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2.1.1.2 Position Indication for PORV ana Safety Valves

2.1.1.2.1 System Description

The purpose of this modification is to provide the Control Room Operator with information on the status of the pressurizer electromatic relief valve RC-RV2 and the pressurizer code safety valves RC-RV1A and RC-RV1B. Discharge flow will be measured by differential pressure transmitters connected across elbow taps downstream of each of the valves. In addition, the electromatic relief valve will be monitored by accelerometers mounted on the valve. These will detect flow if the valve opens. Alarms and indications will be provided in the control room to inform the operator if any of these valves are open.

2.1.1.2.2 Design Bases

A reliable and unambiguous indication will be provided to the Control Room Operator if the pressurizer electromatic relief valve or code safety valves open. The monitoring system will remain functional in containment conditions associated with any transient for which valve status is required by the operator. Redundant and diverse means will be provided for monitoring the electromatic relief valve (RC-RV2). The monitoring systems will remain functional during a loss of off-site power. All equipment inside containment will be seismically mounted. The integrity of existing safety related systems will not be impaired by this modification.

2.1.1.2.3 System Design

All of the system components have been selected for reliable operation and, where applicable, for operation under adverse conditions inside containment. The differential pressure transmitter model selected has previously been qualified for nuclear applications inside containment. The actual units used however have not been ordered with nuclear safety grade certification. The accelerometers and their associated electronics have been previously qualified for nuclear applications in the Loose Parts Monitoring System. The monitoring systems will be supplied from on-site electrical power supplies. Diverse and redundant means will be used for monitoring of the electromatic relief valve. Both differential flow measurement and acoustic detectors will be provided.

2.1.1.2.4 Design Evaluation

Elbow taps are widely used for flow measurement in fluid systems and a great deal of empirical data is available for calculating expected differential pressure across elbow taps for given flow conditions. Calculations have been made, using conservative assumptions, to demonstrate that a satsfactory signal will be generated when any of the valves open. Calculations have been made for saturated, liquid and two phase flow. Tests run by B&W at their Alliance facility have confirmed the feasibility of this approach.

Acoustic monitoring of the electromatic relief valve makes use of well proven equipment and techniques which have been used in the B&W Loose Parts Monitoring System. Tests run on this valve at the B&W Alliance facility demonstrated that the acoustic monitoring system gave satisfactory results.

2.1.1.2.5 Safety Evaluation

Instrument taps will be installed on elbows in the discharge piping of pressurizer code safety valves RC-RV1A and RC-RV1B and electromatic relief valve RC-RV2. This piing is classified as N2, Seismic I. Analysis has been performed to demonstrate that this modification will not degrade the integrity of the existing pipe. The pipe classification has been maintained up to and including the instrument root valves. The mounting of new equipment which will be located in the vicinity of safety related systems has been analyzed to ensure that no hazardous missiles will be generated in a seismic event. It has been concluded that this modification will not degrade any safety related systems. The valve position indication function has not been classified as safety grade.

2.1.1.2.6 Instrumentation

The output signals from the three differential pressure transmitters will be displayed on indicators in the control room. They will be calibrated in "inches of water". Each signal will also go to an alarm bistable. A control room alarm will be initiated if any of the signals exceed a pre-determined value. This will alert the operator that one of the valves is open. The differential pressure signal will also be monitored by the plant computer for logging, trending, and alarm functions.

The outputs from the accelerometers which will be mounted on RC-RV2 will be processed by monitoring equipment installed in the existing Loose Parts Monitoring Cabinet. An output signal indicative of flow through the valve will be displayed and recorded locally. A control room alarm will be initiated if flow is detected. This signal will also be monitored by the plant computer for logging, trending, and alarm purposes.

2.1.1.3 <u>Emergency Power Supply Requirements for Pressurizer Heaters, PORV, Block Valve, and Pressurizer Level Indication</u>

2.1.1.3.1 Pressurizer Heaters

2.1.1.3.1.1 System Description

The purpose of this modification is to provide redundant emergency power for the 126 KW of pressurizer heaters required to maintain natural circulation conditions in the event of a loss of offsite power. A manual transfer scheme will be installed to transfer the source of power for 126 KW of pressurizer heaters from the balance of plant (BOP) source to a "Red" engineered safeguards (ES) source. A similar manual transfer scheme will be installed to transfer the source of power for 126 KW of pressurizer heaters from the BOP source to a "Green" ES source. Each manual transfer scheme will have double isolation on each end of the transfer and have mechanical key interlocks to govern the order of the transfer procedure. Figure 2.1-4 is a schematic representation of these transfer schemes.

2.1.1.3.1.2 Design Basis

Babcock and Wilcox has recommended that at least 126 KW of pressurizer heaters be restored from an assured power source within two hours after a loss of offsite power. Separation and isolation of Class IE equipment and circuits from non-Class IE equipment and circuits will be in accordance with Regulatory Guide 1.75 wherever practicable.

2.1.1.3.1.3 System Design

Existing spare Class IE 480 volt circuit breakers on the "Red" and "Green" ES systems will be utilized for the two transfer schemes. The disconnect switch assemblies for each transfer scheme will consist of two cabinets and one tab-keyed, removable element. One cabinet will be located near and connected in series with the 480 V ES circuit breaker. The other cabinet will be located near and connected in series with the Pressurizer Heater Control Center circuit breaker. Class IE qualified power cable will connect the load sides of the disconnect switches as shown in Figure 2.1-4. Class IE qualified under-voltage relays will be installed on each ES bus. They will initiate tripping of the ES circuit breaker to the pressurizer heaters when the bus voltage drops below its set point. The set point will be chosen so that starters on the ES bus can pickup if energized and the voltage at the ES motors is not lower than their ratings allow. An Engineered Safeguards actuation signal shall trip but not lockout each ES circuit breaker to the pressurizer heaters. The remainder of the electrical power distribution system to the pressurizer heaters will remain as it presently exists.

2.1.1.3.1.4 System Operation

All pressurizer heaters will be powered from the BOP electrical power distribution system when offsite power is available. Upon a loss of offsite power, manual transfers will enable each of the onsite emergency diesel generators ("Red" and "Green") to provide power to 126 KW of pressurizer heaters when the diesel generators can accommodate that load. Procedures will call for tripping non-essential loads to accomplish this within the two-hour requirement. Mechanical key interlocks will dictate that the order of events in the transfer from BOP to ES power source will be as follows:

A. Opening the circuit breaker in the PHCC which will allow removal of key #1.

B. Key #1 will open the cabinet door of the disconnect switch located near the PHCC. The removable element will then be removed along with Key #2 and carried to the 480 V ES switchroom.

C. The removable element will be inserted into the appropriate cabinet. Key #2 will lock that cabinet door and allow removal of Key #3.

D. Key #3 will remove the inhibit feature from the 480V circuit breaker.

E. The circuit breaker control switch will then be operated to close the ES circuit breaker feed to the transferred pressurizer heaters when it has been established that bus loading and emergency D/G loading permit doing so.

When offsite power is restored, the reverse procedure will be used to transfer back to the BOP source.

2.1.1.3.1.5 Safety Evaluation

The manual transfer scheme design provides double Class IE separation of the ES system from the BOP system - the ES circuit breaker and the disconnect switch. Taking into account the single failure criteria, faults on the BOP system will, at most, cause the loss of one 480 volt ES system. The transfer scheme design also precludes the connection of the "Green" ES system to the "Red" ES system.

2.1.1.3.1.6 Inservice Testing Requirements

The emergency diesel generator loading procedure will be rewritten to incorporate this modification. Therefore, these transfer schemes will be tested when the emergency diesel generators are tested.

