulated accident precursors, do not affect any accident mitigating systems, and do not introduce any new accident initiation mechanisms.

Therefore, the changes to the Minimum Critical Power Ratio safety limit do not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The GNF2 fuel to be used in Cycle 15 is of a design compatible with the co-resident Areva ATRIUM-10 fuel. Therefore, the introduction of GNF2 fuel into the Cycle 15 core will not create the possibility of a new or different kind of accident. The proposed change does not involve any new modes of operation, any changes to setpoints, or any plant modifications. The proposed revised MCPR SLs have accounted for the mixed fuel core and have been shown to be acceptable for Cycle 15 operation. Compliance with the criterion for incipient boiling transition continues to be ensured. The core operating limits will continue to be developed using NRC approved methodologies which also account for the mixed fuel core design. The proposed MCPR SLs or methods for establishing the core operating limits do not result in the creation of any new precursors to an accident.

   Therefore, this change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

   Response: No.

   The MCPR SLs have been evaluated in accordance with GNF's NRC-approved cycle-specific limit methodology to ensure that during normal operation and during AOO's at least 99.9% of the fuel rods in the core are not expected to experience transition boiling. The proposed revised MCPR SLs have accounted for the mixed fuel core and have been shown to be acceptable for Cycle 15 operation. Compliance with the criterion for incipient boiling transition continues to be ensured. On this basis, the implementation of the change to the MCPR SLs does not involve a significant reduction in a margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, EGC has determined that operation of the facility in accordance with the proposed change does not involve a significant hazards consideration as defined in 10 CFR 50.92(c), in that it:

(1) Does not involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Does not create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Does not involve a significant reduction in a margin of safety.

Based on the above evaluation, EGC concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

EGC has evaluated this proposed operating license amendment consistent with the criteria for identification of licensing and regulatory actions requiring environmental assessment in accordance with 10 CFR 51.21, "Criteria for and identification of licensing and regulatory actions requiring environmental assessments." EGC has determined that this proposed change meets the criteria for a categorical exclusion set forth in paragraph (c)(9) of 10 CFR 51.22, "Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review," and as such, has determined that no irreversible consequences exist in accordance with paragraph (b) of 10 CFR 50.92, "Issuance of amendment." This determination is based on the fact that this change is being proposed as an amendment to the license issued pursuant to 10 CFR 50, "Domestic Licensing of Production and Utilization Facilities," which changes a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, "Standards for Protection Against Radiation," or which changes an inspection or a surveillance requirement, and the amendment meets the following specific criteria:

(i) The amendment involves no significant hazards consideration.

As demonstrated in Section 4.3, "No Significant Hazards Consideration," the proposed change does not involve any significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released offsite.

The proposed change does not result in an increase in power level, does not increase the production nor alter the flow path or method of disposal of radioactive waste or byproducts. It is expected that all plant equipment would operate as designed in the event of an accident to minimize the potential for any leakage of radioactive effluents; thus, there will be no change in the amounts of radiological effluents released offsite.

Based on the above evaluation, the proposed change will not result in a significant change in the types or significant increase in the amounts of any effluent released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

There is no net increase in individual or cumulative occupational radiation exposure due to the proposed change. The proposed action will not change the level of controls or methodology used for processing of radioactive effluents or handling of solid radioactive waste, nor will the proposed action result in any change in the normal radiation levels within the plant.

Based on the above information, there will be no increase in individual or cumulative occupational radiation exposure resulting from this change.

6.0 REFERENCES

1. NEDE-33106P, "GEXL97 Correlation for ATRIUM-10 Fuel"

2. NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II)," Revision 19

ATTACHMENT 2

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Proposed Technical Specifications Changes

MARKED-UP TS PAGE

2.0-1

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 ≤ 25% RTP.

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

For Unit 1, MCPR shall be ≥ 1.13 for two recirculation loop operation or ≥ 1.15 for single recirculation loop operation.

~~For Unit 2, MCPR shall be ≥ 1.11 for two recirculation loop operation or ≥ 1.12 for single recirculation loop operation.~~

For Unit 2, MCPR shall be ≥1.14 for two recirculation loop operation or ≥1.17 for single recirculation 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.

ATTACHMENT 3

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Proposed Technical Specifications Changes

CLEAN TS PAGE

2.0-1

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For Unit 1, MCPR shall be ≥ 1.13 for two recirculation loop operation or ≥ 1.15 for single recirculation loop operation.

For Unit 2, MCPR shall be ≥ 1.14 for two recirculation loop operation or ≥ 1.17 for single recirculation loop operation.

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ATTACHMENT 4

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Global Nuclear Fuel Affidavit Supporting Request to
Withhold from Public Disclosure Under 10 CFR 2.390 and 10 CFR 9.17

ENCLOSURE 5

CFL-EXN-HA2-12-124-R1

Affidavit

Global Nuclear Fuel – Americas

AFFIDAVIT

I, Atul A. Karve, state as follows:

(1) I am Engineering Manager, Methods, Global Nuclear Fuel – Americas, LLC (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 Enclosures 1 and 3 of GNF's letter, CFL-EXN-HA2-12-124-R1, C. Lamb (GNF-A) to J. Fisher (Exelon Generation), entitled "GNF Additional Information for SLMCPR Technical Specification Submittal Letter for LaSalle Unit 2 Cycle 15," dated October 4, 2012. GNF-A proprietary information in Enclosure 1, which is entitled "GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, LaSalle Unit 2 Cycle 15," and Enclosure 3, which is entitled "Supplemental LaSalle Unit 1 RAI Responses Applied to LaSalle Unit 2 Cycle 15," is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] A "[[" marking at the beginning of a table, figure, or paragraph closed with a "]]" marking at the end of the table, figure or paragraph is used to indicate that the entire content between the double brackets is proprietary. 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" (Exemption 4). The material for which exemption from disclosure is here sought 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, 975 F2d 871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704 F2d 1280 (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 aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. 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 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. 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. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(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 this methodology, along with the testing, development and approval was achieved at a significant cost to GNF-A.

The development of the fuel design and licensing methodology along with the interpretation and application of the analytical results is derived from an extensive experience database that constitutes a major GNF-A asset.

(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 information 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.

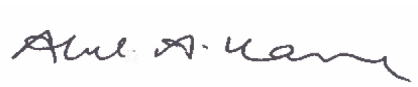
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

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 on this 4th day of October 2012.



Atul A. Karve
Engineering Manager, Methods
Global Nuclear Fuel – Americas, LLC

ATTACHMENT 7

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Global Nuclear Fuel Letter Additional Information Regarding the Requested Changes to the Technical Specification MCPR SL for LaSalle County Station, Unit 2, Cycle 15

(Non-Proprietary)

ENCLOSURE 2

CFL-EXN-HA2-12-124-R1

GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR – LaSalle Unit 2 Cycle 15

Non-Proprietary Information – Class I (Public)

INFORMATION NOTICE

This is a non-proprietary version of CFL-EXN-HA2-12-124-R1 Enclosure 1, which has the proprietary information removed. Portions of the document that have been removed are indicated by white space inside an open and closed bracket as shown here [[ ]].

