

Central file



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FEB 06 1986

The Honorable Arlen Specter
United States Senate
Washington, DC 20510

Dear Senator Specter:

I have been asked to respond to your January 8, 1986 referral requesting information related to concerns that have been raised by one of your constituents, Ms. Mary Osborn. She requests continued NRC oversight of Three Mile Island, Unit 1 (TMI-1) and discusses concerns regarding plant growth abnormalities and other health effects which she associates with the 1979 accident at Three Mile Island, Unit 2.

With regard to NRC oversight of TMI-1, the NRC recently completed a special inspection of TMI-1 restart activities. This inspection, which was initiated on October 3, 1985, continued for 94 consecutive days and involved some 3500 hours of inspection. The level of inspection activity during this three month period is well above that applied to a typical operating plant in a year and provided us with good insights into the performance of the licensee and the plant.

Continued oversight, although somewhat less intense, will continue indefinitely, and include both close observation of day-to-day activities and also broader scope reviews of plant and licensee performance. Day-to-day activities will be monitored by a staff of four full-time on-site resident inspectors from NRC Region I. This is twice the size of the typical resident office staff at an operating nuclear power plant. It represents a long-term NRC commitment to increased direct inspection at TMI-1. Additional inspections will be conducted by NRC Headquarters and NRC Region I specialists.

The NRC Region I Administrator, Dr. Thomas Murley, summarized the results of the NRC's special inspection of the TMI-1 restart and described our inspection plans at a press conference in Middletown on January 8, 1986. Copies of the press releases associated with that conference contain additional details and are enclosed for your information.

The issues of plant abnormalities and health effects described by Ms. Osborn have been thoroughly considered by the Commission, and are documented in Commission Memoranda and Orders CLI-84-22 (December 13, 1984) and CLI-85-08 (May 16, 1985). Copies are enclosed.

I am confident that the enclosed information will address Ms. Osborn's concerns. If we can be of further assistance, please advise us.

Sincerely,
Original signed by
Victor Stello
Victor Stello, Jr.
Acting Executive Director
for Operations

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Enclosures: As Stated

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EDO 001334

SECY 86-32

CA

Docket Nos. 50-289; 50-320

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UNITED STATES NUCLEAR REGULATORY COMMISSION

OFFICE OF PUBLIC AFFAIRS, REGION I
631 Park Avenue, King of Prussia, Pa. 19406
Tel. 215 337-5330

I-86-4

January 8, 1986

Contact: Karl Abraham

NRC TO MAINTAIN A HIGH LEVEL OF INSPECTION ATTENTION AT THREE MILE ISLAND UNIT 1; FOUR RESIDENT INSPECTORS TO REPLACE RESTART STAFF

Middletown, PA - The NRC staff has created a new organization to assume inspection responsibilities at Three Mile Island Unit 1 for the foreseeable future, Dr. Thomas E. Murley, Regional Administrator of NRC Region I, announced today

To assure that a high level of inspection attention is devoted to operations at TMI 1, said Dr. Murley, a four-inspector resident inspection office was being established on Three Mile Island, headed by Senior Resident Inspector Richard J. Conte. The resident inspection offices at most operating nuclear power plants are staffed by two inspectors.

Dr. Murley also announced that a series of special team inspections have been scheduled for this year. Responsibility for the NRC inspection program at TMI-1 now reverts to the permanent NRC Region I line organization, said Dr. Murley.

The TMI-1 Restart Staff had been created in late May 1985, to provide special surveillance of the three-month restart and power ascension program at TMI-1. Under the management direction of William F. Kane, Deputy Director of NRC's Region I Division of Reactor Projects, the Restart Staff provided continual shift coverage ranging from 12 to 24 hours a day, depending upon particular plant activities. Additional inspection coverage was conducted by NRC Region I specialist inspectors under the day-to-day direction of Mr. Conte, the Senior Resident Inspector who also served as Restart Manager.

(MORE)



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631 Park Avenue, King of Prussia, Pa. 19406
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I-86-5

January 8, 1986

Contact: Karl Abraham

NRC TMI-1 RESTART INSPECTIONS SHOW THAT PLANT CREW DID VERY WELL
IN BRINGING THE UNIT BACK INTO SERVICE AFTER ITS 6 1/2-YEAR OUTAGE

Middletown, PA - On the basis of an intense inspection effort, Dr. Thomas E. Murley, Regional Administrator of NRC Region I, said today, the restart of the reactor and its power ascension program had been handled very well by the staff of GPU Nuclear, Inc., the plant's owner.

Dr. Murley, Regional Administrator of NRC Region I in King of Prussia, PA said that last Sunday, when shift coverage ended after 94 days, the NRC staff had performed more than 3,000 hours of inspections of TMI-1.

"The scope and duration of this type of coverage was unusual, if not unprecedented in the history of the NRC, for coverage of an operating nuclear power plant," Dr. Murley said.

Dr. Murley said that during its tour at TMI-1, the Restart Staff had focused its inspections on the performance of both the licensee's plant and personnel. Although the principal focus of these inspection activities was on plant operations, maintenance, surveillance, and testing, they also considered radiological controls, security and safeguards, emergency planning, and design engineering.

(MORE)

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

CONFIDENTIAL
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SERVED DEC 13 1984

Re the Matter of
METROPOLITAN EDISON COMPANY
(Three Mile Island Nuclear
Station, Unit No. 1)

Docket No. 50-289-SP
(Restart)

ORDER

CLI-84- 22

On June 21, 1984 Marjorie and Norman Aamodt filed a motion with the Commission alleging that releases of airborne radioactive materials from the March 28, 1979 accident at TMI-2 were substantially greater than have been acknowledged by the licensee, the NRC staff or the Commonwealth of Pennsylvania and that such led to health effects in the local population. The Aamodts further claim that licensee probably intentionally destroyed radiation release records to prevent the disclosure of the hazard the accident posed to the health of local residents. The Aamodts' assertions regarding purported health effects are based on their analysis of door-to-door interviews that Ms. Marjorie Aamodt, among others, conducted of residents of two areas near the TMI-2 facility. The Aamodts requested the Commission to investigate immediately their allegations and that the

Commission defer a decision on Unit 1 restart until the issues they raise have been fully resolved.

Both the NRC staff and the licensee filed responses opposing the request. The NRC staff notes that there have been allegations of adverse health effects raised by numerous groups in the aftermath of the TMI-2 accident, and that these allegations have been investigated by the NRC, independent investigatory bodies, and the Commonwealth of Pennsylvania, and found to be without merit. Staff concludes that nothing in the Aamodts' "survey" gives cause to question the conclusions previously reached. The staff further notes that while health effects claims were not evaluated in the management phase of the restart proceeding, there was extensive testimony in the emergency planning phase of the proceeding on alleged thyroid abnormalities and potential fetal health effects downwind of the plant, and those claims were found by the Licensing and Appeal Board to be without merit. The staff believes that the charge that licensee has intentionally destroyed radiation release records is sheer speculation unsupported by evidence and should be given no weight.

The licensee acknowledges that radiation records are missing, but emphasizes that it informed the NRC staff that records were missing shortly after the accident. It argues that if the Aamodts wished to raise allegations of intentional withholding of this data as a management integrity issue in the restart proceeding, they should have done so five years ago. The licensee also states that the Aamodts' conclusions on health effects are a direct contradiction to numerous scientific studies performed by a variety of organizations and that the Commission has before it enough

scientifically-based information to determine that the issues which the Aamodts attempt to raise need not be further pursued.

After responding to the Aamodts' motion, the NRC staff asked the Centers for Disease Control (CDC) to review the Aamodts' allegations. On September 7, 1984 CDC sent a three-page critique of the Aamodt's allegations to the staff. CDC concluded that the Aamodts had not presented convincing evidence of increased cancer incidence, cancer mortality, or adverse pregnancy outcomes in TMI-1 area residents related to the TMI-2 accident.

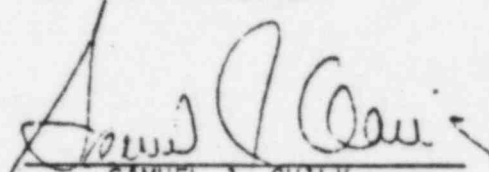
At an August 15, 1984 Commission meeting, Ms. Aamodt informed the Commission of a relatively high radiation measurement she had taken somewhere in the vicinity of the TMI-1 site. Ms. Aamodt stated that she had measured "ten times background" with a Geiger counter. Subsequently, the NRC staff, and representatives of EPA and the Commonwealth of Pennsylvania's Department of Environmental Resources went with the Aamodts to three locations selected by the Aamodts. At each of these locations informal field surveys were taken with portable instrumentation designed to monitor alpha, gamma and beta radiation. No radioactivity beyond background levels was found at any location. Soil samples were also collected at each location and a water sample was taken at one of the locations. The analysis of these samples did not produce evidence which would support the Aamodts' allegations.

