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

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Subject: Additional Information Supporting License Amendment Request Regarding the Use of Neutron Absorbing Inserts in Unit 2 Spent Fuel Pool Storage Racks

References:

1. Letter from P. R. Simpson (Exelon Generation Company, LLC) to U.S. NRC, "License Amendment Regarding the Use of Neutron Absorbing Inserts in Unit 2 Spent Fuel Pool Storage Racks," dated October 5, 2009

2. Letter from E. A. Brown (U.S. NRC) to M. J. Pacilio (Exelon Generation Company, LLC), "LaSalle County Station, Units 1 and 2 – Request for Additional Information Related to the Use of Neutron Absorbing Inserts," dated November 19, 2010

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Facility Operating License Nos. NPF-11 and NPF-18 for LaSalle County Station (LSCS), Units 1 and 2, respectively. The proposed change revises Technical Specifications (TS) Section 4.3.1, "Criticality," to address a non-conservative TS. Specifically, the proposed change addresses the BORAFLEX™ degradation issue in the Unit 2 spent fuel storage racks by revising TS Section 4.3.1 to allow the use of NETCO-SNAP-IN® rack inserts in Unit 2 spent fuel storage rack cells as a replacement for the neutron absorbing properties of the existing BORAFLEX™ panels.

The NRC requested additional information to complete the review of the proposed license amendment in Reference 2. In response to these requests, EGC is providing the attached information.

EGC has reviewed the information supporting a finding of no significant hazards consideration, and the environmental consideration, that were previously provided to the NRC in Attachment 1 of Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. In addition, the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of November 2010.

Respectfully,

Patrick R. Simpson
Manager – Licensing

Attachments:
1. Response to Request for Additional Information
2. Revised Markup of Proposed Technical Specifications Page
3. Additional Measures During Transition Period to Rack Inserts

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector – LaSalle County Station
Illinois Emergency Management Agency – Division of Nuclear Safety

NRC Request 1

TS 4.3.1.a states:

"keff ≤ 0.95 if fully flooded with unborated water, which includes an allowance for uncertainties as described in Section 9.1.2 of the UFSAR; ..."

a. Explain the controls that exist or that will be developed so that recent and proposed changes to Updated Final Safety Analysis Report Section 9.1.2 and associated analyses will be comprehensively evaluated to ensure that such changes do not challenge the inputs, assumptions, and methods, which form the bases for this license amendment request.

b. Identify the major parameters, values, uncertainties and/or assumptions in the criticality analysis that ensures that keff ≤ 0.95 if fully flooded with unborated water.

c. Provide a list of those analyses/calculations which were used to establish compliance with the requirements of 10 CFR 50.68(b)(4).

Response 1

The criticality analysis documented in AREVA NP Inc. Report No. ANP-2843(P), "LaSalle Unit 2 Nuclear Power Station Spent Fuel Storage Pool Criticality Safety Analysis with Neutron Absorbing Inserts and Without Boraflex," Revision 1, dated August 2009, was performed to support the storage of spent fuel in the LaSalle County Station (LSCS) Unit 2 spent fuel pool (SFP) in various configurations with the rack inserts installed with no credit for BORAFLEX™ in the spent fuel storage racks. The analysis demonstrates, in accordance with 10 CFR 50.68, "Criticality accident requirements," paragraph (b)(4), that the effective neutron multiplication factor, k_{eff}, is less than or equal to 0.95, at a 95 percent probability, 95 percent confidence level with:

a. the spent fuel storage racks fully loaded with ATRIUM 10 fuel that has higher reactivity than any as-fabricated fuel in the LSCS Unit 1 or Unit 2 SFPs,

b. no negative reactivity credit for the BORAFLEX™ installed between spent fuel storage rack cells,

c. rack inserts installed, and

d. the SFP flooded with unborated water at a temperature corresponding to the highest reactivity (i.e., 4°C).

