SAI-186-029-07

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

Beaver Valley Power Station

(Docket 50-334)

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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 Duquesne Light Company for the Beaver Valley Power Station (Docket 50-334) 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 44141 (NUREG-0737, I.A.2.1.4) and 44491 (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 (Duquesne Light Co.) 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 Beaver Valley plant, there were 2 submittals with attachments, for a total of 4 items, which are listed below.

1. Letter from J.A. Werling, Station Superintendent, Duquesne Light Co., Beaver Valley Power Station, to P.F. Collins, Chief, Operator Licensing Branch, NRC. September 2, 1980. (1 pg, with enclosure: item 2). NRC Acc No: 8010280438. (Transmittal).

2. "Duquesne Light Co., Beaver Valley Power Station, Operations Training Manual", Rev. 2, approved by J.A. Werling, 08/28/80. Effective date: 09/12/80. (58 pp, attached to item 1). NRC Acc No: 8010280443.

3. Letter from J.J. Carey, Vice President, Nuclear, Duquesne Light Co., Nuclear Division, to S.A. Varga, Chief of Operating Reactors Branch #1,

Division of Licensing, NRC. April 21, 1982. (2 pg, with enclosure: item 4). NRC Acc No:. (re: Response to NRC RAI, March 16, 1982).

4. "Response to RAI, NRC letter dated March 16, 1982", Duquesne Light Co., Beaver Valley Power Station, Unit No. 1. Undated. (7 pp, attached to item 3).

Submittal item 2 describes the basic programs at Beaver Valley, Unit 1. It should be noted that the licensee's training program has two options; Option II is the current program in use and Option I has been retained for auditing purposes only. Submittal item 3 and 4 are the response to a request for additional information made in the course of this evaluation (Reference 6). These submittal items contain details that are not in the original program descriptions and, for purposes of this evaluation, are considered to be an integral part of the licensee's training program description. In submittal item 3, the licensee states that their training programs, described in submittal item 2, are undergoing a revision and the latest revision will be Issue 3. However, it should be noted that this report is based on Issue 2.

The original draft of this report noted several instances where requirements were not met by the licensee. In an attempt to resolve these open items, a conference telephone call among the NRC, SAI and the licensee was arranged by the NRC Project Manager. This call was documented by the Project Manager in the following:

5. "Record of Telephone Conversation - Beaver Valley Unit 1," August 6, 1982, 2:00 p.m. Participants: S. Sovick (DLC), T. Vassallo (DLC), P. Liang (SAI), R. Liner (SAI), P. Tam (NRC).

The subject matter and outcome of this discussion are noted in the evaluations which follow.

IV. EVALUATION

SAI's evaluation of the training programs at Duquesne Light Company's Beaver Valley Power Station, Unit 1, 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.

Duquesne Light Company's original submittal (submittal items 1 and 2) has training lectures titled "Heat Transfer and Fluid Flow", but no course outline for these lectures was provided. Later, the licensee in the

response (submittal items 3 and 4) to the request for additional information (Reference 6) stated that their training programs currently in use have been revised to include heat transfer, fluid flow, and thermodynamics and meet the requirements as identified by NRC and additionally meet those requirements established by INPO. In addition, this training area involves 80 contact hours. Therefore, SAI believes that this requirement is met at Beaver Valley 1.

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 original submittal dated September 2, 1980 listed technical training lectures, titled "Mitigating Core Damage", but no course outline for these lectures was provided. Later, Duquesne Light Company submitted a training program description titled "Mitigating Core Damage". This training program description listed all the six major subtopics in Enclosure 3 of Denton's letter without providing the detailed course content. However, the licensee in submittal item 4 stated that the training program entitled "Mitigating Core Damage" was developed to meet the NRC requirements and that the Denton letter was used as a guide in the development of this program. Therefore, SAI would credit Duquesne Light Company for meeting this requirement at the Beaver Valley 1.

