



**GE Nuclear Energy**

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August 1995

**Licensing Topical Report**

# **SBWR Test and Analysis Program Description**

## **Supplement 1 - Discussion of PIRT Parameters**



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Attention: Theodore E. Quay, Director  
Standardization Project Directorate

Subject: **SBWR - Test and Analysis Program Description Supplement 1 - Discussion of PIRT Parameters, NEDO-32391, Supplement 1 (Non-proprietary)**

Reference: 1. MFN 167-95, J. E. Quinn (GE) to T. E. Quay (NRC), *SBWR - Test and Analysis Program Description Supplement 1 - Discussion of PIRT Parameters*, NEDC-32391P, Supplement 1 (Proprietary), August 28, 1995.

This letter transmits the non-proprietary version of Supplement 1 of the *SBWR Test and Analysis Program Description (TAPD)* report (Reference 1), for your review. The Reference 1 supplemental report provides details of the method of development and supporting data and analyses relative to the Phenomena Identification and Ranking Tables (PIRT) parameters, which were developed for and used in SBWR Test Program.

If you have any questions regarding this report, please contact John Leatherman of our staff on (408) 925-2023.

Sincerely,

James E. Quinn,  
Projects Manager

Enclosure: *Test and Analysis Program Description Supplement 1 - Discussion of PIRT Parameters, NEDO-32391, Supplement 1, August 1995*



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# **SBWR Test and Analysis Program Description**

## **Supplement 1 - Discussion of PIRT Parameters**

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## ABBREVIATIONS AND ACRONYMS

ABWR	Advanced Boiling Water Reactor
AC	Alternating Current
ADS	Automatic Depressurization System
APRM	Average Power Range Monitor
ARI	Alternate Rod Insertion
ASME	American Society of Mechanical Engineers
ATLAS	GE's 8.6 MW Heat Transfer Loop
ATWS	Anticipated Transients Without Scram
Bldn	Blowdown
BO	Boiloff
BWR	Boiling Water Reactor
CACS	Containment Atmospheric Control System
CCFL	Counter Current Flow Limiting
CISE	Centro Informazioni Studi Esperienze
COL	Combined Operating License
CPR	Critical Power Ratio
CRD	Control Rod Drive
CTP	Core Thermal Power
CRIEPI	Central Research Institute of Electric Power Industry
CSAU	Code Scaling, Applicability and Uncertainty
CSHT	Core Spray Heat Transfer
DBA	Design Basis Accident
DC	Downcomer
DPV	Depressurization Valve
DW, D/W	Drywell
EBWR	Experimental Boiling Water Reactor
ECCS	Emergency Core Cooling System
EOPs	Emergency Operating Procedures
FAPCS	Fuel and Auxiliary Pool Cooling System
FIST	BWR Full Integral Simulation Test
FIX	Swedish Test Loop Used for Testing External Pump Circulation
FMCRD	Fine Motion Control Rod Drive
FRIGG	Research Heat Transfer Loop Operated for Danish Atomic Energy Commission
FW	Feedwater
FWCS	Feedwater Control System
GDCS	Gravity-Driven Cooling System
GE	General Electric Company

## ABBREVIATIONS AND ACRONYMS (Continued)

GEXL	General Electric Critical Quality Boiling Length Correlation
GIRAFFE	Gravity-Driven Integral Full-Height Test for Passive Heat Removal
GIST	GDCS Integral System Test
HCU	Hydraulic Control Unit
HVAC	Heating, Ventilating and Air Conditioning
IC	Isolation Condenser
ICS	Isolation Condenser System
INEL	Idaho National Engineering Laboratory
LASL	Los Alamos Scientific Laboratory
LB	Large Break
LOCA	Loss-Of-Coolant Accident
LOOP	Loss Of Offsite Power
LPCI	Low Pressure Coolant Injection
MCPR	Minimum Critical Power Ratio
MIT	Massachusetts Institute of Technology
MPL	Master Parts List
MSIV	Main Steamline Isolation Valve
MSL	Main Steamline
MW	Megawatt
NBS	Nuclear Boiler System
NRC	Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
P&ID	Process and Information Diagram
PANDA	Passive Nachwarmeabfuhr-und Druueckabbau-Testanlage (Passive Decay Heat Removal and Depressurization Test Facility)
PANTHERS	Performance Analysis and Testing of Heat Removal Systems
PAR	Passive Autocatalytic Recombiners
PCCS	Passive Containment Cooling System
PCT	Peak Cladding Temperature
PIRT	Phenomena Identification and Ranking Tables
PSTF	Pressure Suppression Test Facility
QDB	Qualification Data Base
RC&IS	Rod Control and Information System
RPV	Reactor Pressure Vessel
RWCU	Reactor Water Cleanup
SB	Small Break



