

(EX. 1109)

A-29

EVANS

REPORT OF REVIEW BOARD

for the

DETERMINATION OF TECHNICAL AND ORGANIZATIONAL READINESS

for

PLACING THREE MILE ISLAND UNIT 2

into

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

COMMERCIAL OPERATION

26 October, 1978

A.29

Mills DEP. EXHIBIT 112
FOR IDENTIFICATION
8/2/79 R. ZERON

8001170386

MEMBERS OF THE REVIEW BOARD:

	<u>Signature</u>		<u>Date</u>
	<u>Concur</u>	<u>Dissent</u>	
R. C. Arnold	<u>R. C. Arnold</u>	<u>12/18/78</u>	<u>12/18/78</u>
J. L. C. Bachofer, Jr.	<u>J. L. C. Bachofer, Jr.</u>		<u>12/13/78</u>
R. W. Conrad	<u>R. W. Conrad</u>		<u>12/21/78</u>
I. R. Finfrock, Jr.	<u>I. R. Finfrock, Jr.</u>		<u>12/26/78</u>
J. G. Herbein	<u>J. G. Herbein</u>		<u>12/18/78</u>
W. H. Hirst	<u>W. H. Hirst</u>		
R. F. Wilson	<u>R. F. Wilson</u>		<u>12/18/78</u>

POOR ORIGINAL

Reviewed:

G. P. Miller G. P. Miller

12/18/78

1.0 INTRODUCTION

1.1 Purpose

The review provides an opportunity for management assessment of:

- A. The generating unit's suitability for safe, efficient, economic and legal commercial operation, and
- B. The Operating Companies' organizational preparedness to support commercial operations.

1.2 Method

A Review Board was convened in accordance with the CPU System Procedure and met for a full day on October 26, 1978 to review information provided as specified in the Procedure. Material was prepared and distributed beforehand to the members of the Review Board in the form of a bound document, a copy of which is attached as Appendix I to this report. Attendees at the Review Board meeting are listed in Appendix II.

Where adequate information was lacking, one of two methods was utilized to satisfy the intent of the review.

- A. Responsibilities were assigned to provide the additional information which was subsequently forwarded to the Review Board.
- B. A subcommittee of the Review Board, consisting of Messrs. Arnold, Herbein, Hirst and Wilson, subsequently reviewed the additional information. The results of that review are attached as Supplement A.

2.0 CONCLUSION

Based upon consideration of the information furnished and discussion of that information, it is concluded that the status of Three Mile Island Unit 2 with respect to all criteria in the Procedure is acceptable. Therefore it is determined that the Unit is technically ready for commercial operation and the Operating Company is prepared to support commercial operation at a power level of 880 MWe (summer net capability).

3.0 DISCUSSION

This Section contains brief summaries of the information presented appropriate to each of the criteria in the Procedure and further summarizes pertinent verbal discussion.

Criterion 2.1 Staff

The subject was discussed by Messrs. Miller, Beers, Rudolph, Herkert, Seelinger, Floyd and Dubiel, all of Met-Ed. A staff of 211 persons directly assigned to Three Mile Island Unit 2 is supplemented by about 50 persons in support functions. Met-Ed is revising the station organization to enhance administrative and maintenance capabilities at the station. Vendor and Maintenance contractor support for the first fuel cycle has been arranged. All of the necessary NRC Operator Licenses have been obtained and an approved requalification program is in place and operative. Unit 1 experience to date has been such that no suspensions or revocations of Operators' Licenses have been required.

Criterion 2.2 Procedures

Discussion was presented by Mr. Seelinger. Administrative, Operating Abnormal and Emergency Alarm Response, Maintenance, Health Physics, Chemistry, Fueling, Surveillance, Security and Stores Procedures have been prepared, reviewed and verified. A comparison of the numbers of procedures in each of the categories above is presented and discussed in Appendix I.

Criterion 2.3 Licenses, Permits, Certificates

Discussion was led by Mr. G. J. Troffer. Met-Ed indicates that all necessary licenses have been obtained, are currently in force and properly posted or filed; that all necessary insurance coverages have been provided and are in force. Further, all necessary permits/certifications required to meet insurance requirements have been properly secured and posted with the following exception: nine pressure vessels in the water pretreatment system are not permitted due to lack of over-pressure protection. There is one safety relief valve on order, since May 10, 1978, that must be installed, and then all nine vessels will be properly certified. The water treatment system will not be placed in operation until approximately March 1979, and therefore this outstanding work will not interfere with readiness for earlier commercial operation. GPU Startup (Tom Faulkner) is responsible for the completion of this outstanding work.

Criterion 2.4 Safety and Security

The discussion was lead by Messrs. Grice and Hafer. Inspections were made, both independently and jointly (with insurance company representatives) and a deficiency list prepared which is included in Appendix I. The required actions for resolution, the responsibilities for action assigned and anticipated completion dates are identified. The Review Board concurs with the conclusion that none of these deficiencies represent limitations upon the commercial operation of TMI-2.

Criterion 2.4 (continued)

There was considerable discussion about Deficiency Item 17 concerning the installation of a fixed fire protection system covering the cable-spreading room and the cable area above the Health Physics/First Aid area. Mr. Ritthamel has the responsibility to provide a memo to the Review Board with the scenario which provides the basis for concern and the need for possible additional protection and any additional basis for the recommendation.

A Safety/OSHA review was conducted by GAI and a list of deficiencies identified. Of the 167 items, 34 have been corrected, 49 more have been engineered and issued to Catalytic for work and action on the balance of the items has been resolved and responsibility identified with the GPUSC TMI-2 Project Organization, but no completion dates have been established. It was agreed that of these remaining items, those for which no decision has been reached for appropriate technical resolution shall be reviewed by GPUSC Technical Functions Group. The GPUSC TMI-2 Project Manager has the responsibility to provide a schedule within one week of the Review Board meeting for the completion of items assigned to Catalytic for work and for the engineering of the remainder. Discussion of the statement on page 47a of Appendix I revealed that the statement was incorrect and is therefore not deemed applicable to the consideration of suitability for commercial operation.

