SAI-186-029-39

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

Vermont Yankee Nuclear Power Station

(Docket 50-271)

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TABLE OF CONTENTS

I. INTRODUCTION

Science Applications, Inc. (SAI), as technical assistance contractor to the U.S. Nuclear Regulatory Commission, has evaluated the response by Vermont Yankee Nuclear Power Corporation for the Vermont Yankee Nuclear Power Station (Docket 50-271) to certain requirements contained in post-TMI Action Items I.A.2.1, Immediate Upgrading of Reactor Operator and Senior Reactor Operator Training and Qualification, 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 44206 (NUREG-0737, I.A.2.1.4) and 44556 (NUREG-0737, II.B.4.1). As delineated below, the evaluation covers only 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

*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	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.) 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.) Enclosure 1, Item A.2.c.(3) Training programs shall be modified, as necessary to provide increased emphasis on reactor and plant transients.
INSTRUCTOR REQUALIFICATION	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.
PERSONNEL REQUALIFICATION	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.) 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. 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.

*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 conductions. 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 noncondensible 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 3. Enclosure 3 from Denton's Letter

TRAINING CRITERIA FOR MITIGATING CORE DAMAGE

A. Incore Instrumentation

1. Use of fixed or movable incore detectors to determine extent of core damage and geometry changes.

2. Use of thermocouples in determining peak temperatures; methods for extended range readings; methods for direct readings at terminal junctions.

3. Methods for calling up (printing) incore data from the plant computer.

B. Excore Nuclear Instrumentation (NIS)

1. Use of NIS for determination of void formation; void location basis for NIS response as a function of core temperatures and density changes.

C. Vital Instrumentation

1. Instrumentation response in an accident environment; failure sequence (time to failure, method of failure); indication reliability (actual vs indicated level).

2. Alternative methods for measuring flows, pressures, levels, and temperatures.

   a. Determination of pressurizer level if all level transmitters fail.

   b. Determination of letdown flow with a clogged filter (low flow).

   c. Determination of other Reactor Coolant System parameters if the primary method of measurement has failed.

D. Primary Chemistry

1. Expected chemistry results with severe core damage; consequences of transferring small quantities of liquid outside containment; importance of using leak tight systems.

2. Expected isotopic breakdown for core damage; for clad damage.

3. Corrosion effects of extended immersion in primary water; time to failure.

E. Radiation Monitoring

1. Response of Process and Area Monitors to severe damages; behavior of detectors when saturated; method for detecting radiation readings by direct measurement at detector output (overranged detector); expected accuracy of detectors at different locations; use of detectors to determine extent of core damage.

2. Methods of determining dose rate inside containment from measurements taken outside containment.

F. Gas Generation

1. Methods of H_2 generation during an accident; other sources of gas (Xe, Ke); techniques for venting or disposal of non-condensibles.

2. H_2 flammability and explosive limit; sources of O_2 in containment or Reactor Coolant System.

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.

the training in mitigating core damage and related subjects should consist 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.

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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 (Vermont Yankee Nuclear Power Corporation) 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 Vermont Yankee Nuclear Power Station, there were 3 submittals with attachments, for a total of 13 items, which are listed below.

1. Letter from M.D. Lyster, Training Supervisor, Vermont Yankee Nuclear Power Corp., to P.F. Collins, Chief of Operator Licensing Branch, NRC. July 29, 1980. (1 pg, with enclosure: items 2 & 3). NRC Acc No: 8008050379.(re: Transmittal, response to NRC letter dated March 28, 1980).

2. "Initial Operator Licensing", Proc. No.: A.P. 0710, Rev. No.: 0. Undated. (3 pp, attached to item 1). NRC Acc No: 8008050382.

3. "Licensed Operator Retraining", Proc. No.: A.P. 0711, Rev. No.: 0. Undated. (6 pp, attached to item 1). NRC Acc No: 8008050385.

4. Letter from L.H. Heider, Vice President, Vermont Yankee Nuclear Power Corporation to Darrell Eisenhut, Director Division of Licensing, NRC. December 15, 1980.

5. Letter from E.W. Jackson, Manager of Operations, Vermont Yankee Nuclear Power Corp., to D.B. Vassallo, Chief of Operating Reactors Branch #2, Division of Licensing, NRC. May 5, 1982.(3 pp, with enclosures: items 6,7,8,9,10,11,12, & 13). NRC Acc No: 8205100180. (re: Response to NRC's RAI dated April 2, 1982).

6. Enclosure 1, "Thermal Hydraulics", Undated. (25 pp, attached to item 5).

7. Enclosure 2, "Heat Transfer", Undated. (34 pp, attached to item 5).

8. Enclosure 3, "Definition of Thermodynamics Terms", Undated. (13 pp, attached to item 5).

9. Enclosure 4, "Fluid Flow & Pressure Drop", Undated. (16 pp, attached to item 5).

10. Enclosure 5, "V. Critical Power", Undated. (15 pp, attached to item 5).

11. Enclosure 6, Untitled, undated.(45 pp, attached to item 5). (re: Topic outlines covered by the Initial Operator Licensing Program & the Licensed Operator Program for control and mitigation of accidents involving core damage).

12. Enclosure 7, Untitled, undated.(2 pp, attached to item 5).(re: Description of Fluid Mechanics, Heat & Thermodynamics courses).

13. Enclosure 8 Untitled, undated.(1 pg, attached to item 5).(re: VERMONT YANKEE Nuclear Power Station organizational chart).

IV. EVALUATION

SAI's evaluation of the training programs at Vermont Yankee Nuclear Power Corporation's Vermont Yankee Nuclear Power Station 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. TMI Action Item I.A.2.1: Upgrading of Reactor Operator and Senior Reactor Operator Training and Requalification Programs.

