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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

LICENSEE'S RESPONSE TO STEVEN C. SHOLLY'S
FOURTH SET OF INTERROGATORIES

INTERROGATORY NO. 16-007

With regards to qualifications of a witness to permit review of Licensee's Security Plan, what qualifications would be acceptable to Licensee?

RESPONSE

There are no qualifications which per se qualify a witness to review Licensee's Security Plan. As discussed in Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-410, 5 NRC 1398 (1977), whether a particular witness is qualified to review a licensee's security plan, subject to protective order, can only be addressed after the following threshold showing has been persuasively demonstrated by the intervenor sponsoring the witness: (1) the relevancy of the intervenor's security-related contention(s) to specific aspects of Licensee's Security Plan; and (2) the relevancy of a particular witness' expertise to those portions of Licensee's Security Plan which the intervenor has demonstrated are relevant to its contention(s). Thus, whether Intervenor Sholly's witness will be

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sufficiently qualified to review specific aspects of Licensee's Security Plan will depend upon the nature of the witness' expertise, the area(s) in which the witness will be called to testify, the specific aspects of Licensee's Security Plan sought to be reviewed by the witness, and the relevancy of this review to Sholly Contention 16.

INTERROGATORY NO. 15-005

Has Licensee or its contractors ever asked TMI operators to evaluate the design adequacy of the control room?

RESPONSE

Although there previously was not a formal program established for asking the TMI-1 operators to evaluate the design adequacy of the Control Room, the organization structure and communications between the Operations and Engineering sections of the Company did permit an exchange of comments and ideas concerning the Control Room design. Since the TMI-2 accident of March 28, 1979, a formal program has been established to solicit comments from the operators on the design changes associated with the restart of TMI-1.

The review of the Control Room design referred to in answer to Interrogatory 15-002 will be performed in coordination with plant operators, who will have an opportunity to make comments on the design and layout of the control panels.

INTERROGATORY NO. 15-007

Specify the environmental conditions present in the Unit 1 control room, including temperature, humidity, noise level, lighting requirements, and provisions for protection against contaminants (radioactive or otherwise). Specify how these environmental conditions are maintained.

RESPONSE

The Unit 1 FSAR section 9.8 "Station Ventilation Systems" provides design bases and system function descriptions. In particular, sections 9.8.2h, 9.8.3.4, and 9.8.4f deal with the control room.

The relative humidity in the Control Room will vary from 10 percent to 60 percent depending on the season and mode of temperature maintenance, i.e., heating or cooling.

The components or systems associated with the Control Room generate insignificant noise, except for alarms, which are intended to attract attention.

The Unit 1 Technical Specifications describe how the Control Room filtration system is tested and surveilled. Additional information is contained in FSAR section 1.4.11.

The lighting design for the Control Room called for 150-foot candles at the fixture. This would result in an average of 100-foot candles of light at a height of 2.5 feet above the floor.

INTERROGATORY NO. 15-008

What is Licensee's policy regarding housekeeping duties in the control room?

RESPONSE

At least one individual from the Maintenance Department is assigned janitorial duties in the Control Room, working the 11 p.m. to 7 a.m. shift Monday through Friday. The Control Room operators are not assigned housekeeping duties in the Control Room while they are assigned to the Control Room operator watch station.

INTERROGATORY NO. 15-011

Describe in detail how the control room panels are layed out in functionally demarcated areas.

RESPONSE

The Control Room is arranged so that displays and controls frequently employed on a routine basis or which would be needed quickly in case of an emergency are mounted on an operating panel which is clearly visible and close to the operator. Less frequently used controls and indicators, and those which would not be needed quickly in an emergency are located further away from the operator on vertical panels.

Further, the controls are grouped by the system to which they relate. Different systems (e.g., reactor control, turbine control, condensate, electrical) have their respective controls in functional groupings on the panels. This is further explained in Section 7.4 and Figure 7.21 of the FSAR. See also response to Interrogatory No. 15-013.

INTERROGATORY NO. 15-012

Detail all instances in which operators have resorted to their own labelling in the control room of Unit 1 due to inadequacies in the original labelling.

RESPONSE

Licensee has not maintained records regarding the use of temporary labels. Operators do not normally resort to their own independent labelling in the Control Room. If the original labelling were discovered to be inadequate, new permanent replacement labels would be constructed and installed with the approval of unit management.

Temporary "Dymo" tape labels are used in the Control Room in cases where permanent labelling would not be feasible (i.e., changing setpoints of instruments) and as a temporary replacement for permanent labels which have been damaged while new permanent labels are being constructed.

INTERROGATORY NO. 15-013

For panels in the control room having similar controls for a number of different features, discuss how these controls are differentiated other than by labelling. Discuss the extent to which large numbers of similar controls on any given panel gives rise to operator error because of the absence of differences in appearance, shape, color, and/or texture.

RESPONSE

Position of controls on Control Room panels and grouping of various related controls are general means utilized to differentiate such controls. Licensee's response to Interrogatory 15-016 provides photographic documentation on Control Room panel and control layout. Licensee has not correlated similarity of controls to operator error rate and the overall impact of appearance, shape, color, and/or textures on that rate, per se. However, past practice has been to review operator errors and other incidents as they occur, and to implement whatever corrective action necessary to minimize the likelihood of recurrence.

INTERROGATORY NO. 15-014

Discuss precautions taken to ensure that controls for protection systems in the Unit 1 control room cannot be accidently manipulated.

RESPONSE

Precautions which are incorporated to ensure that controls for protection systems are not accidently manipulated are listed below:

(1) Operator training - provides recognition for and knowledge of consequence of control manipulation;

(2) Administrative procedures and security controls - limits access to the location of controls; and

(3) Design of controls - key locks, interlocks, alarms, and physical force required to manipulate controls preclude or protect against accidental movement.

INTERROGATORY NO. 15-015

Discuss how operators may determine if an annunciator lamp is burned out.

RESPONSE

An annunciator lamp that has burned out would be discovered during alarm tests conducted each shift in which all annunciator window lights are turned on. Absence of the illuminated annunciator window during this test would be investigated and repaired as necessary.

INTERROGATORY NO. 15-016

Discuss how meters used in the control room are coded to permit easy determination by operators of whether the meters indicate normal, marginal, or out-of-tolerance conditions.

RESPONSE

The information requested in this interrogatory can be obtained from detailed photographs of the Unit 1 Control Room

which have been taken by the Licensee. These photographs will be placed in Licensee's Discovery Reading Room by approximately April 15th.

Further, Licensee notes that Intervenor Sholly visited the TMI-1 Control Room accompanied by a photographer on March 7, 1980. Photographs taken are currently in Intervenor Sholly's possession.

INTERROGATORY NO. 15-017

Discuss the extent to which analog trend recorders are utilized in the Unit 1 control room.

RESPONSE

See photographs referred to in response to 15-016.

INTERROGATORY NO. 15-018

Identify and provide the location within the Unit 1 control room of all chart recorders which record more than six (6) functions.

RESPONSE

See photographs referred to in response to 15-016.

INTERROGATORY NO. 15-019

How many annunciator lights are there in the Unit 1 control room? How many separate meters? How many control switches? How many strip chart recorders?

