

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

NRC STAFF RESPONSES TO INTERROGATORIES  
SUBMITTED BY MARVIN I. LEWIS

Pursuant to 10 C.F.R. §2.720 and 10 C.F.R. §2.714, the NRC Staff has responded to Marvin I. Lewis' Interrogatories to the Nuclear Regulatory Commission dated January 6, 1980. Each Interrogatory not objected to is restated and a response provided. Following the responses is an unsigned affidavit identifying the individuals who prepared the responses. Signed and notarized affidavits will be provided in the near future.

INTERROGATORY No. 1

What actions in the Long term and Short term actions are specifically related to filters? Vent Header?

RESPONSE

The long term and short term recommendations made in NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations," do not specifically relate to plant ventilation filters. For the gaseous radwaste vent header however, the short term recommendation (Section 2.1.6a, Integrity of Systems Outside Containment Likely to Contain Radioactive Materials) requires that the licensee immediately establish and implement a program to reduce leakage from systems outside containment that would or could contain highly radioactive fluids (gaseous radwaste vent header is included because gas is considered as fluid) during a serious transient or

1937 049

G 8002070 178

accident to as-low-as-practical levels. The recommendation further requires that the licensee provide a summary description of his program to the NRC for review and approval.

INTERROGATORY No. 2

How are the answers in NRC #1 specifically going to help the filters and vent header work correctly and adequately in a repeat of the March 28 accident at TMI #1?

RESPONSE

During the accident at TMI-2, the reactor coolant drain tank, in accordance with the design of the system, vented highly radioactive gases to the waste gas system vent header which subsequently leaked into the TMI-2 auxiliary building. The leakage is believed to have originated from the waste gas compressors and also from valves in the waste gas vent header. It is also suspected that the makeup tank vent valve was leaking directly into the TMI-2 auxiliary building at the time of the accident.

The lesson learned in this case was that more positive control and knowledge of the leakage rates of the system is needed to provide the operating staff with information on operability of usable equipment to restrict or control the release of radioactive materials to the environment.

The solution recommended in NUREG-0578 is to make every effort to eliminate or reduce the leakage from the systems, perform periodic tests to assure that the leakage from these systems are maintained as low as practical, and provide the plant staff with current knowledge of the system leakage rates.

1937 050

INTERROGATORY No. 3

There is a large new filter on the auxiliary building at TMI #2. In a repeat of the TMI #2 accident at TMI #1, would such a new filter be required on TMI #1?

RESPONSE

In a repeat of the TMI-2 accident at TMI-1, a new supplementary auxiliary building ventilation filtration system installed on the roof of the TMI-2 auxiliary building subsequent to the TMI-2 accident will not be required at TMI-1.

INTERROGATORY No. 4

If the answer to NRC #3 is yes, will such a filter of similar design of application be placed on TMI #1 before restart?

RESPONSE

The answer to interrogatory No. 3 is no and therefore, this interrogatory is not applicable.

INTERROGATORY No. 5

If the answer to NRC is no, explain why such a new filter will not be needed in a repeat of the TMI #2 accident at TMI #1.

RESPONSE

Subsequent to the TMI-2 accident, a new supplementary auxiliary building filtration system was installed on the TMI-2 auxiliary building vent exhaust. This was done to provide additional capacity for removing airborne radioactive iodines. The originally installed activated carbon adsorbers were found to be less efficient than design rating for removal of radioiodine from exhaust air during and after the accident. During the original testing

1937 051

of the TMI-2 auxiliary building filtration system prior to the accident (tests were performed during February 1978), the licensee experienced leakage through the bypass damper in the bypass line around the filters resulting in the pre-operational tests of the filtration system being unacceptable. After the leaking damper was temporarily sealed, the result of retesting of activated carbon adsorbers (March, 1978) exceeded the requirements specified for decontamination efficiencies in Regulatory Guide 1.140, "Design, Testing, and Maintenance Criteria For Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light Water-Cooled Nuclear Power Plants". However, no subsequent decontamination efficiency tests were performed between the time the bypass line was semi-permanently sealed on April 1978 and the time of the accident in March 1979. Since the TMI-2 auxiliary building filtration system was not an engineered safety-feature filtration system, there were no technical specification requirements to conduct retesting. The activated carbon adsorber material which had been installed to remove airborne radioactive iodines apparently became degraded losing part of its decontamination efficiencies at the time of the accident after being in service continuously for almost one year.

1937 052  
The TMI-1 auxiliary and fuel handling building filtration system is an engineered-safety feature filtration system to mitigate the consequences of postulated accidents by removing from building atmosphere radioactive material that may be released in the accident and therefore, the filtration system design is in accordance with Regulatory Guide 1.52, "Design, Testing, and Maintenance Criteria for Post Accident Engineered-Safety-Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants". Regulatory Guide 1.52 requires, among other things, testing of activated carbon adsorbers for decontamination efficiencies for

every 720 hours of system operation. In addition, the TMI-1 auxiliary building filtration system is not designed with bypass and bypass damper which caused leakage in the TMI-2 system.

