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10 CFR 50.90

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August 12, 2010

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

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

Subject: Additional Information Supporting Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate

References:

1. Letter from M. D. Jesse (Exelon Generation Company, LLC) to U. S. NRC, "Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated March 25, 2010

2. Letter from P. Bamford (U. S. NRC) to M. J. Pacilio (Exelon Generation Company, LLC), "Limerick Generating Station, Unit Nos. 1 and 2 – Request for Additional Information Related to Request for License Amendment Regarding Measurement Uncertainty Recapture Power Uprate," dated July 15, 2010

In Reference 1, Exelon Generation Company, LLC (EGC) requested an amendment to Facility Operating License Nos. NPF-39 and NPF-85 for Limerick Generating Station (LGS), Units 1 and 2, respectively. Specifically, the proposed changes revise the Operating License and Technical Specifications to implement an increase in rated thermal power of approximately 1.65%. In Reference 2, the NRC requested additional information to support review of the proposed changes. In response to this request, EGC is providing the attached information.

EGC has reviewed the information supporting a finding of no significant hazards consideration and the environmental consideration provided to the NRC in 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

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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. Kevin Borton at (610) 765-5615.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 12th day of August 2010.

Respectfully,

Michael D. Jesse
Manager, Licensing – Power Uprate
Exelon Generation Company, LLC

Attachment: Response to Request for Additional Information

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

ATTACHMENT

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

NRC Request 1

The Power Grid Uprate Voltage Analysis for LGS (Attachment 12) of the LAR did not consider a LGS dual unit trip scenario and its impact on grid stability after the increased loading of the power uprate. Explain in detail why a LGS dual unit trip scenario after uprate was not considered and analyzed.

Response

The Power Grid Uprate Voltage Analysis did not study a dual unit trip scenario, since this is not part of the Limerick Generating Station (LGS) licensing and design basis. The Power Grid Uprate Voltage Analysis studied the loss of one Limerick Generating Station (LGS) unit with the other unit shut down. This is discussed in the Power Grid Voltage Analysis in several sections, including Section 1, "Executive Summary," Section 3.1, "Voltage Magnitude and Voltage Drop," and Section 4, "Conclusion." Note that the loss of one LGS unit as modeled in this study includes a loss of coolant accident (LOCA), as described in the Power Grid Voltage Analysis, Appendix B, Section 1.3.4, "One LGS Unit Trip with LOCA and Other Unit Shutdown."

Consideration of a LOCA on one unit and a shutdown of the other unit is consistent with the licensing and design basis for the offsite electrical power system for LGS, Units 1 and 2, which is that the capacity of each offsite power supply is sufficient to operate the loads required for safe shutdown of both units with a loss of coolant accident (LOCA) in one unit and a simultaneous safe shutdown of the other unit. This basis is discussed in the LGS Updated Final Safety Analysis Report, Section 8.1.6.1.6, "Regulatory Guide 1.32 (February 1977) - Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants," and throughout UFSAR Chapter 8.

NRC Request 2

In the LAR, Attachment 1, Section 3.4.1, the licensee concludes that there will be a minor increase in normal power system loads. Provide a detailed discussion demonstrating that the minor increase in normal power system loads due to the uprate will not impact the degraded voltage relay (DVR) allowable value for loss of power covered by LGS, Unit 1 and 2, TS 3/4.3.3, Table 3.3.3-2.

Response

Load changes under thermal power optimization (TPO) conditions are associated with running horsepower (hp) for condensate pump motors. The projected increase is 43 hp for each of the three running pump motors (per operating unit), from 4094 to 4137 hp, each. The TPO value is bounded by the analysis value used for electrical load flow analyses of 4410 hp (= 0.98 x 4500 hp) in the degraded voltage analysis.

In addition, there is a small added station electrical load associated with introduction of the LEFM Checkplus system (one per operating unit). This load is at 120V and serves an air conditioning unit, power conditioning equipment (UPS), computer boards, and the LEFM meter cabinet. This power is supplied from the non-safety related panels. During the design, a load change evaluation was performed and it was determined the increased loads on the panels were bounded by the transformer ratings used in the evaluation.

Thus, there are no required changes to the electrical load flow analysis associated with degraded voltage since analytical values used as input remain bounding. Similarly, there is no required change to the DVR allowable value.

