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Nuclear

Risk-informed Technical Specifications - Initiative 5b

Relocation of Surveillance Test Intervals

April 8, 2004
Presentation to NRC

Attachment 2

Agenda

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- Overview of Initiative 5b – David Helker
- Methodology/Guidance & Pilot Program – Philip Tarpinian
- Process Considerations – Eugene Kelly
- PRA Model Quality – Donald Vanover
- Scope of Submittal – Glenn Stewart
- Next Steps – David Helker

Initiative 5b

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- Relocate to licensee-controlled document
- Retain surveillance requirements in Tech Specs
- Surveillance test interval (STI) adjustment
- Change interval based on risk-informed process
- Tempered by performance and commitments
- TSTF-425; Reg. Guide 1.200
- BWR Owners Group lead; Limerick pilot

Methodology/Guidance

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- NEI/BWROG methodology document
- Qualitative and quantitative reviews
- Risk significance of SSC's (high or low)
- Addresses modeled and un-modeled SSC's
- Candidates validate all "legs" of methodology
- Integrated Decision-making Panel (IDP)
- Addresses five criteria of Reg.Guide 1.177

Pilot Project

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- IDP charter established
- Evaluation record/panel minutes
- Commitment reviews
- Six candidate surveillances
- Observed by NRC, NEI, BWROG
- Equipment and surveillance history
- System manager/subject matter expert presentations
- PRA risk information provided

Candidate Surveillances

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- CRD notch testing
- SGTS/RERS flow
- 4kV under-voltage relays
- LOCA/LOOP logic
- Main steam isolation valve position (RPS)
- Redundant reactivity control system

Process Considerations

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- Analogous to Maintenance Rule, IDP concept
- Reliable and repeatable
- What brings an STI back to IDP (NSRB input)
- PRA model revisions ...effect on extensions
- Shortening the interval (two-way street)
- Extrapolation limit to data
- Phased implementation ..."baby steps"

Process Considerations

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- Checking for cumulative effects
- Resources, safety, and reliability
- Test methods or practices
- NRC SER for 5b methodology supercedes previous commitments to Regulatory Guides and Topical Reports for "frequency" (TS Bases)
- Interdependence of Maintenance Rule, PRA, and *Surveillance Frequency Control Program*

Process Considerations

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- Capturing surrogate monitoring
- STI Evaluation Minutes
- Some surveillances confirmed as appropriate (e.g., main turbine valves)
- Other surveillances require additional information to adjust (e.g., LOCA/LOOP relays)
- Alternate testing and defense-in-depth …other tests which exercise the component

PRA Model Quality

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- BWROG *Peer Certification Report* issued in 1999
  - One A, 59 B, 97 C, 19 D & 21 S Facts & Observations
  - 2001 Model update addressed majority of findings
- Model evaluated against ASME Standard and Regulatory Guide 1.200 -- Gap Analysis
  - Areas not fully meeting Category II of standard evaluated for impact on the application
  - Uncertainty associated with 'gaps' explored in sensitivity studies
  - Gap Analysis findings in 2004 PRA update

STI Assessments

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- Examine for appropriate level of detail
- Enhance as necessary
  - Explicitly address $\lambda t/2$ failure modes
  - Identify appropriate 'equivalent' basic events
  - Common Cause Failure of relevant components
- Include uncertainty evaluation as input
- Specific assessments for each STI

Example Analysis

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- MSIV position switches and relays in Model
- Incorporate standby failure terms and CCF
- "De-modularized" related portions (address Gap)
- Re-calculate new baseline CDF and LERF
- Verified no significant change to risk profile
- Re-run with adjusted intervals as input for the standby failure rates and associated CCF terms

PRA Input to IDP

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- Best estimate ΔCDF and ΔLERF values
- Include uncertainty based on 95th percentile
- Re-run 95th percentile value standby failure rates
- Extremely small changes in risk metrics
  - Not unexpected ... multiple failures necessary to fail MSIV position logic; only one input to RPS logic
- Two-year interval approved
- Experiential information needed for relays at similar intervals; otherwise, phased approach