There was further discussion prompted by Review Board questioning which identified that safety "software", i.e., training, adherence to safety procedures, etc., had also been considered in the course of this review.

There was substantial discussion presented to the Review Board orally on the station security systems, construction of which is currently in progress and is scheduled to be completed February 15, 1979. Test procedures for acceptance and regular surveillance testing of the security systems are being prepared concurrently. Discussion by the Review Board identified the need for a fire safety review of the security devices and systems and further, for a review to be made of the need for a modification to the security systems to permit unusual access in case of fire or personnel safety emergencies. The Review Board recommends this responsibility be assigned by Met-Ed to Messrs. Herbein and Robidoux.

Criterion 2.5 Construction Completion

The discussion was led by Mr. Barton.

- 2.5.1 Completion/turnover of systems necessary for operation and maintenance is essentially complete except for test data packages on 6 systems which are anticipated to be turned over to Met-Ed by November 3, 1978.

Criterion 2.5 (continued)

- 2.5.2 Preparations/review of deficiency lists have been prepared and reviewed. As of the date of the Review Board, some 1200 deficiency items remain outstanding of some 10,000 plus which had been identified through the various routine inspections and observations during initial operations and testing. Of these, 308 have been cleared to QC for sign-off and an additional 239 completed and cleared by QC; therefore, in reality approximately 850 items need work and QC sign-off. Of these, approximately 250 to 300 may require physical work and the balance administrative effort. This list is prioritized and no items adverse to the reliability or safety of the generating unit have been identified as remaining. Plans exist to "blitz" this work during the screen outage and a review by the CPUSC Project Manager with Met-Ed is scheduled for November 9, at which time final resolution will be identified.
- 2.5.3 List of modifications/field changes necessary to complete and evaluation for unsafe, inoperable or limiting conditions.
- 2.5.4 Lists have been prepared and reviewed and evaluated. There are no unsafe, inoperable or limiting conditions remaining.
- 2.5.5 Drawings, manuals, records, system descriptions is an ongoing effort and is controlled by Met-Ed Administrative Procedures. All as-built drawings are scheduled to be issued by the end of 1978, as are final system descriptions. All equipment instruction manuals have been issued to Met-Ed.

Criterion 2.6 Testing

The discussion was led by Mr. Toole. At the time of the Review Board session, testing of Three Mile Island Unit 2 had proceeded to the 75 percent power plateau and therefore obviously was not complete. Final review against this criterion is to be conducted by the subcommittee identified above. As of the Review Board meeting, 143 test results have been evaluated, 23 power related tests are in the process of evaluation, and 141 have been turned over to the Station Superintendent and approved. This process will be followed to completion per the approved procedure. It was indicated that 7 tests will not be completed as originally written since an evaluation determined that there are no unresolved problems and none of the testing omitted is related to federal, state or local requirements.

A review by the subcommittee of the Review Board of the final test results and of the technical implications of exceeding turbine generator ratings is prerequisite to final specification of the unit capacity rating.

Criterion 2.6 (continued)

Discussion by the Review Board confirmed that the Station Superintendent and staff were actively involved with the review and approval of test results.

There was extended discussion of the operation of the condensate polishing and makeup water systems. With respect to the makeup water system, Messrs. Miller and Herbein were tasked to define the remaining problems, identify the required resources and propose a target date for the necessary modifications to assure the satisfactory operation of this system in the future. The Unit 1 makeup system has been adequate for both units thus far, but the Board feels that its failure would render the station vulnerable to unplanned shutdown. Therefore, the station staff is to (a) determine the effort required to activate this equipment at some minimal level of performance should the conditions dictate and (b) assure that the equipment does not deteriorate due to idle conditions.

In response to discussion and question by the Review Board, it was identified that pipe vibration of the ESF steam and feedwater systems has been and continues to be monitored and evaluated with escalating power levels, and that the necessary modifications were made or are scheduled to provide appropriate restraint. It was recommended that the station staff review the applicable test procedures and determine whether portions of these should be incorporated in the in-service inspection program for long term evaluation of pipe support adequacy, especially on ESF systems.

In response to further questioning, it was identified that the All Rods Out boron test results were not in good agreement with the B&W predictions; however, this matter was resolved satisfactorily by a re-analysis by B&W of the predicted numbers.

It was also identified that the DNBR value was slightly lower than expected because of a slightly lower than expected main coolant flow. The results, strongly influenced by a B&W specified allowance for instrumentation error, are still within tolerances and are not a safety problem. It is possible that more accurate instrumentation (which is being considered) may provide slightly increased margins.

Internals vibration and neutron noise tests are planned for the 100 percent power level test sequence.

The possibility was identified that at 2772 MWt, the turbine generator maximum expected capability of 959.2 MWe could be exceeded. The responsibility for evaluation and assessment of this situation prior to exceeding nameplate rating during the test program was assigned to J. L. C. Bachofer and R. F. Wilson.

Mr. Wilson requested that summaries of the detailed technical evaluation of test results be forwarded to him. Mr. Seelinger was assigned this responsibility.

Criterion 2.7 Power Transmission and Supply

The discussion was led by Messrs. Bonneville and Slater. The discussion and written material provided in Appendix I indicate that Criteria 2.7.1, 2.7.2 and 2.7.3 have been met. Criteria 2.7.3.1 (incremental costs) and 2.7.3.2 (economic dispatch information) were not addressed before the Review Board. Information subsequently submitted by Met-Ed is attached as Appendix III in satisfaction of these requirements. Additionally, further information supplementing that provided in Appendix I with respect to system evaluation and stability was subsequently furnished and is attached as Appendix IV.

4.0 STATION SUPERINTENDENT'S REVIEW

Mr. Miller discussed his views of the status of TMI-2, elaborated on the statement presented by him in Appendix I of residual problems and confirmed his opinion that TMI Unit 2 is in a proper state of technical and operational readiness to commence commercial operation.