No additional analyses are needed to demonstrate compliance with the requirements of 10 CFR 50.68(b)(4) for the LSCS Unit 2 spent fuel storage racks with rack inserts installed.

Exelon Generation Company, LLC (EGC) recognizes that the uncertainties described in ANP-2843(P) must be comprehensively evaluated to ensure that inputs, assumptions, and methods which form the bases for the proposed change are not challenged in future reload evaluations, and to ensure that k_{eff} remains $\leq$ 0.95 at a 95 percent probability, 95 percent confidence level. Therefore, procedural controls require each reload lattice to be evaluated to confirm that the reload fuel remains bounded by the limiting lattice assumed in the SFP criticality analysis of record. This analysis includes an evaluation of the following uncertainties and tolerances:

- Fuel rod pitch,
- Fuel enrichment,
- Fuel density,
- Channel bulge,
- Pellet diameter,
- Clad diameter,
- Pellet void volume,
- Gadolinia concentration,
- Rack insert areal ^{10}B density,
- Rack insert thickness,
- Stainless steel wall thickness,
- Storage cell pitch,
- Storage cell inside dimension,
- In-core depletion, and
- Code biases for in-rack modeling.

Since some of the specific values of the uncertainties and tolerances listed above may change (e.g., manufacturing uncertainties may be reduced due to an improved manufacturing process), this review is performed in accordance with 10 CFR 50.59, "Changes, tests and experiments," to determine if prior NRC review and approval is required. In order to provide assurance that the uncertainties listed above are comprehensively evaluated to ensure that inputs, assumptions, and methods which form the bases for the proposed change are not challenged in future reload evaluations, and to ensure that k_{eff} remains $\leq$ 0.95, with 95 percent probability and 95 percent confidence, EGC is proposing to revise TS 4.3.1.a to read as follows:

a. $k_{eff} \leq 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in either: (1) Section 9.1.2 of the UFSAR, or (2) AREVA NP Inc. Report No. ANP-2843(P), "LaSalle Unit 2 Nuclear Power Station Spent Fuel Storage Pool Criticality Safety Analysis with Neutron Absorbing Inserts and Without Boraflex," Revision 1, dated August 2009, for the Unit 2 spent fuel storage racks with rack inserts; and

The revised markup is provided in Attachment 2.

ANP-2843(P) describes the parameters, values, uncertainties, and assumptions used in the criticality analysis for the LSCS Unit 2 spent fuel storage racks with rack inserts installed. The major parameters, values, uncertainties, and assumptions used in this analysis to ensure that $k_{eff} \leq 0.95$ are identified below.

- The maximum lattice in-rack k-infinity of the assemblies establishes the maximum reactivity of any assembly allowed to be stored in the SFP. The allowable values for the maximum lattice in-rack k-infinity, and the height of each zone, for the top, intermediate, and bottom portion of each assembly are contained in the proposed TS 4.3.1.1.d.

- The minimum areal density of ^{10}B contained in the rack inserts establishes the minimum amount of neutron attenuation in the SFP required to ensure $k_{eff} \leq 0.95$. As discussed in response to NRC Request 4, the minimum ^{10}B areal density of 0.0086 grams $^{10}B/cm^2$ is being added to proposed TS 4.3.1.1.c. No credit is taken for any remaining BORAFLEX™ neutron absorber for cells in which a rack insert has been installed.

- The design of the spent fuel storage racks establishes the storage configuration (e.g., center-to-center spacing) of assemblies in the SFP. The currently installed Unit 2 spent fuel storage racks were designed and manufactured by U.S. Tool and Die.

- The BORAFLEX™ monitoring program described in the response to NRC Request 3, and the interface conditions between cells with and without rack inserts, as specified in proposed TS 4.3.1.1.e provide assurance that $k_{eff} \leq 0.95$ for the cells that do not yet have an insert installed.

- The overall design of the rack insert ensures that it can be installed correctly in each SFP cell, and can perform its design function (neutron attenuation).