Based on the available information the Commission agrees with the staff and the licensee that the Aamodts have not presented sufficient reliable information to show that previous, more comprehensive and

Commissioner Bernthal disapproved in part and provided separate views.
Commission Asselstine disapproved and provided additional views.

It is so ORDERED.

For the Commission*


SAMUEL J. CHILK
Secretary of the Commission

Dated at Washington, D.C.

this 13 day of Dec, 1984.

* Commissioner Zech was absent for the affirmation of this order; if he had been present he would have approved it. Commissioner Asselstine, in order to allow the will of the majority to prevail, did not participate in the formal vote.

ADDITIONAL VIEWS OF COMMISSIONER ASSELSTINE

The Commission should do more to resolve the concerns raised by Mr. and Mrs. Aamodt. The Commission should request that the Pennsylvania Department of Health review the information submitted by the Aamodts as well as the various existing studies of the radiological releases from the TMI accident and their impact on the people surrounding the plant as part of the Department's ongoing epidemiological research efforts. To assist the Department in this effort, the Commission should provide the funds needed to hire an independent consultant who is expert in the fields of epidemiology and the health effects of ionizing radiation. I can think of no more upsetting concern to the people living in the vicinity of the Three Mile Island plant than the possibility that radiation releases from the accident were higher than estimated by previous studies and that such releases are causing serious health effects. Given the obvious seriousness of these concerns, we should do more than just rely on what appears to be a very cursory review of the Aamodts' information by the Centers for Disease Control. At the same time, I do not find sufficient evidence in the Aamodts' petition to justify a decision to defer further action in the TM-1 restart proceeding at this time.

SEPARATE VIEWS OF COMMISSIONER BERNTHAL

In my vote of 30 October 1984 on the above matter, I noted the suggestion of the Center for Disease Control that "it might still be useful for NRC to fund additional scientifically valid followup studies in [the TMI area] population". While rejecting the Aamodt's paper as "not presenting convincing evidence of cancer incidence, cancer mortality, or adverse pregnancy outcome in TMI area residents following the [TMI-2] accident", CDC also provided guidance to the Commission on a worthwhile approach that might be taken for these "scientifically valid followup studies", to wit: "The proper way to address [these] concerns is through the Pennsylvania Department of Health's TMI followup program".

In my judgment, the Commission must continue to exercise extraordinary diligence, vigilance, and persistence in this matter, so that to the extent scientifically possible, all reasonable concerns regarding possible effects of the TMI-2 accident on citizens in the TMI area may be acted upon or laid to rest. To demonstrate its commitment to that goal, the Commission therefore should have carried through on CDC's suggestion, and should have offered direct support to the Pennsylvania Department of Health's followup program by contractual or other appropriate arrangement. It is worth noting in this regard that Dr. George Tokuhata, Director of the Division of Epidemiology Research of the Pennsylvania Department of Health, in a recent meeting with the TMI-2 advisory Panel committed the expertise of his Department to continued monitoring of the possible long-term health effects of the TMI-2 accident.

I therefore cannot support the Commission's disposition of the Aamodt motion in the terms contained in the current order. I would have taken action consistent with my comments above.

September 7, 1984

William A. Mills, Ph.D.
Chief
Health Effects Branch
Division of Radiation Programs
and Earth Sciences
Office of Nuclear Regulatory Research
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Bill:

I received the AAMODT document from you and another about the same time from Dr. George Tokuhata of the Pennsylvania Department of Health. Much to my surprise they are different. The copy you sent is missing pages 2, 4, 6, 9, 11, Figure 1, Affidavits 2, 4, 7, 9 and parts of Affidavit 1, and Attachment 2. Dr. Charles Stutzman, Dr. Matthew Zack and I reviewed the Tokuhata version and the following comments are a compilation of them.

We believe that there are a number of deficiencies evident in the epidemiologic aspects of the data presented in this report. Following are our combined comments.

1. Pages 1, 4, Figure 1. The areas listed are outside the highest exposed areas and away from the predominant areas (NNW, ENE, SSE) according to the May 10, 1979, preliminary dose assessment report.
2. Page 1, paragraph 2. Who diagnosed the "radiation related health effects?" Was a physician consulted? What were the effects or symptoms?
3. Page 1, paragraph 3. Was anyone from the State, EPA, DOE, NRC, or USDA requested to investigate the plant problems?
4. Page 3, paragraph 4; page 4, paragraphs 2 and 4. Appear to represent interviewer bias.
5. Page 4, paragraph 3. Appears to represent both selection and volunteer bias.
6. Page 4, paragraph 4. Was it possible the lump was present before the TMI accident? Was date of diagnosis sought?
7. Page 5, 3.2.a. This is an assertion. What is the data? Deaths may be increased but cancers present before TMI.
8. Page 5, 3.2b. and c. All diagnoses and dates of diagnoses need to be confirmed by medical records review.

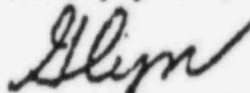
Page 3 - William A. Mills, Ph.D.

17. Without annual comparison data, the conclusion of a "continuing" excess cancer mortality rate is unfounded.
18. Page 7, 3.24. Affidavits are testimony and opinion, not scientific data.
19. Page 8, 3.0, Sentence 1 and 2. Data inadequate to support these statements.
20. Page 8, 3.0, Sentence 3. Were plants inspected/studied for any cause except radiation (e.g. insects, chemicals, plant disease, and of life span, etc.)
21. Page 8, 3.0. The dose estimates presented in this paper of 100+ rem appear to be based solely on anecdotal reports by several residents of reddening of the skin (erythema). Although we agree that erythema can result from high dose radiation exposure, not all erythema results from ionizing radiation but from other things such as sunburn, allergy, drugs, etc.
22. Page 9, paragraph 1. Discussion confuses cancer deaths and cancer incidence. That "life is terminated" more rapidly is a conclusion totally unsupported by the data presented.
23. Page 9, paragraph 2. No data is presented to show that there is an alarming increase in health problems, only a possible, but likely unrelated, increase in cancer deaths.

This paper does not present convincing evidence of cancer incidence, cancer mortality, or adverse pregnancy outcome in TMI area residents following the accident. The proper way to address this concern is through the Pennsylvania Department of Health's TMI followup program. The Centers for Disease Control, National Institutes of Health, and Pennsylvania Health Department combined resources to develop a census of the 0-5 mile residents shortly after the accident. Although that effort was criticized at the time as useless it might still be useful for NRC to fund additional scientifically valid followup studies in that population.

I hope this brief review is helpful.

Sincerely yours,



Glyn G. Caldwell, M.D.
Assistant Director for Epidemiology
Chronic Diseases Division
Center for Environmental Health

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 31 1984

MEMORANDUM FOR: Chairman Palladino
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
Commissioner Zech

FROM: William J. Dircks
Executive Director for Operations

SUBJECT: STAFF ACTIONS FROM THE AUGUST 15, 1984
COMMISSION MEETING ON TMI-1 (M840815)

At the August 15, 1984 Commission meeting on TMI-1, Commissioner Asselstine, in connection with discussions on the Aamodt's cancer survey, requested that the staff provide a comprehensive list of the studies and surveys that have been performed regarding radiological impacts of the TMI-2 accident. Such a list is provided as Enclosure (1). The staff considers this to be a reasonably complete bibliography. A brief summary of the scope and principal findings from the more significant studies is provided at Enclosure (2). In addition, H. Denton, Director, NRR recommended at the August 15 meeting that the Commission consider referring the Aamodt's cancer study to a Federal Agency with expertise in epidemiology, specifically, the Centers for Disease Control (CDC). A proposed letter that the staff recommends the Commission use to make such a referral is provided as Enclosure (3). As noted in Enclosure (3), the staff has contacted the CDC on this matter.

