

TECHNICAL EVALUATION REPORT
IMPROVEMENTS IN TRAINING AND
REQUALIFICATION PROGRAMS AS REQUIRED BY
TMI ACTION ITEMS I.A.2.1 AND II.B.4

for the
James A. FitzPatrick Nuclear Power Plant
(Docket 50-333)

August 25, 1982

Prepared By:

Science Applications, Inc.
1710 Goodridge Drive
McLean, Virginia 22102

Prepared for:

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

XA Copy Has Been Sent to PDR

Contract NRC-03-82-096

PDR

8208310344 15pp.

XA



TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
I.	INTRODUCTION.	1
II.	SCOPE AND CONTENT OF THE EVALUATION	1
	A. I.A.2.1: Immediate Upgrading of RO and SRO Training and Qualifications	1
	B. II.B.4: Training for Mitigating Core Damage. .	6
III.	LICENSEE SUBMITTALS	7
IV.	EVALUATION.	9
	A. I.A.2.1: Immediate Upgrading of RO and SRO Training and Qualifications	9
	B. II.B.4: Training for Mitigating Core Damage. .	12
V.	CONCLUSIONS	12
VI.	REFERENCES.	13

I. INTRODUCTION

Science Applications, Inc. (SAI), as technical assistance contractor to the U.S. Nuclear Regulatory Commission, has evaluated the response by the Power Authority of the State of New York for the James A. FitzPatrick Nuclear Power Plant (Docket 50-333) to certain requirements contained in post-TMI Action Items I.A.2.1, Immediate Upgrading of Reactor Operator and Senior Reactor Operator Training and Qualifications, and II.B.4, Training for Mitigating Core Damage. These requirements were set forth in NUREG-0660 (Reference 1) and were subsequently clarified in NUREG-0737 (Reference 2).*

The purpose of the evaluation was to determine whether the licensee's operator training and requalification programs satisfy the requirements. The evaluation pertains to Technical Assignment Control (TAC) System numbers 44161 (NUREG-0737, I.A.2.1.4) and 44511 (NUREG-0737, II.B.4.1). As delineated below, the evaluation covers on some aspects of item I.A.2.1.4.

The detailed evaluation of the licensee's submittals is presented in Section IV; the conclusions are in Section V.

II. SCOPE AND CONTENT OF THE EVALUATION

A. I.A.2.1: Immediate Upgrading of RO and SRO Training and Qualifications

The clarification of TMI Action Item I.A.2.1 in NUREG-0737 incorporates a letter and four enclosures, dated March 28, 1980, from Harold R. Denton, Director, Office of Nuclear Reactor Regulation, USNRC, to all power reactor applicants and licensees, concerning qualifications of reactor operators (hereafter referred to as Denton's letter). This letter and enclosures imposes a number of training requirements on power reactor licensees. This evaluation specifically addressed a subset of the requirements stated in Enclosure 1 of Denton's letter, namely: Item A.2.c, which relates to operator training requirements; item A.2.e, which concerns instructor requalification; and Section C, which addresses operator requalification. Some of these requirements are elaborated in Enclosures 2, 3, and 4 of Denton's letter. The training requirements under evaluation are summarized in Figure 1. The elaborations of these requirements in Enclosures 2, 3 and 4 of Denton's letter are shown respectively in Figures 2, 3 and 4.

As noted in Figure 1, Enclosures 2 and 3 indicate minimum requirements concerning course content in their respective areas. In addition, the Operator Licensing Branch in NRC has taken the position (Reference 3) that the training in mitigating core damage and related subjects should consist

*Enclosure 1 of NUREG-0737 and NRC's Technical Assistance Control System distinguish four sub-actions within I.A.2.1 and two sub-actions within II.B.4. These subdivisions are not carried forward to the actual presentation of the requirements in Enclosure 3 of NUREG-0737. If they had been, the items of concern here would be contained in I.A.2.1.4 and II.B.4.1.