RESPONSE

See photographs referred to in response to 15-016.

INTERROGATORY NO. 15-020

How many alarms which appear in the Unit 1 control room refer an operator to a remote (out-of-control-room) location, requiring the operator to leave his station or send an auxiliary operator to answer the alarm or assess the cause for the alarm or correct

the alarm-causing situation. Identify each alarm and the name and location of the remote station to which the operator is referred by the alarm.

RESPONSE

There are fifteeen (15) alarms which appear in the Unit 1 Control Room which refer the Control Room operator to a remote (satellite) annunciator which in turn may have several alarm windows with respective alarm response procedures. Upon receipt of the "satellite trouble" alarm, the Control Room operator would first acknowledge the Control Room alarm and then dispatch an auxiliary operator to the satellite station in order to assess and correct the cause of the alarm. A table listing the various alarms is attached.

INTERROGATORY NO. 15-021

For all the following code colors used in the Unit 1 control room, list each separate meaning which this color can have (i.e., valve open, flow stopped, etc.):

a.	Red	d.	White
b.	Green	e.	Blue
c.	Amber	f.	Flashing lights of any color

RESPONSE

The following color coding scheme for indicating lights has been utilized in TMI-1 Control Room:

Green - to indicate close-off or nonoperating position;

Red - to indicate open, on or operating position;

Amber - to indicate abnormal condition or where applicable, engineered safeguards actuated equipment in abnormal position;

Control Room Alarm		Remote Station Alarm	
Panel Location	Alarm Description	Building	Panel Description
Main H-1-5	Boiler Trouble	Turbine	Auxiliary Boiler Annunciator Panels A&B
Left B-7-8	Circulating Water Chlorinator Trouble	CWCL House	Circulating Water Chlorinator Panel
Main A-1-5 Main B-1-5	D/G 1B Trouble D/G 1A Trouble	D/G	Diesel Generator Annunciator Panels A&B
Main L-2-6	Generator Hydrogen Seal Oil System Trouble	Turbine	Hydrogen Seal Oil Annunciator Panel
Left A-8-10	Cycle Make-Up De-mineralizer Trouble	Turbine	Illinois Water Treatment Annunciator Panel
LWDS-1-10	Radioactive Waste Panel Alarm	Auxiliary	Radioactive Waste Annunciator Panel
Left-B-5-8	Powdex Trouble	Turbine	Powdex Annunciator Panel
Left A-7-10	Cycle Make-UP Pre-treatment Plant Trouble	Pretreatment	Pretreatment Annunciator Panel
Left B-7-7	River Chlorinator Trouble	RWCL	River Water Chlorinator Annunciator Panel
Left B-6-8	River Rake or Screens Trouble	Screenhouse	Screenhouse Annunciator Panel
Main L-3-7	Generator Stator Liquid Charge System Trouble	Turbine	Stator Coolant Annunciator Panel
Main M-1-6	230kV Substation Trouble	Substation	Substation Annunciator
Right Front 7-2	Industrial Waste Treatment Trouble	Industrial Waste	Industrial Waste Treatment System Annunciator
Right Front 8-2	Industrial Waste Filter Trouble	Industrial Waste	Industrial Waste Filter System Alarm Panel
Right Front 7-4	UPS Diesel Generator Trouble	UPS Diesel	UPS Diesel Generator Alarm Panel

Blue - to indicate limit conditions or where applicable, engineered safeguards actuated equipment in normal position;

White - to indicate available condition such as energized line, available power, etc.

Flashing indicating lights for system or equipment status have not been used in TMI-1 Control Room design. The plant annunciator provides a flashing window feature for alarm sequences, and computer-driven CRT displays also flash under certain conditions.

INTERROGATORY NO. 15-022

To what extent has Licensee used "task analysis" as described in EPRI NP-309, "Human Factors Review of Nuclear Power Plant Control Room Design", in evaluating the design of the Unit 1 control room?

RESPONSE

The procedure used for design of the control board is traditional in this industry. This involves a physical mockup of the control boards, using paper facsimilies for the control board mounted devices. Numerous meetings were held with Metropolitan Edison personnel, including the Station Superintendent and Senior Operating Staff to perform simulated operations on the control board mockup. Through this technique, the physical arrangement of the devices on the control board was established, utilizing the combined experiences of all personnel involved. After the physical arrangement was established, drawings were made from the mockup and issued to the control board fabricator.

INTERROGATORY NO. 15-023

Identify by name, title, organization, and professional qualifications of any and all experts in the field of human factors engineering who participated in the design or review of the design of the Unit 1 control room, or any portion thereof.

RESPONSE

Licensee is not aware of any persons who participated in the original design of the Unit 1 Control Room who would qualify as an "expert" in the field of human factors engineering.

INTERROGATORY NO. 15-029

To what extent does the Unit 1 control room make use of computer-based graphic display to inform operators of system status and parameters?

RESPONSE

Licensee is presently developing the capability to use computer-based graphic displays in the MODCOMP computer system. The extent to which these will be used has not been defined.

INTERROGATORY NO. 15-034

What means will be utilized in the Unit 1 control room to assure that operators know the status of the PORV on the pressurizer, i.e., whether the PORV is open or closed? Is this means single-failure proof? Is the pressurizer qualified as "safety-grade"? If not, why not?

RESPONSE

TMI Unit 1 control room instrumentation that provides information on the PORV status is described in Licensee's Restart Report, Section 2.1.1.

Licensee has objected to the last two questions in this interrogatory.

INTERROGATORY NO. 15-035

On what panel in the Unit 1 control room are the following features located:

(a) PORV status

(b) Status panel for RCDT (reactor coolant drain tank)

(c) Emergency Auxiliary feedwater controls

(d) Display for reactor coolant pump vibration and eccentricity

(e) Pressurizer level indication

(f) Reactor coolant pump seal pressure

(g) Reactor coolant pump seal temperature

(h) Reactor coolant pump controls

(i) Borated water storage tank controls

(j) High pressure injection controls

(k) Low pressure injection controls

(l) Decay heat indicators

(m) Decay heat pump controls

(n) ECCS actuation control

(o) ECCS status panel

(p) Letdown controls

(q) Intermediate closed cooling pump controls

RESPONSE

See photographs referred to in response to 15-016.

INTERROGATORY NO. 15-039

Provide evidence that Licensee will provide a direct indication of emergency feedwater flow to the steam generators to the Unit 1 control room panels.

RESPONSE

A description of Control Room indication provided to indicate Steam Generator emergency feedwater flow is contained in Licensee's Restart Report, Sections 2.1.1 and Supplement 1, Part 1, Questions 4 and 6 and Supplement 1, Part 2, Questions 4 and 5.

INTERROGATORY NO. 15-040

Provide evidence that Licensee will provide an alarm or other appropriate indication that the emergency feedwater system is misaligned or otherwise inoperative.

RESPONSE

The administrative controls which verify the operational readiness of Emergency Feedwater components are summarized below:

1. ESAS Checklist

   This checklist verifies the readiness of EFW components each shift. It verifies Control Room valve position and control switch positions for the above systems.

   The checklist is initiated by the off-going shift and signed by the on-coming Control Room operators, Shift Foreman and Shift Supervisor.

