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10 CFR 50.90

June 23, 2006

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

Limerick Generating Station, Unit 2
Facility Operating License No. NPF-85
NRC Docket No. 50-353

Subject: Response to Request for Additional Information
Exigent License Amendment Request
Proposed One-Time Change to the Drywell Average
Air Temperature Limit - Technical Specification 3.6.1.7

References:

(1) Letter from P. B. Cowan, Exelon Generation Company, LLC, to U. S. Nuclear Regulatory Commission, License Amendment Request, "Exigent License Amendment Request; Proposed One-Time Change to the Drywell Average Air Temperature Limit - Technical Specification 3.6.1.7," dated June 9, 2006.

(2) Telecon between J. Kim, U.S. Nuclear Regulatory Commission, and G. Stewart, Exelon Generation Company, LLC, dated June 22, 2006.

In Reference 1, Exelon Generation Company, LLC (Exelon), requested a one-time change to the Technical Specifications (TS), Appendix A, of Facility Operating License No. NPF-85 for Limerick Generating Station (LGS), Unit 2. The proposed one-time change would revise TS Limiting Condition for Operation (LCO) 3.6.1.7 concerning drywell average air temperature. Specifically, the proposed change would add a footnote to the TS limit for drywell average air temperature of 145 degrees Fahrenheit (°F) to allow continued operation of LGS, Unit 2, with drywell average air temperature no greater than 148°F for the remainder of the current operating cycle (Cycle 9), which is currently scheduled to end in March 2007, or until the next shutdown of sufficient duration to allow for unit cooler fan repairs, whichever comes first.

As indicated in Reference 1, the impact of localized elevated temperatures within the LGS Unit 2 drywell, due to the out-of-service 2D-V212 drywell unit cooler, has been evaluated. In Reference 2, the NRC requested that a copy of the technical evaluation of the localized elevated drywell temperatures be formally submitted to the NRC. The enclosure to this letter provides a copy of the technical evaluation without attachments as discussed in a follow-up telecon on June 23, 2006.

Exelon has concluded that the information provided in this response does not impact the conclusions of the: (1) Technical Analysis, (2) No Significant Hazards Consideration under the standards set forth in 10 CFR 50.92(c), or (3) Environmental Consideration as provided in the original submittal (Reference 1).

There are no regulatory commitments contained within this letter. If you have any questions or require additional information, please contact Glenn Stewart at 610-765-5529.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of June 2006.

Respectfully,

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

Enclosure: Technical Evaluation - Impact of the Unit 2 Drywell Atmosphere Having Localized Elevated Temperatures Exceeding 150 Degrees F.

cc:	Regional Administrator - NRC Region I	w/ enclosure
	NRC Senior Resident Inspector - Limerick Generating Station	"
	NRC Project Manager, NRR - Limerick Generating Station	"
	Director, Bureau of Radiation Protection - Pennsylvania Department of Environmental Protection	"

ENCLOSURE

EXIGENT LICENSE AMENDMENT REQUEST

LIMERICK GENERATING STATION, UNIT 2
DOCKET NO. 50-353

REQUEST FOR ADDITIONAL INFORMATION

TECHNICAL EVALUATION
(AR No. 00473983, Assignment 04)

IMPACT OF THE UNIT 2 DRYWELL ATMOSPHERE HAVING LOCALIZED ELEVATED TEMPERATURES EXCEEDING 150 DEGREES F.

Assignment Report

Assign #: 04 **AR #: 00473983**

Aff Fac:	Limerick	**Assign Type:**	ACIT	**Status:**	COMPLETE
Priority:		**Assigned To:**	U006MJM	**Due Date:**	06/06/2006
Schedule Ref:		**Prim Grp:**	A5252NESD	**Original Date:**	05/01/2006
Unit Condition:		**Sec Grp:**			

Assignment Request

Subject/Description: Perform technical evaluation on DW unit coolers

Assignment Completion

In Progress Notes:

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TECHNICAL EVALUATION
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This evaluation was prepared in accordance with the requirements of Procedure CC-AA-309-101, Revision 007 and HU-AA-1212, Revision 000.
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Document No. AR # 00473983, Assignment 04
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Title: Impact of the Unit 2 Drywell atmosphere having localized "elevated temperatures" exceeding 150 Degrees F.
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I. REASON/SCOPE:
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The Unit 2 drywell air cooling system was designed to limit the air temperature inside the drywell during normal operation to an average of 150 Degrees F, with the maximum not to exceed 150 Degrees F in areas containing equipment which requires environmental qualification and not to exceed 160 Degrees F in other areas. Currently, there are two localized spots within the Unit 2 drywell that are experiencing air temperatures greater than 150 Degrees F; 1) Elevation 320', azimuth 345 (TE-077-202C) is approximately 202 Degrees F and 2) Elevation 320', azimuth 225 (TR-057-210) is approximately 167 Degrees F. These elevated temperatures have been experienced since early April 2006.
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The reason for these localized areas within the Unit 2 drywell exceeding 150 Degrees F is due to the fact that the 2D-V212 drywell unit cooler is not in service due to problems associated with both of its fans. Additionally, with the 2D-V212 unit cooler not in service, the drywell average air temperature increased from approximately 129 Degrees F to approximately 142 Degrees F. This unit cooler (2D-V212) is designed to supply and return air from the upper portions of the drywell.
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Engineering has been requested to evaluate the impact that these elevated temperatures have on the design and function of the Unit 2 drywell and the supporting structures, systems and components (SSC's). Specifically, this review should include the following aspects, as a minimum:
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1. Impact on the environmental qualification of components.
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2. Impact of other mechanical equipment within these areas that are not subjected to EQ requirements.
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3. Impact on snubbers (mechanical and hydraulic)
.
4. Impact on electrical items (i.e. cable, conduit, raceways).
.
5. Impact of the elevated localized temperatures on the initial condition for the Design Bases Accident LOCA and resultant maximum accident temperatures.

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6. Impact on the containment liner, structural steel and concrete in the areas of the elevated temperatures.
.
7. Impact of the temperature gradient across the concrete containment structure at the location of the elevated temperatures and the possibility of elevated stresses and structural degradation and cracking.
.
These two localized elevated temperature spots will remain until the 2D-V212 unit cooler fans are repaired and the unit cooler is returned to service. This work is currently scheduled for the 2R09 Refueling Outage or next appropriate opportunity.
.
For the various reviews that need to be performed, an elevated temperature of 210 Degrees F (Elevation 320', Az. 345) and 175 Degrees F (Elevation 320', Az. 225) will be assumed in order to provide operating margin and conservatism. The review is bounded between areas 13, 14 and 17 on elevation 320' and includes 10 feet above and below the specified elevated temperatures elevation of 320'. This bounded area was determined based upon a review of the existing temperatures within the drywell, the existing unit cooler air flows throughout the drywell and engineering judgment. The bounding temperatures of 210 Degrees F and 175 Degrees F were determined based upon the fact that LGS has typically experienced an increase in the drywell average air temperature of 2-4 Degrees F during the summer months which will also result in an increase in the noted elevated temperatures. Adding 8 degrees to the noted elevated temperatures for this evaluation bounds any expected temperature increase during the summer months.
.
A HU-AA-1212 review was performed for this evaluation and a Risk Rank of 2 was determined utilizing the guidance provided. This risk rank requires an "Independent Third Party Review" by an A/E, Consultant, or of-site Specialists. For this Technical Evaluation, this review will be done by Engineering at Kennett Square.
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II. EVALUATION:
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A. DESIGN BASIS
.
The drywell air cooling system is designed to remove heat from the drywell during normal plant operation (non-safety related function) and to maintain air circulation and a thoroughly mixed condition under accident conditions (safety related function). The system is currently designed to limit the temperature inside the drywell, during normal plant operation, to an average of 150 Degrees F, with the maximum not to exceed 150 Degrees F in areas containing environmentally qualified equipment and not to exceed 160 Degrees F in other areas (UFSAR Section 9.4.5.2.1). Additionally, the current design annual average air temperature used for equipment qualified life is 145 Degrees F.
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The drywell air cooling system is designed to limit the temperature inside the drywell, in the event of a loss of offsite power and reactor scram, to 186 Degrees F in the general areas and 210 Degrees F in the area below the vessel. This system is also designed to prevent concrete structures within the primary containment from exceeding their maximum design temperature during normal plant operation (UFSAR Sections 3.8.6.b.4 and 9.4.5.2.1).
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The drywell air cooling system includes eight unit coolers, each of which contains two redundant cooling coils and fans. During normal operation one fan in each unit cooler is in service delivering a total of 56,000 cfm of conditioned air at a temperature of approximately 78 Degrees F to the various elevations within the drywell. Cooling water is supplied by the drywell chilled water system at a design rate of 105 gpm per cooling coil.