- The codes used in the criticality analysis have been benchmarked to critical experiments or to other benchmarked codes to ensure that they accurately predict the neutron behavior in the SFP.

- Abnormal and accident conditions have been evaluated in the criticality analysis to ensure that none of these conditions result in exceeding the k_{eff} limit of 0.95.

- Uncertainties and manufacturing tolerances are included in the analysis to ensure k_{eff} is within limits, at a 95 percent probability and 95 percent confidence level, as required by 10 CFR 50.68(b)(4). The following uncertainties and tolerances have been considered:

    - Fuel rod pitch,
    - Fuel enrichment,
    - Fuel density,
    - Channel bulge,
    - Pellet diameter,
    - Clad diameter,
    - Pellet void volume,
    - Gadolinia concentration,
    - Rack insert areal ^{10}B density,
    - Rack insert thickness,
    - Stainless steel wall thickness,
    - Storage cell pitch,
    - Storage cell inside dimension,
    - In-core depletion, and
    - Code biases for in-rack modeling.

- The area of applicability has been established based on benchmarks to critical experiments to ensure that the codes used in the analysis are valid in the specific SFP environment and conditions.
- The moderator temperature that results in the highest reactivity for the SFP for the analyzed condition has been used.
- The maximum lattice reactivity for a zone is assumed to be the lattice reactivity for the entire zone.
- Each lattice in each fuel assembly in the array is assumed to be at its lifetime peak reactivity level (i.e., no credit is taken for assembly burnup).
- The most limiting orientation or position of each assembly in its SFP rack cell is assumed in the analysis.

NRC Request 2

Section 4.3.1 of NUREG-1433, "Standard Technical Specifications, General Electric Plants, BWR/4," includes a description of the assembly maximum U-235 enrichment limit. Address why a similar limit was not included with the proposed change.

Response 2

TS 4.3.1.1.a of NUREG-1433 includes both a description of the maximum assembly in-core k-infinity limit and the maximum lattice average U-235 enrichment limit. An in-rack k-infinity limit is included in EGC's proposed TS 4.3.1.1. The enrichment and in-rack k-infinity limits each provide adequate protection to ensure public health and safety, in that they determine the reactivity limit of the bundles that are allowed to be stored in the spent fuel storage racks. EGC proposed only an in-rack k-infinity limit for the reasons cited below.

The in-rack k-infinity limit is an effective limiting specification, since it accounts for factors that could affect in-pool reactivity in the future, including the principal fuel assembly drivers of U-235 enrichment and gadolinia loading. Enrichment and gadolinia loadings can vary from assembly design to assembly design. However, the in-rack k-infinity limit in proposed TS 4.3.1.1 ensures peak in-pool reactivity does not exceed the design basis supporting the specification. Using the in-rack k-infinity limit ensures that the SFP criticality analysis remains bounding. Additionally, since the k-infinities in the proposed TS are in-rack values, the in-core changes in k-infinity cannot result in a violation of the criticality analysis, as long as the in-rack k-infinity limit for the assembly is met.

However, since the combination of U-235 enrichment and gadolinia loading are the principal drivers in determining the in-rack k-infinity limit, the proposed TS 4.3.1.1.d is being revised to read:

> The combination of U-235 enrichment and gadolinia loading shall be limited to ensure fuel assemblies have a maximum k-infinity of 0.9185 for all lattices in the top of the

assembly, a maximum k-infinity of 0.8869 for all lattices in the intermediate portion of the assembly, and a maximum k-infinity of 0.8843 for all lattices in the bottom of the assembly as determined at 4°C in the normal spent fuel pool in-rack configuration. The bottom, intermediate, and top zones are between 0"-96", 96"-126", and greater than 126" above the bottom of the active fuel.

The revised markup is provided in Attachment 2.