2. Administrative Valve Controls

   Critical valves in the EFW systems have been either locked or placed under routine surveillance. This includes locking of manual overrides where applicable, and/or routine checking of the manual overrides as part of the auxiliary operator log sheet entries.

3. Log Sheets

   Noncontrol room indicated main flow path EFW valves will be checked either with each shift or daily as to correct position. The determination of frequency is based on accessibility not only to the operations staff but to other personnel who may be working in the plant.

4. Verification Prior to Surveillance or After Maintenance

EFW valve positions will be checked as part of the initiating procedure for the redundant train prior to initiating surveillance on any EFW train. Upon completion of surveillance the valves or switches that were manipulated will be verified by procedure as to correct position.

Prior to returning components to service after maintenance or special testing the affected components and all other components within the boundaries of the maintenance will be verified to be in the correct position by two independent verifications.

INTERROGATORY NO. 15-043

Provide appropriate documentation that would provide assurance that visual acuity has been properly considered in the design of the Unit 1 control room.

RESPONSE

Visual acuity of components on the Control Room console and vertical boards was one of the main elements checked during board design, manufacturer and vendor inspection prior to shipment of the equipment. To Licensee's knowledge, there is no adequate documentation that exists.

INTERROGATORY NO. 15-045

Describe the extent to which video monitors in the control room at Unit 1 permit reactor operators to monitor critical areas within the plant. If such monitoring capability is not yet available, describe when it will be available or explain why it will not be made available before restart.

RESPONSE

Licensee has no present plans to install video monitors in the Control Room to monitor critical areas within the plant. Licensee believes that such monitors are not necessary and could distract the Control Room operators.

INTERROGATORY NO. 15-046

How many CRT displays exist in the Unit 1 control room? What types of information can be displayed on these CRT's? Does the CRT display system have computer-based graphics capability, and, if so, to what extent will this be used in the Unit 1 control room?

RESPONSE

At present there is one CRT display in the Unit 1 Control Room which can display alpha numeric information. It does not have computer-based graphic capability. It is anticipated that additional CRT displays driven by the new MODCOMP computer will be installed in the Control Room. The exact number and type of displays have not yet been defined. It should be noted that these CRT displays are not required by the reactor operators to operate the plant safely.

INTERROGATORY NO. 15-047

Describe the measures taken to assure that critical controls are not subject to unintentional or accidental initiation while operators are manipulating other controls or attempting to monitor meters, displays, and charts. Identify any and all instances in which protective systems and engineered safeguards systems have unintentionally or accidently been initiated.

RESPONSE

In addition to the response provided for Interrogatory No. 15-014, the following information concerning unintentional ES Systems actuation is provided:

Report 50-289/74-29 discusses the inadvertent actuation of the Make-up Pump 1C, Diesel Generator 1B, Decay Heat Pump 1B and the Reactor Building Isolation and Cooling Test Group I valves. This actuation resulted from a faulty test switch and did not affect the design basis for system operation capabilities.

Report 50-289/77-15/3L discusses the inadvertent starting of the 1A Diesel Generator as a result of the deenergized 230kV substation Bus 4. This Diesel Generator start did not affect the design basis for system operation capabilities.

INTERROGATORY NO. 15-048

Discuss the extent to which inadvertent or accidental initiation of protective systems or engineered safety features systems may cause such systems to be challenged more frequently than their design basis.

RESPONSE

As demonstrated by our response to 15-047, inadvertent actuation of ES features is a very infrequent occurrence and as such is of little consequence with respect to challenging the design basis for component operation.

INTERROGATORY NO. 15-050

To what extent does the alarm/annunciator display system in Unit 1 make use of auditory discrimination and/or prioritization systems to assist operators in locating alarming indicators and assessing possible patterns in alarm conditions? If such methods are not used, explain why not. If they are used, explain how they work and provide the design basis for such methods.

RESPONSE

Certain sets of alarms, e.g., computer alarms, are auditorily discriminated. Key critical alarms such as reactor trip, turbine trip and certain engineered safeguard system alarms are color coded to indicate their importance.

INTERROGATORY NO. 15-051

Is there an annunciator for reactor trip in the Unit 1 control room? If so, where is it located? If not, explain why not.

RESPONSE

Yes there is a reactor trip alarm. It is located on the main annunciator panel window box F-1-1.

INTERROGATORY NO. 15-052

Explain the extent to which extinguished indicator and/or alarm lamps are utilized by reactor operators as positive indicators of system status. Explain, if such positive indication is based upon extinguished lamps, how this impacts on the availability of critical information for reactor operators during emergency situations when accurate information is an absolute necessity.

RESPONSE

Extinguished lights are not used to indicate system status. Critical pumps or valves for instance have positive indication provided consisting of an energized/deenergized (open/closed) light position indication of different colors.

INTERROGATORY NO. 15-054

Discuss how operators determine that the primary system has reached saturation conditions. If done manually, explain why this function cannot be monitored by the Unit 1 computer, thus assuring that when saturation conditions occur, operators are immediately aware of the condition.

RESPONSE

Licensee's Restart Report, Section 2.1.1, Supplement 1, Part 1, Response to Question 20, and Supplement 1, Part 2, Response to Question 94, contain responsive information.

INTERROGATORY NO. 15-055

Explain why there is not a consistent practice in the placement of labelling at control/display locations in the Unit 1 control room, i.e., why some labels are placed above and others are placed below. Discuss the extent to which such inconsistent practices may cause confusion among operators and why a consistent labelling practice in this regard would not reduce the chances for operator error, and thus provide more protection for public health and safety.

RESPONSE

The Control Room review referred to in the response to Interrogatory 15-002 does include a specific review of labelling practices. Operator training and qualifications relative to Control Room labelling currently minimize the risk of operator error.

INTERROGATORY NO. 15-056

During what year did preliminary work begin on the design of the Unit 1 control room? Identify by name, title, and organization who worked on the initial design of the Unit 1 control room. Similarly, identify who was responsible for the final design of the Unit 1 control room.

RESPONSE

Work on the design of the TMI Unit 1 Control Room began in late 1966, and evolved through numerous conferences with the architect engineer, the owner and the reactor vendor.

The principal individuals who participated in the design and review are as follows:

GAI	MET ED	B&W
W. F. Saller	R. M. Klingaman	F. Thomasson
W. E. Meek	J. L. Wise	H. Stevens
V. H. Willems	H. R. Morris	K. Schroeder
	J. R. Floyd	W. E. Wilson
		D. E. Wurster

INTERROGATORY NO. 15-057

What formal steps has Licensee management taken to ensure that the capabilities and limitations, both physical and mental, of reactor operators are taken into account in the design and review of the design of the Unit 1 control room? Is there a formal plan for periodic review of control room design which reviews operator concerns about the control room design? If so, identify and discuss. If not, explain why not.

RESPONSE

During the original design of the Unit 1 Control Room, a mockup of the control panels was constructed and used to define the locations of controls and instruments. Reactor operators participated in this design process to ensure that the control panels meet the needs of the operating staff.

See also response to Interrogatory 15-006.