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.

The training program for the initial licensing of both reactor operators and senior reactor operators is carried out according to procedure A.P. 0710 titled "Initial Operator Licensing" (submittal item 2). In their submittal item 4, the licensee stated that the program described in A.P. 0710 presented the subjects of heat transfer, fluid flow and thermodynamics at a level of detail at least commensurate to Denton's Enclosure 2. Based on this response, it is reasonable to conclude that this aspect of the training program is satisfactory.

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).

The licensee provided in submittal item 5 an outline of their course on the use of installed plant systems which are designed to control and mitigate an accident involving core damage. Reviewing the outline relative to the requirements of Denton's Enclosure 3 shows that while the organization of material is different between the two, it appears to cover the material identified in Enclosure 3. In many cases, the outline contains much more specific material about individual plant components or other systems. From this evaluation of the licensee submitted material, SAI believes that the Vermont Yankee training program meets this requirement.

In submittal item 4, the licensee stated that their training program involved 80 or more contact hours on the use of installed plant systems to control and mitigate an accident and on related subjects such as heat transfer, fluid flow and thermodynamics. This aspect of Vermont Yankee's training program meets the NRC 80-hour criterion.

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.

In submittal item 4, the licensee stated that the Initial Operator Licensing Program contained an increased emphasis on both normal and abnormal (accident) reactor and plant transients. SAI judges that this meets the NRC requirements.

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.

The licensee stated in submittal item 4 that "...training program instructors are routed all material and included in training sessions related to operating history, problems with and changes to procedures and administrative limitations." These actions are the major elements of an instructor requalification program. While SAI feels that the Vermont Yankee instructor requalification program is in compliance with the NRC requirements, we also think that a stronger program would be one which involves a testing program to demonstrate that the instructors are qualified (or requalified).

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.

The licensee's requalification program is outlined in submittal items 5, 6, 7, 8, 9 and 10. These enclosures outline a program which meets the requirements of Enclosures 2 and 3 in Denton's letter. The licensee explicitly states in submittal item 4 that their training in the areas of heat transfer, fluid flow, thermodynamics and accident mitigation involve "at least 40 contact hours" and that "coincident material is covered during training in other subjects so a more precise estimate of contact hours is unavailable."

In obtaining clarification, SAI found that the entire requalification program involves 24 days of instruction (192 hours) and that about one half of this is devoted to areas that SAI feels are related to accident mitigation training. Considering 1) the extent of the requalification program (192 hours), 2) the detailed outlines provided on the instructions relative to heat transfer, fluid flow, thermodynamics and accident mitigation (submittal items 1 through 6) and 3) the judgement that about one half of the requalification program appears to be related to accident mitigation, SAI believes that Vermont Yankee meets the NRC requirements.

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.

The licensee in its submittal item 3 stated that individuals not achieving an overall examination grade of 80% or a grade of 70% on any category will be removed from licensed duties and enrolled in an accelerated training program. This aspect of the program complies with the NRC requirements.

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).

In submittal item 3, the licensee listed control manipulations which are to be performed as part of the requalification program. These manipulations are the same as those identified in Enclosure 4 of Denton's letter with one exception - No. 25 Reactor Trip. In submittal item 4, the licensee stated that in their Appendix B of A.P. 0711, fourteen of the twenty manipulations would result in reactor trip. Since they listed the multiple initiating events which lead to a reactor trip, they saw no need to list the trip by itself. SAI recognizes that reactor trips can occur for which there is no immediately visible cause and that in these situations the operators' response should be very similar to many of the other reactor trips for which the cause is obvious. SAI feels that the Vermont Yankee deletion of this manipulation is not a significant deviation from the requirements of Enclosure 4 and therefore concludes the requirement is met.

B. TMI Action Item 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 Action Item II.B.4 training requirement for licensed personnel is met at Vermont Yankee by implementing the programs described and evaluated for TMI Action Item I.A.2.1. The training of non-licensed personnel at Vermont Yankee was also evaluated.

The requirement is that accident mitigation training be given to non-licensed personnel in the operating chain from the plant manager to the licensed operators and also the shift technical advisors. In submittal item 4 the licensee stated that the accident mitigation training is given to shift technical advisors and licensed personnel through the Operators Superintendent. The licensee also stated that training is not complete for the Plant Manager and Assistant Plant Manager. This information is supplemented by an NRC inspection (Reference 6) which lists personnel who have received the accident mitigation training. These people were: plant manager, assistant plant manager, operations superintendent, technical services superintendent, nuclear safety engineers (STAs), senior reactor operators, reactor operators and operations training department staff. This

information, together with the organization chart (submittal item 13) leads SAI to the conclusion that this requirement is met.

V. CONCLUSION

SAI has evaluated Vermont Yankee Nuclear Power Station for the establishment and content of training and requalification programs which are responsive to the requirements of TMI Action Items I.A.2.1 and II.B.4.

SAI has concluded, based on the evaluation presented in section IV, that Vermont Yankee Nuclear Power Corporation meets the requirements of TMI Action Item I.A.1.2.

For TMI Action Item II.B.4, SAI has concluded that the training requirements for both licensed and non-licensed personnel are met.

VI. REFERENCES

1. "NRC Action Plan Developed as a Result of the TMI-2 Accident." NUREG-0660, 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 position regarding the requirement for 80 contact hours is an informal one. 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. I & E Report No.: 50-271/81-18, Office of Inspection and Enforcement, NRC. Approved by R.M. Gallo, Chief of Reactor Projects Section 1A, Project Branch #1, NRC, 11/20/81. NRC Acc No: 8112080284. (re: Verification and review of the training program concerning NUREG-0737, Item II.B.4.2A/2B.)