We believe therefore, in a repeat of the TMI-2 accident at TMI-1, a new supplementary filtration system will not be required at TMI-1 since degrading activated carbon adsorbers would be identified and replaced periodically as required.

INTERROGATORY No. 6

Krypton-85 seems to be leaking unexpectedly according to Bob Arnold, Met-Ed. Will any catchments or filters be placed on TMI #1 in order to reduce the leakage of Kr 85 after TMI #1 has a similar accident to TMI #2. Will this be done before restart? After another accident? When?

RESPONSE

The gaseous release of about 1 uci/sec (Kr-85) to the environment due to this leakage pathway has been less than a thousandth of the TMI-2 technical specification limit. Consequently, the resulting annual external dose to any individual in unrestricted area would be less than a thousandth of limit specified in Appendix I to 10 CFR 50 limits. We believe therefore, that no provisions for removing Kr-85 (gas compression, charcoal adsorption, and cryogenic process) from such a minute leakage pathway are required. No filters are known to have the capability to remove noble gases (Kr-85) from gas stream at the present time.

INTERROGATORY No. 7

Where are the cracks which are allowing the release of Krypton 85 at TMI #2? Have these areas been inspected and repaired at TMI #1?

RESPONSE

The leakage path is believed to be through steam valve packing in the main steam line inside containment. The steam valves will be visually inspected for leakage at TMI-1 prior to restart.

INTERROGATORY No. 8

List the isotopes which got out, when, how much (vol. and curies) by date and hour if possible. If in the references, merely give page numbers.

RESPONSE

We have enclosed an Executive Summary of TMI-1 and TMI-2 radioactive liquid and gaseous releases as a result of the TMI-2 accident on March 28, 1979 continuing throughout October, 1979. The summary was prepared for the licensee by his consultant, Porter Gertz Consultants, Inc. of Ardmore, Pennsylvania.

INTERROGATORY No. 9

Using Table S-3, compare the allowables with the actual releases. Was the utility in violation? Is this violation specified in NUREG-0600 or Lessons Learned? Page Number?

RESPONSE

The Table, S-3, "Summary of Environmental Considerations for Uranium Fuel Cycle," in 10 CFR 51.20 has values of 400,000 Ci of Kr-85 and 0.83 Ci of I-131 normalized to model LWR annual fuel requirement or reference reactor

year. These values set forth in Table S-3 are for use in evaluating the contribution of environmental effects from uranium fuel cycle excluding reactor operation. The executive summary of radioactive liquid and gaseous releases enclosed in response to Interrogatory No. 8 indicates a release of approximately 10 million curies of noble gases (xenons and kryptons) and 14.7 curies of iodine-131 through October, 1979. We do not have a separate release data for Kr 85 alone.

The licensee was in violation of 10 CFR 20.106, "Radioactivity in Effluents to Unrestricted Areas," and the TMI-2 Technical Specifications. This violation was specified in Appendix II-1 to NUREG-0600 as a potential item of noncompliance (page II-1 6, item G). The NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short Term Recommendations," does not specify this violation because it was intended to make recommendations in the areas of design and analysis and plant operations to provide additional protection for public health and safety and was not intended for investigation of the accident specifying the licensee's potential violations.

1937 055

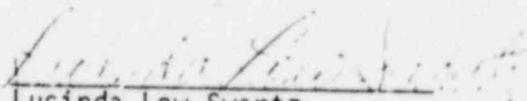
INTERROGATORY No. 10

Contact suspended licensee and state if you agree or disagree with his answers to Lewis Interrogatories.

RESPONSE

The NRC Staff objects to this Interrogatory as being burdensome and improper.

Respectfully submitted,

  
\_\_\_\_\_  
Lucinda Low Swartz  
Counsel for NRC Staff

Dated at Bethesda, Maryland  
this 28th day of January 1980.

1937 056

The answers to Marvin I. Lewis' Interrogatories 1-9 were prepared by us.  
We certify that they are true and correct to the best of our knowledge.

---

Jay Y. Lee  
Senior Nuclear Engineer  
NRC/TMI Technical Support Staff  
ONRR/NRC

---

John T. Collins  
Deputy Director  
NRC/TMI Technical Support Staff  
ONRR/NRC

Sworn and subscribed before me,  
a Notary Public in and for the  
County of Dauphin, Commonwealth  
of Pennsylvania, this \_\_\_\_\_ day  
of January 1980.