2.1.1.3.2 Power Operated Relief Valve (PORV)

The present plant design is such that emergency diesel generator power will be supplied to the PORV (RC-V2) upon loss of offsite power. The PORV is powered from the 250 VDC Distribution Panel IC which in turn is pwoered from the "Red" and "Yellow" ES batteries and ES Battery Chargers 1A, 1C, and 1E.

2.1.1.3.3 Block Valve

The present plant design is such that emergency diesel generator power will be supplied to the block valve (RC-V3) upon loss of offsite power. The block valve is powered from the 480 V Engineered Safeguard Valve Conrol Center 1C.

2.1.1.3.4 Pressurizer Level Instrumentation

The present plant design is such that emergency diesel generator power will be supplied to the pressurizer level instrumentation power supplies (RC-1-LT1, RC-1-LT2, RC-1-LT3) upon loss of offsite power. The pressurizer level instrumentation power supplies are part of the ICS, NNI System, and are powered from the 120 volt ICS, NNI Power Distribution Panel ATA. That panel is, in turn, powered from the 120 volt Vital Distribution Panel VBA.

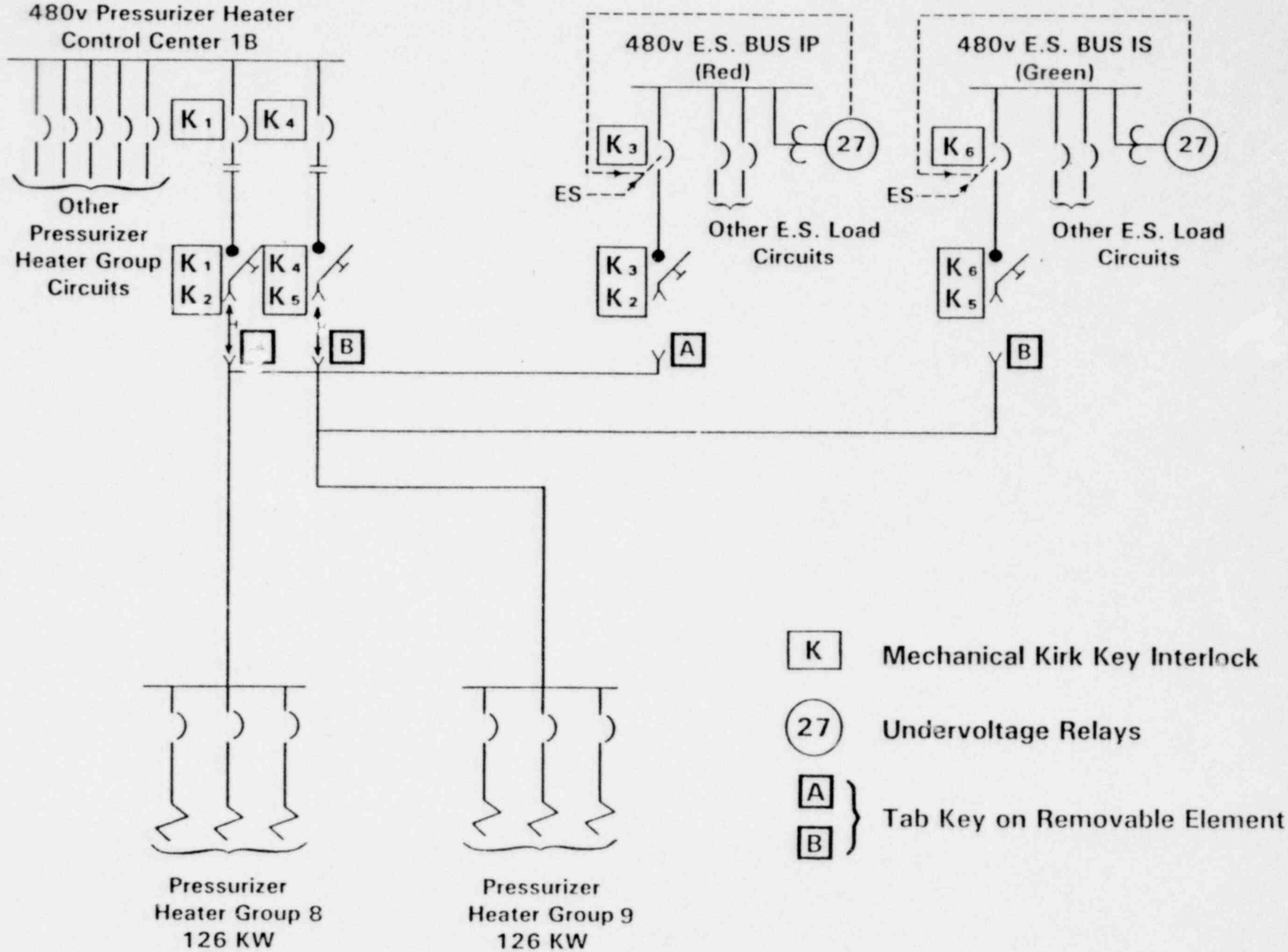

Figure 2.1-4

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5.4 MINIMUM QUALIFICATION REQUIREMENTS FOR TMI UNIT 1 PERSONNEL

5.4.1 Vice President-Nuclear Operations

The Vice President-Nuclear Operations shall have 10 years of power plant experience, of which 3 years shall be nuclear power pla .t experience. A Bachelor of Science Degree in an Engineering or Scientific field is required and may be credited to the remaining 7 years of power plant experience. The Vice President shall have acquired the experience and equivalent training normally required to be eligible for a Senior Reactor Operator's License.

Incumbent

B.S. Marine Engineering - U.S. Naval Academy

5/70 to 8/70	-	Supervisor of reactor plant services at Saxton Nuclear Experimental Corporation
8/68 to 5/70	-	Supervisor Operations and test at Saxton
9/67 to 8/68	-	Staff Engineer at Saxton
5/67 to 9/67	-	Yankee Atomic as Assistant to Operations Supervisor
1960 to 5/67	-	Served 6 years on conventional destroyers in various capacities including Chief Engineer. (One year at KAPL.)
5/77 to present	-	Vice President - Generation
9/76 to 5/77	-	Manager - Generation Operations
6/75 to 9/76	-	Manager - Generation Operations Nuclear - Responsible to V.P Generation for day-to-day direction and supervision of TMI operations.
1/74 to 6/75	-	Superintendent - Nuclear Generating Station (Construction project to operating plant)
1/73 to 1/74	-	Assistant Superintendent TMI
8/70 to 12/72	-	Station Engineer at TMI - Responsible for instrument, electrical, mechanical, nuclear, health physics & chemistry, site engineering and technical supervision.

5.4.2 Unit Superintendent

The Unit Superintendent shall have a minimum of eight years of responsible power plant experience of which at least three years will be in nuclear power plant design, construction, startup, operation, maintenance, or technical services. A maximum of two years of remaining five may be fullfilled by acedemic training. The Unit Superintendent must hold a senior reactor operator license.

Incumbent (acting)

High School graduate. U.S. Merchant Marine Academy, Kings Point, NY (1963)
(Marine Engrg) 1965-70 Newport News Shipbuilding (assigned to various new const. nuclear submarines.)
1970-71 Newport News Shipbuilding (Asst. Project Mgr. for completion of reactor plant).
1971-1973 Newport News Shipbuilding & Dry Dock Co. (Senior Test Supervisor) 2/73 to 8/74 GPU corp. Supt.-Test Design.
5 Years experience Nuclear Power Plant Operation - TMI

5.4.3 Supervisor of Operations

The Supervisor of Operations will have a minimum of four years of responsible power plant experience of which at least one years will be in nuclear power plant design, construction, startup, operations, maintenance, or technical services. A maximum of two years of academic or related training may be included as part of the remaining five years of power plant experience. The Supervisor of Operations shall hold a Senior Reactor Operators License.

