UNITED STATES
NUCLEAR REGULATORY COMMISSION
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ENVIRONMENTAL IMPACT APPRAISAL BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NOS. 49 AND 48 TO FACILITY LICENSE NOS. DPR-44 AND DPR-56

PHILADELPHIA ELECTRIC COMPANY

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 Description of Proposed Action

In their submittals of January 18, April 12, May 19, June 12 and September 19, 1978, Philadelphia Electric Company (the licensee) proposed to increase the total storage capacity of the spent fuel pools (SFP) at Peach Bottom Atomic Power Station, Units 2 and 3, from 2220 to 5632 fuel assemblies.

2.0 Need for Increased Storage Capacity

Peach Bottom Unit Nos. 2 and 3 are boiling water reactors, located at the licensee's site in York County, Pennsylvania and each has a design electrical rating of 1065 Net MWe. The units have been in commercial operation since July 5, 1974 (for Unit 2) and December 23, 1974 (for Unit 3). The reactor spent fuel storage pools currently contain fuel storage racks that can accommodate 1110 fuel assemblies at each Unit.

During a normal refueling approximately one-third to one-fourth of the fuel assemblies are replaced by new fuel. The period between refueling intervals normally varies between twelve and eighteen months depending on plant operating history and the system wide outage schedule. With the licensee's projected refueling cycles, the licensee projects that the fuel pools will be unable to accept full, refueling discharges by 1981 for Unit 2 and by 1982 for Unit 3. Neither Unit has the current capability to discharge the entire core that is presently in the reactor vessel. By adding an additional 1706 fuel storage positions in each pool, the modification will permit the offloading of the fuel cores through 1987 for Unit 2 and 1988 for Unit 3.

The proposed modifications to the SFP will not alter the external physical geometry or require modifications to the SFP cooling or purification system. The proposed modification does not affect the quantity of uranium fuel utilized in the reactor, the rate of spent fuel generation or the total quantity of spent fuel generated

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during the anticipated operating lifetime of the facility. The proposed modification will increase the number of spent fuel assemblies stored in the SFP, the length of time that the reactor can continue to operate without shipping spent fuel offsite, 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 (MFRP) in Morris, Illinois 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 thru 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 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 separation facility.

4.0 The Plant

A description of the Peach Bottom Units is contained in the Final Environmental Statement (FES) issued by the Commission in April 1973. Pertinent descriptions of principal features relevant to the proposed modification are summarized below to aid the reader in following the evaluation in subsequent sections of this appraisal.

4.1 Fuel Inventory

The reactor core of each Unit contains 764 fuel assemblies. During a refueling, which occurs every twelve to eighteen months, between 270 to 280 fuel assemblies are discharged to the spent fuel pool. The assemblies now in use were manufactured by the General Electric Company.

4.2 Station Cooling Water Systems

The Peach Bottom circulating water system is an open cycle (once through) cooling system for the Unit condensers which employs helper cooling towers. Cooling water is withdrawn directly from Conowingo Pond and discharged to a 4700 ft. canal. Water from this canal can be diverted to mechanical draft cooling towers for partial cooling before it is discharged back to the pond. The condenser cooling water has a normal flow rate of 750,000 gallons per minute per Unit and removes approximately 7.6×10^9 BTU/hr of heat from the condenser of each Unit.

The spent fuel pool cooling water heat exchangers are provided cooling from the plant's service water system. Booster pumps in the service water system provide coolant water at a rate of approximately 1000 gallons per minute. Each SFP heat exchanger is designed to transfer 3.75×10^6 BTU/hr from 115°F fuel pool water to 90°F service water.

Other plant cooling water systems are not directly applicable to this licensing action.

4.3 Radioactive Wastes

The plant 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 Final Environmental Statement (FES) dated April 1973. There will be no change in the waste treatment systems described in Section III.D.2 of the FES because of the proposed modification. The impact of additional waste generated by this modification is discussed in Section 5.3 below.

4.4 Purpose of SFP

Each SFP at Peach Bottom 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 of 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 Spent Fuel Pool Cooling and Purification System

The SFP cooling and purification system for each Unit consists of three 580 gpm circulating pumps, three heat exchangers, a filter-demineralizer and the required piping, valves and instrumentation. The pumps draw water from two skimmer surge tanks. This flow is passed through the filter-demineralizer and heat exchanger and returned to the pool. The filter-demineralizer may be bypassed. There is one spare filter-demineralizer which may be used by either Unit.