NRC Request 3

The current LAR indicates the NETCO-SNAP-IN® rack inserts will not be installed in all useable storage cells until 2016. In the interim, the licensee will continue to credit BORAFLEX™ in those storage modules that do not have NETCO-SNAP-IN® rack inserts. Some of the cells for which the licensee intends to continue crediting BORAFLEX™ and storing fuel assemblies have degraded below the minimum B-10 areal density of 0.020 gm/cm^2 used in the analysis of record as described in the June 15, 1989 safety evaluation (ADAMS Accession No. ML021140183). With respect to the crediting of degraded BORAFLEX™, provide the following information:

a. A description of the nuclear criticality safety analysis performed to demonstrate the acceptability of storing fuel in cells with BORAFLEX™ below the a B-10 areal density of 0.020 gm/cm^2;

b. A description of the measures to be used to account for unknowns or uncertainties in a. above; and,

c. A description of the measures to prevent a misloading during fuel handling or a justification explaining why the consequences of such an event would be acceptable.

Response 3.a

The current criticality analysis for the most reactive fuel type in the Unit 2 SFP (i.e., ATRIUM-10) includes an assumed BORAFLEX™ panel thinning of 50 percent. This corresponds to an areal density of approximately 0.012 grams $^{10}B/cm^2$. Even with this amount of panel thinning, in-rack k_{eff} is demonstrated to be less than 0.95. Therefore, k_{eff} also remains less than 0.95 with areal densities between 0.012 and 0.020 grams $^{10}B/cm^2$.

For degradation (i.e., panel thinning) beyond 50 percent and/or for fuel types which do not incorporate BORAFLEX™ panel thinning explicitly in the base in-rack k_{eff} calculations, analyses have been performed to estimate the penalty to in-rack k_{eff} based on a certain amount of panel thinning. From these penalties, a maximum allowable panel thinning value has been calculated to maintain margin to the k_{eff} limit of 0.95.

For ATRIUM-10 fuel, the base in-rack k calculation includes 50 percent BORAFLEX™ degradation, and a penalty is added based on an equation developed by AREVA that estimates the k_{eff} penalty for a given amount of panel thinning up to 80 percent. These calculations result in a maximum allowable degradation of 57.5 percent.

For GE-14 fuel, the criticality analysis includes equations for penalties to add to the base in-rack k_{eff} calculation. However, the AREVA (i.e., ATRIUM-10) method of calculating the thickness reduction penalty is used, as it results in a higher Δk penalty and was developed to be accurate up to 80 percent thickness reduction. These calculations result in a maximum allowable degradation of 79.8 percent for GE-14 fuel.

For ATRIUM-9B fuel, the criticality analysis includes equations for penalties to add to the base in-rack k_{eff} calculation. These calculations result in a maximum allowable degradation of 68.1 percent for ATRIUM-9B fuel.

For Legacy GE fuel (Cycle 2+ excluding GE-14), the criticality analysis includes penalties to add for BORAFLEX™ degradation. These calculations result in a maximum allowable degradation of 65.3 percent for Legacy GE fuel (Cycle 2+).

For Legacy GE fuel (Cycle 1), a specific analysis was performed to show that the Cycle 1 GE fuel has lower in-rack k_{eff} than GE-14. Therefore, the GE-14 fuel bounds the Cycle 1 GE fuel. Using equations for penalties provided in the analysis, it is estimated that Cycle 1 GE fuel may reside in the Unit 2 SFP with significantly more BORAFLEX™ loss than allowed by GE-14 fuel (i.e., greater than 80 percent).

Response 3.b

The discussion above describes the approach being used, and the limitations placed on BORAFLEX™ degradation, in the current analyses to demonstrate the acceptability of storing fuel in the Unit 2 SFP. Implementation of these limitations ensures that k_{eff} in the SFP remains less than 0.95. However, in order to account for unknowns or uncertainties in the analyses discussed above, EGC is proposing additional measures to increase the margin to the k_{eff} limit of 0.95 in the Unit 2 SFP. These additional measures are described in Attachment 3.