Archival Requirements

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- RG-1.200, Section 4
- Documentation provided at NEI
  - LGS PRA Model and supporting documentation
  - 1999 Peer Review Report and responses
  - GAP Analysis documentation
  - Analysis files including sensitivity studies
  - Detailed PRA quality assessment report
  - Exelon PRA maintenance and update procedure

Submittal Documentation

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- Overview of LGS PRA Model and relevant reviews
- Discussion of plant changes since last update, and impact on risk metrics
- Gap Analysis findings that impact application
- "Key assumptions" derived from sources of uncertainty
- Resolution of peer review comments and identification of open items that impact application
- Discussion of sensitivity study results

Scope of Submittal

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- Relocate to licensee-controlled document
- Add *Surveillance Frequency Control Program* to LGS Technical Specifications
- Allow internal approval of candidate adjustments
- Overview of STI selection and revision process
- Discussion of the six candidate examples
- Summary of PRA Model quality (Reg. Guide 1.200)

Scope of Submittal

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- Exclusion Rules
  - Event-based with no time component
  - Event-based with time component
  - References to pre-established programs
  - Certain values or parameters
- Surveillance Tables
  - ST/STI exceptions (footnotes) and applicability (Operational Conditions) remain in TS
  - STIs listed in TS by exception versus new "frequency notation"

Next Steps

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- Remaining STI candidates (Complete)
- Finalize submittal, methodology, TSTF (April 2004)
- Submit Limerick Amendment Request (May 2004)
- Submit 5b Methodology and TSTF-425 (May 2004)
- PRA Model Quality - RG 1.200
  - Gap analysis (complete)
  - NRC Audit (July 2004)
  - Integral to application
- Develop administrative controls (later in 2004)

RI-TS Surveillance Test Interval (STI) Evaluation

BWROG RI-TS Initiative 5b Pilot (Ref. TSTF-425)
(Exelon BRIM 132, LGS 2004 Bus. Plan Goal PR.05.LIM.03)

Station: Limerick Generating Station **Unit(s):** 1 & 2

urveillance Test Number (s):	Revision Number(s):
ST-2-041-616-1	25
ST-2-041-617-1	25
ST-2-041-618-1	27
ST-2-041-619-1	24
ST-2-041-616-2	15
ST-2-041-617-2	15
ST-2-041-618-2	18
ST-2-041-619-2	19

Technical Specification Surveillance Requirement (SR) Number(s): 4.3.1.1-1, 4.0.5

Technical Specification SR (Text): Reactor Protection system instrumentation surveillance requirements – Main Steam Line Isolation Valve – Closure; Surveillance Requirements for Inservice Inspection and Testing of ASME Code Class 1, 2 and 3 Components :

3.3.1 As a minimum, the reactor protection system instrumentation channels shown in Table 3.3.1-1 shall be OPERABLE with the REACTOR PROTECTION SYSTEM RESPONSE TIME as shown in Table 3.3.1-2.

TABLE 4.3.1.1-1

REACTOR PROTECTION SYSTEM INSTRUMENTATION SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL FUNCTIONAL TEST	CHANNEL CALIBRATION(a)	OPERATIONAL CONDITIONS FOR WHICH SURVEILLANCE REQUIRED
				1, 2
5. Main Steam Line Isolation Valve - Closure	N.A.	Q	R	1

Technical Specification SR Bases (and Intent):

5. <u>Main Steam Line Isolation Valve-Closure</u>

The main steam line isolation valve closure trip was provided to limit the amount of fission product release for certain postulated events. The MSIVs are closed automatically from measured parameters such as high steam flow, low reactor water level, high steam tunnel temperature, and low steam line pressure. The MSIVs closure scram anticipates the pressure and flux transients which could follow MSIV closure and thereby protects reactor vessel pressure and fuel thermal/hydraulic Safety Limits.

