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10 CFR 50.90

April 27, 2006

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

Limerick Generating Station, Units 1 & 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Subject: Supplement to the Request for License Amendment Related to Application of Alternative Source Term, dated February 27, 2004

References: (1) Letter from M. P. Gallagher (Exelon Generation Company, LLC) to US NRC, dated February 27, 2004

(2) Letter from R. Guzman (U. S. Nuclear Regulatory Commission) to C. Crane (Exelon Generation Company), dated April 3, 2006

In Reference 1, Exelon Generation Company, LLC (Exelon) submitted a request for a change to Appendix A, Technical Specifications (TS), of Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS). Specifically, the proposed change is requested to support application of an alternative source term (AST) methodology, in accordance with 10 CFR 50.67, "Accident source term."

On April 3, 2006, the NRC requested additional information regarding the AST submittal (Reference 2). Attachment 1 to this supplemental letter provides the additional information requested by the NRC in the Reference (2) letter. Attachment 2 to this supplement summarizes an additional commitment made per this supplemental letter regarding a change in the Reactor Enclosure Recirculation System assumed organic iodide efficiency.

Attachment 3 provides copies of plant drawings to support the NRC review. **The drawings within Attachment 3 contain sensitive security related information and are requested to be withheld from public disclosure under 10 CFR 2.390 and in accordance with RIS 2005-26, Control of Sensitive Unclassified Nonsafeguards Information Related to Nuclear Power Reactors.**

AP01

There is no adverse impact to the No Significant Hazards Consideration submitted in the Reference (1) letter. If you have any questions or require additional information, please contact Doug Walker at (610) 765-5726.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

04/27/06
Executed On

Pamela B. Cowan
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachments:

1. Response to Request for Additional Information
2. Summary of Additional Commitments
3. Applicable Plant Drawings

cc:	S. J. Collins, Regional Administrator, Region I, USNRC	(w/o Attachment 3)
	S. Hansell, USNRC Senior Resident Inspector, LGS	"
	T. Valentine, Project Manager [LGS], USNRC	(w/Attachments)
	R. R. Janati - Commonwealth of Pennsylvania	(w/o Attachment 3)

ATTACHMENT 1

LIMERICK GENERATING STATION
UNITS 1 AND 2

Docket Nos. 50-352
50-353

License Nos. NPF-39
NPF-85

Supplement to License Amendment Request for
"LGS Alternative Source Term Implementation"

Response to Request for Additional Information

ATTACHMENT 1

REQUEST FOR ADDITIONAL INFORMATION REGARDING PROPOSED LICENSE AMENDMENT REQUEST FOR IMPLEMENTATION OF ALTERNATIVE SOURCE TERM (AST)

By letter dated February 27, 2004, as supplemented by letters dated October 25, 2004, and October 10, 2005, Exelon Generation Company, LLC submitted a request for an amendment to the Technical Specifications for Limerick Generating Station, Unit Nos. 1 and 2 (LGS). The amendment would allow for the use of an alternate source term in the LGS design-basis radiological accident analysis. The following questions refer to the October 10, 2005, LGS response to the Nuclear Regulatory Commission (NRC) staff's request for additional information dated August 18, 2005. The NRC has determined that a response to the following questions is necessary in order for the staff to complete its review.

1. The submittal states that the release point for the secondary effluent is through the North Stack without credit for the standby gas treatment system (SGTS) filters. Please clarify if there are other release points, such as seals on doors, penetrations, and cracks, that leakage could escape from during the transition period from normal operation to SGTS operation when the building has a potential to increase in pressure and why these potential release points do not have to be considered.

   EXELON RESPONSE
   A plant walkdown and review of drawings has shown that there are no reactor enclosure doors, blowout panels, or penetrations closer to the Main Control Room (MCR) intake than that assumed for the North Stack exhaust. The North Stack exhaust is at the north centerline of the two reactor units, directly in line with the centerline of the control room intake. The reactor enclosure walls are solid concrete, 2 feet thick. If the assumption of a diffuse area release via the reactor enclosure walls were made, the resulting X/Q would be lower.

