ATTACHMENT

TECHNICAL EVALUATION REPORT

TMI ACTION PLAN ITEMS I.A.2.1 AND II.B.4

DRESDEN STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

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This evaluation was performed by Joseph Buzy, Licensee Qualifications Branch, based on licensee input and Region III Inspection Reports prepared by T. Tongue and M. Jordan.

I. INTRODUCTION

The Licensee Qualifications Branch has evaluated the response from Commonwealth Edison (CE) for the Dresden Station, Units 2 and 3 (Docket Nos. 50-237/249) to requirements contained in post-TMI Action Plan Items I.A.2.1, Immediate Upgrading of Reactor Operator and Senior Operator Training and Qualifications and II.B.4, Training for Mitigating Core Damage. These requirements were contained in NUREG-0660 (Reference 1) and were subsequently clarified in NUREG-0737 (Reference 2).* The details of the licensee's submittals and evaluation of the current program are contained in Sections IV and V of this TER.

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 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). That letter and enclosures imposed 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. Some or all of these requirements are also presented in this TER as Figures 2, 3 and 4. The criteria for reactor operator training and licensing were stated in Enclosure 1 of Denton's letter and are summarized in TER Figure 1.

As noted in Figure 1, Enclosures 2 and 3 of Denton's letter indicate minimum requirements concerning course content in their respective areas. In addition, the Operator Licensing Branch (OLB) in NRC has taken the position (Reference 3) that training in mitigating core damage and related subjects should consist of at least 80 contact hours** in both the initial training and the initial 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 of Denton's letter. 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.

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*Enclosure 1 of NUREG-0737 contained four subactions within I.A.2.1. and two subactions 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.

**A contact hour is a 1-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.

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. Information from Enclosure 3 of 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 of Denton's letter

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.

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.

INPO has developed its own guidelines for training in the subject areas shown in Figures 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 to be acceptable by the staff if it makes explicit reference to increased emphasis on transients and gives some indication of the nature of the increase or it addresses both normal and abnormal transients (without necessarily indicating an increase in emphasis) and the requalification program satisfies the requirements for control manipulations, Figure 1, Item C.3. The latter requirement calls for all the manipulations listed in Figure 4 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 operator 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 Part 55, the requirements of Figure 4 are more demanding. Figure 4 requires about 32 specific manipulations over a 2-year cycle while 10 CFR Part 55, Appendix A, requires only 10 manipulations over a 2-year cycle. The staff evaluation is presented in Section IV.

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. Figure 3 provides guidance on the content of this training.

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*"Plant Manager" in this context refers to the highest ranking manager at the plant site.

For licensed personnel, this training would be redundant in that it is also required, by Item I.A.2.1, in the operator requalification program. However, Item 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 nonlicensed 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.

Implementation dates for the above items are contained in Section III-Licensee Submittals-Item 4 and were verified by Inspection Reports 50-237/81-20, 50-249/81-14 for I.A.2.1. Item II.B.4 was verified by Inspection Reports 50-237/82-04, 50-249/82-06 for licensed personnel, including shift control room engineers (SCREs) who perform the function of shift technical advisors (STAs) at Dresden, and was completed by all required personnel by the time Inspection Reports 50-237/82-29, 50-249/82-30 were issued.

III. LICENSEE SUBMITTALS

The licensee, CE, has submitted a number of documents (letters with various attachments) which describe the training and requalification programs. These submittals were made in response to the H. R. Denton letter and NUREG-0737 and served as the information base for this evaluation. For the Dresden Station, there were nine submittals with attachments.

1. June 12, 1980 letter from D. L. Peoples to D. Eisenhut (with enclosure). Response to H. R. Denton letter of March 28, 1980, Item I.A.3.1, licensing examination requirements.

2. August 1, 1980 letter from W. F. Naughton to D. Eisenhut (with enclosure). Forwards revised Requalification Program Topical Report.

3. September 15, 1980 letter from W. F. Naughton to P. F. Collins (with enclosure). Provides preliminary outlines of modules on Thermal Hydraulics and Core Damage Mitigation. Advises that detailed contents will be based on INPO Guidelines, internal and consultant research and on vendor and owners group information.

4. October 29, 1980 letter from L. O. DelGeorge to P. F. Collins (with three attachments). Provides response to Enclosure 1 of the H. R. Denton letter of March 28, 1980, attachments include Examples of Training in: Heat Transfer, Fluid Flow, and Thermodynamics; Core Damage Mitigation, Reactor and Plant Transients included in Simulator Training.