The MSIV position scram is not credited in the design basis RPV overpressure analysis, nor is it required for mitigation of limiting design basis events analyzed in the reload licensing analysis.

The MSIV/RPS functional test exercises both the MSIV RPS limit switch, and the associated RPS logic via the "K03" relay.

Recommended STI Change: Extend current quarterly (92 days) functional testing, to refuel (24 months) frequency, using a phased approach.

Station Benefit: Station load reductions are taken on a quarterly basis for turbine valve testing and MSIV/RPS testing. This change reduces the length of these on-line load drops (saves MegaWatts), and reduces potential for inadvertent MSIV closures.

(NOTE: Future Exelon T.S. revision request will pursue relocation of STI from T.S. to TRM, and STI extension)

A. SYSTEM & MAINTENANCE RULE (MRule) INFORMATION

SYSTEM NUMBER: 041C: Nuclear Boiler (FW & MSIVs)
071: RPS

Current MRule R-S Classification: HSS
Current MRule R-S Basis: (from System 41C & 71): "The SSC is explicitly modeled by the PSA and is quantitatively risk significant. The SSC was assessed by the Expert Panel to be risk significant."

Current PRA Model:	LGS101R1/LGS201R1	
Current PRA R-S Classification (System)	Risk significant	[values below pertain to System 071]
Current PRA RAW (System):	21.92	(MRULE R-S threshold: 2.0)
Current PRA RRW (System)	1.047	(MRULE R-S threshold: 1.005)
Current PRA Limiting Cutset (System)	4418	(MRULE R-S threshold: top 90%)
NEI 00-04 R-S Insights	*MRule HSS classification retained as allowed b[illegible] 5b Methodology guideline document.*	

B. QUALITATIVE ANALYSIS:

1 **COMMITMENT REVIEW** (Is STI credited in any commitments?) Commitments for MSIV ST

ST-2-041-616-1 Main Steam Line Isolation Valve – Closure; Division IA, Channel A1 Functional Test
T03612 LER 2-94-06, TS 4.0.5 requirement
T03878 LER 1-96-013, Scram during MSIV test

TS 3.3.1 Reactor Protection System Instrumentation
4.3.1.1 Channel Check, Functional and Calibration per Table 4.3.1.1-1 MSIV Func=Quarterly

TS 4.0.5 IST program
ST-2-041-616-1 Ref. 6.9 Specification ML-008, Pump & Valve Inservice Testing (IST) Program.
Not full open alarm and test box channel trip I steps in ST-2-041-616-1.

UFSAR
(page 1.13-99)

II.K.3.16 <u>REDUCTION OF CHALLENGES AND FAILURES OF RELIEF VALVES - FEASIBILITY STUDY AND SYSTEM MODIFICATIONS</u>

3) Reduce MSIV testing frequency (see section 6.3.1.4.4 of Reference 1[illegible] A number of isolation events occur when the MSIV closure tests are being conducted. Reduci[illegible] test frequency would result in a reduction in the number of isolation events. Appropriate redu[illegible]n made to the frequency of testing for the LGS MSIVs.