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Unit coolers 2A-V212, 2B-V212, 2G-V212 and 2H-V212 are in operation after a LOCA to maintain the drywell atmosphere in a thoroughly mixed condition and are considered safety related. Unit coolers 2C-V212, 2D-V212, 2E-V212 and 2F-V212 are not safety related.
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Technical Specification 3.6.1.7 specifies that the drywell average air

temperature shall not exceed 145 Degrees F during OPERATIONAL CONDITIONS 1,2 and 3. With a temperature greater than 145 Degrees F, reduce the temperature to within the limit within 8 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. The supporting Technical Specification Basis states that the limitation on drywell average air temperature ensures that the containment peak air temperature does not exceed the design temperature of 340 Degrees F during steam break conditions and is consistent with the safety analysis.

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B. REGULATORY BASIS

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On June 1, 2001 Exelon submitted License Amendment Request No. 99-01766, to the NRC, which requested a change to Section 3.6.1.7 of the LGS Technical Specifications to change the average air temperature within the drywell during normal operation from 135 Degrees F to 145 Degrees F. On May 8, 2002, Exelon received approval from the NRC for the requested change in the drywell average temperature during normal operation. Note, although the drywell average air temperature was increased, the requirements for localized elevated temperatures, 150 Degrees F in areas requiring environmental qualification and 160 Degrees F in other areas, were not changed.

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C. ANALYSIS:

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1. IMPACT ON THE ENVIRONMENTAL QUALIFICATION OF COMPONENTS

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A review of the impact on the environmental qualification of components within the bounded area with the elevated temperatures has been performed. Utilizing the PIMS data base, a listing (Attachment 5) of all of the environmentally qualified components within the unit 2 drywell was created and was reviewed for those components located within the bounded area. The review determined that there is no EQ equipment in the above specified bounded area (with the nearest component being at elevation 286'). Therefore, no EQ equipment is affected by these localized elevated temperatures.

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It should be noted that beyond the above specified bounded area one other elevated temperature above 150 Degrees F was identified (TE-077-202B, which is located on elevation 320' Az. 125 read 154 Degrees F). However, this temperature element, due to its close proximity to a main steam line, has been previously evaluated and removed from the drywell volumetric average air temperature computation and is not used as an indicator of localized temperatures. (See Reference 9).

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2. IMPACT ON MECHANICAL EQUIPMENT

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A review of the impact on mechanical components within the bounded area with the elevated temperatures was performed. Attachments No.1 and 3 are listings of the mechanical components identified. This list indicates that other than snubbers (20 total), there are no active safety related components within the bounded area. Three motor operated valves (HV-041-2F001, HV-041-2F002 and HV-041-2F005) were identified as performing a passive safety related function. The passive function of these three motor operated valves has been judged to be unaffected by the localized elevated temperatures based upon a review of design and qualification documents (Reference 21) which showed that they can operate in the current environmental conditions. Additionally, the 5 other passive safety related manual valves, 1 passive safety related flow orifice and 2 safety related variable supports were also judged to be unaffected based upon a review of vendor documentation which showed that all of these components had a designed temperature of at least 500 Degrees F. The 10 non safety related temperature elements have been evaluated and determined that their individual operation is not critical to plant operation so that the presence of elevated temperatures will not impact the function of any safety related equipment.

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Based on the above, the elevated temperatures will not negatively impact the performance of any safety related mechanical component within the drywell.

