ENVIRONMENTAL IMPACT APPRAISAL

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 34 TO FACILITY OPERATING LICENSE NO. DPR-50

METROPOLITAN EDISON COMPANY, JERSEY CENTRAL POWER AND LIGHT COMPANY,
PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT NO. 1

DOCKET NO. 50-289

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1.0 Description of Proposed Action

In their submittal of February 3, 1977, supplemented by a letter dated May 24, 1977, Metropolitan Edison Company (MEC) requested an amendment to Facility Operating License No. DPR-50 for the Three Mile Island Nuclear Station Unit No. 1 (TMI-1) to increase the storage capacity of the "B" spent fuel pool (SFP) at this facility.

The modification evaluated in this environmental impact appraisal is the proposal by MEC to replace the spent fuel storage racks originally provided for this pool with closer spaced racks to increase the storage capacity of the "B" spent fuel pool from 174 to 496 fuel assemblies. This would increase the total storage capacity of the "A" and "B" SFPs from 430 assemblies to 752 assemblies.

2.0 Need for Increased Storage Capacity

TMI-1 received its operating license, DPR-50, in April 1974. At present there are 104 fuel assemblies stored in the "A" spent fuel pool. These are the assemblies discharged during the first and second refueling outages in March 1976 and March 1977. The currently unused storage capacity of the "A" SFP is 152 assemblies. Based on normal operation in the future, approximately 52 assemblies will be added to the SFP each year. Thus, in the absence of off-site fuel shipments, the "A" SFP would be full by the Spring of 1980, and the "B" SFP, with the presently authorized storage capacity of 174, would be substantially full (incapable of accommodating the assemblies discharged from a normal refueling) after 1983.

In addition to providing for storage of spent fuel, it is prudent engineering practice to maintain sufficient reserve space in the SFP to off-load a full core should it be necessary to inspect or repair core internals. Since a full core consists of 177 fuel assemblies, it can be seen from the above that there is insufficient capacity remaining in the "A" SFP at this time to accommodate a full core off-load. There is, however, sufficient authorized capacity to accommodate a full core off-load if the "B" SFP is also utilized. This capability, nevertheless, will be eliminated in about three years (1980) based on the presently authorized storage capacity and normal refueling schedules. With the proposed increase in capacity of the "B" SFP, however, the capability for a full-core off load will be extended for about six additional years (1986).

The basic need for the proposed increase in on-site spent fuel storage capacity stems from the current unavailability of off-site storage for TMI-1 spent fuel and the expectation that several years will be required before the necessary storage capacity can be made available. This situation is discussed further in Sections 3.0 and 7.0.

The proposed modification will not alter the external physical geometry of the spent fuel pool or require additional modifications to the SFP cooling or purification systems. The proposed modification does not affect in any manner the quantity of uranium fuel utilized in the reactor over the anticipated operating life of the facility and thus in no way affects the generation of spent uranium fuel by the facility. The rate of spent fuel generation and the total quantity of spent fuel generated during the anticipated operating lifetime of the facility remains unchanged as a result of the proposed expansion. The modification will increase the number of spent fuel assemblies stored in the SFP and the length of time that some of the fuel assemblies will be stored in the pool.

3.0 Fuel Reprocessing History

Currently, spent fuel is not being reprocessed on a commercial basis in the United States. The Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down in 1972 for alterations and expansions; on September 22, 1976, NFS informed the Commission that they were withdrawing from the nuclear fuel reprocessing business. The Allied General Nuclear Services (AGNS) proposed plant in Barnwell, South Carolina is not licensed to operate. The General Electric Company's (GE) Midwest Fuel Recovery Plant in Morris, Illinois, now referred to as Morris Operation (MO), is in a decommissioned condition. Although no plants are licensed for reprocessing fuel, the storage pool at Morris, Illinois and the storage pool at West Valley, New York (on land owned by the State of New York and leased to NFS through 1980) are licensed to store spent fuel. The storage pool at West Valley is not full but NFS is presently not accepting any additional spent fuel for storage, even from those power generating facilities that had contractual arrangements with NFS. Construction of the AGNS fuel receiving and storage station has been completed. AGNS has applied for--but has not been granted--a license to receive and store irradiated fuel assemblies in the storage pool at Barnwell prior to a decision on the licensing action relating to the reprocessing facility.

On April 7, 1977, the President issued a statement outlining his policy on continued development of nuclear energy in the U. S. The President stated that: "We will defer indefinitely the commercial reprocessing and recycling of the plutonium produced in the U. S. nuclear power programs. From our own experience, we have concluded that a viable and economic nuclear power program can be sustained without such reprocessing and recycling."

MEC had originally planned to ship the TMI-1 spent fuel to a reprocessing facility to separate the fissionable material for recycling. As discussed in more detail in Section 7.0, "Alternatives", reprocessing of spent fuel is not an available alternative in the foreseeable future.

4.0 The Plant

The Three Mile Island Nuclear Station, Unit No. 1 is described in the Final Environmental Statement (FES) issued by the Commission in December 1972. TMI-1 utilizes a pressurized water reactor (PWR) with a licensed thermal power of 2535 megawatts (MWt) to produce a net power output of about 800 electrical megawatts (MWe). The fuel storage facilities for Units 1 and 2 of the station are not shared. Descriptions of pertinent features of TMI-1 as it currently exists are summarized below.

4.1 Fuel Inventory

The TMI-1 reactor contains 177 fuel assemblies. A fuel assembly consists of a 15x15 array of Zircaloy tubes approximately 13 feet long, fixed at either end by stainless steel upper and lower end fittings and supported at intermediate points along its length by Inconel spacer grids. The overall dimensions of the fuel assembly are about 8.5 inches square by about 165.6 inches long. Of the 225 tubes in the 15x15 array, 208 contain fuel, 16 are guide tubes for control rod assemblies, axial power shaping rod assemblies, or orifice assemblies (depending on core location) and one tube is a guide tube for incore instrumentation. Each fuel tube contains a stack of uranium dioxide pellets approximately 12 feet high. The ends of the fuel tubes are sealed with plugs and the tubes are evacuated and back-filled with helium. About one-third of the fuel assemblies are removed from the reactor and replaced with new fuel each year.

4.2 Plant Cooling Water Systems

TMI-1 employs hyperbolic natural draft cooling towers to provide closed cycle cooling for the condenser. Blowdown from this closed system is diluted by combining it in a cooling pond with the discharge from the river water systems. The river water systems consist of the river water portions of the Nuclear Services Cooling Water System, the Secondary Services Cooling Water System, the Decay Heat Services Cooling System, the Reactor Building Emergency Cooling System and the Screen House Ventilation Cooling System. Of these systems, all but the last ultimately discharge to a cooling pond where cooling is supplemented by operation of a mechanical draft cooling tower as necessary to meet thermal discharge limits. The cooled water is then discharged to the river. The Screen House Ventilation Cooling System is a minor low capacity system that discharges directly back to the river.