Incumbent

High School Graduate. Snowden Twp. Lebrary PA. (College Prep). U.S. Navy 12/60 to 11/68. Rank: ET1 E-6, Electronic and Nuclear Jobs. 11 Years experience Nuclear Power Plant Operation TMI and Saxton Experimental.

5.4.4 Shift Supervisor

Each Shift Supervisor shall have a high school diploma or an equivalent education. He shall have a minimum of 4 years power plant experience of which a minimum of one year will be nuclear power station operations or maintenance. A maximum of two years of academic or related education may be included as part of the remaining three years of required plant experience. The Supervisors in this category should hold a Senior Reactor Operators License.

Incumbent A

High School Graduate. U.S. Army 9/58 to 9/60. 10 Years experience Nuclear Power Plant - Operation - TMI.

Incumbent B

High School Graduate. 10 years experience in Nuclear Power Plant Operation - TMI.

Incumbent C

High School Graduate. U.S. Navy 1/62 to 11/67. U.S. Navy Basic Elect. & Nuclear Theory 10/64 & 7/62. Electrician Mate 2C. 10 Years experience Nuclear Power Plant Operation - TMI.

Incumbent D

High School Graduate. U.S. Air Force. 9/59 to 9/63, Rank A/1c 10 Years experience Nuclear Power Plant Operation - TMI

Incumbent E

High School Graduate. Pa. National Guard 3/65 to 3/71. 10 Years experience Nuclear Power Plant Operation - TMI

Incumbent F

High School Graduate. U.S. Navy ET1 3/66 to 12/71. U.S. Navy Elec. (Electro) & Nuclear Power School (1964), Steel Valley Tech. Nuclear Power School (1965) (Electronics). (7 years experience Nuclear Power Plant Operation - TMI)

Incumbent G

High School Graduate. U.S. Air Force, 10/65 to 2/69. Rank: SGT. USAF Maintenance School Aircraft Mechanic. 10 Years experience Nuclear Power Plant Operation - TMI

Incumbent H

High School Graduate. Utah State Univ. (Forest Management). U.S. Navy 3/66 to 2/73, Rank: E5. 6 Years experience in Nuclear Power Plant Operation - TMI.

Incumbent I

High School Graduate. U.S. Army 1955 to 1957 Rank: Sgt. 15 Years Nuclear Power Plant Operation - TMI

5.4.5 Shift Foreman

Each Shift Foreman shall have a high school diploma or an equivalent education. He shall have a minimum of 4 years power plant experience of which a minumum of one year will be nuclear power station operations or maintenance. A maximum of two years of academic or related education may be included as part of the remaining three years of required plant experience. The Foreman in this category should hold a Reactor Operators License.

Incumbent A

High School Graduate. Special training in Security Police and Computer Operation. ----Bolling Air Force Base, Washing, D.C. (11/63 to 1/68), Presidential Honor Guard. 10 Years experience in Nuclear Power Plant Operation - TMI.

Incumbent B

High School Graduate. U.S. Navy Nuclear Power School, 1965 - 6 Month Course Nuclear Power Prototype Training, 1965. Machinist Mate Class "A" School, 1964, five month Course, Navy Enlisted Submarine School, 1964, Maintenance Data Collection for Supervisors, 1969 -----Naval Experience 8/65 to 2/69, Machinist Mate, nuclear attack submarine USS Whale (SSSN638); Machinist Mate 1st Class POLARIS submarine USS Theodore Roosevelt (SSBN600) 2/69 to 2/71. 8 Years experience in Nuclear Power Plant Operation - TMI.

Incumbent C

High School Graduate. Prince Georges Community College, Suitland, Md. (Engrg). Elec. Mate, Nuclear Power School and Nuclear Power Training Unit. U.S. Navy from 2/68 to 2/71. 8 years experience in Nuclear Power Plant Operation - TMI.

Incumbent D

High School Graduate. Cleveland Institute of Electronics. Four years experience in Nuclear Power Plant Operation - TMI.

Incumbent E

High School Graduate. Correspondence Course in Mechanical Drafting. U.S. Navy (Submarine service) 9/57 to 9/60. 3rd Class. 10 Years experience in Nuclear Power Plant Operation - TMI.

Incumbent F

High School Graduate/ U.S. Navy, Electronic Technician 2nd Class, 7/63 to 8/70. 8 1/2 years experience in Nuclear Power Plant Operation - TMI.

5.2.6 Supervisor Preventative Maintenance

This position is required to support the Met-Ed organization and shall have appropriate qualifications.

Incumbent A

High School Graduate. Temple University - 2 Semesters. U.S. Navy 7/47 to 11/72. Retired. Rank: Lt.
Six years experience Nuclear Power Plant Maintenance - TMI.

Incumbent B

High School Graduate. Naval Course (Various) U.S. Navy 3/58 to 6/62. Rank: E5.
Westinghouse Electric Corp. Saxton, PA (Elec. Tech.) 7/66 to 11/68.
9 Years experience in Nuclear power Plant Operation and Maintenance - Saxton Nuclear Experi. Station and TMI.

5.4.7 Director - Technical Support

The Director-Technical support shall have 8 years in responsible positions related to power generation, of which one years shall be nuclear power plant experience. A Bachelor of Science Degree in an Engineering or Scientific field is preferred and may be credited to the remaining 7 years of experience. The individual should have non-desctructive testing familiarity, craft knowledge, and an understanding of electrical, pressure vessel and piping codes.

Incumbent

B.S. Mech. Eng. - Villanova University, 1963

1963	-	Cadet Eng. - Reading
1965-67	-	2 years Crawford Station - Plant Eng. and then Mech. Maintenance Form.
1967	-	1 1/4 year Saxton Nuclear - obtained NRC operator license
	-	8 years TMI Unit #1 - Supervisor Operations - 8/1/68 Plant Engineer - 1/1/73 Unit Supt. - 8/1/74 to May 77 Obtained SRO license.

5.4.8 Shift Technical Engineer

The Shift Technical Engineer shall have a Bachelor of Science Degree in an Engineering or Scientific related field. A minimum of two years of related experience in power generation. In addition to the academic education, the Shift Engineer shall possess a thorough knowledge of plant systems and components.

Incumbent A

High School Graduate. University of Missouri - B.S. Mechanical Engineering - 1972

1972-76 Field Engineer, General Electric Co. Installation & Service Eng. Div.
1976 - present - Metropolitan Edison Company - 1976 - Eng. II Nuclear TMI
1978 - Eng. III-Generation - Reading
1979-Shift Engineer III-TMI
6-66 to 4-70 U.S. Air Force - Inventory Management Specialist, Dyess Air Force Base, Abilene Texas

Incumbent B

High School Graduate. North Carolina State University - B.S. Nuclear Engineering - 1976
4/70-4/76 National Guard special schools in Accounting and Radar techniques
1970-1971 - HP Tech. with Westinghouse Nuclear Fuel Div.
1971-1973 - Service Representative 3M Corp. - Instrumentation Technician
1976-present - Metropolitan Edison Company - Engineer I-Generation
1979-Engineer II-Generation
1979-Shift Engineer II Three Mile Island

Incumbent C

High School Graduate. 1976 - B.S. Physics Albright College and MSE Towne School of Engineering and Applied Science, University of Pa.
1976 - Metropolitan Edison Company - Engineer I-Generation
1979 - Metropolitan Edison Company - Engineer II-Generation
1979 - Three Mile Island - Shift Engineer II

Incumbent D

High School Graduate. B.S. Nuclear Engineering - Rensselaer Polytechnic Institute, Troy, N.Y. - 1976
Master of Engineering - Nuclear Engineering - Penn State U. 1979
6/78-9/79 - Metropolitan Edison Company
6/78 - Eng. I-Generation
9/79 - Shift Engineer I - Three Mile Island

Incumbent E

High School Graduate. BSEE, Pennsylvania State University - 1977 U.S. Navy 7/68 to 7/72 - Aviation Electricians Mate - Class A, Flight Electrician and ECM Operator
11/77 - Present - Metropolitan Edison Company - Three Mile Island
11/77 Eng. I-Nuclear
8/79 Eng. II-Nuclear
9/79 Shift Engineering

Incumbent F

High School Graduate. B.S. Nuc. Eng.-Penn State Univ. 1977
6-77 to present - Metropolitan Edison Co. - Three Mile Island
6/77 Three Mile Island - Eng. 1
9/79 Three Mile Island - Shift Technical Eng.