Another issue raised at the August 15 meeting was the extent of the staff's knowledge of the investigation into the Hartman allegations at the time of the restart hearings. In this regard, I direct your attention to the recently released OI investigation report on TMI-2 leak rate falsification, (provided

Contact:
J. Van Vliet
X28213

CHRONOLOGICAL BIBLIOGRAPHY

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STATUS OF RADIOLOGICAL IMPACT STUDIES
FROM THE ACCIDENT AT THREE MILE ISLAND

As a result of the accident at Three Mile Island, Unit 2, the radiological environs of the site have been the subject of intense, and comprehensive radiation monitoring and radiological impact studies. These investigations included assessment of the causes of the accident and of the radiation exposures and potential impacts, during and subsequent to the accident: to the workforce, the general population within 50 miles of the site, and the terrestrial and aquatic environment relative to effects on domestic animals and wildlife. Many well known and respected agencies and organizations participated in this effort to assess any impact resulting from the accident. Among those conducting the most comprehensive radiological assessments were: Department of Energy (DOE), Department of Health, Education and Welfare (HEW), Environmental Protection Agency (EPA), Commonwealth of Pennsylvania, Metropolitan Edison Company, and the Nuclear Regulatory Commission (NRC).

The radiological monitoring programs which these groups initiated during the first few days after the accident included the placement of environmental thermoluminescent dosimeters (TLDs) within a 20-mile radius of the site, aerial and ground radiation surveys, monitoring of liquid effluents from the site, sampling and analysis of local milk, food, soil, vegetation, and grass samples, and analysis of surface and drinking water. In addition to these monitoring programs, the utility had TLDs and air particulate monitors in place at the time the accident began. In order to assess if there was any potential airborne contamination, a whole body counting system was set up in Middletown twelve

intervals. Results of calculations to determine the maximum doses that an individual would receive as a result of ingestion of water and fish from the Susquehanna River indicate that the health and safety of the public was not endangered, nor was there significant environmental impact.

Environmental Monitoring and Sampling Results

Assessment of the TLD and other monitoring data indicate that the major offsite releases of radioactive materials occurred on the first day of the accident. The highest direct measurements were obtained on site [3000 mR/h ($\beta+\gamma$) and 400 mR/h (γ) indicated in the plume over the plant on March 29] and at nearby Kohr Island. "The release quickly dissipated and exposure levels on the ground on-site were orders of magnitude less" (NUREG/CR-1250, p. 389). Measurements indicated that the plume traveled to the north-northwest.

In general, following the accident, levels of ^{131}I detected in air samples were on the order of a few picocuries per cubic meter (pCi/m^3) or less (the maximum permissible concentration (MPC) in air in an unrestricted area is $100 \text{ pCi}/\text{m}^3$). The highest observed ^{131}I concentration offsite was 110-120 pCi/m^3 . This measurement was made on April 16, 1979, four days after changing of the filters in TMI's process ventilation was initiated.

Following the accident, thousands of environmental samples (of air, water, milk, vegetation, soil, and foodstuffs) were collected by the various groups monitoring the area. Of the radionuclides detected (^{139}Cs , ^{89}Sr and ^{90}Sr , ^{133}Xe , and ^{131}I) in some of these samples, "only very low levels of radioiodines and radioxenons

tation were also studied. The results of the above study found that "none of the reported plant and animal health effects...can be directly attributed to the operation or the accident at the TMI Nuclear Power Station" (NUREG-0738, p.29).

Estimates of Doses

Radiological monitoring of the environment by EPA, HEW, DOE, Metropolitan Edison, and the Commonwealth of Pennsylvania "confirmed that radiation levels off site were quite low and remained so during the course of and subsequent to the accident" (NUREG/CR-1250, p. 398). TLD data indicated that the maximum dose would be received by an individual located on the east bank of the Susquehanna River. Estimates by the Ad Hoc Interagency Dose Assessment Group, the President's Task Group on Health Physics and Dosimetry, the Department of Energy, and others show that the maximum offsite individual dose was less than 100 mrem. The highest actual individual offsite dose indentified was received by an individual who was on nearby Hill Island for short periods of time during the accident. The Ad Hoc Group and the President's Commission calculated the most probable dose to this individual to be 37 and 50 mrem respectively.

Several independent studies were performed using different methodologies to estimate the collective dose to the population (approximately 2,164,000 people) living within a 50-mile radius of TMI. The results of these studies were similar, with the maximum population dose estimates indicating that "the population dose could not have exceeded 5000 person-rem" (NUREG-1250, p. 399). The estimated annual collective dose to this population from natural background radiation is about 240,000 person-rem.

James O. Mason, MD, Ph.D
Director, Centers for Disease Control
1600 Clifton Road, N.E.
Atlanta, Georgia 30333

Dear Dr. Mason:

The enclosed paper entitled, "Aamodt Motions for Investigation of Licensee's Reports of Radioactive Releases During the Initial Days of the TMI-2 Accident and Postponement of Restart Decision Pending Resolution of This Investigation" has been submitted to the Nuclear Regulatory Commission in connection with the Three Mile Island, Unit 1 (TMI-1) restart proceedings. The Aamodts, authors of the paper, allege that there were massive radioactive releases in the early hours of the TMI-2 accident and that these releases were subsequently covered up by the licensee, NRC and others. The bases for this allegation are (1) a survey the Aamodts performed which indicates a significant increase in cancer incidence in the TMI area, (2) interviews with area residents who claim to have experienced radiation-related health effects during the early days of the TMI-2 accident, and (3) analysis of flora growth abnormalities.

As a result of the TMI-2 accident, the radiological environs of the TMI site have been the subject of intense, comprehensive radiation monitoring and radiological impact studies by a number of federal, state and private organizations. The findings from these activities do not support the Aamodt's allegations of massive radiation releases, and do not correlate with the Aamodt's survey findings of a significantly increased cancer incidence rate.

However, the Aamodts' allegation of an NRC cover-up would tend to invalidate the findings from any NRC staff review of this matter. Consequently, the Commission is seeking an independent review. We request that the Centers for Disease Control perform this review and comment on the findings reported by the Aamodts and their conclusions of an increase in cancer incidence. We request that this review be completed within a reasonable time. This request has been the subject of previous discussions and correspondence (also enclosed) between Dr. William Mills (NRC) and Dr. Glyn Caldwell (CDC).

The Commission thanks you for your assistance.

Sincerely,

Nunzio J. Palladino

Enclosures:
As stated

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED
JUN 22 1979

74 JUN 22 1979

BEFORE THE COMMISSIONERS:
Nunzio J. Palladino, Chairman
Victor Gilinsky
James Asselstine
Thomas Roberts
Frederick Bernthal

In the Matter of

METROPOLITAN EDISON COMPANY

Docket 50-289

Three Mile Island Nuclear
Generating Station, Unit 1

AAMODT MOTIONS FOR INVESTIGATION
OF LICENSEE'S REPORTS OF RADIOACTIVE RELEASES
DURING THE INITIAL DAYS OF THE TMI-2 ACCIDENT
AND POSTPONEMENT OF RESTART DECISION
PENDING RESOLUTION OF THIS INVESTIGATION

1. although residents have attempted to raise the issue of serious health effects which occurred during the early days of the accident as well as illnesses which have subsequently developed, the licensee has maintained its posture of deception to this day, asserting as recently as April 1984 in a newsletter to stockholders that no human injury has been caused by the TMI-2 accident.

Therefore, we herein motion the Commission to stay its decision in rendering a judgement as to this licensee's fitness to operate the TMI-Unit 1 until these allegations are fully examined.

2.0 INTRODUCTION

Restart of TMI-1 is pendant upon a judgement that the Licensee's management possesses the integrity needed to safeguard the public from the potential dangers of plant operation. We herein present evidence that, in the early days of the accident, people who lived at high elevations in a generally northwesterly direction from the plant were subjected to radiation exposures of 100 rems or more. The significance of this evidence lies in the fact that the Licensee, as well as the NRC and the Commonwealth of Pennsylvania, holds a publicly stated position that radiation releases at the time of the accident were negligible and that this position is supported by the willful withholding of data by Licensee which would prove this position false.

Licensee asserts that missing radiation records from the first day of the accident and the missing vent filters were "lost". We believe that they were intentionally destroyed.

The areas selected were ones where residents had experienced erythema and metallic taste during the early days of the accident. One of these areas was six miles northwest of the plant (Area 1) and the other, three and one-half miles southwest (Area 2). A third area, seven miles northwest of the plants, was chosen because of its high elevation (Area 3) and clear view of the TMI plants. Figure 1 summarizes these area characteristics as well as age distribution of the residents.

Almost every household was willing to provide the information solicited. There were no refusals in Area 1, four in Area 2 and 2 in Area 3. The interviewers represented themselves as a group of citizens interested in health issues.

Several other residents of the TMI area, not in the precise areas surveyed, but residing or working in the area northwest of the plants were also interviewed because we learned of their unique experiences.

