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Monticello Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

April 18, 2008 L-MT-08-021

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

Monticello Nuclear Generating Plant
Docket 50-263
Renewed Operating License No. DPR-22

Commitment Closure: Technical Support Center Dose Assessment in Conjunction with the Full-Scope Alternative Source Term License Amendment

On September 15, 2005, the Nuclear Management Company, LLC (NMC) submitted a License Amendment Request (LAR) to implement a full-scope Alternative Source Term (AST) methodology for the Monticello Nuclear Generating Plant (MNGP). In that submittal it was stated that the dose to Technical Support Center (TSC) personnel was not being reported because NMC was in the process of constructing a new TSC facility. The NMC committed to provide the TSC dose analyses following facility completion. Enclosure 1 provides the TSC dose assessment. The analyses demonstrate that the dose to TSC occupants is well within regulatory limits.

Summary of Commitments

This letter contains no new or revised commitments and closes the following commitment.

NMC will provide a TSC 30-day dose analysis after TSC project completion.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on April 18, 2008.

Bradley J. Sawatzke
Plant Manager, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure

cc: Administrator, Region III, USNRC
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ENCLOSURE

DISCUSSION OF TSC DOSE ASSESSMENT

1.0 BACKGROUND AND SUMMARY

On March 11, 2004, the Nuclear Management Company, LLC (NMC) provided a voluntary report[1] involving the potential unavailability of the Technical Support Center (TSC) during a Design Basis Accident (DBA) LOCA. The NMC submitted a License Amendment Request (LAR) on September 15, 2005, to implement a full-scope Alternative Source Term (AST) methodology for the Monticello Nuclear Generating Plant (MNGP) (Reference 1). In that submittal it was indicated that the dose to personnel in the TSC would not be reported because the NMC was in the process of constructing a new TSC facility (typically, TSC dose results are provided). The NMC committed within the LAR to provide a TSC dose analysis following completion of the new TSC facility. The commitment stated:

> NMC will provide a TSC 30-day dose analysis after TSC project completion.

Construction of the new TSC was completed in July 2007. The 30-day dose consequences to personnel in the TSC resulting from postulated DBAs have been evaluated for the facility. The analyses demonstrate that the dose to TSC occupants is well within regulatory limits. Submittal of this letter providing the TSC dose analysis results completes and closes this commitment.

2.0 INTRODUCTION

Section 1.3, 'Scope of Required Analyses,' in Regulatory Guide (RG) 1.183, (Reference 2) provides guidance for utilization of the Alternative Source Term (AST) methodology to re-evaluate dose consequences for areas related to NUREG-0737, "TMI Action Plan" (Reference 3). RG 1.183 indicates that the radiological consequences in Emergency Response Facilities (NUREG-0737, III.A.1.2) should be considered within the scope of application of the AST. The extent of this evaluation should be consistent with previous licensee commitments in response to NUREG-0737.

Evaluations were performed with the full-scope AST methodology approved for application at the MNGP by the NRC in License Amendment No. 148 (Reference 4). The analyses demonstrate that the dose to occupants of the TSC is well within the limits specified NUREG-0737 and RG 1.183.

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1. U.S. NRC Event Report number 40585.

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3.0 METEOROLOGICAL DATA

Meteorological data from the years 1998-2002 were used to calculate atmospheric dispersion factors (χ/Q) to support this evaluation. The data set selected was consistent with RG 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," (Reference 5), which states that five years of hourly observations are considered representative of long-term trends at most sites and that one year including all four seasons is the minimum acceptable duration. The five-year MNGP data set used includes all four seasons for five consecutive years within the data set and provides a representative long-term trend. An NRC staff review of the meteorological data was provided in the Safety Evaluations for the MNGP for a fuel handling accident and the full-scope AST, License Amendments 145 and 148, respectively (References 6 and 4).

