Replacement of Cycle-Specific Numeric TS Values of SLMCPR with a DNBR Safety Limit TSTF-357



BWROG/NRC Meeting Bert Morris BWROG TSICC Chairman

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Summary Statement

- Numeric SLMCPR is in TS 2.1, Safety Limits
- Early in BWR history, TS value seldom changed
- Increasingly common for cycle-to-cycle SLMCPR TS changes
- Resulting in large number of TS changes to update SLMCPR
 - Timing of TS artificially constrains core design process
 - Causing BWR hardship in cost and resources
- Industry Proposal TSTF-357
 - Use SLMCPR DNBR criteria in TS and relocate SLMCPR numeric value to the COLR

History of Core Limits in TS

Original BWR TS contained numeric values of all core thermal limits. Begulted in TS obenges even evels and in beguy.

- limits. Resulted in TS changes every cycle and in heavy resource burden on Licensees and NRC
 - LHGR SLMCPR
 - APLHGR OLMCPR
- GL 88-16 allowed removal of core thermal limits numerical values from TS to the COLR provided core limits calculated with NRC-approved methods
- SLMCPR numeric value was in Safety Limits (SLs) section of TS and was not relocated by GL 88-16
- Agreement, in principle, reached between GE and NRC to relocate SLMCPR for STS – August 1989
- Post GL 88-16 there is an increasing trend in SLMCPR cycle-to-cycle changes

History of TSTF-357

1999	BWROG RACM and TS Committees sponsored a change to STS to relocate SLMCPR numeric value to COLR. TSTF-357 Rev. 0 submitted to NRC in October 1999.
January 2000	TSTF-357 was rejected based on NRC position that 10 CFR 50.36 required Safety Limits be in TS.
2002	BWR interest continued due to high number of SLMCPR TS changes. BWROG TS Committee voted to revise TSTF-357 and revisit TSTF with NRC.
November 2002	Exelon submitted 50.36 exemption to allow removal of SLMCPR numeric value from TS for its BWR fleet
February 2003	BWROG Exec Committee/NRC meeting, NRC notified of intent to resubmit modified TSTF-357. NRC agreed to reconsider issue.

History of TSTF-357

April 2003TSTF-357 Revision 1 submittedApril 2003Exelon withdrew exemption request at the request of NRC
based on agreement for TSTF-357 reconsiderationMarch 2004NRC notified BWROG that TSTF-357, Rev. 1 would be rejectedCurrentBWROG request to meet with NRC to elaborate on need for
TSTF-357

Direct Cost To BWRs

- Absolute SLMCPR value is calculated for each reload cycle. Value is a statistical derivation that is dependent, among other factors, on core history and next core loading.
- Approximately 18 core reloads are performed each year. Small changes in analytic SLMCPR (+/- .01 to .02) are typical.
- If analytic SLMCPR value > TS value, Licensees must request TS change
- If analytic SLMCPR value is bounded by TS value, Licensees must decide whether to request TS change based on:
 - Cost of change
 - Need for operating margin
- Net traffic is about 9 SLMCPR TS changes per year
- NRC review costs typically \$15 \$20 K. Licensee internal costs equal or higher
- Direct cost to BWRs ~ \$350K/year. Estimated NRC resource commitment at 2/3 FTE.
- Costs would be higher except many utilities are opting out of TS changes

Impact on Fuel Design Cycle

Need to generate SLMCPR value for TS submittal artificially forces core design to be completed 7-8 months prior to next cycle

- - 1 month Licensee review of vendor SLMCPR report
 - Licensee preparation and in-house review times for TS change is about 2 months
 - Licensee goal to give NRC at least 4-5 months review time before outage
- Completing final core design late in current cycle when fuel burn-up and cycle energy needs are more accurate results in better core design and improved basis for core limits
- Need to generate TS value is impacting core design schedule
- Maintenance of SLMPCR value in COLR would allow additional time to optimize core and fuel economics

Impact on Regulatory Process

- Licensees unable to meet standard NRC expectation of submitting outage TS 1 year before need
 - NRC has reiterated timing expectations to PMs
 - Shortened review turn-around puts resource pressure on Licensees and NRC staff
- Approval timing drives TS implementation, COLR finalization, final plant core design change closure into busy outage period
- Licensee management anxiety uncertainty and timing of outage required TS
- BWR regulatory hardship in excess of PWRs TS structure results in additional licensing requirements in seeking TS approval cycle-to-cycle

Basis for TSTF-357

Original selection of SLs in TS premised on expectation that values would seldom change. SLMCPR only value in BWR or PWR TS that changes each cycle.