October 4, 2012

GNF-0000-0152-9225-R1-NP

eDRFSection: 0000-0152-9225 R0

GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR

LaSalle Unit 2 Cycle 15

Information Notice

This is a non-proprietary version of the document GNF-0000-0152-9225-R1-P, which has the proprietary information removed. Portions of the document that have been removed are indicated by an open and closed bracket as shown here [[ ]].

Important Notice Regarding Contents of this Report
Please Read Carefully

The design, engineering, and other information contained in this document is furnished for the purpose of providing information regarding the requested changes to the Technical Specification SLMCPR for Exelon LaSalle Unit 2. The only undertakings of Global Nuclear Fuel - Americas, LLC (GNF-A) with respect to information in this document are contained in contracts between GNF-A and Exelon, and nothing contained in this document shall be construed as changing that contract. The use of this information by anyone other than Exelon, or for any purposes other than that for which it is intended is not authorized; and with respect to any unauthorized use, GNF-A makes no representation or warranty, express or implied, and assumes no liability as to the completeness, accuracy, or usefulness of the information contained in this document.

Table of Contents

List of Figures

List of Tables

1.0 Methodology

Global Nuclear Fuel (GNF) performs Safety Limit Minimum Critical Power Ratio (SLMCPR) calculations in accordance to NEDE-24011-P-A "General Electric Standard Application for Reactor Fuel" (Revision 19) using the following NRC-approved methodologies and uncertainties:

- NEDC-32601P-A, "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32694P-A, "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," August 1999.
- NEDC-32505P-A, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," Revision 1, July 1999.

Table 2 identifies the actual methodologies used for the LaSalle Unit 2 Cycle 15 SLMCPR calculations.

2.0 Discussion

In this discussion, the TLO nomenclature is used for two recirculation loops in operation, and the SLO nomenclature is used for one recirculation loop in operation.

2.1. Major Contributors to SLMCPR Change

In general, the calculated safety limit is dominated by two key parameters: (1) flatness of the core bundle-by-bundle Minimum Critical Power Ratio (MCPR) distribution; and (2) flatness of the bundle pin-by-pin power/R-Factor distribution. Greater flatness in either parameter yields more rods susceptible to boiling transition and thus a higher calculated SLMCPR. MCPR Importance Parameter (MIP) measures the core bundle-by-bundle MCPR distribution and R-Factor Importance Parameter (RIP) measures the bundle pin-by-pin power/R-Factor distribution. The effect of the fuel loading pattern on the calculated TLO SLMCPR using rated core power and rated core flow conditions has been correlated to the parameter MIPRIP, which combines the MIP and RIP values.

Table 3 presents the MIP and RIP parameters for the previous cycle and the current cycle along with the TLO SLMCPR estimate using the MIPRIP correlation. If the minimum core flow case is applicable, the TLO SLMCPR estimate is also provided for that case although the MIPRIP correlation is only applicable to the rated core flow case. This is done only to provide some reasonable assessment basis of the minimum core flow case trend. In addition, Table 3 presents estimated effects on the TLO SLMCPR due to methodology deviations, penalties, and/or uncertainty deviations from approved values. Based on the MIPRIP correlation and any effects due to deviations from approved values, a final estimated TLO SLMCPR is determined. Table 3

also provides the actual calculated Monte Carlo SLMCPRs. Due to the increased uncertainty included in the Monte Carlo SLMCPR calculation due to the use of the GNF2 and ATRIUM-10 GEXL models, which have greater critical power uncertainties than GE14 and earlier GNF fuel designs shown in Table 6, and the inherent assumption in the MIPRIP correlation of a normal distribution of bundle MCPRs in the core, while the Monte Carlo SLMCPR uses actual core MCPR distributions, the LaSalle Unit 2 Cycle 15 calculated Monte Carlo TLO SLMCPR using rated core power and rated core flow conditions is conservative compared to the corresponding estimated TLO SLMCPR value.

The intent of the final estimated TLO SLMCPR is to provide an estimate to check the reasonableness of the Monte Carlo result. It is not used for any other purpose. The methodology and final SLMCPR is based on the rigorous Monte Carlo analysis.

The items in Table 3 that result in the increase of the estimated SLMCPR are discussed in Section 2.2.

Cycle 15 will be the first full reload of GNF2 for LaSalle Unit 2. The critical power uncertainty for GNF2 is defined in Table 6. As seen in Table 6, the critical power uncertainty for GNF2 is lower than the previous cycle's fuel type (ATRIUM-10). As such, the GEXL uncertainty of the new fuel type tends to make the final SLMCPR lower than that which would be calculated using only the critical power uncertainties for the previous cycle's fuel type. However, GNF did not supply reload fuel or determine any design or licensing calculations for the previous cycle. As such, comparisons of SLMCPR analysis bases, assumptions and results are limited.

2.2. Deviations in NRC-Approved Uncertainties

Tables 4 and 5 provide a list of NRC-approved uncertainties along with values actually used. A discussion of deviations from these NRC-approved values follows, all of which are conservative relative to NRC-approved values. Also, estimated effect on the SLMCPR is provided in Table 3 for each deviation.

2.2.1. R-Factor

At this time, GNF has generically increased the GEXL R-Factor uncertainty from [[ ]] to account for an increase in channel bow due to the emerging unforeseen phenomena called control blade shadow corrosion-induced channel bow, which is not accounted for in the channel bow uncertainty component of the approved R-Factor uncertainty. The step "σ RPEAK" in Figure 4.1 from NEDC-32601P-A, which has been provided for convenience in Figure 3, is affected by this deviation. Reference 4 technically justifies that a GEXL R-Factor uncertainty of [[ ]] accounts for a channel bow uncertainty of up to [[ ]].

LaSalle Unit 2 has experienced control blade shadow corrosion-induced channel bow to the extent that an increase in the NRC-approved R-Factor uncertainty of [[ ]] is deemed prudent to address its effect. Accounting for the control blade shadow corrosion-induced

channel bow, the LaSalle Unit 2 Cycle 15 analysis shows an expected channel bow uncertainty of [[ ]], which is bounded by a GEXL R-Factor uncertainty of [[ ]]. Thus the use of a GEXL R-Factor uncertainty of [[ ]] adequately accounts for the expected control blade shadow corrosion-induced channel bow for LaSalle Unit 2 Cycle 15.

2.2.2. Core Flow Rate and Random Effective TIP Reading

In Reference 5, GNF committed to the expansion of the state points used in the determination of the SLMCPR. Consistent with the Reference 5 commitments, GNF performs analyses at the rated core power and minimum licensed core flow point in addition to analyses at the rated core power and rated core flow point. The approved SLMCPR methodology is applied at each state point that is analyzed.

