Exelon Nuclear

10CFR50.59(d)(2)

10CFR72.48(d)(2)

November 10, 2008

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

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352, 50-353 and 07200065

Subject: 24-Month 10CFR50.59 and 10CFR72.48 Evaluation Summary Report For the Period July 1, 2006 through June 30, 2008

Attached is the 24-Month 10CFR50.59 and 10CFR72.48 Evaluation Summary Report for Limerick Units 1 and 2 for the period of July 1, 2006 through June 30, 2008, forwarded pursuant of 10CFR50.59(d)(2) and 10CFR72.48(d)(2). The report includes brief descriptions of any changes, tests and experiments, including a summary of the evaluation of each. Five plant changes were implemented using 10CFR50.59 Evaluations during this 24-month period. There were no plant changes implemented using 10CFR72.48 Evaluations during this 24-month period. The summaries of these changes are included in this report.

There are no commitments contained in this letter.

If you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Original signed by Christopher H. Mudrick

Christopher H. Mudrick
Vice President – Limerick Generating Station
Exelon Generation Company, LLC

Attachment: Limerick Generating Station 24-Month 10CFR50.59 and 10CFR72.48 Evaluation Summary Report, July 1, 2006 through June 30, 2008

cc: S. J. Collins, Administrator Region I, US NRC
E.M. DiPaolo, USNRC Senior Resident Inspector, LGS

10 CFR 50.59 Evaluation and 10 CFR 72.48 Evaluation

24-Month Summary Report

Limerick Generating Station

2008

Note: This report summarizes 10 CFR 50.59 and 10CFR72.48 Evaluations that were approved between July 1, 2006 and June 30, 2008.

Evaluation number:	LG2006E001 Rev.0
50.59 Reviewer approval date:	10/24/06
PORC number:	06-026
PORC approval date:	12/12/06
Implementing document:	ECR 06-00363
Preparer:	Michelle Karasek
Evaluator:	Ted Johnston
Reviewer:	Ron Hess

	Unit 1	Unit 2	Units 1 & 2	Common
Unit applicability:	[ ]	[ ]	[x]	[ ]
Complete on:	[ ]	[ ]	[x]	[ ]

Title:

Risk Informed ISI Program Revision 2 with BER

Description of Activity:

The activity is a configuration change processed via an ECR, which incorporates the results of revision 2 of the Risk Informed Inservice Inspection Program (RISI). The RISI program was updated to incorporate changes resulting from a PRA model update and to evaluate and include the Break Exclusion Region (BER) piping welds into the RISI program.

Reason for Activity:

This configuration change is being processed to update UFSAR sections 3.6, 5.2, and 6.6 to allow the use of risk-informed technology in determining the number of augmented piping inspections in the break exclusion region (BER) and to revise the ISI Program Specifications NE-042 (Unit 1) and NE-027 (Unit 2) to reflect the conclusions of revision 2 of the RISI Program.

Effect of Activity:

This configuration change represents a change in methodology for BER piping welds described in the UFSAR, however, this methodology has been approved by the NRC via a safety evaluation for EPRI Topical Report (TR-1006937, Rev. 0-A). The changes to the original RISI Program as a result of the PRA model update do not affect the plant operation, design bases, license, or safety analysis described in the UFSAR, since the original RISI methodology did not change. As such, prior NRC approval is not required for this configuration change.

Summary of Conclusion for the Activity's 50.59 Review:

This activity will require a 50.59 Evaluation due to a change in methodology in UFSAR sections 3.6, 5.2, and 6.6; however, since NRC approval has already been granted via a safety evaluation and no deviations to the methodology described in EPRI TR-1006937 have been taken, no prior NRC approval is required.