INTERROGATORY NO. 15-058

What mechanism exists within Licensee's organization to review and approve proposed changes to control room design? Besides this mechanism, what other sources are called upon to participate in such reviews?

RESPONSE

Any physical change proposed for the unit will be developed, documented, reviewed and approved by fulfilling the requirements of the Engineering Change/Modification Procedure (AP-1043). Completion of this procedure will require that along with other requirements the proposed change must receive multi-discipline technical reviews, a safety evaluation, and several levels of management approval. These reviews and approvals involve both onsite and offsite organizations. For organizational responsibilities see the Restart Report, Chapter 5.

INTERROGATORY NO. 15-059

Identify by name, title, and organization, who among the staffs of Licensee, the Unit 1 architect-engineer, and Babcock and Wilcox which participated in the design or review of design of the Unit 1 control room had formal training and education in human factors engineering. For each such person, identify the extent to which he or she participated in the design or review of the design of the Unit 1 control room. Identify recommendations regarding control room design made by such individuals and explain whether or not their advice was followed, and if it was not, explain why not.

RESPONSE

Participants in the arrangement and the design of the TMI Unit 1 Control Room were experienced reactor operators or reactor systems engineers, familiar with the requirements for operating a unit of this type. To Licensee's knowledge, they did not have formal training in human engineering.

INTERROGATORY NO. 15-060

To what extent during the design of the Unit 1 control room were mockups utilized to assess the design of the Unit 1 control room?

RESPONSE

See answer to Interrogatory No. 15-057.

INTERROGATORY NO. 15-061

Identify any mechanisms within Licensee's organization which provide a systematic review of operator performance and provide suggestions for improvements in control room design, operating procedures, and training programs.

RESPONSE

See answer to Interrogatory No. 15-005. Licensee has objected to this interrogatory insofar as it relates to operating procedures and training.

INTERROGATORY NO. 15-069

Describe the physical and medical standards which control room operators and senior reactor operators must meet, especially with respect to limitations imposed by the design and layout of the TMI-1 control room as it now exists. Include in your description any standards on the following which operator or senior operator candidates must meet and maintain compliance with:

(a) Visual acuity requirements

(b) Color blindness tests

(c) Hearing tests

(d) Psychological evaluations

(e) Evidence of drug or alcohol use

(f) Height and weight limits

(g) History of fainting, seizures, and cardiovascular problems.

RESPONSE

Licensee has no special medical standards imposed by the design of the Control Room. 10 C.F.R. Section 55.11 specifies medical and physical requirements for licensed operators. NRC Form 396, Certificate of Medical History, is completed periodically for each of Licensee's licensed personnel. Licensee evaluates personnel testing results individually in pertinent areas.

INTERROGATORY NO. 15-076

Identify by name, title, and position within Licensee organization, any and all persons on the PORC with formal training in the field of human factors engineering.

RESPONSE

The PORC membership is described in the Unit Technical Specifications Section 6.

The qualifications and professional background of Licensee PORC members are contained in Licensee's Restart Report, Section 5. Names of specific individuals of interest will be provided on request.

INTERROGATORY NO. 17-001

In reference to scenario "B" in Contention No. 17 as admitted by the Board, could the diesel generator therein described have been placed in an operable condition, given the facts of the conditions as they existed on March 28, 1979 at Unit 2 of TMI? If so, how. Be specific. If so, could this have been done without significant risk to the health and safety of the person or persons involved in placing the generator in an operable condition?

RESPONSE

If the TMI-1 diesel generator fuel rack is tripped, it must be reset locally. This would be done by positioning the fuel rack reset lever to the reset position and pressing the reset push button on the engine mounted instrument panel. The TMI-1 EDG building is not directly connected to any other building which normally contains radioactive material. Access to the EDG building does not require passage through any building normally containing radioactive material. Therefore, safe access to the diesel to perform the reset function could be performed during an incident similar to that of TMI-2.

INTERROGATORY NO. 17-002

In reference to scenario "B" in Contention No. 17 as admitted by the Board, if a total offsite power loss had occurred before the diesel generator referenced in Contention No. 17 had been placed in an operable status, could the diesel generator have been placed in an operable condition before significant core melting would have occurred, given the situation as occurred on March 28, 1979 at TMI-2?

RESPONSE

Yes. The operators available for dispatch to reset the diesel generator would normally be in the Control Room or at the control point of the auxiliary building. The Control Room is the most distant from the diesel generator building. Based on actual tests, an operator can travel from the Control Room to the EDG building and reset the fuel rack in less than three minutes. All known analyses of alternative scenarios have indicated a substantial margin beyond three minutes before core melting might have occurred.

INTERROGATORY NO. 17-003

What is Licensee's opinion regarding the impact on the sequence of events at Unit 2 and their subsequent "resolution" if personnel from Unit 1 had not been available for assistance?

RESPONSE

Licensee's opinion is that the sequence of events at Unit 2 and the subsequent resolution would not have been significantly impacted if personnel from Unit 1 had not been available for assistance.

INTERROGATORY NO. 17-004

Given the description of scenario "F" in Contention No. 17 as accepted by the Board and given the sequence of events as they transpired on March 28, 1979 at TMI-2, would the venting described in scenario "F" have required any type of protective action in order to protect the public health and safety? If so, describe. If so, also describe whether or not such protective actions could have been implemented in sufficient time to be of use in reducing public exposure to radiation.

RESPONSE

By 0700 on March 30, 1979, the inventory of gases in the makeup tank had been reduced considerably by the necessarily frequent venting to the vent header for tank pressure control. In fact, at 0901, the valve was opened for venting and left open continuously.

The release of the gases from the makeup tank did not require any type of protective action. Refer to TDR-TMI-116 for resultant radiological data. Leaving the valve open would not have materially altered the situation.

INTERROGATORY NO. 17-005

Assuming that the condition of the Unit 2 reactor had been as described in scenario "C" in Contention No. 17 as accepted by the Board, to what extent would the total amount of radiation released to the containment as well as to the auxiliary building (from all pathways) have been increased beyond what was so released during the Unit 2 accident on March 28, 1979? Specify in your answer any increases in the following isotopes:

(a) Iodine-131 (c) Cesium-137

(b) Strontium-90 (d) Krypton-85

RESPONSE

Licensee has underway an evaluation which will provide the answer to this interrogatory and expects to supplement this response in about two weeks.

INTERROGATORY NO. 17-006

Inasmuch as the Battelle, Columbus Laboratories report on the TMI accident and alternative sequences (NUREG/CR-1219) identifies as Case 8 "loss of all AC electric power", and inasmuch as this proposed case falls within the scope of scenario "B" in Contention No. 17, and inasmuch as the Battelle report predicts complete core meltdown by 2.9 hours if power is not restored, explain why the Licensee should not be required to install meltdown mitigation features at TMI-1 prior to restart to ensure sufficient time for evacuation in the event of a complete core meltdown.

RESPONSE

As described in the answer to Interrogatory No. 17-002, power could be readily restored prior to the time that core melting is hypothesized in this accident sequence.

INTERROGATORY NO. 17-007

Given the facts as described in Interrogatory 17-006 (above, reconcile Licensee's Emergency Plan with the fact of potential complete core meltdown by 2.9 hours into this particular accident sequence, i.e., how does this fact change the validity of the assumptions and bases utilized in determining the sizes of Licensee's proposed EPZ for plume exposure?