4.0 ATMOSPHERIC DISPERSION FACTORS

The χ/Q values at the TSC Ventilation System intake location for ground level releases from the Reactor Building (RB) and Turbine Building (TB) were calculated using the computer code ARCON96 (described in NUREG/CR-6331).[2] ARCON96 is endorsed in RG 1.194 as an acceptable method for determining χ/Q values for use in Control Room habitability assessments. Since the χ/Q values are intended for use in habitability analyses for the TSC, ARCON96 was considered an acceptable method for calculating these values. The ground level source locations evaluated were consistent with those in Reference 1. For the TSC, the RB vent and RB nearest wall locations are within the same sector; therefore, only the RB nearest wall χ/Q was estimated because it is closer to the TSC intake. For the TB releases, condenser and the TB vent χ/Q values were calculated. χ/Q values for the ground level releases are summarized in Tables 1a – 1c, below.

Table 1a
χ/Q Values for Reactor Building Releases

Time Period	χ/Q Values (sec/m^3)
0-2 Hours	3.99E-4
2-8 Hours	2.78E-4
8-24 Hours	1.10E-4
1-4 Days	7.62E-5
4-30 Days	5.67E-5

2. U.S. NRC, NUREG/CR-6331 (PNNL-10521), Revision 1, "Atmospheric Relative Concentrations in Building Wakes," dated May 1997.

Table 1b
χ/Q Values for Condenser Releases

Time Period	χ/Q Values (sec/m^3)
0-2 Hours	2.87E-4
2-8 Hours	2.09E-4
8-24 Hours	8.32E-5
1-4 Days	5.59E-5
4-30 Days	4.31E-5

Table 1c
χ/Q Values for Turbine Building Vent Releases

Time Period	χ/Q Values (sec/m^3)
0-2 Hours	3.13E-4
2-8 Hours	2.21E-4
8-24 Hours	8.87E-5
1-4 Days	5.99E-5
4-30 Days	4.49E-5

The releases from the RB and TB are ground level releases. The release from the Off-gas Stack, however, is considered an elevated release. RG 1.194 recommends evaluating elevated releases using both ARCON96 and PAVAN. PAVAN, documented in NUREG/CR-2858,[3] is intended for the calculation of offsite χ/Q values, but contains a model for fumigation conditions. Because of the large elevation difference between the off gas stack and the TSC intake, ARCON96 calculates very small χ/Q values. Therefore, the NRC recommends comparing the results of the two codes for the 0-2 hour period and selecting the largest value. The ARCON96 values can be used for the 2-8 and 8-24 hour time periods. For the 1-4 and 4-30 day time periods, it is recommended that the ARCON96 χ/Q values be increased by assuming that the plume wraps around and the largest PAVAN χ/Q value exists for one hour each day. RG 1.194 also recommends performing PAVAN calculations at several distances to determine the distance at which the largest χ/Q values are calculated.

Elevated χ/Q values calculated using both PAVAN and ARCON96 were considered for use in the TSC dose evaluation. The PAVAN results at the TSC location distance were used for all time periods for the TSC Off-gas Stack release χ/Q values. The PAVAN results for the TSC intake distance are larger than the RG 1.194 values by a factor of 1000 for the 2-8 and 8-24 hour time

3. U.S. NRC, NUREG/CR-2858 (PNL-4413), "PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations," dated November 1982.

periods. The PAVAN results are smaller than the RG 1.194 values for the 1-4 day and 4-30 day periods. However, since most of the dose from accidents with releases from the Off-gas Stack occurs during the first 24 hours of the accident, the use of the PAVAN results will be more conservative than the RG 1.194 results. The use of fumigation provides additional conservatism. This methodology follows the approach approved for the MNGP full-scope AST in License Amendment 148. Elevated release χ/Q values utilized in the TSC dose analysis are summarized in Table 2, below.

Table 2
TSC χ/Q Values for Off-gas Stack Releases

Time Period	χ/Q Values (sec/m^3)
Fumigation	3.13E-4
0-2 Hours	3.50E-6
2-8 Hours	3.97E-7
8-24 Hours	1.34E-7
1-4 Days	1.31E-8
4-30 Days	4.90E-10

5.0 LOSS OF COOLANT ACCIDENT EVALUATION FOR TSC

Implementation of the full-scope AST for the MNGP was approved by the NRC staff in License Amendment 148. The source term used in the TSC dose evaluation was the one utilized in the full-scope AST implementation for the MNGP. Modeling of the LOCA release follows the approach approved in the MNGP full-scope AST.