The open cycle river water portion of the Nuclear Services Cooling Water System provides cooling for the Nuclear Services Closed Cycle Cooling Water System. This closed cycle system then provides cooling by means of heat exchangers to the various nuclear services including the reactor coolant pump air and oil coolers, the reactor coolant pump seal return cooler, the reactor building cooling unit fan motor coolers, the waste evaporator condensers and distillate coolers, the waste gas compressors and the spent fuel pool coolers.

4.3 Radioactive Wastes

The station contains waste treatment systems designed to collect and process the gaseous, liquid and solid waste that might contain radioactive material. The waste treatment systems are evaluated in the FES dated December 1972. There will be no change in the waste treatment systems described in Section III.D.2 of the FES because of the proposed modification.

4.4 Purpose of SFP

The SFP at TMI-1 was designed to store spent fuel assemblies prior to shipment to a reprocessing facility. These assemblies may be transferred from the reactor core to the SFP during a core refueling, or to allow for inspection and/or modification to core internals. The latter may require the removal and storage of up to a full core. The assemblies are initially intensely radioactive due to their fission product content and have a high thermal output. They are stored in the SFP to allow for radioactive and thermal decay.

The major portion of decay occurs during the 150-day period following removal from the reactor core. After this period, the assemblies may be withdrawn and placed into a heavily shielded fuel cask for offsite shipment. Space permitting, the assemblies may be stored for an additional period allowing continued fission product decay and thermal cooling prior to shipment.

4.5 SFP Cooling and Purification System

The TMI-1 A and B spent fuel pools are provided with a cooling loop which removes decay heat from fuel stored in the SFP and a purification loop to permit unrestricted access to the SFP area and to provide optical clarity of the SFP water. The Spent Fuel Cooling System was designed to limit the SFP water temperature to about 135^{o}F during normal refueling operations and to about 150^{o}F during full core discharge situations, 150 hours after reactor shutdown. The cooling system is described in Section 9.4 of the FSAR.

Cleanup of pool water is accomplished by diverting part of the flow in the Spent Fuel Cooling System to the primary coolant chain of the Radioactive Liquid Waste Disposal System (RLWDS). The primary coolant chain, or SFP purification system, consists of two precoat filters, two demineralizers, one evaporator and the required piping, valves and instrumentation. The Borated Water Recirculation Pump transfers water from the SFPs and the refueling cavity to the RLWDS. The water from the pool or the refueling cavity passes through the filter and/or the demineralizer and then is returned to the pool or the refueling cavity.

Spent fuel has been stored in the Three Mile Island Unit 1 "A" SFP. MEC has, therefore, experience with this purification system. The radioactivity levels in the vicinity of the pool, which result primarily from the radioactivity in the pool water, are acceptably small and represent typical radiation levels in the vicinity of the SFP at other nuclear power plants. The primary purification medium has been the precoat filters; however, mixed-bed demineralizers and an evaporator are available if they are needed. The precoat filters have been backwashed about once a month, and the purification system is operated for three to four months a year. The normal flow into the primary coolant chain of the RLWDS from the SFP is 150 gpm although the design flow rate of the pump is 180 gpm.

Radioactivity enters the pool water by introduction of reactor coolant water into the pool during refueling, by the removal of crud from the surface of the spent fuel assemblies during handling of the assemblies and by the leakage of fission products from within the spent fuel assemblies. The rate of introduction of reactor coolant water into the pool will not change as a result of the proposed modification because the modification does not include a change in the refueling schedule. Although the proposed modification will increase the total number of assemblies that can be stored in the pool, we do not expect a significant increase in the number of times assemblies are handled before shipment offsite. Therefore, because any significant removal of crud from the surface of the assembly would occur during the initial fuel handling when the assembly is transferred from the core to the SFP, there should not be a significant increase in crud introduced to the pool water due to the proposed modification. Experience with spent fuel stored at the Morris Operation (formerly the Midwest Fuel Recovery Plant)(Morris, Illinois) and at Nuclear Fuel Services (West Valley, New York) has indicated that there is little or no leakage of radioactivity from spent fuel which has cooled several months; therefore, there should not be a significant increase in leakage activity from spent fuel to the pool because of the proposed modification.

Because we expect only a small increase in radioactivity released to the pool water as a result of the proposed modification, we conclude that the TMI-1 purification system is adequate for the proposed modification. However, if the actual release of radioactivity proves to be greater, MEC can:

1. Increase the system flow rate from 150 gpm to 180 gpm;

2. Operate the system for periods greater than 4 months per year;

3. Backwash the precoat filters more frequently than has been done; and

4. Use the demineralizers, and the evaporator in the RLWDS.

On the basis of the above, we conclude the spent fuel pool cleanup system is adequate for the proposed modification and will keep the concentrations of radioactivity in the pool water to acceptably low levels.

5.0 Environmental Impacts of Proposed Action

5.1 Land Use

The proposed modification involves a change in the storage arrangement within an existing SFP within an existing building. Therefore, the modification would not affect the quantity or quality of present land use.

5.2 Water Use

The principal quantity of water consumed as a result of spent fuel storage is that lost by evaporation from the mechanical draft cooling towers which reject all or a portion of the waste heat to the atmosphere. The quantity of water consumed in cooling stored spent fuel, however, is only a small fraction of the total water necessarily consumed by the plant. As stated in Section V.B.1 of the FES, the total water consumed as a result of operation of both units of the Three Mile Island Nuclear Station is estimated to be about 20,800 gpm. The bulk of this consumption arises from evaporation and drift associated with operation of the natural draft and mechanical draft cooling towers which reject waste heat to the atmosphere. The major portion of this waste heat is that which cannot be effectively used in the generation of electricity. This amounts to about two-thirds of the thermal power of Units 1 and 2, or about 3500 MWt. By contrast, the thermal load presented by the "A" and "B" SFPs of Unit 1 if filled to presently authorized capacity with spent fuel with an average decay period of one year is less than 6 MWt. Since most of the fuel stored in the pool would have a decay period greater than one year, the water usage associated with cooling of stored spent fuel would be less than 0.2% of the total water usage. Increasing the total Unit 1 storage capacity from 430 assemblies to 752 assemblies, as proposed by MEC, would not increase the thermal load proportionately. This is because the effect of increased storage capacity is to allow longer term storage and hence, further radioactive decay of the stored fuel. Nevertheless, even if it is assumed that all of the stored fuel has a decay period of one year, the increase in water usage attributable to the increased storage capacity would be less than 0.15%.

