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Docket No. 50-344

Mr. Bart D. Withers
 Vice President Nuclear
 Portland General Electric Company
 121 S. W. Salmon Street
 Portland, Oregon 97204

Dear Mr. Withers:

SUBJECT: NUREG 0737 ITEM 1.A.2.1.4 "UPGRADING OF OPERATOR TRAINING", NUREG-0737
 ITEM II.B.4 "MITIGATING CORE DAMAGE"

The staff has completed its review of the above subject items for the Trojan facility. Based upon the evaluation contained in the enclosed Safety Evaluation Report (SER), we conclude that PGE's training program satisfies all staff criteria for items 1.A.2.1.4 and II.B.4, and accordingly are considered to be closed.

In order to prepare the SER, NRC Region V personnel held discussions with members of your staff at the Trojan facility on October 20 and 21, 1982. We would like to extend our appreciation for the assistance provided by your staff members at that meeting.

Sincerely,

Original signed by

Charles M. Trammell, III
 Project Manager
 Operating Reactors Branch #3
 Division of Licensing

Enclosure:
 Safety Evaluation

cc w/enclosure:
 See next page

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OFFICE	ORB#3:DL	ORB#3:DL	ORB#3:DL			
SURNAME	PMKreutzer	CTramme11/pn	RAClark			
DATE	11/17/82	11/17/82	11/17/82			

Portland General Electric Company

cc: Multnomah County Library
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Portland, Oregon 97205

Michael Malmros, Resident Inspector
U. S. Nuclear Regulatory Commission
Trojan Nuclear Plant
P. O. Box 0
Rainier, Oregon 97048

Robert M. Hunt, Chairman
Board of County Commissioners
Columbia County
St. Helens, Oregon 97501

Donald W. Godard, Supervisor
Siting and Regulation
Oregon Department of Energy
Labor and Industries Building
Room 111
Salem, Oregon 97310

Regional Administrator
Nuclear Regulatory Commission, Region V
Office of Executive Director for Operations
1450 Maria Lane, Suite 210
Walnut Creek, California 94596



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
NUREG-0737 ITEM 1.A.2.1.4 "UPGRADING OPERATOR TRAINING"
NUREG-0737 ITEM II.B.4 "MITIGATING CORE DAMAGE"
TROJAN NUCLEAR GENERATING STATION
DOCKET NO. 50-344

INTRODUCTION

Following the accident at Three Mile Island, Unit 2, the staff developed the NRC Action Plan, NUREG-0660, to provide a comprehensive and integrated plan to improve safety at power reactors. Specific NUREG-0660 items were approved by the Commission for implementation at power reactors, and they were issued as NUREG-0737. This Safety Evaluation Report (SER) addresses Portland General Electric's (PGE's) compliance with the recommendations contained in NUREG-0737 for items 1.A.2.1.4 "Immediate Upgrading of Reactor Operator and Senior Reactor Operator Training and Qualifications" and II.B.4 "Training for Mitigating Core Damage."

DISCUSSION

NUREG-0737 items 1.A.2.1.4 and II.B.4 specify additional training for licensed and non-licensed personnel in the areas of heat transfer, fluid flow, thermodynamics and mitigation of core damage. PGE's training programs, in these areas, have been evaluated by an NRC contractor, Science Applications, Inc. (SAI). The staff's SER modifies the attached SAI Technical Evaluation Report (TER) as necessary to complete all open items and dispose of discrepancies. All aspects of items I.A.2.1.4 and II.B.4 have been evaluated in this SER. For those items specified in the TER as meeting NRC evaluation criteria, the staff is in agreement with these conclusions and those items are not further addressed. For clarity, the format used in the Evaluation section of this SER is similar to the format used in the TER.

Paragraph 2 of Section II.A of the TER indicates that training in mitigating core damage and related subjects (heat transfer, fluid flow and thermodynamics) should consist of at least 80 contact hours in both the initial training and requalification programs. This staff position has been modified, such that the 80 contact hour guideline no longer applies to the requalification program. Accordingly, the criteria to be used in our evaluation of the training program at Trojan are:

- I.A.2.1.4: For licensed personnel, about 80 contact hours of training in mitigation of core damage, thermodynamics, fluid flow and heat transfer are desirable in the initial training program. The requalification program need not contain 80 contact hours of training in these subject areas, but these subjects should receive equal emphasis with other subjects considered in the requalification program.

II.B.4: Shift technical advisors (STAs) and operating personnel (licensed and non-licensed) from the plant manager through the operations chain to the licensed operators shall receive training on the use of installed systems to control or mitigate accidents in which the core is severely damaged (similar to I.A.2.1.4). Managers and technicians in the Instrumentation and Control (I&C), health physics (H.P.) and chemistry departments should receive training commensurate with their responsibilities.