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3A. PSA (MECHANICAL) Snubbers:
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All PSA snubbers installed in the Unit 2 drywell contain grease (type NRRG-159) for lubrication of internal rotational devices such as capstan springs, thrust bearings and the ball-screw shaft. Basic-PSA (snubber vendor) has provided temperature vs. time charts that depict the effect of increased temperature on each type of snubber (Reference 16). LGS uses two sizes of snubbers, PSA-1 and PSA-3.
.
In general, mechanical snubbers are qualified for continuous operation at 150 Degrees F for a 40 year design life. Given a temperature increase to 210 Degrees F until 2R09, the remaining service life for the PSA-1 size is approximately 1.9 years and for the PSA-3 size is approximately 10 years as determined by the temperature vs. time charts (Reference 16). Therefore both sizes of the PSA mechanical snubbers will provide adequate support and function until the 2R09 outage. However, as a minimum, the following PSA-1 size snubbers should be removed, regreased, and reinstalled during 2R09; 1) DCA-408-E01-H001, 2) DBA-208-E02-H001, 3) DBA-208-E02-H010 and 4) DBA-208-E02-H011. The PSA-3 size snubbers do not require any regreasing in 2R09 due to the elevated temperature issue since they are already scheduled for regreasing in 2R09 as part of the normal maintenance process.
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3B. LISEGA (Hydraulic) Snubbers:
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All Lisega snubbers contain stainless steel components, AK350 hydraulic fluid, and viton seals. These snubbers are rated for continuous operation at 176 Degrees F for 21 years. There are only three snubbers affected by the elevated temperature of 210 Degrees F in area 13C on elevation 320'. These snubbers are; 1)DCA-293-E01-H002, DCA-293-E01-H003 and DCA-421-E02-H003. Through discussion with Lisega personnel (Reference 20), it was determined that the effect of the elevated temperature (210 Degrees F for approximately 12 months vs. 176 Degrees F for continuous operation) will not significantly affect the service life of these snubbers. However, the impact on selected individual snubber components are still evaluated below.
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a. The stainless steel components are unaffected by the increase in temperature and, in fact, remain unaffected at temperatures much greater than 210 Degrees F. The Viton seals will not be affected by the 210 Degrees F condition for the next 12 months since the viton material will remain fully elastic indefinitely when exposed to 400 Degrees F temperatures (Reference 17).
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b. Analysis has showed that the AK350 hydraulic fluid will show some signs of decreased viscosity. The elevated temperatures will have the effect of decreasing the viscosity of the AK350 hydraulic fluid from approximately 125 millimeters squared per second to approximately 87 millimeters squared per second and thereby, increasing the response time for lock-up and bleed rates.(Reference 18). The fluid will show an increase in the lock-up velocity of 2.04 inches per minute (ipm) above the upper end of the acceptance criterion of 14.2 ipm, and a bleed rate of 0.272 ipm above the upper end of the acceptance criterion of 4.7 ipm. This increase in the response times is considered by Engineering to be negligible and should not affect the ability of the snubber to respond when in service during normal operation or DBA's.
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Therefore, the Lisega snubbers will provide adequate support and function until the 2R09 outage and this short time exposed to the elevated temperatures, does not affect the snubber service life.
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4. IMPACT ON ELECTRICAL ITEMS
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The cable raceway drawings within the bounded area with the elevated temperatures were reviewed to identify the specific cables and electrical equipment. This review indicated that there are 52 cables (Attachment 2) in the area and no electrical equipment. The temperature rating for the Limerick standard cable is 90 Degrees C or 194 Degrees F (UFSAR Section 8.3.1.1.7).
.
While the rating of the cable has an ambient temperature component, the

insulation rating is normally applied to current carrying ability of power cables having heat rise or for cables in raceways with power cables. The cables found in the bounded area are mostly instrumentation or used for equipment not required during normal operation. Cable insulation has a maximum ambient operating temperature. For standard cables at Limerick, the maximum temperature is 194 Degrees F. The National Electric Code prohibits the usage of cables in areas above its rated ambient maximum temperature and derating factors are not commonly available above a cable's rated maximum temperature. Therefore, the conservative assumption is to assess these cables for failure.

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a. Four cables are abandoned in place and not in use.

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b. Four cables are spares and not in use.

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c. Six cables are used for welding and not during operation.

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d. Two cables are only used for ILRT during outages.

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e. Twelve cables are used to measure vessel and head flange temperature. These are not needed for operation.

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f. Six cables are used for the three head vent valves. While these valves do not have an active safety related function, a failure of the cable may cause a hot short, which may change the valve position. Compensatory action has been developed to open the feeds to these valves (Reference 22).