---

My Commission expires \_\_\_\_\_

1937 057

## EXECUTIVE SUMMARY

## THREE MILE ISLAND UNITS I and II LIQUID and GASEOUS RELEASES

1937 058

DISCHARGE PATHWAYS	1st	Incident				2nd
	Quarter	Period	4/1/79 to	5/1/79 to	6/1/79 to	Quarter
	1/1/79 to	3/28/79 to	4/1/79 to	5/1/79 to	6/1/79 to	4/1/79 to
	3/31/79	3/31/79	4/30/79	5/31/79	6/30/79	5/30/79
<b>I. Liquid Released:</b>						
a) Discharge less Tritium:						
1) Concentration (uCi/cc)	1.29E-8 (a)	7.44E-8 (a)	1.75E-7 (a)	2.89E-6 (a)	2.84E-8 (a)	6.63E-8 (a)
2) Total Activity (Ci)	0.277E0 (b)	1.00E-1 (b)	1.62E0 (b)	2.21E-1 (b)	1.62E-1 (b)	2.03E0 (b)
b) Iodine-131 Released:						
1) Concentration (pCi/cc)	4.97E-9 (a)	7.16E-8 (a)	1.70E-8 (a)	2.25E-9 (a)	5.60E-10 (a)	7.57E-9 (a)
2) Total Activity (Ci)	0.107E0	9.62E-2	1.57E-1	1.72E-2	3.70E-3	1.78E-1
c) Tritium Released:						
1) Concentration (uCi/cc)	4.65E-6 (a)	5.13E-7 (a)	6.45E-7 (a)	7.05E-7 (a)	4.60E-7 (a)	6.77E-7 (a)
2) Total Activity (Ci)	104.1E0	0.69E0	7.80E0	5.16E0	3.04E0	1.55E1
<b>II. Airborne Iodine Released:</b>						
a) Quarterly Release Rate (uCi/sec)	5.5E-1	5.8E-1	1.20E0	9.89E-3	2.12E-5	1.22E0
b) Total Iodine-131 Released (Ci)	4.57E0	4.57E0	9.45E0	7.8E-2	1.67E-4	9.6E0
<b>III. Noble Gases Released:</b>						
a) Quarterly Release Rate (Ci/sec)	1.12E0	1.12E0	1.41E-1	1.51E-4	9.5E-5	1.41E-1
b) Total Noble Gases Released (Ci)	5.83E6	8.83E6	1.11E6	1.42E3	7.50E2	1.11E6

## FOOTNOTES:

- a) Concentrations are based upon actual MDCT flows. These are concentrations in the effluent averaged over the period.
- b) This data includes Iodine-131 released to the Susquehanna River as a result of the TMI Unit II accident on March 28, 1979.

## EXECUTIVE SUMMARY

## THREE MILE ISLAND UNITS I and II LIQUID and GASEOUS RELEASES

DISCHARGE PATHWAYS	7/1/79 to	8/1/79 to	9/1/79 to	3rd Quarter
	7/31/79	8/31/79	9/30/79	7/1/79 to 9/30/79
<b>I. Liquid Released:</b>				
a) Discharge less Tritium:				
1) Concentration ( $\mu\text{Ci}/\text{cc}$ )	1.12E-8 (a)	2.66E-9 (a)	2.33E-9 (a)	5.18E-9 (a)
2) Total Activity (Ci)	7.85E-2 (b)	1.89E-2	1.76E-2	1.15E-1
b) Iodine-131 Released:				
1) Concentration ( $\mu\text{Ci}/\text{cc}$ )	4.57E-10 (a)	9.10E-11 (a)	8.52E-11 (a)	2.97E-10 (a)
2) Total Activity (Ci)	3.20E-5	6.46E-4	6.59E-4	4.51E-3
c) Tritium Released:				
1) Concentration ( $\mu\text{Ci}/\text{cc}$ )	7.20E-7 (a)	3.20E-7 (a)	3.54E-7 (a)	4.53E-7 (a)
2) Total Activity (Ci)	5.04E0	2.27E0	2.55E0	9.86E0
<b>II. Airborne Iodine Released:</b>				
a) Quarterly Release Rate ( $\mu\text{Ci}/\text{sec}$ )	1.58E-6	<MDA	<MDA	1.58E-6
b) Total Iodine-131 Release (Ci)	1.24E-5	<MDA	<MDA	1.24E-5
<b>III. Noble Gases Released:</b>				
a) Quarterly Release Rate (Ci/sec)	1.27E-5	1.14E-5	8.68E-6	3.30E-5
b) Total Noble Gases Released (Ci)	100	90	70	260

## FOOTNOTES:

- a) Concentrations are based upon actual MDCI flows. These are concentrations in the effluent averaged over the period.
- b) This data includes Iodine-131 released to the Susquehanna River as a result of the TMI Unit II accident on March 28, 1979.

