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DEATH AND TAXES:

AN INVESTIGATION OF THE INITIAL OPERATION OF THREE MILE ISLAND NO. 2

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PREFACE

This investigation of events preceding the Three Mile Island nuclear accident was conducted by Public Citizen from March 30, 1979 to April 4, 1979.

The findings are based upon documents on file at the Nuclear Regulatory Commission, U.S. Federal Energy Regulatory Commission and U.S. Securities and Exchange Commission. Every fact in the findings is documented in footnotes to this report.

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Christopher Coley, scientific research assistant for the Health Research Group, also contributed to researching the report.

Jean Fallow and Debbie Wismer worked tirelessly to type it in final form.

SUMMARY

On March 28, 1979, the Three-Mile Island No. 2 Nuclear Generating Unit near Harrisburg, Pennsylvania suffered the worst accident at a commercial nuclear plant in American history. After a series of malfunctions, the plant overheated, releasing radioactivity into the atmosphere. Atomic workers and persons living within miles of the plant were placed in grave danger. Although company officials claim the accident is now under control, the crippled plant continues to pose a serious health hazard to persons in the vicinity.

Since the accident occurred, state and federal officials have been investigating the technical causes of the mishap. In their search for the human or mechanical errors which led to the crisis, however, the officials have overlooked a crucial question: Did the Metropolitan Edison Company (Met Ed) and the other utility companies which own the plant rush TMI-2 into commercial service before its safety was assured in order to realize certain financial benefits?

This report examines that question. It concludes that there is substantial evidence to suggest that the safety and reliability of TMI-2 were far from assured when the unit was placed in commercial service at 11 p.m. on December 30, 1978, but that the companies nonetheless placed the unit in service at that time in order to realize significant federal tax benefits. Among the evidence which supports this proposition is the following:

(1) From the time the TMI-2 reactor went critical (achieved a chain reaction) to the time the unit was placed in commercial service, TMI-2 suffered numerous problems, many of which were similar to the several malfunctions which reportedly contributed to the March 28, 1979 accident. The problems included 12 accidental reactor trips, including 4 which activated the emergency core cooling system, and seven shutdowns of the entire system for repairs.

(2) TMI-2's problems began the day after the plant went critical, continued until the day the plant was placed in commercial service, and persisted in the days and weeks that followed. Altogether, TMI-2 was shut down for repairs for 105 of the 274 days between March 28, 1978, when the reactor went critical, and December 30, 1978, when the plant was placed in commercial service.

(3) Despite the fact that TMI-2 was experiencing mechanical failures and other problems in the period before December 30, 1978, Met Ed reported that it had successfully completed start-up

tests and procedures required under the terms of its license and, thereafter, declared TMI-2 to be in commercial service.

(4) Under federal tax laws, Met Ed and the other owners of TMI-2 could collect substantial investment tax credits (i.e., direct tax write-offs) in 1978, provided TMI-2 was placed in service during the tax year ending December 31, 1978. Internal company statistics, on file with the Federal Energy Regulatory Commission, indicate that TMI-2's owners expected to gain approximately $17-28 million in investment tax credits as a direct result of placing the reactor in service 25 hours before the 1978 tax deadline.

(5) Under federal tax laws, Met Ed and the other owners of TMI-2 could take 6 months of depreciation deductions on TMI-2 in 1978, provided the plant was placed in service during the 1978 tax year. This provision made it possible for the companies to claim approximately $20 million as a direct result of placing the reactor in service on December 30, 1978.

(6) In their 1978 annual reports, the owners of TMI-2 heralded the new plant, telling shareholders that placing the plant in commercial operation in December was "a major milestone in the history" of the utilities.

(7) Of the 8 commercial nuclear power plants with reactors built by Babcock & Wilcox, 4 were placed in commercial service in December of a year and one in late November.* Other nuclear plants which have been placed in commercial service in December include Pt. Beach 1 in Wisconsin and Prairie Island 1 and 2 in Minnesota.

(8) Officials at the Nuclear Regulatory Commission admitted that NRC does not get involved in a company's decision to begin commercial operation. That decision "depends on the tax structure of the company," according to one official.

Our investigation does not attempt to provide a technical explanation for the March 28, 1979 accident. It suggests, however, that the accident might have been averted if (1) TMI-2's

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* Owners of Babcock & Wilcox facilities are not unusual in this respect, since other atomic power plant owners have the same financial incentives to begin commercial operation before the tax year ends.

owners had postponed commercial operation of the unit until adequate testing and repair had been accomplished and (2) the NRC had closely monitored the condition of TMI-2 prior to commercial operation, especially in light of the financial incentives the owners had to begin commercial service in the tax year. In the absence of evidence that either TMI-2's owners or the NRC acted cautiously and prudently to assure that the plant was safe before being placed in commercial operation, the haunting question remains: Could the March 28, 1979 accident have been prevented by a rational utility tax system and nuclear regulatory structure?

NARRATIVE

The Initial Operation

On February 8, 1978, the Nuclear Regulatory Commission (NRC) granted an operating permit for an 880 megawatt nuclear power plant on Three Mile Island, Pa. The plant, known as Three Mile Island No. 2 (TMI-2), was owned by General Public Utilities (GPU), a giant holding company with three subsidiaries: Metropolitan Edison (Met Ed), with a 50% share, Jersey Central Power and Light (JCP&L), with a 25% share, and Pennsylvania Electric Company (Penelec), with a 25% share. Met Ed operated the plant and held the NRC license.

Under the terms of its operating license regulations, NRC approved Met Ed's Final Safety Analysis Report and Technical Specifications, which included detailed operating procedures, startup procedures and tests which were to be completed before the plant operated at full power, obtained full operational status, and was declared to be in commercial service. Once the operating license was granted and these procedures were approved, Met Ed was supposed to report specified problems and "reportable events" which had safety significance, and to submit to NRC inspections and orders. However, full operational control of the startup was left with Met Ed, which did not need NRC certification or approval to declare the plant in commercial operation.

On March 13, 1978, Met Ed informed NRC that it planned to complete its testing and begin commercial operation by May 30, 1978. Events in the months to come, however, would prove this initial prediction to be overly optimistic.

On March 29, 1978, the day after the plant's reactor achieved a chain reaction for the first time, a fuse blew, causing the reactor to trip off. A relief valve in the primary cooling system's pressurizer failed to close, dropping coolant pressure in the reactor to the point where the emergency core cooling system was activated. The mishap, one of many to plague TMI-2, foreshadowed problems which would be linked to a disastrous breakdown exactly one year later.