5.0 ACTION ITEMS OUTSTANDING

<u>Criterion</u>	<u>Item</u>	<u>Responsibility</u>
2.3.2	Insurance certificates	Troffer
2.4.1	Fire inspection deficiency Item 17	Barton/Ritthamel/Wilson
2.4.1	Security system-emergency access	Herbein/Robidoux
2.6	Test Completion	Toole/Subcommittee (Arnold, Wilson, Herbein, Hirst)
2.6	LAWT Makeup system - identify resources and target operation	Herbein/Miller
2.6	NSSS vs. Turbine Generator capability	Bachofer/Wilson
2.6	Test evaluation summaries to GPUSC Tech. Functions	Seelinger

TMI UNIT 2 COMMERCIAL REVIEW BOARD

October 26, 1978

Attendance

R. C. Arnold	GPUSC
J. L. C. Bachofer, Jr.	"
J. J. Barton	"
R. W. Conrad	Penelec
R. C. Cutler	GPUSC
J. T. Faulkner	"
I. R. Finfrock, Jr.	JCPL
F. H. Grice	Met-Ed
J. G. Herbein	"
C. E. Herkert	"
D. E. Hetrick	GPUSC
R. W. Heward, Jr.	"
W. H. Hirst	"
L. L. Lawyer	Met-Ed
R. R. Lefin	"
J. B. Logan	"
G. P. Miller	"
C. R. Montgomery	GPUSC
J. P. O'Hanlon	Met-Ed
R. G. Ritthamel	GPUSC
D. A. Ross	JCPL
J. Rudolph	Met-Ed
J. L. Seelinger	"
M. R. Schäffer	"
D. M. Shovlin	"
H. J. Slater	Met-Ed
R. J. Toole	GPUSC
G. J. Troffer	Met-Ed
R. F. Wilson	GPUSC
T. P. Wolff	Penelec

METROPOLITAN EDISON COMPANY Subsidiary of General Public Utilities Corporation

Subject TMI-2 INCREMENTAL COSTS


Location Reading

To J. L. C. BACHOFER, JR.

Date October 30, 1978
GAM 4993

The incremental costs for TMI-2 have been updated into the Met-Ed Loading Schedule beginning in May of 1978. These costs are based upon the unit's heat rate curve. On a monthly basis fuel costs, maintenance costs and the performance factors are input into the system. The fuel costs are from the fuel forecast, the maintenance costs are based upon TMI-1 experience, and the performance factor is assumed to be one until actual experience is available.

Attached for your information is a copy of the October Loading Schedule and the Capacity Costs. If you would have any questions please contact me.


E.J. MOYER
Ext. 142

EJM:dlk

Attachment

cc: R. C. Arnold
J. G. Herbein
L. L. Lawyer
G. P. Miller

File: 62.0022.0013

PLANT	TURBINE NUMBERS	UNIT	START	SPTRK	MINUTE RATE	BOILER NUMBERS	BOILER/UNIT NO-LOAD	UNIT
LOWMEADOW	1 OR 2	1	5911.57	182.00	3.06800			
DEERHASKA	1 OIL	1	44.54	300.30	5.00500			
FOUNTAIN	1 OR 2 OIL	1	36.99	298.16	4.96933			
HUNTERSTOWN	1, 2 OR 3 (OIL)	1	33.95	292.00	4.86666			
HARTFORD	1 OIL	1	30.40	287.74	4.19566			
3 MILE (S&JC SHARE)	12	1	172.20	96.22	1.60367			
	1	1	275.48	29.13	.48550			
	1	1	556.19	58.25	.97081			
3 MILE (S&ME SHARE)	12	1	166.41	192.45	3.20750			
TELEA	1 OR 2 OIL	1	43.39	293.59	4.89166			
	1 3 GAS	1	86.43	269.25	4.47083			
	1 4 OIL	1	54.28	327.73	5.46166			
PORTLAND CT	1 4 GAS	1	53.90	338.15	5.63583			
	1 3 OIL	1	96.65	252.28	4.20466			
	1 1	1	178.85	118.79	1.97833	1	20.06	
PORTLAND	1 2	1	203.73	141.87	2.36450	2	36.29	
	1 4 OR 5 (GAS)	1	47.14	245.94	4.09900			
TITUS CT	1 4 OR 5 (OIL)	1	47.49	232.50	3.87500			
	1 2	1	212.39	118.77	1.97950	2	16.99	
TITUS	1 2	1	210.44	117.69	1.96150	3	16.84	
	1 1	1	238.92	116.83	1.94716	1	16.71	
SHAWNEE	1 OIL	1	52.36	301.87	5.03116			
KEYSTONE	1 OR 2	1	6016.36	157.84	2.63066			
RIEGEL CT W/DRY	1	1	66.61	316.96	5.28266			
RIEGEL CT W/DRY	1	1	66.61	316.96	5.28266			
RIEGEL CT W/DRY	1	1	71.92	356.62	5.94366			
	18-2CTS HOT	1	2771.34	1338.74	22.31233			
	18-3CTS HOT	1	4083.19	1999.38	33.30633			
	18-4CTS HOT	1	5195.36	2658.02	44.30033			
GILBERT CC-STM	18-1CT COLD	1	2217.73	681.20	11.35333			
	18-2CTS COLD	1	4235.27	1338.74	22.31233			
	18-3CTS COLD	1	6252.83	1998.38	33.30633			
	18-4CTS COLD	1	8270.37	2658.02	44.30033			
GILBERT (CC) CT	1CC 4, 5, 6 OR 7	1	101.36	615.67	10.26116			
GILBERT CC-STM	18-1CT HOT	1	1455.46	681.20	11.35333			
	1 C-1, 2, 3, 4-0	1	101.87	420.92	7.01533			
GILBERT CT	1 C-1, 2, 3, 4, -0	1	89.02	271.15	4.51916			
	1 3 (OIL)	1	168.13	163.18	2.71966	3	17.02	
	1 1 & 2 (OIL)	1	420.53	164.41	2.47683	1ST OIL AIR	33.91	

POOR ORIGINAL

MET-ED LOADING SCHEDULE
(CRUISE)
(LAMBDA)