Figure 1. Training Requirements from TMI Action Item I.A.2.1*

Program Element	NRC Requirements**
OPERATIONS PERSONNEL TRAINING	<p>Enclosure 1, Item A.2.c(1) Training programs shall be modified, as necessary, to provide training in heat transfer, fluid flow and thermodynamics. (Enclosure 2 provides guidelines for the minimum content of such training.)</p> <p>Enclosure 1, Item A.2.c(2) Training programs shall be modified, as necessary to provide training in the use of installed plant systems to control or mitigate an accident in which the core is severely damaged. (Enclosure 3 provides guidelines for the minimum content of such training.)</p> <p>Enclosure 1, Item A.2.c.(3) Training programs shall be modified, as necessary to provide increased emphasis on reactor and plant transients.</p>
INSTRUCTOR REQUALIFICATION	<p>Enclosure 1, Item A.2.e Instructors shall be enrolled in appropriate requalification programs to assure they are cognizant of current operating history, problems, and changes to procedures and administrative limitations.</p>
PERSONNEL REQUALIFICATION	<p>Enclosure 1, Item C.1 Content of the licensed operator requalification programs shall be modified to include instruction in heat transfer, fluid flow, thermodynamics, and mitigation of accidents involving a degraded core. (Enclosures 2 and 3 provide guidelines for the minimum content of such training.)</p> <p>Enclosure 1, Item C.2 The criteria for requiring a licensed individual to participate in accelerated requalification shall be modified to be consistent with the new passing grade for issuance of a license: 80% overall and 70% each category.</p> <p>Enclosure 1, Item C.3 Programs should be modified to require the control manipulations listed in Enclosure 4. Normal control manipulations, such as plant or reactor startups, must be performed. Control manipulations during abnormal or emergency operations must be walked through with, and evaluated by, a member of the training staff at a minimum. An appropriate simulator may be used to satisfy the requirements for control manipulations.</p>

*The requirements shown are a subset of those contained in Item I.A.2.1.

**References to Enclosures are to Denton's letter of March 28, 1980, which is contained in the clarification of Item I.A.2.1 in NUREG-0737.

Figure 2. Enclosure 2 from Denton's Letter

TRAINING IN HEAT TRANSFER, FLUID FLOW AND THERMODYNAMICS

1. Basic Properties of Fluids and Matter.

This section should cover a basic introduction to matter and its properties. This section should include such concepts as temperature measurements and effects, density and its effects, specific weight, buoyancy, viscosity and other properties of fluids. A working knowledge of steam tables should also be included. Energy movement should be discussed including such fundamentals as heat exchange, specific heat, latent heat of vaporization and sensible heat.

2. Fluid Statics.

This section should cover the pressure, temperature and volume effects on fluids. Example of these parametric changes should be illustrated by the instructor and related calculations should be performed by the students and discussed in the training sessions. Causes and effects of pressure and temperature changes in the various components and systems should be discussed in the training sessions. Causes and effects of pressure and temperature changes in the various components and systems should be discussed as applicable to the facility with particular emphasis on safety significant features. The characteristics of force and pressure, pressure in liquids at rest, principles of hydraulics, saturation pressure and temperature and subcooling should also be included.

3. Fluid Dynamics.

This section should cover the flow of fluids and such concepts as Bernoulli's principle, energy in moving fluids, flow measure theory and devices and pressure losses due to friction and orificing. Other concepts and terms to be discussed in this section are NPSH, carry over, carry under, kinetic energy, head-loss relationships and two phase flow fundamentals. Practical applications relating to the reactor coolant system and steam generators should also be included.

4. Heat Transfer by Conduction, Convection and Radiation.

This section should cover the fundamentals of heat transfer by conduction. This section should include discussions on such concepts and terms as specific heat, heat flux and atomic action. Heat transfer characteristics of fuel rods and heat exchangers should be included in this section.