While there are periods immediately following refueling or following a full core off-load when the water usage would be somewhat higher due to the temporarily greater thermal load, these are necessary transient conditions that have been discussed in Section 4.5 and which have only a minor effect on the incremental long term water usage.

Based on the above, we conclude that the proposed increase in spent fuel storage capacity will not have a significant effect on the water usage by the Three Mile Island Nuclear Station.

5.3 Radiological

5.3.1 Introduction

The potential offsite radiological environmental impacts associated with the expansion of the spent fuel storage capacity were evaluated and determined to be environmentally insignificant as addressed below.

The proposed expanded spent fuel storage capacity will allow storage of spent fuel generated in the next 12 years without shipment offsite. The additional spent fuel which would be stored due to the expansion is fuel which has decayed at least eight years. During the storage of the spent fuel under water, both volatile and nonvolatile radioactive nuclides may be released to the water from the surface of the assemblies or from defects in the fuel cladding. Most of the material released from the surface of the assemblies consists of activated corrosion products such as Co-58, Co-60, Fe-59 and Mn-54 which are not volatile. The radionuclides that might be released to the water through defects in the cladding, such as Cs-134, Cs-137, Sr-89 and Sr-90, are also predominately nonvolatile. The primary impact of such nonvolatile radioactive nuclides is their contribution to radiation levels to which workers in and near the SFP would be exposed. The volatile fission product nuclides of most concern that might be released through defects in the fuel cladding are the noble gases (xenon and krypton), tritium and the iodine isotopes.

Experience indicates that there is little radionuclide leakage from spent fuel stored in pools after the fuel has cooled for several months. The predominant radionuclides in spent fuel pool water appear to be those that were present in the reactor coolant system prior to refueling (which becomes mixed with water in the spent fuel pool during refueling operations) or crud dislodged from the surface of the spent fuel during transfer from the reactor core to the SFP. During and after refueling, the spent fuel pool purification system reduces the radioactivity concentrations considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at reactor operating conditions of approximately 800°F. A few weeks after refueling, the spent fuel cools in the spent fuel pool so that the fuel rod temperature is relatively cool, approximately 180°F. This substantial temperature reduction should reduce the rate of release of fission products from the fuel pellets and decrease the gas pressure in the gap between pellets and clad, thereby tending to retain the fission products within the cladding. In addition, most of the gaseous fission products have short half-lives and decay to insignificant levels within a few months. Based on the operational reports submitted by licensees and discussions with operators, there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO) (formerly Midwest Fuel Recovery Plant) at Morris, Illinois, or at Nuclear Fuel Services' (NFS) storage pool at West Valley, New York. Spent fuel has been stored in these two pools which, while it was in a reactor, was determined to have significant leakage and was, therefore, removed from the core. After storage in the onsite spent fuel pool, this fuel was later shipped to either MO or NFS for extended storage. Although the fuel exhibited significant leakage at reactor operating conditions, there was no significant leakage from this fuel in the offsite storage facility.

5.3.2 Radioactive Material Released to Atmosphere

With respect to gaseous releases, short-lived noble gases in the spent fuel will decay to negligible amounts after a year of storage. Therefore, the only significant noble gas isotope remaining in the SFP and attributable to storage of additional assemblies for a longer period of time would be Krypton-85. We have assumed that 0.12% of all fuel rods have cladding defects which permit the escape of fission product gases. This is the average failed fuel fraction for zircaloy clad fuel for pressurized water reactors given in NUREG 0017. As discussed previously, experience has demonstrated that after spent fuel has decayed 4 to 6 months, there is no significant release of fission products from defected fuel. However, to bound any potential releases, we assumed that the fission product gases escape on a relatively linear basis with time. On this basis, we have conservatively estimated that an additional 22 curies per year of Krypton-85 may be released from the SFP when the modified pool is completely filled. The fuel storage pool area is continuously ventilated and the exhaust air is normally released from the auxiliary and fuel handling building vent. If the facility were to release an additional 22 curies per year of Kr-85 as a result of the proposed modification the increased release would result in an additional total body dose at the site boundary (east-southeast) to an individual of less than 0.001 mrem/year. This dose is insignificant when compared to the approximately 100 mrem/year that an individual receives from natural background radiation.

The additional total body dose to the estimated population within a 50-mile radius of the plant is less than 0.001 man-rem/year. This is less than the natural fluctuations in the dose this population would receive from natural background radiation. Under our conservative assumptions, these exposures represent an increase of less than 0.5% of the exposures from the plant evaluated in the FES for the individual (Table 14) and the population (Table 15). Thus, we conclude that the proposed modification will not have any significant impact on radiation levels or exposures offsite.

Assuming that the spent fuel will be stored onsite for several years, iodine-131 releases from spent fuel assemblies to the SFP water will not be significantly increased because of the expansion of the fuel storage capacity since the iodine-131 inventory in the fuel will decay to negligible levels between each annual refueling. The iodines are removed from the SFP water by the SFP cleanup system or through decay as a result of their relatively short half lives.

Storing additional spent fuel assemblies is not expected to increase the bulk water temperature above the 135°F used in the design analysis during normal refuelings (removal of about 1/3 core each year). Since the temperature of the pool water will normally be maintained below 135°F, it is not expected that there will be any significant change in evaporation rates and the release of tritium or iodine as a result of the proposed modification from that previously evaluated. Most airborne releases from the plant result from leakage of reactor coolant which contains tritium and iodine in higher concentrations than the spent fuel pool. Therefore, even if there were a slightly higher evaporation rate from the spent fuel pool, the increase in tritium and iodine released from the plant as a result of the increase in stored spent fuel would be small compared to the amount normally released from the plant and that which was previously evaluated in Section III.D.2.a of the FES.

5.3.3 Solid Radioactive Wastes

Operating experience at TMI-1 has demonstrated that the SFP purification system is effective in maintaining water purity and low concentrations of radionuclides. The concentration of radionuclides in the pool is controlled by filters in the SFP purification system and by decay of short-lived isotopes. The activity is high during refueling operations while reactor coolant water is introduced into the pool and decreases as the pool water is processed through the filters. The additional radioactivity that may be released to the SFP water by storing more spent fuel assemblies in the pool may result in more frequent replacement of the filters or an increased amount of radioactivity accumulated on the filters or both. The increase of radioactivity, if any, should be minor because the additional spent fuel to be stored is relatively cool, thermally, and radionuclides in the fuel will have decayed significantly.

