

**MFN 07-603**

**Enclosure 2**

**Licensing Topical Report NEDO-33374, "Safety Analysis  
Report for Fuel Storage Racks Criticality Analysis for  
ESBWR Plants,"  
November 2007**

**Non-Proprietary Version**



**HITACHI**

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Wilmington, NC 28401

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**eDRF-0000-0076-8445**  
**November 2007**

## **Licensing Topical Report**

# **SAFETY ANALYSIS REPORT FOR FUEL STORAGE RACKS CRITICALITY ANALYSIS FOR ESBWR PLANTS**

David G. Davenport

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Electronic approvals filed in  
eDRF-0000-0076-8445.

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## **Acknowledgments**

This document is the result of the technical contributions from many individuals and organizations in addition to the authors of this document. At the GEH, significant contributions to the development of this analysis were provided by John Zino (GNF) and Russell Stachowski (GNF). At Equipos Nucleares, S. A., significant contributions were provided by Luis Costas, Marisa Crespo, and Alfonzo Alvarez.

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## 1.0 INTRODUCTION

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The new and spent fuel storage racks have a Keffective (hereafter, K-eff) less than 0.95 for both nominal and abnormal configurations. The nominal configurations included displacement of stored fuel assemblies within the ranges permitted by the rack manufacturing tolerances. Maximum cold uncontrolled Kinfinte (hereafter, K-inf) peak considered is 1.35. The abnormal configurations considered the drop or inadvertent storage of a spent fuel outside of the storage racks.

Both the new and spent fuel storage racks satisfy the requirements of  $K(95/95) < 0.95$  for all storage conditions. [[ ]]

[[

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## 2.0 REQUIREMENTS

For the fresh and spent fuel racks, the analyses should determine the most reactive bundle and use this in the various normal and accident scenarios.  $K(95/95)$  of the system under all conditions should be below 0.95. Reference 1 outlines the standards that must be met for these analyses. For calculation purposes, the cold in-core  $K_{\text{inf}}$  should not exceed 1.35 per Reference 4.

### 3.0 ASSUMPTIONS

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**4.0 MODEL**

**4.1 Spent Fuel Rack – Buffer Pool**

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**4.2 Spent Fuel Rack – Spent Fuel Pool**

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**4.3 Fuel Bundle**

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**4.4 Fuel Material**

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## **5.0 BIAS AND UNCERTAINTY DETERMINATION**

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## **6.0 CRITICALITY ANALYSIS OF THE FRESH FUEL STORAGE RACKS**

### **6.1 New Fuel Handling Process**

Upon receipt of new fuel, bundles are uncrated, upended, and loaded into the fuel inspection stand. The inspected new fuel bundles are channeled and moved into the spent fuel pool. From this point on, the assemblies are submerged. The new fuel assemblies are transferred, via the Inclined Fuel Transfer Tube, from the spent fuel pool to the buffer pool in the Reactor Building. The new fuel storage racks are submerged in the buffer pool, where the new fuel assemblies are stored until needed for refueling. ESBWR does not utilize dry storage or a fuel storage vault for new fuel.

### **6.2 Summary**

Since the new fuel storage racks in the buffer pool are submerged, partial and preferential flooding considerations do not exist. Therefore, criticality analysis is not required under these conditions. Criticality analysis in flooding conditions is covered by the analysis performed for the spent fuel storage racks, in section 7.

## **7.0 CRITICALITY ANALYSIS OF THE SPENT FUEL STORAGE RACKS**

### **7.1 Analysis of Normal Cases**

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### **7.2 Analysis of Accident and Non-normal Cases**

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### **7.3 Normal Cases Results**

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**7.4 Non-normal and Accident Cases Results**

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## 8.0 CONCLUSIONS

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Thus, the fresh and spent fuel storage racks design will [[  
]] maintain a subcritical K-eff under both normal and non-normal  
conditions.

## 9.0 REFERENCES

1. SRP 9.1.1 "Criticality Safety of Fresh and Spent Fuel Storage and Handling Review Responsibilities", U.S. Nuclear Regulatory Commission, Revision 3, March 2007.

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5. NUREG/CR-0200 (ORNL/NUREG/CSD-2) "SCALE: A Modular Code System for Performing Standardised Computer Analyses for Licensing Evaluation", ORNL, Revision 6, September 1998.

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**Enclosure 3**

**Affidavit**

# GE Hitachi Nuclear Energy

## AFFIDAVIT

I, **David H. Hinds**, state as follows:

- (1) I am the Manager, New Units Engineering, GE Hitachi Nuclear Energy ("GEH"), have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.
- (2) The information sought to be withheld is contained in Enclosure 1 of GEH letter MFN 07-603, Mr. James C. Kinsey to U.S. Nuclear Regulatory Commission, entitled *Transmittal of Licensing Topical Report NEDC-33374P, "Safety Analysis Report for Fuel Storage Racks Criticality Analysis for ESBWR Plants," November 2007*, dated November 9, 2007. The GEH proprietary information in Enclosure 1, which is entitled *Licensing Topical Report NEDC-33374P, "Safety Analysis Report for Fuel Storage Racks Criticality Analysis for ESBWR Plants," November 2007 - GEH Proprietary Information*, is delineated by a [[dotted underline inside double square brackets.<sup>(3)</sup>]]. Figures and large equation objects are identified with double square brackets before and after the object. In each case, the superscript notation <sup>(3)</sup> refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination. A non-proprietary version of this information is provided in Enclosure 2, *Licensing Topical Report NEDO-33374, "Safety Analysis Report for Fuel Storage Racks Criticality Analysis for ESBWR Plants," November 2007 - Non-Proprietary Version*.
- (3) In making this application for withholding of proprietary information of which it is the owner, GEH relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).
- (4) Some examples of categories of information which fit into the definition of proprietary information are:
  - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GEH competitors without license from GEH constitutes a competitive economic advantage over other companies;
  - b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;
  - c. Information which reveals aspects of past, present, or future GEH customer-funded development plans and programs, resulting in potential products to GEH;

- d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a., and (4)b, above.

- (5) To address 10 CFR 2.390(b)(4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GEH, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GEH, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.
- (6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GEH. Access to such documents within GEH is limited on a "need to know" basis.
- (7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GEH are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
- (8) The information identified in paragraph (2), above, is classified as proprietary because it identifies detailed GE ESBWR design information for the Spent Fuel Storage Racks. GE utilized prior design information and experience from its fleet with significant resource allocation in developing the system over several years at a substantial cost.

The development of the evaluation process along with the interpretation and application of the analytical results is derived from the extensive experience database that constitutes a major GEH asset.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GEH's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GEH's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical and NRC review costs comprise a substantial investment of time and money by GEH.

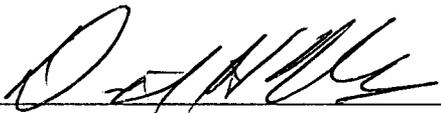
The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GEH's competitive advantage will be lost if its competitors are able to use the results of the GEH experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GEH would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GEH of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 9th day of November 2007.

  
\_\_\_\_\_  
David H. Hinds  
GE Hitachi Nuclear Energy