Response 3.c

Movement of fuel and core components within the SFPs is controlled by procedures. Movement of an item in-to or out-of a SFP storage location is performed via an approved move sheet. Procedures mandate that prior to issuance, a move sheet is prepared and reviewed by a task qualified individual and approved by the Reactor Engineering Manager. Additional procedures mandate that move sheets involving fuel receive multiple independent reviews and a site challenge consisting of a reactor engineer and a senior reactor operator. Procedural guidance is also provided on the review process and directs usage of a move sheet verification checklist that documents move sheet compliance with fuel rack criticality analyses and site specific limitations. Site limitations on SFP locations are documented in a site procedure. These limitations are updated each time a BORAFLEX™ rack degradation projection is performed.

LaSalle utilizes ShuffleWorks as the site fuel movement and accounting software. Currently, locations within ShuffleWorks are designated as either Operable or Inoperable via the use of Location Tags and use of Inoperable locations is prevented within the software by restricting a fuel movement device from placing fuel in an Inoperable location. The software Tags and restrictions are updated each time a BORAFLEX™ rack degradation projection is performed.

Fuel movement is controlled by procedures. For each fuel move, a qualified fuel handler performs the movement after receiving verification from a second qualified individual and independent verification and authorization by a qualified fuel handling supervisor.

EGC began declaring LSCS Unit 2 SFP storage locations unusable due to BORAFLEX™ degradation on December 1, 2007. Since that time, no fuel misloadings involving a fuel assembly being loaded into an unusable location have occurred.

In the event that a breakdown in human performance practices and procedural controls results in placement of a fuel bundle in an unusable location, the consequences are mitigated by categorization of all BORAFLEX™ credited storage locations as either UNUSABLE, RESTRICTED, or UNRESTRICTED. [See Attachment 3 of this response for additional discussion of RESTRICTED locations.]

If a RESTRICTED fuel assembly, such as the limiting ATRIUM-10 bundle, is placed in error in a RESTRICTED location, there would remain over 5 percent margin to the allowable peak panel degradation for the ATRIUM-10 bundle to ensure $k_{eff} \leq 0.95$.

If a RESTRICTED fuel assembly is placed in error in an UNUSABLE location, at least one adjacent location would not contain fuel since the UNUSABLE declaration would be applied to cells on each side of the panel in question. In addition, adjacent locations that contain fuel would have at minimum 27.5 percent margin to the allowable BORAFLEX™ peak panel degradation.

The categorization of LSCS Unit 2 SFP storage locations as UNUSABLE, RESTRICTED, or UNRESTRICTED is a short duration action and is applicable until a time when all accessible storage locations in the Unit 2 SFP contain NETCO Rack Inserts.

NRC Request 4

Section 50.36(c)(4) to Title 10 of the *Code of Federal Regulations*, requires that the Design Features section of the TS shall include "...features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in categories described in paragraphs (c) (1), (2), and (3) of this section." Given Lasalle's plans to rely on the B-10 content of the rack inserts in the Unit 2 spent fuel pool, provide a description of those administrative controls that will be put in place to ensure that B-10 content of the NETCO-SNAP-IN® rack inserts will be consistent with what is assumed in the rack inserts and analyses.

Response 4

The proposed change to TS 4.3.1.1.c has been modified to include the minimum certified ^{10}B content of the NETCO-SNAP-IN® rack inserts. The revised markup is provided in Attachment 2.