While the questionnaire did 'suggest' symptoms, the interviewers found, without exception that this did not more than remind the participant. All interviewers were of the opinion that the residents were conservative in their provision of information and that what was obtained was less than actually existed. For instance, a woman with an obvious lump in her arm did not mention it until the interviewer questioned her about it.

3.2 RESULTS OF SURVEY

The survey produced the following significant information:

- a. a cancer death rate for each area from six to over eight times greater than expected,
- b. a large number of cancers and other tumors diagnosed after 1979,
- c. a number of other serious health effects, and
- d. first-hand accounts by residents of exposure to plumes in each of the areas surveyed.

3.21 CANCER DEATH RATE

Figure 2 presents the cancer death rate analysis. Based on data obtained concerning only those 313 persons about which information was obtained, the overall cancer mortality rate for the five year period since the accident was 6.5 times higher than expected. Even if it were assumed that there were no cancer deaths among the 144 persons about whom no information was obtained, the mortality rate is 5.2 times higher than expected. The highest rates were in Areas 1 and 3. These areas also provide the most reliable data since essentially the entire populations were surveyed.

3.22 OTHER HEALTH EFFECTS - DIAGNOSED CANCERS AND TUMORS

Shown below are the number of diagnosed cancers and other tumors among living persons in each of the three areas. These data would suggest a continuing cancer mortality rate far in excess of that expected.

FIGURE 3 - CANCERS AND TUMORS DIAGNOSED - PERSONS LIVING

AREA	NUMBER
1	6
2	10
3	3
ALL	19

3.23 OTHER HEALTH EFFECTS

Other health effects picked up by the survey were most notably five cases of anemia, four cases of spontaneously ruptured or collapsed organs, seven persistent rashes and eleven birthing abnormalities in nineteen pregnancies.

Three of the four cases of ruptured or collapsed organs occurred in Area 3; the fourth case was in Area 1. A fifth case (subject of Affidavit 6) occurred out of the areas surveyed but in a northwesterly direction from TMI and to an individual who was subjected to fallout from a plume on Friday, March 30, 1979.

FIGURE 5 INDIVIDUALS' RADIATION EXPOSURE

AFFIDAVIT	AREA	DATE	SYMPTOMS
1	1	3/29/79	Erythemia Metallic Taste Burning Throat Hair Loss Rashes
2	2	4/2/79	Erythemia Metallic Taste Nausea
4	3	3/28/79 (evening)	Tearing Eyes
5	Near 3	3/28, 29/79	Nausea Metallic Taste Exposed Film
6	Beyond 1	3/30/79	Erythemia Tingling Skin Hair Greying and Loss Discoloration of Skin Skin Cysts

Although we present no baseline for cancer deaths for the selected areas for the five years prior to the accident, we believe that the residents reached back to recall 'recent' cancer deaths. In Area 2 two cancer deaths prior to 1979 were reported. We conclude that there were few cancer deaths (as would be expected in a population of this size), possibly only the two reported in these areas in the five year pre-accident period. This conclusion is supported by the frequently-expressed opinion of the residents as well as a medical doctor, a paramedic and two nurses we met in the area that, since the TMI accident, the occurrence of cancer has increased enormously on the west shore and that life is terminated in a more rapid fashion than would be expected.

Although no data is available for expectations of cancer and other tumor diagnoses, as well as the other health effects, the numbers of occurrences of serious health problems in a population of this size is alarming. Particularly so, when according to the residents, all of these effects occurred after March 1979.

We attempted to have soil samples from the areas analyzed. A spectral analysis has not been completed. EPA soil sampling since the accident was recently published, however we have not had an opportunity to view the data. This information has not been provided in the Restart Proceeding. The only information concerning soil sampling that we have found in the studies of the accident is an assertion in the Rogovin Report (Vol. II, Part 2, p. 389) that although several radionuclides were detected in some samples, they could not be attributed to the accident. Alpha particulate contamination was not determined since it was assumed that uranium

It is a fact that the Licensee, the NRC and the Commonwealth of Pennsylvania have no data in their possession which can define the quantity of radioactive materials emitted over the areas of this study during the early days of the accident. On the other hand, the record is replete with evidence of radiation release records being "lost", filters being "lost" and calculations and measurements of high dose rates being explained away or denegated. (See NUREG-0600, II-397; II-3-18; II-3-77; NUREG-0760 at 31-33.)

6.0 CONCLUSIONS

The evidence is here. A grossly high cancer mortality rate is present exactly where plumes traveled in the early days of the accident. The fact that radiation monitoring data and TMI plant records have been "lost" or misconstrued only emphasizes the point that the Licensee conspired to hide the seriousness of the accident. The Licensee alone monitored radiation releases during the initial days of the accident.

AFFIDAVIT 1

On April 24, 1984, I, [redacted],

[redacted] provided the following information in response to a questionnaire presented by Francine Taylor of Lancaster, Pa. and to Marjorie Aamodt in a subsequent interview that same day. I also provided Ms. Aamodt with a letter which was addressed to Governor Thornburgh and is dated November 19, 1981. I never received an answer to this letter. The letter is attached to this affidavit and is to be considered a part of it.

At the time of the TMI accident, I was living at [redacted], not far from my present home. This area is approximately four miles northwest of TMI. Concerning my experiences following the accident at TMI: On Thursday, March 29, 1979, I was working all day with my son in our garage. The garage doors were open. That night when I took a shower, my face, neck and hands looked like I was at the seashore and got burned real bad. I felt nauseous. My eyes were red and burning. I felt like I was looking through water. Friday morning when I got out of bed, my lips and nose were blistered, and my throat and inside my chest felt like fire. It tasted like burning galvanized steel. My-son had similar experiences he was 22 years old at the time. On Friday we decided to evacuate. While packing our truck, a township police officer, in a closed car, shouted over his loudspeaker system, "Bill, don't breath this air. Get inside". We spent the first night in Mechanicsburg with relatives. We convinced other family members to go with us and traveled to Front Royal, Va on Saturday. We stayed at a camp ground in Front Royal for about one week. During this time I experienced severe diarrhea which caused rectal bleeding. We took one of our dogs with us, a German Shepherd, female. Following our arrival in Virginia, the dog passed only blood from the rectum and bleed from the nose and mouth. Since I felt that these conditions may have been caused by nervousness due to our flight, I gave her a sedative. When we returned home, we went in the garage first and found our male German Shepherd had died. His eyes were milky white. We had provided about 100 lb. of food and 50 gallons of water, however, he had only drunk water, about five gallons. It appeared that he had thrown up some of this water before he died. We had five cats that lived in a box on the back porch. All but one was dead. All cats had milky white eyes. The one living cat had one eye that was milky white; skin grew over this eye during the following weeks. This cat lived for about six months after the accident. She had kittens prior to her death. The kittens were born dead and hairless. I should also note that we noted a metallic taste when we entered our home after the evacuation.

My son and I have both experienced hair loss; mine was on my head, arms, legs and torso. This hair has regrown. My son lost hair on his arms and torso, which has also regrown. In 1981 a sore developed on my leg. The sore remained for two years, healing after we moved to Florida. The effected area is still detectable as a faint discoloring. The skin was inflamed, open, and raised; the doctor's diagnosis was uncertain. Also in 1981 my wife, [redacted], was diagnosed as having paroxysmal tachycardia and in 1982 as having an underactive thyroid. I have also experienced problems with my heart. Although I had had a slight murmur prior to the accident, I had passed a physical required for racing cars. However, in December 1980 I needed to undergo an aortic valve replacement. I was 43 years old at the time.

The spring following the accident, our walnut trees did not produce any leaves, and there were no walnuts. There were no flies or other flying insects until July 1979. There were no birds, squirrels or pheasants

AFFIDAVIT 2

On May 5, 1984, I, [REDACTED], provided the following information to Marjorie Amodeo at my place of residence on [REDACTED]. My residence is approximately 2-3 miles south west of TMI and is at a high elevation.

On Monday evening, April 2, 1979, after returning from West Virginia where I had evacuated with my family, I worked outside on my camper from approximately 6 until 7 p. m. My family stayed inside. When my wife called me in for supper, my skin was burning. My face, arms and hands were reddened and remained that way for *about 12 hours*. I had a metallic taste. I felt nauseous. I felt "funny in the head". I took a shower that evening before going to bed. Since I had a head cold, I went to the doctor's the next day. I told my doctor about my experiences the following evening. He read from a book what symptoms are related to radiation exposure. We noted that these symptoms matched what I had experienced, however the doctor reassured me that nothing had come out of the plant. Concerning the weather conditions on the Monday evening, April 2, 1979, I remember that there was a light mist over the area.