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g. Sixteen cables are used to monitor drywell temperatures and process/component temperatures. Some of these are spare. While these cables are used during operation, their individual operation is not critical to plant operation and their failure is usually obvious. No actions are recommended for these 16 cables.

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h. One cable is used to monitor feedwater line "B" temperature into the reactor. This cable is used for performance monitoring and is not critical to plant operation. While a loss of this cable is inconvenient, there are other feedwater temperature elements available.

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i. One cable is used to monitor feedwater nozzle N4D. This is for long term trending and not required for operation.

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j. There are no power cables (i.e. ones that contribute heat rise) that would normally be derated for ampacity considerations.

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The 52 cables identified within the bounded area with the elevated temperatures are not critical to plant operation or the response of the plant to an accident conditions. While it is not recommended to operate outside of the cable rating, these cables are for the most part, not load carrying with most used for temperature elements. Two recommendations are provided for consideration: 1) Open the feeds to the head vents to ensure that no inadvertent actuation will occur due to a potential hot short and 2) Verify cable insulation integrity via a megger of the 6 cables associated with the head vent valves at the next convenient opportunity but not later than the 2R09 outage.

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5. IMPACT ON DBA LOCA AND MAXIMUM ACCIDENT TEMPERATURE

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The drywell average air temperature is an assumed initial condition used for the design analyses related to the Primary Containment and the equipment contained within the primary containment during normal operating conditions and following Design Bases Accidents (DBA's). A review of Table 6.2-4A (Titled: LGS Power Rerate Containment Analysis) of the UFSAR shows that the assumed initial drywell temperature for both the short-term and long-term analyses is 150 Degrees F with a resultant maximum peak temperature of 340 Degrees F. Additionally, the Exelon and GE analyses that were performed in support of the Tech. Spec. Drywell Average Air Temperature change from 135 Degrees F to 145 Degrees F, via ECR 99-01766 (Reference 6), were reviewed and found to also specify an initial drywell

temperature of 150 Degrees F. However, both the noted UFSAR table and the referenced Exelon and GE analyses do not address localized elevated temperatures as an initial condition. These analyses were based solely on an initial drywell average air temperature of 150 Degrees F. A review of the LGS UFSAR did not identify any other accident analysis which specifically considered localized elevated temperatures as an input. Additionally, the original NRC Safety Evaluation Report (SER) and supplements were reviewed and none were found to specifically identify any initial drywell elevated temperatures above 150 Degrees F utilized in any of their analyses.
.
The presence of elevated temperatures at two locations within the drywell is not adding additional heat to the cooling load within the drywell but is only a result of less cooling capability due to the 2D-V212 unit cooler being out of service. Even with these elevated temperatures, the drywell average air temperature is still being maintained below the Technical Specification operating limit of 145 Degrees F. Furthermore, following a DBA, no credit for any drywell air cooling unit coolers is taken so that if the initial drywell average air temperature condition (150 Degrees F maximum) is satisfied, the resultant post accident peak temperature of 340 Degrees F will not be exceeded.
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6. IMPACT ON CONTAINMENT LINER, STRUCTURAL STEEL AND CONCRETE
.
The localized elevated temperatures evaluated were limited to the upper elevations of the drywell. The impact of these elevated temperatures on the drywell structural components including the liner plate have been addressed and is documented in a structural computation (Attachment 4). Based on this computation, the structural components remain qualified. Additionally, calculation LS-0231 was previously generated to address the impact on the containment structural components when raising the drywell average air temperature from 135 Degrees F to 150 Degrees F. Since the drywell average air temperature will still be maintained below 150 Degrees F, the results and conclusions from calculation LS-0231 remain valid.
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7. CONCRETE CONTAINMENT STRUCTURE TEMPERATURE GRADIENT
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An engineering computation (Attachment 4) has been performed to determine the impact of the increased temperature gradient for the bounded area affected by the localized elevated temperatures. This computation determined that the structural elements within the drywell remain qualified and capable of performing all their intended functions.
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III. CONCLUSION:
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Based upon the impact reviews performed as described above, it is acceptable to continue operation of Unit 2 until the 2R09 outage with two localized areas within the drywell experiencing temperatures above the UFSAR allowable limit. These reviews have concluded that the ability of safety related structures, systems, and components (SSC's) will not be adversely affected.
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ACTIONS:
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1. PSA-1 Snubbers (DCA-408-E01-H001, DBA-208-E02-H001, DBA-208-E02-H010 and DBA-208-E02-H011) need to be added to the 2R09 Outage scope for regreasing.
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2. Open feeder breakers to head vent valves HV-041-2F001, HV-041-2F002 and HV-041-2F005 to eliminate potential for a hot short condition.
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3. Verify cable insulation integrity via a megger of the 6 cables (20B22534A/C, 20B22535A/C and 20B22634A/C) associated with the head vent valves.
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IV. REFERENCES:
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1. P&ID M-0077, SHT. 0002, Rev. 0005 "Drywell Cooling"
2. Technical Specification Sections 3.6.1.5 and 3.6.1.7
3. UFSAR Sections 3.8.1, 3.11, 3.8.6.b.4, Table 3.8-3, 6.2.1.1, 6.2.1.8, Table 6.2-4A, Table 6.2-5, Table 6.2-5A, 8.3.1.1.7, 9.4.5.2 and

