SAI-186-029-28

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

Davis-Besse Nuclear Power Station

(Docket 50-346)

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I. INTRODUCTION

Science Applications, Inc. (SAI), as technical assistance contractor to the U.S. Nuclear Regulatory Commission, has evaluated the response by Toledo Edison Company for the Davis-Besse Nuclear Power Station (Docket 50-346) 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 44152 (NUREG-0737, I.A.2.1.4) and 44502 (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 Reactor Operator and Senior Reactor Operator 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	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.

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 (Toledo Edison Company) 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 Davis-Besse plant, there were 3 submittals with attachments, for a total of 9 items, which are listed below.

1. Letter from R.P. Crouse, Vice President, Nuclear, Toledo Edison, to H.R. Denton, Director, NRC. August 4, 1980. (1 pg, with enclosure: item 2). NRC Acc No: 8008120498.(re: Response to NRC letter dated March 29, 1980; Transmittal).

2. Response to Item 2.C. of Enclosure 1 of H.R. Denton's letter dated March 29, 1980; Davis-Besse Nuclear Power Station. Untitled. August 4, 1980. (8 pp, attached to item 1). NRC Acc No: 8008120502. (Notes: Contents include a chart and an overview of the revised training program).

3. Letter from R.P. Crouse, Vice President, Nuclear, Toledo Edison, to J.F. Stolz, Chief of Operating Reactors Branch #4, NRC. July 6, 1981.(1 pg). NRC

Acc No: 8107100037. (re: Activities concerning the development of the training program for mitigating core damage).

4. Letter from R.P. Crouse, Vice President, Nuclear, Toledo Edison, to J.F. Stolz, Chief of Operating Reactors Branch #4, NRC. May 10, 1982. (1 pg, with enclosures: items 5,6,7,8 & 9). NRC Acc No: 8205170322. (re: Response to NRC's RAI).

5. Attachment, Untitled. May 10, 1982. (4 pp, attached to item 4). (re: Response to NRC's questions given in the RAI).

6. "Simulator Training Program Documentation, Training Information Notice" from N.S. Elliott, Manager of Training Services, Babcock & Wilcox. December 8, 1980. (12 pp (includes the Simulator Training Summary Sheet), attached to item 4).

7. "TECO 1981 Requalification Simulator". Undated. (3 pp, attached to item 4).

8. "Operator Training-Degraded Core Recognition and Mitigation; Study Guide", Phase 1, Volume 1, Davis-Besse, Nuclear Power Station. May 1981. (104 pp, attached to item 4). NRC Acc No: 8205170328.

9. "Operator Training-Degraded Core Recognition and Mitigation; Study Guide", Phase 1, Volume 2, Davis-Besse, Nuclear Power Station. June, 1981. (270 pp, attached to item 4).

The last six items were in response to a request for additional information (Reference 5).

IV. EVALUATION

SAI's evaluation of the training programs at Toledo Edison Company's Davis-Besse 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. 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.

In Submittal Item 2 the licensee stated that they had reemphasized the importance of this subject by restructuring the content of the programs dealing with heat transfer, fluid flow and thermodynamics. The licensee explicitly stated that the restructured programs address the needs as outlined in Denton's Enclosure 2. This meets the NRC requirements in this specific area.

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).

In Submittal Item 2, the licensee stated that the training program had been modified to emphasize the installed systems to be used in accident situations. The modification places emphasis on the use of systems in normal, emergency and abnormal modes. About three weeks of training in this area are given and involve both lectures and the use of simulators. A brief listing of the topics covered was provided. The topics covered are:

Potentially damaging operating conditions
Core cooling mechanics
Recognizing core damage
Gas/steam binding effects on core cooling
Hydrogen hazards during severe accidents
Monitoring critical parameters during accident conditions
Radiation hazards and radiation monitoring response
Criteria for operation and cooling mode selection.