Each of the SFP heat exchangers is designed to transfer 3.75×10^6 BTU/hr from 115°F fuel pool water to 90°F service water which is flowing through the heat exchanger at a rate of 4.0×10^5 pounds per hour. The licensee's submittal states that when a full core is offloaded into the SFP, the Residual Heat Removal System will be used to maintain the fuel pool water temperature below 150°F.

5.0 Environmental Impact of Proposed Action

5.1 Land Use

The proposed modification will not alter the external physical geometry of the SFP. The SFP is entirely contained within the existing reactor building structure. No additional commitment of land is required. The SFP was designed to store spent fuel assemblies under water for a period of time to allow shorter-lived radioactive isotopes to decay and to reduce their thermal heat output. The Commission has never set a limit on how long spent fuel assemblies could be stored onsite. The longer the fuel assemblies decay, the less radioactivity they contain. The proposed modification will not change the basic land use of the SFP. The pool was designed to store the spent fuel assemblies for at least four normal refuelings. The modification would provide storage for at least ten normal refuelings. The pool was intended to store spent fuel. This use will remain unchanged by the proposed modification. The proposed modification will make more efficient use of the land already designated for spent fuel storage.

5.2 Water Use

There is no significant change in plant water usage as a result of the proposed modification. As discussed in the Safety Evaluation supporting this amendment, storing additional spent fuel in the SFP will slightly increase the heat load on the SFP cooling system. The modification will not change the flow rates within the cooling system. With the increased spent fuel storage, normal refueling sequences without a full core discharge will result in a pool stabilization temperature below the 150°F used as a design basis in the Final Safety Analysis Report (FSAR). The maximum expected heat load occurs after discharge of a full core. The SFP cooling system has adequate design capacity following discharge of a full core to maintain the pool water temperature below the 150°F design value in the FSAR even with the increased storage of spent fuel associated with the proposed modification. Since the temperature of the SFP water during normal refueling operations will remain below 150°F, the rate of evaporation and thus the need for makeup water will not be significantly changed by the proposed modification.

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 additional spent fuel which would be stored due to the expansion is the oldest fuel which has not been shipped from the plant. This fuel should have decayed at least five 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 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 the spent fuel pool water appear to be radionuclides 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 cleanup system reduces the radioactivity concentrations considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at the reactor operating condition of appoximately 800°F. A few weeks after refueling, the spent fuel cools in the spent fuel pool so that fuel clad 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 gap.

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 Morris Operation (MO) (formerly Midwest Recovery Plant) at Morris, Illinois and Nuclear Fuel Services' (NFS) storage pool at West Valley, New York, and discussions with the operators, experience demonstrates that there has not been any significant leakage of fission products from spent light water reactor fuel stored at these facilities. 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 not significant leakage from this fuel in the offsite storage facility.

Because we expect only a small increase in radioactivity released to the pool water as a result of the proposed modification as discussed above, we conclude that the SFP purification system will keep concentrations of radioactivity in the pool water to levels which have existed prior to the modification.

5.3.2 Radioactive Material Released to Atmosphere

With respect to gaseous releases, the only significant noble gas isotope attributable to storing additional assemblies for a longer period of time would be Krypton-85. 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 defective fuel. However, we have conservatively estimated that an additional 244 curies per year of Krypton-85 may be released from both units when the modified pools are completely filled. This increase would result in an additional total body dose of less than 0.008 mrem/year to an individual at the site boundary. 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 0.005 man-rem/year. This is small compared to the fluctuations in the annual dose this population would receive from natural background radiation. Under our conservative assumptions, these exposures represent an increase of less than 0.1% of the exposures from the plant evaluated in the FES for the individual (Table V-5) and the population (Table V-6). Thus, we conclude that the proposed modification will not have any significant impact on 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 refuelings.