In early April, the reactor tripped twice due to spurious instrument signals. Then, on April 23, 1978, the plant suffered its most severe malfunction since the operating permit was granted. The reactor tripped again, resulting in a rapid loss of pressure in the primary cooling system. For the second time in 26 days, the emergency core cooling system was activated.

The cause of the drop in pressure was found to be inadequate design of the main steam release valves, five of which opened and failed to close. The plant shut down for five months while engineers redesigned and replaced all the steam release valves.

The Tax Incentives

Although Met Ed's engineers were having difficulties with the reactor, the company's accountants were already counting the dollars which the new facility would bring the utility.

Under federal tax laws, the government provides two kinds of subsidies to utilities and other businesses for capital investment. One, the investment tax credit, allows companies to reduce their tax bills by approximately 10% of the cost of new machines and equipment. The other, accelerated depreciation, allows equipment to be written off much faster than it actually wears out. The tax deferral from the accelerated writeoffs is the equivalent of an interest-free loan. */

TMI-2, with construction costs totalling about $700 million, was able to generate between $25-40 million in investment tax credits for Met Ed and the other owners. **/

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*/ Because of their high rate of capital expansion, utilities receive a large share of these tax subsidies. In the case of investment tax credits, utilities receive nearly 40% of the $18 billion in credits granted annually.

The large percentage of tax subsidies received by utilities is especially important because federal tax laws mandate that benefits of the tax reductions not be passed through to consumers. Instead, customers must pay "phantom taxes" based on the companies' tax bills, as if the tax subsidies did not exist. In the case of the investment credit, consumers must pay the utilities a rate of return on the subsidy -- as if it had been put up by the shareholders rather than the federal government.

Only over the life of the equipment involved do customers receive any direct benefit from the investment credit -- and that only because the utilities do not depreciate the portion of the assets paid for with the tax subsidy.

**/ Approximately 60-90% of the cost of a nuclear plant qualifies for the investment credit, according to sources at the Internal Revenue Service Office of Tax Analysis. Because the investment credit was only 4% for utilities during the early years of TMI-2's construction, the total credit generated by the plant could be as low as $25 million. Without yearly construction figures, it is not possible to compute the exact amount of tax credits generated by the facility.

Under the tax laws, IRC §46(c) (1), however, most of that credit could only be claimed in the year TMI-2 was placed in service.*/ Therefore, TMI-2's owners had a major financial incentive to put the plant into commercial service before the end of the current tax year - December 31, 1978.

According to documents filed by Met Ed and JCP&L with the Federal Energy Regulatory Commission, the companies were well aware of this tax requirement and were planning accordingly. In April 1978, Met Ed prepared a financial forecast which predicted net investment tax credits in 1978 totalling $10.9 million. 90% of that total was projected after mid-year, when TMI-2 was scheduled to go into service. (See attached graph). In July 1978, JCP&L prepared a similar financial forecast which predicted net investment tax credits in 1978 totalling $23.9 million. The forecast showed credits soaring in November and December, when TMI-2 was then scheduled to go into service. (See attached graph). Evaluation of these figures indicates that the owners of TMI-2 were anticipating investment tax credits of $17-28 million from the placing in service of TMI-2 in 1978.

Putting the plant in service in December 1978 would also permit the owners to take a half year's depreciation deductions on TMI-2, IRC §162(m)(2); Treas. Regs. §1.167(a)-10. Because the companies "utilize liberalized depreciation methods and the shortest depreciation lives permitted by the Internal Revenue Code in computing depreciation deductions," (GPU 1978 Annual Report, p. 24), the half year writeoff could result in a 1978 tax saving of approximately $20 million.**/ Adding this figure to the approximately $20 million available in investment tax credits, therefore, yields a total of about $40 million that the companies stood to gain by 1978 commercial service.

The lack of this $40 million in tax savings would have had a dramatic effect on GPU's financial situation in 1978. It would have reduced internal funds available for investment (after dividend payments) by 19%, "GPU 1978 Annual Report," p. 22. It would have probably reduced borrowing capacity by an

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*/Although the investment tax credit is generally available only in the year assets are placed in service, owners of long-term construction projects may claim a credit for a portion of post-1975 payments as expended. IRC §46(d).

**/The "guideline life" allowable for nuclear plants under the Asset Depreciation Range system is 20 years, and the "20% rule" allows a 16-year life to be used. Rev. Proc. 72-10, as revised. Using the double declining balance method of depreciation on the $700 million TMI-2 plant yields $44 million in deductions for a half year, and tax savings of approximately $22 million. According to GPU's Annual Reports, only $3-5 million of this tax saving was flowed through to customers.

even greater amount.*/ In addition, GPU had based its projections in a series of utility rate cases on the prediction that TMI-2 would be in service in 1978 and that the tax benefits would be obtained. Without those benefits, the projections would have to be revised. In short, the availability of the $40 million in tax benefits had great significance for GPU and its subsidiaries.

The Other Financial Incentives

In addition to the substantial tax incentives for placing the plant into commercial operation by December 31, 1978, the owners of TMI-2 had other reasons to move quickly. On May 31, 1978, and June 8, 1978, the Pennsylvania Public Utilities Commission prohibited the two Pennsylvania-based subsidiaries -- Penelec and Met Ed -- to raise rates in anticipation of TMI-2 starting commercial service. The commission declared that the companies would have to "begin commercial operation" before they could be eligible for a rate increase.

Another less measurable, but equally compelling incentive was the impact on shareholders and investors of placing TMI-2 on line. By including the plant as an operational asset in the 1978 annual reports, the owners could bolster shareholder and investor confidence.

The Return to Operation

With significant financial benefits at stake, the companies began a race with the calendar in September, 1978. However, the plant's mechanical problems persisted.

After the turbine was ready to go again, the reactor went critical on October 17. Three days later, the reactor tripped due to its interaction with the secondary coolant system, which experienced trouble with the feedwater pump.

On October 13, the reactor was shut down to repair a broken valve in the pressurizer.

A faulty bearing which caused great vibration of the turbine on October 28 caused a three and one-half day shutdown for repairs.

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*/In fact, $40 million is equivalent to 30% of GPU's reported book net income for 1978. "GPU 1978 Annual Report," p.26.

An operator error involving improper closing of valves, which led to loss of feedwater, caused a reactor trip on November 3.

