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

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KAY L. RICHMAN
TIMOTHY B. McBRIDE
CHARLES W. SURASKY*

*NOT ADMITTED IN D.C.

(202) 331-4100

TELECOPIER
(202) 296-0694 & 296-1760

TELEX
89-2693 (SHAWLAW WSH)
CABLE "SHAWLAW"

JOHN H. SHARON
EDWARD B. CROSLAND
COUNSEL

September 6, 1979

George Frampton, Esquire
NRC/TMI Special Inquiry Group
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear George:

I am enclosing, in response to the request in your letter of August 28, 1979 to George F. Trowbridge, copies of the following sections of Burns & Roe, Inc.'s Specification 2555-46 ("Control Boards, Control Systems and Instrumentation, Three Mile Island Nuclear Station, Unit No. 2").

1. Division 1 (General Requirements and Special Conditions)

   A. Section 1A (General Requirements - Delivery):

      a. Part 14 -- Engineers' Drawings and Specifications.
      b. Part 26 -- Testing and Startup.

   B. Section 1B (Special Conditions):

      a. Part 3.2 -- Instruction Manuals and Spare Parts Lists.
      b. Part 9.0 -- Conformance with Trade Practices.
      c. Part 10.0 -- Federal OSHA Regulations

2. Division 2 (Technical Specifications)

   A. Section 2A (Control Boards, Control Systems and Instrumentation):

      a. Part 2.1 -- Work to be Provided.
      b. Part 2.3 -- Codes and Standards
      c. Part 2.4 -- Drawings

Hymc — Please contact Marino & get him a copy. Thanks. George

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Section 2A (cont'd.)

d. Part 3.2 -- Seismic Conditions
e. Part 3.5 -- Mimic Lines and Color Coding
f. Part 3.6 -- Panel Finish and Painting
g. Part 3.7 -- Electrical Requirements
h. Part 3.8 -- Pneumatic Requirements
i. Part 3.14 -- Instrumentation and Control System
j. Part 3.15 -- Thermowells
k. Part 5.1 -- Acceptance Tests
l. Part 5.4 -- Operational Tests
m. Part 5.5 -- Calibrations

Sincerely,

Mat.

Matias F. Travieso-Diaz

MFTD:ry

Enclosures

Before receiving final payment for his Work, the Vendor shall certify and furnish proof satisfactory to the Owner that all material and equipment embodied in the Work and all labor costs incurred thereon have been fully paid and discharged.

The Vendor shall include a provision satisfying the requirements of this Article as a part of any and all subcontracts entered into for the work or any portion thereof.

12. EXCLUSIVE LIABILITY

The Vendor shall be exclusively liable for all contributions or taxes imposed by or required under the State Unemployment Insurance Law, Disability Benefits Act, or the Federal Social Security Act or any other act, now or hereafter in effect, upon or in respect of wages, salaries or other compensation paid to employees engaged upon, or in connection with the work to be performed hereunder, and shall furnish to the Owner his State Unemployment Insurance Registration Number.

13. INFRINGEMENT OF PATENTS

The Vendor shall hold and save the Owner harmless from liability of any nature or kind for or on account of any patented or unpatented design, invention, method or article furnished or used by the Vendor in the performance or fulfillment of the Contract. The Vendor agrees to defend at its own expense any suit or action brought against the Owner based on a claim that the equipment or material, or any part thereof, furnished hereunder constitutes an infringement of any patent, if notified promptly in writing and given authority, information and assistance for the defense of the same, and agrees, further, to pay all costs, expenses and damages incurred by or awarded against the Owner therein. If the equipment, or material, or any part thereof is in such suit or action held to constitute infringement, or its use is enjoined, the Vendor shall at its option, but at its own expense, either procure for the Owner the right to continue using such equipment, or replace the same with non-infringing equipment, or modify it so that it becomes non-infringing; provided, however, that all replacements or modifications of equipment proposed shall first be approved by the Owner. If not so approved, the Owner shall have the right to require the removal of the infringing equipment and the return of the purchase price and installation costs thereof.

14. ENGINEERS' DRAWINGS AND SPECIFICATIONS

Any Work shown on the Owner's or Engineers' Drawings and not particularly described in these specifications, order or Contract, or specified and not shown on the drawings, shall be included by the Vendor and the omission from both drawings and specifications of express references to any detail of work necessary and obviously intended shall not relieve the Vendor from furnishing the same.

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These specifications, order or Contract and the accompanying drawings are intended to describe and provide for a finished piece of Work. They are intended to be complementary, and what is called for by either shall be as binding as if called for by all. It is understood and agreed by the Vendor that the Work described shall be complete in every detail, even though every item necessarily involved is not particularly mentioned. The Vendor shall provide all shop labor, materials and equipment necessary for the entire completion of the Work described, and shall not avail himself of any manifestly unintentional error, omission or inconsistency should such exist.

Should any error or inconsistency appear in the drawings, specifications, order or Contract, or should the Vendor be uncertain as to the Work, the Vendor, before proceeding with the Work, shall inform the Owner or Engineers of the same in writing, and then proceed with the Work as directed by the Owner or Engineers in writing.

15. VENDOR'S DRAWINGS

The Vendor shall prepare all necessary detail drawings, designs, etc., giving full and complete information, and he shall commence this work immediately upon receipt of the necessary information, priority being given to those drawings, etc., necessary for fabrication of the material or equipment in the order of its required delivery.

Unless otherwise specified, not less than five (5) copies of all Vendor's and subvendor's drawings shall be submitted to the Owner or Engineers for approval. The Vendor shall submit all drawings to the Owner or Engineers at the proper time so as to prevent delays in the delivery of materials and equipment. All Vendor's drawings submitted for approval by the Owner or Engineers shall be sent directly to the Owner's or Engineers' Home Office.

All drawings submitted by subvendors of the Vendor, for approval by the Owner or Engineers, shall first be sent by the subvendors directly to the Vendor, who shall keep a record of the drawing numbers and dates of receipt. The Vendor shall check thoroughly all subvendors' drawings as regards measurements, sizes of members, materials and details to satisfy himself that they conform to the intent of the Owner's or Engineers' plans and specifications. Drawings found to be inaccurate or otherwise in error shall be returned to the subvendors for correction before submitting them to the Owner or Engineers. After the Vendor has checked and approved such drawings, he shall place thereon the date of approval and signature of the checker, and then submit them to the Owner or Engineers for approval.

All Vendor's and subvendors' drawings shall be submitted in the order in which materials and equipment are needed at the site without necessarily waiting for completion of all drawings before submitting part of them for approval. The Owner's or Engineers' approval of the Vendor's and subvendors' drawings shall not relieve the Vendor from responsibility for errors or omissions which may exist, even though Work is done in accordance with such approved drawings.

The Vendor shall forward to the Owner or his representatives a summary report of the progress of the various divisions of the Work under the Contract whether in the mills or shops and in the field, stating the existing status, rate of progress, estimated time of completion and cause of delays, if any. This report shall be submitted monthly and in the form required by the Owner or his representatives.

The Vendor shall submit to the Owner or his representatives his purchase order list, if any, showing his various subvendors, purchase order number, date, a description of the material involved and the delivery date specified. Such information is to be submitted at monthly intervals so that the Owner or his representatives will be aware of the progress being made by the Vendor in the placing of orders.

The Vendor shall be responsible for expediting the delivery of all materials to be furnished by him so that progress shall be maintained according to the delivery schedule in effect.

During the course of the Work, Vendor must regularly update its CPM schedule for the more current aspects of the Work and submit it on a monthly basis on the last of the month.

Vendor shall conform to the overall program of the Owner or his representatives to achieve the rapid completion of the project as a whole and within the limits of the schedules in effect.

26. TESTING AND START-UP

The Operator and/or Engineers will direct the testing and starting up of all equipment being furnished under this specification. The Vendor will be required to furnish specialists from the equipment manufacturer's organization, who are thoroughly qualified in the operation of the equipment, to supervise the testing and start-up, under the general direction of the Operator or Engineers.

The Vendor's responsibility under this section shall extend to all equipment furnished by him, regardless of the identity of the manufacturer of such equipment.

27. EXCEPTIONS

Each and every exception to the Specification and General Requirements shall be listed separately by the Bidder. In case no exceptions are submitted with the proposal, it will be understood that the proposal includes the Specification and General Requirements in all respects.

The reproducibles shall be such that deletions, changes and additions may be made to them easily. The reproducibles shall be 17" high by 22" wide in accordance with ASA standard Y14.1-1957 for size C drawings. The reproducibles shall be submitted by Contractor at the same time as its internal wiring diagrams.

3.2 Instruction Manuals and Spare Parts Lists

3.2.1 Requirements

Contractor shall prepare and furnish Instruction Manuals and Spare Parts Lists where they are called for in the technical division of this specification. These items shall be submitted in accordance with the provisions of the GENERAL REQUIREMENTS and the procedure set forth herein. The Shop Drawing Transmittal Form shall be used as the transmittal letter. The Instruction Manuals shall be transmitted at time of shipment of the equipment described. A total of 16 copies of the Instruction Manual (s) (not ten (10) as stated in the General Requirements) and twelve (12) copies of the Spare Parts List shall be mailed directly to the recipients at the addresses and in the number given below.

The Spare Parts List shall consist of a complete listing of the names and part numbers of all replacement parts. A separate list shall be made giving the names, numbers and prices of parts recommended by Contractor to be purchased and carried in stock by Owner for maintenance purposes. The list of recommended spare parts shall be based on the approved Shop Drawings and is to be submitted within thirty (30) days after approval of Shop Drawings so that there will be time for Owner, if it chooses, to order the spare parts and have them delivered with the equipment.

Address	Number of Copies: Transmittal Letter	Instruction Manuals	Spare Parts List
Burns and Roe, Inc. 670 Winters Ave. Paramus, N.J. 07652 ATTN: Mr. J. P. Cady, Jr.	4	2	1
United Engineers & Constructors, Inc. P.O. Box 480 Middletown, Pa. 17057 ATTN: Mr. G. T. Cavis	1	2	2

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Address	Number of Copies: Transmittal Letter	Instruction Manuals	Spare Parts List
United Engineers & Constructors, Inc. 30 South 17th Street Philadelphia, Pa. 19101 ATTN: Mr. E. H. Case	1	-	-
Metropolitan Edison Company P.O. Box 480 Middletown, Pa. 17057 ATTN: Mr. J.G. Herbein	2	8	5
GPU Service Corporation 260 Cherry Hill Road Parsippany, New Jersey 07054 ATTN: Mr. R. W. Heward, Jr.	2	1	1
GPU Service Corporation c/o United Engineers and Constructors, Inc. P.O. Box 480 Middletown, Pa. 17057 ATTN: Mr. J. J. Barton	1	1	1
GPU Service Corporation P.O. Box 480 Middletown, Penna. 17057 ATTN: Mr. J. B. Wright	1	1	1
(with Equipment)	1	1	1

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3.2.2 General Format of Instruction Manuals

The Instruction Manuals shall be complete and specific and the contents shall conform with the index. Every attempt shall be made to use material specific to the Contract Documents including all literature of the suppliers or manufacturers, that would be useful to Owner in the care, operation and maintenance of the equipment. Nomenclature of reference to any one item shall be consistent throughout the manuals.

The information furnished shall be complete for main and auxiliary equipment and systems furnished by Contractor and/or it suppliers. Material that does not contribute to the understanding of the design, care, operation and maintenance of the equipment shall be excluded from the Instruction Manuals where

practicable. If it is necessary to use existing material containing extraneous items, the item referred to shall be clearly and plainly marked and the irrelevant data shall be deleted in an orderly and systematic manner.

Use shall be made of drawings, diagrams (including wiring diagrams), pictures or actual photographs when they add to the understanding and clarity of the text.

All material shall be free from stamps commonly used for identification of customer, order number, and the like.

Precautions and warnings relative to the safety of life and equipment shall be included where applicable.

It is recognized that there are commercial-type handbooks for many of the items of equipment.

.1 Where published material is available in a form that contains the essential information required, such material may be utilized in whole or in part if properly integrated into the overall Instruction Manual, even though it may not necessarily follow the order of arrangement specified in the "Arrangement Format of Instruction Manuals" set forth in Paragraph 3.2.3. For example, Contractor may utilize sub-assemblies instructions that are furnished by manufacturers who may supply instruction handbooks on their subassembly, as in the case of the Thrust bearing on a turbine.

.2 Where the content of these subassembly publications is such that it will meet the intent of these requirements, Contractor may include such publications in their existing published form as part of its Instruction Manuals provided they are suitably integrated into the description of its equipment and are indexed in their entirety in Contractor's general index.

.3 If the publication of the subassembly manufacturer does not contain a complete care, operation, maintenance and parts breakdown, meeting the intent of these requirements, then it shall be the responsibility of Contractor to include such information in its Instruction Manuals or to arrange with the subassembly manufacturer to provide a publication that will meet these requirements.

.4 Where the subassembly item is of such a nature that local repair is normally not employed and the item is usually returned to the factory as a unit for overhaul, reference shall be made to such facts in the Instruction Manuals and the specific information concerning its repair and parts breakdown may be omitted.

The page size shall be 8-1/2" by 11" and shall be punched to fit the standard three hole binder. The use of foldout pages or turn pages shall be kept to a minimum. Foldout pages shall be held to a two-page foldout whenever practicable but shall not exceed an overall length of 34" from the binding edge.

Each Instruction Manual shall be collated in its proper order and placed in an expandable hard-covered three-post binder. The binder shall be of the type that may be taken apart without the use of threaded binding posts.

3.2.3 Arrangement Format of Instruction Manuals

The Manuals shall be divided into the following sections, arranged in the order shown:

Title Page
Index
Isometric Drawings
Section I - Installation
Section II - Operation
Section III - Maintenance
Section IV - Parts Catalog
Associated Publications

The first page of each Instruction Manual shall be a title page conforming to the Sample Title Page enclosed.

The index pages shall confo to the Sample Index which follows the Sample Title page enclosed.

If handbooks of subassembly equipment or other components are included as part of the Instruction Manuals as permitted herein, then these associated handbooks shall be noted under the "Manufacturer's Catalog" heading of the index.

Actual photographs, pictures or isometric drawings of the major equipment shall be included immediately after the index page.

INSTRUCTION MANUAL

OPERATION - MAINTENANCE INSTRUCTIONS

AND

PARTS CATALOG

FOR

(Applicable Name of Equipment)

(Model No.)

CONTRACTOR

(Name of Contractor)

(Address)

SAMPLE TITLE PAGE

INDEX

	Manufacturer's Catalog	Page No.
SECTION I - INSTALLATION		
SECTION II - OPERATION		
General Description		
Performance Specifications		
Starting Instructions		
Operating Instructions		
Shutdown Instructions		
Design Data		
Curves		
Test Reports and Certificates		
SECTION III - MAINTENANCE		
Disassembly Instructions		
Maintenance Instructions		
Settings, Clearances and Adjustment Data		
Test and Calibration Procedures		
SECTION IV - PARTS CATALOG		
Replacement Parts, Drawings and Lists		
Instructions for Ordering Replacement Parts		

SAMPLE INDEX

3.2.4 Operation Section of the Instruction Manual

The operation section of the Instruction Manuals shall contain:

.1 General description of all equipment, including overall design, specific and special features of design, and descriptive drawings, where practicable.

.2 Performance specifications for all equipment stating the basis for calculations and allowable variations

.3 Starting instructions complete, detailed, and specific for all equipment furnished, noting the step-by-step procedure to be followed for starting the equipment. Precautions and critical points to be observed shall be noted and emphasized as required. These instructions shall be divided into "Initial Starting", "Normal Starting" and "Starting after Overhaul".

.4 Operating instructions complete, detailed and specific for all equipment furnished. Included shall be precautions and critical points to be observed, including suggested form to be used in taking periodic readings to maintain an operations record. There shall be a tabulation of possible operating difficulties with the probable causes listed and remedial action to be taken under each one.

.5 Shutdown instructions complete, detailed and specific for all equipment furnished, noting the step-by-step procedure to be followed for shutting down the equipment. Precautions and critical points to be observed shall be noted and emphasized. These instructions shall be divided into "Normal Shutdown' and "Emergency Shutdown".

.6 Design data for all equipment and systems specifying horsepower, kilowatts, voltage, amperage, pressure, temperature, revolutions per minute flow etc.

.7 Characteristic curves for all equipment where called for in the equipment specifications or normally furnished for the particular equipment, such as fuel consumption, head, capacity, horsepower, efficiency, etc.

3.2.5 Maintenance section of the Instruction Manuals

.1 Disassembling instructions complete, detailed and specific for all assemblies of all equipment furnished, noting the step-by-step procedure to be followed. Unusual care and precautions to be taken shall be noted and emphasized.

.2 Maintenance instructions complete, detailed and specific for all equipment furnished, and shall include normal preventive maintenance instructions and lubrication information. Schedule shall be included covering tests and inspections to be performed after various periods of operation. A summary description and identification of special tools required or furnished for maintenance shall be of these instructions.

.3 Settings, clearance and adjustment data tabulated for all equipment covering instrument settings for operation, alarm and shutdown, and operating clearances for equipment and adjustments required for equipment for proper operation. There shall also be included a tabulation of operating conditions such as temperature, pressure, flow, etc., for all equipment and systems. The above data shall be arranged under two headings: recommended and actual. The actual shall be entered after installation or field test.

3.2.6 Parts Breakdown

Parts breakdown section of the Instruction Manuals

.1 Replacement parts, drawings and lists completely detailed and with specific replacement part drawings and lists for all equipment assemblies and subassemblies. The material shall cover all information required for ordering replacement parts such as part name, part number, equipment serial number, etc.

.2 Complete instructions for ordering replacement parts in a manner that would prevent errors or misunderstandings. Recommended forms for tabulating replacement part information and instructions for returning material to the factory shall also be included. Special storage or handling prcedures required for any particular parts shall be noted.

3.2.7 Associated publications portion of the Instruction Manuals

.1 When the manufacturer of a major unit of equipment finds it feasible to utilize in its Instruction Manual existing publications on subassembly or associated equipment components, these associated publications shall be located in this section unless they can be subdivided, in which case subparagraphs 3.2.2.1 and 3.2.2.2 of General Format of Instructions Manuals shall apply.

.2 When a section or a part thereof does not apply, the section or part title shall be shown on its appropriate place in the Index and shall be followed by the words, "Not Applicable".

4.0 CONTRACTOR'S PURCHASE ORDER LIST AND REPORTS

4.1 Purchase Order List

Contractor shall submit a report on the status of its purchase orders. This report shall be made on a reproducible copy of a form which will be furnished to Contractor by United Engineers and Constructors, Inc. after Award of Contract. This report form shall be used by Contractor in making copies as required for reporting purposes. During the course of work, vendor will update its CPM schedule when important changes occur from the original submittal.

4.2 Progress Reports

Except as hereinafter specified, five (5) copies of each of the reports listed below shall be transmitted to:

United Engineers and Constructors, Inc.
30 South 17th Street
Philadelphia, Pa. 19101
ATTN: Mr. E. H. Case, Manager- Purchasing

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and

Two (2) copies of each of the reports shall be transmitted to:

Mr. J. P. Cady, Jr., Project Manager
Burns and Roe, Inc.
670 Winters Ave.
Paramus, N.J. 07652

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7.0 BREAKDOWN OF PRICE AND INVOICING

(Not Applicable)

8.0 COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK

Contractor shall commence work on written notice from Owner to proceed. Contractor shall deliver the equipment F.O.B. factory, freight allowed to project site, as required by Contract Documents.

9.0 CONFORMANCE WITH TRADE PRACTICES

It is Contractor's responsibility to assure that the equipment it supplies is manufactured or fabricated by skilled and trained labor and to assure that such equipment, fabricated in Contractor's or Subcontractor's shop and which requires handling, erection and field installation by construction crafts, conforms with the requirements of local trade practices, codes, and agreements applicable to the construction site.

10.0 FEDERAL OSHA REGULATIONS

Seller represents and warrants that all articles covered by this purchase order meet or exceed all specifications promulgated to meet safety and health standards under the Occupational Safety & Health Act of 1970 (U.S.C. Eq Eq 651 et seq. (1970), and the regulations in effect as of the date of this order as they relate to the uses for which such articles have been purchased. Nothing herein shall be deemed to refer to the conditions and procedures under which such articles are manufactured or other wise processed by seller prior to delivery.

DIVISION 2

SECTION 2A

CONTROL BOARDS, CONTROL SYSTEMS, AND INSTRUMENTATION

1.0 SCOPE

This Specification covers the design, fabrication, testing and delivery of control boards, control systems, instrumentation and accessories complete all as indicated on the drawings and as specified herein.

2.0 GENERAL

2.1 Work to be Provided

The Work to be provided under this Specification shall consist of supplying the following equipment, and providing the services specified:

.1 Control Boards, completely fabricated, wired and piped including supply and mounting of equipment shown on panelboard drawings and Bills of Materials and Instrument Data Sheets.

a. Turbine Control
b. Electric Control
c. Coolant Systems Monitoring
d. Plant Equipment Temperature Recording
e. Containment Isolation
f. Turbine Supervisory
g. Station Electric Auxiliaries Monitoring Panel
h. Turbine Auxiliaries and Test
i. Generator and Transformer Protection
j. Vital Power Panel
k. Liquid and Gas Radwaste Control Panel
l. Solid Radwaste Control Panel

.2 Balance-of-Plant Process Instrument - Cabinets with complete fabrication, equipment supply, mounting, wiring and piping mounted in these cabinets.

These cabinets shall house all of the equipment shown on the Instrumentation and Control Schematics as being located in the "Cable Room". Estimated five (5) cabinets required. Vendor to determine exact number.

.3 All instrumentation and accessories indicated on the Instrument Data Sheets listed in Volume III, and elsewhere in this Specification. This includes equipment to be field mounted, wired and piped by Others as well as that installed by Contractor in Control Boards or Cabinets.

.4 Installation of Owner furnished equipment on control boards including all necessary wiring and piping.

.5 Any and all special tools required for installation and/or maintenance of any or all equipment or parts thereof.

.6 Desk

2.2 Work by Others

The following work will be provided by others:

.1 Installation of control boards and field-mounted instruments and accessories.

.2 Instrument piping between transmitters and pneumatic receivers, control air lines to transmitters and valve positioners, except for piping between manifolds and instruments within the confines of the panel, console or cabinet.

.3 All electrical conduit and wiring external to the panels, consoles and cabinets.

.4 Equipment foundations, including embedded members and anchor bolts.

.5 All panels and consoles indicated as "Not Included in Spec. 2555-46" on Control Room and Cable Room arrangement drawings.

.6 Instruments shown on flow diagrams but not included in the Instrument Data Sheets, Volume III.

.7 Furnishing of all equipment shown on panel layout arrangement bills of materials as "Owner-furnished" or "Furnished by Others - Not in Spec. 2555-46".

2.3 Codes and Standards

All Work provided under this specification shall be in strict conformance with the latest edition and latest addenda thereto, of the applicable codes, standards, specifications, regulations, procedures and tests of the following:

1920 321

.1 National Electrical Code

.2 National Electrical Manufacturers Association

.3 Institute of Electrical and Electronics Engineers

.4 American National Standards Institute

.5 American Society of Mechanical Engineers

DIVISION 2

SECTION 2A

CONTROL BOARDS, CONTROL SYSTEMS, AND INSTRUMENTATION

1.0 SCOPE

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b. Electric Control
c. Coolant Systems Monitoring
d. Plant Equipment Temperature Recording
e. Containment Isolation
f. Turbine Supervisory
g. Station Electric Auxiliaries Monitoring Panel
h. Turbine Auxiliaries and Test
i. Generator and Transformer Protection
j. Vital Power Panel
k. Liquid and Gas Radwaste Control Panel
l. Solid Radwaste Control Panel

.2 Balance-of-Plant Process Instrument - Cabinets with complete fabrication, equipment supply, mounting, wiring and piping mounted in these cabinets.

These cabinets shall house all of the equipment shown on the Instrumentation and Control Schematics as being located in the "Cable Room". Estimated five (5) cabinets required. Vendor to determine exact number.

.3 All instrumentation and accessories indicated on the Instrument Data Sheets listed in Volume III, and elsewhere in this Specification. This includes equipment to be field mounted, wired and piped by Others as well as that installed by Contractor in Control Boards or Cabinets.

.4 Installation of Owner furnished equipment on control boards including all necessary wiring and piping.

.5 Any and all special tools required for installation and/or maintenance of any or all equipment or parts thereof.

.6 Desk

2.2 Work by Others

The following work will be provided by others:

.1 Installation of control boards and field-mounted instruments and accessories.

.2 Instrument piping between transmitters and pneumatic receivers, control air lines to transmitters and valve positioners, except for piping between manifolds and instruments within the confines of the panel, console or cabinet.

.3 All electrical conduit and wiring external to the panels, consoles and cabinets.

.4 Equipment foundations, including embedded members and anchor bolts.

.5 All panels and consoles indicated as "Not Included in Spec. 2555-46" on Control Room and Cable Room arrangement drawings.

.6 Instruments shown on flow diagrams but not included in the Instrument Data Sheets, Volume III.

.7 Furnishing of all equipment shown on panel front arrangement bills of materials as "Owner-furnished" or "Furnished by Others - Not in Spec. 2555-46".

2.3 Codes and Standards

All Work provided under this specification shall be in strict conformance with the latest edition and latest addenda thereto, of the applicable codes, standards, specifications, regulations, procedures and tests of the following:

.1 National Electrical Code

.2 National Electrical Manufacturers Association

.3 Institute of Electrical and Electronics Engineers

.4 American National Standards Institute

.5 American Society of Mechanical Engineers

.6 American Society for Testing and Materials

.7 Instrument Society of America

.8 Federal Standard 595, 1961 Edition

.9 Federal Spec. TT-P-636, Primers

.10 Commonwealth of Pennsylvania code and regulations
.11 Insulated Power Cable Engineers Association
.12 ABC -Safety Guide 12 | 16 | 2

2.4 Drawings

Drawings are listed in Attachment I of this specification.

Engineer's drawings outline the scope of the work and show the intended arrangement of the equipment and accessories.

The flow diagrams and instrument schematic diagrams are included for information only and are not intended to define the scope of supply.

Engineer reserves the right, prior to final approval of drawings, to change the arrangements of instruments, switches, controls, mimic buses and other items on the panels without change in price. Engineer also reserves the right, prior to final approval of the manufactuers' drawings, to change the pickup or tap ranges of the protective relays and other required devices and the current transformer ratios without change in price. Contractor shall check this item with Engineer before proceeding with fabrication.

3.0 DETAILED REQUIREMENTS

3.1 Description of Service

.1 The equipment specified herein, will be installed indoors except as otherwise specified.

Ambient conditions are as follows, except as otherwise noted on Instrument Data Sheets:

	Temp.	Rel. Hum.
Control Room	75°F	50%
Cable Room	75°F	50%

Contractor shall make Control board layout drawings showing arrangement of equipment using the layouts supplied with this Specification as a guide. Such drawings shall be approved by Engineer prior to fabrication of equipment.

Contractor shall fabricate these control boards in accordance with its panel layout drawings, mount all devices furnished by him or supplied to him by others, wire and pipe all devices to terminal blocks in the boards, and test all circuits installed by him in the boards.

Contractor shall be responsible for the coordination of equipment purchased from different Sub-contractors so as to furnish control boards, consoles and cabinets complete and ready for installation and operation.

3.2 Seismic Conditions

3.2.1 Seismic Conditions - Class I

Panelboards, consoles, cabinets and rack assemblies, with their included equipment, piping and wiring specified herein as Class I shall comply with seismic Class I requirements. Each piece of equipment and each component thereof shall be designed to withstand lateral and vertical seismic forces by using equivalent static loads as follows: 3

.1 Equipment and components shall be designed such that the period of free vibration falls outside the range of 0.02 to 0.2 seconds.
50 ÷ 5 Hz.

.2 The equivalent static loads for design basis earthquake are obtained by using the following percentages of "g" acceleration in addition to normal operating loads:

Horizontally, in any direction	50%
Vertically, up or down	33%

.3 As an alternate method of analysis — in place of items .1 and .2 above — for each piece of equipment, and sizeable component thereof, the equivalent static loads shall be developed for both Single Earthquake and Double Earthquake from the applicable seismic response curves No. 1 through 12. 4

a. Entering a curve with the period of free vibration (T) of the component or piece of equipment will give the load factor which multiplies the weight of the item to produce the horizontal equivalent static load. The vertical load shall be calculated as equal to 2/3 of the horizontal load.

b. Note that the calculated value of the period (T) shall have added to it a tolerance band of ±0.02 seconds for entering a seismic response curve; the largest acceleration value in this band of periods (T ±.02 seconds) shall be used for design. 2

c. Equipment and components may be designed using the equivalent static loads for the peak values of the applicable seismic response curves in place of performing the dynamic analysis necessary for the above period calculation.

Horizontal and vertical equivalent loads shall be applied simultaneously in addition to the normal design loads for idle and/or operating conditions in such a manner as to produce the most severe loading conditions.

Design of equipment and components shall be based on using the applicable codes and standards allowable stress values for the combinations of normal design loads plus the design basis (single) earthquake loads. In addition, there must be no loss of function based on the combinations of normal design loads plus twice the design basis earthquake loads.

Approved tests of equipment and/or components, via a shock test equivalent to twice the design basis earthquake load or a vibration test equivalent to the maximum accelerations in the single and double design basis earthquake loads, may be substituted for analysis of (1), (2), or (3) above.

Design calculations and analysis or certified test data shall be submitted to demonstrate compliance with design requirements and shall require approval of Engineer prior to fabrication and/or acceptance.

.4 Following is a list of Fire Protection System panels by building and elevation. These panels are Seismic Class I and must comply with the Seismic conditions stated in Para. 3.2.1. 22

PANEL NO.	LOCATION
720 AR	Control Bldg. Area El. 305'-0"
720 AG	Control Bldg. Area El. 305'-0"
717 AG	Emergency Diesel Generator Bldg. El. 280'-6"
717 AR	Emergency Diesel Generator Bldg. El. 280'-6"
718 AR	River Water Pump House El. 312'-0"
718 AG	River Water Pump House El. 312'-0"
715 AR	Control Bldg. El. 331'-6"
715 AG	Control Bldg. El. 331'-6"
705 BR	Service Bldg. El. 280'-6"
705 BG	Service Bldg. El. 280'-6"
708 ARG	Auxiliary Bldg. El. 328'-0"
704 AR	Emergency Diesel Generator Bldg. El. 280'-6"
704 AG	Emergency Diesel Generator Bldg. El. 280'-6"
709 AR	Control Bldg. El. 351'-6"
709 AG	Control Bldg. El. 351'-6"

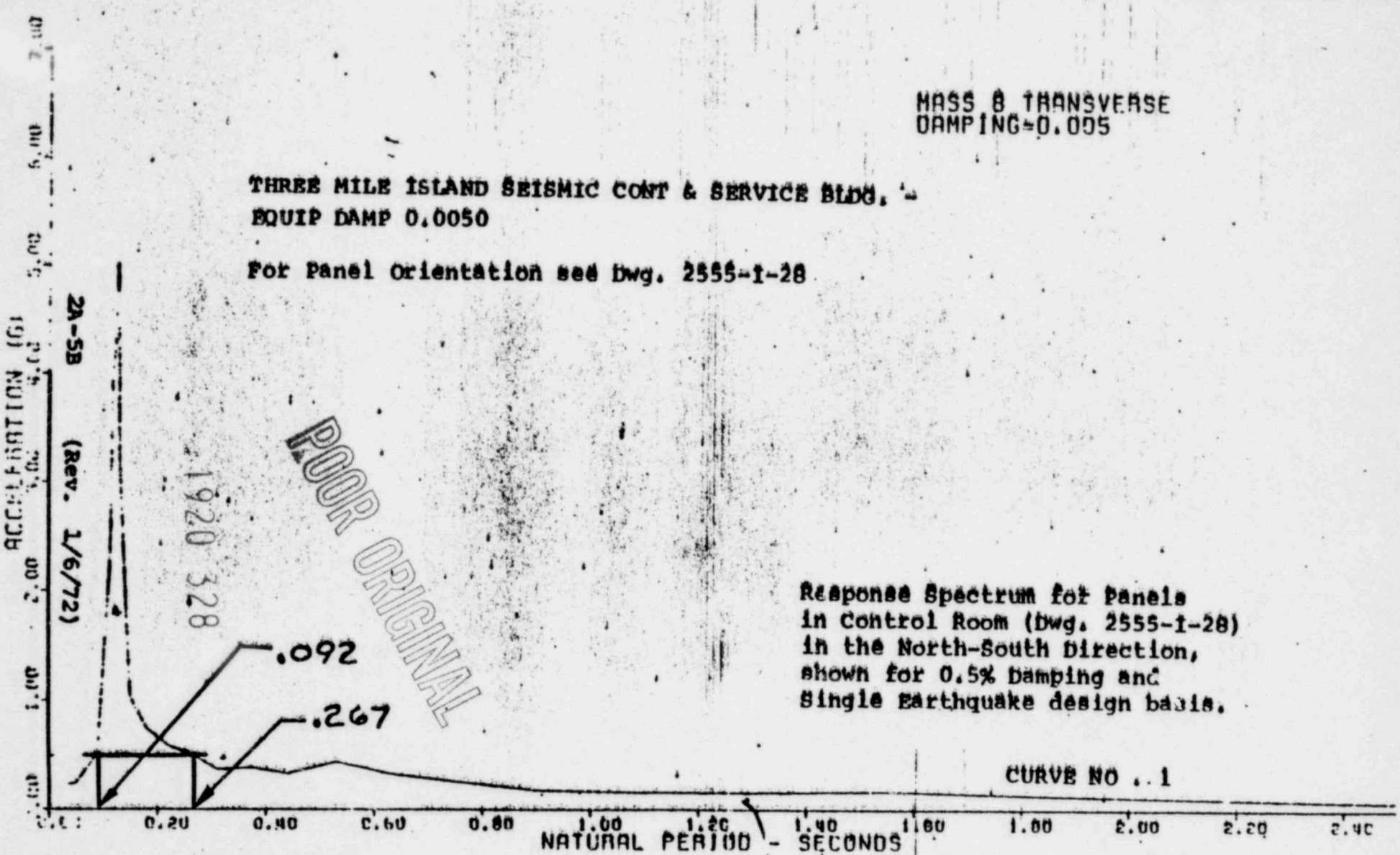
22

Since the most severe condition is at Elevation 351'-6" in the control building one of the panels in that area shall be qualified by testing. The devices internal to the 1 must be monitored for operation during the test. Attached are four floor response spectra curves at various damping levels for the control building at El. 351'-6". The test shall be performed in accordance with IEEE Standard 344 dated 1971.

MASS 8 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG.
EQUIP DAMP 0.0050

For Panel Orientation see Dwg. 2555-1-28



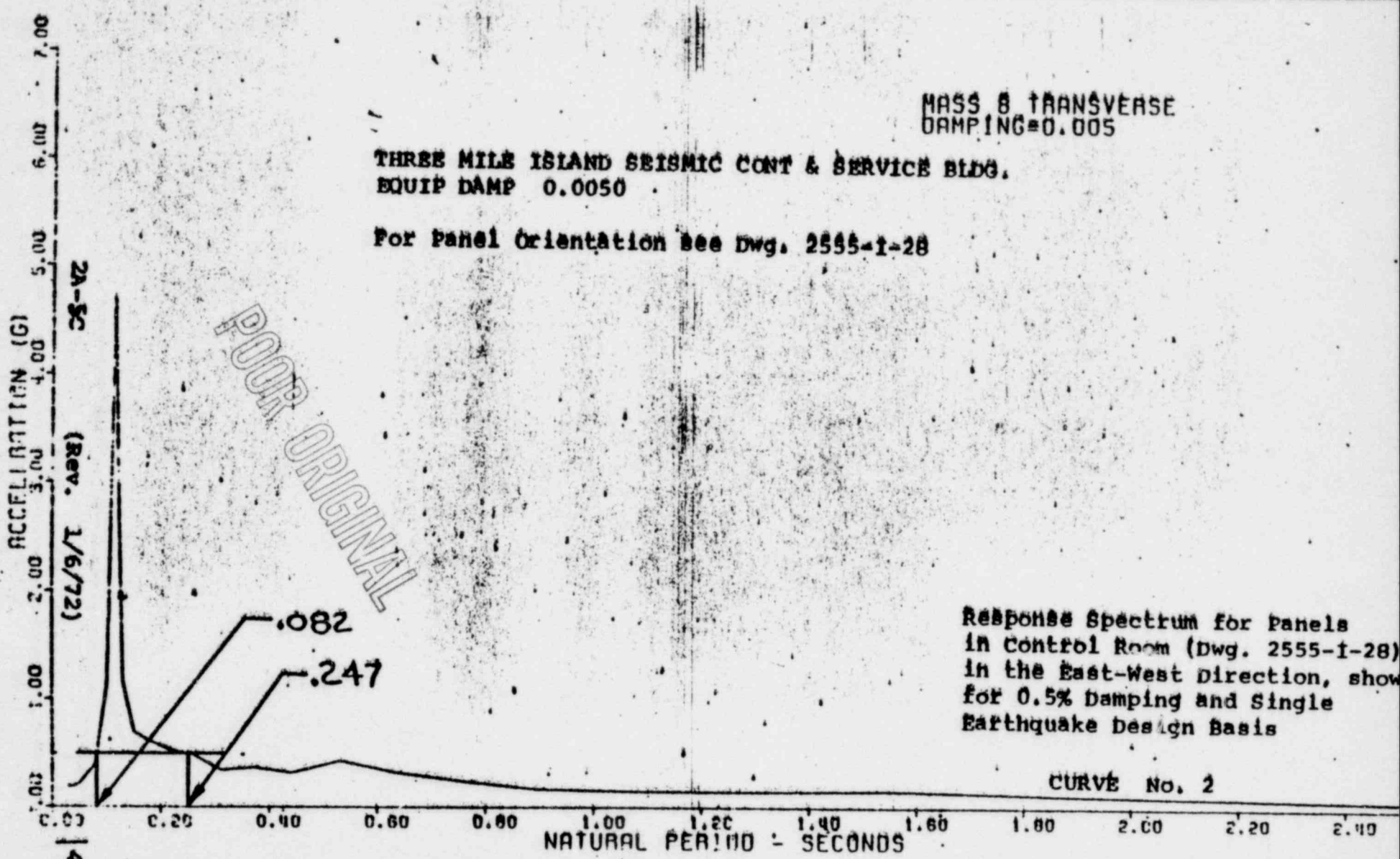
Response Spectrum for Panels in Control Room (Dwg. 2555-1-28) in the North-South Direction, shown for 0.5% Damping and Single Earthquake design basis.

14. MI CONTROL BLDG N-S OBE

MASS 8 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG.
EQUIP DAMP 0.0050

For Panel Orientation See Dwg. 2555-I-28



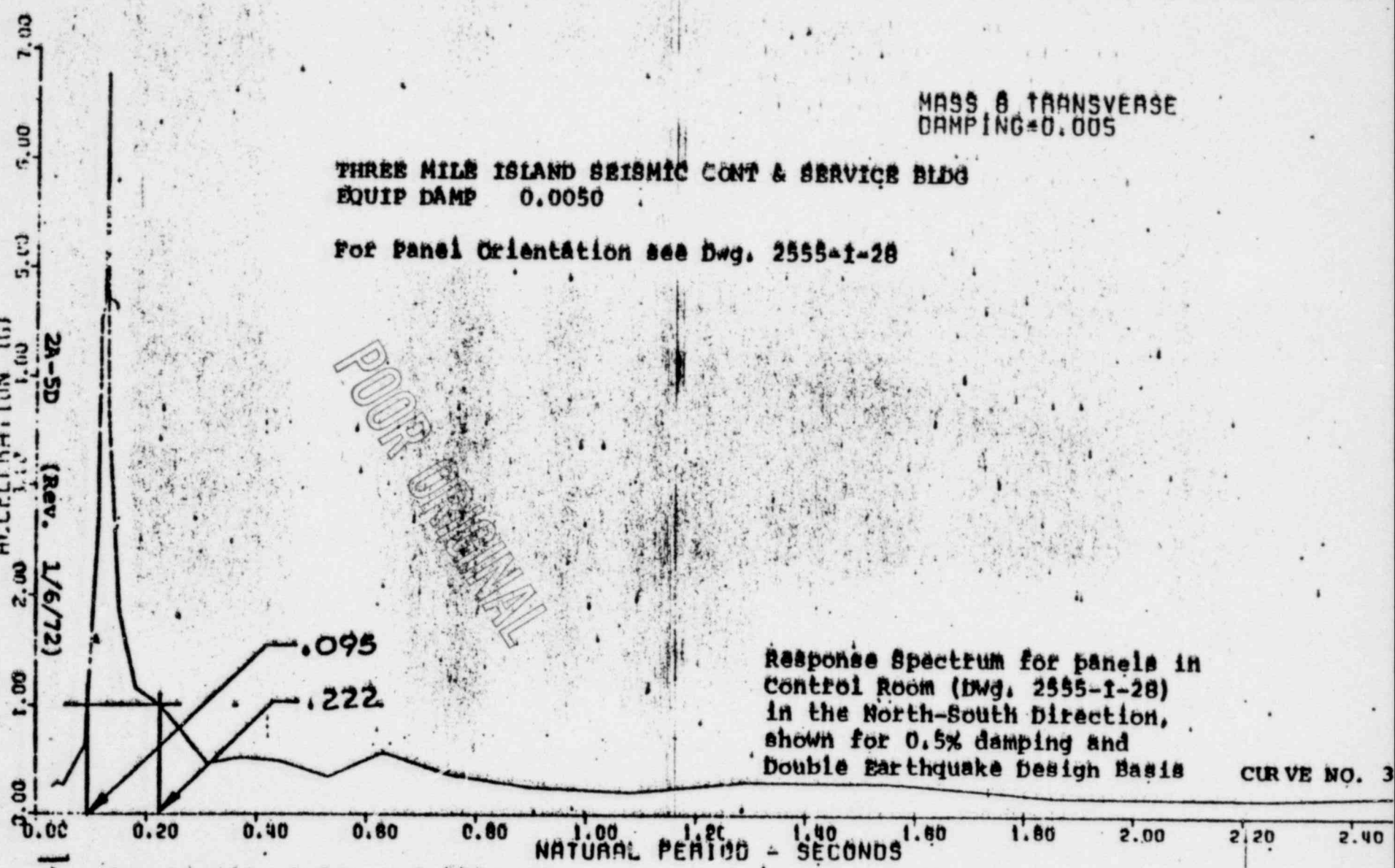
Response Spectrum for Panels in Control Room (Dwg. 2555-I-28) in the East-West Direction, show for 0.5% Damping and Single Earthquake Design Basis

CURVE No. 2

MASS & TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG
EQUIP DAMP 0.0050

For Panel Orientation see Dwg. 2555-1-28



Response Spectrum for panels in Control Room (Dwg. 2555-1-28) in the North-South Direction, shown for 0.5% damping and Double Earthquake Design Basis

CURVE NO. 3

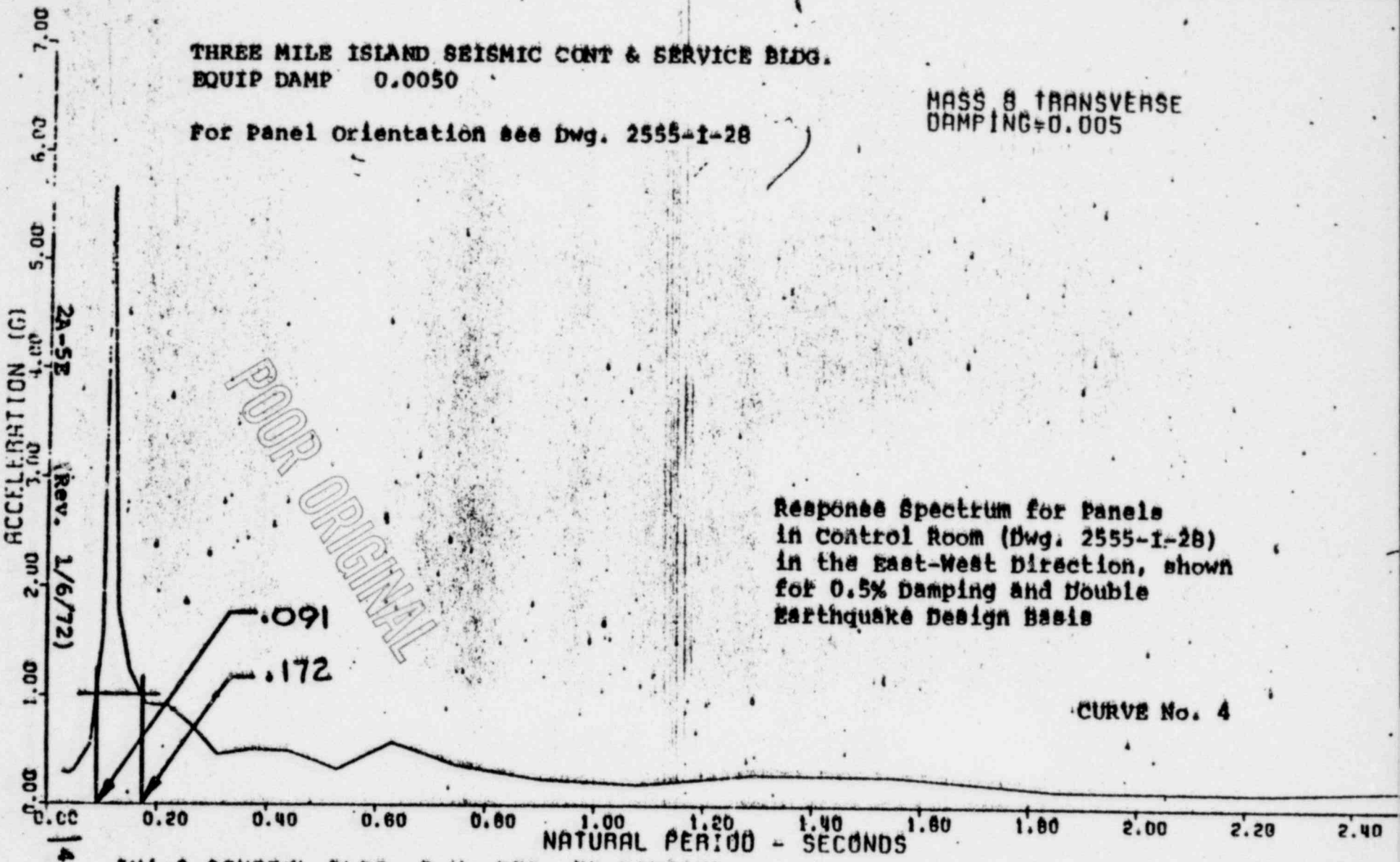
14

THI CONTROL BLDG N-S DBE

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG.
EQUIP DAMP 0.0050

For Panel Orientation see Dwg. 2555-I-28

MASS & TRANSVERSE
DAMPING=0.005



Response Spectrum for Panels in Control Room (Dwg. 2555-I-28) in the East-West Direction, shown for 0.5% Damping and Double Earthquake Design Basis

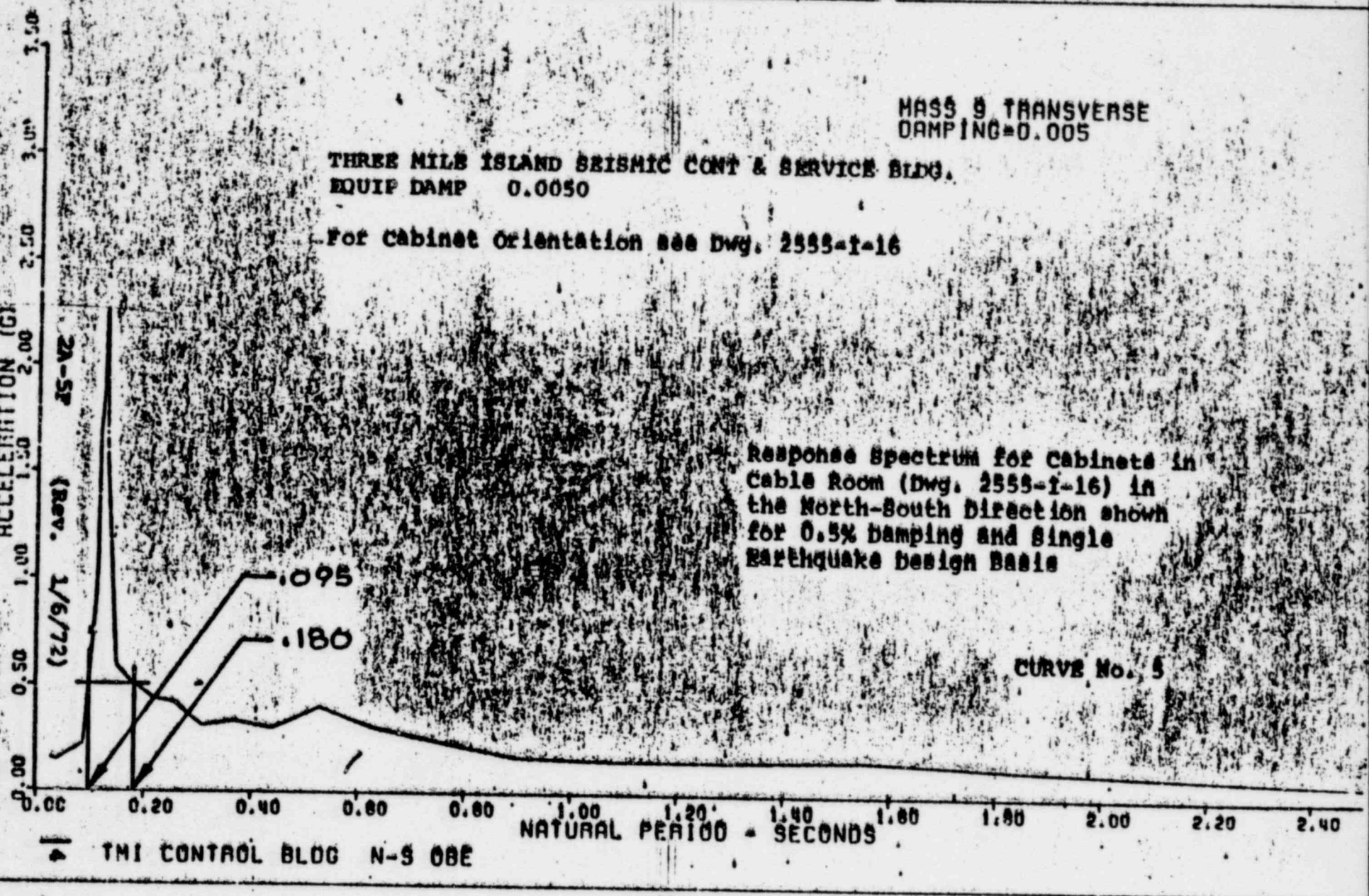
CURVE No. 4

THI-2 CONTROL BLDG E-W DBE 5% DAMPING

MASS 9 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG.
EQUIP DAMP 0.0050

For Cabinet Orientation see Dwg. 2555-I-16



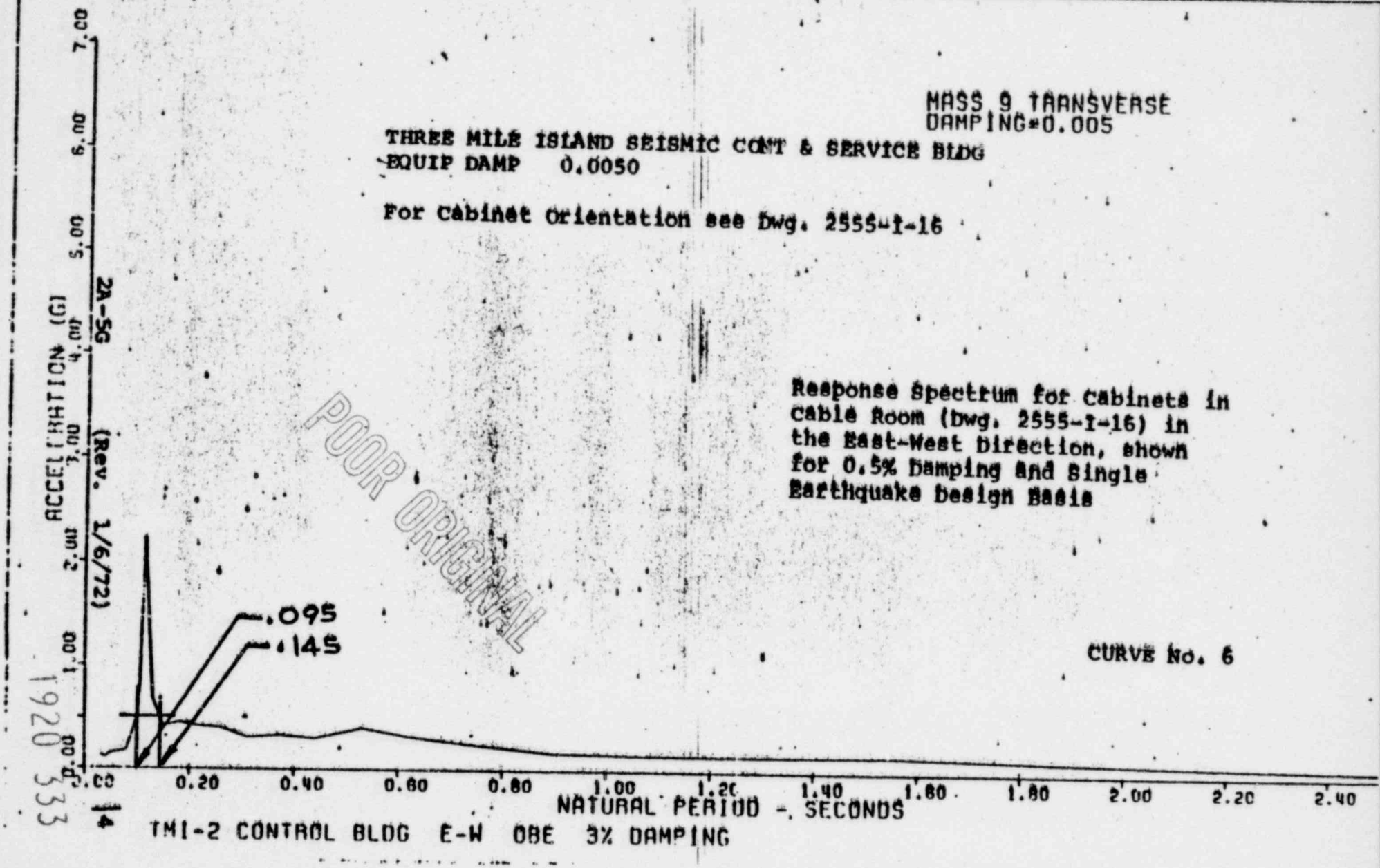
Response Spectrum for Cabinets in Cable Room (Dwg. 2555-I-16) in the North-South Direction shown for 0.5% Damping and Single Earthquake Design Basis

CURVE No. 5

MASS 9 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG
EQUIP DAMP 0.0050

For Cabinet Orientation see Dwg. 2555-I-16



TMI-2 CONTROL BLDG E-W OBE 3% DAMPING

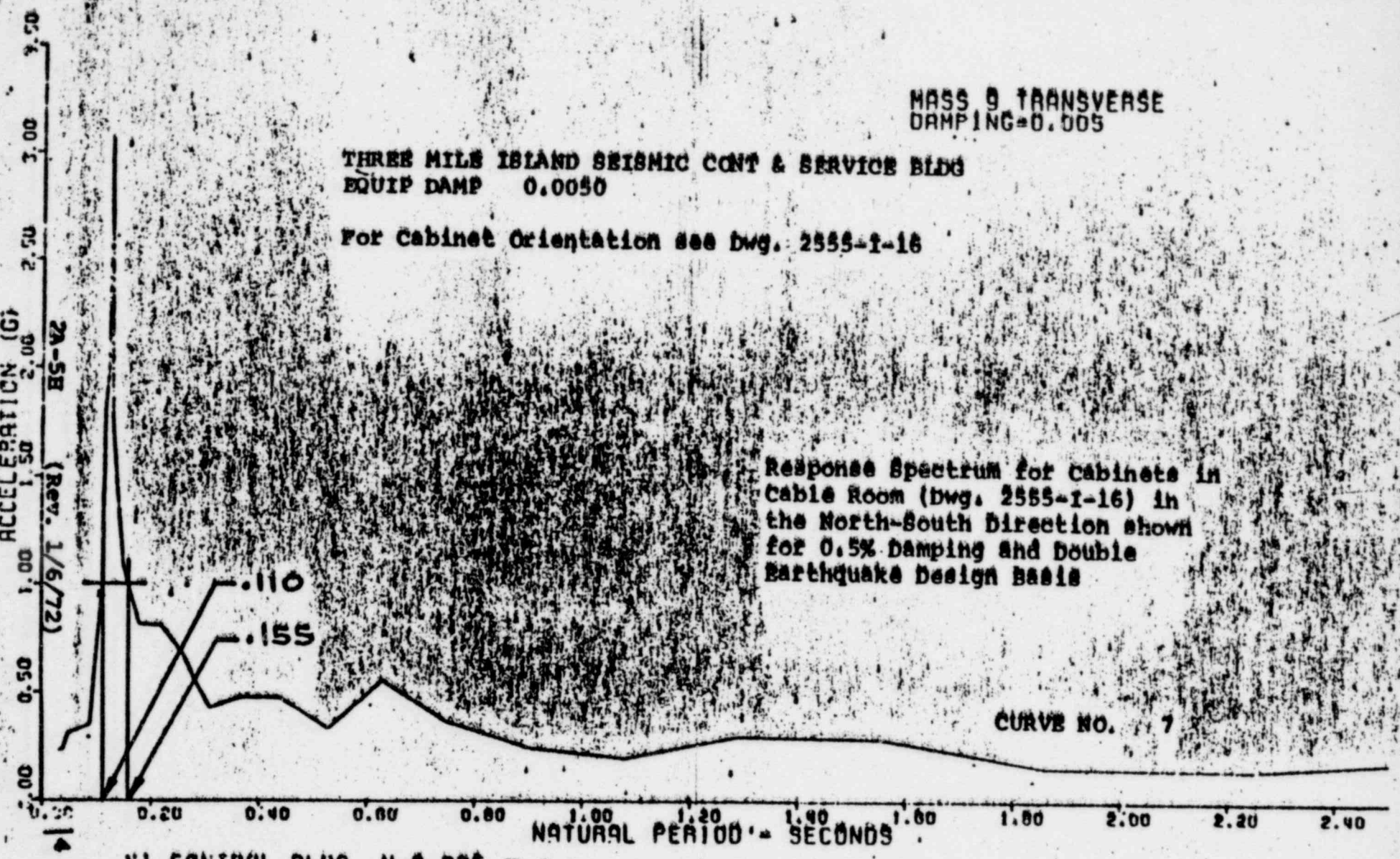
Response Spectrum for Cabinets in Cable Room (Dwg. 2555-I-16) in the East-West Direction, shown for 0.5% Damping and Single Earthquake Design Basis

CURVE No. 6

MASS 9 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG
EQUIP DAMP 0.0050

For Cabinet Orientation see Dwg. 2555-I-16



Response Spectrum for Cabinets in Cable Room (Dwg. 2555-I-16) in the North-South Direction shown for 0.5% Damping and Double Earthquake Design Basis

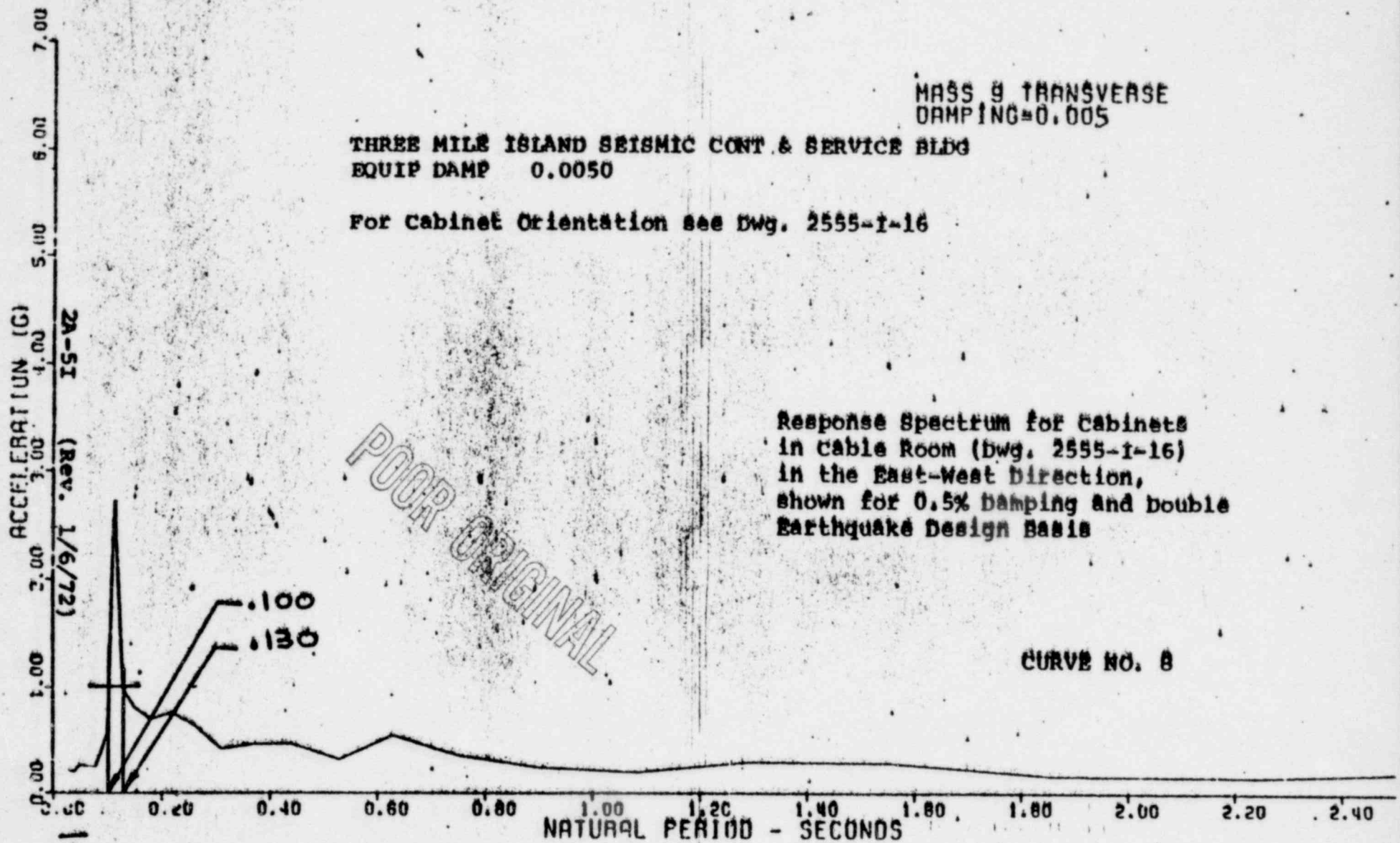
CURVE NO. 7

X1 CONTROL BLDG N-S DBE

MASS 9 TRANSVERSE
DAMPING=0.005

THREE MILE ISLAND SEISMIC CONT & SERVICE BLDG
EQUIP DAMP 0.0050

For Cabinet Orientation see Dwg. 2555-I-16



Response Spectrum for Cabinets in Cable Room (Dwg. 2555-I-16) in the East-West Direction, shown for 0.5% Damping and Double Earthquake Design Basis

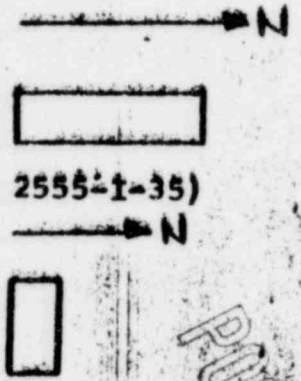
CURVE NO. 8

14

TMI-2 CONTROL BLDG E-W DBE 5% DAMPING

THREE MILE ISLAND SEISMIC AUX. & FUEL HANDLING BLDG.
EQUIPMENT DAMP 0.0050

MASS 4 TRANSVERSE ACCELERATION
DAMPING=0.005



Response Spectrum for "Radwaste Disposal System Panels" (Dwg. Nos. 2555-1-35 & 36) in the North-South Direction, shown for 0.5% Damping and Single Earthquake Design Basis

CURVE NO. 9

4

THI-2 AUX.&FUEL HDLG. BLDG. N-S OBE 3% DAMPING

THREE.MILE ISLAND SEISMIC AUX. & F.H. BLDG.
EQUIP DAMP 0.0050

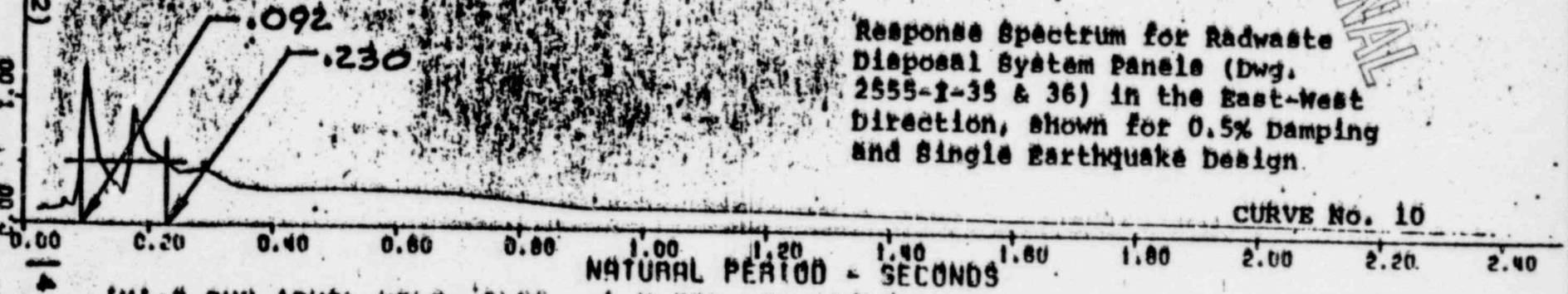
MASS 4 TRANSVERSE ACCELERATION
DAMPING=0.005

N

Panel Orientation (Dwg. 2555-I-35)

N

Panel Orientation (Dwg. 2555-I-36)



Response Spectrum for Radwaste Disposal System Panels (Dwg. 2555-I-35 & 36) in the East-West Direction, shown for 0.5% Damping and Single Earthquake Design.

CURVE No. 10

FHI-2 AUX. & FUEL HDLG. BLDG. E-W OBE 3% DAMPING

POOR ORIGINAL

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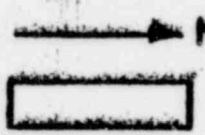
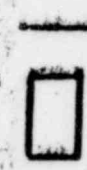
THREE MILE ISLAND SEISMIC AUX & F.H. BLDG.
EQUIP DAMP 0.0050

MASS 4 TRANSVERSE ACCELERATION
DAMPING=0.005



Panel Orientation (Dwg. 2555-1-35)



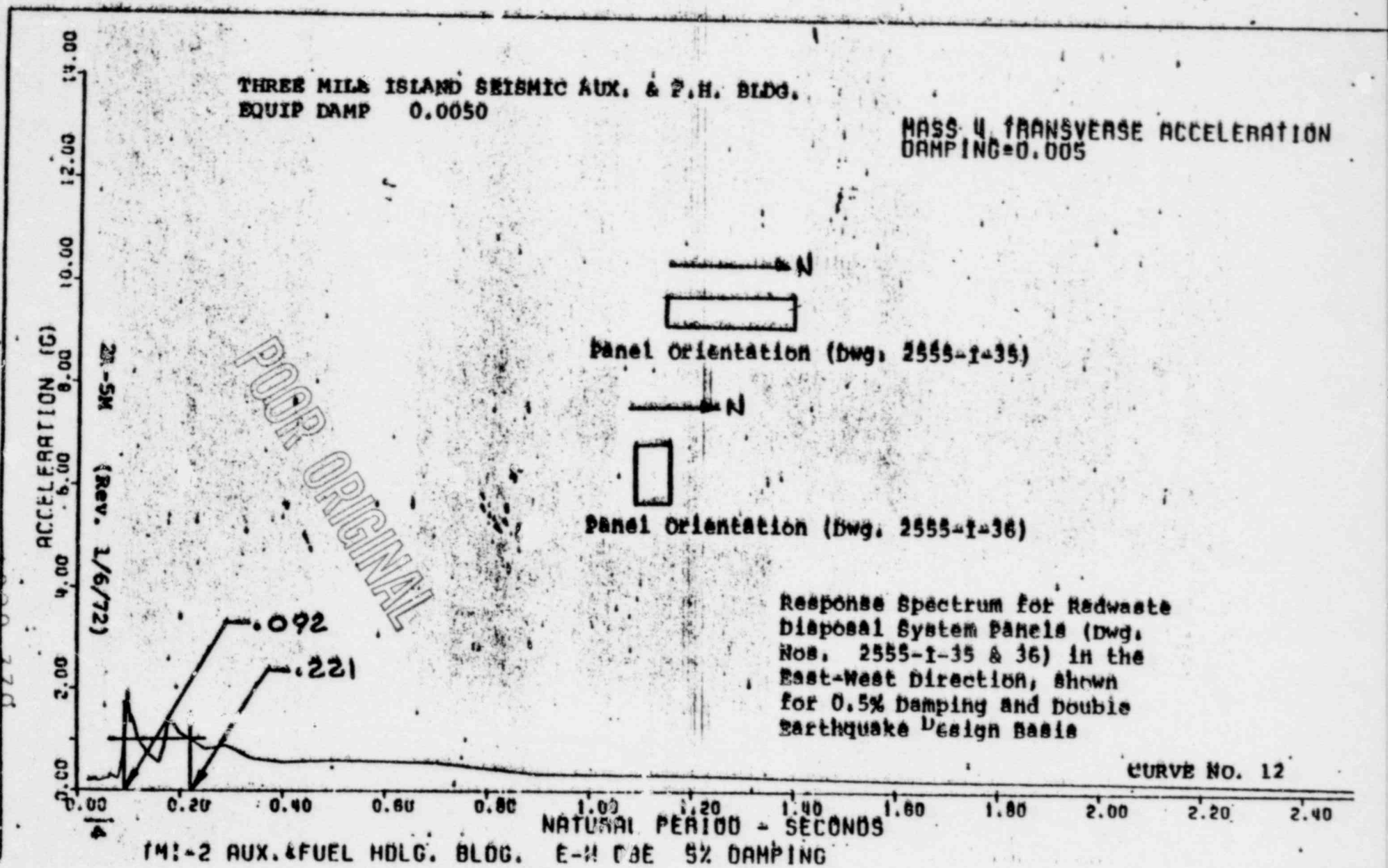
Panel Orientation (Dwg. 2555-1-36)

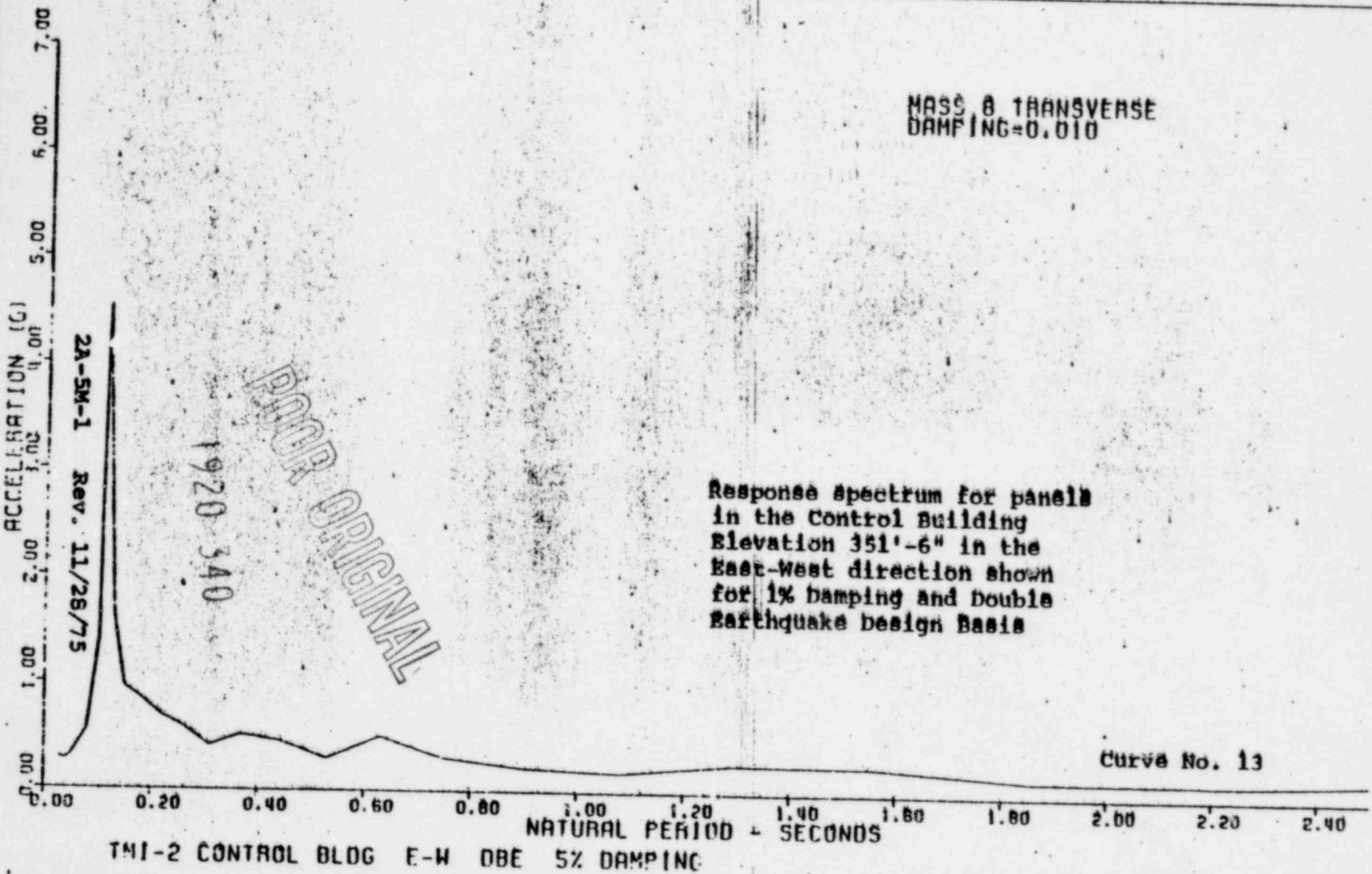
Response Spectrum for Radwaste Disposal System Panels (Dwg. Nos. 2555-1-35 & 36) in the North-South direction, shown for 0.5% damping and double [illegible] Earthquake Design

CURVE No. 11

14

1-2 AUX.&FUEL HDLG. BLDG. N-S OBE 5% DAMPING

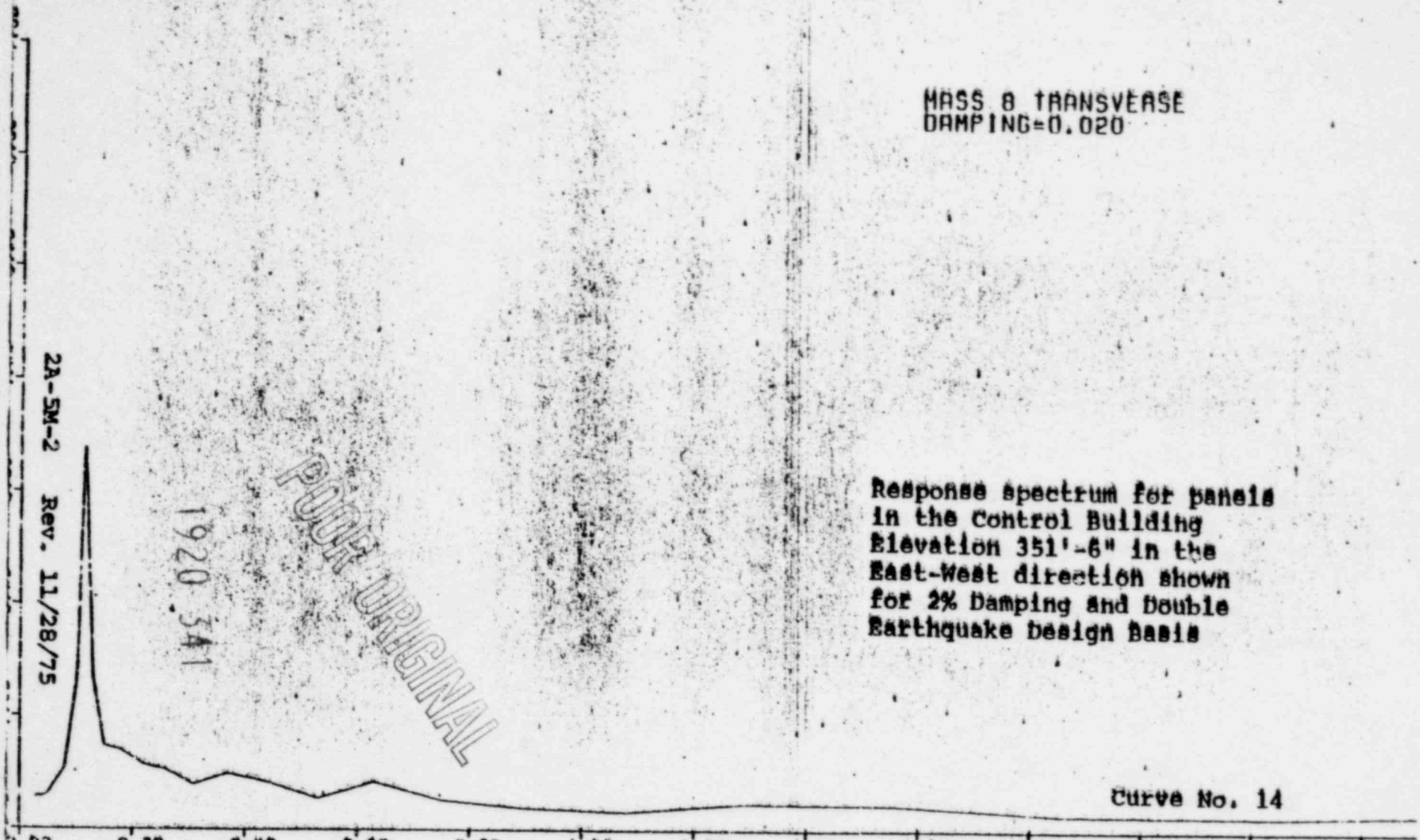

THREE MILE ISLAND SEISMIC AUX. & F.H. BLDG.
EQUIP DAMP 0.0050
MASS 4 TRANSVERSE ACCELERATION
DAMPING=0.005
N
Panel Orientation (Dwg. 2555-I-35)
N
Panel Orientation (Dwg. 2555-I-36)
Response Spectrum for Radwaste Disposal System Panels (Dwg. Nos. 2555-I-35 & 36) in the East-West Direction, shown for 0.5% Damping and Double Earthquake Design Basis
CURVE NO. 12
.092
.221
ACCELERATION (G)
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
2.40
NATURAL PERIOD - SECONDS
FM:-2 AUX.&FUEL HDLG. BLDG. E-W DBE 5% DAMPING
2S-5M (Rev. 1/6/72)
POOR ORIGINAL



Response Spectrum for panels in the Control Building Elevation 351'-6" in the East-West direction shown for 1% damping and Double Earthquake Design Basis

Curve No. 13

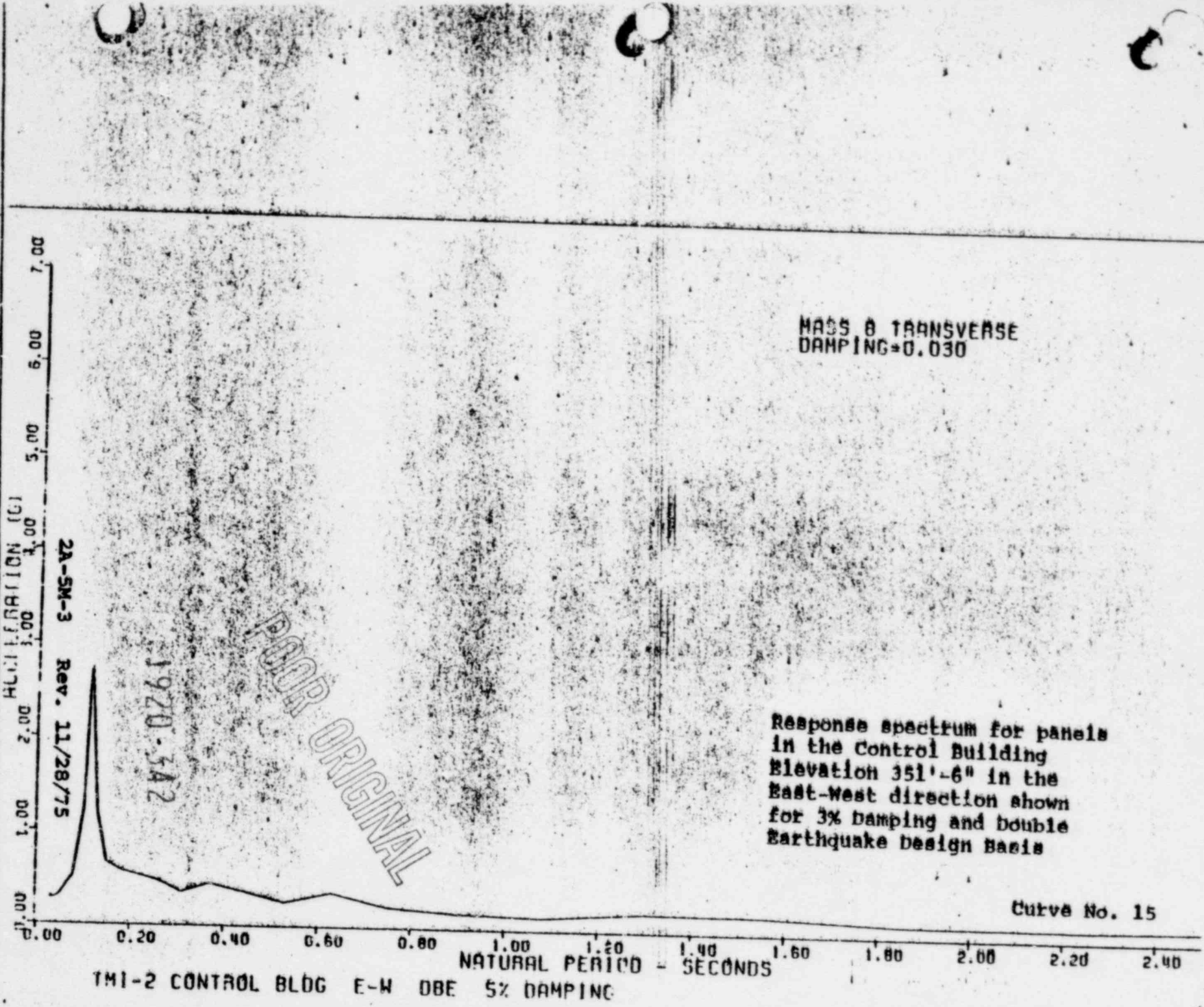
MASS 8 TRANSVEASE
DAMPING=0.020



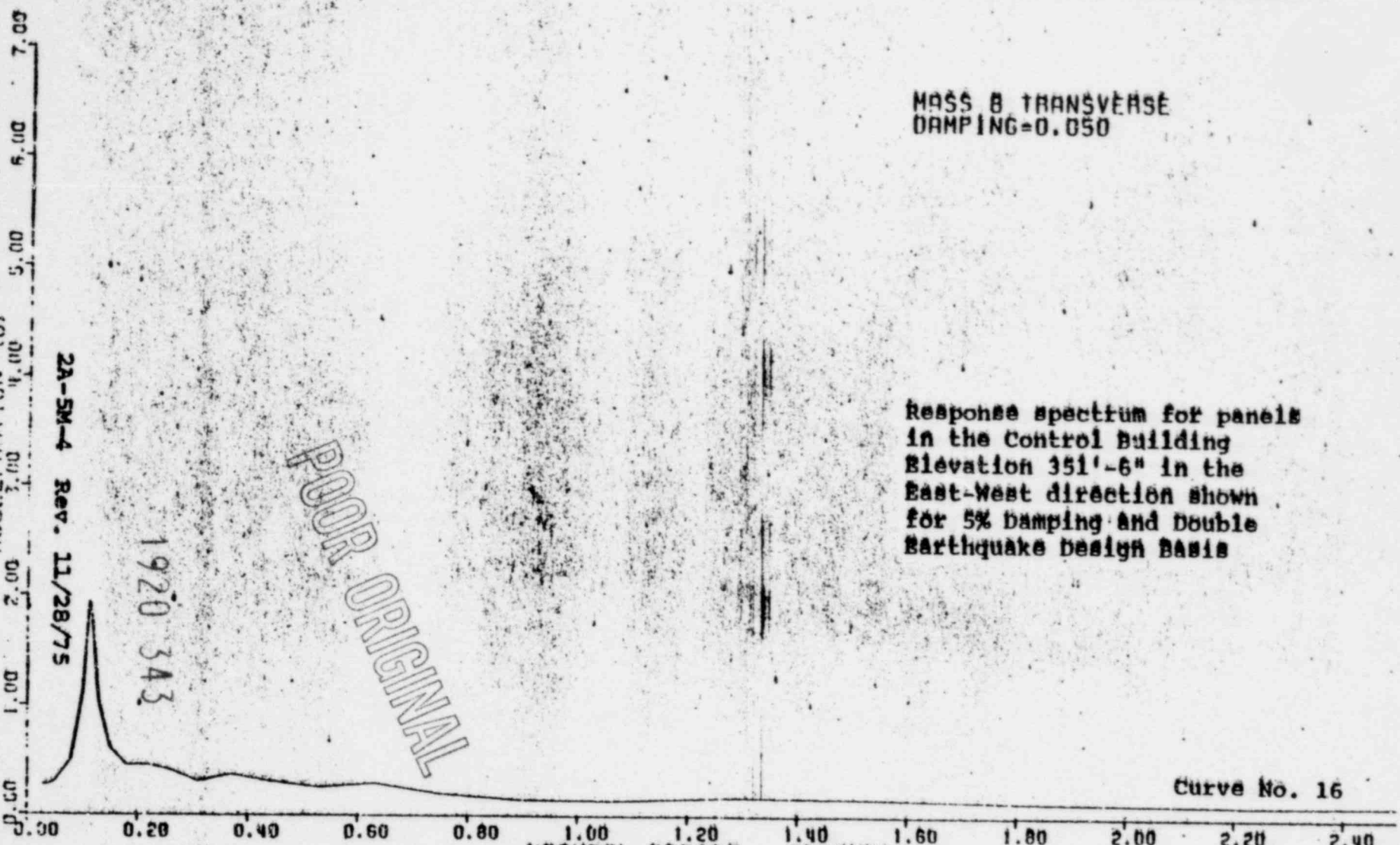
Response spectrum for panels in the Control Building Elevation 351'-6" in the East-West direction shown for 2% Damping and Double Earthquake Design Basis

Curve No. 14

TMI-2 CONTROL BLDG E-W DBE 5% DAMPING


MASS 8 TRANSVERSE
DAMPING=0.030
Response spectrum for panels in the Control Building Elevation 351'-6" in the East-West direction shown for 3% damping and double Earthquake Design Basis
Curve No. 15
2A-SM-3 Rev. 11/28/75
1920.2A2
POOR ORIGINAL
ACCELERATION (G)
0.00
1.00
2.00
3.00
5.00
6.00
7.00
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
2.20
2.40
NATURAL PERIOD - SECONDS
TMI-2 CONTROL BLDG E-W DBE 5% DAMPING

MASS 8 TRANSVERSE
DAMPING=0.050



Response spectrum for panels in the Control Building Elevation 351'-6" in the East-West direction shown for 5% damping and Double Earthquake Design Basis

Curve No. 16

TMI-2 CONTROL BLDG E-W DBE 5% DAMPING

Nameplates shall be of clear, transparent vinyl with matte finish on the front surface and color on the rear surface. They shall be reverse engraved on the rear surface in contrasting color characters. Nameplates shall be "Ply-Vinyl" type as manufactured by the Engraved Products Co. of Skokie, Ill. or approved equal. They shall be secured to the panels with black steel, self-tapping, sheet-metal screws. The color of the nameplates shall be dark brown. (Engraved Products chip No. EP 615A) for the tan panelboards and black (Engraved Products chip No. EP-604A) for all other panelboards. The engraved characters shall be white in both cases. Lettering shall be 3/16 inch high capital letters with no more than six characters per horizontal inch.

Equipment location identification inside the enclosures shall be by indelible markings adjacent to equipment. Instrument shall be identified by means of a suitably inscribed metal or plastic tag affixed by screws or attached by stainless steel or copper wire. Every instrument supplied by Contractor shall bear the tag number as shown on the Instrument Data sheets and drawings. The nameplates for point identification on multipoint recorders shall be mounted adjacent to the recorder on the front face of the panel for miniature recorders or inside glass door for full size recorders.

3.5 Mimic Lines and Color Coding

Mimic lines shall be of 1/4, 3/8 or 1/2in. width, 1/16 in. thick, smooth-edged anodized or painted aluminum. These shall be arranged as shown on the front panel layouts. Attachments shall be made by concealed (or otherwise unobtrusive) screws or studs. Mimics of equipment shall be shaped and located as shown on panel layouts. Mimics for these devices shall be of a thickness and material matching that of the lines. Mimic color shall be as designated in the code listed below. (Hold colors for later advice.)

Red	High-pressure steam
Orange	Low-pressure steam, or 6.9kv
Yellow	Heater drains, or 22 kv
Green	Feedwater, or 4160 V.
Purple	Circulating water, or 120 V. regulated a-c.
Blue	Condensate, or 480 V.
Brown	Oil
White	Air, or 125/250 V. d-c.
Black	Miscellaneous, ammeter and voltmeter switches
(Later)	Primary Coolant

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3.6 Panel Finish and Painting

Contractor shall:

.1 Thoroughly remove all mill scale and rust.

.2 Clear all surfaces by vapor degreasing or wash with petroleum solvent.

.3 Fill all scratches, dents and any other imperfections on the front and side surfaces with putty and grind or sand smooth prior to painting.

.4 Apply a primer coat followed by final sanding, and finish coats of paint on the outside and on the inside. Dry film thickness on outside of panel shall be 2½ mils, minimum for primer and 2 mils minimum for finished paint.

All panel boards, cabinets and console sections, in the Control Room shall be painted tan, Color No. 23522 as per Federal Standard 595, 1961 edition. In order to assure a uniform quality, gloss and color of paint used to paint all the cabinets, consoles and panels in the Control Room, Contractor shall purchase all the tan paint and primer from Keeler and Long, 167 Maple St. Waterbury, Conn. (Tel No. 203-753-4163.) Cabinets and the programmers console in the Cable Room and local panels shall be painted in accordance with the following schedule: All Control Room located equipment to be Tan 23522, all computer equipment to be Tan 23522, all Cable Room equipment except computer to be gray ANSI 61, all remotely located panels to be gray ANSI 61. 1

For Cabinet 163, 173 and 214A, paint the final coat red, Keeler and Long 903. For Cabinet 164, 174 and 214B, paint the final coat green, Keeler and Long 2338. An Engineer approved equal color is also acceptable. 22

The analog input peripheral cabinets for collection of SPND inputs to the computer system shall be tan, 23522.

Tan paint shall be low semi-gloss alkyd-type enamel Keeler and Long. No. 8213. Primer shall be Keeler and Long No. 6040 quick dry white primer. Other paint shall also be low semi-gloss alkyd type enamel with compatible primer. 1

All enclosed panels consoles and cabinets shall be painted inside with a white finish. Any scratches occurring in handling of instruments shall be re-touched by Contractor.

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All instrument bezels and other surfaces on the panel fronts shall be finished in satin-finish black. No bright chromium shall be used anywhere on the front panel faces.

Instrument faces and dials shall be white with black numerals.

3.7 Electrical Requirements

3.7.1 Internal Wiring-Control Boards (Panels)

All instruments, controls, annunciators, switches, indicating lights, relays and auxiliary equipment shall be completely wired in accordance with Engineer's wiring diagrams within the control boards. All intraconnecting wiring for components within a panel console or cabinet shall be supplied by and work therefor performed by Contractor. All interconnecting wiring, that is wiring between separate panels, separate consoles and separate cabinets or between any of the consoles, cabinets and panels and other field-mounted devices will be performed by others during installation. Contractor shall provide suitably marked terminal blocks at each console cabinet and panel to enable quick and correct interconnecting of the complete instrumentation system during installation.

Thermocouple extension wire will be installed by others directly to instrument terminals. Thermocouple cold junctions shall be installed in panelboards rather than in field.

Vertical wiring on the panels between the terminal blocks and the devices shall be enclosed in non-combustible non-halogen bearing raceways with removable covers. Horizontal wiring between the raceways and the devices may run exposed. All exposed wiring on panels or racks shall be formed neatly with square corners, with wires neatly grouped in packs using non-combustible, non-metallic wiring cleats or bands non-halogen bearing and with groups substantially supported along the panel. | 1 | 1

Contractor shall provide terminals and facilities as shown on the schematic diagrams. Protection of control and potential circuits within the panels or console shall be provided as follows:

Control circuits, a-c and d-c, shall be protected by air circuit breakers located in such a position that they are easily and safely accessible. Each air circuit breaker shall have a nameplate identifying its use. Potential circuits, for instrumentation and for metering, shall be protected by fuses located in such a position that they are easily and safely accessible. Each fuse, or set of fuses shall have a nameplate identifying their use.

In wiring fuse blocks the convention shall consistently be observed that the upper terminal(s) shall be the supply or potential source and the lower terminal(s) shall be the load or protected side.

All instrumentation equipment located in consoles, panelboards and cabinets shall be connected to the Regulated a-c bus. Instrumentation equipment which is field located will be connected to the regular a-c power bus. Contractor shall provide voltage regulations for this field-located instrumentation as required. Lighting, receptacles and other utility services (such as fans) shall also be connected to the regular a-c power bus, as shall the recorder chart drives. Each recorder shall be permanently wired to the chart drive supply circuit and separately bused.

Where specifically noted on the Instrument Data Sheets, connections shall be made to the Uninterrupted (vital) a-c power supply bus. The characteristics of these power supplies is as follows:

Regulated Power	Regular Power	Uninterrupted (Vital) Power
Ungrounded Single phase 120V ± 1%	Grounded Single phase 120V ± 10% normal, with dips to -20% on occasion, persisting for 2 to 5 seconds	Ungrounded Single phase 120V ± 3%
60 Hz ± 2.5 Hz Max. 5% Harmonics	60 Hz ± 2.5 Hz Max. 5% Harmonics	60 Hz ± 0.6 Hz Max. 5% Harmonics

Each instrumentation power supply, transducer and individual instrument chassis that must be connected to the instrumentation supply circuits shall also be individually fused. Fuse blocks, fuses and identifying nameplates shall be readily accessible for inspection and maintenance.

3.7.2 Wiring-Service

The control console and panels shall be provided with interior lighting fixtures at each end and at approximately six-foot spacing throughout the length of each. Each fixture shall be equipped with a 20-watt fluorescent bulb and quick-start, quiet high power factor starter. Heavy-duty switches shall be provided at each point of access to the control console. Switches shall be three-way or four-way type for switching lights on and off from any other point of access.

Contractor shall provide duplex convenience receptacles of the three-pole grounding type at approximately eight-foot intervals in the control console and on all interior surfaces of the vertical boards. Receptacles shall be wired for 120 volts, single phase, 20 amps, of the parallel blade with U blade grounding type. These receptacles shall be located approximately 24 inches above the floor for panels and cabinets and 6 inches above the floor for the console. All fixtures, guards, switches, receptacles, conduit and wiring devices shall be furnished, installed and wired to terminal blocks by Contractor.

3.7.3 Control and Secondary Wiring

Control and secondary wiring shall be 600 volt flameproof minimum size No. 14 AWG stranded tinned copper. At least 37 strand wire shall be used for all cables subject to flexure. Insulation used shall be of a type which has successfully passed the flame resisting tests of Subparagraphs 5.2.7 of this specification.

3.7.4 Connectors

All internal wire terminations at device terminal screws shall be made with crimp-type spade lugs or ring tongue terminals which firmly grip the conductors and employ insulated compression sleeves to grip the wire insulation.

3.7.5 Control Switches and Push Buttons

Control switches for motor control of heavy equipment, for operation of circuit breakers, and for switching of electrical instruments shall be GE Type SBM or approved equal. Motor and circuit breaker switches shall have four positions with pull-to-lock in the trip position unless otherwise indicated, and shall have pistol-grip handles. Synchronizing switches shall have one (1)

common removable oval handle. Each switch shall be provided with a black escutcheon plate with white lettering. Pushbuttons and their associated indicating lights shall be Cutler Hammer heavy-duty oil-tight Model E30, or approved equal.

3.7.6 Terminal Blocks

Terminal blocks shall be provided for all external connections. Terminal blocks shall be as manufactured by States (Type NT) or Stanwyck (Type SL) or approved equal 600 volt, barrier type, with sliding links and marking strips identifying all internal and external wiring. Shorting-type terminal blocks shall be provided for all current transformer circuits. Terminal blocks shall be mounted in easily accessible locations near the panel cable entrances on the back of the panels. Owner's cables will enter panels as indicated on the panel arrangement drawings. Adequate wireways shall be provided for Owner's external cabling to the terminal blocks. A minimum of thirty percent spare terminals shall be provided except where specific exception is granted. Only one wire per terminal will be used by Owner on the outgoing side of these blocks. Any common connections required shall be provided by Contractor on the panel side of the block.

All incoming power terminals are to be conspicuously identified to permit ready differentiation from other terminals and shall be grouped in a logical pattern. Duplicate terminals shall be provided when connecting power feeds in parallel.

3.7.7 Grounding - Electrical

A 1/4 by 1 inch copper ground bus shall be provided for all equipment and wiring grounding and for grounding the structure of the panelboard or other enclosure. Clamp-type terminals shall be provided at each end of the ground bus for connecting panel ground buses together and for connecting Owner's ground cable. Contractor shall also provide materials for interconnecting adjacent shipping sections. Contractor shall connect all equipment cases to this ground bus with insulated grounding conductors.

3.7.8 Grounding - Instrumentation

Instrumentation ground buses, shall be 1/8 x 1 inch copper bus insulated from the main frame.

3.7.9 Indicating Lights

Indicating Lights shall be Westinghouse rectangular Minalite with 24 volt, 0.75 watt bulb and colored lens. It shall contain a resistor for 125 volt d-c service voltage and a transformer shall be used in place of the resistor for 120 volt a-c service voltage. Indicating lights shall be re-lampable from the front of panel.

Indicating light colors shall be as follows:

Condition	Color
Power On, or Valve Open	Red
Power Off, or Valve Closed	Green
Supervisory	White
On (in "Auto" mode), or Abnormal condition, or other Limit Conditions	Amber Blue

3.8 Pneumatic Requirements

Air pressure available 80 to 120 psig.

3.8.1 Tubing

Pneumatic tubing shall be 1/4 inch O.D. x 0.030 inch wall, seamless, dead soft copper.

3.8.2 Fittings

Tube fittings shall be Tylok compression type, brass.

3.8.3 Bulkhead Fittings

Tubing runs entering or exiting from the enclosure shall be terminated in bulkhead fittings, of the type mentioned above, suitably arranged in a bulkhead plate.

3.8.4 Stop Valves

Stop valves shall be forged brass blunt point needle type with stainless steel stem. Valve ends shall have male NPT ends, Whitey valves or equal and shall be fitted with Tylok tube couplings as required. Valves for incoming tube connections, (i.e. from pressure transmitters and sources of air pressure) shall be mounted in a common terminal block (or bar).

3.8.5 Tubing and Tubing Connections

Runs shall be continuous from equipment to bulkhead fitting, except where tees are required or where tubing cannot properly be formed, attached, or removed in one piece without deformation.

Runs shall be grouped to connect into bulkhead fittings in back of panels. Supply lines may terminate at a pipe manifold. The tubing bulkhead fittings shall not prevent complete accessibility to areas behind the panels. Connections from control devices that do not require valves may be terminated in bulkhead fittings.

Each tube terminal connection shall be identified by a metal tag stamped with the Owner's tag number for the connected instrument or control device.

Arrangement shall be logical, orderly, accessible and neat, with straight, parallel runs and a minimum of crossing. Vertical runs shall be plumb. Horizontal runs shall pitch slightly away from instrument. Runs shall be free from flat spots, too sharp bends or bad alignment.

Supports shall provide complete freedom from strain or equipment, and runs shall be so arranged that connections can be broken without distorting the tubing.

A plugged test tap (1/4" NPT) shall be provided in each tube line.

The tubing and associated equipment shall not interfere with electrical terminals.

3.9 Cleaning and Cleanliness Requirements

Cleaning of equipment shall be in accordance with the provisions of Specification Section 2C- Cleaning and Cleanliness Requirements for Nuclear Applications. Class B cleanliness shall apply for items subject to process fluids and instrument internals. Panelboard assemblies, console assemblies, cabinet assemblies and the desk shall be Class D cleanliness. |4|

3.10 Preparation and Shipment

Sealing, packaging, packing and marking of components for shipment and storage shall be in accordance with the provisions of Specification Section 2D-Sealing, Packaging, Packing and Marking of Components for Shipment and Storage.

3.14 Instrumentation and Control Systems

.1 Contractor shall supply all of the instrumentation described in the Instrument Data Sheets attached to this specification and listed in Vol. III.

Where manufacturer's name and model number are mentioned, the words "or approval equal" shall be understood.

Colors shall be as specified in Paragraph 3.6.

Electrical supply conditions are as defined in Subparagraph 3.7.1

Wherever applicable, force-balance instruments shall be supplied in preference to motion-balance instruments.

.2 Instrumentation is shown connected together in systems as depicted in The Instrumentation and Control Schematics contained in and listed in Vol. II.

.3 Instrumentation and Control Schematics are meant to guide Contractor in ascertaining requirements of each control or measurement loop. Contractor shall, after award, submit its own detailed loop diagram for each control or measurement loop to Engineer for approval.

3.15 Thermowells

Manufacturer shall provide stress analysis calculations to verify the design of each type of thermowell specified in Specification 2555-46 Data Sheets for the maximum steam and water design conditions at the specified limiting velocities.

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4.0 INSTALLATION

The equipment shall be shipped completely assembled, ready for installation by others. Contractor shall however, provide the services of a competent engineer for consultation during the installation and checkout.

5.0 TESTING

5.1 Acceptance Tests

Testing prior to acceptance of the completely wired and piped panels, boards, consoles and cabinets shall be performed in Contractor's plant prior to shipment of the equipment to Owner. All tests shall be made in accordance with NEMA, USASI and IEEE Standards. Suitable test inputs shall be provided by means of equipment external to the specified system. The type of external test equipment and test procedures shall be subject to approval by Engineer. Tests shall be performed to insure compliance with the requirements of this Specification.

5.2 Electrical Insulation, Continuity and Wiring Diagram Conformity Tests

After complete assembly of the control boards, panels and consoles tests shall be conducted by Contractor to demonstrate integrity of all electrical insulation, the continuity of all connected circuits and conformity with approved wiring diagrams.

Tests shall comprise (but not be limited to) the following:

.1 Each circuit shall be tested to ascertain the value of ground resistance using a 1000 volt Megger. Minimum resistance shall be one megohms.

.2 Each switch shall be checked for conformity to the switch development diagrams.

.3 Each annunciator window shall be tested functionally.

.4 All manually-actuated control devices and associated wiring shall be checked for function and correctness of wiring.

.5 All indicating lamps shall be tested by applying rated voltage to lamp circuits.

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.6 All indicator and meters shall be checked by applying actual or simulated input signals to verify normal full-scale deflection.

.7 Insulation and jacketing for all wiring must be of a type which has satisfactorily passed both of the flame tests of IPCEA S-19-81 (NEMA WC-3) and in addition must be non-halogen-bearing, such as GE Vulkene Type SIS or approved equal. 2

5.3 Pneumatic Tests

A mechanical pressure test shall be made on all valves, fittings, piping, tubing and connections. These shall be carefully inspected and checked for leaks. In accordance with I.S.A. RP7.1, "Pneumatic Control Circuit Pressure Test" using air with a dew point of 10°F below the minimum ambient test temperature but not below -40°F. All lines shall be blown free of foreign matter before test. After testing, all lines shall be sealed against dust and dirt until final installations. Dry gas shall be used for the pressure testing.

5.4 Operational Tests

After calibration in accordance with paragraph 5.5 all

control, indication and alarm circuits shall be tested to ensure proper operation in order to complete control loops that will be closed in the field. Suitable test inputs and loads shall be provided by Contractor external to the specified system in order to test performance of Contractor-supplied equipment in a complete loop. Contractor shall submit to Engineer a complete description of his test facilities and proposed test procedures for approval prior to running any acceptance tests.

5.5 Calibrations

All instrumentation system components, such as transmitters, amplifiers, analog computer chassis, receivers, recorders, controllers and the like, shall be calibrated prior to use. Contractor shall provide certified calibration records showing actual calibration for each instrument. Contractor or manufacturer's records are considered acceptable to satisfy this requirement. Certification of calibration is acceptable in lieu of certified calibration record for each instrument. 2 2 18

6.0 INFORMATION TO BE SUBMITTED

6.1 With Bid

The technical information and data sheet included in the Bid Form shall be submitted completely filled out by Bidder. After acceptance by Enginear, this data in the Bid Form shall become part of the Technical Specification for this equipment.

6.2 After Award

The following information and data shall be submitted after award within the time indicated.

6.2.1 Schedule 1

a. An overall schedule in sufficient detail to demonstrate Contractor's ability to perform the Work within the specified time — 30 Days After Award

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89-2693 (SHAWLAW WSH)
CABLE "SHAWLAW"

JOHN H. SHARON
EDWARD B. CROSLAND
COUNSEL

September 6, 1979

→ Joan. Please log in.

George Frampton, Esquire
NRC/TMI Special Inquiry Group
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear George:

I am enclosing a copy of the transcript of the deposition of Lawrence L. Lawyer of Met-Ed by the President's Commission on the Accident at Three Mile Island. According to my records, we have now provided to you copies of the transcripts of all depositions taken by the President's Commission.

Sincerely,

Mat

Matias F. Travieso-Diaz

MFTD:ry

Enclosure

1920 356

TDR-TMI-115

DEVELOPMENT OF UNDERSTANDING

The object of this task is to re-create, as best as possible, the chronology and an on-going status understanding of the TMI-2 accident as it developed.

It is obvious from the sequence of events and the response actions taken by the operators that perception and understanding of the transient were changing, especially in the early hours.

Levels of complication in assessing this developing understanding are introduced by the various communication interfaces which were established about the data source. These interfaces provided data (as well as on-going assessment) to an increasingly growing number of people who inturn contributed to what may be regarded as a common understanding of the accident.

As time wore on the number of communication interfaces grew geometrically and became so intertwined as to give rise to an apparent common pool of understanding. Consequently the task of unraveling the growth of understanding becomes increasingly more difficult as more communication interfaces were established (later in time following the accident).

Necessarily then, the subject assessment must be attacked starting with the TMI-2 operator's understanding and procede through that of the site management, Met-Ed management, GPU management, the GPU response team, and the industry advisory group. Further the peripherical

branches of B&W and NRC understanding could also be examined. Figure 1 attempts to illustrate the challenge and the scope of the above.

Interface 1

An analysis of the perception ofsignificant problems and growth of knowledge during the event can be divided into three areas: A) Efforts to maintain control of the plant during the first four hours, B) Assessment of the radiation emergency, and C) Perception of the non-condensable gas bubble in the reactor vessel.

A. Efforts to Maintain Control of the Plant

During the First Four Hours of the Event, the main concern of the operators was to bring the primary and secondary systems to a stable condition. Several key factors should be discussed to focus on the basis for operator actions. Details used to formulate each of these key factors were derived from interviews with the shift supervisor, shift foreman and two control room operators.

1. Pressurizer Level Indication - From very early into the transient, operations personnel were very concerned with pressurizer level indication.

Within five seconds after the reactor trip the operator had started a second make-up pump in anticipation of the expected rapid decrease in level never occurred, and within six minutes the pressurizer level was off scale high. The operators felt they had caught the expected level decrease with increased high pressure injection. The major concern of the operators at this point was to not take the R.C. system solid. Based on high level indication and concern of taking the system solid, the operator bypassed Safety Injection, stopped MUPIC, and throttled

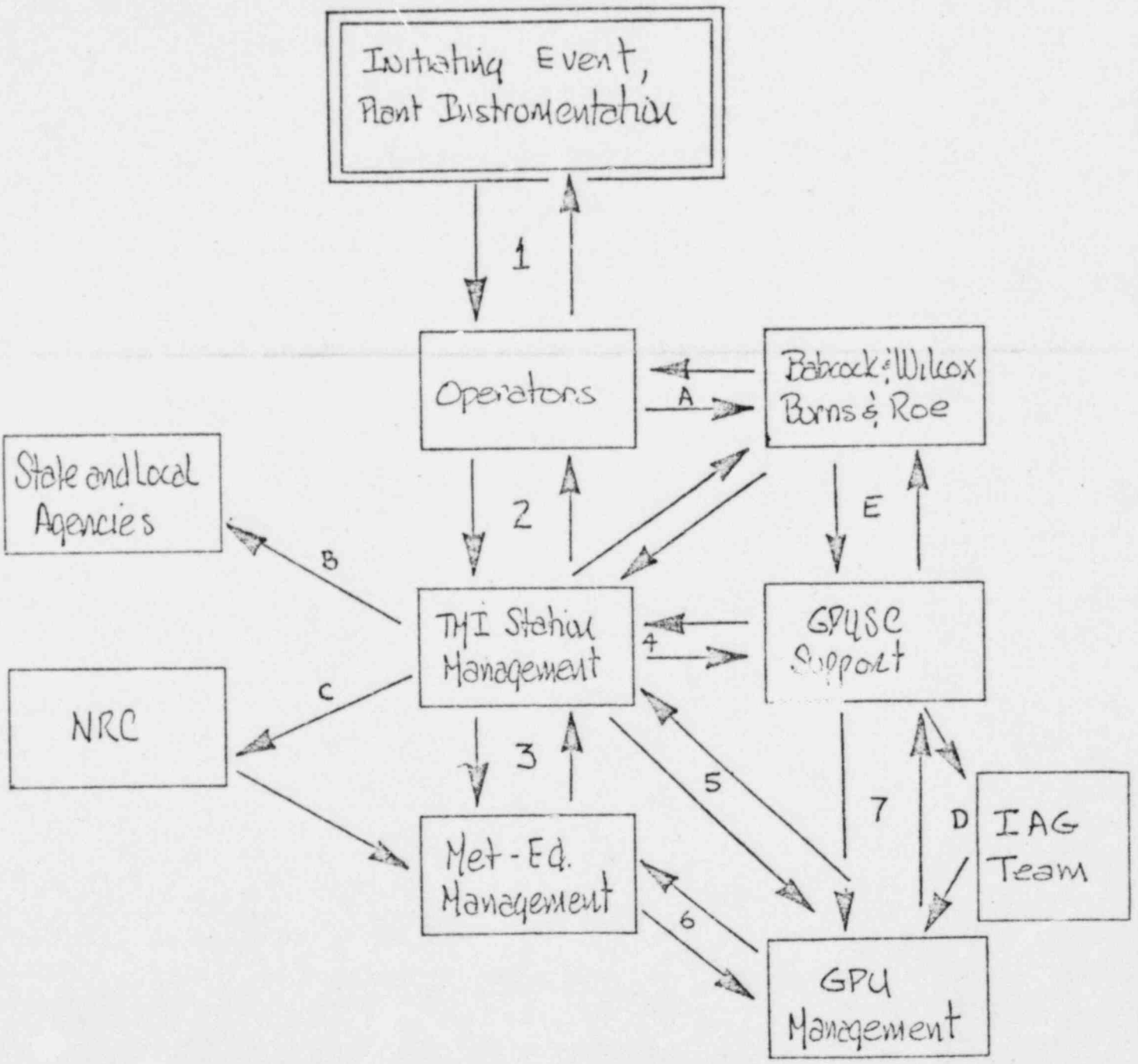

Figure 1. Communication Interfaces which enabled the Development of Understanding

the MU-V16's. At this point RC pressure was still decreasing, and judgments were made primarily on pressurizer level based on either past experience during feedwater transients or reactor trips, training, or procedural guidance.

2. Failure of the Pressurizer Electromatic Relief Valve to Close - During the initial reactor coolant system pressure increase due to the turbine trip, the electromatic relief valve on the pressurizer opened, as designed, at 2255 psi. After the reactor trip, the valve failed to close as pressure decreased through 2205 psi, although the operator did verify that the valve indication did not signal an open valve. This valve remained open for the first two hours and twenty-two minutes of the event. Thus, the control room operators had failed to recognize a constant loss of coolant through the open relief valve for that period. On at least three different occasions, the operators checked the computer output for the thermocouple bands on the relief valve discharge piping to determine whether the valve had properly seated as indicated; however, the computer data was misinterpreted and the block valve was not shut for two hours and twenty-two minutes. Readings from the thermocouple were in the range of 230°-280°. The operator judged these valves to be quite low compared to pressurizer temperature (approximately 600°) and therefore concluded that the electromatic must be closed. The operator did not realize that the temperature indication was from a thermocouple strapped to the outside of the discharge pipe and based on heat losses, readings in the range of 250° were an indication of an open relief valve.

During the time that this valve was open, many other indications of a loss of coolant accident were present in the Control Room, such as rapidly falling RC pressure, rapidly increasing RC drain tank pressure and temperature, increasing RB sump level while both sump pumps running, increasing RB temperature and pressure. Although these indications of a LOCA existed, the operators did not associate them with the stuck open relief valve. The operators continued to focus on the initiating event (loss of feedwater) and attempted to deal with the consequences of that event on the condensate system and the turbine heat sink.

3. Reactor Coolant Pump Operation - At one hour and thirteen minutes into the event, two Reactor Coolant pumps were tripped due to observed "flow fluctuations" and allowable NPSH requirements of operating four RCP's. Approximately thirty minutes later the remaining two Reactor Coolant pumps were tripped based on similar concerns. Approximately two minutes after the Reactor Coolant pumps were tripped, the operator began to raise steam generator level from thirty percent on the start-up range to fifty percent on the operating range to further induce natural circulation. Within the next thirty minutes RC hot leg temperatures were increasing to off scale (greater than 620°). It was realized that natural circulation was not occurring probably due to a steam bubble formation in the A loop (the B loop was isolated). Attempts were made to again start a RC pump to force circulation through the core; however, attempts were aborted due to pump motor low running current. (The 2B RC pump was run for a period of about 19 minutes some 75 minutes after the last pump was tripped.). The 1A Reactor Coolant pump was started

approximately fourteen hours after all pumps had been stopped.

It appears that the actions of securing the Reactor Coolant pumps were taken based on minimizing equipment damage (i.e. to prevent pump cavitation and protection of pump seals) and not based on an understanding of what was occurring in the primary system.

B. Assessment of the Radiation Emergency - The growth of knowledge in this area developed rapidly approximately two hours and forty-five minutes into the event, as the first radiation monitoring alarms were received throughout the plant. This knowledge was accumulated quickly, and used effectively to determine action levels according to the radiation emergency plan. Although the extent of fuel failure was not realized this early in the event, the perception of the significance of the radiation monitoring system readings was accurate.

C. Perception of the Non-Condensable Gas Bubble in the Reactor Vessel - Early in the evening of March 29th, a group of engineers met to discuss present plant status. Two of these engineers reported to the control room to back up the operating staff. By approximately 2100, it was apparent to this group that a non condensable bubble existed in the reactor coolant system. Prior to 2300, a formula was derived to calculate the size of the gas space in the system. Gas bubble volumes were routinely calculated throughout the 30th of March and calculated volumes began to decrease late in the evening of the 30th. Based on analysis of the 3/28 reactor building pressure spike and containment air sample analysis which began at approximately 0400 on 3/31, it was determined that the gas bubble in the reactor coolant

system was primarily hydrogen. Volume of the gas space decreased steadily through April 2. This was confirmed as the increase in hydrogen concentration of containment atmosphere leveled off as the bubble in the reactor coolant system diffused.

Interface 3

The first management communications concerning the TMI-2 accident were drafted in a telephone conversation between Mr. Herbein and Mr. Fabian approximately 7:15 a.m. Wednesday, March 28. At this time, they mutually drafted a statement for response to press inquires that related that the TMI-2 reactor was shutdown due to a malfunction in a feedwater system. The entire unit systematically shutdown and was expected to be out of service for about a week while equipment is checked and repairs were made.

At approximately 9:30 Wednesday morning, Gary Miller called Mr. Troffer to relate his conversations with Lt. Governor Scranton concerning the unit status. During these conversations, Gary indicated that there was some fuel pin leakage, however, he noted that he didn't have any indication of fuel melt. The prepared statement to the press was updated by noon, March 28. This statement revealed radiation levels were being monitored in and around the plant and that there had been no recordings of any significant levels of radiation and none were expected outside the plant. No evacuation of the local population was indicated at that time and that the reactor was being cooled according to design by the reactor coolant system and should be cooled down by the end of the day, March 28. It added there was no danger of a melt down.

During the Met-Ed press conference in Hershey, on March 29, Mr. Herbein said it was too early to tell the extent of the fuel damage at TMI-2. However, he noted that fuel failure had been experienced during the accident. He related this fuel failure to the point of turning off the reactor coolant pumps during the transient. He updated the plant

status to say that a reactor coolant pump was running and cooldown was proceeding and that he expected to be on the decay heat system in approximately 72 hours. In response to questions from the press, Mr. Herbein related perhaps one half to one percent of the rods may have experienced some melting and that the fuel had primarily failed due to the reactor coolant system depressurization and the need to shutdown the reactor coolant pumps. He noted that it was possible for some steaming in the upper core region at that time that lead to the fuel failure.

Early in the evening of Thursday, March 29, Mr. William Lowe, Mr. J. P. Moore had gone to the Unit 2 Control Room to assist the operating staff. Based on observed indications this group assessed that there was a non-condensable gas bubble above the core. Later that evening, calculations began to determine the volume of the gas bubble.

During the press conference given on March 30, Mr. Herbein revealed the evidence of the gas bubble above the core. However, he noted that it appeared that the fuel assemblies were covered at that time and that decay heat removal was progressing. He suggested at this time that the fuel failure was caused by a momentary uncovering of the fuel during the transient.

During the press conference on March 31, Mr. Herbein revealed that efforts were underway to reduce the size of the bubble over the top of the fuel. Initial indications indicated that the venting process was successful and that the bubble had reduced in size. He did mention at this time, however, a concern that the venting process has lead to a build up of hydrogen in the reactor building. During the evening a

sample of the reactor building atmosphere has been taken and that at this time there was no danger of an explosive mixture in the reactor building.

The first results of the reactor coolant analysis were received on March 30th. Based on these results, Mr. Herbein noted in the March 31 press conference that the core was indeed severely damaged and that there was a possibility that a very large percentage of fuel assemblies were in the damaged condition. This March 31 press conference was the last held by Met-Ed. After that time, communications concerning the plant status were handled by the NRC.

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JOHN H. SHARON
EDWARD B. CROSLAND
COUNSEL

September 6, 1979

George Frampton, Esquire
NRC/TMI Special Inquiry Group
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear George:

In response to your request for documents following the deposition of James Seelinger on September 5, 1979, I enclose a copy of Mr. Seelinger's notes on the emergency organization for March 28 to April 2, 1979.

Sincerely,

Mat

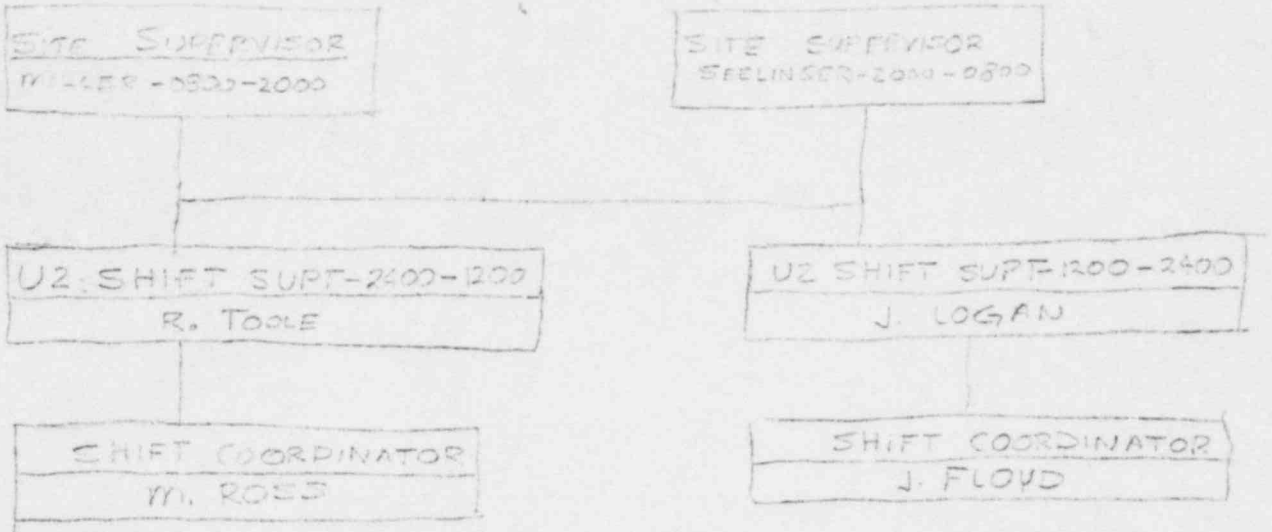
Matias F. Travieso-Diaz

MFTD:ry

Enclosure

cc: Alan R. Yuspeh, Esquire

Shift W
Mand Cove



ECS

Potts

Maggard

GPM

JLS

2400 1200
Logan
Toole
Lloyd
Potts
McAleavy
Gato

1200 - 2400
Ross
Troggans
Logan
Dabel
Poje

Logan
↳ 2400 - 0800
Sat 1600 - 2400

Sun 1200 - 2400

site supervisor - GPM/JLS

ECS coordinator Potts/Troggans

U2 shift supt - Toole/Logan

U2 shift coordinator Lloyd/Ross

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JOHN H. SHARON
EDWARD B. CROSLAND
COUNSEL

September 5, 1979

George Frampton, Esquire
NRC/TMI Special Inquiry Group
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear George:

In response to your request for documents following the deposition of John Hilbish on September 5, 1979, I enclose a copy of the Development of Understanding analysis. It is my understanding that this analysis is the document which Mr. Hilbish referred to during his deposition as the "growth of knowledge" memorandum.