The precoat filters and the demineralizers in the Radioactive Liquid Waste Disposal System (RLWDS) are used to cleanup water from the Containment Building Fuel Transfer Canal, the Borated Water Storage Tank, the primary coolant, and the Reactor Coolant Bleed Tank in addition to the Spent Fuel Pool. The frequency of backwashing the filter precoat and replacing the demineralizer resin because of the processing water from the above 6 systems is 15 times per year for each filter and approximately once per year for each demineralizer. The volume of waste of the demineralizer resin in the purification system is 36 cu. ft. The volume of the precoat on the filters is 1.3 cu. ft. The demineralizer resin and the filters are removed from the site as solid waste. The precoat filters are removed from service when the pressure drop across the filter becomes excessive. The demineralizer resins are removed from service when the decontamination factor falls below a predetermined level or when the surface dose rate of the housing reaches a predetermined level. MEC does not expect an increase in solid waste from the proposed SFP modification based on operating experience to date which shows the fuel pool introduces a negligible amount of waste to the RLWDS.

While we agree with MEC's conclusion that there should not be an increase in solid radwaste due to the modification, we have nevertheless conservatively assumed that the amount of solid radwaste may be increased by an additional eight precoat filter changes a year or an additional demineralizer resin bed a year. The annual average volume of solid waste shipped from TMI-1 from 1974 to 1976 was 12,500 cubic feet. If the storage of additional spent fuel does increase the amount of solid waste from the SFP purification systems by about 36 cubic feet per year, the increase in total waste volume shipped would be less than 1% and would not have any significant additional environmental impact.

There will be no material removed from the Spent Fuel Pools because of the proposed modification. The fuel racks of the "B" Spent Fuel Pool, which is the pool to be modified, are stored in an open field next to TMI-1. Since these racks are uncontaminated, they will remain in storage until a use for the aluminum is found or they will be disposed of as scrap metal.

5.3.4 Radioactivity Released to Receiving Waters

There should not be a significant increase in the liquid release of radionuclides from the station as a result of the proposed modification. The amount of radioactivity on the primary coolant chain filters and demineralizer resins might slightly increase due to the additional spent fuel in the pool but this increase of radioactivity should not be released in liquid effluents from the station. The precoat filters remove insoluble and soluble radioactive matter from the SFP water. The filter precoat is periodically flushed from its housing to the used precoat tank of the solid waste disposal system. The radioactivity will be retained on the filter or remain in the flush water which is returned to the liquid radwaste system for processing.

The resins are periodically flushed with water to the spent resin tank of the solid waste disposal system and are not regenerated. The water used to transfer the spent resin is decanted from the tank and returned to the liquid radwaste system for processing. The soluble radioactivity will be retained on the resins which are dewatered and solidified.

If any activity should be transferred from the spent resin or filter precoat to this flush water, it would be removed by the liquid radwaste system. After processing in the radwaste system, there should not be a significant increase in the amount of radioactivity released to the environment in liquid effluents as a result of the proposed modification.

The spent resins and filter precoat are finally placed in shipping containers or 55 gallon drums and solidified before shipment offsite to a burial site.

5.3.5 Occupational Exposures

We have reviewed MEC's plan for removal, disassembly and disposal of the old racks and the installation of the new racks with respect to occupational radiation exposure. There will be no occupational exposure associated with the removal of the old racks because these racks were removed two years before plant startup. MEC estimated an exposure of 0.15 man-rem during the installation of the new racks. MEC stated this estimate was based on actual fuel pool surveys and conservative rack installation requirements. Because the "B" spent fuel pool has never contained spent fuel we consider this to be a reasonable estimate.

We have estimated the increment in onsite occupational dose resulting from the proposed increase in stored fuel assemblies on the basis of information supplied by MEC and by utilizing realistic assumptions for occupancy times and for dose rates in the spent fuel pool area from radionuclide concentrations in the SFP water. The spent fuel assemblies themselves contribute a negligible amount to dose rates in the pool area because of the depth of water shielding the fuel. The occupational radiation exposure resulting from the proposed action represents a negligible burden. Based on present and projected operations in the spent fuel pool area, we estimate that the proposed modification will add less than one percent to the total annual occupational radiation exposure burden at this facility. The small increase in radiation exposure will not affect MEC's ability to maintain individual occupational doses to as low as is reasonably achievable and within limits of 10 CFR 20. Thus, we conclude that storing additional fuel in the SFP will not result in any significant increase in doses received by occupational workers.

5.3.6 Evaluation of Radiological Impact

As discussed above, the proposed modification does not significantly change the radiological impact evaluated in the FES.

5.4 Nonradiological Effluents

There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modification. The only offsite nonradiological environmental impact resulting from this proposed action would be an additional discharge of heat to the atmosphere or to the Susquehanna River. As noted in Section 5.2, however, the incremental thermal load to the atmosphere which would result from the proposed modification is less than about 0.15% of the combined thermal load for Units 1 and 2, or about 0.3% of the thermal load for Unit 1. Because of the small size of this incremental heat load, and the availability of mechanical draft cooling towers if needed, this additional heat discharge would not affect the ability of TMI-1 to meet its thermal effluent limitations.

Accordingly, on the basis of the foregoing, we conclude that the incremental environmental impact of nonradiological effluents as a result of the proposed modification is not significant.

5.5 Impacts on the Community

The new storage racks will be fabricated offsite and shipped to the plant. No environmental impacts on the environs outside the spent fuel storage building are expected during installation of the new racks. The impacts within this building are expected to be limited to those normally associated with metal working activities. No significant environmental impact on the community is expected to result from the fuel rack conversion or from subsequent operation with the increased storage of spent fuel in the SFP.

6.0 Environmental Impact of Postulated Accidents

Although the proposed high density racks will accommodate a larger inventory of spent fuel, we have determined that the installation and use of the racks will not change the radiological consequences of a postulated fuel handling accident from those values reported in the FES for TMI-1 dated December 1972.

Additionally, the NRC staff has underway a generic review of load handling operations in the vicinity of spent fuel pools to determine the likelihood of a heavy load impacting fuel in the pool and, if such an event can occur, the radiological consequences of such an event. Because TMI-1 will have technical specification requirements to prohibit the movement of loads in excess of 3000 pounds over stored spent fuel, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the acceptability of the proposed modification is not affected. In addition, spent fuel shipping casks will not be permitted in the Unit 1 Refueling Building prior to our completion of the cask drop analysis review.

7.0 Alternatives

Alternatives to the proposed modification which have been considered by the NRC staff include the following: (1) shipment of spent fuel to a fuel reprocessing facility, (2) shipment of spent fuel to separate fuel storage facility, (3) shipment of spent fuel to another reactor site and (4) terminating operation of TMI-1. Each of these alternatives is considered below.

The total cost of the proposed modification is estimated to be about $920,000 in 1976 dollars, or approximately $2850 for each of the 322 additional fuel assemblies that the increased storage capacity will accommodate.