Date Sworn _____

AFFIDAVIT 3

I, [REDACTED] provided the following information to Marjorie Aamodt in a telephone conversation on June 18, 1984. I was ill with the flu at the time of the TMI accident. I was in bed most of the time. However, one day, which I believe was Friday, March 30, 1979, I was out of bed and decided to shake out a throw rug. I went out on the porch. It sounded as if it was raining. The sound appeared to be in the trees. I could not see any rain so I reached out beyond the porch roof to try to feel it. I did not feel any rain on my hands or arms. I was extremely puzzled, I was impressed by the stillness except for the sound of rain. There were no sounds of birds or other sounds to which we are accustomed. This all seemed very strange, however I was too sick at the time to pursue the matter further, so I returned to bed. My certainty in dating this event on March 30, 1979 is tied to a telephone call I received later that same day. A neighbor called to tell me that my son had been taken from his school to Dillsburg because of the TMI accident, and she volunteered to pick him up.

I could never get the experience of the silence and the rain-like sound out of my mind. Subsequently, several of my friends told me about similar experiences at the same time. One of these friends is [REDACTED]

I and my sons remained during the accident. We would have chosen to leave, however I am a widow, and I did not have sufficient financial resources to leave.

[REDACTED]

Date-----1

AFFIDAVIT 4

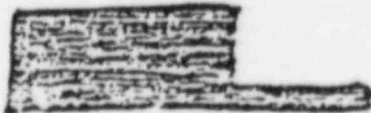
On April 28, 1984, at my home, ~~XXXXXXXXXXXXXXXXXXXX~~, I related the following experiences that I had at the time of the accident at TMI. On Wednesday evening, March 28, 1979, unaware of any problems at the TMI plants, my wife and I were outside in the evening to take a walk on our street. The walk lasted approximately ten minutes. That evening, my eyes began to water and burn. My eyes watered throughout the entire night.

In the fall of 1982, I began to have problems with my eyes. My eyes felt like they were burning. About three months after this occurred, I decided to see a doctor. At this time the skin around my eyes was irritated and red, and there was a distinct red mark on the innerside of my nose. Although the redness around my eyes has disappeared, the mark on my nose has remained.

The first doctor appeared unable to help, and since I was troubled about my eye condition, unique to me during my lifetime, I saw a second doctor. I also had a rash on my forearms which had come and gone since shortly after March 1979. This rash is particularly noticeable after showering and in warm weather. The dermatologist prescribed Prednizone.

In 1981, my wife ~~XXXXXX~~ was diagnosed as having fibroid tumors in her uterus. These tumors were large, but were successfully removed in September of 1982.

I believe that my skin conditions and possibly my wife's tumors are related to some exposure we may have gotten from the accident at TMI. We were unaware of the problems there or any dangers to ourselves until several days after the accident. Actually, it was a TMI worker who is a neighbor and who evacuated early on the first day of the accident who returned on the weekend to warn his neighbors to evacuate.



Dated-----

100

5/7/64

Date Sworn _____ - 10 -

I, ~~_____~~, provided the following information to Jane Lee and Marjorie Aamodt on May 11, 1984.

On Friday evening, March 30, 1979, I was standing on the front porch of my home. My home faces south. It was raining, and the wind was blowing. All of a sudden the cat that had been let out began to howl in a most unusual way. I had never heard a sound like that from this or any other cat. I called the cat by name, however it did not come home. From the direction of the howling, I could tell that the cat was under the porch. I went over to the bannister and leaned over to call the cat again. While standing in this position at the east side of the porch, I experienced a most unusual sequence of events. Suddenly, the wind stopped; there was a movement in the limbs of the trees next to the porch, and a wave of heat engulfed me. The gust of heat brought the rain over me. Then the wind started again. This all happened in about one minute. I was so startled that I went in, taking the cat, who had by now come up on the porch. I wiped the cat's wet coat and then washed my hands and face. My face felt tingly. About an hour later, I washed my face again and wiped my arms and legs with the towel. I noticed that my arms and face were pink. I applied a lotion because my skin felt tingly.

On Saturday morning, my skin was a darker pink, and there was an itch at the front of my scalp. This was the only part of my scalp that was not covered by a scarf. When I went to church on Sunday, my friends commented that I looked healthy and sunburned. On this day, hard little lumps, a little bigger than a pinhead appeared on my forehead and into the hairline.

On Tuesday, my scalp felt prickly and tingly, so I washed my hair again, shampooing it three times which is more than I customarily do. (I generally wash my hair once a week.) About three weeks later, I noticed that a lot of gray hairs had appeared across the front of my hair. When I washed my hair that week, my comb was full of hair. The next week, the loss of hair increased. I called my hairdresser, ~~_____~~, who subsequently applied treatments which he believed would arrest the loss of hair. The hair loss did appear to stop. The gray hairs have also disappeared, and my hair is now uniformly brown as it was before the events described.

In the subsequent weeks, the skin on my forearms and neck turned darker and was scaly. This condition lasted for several years. There is however some permanent discoloration however it not prominent. My forearms were, and continue to be, very sensitive to the sun, becoming itchy with exposure. I try to avoid sunlight. I have also noticed that if my arms are injured, the bruise will last longer than was normal for me prior to the events described above.

AFFIDAVIT 7

I, [REDACTED] reside at [REDACTED] six and one-half miles north northwest of TMI. This was also my residence at the time of the TMI accident as well as that of my husband, son and daughter.

On the morning of March 28, 1979, my husband was putting his tools into his truck. It was six o'clock in the morning when he came in to ask me to go out and smell the air. I wondered to myself whether it would be the Hershey chocolate smell or the aroma of Capitol Bakers' bread. This time the air was different. The air smelled like metal. It was overwhelming. I could taste metal in my mouth. It seemed as though as every taste bud in my mouth could sense this metal. We were very puzzled.

Later that morning, at 8 o'clock, my son and I walked my daughter to the bus stop. There was no metallic smell in the air.

[REDACTED]

Date-----

I, [redacted] of [redacted] provided the following information to Jane Lee, a neighbor, and Marjorie Aamodt at my home on [redacted] on Monday, May 7, 1984. I provided this information voluntarily and attest to its truthfulness.

My home is approximately 2 miles from the TMI plants. My house faces in that direction and is north west of TMI. I have several trees in my frontyard. One of these, a maple at the south corner of the yard next to a wooden fence appeared to be affected by the accident at TMI. This tree is about 30 years old and is still living, however it has undergone considerable changes. About a week after the accident, I noticed that the leaves in the center of the tree were turning brown. The leaves then dropped off leaving a circle of defoliation about twelve feet in diameter. The next year the barked dropped off many branches. This caused these branches to die. About one-fourth of the limbs are now gone. The top of the tree, which was the area that was affected after the accident, now has few leaves. Two pear trees, one a Keifer and the other a Harvest, both planted in the late 1920's, have died. Six trees had been good bearing trees prior to the accident, however they all produced dwarfed pears after the accident. The number of pears decreased also. Since the accident, I can no longer grow clover seed, because the clover yields so few seeds. In 1981, the last year I grew clover, there were only 0-10 seeds per stem, whereas I got about 75-125 seeds per stem before the accident. This problem has affected other farmers in my area, but is not a problem on a farm in this area but at a greater distance from the TMI plants, approximately 12-15 miles. I attribute the decrease in seed production to the disappearance of bumble bees that pollinate clover. Last year we had no apples from our 3 trees. One apple tree, in the yard, started 'going back' after the accident. Last year, it only had a couple of leaves, three blossoms and no apples. The only crop that 'does good' is potatoes. We have had a number of problems with livestock including sows that did not come into heat. These sows were not born on my farm, but were purchased from a farm near here.

I was inside my house on the day of the accident and stayed in most of the time. I have a rash 'back of my ear' and down on the side of my face' ever since the Krypton venting began.

I have lived in this area all of my life and have farmed since 1912.

[redacted]

[redacted]

Attendum - The leaves on my garlic plants curled tightly, and the plants died. This happened in 1974 after the accident.

The Bulletin
of the Torrey Botanical Club

Editor-in-Chief: James E. Gunkel

20 Cornwall Dr.
Bridgewater, NJ 08807
(201) 328-1700

May 11, 1954

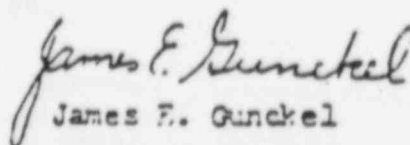
AFFIDAVIT 9

I have carefully examined a few specimens of common plants collected shortly after the accident at TMI and compared them with specimens collected more recently. The current abnormalities are probably carried forward by induced chromosomal aberrations. There were a number of anomalies entirely comparable to those induced by ionizing radiation -- stem fasciations, growth stimulation, induction of extra vegetative buds and stem tumors.