For the TLO calculations performed at 82.8% core flow, the approved uncertainty values for the core flow rate (2.5%) and the random effective Traversing In-Core Probe (TIP) reading (1.2%) are conservatively adjusted by dividing them by 82.8/100. The steps "σ CORE FLOW" and "σ TIP (INSTRUMENT)" in Figure 4.1 from NEDC-32601P-A, which has been provided for convenience in Figure 3, are affected by this deviation, respectively.

Historically, these values have been construed to be somewhat dependent on the core flow conditions as demonstrated by the fact that higher values have always been used when performing SLO calculations. It is for this reason that GNF determined that it is appropriate to consider an increase in these two uncertainties when the core flow is reduced. The amount of increase is determined in a conservative way. For both parameters it is assumed that the absolute uncertainty remains the same as the flow is decreased so that the percentage uncertainty increases inversely proportional to the change in core flow. This is conservative relative to the core flow uncertainty because the variability in the absolute flow is expected to decrease somewhat as the flow decreases. For the random effective TIP uncertainty, there is no reason to believe that the percentage uncertainty should increase as the core flow decreases for TLO. Nevertheless, this uncertainty is also increased as is done in the more extreme case for SLO primarily to preserve the historical precedent established by the SLO evaluation. Note that the TLO condition is different than the SLO condition because for TLO there is no expected tilting of the core radial power shape.

The treatment of the core flow and random effective TIP reading uncertainties is based on the assumption that the signal to noise ratio deteriorates as core flow is reduced. GNF believes this is conservative and may in the future provide justification that the original uncertainties (non-flow dependent) are adequately bounding.

The core flow and random TIP reading uncertainties used in the SLO minimum core flow SLMCPR analysis remain the same as in the rated core flow SLO SLMCPR analysis because these uncertainties (which are substantially larger than used in the TLO analysis) already account for the effects of operating at reduced core flow.

2.3. Departure from NRC-Approved Methodology

No departures from NRC-approved methodologies were used in the LaSalle Unit 2 Cycle 15 SLMCPR calculations.

2.4. Fuel Axial Power Shape Penalty

At this time, GNF has determined that higher uncertainties and non-conservative biases in the GEXL correlations for the various types of axial power shapes (i.e., inlet, cosine, outlet, and double hump) could potentially exist relative to the NRC-approved methodology values (References 3, 6, 7, and 8). The following table identifies, by marking with an "X," this potential for each GNF product line currently being offered:

[[

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For the Atrium-10 fuel product from AREVA, no axial power shape penalty is applied (Reference 10). Axial bundle power shapes corresponding to the limiting SLMCPR control blade patterns are determined using the PANACEA 3D core simulator. These axial power shapes are classified in accordance to the following table:

[[

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If the limiting bundles in the SLMCPR calculation exhibit an axial power shape identified by this table, GNF penalizes the GEXL critical power uncertainties to conservatively account for the effect of the axial power shape. Table 6 provides a list of the GEXL critical power uncertainties

determined in accordance to the NRC-approved methodology contained in NEDE-24011-P-A along with values actually used.

For the limiting bundles, the fuel axial power shapes in the SLMCPR analysis were examined to determine the presence of axial power shapes identified in the above table. These power shapes were found; therefore, power shape penalties were applied to the calculated LaSalle Unit 2 Cycle 15 SLMCPR values, but did not affect the final SLMCPR.

2.5. Methodology Restrictions

The four restrictions identified on page 3 of the NRC's Safety Evaluation (SE) relating to General Electric (GE) Licensing Topical Reports (LTRs) NEDC-32601P, NEDC-32694P, and Amendment 25 to NEDE-24011-P-A (March 11, 1999) are addressed in References 1, 2, 3, and 9.

The four restrictions for GNF2 were determined to be acceptable by the NRC review of "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II)," NEDC-33270P, Revision 0, March 14, 2007. Specifically, in the NRC audit report ML081630579 for the said document, Section 3.4.1 (page 59) states:

> "The NRC staff's SE of NEDC-32694P-A (Reference 19 of NEDC-33270P) provides four actions to follow whenever a new fuel design is introduced. These four conditions are listed in Section 3.0 of the SE. The analysis and evaluation of the GNF2 fuel design was evaluated in accordance with the limitations and conditions stated in the NRC staff's SE, and is acceptable."

GNF's position is that GNF2 is an evolutionary fuel product based on GE14. It is not considered a new fuel design as it maintains the previously established 10x10 array and 2 water rod makeup, as stated by the NRC audit report ML081630579, Section 3.4.2.2.1 (page 59):

> "The NRC staff finds that the calculational methods, evaluations and applicability of the OLMCPR and SLMCPR are in accordance with existing NRC-approved methods and thus valid for use with GNF2 fuel."

As such, no new GNF fuel designs are being introduced in LaSalle Unit 2 Cycle 15; therefore, the NEDC-32505P-A statement "…if new fuel is introduced, GENE must confirm that the revised R-Factor method is still valid based on new test data" is not applicable.

2.6. Minimum Core Flow Condition

For LaSalle Unit 2 Cycle 15, the minimum core flow SLMCPR calculation performed at 82.8% core flow and rated core power condition was limiting as compared to the rated core flow and

rated core power condition for SLO conditions. For convenience, Figures III.5-1 and III.5-2 from NEDC-32601P-A have been provided in Figures 4 and 5, respectively, in order to show this minimum core flow condition relative relationship to the data on these figures. For this condition the MIP [[

]] Therefore, this demonstrates that the MIP criterion for determining what constitutes a reasonably bounding limiting rod pattern is still valid for this minimum core flow condition. Hence, the rod pattern used to calculate the SLMCPR at 100% rated power/82.8% rated flow reasonably assures that at least 99.9% of the fuel rods in the core would not be expected to experience boiling transition during normal operation or anticipated operational occurrences during the operation of LaSalle Unit 2 Cycle 15. Consequently, the SLO SLMCPR value calculated from the 82.8% core flow and rated core power condition limiting MCPR distribution reasonably bounds this mode of operation for LaSalle Unit 2 Cycle 15.

2.7. Limiting Control Rod Patterns

The limiting control rod patterns used to calculate the SLMCPR reasonably assures that at least 99.9% of the fuel rods in the core would not be expected to experience boiling transition during normal operation or anticipated operational occurrences during the operation of LaSalle Unit 2 Cycle 15.

2.8. Core Monitoring System

The utility has requested that GNF perform the SLMCPR calculation applying the GETAB power distribution methodology and uncertainties. Due to the presence of third party proprietary information, the utility has provided in a separate attachment, the basis that the GETAB power distribution methodology and uncertainties are applicable for the POWERPLEX-III core monitoring system.

2.9. Power/Flow Map

The utility has provided the current and previous cycle power/flow map in a separate attachment.

