# THE NUCLEAR REGULATORY COMMISSION, OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS REVIEW OF THE U.S. DEPARTMENT OF ENERGY KEY TECHNICAL ISSUE AGREEMENT RESPONSE TO PRE.03.02 FOR A PROPOSED GEOLOGIC REPOSITORY AT YUCCA MOUNTAIN, NEVADA

## 1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission's (NRC) goal of issue resolution during this interim prelicensing period is to ensure the U.S. Department of Energy (DOE) has assembled enough information about a given issue for NRC to accept a license application for review. Resolution by the NRC staff during prelicensing does not preclude anyone from raising any issue for NRC consideration during the licensing proceedings. Also, and just as importantly, resolution by the NRC staff during prelicensing does not prejudge the NRC staff evaluation of that issue after its licensing review. Issues are resolved by the NRC staff during prelicensing when the staff have no further questions or comments about how DOE addresses an issue. Pertinent new information could raise new questions or comments about a previously resolved issue.

To satisfy the information needs of Key Technical Issue (KTI) Agreement PRE.03.02, DOE submitted a report titled Extreme Wind/Tornado/Tornado Missile Hazard Analysis (Office of Civilian Radioactive Waste Management, 2003) with a cover letter.[1] It was noted this report replaces the report with similar title (Office of Civilian Radioactive Waste Management, 1999).

The agreement response (Office of Civilian Radioactive Waste Management, 2003) provides information about the design basis straight wind and tornado, credible tornado missile characteristics for large structures, and justification for excluding such tornado missiles as credible hazards for small systems. Specifically, DOE states the NRC information needs regarding KTI Agreement 03.02 are satisfied and the status should be considered closed.

## 2.0 WORDING OF THE AGREEMENT

Section 1, Purpose, of the DOE report (Office of Civilian Radioactive Waste Management, 2003) identifies KTI Agreement PRE.03.02 as satisfied by the information provided within the report. The staff review of the DOE response is based on DOE providing the requested information identified in the NRC staff letter dated August 14, 2001 (ACC: MOL.20010925.0118). The wording of the agreement is as follows:

PRE.03.02: "Provide an analysis, including (1) selection of the design basis tornado, together with the supporting technical basis; (2) selection of credible tornado missile characteristics for the waste package and other structures, systems, and components, together with the technical bases; and (3) analysis of the effects of impact of the design basis tornado missiles or justification for excluding such tornado missiles as credible hazards."

[1]Ziegler, J.D. "Transmittal of Information Addressing Key Technical Issue (KTI) Agreement Item, Preclosure Safety (PRE) 3.02." Letter (July 24) to Document Control Desk, U.S. Nuclear Regulatory Commission. Las Vegas, Nevada: DOE. 2003.

## 3.0 TECHNICAL INFORMATION PROVIDED IN THE AGREEMENT RESPONSE

Office of Civilian Radioactive Waste Management (2003) provided an analysis that establishes the design basis wind speeds for the straight wind and tornadoes with associated spectrum of tornado missiles.

### 3.1 DESIGN BASIS STRAIGHT WIND

The information contained in this section was classified as “Official Use Only” (OUO).

### 3.2 DESIGN BASIS TORNADO

The information contained in this section was classified as “Official Use Only” (OUO).

### 3.3 TORNADO MISSILE SCREENING METHODOLOGY

The information contained in this section was classified as “Official Use Only” (OUO).

### 3.4 DESIGN BASIS TORNADO MISSILES

The information contained in this section was classified as OUO .

### 3.5 WALL THICKNESS TO RESIST TORNADO MISSILES

The information contained in this section was classified as OUO .

## 4.0 NRC EVALUATION AND COMMENT

Staff reviewed the DOE report (Office of Civilian Radioactive Waste Management, 2003), reference documents, and other technical documents. Staff evaluation is described next.

### 4.1 DESIGN BASIS STRAIGHT WIND

The information contained in this section was classified as OUO .

### 4.2 DESIGN BASIS TORNADO

The information contained in this section was classified as OUO .

### 4.3 TORNADO MISSILE SCREENING METHODOLOGY

The information contained in this section was classified as OUO .

## 4.4 DESIGN BASIS TORNADO MISSILES

The information contained in this section was classified as OUO .