5. April 15, 1982 letter from E. D. Swartz to D. G. Eisenhut (two pages with enclosure). Provides status of II.B.4, Training for Mitigation Core Damage at Quad Cities, Dresden and Zion.

6. August 4, 1983 letter from E. D. Swartz to H. R. Denton (two pages with attachment). Forwards revised Requalification Topical Report dated May 16, 1983.

7. December 19, 1983 letter from E. D. Swartz to H. R. Denton (three pages with enclosures). Responds to request for additional information contained in the October 31, 1983 letter from D. M. Crutchfield to D. L. Farrar.

8. August 7, 1984 letter from J. G. Marshall to H. R. Denton (two pages with enclosure). Submits revised Licensed Operator Requalification Topical Report.

9. September 11, 1984 from B. Rybak to H. R. Denton. Provides response to D. M. Crutchfield letter of July 2, 1984 to D. L. Farrar concerning closeout of I.A.2.1 and II.B.4.

IV. EVALUATION

LQB's evaluation of training programs at CE's Dresden Station, Units 2 and 3, is presented below. Section A addresses TMI Action Plan Item I.A.2.1 and presents the assessment organized in the manner of Figure 1. Section B addresses TMI Action Plan Item II.B.4. Note that while the training programs were implemented by the licensee and evaluated by Region III during the 1981-82 period, no record of an NRR evaluation exists. This evaluation consists of a review of the original submittals and the licensee's program as presented in Item 9 of Section III.

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

Figure 1, Item A.2.C(1)

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

The program outline (Section III, Item 3) provided revised modules for reactor operator training programs for all CE stations; however, more detailed information (Section III, Item 4) addressed operator training and retraining and was applicable for boiling water reactors.

During the period of July 3-31, 1981, the Dresden Resident Inspector reviewed the program and found the HTFFT training and retraining of licensed personnel in compliance with the commitments of Item 4 of Section III. The findings are contained in Inspection Report 50-237/81-10, 50-249/81-14. In the current review of Item 4, the staff concludes that the program was comparable to the requirements of Enclosure 2 of the H. R. Denton letter (see Figure 2).

LQB's review of the current Dresden HTFFT training, contained in Section III, Item 9, indicates the program now contains problem solving and includes specific learning goals for each module. The length of the course is about 80 hours. We conclude that the current program meets or exceeds the requirements of Enclosure 2 of the Denton letter.

Figure 1, Item A.2.C(2)

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

In the enclosure to Section III, Items 3 and 4, the licensee provided outlines and more specific details on mitigation of core damage. The contents of the training modules were based on INPO guidelines, internal and consultant assisted research and on vendor and owners group information.

During the period of July 3-31, 1981, the Dresden Resident Inspector reviewed the implementation of the training program for operators. The inspection results are contained in Inspection Report 50-237/81-20 and 50-249/81-14. During the inspection which led to the preparation of Inspection Report 50-237/82-06 and 50-249/82-06*, the inspectors found that mitigating core damage training had been completed for operating personnel and SCREs. We cannot determine if the inspector reviewed the training program using inspection requirements (Denton letter). However, the LQB review for mitigating core damage training contained in Section III, Items 3 and 4 has led to the conclusion that the program was comparable to the requirements in Enclosure 3 of the Denton letter.

The LQB review of mitigating core damage training described in Section III, Item 9, indicates additional evolution of this program. Mitigating core damage has been integrated into system lectures, procedures, classroom activities and simulator instruction. The program is based on General Electric mitigation of core damage training. This training also includes those features contained in INPO STG-01, Revision 1 of 1/15/81, "Guidelines for Training to Recognize and Mitigate

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*Conducted during the period between January 30 - April 2, 1982.

the Consequences of Core Damage." LQB and previous reviewers have compared the INPO Guideline with that contained in Enclosure 3 of the Denton letter and have determined the guidelines meet or exceed mitigating core damage training requirements for operations personnel. We conclude that the current training for mitigating core damage meets the training requirements for CE licensed personnel. Although the time required to teach this subject cannot be precisely determined, we conclude that the total CE effort to teach HTFFT and mitigating core damage far exceeds 80 hours.

Figure 1, Item A.2.C(3)

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

The Licensee in Item 4 of Section III, provided a description of additional training in reactor and plant transients. The additional training applies to initial operator and requalification training programs. We are unable to determine if Regional Inspectors reviewed this commitment. However, we find, based on the review of the description of the training in reactor and plant transients, that the training meets the requirement of the Denton letter.