It should be noted that, as discussed herein, TMI-1 could continue to operate for a few years with its presently authorized fuel storage capacity without being required to shutdown because of a lack of such storage capacity. MEC desires to make the modification at this time, however, because the "B" SFP does not now and has not previously contained irradiated fuel. Therefore, the modification can be made in a dry pool that is still uncontaminated. This means that the modification can be done more efficiently and with less radiation exposure of personnel than would be the case if the modification were done while the "B" SFP contained irradiated fuel or after it had provided temporary storage for irradiated fuel. In addition, the original "B" SFP storage racks can be used or disposed of as ordinary salvage material at this time rather than be disposed of as radioactive solid waste after they have been used. MEC desires that this modification be made at the earliest practicable date. This is because if a situation requiring unloading of the entire core were to arise unexpectedly prior to the modification, some fuel would have to be stored in the "B" SFP and the benefits of an uncontaminated pool would be lost. In addition, if the modification were deferred until after refueling in 1980, the modification would have to be performed in a pool already containing irradiated fuel.

Based on the above considerations we agree with MEC that the proposed modification, if approved, should be implemented at the earliest practicable date.

7.1 Reprocessing of Spent Fuel

As discussed earlier, none of the three commercial reprocessing facilities in the U. S. are currently operating. The General Electric Company's Midwest Fuel Recovery Plant (MFRP) at Morris, Illinois is in a decommissioned condition. On September 22, 1976, Nuclear Fuel Services, Inc. (NFS) informed the Nuclear Regulatory Commission that they were "withdrawing from the nuclear fuel reprocessing business." The Allied General Nuclear Services (AGNS) reprocessing plant received a construction permit on December 18, 1970. Construction of the reprocessing facility is essentially complete, but no operating license has been granted. On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 MTU of spent fuel in the onsite storage pool, on which construction has also been completed, but hearings with respect to that application have not yet commenced and no license has been granted. In the light of the President's policy statement of April 7, 1977, the future of operatons at the Barnwell facility are not clear. However, even if AGNS should decide to proceed with operation of the Barnwell facility, the reprocessing plant will not be licensed until the issues presently being considered in the GESMO proceedings are resolved and the GESMO proceedings are completed.

In 1976, Exxon Nuclear Company, Inc. submitted an application for a proposed Nuclear Fuel Recovery and Recycling Center (NFRRC) to be located at Oak Ridge, Tennessee. The plant would include a storage pool that could store up to 7,000 MTU in spent fuel. The application for a construction permit is under review. As with the Barnwell facility, the Presidential policy statement of April 7, 1977, makes the future of this project unclear.

Accordingly, in view of the change in national policy and circumstances beyond MEC's control, reprocessing of the spent fuel is not an available option at this time.

7.2 Independent Spent Fuel Storage Installation

An alternative to expansion of onsite spent fuel pool storage is the construction of new "independent spent fuel storage installations" (ISFSI). Such installations could provide storage space in excess of 1,000 MTU of spent fuel. This is far greater than the capacities of onsite storage pools. Fuel storage pools at GE Morris and NFS are functioning as ISFSIs although this was not the original intent. Likewise, if the receiving and storage station at AGNS is licensed to accept spent fuel, it would be functioning as an ISFSI until the separations facility was licensed to operate. The license for the GE facility at Morris, Ill. was amended on December 3, 1975 to increase the storage capacity to about 750 MTU. As of April 1, 1977, approximately 259 MTU was stored in the pool in the form of 1,055 assemblies. The NRC staff has discussed the status of storage space at Morris Operations (MO) with GE personnel. We have been informed that GE is primarily operating the MO facility to store either fuel owned by GE (which had been leased to utilities on an energy basis) or fuel which GE had previously contracted to reprocess. We were informed that the present GE policy is not to accept spent fuel for storage except for that fuel for which GE has a previous commitment. The NFS facility has capacity for about 260 MTU, with approximately 170 MTU presently stored in the pool. The storage pool at West Valley, New York is on land owned by the State of New York and leased to NFS through 1980. Although the storage pool at West Valley is not full, since NFS withdrew from the fuel reprocessing business, correspondence we have received indicates that they are not at present accepting additional spent fuel for storage even from those reactor facilities with which they had contracts.

With respect to construction of new ISFSIs, Regulatory Guide 3.24, "Guidance on the License Application, Siting, Design, and Plant Protection for an Independent Spent Fuel Storage Installation," issued in December 1974, recognizes the possible need for ISFSIs and provides recommended criteria and requirements for water-cooled ISFSIs. Pertinent sections of 10 CFR Parts 19, 20, 30, 40, 51, 70, 71 and 73 would also apply.

We have estimated that at least five years would be required for completion of an independent fuel storage facility. This estimate assumes one year for preliminary design; one year for preparation of the license application, Environmental Report, and licensing review in parallel with one year for detail design; two and one-half years for construction and receipt of an operating license; and one-half year for plant and equipment testing and startup.

A few industry proposals for construction of independent spent fuel storage facilities have been made to date. In late 1974, E. R. Johnson Associates, Inc. and Merrill Lynch, Pierce, Fenner and Smith, Inc. issued a series of joint proposals to a number of electric utility companies having nuclear plants in operation or near operation, offering to provide independent storage services for spent nuclear fuel. A paper on this proposed project was presented at the American Nuclear Society meeting in November 1975. In 1974, E. R. Johnson Associates estimated the construction cost at approximately $9,000 per spent fuel assembly.

Several licensees have evaluated construction of a separate independent spent fuel storage facility and have provided cost estimates. Connecticut Yankee, for example, estimated that to build an independent facility with a storage capacity of 1,000 MTU (BWR and/or PWR assemblies) would cost approximately $54 million and take about 5 years to put into operation. This would correspond to about $25,000 per TMI-1 fuel assembly. MEC similarly has provided an estimate of the costs of a MEC-owned ISFSI. In this case the costs range from $19,000 to $30,000 per assembly for storage capacities of 200 to 550 MTU. Commonwealth Edison estimated the construction cost to build a fuel storage facility at about $10,000 per fuel assembly. To this would be added costs for maintenance, operation, safeguards, security, interest on investment, overhead, transportation and other costs.

On December 2, 1976, Stone and Webster Corporation submitted a topical report requesting approval for a standard design for an independent spent fuel storage facility. No specific locations were proposed, although the design is based on location near a nuclear power facility. No estimated costs for fuel storage were included in the topical report.