Storing additional spent fuel assemblies may increase the bulk water temperature during normal refuelings above the 115°F used in the design analysis. When the modified pools are full, the pool water temperature may reach 145°F and may be above 115°F for as long as 32 days. It is not expected that there will be any significant change in the annual release of tritium or iodine as a result of the proposed modification from that previously evaluated in the FES.

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 the FES. If levels of radioiodine become too high, the air can be diverted to charcoal filters for the removal of radioiodine before release to the environment. In addition, the plant radiological effluent Technical Specifications, which are not being changed by this action, restrict the total releases of gaseous activity from the plant including the SFP.

5.3.3 Solid Radioactive Wastes

The concentration of radionuclides in the pool is controlled by the filter-demineralizers 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 filter-demineralizer. 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.

While we believe that there should not be an increase in solid radwaste due to the modification, as a conservative estimate, we have assumed that the amount of solid radwaste may be increased by about 190 cubic feet of resin a year from the demineralizer (about seventeen additional resin beds/year) for each unit. The estimated annual average amount of solid waste shipped from Peach Bottom 2/3 for 1974 to 1976 is about 27,000 cubic feet per year. If the storage of additional spent fuel does increase the amount of solid waste from the SFP purification systems by about 380 cubic feet per year, the increase in total waste volume shipped would be less than 1.5% and would not have any significant environmental impact.

The present spent fuel racks to be removed from the SFP are contaminated and will be disposed of as low level waste. We have estimated that less than 13,500 cubic feet of solid radwaste will be removed from the SFP of each unit because of the proposed modification. This is the total for both steps of the modification. Therefore, the total waste shipped from the plant will be increased by about 2.5% per year when averaged over the lifetime of the plant. This will not have any significant environmental impact.

5.3.4 Radioactivity Released to Receiving Waters

There should not be a significant increase in the liquid release of radionuclides from the plant as a result of the proposed modification. The amount of radioactivity on the SFP filter-demineralizer 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 demineralizer resins are periodically flushed with water to the condensate phase separator tank. 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. If any activity should be transferred from the spent resin to this flush water, it would be removed by the liquid radwaste system.

Leakage from the SFP is collected in the Reactor Building floor drain sumps. This water is transferred to the liquid radwaste system and is processed by the system before any water is discharged from the station.

5.3.5 Occupational Exposures

We have reviewed the licensee's plan for the removal, crating and disposal of the low density racks and the installation of the high density racks in two steps with respect to occupational radiation exposure. The occupational exposure for this entire operation is estimated by the licensee to be about 20 man-rem for each unit. We consider this to be a conservative estimate based on relevant experience for similar operations. This operation is expected to be a small fraction of the total annual man-rem burden from occupational exposure.

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 the licensee and by utilizing relevant 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 should add less than one percent to the total annual occupational radiation exposure burden at this facility. 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 Impacts of Other Pool Modifications

As discussed above, the additional radiological environmental impacts in the vicinity of Peach Bottom 2/3 resulting from the proposed modification are very small fractions (less than 1%) of the impacts evaluated in the Peach Bottom 2/3 FES. These additional impacts are too small to be considered anything but local in character.

Based on the above, we conclude that an SFP modification at any other facility should not significantly contribute to the environmental impact of the Peach Bottom Atomic Power Station and that the Peach Bottom 2/3 SFP modification should not contribute significantly to the environmental impact of any other facility.

5.3.7 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 effluents from the station as a result of the proposed modification.

The only potential offsite nonradiological environmental impact that could arise from this proposed action would be an additional discharge of heat, mainly to the atmosphere and to Conowingo Pond. Storing spent fuel in the SFP for a longer period of time will add more heat to the SFP water. The SFP heat exchangers are cooled by the Plant Service Water System as described in Section 10.5 of the FSAR.

An evaluation of the augmented spent fuel storage facility was made to determine the effects of the increased heat generation on the plant cooling water systems, and ultimately, on the environment. The heat load resulting from the presence of 2816 spent fuel assemblies is within the capabilities of the existing cooling system. No adjustment to flow rates or system modifications are required.

As stated in our Safety Evaluation (SE) supporting this amendment we find that the maximum incremental heat load that will be added by increasing the number of spent fuel assemblies that are to be stored in each of these pools from 1110 to 2816 will be within the capacity of the SFP cooling system to maintain the pool outlet water temperature below 150°F. Our evaluation in the SE is that this is an acceptable limit.