5.4.9 Manager of Support Services and Logistics

This position is required to support the Met-Ed organization and shall have appropriate qualifications.

Incumbent (also acting as Unit Superintendent)

High School graduate. U.S. Merchant Marine Academy, Kings Point, NY (1963) (Marine Engrg) 1965-70 Newport News Shipbuilding (assigned to various new const. nuclear submarines.)
1970-71 Newport News Shipbuilding (asst. Project Mgr. for completion of reactor plant).
1971-1973 Newport News Shipbuilding & Dry Dock Co. (Senior Test Supervisor)
5 Years experience Nuclear Power Plant Operation - TMI

5.4.10 Supervisor - Radiation Protection and Chemistry

The Supervisor-Radiation Protection and chemistry shall possess the minimum qualifications as stipulated in ANSI 18.1. These qualifications require a Bachelor of Science Degree in an Engineering or Scientific field related to Health Physics and Chemistry. In addition to the academic requirements, the Supervisor shall have 5 years experience in nuclear power plant generation. A minimum of three years experience shall be related to radiation protection. A Masters Degree may be substituted for 2 years of professional experience.

Incumbent

High School Graduate. Villanova University-BME Degree.
U.S. Navy 6/54 8/78 Retired. Rank: Capt.
1 year experience Nuclear Power Plant - TMI (Technical Administration Support)

5.4.11 Manager-Training

This position is required to support the Met-Ed organization and shall have appropriate qualifications.

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Incumbent F

High School Graduate. B.S. Nuc. Eng.-Penn State Univ. 1977
6-77 to present - Metropolitan Edison Co. - Three Mile Island
6/77 Three Mile Island - Eng. 1
9/79 Three Mile Island - Shift Technical Eng.

5.4.9 Manager of Support Services and Logistics

This position is required to support the Met-Ed organization and shall have appropriate qualifications.

Incumbent (also acting as Unit Superintendent)

High School graduate. U.S. Merchant Marine Academy, Kings Point, NY (1963) (Marine Engrg) 1965-70 Newport News Shipbuilding (assigned to various new const. nuclear submarines.)
1970-71 Newport News Shipbuilding (asst. Project Mgr. for completion of reactor plant).
1971-1973 Newport News Shipbuilding & Dry Dock Co. (Senior Test Supevisor)
5 Years experience Nuclear Power Plant Operation - TMI

5.4.10 Supervisor - Radiation Protection and Chemistry

The Supervisor-Radiation Protection and chemistry shall possess the minimum qualifications as stipulated in ANSI 18.1. These qualifications require a Bachelor of Science Degree in an Engineering or Scientific field related to Health Physics and Chemistry. In addition to the academic requirements, the Supervisor shall have 5 years experience in nuclear power plant generation. A minimum of three years experience shall be related to radiation protection. A Masters Degree may be substituted for 2 years of professional experience.

Incumbent

High School Graduate. Villanova University-BME Degree.
U.S. Navy 6/54 8/78 Retired. Rank: Capt.
1 year experience Nuclear Power Plant - TMI (Technical Administration Support)

5.4.11 Manager-Training

This position is required to support the Met-Ed organization and shall have appropriate qualifications.

Incumbent

B.S. Degree in Physics - Ill. Institute of Technology.
Employed - U.S. Navy 1948 - 58 - Reactor Operator, Nuclear Power School Instructor
Met-Ed - 1973 - Present - Head of Licensing, QA Program, Manager Generation Operations.
Argonne National Laboratory 6/58-7/68 - Instructor and Reactor Operator.
Vermont Yankee Nuc. Power Corp. 7/68-7/73.

6.0 OPERATOR ACCELERATED RETRAINING PROGRAM (OARP)

6.1 INTRODUCTION

In preparation for restarting TMI-1, a retraining program for TMI-1 Reactor Operators and Senior Reactor Operators is being implemented. Several training issues considered as prerequisites to resuming power operation at TMI-1 have been identified and addressed in the Operator Accelerated Retraining Program and subsequent evaluation process is required of all personnel who will be assigned as Reactor Operators and Senior Reactor Operators at TMI-1 during the resumption of power operation.

The Operator Accelerated Retraining Program includes over sixty (60) presentations and/or practice sessions involving over two-hundred hours of training. Included in the program are at least twenth (20) hours of training directly involved with analyzing and handling abnormal and emergency situations at the Babcock and Wilcox Nuclear Training Center Simulator.

The Operator Accelerated Retraining Program covers topics which can be grouped into four functional areas:

° TMI Plant System Review
° TMI Plant Operational Review
° Radioactive Materials Control
° TMI Plant Transient Analysis

The combination of the Operator Accelerated Retraining Program and the previous TMI-1 operator training and requalification programs can enable the safe and effective operation of the Three Mile Island Nuclear Station Unit 1.

6.2 PROGRAM OBJECTIVES

The Operator Accelerated Retraining Program is designed to accomplish several objectives relating to enhancing TMI-1 Reactor Operator and Senior Reactor Operator performance. The achievement of these objectives is in accordance with the performance standards specified in Section VI (Evaluation Procedure) and is a prerequisite to resuming operation of TMI-1. Program lectures which support the objectives and references for the objectives are listed in Appendix A.

The Operator Accelerated Retraining Program objectives are as follows:

A. To improve operator performance during small break loss of coolant accidents.

B. To assure that the operator can recognize and respond to conditions of nadequate core cooling.

C. To improve operator performance during transients and accidents including events that cause or are worsened by inappropriate operator action.

D. To assure that the operators have an in-depth understanding of the TMI-2 accident and lessons learned.

E. To assure that operators are knowledgeable of operating procedures and actions required upon initiation of the engineering safeguards features including reactor coolant pump requirements.

F. To assure that operators understand the manometer effects of water levels in the reactor coolant system under different coolant system presure and temperature conditions.

G. To assure that operators are aware of the extreme seriousness and consequences of the simultaneous blocking of both auxiliary feedwater trains.

H. To assure that operators are aware of the prompt NRC notifications required in the case of serious events and significant events.

I. To provide the operators with an in-depth understanding of the methods required to establish and maintain natural circulation.

J. To assure that operators are knowledgeable of both short and long term plant systems modifications.

K. To provide the operators with a review of the major plant systems.

L. To provide specialized training on "Operations and Procedural Guidance Requirements".

M. To assure operators are fully qualified through the administration of the Company and NRC administered final written and oral examination.

N. To provide the operator with a review of major administrative, normal, abnormal, and emergency procedures.

O. To assure all licensed Unit 1 operators receive training on the B&W Simulator covering the TMI-2 incident.

6.3 Topical Outline

The Operator Accelerated Retraining Program includes over sixty (60) presentations and/or practice sessions covering topics which can be grouped into four (4) functional areas:

° TMI Plant Systems Review
° TMI Plant Operational Review

° Radioactive Matcrials Control
° TMI Plant Transient Analysis

The program topics include coverage of essential information needed to understand TMI-1 plant design and oepration. Detailed information on plant systems, operating procedures, and transient analysis are also included to provide an overall understanding of safe nuclear plant operating practices.

A. TMI Plant Systems Review

Topics which provide a specific plant systems information address the following areas:

° Features of Facility Design
° Instrumentation and Control
° Safety and Emergency Systems

Presentations covering specific information on system functions, capabilities, limitation, interrelationships and controls are involved.

The specific topics are:

1. Reactor Coolant System
2. Makeup and Purification System
3. Control Rod Drive System
4. Nuclear Instrumentation and In-Core Instrumentation
5. Decay Heat Removal
6. Decay Heat River System
7. Containment Isolation System
8. High Pressure Injection System
9. Nuclear Services Closed Cooling System
10. Decay Heat Closed Cooling System
11. Core Flood System
12. Nuclear Service River Water System
13. Reactor Building Emergency Cooling System
14. Intermediate Closed Cooling System
15. Feedater System
16. Condensate System
17. Emergency Feedwater System
18. Main Steam System
19. Electrical Distribution System
20. Emergency Diesel
21. Reactor Protection System
22. Ventilation
23. Hydrogen Recombiner and Hydrogen Purge
24. Emergency Safeguards Actuation System
25. Non-nuclear Instrumentation and Interlocks
26. Computer and Mod Comp
27. TMI-1 Short Term Change Modifications
28. TMI-1 Long Term Change Modifications

B. TMI Plant Operational Review

Topics which provide information covering the plant general operating characteristics and specific procedural guidance address the following areas:

- ° Heat Transfer and Fluid Dynamics
- ° Principles of Reactor Operation and Reactor Theory
- ° General and Specific Operating Characteristics
- ° Administrative Procedures, Conditions and Limitations
- ° Fuel Handling and Core Parameters

Presentations on plant operation are designed to give detailed information on fundamental plant operation and specific procedural guidance. The specific topics are:

1. Heat Transfer and Fluid Dynamics
2. Reactor Theory
3. Use of Procedures
4. Operating Characteristics Review-including natural circulation
5. Solid Plant Operations
6. Operational Chemistry
7. Standard and Emergency Operating Procedures-(covered in nine sections)
   - (1) Administrative Procedures
   - (2) Limitations and Precautions
   - (3) Emergency Procedures
   - (4) Emergency Feedwater Procedures
   - (5) Reactor Coolant Pump Procedures
   - (6) Electrical Power Emergency Procedures
   - (7) Primary System Leak Emergency Procedures
   - (8) Operating Procedures
   - (9) Steam System Emergency Procedures
8. Technical Specifications - Limiting Conditions for Operations
9. Technical Specifications Review
10. Fuel Handling and Core Parameters
11. NRC Prompt Notification Enforcement Policy

C. Radioactive Materials Control

Topics which provide information covering radioactive materials control address the following areas:

° Radiation Control and Safety
° Radioactive Material Handling, Disposal and Hazards
° TMI Emergency Plan

The specific topics are:

1. TMI Radiation Emergency Plan
2. Radiation Safety and Radioactive Materials Control
3. Radiation Monitoring
4. Radioactive Waste Disposal
5. Liquid and Gaseous Releases

D. TMI Plant Transient Analysis

Topics which provide information covering plant abnormal operating characteristics and plant transients address the following areas:

° TMI-2 Transient
° Safety Analysis for TMI-1
° TMI Simulator Training

The specific topics are:

1. TMI-2 Transient
2. Small Break Loss of Coolant Accident Operator Guidance
3. Reactor Coolant System Elevations and Manometer Effect
4. Expected Instruments and Plant Response to Transients
5. TMI Control Room Session
6. Safety Analysis Workshop

In addition to these topics, specifically designed training sessions were conducted at the Babcock and Wilcox Simulator Training Center. These training sessions involved discussion of plant transient information and simulator training sessions where specific casualty situations were handled by the trainees.

The topics covered included:

1. Power Distribution and Rod Withdrawal Limits
2. heat Transfer and Fluid Flow
3. Small Break Analysis
4. Safety Analysis
5. Unannounced Casualties (conducted on the simulator)
6. Special program on the B&W Simulator covering the TMI-2 accident

6.4 PROGRAM RATIONALE

The selection of topics to be included in the Operator Accelerated Retraining Program was based on several factors. During the program formulation stage, the extensive training curriculum the TMI-1 Reactor Operator and Senior Reactor Operator have already completed was balanced with the training needs related to the current TMI-1 and TMi-2 plant status. Specific sources utilized in identifying program topics include the following areas:

A. Standard references for operator training programs considered in determining course content include:

1. 10 CFR 55 - Operator's License
2. NUREG-0094 - NRC Operator Licensing Guide
3. TMI-1 FSAR
4. TMI-1 Operator Requalification Program

The topics included in the Operator Accelerated Retraining Program provide for coverage of all the areas in the NRC operators written examination (10 CFR 55.21/22). In addition topics included in the program include lecture requirements in the TMI Requalification Program (10 CFR 55 Appendix A and TMI-1 FSAR Section 12).

B. Other Licensed Nuclear Operator Training References

In making specific topic selections for the course content, other information sources for operator training were used. These sources include:

1. NRC Bulletin 79-05, 79-05A, 79-05B and 79-05C.

2. Metropolitan Edison Company commitments on operator training (J. Herbein letter to NRC dated June 28, 1979).

3. NRC letter - Order and Notice of Hearing, August 9, 1979.

4. Selected training programs conducted at other Babcock and Wilcox incident nuclear plants since the TMI-2 incident.

5. Interviews with TMI Operators.

6. TMI-1 plant modifications (Short Term and Long Term).

7. TMI-2 incident information and other relevant License Event Reports.

8. NUREG - 0578 TMI-2 Lessons Learned

6.5 INSTRUCTIONAL PROCEDURE

The Operator Accelerated Retraining Program topics are presented using a variety of instructional techniques. Instructional techniques utilized for particular program topics are selected to build comprehension of nuclear plant fundamentals, develop the ability to analyze and respond to plant operational situations, and ensure understanding of current TMI-1 plant conditions and procedural guidance.

In order to achieve the retraining program goals, the instructional techniques utilized will include:

- ° Classroom Lectures
- ° Classroom Discussions
- ° Classroom Working Sessions
- ° TMI Control Room Training Sessions
- ° Nuclear Plant Simulator Practice Sessions (B&W Simulator Training Center)

A. Classroom Sessions

In preparation for the classroom presentations conducted at TMI, an extensive program development process was completed. This preparation included the involvement of a primary and backup instructor for designated training sessions. Comprehensive lesson plans developed for the training sessions ensure a well directed approach for the presentations.

1. Topic Lesson Plan Preparation

Lesson plans developed for the training sessions are in accordance with a standard format which includes all the elements of a comprehensive presentation and written guidance for carrying out a topic presentation.

Primary instructors assigned to prepare topic lesson plans have technical expertise in the specific areas covered by assigned topics. The primary instructor identified specific lesson plan objectives and developed the lesson plan material.

Backup instructors assigned to assist in preparing topic lesson plans have experience in developing technical training material.

In addition to assisting in topic lesson plan development the backup instructor also completes a Lesson Plan Development Summary which identifies essential information pertinent to the topic objective, instruction techniques, and evaluation procedures.

The combined development efforts of the primary and backup instructors is reviewed by designated training department staff members at various stages to ensure a well directed, comprehensive topic presentation is adequately supported.

2. Topic Classroom Presentation

Classroom sessions are conducted following the direction provided by the topic lesson plan and lesson plan development summary. In order to ensure a comprehensive coverage of essential information in the classroom presentation, at least two people will be involved with the presentation. The primary instructor (or a designated alternate) will present the topical information. The backup instructor (or a designated alternate) will site in on the presentation and ensure that the essential topic information is covered during the presentation. This may involve clarifying certain points and asking specific questions related to the topic lesson objectives and support material.

In preparation for the classroom presentations, practice sessions involving the primary and backup instructor (or designated alternates) are conducted as required. The practice sessions involve discussion of lesson material and presentation techniques and may include an abbreviated practice presentation of part of the lesson. The practice sessions serve as a means of ensuring that actual lesson presentations will meet required standards and facilitate the achievement of the lesson objectives. The required extent of the practice session will depend upon the experience level of the primary instructor in presenting similar training material.

B. Control Room and Simulator Sessions

The Control Room and Simulator Training sessions are designed to enable hands on application of guidance provided to TMI-1 operators. In preparation for these sessions, specific areas of coverage were designated to ensure essential items identified and/or demonstrated for the operators.

1. Control Room Sessions

A review with the information/instrumentation available in the TMI-1 Control Room is addressed in a specific session. This supplements the references made during other topic presentations which interfaced with Control Room features. A tour of the Control Room conducted under the guidance of a lesson plan prepared by a primary backup instructor team is designed to build the association of operational concept and guidance with actual system controls.

2. Simulator Sessions

The B&W Simulator Training is included in the program to provide actual practice for the TMI operators in handling plant transient situations.

The training practices used during the simulator training sessions enabled the following:

° Detailed use of procedures (including follow-up actions)

° Plant casualties carried out until a stable condition is reached

° Multiple plant casualties simulated

° Watch section members handling casualties as a team, with specific job assignments made

° Casualty conditions analyzed with watchstander input, supervisor deciding course of action and supervisor directing recovery

° Watch section members evaluated as a team on specific casualty response

6.6 EVALUATION PROCEDURE

The Operator Accelerated Retraining Program is evaluated formally and informally in several manners. Continuous informal evaluation is occurring during the training sessiosn as the instructor and/or backup instructor gauge trainee understanding by asking questions and observing performance.

Formal evaluations of the training program, instructor delivery, trainee performance and trainee knowledge level are also conducted and analyzed. In addition, performance standards are specified for key evaluation processes.

A. Trainee Evaluation of the Program

At the completion of each week of the training program, the trainees are asked to evaluate and comment on the training sessions. This evaluation encompasses the instructors, training materials, presentation techniques, and classroom facilities. Results of these evaluations are a means of measuring the trainees reaction to the training program. Problems which are identified by these evaluations are considered and resolved by the TMI Training Department staff. Necessary changes to the program are factored into subsequent presentations. If a deficiency is deemed to be severe and cannot be otherwise compensated for, parts of the program will be repeated with the appropriate modifications incorporated.

B. Presentation Evaluations

Each session of the program will be monitored and evaluated by the session backup instructor or a designated alternate.

An Instructor Evaluation Form is completed for the session and a presentation grade computed. To ensure the overall quality of instruction for each session, the following minimum standards are established.

1. Individual Presentation Standard

   Presentation Grade $\geq$ 2.5 (on a 4.0 scale)

   The Presentation Grade is the average grade of all the individually graded entries on the Instructor Evaluation Form.

2. Topic Presentation Standard

   Topic Grade $\geq$ 3.0 (on a 4.0 scale)

   The Topic Grade is the average grade of all the individual presentation grades for the topic.

Presentations which do not meet the minimum standards will be subjected to the following:

1. Weaknesses found in the presentation will be discussed with the instructor.

2. Key concepts which are not adequately covered in this presentation will be presented again to the trainees in a subsequent training session.

3. Trainee performance on quiz questions on the concepts covered in the presentation will be evaluated. If trainee performance of 70% is found, the entire training session will be repeated for the affected trainees.

C. <u>Knowledge Evaluations by Quiz</u>

Each lesson plant for the program is developed with representative quiz questions identified. During each week of training, quizzes will be administered and utilized for evaluation of trainee knowledge level. The quizzes will meet or exceed the following quiz standards:

1. Quizzes will be administered each week.

2. Each quiz will consist of at least ten questions.

3. At least 75% of the individual lesson plans presented during the week will have representative questions included in one or more of the quizzes.

4. A variety of question types may be used, but essay questions will predominate. Predetermined quiz question point values will be assigned for evaluation purposes.

Quizzes will be scored and a grade for each quiz determined. To ensure satisfactory level of understanding of the weekly program material, the following minimum standard is established for each trainee's performance:

1. Individual Quiz Standard

   Individual Quiz Grade $\geq$ 80%

For trainees who do not meet this standard, the following will occur:

1. Trainee will review the program the program material by reviewing the topic lesson plant and/or handouts.

2. Trainee will review the material with a designated staff member

   a. Control Room Operators and Shift Foreman will review the material with the Shift Supervisor.

   b. Shift Supervisors and licensed plant management will review the material with a designated instructor.

3. Another quiz will be administered and graded with the same standards in effect. The quiz will cover the material included in the unacceptable quiz(zes) and will be composed of questions not previously used during the program.

D. Knowledge Evaluation by Oral and Written Comprehensive Examination

1. Following the completion of the program, an Auditor Group will conduct a written and oral evaluation of the licensed trainees. The evaluation will be equivalent to an NRC administered licensing examination. It will include an expanded examination section covering the Operator Accelerated Retraining Program objectives. Each successful trainee will be reuqired to pass the audit examination with the minimum examination standard.

2. Licensed Unit 1 personnel who have successfully completed the Operator Accelerated Retraining Program will finally be required to take an NRC administered oral and written license examination.

6.7 PROGRAM FORMAT

The Operator Accelerated Retraining Program is developed in over sixty individual lessons involving classroom presentations, TMI Control Room walkthrough and simulator training sessions. The entire program is scheduled for completion in seven modules, with a module cosisting of 4 to 5 days (8 hr/day) of training.

Structuring the program into modules enable the scheduling of the presentations to occur during the six weeks cycle TMI training shift, or as a full time program. The content of each module is a selected grouping of individual lesson plans which cover material which is related to similar subjects. The modules are identified in Appendix B and are representative of the program scheduling.

A. Simulator Training Module

The initial program training module involved four and one-half days of training at the Babcock and Wilcox Nuclear Training Center. The module content included classroom training sessions and Control Room operational sessions. The individual topics were:

1. Power Distribution and Rod Withdrawal Limits (4 hours)

2. Heat Transfer and Fluid Flow (4 hours)

3. Small Break Analysis (4 hours)

4. Safety Analysis (4 hours)

5. TMI-2 Accident Analysis (4 hours)

6. Unannounced Casualties (16 hours)

The plant casualties included:

a. Natural Circulation Cooldown

b. Total Loss of Feedwater with no Emergency Feedwater (TMI-2 Accident)

c. Station Blackout (with diesels)

d. Loss of Coolant Accident

e. Steam Generator Overfeed

f. Steam Generator Tube Leak

g. Steam Leak in the Reactor Building

The simulator training module provides an overview of guidance for operators which has resulted from analysis of the TMI-2 incident and involvement in simulated plant abnormal and emergency conditions. This initial program module supplemented previous operator training and provided a reference point for subsequent program modules dealing with detailed plant systems, operator guidance and nuclear plant fundamentals.