On October 18, 1977, the Department of Energy announced that the Government was preparing to accept and take title to used, or spent, nuclear reactor fuel from utilities on payment of a one time storage fee. The announcement further noted that to implement this policy the Government would need both interim and permanent spent fuel storage capability and, to this end, the Department of Energy would begin immediate discussions with private industry to determine whether suitable interim fuel storage services could be provided to the Government on a contract basis. Based on this announcement it appears that positive steps to increase off-site spent fuel storage capacity and to make the capacity available to all utilities will be initiated in the near future. As noted above, however, the staff estimates that at least five years would be required to complete an ISFSI and place it in operation. Based on initiation of such a project in 1978, the resulting facility might thereby be available by 1983.

Therefore, on a short term basis (i.e., prior to 1983) an independent spent fuel storage installation is not a viable alternative based on cost or availability in time to meet MEC's needs. It is also unlikely that the total environmental impacts of constructing an independent facility and shipment of spent fuel would be less than the minor impacts associated with the proposed action.

In the long term, the Department of Energy will implement its program for storage of spent fuel. As announced in the President's energy policy statement of April 29, 1977, the Government is committed to provide a storage facility for nuclear wastes by 1985. The proposed increase in storage capacity will allow TMI-1 to operate until 1986 with full core offload capability, by which time the Federal storage facility is expected to be operable.

7.3 Storage at Another Reactor

General Public Utilities Corporation, owner of MEC, is preparing to place Three Mile Island Unit No. 2 (TMI-2) into operation in the near future. Although the TMI-2 SFPs are separate from the TMI-1 pools, they are located in the same building and cooled spent fuel could be transferred from one unit to the other through use of an appropriately shielded cask. Such an operation could be used to maintain, for a period of time, a full core offload capability for Unit 1. The same operation, however, would also hasten the time when (barring shipment of spent fuel off-site) Unit 2 would encounter storage problems. Specifically, we have estimated, based on a normal refueling schedule, that if no Unit 1 spent fuel were transferred to the Unit 2 SFPs, TMI-2 could maintain a full core offload capability through the refueling in 1984. On the other hand, based on the presently authorized Unit 1 storage capacity, if Unit 1 spent fuel were transferred to Unit 2 as necessary to maintain a full core offload capability for Unit 1, TMI-2 could maintain the same capability only through the refueling of 1982. A single full core offload capability (to be used by either unit) could be maintained for an additional one to two years if inter-unit transfers of spent fuel were used as needed.

It was previously noted that the staff has estimated that at least five years will be required to place an ISFSI into operation. From the above schedule considerations it is seen that even if such a project were initiated in 1978 and completed on schedule, off site storage would not be available until after the time each of the units reached the point where each could still just maintain individual full core offload capabilities. Further, any significant delay in completion of such a facility could jeopardize this capability for both units and possibly require termination of operation until other storage arrangements could be effected.

In this regard, the proposed increase in storage capacity for TMI-1 would significantly lessen the probability that operation of Units 1 or 2 would be affected by the delayed availability of off-site storage. Specifically, the storage capability of Unit 2 would remain unchanged (full core offload capability until about 1984) and the full core offload capability for Unit 1 could be extended to about 1986. In addition, this could be accomplished without requiring the extra handling of spent fuel incident to inter-unit transfers.

General Public Utilities Corporation has also considered the shipment of excess TMI-1 spent fuel to the Oyster Creek Reactor SFP. Oyster Creek is a boiling water reactor (BWR) operated by the Jersey Central Power and Light Company subsidiary of General Public Utilities. Oyster Creek was granted permission in 1977 to increase its spent fuel storage capacity. With this increase Oyster Creek now has the capacity to accumulate its own spent fuel until 1984 while retaining a full core offload capability. As with TMI-2, however, shipment of TMI-1 fuel to Oyster Creek would provide only a temporary solution for TMI-1 fuel storage and would reduce the time until Oyster Creek could again encounter spent fuel storage problems. In addition, a portion of the spent fuel storage racks at Oyster Creek would require modification in order to accommodate the fuel from TMI-1.

According to a survey conducted and documented by the Energy Research and Development Administration, up to 46 percent of the operating nuclear power plants will lose the ability to refuel during the period 1975-1984 without additional spent fuel storage pool expansions or access to offsite storage facilities. Thus, MEC cannot assuredly rely on other power facilities to provide additional storage capability except on a short-term emergency basis. If space were available in another reactor facility, the cost would probably be comparable to the cost of storage at a commercial storage facility.

In view of the foregoing we conclude that transfer of TMI-1 spent fuel to TMI-2, Oyster Creek or any other reactor provides only a temporary solution for TMI-1 and depending on the timely availability of other offsite storage capacity, could ultimately adversely affect the capability of TMI-1 and/or the receiving facility to continue operation. On the other hand, the increase in storage capacity proposed for TMI-1 significantly improves its ability to continue operation until offsite storage facilities are available and reduces the probability of impacting the storage capabilities of other units.

7.4 Shutdown of Facility

There are two conditions when lack of fuel storage capacity would require reactor shutdown: (1) when it was necessary for repair or inspection purposes to fully unload the core and there was insufficient storage capacity for the full core (177 assemblies), or (2) the reactor required refueling to continue operation but all storage locations were filled. Although neither of these conditions apply at the present time, the conditions could develop in the future. Specifically, based on the presently authorized fuel storage capacity and a normal refueling schedule (with no transfer of spent fuel from TMI-1) the condition of loss of full core offload capability would occur following refueling in 1980; and the condition of complete loading of the SFPs would occur in about 1983.

We have estimated that if TMI-1 were required to shutdown due to a lack of fuel storage capacity, the replacement cost of energy would be approximately $77 million per year. This estimate is based on a Unit Capacity Factor of 70.9% which is the reported cumulative Unit Capacity Factor for TMI-1 as of September 1, 1977.

The above costs represent only the costs of replacement power and certain fixed costs. If the facility were to be permanently shutdown, additional costs for security monitoring and decommissioning would also be incurred. In addition, from the point of view of natural resources, such a shutdown would result in the consumption of approximately 7.7 million additional barrels of fuel oil per year.

7.5 Summary of Alternatives

The suitability of the various alternatives to the proposed modification are summarized as follows: (1) Reprocessing of spent fuel is not an available option at this time; (2) Because an ISFSI is unlikely to be available for acceptance of spent fuel prior to 1983 and because with normal operation TMI-1 would substantially fill its authorized storage capacity by 1983, shipment of spent fuel to an ISFSI is a marginally viable alternative which could be foreclosed if there were even modest schedule slippages in completion of the ISFSI. In addition, the cost of providing storage space at an ISFSI is much higher than the cost of increasing the capacity at TMI-1. Further, the proposed increased capacity at TMI-1 will provide allowance for slippage in the construction schedule of an ISFSI; (3) Transfer of TMI-1 fuel to the storage facility of another reactor would provide short-term relief to TMI-1 but could create or aggravate fuel storage problems for the receiving facility; and (4) Plant shutdown, when required, would be an exceedingly expensive alternative to providing the requested additional storage capacity and would require the provision of replacement power. Initially, at least, this replacement power would probably be provided by currently available oil-fired units. In contrast to these alternatives, the proposed increase in spent fuel storage capacity at TMI-1, has a minimal environmental impact, involves comparatively moderate additional expense and provides on-site storage capacity for a period consistent with the expected availability of off-site storage at an ISFSI.