7.2.2.1.2.3.1.9
RPS - IEEE 279 (1971), Paragraph 4.9 – C[illegible]r S[illegible] Ch[illegible]s
The MSIV position switches are tes[illegible] du[illegible] [illegible]at caus[illegible]e limit switches to operate at the setpoint value of the valve positio[illegible]
SER
SER for power uprate 2-22-95, [illegible]TS [illegible]
3.2.7 Main Steam Isolation Valv[illegible]
MSIV performance will be moni[illegible]d [illegible]or[illegible]g t[illegible]urveillance requirements in the technical specification to ensure original licensing basis f[illegible] a[illegible] preserved. Maintenance of MSIV performance to existing licensing basis standards is acceptable t[illegible]aff.
CT database: No PLS regardin[illegible]est frequency were identified.
Regulatory Guides
Regulatory Guide 1.22 (1972) - Periodic Testing of Protection System Actuation Functions (Safety Guide 22)
Regulatory Guide 1.118 (June 1978) - Periodic Testing of Electric Power and Protection Systems
IEEE 338 (1975) - Criteria for the Periodic Testing of Nuclear Power Generating Station Protection Systems (also ref. 1977 and 1987) (Protection Systems changed to Safety Systems in 1977)
6.5 Test intervals
6.5.2 Change of test interval
IEEE 577-1976 Standard Requirements for Reliability Analysis in the Design and Operation of Safety Systems for Nuclear Power Generating Stations
4.4.3 changes in test intervals per IEEE 338 and IEEE 352
IEEE 352-1987 Guide for General Principles of Reliability Analysis of Nuclear Power Generating Station Safety Systems
IEEE 279 (1971), "Criteria for Protection Systems for Nuclear Power Generating Stations
RPS meets intent (per TS Bases).
NEDC-30851P-A, TS Improvement Analysis for BWR RPS
Used to determine RPS surveillance intervals (per TS Bases)
GL 93-05 Line-item TS Improvements to reduce Surveillance Requirements for Testing During Power Operation
RPS functional test frequency may be changed from monthly to quarterly

Conclusion
Based upon review of the above, no commitments were identified prohibiting this STI change.

2 **SURVEILLANCE TEST HISTORY OF THE COMPONENTS AND SYSTEM ASSOCIATED WITH THE STI EXTENSION:**

The RPS/MSIV surveillance test history was reviewed. In a history of over 800 tests, there was apparent occurrence of failure of the MSIV-RPS input logic. This resulted in a reactor scram. See item 5 below.

3 **RELIABILITY REVIEW:**
PERFORMANCE (OPERATION & MAINTENANCE) HISTORY OF THE COMPONENTS AND SYSTEM ASSOCIATED WITH THE STI EXTENSION:
NOTE: THE MSIV-RPS LIMIT SWITCHES ARE DONATED TO THE MR SYSTEM 71 (RPS).
MRule Train Actual Unreliability: not monitored, MRule Unreliability Performance Criteria: N/A

MRULE MPFF and FF history here for MSIVs and RPS logic:
A review of the Maintenance Rule functional failures was performed for system 41C. One functional failure was identified, but it was due to a failed outboard DC solenoid. Since it involved an unplanned load drop greater than 20%, it was determined to be a functional failure. There have been no MPFFs on system 41C since Maintenance Rule monitoring has been in effect. (July 1996).

A review of Maintenance Rule functional failures was also performe[illegible]m 71. One functional failure was identified, but it was due to failure of PS-0010202D to actuate. [illegible]ve[illegible]en no MPFFs on system 71 since Maintenance Rule monitoring has been in effect (July 19[illegible]6)

Additional PIMS component history review:

A review of all maintenance histor[illegible] th[illegible]SI[illegible]PS[illegible]m[illegible]wit[illegible]s was p[illegible]rmed. Those corrective maintenance activities perform[illegible]e[illegible]t[illegible]che[illegible]ed[illegible]her wiring issues, or occurrences where the RPS limit switch did not reset [illegible]w[illegible]te[illegible]

A review of all maintenance hi[illegible]y f[illegible]h[illegible]P[illegible] (K03) was performed. Since 1993, 5 corrective maintenance items were creat[illegible] T[illegible]e[illegible]ns were for buzzing relays, one was for a failed response time test, and the last one replaced two [illegible]ys[illegible] part of the 5/22/96 scram investigation discussed in item B-5.