EVALUATION

I.A.2.1: Immediate Upgrading of Reactor Operator and Senior Reactor Operator Training and Qualification

Enclosure 1 to Denton's March 28, 1980 letter - Item A.2.C(1):

This NRC guideline specifies that the initial training programs for Reactor Operator (RO) and Senior Reactor Operator (SRO) candidates cover the subjects of heat transfer, fluid flow and thermodynamics at a level specified in Enclosure 2 of Denton's letter. In order to determine the extent of the licensee's compliance with this objective, Region V licensing representatives held discussions with the licensee's training supervisor, and other plant personnel, at the Trojan site on October 20 and 21, 1982. The content of the licensee's RO and SRO initial training programs was evaluated against the following program recommended in Enclosure 2 to Denton's March 28, 1980 letter:

1. Basic Properties of Fluids and Matter
2. Fluid Statics
3. Fluid Dynamics
4. Heat Transfer by Conduction, Convection and Radiation
5. Change of Phase-Boiling
6. Burnout and Flow Instability
7. Reactor Heat Transfer Limits

In each of the above subject areas 1-7, the licensee's program was reviewed for content and length of training. The licensee's training program adequately addressed all fundamentals, characteristics, concepts and applications suggested in Enclosure 2 to Denton's letter regarding heat transfer, fluid flow and thermodynamics. For these subject areas, the licensee indicated that the initial training program consisted of 21 contact hours, considering the time spent on studying, testing and review. Acceptability of the length of training is addressed later in this SER.

Enclosure 1 to Denton's March 28, 1980 letter - Item A.2.C(2):

This NRC guideline specifies that the initial training given to RO and SRO candidates should include the subject of accident mitigation, at a level of detail consistent with Enclosure 3 of Denton's letter. While visiting the Trojan site, Region V licensing personnel reviewed the accident mitigation portion of the licensee's initial training program against the following suggested course content of Enclosure 3:

1. Incore Instrumentation
2. Excore Nuclear Instrumentation
3. Vital Instrumentation
4. Primary System Chemistry
5. Radiation Monitoring
6. Gas Generation

In each of the above subject areas 1-6, the licensee's training program was reviewed for content and length of training. The licensee's program adequately addressed all characteristics, methodology, concepts and applications specified in Enclosure 3 to Denton's letter regarding mitigation of core damage. For these subject areas, the licensee indicated that the initial training program consisted of 48.5 contact hours (considering the time spent on studying, testing and review), rather than the 21.5 hour figure indicated in the enclosed TER.

As indicated earlier, about 80 contact hours of training in mitigation of core damage, thermodynamics, fluid flow and heat transfer are specified to be included in the RO and SRO initial training program. As discussed above, the licensee's initial training program consists of approximately 70 (21 + 48.5) contact hours in these subject areas.

In evaluating the acceptability of the length of the licensee's initial training program in these subject areas, additional factors were considered. The "about 80 contact hour" criterion represents the amount of initial training that is recommended for untrained, inexperienced candidates that have little or no formal college level education in engineering subjects. During discussions with the licensee at the Trojan facility, the licensee stated that PGE's hiring policy requires all reactor operator candidates to have previous Navy nuclear experience, or to be graduates of the Memphis State University reactor operator training program.

The Navy nuclear training program for enlisted personnel consists of 80¹⁾ contact hours of heat transfer, fluid flow and thermodynamics. For Naval officers, the program contains 85¹⁾ contact hours.

The Memphis State University program contains about 60 contact hours of instruction in these subject areas as can be approximated from the following table.

Memphis State University Program

	<u>Semester Units</u>	<u>Contact Hours</u>
Physics, Mechanics, Thermodynamics Heat Transfer	4	60
Electricity, Fluid Mechanics	4	60
Nuclear Physics	3	45
Reactor Physics	3	45
Chemistry and Materials of Construction	3	45
Radiation Protection	4	60
Instrumentation	3	45

1) American Council on Education, Handbook to the Guide to the Evaluation of Educational Experiences in the Armed Services, September 1981

In all cases, the 70 hours of contact training in these subjects at Trojan is in addition to the Navy or University training. Accordingly, the licensee's initial training program for ROs and SROs in the area of mitigating core damage, heat transfer, fluid flow and thermodynamics meets or exceeds NRC criteria for length of training and is therefore acceptable.

Enclosure 1 to Denton's March 28, 1980 letter, Item C.1

This NRC guideline specifies that licensed operator requalification programs should include instruction in mitigating core damage, heat transfer, fluid flow and thermodynamics. As indicated in D. G. Eisenhut's September 13, 1982 memo to the Directors, Regions I-V, the requalification program need not contain 80 contact hours of training in these subject areas, but the subjects should be equally emphasized with other subjects considered in the requalification program. At the October meeting with the licensee, PGE indicated that the requalification program contained about 20 contact hours of training in the above subject areas plus 25 contact hours of simulator time. Accordingly, the staff has determined that the above subject areas have been adequately addressed in PGE's licensed operator requalification program.

II.B.4: Training for Mitigating Core Damage

This NRC guideline, while similar to I.A.2.1.4, specifies that both licensed and non-licensed operating personnel, from the plant manager to licensed operators (including STAs), receive training for mitigating core damage. Additionally, managers and technicians in the I&C, H.P., and chemistry departments should receive training commensurate with their responsibilities.

As previously discussed, the training in this subject area for licensed personnel is acceptable. As for non-licensed operating personnel at Trojan, in the plant manager to RO chain, all receive training in mitigating core damage, according to the licensee. Supervisors and technicians in the I&C, H.P. and chemistry departments routinely perform functions that would be used to assess and mitigate core damage. Training in Plant Emergency Procedures and special techniques related to the mitigation of core damage is also conducted. Accordingly, the staff has determined that the training program for non-licensed operating personnel, in the subject of mitigation of core damage, is acceptable.

CONCLUSION

We have concluded, based on the considerations discussed above, that PGE's training program satisfies all staff criteria for items I.A.2.1.4 and II.B.4.

Dated: November 12, 1982

Attachment: SAI Technical
Evaluation Report

Principal Contributors: M. Padovan, NRC Reg. V
G. Zwetzig, NRC Reg. V