



# Entergy Operations

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January 9, 1991

W. T. Cottle  
Vice President  
Operations  
Grand Gulf Nuclear Station

U.S. Nuclear Regulatory Commission  
Mail Station P1-137  
Washington, D.C. 20555

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
License No. NPF-29  
Current Cycle Safety Analysis, Revision 3

GNRO-91/00003

Gentlemen:

Entergy Operations, Inc. hereby transmits one signed original and ten copies of Revision 3 to the Current Cycle Safety Analysis (CCSA), for Grand Gulf Nuclear Station (GGNS).

The CCSA provides information on the current GGNS fuel cycle operations and contains analyses supporting operation and the current fuel reload. Analyses included in the CCSA have been approved by the NRC either through specific review of the GGNS reload applications or as topical reports submitted by vendors.

The CCSA was developed to provide a convenient source for current accident and transient analyses. The CCSA is considered part of the Updated Final Safety Analysis Report (UFSAR), and will be updated at least within 60 days of the start of every cycle. Revision 2 was submitted June 30, 1989 (AECM-89/0110) and reflected analyses to support GGNS Cycle 4. This revision to the CCSA reflects the Cycle 5 fuel reload accomplished during the fourth GGNS refueling outage which occurred in late 1990.

The Advanced Nuclear Fuels (ANF) Corporation report, ANF-89-171(P), Volumes 1 and 2, submitted as part of Attachment 2 to this letter contains information considered by ANF to be proprietary. In accordance with 10CFR2.790(b), the enclosed affidavit (Attachment 1) executed by R. A. Copeland of ANF provides the necessary information to support the withholding of the subject report from public disclosure.

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January 9, 1991

GNRO-91/00003

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As required by 10CFR50.71(e)(2) and as authorized by Entergy Operations, I hereby certify, to the best of my knowledge, information and belief, that the information given in the attached CCSA Revision 3 accurately represents changes made since the previous submittal, necessary to reflect information and analyses submitted to the NRC or prepared pursuant to NRC requirement.

If you have any questions, please contact this office.

Yours truly,



WTC/PRS/ams

attachment:

1. ANF Affidavit
2. CCSA Revision 3

cc:

Mr. D. C. Hintz (w/o)  
Mr. J. Mathis (w/a)  
Mr. R. B. McGehee (w/o)  
Mr. N. S. Reynolds (w/o)  
Mr. H. L. Thomas (w/o)

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Washington, D.C. 20555

ADVANCED NUCLEAR FUELS CORPORATION  
AFFIDAVIT

AFFIDAVIT

STATE OF WASHINGTON )  
 ) ss.  
COUNTY OF BENTON )

I, R. A. Copeland being duly sworn, hereby say and depose:

1. I am Manager, Reload Licensing, for Advanced Nuclear Fuels Corporation, ("ANF"), and as such I am authorized to execute this Affidavit.

2. I am familiar with ANF's detailed document control system and policies which govern the protection and control of information.

3. I am familiar with the topical report ANF-89-171(P), Volumes 1 and 2 entitled "Grand Core 1 ANF-1.4 Design Report Mechanical, Thermal-Hydraulic and Neutronic Design for Advanced Nuclear Fuels 9x9-5 Fuel Assemblies," referred to as "Document." Information contained in this Document has been classified by ANF as proprietary in accordance with the control system and policies established by ANF for the control and protection of information.

4. The Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by ANF and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in the Document as proprietary and confidential.

5. The Document has been made available to the U.S. Nuclear Regulatory Commission in confidence, with the request that the information contained in the Document will not be disclosed or divulged.

6. The Document contains information which is vital to a competitive advantage of ANF and would be helpful to competitors of ANF when competing with ANF.

7. The information contained in the Document is considered to be proprietary by ANF because it reveals certain distinguishing aspects of ANF licensing methodology which secure competitive advantage to ANF for fuel design optimization and marketability, and includes information utilized by ANF in its business which affords ANF an opportunity to obtain a competitive advantage over its competitors who do not or may not know or use the information contained in the Document.

8. The disclosure of the proprietary information contained in the Document to a competitor would permit the competitor to reduce its expenditure of money and manpower and to improve its competitive position by giving it valuable insights into ANF licensing methodology and would result in substantial harm to the competitive position of ANF.

9. The Document contains proprietary information which is held in confidence by ANF and is not available in public sources.

10. In accordance with ANF's policies governing the protection and control of information, proprietary information contained in the Document has been made available, on a limited basis, to others outside ANF only as required and under suitable agreement providing for nondisclosure and limited use of the information.

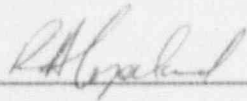
11. ANF policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

12. Information in this Document provides insight into ANF licensing methodology developed by ANF. ANF has invested significant resources in developing the methodology as

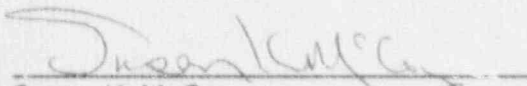
well as the strategy for this application. Assuming a competitor had available the same background data and incentives as ANF, the competitor must, at a minimum, develop the information for the same expenditure of manpower and money as ANF.

THAT the statements made hereinabove are, to the best of my knowledge, information, and belief, truthful and complete.

FURTHER AFFIANT SAYETH NOT.

  
\_\_\_\_\_

SUBSCRIBED before me this 10<sup>th</sup>  
day of October, 1990.

  
\_\_\_\_\_  
Susan K. McCoy  
NOTARY PUBLIC, STATE OF WASHINGTON  
MY COMMISSION EXPIRES: 1/10/92

REVISION 3  
OF THE  
GGNS UNIT 1  
CURRENT CYCLE SAFETY ANALYSIS

Entergy Operations, Inc.  
Grand Gulf Nuclear Station  
Unit 1  
Docket No. 50-416  
Revision 3

Instructions For Filing Revision 3

1. Insert the "Revision 3" tab, transmittal letter (GNRO-91/00003) and this instruction sheet into the back of the CCSA Volume.
2. Remove and insert the pages and topical reports listed below. Dashes (---) in the remove or insert column indicate no action required.

REMOVE

CCSA Cover Sheet  
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Table of Contents  
Introduction (all pages)  
ANF-88-1 (all pages)  
ANF-88-15 (all pages)  
XN-NF-80-19(P)(A), Volume 4,  
Revision 1 (all pages)  
XN-NF-80-19(P), Volume 4,  
Supplement 1 (all pages)  
NESDQ-88-003 Revision 0  
(all pages)

INSERT

CCSA Cover Sheet  
TAB, "Page Index"  
Page Index  
Table of Contents  
Introduction (all pages)  
ANF-90-022, Revision 2 (all pages)  
ANF-90-021, Revision 2 (all pages)  
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ANF-89-171(P), Volumes 1 and 2  
(all pages)



GRAND GULF NUCLEAR STATION  
UNIT 1  
CURRENT CYCLE SAFETY ANALYSIS  
(CCSA)

3

GG  
CCSA

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CURRENT CYCLE SAFETY ANALYSIS  
(CCSA)

Table of Contents

| Tab        | Description                       |  |   |
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| 1          | Introduction                      |  |   |
| 2          | ANF-90-022<br>Revision 2          | Grand Gulf Unit 1 Cycle 5 Reload Analysis  | 3 |
| 3          | ANF-90-021<br>Revision 2          | Grand Gulf Unit 1 Cycle 5 Plant Transient Analysis   |   |
| 4          | XN-NF-86-37 (P)                   | Generic LOCA Break Spectrum Analysis for BWR/6 Plants  |   |
| 5          | Deleted                           |  |   |
| 6          | XN-NF-825 (P)(A)<br>Supplement 2  | BWR/6 Generic Rod Withdrawal Error Analysis, MCP <sub>R</sub> for Plant Operations Within the Extended Operating Domain                | 3 |
| 7          | ANF-88-183 (P)                    | Grand Gulf Unit 1 Reload XN-1.3, Cycle 4 Mechanical Design Report  |   |
| 8          | ANF-89-171 (P)<br>Volumes 1 and 2 | Grand Gulf 1 ANF-1.4 Design Report Mechanical, Thermal-Hydraulic and Neutronic Design for Advanced Nuclear Fuels 9x9-5 Fuel Assemblies |   |
| Revision 0 | AECM-87/0234                      | Transmittal letter   |   |
| Revision 1 | AECM-88/0188                      | Transmittal letter and Revision 1 Insert Instructions  |   |
| Revision 2 | AECM-89/0110                      | Transmittal letter and Revision 2 Insert Instructions  |   |
| Revision 3 | GNRO-91/00003                     | Transmittal letter and Revision 3 Insert Instructions  | 3 |

INTRODUCTION

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## 1.0 Background

Performing 10CFR50.59 evaluations requires the review of analyzed events presented in the UFSAR. In the process of performing such evaluations, it was recognized that the UFSAR annual revision may not include reload analyses performed for the current plant operating cycle due to the relative timing of the cycle startup and the revision submittal.

It was further recognized that some of the analyses presented in the UFSAR form the basis for subsequent analyses performed for future cycles. These analyses typically require little revision from cycle to cycle unless a significant change in fuel type or methodology is made. The reload analyses that are repeated each cycle address such changes in fuel type or methodology and either complement or are based on these "baseline" analyses provided in the UFSAR. Also, during any given cycle, additional analyses may be performed to support operations, procedural changes, technical specification changes, etc. | 3

To provide a ready access to current cycle analyses and their relationship to baseline analyses for 10CFR50.59 and other evaluations, this "Current Cycle Safety Analysis" (CCSA) document was developed. Analyses included in the CCSA have been approved by the NRC either through specific review of Entergy Operations applications or as topical reports submitted by vendors. The CCSA is considered part of the UFSAR, is controlled by administrative procedure, and is maintained current consistent with 10CFR50.71(e). | 3

The CCSA offers a convenient means apart from the UFSAR annual revision to provide the latest accident and transient analysis results to personnel using this information. It is intended that the CCSA will be updated at least within 60 days of the start of every cycle, and more frequently depending on the nature and scope of changes accumulated. | 3

## 2.0 Scope and Description

The CCSA is related to the UFSAR as an integral updated document. Sections in the UFSAR that are affected by subsequent analyses presented in the CCSA refer the reader to the CCSA and, therefore, the current analyses. | 3

It is intended that before performing a review of analyses presented in the UFSAR, the reader is to consult Table 1 of the CCSA and determine whether the analysis of interest is included in the CCSA. If the analysis is in the CCSA, the review should commence with the document in the CCSA assisted by baseline information presented in the UFSAR, as required. If the analysis is not in the CCSA, it is an indication that the information in the UFSAR represents the latest analyses on that subject and that the review should proceed using the UFSAR.

The UFSAR will be revised annually to include information from the CCSA that is judged to be of a permanent baseline nature. This information will then be deleted from the CCSA. The UFSAR will also include references directing the reader to the appropriate sources for analysis not incorporated in the specific sections of the UFSAR. | 3

The non-baseline cycle related analyses that are presented in the CCSA provide the current cycle analyses. These are replaced as they become superseded each cycle.

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## 2.1 Analyzed Events

The analyzed events presented in the CCSA are those for which the description contained in the UFSAR is not applicable to the current cycle. Analyses described in the UFSAR that are still applicable to the plant in the current cycle are not presented in the CCSA. Thus, sections in the UFSAR that do not refer to the CCSA are applicable as presented. For those sections that contain a reference to the CCSA, a review of the analyses presented in the CCSA is required.

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## 2.2 Presentation of Analyzed Events

CCSA analyses are provided as attachments identified by their document numbers. A listing of these documents along with titles and the events analyzed is provided in Section 3.0 below.

## 2.3 UFSAR-CCSA Cross Reference Listing

Table 1 "Summary of Analyzed Events" provides a cross-reference listing of UFSAR events analyzed for the current cycle to CCSA attachments. Table 1 relates the event with its UFSAR section, the primary purpose for analyzing the event, and the CCSA attachment containing the current cycle analysis of this event.

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For the sake of completeness, UFSAR sections presenting methodologies, design bases, and design descriptions have also been listed to provide an appropriate cross-reference to vendor information for these modeling issues. The "event" column states "Methods" for these entries.

2.3.1 This section provides explanation of column headings found in Table 1.

|                 |   |  |
|-----------------|---|--|
| UFSAR Section   | - | The Section in the UFSAR in which this event is addressed. If the event has not been previously addressed in the UFSAR, it is so stated. |
| Event           | - | This column identifies the event analyzed.   |
| Primary Purpose | - | The primary purpose (parameter and/or conditions evaluated) for performing this specific analysis.                                       |
| CCSA Attachment | - | Identifies the appropriate CCSA attachment which provides the analysis description and results for the event of interest.                |

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2.3.2 The following defines acronyms used in Table 1.

|        |   |  |
|--------|---|--|
| CPR    | - | Critical Power Ratio   |
| CS     | - | Core Stability   |
| ELL    | - | Extended Load Line   |
| FLE    | - | Fuel Loading Error   |
| FWCF   | - | Feedwater Controller Failure   |
| FWHOS  | - | Feedwater Heater Out of Service  |
| ICF    | - | Increased Core Flow  |
| LOFWH  | - | Loss of Feedwater Heating transient                                    |
| LRNB   | - | Load Reject No Bypass (also known as GLR for Generator Load Rejection) |
| RDA    | - | Rod Drop Accident  |
| RWE    | - | Rod Withdrawal Error   |
| SLMCPR | - | Safety Limit MCPR  |
| SLO    | - | Single Loop Operation  |

### 3.0 CCSA Attachments

The following lists attachments found in the CCSA.

- |    |                                  |   |   |
|----|----------------------------------|---|---|
| 1. | ANF-90-022<br>Revision 2         | Grand Gulf Unit 1 Cycle 5 Reload Analysis<br>Event: SLO;<br>LOCA;<br>CS;<br>FLE;<br>RDA   | 3 |
| 2. | ANF-90-021<br>Revision 2         | Grand Grand Unit 1 Cycle 5 Plant Transient Analysis<br>Event: LOFWH;<br>FWCF;<br>LRNB;<br>RWE;<br>Flow Excursion;<br>Overpressurization |   |
| 3. | XN-NF-86-37 (P)                  | Generic LOCA Break Spectrum Analysis for BWR/6 Plants<br>Event: LOCA  |   |
| 4. | Deleted                          |   |   |
| 5. | XN-NF-825 (P)(A)<br>Supplement 2 | BWR/6 Generic Rod Withdrawal Error Analysis,<br>MCPR for Plant Operations Within the Extended<br>Operating Domain                       | 3 |

6. ANF-88-183 (P) Grand Gulf Unit 1 Reload XN-1.3, Cycle 4  
Mechanical Design Report
7. ANF-89-171 (P) Grand Gulf 1 ANF-1.4 Design Report Mechanical,  
Volumes 1 and 2 Thermal-Hydraulic and Neutronic Design for Advanced  
Nuclear Fuels 9x9-5 Fuel Assemblies

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TABLE 1  
Summary of Analyzed Events

| UFSAR SECTION | EVENT                    | PRIMARY PURPOSE                                       | CCSA ATTACHMENT                                |
|---------------|--------------------------|---|--|
| 4.1           | Methods                  | General analysis techniques, summary fuel description | ANF-90-022                                     |
| 4.2           | Methods                  | Fuel mechanical design description                    | ANF-90-022<br>ANF-88-183 (P)<br>ANF-89-171 (P) |
| 4.3           | Methods                  | Nuclear design description                            | ANF-90-022                                     |
| 4.4           | Methods                  | Thermal-hydraulic design description                  | ANF-90-022                                     |
| 4.4.4.6       | CS                       | Define detect and suppress region                     | ANF-90-022                                     |
| 5.2.2         | Overpressure             | Overpressure protection                               | ANF-90-021                                     |
| 5A            | ASME over-pressurization | MSIV closure Max pressure                             | ANF-90-022<br>ANF-90-021                       |
| 6.3.3         | ECCS Performance         | Peak Clad Temperature                                 | ANF-90-022                                     |
| 15.0.3.3      | Safety Limit             | SLMCPR  | ANF-90-022<br>ANF-90-021                       |
| 15.1.1        | LOFWH                    | CPR with reduced FW temperature                       | ANF-90-021                                     |
| 15.1.2        | FWCF                     | CPR at rated  | ANF-90-021                                     |
| 15D           | FWCF                     | CPR with ICF  | ANF-90-021                                     |
| 15D           | FWCF                     | CPR with ELL  | ANF-90-021                                     |
| 15D           | FWCF                     | CPR at Power below 40% (w/o direct scram)             | ANF-90-021                                     |
| 15D           | FWCF                     | CPR - w/o bypass                                      | ANF-90-021                                     |
| 15D           | FWCF                     | CPR with FWHOS  | ANF-90-021                                     |

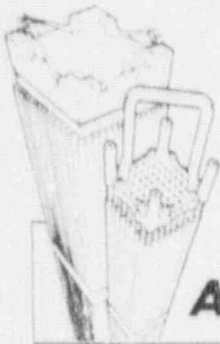
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TABLE 1  
Summary of Analyzed Events (Cont.)

| UFSAR SECTION | EVENT       | PRIMARY PURPOSE                               | CCSA ATTACHMENT                                 |
|---------------|-------------|---|---|
| 15.2.2        | LRNB        | CPR at rated                                  | ANF-90-021                                      |
| 15D           | LRNB        | CPR with ICF                                  | ANF-90-021                                      |
| 15D           | LRNB        | CPR with ELL                                  | ANF-90-021                                      |
| 15D           | LRNB        | CPR at power below 40% (w/o direct scram)     | ANF-90-021                                      |
| 15C           | SLO         | Operation with one loop out of service        | ANF-90-022                                      |
| 15.4.1, 2     | RWE         | CPR vs. Power                                 | ANF-90-021<br>XN-NF-825 (P)(A),<br>Supplement 2 |
| 15.4.7        | FLE         | CPR - Misloaded bundle                        | ANF-90-022                                      |
| 15.4.9        | RDA         | Enthalpy deposition                           | ANF-90-022                                      |
| 15.6.5        | LOCA        | Determine break location, limiting break size | XN-NF-86-37 (P)                                 |
| 15D           | Flow Runout | CPR & MAPLHGR vs. Flow                        | ANF-90-021                                      |

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ANF-90-022  
REVISION 2



**ADVANCED NUCLEAR FUELS CORPORATION**

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GRAND GULF UNIT 1 CYCLE 5  
RELOAD ANALYSIS

AUGUST 1990

*A Siemens Company*