AmerGen

AmerGen Energy Company, LLC
Three Mile Island Unit 1
Route 441 South, P.O. Box 480
Middletown, PA 17057

Telephone: 717-944-7621

An Exelon/British Energy Company

10 CFR 50.90

February 16, 2001
5928-01-20055

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

Dear Sir/Madam:

SUBJECT: THREE MILE ISLAND, UNIT 1 (TMI Unit 1)
OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289
EXIGENT TECHNICAL SPECIFICATION CHANGE REQUEST NO. 309,
RESPONSE TO VERBAL REQUEST FOR ADDITIONAL INFORMATION

In response to the NRC's verbal request on February 16, 2001, attached is a copy of the calculation (C-1101-531-E220-018, "Risk Evaluation of Crosstying NR and SR at power"), which supports the determination of incremental core damage frequency while in the proposed system configuration described in the AmerGen submittal dated February 14, 2001. The Risk Achievement Worth (RAW) for the TMI-1 Nuclear River Water (NR) System is 59.8 using the latest TMI PRA model. This value is from the base PRA model and does not include this system configuration. Therefore, this value is conservative.

The NRC staff also verbally requested additional information regarding the ability to close SR-V-2 within the thirty (30) minutes. In response, this valve can be closed from the control room with a stroke time as indicated on the Bill of Material of three (3) minutes. In addition, an auxiliary operator was briefed on the actions needed to close SR-V-2. The operator was then asked to go from a remote area of the auxiliary building to the SR-V-2 valve and simulate stroking the valve closed. The time required to get to the valve was less than ten (10) minutes. Based on the gear ratio specified in the bill of materials for SR-V-2, closing the valve would take approximately eighty (80) turns of the valve operator handwheel. It would take less than five (5) minutes to stroke the valve closed once arriving at the valve. Therefore, SR-V-2 can be manually closed in less than thirty (30) minutes.

A001

Please contact George Rombold at (717) 948-8554 if you have any questions regarding this submittal.

Sincerely yours,

Mark E. Warner
Vice President, TMI Unit 1

MEW/mrk

Enclosure: AmerGen Calculation C-1101-531-E220-018, "Risk Evaluation of Crosstying NR and SR at power"

cc: USNRC Regional Administrator, Region I
USNRC TMI Senior Resident Inspector
USNRC TMI Unit 1 Senior Project Manager
Chairman, Board of Supervisors of Londonderry Township
Chairman, Board of County Commissioners of Dauphin County
Director, Bureau of Radiation Protection, PA Department of Environmental Resources
File No. 01025

AMERGEN ENERGY COMPANY, LLC

Three Mile Island, Unit 1
Operating License No. DPR-50
Docket No. 50-289
Exigent Technical Specification Change Request No. 309, Verbal Request For Additional Information

---

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF DAUPHIN)

This Response to a verbal Request for Additional Information is submitted in support of Licensee's request to change Appendix A to Operating License No. DPR-50 for Three Mile Island, Unit 1. Included is a response to NRC requests in a conference call on February 16, 2001. All statements contained in this submittal have been reviewed, and all such statements made and matters set forth therein are true and correct to the best of my knowledge.

AmerGen Energy Company, LLC

BY: ______________________
Vice President, TMI Unit 1

Sworn and subscribed to before me this
16th day of February, 2001.

SEAL:

____
Notary Public

Notarial Seal
Suzanne C. Mik...sik, Notary Public
Londonderry Tw..., Dauphin County
My Commission E... Nov. 22, 2003
Member, Pennsylvania Association of Notaries

AmerGen

CALCULATION COVER SHEET
(Ref. EP-006T)

Subject:	Calculation No.	Rev. No.	System Nos.	Sheet
Risk Evaluation of Crosstying NR and SR at Power	C-1101-531-E220-018	0	531	1 of 1

1. Is this calculation within the scope of the Operational Quality Assurance Plan? (IF YES, a verification is required.) ☐ Yes ☒ No

2. Does this calculation contain assumptions / design inputs that require confirmation? (If YES, provide CAP or appropriate configuration control number(s)) (e.g., ECD, PFU, MD, PCR, etc.) ________ ☐ Yes ☒ No

3. Does this calculation require revision to any existing documents? (If yes, provide CAP or appropriate configuration control number(s)) ________ ☐ Yes ☒ No

4. Is this calculation performed as a design basis calculation? (If YES, identify design basis parameters.) (See Section 3.3) ☐ Yes ☒ No

Parameter: ________

Referenced Calculations, Safety Evaluations and Technical Reports (See Section 4.2.3.5)	Rev. No.