   A periodic secondary containment inleakage drawdown test is performed to verify the leak tightness (less than 2500 cfm) of the reactor enclosure secondary containment, which includes penetrations, seals, gaskets, and potential cracks in the secondary containment walls. This demonstrates that the basis for assuming the release point through the North Stack (at 3000 cfm during drawdown, 2500 cfm thereafter) is the most limiting.

   Additionally, the MCR is maintained at a positive pressure at 1/8" water gauge (wg) during normal operation. The MCR pressure will not fall below that in the Reactor Enclosure during the transition period. Therefore, there will be no leakage from Secondary Containment to the MCR during the drawdown (transition) period.

2. At the bottom of page 47 of the loss-of-coolant accident (LOCA) analysis, LM-0646, Revision 1, under P1, it is stated that "For the first 15.5 minutes, flow is directed through the North Stack without RERS [reactor enclosure recirculation system] or SGTS filter credit." Page 24 of the LOCA calculation states that LGS conforms to Regulatory Position 4.2 Appendix A, Regulatory Guide 1.183. Regulatory Positions 4.2 states leakage from the primary containment is assumed to be released directly to the environment as a ground-level release during any period in which the secondary containment does not have a negative pressure as defined in technical specifications. The NRC staff then noted that, on page A-14 of the calculation, under compartment filter

data for compartment No. 2, Reactor Enclosure, the RERS filters are assumed to be operating at time equals 1 minute and continue to operate through the drawdown period and the 30-day analysis. Thus, there appears to be an inconsistency in the credit given for RERS filters. The Standard Review Plan (SRP, NUREG-0800) does not allow credit for filters during the drawdown period. Please clarify if credit is being taken for the RERS filters, provide justification for the credit if it is taken, and adjust the LOCA analysis if necessary.

EXELON RESPONSE

The calculation did credit RERS filtration beginning at 3 minutes post-LOCA (Loss of Coolant Accident). This is justified because the RERS, once started, does not require a negative pressure in the reactor enclosure to perform its intended function; further justification is provided at length below (see response to Question 3). Note that this crediting of the filtration function of the RERS during the drawdown period accounts for only a 0.016 rem TEDE reduction in the control room post-LOCA dose. The inconsistency on page 47 of Calculation LM-0646 has been captured in Exelon's Corrective Action Program and has no impact on the results of the calculation.

Filtration by the SGTS is not credited during the 15.5-minute drawdown period. The SGTS North Stack release point location is simply used for conservatism.

3. In the submittal, credit is taken for a 50-percent mixing efficiency in the reactor enclosure building during the drawdown period. The SRP does not allow credit for mixing during the drawdown period, thus additional justification to support a non-standard review is required. Although mixing does begin when the RERS starts at 3 minutes, the mixing is not instantaneous and the time it takes to assure sufficient dilution of the primary containment leakage in the secondary containment has not been established. In addition, only a portion of the volume of the reactor enclosure is processed by the RERS during the drawdown. Please provide additional information to justify the assumption that a credit for 50 percent mixing during drawdown in the reactor enclosure building is conservative and acceptable.

EXELON RESPONSE

Exelon's position is that the LGS RERS is a safety related, Tech Spec, engineered safety feature (ESF) system that meets Regulatory Guide 1.183 Section 5.1.2 requirements for credit for accident mitigation features. The RERS is an industry-unique system that provides forced mechanical mixing in the secondary containment. The system is available 3 minutes following the LOCA signal, is independent of secondary containment pressure, and provides filtration and recirculation of 60,000 cfm of air throughout the secondary containment. Note that 60,000 cfm is the nominal system flow, the Tech Spec tolerance of $\pm$ 10% was utilized in the accident analysis previously submitted.

The timeline and model description in the following table shows the key timing and model parameters and shows where LGS performed LOCA dose analysis consistent with Reg Guide 1.183 guidance. The table also shows where, based on LGS specific design features, different methodologies and assumptions are used. This table represents a brief summary with further and more detailed discussion in the text of these responses.