Another requirement relative to accident mitigation training is that approximately 80 contact hours be involved for training in the area of accident mitigation and related subjects. The licensee in submittal item 4 stated that their training for accident mitigation involves approximately 28 contact hours (5 four-hour lectures and 1 eight-hour lecture). These 28 contact hours combined with the 80 contact hours involved, as stated in submittal item 2, in the training areas of heat transfer, fluid flow and thermodynamics, exceeds the 80 contact hours 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.

The Beaver Valley training program appears to contain no increased emphasis in the training area dealing with reactor transients. However, the licensee in submittal item 4 stated that this part of their training program is included in their Mitigating Core Damage Program. SAI has examined the submitted training program description titled "Mitigating Core Damage" and does not believe the Beaver Valley training program meets this requirement.

In the conversation identified earlier as Submittal Item 5, the licensee disagreed with this appraisal and cited IE Inspection Report 81-29 (12/28/81) as supporting his contention. SAI has reviewed this report and found that it does not address the specific issue at hand. Our original conclusion remains.

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 original submittal, dated September 2, 1980, made no statement on this subject matter. Consequently, SAI questioned this in the request for additional information (Reference 6). Later in the response (submittal item 4), the licensee stated that their present requalification program addresses each of these concerns and each licensed instructor attends the requalification program. However, the licensee makes no statement concerning the requalification of non-licensed instructors. Thus, SAI raised this concern during an informal phone conversation among the licensee, the NRC Project Manager, and SAI (prior to that noted as Submittal Item 5). In this conversation, the licensee stated that they have more than six non-licensed instructors and approximately four licensed instructors and that the non-licensed instructors do not go through a requalification program. Therefore, it appeared to SAI that this requirement is not entirely met at Beaver Valley 1.

In the discussion of August 6, 1982 (Submittal Item 5), the licensee indicated his non-licensed instructors taught only fundamental subjects such as mathematics and physics and did not get involved in subjects such as plant operations. Based on this assertion, we believe the licensee meets the intent of the 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 licensee's original submittal (submittal items 1 and 2) has training lectures titled "Principals of Heat Transfer and Fluid Flow" and "Theory of Fluid Thermodynamics", but no course outline for these lectures was provided. Later, the licensee informed the NRC Project Manager that their requalification program has no training in the area of accident mitigation with core damage. Therefore, SAI concludes that this requirement is not met at Beaver Valley 1. Also, SAI notes that the licensee's requalification program has no specific contact hour requirement in these subject areas.

In the discussion of Submittal Item 5, the licensee indicated he did in fact have training in mitigating core damage but that it was not to the level of detail indicated in Denton's Enclosure 3, nor did it involve 80 contact hours. Moreover, the licensee did not feel that Enclosure 3 and 80 contact hours were part of the requirement for his requalification program. We still conclude the licensee does not meet this requirement.

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.

If an operator at Beaver Valley fails to attain an overall average of at least 80 percent, with a minimum of 70 percent in each category in the annual examination, he will be removed from shift duties and will be required to participate in accelerated requalification programs under the direction of the Station Training Supervisor. He will be returned to shift duties after retesting and achieving an overall average of 75 percent, and lectures will be scheduled in these areas in which a grade of less than 80 percent was achieved. Therefore, SAI judges that the Beaver Valley requalification program meets the NRC requirement.

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 2, the licensee listed only nine reactor manipulations. However, the licensee in the later submittal (submittal item 4) stated that their requalification program includes simulator training where all required manipulations are performed. Although the licensee made this claim, the section titled "Simulator Training" in the licensee's requalification program stated that "Some or all of the licensed operators and Senior Operators may participate in simulator training during the requalification program" (emphasis added). This statement implies that not all of the licensed operators are required to take the simulator training. This then implies that not all of them are required to perform the 27 control manipulations specified in Enclosure 4. Furthermore, even for those who do participate in the simulator training, there is no indication that the starred items in Enclosure 4 are to be performed annually, all others biennially. Therefore SAI concluded that the licensee's requalification program does not appear to meet the NRC requirements.