Evaluation number:	LG2007E001 Rev.0
50.59 Reviewer approval date:	2/28/07
PORC number:	07-005
PORC approval date:	3/2/07
Implementing document:	S71.0.A
Evaluator:	Bob Weingard and Jessica Bailey
Reviewer:	George Bonanni

	Unit 1	Unit 2	Units 1 & 2	Common
Unit applicability:	[ ]	[ ]	[x]	[ ]
Complete on:	[ ]	[ ]	[x]	[ ]

Title:

Defeating the Mode Switch to Shutdown SCRAM

Description of Activity:

This activity supports the Temporary Configuration Change (TCC) via procedure, S71.0.A "Defeating the Mode Switch to Shutdown SCRAM". Jumpers will be installed to keep the associated Reactor Protection System (RPS) manual scram trip channels energized. Four jumpers will be installed to bypass the Mode Switch to Shutdown Scram contacts as well as the Reactor Manual Scram Pushbuttons in each Reactor Manual Scram trip Channel (A1, A2, B1, and B2). This installation is due to terminal block accessibility. The jumper technical design requirements are evaluated under technical evaluation IR552104, A02.

A 50.59 Evaluation was performed for S71.0.A "Defeating the Mode Switch to Shutdown SCRAM" because the jumper installation eliminates the Main Control Room operator manual scram capability. Although ensuring that all rods have been inserted is a prerequisite to the S71.0.A procedure to install the jumpers, the UFSAR explicitly states that a scram is initiated whenever the mode switch is placed in the shutdown position. Additionally, the UFSAR states that pushbuttons are located in the control room to enable the operator to shutdown the reactor by initiating a scram. Installing the jumpers eliminates these functions and was considered an adverse change to the plant. Only the manual SCRAM functions from the Mode Switch and the Main Control Room Manual SCRAM Pushbuttons are affected by the installation of the jumpers.

This 50.59 evaluation is applicable to both the Unit 1 and Unit 2 Reactor Protection System Manual Scram logic bypass. The new procedure, S71.0.A "Defeating the Mode Switch to Shutdown SCRAM" is generic to both units.

Reason for Activity:

To support the Soft Shutdown initiative (reference IR 501705), bypassing the Reactor Mode Switch to Shutdown Scram function is required to prevent scramming the control

rods from position 00 with fully charged Control Rod Drive (CRD) accumulators. Scrams from position 00 should be limited to ensure CRD component lifetime and system reliability are not affected. Scrams with rods at position 00 can result in degradation to drive seals.

Effect of Activity:

The only functions the jumpers will impact are the manual scram signals provided when the mode switch is taken to shutdown and when the manual scram pushbuttons are depressed. All 185 control rods will already be fully inserted prior to installing the jumpers (a S71.0.A procedure prerequisite). Valve repositioning for scram pilot valves, backup scram valves, and scram discharge volume vents and drains is not required when the mode switch is placed in shutdown since all rods will already be inserted. All other functions of the mode switch will occur when the mode switch is taken to shutdown. Only the manual SCRAM functions from the Mode Switch and the Main Control Room Manual SCRAM Pushbuttons are affected by the installation of the jumpers.

Summary of Conclusion for the Activity's 50.59 Review:

Bypassing the Mode Switch to Shutdown and Manual Pushbutton SCRAM signals by installing jumpers to keep the associated Reactor Protection System (RPS) trip channel energized is acceptable because all 185 control rods will be verified to be fully inserted prior to installing the jumpers and the 50.59 evaluation has concluded that the design, function, the method of performing functions of RPS, and plant response to design basis accidents and transients are maintained as described in the UFSAR and this activity. This activity does not require a License Amendment, is compliant with NRC regulations, and maintains sufficient safety margins.

Evaluation number:	LG2007E002 Rev.0
50.59 Reviewer approval date:	2/8/07
PORC number:	07-005
PORC approval date:	2/16/07
Implementing document:	ECR 06-00297
Evaluator:	Andy Olson
Reviewer:	Alex Psaros

	Unit 1	Unit 2	Units 1 & 2	Common
Unit applicability:	[ ]	[ ]	[x]	[ ]
Complete on:	[ ]	[ ]	[x]	[ ]

Title:

Application of TRACG04 for Stability Analysis

Description of Activity:

This activity addresses the acceptability of applying TRACG04 for the purpose of performing reload stability analysis as documented in the Limerick Generating Station Core Operating Limits Report (COLR). TRACG04 is a modification of the NRC approved TRACG02 code and has not been generically approved by the NRC (TRACG04 has been approved for stability analysis at Hope Creek). Therefore, applying TRACG04 to the reload analysis constitutes a change in methodology. TRACG04 supports the application of the NRC approved PANAC11 kinetics code.