Accident Event Timeline with Respect to LOCA Modeling

Time (minutes)	Key Accident Analysis Event	Comment
0	LOCA Initiation	
0.167	SGTS Initiation with or w/o LOOP	SGTS not credited as filter until drawdown complete
0.333	Initiation of RERS without LOOP	Not credited, since LOOP conditions are limiting
2.0	Initiation of Gap Release	Start of RADTRAD LOCA Models
3.0	Initiation of RERS after LOOP	Equals 1 minute after RADTRAD Model Start
15.5	Drawdown Complete	Conservatively, this value was also used for the end of the drawdown period for the RADTRAD Model, although 13.5 minutes could have been used and have been consistent the TS 4.6.5.3.g.2 drawdown time limit. As analyzed the 15.5 minutes would justify a 17.5 minute drawdown Technical Specification, but this has not been requested.

RADTRAD Model Flow and Filtration Credit Parameters Time Periods

	0 to 1 minutes (during drawdown, before RERS start)	**1 to 15.5 minutes (during drawdown, after RERS start)**	**After 15.5 minutes (after drawdown)**
Mixing / Treatment Safety Feature Availability	1. No Mixing Credited 2. No RERS Filter Credited 3. No SGTS Filter Credited	1. Mixing by RERS Credited 2. RERS Filtration Credited 3. No SGTS Filter Credited	1. Drawdown Complete 2. Mixing by RERS Credited 3. RERS Filter Credited 4. SGTS Filter Credited
Secondary Containment (SC) Exhaust Flow Rate	9.0E+06 cfm to simulate no mixing credit	3.0E+03 cfm (higher flow during drawdown)	2.5E+03 cfm (normal SGTS minimum flow)
RERS Filter Credit (Recirc & SC Exhaust)	None	95% for Elemental & Organic Iodine 99% for Aerosol	95% for Elemental & Organic Iodine 99% for Aerosol
SGTS Filter Credit	None	None	99% for Elemental & Organic Iodine 99% for Aerosol
Regulatory Guidance Consistency	Consistent with regulatory guidance, no credit for mixing or filtration during this period. Rapid secondary containment exhaust flow used to simulate no mixing credit	Departure from guidance, based on LGS specific conditions: Mixing credited based on: 1. High RERS flow rate from compartments, and mixing in ductwork and filter inlet plenum 2. Natural and forced mixing in compartments based on room coolers and general separation between release points and room exhaust points RERS filter credited based on: 1. RERS compartment flow dominates compared to potential exfiltration 2. RERS filters supply to compartments	1. Consistent with regulatory guidance since drawdown is complete, and ESF filters are available and credited 2. Mixing by RERS in ductwork and plenum; RERS air turnover and compartment natural and forced mixing by air coolers sufficient that the guidance recommendation of 50% mixing is conservative

The basis for this position is elaborated below.

Current Regulatory Guidance:

- Regulatory Guide 1.183 Section 5.1.2 states:

  "*Credit may be taken for accident mitigation features that are classified as safety-related, are required to be operable by technical specifications, are powered by emergency power sources, and are either automatically actuated or, in limited cases, have actuation requirements explicitly addressed in emergency operating procedures. The single active component failure that results in the most limiting radiological consequences should be assumed. Assumptions regarding the occurrence and timing of a loss of offsite power should be selected with the objective of maximizing the postulated radiological consequences.*"

  The LGS RERS is a safety related, engineered safety feature (ESF) system that meets all of the above attributes. The RERS is designed to auto-start within 20 seconds; however, in the event that offsite power is not available, the RERS will auto-start within 3 minutes.

- Regulatory Guide 1.183 Appendix A, Section 4.1 states:

  "*Leakage from the primary containment should be considered to be collected, processed by engineered safety feature (ESF) filters, if any, and released to the environment via the secondary containment exhaust system during periods in which the secondary containment has a negative pressure as defined in technical specifications. Credit for an elevated release should be assumed only if the point of physical release is more than two and one-half times the height of any adjacent structure.*"

  Following the drawdown period, primary containment releases are processed through the RERS and SGTS, both of which are ESF systems. All releases at LGS are ground-level releases.

- Regulatory Guide 1.183 Appendix A, Section 4.2 states:

  "*Leakage from the primary containment is assumed to be released directly to the environment as a ground-level release during any period in which the secondary containment does not have a negative pressure as defined in technical specifications.*"

  For LGS, the RERS provides functions unlike at most other licensed U.S. nuclear plants. One RERS function is to deliver a portion of its filtered air to the SGTS for further filtration and exhaust to the environment via the North Stack (as a ground level release). Since the RERS has no operating restrictions related to negative differential pressure (with respect to the outside), the drawdown period has no affect on system performance. Therefore, mixing begins when the RERS starts. For the purpose of this evaluation, this is conservatively assumed at 3 minutes post-LOCA.