B. TMI Module One

The first module of the program conducted at TMI involved four ays o: classroom training focused on nuclear plant fundamentals intergrated with specific plant operational characteristics. The individual topics are:

1. Heat Transfer and Fluid Dynamics (16 hours)

2. Reactor Theory (16 hours)

The content of module one provides an in-depth coverage of the fundamental aspects of nuclear reactor control and nuclear reactor heat removal. These topics review principles necessary for understanding the purpose and function of nuclear plant systems, operational procedures and required operator actions for safety operating TMI-1.

C. TMI Module Two

The second module of the program conducted at TMI involves three and one-half days of classroom training covering specific TMI-1 plant information on selected plant transients, plant systems and the Radiation Emergency Plan. The individual topics are:

1. TMI-2 Transient (4 hours)

2. Reactor Coolant System (5 hours)

3. Make-up and Purification System (4 hours)

4. In-Core Instrumentation (1 hour)

5. Control Rod Drive System (4 hours)

6. Nuclear Instrumentation (2 hours)

7. Integrated Control System (4 hours)

8. Radiation Emergency Plan (4 hours)

9. NRC Prompt Reporting Requirements and Enforcement Policy (0.5 hours)

The content of module two provides detailed coverage of the TMI-2 Transient which occurred March 28, 1979. This puts into perspective the plant systems and procedural training sessions included in subsequent program lessons. Detailed plant systems coverage begins in module two with sessions on key primary plant systems.

D. TMI Module Three

The third module of the program conducted at TMI involves four and one-half days of classroom training covering specific TMI-1 plant systems and operational procedures. The individual topics are:

1. TMI-1 Short-Term Modifications (4 hours)
2. Decay Heat Removal System (1 hour)
3. Decay Heat Closed Cooling System (1 hour)
4. Decay Heat River System (1 hour)
5. Core Flood System (1 hour)
6. Containment Isolation (1 hour)
7. High Pressure Injection (1 hour)
8. Use of Procedures (2 hours)
9. Nuclear Service Closed Cooling System (1 hour)
10. Nuclear Services River Water System (1 hour)
11. Reactor Building Emergency Cooling System (1 hour)
12. Intermediate Closed Cooling System (1 hour)
13. Feedwater System (1 hour)
14. Condensate System (1 hour)
15. Procedure Review-Reactor Coolant Pump Procedure (2 hours)
16. Emergency Feedwater System (2 hours)
17. Procedure Review-Emergency Feedwater Procedure (2 hours)
18. Main Steam System (1 hour)
19. Electrical Distribution (3 hours)
20. Emergency Diesel (2 hours)
21. Procedure Review-Electrical Power Emergency Procedure (2 hours)
22. Engineered Safeguards Actuation System (4 hours)

The content of module three provides detailed coverage of selected TMI-1 primary and secondary plant systems. The systems covered in the program include systems essential to normal and emergency cooling of the reactor.

E. TMI Module Four

The fourth module of the program conducted at TMI involves four and one-half days of classroom training covering specific TMI-1 plant systems, operational procedures and radioactive materials monitoring/control. The individual topics are:

1. Procedure Review-Primary System Leak Emergency Procedure (2 hours)

2. Procedure Review-Steam System Emergency Procedure (2 hours)

3. Reactor Protection System (4 hours)

4. Operating Characteristics Review including Natural Circulation (4 hours)

5. Solid Plant Operations (2 hours)

6. Procedure Review-Emergency Procedure (2 hours)

7. Procedure Review-Operating Procedures (4 hours)

8. Radiation Safety and Radioactive Materials Control (4 hours)

9. Radiation Monitoring (4 hours)

10. Radioactive Waste Disposal (4 hours)

11. Liquid and Gaseous Releases (2 hours)

12. Operational Chemistry (2 hours)

The content of module four provides detailed coverage of selected TMI-1 systems and plant procedures. Specific attention is given to normal and abnormal plant operations characteristics and related procedural guidance. Radiation safety, radiation monitoring, and radioactive materials control is covered to review existing guidance and present modifications made at TMI following the TMI-2 incident.

F. TMI Module Five

The fifth module of the program conducted at TMI involves five days of classroom training covering specific TMI-1 plant systems, operational procedures, technical specifications and plant operational characteristics. The individual topics are:

1. Ventilation (3 hours)

2. Hydrogen Recombiner and Hydrogen Purge (1 hour)

3. Technical Specifications-Limiting Conditions for Operation (4 hours)

4. Technical Specifications-Definitions and Safety Limits (2 hours)

5. Procedure Review-Administrative Procedures and Limitations and Precautions (2 hours)

6. Technical Specifications Review (4 hours)

7. Non-Nuclear Instrumentation and Interlocks (4 hours)

8. Small Break Loss of Coolant Accident Operator Guidance (4 hours)

9. Expected Instrument and Plant Response to Transients (4 hours)

10. Reactor Coolant System Elevations and Manometer Effects (2 hours)

11. Fuel Handling and Core Parameters (4 hours)

12. Simulated Transients in Control Room (4 hours)

The content of module five provides detailed coverage of selected TMI-1 Systems and plant procedures. Specific attention is given to normal and abnormal plant operating characteristics and related procedural guidance, including plant technical specifications. The TMI-1 Control Room is used to develop further relationship between expected plant response to operational situations and actual control instrumentation locations and features.

G. <u>TMI Module Six</u>

The sixth module of the program conducted at TMI involves five days of classroom training covering TMI-1 plant modifications and extensive coverage of safety analysis for TMI-1. The individual topics are:

1. Computer and Computer Modifications (4 hours)

2. TMI-1 Long Range Design Modifications (4 hours)

3. Safety Analysis Workshop (32 hours)

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The content of module six provides an overview of specific changes being planned and accomplished at TMI and provides an in-depth presentation of key safety analysis areas and their implication to TMI-1 plant operation. The safety analysis training will cover several areas of integrated TMI-1 plant response to normal and abnormal events and provide guidance in evaluating plant performance in real time. The fundamental principles of plant operation and plant system information will be combined with existing plant data to analyze several categories of potential abnormal operating conditions and categories of plant emergencies.

7.0 RADWASTE MANAGEMENT

7.1 GENERAL

The purpose of this section is to demonstrate that the decontamination or restoration of TMI-2 will not affect the safe operation of TMI-2 and that waste handling at TMI-1 is not dependent on operations at TMI-2.

The separation or isolation of Unit 1 and Unit 2 radwaste management capabilities include near term and long term modifications to the solid, liquid, and gas treatment and disposal systems. The primary area of concern is the piping interconnections in the liquid radwaste systems. These systems are currently shared by both Units. Among other concerns to be addressed are the effects of separation in the nuclear sampling systems, availability of waste storage, environmental barriers and effluent monitoring.

7.1.1 Near Term Modifications

Near term modifications (those made before startup of Unit 1) will be made to the liquid radwaste systems currently shared by both units. In particular, the intent of the separation requirements will be met by temporary recovery systems. These systems innclude Epicor 1 and Epicor 2 and the Chem-Nuclear Submerged Demineralizer system. There is no need or intent to send any Unit 2 radwaste to Unit 1 for processing.

Separation in nuclear sampling systems is being provided by the installation of a temporary sample sink. For further discussion of sampling system separation refer to Section 2.1.

In the short term, the use of Unit 1 Reactor Coolant Bleed Tanks as a temporary storage facility for effluent (processed) water from the Epicor-2 System may be necessary due to limited availability of onsite tankage. This water will be tritiated but otherwise wll be of discharge quality. By Spring, 1980, we expect to have additional tank storage capacity available onsite which will eliminate the need to use Unit 1 tanks for this purpose.