TIME	PORTLAND				TITUS				TWT				
	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL			
MTR.	100	65	65	75	75	20	20	20	20	20	20	100	
2.6	110												
2.8	115											650	
3.2												920	
3.4													
3.6				100									
3.8				155									
4.2				195									
4.4		95		235									
4.6		115		210									
4.8		120		215									
5.2		125		220									
5.4		130		225									
5.6		135		230									
5.8		140		235		25			25				
6.2				240			25			25			
6.4		145		245		30				30			
6.6		150		250			30						
6.8		155		255		46							
7.2		160		260			46			46			
7.4		165		265									
7.6		170											
7.8		180				70				70			
8.2		185					70						
8.4						76				76			
8.6							76			84			
8.8						84							
9.2							84						
9.4						25							
9.6					80					25			
9.8					110			25					
10.2					135		0						
10.4					160						30		
10.6					175								
10.8					190			30					
11.2		80			200								
11.4		95			205								
11.6		110			210								
11.8		115				46							
12.2					215					46			
12.4		120						46					
12.6		125			220								
12.8		130											
13.2					225								
13.4		135											
13.6					230		70						
13.8													

POOR ORIGINAL

Inter-Office Memorandum

Date October 25, 1978



Subject Determination of Technical and Organizational
Readiness for Placing a Generating Unit into
Commercial Operation Paragraph 2.7.3

To Messrs. G. P. Miller
R. Bensel

Location Reading

The transient stability studies required for the Three Mile #2 generating unit are complete. The results and conclusions of the studies are documented in a GPU Transmission Planning Department report titled "TMI Stability Review" dated April, 1976. Since decisions on certain areas of system protection were based on and conform to the results and conclusions of that report, the transient stability performance of the Three Mile Island #2 unit will be acceptable.

Detailed testing of the dynamic stability (steady state) of the Three Mile Island #2 unit was not undertaken. With the excitation system adjusted to give an acceptable response to an open circuit step voltage change, the Three Mile Island #2 unit being connected to the existing transmission system is not considered to be a likely candidate to experience dynamic instability.

S. C. Thomas

SCT/KTW/sad

cc: Messrs. R. W. Werts
E. Newton Jr.
R. M. Becker

SUPPLEMENT "A"

TO THE

REPORT OF THE REVIEW BOARD

FOR THE

DETERMINATION OF TECHNICAL AND ORGANIZATIONAL READINESS

FOR

PLACING THREE MILE ISLAND UNIT 2

INTO

COMMERCIAL OPERATION

At the time of the Review Board Meeting on October 26, 1978, the TMI Unit 2 was operating at 75 per cent of licensed reactor power. A Subcommittee of the Board, consisting of Messrs. Arnold, Herbein, Hirst and Wilson, was appointed to review the balance of the test program prior to placing the Unit in commercial service.

All four members of the Subcommittee were kept abreast of plant problems and the progress of the test program on a routine basis. It is the opinion of the Subcommittee that the Unit has demonstrated its ability to operate safely and reliably up to and including 959 MW gross and should be placed into commercial service with a winter capacity rating of 906 MW net, the Unit's design electrical rating.

As of December 28, the date upon which all essential elements of the test program were complete, the following items are worth noting:

1. Reactor power will be limited to 2717 MW_t (98 per cent of the licensed power level of 2772 MW_t), unless new analyses provide justification for operation at higher power levels with the measured reactor coolant flow.
2. Currently, the reactor coolant flow instrument for the "A" loop is reading low and this restricts power to about 2690 MW_t until that condition is corrected. The lower allowable reactor power will, for some meteorological conditions, be more limiting than turbine generator design limits.
3. Initial data indicates operating limits provided by Westinghouse to ensure operation is within turbine first stage flow design limits may be more restrictive than necessary to maintain flow within the specified limits. This issue will be pursued by Mr. Wilson.
4. It is likely that the turbine generator can be operated safely at levels above the 959.2 MW limit (i.e., allowable first stage flow may be greater than presently prescribed) specified by Westinghouse. Resolution of this item will require further analyses by Westinghouse. Pending completion of those analyses, the Unit must be operated within the limits prescribed by the technical manual.
5. The ability of the condensate systems deep bed demineralizers to remove sodium is very limited. This fact, coupled with recently imposed strict feedwater specification for sodium (5 ppb), may restrict plant operations during chemistry upsets in the condensate and feedwater systems. This issue will be pursued jointly by Met-Ed and GPUSC personnel.
6. Currently there are unresolved problems with the heater drain pumps. There have been several instances of pump seizure for causes as yet unexplained. The system does have three pumps installed and the Unit can operate at

essentially full load with only two pumps. If all three pumps are out of service simultaneously, the Unit may be restricted for such periods to about 650 MW. Corrective action is being pursued jointly by Met-Ed and GPUSC with the vendor.

7. Events during the past two months have re-emphasized the vulnerability of the Unit to shortages of make-up water as discussed in the second paragraph of page 5 of the main report. Corrective action for both operational and design difficulties with the Unit 2 LAWT system is being pursued jointly by Met-Ed and GPUSC.

<u>R. C. Arnold</u> R. C. Arnold	<u>12/29/78</u> date	<u>J. G. Herbein per telecom</u> J. G. Herbein per telecom	<u>12/29/78</u> date
<u>W. H. Hirst</u> W. H. Hirst	<u>12/29/78</u> date	<u>R. F. Wilson</u> R. F. Wilson	<u>12/29/78</u> date

Reviewed by:

<u>G. P. Miller per telecom</u> G. P. Miller per telecom	<u>12/29/78</u> date
---	-------------------------

EXTRA COPY

A-29

REPORT OF REVIEW BOARD

for the

DETERMINATION OF TECHNICAL AND ORGANIZATIONAL READINESS

for

PLACING THREE MILE ISLAND UNIT 2

into

COMMERCIAL OPERATION

26 October, 1978

MILK & DEPARTMENT 112
FOR IDENTIFICATION
8/3/79 R. ZERKIN

MEMBERS OF THE REVIEW BOARD:

	<u>Signature</u>		<u>Date</u>
	<u>Concur</u>	<u>Dissent</u>	
R. C. Arnold	<u>[Signature]</u>	<u>12/18/78</u>	<u>12/18/78</u>
J. L. C. Bachofer, Jr.	<u>[Signature]</u>		<u>12/18/78</u>
R. W. Conrad	<u>[Signature]</u>		<u>12/21/78</u>
I. R. Finrock, Jr.	<u>[Signature]</u>		<u>12/26/78</u>
J. G. Herbein	<u>[Signature]</u>		<u>12/18/78</u>
W. H. Hirst	<u>[Signature]</u>		
R. F. Wilson	<u>[Signature]</u>		<u>12/18/78</u>

Reviewed:

G. P. Miller [Signature] 12/18/78

POOR ORIGINAL

1.0 INTRODUCTION

1.1 Purpose

The review provides an opportunity for management assessment of:

- A. The generating unit's suitability for safe, efficient, economic and legal commercial operation, and
- B. The Operating Companies' organizational preparedness to support commercial operations.

1.2 Method

A Review Board was convened in accordance with the GPU System Procedure and met for a full day on October 26, 1978 to review information provided as specified in the Procedure. Material was prepared and distributed beforehand to the members of the Review Board in the form of a bound document, a copy of which is attached as Appendix I to this report. Attendees at the Review Board meeting are listed in Appendix II.

Where adequate information was lacking, one of two methods was utilized to satisfy the intent of the review.

- A. Responsibilities were assigned to provide the additional information which was subsequently forwarded to the Review Board.
- B. A subcommittee of the Review Board, consisting of Messrs. Arnold, Herbein, Hirst and Wilson, subsequently reviewed the additional information. The results of that review are attached as Supplement A.

2.0 CONCLUSION

Based upon consideration of the information furnished and discussion of that information, it is concluded that the status of Three Mile Island Unit 2 with respect to all criteria in the Procedure is acceptable. Therefore it is determined that the Unit is technically ready for commercial operation and the Operating Company is prepared to support commercial operation at a power level of 880 MWe (summer net capability).

3.0 DISCUSSION

This Section contains brief summaries of the information presented appropriate to each of the criteria in the Procedure and further summarizes pertinent verbal discussion.

Criterion 2.1 Staff

The subject was discussed by Messrs. Miller, Beers, Rudolph, Herkert, Seelinger, Floyd and Dubiel, all of Met-Ed. A staff of 211 persons directly assigned to Three Mile Island Unit 2 is supplemented by about 50 persons in support functions. Met-Ed is revising the station organization to enhance administrative and maintenance capabilities at the station. Vendor and Maintenance contractor support for the first fuel cycle has been arranged. All of the necessary NRC Operator Licenses have been obtained and an approved requalification program is in place and operative. Unit 1 experience to date has been such that no suspensions or revocations of Operators' Licenses have been required.

Criterion 2.2 Procedures

Discussion was presented by Mr. Seelinger. Administrative, Operating Abnormal and Emergency Alarm Response, Maintenance, Health Physics, Chemistry, Fueling, Surveillance, Security and Stores Procedures have been prepared, reviewed and verified. A comparison of the numbers of procedures in each of the categories above is presented and discussed in Appendix I.

Criterion 2.3 Licenses, Permits, Certificates

Discussion was led by Mr. G. J. Troffer. Met-Ed indicates that all necessary licenses have been obtained, are currently in force and properly posted or filed; that all necessary insurance coverages have been provided and are in force. Further, all necessary permits/certifications required to meet insurance requirements have been properly secured and posted with the following exception: nine pressure vessels in the water pretreatment system are not permitted due to lack of over-pressure protection. There is one safety relief valve on order, since May 10, 1978, that must be installed, and then all nine vessels will be properly certified. The water treatment system will not be placed in operation until approximately March 1979, and therefore this outstanding work will not interfere with readiness for earlier commercial operation. GPU Startup (Tom Faulkner) is responsible for the completion of this outstanding work.

Criterion 2.4 Safety and Security

The discussion was lead by Messrs. Grice and Hafer. Inspections were made, both independently and jointly (with insurance company representatives) and a deficiency list prepared which is included in Appendix I. The required actions for resolution, the responsibilities for action assigned and anticipated completion dates are identified. The Review Board concurs with the conclusion that none of these deficiencies represent limitations upon the commercial operation of TMI-2.

Criterion 2.4 (continued)

There was considerable discussion about Deficiency Item 17 concerning the installation of a fixed fire protection system covering the cable-spreading room and the cable area above the Health Physics/First Aid area. Mr. Ritthamel has the responsibility to provide a memo to the Review Board with the scenario which provides the basis for concern and the need for possible additional protection and any additional basis for the recommendation.

A Safety/OSHA review was conducted by GAI and a list of deficiencies identified. Of the 167 items, 34 have been corrected, 49 more have been engineered and issued to Catalytic for work and action on the balance of the items has been resolved and responsibility identified with the GPUSC TMI-2 Project Organization, but no completion dates have been established. It was agreed that of these remaining items, those for which no decision has been reached for appropriate technical resolution shall be reviewed by GPUSC Technical Functions Group. The GPUSC TMI-2 Project Manager has the responsibility to provide a schedule within one week of the Review Board meeting for the completion of items assigned to Catalytic for work and for the engineering of the remainder. Discussion of the statement on page 47a of Appendix I revealed that the statement was incorrect and is therefore not deemed applicable to the consideration of suitability for commercial operation.

There was further discussion prompted by Review Board questioning which identified that safety "software", i.e., training, adherence to safety procedures, etc., had also been considered in the course of this review.

There was substantial discussion presented to the Review Board orally on the station security systems, construction of which is currently in progress and is scheduled to be completed February 15, 1979. Test procedures for acceptance and regular surveillance testing of the security systems are being prepared concurrently. Discussion by the Review Board identified the need for a fire safety review of the security devices and systems and further, for a review to be made of the need for a modification to the security systems to permit unusual access in case of fire or personnel safety emergencies. The Review Board recommends this responsibility be assigned by Met-Ed to Messrs. Herbein-and Robidoux.

Criterion 2.5 Construction Completion

The discussion was led by Mr. Barton.