Failure Rate Extrapolation Data (f[illegible] PRA Use in Section C-2)
Limit Switches:
Surveillance Test history of other, identical limit switches in other applications was reviewed to support extension of the ST interval.
<u>Results</u>
Other LGS plant equipment that use the NAMCO EA740-50100 limit switch are:
ZS-051-*51A(B)
ZS-051-*41A(B, C, D)
The above limit switches are exercised during cold shutdown testing (typically 1R frequency). Since 1994, 112 tests/partial tests were performed; 20 had unsatisfactory results; of those 20 tests, none were the result of failure of the NAMCO limit switches.
Secondly, a corrective maintenance history review for the above limit switches was performed. No corrective maintenance action requests were created as a result of failure of the NAMCO switches.

K03 Relays:
Later

4 **UNAVAILABILITY REVIEW:**

MRule Train Actual Unavailability: N/A MRule Unavailability Performance Criteria: N/A

No unavailability Performance Indicators exist for MSIVs or MSIVs/RPS. RPS train unavailability Performance Indicators apply to entire RPS train, not a single RPS input such as MSIV Closure.

5 PAST INDUSTRY AND PLANT-SPECIFIC EXPERIENCE WITH THE FUNCTIONS AFFECTED BY THE PROPOSED CHANGES

Limerick had previous operating experience associated with test failures of the MSIV-RPS limit switches. The problem was that the limit switches did not reset following actuation. This problem was resolved with a design change to the limit switch roller size implemented in 1995. No similar failures have occurred since the design change was implemented.

On 5/21/96, during quarterly MSIV-RPS testing on Limerick Unit 1, a reactor scram occurred. The scram was initiated by high reactor pressure. There was a failure of the RPS logic to initiate the "MSIV Not Fully Open" scram signal, although no specific failed components were found.

On 2/19/85, Quad Cities unit 2 scrammed from 96 percent power while performing the biweekly MSIV surveillance test. During this test, each valve is cycled 10 percent closed using a dedicated test push button. The purpose of the test is to verify operability of the "MSIV not full open" reactor protection system (RPS) logic. This logic utilizes a limit switch mounted on each MSIV which is actuated at the 10 percent closed position. The logic, which was designed to reopen the MSIV, failed. A similar event occurred at Dresden on 7/12/86.

Brunswick has had numerous problems with exceeding the TS allow[illegible]or MSIV-RPS limit switch location. Limerick's calibration history has shown very good re[illegible] RPS function actuates within allowable limits).

On 7/12/82, Fitzpatrick failed a quarterly MSIV-RPS te[illegible]e to[illegible]it sw[illegible] being out of adjustment.

The above operating experience s[illegible]ort[illegible]e p[illegible]os[illegible] S[illegible]nterval e[illegible]nsion, based on internal design enhancements, differences in [illegible]ig[illegible]et[illegible]en [illegible] c[illegible]r plants, and in-plant performance. The proposed change does not alt[illegible]c[illegible]e M[illegible]ic.

6 VENDOR-SPECIFIED MAINTEN[illegible]CE [illegible]

The LGS Environmental Quali[illegible]ti[illegible]ro[illegible]m dictates replacement of the MSIV-RPS limit switches. Maintenance of these switche[illegible] affected by the change to the frequency of functional testing.

7 ASME AND OTHER CODE-SPECIFIED TEST INTERVAL

The Limerick Inservice Testing (IST) program has a cold shutdown test justification for the MSIVs. The justification states that full stroke exercising of the MSIVs requires isolation of one of the four main steam lines, which results in reactor power fluctuations, primary system pressure spikes, and increased steam flow in the non-isolated steam lines.

Section 4.2.4 of NUREG 1482 discourages MSIV testing at power, including partial stroke testing. Nevertheless, LGS had continued to perform partial stroke testing as a means to verify valve performance.

Based on this existing IST documentation, a change will also be required to Specification ML-008. This change will be made to delete the statement that partial stroke testing satisfies the LGS IST program. This change can be made via ECR to post ML-008. Based on discussions with the IST Program Manager, the IST change will be an internal document change only, and will not require a relief request.