Most of the stem abnormalities described in the literature, and in my own experience, are induced by relatively high doses of X or gamma rays extending over a period of usually 2-3 months. Notable exceptions, however, are similar responses to beta ray exposure from radioisotopes (P^{32} , Zn^{65} , Ca^{45}) and for only 24 hours. In other words, it would have been possible for the types of plant abnormalities observed to have been induced by radioactive fallout on March 29, 1979.

In discussing the general biological effects of irradiation, some clarification may be helpful. In plants, the dose rate (e.g., mr/hr) is much more important than total dose (e.g., mr/yr) in inducing abnormalities. Further, the "quality factor" for gamma and beta radiation is not the same as generally assumed. In fact, I have incontrovertible experimental results to show that beta rays are at least a quality factor of two in plants.

I am the world authority on modifications of plant growth and development induced by ionizing radiations, having researched this area for 34 years at the Brookhaven National Laboratory and at Rutgers University. The three review papers appended attest to my expertise.


James E. Gunkel

ATTACHMENT #1
A VOLUNTARY COMMUNITY HEALTH SURVEY

Date: _____

Location: _____

1. Have you been contacted by the Pa. Dept. of Health survey on TMI? _____ When? _____

2. Family name _____ Willing to participate? yes _____ no _____

3. Family members:

name	status	sex	birth-date	3/28/79	3/29/79	3/30/79
(doctor)						

If deceased, when? _____ Onset of illness _____ Diagnosis _____ Dr. _____

4. Current address and phone no.: _____
Address on 3/28/1979: _____

5. Persons outdoors?

name	3/28-hours	3/29-hours	3/30-hours

6. If vacated the area:

who	to where	when left--when returned

7. Did anyone notice (indicate date, time, who) _____

- a. unusual atmospheric conditions _____
- b. metallic taste, smell _____
- c. eye irritation, burning _____
- d. skin irritation, redness _____
- e. irritation of nose, throat, chest _____
- f. experience nausea _____
- g. experience vomiting _____
- h. experience diarrhea _____
- i. experience headaches _____
- j. develop hypothyroidism _____ hyperthyroidism _____
- k. within 2-4 wks unusual hair loss or color change _____
- l. red spots under skin _____ bleeding gums _____
- m. unusual bleeding _____
- n. cancer _____ form _____ treatment _____ doctor _____
- o. later was there confirmed (doctor) anemia _____ blood or thyroid disorder _____

8. women: If pregnant, date of last menstrual period before 3/28/79 _____
Complications with pregnancy? _____ stillbirth _____ miscarriage _____
premature birth _____ Date of birth _____ Wt. at birth _____
health of child since birth _____
caesarean section _____ Date of birth _____ wt. at birth _____
health of child since birth _____ crib death _____

9. History of disorders in family tree (leukemia, cancers, thyroid, etc.) _____

10. Animals.

name	age in 3/79	inside/outside	alive/dead	health problems

11. Additional comments _____

Dangerous Properties of Industrial Materials

Fifth Edition

N. IRVING SAX

Assisted by:

Marilyn C. Bracken/Robert D. Bruce/William F. Durham/Benjamin Feiner/
Edward G. Fitzgerald/Joseph J. Fitzgerald/Barbara J. Goldsmith/John H. Harley/
Robert Herrick/Richard J. Lewis/James R. Mahoney/John F. Schmutz/
E. June Thompson/Elizabeth K. Weisburger/David Gordon Wilson



VAN NOSTRAND REINHOLD COMPANY

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produce a considerable effect. Their specific ionization is high although not as great as that for α radiation.

The preceding paragraphs have emphasized the ionization effects, particularly specific ionization. Many secondary effects can be caused by the ionization process. It may disrupt molecules, it may destroy body cells, or the energy may merely appear in final form as heat released within the absorber. Depending on the location of the absorbing atom within the molecule, the ionization may or may not disrupt the molecule. If this molecule is in a critical place within the cell, the cell, its function, or its ability to reproduce itself may be destroyed. Many of these processes are reversible; that is, damage caused by molecule disruption or cell destruction can be reversed by the usual reparative mechanism of the body. This is confirmed by experimental data which show that a fixed total dose spread out over a period of weeks produces a smaller effect than the same dose delivered in a few minutes. However, in the case of a large acute dose or continued chronic overexposure, there is the possibility that non-reversible damage will occur.

Another type of cell change which is possible is that the regulative functions of a tissue may be destroyed. In this case a carcinoma (cancer) may be produced. Although the mechanism is not fully understood, there is direct evidence that continued insult to a tissue may produce this result. The high rates of leukemia among radiologists, bone cancer among Ra dial painters, and lung cancer among miners of the Czechoslovakian, German, and U.S. uranium mines all point to radiation as the causative agent. This irreversible damage in chronic radiation exposure was apparently cumulative and the cumulative effects led to the illnesses.

Internal Emitters. The biological effects of radiation from radioisotopes in the body are complicated by several factors. In any determination of radiation effects, whether in working populations or in animal experiments, the following factors must be considered: (1) the location of specific isotopes in the body, and (2) the relative sensitivity of different tissues to radiation.

The general effects of external radiation have been previously described but there are certain modifications in the consideration of radiation from internal sources. The first is that different elements tend to localize in different organs of the body, e.g., calcium or strontium in bone, iron in the red blood cells, and iodine in the thyroid. This is true for any material which is metabolized following either inhalation or ingestion. Of course, many not readily soluble substances will remain in the lungs for long periods after inhalation. This means that the total amount of such a radioactive material is not distributing its dose uniformly but rather is concentrating its effect on a relatively small fraction of the body.

Most of the heavy metals tend to be deposited in the

bone structure. After deposition, there is usually a continuous excretion of the isotope which gradually reduces the amount present. The excretion rate of such materials has been considered to follow much the same pattern as the radioactive decay of an isotope. The time required by the body to eliminate one-half the total quantity it contains is thus referred to as "biological half-life." Most of the experimental data on excretion seem to fit a power function which is the resultant of a number of exponentials rather than a simple exponential function, but the concept of biological half-life is still used in deriving permissible levels.

Such body deposits may depend on many physiological factors both in the process of deposition and of excretion. For many years a high calcium diet was recommended for radium workers, as it was supposed that a large excess of calcium entering the body would reduce the amount of Ra deposition. Actually, the relative radium deposition is a function of the ratio of radium to calcium in the blood stream. Unless the calcium level of the blood is maintained at a very high value there will still be deposition of radium. The increase in the blood calcium required to cut the radium deposition by even a factor of three would be impossible to attain.

Besides the bone structure, common sites of deposition are the lungs and lymph nodes for inhaled particles, and specific organs for certain isotopes, such as the thyroid for iodine and spleen for iron.

A second consideration is that certain organs or tissues are more radiosensitive than others. The membranes lining the bronchi are supposedly quite sensitive to radiation and this is the primary site of many lung cancers attributed to inhaled radioactive material. The spleen is also sensitive to radiation and relatively small doses have produced more irreversible damage in that organ than in other parts of the body.

The organ most likely to be damaged because of the combined effects of concentration and radiosensitivity is known as the critical organ for a particular isotope. In general, any cell in the process of division (mitosis) is radiosensitive and for that reason a person is more sensitive to radiation during his growing period than as an adult.

Radiation Injury. The effects of radiation are nonspecific; i.e., other agents or diseases can cause the same damage. For example, it is impossible to distinguish between radiation-induced anemia and normally incident anemia. Other possible effects such as lung cancer, leukemia, and bone cancer present similar difficulties.

In any case, where the effects of radiation are being studied, conclusions can only be drawn on the basis of incidence of a particular type of damage above that normally occurring in a comparable population. If tabulations are made of incidence in a particular group, such as chemical operators exposed to radiation in a process

State Representative Stephen Reed's Letter to the NRC

August 2, 1979

Honorable Joseph M. Hendrie, Chairman
U.S. Nuclear Regulatory Commission
Washington, District of Columbia

Dear Chairman Hendrie,

I am entirely baffled by the apparent refusal of the U.S. Nuclear Regulatory Commission to have extensively reviewed the reports by hundreds of Three Mile Island area residents who, during March 28-31, 1979 primarily, and at times subsequent, experienced:

- (a) metallic taste in their mouth
- (b) metallic or iodine-like odor in the air
- (c) irritated and watery eyes
- (d) moderate or severe respiratory inflammation
- (e) gastro-intestinal dysfunction and diarrhea
- (f) disruption of the menstrual cycle in females
- (g) skin rashes (some appearing as radiation burns)
- (h) sharp, abnormal pains in joints.