The RERS takes suction from all secondary containment compartments at a nominal average rate of 2 air changes per hour. RERS is the dominant means by which airborne radioactivity exits from all compartments. RERS flow from all compartments is mixed in the filter intake plenum and ductwork, with approximately 5% of the RERS filtered flow directed to the SGTS for discharge, and the remaining filtered, mixed flow is distributed throughout the secondary containment. Therefore, RERS filtration and significant mixing is largely instantaneous within the plenum and ductwork.

- Regulatory Guide 1.183 Appendix A, Section 4.4 states:

  "*Credit for dilution in the secondary containment may be allowed when adequate means to cause mixing can be demonstrated. Otherwise, the leakage from the primary containment should be assumed to be transported directly to exhaust systems without mixing. Credit for mixing, if found to be appropriate, should generally be limited to 50%. This evaluation should consider the magnitude of the containment leakage in relation to contiguous building volume or exhaust rate, the location of exhaust plenums relative to projected release locations, the recirculation ventilation systems, and internal walls and floors that impede stream flow between the release and the exhaust.*"

The value of the LGS RERS relative to its mixing capabilities has previously been submitted and reviewed by the NRC (e.g., SER for Increased Secondary Containment Inleakage Rate). The system provides 60,000 cfm of filtered recirculation in the reactor enclosure (secondary containment). This flow rate provides one complete air change every 30 minutes. Although the LGS AST submittal assumes 50% mixing starting after 3 minutes and continuing for 720 hours, a recirculation air mixing study confirms that mixing would be much higher (>86% after 1 hour and >95% within 90 minutes). The conservatism of assuming 50% mixing for the duration of the accident offsets the initial 15 minutes when mixing may not be greater than 50% based on air turnover alone. The RERS mixing credit was applied at the time the system starts (at 3 minutes post-LOCA).

Additionally, the exhaust registers are generally located high in compartments and away from walls and release points. However, even if a less than well mixed and higher than average concentration is taken into the RERS system, only a 5% flow fraction would be discharged. This discharge would be to the SGTS system and through the 8" charcoal adsorber bed, even though not credited for the drawdown period. The well mixed balance of RERS flow is filtered and distributed throughout secondary containment.

The attributes of an AST different from the previously licensed TID-14844 based source terms (characterized by the composition and magnitude of the radioactive material, the chemical and physical properties of the material, and the timing of the release to the containment) have no affect on the design or function of the RERS. Therefore, continued mixing credit is appropriate.

From LGS SER, SSER-3: "The staff evaluated the specific features of the reactor building, the SGTS, and the RERS and noted that the air volume of the reactor building was about four times larger than that of the primary containment (1.8×10^6 cubic feet versus 4.1×10^5 cubic feet). Because the RERS produces high recirculation in the reactor enclosure building, the staff would expect that the primary containment leakage would be thoroughly mixed with the reactor building air prior to treatment by the SGTS. Nonetheless, in the staff's analysis, the primary containment leakage was conservatively assumed to be mixed with only 50 percent of the reactor building air during this period." In this statement, the staff implied that greater than 50% mixing would be expected. The value of 50% mixing was used in the confirmatory analyses.

It should be noted that the LGS SSER-3 suggests that mixing or treatment during the drawdown period would not be credited. From the SSER 3, "There was assumed to be no bypass leakage except during those periods when secondary containment would not be drawn down to at least a –0.25 inch water gauge (wg) pressure. During the periods that the secondary containment would not be drawn down, it was assumed that the primary containment leakage went directly to the environment without credit for mixing or treatment of any kind." However, at that writing, the drawdown period (i.e., the original TS value of 2 minutes, 20 seconds) was less than the RERS start time (i.e., 3 minutes) under LOCA-LOOP conditions. Therefore, the issue here did not require evaluation.