In Submittal Item 5 the licensee provided additional details of the training program relative to the use of installed instrumentation. This was supplemented with Submittal Items 8 and 9 which comprise the study guide for the Davis-Besse accident mitigation program. This latter material provides considerable detail on the accident mitigation training at Davis-Besse. It is judged that all the requirements of Enclosure 3 are met.

The instructions in the areas of heat transfer, fluid flow, thermodynamics and accident mitigation is estimated to involve about 280 contact hours based on the information in Submittal Item 2. This far exceeds NRC requirements.

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 2, the licensee stated that an increased emphasis was placed on systems integrated performance. In Submittal Item 5, the licensee elaborated on this issue by identifying both normal and accident initiated transients. The current number of contact hours associated with transient training is estimated to be about 640 hours. This portion of the Davis-Besse training program meets NRC require-ments.

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.

In Submittal Item 1, the licensee stated that all instructors hold or have held a Senior Operator License for Davis-Besse. In Submittal Item 5, additional information was provided to support the licensee's claim that instructors stay cognizant of operating history, problems and changes to procedures and administrative limitations. The licensee stated that the instructors are cognizant because:

- They initiate required readings and lectures.
- They review all licensee event reports, transient assessment reports for Davis-Besse and other B&W units.

These activities, coupled with the normal senior reactor requalification program, appear to be adequate for meeting the NRC requirement.

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 requalification program for the Davis-Besse plant is the same as the initial training program. Because the initial training program meets the requirements for instruction in the areas of heat transfer, fluid flow, thermodynamics and accident mitigation and because the requirements are the same for both the initial training and the requalification program, the requalification program also 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.

In Submittal Item 5, the licensee stated that accelerated requalification is required for all operators who score less than 80% on an overall basis or in any category. This exceeds 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).

Submittal Item 5 states that the B&W simulator is used in performing most of the control manipulations identified in Denton's Enclosure 4. The only noted exception was the 'loss of instrument air' manipulation which is handled on a walk-thru basis. Submittal Item 6, which is used for documentation of the control manipulations, was compared against the required list of Enclosure 4. All the necessary manipulations were found in Submittal Item 6 although no frequency of performance for the manipulations was found. It is assumed, however, that the frequency is compatible with the requirements of Enclosure 4 because the introduction specifically refers to the requirements of Denton's Enclosure 4. (Six of the manipulations must be performed annually, the others biennially.) On this basis it is judged that the Davis-Besse requalification program complies with the requirements of Enclosure 4.

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.

In Submittal Items 2 and 5 the licensee provided information about the accident mitigation training given to licensed personnel in both the initial training and requalification program. This information was analyzed in previous paragraphs and the conclusion was reached that the instruction involved the required topics and number of contact hours.

In Submittal Item 5 the licensee provided some information about the accident mitigation training of shift technical advisors. The information indicates that the shift technical advisor receives instructions and quizzes on accident mitigation subjects the same as licensed personnel. This meets the requirements of Action Item II.B.4 for shift technical advisors. There is however, no indication that non-licensed operating personnel, in this specific case the station superintendent, receives the training as required.

V. CONCLUSIONS

SAI has reviewed the Toledo Edison submittals in order to evaluate the status of the programs at Davis-Besse relative to the requirements of TMI Action Items I.A.2.1 and II.B.4. The evaluation focused primarily on the establishment and content of these programs. Our findings are summarized in the following two paragraphs.

The licensee has provded reasonable assurance that all of the requirements of TMI Action Item I.A.2.1 are met by the training and requalification program at Davis-Besse. We would suggest verification that the control manipulations which are part of the simulator training program are performed with the frequency specified by Denton's Enclosure 4.

SAI has concluded that the requirements of TMI Action Item II.B.4 are only partially met at the Davis-Besse Nuclear Power Station Unit One. The submittal information does not indicate that tne plant manager, in this case the station superintendent, receives the required accident mitigation training. All other aspects of the II.B.4 requirements 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 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. Letter from John F. Stolz, NRC, to Richard P. Crouse, Toledo Edison Co., Subject: NUREG-0737 Items I.A.2.1 and II.B.4 - Request for Additional Information, dated April 5, 1982.