Another reactor trip occurredon November 7, again due to reduced feedwater from pump failure. The reactor core was slightly above normal for test purposes. Reduced primary coolant pressure brought in the emergency core cooling system again. Dials indicated that there was below-zero volume of coolant in the pressurizer, which regulates the primary coolant pressure, but Met Ed later reported that its calculations showed that the pressurizer was never empty.

On November 21, Met Ed found that the feedwater system was contaminated with turbine lubricating oil. This put the turbine out of service for the 11 days required to clean up the secondary coolant system.

About a week after the contamination occurred, Leonard Belter, an attorney for Penelec, wrote to the Federal Energy Regulatory Commission, where the utility was involved in a rate case. Belter explained that the oil contamination had delayed the date TMI-2 would begin commercial service until December 12, since "extensive efforts were necessary to ensure (the oil) was removed from all systems." Belter assured the Commission, however, that a "start-up and test program" was planned to "identify any deficiencies in design or construction."

The plant started up again on December 2. That day,it experienced persistent feedwater problems, resulting in a turbine trip and two reactor trips. The emergency core cooling system kicked in on the last turbine trip.

Continued feedwater problems resulted in shutting off the turbine on December 16 for feedwater pump repair. This consumed six days.

The Eleventh Hour

The plant finally reached 97% power on December 27, permitting scheduling of the required full power trip test for December 28. NRC inspectors were present to witness the test. After successful completion of the test, the unit was shut down to repair steam leaks.

At 11:00 a.m. on December 30, the turbine was shut down to repair more steam leaks. The turbine was reactivated at 2:15 p.m. and the power level was increased. 80% power was reached at 10:20 p.m.

With just 25 hours left before the end of the 1978 tax year, TMI-2 was declared to be in commercial service at 11 p.m. on Saturday December 30.

The Aftermath

The owners of TMI-2 quickly began to realize financial benefits from the decision to place the unit in commercial operation. In January, 1979, the Pennsylvania Public Utilities Commission granted Penelec an increase of $56.2 million in retail base rates, of which $26.4 was attributable to TMI-2. The same month, JCP&L was granted a $33.8 million hike in retail base rates, including $19 million applicable to TMI-2. Two months later, Met Ed would gain a $49.2 million hike from the Pennsylvania Commission.

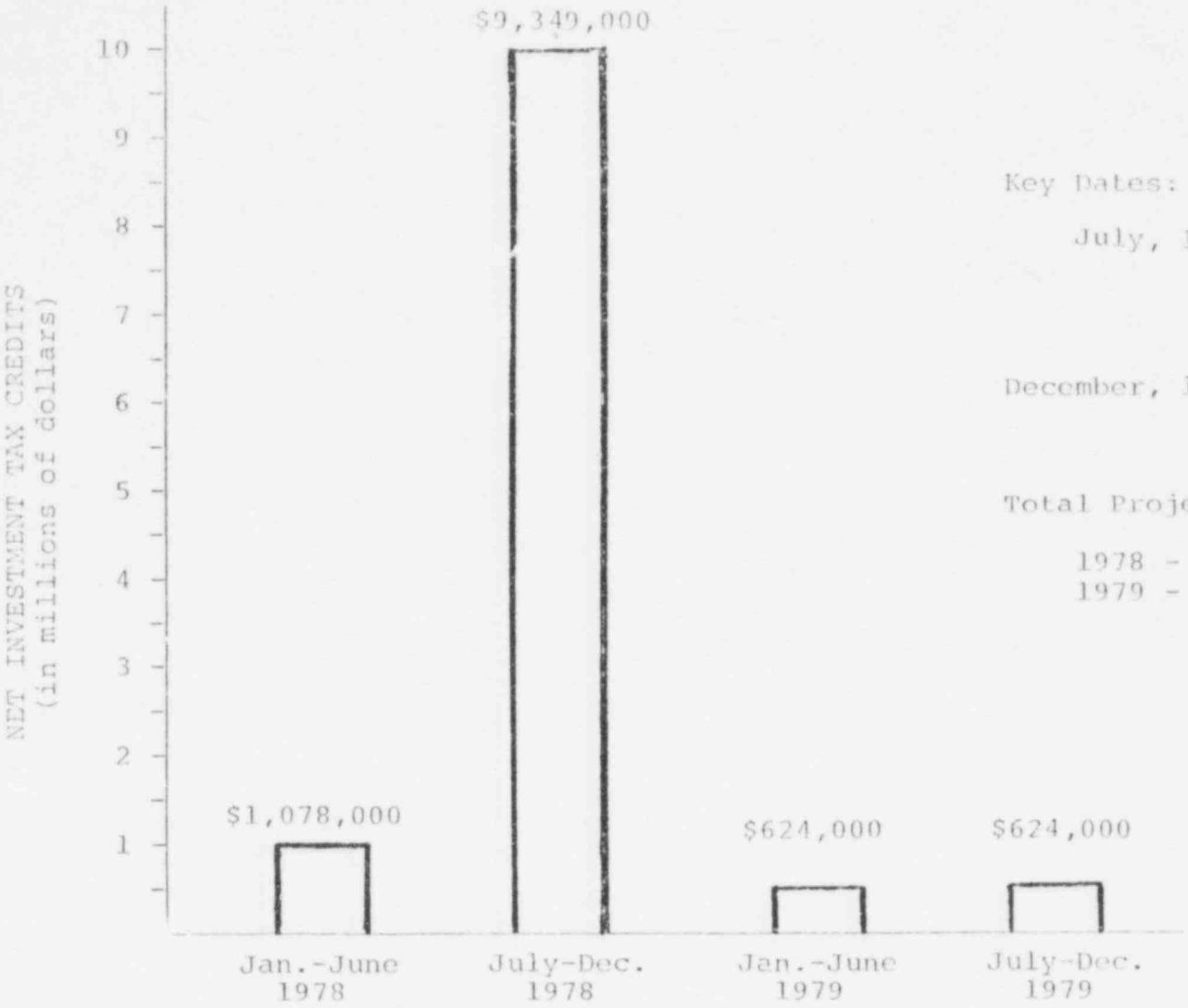
In addition, the companies' annual reports all heralded the plants as a "major milestone" contributing to "a memorable year." The annual reports also announced decreases in tax due in part to "the placing in service of the TMI-2 nuclear generating unit in December 1978."