- 2.5.1 Completion/turnover of systems necessary for operation and maintenance is essentially complete except for test data packages on 6 systems which are anticipated to be turned over to Met-Ed by November 3, 1978.

Criterion 2.5 (continued)

- 2.5.2 Preparations/review of deficiency lists have been prepared and reviewed. As of the date of the Review Board, some 1200 deficiency items remain outstanding of some 10,000 plus which had been identified through the various routine inspections and observations during initial operations and testing. Of these, 308 have been cleared to QC for sign-off and an additional 239 completed and cleared by QC; therefore, in reality approximately 850 items need work and QC sign-off. Of these, approximately 250 to 300 may require physical work and the balance administrative effort. This list is prioritized and no items adverse to the reliability or safety of the generating unit have been identified as remaining. Plans exist to "blitz" this work during the screen outage and a review by the GPUSC Project Manager with Met-Ed is scheduled for November 9, at which time final resolution will be identified.
- 2.5.3 List of modifications/field changes necessary to complete and evaluation for unsafe, inoperable or limiting conditions.
- 2.5.4 Lists have been prepared and reviewed and evaluated. There are no unsafe, inoperable or limiting conditions remaining.
- 2.5.5 Drawings, manuals, records, system descriptions is an ongoing effort and is controlled by Met-Ed Administrative Procedures. All as-built drawings are scheduled to be issued by the end of 1978, as are final system descriptions. All equipment instruction manuals have been issued to Met-Ed.

Criterion 2.6 Testing

The discussion was led by Mr. Toole. At the time of the Review Board session, testing of Three Mile Island Unit 2 had proceeded to the 75 percent power plateau and therefore obviously was not complete. Final review against this criterion is to be conducted by the subcommittee identified above. As of the Review Board meeting, 143 test results have been evaluated, 23 power related tests are in the process of evaluation, and 141 have been turned over to the Station Superintendent and approved. This process will be followed to completion per the approved procedure. It was indicated that 7 tests will not be completed as originally written since an evaluation determined that there are no unresolved problems and none of the testing omitted is related to federal, state or local requirements.

A review by the subcommittee of the Review Board of the final test results and of the technical implications of exceeding turbine generator ratings is prerequisite to final specification of the unit capacity rating.

Criterion 2.6 (continued)

Discussion by the Review Board confirmed that the Station Superintendent and staff were actively involved with the review and approval of test results.

There was extended discussion of the operation of the condensate polishing and makeup water systems. With respect to the makeup water system, Messrs. Miller and Herbein were tasked to define the remaining problems, identify the required resources and propose a target date for the necessary modifications to assure the satisfactory operation of this system in the future. The Unit 1 makeup system has been adequate for both units thus far, but the Board feels that its failure would render the station vulnerable to unplanned shutdown. Therefore, the station staff is to (a) determine the effort required to activate this equipment at some minimal level of performance should the conditions dictate and (b) assure that the equipment does not deteriorate due to idle conditions.

In response to discussion and question by the Review Board, it was identified that pipe vibration of the ESF steam and feedwater systems has been and continues to be monitored and evaluated with escalating power levels, and that the necessary modifications were made or are scheduled to provide appropriate restraint. It was recommended that the station staff review the applicable test procedures and determine whether portions of these should be incorporated in the in-service inspection program for long term evaluation of pipe support adequacy, especially on ESF systems.

In response to further questioning, it was identified that the All Rods Out boron test results were not in good agreement with the B&W predictions; however, this matter was resolved satisfactorily by a re-analysis by B&W of the predicted numbers.

It was also identified that the DNBR value was slightly lower than expected because of a slightly lower than expected main coolant flow. The results, strongly influenced by a B&W specified allowance for instrumentation error, are still within tolerances and are not a safety problem. It is possible that more accurate instrumentation (which is being considered) may provide slightly increased margins.

Internals vibration and neutron noise tests are planned for the 100 percent power level test sequence.

The possibility was identified that at 2772 MWt, the turbine generator maximum expected capability of 959.2 MWe could be exceeded. The responsibility for evaluation and assessment of this situation prior to exceeding nameplate rating during the test program was assigned to J. L. C. Bachofer and R. F. Wilson.

Mr. Wilson requested that summaries of the detailed technical evaluation of test results be forwarded to him. Mr. Seelinger was assigned this responsibility.

Criterion 2.7 Power Transmission and Supply

The discussion was led by Messrs. Bonneville and Slater. The discussion and written material provided in Appendix I indicate that Criteria 2.7.1, 2.7.2 and 2.7.3 have been met. Criteria 2.7.3.1 (incremental costs) and 2.7.3.2 (economic dispatch information) were not addressed before the Review Board. Information subsequently submitted by Met-Ed is attached as Appendix III in satisfaction of these requirements. Additionally, further information supplementing that provided in Appendix I with respect to system evaluation and stability was subsequently furnished and is attached as Appendix IV.

4.0 STATION SUPERINTENDENT'S REVIEW

Mr. Miller discussed his views of the status of TMI-2, elaborated on the statement presented by him in Appendix I of residual problems and confirmed his opinion that TMI Unit 2 is in a proper state of technical and operational readiness to commence commercial operation.