The TSC Ventilation System is assumed to operate in the normal mode for 1 hour after the onset of the LOCA. At that time, the ventilation system is assumed to be manually placed in the emergency mode of operation. The TSC 30-day post LOCA doses are determined for the minimum and maximum TSC free air volume and for combinations of TSC minimum and maximum outside air intake flow rates for TSC normal and emergency ventilation modes.

The maximum calculated 30-day post-LOCA dose to TSC occupants due to immersion in the airborne cloud within the TSC is 0.775 rem (TEDE). The maximum 30-day airborne immersion dose to TSC personnel occurs for the combination of maximum air intake flow rate of 1,100 scfm during TSC normal mode ventilation, minimum air intake flow rate of 710 scfm during TSC emergency mode ventilation, and the maximum TSC volume. Use of the maximum air intake flow rate during TSC normal mode ventilation maximizes the

amount of post LOCA unfiltered airborne iodine activity that enters the TSC. Use of the minimum air intake flow rate during TSC emergency mode ventilation and the TSC maximum volume minimizes the rate at which airborne activity is exhausted from the TSC volume.

The TSC dose due to external radiation sources (shine) was evaluated at 12 locations in the TSC. The maximum 30-day post-LOCA TSC dose to TSC occupants due to external radiation sources is 0.079 rem (TEDE) and occurs in the northwest corner of the TSC. The average 30-day TSC dose for all 12 dose locations is 4.907 E-02 rem (TEDE). The major contributors to the TSC shine dose are airborne activity in the reactor building and the external cloud, which account for more than 90 percent of the total TSC dose at the maximum dose point location.

Section 4.2.1 of RG 1.183 states that all sources of radiation that can cause exposure to Control Room operators should be considered in the dose analyses. This guidance also applies to personnel in the TSC. Consistent with the Reference 1 evaluation, separate calculations assess the internal (inhalation) dose and the external (shine) dose. The total 30-day post-LOCA dose to TSC occupants is the sum of the inhalation and external doses. The dose results are summarized in Table 3.

Table 3
Post LOCA Dose to TSC Occupants

	TEDE	**Regulatory Limit* (TEDE)**
Internal (Inhalation) Dose	0.775 rem	---
External (Shine) Dose	0.079 rem	---
Total Dose	**0.854 rem**	**5 rem**

* RG 1.183 and General Design Criterion 19.

6.0 EVALUATION OF OTHER DESIGN BASIS ACCIDENTS

The LOCA is the DBA resulting in the greatest calculated fission product release for the MNGP. Dose consequences resulting from design basis accidents other than the LOCA were also evaluated for the MNGP TSC facility. These evaluations determined that doses to TSC occupants from the postulated Main Steam Line Break (MSLB) Accident, Control Rod Drop Accident (CRDA) and Fuel Handling Accident (FHA) were bounded by the calculated doses to Control

Room operators for these accidents. The limiting control room 30-day doses for the CRDA, MSLB accident, and the FHA were determined to be less than 5 rem TEDE, demonstrating that the TSC 30-day doses for these three accidents would remain within the 30-day dose criterion of 5 rem TEDE (References 1 and 3).

REFERENCES

1. NMC to NRC, "License Amendment Request – Full Scope Application of an Alternative Source Term," dated September 15, 2005.

2. Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Plants," July 2000.

3. NUREG-0737, "Clarification of TMI Action Plan Requirements," dated November 1980, and Supplement 1, dated January 1983.

4. NRC to NMC, "Monticello Nuclear Generating Plant – Issuance of Amendment Re: Full Scope Implementation of the Alternative Source Term Methodology (TAC No. MC8971)," dated December 7, 2006.

5. Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," dated June 2003.

6. NRC to NMC, "Monticello Nuclear Generating Plant – Issuance of Amendment Re: Use of the Alternative Source Term for the Postulated Fuel Handling Accident (TAC No. MC7596)," dated April 24, 2006. (Accession Number ML060600572)