However, the operational problems continued. During a turbine trip test on January 15, 1979, a steam bellows ruptured and power to the pressurizer in theprimary coolant system was lost, causing a reactor trip. The reactor was out of service for 17 days for repairs.

On March 28, 1979, improperly closed valves in the secondary coolant system, malfunction of a feedwater pump, a relief valve in the pressurizer sticking open and failure to operate the emergency core cooling system properly led, as far as is now known, to the most serious commercial reactor accident in U.S. history. The accident caused incalculably grave injury to public health, and as yet unmeasured, financial cost.

On April 3, 1979, Richard Muranaka, chief of NRC's Operating Data Section, which evaluates the Monthly Operating Reports filed by utilities prior to commercial operation, explained in an interview that the NRC does not get involved in deciding the date a plant can begin commercial operation. "When NRC grants an operating permit, the company is authorized to operate," he said. "When the company puts the plant into commercial operation really depends on their tax structure. There's some tax advantage for a plant to go into operation before the end of the year. This is particularly evident when a plant goes into operation late in the year."

METROPOLITAN EDISON'S PROJECTED INVESTMENT TAX CREDITS FOR 1978 AND 1979*
(FORECAST MADE IN APRIL 1978)



Key Dates:

July, 1978 - Three Mile Island Unit 2 scheduled to begin commercial service.

December, 1978 - The end of Metropolitan Edison's 1978 tax year.**

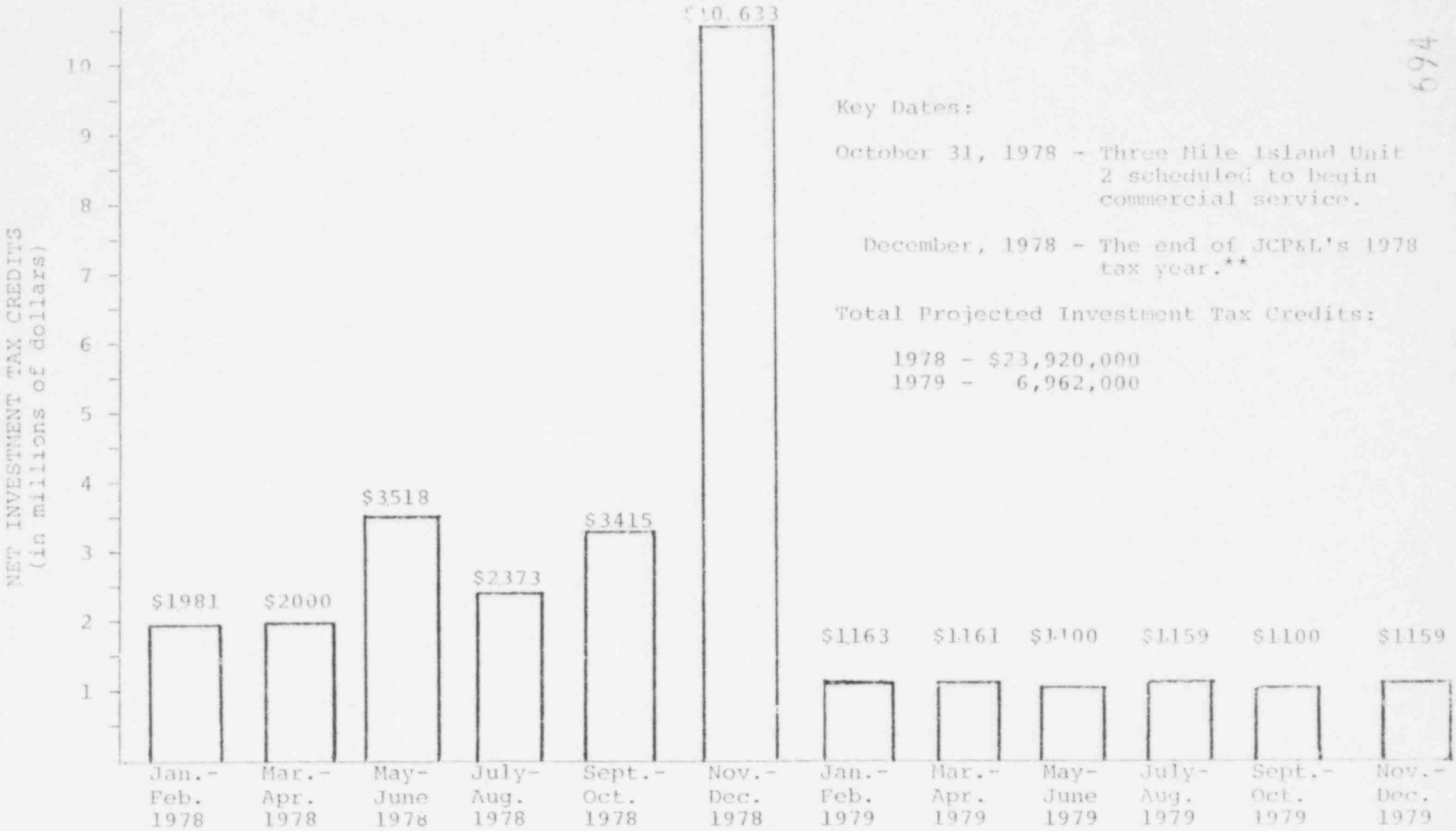
Total Projected Investment Tax Credits:

1978 - $10,927,000
1979 - $ 1,248,000

* Source: "Work Papers in Support of Period II," submitted by Metropolitan Edison Company to the Federal Energy Regulatory Commission November 13, 1978 as part of the record in a utility rate case, Docket No. ER 79-58.

** Metropolitan Edison is a 50% share owner of TMI-2.

JERSEY CENTRAL POWER & LIGHT'S PROJECTED
INVESTMENT TAX CREDITS FOR 1978 AND 1979*
(FORECAST MADE IN JULY 1978)



Key Dates:

October 31, 1978 - Three Mile Island Unit 2 scheduled to begin commercial service.

December, 1978 - The end of JCP&L's 1978 tax year.**

Total Projected Investment Tax Credits:

1978 - $23,920,000
1979 - 6,962,000

* Source: "Work Papers in Support of Period II," submitted by Metropolitan Edison Company to the Federal Energy Regulatory Commission November 13, 1978 as part of the record in a utility rate case, Docket No. ER 79-58.