An environmental barrier has been designed to provide physical separation and prevent air movement between Unit 1 and Unit 2 portions of the fuel handling building. Design criteria for this installation will be reviewed by the NRC and approved for TMI-2 prior to completion of this modification.

All liquid waste is monitored and alarmed in Unit 1.

Industrial waste systems and sanitary facilities are presently shared by the two units. Since they are non-radioactive systems which present little risk of cross contamination, it is not intended that separation be provided. Sampling will be conducted to detect any contamination from Unit 2. Appropriate isolation will be provided if needed.

7.1.2 Long Term Modifications

Over the longer term, including the recovery phase and subsequent recommissioning of Unit 2, some permanent plant radwaste facilities will be installed. These facilities include evaporator solidification and resin handling capabilities. At this point preliminary engineering for these systems is in progress but a complete scope of the project is not yet defined nor is there any established construction schedule or funding authorization.

7.2 DISCUSSION OF SPECIFIC TERMS

7.2.1 Specific Areas of Separation/Isolation

Speciic areas of separation/isolation pertinent to the radwaste system are.

a. Radioactive waste transfer piping
b. Fuel handling building and environmental barrier
c. Liquid wastes
d. Miscellaneous waste evaporator
e. Solid waste disposal
f. Sanitary facility drains
g. Health physics and decontamination area
h. Sampling stations and radiochemical laboratory
i. Industrial waste treatment system
j. Industrial waste filter system
k. Sanitary facility drains

7.2.1.1 Radioactive Waste Transfer Piping

Prior to the accident at Unit 2, five radwaste tielines were use with a sixth tieline planned. The fiver operating tielin were:

a. Waste Disposal Liquid Reactor Coolant Tieline

This line tied both reactor coolant evaporators together.

b. Evaporator Distillate Tieline

This tie permitted transfer of distillate between units.

c. Waste Disposal Liquid - Miscellaneous

This tie permitted transfer of miscellaneous radwaste to the miscellaneous radwaste system of Unit 1 for treatment and evaporation.

d. Concentrated Waste

The concentrated waste tie permitted the storage of concentrated waste in Unit 2 prior to processing.

e. Spent Resin Tie

The spent resin tie permitted transfer of Unit 2 spent resin to Unit 1 for processing and shipment.

The reclaimed boric acid tieline was planned but never completed.

The methods to be used to isolate the above lines will be by means such as disconnecting control air, removing fuses from control circuits and MCC's, installation of spectacle flanges, disablement of manual valves or reconnection to special facilities being installed for Unit 2. The specific method selected for each will be documented, reviewed, approved and incorporated into operating procedures. These lines will not be severed.

7.2.1.2 Fuel Handling Building and Environmental Barrier

The fuel handling building is common to both units. A wall will be errected to provide physical separation and prevent air movement between Unit 1 and Unit 2 fuel handling areas.

The existing fuel handling building crane will be maintained on the Unit 2 side of the wall, with access to the Unit 1 side by a removable wall section.

7.2.1.3 Liquid Wastes

Liquid discharges from Unit 2 that are copmmon to Unit 1 are:

a. Evaporator distillate
b. Epicor 1 effluent
c. Epicor 2 effluent

In Unit 2 the liquid waste system is divided into two separate chains: the reactor coolant liquid waste chain and the miscellaneous waste chain. The reactor coolant liquid waste chain transfers concentrated wastes to Unit 1 for disposal. A discussion of the disposal of concentrated wastes is found in Section 7.2.1.5.

7.2.1.4 Miscellaneous Waste Evaporator

The design of Unit 2 originally relied on Unit 1 for miscellaneous waste evaporation. Miscellaneous waste was transferred by way of the miscellaneous waste tieline to Unit 1 (see Section 2.1). This miscellaneous waste is made up from the following sources in Unit 2:

a. Auxiliary building sump
b. Radwaste building sump
c. Neutralized waste
d. Contaminated drains (laundry and decontamination)
e. Radioactive secondary wastes

Miscellaneous waste will be processed by Epicor 2, the submerged demineralization system and the HPD evaporator system. The Unit 1 miscellaneous waste evaporator will only be used for subsequent processing and by specific approval for each batch.

7.2.1.5 Solid Waste Disposal

The Unit 2 radwaste systems are dependent on Unit 1 for solid waste disposal. The following sources are included.

a. Evaporator concentrates
b. Spent Resins
c. Compactible trash

The Unit 2 evaporator concentrate and spent resins will be handled separately from Unit 1. The isolation of the solid waste tielines is discussed in Section 7.2.1.1. The solids from both units are packaged for offsite shipment in the Unit 1 Auxilairy Building. Spent resins, concentrated liquids, and used precoat filter material produced as a result of radioactive systems operation are now processed in the same facility.

7.2.1.6 Sanitary Facility Drains

Sewage and sanitary drains from Unit 2 join those of Unit 1 in the sewage disposal holding tanks and pumping station. This sewage is then hauled offsite for disposal.

Should any Unit 2 sanitary facilities become contaminated, they will be isolated and any associated sewage batch so sampled prior to removal from the site.

7.2.1.7 Health Physics and Decontamination Areas

Unit 2 has its own health physics and decontamination areas, personnel, and overall organization. Prior to the accident, Unit 2 was using the Unit 1 decontamination area.

In general, all health physics control for Unit 2 will be conducted from the Unit 2 health physics checkpoint or temporary checkpoints for remote entries into construction or decontamination areas. Decontamination of hot material will be done in the Unit 2 area or in external facilities.

7.2.1.8 Sampling Stations and Radiochemical Laboratory

The sampling station and radiochemistry laboratory located on Unit 1 were shared facilities prior to the accident.

A temporary sample sink has been installed for interim operation and a permanent sample sink and radiochemistry lab facility will be installed in the Unit 2 model room prior to Unit 1 startup.

7.2.1.9 Industrial Waste Treatment System (IWTS)

The following Unit 2 sumps feed the IWTS:

a. Turbine Building
b. Control and Service Building
c. Tendon Galley
d. Control Building Area
e. Diesel Building

A similar collection of sumps from Unit 1 also feed the IWTS. Sumps from both Units 1 and 2 feed a common sump in the IWTS.

Procedural controls will be utilized to prevent pumping to the IWTS should any of the Unit 1 area sumps become contaminated.

7.2.1.10 Industrial Waste Filter System (IWFS)

The following Unit 2 sumps feed the IWFS:

a. Sludge sump (Unit 2 pretreatment)
b. Water treatment sump (alternate route only)

Since the Unit 2 pretreatment system is not in operation, input to the sludge sump is very limited.

The following Unit 1 sumps feed the IWFS:

a. Sludge sump (Unit 1 pretreatment)
b. Powdex sump

The IWTS also feeds sludge to the IWFS.

Procedural controls will be utilized to prevent pumping to the IWFS should any of the Unit 1 sumps become contaminated.

7.2.1.11 Sanitary Facility Drains

Sewage and sanitary drains from Unit 2 join those of Unit 1 in the sewage disposal holding tanks and pumping station. This sewage is then hauled offsite for disposal.

Should any Unit 2 sanitary facilities become contaminated, they will be isolated and associated sewage batch so sampled prior to removal from the site.

7.2.2 Effluent Monitoring Discrimination

Methods for distinguishing between Unit 1 and Unit 2 effluent are similar to the isolation system methods discussed in Section 7.2.1.1 which utilize line separation. Separate monitoring will be conducted for Unit 2 discharge lines.

7.3 RADWASTE CAPABILITY

(To be supplied later)