In the August 6, 1982 discussion, the licensee stated that the quoted statement merely meant that the operators may perform the manipulations at the simulator instead of at the plant. He asserted the requalification program did include all the required manipulations and with the necessary frequency. Based on this assertion, we feel it is reasonable to conclude that the licensee meets this requirement.

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 material content in the Mitigating Core Damage training program has been evaluated in item A.2.c(2) and was found satisfactory.

Another requirement relative to accident mitigation training is that approximately 80 contact hours be involved for training in the area of accident mitigation and related subjects for the licensed personnel. The licensee in submittal item 4 stated that their training for accident mitigation with core damage and related training involves the following:

1.	Mitigating Core Damage Program	28 hrs.
2.	Simulator Training	40 hrs.
3.	Emergency Procedure Review, Incident Review - Module 1 - 4	8 - 20 hrs.
4.	Emergency Procedure Review - Module 5	24 hrs.
	Total training directly associated with Accident Mitigation	100 - 112 hrs.

However, SAI feels that items 2, 3, and 4 should not be considered entirely as related training for mitigation of accidents with core damage because these items generally relate to undamaged core condition rather than actual core damage conditions as intended in the requirement. For those licensed personnel who receive this training through the requalification program, SAI estimated 10 contact hours involvement for the related training (Principals of Heat Transfer and Fluid Mechanics" and "Theory of Fluid and Thermodynamics") in the requalification program. This combined with the above Mitigating Core Damage Program gives only a total of 38 contact hours. Therefore, SAI concludes that the 80 contact hours criterion for the licensed personnel is not met at the Beaver Valley 1.

The licensee stated in the call of August 6, 1982 that the II.B.4 requirement had been satisfied and that this could be verified by IE Inspection Report 82-05 (February 22-26, 1982). SAI subsequently reviewed this report. It stated that the inspector had reviewed and confirmed the completion of training for mitigating core damage per II.B.4 and noted that the Beaver Valley Station Training Manual, Issue 3, Sections 2.0 and 9.4 included appropriate training material (this manual was never provided to SAI); the report identified no violations and stated that item II.B.4 was "closed." Subsequently, in a phone conversation of August 17, 1982 among Don Beckman (an NRC inspector involved in the inspection reported in IE Report 82-05), Peter Tam (NRC Project Manager) and Paul Liang (SAI), Mr. Beckman stated that at the time of the inspection, 80 contact hours were not part of the requirement. This leads SAI to adhere to our original conclusion that the licensee has not provided reasonable assurance that the II.B.4 requirement is satisfied with respect to the extent of the training provided.

The section titled "Personnel to be Trained" in the Mitigating Core Damage training program description stated that "Shift Technical Advisors and Operating personnel from the Station Superintendent through the operations chain to the licensed operators shall receive all the training.

operations chain to the licensed operators shall receive all the training. Supervisors and technicians in RadCon, Chemistry, and I&C shall receive training commensurate with their responsibilities" (emphasis added). Given that the licensee made no statement concerning the personnel who have completed the training in this area and no organization chart was submitted, the requirement on personnel to be trained is met only if it can be verified that all the personnel specified above have completed this training. However, in view of the earlier conclusion drawn in the IE report cited above, we conclude the licensee has met the requirement in the case of non-licensed personnel in that they do not require 80 hours of instruction.

V. CONCLUSION

Based on our evaluation as discussed above, SAI concludes that the licensee does not meet all the requirements of NUREG-0737 items I.A.2.1 and II.B.4 because of the following:

I.A.2.1

The requalification program provides neither the appropriate material coverage nor the required 80 contact hours of instruction in mitigation of accidents with core damage. Moreover, the licensee has not acknowledged that the material of Denton's Enclosure 3 is required for this training.

II.B.4

The licensee has provided appropriate instruction in mitigation of accidents with core damage but has not provided the necessary 80 contact hours for licensed personnel.

V. 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. "Licensing Action Request for Additional Information", NRC to J. J. Carey, Duquesne Light Company, 16 March 1982.