- LGS UFSAR Section 15.6.5.5.1.2 (Fission Product Transport to the Environment) states:

  "Because LGS is a Mark II BWR with a large reactor enclosure with all concrete walls on the designated secondary containment boundary to the atmosphere, exfiltration is expected to be minimal and mixing within the reactor enclosure is expected to be large. The only mechanisms available for transport of released activity from the penetrations of containment liner plate to the outside walls appear to be by the movement of air within the enclosure. Considering the large distances from the potential release points to the outer walls, the natural mixing effects of molecular and eddy diffusion, convective mixing due to temperature differences between walls, equipment and the air, and the forced mixing by local fan coolers and the RERS ventilation systems, then the released activity will be diluted and mixed significantly before it can exfiltrate to the atmosphere or be exhausted by the SGTS."

<u>Discussion</u>

The industry-unique RERS at LGS provides for mechanical mixing and filtration of the air in the reactor enclosure secondary containment during accident conditions. The operation and function of this system is not specifically addressed in the available regulatory guidance. Therefore, several facts regarding this system's operation and credit during a LOCA are hereby presented.

The RERS starts automatically at 3 minutes following a LOCA-LOOP, and provides filtration and recirculation of 60,000 cfm of air throughout the secondary containment. The RERS is connected to the normal ventilation supply and exhaust duct that serves the reactor enclosure building and circulates 60,000 cfm of air through approximately 155 supply and 125 exhaust registers distributed to compartments within the reactor enclosure, which results in the entire volume of the reactor enclosure being processed by the RERS. This 60,000 cfm of air circulation throughout the building provides a large airflow relative to the potential 2 scfm of leakage from the primary containment

(0.7%/day containment leakage), which results in more than adequate dilution and mixing. The normal flow through each register varies between a few hundred to several thousand cfm, thereby providing adequate mechanical means to justify secondary containment mixing. The M-129-0048 series drawings provide locations and flow rates for the normal supply (sheets 1 and 2) and exhaust (sheets 5, 6, and 7) registers. Note that the flow rate values cited in these drawings are for the normal mode of operation (based on a total of 180,000 cfm). Flow rates during RERS operation are one third of these values (60,000/180,000). These drawings clearly show that rapid, widespread mixing is afforded by the RERS. Plant architectural (A-0105 through A-0111) and general arrangement drawings (M-0100 through M-0108) show the basic plant layout, including walled compartments typically housing primary containment penetrations. The drawings referenced above are provided in Attachment 3 to this document.

Since the RERS uses the same supply and exhaust registers as the normal reactor enclosure ventilation system, the associated ductwork volume and length provide a significant volume in which the reactor enclosure and equipment compartment exhaust air is mixed prior to RERS filtration. The turbulent airflow with numerous turns and bends in the ductwork provide adequate mixing prior to RERS filtration. This air then passes through the RERS filtration unit with 2" charcoal adsorber (95% efficiency). Additional mixing is provided by the vaneaxial fan downstream of the filter unit. Although the drawdown time is assumed to be 15.5 minutes following start of LOCA, the RERS is capable of performing its function (to provide filtered recirculation throughout the reactor enclosure) even during the drawdown period. This is because it does not require a negative pressure in the reactor enclosure, with respect to the outside, in order to perform its intended function. Therefore, the mixing will begin as soon as the RERS starts at 3 minutes following a LOCA signal. The AST analysis does not assume any mixing during the first 3 minutes following the LOCA signal.

The Standby Gas Treatment System (SGTS) starts automatically at 10 seconds following the LOCA signal, and after the RERS starts at 3 minutes, a portion of the filtered RERS air is directed to the SGTS for further filtration prior to release.

The only other possible sources of air entering the SGTS are:

- the duct connection to the refueling floor, which is isolated by slide gate or guillotine damper and any leakage from it would be clean since a fuel handling accident is not assumed to occur simultaneously with a LOCA,

- the drywell purge exhaust duct connection, which is isolated by leak tight valves with negligible leakage (approx 0.05 scfm, LLRT).

For the AST LOCA evaluation, although SGTS filtration is not assumed during the 15.5-minute drawdown period, RERS filtration and mixing is assumed beginning at 3 minutes post-LOCA upon automatic initiation of the RERS. Before RERS startup, an artificially high exhaust rate is modeled to simulate no mixing. After RERS startup, but during the drawdown period, the SGTS provides 3,000 cfm flow to the North Stack as a ground level release (with no SGTS filter credit). After the drawdown period (once a 0.25" WG negative reactor enclosure pressure is achieved), the SGTS provides 2,500 cfm exhaust through the 8" charcoal adsorber bed (99% efficiency) to the North Stack. The combined functions of RERS and SGTS provide treatment of the reactor enclosure exhaust air by a total of 10" of charcoal, 4 separate HEPA filters, and 2 pre-filters before it reaches the environment.