I am informed that there are no surveillance records for the TMI-2 Fuel Handling Building Air Cleanup System Charcoal Analysis Procedure 2311-14 which relates to TMI Unit 2 Technical Specifications Section 4.9.12c because the procedure only is applicable "whenever there is irradiated fuel in the storage pool". To date, no irradiated fuel has been placed into the Unit 2 storage pool.

Sincerely,

Alan R. Yuspeh

ARY:ry

Enclosure

----------x

PRESIDENT'S COMMISSION ON THE

ACCIDENT AT THREE MILE ISLAND

----------x

DEPOSITION of METROPOLITAN EDISON COMPANY, by LAWRENCE L. LAWYER, held at the Three Mile Island Nuclear Generating Station, Harrisburg, Pennsylvania, on the 8th day of August 1979, commencing at 9:10 a.m., before Robert Zerkin, Notary Public of the State of New York.

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NEW YORK, NEW YORK 10038

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APPEARANCES:

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Attorneys for Metropolitan Edison Company
1800 M Street, NW
Washington, D.C. 20036

BY: ALAN R. YUSPEH, ESQ.
of Counsel

PRESIDENT'S COMMISSION ON THREE MILE ISLAND:

JOAN GOLDFRANK, ESQ.
Associate Chief Counsel

o0o

LAWRENCE L. LAWYER, having been first duly sworn by Ms. Goldfrank, testified as follows:

DIRECT EXAMINATION

BY MS. GOLDFRANK:

Q Would you state your name?

A Lawrence L. Lawyer.

Q What is your present address?

A 1215 Dauphin Avenue, Wyomissing, Pennsylvania 19610.

Q Who is your present employer?

A Metropolitan Edison Company, Post Office Box 542,

Reading, Pennsylvania.

Q What is your present position?

A Manager-Generation Operations.

Q Have you brought with you today a resume?

A Yes. (Handing.)

MS. GOLDFRANK: I would like to have the resume of Lawrence L. Lawyer marked as Lawyer Deposition Exhibit 116 for identification.

(Above-described document herein marked Lawyer Deposition Exhibit 116 for identification, this date.)

Q Looking at what we have marked as Lawyer Deposition Exhibit 116, did you prepare this resume?

A Yes, I did.

Q Is it a current resume?

A Yes, I believe it is, to the best of my knowledge.

Q Your resume indicates that you were in the United States Navy from 1948 to 1958, correct?

A That is true.

Q Did you join the Navy directly out of high school?

A No. I graduated from high school in 1947. I worked in a gas station, as an over-the-road truck

driver, and in a steel mill for the one-year intervening period.

Q While you were in the Navy, were you a reactor operator on a nuclear ship?

A Yes, that is true. In 1948, after boot camp and several electronic schools and that sort of thing, I went to a fleet boat, a regular submarine, for three years. In 1951, I was selected for the NAUTILUS and went for a training program until April of 1954, and was on the NAUTILUS -- and during that period of time I went to nuclear power schools, various schools, was at Idaho for the startup of what was called Mark I, which was a prototype for the NAUTILUS, I then went to the NAUTILUS as a reactor operator, and then when I got off the NAUTILUS in 1955 and taught school for the Navy Nuclear Power School, which was just being set up in New London, prior to getting out.

Q What was the Navy Nuclear Power School?

A It wasn't really a nuclear school, yet it was located at the Westinghouse Bettis, although in a sense it was a nuclear power school, but it wasn't the Navy Nuclear Power School in the sense of a school that we did set up because it didn't pre-exist then. It was a formal six weeks' classroom instruction, and

then the remainder of the period of time was at Idaho Falls or in the desert in Idaho on a prototype.

Q What did you teach at the Navy Nuclear Power School?

A I taught mathematics, electronics and systems and components in both the basic and the advanced courses; that is, enlisted men and the officers' classes.

Q Had you been given any special training to teach at that school?

A I was given training in those same subjects at Westinghouse Bettis. I don't know if you mean technical training. I was given training just prior to the school, some six weeks of instructors' schools, that is,how to teach, as opposed to technical matter.

Q Other than your own training that you had gone through to become a reactor operator and then the training that you were given for instructing in how to teach, was there other training you went through?

A I attended a school on a part-time basis at the University of Pittsburgh in, I presume, 1952-53, in that time frame, and I attended night school at Mitchell College, New London, Connecticut, but that was during the three years that I was teaching at the

school. It may have been at the latter portion of that. I took quite a lot of correspondence courses from the USAFI, United States Armed Forces Institute.

Q What type of courses were you taking at the University of Pittsburgh?

A Physics, German, psychology and history.

Q What courses were you taking at Mitchell College?

A A literature course and, I believe, an English composition course.

Q Was this in anticipation of receiving a Bachelor of Science or --

A I can't really say for sure. I believe that the Mitchell College was at the latter portion of my tour of duty in the Navy and probably was after I had already decided to get out and go to school and get a Bachelor of Science degree, so the answer is probably yes, but I am not certain. Sometime prior to my getting out of the Navy, I was offered Officer's Candidate School. It was at that time that I decided to get out of the Navy. My impression is that that was about six months before I got out, so it was probably early in the year, January of 1958 or December of 1957.

There was one other college course that I took, but it was during the nuclear power training, and I was formally in the six months of school at Westinghouse Bettis, and that was a thermal dynamics and heat transfer course which we took at Carnegie, I believe. I am a little shaky on that. That was a night class, and that was at the college. The rest of them were all in the classrooms provided at Westinghouse Bettis.

Q After you left the Navy, you joined the Argonne National Laboratory?

A Yes.

Q That would have been in June 1958?

A Yes, that is true.

Q What was your position there?

A The date of joining Argonne in 1958 would have been in July. In June 1958, I was discharged, so it was sometime early in the month of July.

Q And you joined them as a reactor supervisor?

A No, I joined them as a -- I don't remember the title, but some kind of technician; it is roughly equivalent to an electronics technician. A lot of the work involved repair of the electronics equipment, but it was all electronics equipment associated with a

reactor and with performing experiments on a reactor.

Q Your resume indicates that at the Argonne National Laboratory, that you were employed there as a reactor operator, is that right?

A Yes. It probably took on the order of six months to be qualified as a reactor operator on the reactor at Argonne, at which time I became a reactor operator; that is not a job title, but rather a functional title at Argonne. I was still at that time what is probably termed a reactor technician, but I was authorized to be a reactor operator, and I am really shaky on this. I would guess four years before I left Argonne, I was promoted to reactor supervisor. I am not at all certain what that time was.

Q Was the reactor operator licensed from the Atomic Energy Commission?

A No.

Q What were your responsibilities as reactor supervisor?

A I was responsible for the safe operation of t: reactor, for the maintenance of the reactor, and for the safety aspects of the experiments which went into the reactor, and included Health Physics.

Q Is the Argonne National Laboratory a

commercial reactor, or is it a research reactor?

A The particular reactor -- there are many reactors at the Argonne National Laboratory, one of which is out in Idaho. The particular reactor I was at was the Argonaut, a small test and research reactor utilized for teaching during President Eisenhower's Atoms for Peace Program. We brought in graduate students from overseas, about 60 at a time, who spent six months at Argonne in reactor studies. I might notice during that ten years at Argonne that I really completed my bachelor's, or did my bachelor's work.

Q You received a bachelor's degree in science, in physics, from the Illinois Institute of Technology in June 1967, is that right?

A That is true.

Q In addition, while you were at the Argonne National Laboratory, you were an instructor in reactor physics and reactor engineering at Argonne National Laboratory, is that right?

A At the Argonaut Reactor, yes.

Q Was that as an instructor in a formal classroom, or was it instruction on the research reactor?

A I don't know if I can distinguish what you mean

as "formal" and something that would be "informal." It consisted of a full day of instruction of a group of students. Approximately four hours of that was the theory of the experiment, and four hours of collecting the data and analyzing the data. It is very closely analogous to a physics laboratory at a university, and I presume I would say that is formal although it isn't accredited by a university. It is similar to the Orsort program at Oak Ridge.

Q In July 1968, you joined the Vermont Yankee Nuclear Power Corporation?

A Yes, that is true.

Q What was your position at the Vermont Yankee Nuclear Power Corporation?

A When I joined the Vermont Yankee Nuclear Power Corporation, I believe my title was training coordinator. My function was to assist in hiring staff for the anticipated reactor. I was, shortly after that time, in charge of writing the procedures for the hydroflush and pre-op test programs and the conduct of the training.

Q Your resume indicates that you were a technical assistant to the plant superintendent. Was that your title for the five years you were with

Vermont Yankee?

A No, that was my title at the end of my tour of duty with Vermont Yankee. It probably was for something on the order of two or three years.

Q What were your responsibilities as technical assistant?

A As technical assistant to the plant superintendent, I was in charge of all of the departments at the station other than Maintenance and Operations; those were Reactor Engineering; Chemistry and Health Physics being the second one; the third one was for Computer Engineering, and the fourth one -- it has been too long ago -- Instrumentation and Control.

In addition, I had a small staff of four engineers, and that is a rough number. It could have been less than that or more than that, but four engineers who were plant staff engineers.

Q While employed at the Vermont Yankee Nuclear Power Corporation, your resume reflects that you took courses at the Western New England College, is that right?

A Yes, in Springfield, Massachusetts.

Q What were those courses?

A All law courses, which would have led to a JD

degree in law.

Q You never completed the program?

A That is true; that was a half a law degree.

MS. GOLDFRANK: Off the record.

(Discussion held off the record.)

Q Then in July 1973, you came to Metropolitan Edison, is that correct?

A That is true.

Q And the position that you first held at Metropolitan Edison was section head of the Licensing and Safety Analysis Section of the Generation Engineering Department?

A Yes, that is true. I might clarify that a little bit. Originally, my letter of offer stated section head of Radiological Safety and Environmental Engineering. Within two or three days after joining Metropolitan Edison, myself and the manager of Generation Engineering interviewed a fellow who could fill that slot, so I took the Licensing position.

Q What were your responsibilities?

A Licensing?

Q Yes.

A I am more familiar with the responsibilities of the Licensing Group now. As I remember it at that

time, it was to handle the incoming and outgoing regulatory correspondence for the Generation Division, including the fossil stations and nuclear stations. Those regulatory agencies were all governmental regulatory agencies.

In addition, there was a safety analysis function which basically encompassed the acts as outlined in Chapter 14 of the FSAR for TMI, Unit 1.

Q You were only involved with TMI Unit 1 at that point with respect to the nuclear stations?

A That is true. We may have handled some correspondence for TMI Unit 2, but not very much. Basically it was a GPU Service Corporation function at that stage.

Q Did you have any involvement with the preparation of the preliminary safety analysis report or the final safety analysis report for Unit 2?

A Yes, I am sure I did, although I don't have a clear recollection of submission of those documents. I think my involvement with the TMI Unit 2 FSAR would have been in receiving the FSAR and distributing it to the holders of FSARs and submission under R. C. Arnold's signature to the NRC.

With the exception of one or two portions of

it which are plant-related, the portion which shows the organizational chart for the plant, we would have handled that in a review sense, so I probably -- well, I am rather sure I coordinated the review of that portion of the FSAR; that would have been a small part.

Q But the PSAR and the FSAR for Unit 2 would have been drafted by GPU?

A The preliminaries were all done before I came up, I am quite certain. The final Safety Analysis Reports were drafted by GPU, primarily by the group working for GPU head, who had a primary input, and would have been Burns & Roe, or whoever the designer was of that particular portion.

Q And you basically just reviewed the organizational structure that was set out in that report with respect to the Island?

A The portions that were primarily operations-oriented. Very much of the FSARs, as you are aware, I am sure, are design-oriented portions, and we didn't have much input into those. The portions that had to do with operations of the plant, such as the staffing or the anticipated staffing, and statements regarding that, I would have coordinated; that would have been reviewed by people at the station.

Q From November 1973 to May 1977, you became manager of Generation Quality Assurance for Metropolitan Edison?

A During the time interval that you specified, I was manager, Generation Quality Assurance. I was promoted to that position in November 1973, some four or five months after I came to Metropolitan Edison.

Q What were your functions as manager?

A Initially, my functions as manager, Generation Quality Assurance was that I was in charge of the quality assurance engineers in the home office and quality control personnel at TMI for TMI Unit 1. At that point in time, 1973, TMI Unit 2 QA was under the auspices of GPU Service Corporation, since it was under construction.

Q At what time did the responsibility for the quality assurance program with respect to Unit 2 transfer to Metropolitan Edison from GPU?

A Well, very generally, that occurred at the time of fuel loading, that initial receipt of fuel.

Q That would have been after you had no longer been manager of Generation for Quality Assurance, is that correct?

A No -- no, that is not true. It was during the

time I was manager, Generation Quality Assurance.

Q Do you remember about when it was, prior to May 1977?

A I don't remember. I could take a guess, I suppose. I would guess it was April of 1975. I am rather sure it was in April.

Q How were the responsibilities transferred from GPU to Metropolitan Edison?

A Well, let me explain that by going back a little bit. Formerly, the responsibility for quality assurance during construction was with Met Ed, the licensee. Met Ed issued a PORD, Project Organization and Responsibilities Document, to GPU Service Corporation, which, in essence, contracted or requested GPU Service Corporation to perform the quality assurance function as well as the construction function and some other functions for Metropolitan Edison Company, so in a sense I was responsible, but more directly, the vice-president of Generation, who issued this PORD transferred that responsibility from me to the Service Corporation.

Now, that document said that at the time of fuel loading of TMI Unit 2, that the quality assurance function would transfer back to Metropolitan Edison

Company. In the intervening time, a Commission regulation or modification of a regulation came out which changed or made more definitive the time at which you had to have an operating quality assurance program and plan in effect, and that was, as I remember it, 60 days prior to fuel loading, so that at that point, we had an operating quality assurance plan or program which we had written that went into effect 60 days prior to fuel loading, and in that plan we recognized that GPU Service Corporation could be requested, contracted to do quality assurance for us during the construction phase.

Now, the working out of "Shall we do audits and surveillances?" "When do they stop on a particular system?" and "When do we start?" we worked that out verbally on-site. It didn't occur at the stroke of midnight, so to speak, when this transfer was effected from one to the other; we did it in a rather smooth transfer, a system at a time.

Q That would be you discussing that transfer with the GPU Startup Group?

A No, with the GPU Quality Assurance Group.

Q Who would have headed that group up?

A Joe Wright was the one on-site with whom I was

most intimately involved in this transfer. The fellow working for me, who was a supervisor of Quality Control at TMI was William Potts.

Q So that you would discuss with them the transfer on a system-by-system basis?

A Yes.

MS. GOLDFRANK: I would like to request that we be provided with a copy of the PORD between GPU and Metropolitan Edison concerning the quality assurance program responsibilities.

A It is somewhat broader than quality assurance.

MS. GOLDFRANK: Then I would request a complete copy of the PORD.

Q It also includes construction responsibilities, is that correct?

A As I remember it, it is engineering, construction--go build me a plant. QA is one of the aspects of that.

As I noted, that document predates the NRC requirement for a quality assurance plan. It probably does not pre-date Appendix B, which was the criterion for quality assurance, but prior to about 1975, or perhaps 1974, but prior to that time, my recollection is it was not terribly clear to licensees throughout the country what the 18 criteria in Appendix B meant

as related to an operating plant. It was to one under construction.

Q Then in May 1977, you became manager for Generation Operations?

A Manager-Generation Operations.

Q That is the present position you hold?

A That is correct.

Q Have you ever been licensed on a commercial nuclear power plant?

A No.

Q What are your responsibilities as manager-Generation Operations?

A My responsibilities as manager-Generation Operations is for the operations and maintenance of Metropolitan Edison Company's generating plants; that is, one hydroelectric station, two coal-fired fossil stations, 13 combustion turbines, and two nuclear stations.

Now, let me modify it slightly in time. March 1, 1979, we promoted Gary Miller to station manager, and as such, he was accountable for operations and maintenance of Metropolitan Edison's nuclear generating stations. There was an understanding and some words in that announcement letter which I don't

know verbatim, but I retained a kind of technical advice in nuclear matters in relationship with the nuclear stations. His promotion, though, was a full promotion, and I retained the fossil portion.

Q What type of organization prior to March 1, 1979 did you have under you to discharge your responsibilities?

A I had a station staff at every station. I guess that was something like, I would guess, 925 people. On the staff in Reading, I had one senior nuclear engineer, one junior nuclear enginear, and two stenographers, and that was all at that time.

Q Did that change?

A I am sorry. I did neglect one thing, although it is not of a great deal of importance, but coincident with the March 1 promotion of Gary Miller, I also had transferred to me a group called the Economy and Production Group from the Engineering Department, which consisted of four people at that time. Their responsibility was to increase productivity and economy, productivity being the amount of time that the plant is up, and the economy being the economy of the operation when they are up. This is an engineering discipline. It did encompass both fossil and nuclear

stations.

Q Once your responsibilities were changed on March 1, 1979, did you lose the one senior and one junior nuclear engineers who reported to you?

A No. I also had the nuclear engineering group prior to March 1 and after March 1.

#2 Q So that even though Gary Miller was made a station manager, which would be a position under yours in the organizational structure, the Nuclear Engineering Department stayed with you?

A With me, that's right, and I incorrectly answered your question. You said, did I transfer the senior nuclear engineer and junior nuclear engineer -- sometime early in 1979, I transferred the junior nuclear engineer to an operating position at the station, so that immediately after that, he was and still is, to the best of my knowledge, a nuclear engineer at the station.

Q Why was that transfer made?

A Because he was qualified for promotion, and that transfer entailed a promotion, and that was because of my belief that we as a corporate staff could better support the plant with transfers from plants to the home office and home office to the plants.

Q Your office was in Reading. is that correct?
A Yes, and Pottsville Pike.
Q How much time did you spend in Reading versus time spent at the various generating plants?
A That varied during the approximately two years that I was manager-Generation Operations, but I think I was at TMI approximately one day per week, a day being an eight-hour day, and something less that one day per week at all of the other facilities combined. There were periods where it was quite a lot more than that at TMI. It was rather uniform at the other stations though.
Q Whose decision was it to make Gary Miller a station manager and take the responsibilities with respect to operations and maintenance for the nuclear plants out from under you?
A Within the scope of my knowledge, I think I have to answer that by saying that was my boss, Jack Herbein. I was involved in that and had knowledge of it and supported it.

Who else was involved I don't know.

Q Do you know what the basis of that decision was?
A I presume it was because -- at least the basis

of my decision was that he is certainly fully qualified to the job.

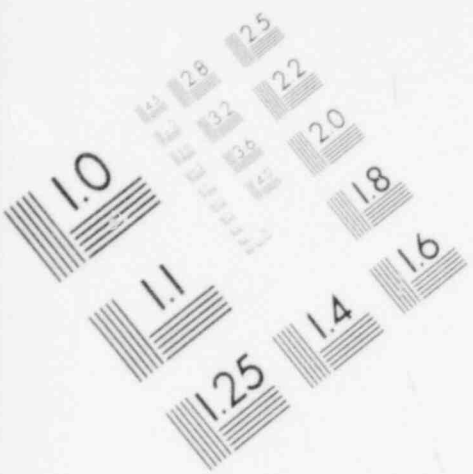
Q Aside from the particular individual involved filling that position, what was the underlying reason for separating the responsibilities for the operation and maintenance of the nuclear stations from the other generating stations of Metropolitan Edison?

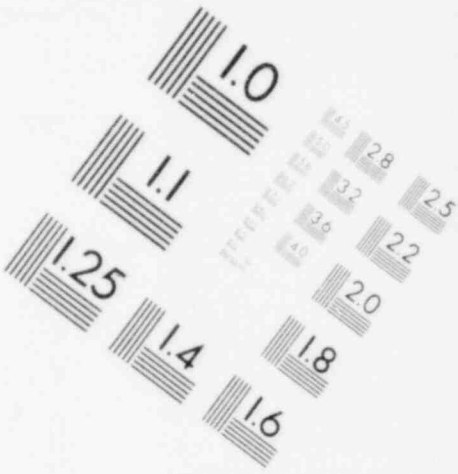
A That implies that there was a reason other than the need and deserving promotion for Gary Miller, and I don't know that there was another. There may have been, however. My feeling is that, for example--and this is just an example -- that prior to that transfer, there were probably 2,700 employees in Metropolitan Edison. Of those, 1,050 or 1100 were in the Generation Division, and of those, 900 or so were under me. Now the only significance of this is that in giving attention to promotions, budgeting and so forth, the work load was quite high -- this kind of work load was quite high. I suspect that there may have been some reasoning on the part of Jack Herbein and anyone else that was involved in that decision to attempt to break the number of people reporting in an individual chain down. The only

other thing I know is that sometime prior to that, maybe a year prior to that, we had a consulting group; Booz, Allen, Hamilton came in and performed an audit, in which they, in a sense, analyzed the organizational structure and recommended that we restructure, and that here would be a better way to restructure.

One of the messages of that, although it wasn't terribly clearly delineated on an organizational chart, but more inferred, was that people in plant operations should be relieved of some of the administrative duties, or I would call them "extracurricular duties," things like personnel matters, budgeting matters and so forth; that exhibited itself not at my level but at the stations in establishing another superintendent. particularly in the large stations, TMI, we established a position of superintendent, Technical Support, or something of this relation, and that encompassed the administrative group, the clerical, stenographic group, document control, personnel, many of these functions, and the idea was to relieve the unit superintendents of that responsibility. That did not take those functions away from the station superintendent, or what is now the station manager, though.

I may have, now that I think of it, and that





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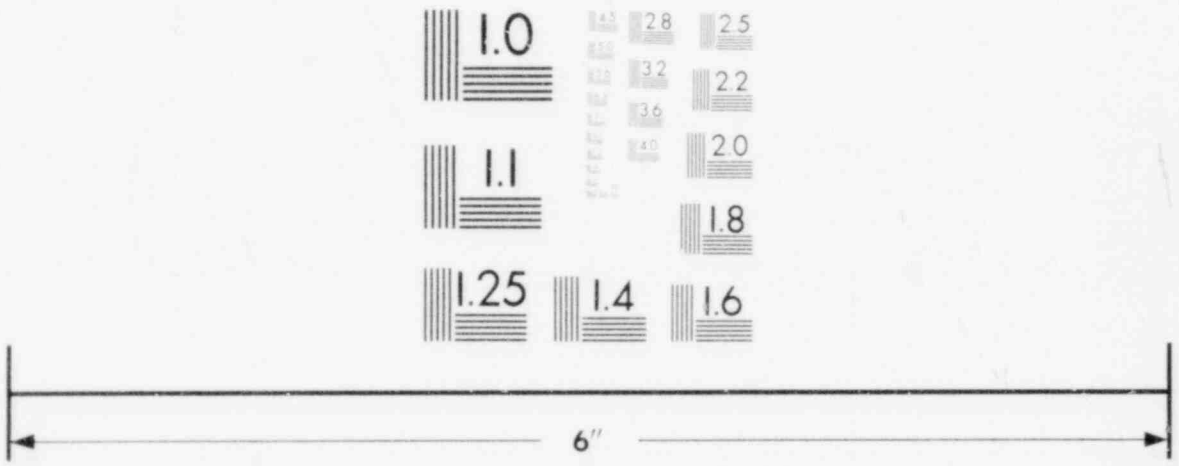
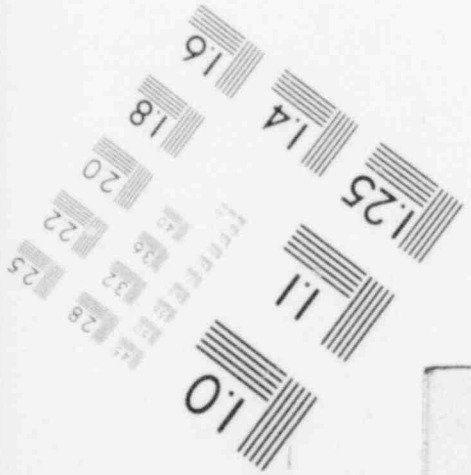
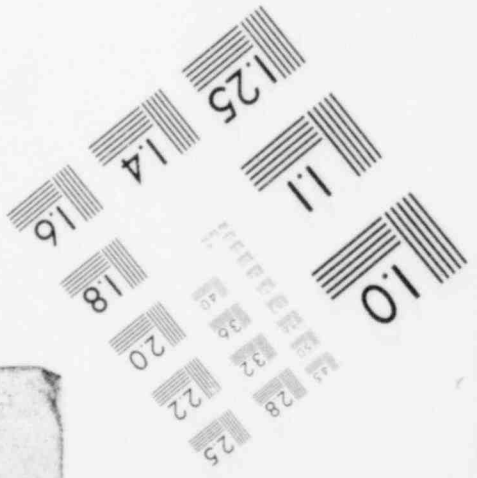


MICROCOPY RESOLUTION TEST CHART





may be what your question was leading me to, I may have been a party to some underlying reason prior to March 1. There was also, and I am not sure that I was ever directly involved in this, but secondhandedly, there was a desire on the part of Mr. Dieckamp to reduce the number of levels of people so that it wasn't so far from a company president to the bargaining unit or hands-on personnel. The number, I believe, that was desirable, was something like eight, and in my chain at TMI, we probably had 9; that may have also been involved in that decision. I don't know that for a fact though; that is kind of secondhand.