Reason for Activity:

The Core Reload Fuel Change Package (CRFCP) is completed for each reload to document compliance with the GESTAR II design basis and fuel licensing requirements. The COLR is required to be updated for each new operating cycle. The COLR contains cycle-specific parameter limits required for operation of the Limerick Generating Station reactor core, including values for stability protection. These values are determined using NRC-approved methodology for reload licensing and are established such that all aspects of the plant safety analysis are met. TRACG04 is applied to determine values for stability protection. However, TRACG04 has not been generically approved by the NRC (TRACG04 has been approved for stability analysis at Hope Creek). This evaluation determines the acceptability of applying TRACG04 without prior NRC approval.

Effect of Activity:

The Core Reload Fuel Change Package provides the Core Loading Plan (CLP) with the core loading pattern and control blade loading pattern, the COLR, and the core monitoring system databank. These three items are used to ensure that the plant is configured and operated in accordance with the GESTAR II requirements. Operation in

accordance with the parameters contained in the Limerick Generating Station COLR will assure that all aspects of the plant safety analysis are met and consequences of all analyzed events are acceptable as defined in the UFSAR. Evaluation of the applicability of TRACG04 ensures that the above requirements are met.

Summary of Conclusion for the Activity's 50.59 Review:

The Reload Core Fuel Change Package identifies the physical changes to plant configuration to be made during a refueling outage and is performed to document compliance of the new reload design with GESTAR II. Additionally, the core operating limit values contained in the COLR are generated using NRC-approved codes and methodologies and were designed to meet all fuel design/licensing criteria, which will continue to limit operation of the fuel to within the UFSAR analyses. This evaluation has determined that theTRACG04 code produces results that are 'essentially the same' as the NRC approved TRACG02 code. Therefore TRACG04 can be applied without prior NRC approval.

Evaluation number:	LG2007E003 Rev.0
50.59 Reviewer approval date:	7/2/07
PORC number:	07-020
PORC approval date:	7/28/07
Implementing documents:	ECR 06-00389, ECR 06-00390, and ECR 06-00391
Evaluator:	George Bonanni
Reviewer:	Ron Hess

	Unit 1	Unit 2	Units 1 & 2	Common
Unit applicability:	[ ]	[ ]	[x]	[ ]
Complete on:	[x]	[ ]	[ ]	[ ]

Title:

Refueling Platform Controls Upgrade/Replacement

Description of Activity:

This activity upgrades the control system and replaces the mast and grapple used in the Limerick Generating Station (LGS) Units 1 & 2 Refueling Platforms. This upgrade will increase the platform speeds (in all axes) and will increase the overall reliability. There are multiple components being replaced to upgrade the overall performance and overcome the obsolescence problems currently being experienced.

A portion of the scope of this design change installs many new control system/operating capabilities to the refueling platform. All of these capabilities remain within the previously evaluated boundaries of the system and do not require further evaluation to document their acceptability. Each of these items can be utilized with the existing NF-400 mast and grapple or they can be utilized with the new NF-500 mast and grapple. As such, this portion of the work scope has been "screened out" in accordance with section 4.3.7.2 of procedure LS-AA-104, rev. 5.

Each of these scope items has been reviewed and addressed in the attached screening:

- Replace the main trolley and monorail trolley power tracks
- Replace/Upgrade bridge, trolley and mast encoders
- Upgrade hose and cable reels
- Upgrade of the load weighing system
- Add a Senior Reactor Operator (SRO) control station
- Replace main power and control cable and associated cable reel
- Replace the interlock status display
- Upgrade bridge motion alarms and displays
- Upgrade of the control system from a hybrid (analog combined with digital) to a fully digital (including new automatic modes of operation)

The following portion of the scope of this design change has been reviewed and cannot be screened out. Downgrading the quality classification of the mast and grapple is considered an adverse change to the facility and must be evaluated under the 50.59 process. The camera is not being downgraded; however, it is included in the list because it is an integral portion of the new grapple. Each of these scope items has been addressed in the attached evaluation.