This section should cover the fundamentals of heat transfer by convection. Natural and forced circulation should be discussed as applicable to the various systems at the facility. The convection current patterns created by expanding fluids in a confined area should be included in this section. Heat transport and fluid flow reductions or stoppage should be discussed due to steam and/or noncondensable gas formation during normal and accident conditions.

This section should cover the fundamentals of heat transfer by thermal radiation in the form of radiant energy. The electromagnetic energy emitted by a body as a result of its temperature should be discussed and illustrated by the use of equations and sample calculations. Comparisons should be made of a black body absorber and a white body emitter.

5. Change of Phase - Boiling.

This section should include descriptions of the state of matter, their inherent characteristics and thermodynamic properties such as enthalpy and entropy. Calculations should be performed involving steam quality and void fraction properties. The types of boiling should be discussed as applicable to the facility during normal evolutions and accident conditions.

6. Burnout and Flow Instability.

This section should cover descriptions and mechanisms for calculating such terms as critical flux, critical power, DNB ratio and hot channel factors. This section should also include instructions for preventing and monitoring for clad or fuel damage and flow instabilities. Sample calculations should be illustrated by the instructor and calculations should be performed by the students and discussed in the training sessions. Methods and procedures for using the plant computer to determine quantitative values of various factors during plant operation and plant heat balance determinations should also be covered in this section.

7. Reactor Heat Transfer Limits.

This section should include a discussion of heat transfer limits by examining fuel rod and reactor design and limitations. The basis for the limits should be covered in this section along with recommended methods to ensure that limits are not approached or exceeded. This section should cover discussions of peaking factors, radial and axial power distributions and changes of these factors due to the influence of other variables such as moderator temperature, xenon and control rod position.

Figure 4. Control Manipulations Listed in Enclosure 4.

CONTROL MANIPULATIONS

- *1. Plant or reactor startups to include a range that reactivity feedback from nuclear heat addition is noticeable and heatup rate is established.
2. Plant shutdown.
- *3. Manual control of steam generators and/or feedwater during startup and shutdown.
4. Boration and or dilution during power operation.
- *5. Any significant (greater than 10%) power changes in manual rod control or recirculation flow.
6. Any reactor power change of 10% or greater where load change is performed with load limit control or where flux, temperature, or speed control is on manual (for HTGR).
- *7. Loss of coolant including:
 1. significant PWR steam generator leaks
 2. inside and outside primary containment
 3. large and small, including leak-rate determination
 4. saturated Reactor Coolant response (PWR).
8. Loss of instrument air (if simulated plant specific).
9. Loss of electrical power (and/or degraded power sources).
- *10. Loss of core coolant flow/natural circulation.
11. Loss of condenser vacuum.
12. Loss of service water if required for safety.
13. Loss of shutdown cooling.
14. Loss of component cooling system or cooling to an individual component.
15. Loss of normal feedwater or normal feedwater system failure.
- *16. Loss of all feedwater (normal and emergency).
17. Loss of protective system channel.
18. Mispositioned control rod or rods (or rod drops).
19. Inability to drive control rods.
20. Conditions requiring use of emergency boration or standby liquid control system.
21. Fuel cladding failure or high activity in reactor coolant or offgas.
22. Turbine or generator trip.
23. Malfunction of automatic control system(s) which affect reactivity.
24. Malfunction of reactor coolant pressure/volume control system.
25. Reactor trip.*
26. Main steam line break (inside or outside containment).
27. Nuclear instrumentation failure(s).

* Starred items to be performed annually, all others biennially.

of at least 80 contact hours* in both the initial training and the requalification programs. The NRC considers thermodynamics, fluid flow and heat transfer to be related subjects, so the 80-hour requirement applies to the combined subject areas of Enclosures 2 and 3. The 80 contact hour criterion is not intended to be applied rigidly; rather, its purpose is to provide greater assurance of adequate course content when the licensee's training courses are not described in detail.

