

UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)
)
 METROPOLITAN EDISON COMPANY) Docket No. 50-289
) (Restart)
 (Three Mile Island Nuclear)
 Station, Unit No. 1))

LICENSEE'S RESPONSE TO THE FOURTH
 SET [SIC; FIFTH SET] OF INTERROGATORIES
 FROM MARJORIE M. AAMODT
 (DATED FEBRUARY 25, 1980)

INTERROGATORY NO. 1

Do you plan to increase the amount of basic engineering and physics training in thermal hydraulics for operators and senior operators?

- (a) Provide description of course material and time allowed to master.
- (b) Provide names and background (education and experience) of instructors.

RESPONSE

Initially, training in basic heat transfer, fluid flow, and thermo dynamics is being increased through the Operator Accelerated Retraining Program (OARP) (see Restart Report, Section 6), which includes 16 hours of instruction in this subject. The principal instructor is Chester F. Kupiec, Jr. A copy of Mr. Kupiec's resume is attached. Information on the OARP lesson plans will be placed in Licensee's Discovery Reading Room. Insofar as the

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"time allowed to master" this material, operators are first examined for retention of the lessons upon completion of instruction; and are thereafter orally examined upon completion of instruction of all the material in the OARP. In addition, operators will be examined after the OARP and prior to restart by an independent consultant from Personnel Qualifications Services (Frank Kelly). See Response to Interrogatory No. 4.

Licensee also plans to increase instruction in this subject in its Operator Training Program (OTP). Course content has not yet been finalized; however, it will at a minimum include instruction in basic heat transfer, fluid flow and thermo dynamics as contained in the OARP. Further, the OTP standards are under review by two special review committees, each of which will be making recommendations for improvements in the OTP standards.

INTERROGATORY NO. 2

What instruction in basic engineering and physics of thermal hydraulics was given to operators and senior operators prior to TMI-2 accident?

- (a) Provide description of course material and time allowed to master.
- (b) Provide names and backgrounds (education and experience) of instructors.

RESPONSE

Training in basic heat transfer, fluid flow and thermo dynamics, as generally described in the Unit 1 FSAR, Section 12, was given to Operators and Senior Reactor Operators before obtaining cold licenses prior to Unit 1 startup. Subsequent

classes received limited specific formal training in the subject; however, principles of basic heat transfer, fluid flow and thermo dynamics did form a part of the instruction given in reactor operations, turbine cycle operations and heat exchange operations.

Licensee's records do not indicate the names of instructors who gave cold license instruction in this subject. Dennis J. Boltz, Nelson D. Brown and Richard W. Zechman instructed in reactor operations, turbine cycle operations or heat exchange operations prior to the TMI-2 accident. The resumes of these training department personnel are attached.

INTERROGATORY NO. 3

If the answer to #1 is "yes," give reason why.

- (a) Relate to TMI-2 accident.
- (b) Had a deficiency in this kind of training ever been perceived prior to TMI-2 accident studies?
- (c) Explain.

RESPONSE

Licensee believes that the intensified training in basic heat transfer, fluid flow, and thermo dynamics, discussed in the Response to Interrogatory No. 1 will assist the operator in better diagnosing and responding to transients such as those which occurred during the TMI-2 accident.

Portions of the Operator Training Program relating to this subject which were conducted at TMI were based on experience gained in operations and training at both military and commercial nuclear power plants, and followed generally accepted industry standards

in effect prior to the TMI-2 accident. Licensee considered these training standards to be adequate.

INTERROGATORY NO. 4

Provide a copy of tests proposed to be used to test retention of course material referred to in Question 1.a.

- (a) How will tests be graded?
- (b) Who will grade tests?
 - (1) Provide names and background.
- (c) What will be considered a passing grade?
- (d) What grade will indicate need for retraining?
 - (1) Will any other factors be considered in eligibility for retraining?
- (e) What grade will cause dismissal from program?
 - (1) Will any other factors be considered in dismissal?

RESPONSE

As described in the Restart Report, Section 6, an examination is under preparation by Frank Kelly, an independent consultant retained by Licensee to administer an audit examination of the Licensed Reactor Operators and Senior Reactor Operators. To preserve the validity of the test, it will not be available until after they are administered. See Licensee's March 14, 1980 objection to Aamodt Interrogatory No. 4.

- (a) The test will contain essay questions and will be graded based on the specific objectives of the questions.
- (b) See attached resume.

- (c) The passing grade criteria for the examination are contained in the Licensee's Restart Report, Appendix A, Response to Question 47.
- (d) Retraining criteria are contained in the reference cited in c. above. Weak areas, as defined in the audit, will be reviewed to determine retraining requirements.
- (e) The criteria for Licensee action for unsatisfactory grades on the audit examination are contained in Section 6.6 of the Restart Report.

INTERROGATORY NO. 5

Who constructed (or will construct) tests requested in #4?

- (a) Provide the name of company or individuals and background.
- (b) Were any principles of test construction used to insure reliability of test to predict performance? Explain.

RESPONSE

- (a) See Response to Interrogatory No. 4.
- (b) The tests are being constructed in accordance with NRC requirements contained in NUREG-0094. Without a definition of what this interrogatory means by "principles of test construction used to insure reliability of test to predict performance" Licensee is unable to respond further to this interrogatory.

INTERROGATORY NO. 6

For each position in the control room, provide the following for pre-TMI-2 accident:

- (a) Educational background required.
- (b) Experience required.
- (c) Training required including course name, description of material covered, length of time for training, length of average training day.
- (d) Tests required for each course, indicating passing grade, retraining grade and dismissal grade.

RESPONSE

Prior to the TMI-2 accident, minimum education and experience standards for Licensee's control room personnel were based on minimum standards contained in American National Standard, ANSI, N18.1-1971, Selection and Training of Nuclear Power Plant Personnel. A copy of the ANSI standard will be placed in Licensee's Discovery Reading Room.

Training and test requirements for control room operators in effect prior to the TMI-2 accident were contained in Licensee's Auxiliary Operator C Program, Auxiliary Operator B Program, Replacement Control Room Operator Program and Shift Foreman and Shift Supervisor Programs. A description of these programs will be placed in Licensee's Discovery Reading Room.

INTERROGATORY NO. 7

Same as #6 for post-TMI-2 accident.

RESPONSE

The minimum education and experience requirement and the basic training course and tests are currently the same as described in Licensee's Response to Interrogatory No. 6. These requirements are under review by two special review committees as described in Licensee's Response to Interrogatory No. 1. In addition, Licensee is conducting an Operator Accelerated Retraining Program, as described in the TMI-1 Restart Report, Section 6.

INTERROGATORY NO. 8

Who constructed tests referred to in 6.d and 7.d.

- (a) Provide background of company or individual in test construction.

RESPONSE

Operator test construction since the TMI-2 accident has been supervised by M.L. Beers, who was Group Supervisor, Nuclear Operator Training, Metropolitan Edison Company, and by Frank Kelly. Mr. Beers' resume is attached. For Mr. Kelly's background, see response to Interrogatory No. 4.

Prior to the accident, individuals responsible for test construction included Mr. Beers and Mr. R.W. Zechman, Supervisor, Operator Training. Mr. Zechman's qualifications are attached hereto.

INTERROGATORY NO. 9

How was reliability of tests (6.d) assessed?

RESPONSE

The tests were constructed in accordance with accepted industry standards, which Licensee considered to be adequate. Furthermore, the performance of Unit 1 operators on NRC-administered licensing examinations has been above the national average. This is a significant indication of the reliability of Licensee's testing and training procedures.

INTERROGATORY NO. 10

How will reliability of tests (7.d.) be assessed?

RESPONSE

These tests will draw upon the OARP and the recommendations of the review committees which are now assessing Licensee's training and testing standards. In addition, operator performance will be analyzed by management on an ongoing basis and adjustments to course material and testing will be implemented in accordance with this review process.

INTERROGATORY NO. 11

What differences between items requested in #6 through #10 do you believe will reduce the number of projected incidents upon restart of TMI-1 over past performance? Explain.

- (a) What is your level of confidence? On what is it based?
 - (1) Give basis and rationale other than opinion. Give personnel and consultants involved in any study and their qualifications relative to hiring and job performance evaluation.

RESPONSE

All of the changes to Licensee's operator training and testing are designed to improve operator capabilities to assure the safe operation of Unit 1. Our confidence that these changes will reduce the number of projected incidents is based on the intensified OARP and testing prior to restart of Unit 1 and on the comprehensive reviews being conducted by special committees of experts in nuclear operations, training and testing.

INTERROGATORY NO. 12

What differences between items requested in #6 through #10 do you believe would have prevented or mitigated the TMI-2 accident? Explain, being specific.

RESPONSE

Testing and operator training in similar incidents at other nuclear plants, small break Loss of Coolant Accidents (LOCA's), other abnormal conditions, High Pressure Injection System and Reactor Coolant Pump operations, and redirected emphasis in heat transfer and fluid dynamics, as described in the Restart Report, Section 6, are to prevent an accident like the TMI-2 accident.

INTERROGATORY NO. 13

In your experience in operating a nuclear power plant, have some individuals performed better than others in "totally unanticipated situations"? (p. 104 Rogovin)

- (a) Was this true during the TMI-2 accident?
- (1) Have you identified such individuals?
 - (2) Have you identified the characteristics of those individuals that were effective?
 - (3) Have you identified characteristics that were not effective?
 - (4) Provide characteristics referred to in 13.a. (2) and basis.
 - (5) Provide characteristics referred to in 13.a. (3) and basis.

RESPONSE

Licensee's operators have been selected and trained to have the capability to respond to unanticipated operational situations. Licensee cannot identify any subset of its operators to date who have "performed better than others in totally unanticipated situations". This applies to Licensee's operators during the TMI-2 accident. See also, Response to Interrogatory No. 14.

INTERROGATORY NO. 14

How do you plan to cope with "totally unanticipated situations"?

- (a) Have you provided for these situations in training? Explain how.
- (b) Have you provided for these situations in screening before hiring? Explain how.

RESPONSE

Training programs now include Simulator Training with increased emphasis on unanticipated situations, decision

analysis training, guidance for the operator outside the realm of established procedures, and safety analysis workshops, as listed in the Restart Report, Section 6. Licensee selects applicants with the proper background and experience which, together with subsequent training, will enable them to respond to all operational situations. See Responses to Interrogatories Nos. 6, 7, and 34.

INTERROGATORY NO. 15

Will there be a "gap" between simulator training and type of plant for TMI-1 operators?

(a) If so, what kind of gap or gaps? Describe.

RESPONSE

Licensee's operators are trained on a simulator located at the B&W Training Center, Lynchburg, Va. Since the accident at TMI-2, all of Licensee's operators have been trained in a B&W simulator training module which trains operators based on analysis of the TMI-2 accident, and exposes operators to simulated, unannounced abnormal and emergency plant conditions. Although control room configuration of the simulator differs from the Unit 1 control room, training in control room manipulations is transferrable to the Unit 1 control room.

INTERROGATORY NO. 19

Under proposed redesign of control room, to how many variables must an operator respond?

- (a) During normal operation?
- (b) During shutdown operation?
- (c) During startup operation?
- (d) In the first 10 minutes of a replay of the TMI-2 accident?

RESPONSE

Section 2 of the Restart Report identifies changes in the control room design for Unit 1. In addition, consultants to Licensee are conducting a human engineering study which is expected to contain recommendations for future control room redesign; however, no "proposed redesign" has yet been identified. Licensee has not, for the various operating modes described in this Interrogatory, quantified the total number of variables to which an operator will be required to respond under the current redesign of the control room.

INTERROGATORY NO. 20

Give questions of #19.a-d. for pre-TMI-2 accident control room at TMI-2.

RESPONSE

With respect to the Unit-2 Control Room, a human factors evaluation of control room design and operator performance at TMI-2 was published by the NRC in January 1980 (NUREG/CR-1270, Vol. 1). A description of the controls, displays, integrated controls/displays, and annunciators to which an operator was required to respond are contained in the report. Licensee

has not quantified the total number of variables to which an operator was required to respond in the Unit 2 control room prior to the TMI-2 accident.

INTERROGATORY NO. 20 (sic)

Do you test for visual acuity, color blindness and reaction time for operators and supervisors?

RESPONSE

To qualify as Reactor Operators and Senior Reactor Operators, individuals are required to be examined by a medical doctor utilizing American National Standard ANS/3.4/ANSI N546-1976, "American Standard Medical Certification and Monitoring of Personnel Requiring Operator License for Nuclear Power Plants". Testing for visual acuity, color blindness and manual dexterity is included in the examination.

INTERROGATORY NO. 27

Why was 71% considered adequate as a passing score on annual examinations, with no need for "accelerated training program"?

- (a) Why do you now believe that 71% is not adequate, or 81% is not adequate? (81% refers to score needed to avoid all training).

RESPONSE

This interrogatory does not accurately describe Licensee's grading standard with respect to annual requalification tests administered under Licensee's Operator Requalification

Program. For a description of these standards, see Section 12 of the FSAR for Unit 1. These requalification grading standards have not changed since the TMI-2 accident. The numerical grading standard alone does not indicate the "adequacy" of the examinations. The construction of the examinations with respect to difficulty is such that the passing grades selected are considered to be adequate to demonstrate an operator's knowledge for safe operation of the power plant.

INTERROGATORY NO. 28

Do you believe from operating experience that 100% scores on tests proposed are necessary for adequate operator performance?

(a) If not, what % score would be adequate and why?

RESPONSE

100% scores are not expected on these examinations as they are designed. Examination grading standards are explained in the Unit 1 FSAR, Section 12, and the Restart Report, Section 6. See Response to Interrogatory No. 27.

INTERROGATORY NO. 29

What additional classifications of subject matter are included in the new test that were omitted in prior tests?

RESPONSE

The audit examination (see Response to Interrogatory No. 4) for Licensee's operators to be administered prior to Unit 1 Restart, will contain a new section on basic heat transfer,

fluid flow and thermo dynamics. Thereafter, Licensee's annual requalification examinations, and subsequent prelicensing audit exams administered by the Licensee, will cover the subject.

See Responses to Interrogatory Nos. 1 and 2.

INTERROGATORY NO. 30

Are you planning to train operators to cope with any Class 9 scenarios in addition to those of the general classification of the TMI-2 accident?

RESPONSE

See response to Interrogatory No. 14. Training of operators in Licensee's emergency plan implementing procedures is described in the Licensee's emergency plan, which is contained in Section 4 of the Restart Report.

INTERROGATORY NO. 31

Do you believe that the man-machine interface suggested by many of the recent studies will improve operator performance?

- (a) How much do you believe it will reduce incidents?
Give basis.
- (b) Would it have prevented initiation of the TMI-2 accident?
- (c) Would it have mitigated the errors subsequent in the TMI-2 accident?

RESPONSE

Improvements in the man-machine interface at TMI-1 are described in the Restart Report, Section 2. Included are provisions for ensuring that control room operators have

improved indication of parameters such as PORV position and saturation margin that were important parameters during the TMI-2 accident. Licensee has not quantified the improvement in operation which will result from these modifications.

The TMI-2 accident was dominated by the failure of the pilot-operated relief valve (PORV) to close. Improved indication of the open or closed position of that valve will enhance man-machine interface. This improvement would alert operators to the need promptly to close the block valve before the PORV and thereby terminate any small break LOCA through a stuck-open PORV.

INTERROGATORY NO. 32

Had a man-machine interface study ever been considered by you before the TMI-2 accident?

(a) When and for what reason?

RESPONSE

The man-machine interface of the Unit 1 control room was considered and appraised in its original design and construction. Mock-ups were erected using facsimiles of the devices to be monitored on the control boards. Through detailed discussion with persons knowledgeable with the plant operating procedures, these devices were then arranged in a logical and operable manner. The physical arrangement finally devised as a result of this consultation between operating and design

personnel was then transferred to a drawing for use by the control board fabricator.

INTERROGATORY NO. 33

How had human errors been dealt with at TMI-1 and 2?

(a) Was this effective?

RESPONSE

Licensee has treated human errors in a manner which it believes has been effective, including prevention of human error through training programs, correction of human error through retraining and, if warranted, through disciplinary measures.

INTERROGATORY NO. 33 (sic)

Are any principles, used in other training procedures of performance analagous to the control room, been borrowed in establishing your training procedures? (sic)

RESPONSE

Licensee's Management and Training Department personnel continually communicate with professional organizations, regulatory agencies and other utilities. Where applicable, useful principles and procedures are incorporated in Licensee's training procedures.

INTERROGATORY NO. 34

What screening of applicants do you do prior to hiring for training? Provide interviews, examinations and tests used in screening.

RESPONSE

A description of Licensee's selection process for reactor operators will be placed in Licensee's Discovery Reading Room. Your attention is called particularly to section 1 of "Selection Process for Reactor Operators". Copies of an employee job appraisal report form and a pre-employment interview form will also be placed in Discovery Reading Room.

INTERROGATORY NO. 35

Have you considered how employees' "mindset" regarding the safety of nuclear energy has affected their performance.

- (a) What are operators told about their responsibility in protecting the health and safety of the public? Provide copy.
- (b) Provide copy of information both written and verbal given to employees relative to the possible hazards of nuclear power generation.
 - (1) Is any information relative to b. given in a newsletter or newspaper? If so, provide some examples.
- (c) Do you agree that the majority of your employees believe that nuclear power generation is very safe?
- (d) What information is given to employees about the effects of low-level radiation? Provide copy.

RESPONSE

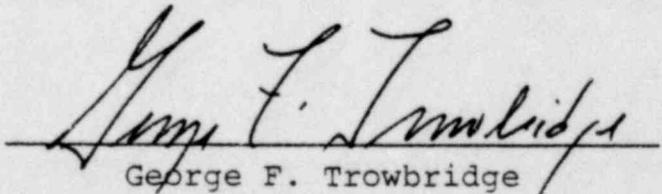
- (a) Licensee has distributed a management policy statement which provides emphasis and designates specific

command responsibilities for protecting the health and safety of the public. See Restart Report, Supplement 1, Response to Question 25.

- (b) Licensee's General Employee Training Program, which is administered to all employees during initial training and in annual retraining, instructs employees on the risks and health effects of nuclear power generation. A copy of the General Employee Lesson Plan on Basic Health Physics will be placed in Licensee's Discovery Reading Room along with copies of information on radiation risks and effects, which are distributed to each employee during the instruction. Also included will be an example of instructive information included in a daily newsletter published by Licensee and distributed to employees.
- (c) No poll of employee opinion regarding this question has been held.
- (d) See b. above.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE


George F. Trowbridge

Dated: March 31, 1980

Attachment

Response to Interrogatory No. 1

CHESTER F. KUPIEC, JR.

EDUCATION

1964

M.S., Nuclear Engineering, Catholic University of America

1962

B.E.E., Electrical Engineering, Catholic University of America

EXPERIENCE

1977 - Present

General Physics Corporation
Manager, Training Projects

Mr. Kupiec is responsible for the Basic Academic Training Programs taught by General Physics. He is Project Manager on the current contract for the Department of Health, Education and Welfare for the development and field testing of courses for a Nuclear Quality Assurance/Quality Control Technician. He has been a Project Manager for the development of Systems Training Manuals for PWR power stations.

Mr. Kupiec has been previously involved with advanced programs which are under development by General Physics and which relate to commercial utility programs. He was a lead investigator on the project to develop an objective operator performance method using the Browns Ferry Power Plant simulator. He also assisted in the preparation, review and editing of training texts, materials and programs.

1968 - 1977

Westinghouse Electric Corporation
Senior Training Engineer

Mr. Kupiec was a Senior Training Engineer for nine years at Westinghouse Electric Corporation, Zion Training Center. He directed other training engineers and instructed in the areas of reactor theory and control, radiation protection and safety, process instrumentation and control, electricity and electronics. His responsibilities also included lesson note writing, lesson plan preparation, test preparation and student evaluations.

POOR ORIGINAL

Attachment

Response to Interrogatory No. 1

CHESTER F. KUPIEC, JR.

EDUCATION

1964 M.S., Nuclear Engineering, Catholic University of America

1962 B.E.E., Electrical Engineering, Catholic University of America

EXPERIENCE

1977 - Present General Physics Corporation
Manager, Training Projects

Mr. Kupiec is responsible for the Basic Academic Training Programs taught by General Physics. He is Project Manager on the current contract for the Department of Health, Education and Welfare for the development and field testing of courses for a Nuclear Quality Assurance/Quality Control Technician. He has been a Project Manager for the development of Systems Training Manuals for PWR power stations.

Mr. Kupiec has been previously involved with advanced programs which are under development by General Physics and which relate to commercial utility programs. He was a lead investigator on the project to develop an objective operator performance method using the Browns Ferry Power Plant simulator. He also assisted in the preparation, review and editing of training texts, materials and programs.

1968 - 1977 Westinghouse Electric Corporation
Senior Training Engineer

Mr. Kupiec was a Senior Training Engineer for nine years at Westinghouse Electric Corporation, Zion Training Center. He directed other training engineers and instructed in the areas of reactor theory and control, radiation protection and safety, process instrumentation and control, electricity and electronics. His responsibilities also included lesson note writing, lesson plan preparation, test preparation and student evaluations.

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1963 - 1968

National Bureau of Standards
Nuclear Engineer

While at the National Bureau of Standards, Mr. Kupiec conducted laboratory experiments of an applied and developmental nature in the areas of neutron physics, solid state radiation detectors, and a fast neutron irradiation facility. The irradiation facility was to be used for testing and evaluating reactor materials for better and safer energy production from reactors.

SPECIAL QUALIFICATIONS

Mr. Kupiec holds a Professional Engineer's License in the State of Illinois and has held a Senior Reactor Operator's license at a 10 KW Nuclear Training Reactor at the Zion Nuclear Power Station.

POOR ORIGINAL

Attachment

Response to Interrogatory No. 2

PERSONAL RESUME

NAME: Dennis J. Boltz

ADDRESS: Box 1280, R. D. #6
Lebanon, Pa. 17042

PHONE: 717-865-6017

DATE OF BIRTH: November 14, 1948

HEALTH: Excellent

PERSONAL: Married: Dependents - Wife, Four Sons
Height: 5'8"
Weight: 165 pounds
Hobbies: Camping, Fishing, Hunting

EDUCATION: NRC Senior Operator License No. SOP-2784-1,
TMINS Unit I - August 1978
NRC Senior Operator License No. SCP-2784,
TMINS Unit I - August 1976
NRC Reactor Operator License No. OP-3615,
TMINS Unit I, August 1974

Metropolitan Edison Company Training Programs
See Enclosure 1

Lebanon Valley College
Annville, Pennsylvania
1966 - 1967 First Semester
Major: Chemistry - Pre-Medical

High School Graduate - 1966
Northern Lebanon High School
Fredericksburg, Pennsylvania
Major: College Preparatory

MILITAR : No Military Experience

POOR ORIGINAL

EXPERIENCE:

January 1, 1977 to Present: Employed by Metropolitan Edison Company holding the position of Administrator - Nuclear Technical Training. I have been instrumentally involved in the development and implementation of Three Mile Island Nuclear Station Unit 1 and Unit 2 Reactor Operator and Senior Reactor Operator License Training Programs. This includes scheduling, instructing, and documentation of these training programs, as well as the administration of mock Nuclear Regulatory Commission RO and SRO license examinations and oral examinations. I personally wrote the examination used in the issuance of the original TMI-2 supervisory NRC SRO Cross Licenses - the first time ever that the NRC granted operator licenses based on the results of an In-house examination. I was heavily involved in the design, writing, training and implementation of the TMI-2 Radiation Emergency Drills required for the issuance of the NRC Station Operating License. I was personally designated coordinator for a previous TMI-2 Unit Superintendent NRC SRO License Training Program, and was personally involved in senior site management training programs. Hold current SRO license.

I actively participate as Refueling Supervisor in the annual TMI-1 refueling operations. Participated in Three Mile Island Nuclear Unit 2 Recovery Effort following March 28, 1979 as Assistant Site Emergency Coordinator, in charge of on and off-site health physics and chemistry operations involving dose rate assessments and sampling activities, and direct supervision of all radioactive liquid transfers, clean-up operations and radioactive liquid releases from TMI Units 1 and 2.

October 1975 to January 1977: Held position of TMI-1 Operations Shift Foreman - Nuclear. Supervised shift operations during plant's initial fuel cycle and first refueling outage.

October 1969 to October 1975: Held position of Control Room Operator - Nuclear at TMI-1. Completed the attached programs successfully and obtained an NRC RO License. Actively participated in TMI-1 initial start-up and testing programs (unit was declared commercial in September 1974).

February 1969 to October 1969: Worked at Met Ed's Crawford Generating Station as Storeroom Manager - maintained inventories for machinery replacement parts, chemicals, maintenance apparatus, etc. Duties included stockkeeping, ordering and dispensing of materials and parts.

June 1968 to February 1969: Worked as Boiler Room Assistant at Met Ed's Crawford Generating Station.

February 1967 to June 1968: Worked for Whitroyer Laboratories, Inc. as a Chemical Process Reactor Operator. Controlled Chemical Reactors employed in the manufacture of patented livestock medicines.

May 1966 to September 1966: Employed by Lebanon News
Publishing Company, Lebanon, Pennsylvania, as a newspaper
proof reader.

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ENCLOSURE 1

METROPOLITAN EDISON COMPANY SPONSORED TRAINING PROGRAMS

1. TMI Reactor Operator Course - 10/20/69 - 9/19/70

- (1) Math (120 hrs)
- (2) Classical Physics (40 hrs)
- (3) Atomic Physics (40 hrs)
- (4) Nuclear Physics (80 hrs)
- (5) Shielding (40 hrs)
- (6) Heat Transfer (80 hrs)
- (7) Reactor Physics (220 hrs)
- (8) Reactor Kinetics (140 hrs)
- (9) Reactor Operations (140 hrs)
- (10) Health Physics (80 hrs)
- (11) Instrumentation and Control (80 hrs)
- (12) Nuclear Instrumentation (20 hrs)
- (13) Basic Electronics (40 hrs)
- (14) NSSS and Balance of Plant Systems - TMI-1 (800 hrs)

2. Post Training Program (600 hrs) - 1/11/71 - 4/25/71

Systems and Operating Procedures review.

3. General Electric Turbine Course (20 hrs) - 7/71

Operator turbine course by General Electric

4. Reactor Familiarization Program (40 hrs) - 9/71

Conducted at Penn State University Reactor Facility, State College, Pa.

- Included:
1. Nuclear Instrumentation Experiments
 2. Shielding Experiments
 3. Critical Mass Experiments
 4. Control Rod Worth Determinations
 5. Four Start-ups on the TRIGA Reactor

5. TMI-1 Pre-Audit Training Program (200 hrs) - 1/29/73 - 3/2/73

Included: Lectures on TMI NSSS, response to alarm procedures, reactor physics, instrumentation and control, Integrated Control System, process instrumentation, Technical Specifications, Operating and Emergency Procedures, electrical systems, and selected NUS Tapes.

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6. Simulator Orientation Course (32 hrs) - 7/73
Conducted by Babcock and Wilcox Corp.
7. Pressurized Water Reactor Simulator Training Programs
By Babcock and Wilcox at Lynchburg, Virginia
(30 hrs) - 8/73
(40 hrs) - 1974
(40 hrs) - 1976
(40 hrs) - 1978
(40 hrs) - 1979
8. TMI-1 Pre-License Review Program (180 hrs) - 1974
Conducted by: 1. Babcock and Wilcox (90 hrs)
2. General Physics Corp. (90 hrs)
9. TMI-1 Licensed Operator Regualification Program - 1974 - present
10. TMI-1 SRO License Training Program (80 hrs) - 6/76
11. Westinghouse Electric Corporation AEH Operator Training Program (20 hrs) - 5/77

POOR ORIGINAL

2

Attachment
Response to Attachment No. 2

RESUME

Name:

Richard W. Zechman

POOR ORIGINAL

Home Address:

458 N. Holly Street
Elizabethtown, Pa. 17022

Education:

High School Graduate - 1955
Reading Senior High School
Reading, Pa.

Pennsylvania State University
University Park, Pa.
Accumulated 83 credits (1961 - 1969)

Penn State Nuclear Reactor Operator/SRO
Training Program - 1965

B&W Unit I Nuclear System Program 1969
B&W Unit II Nuclear Systems Program 1974
B&W Simulator Start-up Certification Program 1977

Licenses Held:

- 1) AEC Operators License OP-1182
Pennsylvania State University 1965 - 1966
- 2) AEC Senior Operator License S02-750
Penn State University 1966 - 1969
- 3) FCC 2nd Class Radio Telephone License (1954 to present)
- 4) FCC General Class Amateur Radio License (1954 to present)

Employment History:

September 1969 to present: Employed by the Metropolitan Edison Company in 1969 as a Training Specialist. Was responsible for the Administration and Training of the TMI Unit I Operator/Senior Operator Cold and Hot License Training Programs. Participated in the administration and training of TMI Unit II Operations Personnel and was promoted to Supervisor of Training on September 1, 1978.

September 1963 to September 1969: Employed by the Pennsylvania State University Nuclear Engineering Department. Having qualified as an AEC Licensed Senior Operator of the Triga Mark III Reactor, held the position of Training Supervisor. Was responsible for the supervision and operation of the nuclear reactor and the training of nuclear engineering students. Participated in the training of the Pennsylvania State University staff of the Triga Mark III Reactor. Was co-author of the Text - "Aircraft Engines in Nuclear Power Plant Heat Loss Training" published by the Nuclear Engineering Department.

September 1956 to 1961: Employed by the Western Electric Company, Laurel Dale, Pa. as a Senior Electronics Technician. Was responsible for calibration of production standards test sets relative to Semiconductor and Microwave devices.

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Attachment
Response to Interrogatory No. 2

THREE MILE ISLAND TRAINING INSTRUCTOR RESUME

NAME: NELSON DAVID BROWN

POOR ORIGINAL

EDUCATION

Name of School	Location	Dates Attended
Palmyra High School	Palmyra, Penna.	1961 - 1965 Graduated College Prep without Foreign Language
Millersville State College	Millersville, Penna.	1965 Did not graduate - Math Major
USAF Radio Relay Repairman School	Keesler AFB Mississippi	June 1966 - Graduated February 1967
Communications Electronics Correspondence Course	Sembach AFB Germany	March 1967 - Graduated April 1967
Radio Relay Repairmans Correspondence Course	Sembach AFB Germany	April 1967 - Graduated July 1967
Transistor School	Frankfurt, Germany	June 1968 - Graduated
CREI - Correspondence	--- various ---	1968 - 1970 Did not complete because I stopped working on electronic equipment.
Auxiliary Operator Training	Three Mile Island Middletown, Pa.	April 1971 - Graduated October 1971
Control Room Operator Training	Three Mile Island Middletown, Pa. & Lynchburg, Va.	March 1974 - Graduated November 1974
NUS Instructor Workshop	Rockville, Md.	September 1975 - Graduated
Senior Operator Training	Three Mile Island Middletown, Pa.	June 1976 - Graduated
Supervisors Development Program	Reading, Penna.	February 1977 - Graduated
Personnel Management	Harrisburg, Penna.	June 1977 - Graduated

Experience:

Administrator - Nuclear and Technical Training - Metropolitan Edison Company
Three Mile Island 1975 - present

In this position I have been responsible for classroom instruction of the Operator Requalification Program. An additional item has been to implement the Replacement Operator Training Programs for Reactor Operators and Senior Reactor Operators. The job duties also included scheduling and documenting training programs, including initial training for TMI - Unit 2. I also participated in TMI - Unit 1 refueling operations, and periodic control room duties, in order to maintain proficiency for my Senior Operator's License, obtained in this position.

Control Room Operator - Nuclear - Metropolitan Edison Company Three Mile Island
1974 - 1975

In this position I was responsible for the operation of the plant (TMI - Unit 1) from initial criticality through the startup program, commercial operation and initial TMI - Unit 1 refueling. Additionally I was responsible for directing the activities of the Auxiliary Operators assigned to the shift. Obtained Reactor Operator License while in this position.

Auxiliary Operator 'A' - Nuclear - Metropolitan Edison Company Three Mile
Island - 1970 - 1974

Following the initial training program I was responsible for operating equipment in the plant as it was turned over from the construction company. Additionally I participated in the initial procedure writing effort, Reactor Fuel receipt and initial core loading.

Butcher - Berney Abbatino, Hershey, Pa. 1970

My job consisted of skinning beef, scalding hogs and custom meat cutting.

Radio Relay Repairman - USAF 1966 - 1970

This position required the maintenance of the microwave and multiplex equipment. Additionally I was responsible for directing the activities of the three other repairmen working in the department.

Butcher - Melvin Burkholder, Campbelltown, Pa. 1964 - 1966

I worked as a Beef skinner, meat cutter and retail clerk part-time and full time as I learned the trade.

The following items are benefits of my work experience:

- 1) Communication ability - this has been enhanced from being an instructor for four years.
- 2) Administration, Documentation, Scheduling & Implementation - my duties as Administrator - Nuclear and Technical Training have required new ideas to save time & money on documentation procedures and efficient use of instructors and classrooms.
- 3) Adaptability - In being able to transfer from an operator to performing the duties I presently have as an Administrator which requires good leadership qualities for directing classroom activities and oral examination administration.

Additionally my employment history has added to the ability of problem solving with a minimum of time and effort.

POOR ORIGINAL

EXPERIENCE

Summary

Twenty-five (25) years in the nuclear industry engaged in nuclear power plant start and test, operator qualification and regulatory evaluation of operator proficiency.

Specific Experience Highlights:

1. NUCLEAR REGULATORY COMMISSION - Seven (7) years.

Chief, Operator Licensing Branch. Responsible for the formulation and evaluation of operator and senior operator examinations, administered to operators of power, test and research facilities. Developed and implemented NRC policies for the use of nuclear power plant simulators utilized as training devices.

2. OPERATOR & SENIOR OPERATOR QUALIFICATION & EVALUATION - Ten (10) years.

Directed efforts and participated in the selection, training and evaluation of operators while in supervisory positions with Westinghouse Electric Corporation and two (2) nuclear service consulting firms.

3. MANAGEMENT OF NUCLEAR POWER PLANT TRAINING SIMULATOR - Three (3) years.

Responsible for the startup and operation of the Westinghouse Nuclear Training Center, Zion, Illinois, USA.

4. STARTUP & OPERATION OF NUCLEAR POWER PLANTS - Five (5) years.

Responsible for the startup and operation of nuclear power plants, test reactors and research facilities - NRC licensed on six (6) plants.

EDUCATION

- o BS Electrical Engineering, University of Vermont
- o Completed credits for MS Nuclear Engineering, University of Pittsburgh

REGISTRATIONS/LICENSES

Nuclear Engineer, State of California, Registration #NU383

PROFESSIONAL AFFILIATIONS

American Nuclear Society - Past Chairman, Reactor Operations Division

COMMITTEES/ADVISORY GROUPS

Present Secretary, ANS-3, Subcommittee on Reactor Operations (authors of ANS Standards N18.7, N18.1 and ANS 3.5).

ASME, Operations and Maintenance Committee

Attachment

Response to Interrogatory No. 8

REPLACES OF RESUME OF
MARSHALL L. BEERS

313 NINE RD., RD #5
LYBRANON, PA. 17042

POOR ORIGINAL

EMPLOYMENT

7/78 to Present: Metropolitan Edison Company
Three Mile Island Nuclear Station
Group Supervisor - Technical Training - Nuclear

6/73 - 6/78: Metropolitan Edison Company
Three Mile Island Nuclear Station
Shift Supervisor

11/70 - 5/73: Metropolitan Edison Company
Three Mile Island Nuclear Station
Unit II Shift Foreman
Unit I Shift Foreman

1966 - 1970: Westinghouse Electric Corporation
Naval Reactors Facility
Idaho Falls, Idaho
Reactor Engineer

1961 - 1966: Westinghouse Electric Corporation
Naval Reactors Facility
Idaho Falls, Idaho
Reactor Test Technician

1956 - 1961: Westinghouse Electric Corporation
Bettis Lab
Pittsburgh, Pa.
Electronics Technician

EDUCATION

High School: Dayton High School, Dayton, Pa.
Graduated 1946

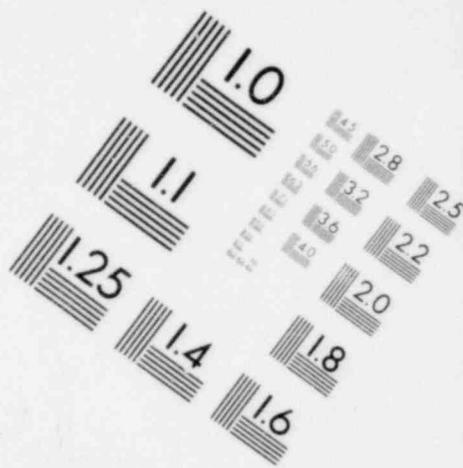
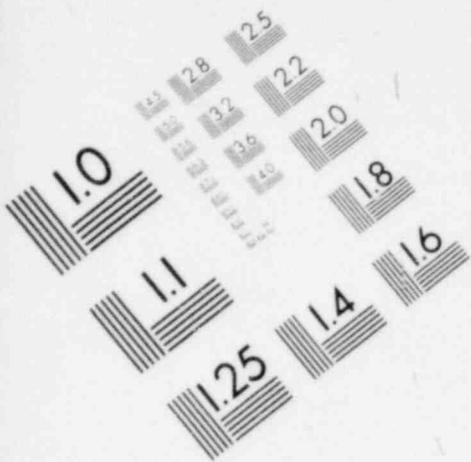
College: Pennsylvania State University
1946 - 1947 1 Academic Year
Electrical Engineering-Course of Study

Other: Allegheny Technical Institute
Pittsburgh, Pa.
Evening School 1954 - 1957
Industrial Electronics-Course of Study

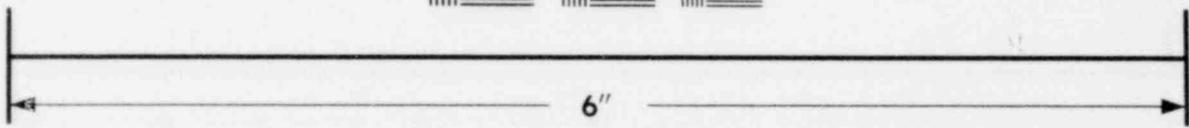
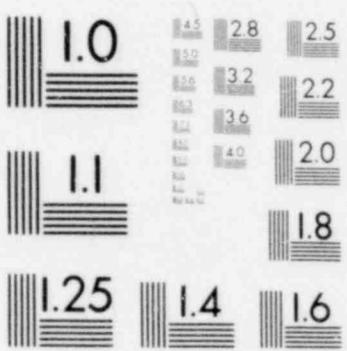
Company Sponsored Courses:

Babcock & Wilcox PWR Technology Course

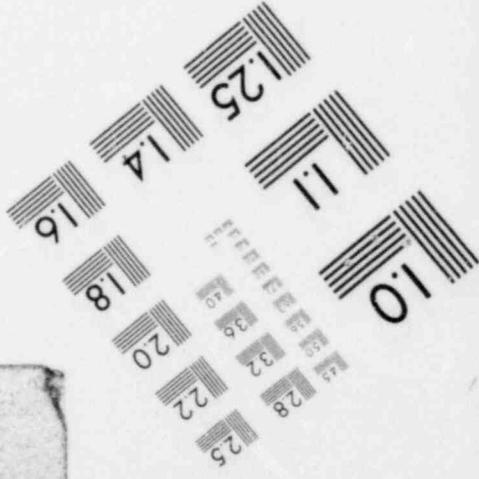
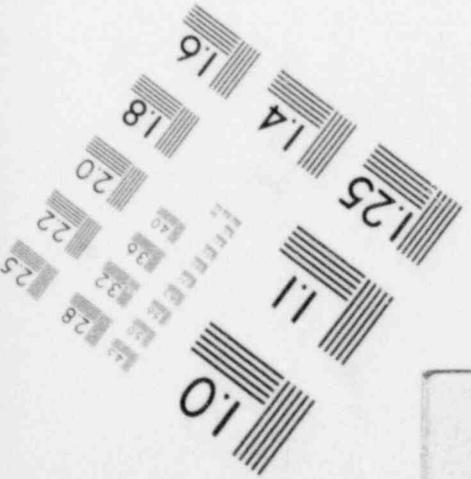
Bailey Meter Company - Integrated Control System Familiarization
Program



**IMAGE EVALUATION
TEST TARGET (MT-3)**



MICROCOPY RESOLUTION TEST CHART



POOR ORIGINAL

SERVICE

1950 - 1952

U.S. Army - Infantry
 Private to Staff Sergeant
 Served in Korea with last position as Platoon Sergeant
 Honorable Discharge

PERSONAL

Birth Date: 1/31/28 Dayton, Pa. Height: 5'9" Weight: 165 lbs.
 Married: Wife - Graduate of Penn State University
 Children: Five; ages - 28, 25, 23, 19, 13
 Health: Excellent - No physical limitations.
 Hobbies: Flying - Private Pilot, Tennis, Skiing

LICENSES AND QUALIFICATIONS

1966 Qualified Reactor Operator - ALW
 Dual Plant Prototype

1974 Three Mile Island Unit I
 NRC Operator License OP-3473

1974 Three Mile Island Unit I
 NRC Senior Operator License SOP-2224

1976 Three Mile Island Unit I
 Renewal - NRC Senior Operator License SOP-2224-1

1977 Three Mile Island Units I & II
 Amended - NRC Senior Operator License SOP-2224-2

1978 Three Mile Island Units I & II
 Renewal - NRC Senior Operator License SOP-2224-3

SHAW, PITTMAN, POTTS & TROWBRIDGE

1800 M STREET, N. W.
WASHINGTON, D. C. 20036

RAMSAY D. POTTS
STUART L. PITTMAN
GEORGE F. TROWBRIDGE
STEPHEN D. POTTS
GERALD CHARNOFF
PHILLIP D. BOSTWICK
R. TIMOTHY HANLON
GEORGE M. ROGERS, JR.
JOHN B. RHINELANDER
BRUCE W. CHURCHILL
LESLIE A. NICHOLSON, JR.
MARTIN D. KRALL
RICHARD J. KENDALL
JAY E. SILBERG
BARBARA M. ROSSOTTI
GEORGE V. ALLEN, JR.
WM. BRADFORD REYNOLDS
FRED A. LITTLE
FRED DRASNER
NATHANIEL P. BREED, JR.
MARK AUGENBLICK
ERNEST L. BLAKE, JR.
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WILLIAM P. BARR
JOHN L. CARR, JR.
PHILIP J. HARVEY
ROBERT M. GOROCN
JEANNE A. CALDERON
BARBARA J. MORGEN*
BONNIE S. GOTTLIEB
ALFRED M. POSTELL
SETH H. HOOGASIAN
SHEILA E. McCAFFERTY
DELISSA A. RIDGWAY
KENNETH J. HAUTMAN
DAVID LAWRENCE MILLER

(202) 331-4100

TELECOPIER

(202) 296-0694 & 296-1760

TELEX

89-2693 (SHAWLAW WSH)
CABLE "SHAWLAW"

EDWARD B. CROSLAND
COUNSEL

*NOT ADMITTED IN D.C.

March 31, 1980

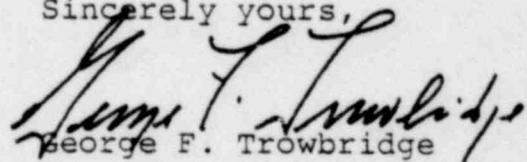
Ms. Marjorie M. Aamodt
R.D. 5
Coatesville, Pennsylvania 19320

Re: Three Mile Island Unit 1
Docket No. 50-289 (Restart)

Dear Ms. Aamodt:

I enclose Licensee's responses to your fourth (sic; fifth) set of interrogatories. Copies of signed affidavits for these responses are not enclosed, but will be forwarded soon.

Sincerely yours,


George F. Trowbridge

Enclosure

cc: Service List