I probably had discussions with Jack Herbein about that and Don Hetrick of the Service Corporation. He was in the Operations Group in the Service Corporation.

Q What is your relationship with the Operations Division at GPU?

A Let me try to term this in terms of responsibilities and obligations. I feel an obligation to keep them informed of ideas that I think are significant in terms of plant operation and maintenance. I feel a responsibility to keep myself informed through them of what the other operating companies are doing. We had periodic meetings, for example, of

the managers from Jersey Central and Penn Elec, with Don Hetrick, who was the manager of Operations in the Service Corporation, and this was in kind of round tables, if you will, of operating experiences.

In addition, we had meetings, GPU-wide, of all three of the operating companies in the Service Corporation, of all the managers, not just managers of Generation Operations. Those were generally two-day meetings statusing new programs, reports on significant developments at the various stations.

Q How frequently would the round table meetings, as you described, occur with respect to the operating stations within the GPU family?

A Those were the round tables of all managers; that manager's meeting was generally quarterly. There was budget restrictions, perhaps, during the last year, which made us miss maybe two of the ones we would have had during the past year, two or three, but they were rather regularly held once each quarter prior to that time.

Q What kind of budget restrictions are you referring to?

A I don't know what you mean by "kind of budget restrictions." Lack of money.

Q To be able to fund these meetings as frequently as you had?

A Not just those, no. It was, in my view, lack of rate relief which results in an impact on stockholders, and therefore, impacts on how much money we are able to spend in ongoing budget, so the budget would be somewhat restricted by that.

Q At these meetings, were the other managers of Operations, and that would be managers of Operations from Jersey Central and Penn Elec?

A Yes, Penn Elec.

Q Would just the managers attend those meetings?

A .es, but I am misleading you now, or you are misleading me. I spoke to two meetings: the managers of Generation Operations, of which there are only three of usin the operating companies; the meeting that I spoke of the most included all the managers of GPU, so that would be the managers of Engineering, Quality Assurance, Operations and so forth, along with the vice-presidents of Generation. The regular quarterly meeting was a meeting of all managers.

Now, during those meetings, the managers of Generation Operation frequently met prior to the

first day of a two-day meeting or in the evening between those meetings. The managers of Generation Operations, to my knowledge, have never met on a regular basis other than in the context of that quarterly meeting. We did have some regular meetings that had to do with staffing of the Forked River plant. We went through a rather formal process with regular meetings, interviewing and selecting people for prospective candidates, the best qualified people for Forked River, because of our concern of picking a good staff for Forked River.

Q Was the same kind of process gone through with respect to staffing of Three Mile Island Unit 2?

A No. I am rather sure it was not. Staffing for TMI Unit 2 was basically a process of building your staff for TMI Unit 1 too large, overstaffing of Unit 1; that is, my description of the situation there was quite different. The GPU system at the time of TMI Unit 2 staffing, we had Oyster Creek as a nuclear station and TMI Unit 1 as a nuclear station. Those were the only two sources from which we could have drawn or perceived that we could have drawn. At least in 1973-74, at the time I came in, there wasn't much lead time in getting people for TMI Unit 2.

With respect to Forked River, we perceived that we had quite a long time with it and identified people in the fossil station in Penn Elec, transferred them for a two-year tour of duty at TMI, where they would get nuclear training in addition to that, and they will be ready for a position, a nuclear position in Forked River, probably a more leisurely plan.

Those transfers didn't take place, by the way.

Q With respect to the Operating and Maintenance budget, how was that coordinated?

A I suppose that was handled differently or somewhat differently each year within my recollection. Initially, as manager of Quality Assurance, my involvement in the O&M budget was rather minimal. I think the budget review was more heavily controlled by the vice-president of Generation at that time. He received the individual budgets and rather did the budget-cutting and negotiations himself, one on one, whereas the last budget that we went through just prior to this year was a budgeting process which started with the individual stations making up the budget, then identifying items which would cost approximately 10 per cent more than that, that they would add if there were the money to do it, and in addition, from the

base budget, if you will, identifying 5, 10 and 15 per cent levels that we would cut; in other words, what items we would cut out if the money were not available. That was done prior to us knowing how much money there would be available for the O&M budget, so the process started much earlier and went through many more revisions and was more of a peer review; that is, the manager's review of the total budget during the time it was being made.

So the manager of Generation Engineering had an opportunity to express his opinion of each of the station budgets, rather than just controlling his own budget.

Q Would you ask the individual generating stations to present you with a budget, and that would be a budget from which you would initially work?

A Yes, and the stations, frankly, probably began with their last year's budget, added in items which they felt were items that should be done, many of them from an economical sense, and that was probably their best description of their starting point.

Q Once you received their starting point, would you then present the budget to Mr. Christman?

A Yes, but there is a distinction. To the best

of my recollection of all of the past budgeting, it was that the individual managers in Generation presented a joint presentation, of which Mr. Christman was one, and presented to each other, base budgets.

Now, in my case, with all of the various stations I had and so forth, had those people reporting to me, presented those budgets to the managers. In the case of Generation Engineering, the manager of Generation Engineering, as I remember, presented his total budget, but as I mentioned before, the other managers had much fewer people on an O&M budget to present, which was basically the reason, which had to do with the fact that my staff, so to speak, was much smaller. The other managers had people performing functions in the home office which they could use as budgeting people for a short period of time. In mine, there were very few of them to do that with, so in essence, I used the station superintendents to present those budgets to the managers.

Q Then once there had been this peer review of this budget on the manager level, then who would the budget be presented to? Would that be the vice-president for Generation of Metropolitan Edison?

A Yes. There may have been two or three joint

presentations with some guidance from the manager or the vice-president of Generation in between. In other words, "Your joint budget is way off the mark. Go do it again," with a somewhat lower level or somewhat higher level, so that probably he would look at the book that was made up of slides and so forth, and it might be his impression that that wasn't a very good piece of staff work, and he could change these things and present this differently without actually being there doing it. So there were probably, I would say, two or three practice presentations or peer review presentations prior to the presentations to the vice-presidents.

(Continued on Page 33.)

SM 4 LC (phone)

Q You indicated that there were certain budget restrictions over the last couple of years, correct?

A There may have been budget restrictions; I suppose there were.

Q Who would indicate to you those budget restrictions; would that come from Metropolitan Edison or GPU?

A Budget restrictions came to me from my boss.

Q So that would be Mr. Herbein?

A Yes. It is my feeling that he took the manager's budget or his budget, as we put it together, after his review, and presented that to the officers of the company. That is partly an assumption, but I think it is accurate.

Q When you received operating and maintenance budgets for generation operations, was it already divided up between the generating stations, or were you allotted a budget that you could then divide up?

A No, the budget was presented by individual area -- that is, individual people reported to me with the exception of the home office staff. I took care of that piece of it, if you will. The rest of it was already split up. It wasn't split fossil-nuclear;

4.2

it was split by station: CT had their own, etc.

Q Is that how the budget would remain during the year, as an operating budget divided by station?

A Yes.

Q And with respect to Three Mile Island, was there a separate budget for Unit 1 and Unit 2, or was it a Three Mile Island budget?

A It was a Three Mile Island budget, which consisted of accounts for TMI Unit 1 and TMI Unit 2 and plant common, before this year.

This year, there was only two. There was no plant common; the distinction being, the plant common is generally 50/50 approximately, so you can budget a Unit 1 and Unit 2 separately by splitting plant common, or you can show the plant common piece.

Prior to this year, we showed, in essence, three budgets for TMI.

Q With respect to this year, do you mean the budget that you are now making up for 1980, or would that have been the budget for 1979?

A The one that we are making now is for 1980.

Q When you indicated that there was no longer a budget for plant common, that would be in the budget for 1980?

4.3

A The 1980 budget will not have a plant common if things go as we anticipate they are going to go.

Q What types of things would be covered by the plant common budget?

A Most immediately apparent is Gary Miller's salary. The industrial waste treatment facility, industrial waste filter system, the guard force, security system -- chemicals may be; I am not sure if chemicals are split or not, but those general things.

Q Is Maintenance being covered by the common budget, or is that divided up between the budget for Unit 1 and the budget for Unit 2?

A The Maintenance force has worked with the ability to charge their time to either unit depending on which unit needed the maintenance effort. Budgeting, though, was an attempt to predict how much of their time would be charged to each unit separately. So it wasn't a plant common function; it was just split arbitrarily.

What we are speaking of, by the way, is the budget prediction. That wasn't always a fact. For example, if the situation dictated, the Maintenance force might spend all of their time on Unit 2. Now that is an exaggeration, but you might estimate that it is going to be because of refueling outages or NRC-required

4.3

equipment or for some other reason, you might predict 60 per cent Unit 1, 40 per cent Unit 2, and it may come out exactly the other way around, and someone has to answer why, but --

GOLDFRANK: I would like to mark as Lawyer Deposition Exhibit 117, minutes of a Meeting No. 4, June 28, 1977, Three Mile Island, O&M Committee Meeting.

(The above-described document was marked Lawyer Deposition Exhibit 117 for identification, this date.)

Q Could you look at what we have marked as Lawyer Deposition Exhibit 117. If you will look at the list of attendees, you will see that your name is listed there, correct?

A Yes.

Q Could you explain to me what the O&M Committee is?

A Well, the O&M Committee meeting to which you are referring is a meeting of GPU Service Corporation and generally the GPU managers who go to a particular site, and the budget for that site, significant O&M items from that budget are presented to those managers. They, in turn, at that meeting generally comment on

items in that budget.

Q This is an advisory group, so to speak, made up of the managers of the GPU family?

A I think it is more -- I would say it is more than informational meeting in which -- if I were going to the O & M budget meeting at Oyster Creek, which I have on several occasions, I might learn that Oyster Creek was able to save X dollars in the O & M budget by contracting a certain kind of work out as opposed to doing it themselves or vice-versa, I would learn of new techniques not in budgeting but rather in performing operations.

Usually it is a rehashing of the problems that they are having, so it is -- I don't know if O & M Committee is a good terminology for it or descriptive terminology for it; it is, in my view, more of an operating experience and maintenance experience.

Q And who would attend these meetings other than a representative from GPU and managers from Met Ed, Jersey Central, and Penn Elec?

A I am not certain a manager from GPU Service Corporation has always attended. I think that is probably true, but other than the people -- other than the managers attending, those are generally the

people who are most familiar with operations and maintenance at that station, and it is usually those people who put on the show, so to speak, present the presentation.

Q So you would have people from the site give presentations on various topics?

A Yes.

Q Would you usually have your unit superintendent attend?

A Yes.

Q And it would be to discuss operating experiences and maintenance experiences?

A Yes.

Q How often did these meetings occur?

A I think they occurred once a year. I am not sure that -- I went to -- well, let me say that during the time I was manager Generation Operations, and manager Quality Assurance, I attended one at Oyster Creek and probably three at TMI and no others of this variety.

We did have an operating or an O & M Committee meeting at the fossil stations, but it was a localized, Met Ed meeting. Those we conducted after each outage.

These were generally in conjunction with an outage, usually after an outage. The one I attended at Oyster Creek and I think all of them that I attended at TMI were post-outage.

Q Why was that?

A Because the bulk of the maintenance in a sense goes on during the outage and the operations is rather smoothly divided as a function of time function -- that is not really true, I guess.

Significant fuel handling developments in operations would occur during the outage.

So the reason was that we did a lot of paper work, planning, executing during an outage, prior to an outage and during an outage, so it was fresh in everyone's mind, and it was a logical time to put on a presentation. If you waited until just prior to the next outage, the person who was most directly in charge of the last outage might be at another station, might be at another company, might be at Met Ed or might not even be with GPU.

Q Would you discuss transients that occurred in the nuclear plants at TMI or Oyster Creek?

A Yes, I think probably so, although I am not

terribly clear on that, but I believe that is true. Developments such as transients probably would have been. That partly would depend upon how long before the outage the transient occurred and whether or not it seemed very significant to the people making the presentation.

Q For instance, the minutes of the meeting that we have marked as Exhibit 117, the agenda for this meeting would have been made up by you or would it have been made up by Gary Miller?

A It would have been made up by either Gary Miller or a fat list of people. I suspect it was made up by Jim O'Hanlon and Bill Sawyer. Bill Sawyer was the outage coordinator at that time.

Q So that these meetings would usually focus on the operation experience and maintenance experience with respect to the fuel outage?

A And the period of time prior to that.

Jim O'Hanlon would have said, "During the last operating cycle we had a certain capacity factor," probably presented the LERs, abnormal occurrences, or whatever they were called at that particular time, what shutdowns occurred, the length of time that they occurrred for and what the final diagnosis of the reason

of those shutdowns or reductions in power were, stopped for testing, et cetera.

(A brief recess was held.)

Q Looking at the minutes of this O & M Committee meeting of June 28, 1977, there is a discussion in Item 3 with respect to a desire to have additional engineering support on-site, and if you will look at the second page of the minutes, it indicates that you indicated that you will try and make some junior engineer swaps to accomplish on-the-job training, correct?

A Yes.

Q Do you remember what that discussion was?

A No. Well, I don't know that it specifically related to that statement or that discussion but we were, perhaps as early as that time, involved in transferring people for the duration of an outage to a station to let people get operating experience at stations, primarily just during outages so there might have been another case, but they would be minor, mostly during outages when more personnel were needed.

Q If somebody from the site, from Three Mile Island needed to contact the Generation Engineering

Division in Reading, do they have to go through you to contact that engineering?

A No.

If they knew who the particular person was, they would contact him directly. If they weren't quite sure, they might go through Mr. Klingaman's section head. They generally would not go through me. I may have been involved in conversation with the station superintendent or the unit superintendent about needing Reading or GPU SC assistance prior to the engineer making that call, but I am interpreting that as not going through me. I may have been involved in a decision that we ought to get somebody from the outside to come in and then we would talk about do we have to get a contractor or do we have someone in-house with the kind of expertise that we were looking for.

But the contact would always be made from engineer to engineer.

Q How would you be kept apprised as to the status of the plant at TMI prior to March 1, 1979 when Gary Miller became manager?

A How would I have been?

Q Yes.

A Under just normal situations?

Q Right.

A Generally by a telephone call each morning from Gary Miller. It initially started in that vein. He called me or I called him in the morning on a rather informal basis -- it was formally every day but not always at the same time.

It wasn't very long, though, that it became apparent that because of scheduling of meetings, et cetera, it was best to do that at a particular time -- and mostly best from my point of view rather than from their point of view. So I established a schedule for each of the stations -- those personnel reporting to me, including the home office engineering person, to contact me at a particular time of the day, and this is generally started at a little before 8:00 in the morning and extended to 9:00 or 9:15.

TMI's call was at 0830, if I remember correctly, 8:20 to 8:35, somewhere in there.

Q Was this a conference call, would anybody else be included in that call or was it just between you and him?

A Initially it was a call from Gary Miller to me.

Then, in order, presumably to save time, he made that a conference call in which the two unit superintedents really were giving the status of their units both to Gary and to myself.

So rather soon after May of 1977 it became a conference call among the four of us.

Q And did this conference call continue daily after March 1st prior to March 28th?

A It did continue after March 1st. I am not sure how long after March 1s. Gary and I, at about March 1st, began discussing whether we should continue that. After March 1st it may have -- those that occurred may have been Gary Miller calling me; I am not sure. I am fairly certain that we agreed to discontinue those calls, or in essence, discontinue those calls.

I do remember that we decided not to discontinue his attendance at a meeting of station superintendents which I was conducting at that time because that was valuable for an exchange of ideas.

We may -- in fact, I guess I am certain we haven't had one of those after March 1st, but we had decided we would continue those.

Q How frequently would you hold those

meetings of those station superintendents?

A Those were intended to be monthly meetings. We might have missed some because of too many people not being available, but I would guess that we made eleven meetings a year, in that kind of order. We alternated from station to station.

That was what was termed the senior superintendent's meetings. The pay grade of people reporting to me, their experience and responsibilities varied quite widely from small hydrostation and a CT supervisor to Gary Miller who had the bulk of the people that reported to me, most of the capital investment and the bulk of that integration, so those meetings were really meetings of the three other superintendents and myself.

Perhaps someone else, on occasion, but almost always it was the four of us. That was the two large fossil stations and Gary Miller from TMI.

Q How is your time divided between the various generating plants that you had responsiblity for?

A It is rather difficult to come up with a number terribly easily. My guess would be 40 percent TMI and 60 the other stations, but it may have been more

TMI than that.

The reason I have difficulty with the question is that one of the things, for example, that I did was spend quite a bit of time on something we called a Manpower Assessment Committee which I Chaired which had to do with the analysis of qualitifcations of people, promotion of people, transfer from one location to the other.

The other managers sat in on that committee and I chaired it.

Now, at whatever time I spent in that -- my initial reaction was that TMI was just one piece of that -- but that probably was 90 percent of the personnel, and in fact, they may have been responding -- Gary Miller may have responded to this personnel aspect better than the fossil stations, so it might have even been more than 90 percent.

I have a little difficulty picking a number, but certainly 40 percent was TMI.

Q What involvement did you have with a schedule as to when TMI Unit 2 would become commercial?

A I am familiar with the document that was initially -- or procedure that was initially drafted which was a procedure for declaring commercial. I

reviewed that document at least once, perhaps more times than that -- but that I am aware of when it was finalized and I presume I attended the on-site meeting of Mr. Arnold and Mr. Herbein when they reviewed the feasibility of declaring TMI 2 commercial.

I am not positive of that; I was not one of the principals of that meeting.

Q You were not on the Commercial Operations Review Board?

A No.

Q Is that the committee you are referring to?

A Yes.

Q What comments did you make on the document that you reviewed with respect to when TMI Unit 2 would be declared commercial?

A I don't remember.

Q Would those have been written down or were they oral comments that you made?

A Probably consisted of a marked up copy, but I only have a recollection of having gone through the procedure at least once.

Q Did you pass your comments on to

somebody on the Commercial Operations Review Board?

A As I remember it, I was asked to comment on the procedure by Mr. Herbein, and I presume I submitted my comments to him.

Q Would you have submitted to him a marked up copy of that document from the Review Board?

A Or a memo or verbal comments; I am not really sure, but I rather think it was somehow a hard copy, probably it was a marked up copy.

MS. GOLDFRANK: We would like to request that we be provided with a copy of Mr. Lawyer's comments concerning the schedule for determining Unit 2 commercial written by the Commercial Operations Review Board.

THE WITNESS: On the record, if I am right, the terminology you used was "Schedule for commercial operation." What I referred to as having commented on was a procedure by which the committee will operate. I don't know if that makes a difference, but it wasn't a time listing of events.

Q But criteria or things --

A Yes, criteria, right.

Q Did you sit in on any of the meetings of the Commercial Operations Review Board?

A I don't believe so but I may have. That part, I don't remember. That presentation may have been done purely by the plant staff; I am just not sure.

Q Were you aware that there was a desire to have Unit 2 become commercial prior to the end of 1978?

A Yes, I think so. From my past experience, I remember at Vermont Yankee there was a very strong desire. I presume this has something to do with the financial arrangements and I would have assumed that the same thing held here.

What that advantage is, I don't know.

Q Who indicated to you that there was a desire to have Unit 2 become commercial prior to the end of 1978?

A I didn't indicate that someone indicated it to me but rather an inference on my part.

On the other hand, I suspect that I would have conveyed that inference on my part to other people, Jack Herbein, those people working for me. It would be an assumption on my part that there was some economic advantage to getting commercial prior to

the end of the year and that would have started in the middle of the year before we went commercial, that we thought it would be much earlier.

Q Did anybody indicate to you specific financial advantages to becoming commercial prior to the end of the year?

A No. I do remember conversations that it was -- well, conversations about when the plant would be declared commercial.

The reason I remember these is from an operational point of view it seems like a very fictitious kind of thing. The plant is no different before than it is after, and not knowing what financial advantage it is to a corporation to have the plant commercial other than somehow there is also a disadvantage through AFEC or something you can suffer some penalty for some period of time after the plant is commercial, but anyway I am not -- from an operational point of view, it really is a budgetary-accounting thing from the day at which they declare it's commercial.

There are operations or were operations in the past where declarations of commmercial at 20 percent power, 80 percent power, a hundred percent power, so

plants have been declared commercial at 50 percent power when the Startup or Test Program was not completed but there was going to be a hold-up in the Startup Power Test Program.

I guess I can't say that from firsthand knowledge. I heard of these plants in terms of Vermont Yankee, but operationally, it would really be a fiction just as in a sense the day of attaining a license is a fiction to us operationally except there is a legal constraint. There is no such legal constraint in terms of commercial operation. That could have been my -- I am fairly sure it was my reaction to being to comment on the procedure for declaring commercial because as manager of Generation Operations, it really didn't make all that difference to me.

I doubt that I made that comments, but I did verbally, I am sure, but probably not in writing; it isn't a very significant comment.

Q From previous testimony I understand that prior to December 30, 1978 when Unit 2 was declared commercial, electricity was sold from the unit, correct?

A Yes, there is a budget provision for power generated during the Startup and Power Test Program or

there is an accounting for this. There must be an accounting in a given way. I don't know that it is charged at the same rate.

From a budgetary point of view that may be a terribly significant difference in how you account for the power that is generated; it is separately accounted for, power generated during the Startup and Power Test Program.

Q I would like you to look at what we have already marked as Deposition Exhibit 92. That is an internal Burns & Roe memorandum concerning the continuing contract after, master of service contract for Burns & Roe after Unit 2 went commercia..

Looking at Page 2 of this exhibit, you will see that you are listed as an attendee at the meeting in Reading apparently concerning this issue which was in August of 1977.

Do you remember attendint that meeting?

A Yes, I believe I do.

Q Was there --

A This was in relation to the continuing services contract. This was rather a proposal, as I remember it -- which I don't remember very well -- but I think a proposal by Burns & Roe to provide us with a

service, yes.

Q And was there a reason why you would not automatically have continued with or you would not have entered into a continuing contract with Burns & Roe as the architect-engineer for Unit 2?

A Yes, there could be many reasons.

The ones that immediately come to mind are there is a competitor in this process which is located in Met Ed as opposed to New Jersey, they are much closer to us and thereby closer to TMI. That particular contractor had a lot of experience with our people. Our people knew their people, knew who was qualified to do what, et cetera.

I think those are probably the two strongest things that I can think of, and in general, a feeling probably that Burns & Roe was not as good an engineering organization as the local one. But that has probably also got a log of personality involved in it.

My tendency might have been the opposite direction because two of the Burns & Roe presenters there I have had a lot of experience with in the past. Buzz Cobean was on the Nautilus, and J.P. Cady was one of my students at the Nuclear Power School, and

I had not had any experience with the local architect-engineer prior to joining Met Ed and not really much after.

Dick Klingaman's Engineering Group had a much closer relationship with the architect-engineers.

Q Looking at the third page of this exhibit which is the second page of conference notes, signed by Mr. Cady, you will notice that the second paragraph under "Discussion," indicates that Mr. Cady apparently concluded that Met Ed personnel favored Gilbert Associates being retained to perform the master service contract rather than Burns & Roe.

Would you say that was an accurate description on his part?

A He may have known something that I didn't know but I certainly would not have been able to predict the inclination of GPU.

That may have been accurate but I would have been guessing. It may have been accurate on the part of Dick Klingaman and Jack Herbein. There may have been that inclination, but I certainly couldn't speak to whether it was factual or not.

I quoted forces dealing in one direction. There were forces in the other direction. One of

them was that Burns & Roe designed the plant. They logically were more familiar with the plant than GAI was, so there had to be an inclination on somebody's part to retain Burns & Roe, otherwise there never would have been the presentation. We, I am certain, just didn't do it for show or to satisfy the purchasing people.

Q Did you also have the same presentation given by Gilbert Associates?

A I am rather sure there was a presentation by Gilbert, but I rather think I wasn't at that presentation. I don't remember but I would tend to remember a presentation by Buzz Cobean much better than Gilbert's people.

Q That is because you knew Mr. Cobean?

A Yes.

Q Whose decision was to retain Burns & Roe?

A Jack Herbein as far as I know.

I am not sure of the size of the contract. That might have been subject to LSA review in which case Mr. Kreitz may have been the final signatory, or if it were a higher value contract it would have had to go through other officers in the GPU system.

Q LSA review?