RESPONSE

The "validity of the assumptions and bases utilized in determining the sizes of Licensee's proposed EPZ for plume exposure" would not change. See responses to Interrogatories 17-006 and 08-006. Licensee's "proposed EPZ for plume exposure" is based on NRC guidance contained within NUREG-0396 and NUREG-0654.

INTERROGATORY NO. 01-010

Explain why the proposed high-radiation containment isolation signal cannot be made to comply with the single-failure criterion.

RESPONSE

The high radiation containment isolation signals probably could be designed to meet the single failure criteria but this is not necessary. See also response to Interrogatory No. 01-002.

INTERROGATORY NO. 01-011

In reference to Licensee's proposed use of Reactor Trip in place of HPI initiation as a diverse containment isolation signal, is there any condition under which HPI injection could occur in the absence of Reactor Trip or after the Reactor Trip signal has been cleared? If so, identify and describe each such condition.

RESPONSE

There is no condition under which HPI injection demand could occur in the absence of the demand for a reactor trip. An HPI injection signal could not occur after the reactor trip

isolation signal had been reset without reinitiating the reactor trip signal.

INTERROGATORY NO. 01-012

By what date will Licensee have developed the bypass and override procedures for containment isolation? Will these procedures be submitted to NRC for review and approval prior to proposed restart?

RESPONSE

Emergency procedures that address containment isolation bypass and override procedures are: EP-1202-6A/B/C and EP-1202-4. These procedures have been implemented.

Operating procedure revisions of relevance to containment isolation bypass and override are scheduled for completion by June 1, 1980.

Licensee procedures are not specifically submitted to the NRC for review; however, the NRC may review and audit Licensee procedures at its discretion. See also response to Interrogatory No. 01-003.

INTERROGATORY NO. 04-012

Provide a copy of Licensee's REMP, including locations of all sampling devices.

RESPONSE

Copies of the Radiation Environmental Program for Units 1 and II may be found in their respective unit technical specification. Locations of sampling sites and devices are found in Attachment A.

INTERROGATORY NO. 04-013

Identify any and all changes made to Licensee's REMP since the Unit 2 accident in March 1978.

RESPONSE

With respect to the REMP referred to in Interrogatory No. 04-012, at the present time the program is operating pursuant to the current technical specification of the Unit. Revisions to the pertinent sections of these documents are being prepared for regulatory approval. Changes made to the REMP since the Unit 2 accident are described in Licensee's Annual Radiological Monitoring Report for 1979. A copy of this report is to be provided to the NRC on April 1, 1980, and a copy will then be placed in Licensee's Discovery Reading Room.

INTERROGATORY NO. 05-007

Does Licensee have installed at Unit 1 or plan to install effluent radiation monitors capable of remaining on-scale during the highest release period which would be associated with a complete core melt accident? If not, explain why not. If so, specify each such monitor, including its location, model and manufacturer, and operating range.

RESPONSE

Licensee has provided extended range effluent monitors as described in the Restart Report Section 2.1.2. These extended ranges are intended to comply with the requirements of NUREG-0578.

INTERROGATORY NO. 09-004

Does Licensee plan to utilize radiation monitoring devices which are capable of transmitting radiation monitoring readings directly to the Unit 1 control room from remote locations off-site? If so, specify the number, model and manufacturer, and locations for such devices. If not, explain why such devices will not provide substantial protection of public health and safety by providing rapid and direct measurement of radiation levels in the environment, measurements which could be utilized in providing information to off-site authorities on which protective action decisions could be made.

RESPONSE

Licensee does not believe that offsite radiation monitoring devices that readout in the Control Room would provide adequate protection of the public.

Licensee's Emergency Plan provides for conservative, anticipatory estimations of potential offsite conditions before offsite monitors would record them. This is essential to an effective, anticipatory Emergency Plan. Further, Licensee will provide mobile teams to monitor and track a moving plume. Fixed-location monitors may not be in the plume and thus may be of little value in real time assessments.

INTERROGATORY NO. 09-005

Does Licensee have or plan to have before restart the Atmospheric Release Advisory Capability System (ARAC)? If not, explain why this system will not provide substantial additional protection of public health and safety, particularly in view of the potential for personnel error in calculating off-site radiation dose rates.

RESPONSE

Licensee does not plan to install the ARAC system prior to restart. Licensee is investigating the upgrading of dose assessment capability for use during an emergency. Presently, Licensee uses a calculation procedure that is very easy to follow and check. Each calculation is double checked by another indi-

vidual. This can be done more rapidly than using a computer system which must first be started up and relevant release information must be fed into it and checked for accuracy by another individual. In any event, dose calculations are confirmed by offsite radiological monitoring teams.

INTERROGATORY NO. 09-006

Has Licensee ever requested that the NRC install ARAC at TMI-1? If so, provide documentation of this request, including NRC response. If not, why not?

RESPONSE

No. See answer to Interrogatory No. 09-005.

INTERROGATORY NO. 11-006

How many hydrogen recombiners of the type Licensee intends to install at Unit 1 would be required to successfully recombine the amount of hydrogen generated during the TMI-2 accident?

RESPONSE

The design basis for hydrogen recombiner capacity Licensee will install and have available at TMI-1 is described in Licensee's Restart Report, Section 2.1.1, and previously submitted Licensee's responses to Sholly's Interrogatory No. 03-005. The system is capable of recombining the amount of hydrogen generated in the TMI-2 accident at the rates specified in the above documents.

INTERROGATORY NO. 11-007

In reference to Licensee's answer to Interrogatory 11-006, what is Licensee's judgment as to any potential impact on containment integrity which might result from the installation of that number of hydrogen recombiners?

RESPONSE

See response to 11-006.

INTERROGATORY NO. 11-008

Has Licensee investigated alternative means of controlling hydrogen gas concentrations in the Unit 1 containment (other than hydrogen recombiners and venting)? If so, specify the methods investigated, who performed the investigations, and the results of these investigations. If not, explain why not.

RESPONSE

As stated in the Restart Report, Section 2.1.1, and NRC Status Report dated January 11, 1980, Section C-8, Licensee's decision to install hydrogen recombiner capacity is voluntary and not required by the NRC. Licensee has not investigated means other than hydrogen recombiner capacity and venting for controlling hydrogen gas in the Unit 1 containment.

INTERROGATORY NO. 13-010

Does Licensee's proposed new computer for Unit 1 have the capability of determining position on fault-trees, and displaying such data to plant operators? If not, is the computer capable of being so modified as to provide this capability?

RESPONSE

The new computer for Unit 1 is believed to have the inherent capability for displaying position on fault-trees, but the Licensee has no plans to pursue such an approach.

INTERROGATORY NO. 13-011

Does the new computer proposed for Unit 1 have the capability of providing CRT display output to several CRT's simultaneously, each displaying different data?

RESPONSE

The new computer at Unit 1 has the capability of providing CRT display outputs to several CRT's simultaneously each displaying different data.

INTERROGATORY NO. 13-012

Does the new computer proposed for Unit 1 have the capability of providing hard copy of graphs of plant operating parameters?