NRC Request 3

In the LAR, Attachment 1, Section 3.4.1, the licensee concludes that there will be small increases in normal operational radiation levels. Discuss in detail how the small increases in normal operational radiation levels will not affect the existing equipment qualification (EQ) per 10 CFR 50.49.

Response

Normal operation radiation levels used in the specification of integrated radiation dose for the EQ program are based on bounding reactor operating pressure (1068 psia), power level for Stretch Power Uprate (SPU) with allowance for calorimetric uncertainty (i.e., 3527 MWt) and for operation with Hydrogen Water Chemistry. Bounding reactor and reactor coolant source terms are used in this specification. These bounding parameters are not changed by TPO. As such, there is no change to the EQ specification for normal operation radiation dose under TPO.

NRC Request 4

In the LAR, Attachment 12, Section 4, of the Power Grid Uprate Voltage Analysis for LGS, the licensee states that in situations where voltage drops exceeded 0.03 per unit, additional analysis was performed to incorporate system adjustments between contingencies. Transformer taps and automatically switched capacitors were allowed to change to regulate voltage. Provide a detailed discussion about the load tap-changing transformers and automatic switched capacitor banks which were allowed to function automatically in the additional analyses. Clarify if these system adjustments and the transformer tap changes will result in any plant design modifications to ensure that voltage drop will not exceed 0.03 per unit.

Response

The devices that were allowed to adjust are components in the transmission and distribution system and are outside of the station design and control. Most transformers have tap settings that can be adjusted to maintain a specific voltage or voltage range. This adjustment can be automatic, based on sensing an unacceptable voltage for a specific period of time, or manual, which requires transmission system operator action. Similarly, some capacitors will switch automatically and others require transmission system operator action. In this study, each outage scenario was initially simulated without allowing adjustment of automatically adjusting transformer taps and capacitor banks. This is done because it is computationally faster. Since the automatic adjustments would improve voltage conditions, the initial simulations are considered conservative. If a scenario resulted in acceptable conditions without adjustments, it was judged to be acceptable with adjustments without further simulation. However, any scenario that resulted in unacceptable conditions was re-evaluated by allowing components to adjust as assumed by the transmission system operator, to ensure that acceptable conditions could be achieved. Although many of the transmission system devices can also be operated manually with centralized control, no manual actions were credited.

The load tap changing capability of the transformers located on the LGS site and discussed in UFSAR Section 8.1.6.3.6, "BTP - PSB 1 - Adequacy of Station Electric Distribution System Voltages," was not assumed to function for the power uprate grid voltage analysis. No design modifications are needed.

