



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

January 12, 2001

LICENSEE: Nebraska Public Power District

FACILITY: Cooper Nuclear Station

SUBJECT: SUMMARY OF MEETING WITH NEBRASKA PUBLIC POWER DISTRICT
REGARDING COOPER NUCLEAR STATION DESIGN-BASIS ACCIDENT
RADIOLOGICAL CONSEQUENCES ASSESSMENT METHODOLOGY AND
MAIN STEAMLINE ISOLATION VALVE (MSIV) LEAKAGE PATHWAY SEISMIC
QUALIFICATIONS

On October 4, 2000, the U.S. Nuclear Regulatory Commission (NRC) and Nebraska Public Power District (NPPD) staff met at the NRC Headquarters in Rockville, Maryland, to receive NPPD's briefing on the subject issues. Enclosure 1 is the list of meeting attendees.

In Amendment 183, the Commission approved some of the requested changes in methodology for accident dose consequence assessment for Cooper Nuclear Station (CNS). The staff and the licensee were unable to expeditiously resolve questions related to the fuel handling accident (FHA) and the main steamline break (MSLB) accident. To permit NPPD to restart from an outage, the staff deferred the review of the implementing changes to dose assessment methodologies for FHA and MSLB accident for one operating cycle with the understanding that NPPD would submit revised methodologies for the staff review prior to the subsequent refueling outage. During the subject meeting, the NPPD staff briefed the NRC staff on its revised approach to resolve the outstanding issues related to dose assessment methodologies for FHA, and MSLB accident; and the staff's concerns related to seismic adequacy of main steamline piping, condenser, and turbine building that are credited for iodine removal by "plate-out."

The licensee provided its revised approach as follows. It plans to include fumigation assumptions in the exclusion area boundary and low population zone dose calculations. The control room personnel dose calculations will use the existing licensing-basis fumigation assumptions instead of ARCON96 generated x/Q for the first 30 minutes of elevated release. Instead of the TID-14844 source term, the licensee plans to use the ORIGEN2 source term, with bounding GE14 core exposure approximately 6 percent greater than General Electric (GE) equilibrium core. For ARCON96 building vent level release assumption for the FHA, the licensee plans to use ARCON96 ground level release. Also, for the FHA, the licensee plans to revise the water decontamination factor from 100 to 200. The staff expressed concern regarding this assumption and indicated that it will further discuss this issue at a subsequent telephone conference. Details of the licensee's presentation are included as Enclosure 2.

Because of the difference in positions between the staff and NPPD concerning the inclusion of fumigation conditions, NPPD agreed to continue its commitment to implement a procedure to provide control room personnel with potassium iodide (KI) thyroid-blocking tablets upon indications of a loss-of-coolant accident that results in core damage. NPPD's commitment regarding the use of KI continues to provide an acceptable interim basis for approving the revisions to the calculational methodology.

An evaluation of the seismic adequacy of the main steam piping, main turbine condenser, and turbine building is integral to crediting iodine removal by "plate-out" in the main turbine condenser after a postulated accident. In its request for Amendment 183, NPPD provided sufficient information to justify the operability, for one operating cycle, of the main steam piping and the main turbine condenser following a safe-shutdown earthquake so that the credit for iodine removal can be justified. However, a more technically detailed analysis is required to justify full qualification which will ensure long-term acceptability. Consequently, the license was amended by the addition of condition 2.C.(6) that documents NPPD commitment to provide this evaluation in a timely manner. At the subject meeting the NPPD provided the staff its plan for seismic qualification of MSIV leakage pathway to the condenser. The licensee indicated that it will perform a detailed evaluation as outlined in its presentation at the subject meeting and will submit a closeout report to NRC by April 2003. The details of the licensee's presentation are included as Enclosure 3.