** Jersey Central Power and Light is a 25% share owner of TMI-2.

CHRONOLOGY

February 8, 1978	Nuclear Regulatory Commission (NRC) grants Metropolian Edison (Met Ed) operating license DPR-730L for Three Mile Island No. 2 nuclear generating unit (TMI-2).[1]
March 13, 1978	Met Ed informs NRC of predicted startup schedule for TMI-2. Company says the unit will achieve criticality by March 25, 1978, will produce electricity by April 2, 1978, and will go into commercial operation by May 30, 1978.[2]
March 28, 1978	TMI-2 achieves initial criticality.[3]
March 29, 1978	A fuse blows causing the reactor to trip. A relief valve in the pressurizer opens and drops the primary coolant pressure to the point that the emergency core cooling system (ECCS) is activated and injects coolant into the reactor.[4]
March 31, 1978	Pennsylvania Electric Company (Penelec) submits annual report to Securities and Exchange Commission (SEC) stating that TMI-2 will begin commercial service in "mid-1978."[5]
March 31, 1978	General Public Utilities Corporation (GPUC) submits its annual report to the SEC, stating that TMI-2 "will start operating in mid-1978."[6]
April 1978	Met Ed, 50% owner of TMI-2, prepares a financial forecast for 1978 and 1979. The company predicts net investment tax credits of $10,927,000 for 1978, 90 percent of which will be realized after July -- the month that TMI-2 is scheduled to begin commercial service. Under federal tax law, Met Ed will only be able to collect the tax credits attributable to TMI-2 if the plant is placed into commercial operation before December 31, 1978, the end of the tax year. The financial forecast predicts only $1,248,000 in net investment tax credits for 1979.[7]
April 1, 1978	TMI-2 reactor trips in response to spurious signal indicating pump failure in one primary coolant loop.[8]

April 18, 1978 — The reactor trips due to spurious electrical indication.[9]

April 21, 1978 — TMI-2 produces electricity for the first time.[10]

April 23, 1978 — Another spurious electrical signal causes reactor trip and consequent turbine trip. Five of twelve main steam release valves open and fail to close, causing rapid loss of secondary cooling. Together with overfeeding of the steam generators, this causes rapid loss of pressure in the primary cooling system. The ECCS is activated for the second time. Later inspection and tests show failure of expansion bellows liners due to design error and unsatisfactory performance of main steam relief valves. This necessitates redesign and replacement of all the main steam relief valves and bellows liners before the plant can be restarted, five months later.[11]

May 31, 1978 — The Pennsylvania Public Utilities Commission (PPUC) reverses an administrative decision allowing Met Ed to increase utility rates about $32 million in anticipation of TMI-2 starting commercial service. The Commission declares that Met Ed will not be permitted to hike its rates until TMI-2 begins commercial operation."[12]

June 8, 1978 — The PPUC reverses an administrative decision allowing Penelec to increase utility rates about $17 million in anticipation of TMI-2 starting commercial service. The Commission declares that Penelec will not be permitted to hike its rates until TMI-2 begins "commercial operation."[13]

July 1978 — Jersey Central Power & Light (JCP&L), 25% owner of TMI-2, prepares a financial forecast for 1978 and 1979. The company predicts net investment tax credits of $10,633,000 for November-December, 1978 -- the months that TMI-2 is now scheduled to begin commercial service. Under federal tax law, JCP&L will only be able to collect the tax credits attributable to TMI-2 if the plant is placed in commercial service before December 31, 1978, the end of the tax year. The company predicts only $6,962,000 in net investment tax credits for all of 1979.[14]

July 11, 1978	Met Ed reports to NRC predicted startup in September and commercial operation on September 1, 1978. Replacement of 12 main steam safety valves with 20 redesigned valves continues.[15]
August 9, 1978	Pennelec informs FERC that the "in-service date of TMI-2" has been changed from July 1, 1978 to October 31, 1978 "in order to replace some non-nuclear equipment which failed to perform adequately during the testing of the unit."[16]
August 11, 1978	Met Ed tells NRC it estimates startup on August 20, 1978 and commercial operation on November 1, 1978.[17]
August 28, 1978	Burns and Roe, the TMI-2 architect-engineer, confirms preliminary calculations that main steam lines would be incapable of withstanding turbine trip from 100% power, so that stronger snubbers will have to be installed.[18]
August 31, 1978	While cooling reactor down after steam valve testing, one of three safety coolant injection channels does not operate as the primary coolant pressure falls below the established value of 1640 psig, because of faulty control mechanism. It is replaced.[19]
September 7, 1978	Met Ed discovers containment isolation valve (valve connecting containment area with outside) was not up to containment grade due to purchasing error and has to be replaced.[20] [On September 8, 1978, a containment isolation valve fails to close due to a dirty relay.][21] [On December 13, 1978, 4 containment isolation valves fail to close on test due to faulty relay.][22]
September 11, 1978	Met Ed reports to NRC it is postponing startup date of September 14, 1978. Date of estimated commercial operation remains November 1, 1978.
September 17, 1978	Reactor achieves criticality after 14 -day shutdown of power generating equipment. TMI-2 generates power the next day.[24]

September 20, 1978	Reactor trips due to problems with main feed pump.[25]
September 25, 1978	Reactor trips due to trip of main feed pump.[26]
October 10, 1978	Met [illegible] reports to NRC estimated date for commercial operation is November 26, 1978.[27]
October 13, 1978	Valve in pressurizer in the primary coolant system breaks down requiring shutdown of reactor for repair.[28]
October 14, 1978	The turbine trips due to loss of main feedwater pump. Plant operator overcompensates for turbine trip causing reactor to trip from low primary coolant pressure.[29]
October 20, 1978	The turbine trips due to problems synchronizing the plant with the power grid.
October 21, 1978	The turbine trips again due to synchronization problem.[31]
October 28, 1978	A high vibration in the turbine requires turbine shutdown for repair of bearing. This takes 3-1/2 days. Meanwhile, the reactor is shut down to repair a valve in the primary coolant.[32]
October 29, 1978	During reactor shutdown, one control rod group accidentally falls from fully out to inserted position. Three rods are stuck almost fully inserted and have to be individually wiggled out.[33]
November 3, 1978	Operator error in closing valves leads to loss of feedwater causing the reactor to trip from high coolant pressure.[34]
November 7, 1978	While operating the reactor in a slightly above normal temperature test, reduced feedwater due to pump failure causes the reactor to trip. Pressure in the primary coolant drops below 1600 psig initiating safety coolant (ECCS) injection for the third time in TMI-2 operation. Dial readings show no pressure regulation reserve, but calculations later indicate that the pressurizer did not empty.[35]