2.10. Core Loading Diagram

Figures 1 and 2 provide the core-loading diagram for the current and previous cycle, respectively, which are the Reference Loading Pattern as defined by NEDE-24011-P-A. Table 1 provides a description of the core.

2.11. Figure References

Figure 3 is Figure 4.1 from NEDC-32601P-A. Figure 4 is Figure III.5-1 from NEDC-32601P-A. Figure 5 is based on Figure III.5-2 from NEDC-32601P-A and has been updated with GE14 and GNF2 data.

2.12. Additional SLMCPR Licensing Conditions

For LaSalle Unit 2 Cycle 15, no additional SLMCPR licensing conditions are included in the analysis.

2.13. 10 CFR 21 Evaluation

There are no known 10 CFR 21 factors that affect the LaSalle Unit 2 Cycle 15 SLMCPR calculations.

2.14. Summary

The requested changes to the Technical Specification SLMCPR values are 1.14 for TLO and 1.17 for SLO for LaSalle Unit 2 Cycle 15.

3.0 References

1. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to R. Pulsifer (NRC), "Confirmation of 10x10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-Factor Methodologies,, FLN-2001-016, September 24, 2001.

2. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to Joseph E. Donoghue (NRC), "Confirmation of the Applicability of the GEXL14 Correlation and Associated R-Factor Methodology for Calculating SLMCPR Values in Cores Containing GE14 Fuel," FLN-2001-017, October 1, 2001.

3. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to Joseph E. Donoghue (NRC), "Final Presentation Material for GEXL Presentation – February 11, 2002," FLN-2002-004, February 12, 2002.

4. Letter, John F. Schardt (GNF-A) to NRC Document Control Desk with attention to Mel B. Fields (NRC), "Shadow Corrosion Effects on SLMCPR Channel Bow Uncertainty," FLN-2004-030, November 10, 2004.

5. Letter, Jason S. Post (GENE) to NRC Document Control Desk with attention to Chief, Information Management Branch, et al. (NRC), "Part 21 Final Report: Non-Conservative SLMCPR," MFN 04-108, September 29, 2004.

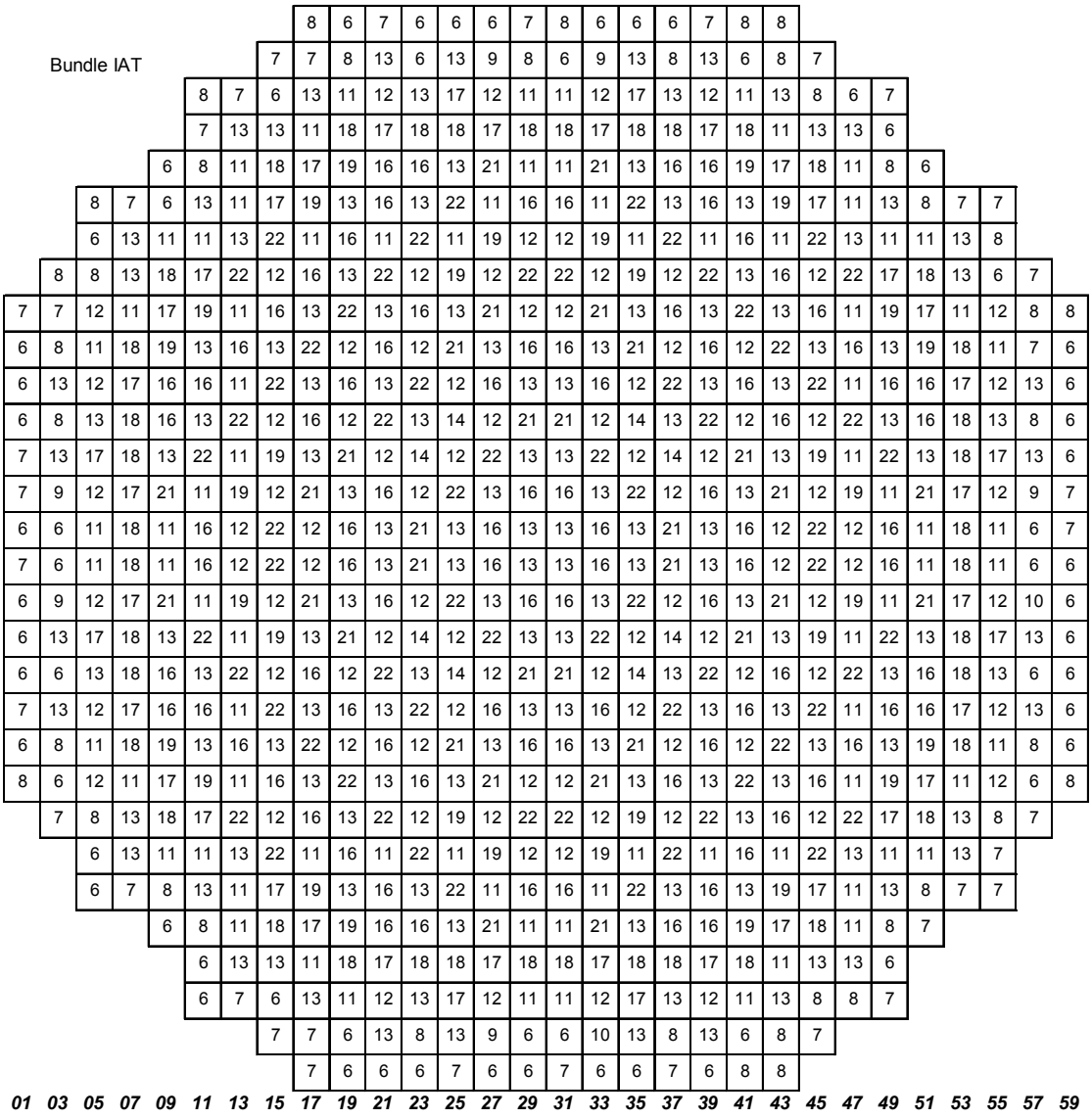
6. Letter, Glen A. Watford (GNF-A) to NRC Document Control Desk with attention to Alan Wang (NRC), "NRC Technology Update – Proprietary Slides – July 31 – August 1, 2002," FLN-2002-015, October 31, 2002.

7. Letter, Jens G. Munthe Andersen (GNF-A) to NRC Document Control Desk with attention to Alan Wang (NRC), "GEXL Correlation for 10X10 Fuel," FLN-2003-005, May 31, 2003.

8. Letter, Andrew A. Lingenfelter (GNF-A) to NRC Document Control Desk with cc to Michelle C. Honcharik (NRC), "Removal of Penalty Being Applied to GE14 Critical Power Correlation for Outlet Peaked Axial Power Shapes," FLN-2007-031, September 18, 2007.

