TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

May 6, 1982

RECEIVED
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Director of Licensing
Attention: Mr. Domenic B. Vassalio, Chief
Operating Reactors Branch No. 2
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Mr. Vassallo:

In the Matter of the) Docket Nos. 50-259
Tennessee Valley Authority) 50-260
50-296

Your letter to H. G. Parris dated April 2, 1982 requested that TVA provide additional information regarding our response to NUREG-0737 items I.A.2.1 and II.B.4 for the Browns Ferry Nuclear Plant. Enclosed is our response to this request.

A copy of this response is being sent to R. T. Liner of Science Applications, Inc., as you requested.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills

L. M. Mills, Manager
Nuclear Licensing

Subscribed and sworn to before
me this 6th day of May 1982.

Paulette H. White
Notary Public

My Commission Expires 9-5-84

Enclosure
cc: See page 2

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Mr. Domenic B. Vassallo May 6, 1982

cc: U.S. Nuclear Regulatory Commission
Region II
ATTN: James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Mr. R. J. Clark (Enclosure)
U.S. Nuclear Regulatory Commission
Browns Ferry Project Manager
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dr. R. T. Liner (Enclosure)
Science Applications, Inc.
1710 Goodridge Drive
McLean, Virginia 22102

ENCLOSURE

RESPONSE TO D. B. VASSALLO'S LETTER TO
H. G. PARRIS DATED APRIL 2, 1982
NUREG-0737 ITEMS I.A.2.1 AND II.B.4
BROWNS FERRY NUCLEAR PLANT

Question 1. The enclosure from your November 10, 1980, submittal includes lectures which appear to have the potential for covering the subjects of heat transfer, fluid flow and thermodynamics for training and requalifications as called out in enclosure 1 of Denton's March 28, 1980, letter. Do these lectures in fact cover this material and is the coverage at the level of detail specified in enclosure 2 of the Denton letter?

Response: The TVA cold and hot license and requalification programs provide training in heat transfer, fluid flow, and thermodynamics. Attachments 1 and 2 outline the training provided for TVA operations employees.

Question 2. The enclosure from your November 10, 1980, submittal includes lectures which appear to have the potential for addressing the subject of using installed plant systems to control or mitigate an accident in which the core is severely damaged. This requirement is called out in enclosure 1 of Denton's letter. Do these lectures address the topic at the level of detail specified in enclosure 3 of Denton's letter?

Response: The TVA cold and hot license and requalification programs include training in the use of installed plant systems to control or mitigate an accident in which the core is severely damaged. The training outline that covers the areas in enclosure 3 of Mr. Denton's letter is shown in attachment 3.

Question 3. Are the lectures and quizzes on the subject of accident mitigation given to shift technical advisors and operating personnel from the plant manager through the operation chain to the licensed operators? If they are, would you please provide the titles of the people who are trained and an organization chart which illustrates their position in the operations chain?

Response: Accident mitigation training is given to shift technical advisors and operations employees from the operations supervisor to the licensed operators to comply with enclosure 3 of Mr. Denton's March 28, 1980 letter. An abbreviated program has been given to managers and technicians in the Health Physics, Plant Chemistry/Radiochemistry, and Instrumentation and Controls sections commensurate with their responsibilities in the event of a core damaging accident. Attachment 4 (Browns Ferry organizational chart) shows the employees trained in accident mitigation.

Question 4. The enclosure from your November 10, 1980, submittal claims to cover all the manipulations as called out in enclosure 4 of Denton's letter. Does the requalification program in fact cover all these manipulations and are these manipulations performed within periods specified in enclosure 4 of Denton's letter?

Response: All control manipulations mentioned in enclosure 4 of Denton's letter are performed by requalifying operators at the required frequency (annually or on a 2-year cycle). These manipulations are shown in attachment 5.