5.5 Impacts on the Community

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 proposed action.

6.0 Environmental Impact of Postulated Accidents

Although the new 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 in the SFP area from those values reported in the FES for Peach Bottom 2/3 dated April 1973.

Additionally, the NRC staff has under way 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 necessary, the radiological consequences of such an event. Because Peach Bottom 2/3 will be required by Technical Specifications to prohibit loads greater than the weight of a fuel assembly to be transported over spent fuel in the SFP, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the proposed modification is acceptable and no additional restrictions on load handling operations in the vicinity of the SFP are necessary while our review is under way.

7.0 Alternatives

In regard to this licensing action, the staff has considered the following alternatives: (1) shipment of spent fuel to a fuel reprocessing facility, (2) shipment of spent fuel to a separate fuel storage facility, (3) shipment of spent fuel to another reactor site, and (4) ceasing operation of the facility.

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. In October 1973, AGNS applied for an operating license for the separation facility; construction of the separation facility is essentially complete. On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 MTU in spent fuel in the onsite storage pool, on which construction has been completed. Hearings on the materials license application have not been 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.

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."

The Nuclear Regulatory Commission issued an order dated December 30, 1977 terminating proceedings to license reprocessing facilities. (42 FR 65334)

The licensee has intended to reprocess the spent fuel to recover and recycle the uranium and plutonium in the fuel. Due to a change in national policy and circumstances beyond the licensee's control, reprocessing of the spent fuel is not an available option at this time.

7.2 Independent Spent Fuel Storage Facility

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 design intent. Likewise, if the AGNS receiving and storage station at its Barnwell, South Carolina reprocessing plant were licensed to accept spent fuel, it would be functioning as an ISFSI. The AGNS position, however, has generally been that it will not commercially operate a stand alone ISFSI. The license for the GE facility at Morris, Illinois was amended on December 3, 1975 to increase the storage capacity to about 750 MTU;* as of June 15, 1978, approximately 310 MTU was stored in the pool in the form of 1,196 assemblies. The 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 understand 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 licensee has no current commitment from GE. 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 thru 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. The status of the storage pool at AGNS was discussed above.

*An application for an 1100 MTU capacity addition is pending, but proceedings have been suspended indefinitely.

**GE letter to NRC dated May 27, 1977.

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.

The staff has 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.

Industry proposals for independent spent fuel storage facilities are scarce 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 contemplated for 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 their 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. 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. We estimated present day cost for such a fuel storage installation to be about $26 million. This does not include client costs associated with the nuclear power facility site preparation. On July 12, 1978 the staff concluded that the proposed approach and conceptual design was acceptable.

On a short-term basis (i.e., prior to 1983) an independent spent fuel storage installation does not appear to be a viable alternative based on cost or availability in time to meet the licensee'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.

On October 18, 1977, USDOE announced a new "spent nuclear fuel policy." USDOE will determine industry interest in providing interim fuel storage services on a contract basis. If adequate private storage services cannot be provided, the Government will provide interim fuel storage facilities.

This interim storage is expected to be available in 1983 or 1984 with a National Waste Repository available in the 1988-1993 time frame. If the Peach Bottom SFP is not modified as proposed, the Peach Bottom Station, which lost the ability to discharge either core in February 1978, would have to shutdown both Units in 1982 since the SFP of both Units will be essentially full. The precise date that interim storage would be available is not known at this time with sufficient precision to provide for planning. Should these facilities not be available when needed, the Peach Bottom Station would be forced to shutdown. Therefore, this does not appear to be a viable alternative, especially when considering the impact of plant shutdown as compared with the negligible consequences of the proposed amendment.

The proposed increase in storage capacity will allow Peach Bottom Station to operate until September 1991 by which time interim storage and probably the Federal repository for spent fuel are expected to be operable.

7.3 Storage at Another Reactor Site

In addition to Peach Bottom Units 2 and 3, the licensee owns Peach Bottom Unit 1 and is constructing two units at the Limerick Generating Station. Peach Bottom Unit 1 is a small (40 MWe) prototype High Temperature Gas-Cooled Reactor which is being decommissioned. Its SFP is not designed to store BWR fuel. To use this pool for storage at the same site would require extensive modifications and seismic analysis at a cost in excess of that which would result from the modification proposed by the licensee. Further, this alternative would result in additional personnel exposures and does not provide sufficient certainty of timely availability.