Mohan C. Thadani, Senior Project Manager, Section 1
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Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosures: 1. List of Attendees
2. Cooper Nuclear Station Radiological Consequence Methodology
3. Cooper Nuclear Station Seismic Qualification of MSIV Leakage Pathway

cc w/encls: See next page

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**MEETING WITH NEBRASKA PUBLIC POWER DISTRICT
OCTOBER 4, 2000**

LIST OF ATTENDEES

<u>NAME</u>	<u>AFFILIATION</u>
Mohan C. Thadani	NRC/NRR/DLPM
Kevin Jones	Cooper Nuclear Station
Robert Beilke	Cooper Nuclear Station
Perry Adelung	Cooper Nuclear Station
Art Wiese	Cooper Nuclear Station
Sharon Mahler	Cooper Nuclear Station
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Michelle Hart	NRC/NRR/DSSA

Cooper Nuclear Station Design Basis Accident Radiological Consequence Methodology

October 4, 2000

Agenda

- Purpose
- CNS License Amendment 183
- Revised Radiological Consequence Methodology Approach
- Schedule

Purpose

- Discuss NPPD's Plan and Schedule to Address CNS License Amendment 183 Outstanding Items:
 - Fumigation
 - TID-14844 Source Term
 - ARCON96 Vent Level Release Mode

CNS License Amendment 183

- Revised Design Basis Accident (DBA)
Radiological Consequence Analysis
Submitted December, 1999
 - Revised Methodology to Incorporate More Up-to-Date Assumptions
 - Included GE14 Fuel Considerations
 - Used ARCON96 to Determine X/Q Values for Control Room Personnel Dose Calculations

CNS License Amendment 183

- (cont.)
 - Included Generic Letter 99-02 Considerations
 - Removed KI Issuance Requirement Associated With CNS License Amendment 167
 - Addressed Secondary Containment Isolation Valve 90 Second Stroke Time Unreviewed Safety Question

CNS License Amendment 183

- CNS License Amendment 183 Issued April 2000
 - Loss of Coolant Accident and Control Rod Drop Accident Analysis Approved on an Interim Basis
 - Deferred Review of Fuel Handling Accident and Main Steam Line Break Analyses

CNS License Amendment 183

- (cont.)
 - Outlined NRC Questions Regarding:
 - Fumigation
 - TID-14844 Source Term
 - Specified Limitations on Moving Loads Over Irradiated GE14 Fuel and Handling Irradiated GE14 Fuel
 - Specified KI Issuance to Control Room Personnel

Revised Dose Calculation Approach

- Fumigation
 - Exclusion Area Boundary and Low Population Zone Dose Calculations Include Fumigation Assumption
 - Control Room Personnel Dose Calculation will use Existing License Basis Fumigation Assumption Instead of ARCON96 Generated X/Q for First 30 Minutes of Elevated Release

Revised Dose Calculation Approach

- TID-14844 Source Term
 - Will Use ORIGEN2 Generated Fission Product Inventory
 - ORIGEN2 Fission Product Inventory to be Used is Same Inventory as That Used by GE for Their Bounding Core GE14 Amendment 22 Evaluation
 - 35.8 GWd/MT Core Average Exposure (CAVEX)
 - 1300 EFPD

Revised Dose Calculation Approach

- ORIGIN2 Source Term
 - GE14 Bounding Core Exposure Approximately 6% Greater than GE14 Equilibrium Core
 - Equilibrium Core Parameters
 - 33.7 GWd/MT CAVEX
 - 46.2 GWd/MT Mean Batch Discharge Exposure
 - 1226 EFPD

Revised Dose Calculation Approach

- ORIGEN2 Source Term Adjustments
 - NUREG/CR-5009 Adjustment for Fuel Rod Exposures to 60 GWd/MT
 - Radial Peaking Factor Multiplier of up to 2.0
- Resultant Fuel Exposure Limitations
 - 33.7 GWd/MT CAVEX
 - 46.2 GWd/MT Mean Batch Discharge Exposure
 - 60 GWd/MT Maximum Fuel Rod Exposure
 - Radial Peaking Factor up to 2.0