ATTACHMENT 2
Revised Markup of Proposed Technical Specifications Page

LaSalle County Station, Units 1 and 2

Facility Operating License Nos. NPF-11 and NPF-18

<u>REVISED TECHNICAL SPECIFICATIONS PAGE</u>

4.0-2

4.0 DESIGN FEATURES (continued)

4.3 Fuel Storage

4.3.1 Criticality

4.3.1.1 The spent fuel storage racks are designed and shall be maintained with:

a. $k_{eff} \le 0.95$ if fully flooded with unborated water, which includes an allowance for uncertainties as described in ~~Section 9.1.2 of the UFSAR; and~~

either: (1) Section 9.1.2 of the UFSAR, or (2) AREVA NP Inc. Report No. ANP-2843(P), "LaSalle Unit 2 Nuclear Power Station Spent Fuel Storage Pool Criticality Safety Analysis with Neutron Absorbing Inserts and Without Boraflex," Revision 1, dated August 2009, for the Unit 2 spent fuel storage racks with rack inserts; and

b. A nominal 6.26 inch center to center distance between fuel assemblies placed in the storage racks.

c. For Unit 2 only, a neutron absorbing rack insert shall be installed in spent fuel storage rack cells prior to loading fuel assemblies in cells that cannot otherwise maintain the requirements of 4.3.1.1.a. The neutron absorbing rack inserts shall have a minimum certified ^{10}B areal density greater than or equal to 0.0086 grams $^{10}B/cm^2$.

d. The combination of U-235 enrichment and gadolinia loading shall be limited to ensure fuel assemblies have a maximum k-infinity of 0.9185 for all lattices in the top of the assembly, a maximum k-infinity of 0.8869 for all lattices in the intermediate portion of the assembly, and a maximum k-infinity of 0.8843 for all lattices in the bottom of the assembly as determined at 4°C in the normal spent fuel pool in-rack configuration. The bottom, intermediate, and top zones are between 0"-96", 96"-126", and greater than 126" above the bottom of the active fuel.

e. For Unit 2 only, at the interface between a non-insert rack module and an insert rack module of the spent fuel pool, the placement of inserts will be expanded one row and one column into the non-insert rack module as necessary to completely surround all assemblies in the insert rack module with four wings of an insert.

4.3.2 Drainage

The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 819 ft.

4.3.3 Capacity

The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 3986 fuel assemblies for Unit 1 and 4078 fuel assemblies for Unit 2.

ATTACHMENT 3
Additional Measures During Transition Period to Rack Inserts

Currently at LaSalle County Station (LSCS), Unit 2 spent fuel storage rack cells are declared UNUSABLE when the RACKLIFE projected degradation for the most limiting panel in a spent fuel pool (SFP) cell exceeds 52.27 percent. This value represents a 10 percent penalty to the RACKLIFE Version 2.0 indicated peak panel degradation for a given cell, as shown below.

For cell operability: $P_{max\_allowable} * 1.1 \leq 57.5$ percent

Therefore, $P_{max\_allowable} \leq 52.27$ percent

In order to provide additional margin to allowable degradations without reducing the total number of available cells, Exelon Generation Company, LLC (EGC) proposes to define three SFP cell categories: UNUSABLE, RESTRICTED, and UNRESTRICTED.

UNUSABLE locations are defined as a cell whose peak panel degradation is greater than 52.27 percent. This is the threshold for cell operability currently in use at LSCS. This degradation threshold provides, at minimum, 27.5 percent margin from the RACKLIFE indicated degradation to the maximum allowable analytical degradation to ensure $k_{eff} \leq 0.95$ for low reactivity fuel.

RESTRICTED locations are defined as a cell whose peak panel degradation is greater than 29.97 percent and less than or equal to 52.27 percent. To maintain margin to a fuel type's maximum allowable degradation, only low-reactivity fuel will be allowed to be placed in RESTRICTED cells.

UNRESTRICTED locations are defined as a cell whose peak panel degradation is less than or equal to 29.97 percent. The value of 29.97 is obtained by applying the same 27.5 percent minimum margin from the RACKLIFE indicated peak panel degradation to the maximum allowable degradation for the most reactive fuel type at LSCS.

The following table summarizes the margin to the maximum allowable thickness reduction for fuel in the Unit 2 SFP.