Since the licensees generally have their own unique course outlines, adequacy of response to these requirements necessarily depends only on whether it is at a level of detail comparable to that specified in the enclosures (and consistent with the 80 contact hour requirement) and whether it can reasonably be concluded from the licensee's description of his training material that the items in the enclosures are covered.

The Institute of Nuclear Power Operations (INPO) has developed its own guidelines for training in the subject areas of Enclosures 2 and 3. These guidelines, given in References 4 and 5, were developed in response to the same requirements and are more than adequate, i.e., training programs based specifically on the complete INPO documents are expected to satisfy all the requirements pertaining to training material which are addressed in this evaluation.

The licensee's response concerning increased emphasis on transients is considered by SAI to be acceptable if it makes explicit reference to increased emphasis on transients and gives some indication of the nature of the increase, or, if it addresses both normal and abnormal transients (without necessarily indicating an increase in emphasis) and the requalification program satisfies the requirements for control manipulations, Enclosure 1, Item C.3. The latter requirement calls for all the manipulations listed in Enclosure 4 (Figure 4 in this report) to be performed, at the frequency indicated, unless they are specifically not applicable to the licensee's type of reactor(s). Some of these manipulations may be performed on a simulator. Personnel with senior licenses may be credited with these activities if they direct or evaluate control manipulations as they are performed by others. Although these manipulations are acceptable for meeting the reactivity control manipulations required by Appendix A paragraph 3.a of 10 CFR 55, the requirements of Enclosure 4 are more demanding. Enclosure 4 requires about 32 specific manipulations over a two-year cycle while 10 CFR 55 Appendix A requires only 10 manipulations over a two-year cycle.

B. II.B.4: Training for Mitigating Core Damage

Item II.B.4 in NUREG-0737 requires that "shift technical advisors and operating personnel from the plant manager through the operations chain to the licensed operators" receive training on the use of installed systems to control or mitigate accidents in which the core is severely damaged.

*A contact hour 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. This definition is taken from Reference 4.

Enclosure 3 of Denton's letter provides guidance on the content of this training. "Plant Manager" is here taken to mean the highest ranking manager at the plant site.

For licensed personnel, this training would be redundant in that it is also required, by I.A.2.1, in the operator requalification program. However, II.B.4 applies also to operations personnel who are not licensed and are not candidates for licenses. This may include one or more of the highest levels of management at the plant. These non-licensed personnel are not explicitly required to have training in heat transfer, fluid flow and thermodynamics and are therefore not obligated for the full 80 contact hours of training in mitigating core damage and related subjects.

Some non-operating personnel, notably managers and technicians in instrumentation and control, health physics and chemistry departments, are supposed to receive those portions of the training which are commensurate with their responsibilities. Since this imposes no additional demands on the program itself, we do not address it in this evaluation. It would be appropriate for resident inspectors to verify that non-operating personnel receive the proper training.

* * * * *

The required implementation dates for all items have passed. Hence, this evaluation did not address the dates of implementation. Moreover, the evaluation does not cover training program modifications that might have been made for other reasons subsequent to the response to Denton's letter.

III. LICENSEE SUBMITTALS

The licensee (Power Authority of the State of New York) has submitted to NRC a number of items (letters and various attachments) which explain their training and requalification programs. These submittals, made in response to Denton's letter, form the information base for this evaluation. For the James A. FitzPatrick Nuclear Power Plant, there were six submittals with attachments, for a total of 14 items, which are listed below. Submittal six and the attachments thereto was in response to the NRC request for additional information (Reference 6).

1. "Licensed Operator/Senior Operator Replacement Training", indoctrination & Training Procedure No. 4, Power Authority of the State of New York, J.A. Fitzpatrick Nuclear Power Plant, Revision 2. August 8, 1980. (20 pp).
2. Letter from J.P. Bayne, Sr. Vice President, Nuclear Generation, Power Authority of the State of New York, to T.A. Ippolito, Chief of Operating Reactors Branch #2, Division of Licensing, NRC. April 10, 1981. (3 pp). NRC Acc No: 8104170323. (re: Activities concerning Post TMI Requirements).