Fig 9.4-8
4. DBD L-S-08F, Rev. 004 "Drywell Air Cooling System"
5. DBD L-T-02, Rev. 000 "Containment"
6. ECR 99-01766, Rev. 000 "Analyze Increasing DW Temperature"
7. ECR 00-01781, Rev. 000 "Analyze Increasing DW Temperature"
8. Spec. M-171, Rev. Rev. 016 "Environmental Services"
9. ST-6-107-590-2, Rev. 102 "Daily Surveillance Log"
10. Dwg. M-306, Rev.011 "U2 Drywell Plan - 295'"
11. Dwg. M-307, Rev.008 "U2 Drywell Plan 310'"
12. Dwg. M-316, Rev.036 "U2 Drywell Sections"
13. Dwg. M-326, Rev.032 "U2 Drywell Section"
14. AR 00483585 "Local Drywell Temperatures"
15. NRC Safety Evaluation Report (SER), dated 8/1983 and Supplements
16. Basic-PSA Snubbers, DR 3020, Revision 002
17. PSP Inc. Webpage on Viton Properties
18. Silicone Fluids AK Paper
19. Calculation LS-0231, Revision 000 (Structural Impact)
20. E-MAIL, DATED 05/10/06, LISEGA Inc. To Exelon (M. Karasek)
21. SDOC's L-200-VC-00003 (Limitorque qual Type Test Report) and E-024-00001 (Qualification Test Report)
22. A/R A1559865, Eval 03 (OP-EVAL OP-06-004)

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V. ATTACHMENTS:

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1. List of Mechanical Items used for the review (1 Page)
2. List of electrical cables within designated areas (2 Pages)
3. List of Snubbers within designated areas (1 Page)
4. Computation (Structural, Concrete Impact) (24 Pages)
5. List of EQ Components in Unit 2 Drywell (22 Pages)
6. E-Mail LISEGA Inc. to M. Karasek, Dated 05/10/06

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VI. APPROVALS:

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Prepared By: Michael J. McGill - Lead (Mechanical)
Joe E. Mittura (Electrical)
Kevin L. Walters (Electrical)
Niranjan Roy (Environmental Qualification)
Jagdish L. Nurula (Structure, Concrete, Liner)
Michelle Karasek (Snubbers)

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Independent Reviewers:

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Dave T. Clohecy (Structural, Concrete, Liner)
Greg L. Curtin

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I (GLC) have independently reviewed this technical evaluation in accordance with the procedural requirements of CC-AA-309-101, Rev 007, section 4.3.1. From the information provided and reviewed, the reviewer agrees with the conclusion of this evaluation and that this evaluation adequately addresses the technical issues (DBA pressure and temperature and mechanical equipment, electrical equipment, structures and component qualification at higher temperatures) to ensure that the increased drywell temperature in the subject locations due to the loss of both the 2D drywell unit cooler will have no injurious affects on the impacted SSC's or the inputs into the DBA analysis.

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Third Party Reviewers:

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Jeff Estermann
Dan Fiorello
Zvi Eisenberg

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Approved By: H. J. Ryan LERT Branch Manager

Completion Notes: