



GE Nuclear Energy

Nuclear Services
175 Curtner Ave. M/C 747
San Jose, CA 95125
(408) 925-1913, Fax (408) 925-6710
E-mail: george.stramback@gene.ge.com

MFN 02-033

June 13, 2002

U.S Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Attention: Chief, Information Management Branch
Program Management
Policy Development and Analysis Staff

Subject: **Presentation Material on Results of Pipe Rupture Task Force for
Meeting on June 19, 2002
Re: Open Session (Non-Proprietary) & Closed Session (Proprietary)**

Enclosed are the presentation slides for the June 19th meeting with the NRC staff on the results from the GE pipe rupture task force. Please note that there are both non-proprietary (Enclosure 1 – Open Session) and proprietary (Enclosure 2 - Closed Session) presentation slides. The closed session presentation slides supplement the information covered in the open session presentation slides.

Enclosure 2 contains proprietary information of the type, which GE maintains in confidence and withholds from public disclosure. The information has been handled and classified as proprietary to GE as indicated in the Enclosure 3 affidavit. GE hereby requests that this information be withheld from public disclosure in accordance with the provisions of 10CFR 2.790 and 9.17.

YGO1
Add: A B Wang
C E Carpenter

If you have any questions about the information provided here please contact, Terry McIntyre at (408) 925-1440, or myself.

Sincerely,



George Stramback
Regulatory Services, Project Manager
GE Nuclear Energy
(408) 925-1913
george.stramback@gene.ge.com

Enclosures:

- (1) *Hydrogen Detonation in BWRs – Results of the Pipe Rupture Task Force, Open Session, June 19, 2002*
- (2) *Hydrogen Detonation in BWRs – Results of the Pipe Rupture Task Force, Proprietary Supplement, Closed Session, June 19, 2002*
- (3) General Electric Proprietary Information Affidavit

cc: AB Wang – USNRC
CE Carpenter – USNRC
TR McIntyre
JF Klapproth



Hydrogen Detonation in BWRs

Results of the Pipe Rupture Task Force

(Open Session)

Terry McIntyre
Manager – Special Projects
16 June, 2002



Background

- Two serious (and similar) events in 2 months
 - *RHR/SCM Rupture – November 2001*
 - *Head Spray Rupture – Dec 2001*
 - *Sudden rupture of NSSS-attached piping*
 - *Both events attributed to detonation of radiolytic hydrogen in pipes*
 - *Root cause (ignition mechanism and location) not completely understood*
- RHR/SCM event contaminated plant areas, caused significant damage, and had potential for serious personnel injury
- Head Spray event characterized as a “near-miss LOCA”
 - *Single failure (check valve) would have resulted in a non-isolatable intermediate-break LOCA*



Plant and Event Info – SCM/RHR Rupture

GE Nuclear Energy

- BWR-4 class plant
- Event Date: November 7, 2001
- Event occurred during routine surveillance test
- Automatic isolation and immediate manual plant shutdown
- Rupture occurred in steam supply line for the RHR Steam Condensing Mode



Plant and Event Info – Head Spray Rupture

GE Nuclear Energy

- **Non-GE BWR**
- **Event Date: December 14, 2001**
- **Event occurred during normal plant operation**
- **Event terminated by closing isolation valve**
 - *Plant operated 2 months before inspection*
- **Rupture occurred in head spray line**



History & Status

- **Task Force Established March 14, 2002**
 - *Met ~ twice weekly*
 - *All short term/high priority technical evaluations complete*
- **BWROG PIRT Briefing March 28, 2002**
- **Draft Task Force Report Completed**
- **Design Review May 1, 2002**
- **BWROG Meeting June 11, 2002**
- **SIL 643 Issued June 14, 2002**
- **NRC Review June 19, 2002**



Task Force Charter & Results

GE Nuclear Energy

- Establish confidence that the identified failure mode of radiolytic hydrogen/oxygen detonation is correct
 - **Very Likely Correct**
- Identify Potential Ignition Sources
 - **Indeterminate**
- Determine the extent of risk of future events within the BWR fleet
 - **Small, but not zero**
- Identify plant characteristics for potential detonation risk
 - **Identified in SIL 643**
- Identify remedial actions/modifications to reduce or eliminate risk of future events
 - **Identified in SIL 643**



Results Summary

- Risk is **SMALL**, but cannot be completely dismissed
- Narrow range of geometry/pressure/temperature conditions required
 - Conditions **rare**, but not unheard of
 - There is no “magic bullet” in the GE design that makes events impossible
- Any detonation event from 1000 psi will result in pipe rupture
 - Large overpressures possible
- GE design is fundamentally sound
 - Avoidance of detonable mixtures part of GE design specification
- PRA: CDF for small/intermediate steam LOCA increased slightly by addition of hydrogen detonation as a LOCA initiator



Conclusions – SIL 643 Recommendations

GE Nuclear Energy

- Identify piping configurations susceptible to radiolytic gas accumulation
- Understand susceptibility and proceed appropriately
 - *Consider effects of potential modifications*
 - *Be proactive on material condition issues*
 - *Consider effects of operational changes*
 - *Modifications may be appropriate in some situations*

General Electric Company

AFFIDAVIT

I, **George B. Stramback**, state as follows:

- (1) I am Project Manager, Regulatory Services, General Electric Company ("GE") and 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 2 to MFN 02-033, George Stramback to NRC, *Presentation Material on Results of Pipe Rupture Task Force for Meeting on June 19, 2002 Re: Open Session (Non-Proprietary) & Closed Session (Proprietary)*, dated June 13, 2002. Enclosure 2 (*Hydrogen Detonation in BWRs – Results of the Pipe Rupture Task Force, Proprietary Supplement, Closed Session, June 19, 2002*), marked GE Proprietary Information, is considered proprietary in its entirety.
- (3) In making this application for withholding of proprietary information of which it is the owner, GE 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), 2.790(a)(4), and 2.790(d)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions 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 General Electric's competitors without license from General Electric 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 cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
- d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
- e. 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 both paragraphs (4)a. and (4)b., above.

- (5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, 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 GE, 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. Access to such documents within GE 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 GE 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 contains details and conclusions from an independent technical evaluation performed by the GE Pipe Rupture task Force regarding two BWR pipe rupture events.

The development of this information and conclusions was achieved at a significant cost, on the order of 50 thousand dollars, to GE.

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 GE asset.

- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE'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 GE.

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.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE 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 GE 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 GE 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 13th day of June 2002.


George B. Stramback
General Electric Company