A recirculation air mixing study (Calc M-76-07) was performed which, based on a 60,000 cfm RERS recirculation rate, indicates that 28.8% mixing occurs in the reactor enclosure 10 minutes after system startup, with 95.3% mixing achieved by 90 minutes. This evaluation is conservative in that it does not include additional mixing methods such as mixing within the RERS ductwork, mixing due to reactor enclosure inleakage, mixing due to convection from heat loads, or mixing due to cooling fans that remain in service during an accident. Although there may not be 50% instantaneous mixing of the reactor enclosure air upon RERS start, the RERS will provide greater than 95% mixing within 90 minutes and increases to near 100% for the remaining duration of the accident. Therefore, the assumption of a constant 50% mixing for the 30-day duration of the accident beginning at 3 minutes post-LOCA is highly conservative.

Additional parametric tests for control room dose effects have been performed. In the analysis submitted for NRC review (Case #1 below), a secondary containment mixing value of 50% from 3 minutes post-LOCA was assumed. The dose contribution from ECCS leakage is very low and will not significantly affect the total dose.

Case No.	Case Description	PC Leakage (Rem TEDE)	ECCS Leakage (Rem TEDE)	MSIV Leakage (Rem TEDE)	Shine (Rem TEDE)	Total (Rem TEDE)
1	Base Case (as submitted): RERS mixing and filtration starting at 3 minutes post-LOCA.	2.487	0.006	0.611	1.78	4.884
2	RERS mixing (50%) at 3 minutes, assuming no RERS filtration to SGTS for 15.5 minutes.	2.503	0.006	0.611	1.78	4.900
3	Step-wise mixing: No mixing for first 10 minutes, stepping up from 28.8% at 10 minutes to 86.9% at 60 minutes in five subsequent steps using mixing results from Calc M-76-07, but remaining at 86.9% from 60 minutes to 720 hours. (The number of total time steps is limited by RADTRAD.) RERS filtration to SGTS starts at 3 minutes post-LOCA	1.914	0.006	0.611	1.78	4.311

In all previous LGS submittals in which mixing credit has been approved, 50% mixing was always assumed from the time RERS was credited (3 minutes post-LOCA) without a graduated build-up of the mixing to the 50% value.

Conclusion:

Based on the above information, the submitted analysis (Case #1) with the assumption of a constant 50% mixing throughout the accident is conservative. If a stepwise but still conservative mixing scheme were used, the dose would be lower due to mixing rates eventually being greater than 50% as per Case #3 above.

In summary, RERS-based mixing and filtration during the drawdown period is justified based on:

- the high volume mixing provided by the RERS system,
- the conservatism in assuming only 50% mixing over the duration of the event,
- the in-duct and plenum mixing of recirculated air,
- the filtration of return supply air,
- the wide distribution of supply and exhaust registers,
- in-compartment mixing due to natural and forced circulation by fan coolers,
- general separation between release points and exhaust points,
- the small fraction of RERS flow exhausted compared to that recirculated.

4. Please provide the technical basis for an apparent change in the licensing basis for the RERS organic filter efficiency from 30 percent to 95 percent. The Safety Evaluation Report, issued on September 22, 2000, as a result of Generic Letter 99-02, authorized a change in test requirements for carbon filter testing based on the adoption of the American Society for Testing and Materials (ASTM) D3803 as the test protocol. It did not address licensing basis assumptions used in design basis accident analyses for the RERS filter efficiency for organic iodine, which appears to still be 30 percent (see Updated Final Safety Analysis Report Table 15.6-13). The NRC staff is concerned that the RERS does not have heaters and has an exception to test at 70 percent relative humidity in lieu of the 95 percent relative humidity specified in ASTM D3803. Testing at the higher relative humidity of 95 percent would remove that exception and facilitate acceptance of the change.