**ABBREVIATIONS AND ACRONYMS (Continued)**

SBWR	Simplified Boiling Water Reactor
S/C	Suppression Chamber (wetwell)
SDC	Shutdown Cooling
SIET	Societa Informazioni Esperienze Termoidrauliche
SLCS	Standby Liquid Control System
SPERT	Special Power-Excursion Reactor Tests
SRV	Safety/Relief Valve
SSAR	Standard Safety Analysis Report
SSLC	Safety System Logic Control
SSTF	Steam Sector Test Facility
TAPD	Test and Analysis Program Description
TCV	Turbine Control Valve
THTF	Thermal-Hydraulic Test Facility
TLTA	Two-Loop Test Apparatus
TPS	Turbine Protection System
TRAC	Transient Reactor Analysis Code
TRACG	Transient Reactor Analysis Code, GE version
TT	Turbine Trip
UCB	University of California, Berkeley
VB	Vacuum Breaker
WW	Wetwell

## **S1.0 Introduction**

### **S1.1 Purpose**

Supplement 1 provides a discussion of the Phenomena Identification and Ranking Tables (PIRT) parameters described in Section 2 of the SBWR Test and Analysis Program Description (TAPD) [1].

### **S1.2 Definition of PIRT Phenomena Listed in TAPD Section 2**

This section provides definitions of phenomena considered in TAPD Section 2.

### **S1.3 Discussion of PIRT Phenomena and Rankings**

This section provides a discussion of PIRT Phenomena and Rankings.

#### **S1.3.1 Loss-of Coolant Accidents (Reactor Vessel and Core)**

This section provides a discussion of the detailed phenomena considered for LOCA (Reactor Vessel and Core).

#### **S1.3.2 Loss-of Coolant Accidents (Containment)**

This section provides a discussion of the detailed phenomena considered for LOCA (Containment).

#### **S1.3.3 Transients**

This section provides a detailed discussion of the phenomena considered for transients.

#### **S1.3.4 Anticipated Transients Without Scram (Pressurization Transients)**

This section presents a discussion of the detailed phenomena considered in ATWS (Pressurization Transients).

#### **S1.3.5 Stability**

This section provides a discussion of the detailed phenomena related stability as provided in TAPD Sections 2.2.4 and 2.3.4.

#### **S1.4 Synopsis of the Identified Phenomena and SBWR Unique Features and Interactions**

This section provides further discussions of the PIRT evaluations in TAPD Sections 2 and 3.

#### **S1.5 Correspondence Between Sections in TRACG Model Description Reports, (NEDE-32176P Rev. 0 and Rev. 1)**

This section provides discussions relating the TRACG Model descriptions to those provided in TAPD Section 2.

#### **S1.6 References**

- [1] *SBWR Test and Analysis Program Description*, NEDC-32391P, Revision C, August 1995.
- [2] *TRACG Qualification*, J.G.M. Andersen, Md. Alamgir, J.S. Bowman, Y.K. Cheung, L.A. Klebanov, W. Marquino, M. Robergeau, D.A. Salmon, J.C. Shaug, B.S. Shiralkar, F.D. Shum, K.M. Vierow. NEDE-32176P, Licensing Topical Report, January 1993.
- [3] *TRACG Model Description*, J.G.M. Andersen, Md. Alamgir, Y.K. Cheung, L.A. Klebanov, J.C. Shaug. NEDE-32176P, Licensing Topical Report, January 1993.