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NLS2009073
September 1, 2009

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Nuclear Regulatory Commission Request for Additional Information Re: Alternative Source Term (TAC No. MD9921)
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:
1. Letter from Carl F. Lyon, U. S. Nuclear Regulatory Commission, to Stewart B. Minahan, Nebraska Public Power District, dated August 19, 2009, "Cooper Nuclear Station - Request for Additional Information Re: Alternative Source Term (TAC No. MD9921)"

2. Letter from Stewart B. Minahan, Nebraska Public Power District, to the U.S. Nuclear Regulatory Commission, dated October 13, 2008, "License Amendment Request for Application of the Alternative Source Term for Calculating Loss-of-Coolant Accident Dose Consequences"

Dear Sir or Madam:

The purpose of this letter is for Nebraska Public Power District to submit a response to requests for additional information (RAI) from the Nuclear Regulatory Commission (NRC) (Reference 1). The RAI requested information in support of NRC's review of a license amendment request for the Cooper Nuclear Station (CNS) facility operating license and technical specifications to adopt the Alternative Source Term for use in calculating the Loss-of-Coolant Accident dose consequences (Reference 2).

Responses to the specific RAI questions are provided in the Attachment to this letter. No regulatory commitments are made in this submittal.

Information submitted by this response to the RAI does not change the conclusions or the basis of the no significant hazards consideration evaluation provided with Reference 2.

If you have any questions concerning this matter, please contact David Van Der Kamp, Licensing Manager, at (402) 825-2904.

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NRR

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 9/1/09
(date)

Sincerely,

Stewart B. Minahan
Vice President and Chief Nuclear Officer

/em

Attachment

cc: Regional Administrator w/ attachment
USNRC - Region IV

Cooper Project Manager w/ attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachment
USNRC - CNS

Nebraska Health and Human Services w/ attachment
Department of Regulation and Licensure

NPG Distribution w/ attachment

CNS Records w/ attachment

Attachment

Response to Nuclear Regulatory Commission Request for Additional Information Re: Alternative Source Term (TAC No. MD9921)

Cooper Nuclear Station, Docket No. 50-298, DPR-46

QUESTION #1

Provide the loading sequence for each emergency diesel generator (EDG) at Cooper Nuclear Station (CNS). In your response, describe the changes that have been made to the EDG loading sequence to support the license amendment request (LAR) for CNS dated October 13, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML082910760).

RESPONSE:

No new electrical loads were added to support this Cooper Nuclear Station (CNS) license amendment request (LAR). Thus, it is not necessary to provide the loading sequence for Diesel Generators (DGs). The Standby Liquid Control (SLC) system has always been connected to the emergency busses. (A description of the electrical supply for the SLC system is included in the response to Question No. 1.1 of Attachment 2 to the LAR).

QUESTION #2

Describe how the loads being added to the CNS EDGs (i.e., standby liquid control system (SLC) components) affect the capability and capacity of the EDGs (e.g., describe the impact of the proposed change on the EDG ratings).

RESPONSE:

No new electrical loads are being added to the DGs to support this LAR. As noted above, SLC system has always been connected to emergency busses. A description of the electrical supply for SLC system is included in response to Question 1.1 of Attachment 2 of the LAR. SLC is not considered in the load calculation because it does not automatically initiate. It is manually initiated, if needed, and can be initiated up to six hours after the Design Basis Accident (DBA) Loss of Coolant Accident (LOCA).

Operators may add additional load to the DGs during the post-accident time period provided DGs do not exceed design load limitations. This will ensure DGs will not exceed their peak loading capabilities and will have adequate fuel reserves. Fuel consumption for DGs is based on these load constraints. Therefore, running SLC is acceptable post-LOCA.

QUESTION #3

In response to question 1 in attachment 2 of the LAR, the licensee stated that SLC is a non-safety-related system. Given that the SLC is a non-safety-related system, describe how this system will be electrically separated from the safety-related system (i.e., provide a detailed discussion on how a fault on the non-Class 1E electrical circuit will not propagate to the Class 1E electrical circuit). Also, describe the independence (e.g., electrical and physical separation) and redundancy of these systems.

RESPONSE:

As stated in response to Question 1.1 in the LAR, power and control for each of the two SLC system pumps are fed from separate essential Motor Control Centers (MCCs) which are in turn fed from divisionally separate essential busses with standby power supplied by the DGs. The SLC squib valves and their associated continuity meters are powered by these same essential MCCs, providing divisionally separate essential power to these valves. SLC system pressure and level indication is powered by a non-essential power panel that is powered via a switchable power source to either of the two essential busses, each of which can be supplied by a DG.

This is original configuration of the electrical supply for the SLC system, and no changes were made in support of this LAR. Based on design of the power and control for SLC, there is no potential for a fault on a non-Class 1E electrical circuit to propagate to a Class 1E electrical circuit. Thus, if SLC tank heaters fail, essential power to the pumps and Squib valves would not be affected.