The U.S. Public Health Service and Pennsylvania State Dept. of Health are jointly conducting a survey of TMI area residents to record medical histories so that the full health consequences of TMI radiation releases in the next 25 years will be documented. That is all fine and should be done. But why is there a complete dismissal by the NRC of any immediate indications of exposure to levels of radiation higher than what were immediately thought the first dates of the accident? Psychosomatically induced ailments are possible with some, but not with hundreds or even more persons and I suggest this matter has been conveniently laid aside.

The NRC is charged with ascertaining full details about the TMI accident. You are further charged with knowing the full effects of even low level radiation on populations near to nuclear reactors. Failure to pursue the aforementioned reports from TMI area residents is a dismal failure of your most important safety responsibilities to the tens of millions of people living near reactors, not to mention the people around TMI.

I therefore recommend that all available expertise be applied to ascertaining the cause of these physical ailments associated with the TMI accident and a completely accurate public disclosure made of its cause and the level of radiation or contamination that people may have been exposed to. The inability of both Metropolitan Edison and the NRC to know even to this day (or at least to have disclosed if you actually do know) the levels of exposure is in itself a major, most serious failing of pre-TMI accident obligations by both parties. And if it is determined that the exact cause of these physical ailments cannot be determined due to the lack of adequate research on the subject pre-TMI, then the public should know the extent to which we indeed are unprepared to deal with nuclear plant emissions.

Yours sincerely,

STEPHEN R. REED
State Representative

AUG 24 1984

Dr. Glyn Caldwell
512- Golfbrook Drive
Stone Mountain, GA 30088

Dear Dr. Caldwell:

The enclosed paper entitled, "Adamodt Motion for Investigation of Licensee's Reports of Radioactive Release During the Initial Days of the TMI-2 Accident and Postponement of Restart Decision Pending Resolution of this Investigation" has been submitted to the Nuclear Regulatory Commission in connection with the restart of Three Mile Island (TMI) Unit 1. The authors of the subject paper allege that, based on a survey they conducted in the vicinity, there is a significant increase in cancer incidence in the TMI area resulting from the accident at TMI-Unit 2.

As I indicated by telephone on August 24, 1984, we would like your review and comment on the findings reported by the authors and their conclusions of an increase in cancer incidence.

Sincerely,

ORIGINAL SIGNED BY

WILLIAM A. MILLS

Dr. William A. Mills, Ph.D.

Chief

Health Effects Branch

Division of Radiation Programs

and Earth Sciences

Office of Nuclear Regulatory Research

Enclosure:

As stated

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
METROPOLITAN EDISON COMPANY, ET AL.
(Three Mile Island, Unit No. 1)

Docket No.(s) 50-289
(Restart)

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document(s) upon each person designated on the official service list compiled by the Office of the Secretary of the Commission in this proceeding in accordance with the requirements of Section 2.712 of 10 CFR Part 2 - Rules of Practice, of the Nuclear Regulatory Commission's Rules and Regulations.

Dated at Washington, D.C. this
13th day of Dec 1984.

Peggy H. Downing
Office of the Secretary of the Commission

* Commission Order (CH-84-22) dtd 12/13/84

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

METROPOLITAN EDISON COMPANY, ET AL.

(Three Mile Island, Unit 1)

Docket No.(s) 50-289

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Nunzio J. Palladino, Chairman
Thomas M. Roberts
James K. Asselstine
Frederick M. Bernthal
Lando W. Zech, Jr.

'85 MAY 16 P3:02

In the Matter of

METROPOLITAN EDISON COMPANY

(Three Mile Island Nuclear
Station, Unit No. 1)

Docket No. 50-289 SP
(Restart)

SERVED MAY 16 1985

MEMORANDUM AND ORDER

CLI-85-G8

I. Background and Summary

On June 21, 1984, Marjorie and Norman Aamodt filed a motion with the Commission alleging that releases of airborne radioactive materials from the March 28, 1979 accident at TMI-2 were substantially greater than have been acknowledged and that these releases have lead to an unexpectedly high level of cancer in local residents. The Aamodts based their allegations on door-to-door interviews that Marjorie Aamodt and others conducted of residents of two areas near the TMI-2 facility. The Aamodts requested the Commission to investigate their allegations and to defer a decision on the restart of TMI-1 until the issues they raised had been studied further and fully resolved. On December 13, 1984 the Commission denied the Aamodts' motion to sponsor a new study of health-related issues arising from the TMI-2

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accident. The Commission stated that the "Aamodts had not presented sufficient reliable information to show that previous, more comprehensive and scientific surveys of TMI-2 accident radiation releases are erroneous." CLI-84-22, 20 NRC 1573.¹

On January 15, 1985 the Aamodts filed a motion asking the Commission to reconsider the December 13 denial of their request. They also requested the Commission to reopen the record in the TMI-1 restart proceeding, asserting that the issues raised by their survey were relevant to "the management competence, emergency planning and health issues" litigated in the restart proceeding. On April 13, 1985, the Aamodts amended their request by submitting additional information.

For the reasons which follow, the motions to reopen the record and to defer a decision on TMI-1 restart are denied.²

II. Analysis of Motion to Reopen the Record

The Aamodts claim that the record of the restart proceeding should be reopened to examine health-related issues arising from the TMI-2 accident. The Aamodts allege that death certificates obtained from the Pennsylvania

¹Commissioners Asselstine and Bernthal dissented. They would have provided NRC funding to ongoing studies being conducted by the Commonwealth of Pennsylvania's Department of Health.

²Should the Commission in the future acquire information regarding the need for any further studies along the lines requested by the Aamodts, it will, of course, make its views known along with any appropriate recommendations. The NRC staff is currently evaluating this matter and will be providing recommendations to the Commission shortly. The Commission is also assessing whether the Commission's Advisory Panel for the Decontamination of TMI-2 could provide a useful forum for citizens to raise health-related concerns. These matters are not relevant to the restart proceeding because health effects resulting from the TMI-2 accident are not related to a determination whether TMI-1 can be safely operated today. See II.C, infra.

Department of Health establish that: (1) there is an elevated cancer mortality rate in certain areas surrounding TMI-2; (2) an increased rate of neonatal hypothyroidism in Lancaster County in 1979 resulted from the TMI-2 accident; (3) serious post-accident health effects within and beyond the ten-mile radius of TMI demonstrates the presently-approved emergency plans are inadequate; (4) residents near TMI are suffering adverse health effects from high levels of radiation currently in the environment; and (5) the 5100 degree Fahrenheit temperatures reached within the TMI-2 core during the accident produced elevated levels of fission products and transuranics which have escaped to the environment and could be harmful to the public.

The Aamodts also believe the record should be reopened on an issue relating to the integrity of licensee's management. The Aamodts allege that information developed in the restart proceeding on the Dieckamp mailgram issue demonstrates that licensee personnel lied to the Pennsylvania Bureau of Radiation Protection on the morning of March 28, 1979. The Aamodts maintain that after the Commonwealth had been warned of projected radiation releases of ten (10) rems per hour over Goldsboro, TMI personnel discounted this information by claiming, contrary to fact, that the surveillance teams had been dispatched and had verified that a significant release had not occurred.

Under established Commission practice three factors are considered in determining whether a motion to reopen should be granted: "(1) Is the motion timely; (2) does it address significant safety (or environmental) issues; and (3) might a different result have been reached had the newly preferred material been considered initially." In the Matter of Metropolitan Edison (Three Mile Island Nuclear Station, Unit No. 1), CLI-85-2, 21 NRC 282, 285, n.3 (1985).

The NRC staff opposed the request to reopen the record, arguing that the criteria for reopening the record had not been satisfied. The licensee also opposed reopening of the record on whether licensee personnel lied to Bureau of Radiation Protection, but did not take a position on whether the record should be reopened on the other issues raised by the Aamodts.