3. I & E Report No. 50-333/81-09, Office of Inspection and Enforcement, NRC. Approved by H.B. Kister, Chief of Reactor Projects Section No. 1C, May 27, 1981. (No. of pages, unknown). NRC Acc No: 8106180346. (re: Status of licensee action concerning TMI Action Plan).
4. Letter from J.P. Bayne, Sr. Vice President, Nuclear Generation, Power Authority of the State of New York, to T.A. Ippolito, Chief of Operating Reactors Branch #2, Division of Licensing, NRC. January 8, 1981. (2 pp, with enclosure). NRC Acc No: 8101160441. (re: Status report on the implementation of NUREG-0737, Items II.B.4).
5. Letter from J.P. Bayne, Sr. Vice President, Nuclear Generation, Power Authority of the State of New York, to T.A. Ippolito, Chief of Operating Reactors Branch #2, Division of Licensing, NRC. March 13, 1981. (4 pp). NRC Acc No: 8103190496. (re: Request for extension of the Training Program for Mitigating Core Damage).
6. Letter from J. P. Bayne, Sr. Vice President, Nuclear Generation, Power Authority of the State of New York, to D.B. Vassallo, Chief of Operating Reactors Branch #2, Division of Licensing, NRC. July 1, 1982. (1 pg, with enclosures: items 7,8,9,10,11,12,13,14). (re: Transmittal, response to NRC's RAI dated May 20, 1982).
7. "Response to NRC May 20, 1982 Request for Additional Information Regarding NUREG-0737, Items I.A.2.1 & II.B.4", J.A. Fitzpatrick Nuclear Power Plant, Power Authority of the State of New York. July 1, 1982. (5 pp, attached to item 6).
8. "Licensed Operator Requalification", Indoctrination & Training Procedure No. 5, Rev. 4, J.A. Fitzpatrick Nuclear Power Plant, Power Authority of the State of New York. August 7, 1980. (25 pp, attached to item 6).
9. "Plant Staff Organization", Fig. 6.2-1. Undated. (1 pg, attached to item 6).
10. "Heat Transfer Lesson Plan", Rev. 1. April 1, 1982. (41 pp, attached to item 6).
11. "Fluid Flow Statics & Dynamics Lesson Plan". Undated. (2 pp, attached to item 6).
12. "Elementary Thermodynamics Lesson Plan". Undated. (3 pp, attached to item 6).

13. "Requalification Training Report, Mitigating Reactor Core Damage". Undated. (2 pp, attached to item 6).
14. "Selected Course Schedules for Replacement License Training". Undated. (3 pp, attached to item 6).

IV. EVALUATION

SAI's evaluation of the training programs at the Power Authority of the State of New York's James A. FitzPatrick Nuclear Power Plant is presented below. Section A addresses TMI Action Item I.A.2.1 and presents the assessment organized in the manner of Figure 1. Section B addresses TMI Action Item II.B.4.

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

Enclosure 1, Item A.2.c(1)

The basic requirements are that the training programs given to reactor operator and senior reactor operator candidates cover the subjects of heat transfer, fluid flow and thermodynamics at the level of detail specified in Enclosure 2 of Denton's letter.

Submittal item 1, "Licensed Operator/Senior Operator Replacement Training" August 8, 1980, states classroom technical training consists of a minimum of 500 hours of formal instruction and is composed of 14 topical areas which include heat transfer, fluid flow and thermodynamics, but no further details.

Submittal item 10, "Heat Transfer Lesson Plan" Revision 1, April 1, 1982, is very detailed, consisting of 23 pages and 14 figures. Submittal item 11, "Fluid Flow Statistics and Dynamics Lesson Plan" consists of three pages and submittal item 12, "Elementary Thermodynamics Lesson Plan" consists of four detailed pages.