EXELON RESPONSE

It is Exelon's position that the use of the RERS filter efficiency of 95% for elemental iodine and 95% for organic iodide, while testing at a humidity level of 70%, is appropriate and consistent with current regulatory guidance.

<u>Original Design/License Bases:</u>

Each LGS unit has two 100% capacity Reactor Enclosure Recirculation Systems (RERS) located within the reactor enclosure secondary containment. The RERS is a safety related, engineered safety feature (ESF) ventilation system that recirculates and filters the secondary containment atmosphere following a Design Basis Accident (i.e., LOCA). The RERS is normally in the standby mode and is activated when a secondary containment isolation occurs. While in the standby mode, the filter trains are isolated from the secondary containment atmosphere and a purge of dry instrument air is provided to the filter housings for moisture control.

The RERS was designed in accordance with the requirements of NRC Regulatory Guide 1.52, Revision 002, dated March 1978. Per Table 2 of this Reg Guide, for a 2 inch deep carbon bed designed to operate outside of primary containment with relative humidity controlled to 70%, an activated carbon decontamination efficiency of 95% for elemental iodine and organic iodide can be assigned. This table also specified that the laboratory testing of carbon samples must be at a 70% relative humidity. LGS was licensed in 1985 utilizing a RERS carbon filter decontamination efficiency of 95% for elemental iodine and organic iodide and a test relative humidity of 70%. Additionally, LGS provided the NRC, along with the license submittal, technical justification supporting the position that the air entering the RERS will be less than 70% relative humidity and that heaters for relative humidity control were not necessary.

In the original NRC Safety Evaluation Report (SER), the NRC stated that the RERS design was consistent with the GDC 41, 42, 43, 61 and 64 requirements as specified in the Standard Review Plan (SRP) and found the system acceptable. Additionally, on page 6-62 of the SER, the NRC specified that the staff assigned the system decontamination efficiencies of 90% for elemental iodine and 30% for organic iodide for the RERS charcoal adsorbers in accordance with Table 2 of RG 1.52. (Note: per Table 2 of Reg Guide 1.52, decontamination efficiencies of 90% elemental and 30% organic are typically assigned for 2-inch carbon filter systems designed to operate inside primary containment with no relative humidity value specified).

In the SSER-3 for a license change associated with the Unit 2 startup, the NRC again specified (on page 15-9) the assumptions used to evaluate the LOCA associated with RERS as 90% elemental, 30% organic and 99% particulate.

<u>Design Change History:</u>

A. Inleakage/Drawdown Time

On Sept. 27, 1996 LGS submitted a Technical Specification change request to the NRC in support of a change to the existing reactor enclosure secondary containment leakage rate (from 1250 cfm to 2500 cfm) and drawdown time (from 140 seconds to 930 seconds) following a DBA. In support of this license change request, the on-site and off-site dose analysis was revised. As part of this revision and to be consistent with previous NRC dose assumptions, the analysis was performed based on a RERS elemental iodine efficiency of 95%, an organic iodide efficiency of 30% and 99% efficiency for particulates. (Note: the design assumptions of 95% / 30% / 99% as specified in this Technical Specification change still differs from the NRC assumptions of 90% / 30% / 99% previously stated in the original SER).

As part of this change, Table 15.6-13 of the LGS UFSAR was also revised to change the assumed RERS filter efficiencies from 95% / 95% / 99% to 95% / 30% / 99% for elemental, organic and particulates utilized in the LOCA analysis.

On Feb 11, 1997 the NRC approved the Technical Specification Change request. In the Safety Evaluation, the NRC stated that they recalculated the off-site and on-site radiological consequences based on current TID-14844 source terms and previous assumptions and parameters. The NRC recalculation showed that the doses still meet the dose guidelines set forth in 10 CFR Part 100.

B. Generic Letter 99-02

On Nov 5, 1999 LGS submitted a Technical Specification change request to the NRC in response to Generic Letter No. 99-02. In this request, LGS changed the testing protocol to ASTM D3803-1989 per the direction specified in the GL. A dose analysis was not needed to support this submittal. Note, the submittal did restate the original design requirement and commitment that the RERS carbon samples would be tested at a relative humidity of 70%. This value (70%) was allowed by the GL for those plants with heaters or analysis previously approved by the NRC.