A. Timeliness

The central issue raised by the Aamodts relates to their allegation that there are elevated levels of cancer in the TMI area. Their request to reopen the record on that matter is untimely. The Aamodts first presented their concerns regarding cancer levels to the Commission in June of 1984, yet did not request reopening of the record until January of 1985. The Aamodts have not presented any justification for not requesting at that time a reopening of the record.³

B. Whether Claims Raise a Significant Safety or Environmental Issue

The Commission has reviewed the material presented by the Aamodts regarding alleged elevated cancer levels in the TMI area and continues to believe that the prior studies are correct in concluding that the number of health effects from radiation releases arising from the TMI-2 accident will be negligible. The Aamodts have not presented information which casts doubt on the previous studies. For example, the Aamodts have not reported when the cancers which form the basis for their allegations were diagnosed relative to

³The Aamodts also have not established when the information they rely on in support of their other claims became available and whether the facts could have been presented to the Commission at an earlier date.

the TMI-2 accident and have not shown that the cancers resulted from the TMI-2 accident. When the cancers arose or were first diagnosed is particularly significant, in light of the obvious fact that cancers which arose prior to the TMI-2 accident cannot be attributed to the accident, and the fact that, even for those cancers arising since the accident, the undisputed scientific evidence is that there is generally a latency period for cancer development following exposure to radiation. Even if additional information, such as date of diagnosis of the cancers, type of cancer, health, occupational, and personal histories of the deceased were available, we believe it is unlikely that statistically and scientifically valid conclusions could be reached regarding the causes of the cancers in the small population groups associated with the Aamodts' informal survey. The epidemiological evidence presented by the Aamodts is fragmentary and anecdotal. As a technical and logical matter, it is not sufficient to support a reasonable doubt as to the adequacy and correctness of the several detailed scientifically conducted studies on which the Commission relied. Therefore, under the circumstances, the Aamodts have not raised a significant safety or environmental concern.

Their other claims similarly fail to raise significant issues. With respect to their allegations that there was a higher rate of neonatal hypothyroidism in Lancaster County in 1979 than there was in the 1981-1983 period, the Pennsylvania Department of Health has analyzed the seven cases of hypothyroidism that arose in 1979 and concluded that they could not be attributed to radiation, but should be attributed instead to factors such as incomplete maturation of thyroid glands and lack of enzymes to synthesize thyroxine. In fact one of the seven cases occurred prior to the accident and another within three months following the accident, a time period too short

for the hypothyroidism to have resulted from the TMI-2 accident. The Aamodts have not provided information that would lead us to question the Department of Health's conclusions.

The Aamodts' allegation that health effects reported by TMI area residents, such as nausea and severe vomiting, resulted from radiation released from the TMI-2 accident that was higher than reported is not supported by available information. The NRC staff estimates that the average radiation dose to an individual within ten miles of the TMI site resulting from the TMI-2 accident was approximately 8 millirems, and the average dose received by individuals within 50 miles was approximately 2 millirems. Based on accepted scientific principles governing the effects of exposure to varying levels of radiation, these dose levels are far too low to be the cause of the kind of adverse health effects cited by the Aamodts. In the absence of other evidence demonstrating a link between the cited health effects and the TMI-2 accident, the Commission must continue to support the findings reached in earlier assessments of radiation releases from the TMI-2 accident.

With respect to the Aamodts' claim that there are currently unacceptably high levels of radiation in the environment near TMI, the NRC staff, the Environmental Protection Agency and the Pennsylvania Department of Environmental Resources conducted an informal field survey with sophisticated radiation monitoring equipment of sites selected by the Aamodts. The agencies concluded that the radiation levels were within the normal range.

The Aamodts also speculate that the high temperatures (in excess of 5000 degrees Fahrenheit) reached within the TMI-2 reactor core during the accident created a "high probability" that transuranic materials were released into the atmosphere. Transuranic materials emit alpha radiation and could be

another possible source of adverse health effects. The NRC staff has examined these allegations and concluded that the likelihood of measurable quantities of transuranic material becoming airborne and subsequently being released into the environment is low. The staff further noted that no measurable quantity of transuranic material other than that associated with normal background levels has been identified in any of the air or soil samples taken around the TMI site during or after the accident. Accordingly, again the Aamodts concerns do not raise a significant issue.

Finally, the Aamodts' claim that the licensee deceived the Pennsylvania Bureau of Radiation Protection concerning radiation measurements on the day of the TMI-2 accident is based on a draft document which was prepared in the course of an NRC investigation conducted in 1980, but before pertinent individuals had been interviewed by the NRC. After the interviews, the staff determined that the facts contained in the working draft were erroneous and concluded that the licensee had not provided erroneous information relating to the Goldsboro dose-rate prediction. The Commission has concluded on the basis of its review of the allegations and the staff's and licensee's responses that the Aamodts' claim of deception is not supported and accordingly does not raise a significant safety issue.

C. Likelihood of Reaching a Different Result

The Commission does not believe that the information presented by the Aamodts in their motion would have led to a different result. With the possible exception of the claim that Metropolitan Edison Company officials deceived Commonwealth officials on TMI-2 accident radiation releases and the

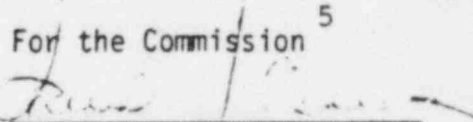
neonatal hypothyroidism issue,⁴ the Aamodts' concerns are not relevant to the restart proceeding because health effects resulting from the TMI-2 accident are not related to a determination whether TMI-1 can be safely operated today. As discussed above, the Commission finds that the Aamodts' claims of licensee deception to be without any foundation. With respect to the neonatal hypothyroidism, the information presented by the Aamodts does not form a basis for concluding that the Licensing Board erred in LBP-81-59, 14 NRC 1211, 1596 when it concluded that the alleged increased in neonatal hypothyroidism was not caused by the TMI-2 accident.

For these reasons the Aamodts' motion to reopen the record is denied, as well as its request that the Commission sponsor a health effects study prior to making a restart decision.

Commissioner Asselstine's separate views are attached.

It is so ORDERED.



For the Commission⁵

 SAMUEL J. CHYLEK
 Secretary of the Commission

Dated at Washington, D.C.

this 16th day of May 1985.

⁴The Licensing Board addressed the hypothyroidism issue in the context of evaluating the protective action criteria used by the Commonwealth of Pennsylvania in emergency planning.

⁵Commissioner Roberts was not present for the affirmation of this item, if he had been present, he would have approved.

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OFFICE OF THE
SECRETARY

UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555

MAY 16, 1985

DOCKET NUMBER 58-2895P
PROD. & UTIL. FAC. RESTART

SERVED MAY 17 1985

DOCKETED
USNRC

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OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

TO: RECIPIENTS OF CLI-85-08

ATTACHED ARE THE SEPARATE VIEWS OF COMMISSIONER ASSELSTINE
WHICH WERE INADVERTENTLY OMITTED FROM A NUMBER OF COPIES
OF CLI-85-08. PLEASE CHECK YOUR COPY OF CLI-85-08 AND
MAKE SURE THAT YOU HAVE THE SEPARATE VIEWS.

SECRETARIAT

ATTACHMENT:
AS STATED

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SEPARATE VIEWS OF COMMISSIONER ASSELSTINE

I concur in the result reached by the Commission, but not in the substance of the order. I do not believe that we should reopen the record of the TMI-1 Restart proceeding to hear this issue. However, I do believe further study is necessary. The Commission should hire an independent consultant who is expert in the fields of epidemiology and the health effects of ionizing radiation. That consultant should review the information submitted by the Aamodts as well as the various existing studies of the radiological releases from the TMI accident and the impact of those releases on the people surrounding the plant.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

EDO PRINCIPAL CORRESPONDENCE CONTROL

FROM:

SEN. ARLEN SPECTER

DUE: 01/29/86

EDO CONTROL: 001334

DOC DT: 01/08/86

FINAL REPLY:

TO:

OCA

FOR SIGNATURE OF:

** GREEN **

SECY NO: 86-32

EXECUTIVE DIRECTOR

DESC:

ROUTING:

ENCLOSES LETTER FROM MARY OSBORN RE TMI CONCERNS

TAYLOR
DENTON
GCUNNINGHAM

DATE: 01/14/86

ASSIGNED TO: RI

CONTACT: MURLEY

SPECIAL INSTRUCTIONS OR REMARKS:

RETURN INCOMING WITH REPLY.

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

PAPER NUMBER: CRC-86-0032 LOGGING DATE: Jan 13 86

ACTION OFFICE: EDO

AUTHOR: A. Specter--Const Ref
AFFILIATION: U.S. SENATE

LETTER DATE: Jan 8 86 FILE CODE: C&R-2 BP

SUBJECT: Allegations of wrong doing by PA Commonwealth,
Health Dept., & others in relation to TMI

ACTION: Direct Reply

DISTRIBUTION: OCA to Ack

SPECIAL HANDLING: Mary Osborn

NOTES:

DATE DUE: Jan 23 86

SIGNATURE: . DATE SIGNED:

AFFILIATION:

Rec'd Off. EDO
Date... 1-14-86
145 P...