RESPONSE

Yes, but only for 112 analog and 112 digital preselected points. This data is only available for historical reviews.

INTERROGATORY NO. 13-013

Does the new computer proposed for Unit 1 have the capability to provide data to a remote offsite location? If not, why not? Has either the NRC or the Commonwealth of Pennsylvania ever requested that computer display information be transmitted directly to them from either the Unit 1 or 2 control room? If so, provide documentation regarding such requests, including Licensee's responses to such requests.

RESPONSE

The new computer being installed at Unit 1 has the capability to provide data to remote offsite locations.

INTERROGATORY NO. 14-003

List and describe each and every change in personnel at the management or supervisory level, directly affecting the operation of Unit 1, which have been made since the 28th of March 1979. For each new person hired by Licensee, describe his new position, professional qualifications, and experience in the nuclear power field.

RESPONSE

Section 5 of the TMI-1 Restart Report describes the organizational and personnel changes in Licensee's management operations affecting Unit 1 since the TMI-2 accident. Biographical information indicates which of those personnel have joined Licensee since the time of the TMI-2 accident.

INTERROGATORY NO. 14-004

Inasmuch as NRC's I & E Special Review Group has cited quality assurance/quality control as being the "master control system available to management to assure that all management control

systems are operable and effective in terms of providing safety", describe each and every change made to Licensee's QA/QC program at Unit 1 since the Unit 2 accident on March 28, 1979.

RESPONSE

Revision 7 to the Operational Quality Assurance Plan for Three Mile Island Nuclear Station, which Licensee has placed in its Discovery Reading Room, describes the QA/QC program and organizations in existence at the time of the TMI-2 accident. Licensee is currently finalizing changes which will be described in Revision 8 to the Plan. Licensee will place Revision 8 in the Discovery Reading Room when it is completed.

INTERROGATORY NO. 14-005

Describe the mechanisms within Licensee organization which assure that Licensee management reviews work performed by its personnel to verify that its directives and policies are effectively carried out on a timely basis.

RESPONSE

The organizational mechanisms and controls for verifying that Licensee's management directives and policies are effectively carried out are contained in the Nuclear Assurance Program, as described in Section 5.3.2 of the Restart Report.

INTERROGATORY NO. 14-006

Identify and describe any and all new technical capabilities which have been added by Licensee since the Unit 2 accident, specifying under what terms these capabilities are to be provided and within what time frame they are available in the event of a serious accident at Unit 1.

RESPONSE

Sections 4 and 5 of the TMI-1 Restart Report describe the areas in which Licensee has increased its managerial technical

resources and capability in connection with Unit 1 operations. These technical improvements primarily fall in the areas of (1) organizational realignment to provide greater emphasis on technical support (Restart Report at §§ 5.1-5.3); (2) addition of a shift technical advisor (Restart Report at § 5.2); and (3) increased and improved emergency planning to provide timely technical support response in the event of an accident (Restart Report at § 4.5). Insofar as the "time frame" for these increased capabilities, the shift technical advisor will be available in several minutes and the technical support response under Licensee's emergency plan will be available in the time frames described in Table 8 to the emergency plan.

Respectfully submitted,

SHAW, PITTMAN, POTTS & TROWBRIDGE

By: George F. Trowbridge
Robert E. Zahler

Dated: March 31, 1980

ATTACHMENT A

SURFACE WATER

Station Code	Distance (miles)	Azimuth
TM-SW-13S2	0.1	270
9A2	0.5	188
9B1	1.5	178
1C3	2.3	347
8C2	2.8	165
8E1	4.1	160
15F1	8.7	308
7G1	14.4	124
7G2	13.6	128
7G3	14.8	124
9G2	14.7	178
6G3	12.6	122

See attached page for locations

DIRECTIONS TO WATER SAMPLING LOCATIONS

TM-SW-1C3
Swatara Creek

Exit from Rt. 441 in Royalton onto Market Street, (a left turn if going north on Rt. 441 from TMI, a right turn if coming from Middletown). Market Street ends at the creek. The sample is collected from the boat ramp, or if the water level is low, from a boat drawn up on shore or from the shore itself.

When composite sampler is installed on Swatara Creek, proceed as follows;

Take Rt. 441 into Middletown, turn south on Mill Street (a right turn just past railroad underpass if going into town from TMI, a left turn just before the underpass if coming out of town). Follow Mill Street approximately two blocks to Middletown Water Co. (white building on left). The sampler is inside a small white concrete block building on the right just before the bridge over the Swatara.

TM-SW-15F1
Steelton Water Co.

Take Rt. 230 into Steelton. Turn west onto Franklin Street (left at first stop light after flashing light as you proceed north out of Steelton business district, or right at first light as you enter Steelton from Harrisburg. Tall red and white checkered natural gas tank is landmark, it sits alongside Franklin Street and the river). Follow Franklin Street west, it bends south toward Bethlehem Steel Plant. Follow to end. Water plant is on right. Composite sampler is inside lab on the left as you enter the building.

TM-SW-8C2
York Haven Hydro Plant

Take I-83 to Newberrytown exit (Exit 13). Follow Rt. 382 east to York Haven. At stop sign proceed straight rather than following Rt. 382. Go downhill to the railroad tracks. Cross tracks and turn left immediately. Follow sign to Met-Ed York Haven Plant. Composite sampler is inside plant, just outside Control Room on the top floor of the generating area. The sampler is housed in a blue metal cabinet along the outside wall.

TM-SW-8E1
Brunner Island

Follow same directions to York Haven Hydro Plant, except after crossing railroad tracks, proceed across the bridge and continue on the road which follows the creek. Turn into Brunner Island Plant entrance immediately on the left after crossing concrete bridge over the creek cutoff to the river. Proceed to gate, sign in. Drive straight through to the main entranceway of the office building, on the left. Sample is collected in jugs inside water lab (first door on left).

TM-SW-8E1
Brunner Island (cont.)

(If coming from York, take Rt. 181 north to Manchester. Turn right on Rt. 921 at the stop light, then left at High Street. The street becomes Board Road. Follow it approximately 1 1/2 miles until it joins Hartman Run Road at the bottom of a hill. Turn left and follow under a railroad overpass and stay left on the main road. Proceed north along the tracks to the plant entrance.)

TM-SW-9G2
York Water Co.

If coming from Columbia on Rt. 30, proceed to North George Street and turn left onto North George Street. If coming from York Haven or Brunner Island on I-83, exit onto North George Street, if on Rt. 181, it becomes North George Street.

Follow North George Street through town to Country Club Road. (Second light after South George Street becomes two-way) Turn right on Country Club Road, go past York College to first stop light. Turn left onto Grantley Road and proceed up the hill for approximately one-half mile, entrance to Water Company grounds is on the left. It is marked with a white sign. Follow the drive to the plant. Enter main entrance and go upstairs to second floor On the right is the water lab and the sample is taken from a continuously flowing tap.

TM-SW-7G2
Wrightsville Water Co.