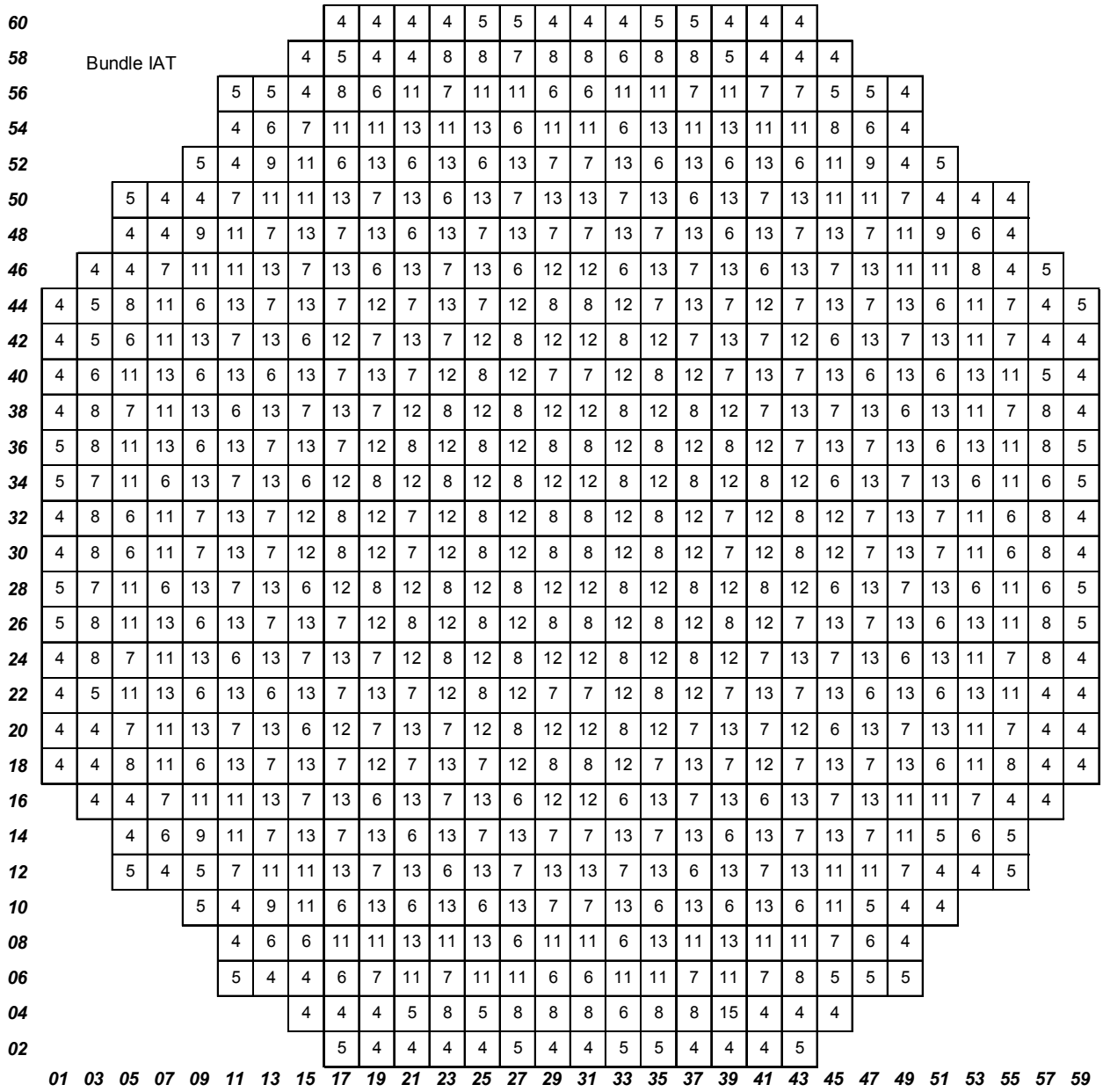
9. Letter, Andrew A. Lingenfelter (GNF-A) to NRC Document Control Desk with cc to Stephen S. Philpott (NRC), "Amendment 33 to NEDE-24011-P, General Electric Standard Application for Reactor Fuel (GESTAR II) and GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P, Revision 3, March 2010," MFN 10-045, March 5, 2010.

10. Global Nuclear Fuel, "GEXL97 Correlation for ATRIUM-10 Fuel," NEDC-33106P, Revision 4, August 2012.



IAT	Bundle Name
6	ATRM10-P10CAZB403-13GZ-100U-400R-9WR-149-T6-4122
7	ATRM10-P10CAZB402-16GZ-100U-400R-9WR-149-T6-4123
8	ATRM10-P10CAZB385-16GZ-100U-400R-9WR-149-T6-4124
9	ATRM10-P10CAZB385-16GZ-100U-400R-9WR-149-T6-4124
10	ATRM10-P10CAZB385-16GZ-100U-400R-9WR-149-T6-4124
11	ATRM10-P10CAZB406-14GZ-100U-400R-9WR-149-T6-4125
12	ATRM10-P10CAZB397-16GZ-100U-400R-9WR-149-T6-4126
13	ATRM10-P10CAZB406-16GZ-100U-400R-9WR-149-T6-4127
14	GNF2-P10CG2B403-16GZ-120T2-150-T6-4205
16	GNF2-P10CG2B402-17GZ-120T2-150-T6-4207
17	GNF2-P10CG2B408-12GZ-120T2-150-T6-4069
18	GNF2-P10CG2B410-17GZ-120T2-150-T6-4070
19	GNF2-P10CG2B408-15GZ-120T2-150-T6-4206
21	GNF2-P10CG2B403-16GZ-120T2-150-T6-4205
22	GNF2-P10CG2B402-17GZ-120T2-150-T6-4207

Figure 1. Current Cycle Core Loading Diagram



IAT	Bundle Name
4	ATRM10-P10CAZB406-13GZ-100U_400M-9WR-149-T6-2972
5	ATRM10-P10CAZB356-12GZ-100U_400M-9WR-149-T6-2973
6	ATRM10-P10CAZB403-13GZ-100U-400R-9WR-149-T6-4122
7	ATRM10-P10CAZB402-16GZ-100U-400R-9WR-149-T6-4123
8	ATRM10-P10CAZB385-16GZ-100U-400R-9WR-149-T6-4124
9	ATRM10-P10CAZB385-16GZ-100U-400R-9WR-149-T6-4124
11	ATRM10-P10CAZB406-14GZ-100U-400R-9WR-149-T6-4125
12	ATRM10-P10CAZB397-16GZ-100U-400R-9WR-149-T6-4126
13	ATRM10-P10CAZB406-16GZ-100U-400R-9WR-149-T6-4127
15	ATRM10-P10CAZB354-12GZ-100U_400M-9WR-149-T6-2924

Figure 2. Previous Cycle Core Loading Diagram

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Figure 3. Figure 4.1 from NEDC-32601P-A

[[

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Figure 4. Figure III.5-1 from NEDC-32601P-A

[[

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Figure 5. Relationship Between MIP and CPR Margin