Question 5. Do the training and the requalification program elements which include heat transfer, fluid flow, thermodynamics and accident mitigation use 80 contact hours? (A contact hour of instruction is a one-hour period in which the course instructor is present or available for instructing or assisting students; lectures, seminars, discussions, problem-solving sessions, and examinations are considered contact periods under this definition.)

Response: Browns Ferry operator requalification for 1980 and 1981 includes a total of 32 hours of heat transfer, fluid flow, and thermodynamics (attachment 1).

Additionally, the operator initial training program (NOTP) has been updated to include the requirements of Denton's March 28, 1980 letter.

Question. For item II.B.4, provide an outline of the training program for mitigating core damage including the number of training hours involved. Your outline can include any training program which relates to the training for mitigating core damage. Follow the guidelines given in enclosure 3 of H. R. Denton's letter dated March 28, 1980 and INPO Guidelines for Training to Recognize and Mitigate the Consequences of Core Damage (Document Number STG-01, Rev. 1, January 15, 1981). NRC requires a minimum of 80 contact hours of training for mitigating core damage.

Response: The mitigating core damage training outline is shown in attachment 3. This program consists of 16 hours of specific mitigation core damage training. Additionally, mitigating core damage training elements are covered in the Nuclear Operator Training Program, Pre-License Training, and Requalification Training for TVA licensed operators. TVA believes the total combined hours of training meet or exceed the recommended 80 contact hours and is sufficient to satisfy the intent of the NRC letter and INPO recommendations.

RFC:COH
4/30/82

Listing of Enclosed Attachments

Attachment 1 - BWR Requalification Training Table of Contents

Attachment 2 - BWR Requalification Training Thermodynamics Thermal Limits

Attachment 3 - BWR Training for Mitigating Core Damage

Attachment 4 - Browns Ferry Functional Organization Chart

Attachment 5 - Required Reactivity Control Manipulations - Browns Ferry Simulator

ATTACHMENT 1

BWR REQUALIFICATION TRAINING

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

ATTACHMENT 2

BWR REQUALIFICATION TRAINING THERMODYNAMICS THERMAL LIMITS

I. BWR CORE THERMAL LIMITS

A. Technical Specification Limits

1. CMFLPD - Core Maximum Fraction of Limiting Power Density
2. "R" Factor
3. MCPR - Minimum Critical Power Ratio
4. LHGR - Linear Heat Generation Rate
5. MAPLHGR - Maximum Average Planar Linear Heat Generation Rate

B. Non-Technical Specification Limits

1. CMPF - Core Maximum Peaking Factor
2. PCIOMR - Preconditioning Interim Operating Management Recommendations

II. PROCESS COMPUTER

A. Special Programs

1. LPRM Calibration (OD 1/2)
2. Computer Outage Recovery Monitor (OD-15)
3. Other On-Demand (OD) Programs
   OD-7, OD-8, OD-10, OD-11, OD-14, OD-16, and OD-17

B. Frequently Used Programs

1. Thermal Data in a Specified Bundle (OD-6)
2. Core Thermal Power and APRM Calibration (OD-3)
3. Periodic Core Evaluation (P1)
   explanation of terms

ATTACHMENT 3

BWR

TRAINING
for
MITIGATING CORE DAMAGE

A. Incore Instrumentation

1. Review of Neutron Monitoring System
2. Use of NMS for determination of void formation, void location basis for NMS response as a function of core temperatures and density changes.
3. Use of NMS or TIP system to determine extent of core damage and geometry changes.

B. Vital Instrumentation

1. Instrumentation response in an accident environment with particular emphasis on post accident monitors (PAM).
2. Instrumentation to be discussed
   a. NMS
   b. RMCS
   c. RPIS
   d. H_2 and O_2 analyzers
   e. Reactor level
3. Topics to be discussed
   a. Instrument failure mode during loss of instrument power or other predictable failures (e.g., loss of reference leg).
   b. Effects on readings due to design transients of temperature, radiation, moisture, and pressure.
   c. Expected degree of accuracy following parameter's return to normal.
   d. Possible alternate means of determining approximate value for critical parameters assuming the primary method of measurement has failed.
   e. Possible use and capability of plant computer in monitoring and analyzing critical parameters.
   f. Isolation philosophy, signals, instrumentation, and potential failure modes.