Coming from York on Rt. 30, exit at Wrightsville Exit. Turn right and follow road to Rt. 462, turn left onto Rt. 462. Follow 462 through town until you approach bridge. Go straight to bottom of hill instead of veering right with Rt. 462 (if coming from Columbia on Rt. 462, make a hard right at the end of bridge to the bottom of the hill). At the bottom of the hill, turn left onto Front Street. Proceed past factories, the road will narrow about a block past Wilton factory. Turn left on a gravel drive just past a trailer on the left with a mailbox with the name Reidle on it. Follow drive around to left to gate in chain link fence. Key to lock is inserted inside metal collar on backside of right gatepost about a foot above ground. The composite sampler is sitting on metal tank approximately 100 yards back in along the quarry.

TM-SW-7G2
Columbia Water Co.

If coming from TMI, follow Rt. 441 to Columbia. Cross Rt. 462 (first stop light) and turn right on Walnut Street, the first street after crossing Rt. 462. Follow Walnut Street toward the river. After crossing the tracks, turn into the gate on the left at the Water Company. The compositer is inside one of the two small brick buildings closest to the river. There is also a manual composite of finished H_2O, by plant personnel, upstairs in the H_2O lab.

TM-SW-7G2 Columbia Water Co. (cont.)	(If coming from Wrightsville, cross the river on Rt. 462 and turn right at first cross street. Go one block, to Walnut Street, turn right and follow to river).
TM-SW-7G3 Lancaster Water Co.	From the Columbia Water Plant, cross the railroad tracks and turn right on Front Street. Follow Front Street south along the tracks for approximately one mile. Turn left on Plane Street which goes through a large stone railroad overpass. Stay left to the top of the hill. At the stop sign, turn right onto Manor Street, follow Manor Street to 15th Street. Turn right on 15th Street and follow it to the Lancaster Water Plant. If the gate is closed, call 684-5056. We have no compositer here, water is manually composited on the hour by plant personnel. (If coming directly from TMI, on Rt. 441, turn left on Rt. 462 in Columbia. Follow Rt. 462 to 15th Street by ITT Grinnell Plant. Turn right on 15th Street and follow 15th Street to the Lancaster Water Plant).
TM-SW-6G3 Chickies Creek	Where Rt. 441 crosses Chickies Creek, just south of Marietta, a grab sample is taken from the creek.
TM-SW-9B1 York Haven Dam	A grab sample is taken from the York Haven Dam on the south end of TMI. If water is going over the dam, the sample is taken from the boat launch above the dam. The lane back to the dam turns off the main access road on TMI just south of the laydown yards at the south end of the island.
TM-SW-9A2 West Shore of TMI	A grab sample from the river along the shore just west of the lower end of the South Parking Lot. The roots of a tree growing out from the bank provides a platform from which to get samples during high flow.
TM-EW-10S1 Discharge Water	Sample from compositer in Discharge Building, RML-7
TM-Ew-13S2 Intake Water	Sample from Intake Building, left at RML-7, for us to pick up.

AQUATIC SEDIMENT

Station Code	Distance (miles)	Azimuth
TM-AQS- 1A2	0.7	0
7A1	0.3	137
10A1	0.8	202
9B1	1.5	183
10B1	1.1	204
11A1	0.5	225

AQUATIC PLANTS

Station Code	Distance (miles)	Azimuth
TM-AQP-1A1	0.7	1
9A2	0.5	188
9B1	1.5	183

GREEN LEAFY VEGETABLE SAMPLING STATIONS

Location	Azimuth	Description
4B1	11	1.1 miles ENE of site at Alwine's farm, W of Fingrich Rd.
7B3	125	1.5 miles SE of site at Becker's farm on E side of Conewago Ck
14D1	296	3.7 miles WNW of site at Fisher's farm
2G1	10	10.5 miles N of site at Oellig farm near Rt. 39, Hummelstown

FRUITS

Station Code	Distance (miles)	Azimuth
TM-FPF- 5F2	5.1	100
12G2	13.6	240

EFFLUENT WATER

Station Code	Distance (miles)	Azimuth
TM-EW-10S1		

PRECIPITATION

Station Code	Distance (miles)	Azimuth
TM-RW- 5A1	0.4	86
8C1	2.3	159
7F1	9.8	128
15G1	13.3	311

MILK

Location	Azimuth	Description
1B1	11	1.2 miles N of site at Hardison's farm along Rt. 441
4B1	65	1.1 miles ENE of site at Alwine's farm, W of Fingrich Rd.
7B3	125	1.5 miles SE of site at Becker's farm on E side of Conewago Ck.
14D1	296	3.7 miles WNW of site at Fisher's farm
2G1	10	10.5 miles N of site at Oellig farm near Rt. 39, Hummelstown

FISH

Station Code	Distance (miles)	Azimuth
TM-AQF- 9B1	1.5	183
16B1	1.1	337

AIR PARTICULATE AND AIR IODINE SAMPLING STATIONS

Location	Azimuth	Description
1S2	0	0.4 miles N of site at N weather station
5A1	91	0.4 miles E of site on N side of Observation Center
12B1	258	1.6 miles WSW of site adjacent to Fishing Creek
1C1	359	2.6 miles N of site at Middletown substation
8C1	160	2.3 miles SSE of site at Falmouth substation
7F1	128	9.9 miles SE of site at Drager Farm off Engle's Tollgate Rd.
9G1	184	13.0 miles S of site in Met-Ed York load dispatch station
15G1	310	15.0 miles NW of site at West Fairview substation

SITE DESIGNATIONS AND LOCATIONS

FOR

THREE MILE ISLAND NUCLEAR STATION TLDS

TMINS TLD PROGRAM

Location	Height Feet	Distance Miles	Azimuth o	Description	Status
TM-ID-1S2	4	0.4	0	North weather station	E, Q
TM-ID-2S2	3½	0.7	25	North bridge	E
TM-ID-4S2	3½	0.3	71	Top of dike	Q
TM-ID-5S2	4	0.2	95	Top of dike	Q
TM-ID-8S1	6	0.4	167	Pole #33-ME-T-60	E
TM-ID-9S2	4½	0.8	184	South TMI	E
TM-ID-10S2	6	0.4	200	Pole #ME-33-T-28	E
TM-ID-11S1	4	0.1	221	Mechanical draft towers	Q
TM-ID-13S1	7	0.4	270	Due west on Shelley's Island	
TM-ID-14S2	3½	0.4	293	Shelley's Island	
TM-ID-15S1	6½	0.5	317	Shelley's Island	
TM-ID-16S1	4	0.2	340	North boat dock	E, Q
TM-ID-3A1	3	0.6	35	Route 441	E, Q
TM-ID-4A1	7	0.5	65	Laurel Road	E
TM-ID-5A1	3	0.4	86	Observation Center	E, Q
TM-ID-6A1	6	0.5	117	Route 441 on light pole	E
TM-ID-7A3	3	0.6	143	Route 441	E, Q