Comments:

APPROVALS

Originator Charles D. Adams *Charles D. Adams*	Date 2/12/2001
Verification Engineer/Reviewer Christopher Pupek *[signature]*	Date 2/12/2001
Section Manager Howard Crawford *Howard Crawford*	Date 2/12/01
Other Verification Engineer/Reviewer	Date
Other Verification Engineer/Reviewer	Date

AmerGen CALCULATION SHEET (Ref. EP-006T)

Subject: Risk Evaluation of Cross-tying NR and SR at Power	Calculation No. C-1101-531-E220-018	Rev. No. 0	System Nos. 531	Sheet 1 of 3

1. PURPOSE:

Evaluate the potential risk impacts of continuing power operation for up to 14 days with the secondary services river water system (SR), and the nuclear services river water system (NR), crosstied while piping repairs are performed on the nuclear services river water system normal underground piping supply line. The secondary services river water system is a not a safety related system but will be crosstied with the safety related nuclear services river water system. The opening of the crossties could potentially impact the availability and reliability of the nuclear services river water system due to the additional failure modes present in the secondary river water system.

2. SUMMARY OF RESULTS;

Operating TMI with the nuclear river water system and the secondary river water system crosstied causes a small risk increase of approximately $2.2e^{-7}$ incremental conditional core damage probability (ICCDP), for the assumed 14day duration.

3. REFERENCES:

1. TMI PRA 2000 Revision including internal floods, model TMI2K using the master frequency file FLOOD.

4. ASSUMPTIONS:

4.1 The cross-tying of the NR and SR systems for up to 14 days could impact the core damage frequency by creating additional failures that could lead to a loss of the nuclear services river water system.
4.2 The portion of the SR system that is used to replace the isolated portion of the NR system is assumed to have equivalent seismic capability as the NR system.
4.3 A proceduralized operator action to isolate the analyzed configuration introduces negligible additional risk during the short 14 day period analyzed.

5. DESIGN INPUT:

The referenced PRA was modified by doubling the loss of nuclear river water initiating event frequency and assuming the event also causes a loss of the secondary river water system.
The rule modification for the event failing the secondary river water system was an addition of (+INIT=LNR) to the SCZ rule in the MECHSUP event tree.

6. OVERALL APPROACH AND METHODOLOGY:

The ICCDP was calculated by incorporating the assumptions listed above into the TMI PRA model and calculating the change to the resultant core damage frequency per year. This CDF per year result was then computed for the 14 days of the alignment period of concern to produce the ICCDP.

7. CALCULATIONS:

Cross-tying the nuclear services river water system with secondary services river water provides additional pumps available for supplying water if required, which increases the availability of the system. However, the system is negatively affected by adding additional piping and components as possible failure mechanisms, but these new failures tend to be passive failures with low failure rates, not active components failing to operate. The additional components are heat exchangers and the piping to the heat exchangers. These components have very low probabilities of failing during the time period of the piping repair effort.

<u>On Line Internal Events Risk</u>
Initiating Event Change
The loss of nuclear river water initiating event frequency in the TMI PRA is $4.11e^{-3}$/year, results in a CDF of

5.75e^{-6}/year. Assuming the initiating event frequency is doubled due to the additional components (see Table 1) from the cross-tie evolution, the new initiating event frequency would be 8.22 e^{-3}/ year and a resultant CDF of 1.16e^{-5}/year. Since the amount of time requested for this alignment is 14 days, the CDF due to the loss of nuclear river water initiating event would be:

(1.16e^{-5}/year * 14/365) or equal to 4.4e^{-7}

The original CDF contribution for this event for 14 days is: (5.75e^{-6}/year * 14/365) or equal to 2.2e^{-7}

Subtracting the original value for the 14day period from the increased CDF value due to the cross-tie evolution results in an increase of 2.2e^{-7} incremental conditional core damage probability (ICCDP), for the duration of the piping repair.