8 OTHER QUALITATIVE CONSIDERATIONS
(include (a) Comparison to Improved T.S., (b) Alternate ST Test List [retained], (c) LCO Review is optional)

(a) Comparison to ITS: Improved Technical Specifications include a functional test of the MSIV-RPS feature on a 92 day frequency. There is no discussion with regard to the basis of the frequency.

(b) Related ST's on MSIV's or MSIV/RPS logic: There are no other tests that exercise the MSIV-RPS logic for which credit can be taken on a 92-day frequency.

Additional considerations: As a prerequisite to the current 92-day ST, reactor power must be reduced to below 95%. The purpose of this power reduction is to limit the plant impact in the event of an inadvertent MSIV closure.

Recently, a single point vulnerability concern due to MSIV testing was raised. Mechanical failure of the MSIV test solenoid would result in the complete closure of the MSIV. A recent qualitative evaluation concluded, "Based on LGS operating history, test, and simulator case results, inadvertent reactor scram resulting from MSIV closure can be avoided with high confidence if initial power level is reduced to 80% or below."

9 IMPACT ON DEFENSE-IN-DEPTH PROTECTION.

The operation of the RPS relays for MSIV closure is un[illegible]nge[illegible] the ext[illegible]ion of the surveillance test interval. The diversity of scram inputs also remains u[illegible]ge[illegible] exte[illegible]n of the STI, given that reliability remains the same does not affect the defe[illegible]ept[illegible]e p[illegible]. The d[illegible]nse in depth protection of the plant remains unchanged.

10 THE IMPACT OF SYSTEMS [illegible]ERNAL EVENT PRA

All relevant systems were includ[illegible]antification thus there is no impact of non-modeled systems.

11 THE IMPACT OF SYSTEMS [illegible]ICH LERF RESULTS ARE NOT AVAILABLE

The Large Early Release Frequency (LERF) is calculated for full power internal events and is addressed quantitatively in section C.

12 THE IMPACT OF SYSTEMS FOR WHICH EXTERNAL EVENTS AND SHUTDOWN PRA ARE NOT AVAILABLE

There is no quantitative external events (fire and Seismic) or shutdown PRA available for this analysis. For fire risk, the fire areas that would cause an MSIV closure plant scram remain unchanged and given that component reliability is maintained the fire risk is unchanged. For Seismic risk, the RPS input would generally be related to a loss of offsite power not MSIV closure, so seismic risk is unaffected. For shutdown risk, the reactor is subcritical and RPS is not required to shutdown the reactor so there is no impact on shutdown risk. The MSIVs are also generally closed during most shutdown plant operating states and the RPS input for closure of the MSIVs is irrelevant.

13 UNCERTAINTY ASSOCIATED WITH THE QUANTITATIVE (PRA) PROCESS

A parametric uncertainty analysis was performed on the quantitative internal events CDF and LERF calculation. The 95th percentile values compared to the point estimate mean values were shown to be about 3 for CDF and about 4 for LERF. A factor of 3 or 4 would not significantly impact the conclusions from this analysis. Additionally, a focused uncertainty assessment which increased the relevant standby failure terms by a factor of 3 also showed that there would be a very negligible change in the calculated change in CDF and LERF risk metrics.

14 QUALITATIVE ANALYSIS – CONCLUSIONS

Based on the need for reactivity manipulations to perform this test, the single point vulnerability of test solenoid failures, and the excellent recent performance of the MSIV-RPS limit switches, revision of this TS surveillance interval is warranted. NUREG-1482, Section 4.2.4 quotes from the revised standard TS bases, "MSIVs should not be tested at power, since even a part-stroke exercise increase the risk of a valve closure when the unit is generating power."

15 PHASED IMPLEMENTATION RECOMMENDATIONS

Based on the surveillance test, maintenance rule, and availability history, it is recommended that quarterly surveillance testing be extended to a refueling outage(1R) frequency. Calibration/functional testing will continue on a refueling outage (1R) frequency. A phased approach to this extension is needed to address the lack of performance data at greater than the current quarterly frequency. The first phase will be to a 6 month interval with further extension to 1 year after 2 successful performances at six-month intervals, followed by extension to 1R after two successful performances at 1year intervals.