## 4.5 WALL THICKNESS TO RESIST TORNADO MISSILES

The information contained in this section was classified as OUO .

## 5.0 SUMMARY

The staff has reviewed the responses provided by DOE to Preclosure Agreement PRE 03.02, and performed an independent assessment to determine if the information provided would support submission of a potential license application for a geological repository at Yucca Mountain, Nevada. The staff concluded that DOE provided an acceptable analysis, including (1) selection of the design basis tornado, together with the supporting technical basis; (2) selection of credible tornado missile characteristics for the waste package and other structures, systems, and components, together with the technical bases; and (3) analysis of the effects of impact of the design basis tornado missiles or justification for excluding such tornado missiles as credible hazards. Therefore, the staff considers this agreement as completed.

In addition to the information provided in its response to PRE 3.02, DOE also provided the selected design basis straight wind speed. After reviewing this information, NRC staff has determined that additional information on straight wind speed may be needed if DOE submits a license application to ensure the application is complete. Specifically:

1. DOE should provide a rationale to justify why use of a 50-year return period design basis wind speed for structures, systems, and components important to safety at the proposed surface facilities would be acceptable or use a return period that is commensurate with the safety functions of the proposed facilities.

2. DOE should use site-specific data, qualified in accordance with 10 CFR Part 63, Subpart G, for additional years for better quantification of the design basis wind speed for structures, systems, and components important to safety.

   The design basis straight wind speed is based on limited site-specific data (available for 4 years only). The region is identified by SEI/ASCE 7–02 to be a special region that requires site-specific data to account for local topographical conditions. Therefore, DOE should use site-specific data for additional years for better quantification of the design basis wind speed for structures, systems, and components important to safety.

3. DOE should qualify the site-specific meteorological data used in its evaluation in accordance with 10 CFR Part 63, Subpart G

## 6.0 STATUS OF THE AGREEMENT

Based on this review, staff consider agreement PRE.03.02 as completed. However at the time of license application the staff will need additional information for establishing the design basis straight wind. The original agreement did not require this information.

## 7.0 REFERENCES


Boissonnade, A., Q. Hossain, J. Kimball, R. Mensing, and J. Savy. "Development of a Probabilistic Tornado Wind Hazard Model for the Continental United States." Volume 1: Main Report. UCRL–ID–140922–Vol–1. Livermore, California: Lawrence Livermore National Laboratory. 2000.

Cramond, W.R., D.M. Ericosn, and G.A. Sander. NUREG/CR–4710, "Shutdown Decay Heat Removal Analysis of a Combustion Engineering 2-Loop Pressurized Water Reactor, Case Study.". Washington, DC: NRC. August 1987.

DOE. DOE–STD–1020–2002, "Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities." Washington, DC: DOE. 2002.

NRC. NUREG–0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants." Missiles Generated by Natural Phenomena, Section 3.5.1.4. Washington, DC: NRC. July 1987.

Office of Civilian Radioactive Waste Management. "Engineering Design Climatology and Regional Meteorological Conditions Report." B00000000–01717–5707–00066. Rev. 00. Las Vegas, Nevada: Office of Civilian Radioactive Waste Management. 1997.

———. "MGR Design Basis Extreme Wing/Tornado Analysis." ANL–MGR–SE–000001. Rev. 00. Las Vegas, Nevada: Office of Civilian Radioactive Waste Management. 1999.

———. "Extreme Wind/Tornado/Tornado Missile Hazard Analysis." CAL–WHS–MD–000002. Rev. 00B. Las Vegas, Nevada: Office of Civilian Radioactive Waste Management. 2003.

Ramsdell, J.V. and G.L. Andrews, NUREG/CR–4461, "Tornado Climatology of the Contiguous Untied States." Washington, D C: NRC. May 1986.

Reamer, C.W. "U.S. Nuclear Regulatory Commission/U.S. Department of Energy Technical Exchange and Management Meeting on Preclosure Safety." Letter (August 14) to S. Brocoum, DOE. Washington, DC: NRC. 2001. [ADAMS Accession Number MOL.20010925.0118]

Structural Engineering Institute/American Society of Civil Engineers. "Minimum Design Loads for Buildings and Other Structures." SEI/ASCE 7–02, Revision of ASCE 7–98. Reston, Virginia: American Society of Civil Engineers. 2003.