- Upgrade of the refueling mast from GE NF-400 to GE NF-500 (Change quality classification)
- Upgrade the refueling grapple, includes camera system (Change quality classification)
- Potential collision with Reactor Cavity Work Platform (RCWP) jib crane

Reason for Activity:

At Limerick Generating Station (LGS) the Unit 1 and Unit 2 Refueling Platform control systems are becoming obsolete and replacement parts are hard to find. In an effort to increase Refueling Platform performance and reliability the platform is being refurbished and a new control system installed. The mast and grapple are being replaced to allow for increased bridge speeds, greater move accuracy, improved reliability and to allow for shared spare parts between sites. The potential collision between the platform mast assembly and the RCWP was evaluated because the refueling platform and RCWP can be used simultaneously.

Effect of Activity:

The refuel platform upgrades result in increased refueling platform speeds and performance. Additional weight will be added to the refueling platform structure and addressed by way of a comparison to and reconciliation with the existing seismic qualification documentation. These design changes do not impact the Fuel Handling Accident (FHA) as described in UFSAR Section 15.7. The additional weight added to the bridge does not impact the seismic qualification described in UFSAR Section 3.7. The platform upgrades (including the additional weight of the new refueling mast and grapple) have no impact the Limiting Conditions for Operation (LCO) as described in the LGS Technical Specifications section 3/4.9 titled Refueling Operations. This design change involves civil/structural, mechanical, electrical and controls analyses and justifications as related to current design basis documentation being impacted by the upgrade.

This design change activity also provides authorization for the manipulation of data in the configuration management database, as well as design drawings, vendor manuals, etc. that must be completed to maintain configuration control of this upgrade. Changes have been made to the UFSAR descriptions for reactor refueling equipment qualifications and refueling operations. The Technical Specification Bases have been enhanced to clarify Surveillance requirements for the main hoist control rod block and redundant loaded

interlocks. Administrative barriers and procedural controls will remain in place to assure the fuel grapple assembly of the Refueling Platform does not collide with the RCWP jib crane during fuel handling in the reactor cavity.

A two level Failure Modes and Effects Analysis (FMEA), digital upgrade evaluations and UFSAR chapter 15 accident analysis evaluations have been performed to ensure that administrative and physical controls are adequately provided to support the operation of the refueling platform to the design basis requirements.

The downgrading of the refueling mast quality designation from "Q" to "Non-Q" and the potential collision between the fuel grapple assembly and the scorpion RCWP jib crane have been performed under the scope of a 10CFR50.59 Evaluation LG2007E003 Revision 0.

Summary of Conclusion for the Activity's 50.59 Review:

The LGS Refueling Platform Controls Upgrade activity is a replacement of hybrid logic controls with digital Programmable Logic Controller (PLC). The existing design functionality of the control system is only being increased by this activity. An increase in functionality and control capability is not an adverse change to any SSC associated with the refueling platform. The refueling bridge controls upgrade is providing increased capability and safety for the operators of the refueling platform. The new system and component designs remain within the UFSAR described boundaries. Therefore, the controls upgrade portion of this design change is acceptable to implement by the 10CFR50.59 Screening.

Since, the upgrade is increasing the refueling platforms speed by 10 Feet Per Minute (FPM) the mast is being replaced by a more rigid and stable hydrodynamic design to support the increased speeds. Bridge speed is increasing from 50 FPM to 60 FPM, main trolley speed is increasing from 30 FPM to 40 FPM and main hoist speed is increasing from 40 FPM to 50 FPM. The weight addition to the Seismic I platform structure is analyzed to verify adequate design margin. The replacement mast is GE Nuclear's latest design and is being supplied as a non-Q component. The replacement grapple is PAR Nuclear's latest design and is being supplied as a non-Q component. Replacement of the "Q" NF-400 mast/grapple with the "Non-Q" NF-500 mast/grapple requires review under 10CFR50.59 evaluation criteria. The potential fuel assembly bail handle failure resulting from a collision between the platform and the RCWP jib crane could impact the FHA and thus requires review under 10CFR50.59 evaluation criteria.

All eight of the 50.59 evaluation questions were answered as NO; therefore, the results of this evaluation indicate that NRC approval is not required prior to implementation. Changes covered under the refueling platform upgrade do not require prior NRC approval because the changes: do not more than minimally increase the likelihood of a Fuel Handling System malfunction, cannot increase the consequences of an FHA or Fuel Handling System malfunction as previously evaluated in the UFSAR, and do not create a

new type of accident or different malfunction result than previously evaluated in the UFSAR. Margin exists between the number of fuel pins predicted to fail during the design basis FHA using the current NRC-approved methodology in GESTAR II (NEDE-24011-P-A) and the current calculated number of fuel pins used to establish the bounding dose value in the UFSAR for the design basis FHA.