Submittal item 7, in response to the NRC request for additional information (Reference 6) indicated 120 contact training hours are devoted to the subject of thermodynamics, heat transfer and fluids. Examination of the aforementioned submittal items indicate the requirements of Enclosure 2 of Denton's letter are fulfilled.

Enclosure 1, Item A.2.c(2)

The requirements are that the training programs for reactor and senior reactor operator candidates cover the subject of accident mitigation at the level of detail specified in Enclosure 3 of Denton's letter (see Figure 3 of this report).

Submittal item 1 indicates that 500 classroom hours are devoted to some 14 operator-training topical subjects. Use of installed plant systems to mitigate accidents involving a severely damaged core is included in the subject training program, but no further details are provided.

Submittal item 7, states: "Initial Training in Accident Mitigation - 32 hours. Mitigation concepts are incorporated into existing lesson plans".

Submittal item 14, "Selected Course Schedules for Replacement License Training" includes a course outline for Mitigating Core Damage which essentially addresses the topics specified in Enclosure 3 of Centon's letter.

While more details would be reassuring it appears reasonable to conclude that the requirements of this Enclosure 1 item are satisfied.

Enclosure 1, Item A.2.c(3)

The requirement is that there be an increased emphasis in the training program on dealing with reactor transients.

Submittal item 1 includes in its list of subjects presented during the course of formal classroom training, Reactor and Plant Transients, but no further details are provided.

Submittal item 7 states: "Training for license candidates in the areas of operational transients and accident analysis is done in a three step process:

- a. Introduction to Emergency Core Cooling Systems (during system training).
- b. Introduction to Transient Analysis (during final review phase).
- c. Normal and abnormal event analysis as outlined in the FSAR and General Electric's Abnormal Events Analysis text".

Submittal item 14 contains the outline for a 40 hour classroom course titled, "Transient and Accident Analysis".

In view of the foregoing it is concluded that sufficient emphasis is provided in training for dealing with reactor transients.

Enclosure 1, Item A.2.e

The requirement is that instructors for reactor operator training programs be enrolled in appropriate requalification programs to assure they are cognizant of current operating history, problems and changes to procedures and administrative limitations.

Submittal item 8, "Licensed Operator Requalification" Section 5.5 indicates that the topics: current operating history, problems and changes to procedures and administrative limitations are included in the program. Section 5.5.12 of this submittal item states: "Licensed facility instructor shall complete the requirements of the licensed operator requalification program. Non-licensed (i.e.: "certified") instructors shall participate in this program to the extent required to assure that they are cognizant of

current operating history problems, changes to procedures and administrative limitations". The requirement of this Enclosure 1 item is met.

Enclosure 1, Item C.1

The primary requirement is that the requalification programs have instruction in the areas of heat transfer, fluid flow, thermodynamics and accident mitigation. The level of detail required in the requalification program is that of Enclosures 2 and 3 of Denton's letter. In addition, these instructions must involve an adequate number of contact hours.

Submittal item 8, section 5.5 indicates that there is training/retraining in the subjects of heat transfer, fluid flow, thermodynamics and core damage mitigation but provides no further details.

Submittal item 7, "Response to the NRC request for additional information" (Reference 6): The licensee obviously misinterpreted the RAI question relating to this Enclosure 1, item C.1 in that it thought that 80 contact training hours were required for each subject area, i.e., 80 hours for heat transfer, 80 hours for fluid flow, 80 hours for thermodynamics and 80 hours for accident mitigation. The response therefore, was in the negative. It was indicated that about 64 contact hours were devoted to accident mitigation and related subjects. Despite the confusion, no indications were found that more than the 64 contact hours mentioned were provided in these subjects in the requalification program. Therefore, while the course content satisfies the requirements of the Denton letter, the 80 contact hour criterion is not satisfied and the requirements of this Enclosure 1 item are not fully met.

Enclosure 1, Item C.2

The requirement for licensed operators to participate in the accelerated requalification program must be based on passing scores of 80% overall, 70% in each category.

