

ATTACHMENT 5

ENTO002-PI-04, Revision 0  
(7 pages)

Preliminary Evaluation of Uniform Hazard Spectra

**Project Instructions**

**for the**

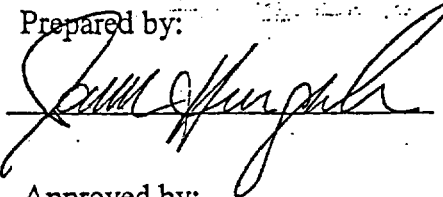
**Entergy Nuclear Potomac Early Site Permitting Project**

**Preliminary Evaluation of Uniform Hazard Spectra**

**Project Instruction No: ENTO002-PI-04**

**Revision No: 0**

Prepared by:



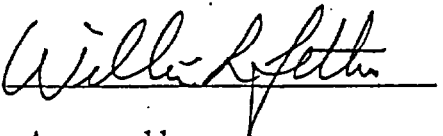
Printed Name:

James Hengesh (WLA)

Date:

May 20, 2002

Approved by:



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William Lettis (WLA)

Date:

May 20, 2002

Approved by:



Printed Name:

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Enercon Project Manager

Date:

5/23/02

## 1.0 PURPOSE

### 1.1 Project Scope

This Project Instruction provides guidelines for completing the initial evaluation of design ground motions at the Grand Gulf Nuclear Station (GGNS) using the stream-lined approach described in our proposal for the Early Site Permit Application for the GGNS site. The initial estimates of ground motions will be developed by compiling and evaluating existing seismic source models and hazard computations and then testing the sensitivity of these existing models to new information that may be available. New information may include changes to seismic source zone geometry, maximum earthquake magnitude, and earthquake recurrence rates. Other changes may include modification to the ground motion attenuation equations and/or revisions to the computational methodology in the probabilistic seismic hazard assessment (PSHA) codes used in the previous EPRI (1993) and LLNL (1994) hazard assessments.

If the resulting Uniform Hazard Spectra (UHS) for the GGNS prove to be consistent with the existing UHS from the EPRI (1993) or LLNL (1994) hazard assessments, William Lettis & Associates (WLA) Project Manager may recommend using these existing values in design of the new facility at the GGNS site.

### 1.2 Responsibilities

WLA shall be responsible for compiling and evaluating the seismic source models, ground motion attenuation equations and applicable PSHA codes. The WLA Project Manager shall provide overall direction of the ground motion assessment. He shall supervise a staff of senior and staff geologists and an engineering seismologist. The Senior Geologist and Engineering Seismologist shall be responsible for day-to-day performance of the technical work for seismic source characterization. Supporting staff shall be either Project or Staff Geologists at WLA and shall be responsible for carrying out specific tasks related to the seismic source characterization.

## 2.0 APPLICABILITY

This Project Instruction is applicable to all persons performing data compilation and data interpretation, and ground motion assessment for the ENTERGY GGNS Early Site Permit investigations.

## 3.0 DEFINITIONS AND ACRONYMS

The definitions of acronyms used in this Project Instruction are presented below:

- EPRI – Electrical Power Research Institute
- ESP – Early Site Permit
- FER – Final Environmental Report

- GGNS – Grand Gulf Nuclear Station
- LLNL – Lawrence Livermore National Laboratories
- NRC – Nuclear Regulatory Commission
- PI – Project Instruction
- PSAR – Preliminary Safety Analysis Report
- PSHA – Probabilistic Seismic Hazard Assessment
- SER – NRC Safety Evaluation Report and Supplements
- SSE – Safe Shutdown Earthquake
- UFSAR – Updated Final Safety Analysis Report
- UHS – Uniform Hazard Spectrum. The response spectrum with the property that the probability of exceeding the response spectral value is equal to a constant at all spectral frequencies.
- WLA – William Lettis & Associates.

The definitions of data sources referred to in this PI are as follows:–

- Peer Reviewed Information – information (e.g., articles, maps and reports) published in professional journals that has undergone peer review prior to publication;
- Published Information – information (e.g., reports, articles and maps) that is published, but that has not undergone peer review prior to publication;
- Unpublished Data and Literature – information (e.g., technical articles and consulting reports) that contains significant relevant information, but that has not been formally peer reviewed or published in the public domain;
- GGNS License Support Documents – information (e.g., the PSAR, UFSAR, FER, and SER) submitted to the NRC in support of the licensing and operation of the GGNS.
- WLA Field Data – information (e.g., maps, notes, photographs and other documentation) gathered during WLA's field reconnaissance.
- Third Party Data – information (e.g., seismicity catalogs, topographic maps, boring logs, and aerial photographs) from reputable sources, but that has not been through a formal technical review.

#### 4.0 METHODOLOGY

This section describes the methodology to be used for the preliminary evaluation of the UHS at the GGNS.