NRC Request 5

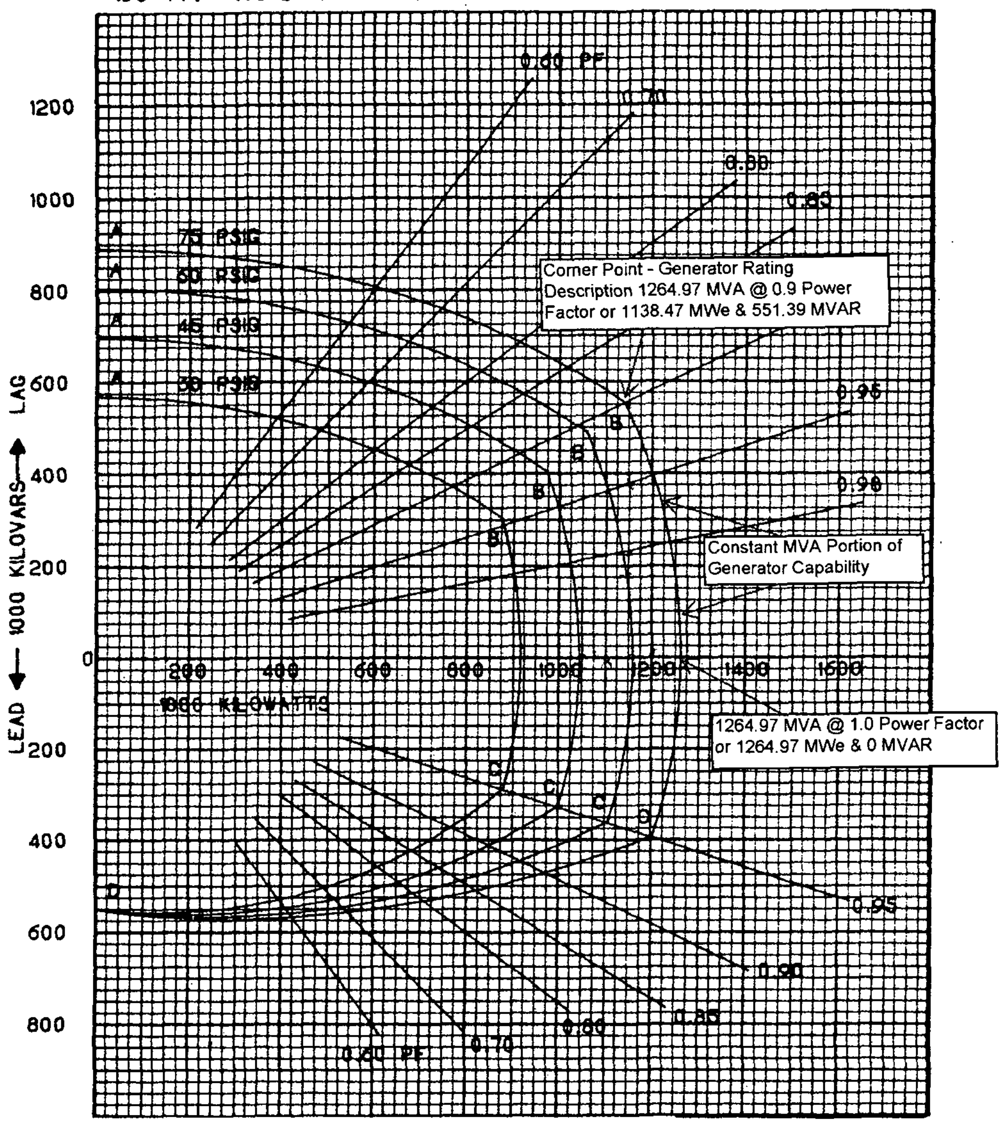
The LAR, Attachment 6, Table 6-2, shows the main generators maximum nominal rating for the uprated condition as 1138.47 MWe [Megawatts electric] and 551.39 MVar [Megavolt-amp-reactive]. The main generators maximum nominal rating of 1138.47 MWe is significantly lower than the expected full load generator output value of 1240 MWe for winter following MUR power uprate, as specified in the LAR, Attachment 12, Appendix B page 2 of 5. Please explain how the main generators worst case (winter) expected MWe output can exceed the maximum nominal MWe rating.

Response

LAR Table 6-2 shows the generator nominal rating of 1264.97 MVA at 0.9 power factor and 75 psig hydrogen pressure. The 1264.97 MVA at 0.9 power factor can also be stated as 1138.47 MWe and 551.39 MVAR. This rating refers to a single point on the generator capability curve where the stator and armature capacity are the same at a lagging power factor. This point is also referred to as a corner point. The corner point is shown on the attached generator capability curve for Limerick. For values of power factors between 0.9 lagging (Point B on the curve) and 0.95 leading (Point C on the curve) the generator capability curve is a constant MVA curve. The generator can operate on or below this constant MVA curve. For Limerick the constant MVA curve is 1264.97 MVA. As a result, at 1.0 power factor the generator can produce 1264.97 MWe and 0 MVAR. At all the points on the constant MVA portion of the curve the vector sum of the MWe and MVAR are equal to 1264.97 MVA. The generator can operate on or below the capability curve but not above it. Therefore, the winter loading of 1240 MWe is associated with an MVAR limit of no more than 250.1 MVAR or a total of 1264.97 MVA. The MWE and MVAR loading are controlled at or below this curve as requested by the transmission system operator.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

ATB 4 POLE. 1.264.970 KVA. 1800 RPM. 22000 VOLTS
.90 PF. .58 SCR. 75 PSIG HYDROGEN PRESSURE. 545VOLTS EXCITATION



CURVE AB LIMITED BY FIELD HEATING
CURVE BC LIMITED BY ARMATURE HEATING
CURVE CD LIMITED BY ARMATURE CORE END HEATING

Estimated capability curves Fig. 17-3
Dwg. 369HA861 (rev 2)

NRC Request 6

Please specify the worst case MWe and MVar loadings on LGS, Unit 1 and 2 main generator step-up transformers for both existing and uprated conditions, and discuss how the uprated loading is within the capability of the transformers.