5.0 ACTION ITEMS OUTSTANDING

<u>Criterion</u>	<u>Item</u>	<u>Responsibility</u>
2.3.2	Insurance certificates	Troffer
2.4.1	Fire inspection deficiency Item 17	Barton/Ritthamel/Wilson
2.4.1	Security system-emergency access	Herbein/Robidoux
2.6	Test Completion	Toole/Subcommittee (Arnold, Wilson, Herbein, Hirst)
2.6	LWT Makeup system - identify resources and target operation	Herbein/Miller
2.6	NSSS vs. Turbine Generator capability	Bachofer/Wilson
2.6	Test evaluation summaries to CPUSC Tech. Functions	Seelinger

TMI UNIT 2 COMMERCIAL REVIEW BOARD

October 26, 1978

Attendance

R. C. Arnold	GPUSC
J. L. C. Bachofer, Jr.	"
J. J. Barton	"
R. W. Conrad	Penelec
R. C. Cutler	GPUSC
J. T. Faulkner	"
I. R. Finfrock, Jr.	JCPL
F. H. Grice	Met-Ed
J. G. Herbein	"
C. E. Herkert	"
D. E. Hetrick	GPUSC
R. W. Heward, Jr.	"
W. H. Hirst	"
L. L. Lawyer	Met-Ed
R. R. Lefin	"
J. B. Logan	"
G. P. Miller	"
C. R. Montgomery	GPUSC
J. P. O'Hanlon	Met-Ed
R. G. Ritthamel	GPUSC
D. A. Ross	JCPL
J. Rudolph	Met-Ed
J. L. Seelinger	"
M. R. Shaffer	"
D. M. Shovlin	"
H. J. Slater	Met-Ed
R. J. Toole	GPUSC
G. J. Troffer	Met-Ed
R. F. Wilson	GPUSC
T. P. Wolff	Penelec

METROPOLITAN EDISON COMPANY Subsidiary of General Public Utilities Corporation

Subject TMI-2 INCREMENTAL COSTS

Location Reading

To J. L. C. BACHOFER, JR.

Date October 30, 1978
GAM 4993

The incremental costs for TMI-2 have been updated into the Met-Ed Loading Schedule beginning in May of 1978. These costs are based upon the unit's heat rate curve. On a monthly basis fuel costs, maintenance costs and the performance factors are input into the system. The fuel costs are from the fuel forecast, the maintenance costs are based upon TMI-1 experience, and the performance factor is assumed to be one until actual experience is available.

Attached for your information is a copy of the October Loading Schedule and the Capacity Costs. If you would have any questions please contact me.



E.J. MOYER
Ext. 142

EJM:dlk

Attachment

cc: R. C. Arnold
J. G. Herbein
L. L. Lawyer
G. P. Miller

File: 62.0022.0013

PLANT	TURBINE NUMBERS	TY I	START	SP I R	MINUTE RATE	BOILER NUMBERS	BOILER UNIT NO-LOAD	T I	T I
LOUISIANA	1 1 OR 2	1 T 1	5917.57	1 182.00	1 3.04800	1		1	1
DELSARA	1 1 OIL	1 1	55.54	1 100.10	1 5.00500	1		1	1
MOUSTAIN	1 10R2 OIL	1 1	36.99	1 298.16	1 4.96933	1		1	1
WINTERSTOWN	1 1,2 OR 3 (OIL)	1 1	33.95	1 292.00	1 4.86666	1		1	1
HAMILTON	1 1 OIL	1 1	36.40	1 287.74	1 4.79566	1		1	1
3 MILL (S) JC SHARE	12	1 T 1	172.70	1 96.72	1 1.60367	1		1	1
	1 1	1 T 1	275.40	1 29.13	1 .48550	1		1	1
	1 1	1 T 1	555.19	1 59.25	1 .97083	1		1	1
3 MILL (S) ME SHARE	12	1 T 1	164.41	1 192.45	1 3.20750	1		1	1
	1 1 OR 2 OIL	1 1	43.39	1 293.50	1 4.89166	1		1	1
	1 3 GAS	1 1	86.43	1 269.25	1 4.47083	1		1	1
PORTLAND CT	1 4 OIL	1 1	94.28	1 327.73	1 5.46166	1		1	1
	1 4 GAS	1 1	51.90	1 338.15	1 5.63583	1		1	1
	1 3 OIL	1 1	96.65	1 252.28	1 4.20466	1		1	1
PORTLAND	1 1	1 1	178.05	1 118.70	1 1.97833	1 1	20.06	1	1
	1 2	1 1	287.73	1 141.87	1 2.36450	1 2	36.29	1	1
TITUS CT	1 4 OR 5 (GAS)	1 1	47.14	1 245.94	1 4.09900	1		1	1
	1 4 OR 5 (OIL)	1 1	57.49	1 232.50	1 3.87500	1		1	1
TITUS	1 2	1 1	212.34	1 118.77	1 1.97950	1 2	16.99	1	1
	1 2	1 1	210.64	1 117.69	1 1.96150	1 3	16.84	1	1
	1 1	1 1	228.92	1 116.83	1 1.94716	1 1	16.71	1	1
SHAWNEE	1 1 OIL	1 1	52.36	1 301.87	1 5.03116	1		1	1
KEYSTONE	1 1 OR 2	1 1	6016.36	1 157.84	1 2.63066	1		1	1
RIEDEL CT W/WRH OIL		1 1	66.61	1 316.96	1 5.28266	1		1	1
RIEDEL CT W/WRH OIL		1 1	66.61	1 316.96	1 5.28266	1		1	1
RIEDEL CT W/O WRH		1 1	71.92	1 356.62	1 5.94366	1		1	1
GILBERT CC-SYM	18-2CTS HOT	1 1	2771.34	1 1338.74	1 22.31233	1		1	1
	18-2CTS FOT	1 1	4083.19	1 1998.38	1 33.30633	1		1	1
	18-4CTS HOT	1 1	5395.36	1 2658.02	1 44.30033	1		1	1
	18-1CT COLD	1 1	2217.73	1 681.20	1 11.35333	1		1	1
	18-2CTS COLD	1 1	4235.27	1 1339.74	1 22.31233	1		1	1
	18-3CTS COLD	1 1	6252.83	1 1998.38	1 33.30633	1		1	1
GILBERT (CC) CT	18-4CTS COLD	1 1	8270.37	1 2658.02	1 44.30033	1		1	1
	ICC 4, 5, 6 OR	7 1	101.16	1 615.67	1 10.26116	1		1	1
GILBERT CC-SYM	18-1CT HOT	1 1	1455.46	1 681.23	1 11.35333	1		1	1
GILBERT CT	1 C-1, 2, 3, 4-D	1 1	101.87	1 420.92	1 7.01533	1		1	1
	1 C-1, 2, 3, 4-G	1 1	89.02	1 271.15	1 4.51916	1		1	1
GILBERT	1 3 (OIL)	1 1	168.13	1 163.18	1 2.71966	1 3	17.32	1	1
	1 1, 2 (OIL)	1 1	426.53	1 144.41	1 2.43683	1 1ST OLD OIL	33.91	1	1