Revised Dose Calculation Approach

- ARCON96 Reactor Building Vent Level Release Mode for Fuel Handling Accident
 - Will Replace ARCON96 Vent Level Release Mode Data with ARCON96 Ground Level Release Mode Data for the Reactor Building Release Point

Revised Dose Calculation Approach

- Other Considerations
 - Revise Fuel Handling Accident (FHA) Water Decontamination Factor from 100 to 200
 - NRC Staff Position from March 31, 2000 NEI-NRR Meeting Addresses Use of a 200 Decontamination Factor for Non-Alternate Source Term FHA Analysis
 - GE Provided Letter Confirming that Regulatory Guide 1.25 Assumptions for Decontamination Factor Remain Valid for GE14 Fuel

Revised Dose Calculation Approach

- (cont.)
 - Plant Modification to Reduce Control Room Ventilation System Isolation Time
 - Faster Ventilation Damper Stroke Time

Revised Dose Calculation Approach

- (cont.)
 - Plant Modification to Initiate Control Room Ventilation System Isolation on a Group VI Isolation
 - LOCA Causes a Group II Isolation
 - Group II Isolation Causes Group VI Isolation
 - FHA Causes Group VI Isolation on High Reactor Building Exhaust Radiation

*Reactor RLD
+ S&TS*

DBA Calculations Affected by Revised Methodology

	Reactor Building Ground Level Release	ORIGEN2 Fission Product Inventory	Pool Decon Factor = 200	Fumigation- Control Room Personnel	Plant Modification to Control Room Isolation
LOCA		x		x	x
FHA	x	x	x	x	x
MSLB					
CRDA		x			
X/Q Offsite					
X/Q CR	x				

Schedule

- Submit Revised Calculations and Related Technical Specification Change to NRC January 2001 ✦
 - Add Technical Specification Associated with Control Room Ventilation Isolation Based on Group VI Isolation
 - Remove Control Room Ventilation Radiation Monitor Technical Specification Based on not Being Required for Control Room Isolation Signal

Schedule

- Requested License Amendment Issuance
Date of September 15, 2001
- Group VI Isolation and Control Room
Ventilation Damper Modifications
Complete Prior to RFO-20 Reactor Vessel
Fuel Handling
- USAR Update per 10CFR 50.71(e)

Cooper Nuclear Station's Plan For Seismic Qualification of MSIV Leakage Pathway to the Condenser

October 4, 2000

AGENDA

- OVERVIEW
 - Background
 - Purpose of Meeting
 - Project Phases/Schedule
 - Project Scope
- Work Completed
- Methodology

OVERVIEW

- Background
 - NPPD submitted Dose Calculations to NRC in December 1999
 - Seismic Qualification of Main Steam Isolation Valve (MSIV) Leakage Pathway to the Condenser Resulted from NPPD's Reliance on Pathway for Radiological Plateout following a LOCA
 - NPPD Completed Initial Evaluations to Obtain License Amendment
 - As Part of a License Condition for License Amendment 183, NPPD Committed to Complete Further Evaluations to Ensure the Structural Integrity of the Pathway Following a Safe Shutdown Earthquake (SSE)

OVERVIEW

- Purpose of Meeting
 - Discuss NPPD's Overall Plan, Schedule, and Technical Approach for the Seismic Qualification of the MSIV Leakage Pathway to the Condenser
 - Facilitate NRC Resource Planning
 - Ensure Timely and Efficient Completion of the Project

OVERVIEW

- Project Phases/Schedule:
 - Phase 1-Initial Walkdown Evaluation-Complete
 - Phase 2-Detailed Evaluations
 - Evaluations are Planned to Begin During Fall 2000 and be Completed in Spring 2001
 - Submit Requested Documentation to NRC (Due Within 8 weeks After Startup From RFO20). Expected: December 1, 2001
 - Phase 3-Develop and Implement Modifications
 - Prepare Modification Document(s).
 - Implement Modifications (Due Prior to Startup From RFO21 or Within 12 months of NRC's Approval of NPPD's Request, Whichever is Later). Expected: April, 2003
 - Phase 4-Closeout
 - Submit Final Documentation to NRC. Expected: April 1, 2003