16 PROPOSED SURROGATE MONITORING RECOMMENDATIONS: (Co[illegible] of Existing MRule monitoring)

No other testing of the RPS "K03" relays is performed and the ma[illegible]ce ru[illegible]erformance criteria would not indicate degradation of the tested components so a n[illegible]onit[illegible]g criteria [illegible]uld be developed. Suggested monitoring is of tracking of ST functional testi[illegible]rfor[illegible]

DRAFT

17 PREPARERS (SECTION B – QUA[illegible]AT[illegible] A[illegible]LY[illegible] [illegible]s not required):

Prepared by: __Ted Ryan______ [illegible] (Su[illegible]t Matter Expert) Date: 2/18/04______
(System Manger[illegible] Co[illegible]n[illegible] S[illegible]li[illegible]

Prepared by: __Victoria A. Wa[illegible]____________ (PRA input) Date: 01/19/04______
(Risk Managem[illegible]neer)

C.	PRA (QUANTITATIVE) ANALYSIS ☐ check if not modeled in PRA
1	OVERVIEW OF PRA MODELLING of STI (Include bounding risk analysis techniques if used, and PRA Quality Issues) The subject surveillance requirement verifies the capability of RPS to initiate a scram on MSIV closure. This is modeled in the Limerick PRA. *For the purposes of this analysis a standby periodically tested failure was* added to the model for the MSIV position switches. The failure rate used was from the EPRI ALWR database using a level switch as a surrogate component since no failure rate data is available. The Limerick PRA has been reviewed against the ASME PRA standard and DG-1122/R.G.1.200. The identified gaps that affect this analysis were addressed as follows. Existing modules that related to the RPS logic were expanded. The parameter file was fully populated for performance of the parametric uncertainty assessment. There is very limited use of plant-specific data in the LGS models. The incorporation of more plant-specific data and the incorporation of revised common cause failure probabilities are anticipated, for the most part, to reduce the failure probabilities used in the model. This means that the currently calculated impacts are most likely conservative. Other remaining issues from the GAP analysis are considered as be[illegible]ed by the uncertainty assessment performed for this analysis. The above changes created the application specific PRA mo[illegible] L[illegible]101R3 and LGS201R3 (See LGS04AF-003). The Unit 1 application model base C[illegible]s 4.[illegible]-6/yr. wh[illegible] is equivalent to the base Unit 1 level 1 PRA model CDF. The Unit 1 base application [illegible]el L[illegible] 4.46[illegible]/yr. which is equivalent to the base Unit 1 model LERF. The Unit 2 applic[illegible] mo[illegible]F i[illegible]valent [illegible] the Unit 2 base model CDF. There is no quantified Unit 2 level 2 mo[illegible]
2	FULL POWER INTERNAL E[illegible]EL[illegible]L IMPACTS (CDF Comparison against R.[illegible].1[illegible] The change in CDF is less th[illegible]1.0[illegible]/[illegible]ding the test interval from once per quarter to once per 2 years. This is much less than the R[illegible]1.[illegible] li[illegible] of 1E-6/yr. Note: CDF = Core Damage [illegible]ency DRAFT
3	FPIE LEVEL 2 PRA MODEL IMPACTS (LERF Comparison against R.G 1.174 limits) The change in LERF is less than 1E-11/yr when extending the test interval from once per quarter to once per 2 years. This is much less than the R.G. 1.174 limit of 1E-7/yr. Note: LERF = Large Early Release Frequency
4	FIRE RISK IMPACTS (CDF & LERF Comparison against R.G 1.174 limits) Based on the very small impact on the FPIE model, it is judged that the impact from fire risk is also very small though no quantitative assessment is available.
5	SEISMIC RISK IMPACTS (CDF & LERF Comparison against R.G 1.174 limits) Based on the very small impact on the FPIE model, it is judged that the impact from seismic risk is also very small though no quantitative assessment is available.
6	SHUTDOWN RISK IMPACTS (CDF & LERF Comparison against R.G 1.174 limits) RPS is not required during shutdown so there is zero impact on shutdown risk.