QUESTION #4

Describe how the SLC meets the single failure criterion.

RESPONSE:

CNS design was developed concurrently with development of the earliest regulations and standards regarding single failure. Because of this timing, CNS design was only compared to the developing regulations and standards and not necessarily required to meet them. As a result, the applicability of single failure to CNS is limited to those items which CNS has committed to. Although SLC is not required to meet single failure criterion, the system is designed with two independent pumps and two explosively actuated injection valves, each powered from separate emergency busses. These are the only active components in the system. A detailed discussion of the suitability of SLC system redundancy in components and features is included in response to Question No. 3 in Attachment 2 of the LAR.

QUESTION #5

Describe how the operators will be notified in the event that the SLC would become inoperable (e.g., control room annunciators).

RESPONSE:

Alarms are provided to notify Control Room operators for SLC Tank Hi/Low Level, SLC Tank Hi/Low Temperature, loss of continuity to the squib valves, and SLC Tank Heater Ground to Solution. When SLC is initiated, the operator turns a key locked switch in the Control Room to the "ON" position and then verifies the pump starts from observing pump discharge pressure and red indicating lights for running (green indicates off). The operator also checks to see that the continuity light for the associated squib valve goes out indicating the squib has fired.

QUESTION #6

Provide a list and description of components being added to your Title 10 of the Code of Federal Regulations Section 50.49 (10 CFR 50.49) program due to this LAR. Confirm that these components are qualified for the environmental conditions they are expected to be exposed to.

RESPONSE:

No new components are added to the Environmental Qualification (EQ) program in support of this LAR. The proposed amendment does not change the operating environment for any components located outside the drywell. EQ profiles are, however, being revised to address the chemical spray that would be introduced into the containment if SLC injection is required.

The radiological analysis for Alternate Source Term (AST) credits SLC system injection to maintain the suppression pool pH levels above 7.0 following a DBA-LOCA to limit the evolution of elemental (gaseous) iodine being released into the containment atmosphere. The new function is to control the pH of the water in the suppression pool, reactor vessel, and core cooling systems following a DBA LOCA. The radiological analysis for AST is not used in the EQ profiles.

Under DBA-LOCA conditions, significant quantities of acid are generated. Injection of sodium pentaborate decahydrate ($Na_2B_{10}O_{16}\cdot 10H_2O$) solution from SLC is credited with buffering the acidity and maintaining pH of the suppression pool inventory above 7.0 for the duration of the DBA-LOCA. Chemical composition of the suppression pool is representative of containment spray conditions after the spray system is manually initiated 10 minutes into the DBA LOCA. Figure 1 reflects the pH profile of the suppression pool following a DBA-LOCA with SLC injection.