Table 1. Description of Core

Description	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
Number of Bundles in the Core	764		764	
Limiting Cycle Exposure Point (i.e. Beginning of Cycle (BOC)/Middle of Cycle (MOC)/End of Cycle (EOC))	N/A	N/A	EOC	EOC
Cycle Exposure at Limiting Point (MWd/STU)	N/A	N/A	13608	13608
% Rated Core Flow	N/A	N/A	82.8	100.0
Reload Fuel Type	ATRIUM-10		GNF2	
Latest Reload Batch Fraction, %	40.8		39.8	
Latest Reload Average Batch Weight % Enrichment	4.03		4.05	
Core Fuel Fraction: ATRIUM-10 GNF2	 1.000 0.000		 0.602 0.398	
Core Average Weight % Enrichment	3.98		4.03	

Table 2. SLMCPR Calculation Methodologies

Description	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
Non-Power Distribution Uncertainty	N/A		NEDC-32601-P-A	
Power Distribution Methodology	N/A		NEDC-32601-P-A	
Power Distribution Uncertainty	N/A		NEDC-32601-P-A	
Core Monitoring System	POWERPLEX-III		POWERPLEX-III	
R-Factor Calculation Methodology	N/A		NEDC-32505P-A	

Table 3. Monte Carlo Calculated SLMCPR vs. Estimate

Description	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
[[				

Table 3. Monte Carlo Calculated SLMCPR vs. Estimate

Description	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
				]]

Table 4. Non-Power Distribution Uncertainties

	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
GETAB					
Feedwater Flow Measurement	1.76	N/A	N/A	N/A	N/A
Feedwater Temperature Measurement	0.76	N/A	N/A	N/A	N/A
Reactor Pressure Measurement	0.50	N/A	N/A	N/A	N/A
Core Inlet Temperature Measurement	0.20	N/A	N/A	N/A	N/A
Total Core Flow Measurement	6.0 SLO/2.5 TLO	N/A	N/A	N/A	N/A
Channel Flow Area Variation	3.0	N/A	N/A	N/A	N/A
Friction Factor Multiplier	10.0	N/A	N/A	N/A	N/A
Channel Friction Factor Multiplier	5.0	N/A	N/A	N/A	N/A

Table 4. Non-Power Distribution Uncertainties

	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
NEDC-32601P-A					
Feedwater Flow Measurement	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Feedwater Temperature Measurement	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Reactor Pressure Measurement	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Core Inlet Temperature Measurement	0.2	N/A	N/A	0.2	0.2
Total Core Flow Measurement	6.0 SLO/2.5 TLO	N/A	N/A	3.02	2.5
Channel Flow Area Variation	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Friction Factor Multiplier	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Channel Friction Factor Multiplier	5.0	N/A	N/A	5.0	5.0

Table 5. Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
GETAB/NEDC-32601P-A					
GEXL R-Factor	[[ ]]	N/A	N/A	[[ ]]	[[ ]]
Random Effective TIP Reading	2.85 SLO/1.2 TLO	N/A	N/A	1.45	1.2
Systematic Effective TIP Reading	8.6	N/A	N/A	5.56	5.56
NEDC-32694P-A, 3DMONICORE					
GEXL R-Factor	[[ ]]	N/A	N/A	N/A	N/A
Random Effective TIP Reading	2.85 SLO/1.2 TLO	N/A	N/A	N/A	N/A
TIP Integral	[[ ]]	N/A	N/A	N/A	N/A
Four Bundle Power Distribution Surrounding TIP Location	[[ ]]	N/A	N/A	N/A	N/A

Table 5. Power Distribution Uncertainties

Description	Nominal (NRC-Approved) Value ± σ (%)	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
Contribution to Bundle Power Uncertainty Due to Local Power Range Monitor (LPRM) Update	[[ ]]	N/A	N/A	N/A	N/A
Contribution to Bundle Power Due to Failed TIP	[[ ]]	N/A	N/A	N/A	N/A
Contribution to Bundle Power Due to Failed LPRM	[[ ]]	N/A	N/A	N/A	N/A
Total Uncertainty in Calculated Bundle Power	[[ ]]	N/A	N/A	N/A	N/A
Uncertainty of TIP Signal Nodal Uncertainty	[[ ]]	N/A	N/A	N/A	N/A

Table 6. Critical Power Uncertainties

Description	Nominal Value ± σ (%)	Previous Cycle Minimum Core Flow Limiting Case	Previous Cycle Rated Core Flow Limiting Case	Current Cycle Minimum Core Flow Limiting Case	Current Cycle Rated Core Flow Limiting Case
		[[			
					]]

ATTACHMENT 8

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Supplemental LaSalle Unit 1 RAI Responses
Applied to LaSalle County Station, Unit 2, Cycle 15

(Non-Proprietary)

ENCLOSURE 4

CFL-EXN-HA2-12-124-R1

Supplemental LaSalle Unit 1 RAI Responses Applied to LaSalle Unit 2 Cycle 15

Non-Proprietary Information – Class I (Public)

INFORMATION NOTICE

This is a non-proprietary version of CFL-EXN-HA2-12-124-R1 Enclosure 3, which has the proprietary information removed. Portions of the document that have been removed are indicated by white space inside an open and closed bracket as shown here [[ ]].

Nuclear Regulatory Commission (NRC) Docket No. 50-373 contains Requests for Additional Information (RAIs) related to the License Amendment Request (LAR) for Technical Specification changes to the Safety Limit Minimum Critical Power Ratio (SLMCPR) values for LaSalle County Station Unit 1 (LS1). In order to assist the review of the LaSalle Unit 2 SLMCPR Technical Specifications LAR, Global Nuclear Fuel (GNF) is including responses to applicable LS1 RAIs as applied to LaSalle County Station Unit 2 (LS2). When the LS1 RAIs shown below refer to "Attachment 5", this is referring to the GNF document for LS1 C15, "GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, LaSalle Unit 1 Cycle 15". Please note that the "GNF Responses to RAIs Applied to LaSalle 2" shown below also reference the similar GNF document for LS2 C15 ("GNF Additional Information Regarding the Requested Changes to the Technical Specification SLMCPR, LaSalle Unit 2 Cycle 15"), and this document is hereafter referred to as the "LS2 C15 Additional Information."

LS1 RAI-01:

In the LS1 LAR, Attachment 6, Tables RAI-06-1 and RAI-06-2, provide core map to show those bundles experienced 0.1 boiling transition criterion of limiting cases for single-loop operation (SLO) and two-loop operation (TLO). Please provide identification of bundle group and number of bundles in the Figure 1, Attachment 5, corresponding to their burnup status (once-burned, twice-burned, or fresh fuel) for Cycle 15.

