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FURNISHING RESPONSE TO NRC TELEPHONE DISCUSSION, CONSISTING OF INFO  
CONCERNING APPLICANT'S TECH SPEC CHANGE REQUEST NO 63A SUBMITTED 02/02/78,  
REQUESTING DELETION OF VARIOUS MONITORING PROGRAMS.

PLANT NAME: THREE MILE ISLAND - UNIT 1

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METROPOLITAN EDISON COMPANY SUBSIDIARY OF GENERAL PUBLIC UTILITIES CORPORATION

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TELEPHONE 215 - 929-3601

August 23, 1978  
GQL 1070

Mr. R. W. Reid, Chief  
Operating Reactors Branch No. 4  
U.S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289

This letter is in response to a telephone discussion between Mr. Fliegel of the NRC and Mr. Roth of Met-Ed concerning our Technical Specification Change Request No. 63A submitted February 2, 1978 (GQL 0303), requesting deletion of various monitoring programs. Mr. Fliegel was specifically questioning our compliance with Section 4.3.1, Thermal Plume Mapping, which states:

"Sampling studies shall be made during the first year of operation to identify and characterize the discharge plume with respect to temperature. The data shall be collected from a sufficient number of sampling points located to provide a patterned coverage of the plume. The staff will review the results at the completion of the one-year studies to determine if sufficient review and operating condition combinations have been examined and will determine if the studies need to be extended."

"The studies shall be conducted during conditions of normal and low flows and extreme temperature conditions to provide the necessary data to validate the analytical plume model. Wind speed and direction measured at the north weather station (I-A-I on Figure 3), air and water temperature and current velocity should be taken concurrently with plume measurements. During the first planned winter cooldown in which an effluent  $\Delta T \geq 10^{\circ}\text{F}$  is expected, and when weather and icing conditions permit monitoring to take place (a "qualifying" cooldown), the  $5^{\circ}\text{F}$   $\Delta T$  isotherm shall be located at its widest point to determine size of the zone of passage. If the effluent  $\Delta T$  fails to reach  $10^{\circ}\text{F}$  during that cooldown, the  $5^{\circ}\text{F}$   $\Delta T$  isotherm shall be located again during succeeding "qualifying" cooldowns until the isotherm has been located five times or is measured during a period in which the effluent  $\Delta T \geq 10^{\circ}\text{F}$ ."

Following is a discussion of TMI-1's operations, with respect to Section 4.3.1, since 1974:

Extensive thermal plume mappings have been conducted at TMI since 1974. These mappings are performed by Ichthyological Associates, Inc. as part of the continuing TMI Ecological Study. A total of 130 mappings have been conducted

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since 1974, during many conceivable variations of plant operation and ambient conditions. The following discussion examines these mappings in terms of individual Tech. Spec. requirements.

1. "Sampling studies shall be made during the first year of operation to identify and characterize the discharge plume with respect to temperature."

The TMI thermal plume was mapped semi-monthly starting in May, 1974, with additional mappings performed during high and low ambient river temperature conditions and during periods of power increases or decreases of the station. A total of 39 thermal plume mappings were conducted in the first year following initial criticality in June 1974.

2. "The data shall be collected from a sufficient number of sampling points located to provide a patterned coverage of the plume."

Temperature measurements in the Susquehanna River near TMI were taken routinely at transects located at the Unit 1 Intake, 25 meters upstream of the discharge, directly out from the discharge and downstream of the discharge at 25, 50, 100, 200, 400 and 1900 meters.

Measurements were taken off shore at distances of 5, 20 and 40 meters and at depths of zero (surface) and .5 meter increments until the river bottom was reached. Individual temperature readings were taken at approximately 136 sample points for each mapping. Occasionally, transects, at 200, 400 and 1900 meters were eliminated if temperature readings showed that an ambient, steady-state condition had been reached and no thermal plume was present.

3. "The staff will review the results at the completion of the one-year studies to determine if sufficient review and operating condition combinations have been examined and will determine if the studies need to be extended."

The NRC sent no correspondence to Met-Ed which indicated that the studies needed to be extended. However, Met-Ed continued the program in good faith for three additional years.

4. "The studies shall be conducted during conditions of normal and low flows and extreme temperature conditions."

Routine thermal plume mappings were conducted twice monthly during the normal conditions which existed at that time. River flow during the first year of routine mappings ranged from 6400 cfs on August 21, 1974 to 111,500 cfs on May 9, 1975. Extreme river flows during the four years of mappings were 6400 cfs on August 21, 1974 and 240,000 cfs on February 20, 1976. These extremes represent the normal range of flows expected in the Susquehanna between the extremes of the summer low flow and spring flood. Extensive sampling was conducted during the summer low flow of 1974, with 18 mappings conducted during June, July and August when river flows ranged from 6400 cfs to 46,900 cfs. Additional sampling was also conducted during the summer low flow of August, 1975 (4 mappings) during which river flows ranged from 8100 cfs to 8300 cfs.