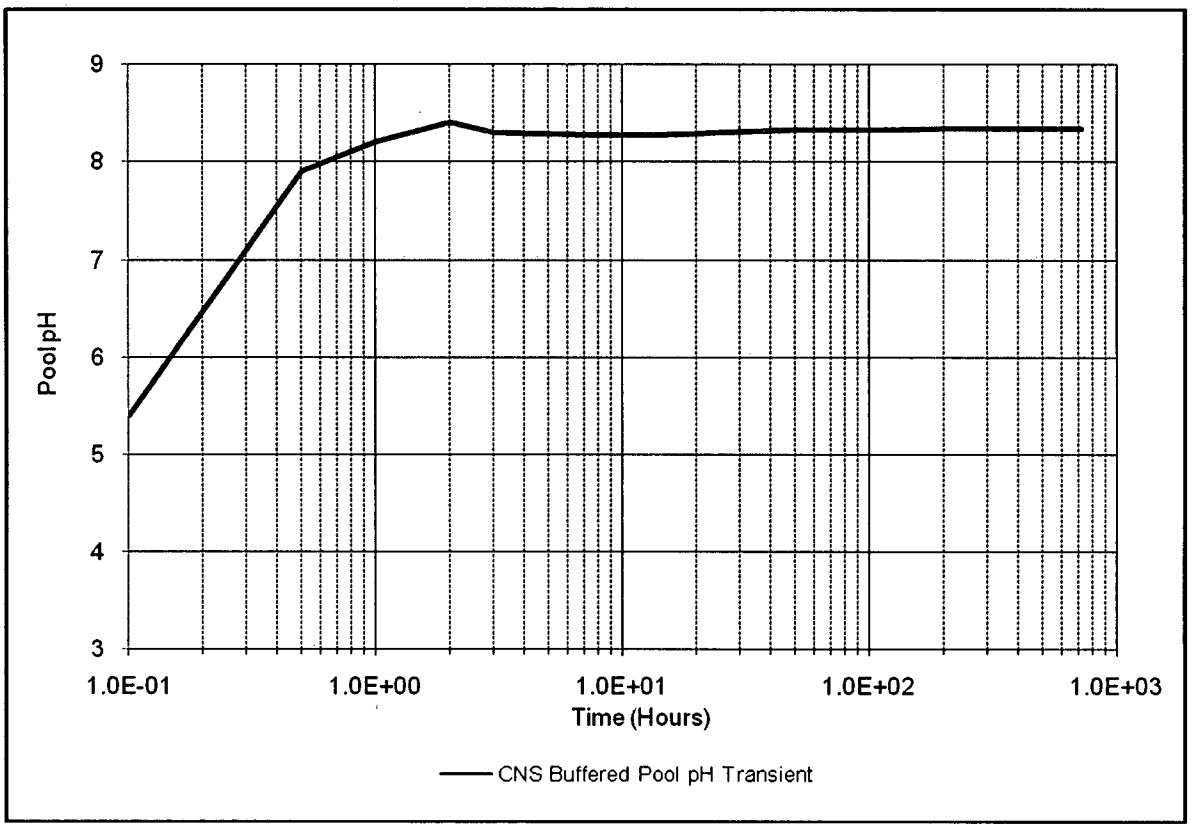

Figure 1 Suppression Pool pH with SLC Injection following DBA-LOCA

Implementation of AST impacts the EQ Program since it effectively changes chemical composition and pH of the drywell spray under DBA-LOCA conditions. Spray conditions for small break LOCAs that do not result in fuel failure will remain as a demineralized water spray. Except for chemical composition of the containment spray, AST implementation does not change any other environmental parameter or profile used to establish environmental qualification of electrical equipment important to safety. Implementation of AST will change the spray condition for EQ Program equipment located in the following EQ Zones:

AST Impact on Environmental Conditions		
EQ Zone	**Description**	**Remarks**
WCPLT	Worst Case Plant (All EQ Zones)	Used for Commodity Items
WCIPC	Worst Case Inside Primary Containment	
PC2	Primary Containment (Drywell) between El. 931' and El. 958'	Outside of Shield Wall
PC4	Primary Containment (Drywell) outside of shield wall below El. 931' near Reactor Recirculation Pumps	
PC5	Primary Containment (Drywell) (>15 ft. from Recirculation Pumps)	
PC6	Primary Containment (Torus Air Space)	

When dissolved in an aqueous solution, each mole of sodium pentaborate dissociates into two (2) equivalents of sodium (Na), two (2) equivalents of borate ($B(OH)_4$), and eight (8) equivalents of boric acid (H_3BO_3) as shown in the following equation.

$$Na_2B_{10}O_{16} + 16H_2O \leftrightarrow 2Na^+ + 2B(OH)_4^- + 8B(OH)_3$$

The following concentrations are being used as a basis for evaluating EQ equipment for containment spray under DBA-LOCA conditions.

Compound	***Molarity* (mol/L)**	***Ppm***
Hydriodic Acid, HI	9.72×10^{-7}	0.12
Cesium Hydroxide, CsOH	9.44×10^{-5}	14.15
Nitric Acid, HNO_3	7.37×10^{-5}	4.64
Hydrochloric Acid, HCl	4.97×10^{-4}	18.12
Borate, $B(OH)_4$	2.32×10^{-3}	182.91
Boric Acid, H_3BO_3	9.27×10^{-3}	574.14

The pH range used to demonstrate qualification following a DBA-LOCA with SLC injection is 7.0 - 8.4. The following table provides a summary of the affected equipment types, listed by EQ Data Package (EQDP), and how the equipment will be qualified for the new chemical spray conditions.

Listing of EQ Equipment Affected by AST Implementation				
EQDP #	**Description**	**Make / Model**	**Qualification Method for Chemical Spray**	**Remarks**
EQDP.2.105	GE/PCI Pressure Switch	A171P	Existing Qualification to Demineralized Spray remains valid	SRV Position Indication is not required for DBA-LOCA.
EQDP.2.116	Namco EA-180 Limit Switches	EA180 Series	Test and Analysis	Evaluated for EQ Zone WCIPC.
EQDP.2.118	Target Rock SRV Solenoid	1/2 SMS-S-02-1	Test and Analysis	SRVs are not required for DBA-LOCA. Conservatively evaluated for chemical spray. Analysis credits sealing of enclosures.
EQDP.2.171	Limitorque Actuator Components (B0212)	SMB Series	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.2.172	R.A. Hiller MSIV Pilot Control Valve Manifold Assembly	SA-A111 SA-A085	Test and Analysis	Evaluated for EQ Zone PC5. Analysis credits sealing of enclosures.
EQDP.2.178	Limitorque SMB with Reliance Class RH Motors	SMB Series	Test and Analysis	Evaluated for EQ Zones PC4 and PC5.
EQDP.2.179 DOR	Limitorque SMB/SB with Peerless 125/250VDC Motors	SB and SMB Series	Test and Analysis	Evaluated for EQ Zone PC4.