Lawyer

A Level of Signature Authority. There is a set of criteria at which a purchase document has to go to succeedingly higher levels of authority for signature.

Q Is that based upon the amount of money that is expended?

A Yes, and the type of contract, whether it is for services, materials, that sort of thing.

(Continued on next page.)

Q Do you remember any discussion that resulted from this Burns & Roe meeting in August of 1977?

A Not specifically. At some time there were discussions -- I don't know if they were as a result of that or preceding that -- primarily centered around only Gilbert and Burns & Roe and the issues I mentioned, how close are they, how fast can Burns & Roe get to the site, will the people know who to call in Burns & Roe, will Gilbert know enough about the plant to be of assistance or of much assistance, and those kinds of things would be in the balance.

I don't know, frankly, whether they preceded or succeeded the presentations. There were probably some of one and some of the other.

Q Are you presently a member or were you, prior to March 28th, a member of the GORB?

A Yes and no. I am a member of a GORB but not a TMI GORB.

Q By GORB are you a member of --

A Oyster Creek.

Q And at one period of time you were a member of the TMI GORB?

A No -- I'm sorry, for the past year or year and a half, some time in the recent past, I have been

an alternate to the TMI GORB, not a member but an alternate member for Mr. Bartman.

Q With respect to the kind of information that you learned as a member of the GORB for Oyster Creek, how was that information transmitted to be utilized at TMI?

A By myself and common members, I guess. There are -- well, that is one, and perhaps the most direct influence. The second is a GPU practice, probably not a policy or procedure, but a practice established some years ago in which Mr. Dieckamp required that significant occurrences at nuclear stations be transmitted to certain senior people. Mr. Creitz and Mr. Herbein get the Oyster Creek experiences, and to the best of my knowledge I receive all of those, probably -- well, I shouldn't say "probably" either -- because of my being manager of Generation Operations or because of my involvement on GORB? It is not transmitted to me as a GORB member, it is third-hand after it goes through Mr. Creitz and Mr. Herbein. Those are not GORB documents, they are such things as LERs, letters to the Commission, letters to the state regulatory agency, Environmental Protection, et cetera.

Q Look at what we have previously marked as

Kunder Deposition Exhibit 87. That is an Action Item No. 31 from the Three Mile Island GORB, and if you look at the second or third pages attached to that there is a response to that action item that is signed by you.

A Yes.

Q Would you read that over to yourself, please? Do you recognize that response?

A Yes.

Q And was that prepared by you?

A No. It was prepared at the plant but I think that probably the Item 3 of that was prepared by me. I am almost certain that -- well, it indicates George Kunder, that I acknowledged his having prepared it. I think that may be somewhat of an injustice or more of an acknowledgement of the work that he did.

He may have totally prepared Items 1 and 2. I know that Item 3 was primarily my thought process. I may have transmitted that before he prepared it, though.

Q Were you a member of the GORB and is that why this was assigned to you?

A No. It was assigned to me because I was manager of Generation Operations. No, it was assigned because, mainly because I was at the meeting that day and volunteered to do that.

Q Do you remember the discussion at the GORB meeting which raised the concern as expressed in Action Item No. 1 with respect to the process and acquisition of user information about accidents at other nuclear plants?

A Not in detail. I do remember vaguely.

Q What do you remember generally?

A The question was raised about whether we needed to develop new techniques for transmitting information, what can we do about the large volume of information that the plant is deluged with, operating people in particular and the industry in general.

Q Was it in response to a particular problem or just a general concern?

A No. As I remember it, it was just a general concern. I don't remember a particular problem. No, I think it was an inquiry on the part of the GORB which on the spot we thought we shouldn't answer -- well, we may have given a yes or no answer but we thought it best to write out in some detail or summarize what the mechanisms were that we were using.

There may have been drafts before this that had more detail in them; I am not sure about that. Somewhere in the process in there I thought about or we had written

some reference to clearing house documents. I know this would come to mind immediately from me because I have read that document for years. It used to be a planned method of transmitting messages, in the '68 time frame.

Q You indicated that Mr. Kunder wrote most of this response, correct?

A I indicated he may have. I didn't know how drastically I had changed it. I am quite sure that I made substantive changes to No. 3.

Q With respect to the page that indicates the current status of means of reviewing information from other nuclear power plants, was that prepared by Mr. Kunder?

A Yes. This is a two-page document and it refers to two pages.

Q Right.

A But I didn't know that I hadn't left all of that out, only included those three items.

Q Did you perform at this time any type of review of the kind of information that was transmitted on such things as CURRENT EVENTS POWER REACTORS from the NRC that are listed on the third page of this document, the second page of your response?

A The first page of my response -- I know the page

you are referring to. Is your question did I regularly have access to and review these documents or did I do a thorough review in coming up with those?

Q In coming up with your analysis of what the system for reviewing information coming from other nuclear power plants --

A I suspect that George Kunder did a thorough review and presented this portion of it at least to me as that, and I went over it very carefully and may have added something, may not have, depending on if anything occurred to me. I did not do a library search to see if there were other pieces of paper.

Q The information that you indicated on this page that was received by the people at Three Mile Island, for instance, CURRENT EVENTS, FEDERAL DIGEST CLEARING HOUSE WEEKLY, OPERATING EXPERIENCE what the type of information that is contained reflected in those documents, was that analyzed to see what exactly was being conveyed in those documents whether or not they were adequate?

A Whether or not those documents were adequate?

Q Yes.

A No.

Q Was there ever any discussion as to the type

of information that you received in those documents?
A I don't understand the question. Discussion by whom? It was my experience that those documents are the kind of documents that transmitted, on occasion, valuable operating information. They were documents which were available both out at the plant and at the home office. I don't remember -- I guess maybe a question is did we ever or regularly get together to discuss those documents.

Q No, my question is with respect to your response to this GORB action item was there an analysis as to the kind of information that was being relayed to you on the documents you were receiving at that time?
A Well, there certainly was an analysis into it to -- not of the individual documents. I think my response here, this portion that I prepared of it, was a conclusion, and that is an analysis, yes.

Q Did you conclude that you received adequate information with respect to experience or information concerning other nuclear power plants?
A Yes.

Q On Page 2 you indicated three possible techniques for improving the transmission of information. What was the GORB's response to your suggestions?

A I don't remember being at the GORB meeting. GORB doesn't generally respond to an answer to one of the action items unless it is inadequate, so I have no recollection of any response to this.

Q You did not present your answer to the GORB but merely sent them this two-page document?

A Yes.

Q You did not give an oral presentation?

A That is true.

Q Did you receive any response back from them as you can remember with respect to that?

A No, I don't think so. No, I am sure I didn't receive a written response from them.

Q They did not ask you to further pursue that issue or implement in any way the suggestions that you had?

A No, not to the best of my knowledge.

Q With respect to the --

A Let me modify something. A GORB member, not as a member of GORB, but a GORB member, did send me a marked-up copy and contested a portion of that No. 3. I think in No. 3 I said something about EEI participation and we ought to get better at that.

My boss attended EEI meetings and did, in fact,

make some summary of those EEI documents so that in a sense he contested the part in which I said there had been no filtering, and in that context that was true, he did do filtering. I orally apologized for that piece of it -- he didn't ask me for an apology, but that was kind of an injustice there. What I had really meant to say was that he also, and a lot of other people, sent all of the documents received. This was, you know, a snow storm of paper for someone to get, and as a result, because of the thickness of it and the other paper work that flows around, I think probably the plant operating people would not go through those in any degree.

It doesn't mean he shouldn't have transmitted them around with a summary of it. That probably was helpful. Generally it is my feeling though that his summary of significant items was done on the airplane on the way back from the meeting; it was a convenient time to do it. But he did not do that as a GORB member, although he is a GORB member, I believe, or at least I assumed he didn't. It was called to my attention that I didn't quite do him justice.

Q Would that have been Mr. Herbein?

A Yes.

Q The kind of information that is listed

on the last page of this exhibit such as CURRENT EVENTS POWER REACTORS, FEDERAL DIGEST CLEARING HOUSE WEEKLY, OPERATING EXPERIENCE, do you receive those documents personally?

A I have received all of those at various times. Whether I do right now or not, I can't be certain.

I am having difficulty finding the -- this is referring to the Clearing House document -- I am having difficulty reestablishing my tie with that. It may come in in my name in the Reading office, but since I have been out here I have seen maybe ten per cent of the issues.

MR. YUSPEH: Is that the Atomic Clearing House documents?

THE WITNESS: Yes, but it is the Commerce Clearing House document. Commerce Clearing House prepared it. It has got atomic something in the title of it.

MR. YUSPEH: Off the record.

(Discussion off the record.)

THE WITNESS: The Item 3 which you referred to as the Clearing House Weekly summaries of NRC documents is the Atomic Energy Clearing House.

Q Prior to March 28th did you receive, on

a regular basis, these documents?

A Yes, with the exception of No. 2. I think No. 2 probably refers to a document that I can't remember the title of now, but it is the loose-leaf pages that come in that are pronouncements of the Federal Register. I suspect that is talking about the Federal Register.

I did receive that regularly when I was manager of Quality Assurance at which time I had licensing responsibility. Subsequent to that, I saw them on a spotty basis, but I certainly didn't receive all of them.

Q Would you personally have read such documents as CURRENT EVENTS, CLEARING HOUSE WEEKLY, OPERATING EXPERIENCE?

A I believe I read all of every one of those documents.

Q Would you then forward those documents to somebody else who would be interested or was it just for your own personal reading?

A Prior to the time at which I became manager of Generation Operations, I marked up the one particular document -- I am referring to the Atomic Clearing House document -- and sent that to people within groups that reported to me, Licensing, Quality

Assurance, and on occasion probably the plant people. I did that on a rather regular basis.

I did not, after becoming manager of Generation Operations, I did not mark those up and send them out. It was my feeling, substantiated on occasion, that those all were transmitted directly to the nuclear section.

Now, there may have been one or two times that I marked something and sent it out, but those would have been pretty rare occasions, and it wasn't a regular process.

Q Can you look at what we have previously marked as Porter Exhibit 2 and tell me whether or not you had ever read that particular CURRENT EVENTS?

A I can't say whether I have or not. My recollection would be severely colored by my knowledge of this one incident, my subsequent knowledge.

Q Referring to Davis-Besse?

A Yes, Davis-Besse.

Q At the time that you would have received this, some time in December 1977 or January 1978, at that point in time though you indicated you would have read this for your own information and not forwarded it on to anybody else, correct?

A With the exception of some items I may have

marked and sent to the nuclear person -- that is the two nuclear engineers that work for me.

Q Do you remember if you forwarded this particular one to one of your nuclear engineers?

A No, I don't even remember for sure that I read that one, but I presume I did.

Q But you don't remember forwarding it to anybody?

A No.

Q Were you aware of the September 24, 1977 incident at Davis-Besse prior to March 28?

A No, I can't say that I was.

Q Were you aware of an incident prior to March 28 at another nuclear power plant that involved a failed open PORV and pressurizer level high?

A And pressurizer level high?

Q Yes.

A No.

Q Were you aware of a memorandum written by Mr. Dunn concerning --

A I don't think I know Mr. Dunn.

Q Were you aware of a memorandum written by an individual from B&W concerning the concerns of a failed open PORV and pressurizer level high?

A No.

Q Were you familiar, prior to March 28, with something that has become known as the Michaelson Report?

A No.

Q Were you familiar with memoranda written by Mr. Creswell from the NRC concerning failed open PORV and pressurizer level high?

A No.

Q When the NRC performs their inspections on the island, do you become involved in those at all?

A In a first-person sense I don't believe I have ever been involved with one. As manager Generation, Quality Assurance, one of my duties was licensing and my people prepared the responses to all of the inspection reports, and I did carefully read all of those prior to Mr. Arnold's signature.

Subsequent to becoming manager Generation Operations, I read those responses by Mr. Herbein after the fact. I think I did read them all but I have never been involved in the first-person sense except that I got the results of the exit interview and verbal description of the exit interview, what kind of problems that we had that were serious.

We would generally get a report, the station

superintendent exited with the NRC inspectors and the inspectors gave them a pretty good idea of what areas we had problems in and what corrective action needed to be taken, and there was some indication on the plant staff's part about whether we agreed with that and were going to do it or we were going to argue or whatever.

That predated the inspection report coming from the home office by quite a period of time. It may depend upon the severity of the findings too.

Q Looking at Kunder Deposition Exhibit 87, there are certain newsletters that come from B&W that are indicated, specifically a B&W weekly newsletter.

A Yes.

Q Would you receive that?

A Yes.

Q Do you similarly read it for your own information or is that read and passed on to somebody else?

A I read that for my own information. That was all, also since 1977 on a regular basis, posted in the home office so it was quite general knowledge.

Q What kind of information is transmitted in

that?

A There were, on occasions, citations of very general problems that occurred at a plant, always the operating history in a capacity factor sense was transmitted -- in other words, the plant was at 100 per cent power except for two hours when it was reduced to 95 per cent for stop power testing, that kind of thing.

It was generally, I would guess, four or five lines about each plant with one exception; TMI 2 was absent from that report from the 1st of April for three or four months later. It is in there again now. But is is kind of noteworthy that the most significant thing that has happened in a B&W plant, no mention was made, but I also understand why; I am sure everyone knows.

Q What is your understanding as to why TMI 2 was not included?

A Well, my presumption is that there is no one in nuclear business in the United States who is not aware of the TMI 2 accident and the volumes of publications that have been produced by that. I would guess that 60 per cent of the utilities at least have been represented at TMI since the accident, so I

think the information has been pretty well transmitted and that what it has taken us and the NRC 40 or 50 pages to describe couldn't be very well written in a paragraph.

Whether B&W transmitted some other document description, I don't know. I am not aware of any.

Q Would you receive any other kinds of standard news letter from B&W?

A I don't believe so.

Q Did you receive any kind of standardized document similar to that from Burns & Roe?

A Not that I remember.

Q Did you ever participate in any of the B&W User's Group Meetings?

A No.

Q Did you participate in any of the B&W Owner's Group Meetings?

A No.

Q On March 28th how were you notified of the incident at TMI?

A Some time about noon of that day I was notified that the accident had occurred and that there were indications of a steam generator tube leak; I'm not certain how I got that information. I am rather sure that it came from my secretary who generally took the

plant status calls on days when I was not in the office, so I am rather sure that that message came from her.

I am not sure that it was first-hand, though. It may have been transmitted from her to somebody else at the conference and subsequently to me. The first -- yes, I was in New York City at a meeting.

The first conversation that I had with plant staff people -- well, there were only two transmittals about the incident at TMI. The second one was with Jim Seelinger who called me at 2:00 the following morning on the 29th.

(Continued on following page.)

Q You were still in New York?

A Yes, and at that time he indicated that it was Mr. Herbein's desire that I come back and assist, but his feeling was that he didn't really think there was probably anything I could do, and whether they really needed me at that time. It was more in terms of -- he expressed some doubt about whether it was necessary that I come and this had more to do with the urgency with which I get there. The tone may have been that I am calling you out of bed now not because I think we need you urgently, but rather because Mr. Herbein told me to call. I don't know if that answers your question. Those were the two transmittals. The knowledge I had on the 28th, and as I remember around noontime or maybe before, and I am sure it was secondhand with respect to the plant staff, possibly, and maybe directly from my secretary, and it may have been from somebody via that.

Q Did you call TMI after you received this message?

A No, I don't believe so.

Q The next communication you had with the plant was about 2:00 that morning when Mr. Seelinger called you and asked you to come back?

A Yes.

Q Did you then come to Three Mile Island?

A Yes. I arrived at TMI probably about noon of that day. At 2:00 I began calling airports and looking for ways to get to the airport, to get an airplane that I could catch to get to Reading. I did not have tickets because I rode the bus up, and I contacted the bus station and the busses were too late, so I arrived, as I remember, at the airport at Reading around 11:00, caught a taxi home, got my car, and drove down here. I think I was out here shortly after noon on the 29th.

Q When you got here, who did you report to?

A Mr. Herbein.

Q In the observation center?

A Yes.

Q Did he instruct you to do anything at that point?

A Stay around and help, I suppose. My recollection of the occurrences at that particular time, I realize now, are not terribly accurate, because subsequent to that time and within the past month I was describing to, I guess, someone from the NRC having to do with how many people arrived what time, and I found out I

was a full 24 hours off, but anyway I did report in to Mr. Herbein at the observation center, and I don't have any particular recollection of a particular task other than to be there and assist him.

Q In what way did you assist him?

A Beginning at about that time, I presume, starting that evening, I stayed in the observation center, and, in essence, represented him from roughly eight o'clock at night to eight o'clock the next morning.

Q In what specific way?

A Specifically in talking to the plant staff via the radio from the observation center, and attempting to organize the people who were coming in to the observation center into some kind of a coherent mass, primarily in the health physics area; that is the people who were coming into the observation center to assist in off-site surveys.

Q Who in the plant did you have contact with?

A Gary Miller, Jim Seelinger, Mike Ross, Greg Hitts, a large number of people.

Q You didn't just have contact with Gary Miller; you had contact with various people?

A Whoever was standing watch in the TMI Unit 2 control room at the time, and by standing watch, I mean

the one that was in charge at the time which initially was Jim Seelinger, Gary Miller, Bill Pittman, and then after some period of time became the shift supervisor level people.

Q Initially, there was one individual that would be in charge of Unit 2 for a period of ten hours or eight hours?

A By initial, you mean beginning the night of the 29th?

Q Yes.

A My feeling is that it was very soon after the night of the 29th that we went to a three-shift rotation. The night of the 29th may have been 12-hour shifts; I am just not sure about that.

Q The 12-hour shifts would have been Gary Miller and Jim Seelinger?

A Yes; perhaps, Joe Logan.

Q What responsibilities have you had with respect to the recovery efforts?

A Initially, I was responsible for setting up the organization of the health physics group.

Q Who was heading that?

A Who did I report to?

Q Were you heading that effort?

A I was heading up the health physics.

Q You were heading it up?

A Yes.

Q Who did you report to?

A Mr. Herbein. Now, rather soon after I began that effort I was standing watch at the observation center during the night, 8:00 to 8:00, and in addition was attending some daytime meetings, in addition to sleeping, and in organizing the health physics group. It was apparent that spending the bulk of my time at night was not a good way to correspond with people who were here primarily in the daytime, so Jack Thorpe from GPU Service Corporation came in and joined me as co-manager of that group, and Mr. Herbein stood the OPS watch during the daytime at the observation center and Jack Thorpe stood the health physics manager watch during the daytime, and then I did both of those at night.

Q What was the purpose of the watch at the observation center, what was still going on at the observation center?

A Initially, on March 29, of course, we had I guess about five people who were corresponding with the survey teams in helos and ground survey teams, and

in addition to talking to people at the ECCS, and in addition I coordinated with TMI 2 what progress they were making on various things, and on the observation center watch, some of those people were also taking data from the plant people, logging data, and making pictorial displays of that data.

Q What type of health physics organization was set up under you?

A What type? I don't know if there was more than one type. Let me tell you some of the functions that I saw.

Initially, I perceived the problem in health physics was the fact that many people were coming from many places into the observation center, and it was overloaded. At that stage the function I saw was a logistics person who could receive primarily HP people and give them some general plant status and prognosis of our need for them over here, and additional functions -- that was the first great need.

It was also perceived that we would need someone to keep track of radiation doses, two people, and manpower projections, and that is what man rem bank we had. Those are the primary functions that I remember at that time.

Within a day or two, some of the people that were identified were from Electric Boat Company, and had a great deal of experience in radiological experience, and that sort of thing. We began to think about radiological engineering, in our considerations, and the badging of people, and so forth, and so that progressed until finally, by the time we moved everyone down to TMI 2, we had an organization chart drawn and people functioning in various areas around the clock, although much fewer at night than in the daytime.

Q Was the health physics organization that had existed prior to March 28 integrated into the organization that you set up?

A Initially, no, with a couple of exceptions. There were two or three people, two people in particular that I remember from the plant staff that were at the observation center, Pete Velez and Huwve, I believe, were the ones that received the potential health physics survey kind of people, and helped orient them on what the status was at the plant and what our need was going to be. Other than that there wasn't really an integration between the groups. There weren't health physics people, to my knowledge, coming to the site initially. It was a matter of putting the survey

teams out in the field in the helos survey on the site.

Q Where were the personnel brought in from that made up your health physics group?

A Where were those personnel brought in from?

Q Yes.

A There were people from Electric Boat, and I'd have to say over and above that, utility people. I couldn't identify where they were from.

Q From other utilities?

A Yes. On, I believe, March 30, I left the site at about noon and went to somewhere beyond Lancaster to get a telephone to the Washington area and have people from the NUS come up, so that within the first couple of days there were people from NUS also here.

Q Have you had any other responsibilities with respect to the recovery effort since the initial involvement with the watch at the observation center and the organization of the HP?

A I, in essence, have continued that OPS watch responsibility. I still stand the watch at night. It is now borne by four of us on a shared basis rather than one, and my big-time activities have changed from the HP organization to the training organization.

Q To the Training?

A Training.

Q What are your responsibilities with respect to Training?

A I am the manager of Training. I am responsible for training plant staff personnel, maintenance, HP, reactor operators.

Q Does that incorporate the existing Training Department under you?

A Yes.

Q Who made that decision?

A Mr. Herbein, to the best of my knowledge; he is the one that told me.

Q Did he indicate to you why one of your responsibilities was his manager of Training?

A I don't think so.

Q What is your understanding as to your responsibilities in that position?

A My understanding is I am totally responsible for Training at TMI.

Q That is for all personnel?

A Yes.

Q Prior to March 28, the Training Department did not report to you, correct?

A Just prior to March 28, they did not.

Q They did not report to the manager of Generation Operations, is that correct?

A That is true.

Q Since when was the decision made to have that department report to you?

A I would guess it was a month ago, but my -- I can't give you a date; approximately a month ago.

Q Since the reorganization of Metropolitan Edison last week, have your responsibilities changed any?

A I am not aware of a reorganization at the Metropolitan Edison Company last week, I am aware of discussions concerning some reorganization.

Q Have those discussions concerned any changes in your responsibilities?

A The discussions did, yes. There was indication by Paul Christman at a joint managers meeting for budgeting one or two weeks ago that I would be accountable for, in addition to training, start-up and test, refueling, and what we call a 96-hour group, which is a very short time frame maintenance group, and I don't offhand remember the others. I have not seen any published reorganization that indicates even that I am in charge of training, so I don't -- I have

had indications, though, through oral discussions, which indicate that my future responsibilities are not going to be as broad as I just described in the budgeting process, so I suspect that the indication that I had, that during the budgeting process, was to be sure that somebody budgeted it, and I am fairly sure that I am not going to be responsible for all those areas. I still expect I will be for some; I don't know.

Q Since March 28, have you made any statements concerning the accident on March 28, and have you been interviewed or have you written any memoranda concerning that accident?

A I would assume that every memo I have written has concerned the accident, with a few minor exceptions it has been somehow related. I have not written a memo which was a dissertation on, here is the sequence of events, or here is what caused it, or that kind of thing. It wouldn't have been accurate to say that they didn't concern the event -- not so much the event, but the recovery.

I forget the first part of your question.

Q Have you been interviewed since March 28 concerning the accident?

A Oh, yes. A fellow from the NRC came to see me one day; I think that was an interview.

Q Was that interview recorded or transcribed?

A Oh, I am sorry. No, that one wasn't; that was more of an information seeking meeting. I have been interviewed -- there was a Quality Assurance Group for the President's Commission that interviewed me on one Saturday.

Q Aside from the President's Commission, have you been interviewed by any other organization?

A Not to the best of my recollection. I am very cautious now because I just forgot the QA Group interview. I am not sure that I have, though.

Q You have not testified before the Udall Committee?

A I have not testified, no.

Q At this time, I would like to recess your deposition. There is a chance that we will call you back at some future time for further questioning, although I do not anticipate that we will do so.

(Whereupon, at 12:20 p.m., the within deposition was recessed.)

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Subscribed and sworn to before me this __day of _____, 1979.

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LC

STATE OF NEW YORK)
) ss.:
COUNTY OF NEW YORK)

We, ROBERT ZERKIN and STEPHEN McCRYSTAL, Notaries Public of the State of New York, do hereby certify that the foregoing deposition of METROPOLITAN EDISON COMPANY, by LAWRENCE L. LAWYER, was taken before us on the 9th day of August 1979.

The said witness was duly sworn before the commencement of his testimony. The said testimony was taken stenographically by ourselves and then transcribed.

The within transcript is a true record of the said deposition.

We are not related by blood or marriage to any of the said parties nor interested directly or indirectly in the matter in controversy; nor are we in the employ of any of the counsel.

IN WITNESS WHEREOF, we have hereunto set our hands this 13th day of August 1979.

ROBERT ZERKIN

STEPHEN McCRYSTAL