Submittal item 8, Section 5.5.10d and 5.5.10e state this requirement as standard procedure and therefore conform with this Enclosure 1 item.

Enclosure 1, Item C.3

TMI Action Item I.A.2.1 calls for the licensed operator requalification program to include performance of control manipulations involving both normal and abnormal situations. The specific manipulations required and their performance frequency are identified in Enclosure 4 of the Denton letter (see Figure 4 of this report).

Submittal item 8, Section 5.5.7b indicates that all licensed personnel shall participate in control manipulations involving reactivity changes or abnormal conditions to demonstrate their skill and familiarity with control systems. As a minimum, abnormal control manipulations must be walked through and evaluated by a member of the training staff. In addition, a control room simulator may be used to satisfy the requirements for abnormal control manipulations provided the control arrangements on the simulator permit effective use of the plants special emergency procedures. Sections 5.5.7b and 5.5.7e list the manipulations required (annually and

biennially) which not only conform to those in Enclosure 4 of Denton's letter but exceed those requirements in total number in that the FitzPatrick Plant requires 36 manipulations. The requirements of this Enclosure 1 item are indeed fulfilled.

B. II.B.4 Training for Mitigating Core Damage

Item II.B.4 requires that training for mitigating core damage, as indicated in Enclosure 3 of Denton's letter, be given to shift technical advisors and operating personnel from the plant manager to the licensed operators. This includes both licensed and non-licensed personnel.

The requirements of TMI Action Items I.A.2.1 under Enclosure 1, item C.1 have not been met; therefore while the requirements of II.B.4 have been met in connection with course content, sufficient numbers of contact training hours have not been provided for licensed personnel.

Submittal item 7 provides the following additional information. Lectures on the subject of mitigating the consequences of severe core damage have been given to the following personnel: Resident Manager, Superintendent of Power, Technical Services Superintendent, Shift Technical Advisor, Radiological & Environmental Services Superintendent, Operations Superintendent, Maintenance Superintendent, Instrument and Control Superintendent, Reactor Analyst Supervisor, all staff licensed personnel, all station Shift Supervisors (SRO), all Senior Nuclear Operators (RO), and all Nuclear Control Operators (RO). The above listing indicates the final criterion associated with II.B.4 has been met.

V. CONCLUSIONS

Upon completion of the item evaluations contained in Section IV, SAI concludes the training program of the Power Authority of the State of New York, James A. FitzPatrick Nuclear Plant fails to fully satisfy the requirements of the TMI Action items I.A.2.1 and II.B.4. A deficiency occurs in satisfying I.A.2.1 in that the licensee's requalification program falls about 20% short of the 80 contact hours required to be devoted to accident mitigation with core damage and related subjects. The same deficiency applies to II.B.4 for licensed operating personnel.

VI. REFERENCES

1. "NRC Action Plan Developed as a Result of the TMI-2 Accident." NUREG-0650, United States Nuclear Regulatory Commission. May 1980.
2. "Clarification of TMI Action Plan Requirements," NUREG-0737, United States Nuclear Regulatory Commission. November 1980.
3. The NRC requirement for 80 contact hours is an Operator Licensing Branch technical position. It was included with the acceptance criteria provided by NRC to SAI for use in the present evaluation. See letter, Harley Silver, Technical Assistance Program Management Group, Division of Licensing, USNRC to Bryce Johnson, Program Manager, Science Applications, Inc., Subject: Contract No. NRC-03-82-096, Final Work Assignment 2, December 23, 1981.
4. "Guidelines for Heat Transfer, Fluid Flow and Thermodynamics Instruction," STG-02, The Institute of Nuclear Power Operations. December 12, 1980.
5. "Guidelines for Training to Recognize and Mitigate the Consequences of Core Damage," STG-01, The Institute of Nuclear Power Operations. January 15, 1981.
6. Request for additional information from the NRC sent to the Power Authority of the State of New York, May 20, 1982.