C. Chemistry Results with Core Damage

1. Initial detection
   a. Chemistry parameters
   b. Pretreatment monitor
2. Determination of extent of damage
   a. Methods of sampling and analysis
      (1) Gamma-ray isotopic
      (2) Gases
   b. Time requirements for sampling and analysis
   c. Indication of:
      (1) Clad defects
      (2) Massive defects
      (3) Fuel melting

d. Additional sampling and analysis
   (1) Reactor coolant
   (2) Containment

3. Consequences of damage
   a. Activity levels in coolant and total activity in core
   b. Contamination considerations
   c. Releases to containment
   d. Releases to the environment
   e. Personnel exposure during sampling and analysis
4. Corrosion effects
   a. Zircaloy/water reaction
   b. Submersion of equipment and time to failure
   c. Emergency chemistry controls

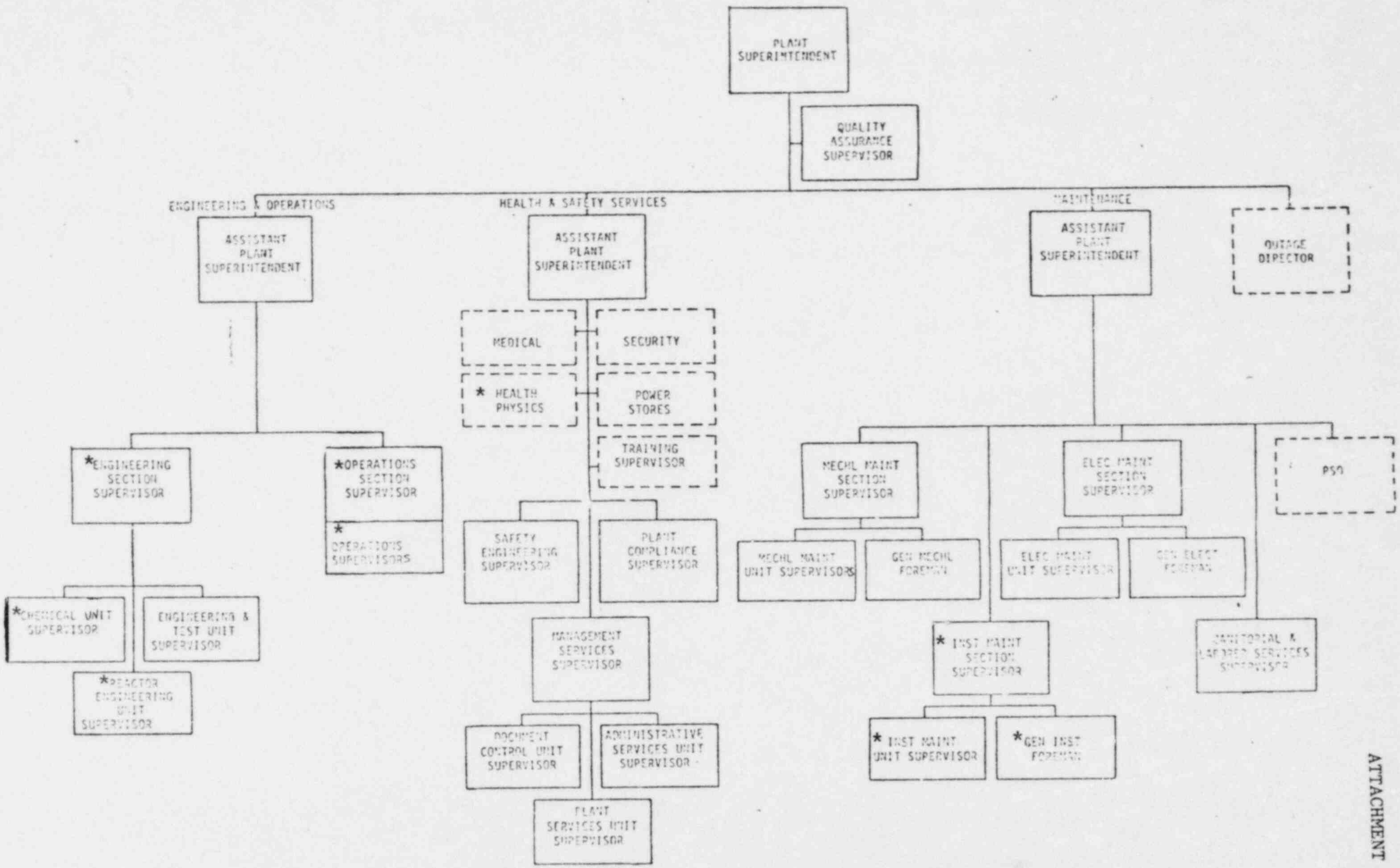
D. Radiation Monitoring

1. Response of process and radiation monitors to severe core damage.
2. Behavior of monitors and detectors when saturated.
3. Methods of detecting radiation readings by direct measurement at detector output signals.
4. Expected accuracy of monitors at different locations.
5. Use of monitors to determine extent of core damage.
6. Radiation monitor failure modes.
7. Methods of determining dose rate inside containment from measurements taken outside containment.

E. Gas Problems Under Accident Conditions

1. Hydrogen
   a. Sources
   b. Hazardous concentrations
   c. Methods of measuring concentration
   d. Venting
   e. H_2 recombiners
2. Oxygen
   a. Reactor coolant system
   b. Containment
3. Other gases
   a. Noncondensables--Xe, K_R, A_R
   b. Accumulation in containment
   c. Venting and leakage