The Limerick Generating Station Units 1 and 2 (LGS 1/2) are scheduled to begin commercial operation in 1983 and 1984 respectively. It is possible (assuming no additional construction delays) that the SFP for LGS 1 might be available for storage of Peach Bottom fuel in mid-to-late 1982, approximately one year after Peach Bottom 2 would have to cease operation because of lack of fuel storage. Use of LGS 1/2 SFP would limit the licensee's ability to operate the Limerick Station. 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, the licensee cannot rely on any other power facility 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 the absence of a general policy regarding interfacility transfer and storage of spent fuel, such action is being decided on a case-by-case basis and would not afford the timely relief needed here.

Storage at another reactor site is not a realistic alternative at this time, or in the foreseeable future.

7.4 Shutdown of Facility

If Peach Bottom Station was forced to shutdown for lack of space to store spent fuel, there would be the loss of the economic benefit from the facility (generation of electric energy) and a cost associated with purchase of replacement energy and maintaining the facility in a standby condition far in excess of the cost of the proposed modification.

Based on information gained from the licensee and comparable data for other operating reactors, the staff estimates that the loss of revenues from the idle unit would be about $318,000/day-Unit.

7.5 Summary of Alternatives

In summary, the alternatives (1) to (3) described above are presently not available to the licensee or could not be made available in time to meet the licensee's need. Assuming the nonavailability of alternatives (1) to (3), the licensee would be forced to either shutdown or request additional spent fuel storage capacity. Even if available, alternatives (2) and (3) do not provide the operating flexibility or the proposed action and are likely more expensive than the proposed modification.

Alternative (4), ceasing operation of the facility, would be much more expensive than the proposed action because of the need to provide replacement power. In addition to the economic advantages of the proposed action, we have determined that the expansion of the storage capacity of the SFP for Peach Bottom Units 2 and 3 would have a negligible environmental impact.

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

As discussed in Section 5.3, expansion of the storage capacity of the SFP will not create any significant additional radiological effects. The additional total body dose that might be received by an individual or the estimated population within a 50-mile radius is less than 0.008 mrem/yr and 0.005 man-rem/yr, respectively. These exposures are small compared to the fluctuations in the annual dose this population receives from background radiation and represent an increase of less than 0.1% of the exposures from the plant evaluated in the FES. The total occupational exposure of workers during removal of the present storage racks and installation of the new racks is estimated by the licensee to be about 20 man-rem for each unit. This is a small fraction of the total man-rem burden from occupational exposure at the station. 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 will not change the evaluation of long-term use of the land as described in the FES for Peach Bottom Units 2 and 3. 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 for Peach Bottom Units 2 and 3. No additional allocation of land would be made; the land area now used for the SFP would be used more efficiently by adopting the proposed action.

8.3.2 Material Resources

It is not likely that taking licensing action here proposed would constitute a comm:tment of resources that would tend to significantly foreclose the alternatives available with respect to any other individual licensing action designed to ameliorate a possible shortage of spent fuel storage capacity. The time frame under consideration is two years, the staff's estimate of the time necessary to complete the generic environmental statement. The action here proposed will not have any significant effect on whether similar actions are or should be taken at other nuclear reactors since it will not affect either the need for or availability of storage facilities at other nuclear reactors. Nor will the added capacity here significantly affect the need for the total additional storage space presently planned at reprocessing facilities for which licensing actions are pending. In order to carry out the proposed modifications, the licensee will require custom-made racks of aluminum and sheets of Boral. These materials are readily available in abundant supply. In the context of this criterion, the staff concludes that the amount of material (aluminum, boron, carbon) required for the racks for Peach Bottom is insignificant and does not represent an irreversible commitment of natural 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.