GNF Response to RAI-01 Applied to LS2:

The bundle groupings for the TLO SLMCPR calculations are shown in Table RAI-01-1, along with the number of bundles in the group, their contribution to percent number of rods in boiling transition (NRSBT) and the group average exposure at the analysis point. The 2-dimensional core map of the bundle groupings is shown in Figure RAI-01-1 for the upper left hand quadrant in the core. The bundle groupings for the SLO SLMCPR calculations are shown in Table RAI-01-2, along with the number of bundles in the group, their contribution to the percent NRSBT and the group average exposure at the analysis point. [[

]]. The TLO case is [[
]] the SLO case is [[ ]].

Table RAI-01-3 shown below contains the bundle group, number of bundles, bundle type, burnup status and fuel type (IAT) associated with the Cycle 15 core loading map presented in Figure 1 of the LS2 C15 Additional Information.

Table RAI-01-1: Bundle Group, Number of Bundles, Bundle Type, % Contribution to NRSBT, and Group Exposure for TLO

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Figure RAI-01-1: Two-Dimensional Map of the Bundle Groupings for Percent Contribution to NRSBT for TLO

Table RAI-01-2: Bundle Group, Number of Bundles, Bundle Type, % Contribution to NRSBT, and Group Exposure for SLO

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[[

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Figure RAI-01-2: Two-Dimensional Map of the Bundle Groupings for Percent Contribution to NRSBT for SLO

Table RAI-01-3: Bundle Group, Number of Bundles, Bundle Type, Burnup Status and Fuel Type for TLO and SLO.

[[

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LS1 RAI-03:

GNF2 fuel deviates from traditional 10x10 design through the introduction of a partial length rod configuration, the use of higher linear power, and the use of mixing vanes. The NRC staff considers this a new fuel design with regards to the four restrictions identified in the safety evaluation of General Electric (GE) Licensing Topical Reports NEDC-32601P, NEDC- 32694, and Amendment 25 to NEDE-24011-P-A. Given that LSCS, Unit 1, Cycle 15, uses a core loading pattern which includes GNF2 fuel, provide the following: (1) an evaluation of the four restrictions in NEDC-32601P, NEDC-32694 and Amendment 25 to NEDE-24011-P-A and the applicability to mixed core with ATRIUM 10 fuel; (2) a description that explains under what conditions the methodologies listed in Section 1.0 of Attachment 5 are sufficient and applied to the LSCS, Unit 1, Cycle15, application; and (3) a clarification for the statement "no new GNF2 fuel designs are being introduced in LSCS, Unit 1, Cycle 15," in Section 2.5 of Attachment 5.

GNF Response to RAI-03-1 Applied to LS2:

The four restrictions for GNF2 were determined acceptable by the NRC review of the "GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), NEDC-33270P, Revision 0, FLN-2007-011, March 14, 2007." Specifically, in the NRC audit report ML081630579 for the said document, Section 3.4.1 page 59 states:

> "The NRC staff's SE of NEDC-32694P-A (Reference 69 of NEDE 33207P) provides four actions to follow whenever a new fuel design is introduced. These four conditions are listed in Section 3.0 of the SE. The analysis and evaluation of the GNF2 fuel design was evaluated in accordance with the limitations and conditions stated in the NRC staff's SE, and is acceptable."

Additionally, the NRC audit report, ML081630579, Section 3.4.2.2.1 page 59 states:

> "The NRC staff finds that the calculational methods, evaluations and applicability of the OLMCPR and SLMCPR are in accordance with existing NRC-approved methods and thus valid for use with GNF2 fuel."

The four restrictions applied specifically to the mixed core were addressed during the transition from ATRIUM-10 to GNF2 fuel. These limitations were addressed for ATRIUM-10 as follows:

1) The TGBLA fuel rod power calculational uncertainty for ATRIUM-10 was determined and verified.

2) The rod power calculation uncertainties were used to reevaluate and confirm the R-factor uncertainty for ATRIUM-10.

3) The applicability of the MIP criterion was previously reevaluated through the inclusion of plants containing ATRIUM-10 fuel in the data contained in Figure 5 of the LS2 C15 Additional Information.

4) The bundle power uncertainty associated with the core monitoring system was verified by Exelon as applied to ATRIUM-10.

GNF Response to RAI-03-2 Applied to LS2:

There are three references listed in Section 1.0 of the LS2 C15 Additional Information. The applicability of each of the three references is discussed. The three references are:

A. NEDC-32601P-A "Methodology and Uncertainties for Safety Limit MCPR Evaluations," August 1999.

B. NEDC-32694P-A "Power Distribution Uncertainties for Safety Limit MCPR Evaluations," August 1999.

C. NEDC-32505P-A "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," Revision 1, July 1999.

Table 2 of the LS2 C15 Additional Information identifies the actual methodologies used for the Cycle 15 SLMCPR calculations. References A and B are directly applicable to the analysis. This process is fuel product independent as long as the R-Factors were appropriately generated.

Reference C is the generic R-Factor methodology report that describes the changed methodology that was adopted after part length rods were introduced. The NRC staff's Safety Evaluation (SE) for NEDC-32505P-A has a requirement that the applicability of the R-Factor methodology is confirmed when a new fuel type is introduced. The confirmation for GNF2 was determined to be acceptable by the NRC staff review of "GEXL17 Correlation for GNF2 Fuel," NEDC-33292P, Revision 0, FLN-2007-011, March 14, 2007 in the NRC audit report ML081630579, Section 3.5.5, page 62. The confirmation for the ATRIUM-10 GEXL97 correlation applicable to LS1 Cycle 15 was determined to be acceptable through the 10 CFR 50.59 process to apply "GEXL97 Correlation for ATRIUM-10 Fuel," NEDC-33106P-A, Revision 4, August 2012. The NRC staff reviewed an earlier version of this report: "GEXL97 Correlation for ATRIUM-10 Fuel," NEDC-33106P-A, Revision 2, June 2004.

GNF Response to RAI-03-3 Applied to LS2:

GNF2 is an evolutionary fuel product based on GE14 that maintains the previously established 10x10 array and two water rod makeup.

LS1 RAI-04:

The LSCS, Unit 1, Cycle 15, is a mixed core with once and twice burned ATRIUM 10 fuel. Please provide: (1) a detailed description of the methodologies used and procedures applied to the LSCS, Unit 1, Cycle 15, calculation for the proposed SLMCPR values based on Figure 3, Attachment 5; and (2) justification that the methodologies related to ATRIUM 10 fuel may not be needed in this application because none is listed in Section 1.0, Attachment 5.

GNF Response to RAI-04-1 Applied to LS2:

While LSCS Unit 2 Cycle 15 contains ATRIUM-10 fuel that was not manufactured by GNF, the methodologies contained within NEDC-32601P-A incorporate fuel-type dependency using fuel-specific inputs. A specific critical power correlation for ATRIUM-10 fuel, GEXL97, referenced in the response to LS1 RAI-03-2, was used in this calculation. Additionally, the following items in Figure 3 of the LS2 C15 Additional Information were calculated specifically for the ATRIUM-10 fuel in the core:

- σCPD (GEXL) – This information comes from the GEXL97 correlation referenced in the response to RAI-03-2.
- σRPEAK – This value was established in accordance with NEDC-32601P-A and is based on the modeling uncertainties for ATRIUM-10 fuel in GNF methods established during the Cycle 11 transition, as well as current manufacturing and channel bow uncertainties relevant to this fuel.