- COMMITMENT (License Amendment 183)
 - *“No later than 8 weeks after the Cooper Nuclear Station (CNS) Cycle 21 startup, the licensee shall submit a request for the staff to review and approve a seismic evaluation to ensure the structural integrity of the main steam line piping from the main steam isolation valves (MSIV) to the main turbine condenser, the main turbine condenser, and the turbine building. The evaluation will be performed to assess the ability of the aforementioned main steam piping and main turbine condenser to remain sufficiently intact to direct main steam leakage from the MSIVs to the main turbine condenser, consistent with the leakage assumptions in the design-basis accident dose calculations during and after a Safe Shutdown Earthquake. This seismic evaluation will employ an analytical methodology acceptable to the staff and will identify any modifications necessary to support the evaluation. The licensee’s approved request shall be fully implemented, including the completion of modifications, within 12 months of approval or prior to CNS Cycle 22 startup, whichever is later.”*

OVERVIEW

- Project Scope (Systems, Structures, and Components to be Evaluated):
 - Condenser Structure and Condenser Anchorage
 - Turbine Building Structure
 - Piping and Pipe Supports
 - Miscellaneous Equipment
 - Seismic Interactions

WORK COMPLETED

STEWARTSON
ASSOCIATES

- Phase 1-Initial Walkdown Evaluation
 - Path Identification and Initial Seismic Verification Walkdowns (See Sketch)
 - Evaluations Already Completed for Dose Calculations License Amendment
 - Turbine Building Evaluation
 - Condenser Anchorage Evaluation
 - Preliminary Piping and Pipe Support Analyses of Main Steam Piping from MSIVs to Turbine and From By-Pass Valves to the Condenser

WORK COMPLETED

- Phase 1 - Walkdown Results
 - Equipment Deficiencies Documented Under Corrective Action Program
 - Significant Deficiencies Were Corrected Prior to Startup From RFO19
 - Miscellaneous Items Identified for Additional Evaluation
 - Vacuum Sample Pumps Mounted on Vibration Isolators
 - Sealing Steam Supply to RFPT B Relief Valve Interaction with Adjacent Piping
 - Steam Jet Air Ejector (SJAE) Sight Glass Vulnerability
 - Fire Protection Line Seismic Interaction
 - SJAE and Gland Steam Condenser Anchorage Capacity
 - Seismic Interaction of Masonry Block Wall near Bypass Valve Inlet Pressure Indicators

*Walkdown
prior to start*

METHODOLOGY

- General
 - Follow General Guidance of NEDC-31858P-A, Revision 2 and Associated NRC SER, Including Specified Limitations
 - Methodology Similar to Other Docketed Evaluations Including Seismic Verification Walkdowns
- Condenser
 - EQE Experience Database Comparison
- Condenser Anchorage (Completed)
 - Static Equivalent Analysis Using CNS Ground Response Spectra for SSE
- Turbine Building Structure (Completed)
 - Reconciliation of Original UBC Analysis to SSE Criteria

*justify using
at Cooper*

*justified for
the anchorage*

METHODOLOGY

- Piping and Pipe Supports
 - Calculations for Main Steam Piping From MSIVs to Turbine and From By-Pass Valves to the Condenser
 - Bounding Seismic Analyses for Bounding/Worst Case System(s)
- Miscellaneous Equipment
 - EQE Experience Database Comparison and Calculations
- Seismic Interactions
 - Seismic Verification Walkdowns
 - EQE Experience Database Comparison
- Outlier Resolution
 - Analyses and/or Modifications