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, it 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 Commission directed that in the consideration of any such proposed licensing action, the following five specific factors should be applied, balanced, and weighted in the context of the required enviornmental statement or appraisal.

a. 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 each of the Peach Bottom Units contains 764 fuel assemblies. In their submittal of January 18, 1978, the licensee presented their estimated schedule for refueling. The facility is scheduled to be refueled at approximately 18 month intervals with about 260 to 280 fuel assemblies generally scheduled to be 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 1110 assemblies in each pool (about 150% of the full core load) was considered adequate. This provided for complete unloading of the reactor even if the spent fuel from the two 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.

Peach Bottom Unit 2 began commercial operation on July 5, 1974, and completed its third operating cycle in September 1978. With the present spent fuel storage racks, Unit 2 does not have sufficient room to store the normal discharge of spent fuel for the fifth cycle, scheduled to begin in September 1981. If expansion of the storage capacity of the SFP is not approved, or if an alternate storage facility for the spent fuel is not located, Peach Bottom Unit 2 will have to shutdown in 1981.

Peach Bottom Unit 3 began commercial operation on December 23, 1974 and will complete its third operating cycle in February 1979. With the present spent fuel storage racks, Unit 3 does not have sufficient room to store the normal discharge of spent fuel for the fifth cycle, scheduled to begin in August 1982. If expansion of the storage capacity of the SFP is not approved, or if an alternate storage facility for the spent fuel is not located, Peach Bottom Unit 3 will have to shutdown in 1982. As discussed under alternatives (Section 7.0), an alternate storage facility 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 1983.

The proposed licensing action (i.e., installing new racks of a design that permits storing more assemblies in the same space) would allow Peach Bottom Unit Nos. 2 and 3 to continue to operate beyond 1982 and until the proposed Federal repository is expected to be in operation. The proposed modification will also provide the licensee with additional flexibility which is desirable even if adequate offsite storage facilities hereafter become available to the licensee.

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

b. 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 storage 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 Peach Bottom storage pools 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 only 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. Similarly, taking this action would not commit the NRC to repeat this action or a related action in 1981.

We conclude that the expansion of the SFP at Peach Bottom Units 2 and 3, 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.

c. 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 nonradiological and radiological impacts resulting from the fuel racks conversion and subsequent operation of the expanded SFP at this station were considered by the Staff.

No environmental impacts on the environs outside the spent fuel storage building are expected during removal of the existing racks and 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 nonradiological 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 SFPs 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 or the expanded SFPs or under postulated fuel handling accident conditions.

d. 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.

e. 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 SFPs will have a negligible environmental impact. Accordingly, deferral or severe restriction of the action here proposed would 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 alternatives. The table, attached, presents a tabular comparison of these costs and benefits. The benefit that is derived from three of these alternatives is the continued operation of Peach Bottom Units 2 and 3 and production of electrical energy. The remaining alternatives (i.e., reprocessing of the spent fuel or storage at other nuclear plants) are not possible at this time or in the foreseeable future except on a short term emergency basis and, therefore, have no associated cost or benefit.

From examination of the table, it can be seen that the most cost-effective alternative is the proposed SFP modifications. As evaluated in the preceding sections, the environmental impacts associated with the proposed modification would not be significantly changed from those analyzed in the Final Environmental Statement for Peach Bottom Atomic Power Station Unit Nos. 2 and 3 issued in April 1973.

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, weighted, and balanced the five factors specified by the Nuclear Regulatory Commission in 40 CFR 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 April 1973. 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: November 30, 1978

Alternative	Cost	Benefit
Reprocessing of Spent Fuel	-	None - this alternative is not available either now or in the foreseeable future.
Increase storage capacity of Peach Bottom's SFPs	\$3630/assembly	Continued operation of Peach Bottom Station and production of electrical energy.
Storage at Peach Bottom Unit 1	>\$3630/assembly	Continued operation of Peach Bottom 2&3; requires modification to Unit 1 SFP and does not preclude use of high density racks at PB Unit 1.
Storage at other nuclear plants	Comparable to storage at Peach Bottom 2/3	Continued operation of Peach Bottom 2/3 and production of electricity. However, this alternative is not likely to be available.
Storage at Limerick	-	None - Limerick storage not available on a timely basis.
Storage at Independent Facility	-	This alternative not available.
Storage at Reprocessing Facility	-	This alternative not available.
Reactor Shutdown	\$318,000/day-Unit	None- No production of electrical energy.