GNF Response to RAI-04-2 Applied to LS2:

The methodologies listed in Section 1.0 of the LS2 C15 Additional Information are applicable to GNF2 and ATRIUM-10 designs, and are therefore applicable to LS2 Cycle 15.

LS1 RAI-05:

Please identify the breakdown of the 10x10 data shown in Attachment 5, Figure 5, by fuel type (i.e., GE14, GNF2), because Figure 5 only shows combined data points for the two fuel types. Also, provide: (1) details of the application of Figure 5 data to a mixed core with ATRIUM 10 fuel; and (2) justification that the estimation formula for SLMCPR value is still valid for LSCS, Unit 1, Cycle 15, application.

GNF Response to RAI-05 Applied to LS2:

The 10x10 (GE14, GNF2) points shown in Figure 5 of the LS2 C15 Additional Information reflect transition cores with a mix of 10x10 fuel products. Thus, there are not specific GNF2 data points in Figure 5. The table shown below provides the GE14 and GNF2 batch sizes, and the corresponding [[ ]] for the 10x10 (GE14, GNF2) points in the figure. Each row in the table below corresponds to one of the "10x10 (GE14, GNF2)" data points in Figure 5. The table is in ascending order of the abscissa of Figure 5 for ease of correlation to the figure. Sums of batch sizes and [[ ]] may not add to 100% due to rounding and/or the presence of other fuel products in the core.

[[		Batch Fraction (%)		[[	
		GE14	GNF2		
		31.0	38.5		
		28.6	71.4		
		64.4	35.6		
		31.0	38.5		
		31.0	38.5		
		64.4	35.6		
		28.6	71.4		
		28.6	71.4		
		67.4	32.6		
		64.4	35.6		
		67.4	32.6		
	]]	67.4	32.6		]]

GNF Response to RAI-05-1 Applied to LS2:

Figure 5 of the LS2 C15 Additional Information is an updated version of Figure III.5-2 from NEDC-32601P-A (referenced in Section 1.0 of the LS2 C15 Additional Information). Per the response to RAI III.5 on NEDC-32601P-A, "The reduction in CPR margin…required to place a nominal rod pattern nearer the operating limit is correlated to the natural logarithm of the ratio of the nominal MIP to the limiting MIP value. This correlation is shown in Figure III.5-2 for all fuel types. The fact that all the data for different fuel types is interspersed about the same curve suggests that it is appropriate to establish a single threshold value for MIP that is independent of fuel type." Figure 5 was previously updated with points representing plants containing ATRIUM-10 fuel. The continued interspersion of the data about the correlation provides continued support for the conservatism of the current MIP criteria used in the SLMCPR process, and the independence of this criterion from fuel type.

GNF Response to RAI-05-2 Applied to LS2:

While still used as a secondary reasonability check, the estimation formula is not part of the SLMCPR development process. It has no effect on the final SLMCPR.

LS1 RAI-07:

Please provide an updated version of power/flow map for Cycle 15 operation including stability Option III features of scram region and controlled entry region for backup stability protection based on the Boiling-Water Reactor Owners Group position stated in NEDO-31960A for SLO and TLO.

GNF Response to RAI-07 Applied to LS2:

Exelon will provide a response to this RAI.

ATTACHMENT 9

LASALLE COUNTY STATION
UNIT 2

Docket No. 50-374

License No. NPF-18

Request for Technical Specification Change for Minimum Critical Power Ratio Safety Limit

Supplemental LaSalle Unit 1 RAI Response Applied to LaSalle County Station, Unit 2, Cycle 15 and the LaSalle County Station, Unit 2, Cycle 14 and Expected Cycle 15 Power-to-Flow Map

ATTACHMENT 9

As stated in Attachment 6, NRC Docket No. 50-373 contains Requests for Additional Information (RAIs) related to the License Amendment Request (LAR) for Technical Specification changes to the Safety Limit Minimum Critical Power Ratio (SLMCPR) values for LaSalle County Station Unit 1 (LS1).

As delineated in Attachment 6, Exelon will provide a response to LS1 RAI-07.

LS1 RAI-07:

Please provide an updated version of power/flow map for Cycle 15 operation including stability Option III features of scram region and controlled entry region for backup stability protection based on the Boiling-Water Reactor Owners Group position stated in NEDO-31960A for SLO and TLO.

EGC Response to RAI-07 Applied to LaSalle Unit 2:

The figure below provides the current power-to-flow map for LSCS, Unit 2, Cycle 14 and expected LSCS, Unit 2, Cycle 15 operation including the stability Option III features of scram region and controlled entry region for backup stability protection. The power/flow map for backup stability protection (BSP) at LSCS, Unit 2 conservatively treats the controlled entry region as an immediate exit region (i.e., Region 2) on the power/flow map. Region 1 on the power/flow map is the scram region. The BSP region boundaries will be calculated for Cycle 15 based on a specified core decay ratio per the approved stability methodology described in GESTAR II (i.e., Section S.4.2.2, which is located in NEDE-24011-P-A, Revision 19, "General Electric Standard Application for Reactor Fuel (GESTAR II, U.S. Supplement)," dated May 2012, on page US-38). The core decay ratio is a function of principal reactor core parameters (e.g., power and power distribution, flow, subcooling, and fuel design). The core decay ratio is independent of the core flow mode (i.e., the same for two loop operation (TLO) and single loop operation (SLO)). Therefore, the calculated BSP regions will be bounding and applicable for both TLO and SLO. The BSP regions shown on the attached power/flow map are expected to bound the calculated BSP regions for LSCS, Unit 2, Cycle 15.

The power/flow map generally depicts a "natural circulation" flow line and a "maximum rod line." The BSP region boundaries are calculated based on points on the natural circulation line and the maximum rod line. The BSP regions are depicted as areas between the maximum rod line, the natural circulation line, and the BSP region boundaries in the high-power, low-flow region of the map. However, the natural circulation line is approximate and the core flow measurement uncertainty is larger at low flow conditions. In the past, this has resulted in operating conditions in which the indicated power-flow condition was below (i.e., to the left of) the natural circulation line on the power-flow map. Also, industry operational experience has identified conditions in which operation above the maximum rod line has occurred. To address these situations, an operational decision was made to conservatively extend operating boundaries (e.g., rod lines, stability regions, etc.) back to "zero flow" and extend the BSP boundaries above the maximum rod line. These operational enhancements to the power/flow map have been made to provide additional guidance to address the unlikely, but possible circumstance of operating at those conditions.

ATTACHMENT 9

LaSalle County Nuclear Station Unit 2 Power-to-Flow Map