## 4.1 Data Compilation

- 4.1.1 Data compilation and review for seismic source characterization shall be completed for an area within 320 km of the project site. A Reference Summary Form (Attachment 1) shall be completed for each source of data and retained in the WLA project file as specified in Paragraph 4.1.2.
- 4.1.2 All sources of data shall be reviewed for accuracy and reliability (ranked from A-highest to D-lowest on the Summary Reference Form, Attachment 1) and retained in the WLA project file as specified below:
- 4.1.2.1 Peer Reviewed Information shall be compiled, and a comprehensive reference list will be retained in the project file together with Reference Summary Forms for each reference. Copies of the peer-reviewed information need not be retained in the project file. Peer reviewed published information will be accepted as reliable.
  - 4.1.2.2 Published Information shall be copied, retained in the project file, and added to the comprehensive reference list. This non-peer reviewed information will be reviewed for completeness and accuracy prior to acceptance as reliable data.
  - 4.1.2.3 Unpublished Data and Literature shall be copied, retained in the project file, and added to the comprehensive reference list. This non-peer reviewed information will be reviewed for completeness and accuracy prior to acceptance as reliable data.
  - 4.1.2.4 GGNS Licensing Documents shall be added to the reference list and do not need to be retained in full in the project file. This information will be accepted as reliable up to the date of publication.
  - 4.1.2.5 WLA Field Data shall be retained in a field notebook with identifiers as indicated in Subsection 4.2 below. The completed field notebooks shall be attached to a Reference Summary Form and retained in the project file.
  - 4.1.2.6 Third Party Data shall be accompanied by the Reference Summary Form to clearly indicate the source of the data. Data from Federal and State sources (e.g. seismicity catalogs) will be reviewed for completeness and accuracy prior to acceptance as reliable data.
- 4.1.3 Reference citations shall follow the Geological Society of America citation format. All pertinent publications shall be summarized on the attached Reference Summary Form. Copies of the Reference Summary Forms will be kept in the WLA project file.

## 4.2 Streamlined Approach to Rock Spectra

### 4.2.1 Recommended UHS

RG 1.165 (NRC, 1997) recommends that either the EPRI (1993) or LLNL (1994) UHS be used for the rock UHS at the site; however, it also notes that if new information has become available, the impact of this new information on the estimation of the seismic hazard should be evaluated to ensure that the UHS is still appropriate.

### 4.2.2 New Information

It has been over 15 years since the EPRI and LLNL studies were conducted. During this time, new information that may affect the seismic hazard at the GGNS site has become available, including data on seismic sources and the ground motion attenuation. In this task, the impact of this new information on the seismic hazard at the site and the adequacy of EPRI and/or LLNL UHS shall be evaluated.

### 4.2.3 Compile EPRI and LLNL Hazard Curves

The median UHS for the reference annual probability of  $10^{-5}$  from the EPRI (1993) and LLNL (1994) studies shall be compiled. Copies of these documents shall be retained in the WLA project file.

### 4.2.4 Identify New Ground Motion Attenuation Relations

The literature shall be reviewed to identify new ground motion attenuation relations that are applicable to the Eastern United States. Appropriate reference citations shall be compiled and added to the comprehensive reference list for new attenuation equations relevant to this task. All reference material reviewed shall be accompanied by the Reference Summary Form and retained in the WLA project file.

### 4.2.5 Compute Hazard Using New Information

Using updated source characterization provided by WLA (Section 4.1) and updated attenuation relations (Section 4.2.4), the seismic hazard shall be computed for spectral frequencies of 0.5, 1.0, 2.5, 5.0, 10.0, 20.0, 33.0, and 50.0 Hz. The median UHS with an annual probability of  $10^{-5}$  shall be computed. The calculations shall be completed in accordance with Enercon CSP 3.01, "Preparation and Control of Calculation", and CSP 3.02, "Control of Computer Software".

### 4.2.6 Evaluate Adequacy of the EPRI and LLNL UHS

Using the UHS computed from the new information on the source characterization and ground motion attenuation, the adequacy of the EPRI and LLNL UHS shall be evaluated. If the UHS computed using the new information is lower than either the EPRI or LLNL UHS, then the use of the EPRI or LLNL UHS shall be recommended and additional hazard studies shall not be needed. If the UHS computed using the new information is greater than both the EPRI and LLNL UHS, then a

complete update of the seismic hazard may be needed. The WLA Project Manager will discuss this option with the Entergy project management to discuss the results and implications of our findings.

## 5.0 WLA PROJECT FILE

The Reference Summary Forms, comprehensive reference list, copies of appropriate articles, and the records required by Enercon CSP's 3.01 and 3.02 shall be retained in the WLA project file.

## 6.0 LOST DATA

In cases where data or files are lost or damaged, the WLA Project Manager shall determine if interpretations and or calculations can be made from existing data or if the data need to be recollected. These actions shall be documented by a WLA incident report indicating the type and number of data lost or damaged. The incident report shall be signed and dated by the WLA Project Manager and the Enercon Quality Assurance Manager.

## 7.0 INDEPENDENT TECHNICAL REVIEW

The calculation of UHS shall be independently reviewed and documented in accordance with Enercon CSP 3.01. The qualifications of the reviewer shall be as specified in the PPD.

## 8.0 ATTACHMENTS

The attachment(s) and their total page count associated with this Project Instruction are as follows:

- Attachment 1: "Reference Summary Form" (1 page).

## 9.0 REFERENCES

Electric Power Research Institute, 1993, "Guidelines for Determining Design Basis Ground Motions," EPRI Report TR-102293, Volumes 1-4.

Lawrence Livermore National Laboratory (1994) "Revised Livermore Seismic Hazard Estimates for Sixty-nine Nuclear Power Plant Sites East of the Rocky Mountains," NUREG-1488, USNRC, April 1994.

Nuclear Regulatory Commission, 1997, Regulatory Guide 1.165, "Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion."

**Attachment 1  
Reference Summary Form  
GGNP Task 1 Data Review**

**Reviewer:** \_\_\_\_\_ (WLA)                      **Date:** \_\_\_\_\_

**Circle Reference Type:**      **Peer Reviewed**                      **Published**  
**License Support**                      **Field Data**                      **Third Party**

**Complete citation (Geological Society of America format)**

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**Applicability (e.g. related to site conditions, tectonic setting, source model, or ground motion estimation)**

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**Summary of relevant information**

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**Data Reliability (A-best D-worst; and provide basis for rating)**

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**Potential new issue**

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