POOR ORIGINAL

MET-FD LOADING SCHEDULE
(GROSS)
(LAMBDA)

MIN.	PHE		PORTLAND				TITUS				TWT											
	1	2	1	2	3	4	1	2	3	4	1	2	3	4	5	6	7	8	9	10		
	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL	COAL	OIL								
100	65	65	75	75	20	20	20	20	20	20	20	100										
2.6	11																					
2.8	85											650										
3.2												920										
3.4																						
3.0			100																			
3.2			155																			
13.6			195																			
13.5	95		235																			
14.8	115		210																			
16.0	120		215																			
14.2	125		220																			
14.4	130		225																			
14.6	135		230																			
14.8	140		235		25					25												
15.0			240						25													
15.2	145		245		30					30												
15.4	150		250						30													
15.8	155		255		46																	
16.0	160		260						46				46									
16.2	165		265																			
16.4	170																					
16.6	180																					
16.8	185				70								70									
17.0									70													
17.2					76																	
17.4									76				76									
17.6																						
17.8					84								84									
18.0									84													
20.4								25														
20.6					80								25									
20.8					110						25											
21.0					135			30														
21.2					160									30								
21.4					175																	
21.6					190								30									
21.8			80		200																	
22.0			95		205																	
22.2			110		210																	
22.4			115					46														
22.6					215								46									
22.8			120										46									
23.0			125		220																	
23.2			130																			
23.4					225																	
23.6																						
23.8			135																			
24.0					230			70														

POOR ORIGINAL

Inter-Office Memorandum

Date October 25, 1978



Subject Determination of Technical and Organizational
 Readiness for Placing a Generating Unit into
 Commercial Operation Paragraph 2.7.3

To Messrs. G. P. Miller
 R. Bensel

Location Reading

The transient stability studies required for the Three Mile #2 generating unit are complete. The results and conclusions of the studies are documented in a GPU Transmission Planning Department report titled "TMI Stability Review" dated April, 1976. Since decisions on certain areas of system protection were based on and conform to the results and conclusions of that report, the transient stability performance of the Three Mile Island #2 unit will be acceptable.

Detailed testing of the dynamic stability (steady state) of the Three Mile Island #2 unit was not undertaken. With the excitation system adjusted to give an acceptable response to an open circuit step voltage change, the Three Mile Island #2 unit being connected to the existing transmission system is not considered to be a likely candidate to experience dynamic instability.

S. C. Thomas

SCT/KTW/sad

cc: Messrs. R. W. Werts
 E. Newton Jr.
 R. M. Becker

SUPPLEMENT "A"
TO THE
REPORT OF THE REVIEW BOARD
FOR THE
DETERMINATION OF TECHNICAL AND ORGANIZATIONAL READINESS
FOR
PLACING THREE MILE ISLAND UNIT 2
INTO
COMMERCIAL OPERATION

At the time of the Review Board Meeting on October 26, 1978, the TMI Unit 2 was operating at 75 per cent of licensed reactor power. A Subcommittee of the Board, consisting of Messrs. Arnold, Herbein, Hirst and Wilson, was appointed to review the balance of the test program prior to placing the Unit in commercial service.

All four members of the Subcommittee were kept abreast of plant problems and the progress of the test program on a routine basis. It is the opinion of the Subcommittee that the Unit has demonstrated its ability to operate safely and reliably up to and including 959 MW gross and should be placed into commercial service with a winter capacity rating of 906 MW net, the Unit's design electrical rating.

As of December 28, the date upon which all essential elements of the test program were complete, the following items are worth noting:

1. Reactor power will be limited to 2717 MW_t (98 per cent of the licensed power level of 2772 MW_t), unless new analyses provide justification for operation at higher power levels with the measured reactor coolant flow.
2. Currently, the reactor coolant flow instrument for the "A" loop is reading low and this restricts power to about 2690 MW_t until that condition is corrected. The lower allowable reactor power will, for some meteorological conditions, be more limiting than turbine generator design limits.
3. Initial data indicates operating limits provided by Westinghouse to ensure operation is within turbine first stage flow design limits may be more restrictive than necessary to maintain flow within the specified limits. This issue will be pursued by Mr. Wilson.
4. It is likely that the turbine generator can be operated safely at levels above the 959.2 MW limit (i.e., allowable first stage flow may be greater than presently prescribed) specified by Westinghouse. Resolution of this item will require further analyses by Westinghouse. Pending completion of those analyses, the Unit must be operated within the limits prescribed by the technical manual.
5. The ability of the condensate systems deep bed demineralizers to remove sodium is very limited. This fact, coupled with recently imposed strict feedwater specification for sodium (5 ppb), may restrict plant operations during chemistry upsets in the condensate and feedwater systems. This issue will be pursued jointly by Met-Ed and GPUSC personnel.
6. Currently there are unresolved problems with the heater drain pumps. There have been several instances of pump seizure for causes as yet unexplained. The system does have three pumps installed and the Unit can operate at

essentially full load with only two pumps. If all three pumps are out of service simultaneously, the Unit may be restricted for such periods to about 650 MW. Corrective action is being pursued jointly by Met-Ed and GPUSC with the vendor.

7. Events during the past two months have re-emphasized the vulnerability of the Unit to shortages of make-up water as discussed in the second paragraph of page 5 of the main report. Corrective action for both operational and design difficulties with the Unit 2 LAWT system is being pursued jointly by Met-Ed and GPUSC.

<u>R. C. Arnold</u> R. C. Arnold	<u>12/29/78</u> date	<u>J. G. Herbein per telecon</u> J. G. Herbein per telecon	<u>12/29/78</u> date
<u>W. H. Hirst</u> W. H. Hirst	<u>12/29/78</u> date	<u>R. F. Wilson</u> R. F. Wilson	<u>12/29/78</u> date

Reviewed by:

G. P. Miller per telecon
G. P. Miller per telecon

12/29/78
date

POOR ORIGINAL