8.0 Evaluation of Proposed Action

8.1 Unavoidable Adverse Environmental Impacts

8.1.1 Physical Impacts

As discussed above, expansion of the storage capacity of the SFP would not result in any significant unavoidable adverse environmental impacts on the land, water, air or biota of the area.

8.1.2 Radiological Impacts

Expansion of the storage capacity of the SFP will not create any significant additional adverse radiological effects. As discussed in Section 5.3, the additional total body dose that might be received by an individual or the estimated population within a 50 mile radius is less than 0.001 mrem/yr and 0.001 man-rem/yr, respectively, and is less than the natural fluctations in the dose this population would receive from background radiation. The total dose to workers during removal of the present storage racks and installation of the new racks is estimated to be about 0.15 man-rem. Operation of the plant with additional spent fuel in the SFP is not expected to increase the occupational radiation exposure by more than one percent of the present total annual occupational exposure at this facility.

8.2 Relationships Between Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Expansion of the storage capacity of the SFP, which will permit TMI-1 to continue to operate with full core offload capability until 1986, will not change the evaluation of long-term uses of the land in the FES. In the short term, the proposed modification would permit the expected benefits (i.e., production of electrical energy) to continue.

8.3 Irreversible and Irretrievable Commitments of Resources

8.3.1 Water, Land and Air Resources

The proposed action will not result in any significant change in the commitments of water, land and air resources as identified in the FES. No additional allocation of land would be made; the land area now used for the SFP would be used more efficiently by reducing the spacings between fuel assemblies.

8.3.2 Material Resources

In their submittal of February 3, 1977 MEC stated that the construction of the proposed storage racks would involve a commitment of 350,000 pounds of stainless steel. According to the Department of Commerce, the amount of stainless steel produced in the U. S. in 1976 was 3,368,000,000 pounds. The commitment of natural resources to the production of the storage racks is thus seen to not represent a significant irreversible commitment of material resources.

The longer term storage of spent fuel assemblies withdraws the unburned uranium from the fuel cycle for a longer period of time. Its usefulness as a resource in the future, however, is not changed. The provision of longer onsite storage does not result in any cumulative effects due to plant operation since the throughput of materials does not change. Thus the same quantity of radioactive material will have been produced when averaged over the life of the plant. This licensing action would not constitute a commitment of resources that would affect the alternatives available to other nuclear power plants or other actions that might be taken by the industry in the future to alleviate fuel storage problems. No other resources need be allocated because the other design characteristics of the SFP remain unchanged.

We conclude that the expansion of the SFP storage capacity at TMI-1 does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

8.4 Commission Policy Statement Regarding Spent Fuel Storage

On September 16, 1975, the Commission announced (40 F. R. 42801) its intent to prepare a generic environmental impact statement on handling the storage of spent fuel from light water reactors. In this notice, the Commission also announced its conclusion that it would not be in the public interest to defer all licensing actions intended to ameliorate a possible shortage of spent fuel storage capacity pending completion of the generic environmental impact statement. The draft statement is expected to be completed soon.

The Commission directed that in the consideration of any such proposed licensing action, among other things, the following five specific factors should be applied, balanced, and weighed in the context of the required environmental statement or appraisal.

1. Is it likely that the licensing action here proposed would have a utility that is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity?

The reactor core for TMI-1 contains 177 fuel assemblies. The facility is normally refueled annually, with about 52 fuel assemblies being replaced. The spent fuel pool was designed on the basis that a fuel cycle would be in existence that would only require storage of spent fuel for a year or two prior to shipment to a reprocessing facility. Therefore, a pool storage capacity for 430 assemblies (about 240% of the full core load) was considered adequate. This provided for complete unloading of the reactor even if the spent fuel from the four previous refuelings were in the pool. It is prudent engineering practice to reserve space in the SFP to receive an entire reactor core, should this be necessary to inspect or repair core internals or because of other operational considerations. With the present spent fuel storage racks, TMI-1 will not have a full core offload capability following the projected refueling in 1980. If expansion of the storage capacity of the SFP is not approved, and an alternate storage facility for the spent fuel is not used, TMI-1 will have to shutdown in 1984. As discussed under alternatives (Section 7.0), an alternate storage facility other than another reactor is not now available. As a long term solution to the spent fuel storage problem, the Federal Government is planning to provide a retrievable repository for spent fuel by 1985.

The proposed licensing action (i.e., installing new racks of a design that permits storing more assemblies in the same space) would allow TMI-1 to continue to operate beyond 1985 when the proposed Federal repository is expected to be in operation. The proposed modification will also provide MEC with additional flexibility which is desirable even if adequate offsite storage facilities hereafter become available to the MEC.

We have concluded that a need for additional spent fuel storage capacity exists at TMI-1 which is independent of the utility of other licensing actions designed to ameliorate a possible shortage of spent fuel capacity.

2. Is it likely that the taking of the action here proposed prior to the preparation of the generic statement would constitute a commitment of resources that would tend to significantly foreclose the alternatives available with respect to any other licensing actions designed to ameliorate a possible shortage of fuel storage capacity?

With respect to this proposed licensing action, we have considered commitment of both material and nonmaterial resources. The material resources considered are those to be utilized in the expansion of the SFP.

The increased storage capacity of the TMI-1 spent fuel pool was considered as a nonmaterial resource and was evaluated relative to proposed similar licensing actions within a one year period (the time we estimate necessary to complete the generic environmental statement) at other nuclear power plants, fuel reprocessing facilities and fuel storage facilities. We have determined that the proposed expansion in the storage capacity of the SFP is a measure to allow for continued operation and to provide operational flexibility at the facility, and will not affect similar licensing actions at other nuclear power plants, or other actions with respect to increasing spent fuel storage capacity in the U.S.

We conclude that the expansion of the SFP at TMI-1, prior to the preparation of the generic statement, does not constitute a commitment of either material or nonmaterial resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing actions designed to ameliorate a possible shortage of spent fuel storage capacity.

3. Can the environmental impacts associated with the licensing action here proposed be adequately addressed within the context of the present application without overlooking any cumulative environmental impacts?

Potential non-radiological and radiological impacts resulting from the fuel rack conversion and subsequent operation of the expanded SFP at this facility were considered by the NRC staff (Sections 5.3 and 5.4, supra).