7 OTHER PRA ISSUES (ex. Impacts from Other External Events excluding Seismic & Fire Risk Impacts)

Sensitivity cases with increased failure probabilities for the tested component indicate a negligible increase in risk even when 3-times the extended interval failure rates are utilized. The parametric uncertainty assessment indicates that the 95th percentile CDF value is about a factor of 3 times the base point estimate mean value, and the 95th percentile LERF value is about a factor of 4 times the base point estimate mean value. The low change in CDF and LERF for this assessment indicates that even at the 95th percentile values for CDF and LERF, the change in risk would be of very low risk significance.

No other external events are applicable. Internal flooding is contained in the internal events PRA model.

8 CUMMULATIVE EFFECT OF ALL RI-TS STI EXTENSIONS ON INTERNAL, EXTERNAL & SHUTDOWN PRAs. (CDF & LERF Comparison against R.G 1.174 limits)

The previous cumulative increase in CDF was 2E-9/yr. With this STI the cumulative increase in CDF remains approximately 2E-9/yr. The previous cumulative increase in LERF was 1E-11/yr. With this STI the cumulative increase in LERF remains approximately 1E-11. These cumulative values remain within the RG 1.174 limits.

9 QUANTITATIVE (PRA) ANALYSIS – CONCLUSIONS

The change to the surveillance test interval is of very low risk signif[illegible] a CDF and LERF perspective as evidenced by the changes remaining within RG 1.174 limits.

The change is within R.G. 1.174 limits when quantified with a [illegible] month fr[illegible]ency. However this interval may be extrapolating the existing failure rate beyond curre[illegible] avai[illegible] [illegible]ata a[illegible]s not recommended unless good performance can be noted from similar comp[illegible]nts [illegible]e [illegible] test[illegible] at a 2 year interval. Otherwise, a phased implementation is recommende[illegible] for [illegible]pr[illegible]t of conf[illegible]nce in the failure rate at intervals beyond 3 months.

10 PREPARER (SECTION C – [illegible]A[illegible]TIVE [illegible])

Prepared by: Victoria Wa[illegible] Date 01/19/04
(Risk Manage[illegible]nt [illegible]gi[illegible]r)

Revised by: __Don Vanover__________ Date: 04/05/04
(Risk Management Engineer)

DRAFT

D	**INTEGRATED DECISION-MAKING PANEL (IDP, a/k/a EXPERT PANEL) REVIEW**	MEETING DATE:
1	Presenter(s): ;	
2	Meeting Discussion: (Review of Qualitative and Quantitative Analyses, and Cumulative Impact)	
3	Meeting Results / Recommendations / Bases: (Consider: phased implementation, additional performance monitoring of failure rates)	

4 Approval / Disapproval: Check one of the following:

- ☐ STI Approved
- ☐ STI Approved with Comments
- ☐ STI Disapproved

IDP / Expert Panel Members:

[illegible]stin[illegible]D[illegible]endees:
[illegible]n[illegible]es not required – see MRule Expert Panel / IDP meeting minutes)

1. Engineering Manager * ______________________
2. Maintenance Manager * ______________________
3. Operations Manager * ______________________
4. Risk Management (PRA) Engi[illegible] ______________________
5. Maintenance Rule Coordinator ______________________
6. Surveillance Test Coordinator ______________________
7. System Manager or Component Engineer ______________________

* also Maintenance Rule Expert Panel Member

5 IDP / Expert Panel Coordinator Final Review / Closure:

______________________ Date: ____________
(IDP Coordinator)