Fuel Type Margin to Maximum Allowable Thickness Reduction			
Fuel Type	**Maximum Allowable Thickness Reduction**	**Reduction at which Fuel is Removed from Cells**	**Margin to Maximum Allowable Thickness Reduction**
Cycle 1 GE	96.9%	52.27%	44.63%
GE14	79.8%	52.27%	**27.53%**
ATRIUM-9B	68.1%	29.97%	38.13%
Cycle 2+ GE (non-GE14)	65.3%	29.97%	35.33%
ATRIUM-10(XM)	57.5%	29.97%	**27.53%**

Additionally, the reactivity of each fuel type contains the following conservative assumptions:

- The peak panel degradation is used to determine cell categorization. This peak panel degradation is assumed for all panels that constitute the cell (i.e. a panel above 52.27% degradation would drive two adjacent cells which share that panel to be declared UNUSABLE).

- Burn-up credit is not utilized in determining specific bundle reactivity.

    - The most reactive RESTRICTED fuel type is ATRIUM-10. The peak hot-excess reactivity for ATRIUM-10 fuel is between 10 gigawatt days per metric ton (GWd/MT) and 20 GWd/MT. There are currently 887 ATRIUM-10 fuel bundles stored in the LSCS SFPs. All ATRIUM-10 bundles have exposures greater than 15 GWd/MT. Three of the bundles have an exposure between 15 GWd/MT and 24 GWd/MT; 48 bundles have an exposure between 24 GWd/MT and 32 GWd/MT; and 836 bundles have an exposure greater than 32 GWd/MT.

    - The most reactive UNRESTRICTED fuel type is the GE-14. The peak hot-excess reactivity for GE-14 fuel is between 10 GWd/MT and 20 GWd/MT. There are currently 437 GE-14 fuel bundles stored in the LSCS SFPs. These GE-14 bundles have exposures greater than 32 GWd/MT.

- For ATRIUM-10 bundles, the most reactive lattice type for each bundle zone is applied to the entire length of that zone. For all other fuel types, the most reactive lattice type for each fuel type is applied to the entire axial length of all bundles of that fuel type.

- The current (i.e., Summer 2009) BADGER test measured the areal density for 28 irradiated panels of varying degradation in the Unit 2 SFP. The RACKLIFE Version 2.0 projection for this time period indicated a higher degradation than the reported BADGER results for all 28 irradiated panels, as indicated in the following table.

ATTACHMENT 3
Additional Measures During Transition Period to Rack Inserts

Summary of BADGER Test Results		
Panel Tested	**BADGER Loss**	**RACKLIFE 2.0 Loss**
*G74 North	*3.85	*3.00
*G74 South	*6.19	*3.00
DD37 North	34.80	44.39
DD37 West	27.77	51.76
EE37 East	6.19	55.28
FF37 South	1.50	54.13
EE37 West	22.14	56.46
CC34 South	3.85	55.32
CC34 West	16.51	60.17
DD35 East	50.75	58.73
EE34 East	16.04	60.51
EE36 South	20.73	62.86
CC34 East	25.42	62.14
DD33 South	36.68	64.84
DD37 East	53.56	60.68
FF35 South	15.57	62.51
CC34 North	39.02	63.55
EE34 South	23.55	65.37
DD35 North	47.47	64.06
DD35 South	51.22	67.40
FF34 South	13.23	63.05
DD37 South	52.16	64.67
DD33 East	24.95	69.38
DD35 West	53.56	68.76
EE36 West	30.11	67.80
DD33 West	16.51	68.00
EE34 West	32.93	68.71
DD33 North	38.56	70.76
FF33 South	14.17	70.00
FF36 South	23.08	78.60
Maximum	**53.56**	**78.60**
Minimum	**1.50**	**44.39**
Average	**28.28**	**62.85**

*Note: Panels G-74 North and G-74 South are reference panels with minimal assumed loss due to panel irradiation. These panels are omitted from the statistical comparison in this table.