November 15, 1978 — Met Ed predicts to NRC commercial operation on December 1, 1978.[36]

November 21, 1978 — Feedwater system is found to be contaminated with Turbine lubricating oil, requiring eleven day cleanup of secondary coolant system.[37]

November 30, 1978 — Leonard Belter, attorney for Penelec, informs FERC that contamination of the feedwater system with turbine lubricating oil, has caused the company to postpone the date TMI-2 will begin commercial service. He says "extensive efforts were necessary to ensure [the oil] was removed from all systems." Belter says that TMI-2 will be tested "at the 100% power level" by December 12, 1978, and that "the unit should be ready to be declared in commercial service" following the test. He adds that the "start-up and test program" has been planned to "identify any deficiencies in design or construction."[38]

December 2, 1978 — TMI-2 is restarted after oil cleanout. The turbine trips from loss of feedwater 1-1/4 hours later. After reconnecting the turbine to the reactor, the reactor trips due to low feedwater. Later the same day, after restarting, the reactor trips from manual excess feedwater flow. The resulting rapid reactor cooldown leads to low primary pressure and safety coolant (ECCS) injection, for the fourth time.[39]

December 8, 1978 — Met Ed discovers that TMI-2 controls permit two emergency pumps (for augmenting primary coolant) could be started on a sinlgle diesel generator which would provide emergency power in the event of loss of power to run and control the plant. The diesel generators take some time to start and should not be immediately loaded with two pumps. Control and design modifications are required.[40]

December 15, 1978 — Met Ed predicts to NRC commercial operation on December 31, 1978.[41]

December 16, 1978 — The turbine is shut down to repair a main feedwater pump. This will take 3 days.[42]

December 28, 1978 — Test of backup diesel generator fails due to clogged oil filter, which is replaced.[43]

December 28, 1978 — Full power feed pump trip and turbine trips required by startup procedure are run, observed by NRC inspectors. The NRC inspectors are satisfied as far as can be told from the test data immediately. TMI-2 is then shut down to repair steam leaks.[44]

December 29, 1978 — TMI-2 is run up to 44% power.[45]

December 30, 1978 — 11 a.m. -- The turbine is shut down to repair a steam leak.

2:15 p.m. -- The turbine is started up and power increase begun.

8:20 p.m. -- The system reaches 80% power.

11 p.m. -- The plant is declared in commercial service, 25 hours before the end of the year.[46]

By placing the plant in commercial service before the 1978 tax year ends, GPUC and its subsidiaries become eligible for two tax benefits: investment tax credits and accelerated depreciation. According to tax experts who have evaluated company documents on file with federal agencies, the investment tax credits could total as much as $20 million[47] and the accelerated depreciation as much as $20 million.[48]

January 2, 1979 — The turbine is shut down for 11-1/2 hours to repair leaky valve.[49]

January 5, 1979 — The reactor power is reduced to 58% due to "random failure" which caused a control rod to be fully inserted.[50]

January 14, 1979 — The turbine is shut down to repair leaky valve. The reactor is shut down to repair leaks in isolation valves connected with the pressurizer.[51]

January 15, 1979 — The reactor is restarted. During a turbine trip test, the steam is released due to loss of vacuum in the condenser. A steam expansion bellows ruptures, venting steam to the control building. Power to pressurizer is

	lost and the reactor trips. Reactor will be cooled to make repairs -- out of service for 17 days.[52]
January 17, 1979	Two instruments to detect interruption of feedwater are found to be outside tolerable limits for unknown reason. The instruments are recalibrated and put down for replacement at the next refueling.[53]
January 1979	Pennsylvania Public Utilities Commission grants Penelec's request for a rate hike to reflect the commercial operation of TMI-2.[54]
February 1979	GPUC issues its 1978 Annual Report. The report calls commercial operation of TMI-2 "a major milestone in the history of General Public Utilities." It states that the company, in 1978, recorded "decreased income taxes of $12 million or 15%, due primarily to a reduction in income subject to tax and an increase in the flow-through portion of the excess of tax over book depreciation principally resulting from the placing in service of the TMI-2 nuclear generating unit in December." According to tax experts who have evaluated company documents on file at SEC and FERC, this statement indicates that GPUC was able to take a half-year's depreciation deduction on TMI-2, since the unit was placed into service in 1978. These depreciation benefits could have resulted in a 1978 tax saving of about $20 million. The annual report also lists investment tax credits of $46 million, without specifying what portion resulted from commercial operation of TMI-2.[55]
February 2, 1979	A heater pump breaks down and is removed from service.[56]
February 6, 1979	A main feedwater pump trips twice, causing automatic reduction to 55% power. Each time the feedpump is restarted and returned to service without determination of the cause of the trip.[57]
February 10, 1979	Turbine is shut down to repair a leaky valve in the secondary coolant system, which was discovered on February 2, 1979.[58]

February 21, 1979 — Met Ed issues its 1978 Annual Report. The report pictures TMI-2 on the cover and says "1978 will remain a memorable year, chiefly because of the completion and entry into commercial service of the second Three Mile Island nuclear generating unit." It states that "income taxes decreased $5 million, or 21%, due primarily to a reduction in income subject to tax and an increase in the flow-through portion of the excess over book depreciation, principally resulting from the placing in service of the TMI-2 nuclear generating unit in December 1978." The report also lists investment tax credits of $14 million for 1978, without specifying what portion resulted from commercial operation of TMI-2.[59]

March 5, 1979 — JCP&L issues its 1978 Annual Report. The report heralds commercial operation of TMI-2 as a "significant achievement" which will have "importance to the customers of JCP&L." It also lists $21 million in investment tax credits for 1978, without specifying what portion resulted from commercial operation of TMI-2.[60]

March [illegible] 1979 — Penelec issues its 1978 Annual Report. The report calls commercial operation of TMI-2 "a significant step." It states that the company realized "a $1.7 million decrease in income tax expense due to the flowthrough of a portion of the excess of tax over book depreciation, resulting from Three Mile Island Unit 2 being placed in service in December 1978." It also lists investment tax credits of $11 million for 1978, without specifying what portion resulted from commercial operation of TMI-2.[61]

March 28, 1979 — Series of malfunctions occurs at TMI-2, leading, over a period of days, to release of radioactivity and significant danger of a core meltdown.[62]

March 29, 1979 — PPUC grants Met Ed a utility rate increase due to the placing in commercial service of TMI-2.[63]