The upgrade refuel platform, including the mast/grapple assembly, will not affect the conditions, assumptions or methodology of the fuel handling accidents, will not affect shutdown cooling or coolant circulation, will not violate any design or licensing requirements/commitments and will not create any new failure modes for the fuel handling system. Design functions will be fulfilled and any impacted SSC will not be adversely affected.

Evaluation number:	LG2007E005 Rev.0
50.59 Reviewer approval date:	6/1/07
PORC number:	07-015
PORC approval date:	6/7/07
Implementing documents:	ECR 06-00510
Evaluator:	Ron Hess
Reviewer:	Mike McGill

	Unit 1	Unit 2	Units 1 & 2	Common
Unit applicability:	[ ]	[ ]	[x]	[ ]
Complete on:	[ ]	[ ]	[x]	[ ]

Title:

Revisions to LGS Turbine System Maintenance Program (TSM)

Description of Activity:

This activity will make the following changes to the LGS Turbine System Maintenance Program (TSM Program).

- Extend the overspeed protection system testing frequencies from weekly to monthly
- Extend the LP Turbine Rotor inspection interval beyond 10 years to allow for 6 operating cycles between inspections.
- Eliminate the requirements from the UFSAR and TRM to inspect at least one main steam stop valve, one main steam control valve, and one combined intermediate valve every 40 months.

Reason for Activity:

Turbine-generator systems include performance of on-line simulated mechanical and electrical overspeed testing to demonstrate turbine trip system operability. Operating experience across the industry has seen a number of spurious SCRAMS that have occurred during the overspeed tests. The test frequency extension is being pursued in order to reduce the potential for reactor SCRAMS that are associated with the online overspeed testing.

The current 10 year low pressure turbine rotor inspection interval defined in the UFSAR was commensurate with previous NEIL insurance requirements that the turbines should be inspected every 8 years and “shall” be inspected every 10 years. Recently NEIL insurance requirements for low pressure (LP) turbines were extended to 100,000 operating hours with the provision that if the unit reaches 100,000 hours during an operating cycle, the inspections shall be performed at the next planned refueling outage.

The Turbine Missile Probability analysis supports 100,000 hours of operation between rotor disk inspections, which is slightly less than 6 operating cycles (assuming a two year refueling cycle and capacity factor greater than 95%). The current analysis contains sufficient margin to allow this inspection interval to be extended to 110,000 operating hours without significant impact to the missile probability analysis results. The extension of the inspection interval to 110,000 operating hours will allow LGS to levelize the inspection schedule for the LP turbine rotors.

The UFSAR and TRM commitment to inspect at least one main steam stop valve, one main steam control valve, and one combined intermediate valve every 40 months was established because it was part of the standard technical specifications for General Electric (GE) boiling water reactors. In 1983, GE submitted their "Probability of Missile Generation in General Electric Nuclear Turbines" analysis to the NRC. The GE model assumes that the turbine valves are periodically tested to ensure their operability, but did not include any requirements for inspection of the valves. Because the valve inspection is not considered in the missile probability analysis for GE turbines the standard tech specs were revised to eliminate the valve inspection requirements. Turbine valve inspections are performed consistent with NEIL requirements and current industry practice.

Effect of Activity:

The extension of the overspeed protection system testing frequency from weekly to monthly and the extension of the LP turbine rotor inspection interval to allow for 6 cycles of operation between inspections will impact the Turbine Missile Probability analysis. The revision to the turbine valve inspection requirements does not have an impact on the Turbine Missile Probability analysis but may have an impact on the reliability of the turbine overspeed protection system.