FUNCTIONAL ORGANIZATION FOR BROWNS FERRY NUCLEAR PLANT



*Personnel Trained in Accident Mitigation

— Indicates functional reporting

ATTACHMENT 4

ATTACHMENT 5

REQUIRED REACTIVITY CONTROL MANIPULATIONS
BROWNS FERRY SIMULATOR

Trainee's Name ____________________ Instructor's Signature ____________________

Date ____________ Purpose of Evaluation ____________________

NOTE: 1. Star (*) items shall be performed annually, all other items shall be performed on a two-year cycle.

2. Personnel with senior license may be credited with these activities if they direct or evaluate control manipulations as they are performed.

	Operator	Supervisor	STA
1) *Reactor startup and heatup			
2) Turbine/generator startup			
3) *10% power change			
4) *Manual control of feedwater during startup or shutdown			
5) *Plant shutdown			
6) Reactor scram			
7) LOCA *Inside drywell Small break			
*Outside drywell Small break			
*Inside drywell Large break			
*Outside drywell Large break			
Main steam line break			
8) Fuel failure/high off-gas			
9) Loss of one recirc pump			
10) *Loss of both recirc pumps			
11) Malfunction of recirc speed control			
12) Inability to drive control rods			
13) Mispositioned control rod (or rod drop)			
14) Nuclear instrumentation failure			
15) Loss of RPS bus			
16) SLC initiation			
17) Turbine/generator trip			
18) Loss of electrical power or loss of bus/busses			
19) Pressure regulator malfunction			
20) Feedwater system malfunction			
21) *Total loss of feedwater (normal & emergency)			
22) Loss of condenser vacuum			
23) Loss of RBCCW			
24) Loss of shutdown cooling system			
25) Total loss of AC electrical power			
26) Scram system failure			
27) Loss of instrument air			
28) Loss of EECW or RHRSW			
29) Other			