Response

LAR Tables 6-3a and 6-3b provide the ratings of the LGS generator step-up transformers. The LGS Unit 1 transformer is rated at 1266 MVA. The LGS Unit 2 transformer is being replaced in 2011, prior to power uprate implementation, and will be rated at 1575 MVA. The maximum MVA the generator can provide is 1264.97 MVA which is less than the rating of the generator step-up transformers. Thus, for all possible MWe and MVAR load combinations the transformers have an adequate capacity.

NRC Request 7

The LAR, Attachment 6, Section 10.3.1 states that the conservatism in the equipment qualifications were originally applied to the environmental parameters and no change is needed for the TPO [thermal power optimization] uprate. Please discuss in detail what specific conservatism in the environmental parameters of the original EQ evaluations, when applied to uprated conditions, results in the existing EQ evaluations bounding the uprated normal and accident conditions.

Response

Conservative assumptions, design input, and methodology are employed to determine EQ profiles. These conservatisms are common to the industry, and include such items as bounding core power, minimum containment volumes, minimum suppression pool water mass, instantaneous high energy line break ruptures, limiting vent areas, the use of enveloping profiles to bound computed results, and design basis (vs. operational) reactor coolant radiation source terms. This approach results in the use of bounding parameters and profiles to establish specification values in the EQ program. There is no change to the limiting operating or limiting accident parameters and profiles associated with TPO. Therefore, the specification of EQ parameters based on these parameters, as discussed in more detail in the responses to Request 3 and Request 8 in this letter, does not require change for TPO.

NRC Request 8

Provide EQ profiles for the EQ areas where temperature and or pressure will increase due to uprate to demonstrate that the existing EQ profiles bound the uprated EQ profiles for both normal and accident conditions. In addition, confirm that the EQ margins required per IEEE-323, section 6.3.1.5 ("Margin") for both inside and outside containment will be maintained for the uprated condition.

Response

EQ Specification for Normal Conditions. Under non-accident conditions, the EQ specification of operating environmental conditions (e.g., pressure, temperature, humidity) is not a "profile;" rather, it is based on a single value or range of values.

There is no change to the EQ specification of normal operating environmental conditions for TPO. Changes in environmental conditions parameters due to TPO are considered acceptable for EQ if the heating, ventilation, and air conditioning (HVAC) systems can maintain environmental conditions within the normal range of fluctuations caused by expected changes in external conditions, such as outside temperature changes and changes in door configurations. The capability of the HVAC systems was evaluated for TPO; all HVAC systems were found to be capable of maintaining environmental conditions within their normal ranges. The maximum expected area temperature change due to TPO was determined to be approximately 1.2 °F, with most areas evaluated to experience changes of < 0.5 °F. All of these changes are within the range of normal fluctuations due to changes in external conditions and are thus considered inconsequential. No ambient pressure changes are expected.

Note also that these expected changes are consistent with those stated in the TPO licensing topical report, "Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization," (Reference 1) Section 5.11.2, "Environmental Qualification Criteria," which states that no significant change in normal operating conditions is expected for a TPO uprate: operating temperature changes of < 2°F (FW lines) and < 1°F (recirculation drive loops).

EQ Profile for Accident Conditions. There are no changes to accident pressure or temperature profiles for EQ. Containment LOCA response under TPO is bounded by the current analysis, which was performed at 102% of current licensed thermal power. There is no required change to the EQ program. Outside containment, the high energy line break mass and energy release for computing area accident pressure and temperature response profiles are bounding for TPO operations with allowance for calorimetric uncertainty. There are no required changes to these profiles under TPO.

IEEE-323 Margins – Since the EQ specifications for normal and accident pressures and temperatures are not changed under TPO, IEEE-323 margins are not impacted.

NRC Request 9

The LAR, Attachment 6, Section 10.3.1.1, states, "Normal temperatures may increase slightly near the Feedwater and Reactor Recirculation lines and will be evaluated through the EQ temperature monitoring program..." Discuss the expected magnitude, and resulting expected impact, of the increased temperatures on the safety related equipment in the area.

Response

The normal operating feedwater temperature is expected to see a small increase under TPO (<2°F). This change will have an inconsequential impact on area temperatures: less than 0.1°F in the Main Steam Tunnel, and no discernable impact inside containment.

The Reactor Recirculation system components are not expected to see a discernible change in operating temperature under TPO.

As discussed in the response to Request 8 above, these changes will have no effect on the EQ specification for the safety related equipment in the area.

REFERENCES

1. NEDC-32938P-A, "Generic Guidelines and Evaluations for General Electric Boiling Water Reactor Thermal Power Optimization," Revision 2, May 2003