April 3, 1979

Richard Muranaka, chief of the NRC's Operating Data Section, states in an interview that the date of commercial operation of a nuclear plant is "left to the utility." He says: "When NRC grants an operating permit, the company is authorized to operate. When the company puts the plant into commercial operation really depends on their tax structure. There's some tax advantage for a plant to go into operation before the end of the year. This is particularly evident when a plant goes into operation late in the year."64

FOOTNOTES

1. Nuclear Regulatory Commission (NRC) Facilities Application Record, 12/31/78.

2. Metropolitan Edison Company (Met Ed) Monthly Operating Report (MOR) for February 1978, dated March 13, 1978.

3. MOR for April 1978, dated May 15, 1978.

4. NRC "Grey Book" for April 1978. (MOR for March 1978 unnavailable).

5. "Form 10-K: Annual Report for the Fiscal Year Ended December 31, 1977," submitted by Pennsylvania Electric Company (Penelec) to the Securities and Exchange Commission (SEC).

6. "Form 10-K: Annual Report for the Fiscal Year Ended December 31, 1977," submitted by General Public Utilities Corporation (GPUC) to the SEC, File No. 13-5516989, Addendum, pp. 1, 9.

7. "Work Papers in Support of Period II," submitted by Met Ed to the Federal Energy Regulatory Commission (FERC) as part of the record in a utility rate case, Docket No. ER 79-58, November 13, 1978.

8. MOR for April 1978, dated May 15, 1978.

9. MOR for April 1978, dated May 15, 1978.

10. MOR for April 1978, dated May 15, 1978.

11. Met Ed Licensee Event Report (LER) 78-33/IT and 78-34/IT, July 31, 1978.

12. Pennsylvania Public Utility Commission v. Metropolitan Edison Company, 26 PUR4th 176, 178-81 (1978).

13. Pennsylvania Public Utility Commission v. Pennsylvania Electric Company, 25 PUR4th 342, 349-50 (1978).

14. "Work Papers in Support of Period II," submitted by Jersey Central Power & Light (JCP&L) to FERC as part of the record in a utility rate case, Docket No. ER 79-58, December 18, 1978.

"Form 10-K: Annual Report for the Fiscal Year Ended

December 31, 1977," submitted by GPUC to the SEC, File No. 13-5516989, p. 21, n.(c).

15. MOR for June 1978, dated July 11, 1978.

16. "Answer of Pennsylvania Electric Company to Petition to Intervene and Motion to Reject and Suspend," submitted by Penelec to FERC in connection with a utility rate case, Docket No. ER 78-494, August 9, 1978.

17. MOR for July 1978, dated August 11, 1978.

18. LER 78-52/IT, Sept. 11, 1978.

19. LER 78-53/3L, Sept. 26, 1978.

20. LER 78-54/3L, Sept. 27, 1978.

21. LER 78-58/3L, Oct. 4, 1978.

22. LER 78-72/3L, Jan. 2, 1979.

23. MOR for August 1978, dated Sept. 11, 1978.

24. MOR for Sept. 1978, dated Oct. 19, 1978.

25. MOR for Sept. 1978, dated Oct. 10, 1978.

26. MOR for Sept. 1978, dated Oct. 10, 1978.

27. MOR for Sept. 1978, dated Oct. 10, 1978.

28. MOR for Oct. 1978, dated Nov. 15, 1978.

29. MOR for Oct. 1978, dated Nov. 15, 1978.

30. MOR for Oct. 1978, dated Nov. 15, 1978.

31. MOR for Oct. 1978, dated Nov. 15, 1978.

32. MOR for Oct. 1978, dated Nov. 15, 1978.

33. LER 78-63/3L; Nov. 28, 1978.

34. MOR for Nov. 1978, dated Dec. 15, 1978.

35. LER 78-65/99X, Jan. 30, 1979.

NRC Inspection Report 50-320/78-33, Nov. 30, 1978.

36. MOR for Oct. 1978, dated Nov. 15, 1978.

37. MOR for Nov. 1978, dated Dec. 15, 1978.

Letter from Pennelec attorney to FERC, Nov. 30, 1978.

MOR for Dec. 1978, dated Jan. 12, 1979.

38. Letter from Leonard W. Belter, Penelec's attorney from Washington, D.C. firm of Debevoise & Liberman, to Kenneth F. Plumb, Secretary of FERC, filed in connection with utility rate case, Docket No. ER 78-494, November 30, 1978.

39. LER 78-69/99X, Feb. 28, 1979.

MOR for Dec. 1978, dated Jan. 12, 1979.

40. LER 78-71/1T, dated Dec. 21, 1978.

41. MOR for Nov. 1978, dated Dec. 15, 1978.

42. MOR for Dec. 1978, dated Jan. 12, 1979.

43. LER 78-74/3L, Jan. 23, 1979.

44. MOR for Dec. 1978, dated Jan. 12, 1979.

NRC Inspection Report 50-320/78-39, Jan. 12, 1979.

45. MOR for Dec. 1978, dated Jan. 15, 1979.

46. MOR for Dec. 1978, dated Jan. 15, 1979.

47. "Work Papers in Support of Period II," submitted by Met Ed to FERC as part of the record in a utility rate case, Docket No. ER 79-58, Nov. 13, 1978.

Robert McIntyre, Director, Public Citizen Tax Reform Research Group, April 4, 1979 and other sources.

48. "General Public Utilities 1978 Annual Report," February 1979, pp.18, 22, 23, 24, 26, 30.

Robert McIntyre, Director, Public Citizen Tax Reform Research Group, April 4, 1979.

49. MOR for Jan. 1979, dated Feb. 9, 1979.

50. LER 79-03/3L, Feb. 2, 1979.

51. MOR for Jan. 1979, dated Feb. 9, 1979.

52. MOR for Jan. 1979, dated Feb. 9, 1979.

53. LER 79-8/3L, Feb. 9, 1979.

54. "General Public Utilities 1978 Annual Report," February 1979, p. 12.

55. "General Public Utilities 1978 Annual Report," February 1979, pp. 2, 18, 26.

Robert McIntyre, Director, Public Citizen Tax Reform Research Group, April 4, 1979 and other sources.

56. MOR for Feb. 1979, dated March 12, 1979.

57. MOR for Feb. 1979, dated March 12, 1979.

58. MOR for Feb. 1979, dated March 12, 1979.

59. "Met Ed Annual Report 1978," February 21, 1979, pp. 2, 4, 13.