The environmental impact of storage rack removal occurred two years prior to reactor startup when the storage racks in the "B" SFP were removed and stored in an open field adjacent to TMI-1. Because this occurred prior to startup there was no contamination on the racks and consequently no radiation exposure. MEC states that these original racks are scheduled to remain in storage until a use is found for the aluminum from which the racks are fabricated or the racks are disposed of as ordinary scrap metal. No further environmental impacts on the environs outside the spent fuel storage building are expected during installation of the new racks. The impacts within this building are expected to be limited to those normally associated with metal working activities and to the occupational radiation exposure to the personnel involved.

The potential non-radiological environmental impact attributable to the additional heat load in the SFP was determined to be negligible compared to the existing thermal effluents from the facility.

We have considered the potential radiological environmental impacts associated with the expansion of the SFP and have concluded that they would not result in radioactive effluent releases that significantly affect the quality of the human environment during either normal operation of the expanded SFP or under postulated fuel handling accident conditions.

4. Have the technical issues which have arisen during the review of this application been resolved within that context?

This Environmental Impact Appraisal and the accompanying Safety Evaluation respond to the questions concerning health, safety and environmental concerns. There are no unresolved technical issues with respect to the licensing action.

5. Would a deferral or severe restriction on this licensing action result in substantial harm to the public interest?

We have evaluated the alternatives to the proposed action, including storage of the additional spent fuel offsite and ceasing power generation from the plant when the existing SFP is full. We have determined that there are significant economic advantages associated with the proposed action and that expansion of the storage capacity of the SFP will have a negligible environmental impact. Accordingly, deferral or severe restriction of the action here proposed could result in substantial harm to the public interest.

9.0 Benefit-Cost Balance

This section summarizes and compares the cost and the benefits resulting from the proposed modification to those that would be derived from the selection and implementation of each alternative. The table below presents a tabular comparison of these costs and benefits.

SUMMARY OF COST-BENEFITS

Alternative	Cost	Benefit
Reprocessing of Spent Fuel	-	None-this alternative is not available now or in the foreseeable future.
Increase storage capacity of TMI-1 SFP	$2850/assembly*	Best assurance of continued operation of TMI-1 and production of electrical energy until storage at an ISFSI is available.
Storage at ISFSI	>$10,000/ assembly plus shipping cost*	Continued operation of TMI-1 and production of electrical energy, depending on the timely availability of the ISFSI. However, timely availability is considered unlikely.
Storage at Other Nuclear Plants	***	Improved assurance of continued operation of TMI-1 and production of electricity until off-site storage is available, but may require shutdown of TMI-1 and receiving reactor if availability of off-site storage is delayed.
Reactor Shutdown	About $77 million/yr**	None-No production of electrical energy.

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* Construction Costs

** This does not include costs of maintaining the plant in a standby condition, decommissioning costs etc.

*** Cost will vary with facility. At TMI-2 cost would be limited to in-house transfer costs and would be low. At Oyster Creek cost would include cost of modifying storage racks (comparable to cost of proposed TMI-1 modification) plus shipping costs. At a non-owned reactor, costs would include space rental, shipping costs and possibly a modification cost.

As can be seen from the table, three alternatives are potentially capable of providing continued operation of TMI-1 and production of electrical power. However, because of the uncertainty as to when off-site storage facilities will be available and the uncertainty as to whether or not TMI-1 would be required to offload a full core in the interim, each of these alternatives provides a different degree of assurance that TMI-1 operation would not be impaired by a lack of fuel storage capability.

Under extremely favorable circumstances reliance on storage at an ISFSI might allow uninterrupted operation of TMI-1, but in terms of a realistic schedule this is considered highly unlikely. Transfer of spent fuel to another reactor provides some improved assurance of continued operation of TMI-1 until off-site storage is available, but again based on realistic scheduling this alternative appears marginal. In addition, this alternative adversely affects the fuel storage situation of the receiving reactor. Increasing the spent fuel storage capacity at TMI-1, as proposed, increases the length of time that the facility can operate without shipping fuel off-site and thus, provides the greatest assurance that TMI-1 will be able to continue in operation until off-site storage facilities are available. In addition, this option does not impact the fuel storage capabilities of other reactors.

The other two alternatives listed do not provide a benefit in terms of production of electrical energy. Reprocessing of spent fuel is not a viable option at the present time or for the forseeable future and therefore, need not be considered further. Reactor shutdown would stop the generation of additional spent fuel at TMI-1, but also would stop the production of electrical energy. Further, as can be seen from the table this would be a very costly alternative.

It therefore appears that there are only two reasonable alternatives: (1) the expansion of the spent fuel storage capacity at TMI-1, or (2) the transfer of spent fuel to another reactor. As can be seen from the table and its footnotes, if one excludes the option of transferring fuel to the TMI-2 SFPs, the proposed increase in storage capacity at TMI-1 is the most cost-effective option. This is because even if shipment were made to Oyster Creek, rack modification costs would be involved and the modification costs would reasonably be expected to be roughly comparable to the costs of the proposed modification at TMI-1. There would also be the additional costs of shipment. Theoretically, shipment could also be made to a non-owned reactor facility where no modification costs would be involved. However, in view of the current fuel storage situation we do not consider this a realistic option.

Transferring spent fuel from the TMI-1 SFPs to those at TMI-2 could be the least expensive option since it involves only inter-facility transfer and no rack modifications. However, as noted previously, this alternative appears to be only marginally acceptable with respect to assuring that TMI-1 could continue operation until an ISFSI is available. Accordingly, in view of the relatively modest cost of the proposed modification and the greater assurance that is provides with respect to maintaining TMI-1 in operation until an ISFSI is available, we conclude that the proposed modification is the most cost effective option that provides reasonable assurance of achieving the desired goal.

As evaluated in the proceeding sections, the environmental impacts associated with the proposed modification would not be significantly changed from those analyzed in the Final Environmental Statement for Three Mile Island Nuclear Station, Units 1 and 2, issued December 1972.

10.0 Basis and Conclusion for not Preparing an Environmental Impact Statement

We have reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51 and the Council of Environmental Quality's Guidelines, 40 CFR 1500.6 and have applied, weighed, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 FR 42801. We have determined that the proposed license amendment will not significantly affect the quality of the human environment and that there will be no significant environmental impact attributable to the proposed action other than that which has already been predicted and described in the Commission's Final Environmental Statement for the facility dated December 1972. Therefore, the Commission has found that an environmental impact statement need not be prepared, and that pursuant to 10 CFR 51.5(c), the issuance of a negative declaration to this effect is appropriate.

Dated: December 19, 1977