1937 059

## EXECUTIVE SUMMARY

## THREE MILE ISLAND UNITS I and II LIQUID and GASEOUS RELEASES

DISCHARGE PATHWAYS	10/1/79 to	11/1/79 to	12/1/79 to	4th Quarter
	10/31/79	11/30/79	12/31/79	10/1/79 to 12/31/79

## I. Liquid Released:

a) Discharge Less Tritium				
1) Concentration (Ci/cc)		1.25E-9		
2) Total Activity (Ci)		9.29E-5		
b) Iodine-131 Released:				
1) Concentration (Ci/cc)		4.89E-11		
2) Total Activity (Ci)		3.62E-4		
c) Tritium Released:				
1) Concentration (Ci/cc)		7.61E-7		
2) Total Activity (Ci)		5.64E3		
d) MDCT Flow For Month (cc)		7.41E-12		

## II. Airborne Iodine Released:

a) Quarterly Release Rate (Ci/sec)	<MDA
b) Total Iodine-131 released (Ci)	<MDA

## III. Noble Gases Released:

a) Quarterly Release Rate (Ci/sec)	9.51E-6
b) Total Noble Gases released (Ci)	75

## FOOTNOTES:

a) Concentrations are based upon actual MDCT flows. These are concentrations in the effluent averaged over the period.

1937-060

POOR ORIGINAL

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )

METROPOLITAN EDISON COMPANY, ET AL. )

(Three Mile Island Nuclear Station, )  
Unit 1) )

) Docket No. 50-289  
)  
)  
)  
)

CERTIFICATE OF SERVICE

I hereby certify that copies of NRC STAFF RESPONSES TO INTERROGATORIES SUBMITTED BY MARVIN I. LEWIS in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class, or, as indicated by an asterisk, through deposit in the Nuclear Regulatory Commission's internal mail system, this 28th day of January 1980.

Ivan W. Smith, Esq.\*  
Atomic Safety and Licensing Board  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dr. Walter H. Jordan  
881 W. Outer Drive  
Oak Ridge, TN 37830

Dr. Linda W. Little  
5000 Hermitage Drive  
Raleigh, NC 27612

George F. Trowbridge, Esq.  
Shaw, Pittman, Potts & Trowbridge  
1800 M Street, N.W.  
Washington, DC 20006

Karin W. Carter, Esq.  
505 Executive House  
P.O. Box 2357  
Harrisburg, PA 17120

Honorable Mark Cohen  
512 E-3 Main Capital Building  
Harrisburg, PA 17120

Walter W. Cohen, Consumer Advocate  
Department of Justice  
Strawberry Square, 14th Floor  
Harrisburg, PA 17127

Mr. Steven C. Sholly  
304 South Market Street  
Mechanicsburg, PA 17055

Mr. Thomas Gerusky  
Bureau of Radiation Protection  
Department of Environmental  
Resources  
P.O. Box 2063  
Harrisburg, PA 17120

Mr. Marvin I. Lewis  
6504 Bradford Terrace  
Philadelphia, PA 19149

Metropolitan Edison Company  
ATTN: J.G. Herbein, Vice  
President  
P.O. Box 542  
Reading, PA 19603

Ms. Jane Lee  
R.D. #3, Box 3521  
Etters, PA 17319

1937 061

Holly S. Keck  
Anti-Nuclear Group Representing  
York  
245 W. Philadelphia Street  
York, PA 17404

John Levin, Esq.  
PA Public Utilities Commission  
Box 3265  
Harrisburg, PA 17120

Jordan D. Cunningham, Esq.  
Fox, Farr and Cunningham  
2320 North 2nd Street  
Harrisburg, PA 17110

Theodore A. Adler, Esq.  
Widoff, Reager, Selkowitz & Adler  
P. O. Box 1547  
Harrisburg, PA 17105

Ms. Ellyn R. Weiss  
Sheldon, Harmon, Roisman & Weiss  
1725 I Street, N.W.  
Suite 506  
Washington, DC 20006

Atomic Safety and Licensing Board  
Panel\*  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Atomic Safety and Licensing Appeal  
Panel (5)\*  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Docketing and Service Section (7)\*  
Office of the Secretary  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Robert Q. Pollard  
Chesapeake Energy Alliance  
609 Montpelier Street  
Baltimore, MD 21218

Chauncey Kepford  
Judith H. Johnsrud  
Environmental Coalition on  
Nuclear Power  
433 Orlando Avenue  
State College, PA 16801

Ms. Frieda Berryhill, Chairman  
Coalition for Nuclear Power Plant  
Postponement  
2610 Grendon Drive  
Wilmington, DE 19808

Ms. Karen Sheldon  
Sheldon, Harmon, Roisman & Weiss  
1725 I Street, N.W.  
Suite 506  
Washington, DC 20006

Ms. Marjorie M. Aamodt  
R.D. #5  
Coatesville, PA 19320

*Lucinda Low Swartz*  
Lucinda Low Swartz  
Counsel for NRC Staff