LQB's review of Section III, Item 9, indicates that the licensee currently provides additional training which includes manipulations listed in the Denton letter. In addition, all licensed candidates receive a 3-day course on Abnormal Events Analysis specific to the Dresden Station, Units 2 and 3. We conclude that the licensee's program continues to meet the requirement for additional training in reactor transients.

Figure 1, Item A.2.(e)

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

The licensee, in Item 4 of Section III, stated that all CE instructors participate in requalification training programs. Vendor instructor requalification programs were under development on October 29, 1980. LQB could not determine if the Region III staff reviewed instruction participation in requalification programs. However, the commitment did meet the program requirements.

In Item 9 of Section III, the licensee restates the requirement for licensed instructors to participate in requalification training. CE has also informed us that vendor/contract instructors at the General Electric Training Center participate in the Staff Requalifications Training Program #45-4.00 issued April 1, 1981.

Figure 1, Item C.1

The primary requirement is that requalification programs have instruction in areas of HTFFT and accident mitigation. The level of detail should be similar to that in Enclosures 2 and 3 of the Denton letter (See Figures 2 and 3). Those additional topics should be of equal emphasis with other areas in the requalification program.

In Section III, Items 2 and 4, the licensee included HTFFT training and accident mitigation in the Requalification Program Topical Report. The Commission approved the Requalification Topical Report in response to the CE Zion Station I.A.2.1 and II.B.4 review (See Reference 6).

In more recent submittals (Items 6 and 8, Section III) CE has continued to include HTFFT and accident mitigation training in the program. The staff concludes that the licensee continues to meet this requirement in the requalification program.

Figure 1, Item C.2

The requirement is for licensed operators to participate in the accelerated training. Passing scores of 80% overall or 70% in each category are the new grade criteria.

The licensee in Section III, Items 1, 4, 6 and 8, has established acceptable grade criteria and, therefore, has met this requirement in previous and current submittals.

Figure 1, Item C.3

This requirement calls for the licensed operators requalification program to include performance of control manipulations involving normal and abnormal situations. The specific manipulations required and performance frequency are identified in Enclosure 4 of the Denton letter (See Figure 4).

In Section III, Item 2, the licensee included a list of plant evaluations and frequency for performing these evaluations. The program was approved by the Commission (see evaluation for Item C.1). Current submittals (Items 6 and 8, Section III) include the required manipulations and, therefore, the licensee continues to meet this requirement in the requalification program.

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

TMI Action Plan Item II.B.4 requires that training for mitigating core damage, as indicated in Enclosure 3 of the Denton letter (See Figure 3) be given to STAs (SCREs at Dresden Units 2 and 3) and operating personnel from the plant manager through the operations chain. Also managers and technicians in instrument and control, health physics and chemistry departments shall receive training commensurate with their responsibility.

TMI Action Plan Item II.B.4, training for licensed personnel at the Dresden Station, Units 2 and 3, has been met by implementing the programs described and evaluated for Item I.A.2.1. This training was verified by Region III inspectors and included in Inspection Report 50-237/82-06 and 50-249/82-06.

Training for nonlicensed personnel was reviewed by Region III inspectors during the 1982 period. Item II.B.4 was verified complete and found acceptable in Inspection Report 50-237/82-29, 50-249/82-30. In Section III Item 9, the licensee has provided additional training to Radiation Chemistry Technicians during the 1983 period. The licensee also states that replacement training for management personnel in the areas of health physics and chemistry will be completed prior to any individual assuming a director level position; i.e., RadChem Director as shown in Commonwealth Edison Generating Station Emergency Plan, Figure 4.1-1.

V. CONCLUSION

Based on our evaluation as described above, the staff concludes that the licensee has met and continues to meet the requirements of NUREG-0737 Items I.A.2.1 and II.B.4 with regard to operator training programs at the Dresden Station, Units 2 and 3.

VI. REFERENCES

1. "NRC Action Plan Developed as a Result of the TMI-2 Accident," NUREG-0660, U. S. Nuclear Regulatory Commission, May 1980.

2. "Clarification of TMI Action Plan Requirements," NUREG-0737, U. S. 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. March 2, 1982 letter from S. A. Varga, DL, to L. O. DelGeorge, CE - Concludes that the Zion TMI items are acceptable. The Requalification Topical Report of August 1, 1980, is included in the program.