ENVIRONMENTAL IMPACT APPRAISAL

BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO THE MODIFICATION OF THE

SPENT FUEL POOLS

FACILITY OPERATING LICENSE NO. DPR-70

CONSTRUCTION PERMIT NO. CPPR-53

PUBLIC SERVICE ELECTRIC & GAS COMPANY

SALEM NUCLEAR GENERATING STATIONS

UNIT 1

DOCKET NO. 50-272

7902150 052

1.0 Description of Proposed Action

By letter dated November 18, 1977, and as revised on February 14, 1978, as supplemented on December 13, 1977, May 17, July 31, August 22, October 13, and 31, November 20, December 22, 1978 and January 4, 1979, Public Service Electric and Gas Company (the licensee) requested an amendment to Facility Operating License No. DPR-70 for the Salem Nuclear Generating Station, Unit No. 1. The request was made to obtain authorization to provide additional storage capacity in the Salem Unit No. 1 Spent Fuel Pool (SFP). Also, by letter dated April 12, 1978, the licensee submitted Amendment No. 42 to the Application for Licenses for the construction and operation of the Salem Nuclear Generating Station, Units Nos. 1 and 2, consisting of changes to the Final Safety Analysis Report, including a revised description of the spent fuel storage facilities for both Salem units to reflect the fact that design changes proposed for Unit No. 1 are planned for Unit No. 2 as well.

The proposed modifications would increase the capacity of each SFP from the present design capacity of 264 fuel assemblies to a capacity of 1170 fuel assemblies.

This Environmental Impact Appraisal relates to the proposed licensing action of amending the Operating License No. DPR-70 for Salem Unit No. 1 to permit modifications of the storage capacity of the Unit No. 1 SFP. The licensee has also indicated, however, by submitting Amendment 42 to the Salem Station FSAR, that it plans identical modifications to Salem Unit No. 2. Since the Salem Station Final Environmental Statement (FES) in April 1973 considered the environmental impacts of the Salem Station rather than for any one particular unit and since the license plans to modify the Unit No. 2 SFP, also, we have addressed cumulative environmental impacts of the expansion of both SFP's that should be addressed in this Environmental Impact Appraisal. However, since the licensing action proposed at this time only involves the Salem Unit No. 1 operating license, certain areas, such as the need for storage capacity and alternatives, are considered primarily from the standpoint of the Unit No. 1 proposal, with reference to Unit No. 2, where appropriate. Similarities or differences between the two units are pointed out for clarification.

2.0 Need for Storage Capacity

The NRC issued the Salem Unit No. 1 operating license on August 13, 1976. Commercial operation began on June 30, 1977. The first refueling of the facility is scheduled for the spring of 1979, at which time 1/3 of the core (about 65 fuel assemblies) is expected to be removed and transferred to the SFP. The current storage capacity of the SFP is 264 fuel assemblies. A full core for Salem Unit No. 1 consists of 193 fuel assemblies. Under the current fuel management plan, the reactor is scheduled to be refueled in this manner annually. After the second refueling, scheduled for the spring of 1980, the present Unit No. 1 SFP would not have room to off-load a full core. While the ability to off-load a full core is not required for safety, it is a desirable capability from an economic and operational standpoint. For example, it would allow inspection of core internals.

If Salem Unit No. 1 is refueled annually, the present SFP would be full after the refueling scheduled for the spring of 1982. If the storage capacity of the SFP is not increased or if alternate storage space for spent fuel from this facility is not located, Salem Unit No. 1 would have to be shutdown in 1983.

The proposed modification would extend the spent fuel storage capability of the pool and leave room for a complete core discharge, through 1993 or through 1996, without room for a full core discharge. In our evaluation, we considered the impacts which may result from storing an additional 906 spent fuel assemblies in the Unit No. 1 SFP and from a similar increase in the Unit No. 2 SFP.

The proposed modification would not alter the external physical geometry of the spent fuel pool or involve significant modifications to the SFP cooling or purification systems. The proposed modification would not affect in any manner the quantity of uranium fuel consumed by the reactor over its anticipated operating life and thus in no way would affect that amount of spent uranium fuel discharged from the reactor. The rate of spent fuel discharged and the total quantity discharged during the anticipated operating lifetime of Unit No. 1 or Unit No. 2 would be unchanged as a result of the proposed expansion. The modification would increase the number of these spent fuel assemblies that could be stored in the SFP of each unit at one time and the storage time of some.

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 MO storage pool and the NFS plant storage pool (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. Construction of the AGNS plant 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 there, prior to a decision on the licensing action relating to the separation facility.

4.0 The Facility

Salem Unit No. 1 and Unit No. 2 (the facilities) are described in the Final Environmental Statement (FES) related to operation of these facilities issued by the Commission in April 1973. Each facility has a pressurized water reactor (PWR) rated at 3338 megawatts thermal (MWt) core power and 1090 megawatts (MWe) gross electrical output. Pertinent descriptions of principal features of each facility as it currently exists are summarized below to aid the reader in following the evaluations in subsequent sections of this appraisal.