NRC General Design Criterion 4, "Environmental and Missile Design Bases," of Appendix A to 10CFR50 requires, in part that structures, systems and components important to safety be appropriately protected against the effects of missiles that might result from failures, such as high energy missiles resulting from a steam turbine failure. The NRC evaluation of the effects of turbine failure on the public health and safety has generally followed the guidance stipulated in Regulatory Guide (RG) 1.115, "Protection Against Low-Trajectory Turbine Missiles," and the NRC Standard Review Plan (SRP), i.e. NUREG-0800, Sections 10.2, 10.2.3, and 3.5.1.3. As discussed in UFSAR Section 1.8, LGS does not utilize all of the guidelines of Reg. Guide 1.115 and does not determine the damage probability in the event of a turbine failure. Instead, LGS utilizes the methodologies and assumptions in the analyses prepared by the turbine manufacturers to determine missile generation probability and no analysis of turbine missile strike and damage probabilities is required as approved by the NRC.

According to NRC guidelines the probability of unacceptable damage from turbine missiles (P4) should be less than or equal to 1 x 10–7 per year for an individual plant. In order to maintain P4 less than 1 x 10-7, the NRC requires licensees to ensure that the

probability of generating a turbine missile (P1) satisfy turbine reliability requirements criteria. For an "unfavorably oriented turbine," such as the LGS Units 1 and 2 main turbines, the probability of generating a turbine missile (P1) is required to be less than 1 x 10-5 per year as documented in NUREG-0991, "Safety Evaluation Report Related to the Operation of Limerick Generation Station Units 1 and 2."

In order to assure that the turbine missile generation probability (P1) follows the turbine reliability criteria, the NRC requires applicable licensees to maintain a Turbine System Maintenance Program (TSM Program). The Current LGS TSM Program was based on the GE Turbine Missile Generation Probability Analysis (January 1984) and the Siemens Missile Probability Analysis (June 18, 1997), which calculates P1 to be 3.0 x 10-6 per year. According to a recent analysis of the Impact Of Increasing Test Interval for Turbine Overspeed Protection System on Turbine Missile Probability and Limerick's evaluation of the impact of change to LP turbine rotor disk inspection interval on missile probability, the proposed change will increase P1 from 3.0 x 10-6 to 3.46 x 10-6 per year.

The elimination of the requirements from the UFSAR and TRM to inspect at least one main steam stop valve, one main steam control valve, and one combined intermediate valve every 40 months allows the valve inspections to be performed consistent with NEIL and current industry practice.

Summary of Conclusion for the Activity's 50.59 Review:

A 50.59 Evaluation is required for the changes to the test frequency for the turbine overspeed protection system and change to the low pressure turbine inspection frequency because they adversely affect the probability of generating a turbine missile, which is a UFSAR described regulatory requirement. The change to the turbine valve inspection requirements may adversely impact the turbine overspeed protection system reliability.

The NRC requires that the probability of generating a turbine missile external to the turbine casing be less than 1x10-5 per year for unfavorably oriented turbines. The probability of generating a turbine missile was determined to be 3.0 x 10-6 per year by GE report "Probability of Missile Generation in General Electric Nuclear Turbines" dated January 1984 and Siemens "Engineering Report ER-9605, Missile Probability Analysis Methodology for Limerick Generating Power Station, Units 1 & 2 with Siemens Retrofit Turbines" dated June 18, 1997. Evaluation of the impact to turbine missile probability due to the increased LP turbine inspection interval concluded the increase in the probability of generating a turbine missile was negligible. MPR report "Impact of Increasing Test Interval for Turbine Overspeed Protection System on Turbine Missile Probability, MPR-2892" (April 4, 2006) determined that the turbine overspeed protection system test interval extension would increase the probability to approximately 3.45 x 10-6 per year. The combined effects of these changes result in an increase in the probability of generating a turbine missile to 3.46x10-6 per year. Therefore the turbine missile probability calculated for LGS remains below the regulatory limit of 1x10-5 per year for unfavorably oriented turbines. This results in a reduction in margin of less than 10% of the available margin to the regulatory limit and is less than a minimal increase.

The revision to the turbine valve inspection requirements does not have an impact on the Turbine Missile Probability analysis. Extending the inspection interval and removing the requirement to inspect all valves of a given type, should an issue be identified, is not an element of the turbine missile generation analysis methodology. Periodic valve testing continues to be performed to demonstrate the operability of the turbine valves. LGS experience indicates that valve degradation is not occurring and the impact on valve reliability is less than minimal. Turbine valve inspections are performed consistent with NEIL requirements and current industry practice.