- TSTF-357 proposes use of 99.9 % DNBR avoidance criterion for SL and moves SLMCPR numeric value to COLR
- Numeric SLMCPR is a surrogate for DNBR. The DNBR criterion is the true SL and meets 50.36 requirements for inclusion of SLs in TS.
- DNBR criterion is the underlying basis of SLMCPR value and does not change cycle-to-cycle
- DNBR criterion is same for all vendor methods and fuel types
- Relocation of numeric SLMCPR is consistent with relocation of all other BWR core limits made under GL 88-16 and for the same reasons:
 - SLMCPR value changes with each reload and is resulting in frequent TS changes
 - Core limits and SLMCPR calculated with NRC-approved methods
 - All other core limits (APLHGR, LHGR, OLMCPR) maintained in COLR
 - COLR process has been successfully employed for many years
- BWROG position that same solution is appropriate for SLMCPR

Impact of TSTF-357 on Monitoring Core Limits

- SLMCPR limit is established such that fuel design limits are not exceeded during operation and transients. Mathematically derived value from which OLMCPR is determined.
- All core limits (APLHGR, LHGR, OLMCPR) serve same function in protecting fuel integrity
- OLMCPR is the monitored parameter
- All core limits have an associated LCO in TS. Numeric core limits are maintained in COLR.
- Relocation of numeric value of SLMCPR to COLR does not change TS requirements for monitoring core limits



TSTF-357 and Control of SLMCPR Numeric Limit

TSTF-357 allows Licensees to maintain numeric SLMCPR value in COLR

- TS 5.6.5, COLR, requires use of NRC-approved methods for derivation of core limits and that the Topical Reports be listed in TS
- TSTF-357, Rev. 1, revises TS 5.6.5 to specifically state that SLMCPR value must be calculated using NRC-approved methods
- TS 5.6.5 requirement to submit COLR and COLR changes to NRC is not changed
- To use a new NRC-approved method, Licensee would be required to request COLR TS change to reference the different method
- COLR maintenance process is subject to NRC inspection

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- SLMCPR calculation process is subject to NRC audit at any time
- Successful multi-year experience in use of COLR process for control of limits
- Adequate controls for maintenance of SLMCPR in COLR are in place

TSTF-357 and NRC Oversight

- Current situation results in repetitive NRC reviews of same TS change
- Current process minimizes efficiencies gained by vendor submittal/NRC approval of fuel topical methods
- Proposed approach frees NRC resources
 - Would allow resource allocation to higher priority TS
 - Some PM work load reduction
- TS submittal history shows SLMCPR is not apt to change based on NRC review
- NRC will continue to be notified of changes to SLMCPR via required submittal of COLRs
- TSTF approval could prescribe COLR requirements or supplemental information needs
- Proposal is consistent with current regulatory practice in using inspection/audit methods to examine activities and processes rather than in-line reviews
- NRC oversight role is maintained by:
 - Review/approval of vendor methodologies
 - TS requirements for NRC approval to change methods
 - Licensee submittal of COLRs
 - NRC inspection/audit

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Summary

BWROG continues to stress need for regulatory relief

- TSTF-357 is a viable approach consistent with past and current regulatory practice
- Maintenance of SLMCPR value in COLR affords core designers more flexibility and improved accuracy
- Monetary and resource benefits for Licensees
- Vendors and Licensees have demonstrated competency in maintaining core limits in COLR - no safety impact
- Proposal is typical of modern regulatory actions in that process is evaluated using inspection/audit methods rather than in-line review NRC oversight function is maintained
- BWROG requests TSTF-357 be approved

Reduction of Regulatory Burden Safety Limit MCPR LARs - RAI Reduction



BWROG/NRC Meeting Mark Turkal Progress Energy

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Summary Statement

- BWRs seeking NRC input on SLMCPR TS submittal content to minimize need for RAIs
- Optimization of core design through use of best-available end-of-cycle fuel conditions results in shortened review period



Background

- Submittal Content
 - Last 46 SLMCPR TS changes have received at least 1 RAI
 - Proprietary nature of information and variability of issues make anticipation of RAIs difficult for individual utilities
 - Utility management expectations to minimize RAIs on all licensing requests
- Review Schedule
 - Shortened review schedule for SLMCPR TS increases need for RAI avoidance
 - The last 16 TS have, on average, been provided 4 months before requested issuance
 - Of the last 14 amendments issued, 3 were approved on or before the requested issuance date



Impacts

Utilities

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- Living with conservative SLMCPRs to avoid need for amendment
 - Results in less than optimum fuel utilization
- RAIs increase NRC review fees
 - The average for 7 recent amendments was ~ \$18,500 per amendment
- RAIs increase Licensee internal costs
 - The average for 7 recent amendments was ~ \$19,000 per amendment
- Just-in-time amendments

Impacts

• NRR

- Since 2000, an average of 9 SLMCPR amendments per year have been issued
- Cyclic impact on resources; peaked primarily to support spring refueling outages (2/3 of LARs)
 - Average of 120 review hours per amendment
 - 1080 hours of review to support issuance of 9 amendments



Optimal Solution

- Issue CLIIP based on TSTF-357
 - COLR revisions continue to be submitted for review

Benefits

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- Eliminates 9 SLMCPR LARs per year and associated RAIs
- Reduces both NRC and utility resource burden
- Allows routine audits to verify SLMCPR calculations conform to approved methodology

Interim Solution

- Review Standard for SLMCPR LARs
 - Establishes minimum standard technical content for SLMCPR LAR

Benefits

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- Should substantially reduce RAIs
- Consistent submittal content and format should ease NRC review burden
- Reduces likelihood of just-in-time amendments

Summary

- Industry is anxious to address difficulties associated with SLMCPR LARs
- Two potential solutions
 - TSTF-357 Optimal
 - SLMCPR LAR Review Standard Interim