Status: E = ETS location, Q = quality control location, N = new location

TMINS TLD PROGRAM

Location	Height Feet	Distance Miles	Azimuth o	Description	Status
TM-ID-11A2	6	0.5	221	Beech Island	
TM-ID-16A1	4	0.4	332	Kohr Island	
TM-ID-10B1	2½	1.1	204	Shelley's Island	
TM-ID-11B1	6	1.9	227	Route 262 Pole #ME2890, BK722-306	E
TM-ID-12B1	4	1.3	253	Goldsboro Air Station	E
TM-ID-13B1	7	1.2	265	Goldsboro Marina on light pole	E, Q
TM-ID-14B1	7	1.4	290	Still House Road on tree	E
TM-ID-15B1	6	1.8	304	Still House Road Pole #ME2397NB, 233L-35L	E
TM-ID-1C1	4	2.6	0	Middletown substation	E
TM-ID-8C1	4	2.3	159	Falmouth-Collins substation	Q
TM-ID-1E4	6	4.3	3	Vine Street exit from 283, Pole #ME2481-LO	E
TM-ID-2E1	6	4.8	18	School House Lane & Miller Road, Pole #ME782-LO	E
TM-ID-3E3	6	4.5	46	Kennedy Lane, Pole #74-ME-97	E
TM-ID-4E5	4	4.9	71	Beagle Road	E
TM-ID-5E1	6	4.6	85	N. Market St. (Rt. 230) & Zaeger Road, Pole #PP&L 31084, S30386	E
TM-ID-6E6	6	4.6	115	Amosite Road, Pole #PP&L 31016, S29272	E
TM-ID-7E6	6	4.8	131	Bainbridge Road (Route 241) & Risser Road, Pole #ME825	E

Status: E = ETS location, Q = quality control location, N = new location

TMINS TLD PROGRAM

Location	Height Feet	Distance Miles	Azimuth o	Description	Status
TM-1D-8E2	6½	4.1	161	Guard shack at Brunner Island	E
TM-1D-9E1	6	4.9	182	Canal Road, Conewago Heights, Pole #ME497EM, BK244122	E
TM-1D-10E3	6	5.0	200	Conewago Creek Road, Strinestown, Pole #ME924CE, BANK 231-139	E
TM-1D-11E3	6	4.1	228	Stevens & Wilson Roads, Pole #ME2521NB	E
TM-1D-12E4	6	4.3	245	Lewisberry & Roxberry Roads, Newberrytown, Pole #ME725NB	E
TM-1D-13E1	6	4.9	268	Yocumtown Road & Old Trail, Pole #ME1050NB	E
TM-1D-14E4	6	4.9	281	Route 262 & Beinhower Road, Pole #ME135FA	E
TM-1D-15E1	6	5.0	313	Lumber Street, Highspire, Pole #PP&L 26827, S31990	E
TM-1D-2F1	6	9.0	15	West Areba Avenue & Mill Street, Hershey, Pole #PP&L 30383, S34608	E
TM-1D-5F1	6	6.8	89	Hummelstown St. Elizabethtown, Pole #PP&L 32190, S30207	E
TM-1D-7F1	4	9.0	132	Drager Farm	Q
TM-1D-3G1	4	19.7	47	Cumberland Street (Route 422) at 16th Street substation, Lebanon	
TM-1D-4G1	6	10.0	68	Route 241	E, Q
TM-1D-6G2	6	21.1	113	Steel Way & Loop Road, Lancaster, Pole #PP&L 21274, 39808, S36930	

Status: E = ETS, Q = quality location, N = new location

TMINS TLD PROGRAM

Location	Height Feet	Distance Miles	Azimuth o	Description	Status
TM-ID-7G1	5½	15.0	124	Columbia	E
TM-ID-9G1	4	13.0	183	North York substation	E
TM-ID-14G1	6	12.2	300	Ereford Road, Camp Hill, Pole #PP&L (ATTCH)23347, S33615	
TM-ID-15G1	3½	15.0	308	West Fairview	E, Q
TM-ID-15G2	6	11.5	307	Penn & Forster Streets, Harrisburg, Pole #PP&L 24035, S34066	
TM-ID-16G1	6	11.2	330	Route 22 & Colonial Road, Colonial Park, Pole #PP&L 25874, S35291	E
TM-ID-16E1	6	4.9	339	Spring Garden Drive & Route 441, Pole #PP&L 27716, S32497	E
TM-ID-3F1	6	7.16	48	(Conewago School) Met-Ed 1039 CW 764/185 on School House Rd. ~1/8 mi. West of Schanks Church	N
TI-ID-4F1	6½	8.53	72	(Bellaire) PP&L 32920 S31503 ¼ mile East of Bellaire cross-roads on Mt. Gretna Road	N
TI-ID-6F1	6	9.36	113	(Donegal Springs) PP&L 33225 South 28173 1/8 mile West of Colebrook Road & Donegal Springs Road intersection on Donegal Springs Road	N
TI-ID-8F1	6½	13.15	157	(Wilshire Hills) ME 693SE Southwest corner of Orchard Road and Stonewood Road, Wilshire Hills	N
TI-ID-9F1	6½	6.48	177	(Manchester)C53-LIM ME 240 MT on Maple Street in Manchester, across from High Street at corner of Cemetery Drive	N
TI-ID-10F1	6½	7.39	196	(Zion's View) ME 1459 CE 5E corner of Coppenhaffer Road & Rt. 295 Intersection	N
TI-ID-10G1	6½	12.69	204	(Weiglestown) EL&P (old Met-Ed) 6632 opposite corner of Alta Vista Road & Fox Run Road ~100 yds. East of Rt. 74	N

Status: E = ETS location, Q = quality control location, N = new location

TMINS TLD PROGRAM

Location	Height Feet	Distance Miles	Azimuth o	Description	Status
TI-ID-11F1	6½	7.96	225	(Andersontown) ME611 DO 2017/100 on Andersontown Road ~1/8 mile on Southwest of Orchard	N
TI-ID-11G1	6½	11.71	225	(Mt. Royal) ME 3053 DO Bank 321-232 West side of Rt. 74 at Mt. Royal Full Gospel Church	N
TI-ID-12F1	6½	8.56	242	(Maytown) 16E/78/END DJ/63 on Alpine Road ~150 yards South of Route 177 at Maytown	N
TI-ID-12G2	6½	11.94	236	(Rossville) ME 574 WR Bank 474-100 West side of Route 74 ~¼ mile from Route 177 crossroads by Earth Craft Barn	N
TI-ID-13F1	6½	7.[illegible]	260	(Lewisberry) PP&L 24599 South 29513 West side of Route 382 ~½ mile North of Lewisberry	N
TI-ID-13G2	6½	10.40	274	(Lisburn) PP&L 23149 South 30533 Northwest corner of Lisburn Road and Main Street of Lisburn (Route 114)	N
TI-ID-13G1	6½	13.19	276	(Mt. Allen) Attach 21728 South 30984 corner of Orchard Lane & Hertzler Road due South of water tower	N
TI-ID-14F1	6½	7.96	292	(Reeser's Summit) Attach 24757 South 31644 on Evergreen Road by Fairview Brethren in Christ Church Resser's Summit	N
TI-ID-15F1	6½	8.49	308	(Steelton) PP&L 21570 S32926 across from parking lot of Steelton Water Company	N
TI-ID-16F1	7	8.07	340	(Rutherford Heights) Attach 27280 S34073 on Derry Street at 66th Street Rutherford Heights, Northeast corner	N

Status: E = ETS location, Q = quality control location, N = new location