This value is conservative since maintenance alignments are in the initiating event frequency calculation, but no additional maintenance or testing will be allowed during the pipe repair time period. To calculate the above CDF, the TMI PRA was evaluated with the loss of nuclear river water system initiating event frequency doubled and a simultaneous total loss of secondary river water.

Split Fraction Change
During the time period of this alignment, the top event split fractions would be negatively affected (increased chance of failure), due to the additional components that may fail. They would be positively affected due to the additional pumps available to supply flow to the cross-tied systems. A positive impact on the systems after a plant trip would also be due to the decreased heat load on the secondary side after the turbine trips off.

A small risk increase during this time period is created because the butterfly valves NR-V-3 and NR-V-5 are required to be capable of maintaining system integrity if the nuclear river water pipe has to be disassembled for repair. However, the pressure across these valves during the pipe repair is in the range of only 30psi. The electrical power to the valves will be disabled during the time of the repair and the failure rate for the inadvertent transfer of a manual valve is 2.85e^{-8} failures per hour. Therefore, the risk significance of NR-V-3 and NR-V-5 failing to maintain system integrity was assessed as low during the time period of the pipe repair.

Containment Issues
The proposed nuclear river water system cross-tie operations will not effect any containment protection features.

Transition and Shutdown Risk
The heat loads for the nuclear services river water system is reduced somewhat during shutdown. In the initial period after a shutdown, the loads are nearly equivalent to the operating loads until the reactor coolant pumps are stopped after the plant is cooled down. The heat load for the secondary services river water system, (primarily consists of main turbine and main feedwater loads), is reduced significantly after shutdown. However, during normal shutdowns and cooldowns, the plant is cooled using the main feedwater system until the decay heat removal system can be operated. After the plant is cooled down and the decay heat removal system is operating, the risk of operating with the systems crosstied is small since they are no longer required for any safety functions. In the event of a loss of the NR and SR systems while crosstied initial decay heat will be removed using the emergency feedwater system which is independent of either river water system.

Seismic Events Risk
The secondary services river water system is not seismically qualified. The two systems can be separated, if required in a short time via (SR-V-2), an action that is proceduralized for this condition. After this one action, the remaining piping is equivalent in seismic capability as the normal nuclear services river water piping. This additional risk as a

result of the operator action was not quantified, but is assumed to be small during the time period of the cross-tie evolution.

Fire Events Risk
Since the normal nuclear service river water pumps are available along with the secondary service river water pumps, there is no negative change to the fire risk due to the cross-tie operation. The actual fire risk is positively impacted by the cross-tie evolution due to the increased redundancy of the cooling system pumps. In summary, a qualitative review of the fire risk shows no increased risk from fires.

Other Risk
The spent fuel pool is cooled using nuclear services river water, a loss of cooling to the spent fuel pool is not evaluated in the PRA. During the period of the cross-tying of the two systems, if they were lost, a long amount of recovery time is available prior to fuel pool heat up.

Table 1 - Additional Components Due to Cross-tie Evolution

No.	Component Type	Number of NR Components	Number of SR Components	Comment
1	Heat Exchangers	6	4	
2	Pumps	3	3	
3	Check Valves	3	3	
4	Butterfly Valves	2	0	* Inadvertent transfer

* The failure of the butterfly valves during the time period is assumed to be small and equivalent to the failure rate of the heat exchanger isolation valves to maintain isolation during maintenance on the heat exchangers. The NR-V-3 and NR-V-5 valves are similar in design to the heat exchanger isolation valves but are larger in size.

8. APPENDICES:
None