Listing of EQ Equipment Affected by AST Implementation				
EQDP #	**Description**	**Make / Model**	**Qualification Method for Chemical Spray**	**Remarks**
EQDP.3.114	CONAX Temperature Elements (RTD & T/C)	7H04-10001-01	Test and Analysis	Evaluated for worst case of EQ Zones PC1, PC4, and PC5.
EQDP.3.115	Victoreen HRRM	875	Test and Analysis	Evaluated for EQ Zone PC5.
EQDP.4.122	Raychem Flamtrol Cable	Flamtrol	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.123 DOR	Kerite HTK/FR Cable	HTK/FR 1000V	Test and Analysis	Evaluated for EQ Zone WCIPC.
EQDP.4.125	Cerro Firewall SR (KS-500)	Firewall SR	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.126 DOR	GE EPAs	238X600NSG 001	Test and Analysis	Evaluated for EQ Zone PC5 and PC6.
EQDP.4.136	CONAX ECSA	N-11027-01 and N-11136-01	Test and Analysis	Generic Qualification. Conax ECSAs inside the drywell are currently qualified by EQDP.3.114.
EQDP.4.138	Rockbestos Firewall III and Firewall SIS	Firewall III	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.139	Brand-Rex Ultrol Cable	Ultrol	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.147	Raychem WCSF-N	WCSN-N Bolted	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.148	CONAX Coaxial EPAs	7T26-10000-01	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.158 DOR	GE Low Voltage Control Cable (Type SI-57275)	SI-57275	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.163	IST Low Voltage EPA	Serial No. 913501	Test and Analysis	Evaluated for EQ Zone PC5.
EQDP.4.164	EGS Grayboot Connectors	GB-1, -2, -3 Series	Test and Analysis	Evaluated for EQ Zone PC5.
EQDP.4.166	Namco EC-210 Connectors	EC-210 Series	Test and Analysis	Evaluated for EQ Zone PC5.
EQDP.4.175	EGS QDC Connector	880701 Series and Namco EC-290	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.183 DOR	BIW Bostrad 7 Instrumentation Cable	Bostrad 7	Test and Analysis	Evaluated for worst case of EQ Zones PC1 and PC5.
EQDP.4.184	Raychem NPKP and NMCK Y-Splice Kits	NPKP and NMCK	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.185	Raychem WCSF-N Inline Crimped Connection	WCSF-N Crimped	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.186	Raychem NPKV Stub Connection	NPKV	Test and Analysis	Evaluated for EQ Zone WCPLT.

Listing of EQ Equipment Affected by AST Implementation				
EQDP #	**Description**	**Make / Model**	**Qualification Method for Chemical Spray**	**Remarks**
EQDP.4.189 DOR	Cerro Pyrotrol III Cable	Pyrotrol III	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.192	Rockbestos Firewall SR (KS-550)	Firewall SR	Test and Analysis	Evaluated for EQ Zone PC4.
EQDP.4.197	Raychem NMCK Splice Kits	NMCK	Test and Analysis	Evaluated for EQ Zone WCPLT.
EQDP.4.205	EGS Patel P-1 Thread Sealant	P-1	Test and Analysis	Evaluated for EQ Zone WCPLT.

QUESTION #7

In response to question 1.5 in attachment 2 of the LAR, the licensee stated that the components exposed to a harsh environment have been evaluated as either qualified or identical to qualified equipment. The licensee should confirm that the identical components added to environmental qualification (EQ) list due to this LAR were maintained as EQ components or provide the attributes, the detailed evaluation, and the documentation to upgrade these components to meet the requirements of 10 CFR 50.49.

RESPONSE:

No new components are added to the EQ program in support of this LAR. The appropriate SLC components are already included in the EQ program and remain qualified. The proposed amendment does not change the operating environment for any components located outside the drywell. EQ profiles are, however, being revised to address the chemical spray that would be introduced into the containment if SLC injection is required.

EQ equipment inside containment will remain qualified for the spray conditions that will exist if SLC is initiated following a DBA-LOCA. A review of the EQDP's has revealed no problems, and the EQDPs have been updated to reflect the new chemical spray conditions using at least one of the following technical approaches:

1) Credit the chemical spray composition in existing IEEE qualification test program(s).
2) Use separate effects testing or analysis to demonstrate material compatibility with Sodium Pentaborate.
3) Device is hermetically sealed or otherwise protected from chemical spray.
4) Component is located in EQ Zone PC1, which is above the highest spray header elevation.
5) Demonstration that the component has performed its function prior to manual spray initiation.

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS20090073

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		