On Sept 19, 2000 the NRC approved the Technical Specification change request and response to GL 99-02. In the Safety Evaluation, the NRC stated that relative humidity for the RERS of 70%, even though there are no heaters, is acceptable and consistent with the actions requested by the GL.

<u>Discussion</u>

In support of the proposed Technical Specification changes submitted to the NRC in response to AST, the on-site and off-site dose analyses were revised to address the alternative source terms. As part of this re-analysis, the assumed RERS carbon filter efficiency was changed from the current 95% / 30% / 99% value to 95% / 95% / 99%. The assumed efficiency for organic iodide was changed from 30% to 95% and was indicated in the submittal.

Prior to implementation of the proposed Technical Specification changes resulting from AST, the LGS UFSAR will be revised to address the change in the assumed organic iodide efficiency from 30% to 95%.

Per previous commitments to GL 99-02, LGS carbon samples are tested in accordance with the requirements of ASTM D3803-1989. A review of this standard indicates that the test will be performed at the designated relative humidity specified by the client. For LGS, this relative humidity is 70%. It is Exelon's position that testing to this value is appropriate and consistent with the design and licensing basis. The basis for this value is as follows:

- The LGS RERS was designed and licensed in accordance with the requirements of Regulatory Guide 1.52, Rev. 002 –1978, which specifies for a 2-inch carbon filter outside of primary containment, the samples must be tested at a relative humidity of 70%. The Reg Guide does not provide any option to utilize 95% relative humidity for testing.

- The 70% relative humidity testing value has been in the LGS UFSAR since initial startup and was clearly reiterated in the Technical Specification changes submitted to the NRC in Sept 1996 and Nov 1999. A review of the resultant NRC Safety Evaluations both indicated no issues with the 70% relative humidity.

The RAI indicates that the staff is concerned that the RERS does not have heaters and has an exception to test at 70% relative humidity in lieu of the 95% relative humidity specified in ASTM D3803-1989. The RERS is not normally in operation and while the filter trains are isolated, a dry air purge is provided to the filters for moisture control as described in Section 6.5.1.3.2 of the UFSAR. Please note that during the initial licensing phase for LGS, considerable technical information was provided to support the basis that the RERS does not need to have heaters and that the relative humidity would be less than 70%. This information is presently incorporated in Section 6.5.1.3.3 of the UFSAR. This position was accepted by the NRC as part of the initial licensing phase and again as stated in the NRC Safety Evaluation, dated Sept. 19, 2000 in response to the LGS GL 99-02 submittal. In Section 3.1 of the Safety Evaluation the NRC states the following; "In accordance with Section 6.5.1.3 of the UFSAR, the relative humidity (RH) for the RERS will not exceed 77% during normal operation and will decrease below 70% post-LOCA due to the increase in heat to the reactor enclosure structure. Therefore, the proposed RH of 70% for the RERS is acceptable because the RH will be less than or equal to 70% during accident conditions". Additionally, we believe that testing to 70% is not an exception to ASTM D3803-1989. A review of GL 99-02 indicates that testing to either a relative humidity of 70% or 95% was an allowable option and not an exception.

In summary, the use of the 95% filter efficiencies for elemental and organic iodides and testing for these efficiencies at 70% RH level is appropriate. The requested licensing basis change for the RERS organic iodide filter efficiency from 30% to 95% is included as part of the AST submittal and is consistent with the LGS commitments to Reg. Guide 1.52, Revision 002.

ATTACHMENT 2
LIMERICK GENERATING STATION
UNITS 1 AND 2

Docket Nos. 50-352
50-353

License Nos. NPF-39
NPF-85

Supplement to License Amendment Request for
"LGS Alternative Source Term Implementation"

Summary of Additional Commitments

SUMMARY OF ADDITIONAL EXELON COMMITMENTS
LIMERICK GENERATING STATION, UNITS 1 & 2

The following table identifies commitments made in this document by Exelon. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"	COMMITMENT TYPE	
		ONE-TIME ACTION (Yes/No)	Programmatic (Yes/No)
Prior to implementation of the proposed Technical Specification changes resulting from AST, the LGS UFSAR will be revised to address the change in the assumed RERS organic iodide efficiency from 30% to 95%.	Prior to Implementation of AST	No	Yes