60. "Jersey Central Power & Light Company Annual Report 1978," March 5, 1979, p.3.

61. "1978 Annual Report: Pennsylvania Electric Company," March 15, 1979, pp. 2, 12, 14.

62. Washington Post, March 28, 1979, p. 1.

63. Joe Malatesta, attorney for Pennsylvania Public Utilities Commission, conversation with Robert B. Stulberg, April 2, 1979.

64. Richard Muranaka, Chief of NRC's Operating Data Section of the Office of Management and Program Analysis, interview with Robert B. Stulberg, April 3, 1979.

Public Citizen

April 5, 1979

President Jimmy Carter
White House
Washington, DC

Dear President Carter:

We are addressing to you the results of our investigation of events related to the Three Mile Island nuclear accident because of your publicly stated commitment to conduct a thorough investigation of the events leading up to and following that disaster. Our report, entitled "Death and Taxes: An Investigation of the Initial Operation of Three Mile Island No. 2," examines the problems encountered by TMI-2 after it was licensed by the Nuclear Regulatory Commission (NRC) in February 1978 and the tax incentives which TMI-2's owners had to put the plant into commercial operation by the end of 1978.

The report concludes that there is substantial evidence to suggest that the safety and reliability of TMI-2 were far from assured when the unit was placed in commercial service at 11 p.m. on December 30, 1978, but that the companies nonetheless placed the unit in service at that time in order to realize significant federal tax benefits. Among the report's findings are:

(1) From the time the TMI-2 reactor went critical (achieved a chain reaction) to the time the unit was placed in commercial service, TMI-2 suffered numerous problems, many of which were similar to the several malfunctions which reportedly contributed to the March 28, 1979 accident. The problems included 12 accidental reactor trips, including four which activated the emergency core cooling system, and seven shutdowns of the entire system for repairs.

(2) TMI-2's problems began the day after the plant went critical, continued until the day the plant was placed in commercial service, and persisted in the days and weeks that followed. Altogether, TMI-2 was shut down for repairs for 195 of the 274 days between March 28, 1978, when the reactor went critical, and December 30, 1978, when the plant was placed

in commercial service.

(3) Despite the fact that TMI-2 was experiencing mechanical failures and other problems in the period before December 30, 1978, Met Ed reported that it had successfully completed start-up tests and procedures required under the terms of its license and, thereafter, declared TMI-2 to be in commercial service.

(4) Under federal tax laws, Met Ed and the other owners of TMI-2 could collect substantial investment tax credits (i.e., direct tax write-offs) in 1978, provided TMI-2 was placed in in service during the tax year ending December 31, 1978. Internal company statistics, on file with the Federal Energy Regulatory Commission, indicate that TMI-2's owners expected to gain approximately $17-28 million in investment tax credits as a direct result of placing the reactor in service 25 hours before the 1978 tax deadline.

(5) Under federal tax laws, Met Ed and the other owners of TMI-2 could take six months of depreciation deductions on TMI-2 in 1978, provided the plant was placed in service during the 1978 tax year. This provision made it possible for the companies to claim approximately $20 million as a direct result of placing the reactor in service on December 30, 1978.

(6) In their 1978 annual reports, the owners of TMI-2 heralded the new plant, telling shareholders that placing the plant in commercial operation in December was "a major milestone in the history" of the utilities.

(7) Of the eight commercial nuclear power plants with reactors built by Babcock & Wilcox, four were placed in commercial service in December of a year and one in late November.* Other nuclear plants which have been placed in commercial service in December include Pt. Beach 1 in Wisconsin and Prairie 1 and 2 in Minnesota.

(8) Officials at the Nuclear Regulatory Commission admitted that NRC does not get involved in a company's decision to begin commercial operation. That decision "depends on the tax structure of the company," according to one official.

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*Owners of Babcock & Wilcox facilities are not unusual in this respect, since other atomic power plant owners have the same financial incentives to begin commercial operations before the tax year ends.

We believe Americans and, indeed all people of the world, deserve an investigation of the causes of, dangers from, and lessons to be learned from the TMI-2 accident which pulls no punches. We urge you to give priority in your investigation to the interaction of federal tax incentives with nuclear safety regulation. In addition to the other recommendations you make to prevent a recurrence of TMI-2, we urge you to press for the following actions:

(1) The NRC should have an active role in conducting start-up operations and tests of nuclear power plants. The NRC should certify the results of these operations, and NRC approval should be required to move to the next step. The NRC must take account of the financial motives of and pressures on its licensees.

(2) The federal tax structure governing public utilities must be reformed to eliminate preferential subsidies to nuclear power and windfalls to utilities at the expense of their customers ("phantom taxes"). The present investment tax credit biases the choice between nuclear power and less capital intensive energy conservation and production means.

(3) As a candidate, you declared that:

> a full-time federal employee, with full authority to shut down the plant in case of any operational abnormality, should always be present in control rooms. (First televised Carter-Ford debate, September 24, 1976).

This campaign pledge has not been fulfilled nor even been the basis of an Administration proposal. Lack of NRC control over action taken at TMI-2 and even lack of information in the early days of the accident severely undermined public confidence that everything possible in thir interest was being done, and may have exacerbated the danger. The need for a round-the-clock federal presence and supreme authority in the control room is made evident by the TMI-2 accident which started at 3 a.m.

(4) TMI-2 has reemphasized that it is folly to cut corners on safety in the guise of "reforming" and "expediting" nuclear licensing. Greater federal review and control of nuclear power plant plans, actual construction, and operation are needed, not "blank check" approval of whatever nuclear utilities do. As the Public Interest Research Group demonstrated in its August

29, 1977 comments on the Administration's draft nuclear licensing bill, changes in regulatory requirements and legal challenges are not a major cause of delay in commencing nuclear power plant operation.

We trust the government will learn the lesson of TMI-2. The Administration and Congress should cooperate in conducting the investigation and proposing solutions to the problems found. In this spirit, we are sending copies of this letter and the report to the chairmen of the congressional committees with jurisdiction over the repercussions of the tax code on the vital issue of nuclear safety.

Yours truly,

Ralph Nader

Sidney Wolfe, M.D.
Health Research Group

Michael Bancroft
Public Citizen Litigation Group

Robert Stulberg
Health Research Group

Robert McIntyre
Tax Reform Research Group

Richard Pollock
Critical Mass Energy Project

cc: Senator Russell Long
Representative Al Ullman