Ambient River temperatures during the first year of mappings ranged from a low of  $0.7^{\circ}\text{C}$  on February 4, 1975 to a high of  $27.4^{\circ}\text{C}$  on July 19, 1974. Ambient river temperatures during the four years of mappings ranged from a low of  $0.7^{\circ}\text{C}$  on February 4, 1975 to a high of  $27.8^{\circ}\text{C}$  on August 14, 1975. Extensive sampling was conducted during June-August 1974 when ambient river temperature ranged from  $19.9^{\circ}\text{C}$  to  $27.4^{\circ}\text{C}$ . Normal semi-monthly sampling was conducted through the periods of low ambient river temperatures during the winters of 1974-1975 and 1975-1976. Winter sampling was subsequently discontinued due to the extreme danger to sampling crews caused by the low water temperatures and ice flows.

5. "The studies shall be conducted...to provide the necessary data to validate the analytical plume model."

Thermal plume data has been compared annually to the plume model described in the FSAR. The model could not be validated since actual conditions during mappings have never approximated the extreme conditions used in the model (10,000 cfs river flow 113 cfs discharge flow and  $12^{\circ}\text{F}$   $\Delta T$ ). This can be expected, since the model assumed "worst case" conditions.

Other models have been studied for their ability to model the TMI thermal plume. No model is believed to be satisfactory, due to the small temperature rise and the low ratio of outfall to ambient flow.

6. "Wind speed and direction measured at the north weather station (I-A-I on Figure 3), air and water temperature and current velocity should be taken concurrently with plume measurements."

Wind speed, wind direction, air temperature and ambient water temperature are taken and included with the report of the thermal plume mapping.

7. "During the first planned winter cooldown in which an effluent  $\Delta T \geq 10^{\circ}\text{F}$  is expected and when weather and icing conditions permit monitoring to take place (a "qualifying" cooldown), the  $5^{\circ}\text{C}$   $\Delta T$  isotherm shall be located at the widest point to determine size of the zone of passage. If the effluent  $\Delta T$  fails to reach  $10^{\circ}\text{F}$  during that cooldown, the  $5^{\circ}\text{F}$   $\Delta T$  isotherm shall be located again during succeeding "qualifying" cooldowns until the isotherm has been located five times or is measured during a period in which the effluent  $\Delta T \geq 10^{\circ}\text{F}$ ."

The only planned winter cooldown which has occurred in over 4 years of monitoring was in February 1976. A total of 12 mappings was taken in 4 days. However, the maximum effluent  $\Delta T$  was  $4.6^{\circ}\text{C}$  ( $8.3^{\circ}\text{F}$ ); therefore, this was not a "qualifying" cooldown. The thermal plume during this cooldown was confined to the area of the discharge and had a width less than 20 meters from shore and length less than 25 meters downstream from the discharge.

During the cooldown in March 1977, 18 thermal plume mappings were conducted. This was also not a "qualifying" cooldown since the maximum effluent  $\Delta T$  was  $0.5^{\circ}\text{C}$  ( $0.9^{\circ}\text{F}$ ).

Met-Ed does not anticipate having a planned winter cooldown in the foreseeable future. Any future cooldown is unlikely to be a "qualifying" cooldown, since the effluent  $\Delta T$  should be significantly less than  $10^{\circ}\text{F}$ .

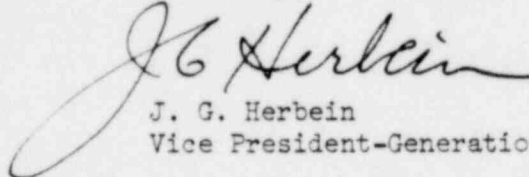


August 23, 1978  
GQL 1070CONCLUSION

The thermal plume mapping program at TMI has been conducted in a manner consistent with requirements of the TMI-1 ETS Section 4.3.1. Compliance with certain items of the specification have been impossible due to the lack of a significant thermal plume. Although 130 mappings have been conducted since 1974, ability to validate the thermal plume model of the FES and identification of thermal plume boundaries during winter cooldown have been impossible due to the minimal thermal plume created by TMI. Additional mappings would be of no assistance in evaluating the thermal impact of TMI, since the station effluent  $\Delta T$  has decreased in the past four years. In 1977, the maximum  $\Delta T$  during a thermal plume mapping was  $1.0^{\circ}\text{C}$  ( $1.8^{\circ}\text{F}$ ). Furthermore, it would not be prudent to create a thermal plume which would not normally exist in order to evaluate its impact on the environment. The present NPDES permit limitations are adequate to ensure minimal environmental impact due to TMI thermal discharges.

The thermal plume mapping program at TMI was examined by the Atomic Safety and Licensing Board during hearings on the license for Three Mile Island Unit 2. The testimony presented to the Board is written, "On those occasions when the (station cooling water)  $\Delta T$  exceeds  $5^{\circ}\text{F}$ , based on the three years of thermal plume studies at TMI, we expect the area of the river encompassed by the  $5^{\circ}\text{F}$ -isopleth-defined plume to be less than 50 meters in length and 20 meters in width approximately 95% of the time. The greatest  $5^{\circ}\text{F}$  plume we have ever observed at TMI-1 extended 200 meters in length and 25 meters in width..." "Met-Ed shall continue to observe and map the thermal discharges associated with TMINS operation and will meet requirements of discharge limitations and monitoring requirements of EPA, DER and NRC for Unit 2."

Sincerely,

J. G. Herbein  
Vice President-Generation

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