4.1 Station Cooling Water Systems

The Salem service water system is a once-through cooling system. Water is pumped from the Delaware River at a flow rate of approximately 41,900 gallons per minute (for each unit), circulated through each facility's turbine services and nuclear services cooling systems and returned to the Delaware River via the circulating water system discharge piping. During normal operations the total heat load for the service water system for each unit is approximately 176 x 10^6 Btu/hr, of which the nuclear services portion is about 59 x 10^6 Btu/hr.

The component cooling water system, which is cooled by the nuclear services portion of the service water system, is designed to remove heat from major components in the station, including the components associated with the removal of heat from the spent fuel pool.

4.2 Radioactive Wastes

The station has waste treatment systems that are designed to collect and process the gaseous, liquid and solid waste that might contain radioactive material from both units. The waste treatment systems for Units 1 and 2 are evaluated in the Final Environmental Statement (FES) dated April 1973. There will be no change in the waste treatment systems described in Section 3.4 of the FES because of the proposed SFP modification of Unit No. 1 or Unit No. 2.

4.3 Purpose of SFP

Each SFP is designed to receive irradiated fuel assemblies removed from the reactor prior either to accomplish a core refueling or to allow for inspection or modification of core internals. The latter purpose may require space in the pool for up to a full core. When first removed from the reactor, assemblies are initially intensely radioactive (due to their fresh fission product content) and have a high thermal output. The SFP provides shielding and cooling.

The major portion of the radioactivity and its associated heat decays in the first 150 days following removal from the reactor core. After this period, the spent fuel assemblies may be placed into a heavily shielded fuel cask and shipped offsite. Space permitting, spent fuel assemblies may be stored for an additional period allowing continued fission product decay and thermal cooling prior to shipment.

4.4 Spent Fuel Pool Purification System

The following description of the SFP purification system is for Salem Unit No. 1. Unit No. 2 has an identical system. The SFP purification loop consists of a 100-gpm purification pump, a cartridge filter, a mixed bed demineralizer and the required piping, valves and instrumentation. The pump draws water from the SFP cooling system loop and discharges through the cartridge filter and the demineralizer. The water is then returned to the pool. It is possible to operate the system with the demineralizer bypassed. There is also a separate pool skimmer system with two skimmers, a 100 gpm pump and one filter.

This purification system is similar to such systems at other nuclear plants which have demonstrated the ability to maintain concentrations of radioactivity in the pool water at acceptably low levels.

Because we expect only a small increase in radioactivity to be released to the pool water as a result of the proposed modification as discussed in Section 5.3.1, we conclude the present spent fuel pool purification system is adequate for the proposed modification and will be able to 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 modifications will alter only the spent fuel storage racks. It will not alter the external physical geometry of the SFP structures for either unit. The SFPs were designed to store spent fuel assemblies under water for a period of time to allow shorter lived radioactive isotopes to decay and to reduce the associated 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 modifications will not change the basic land use of the SFPs. Each pool was designed to store the spent fuel assemblies for up to 4 normal refuelings. The proposed modifications would provide storage for up to 18 normal refuelings. The pools were intended to store spent fuel. This use will remain unchanged by the proposed modifications.

5.2 Water Use

There will be no significant change in plant water consumption or use as a result of the proposed modifications. As discussed subsequently, storing additional spent fuel in the SFP will slightly increase the heat load on the SFP cooling system. This heat is transferred in turn to the component cooling water system and to the service water system. The modifications will not change the flow rate within these cooling systems. The temperature of the SFP water during normal refueling operations and with only one SFP cooling pump running is expected to remain below 134°F, as compared to the 120°F used as the design basis in the FSAR. Therefore, the rate of evaporation and thus the need for makeup water will not be significantly changed by the proposed modifications.

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.

Since the present racks will accommodate spent fuel from four normal (annual) refuelings, the additional storage would consist of spent fuel which has decayed at least 4 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 surface materials thus released would consist 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 predominantly nonvolatile. The primary impact of such nonvolatile radioactive nuclides is their contribution of 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.

As indicated above, we are concerned here only with such releases from the stored spent fuel as would occur after 4 years of storage. Experience at the Morris Operation and Nuclear Fuel Services indicates that there is little radionuclide leakage from spent fuel stored in pools after the fuel has cooled from four to six months. The predominant radionuclides in the spent fuel pool water appear to be those that were present in the reactor coolant system prior to refueling (reactor coolant mixes with SFP water during refueling operations) and those present in crud dislodged from the surface of the spent fuel during transfer from the reactor core to the SFP. During and after refueling, the SFP purification system, which is in continuous operation, reduces the radioactivity concentrations thus introduced to the SFP considerably. It is theorized that most failed fuel contains small, pinhole-like perforations in the fuel cladding at the reactor operating condition of approximately 800°F. After a few weeks in the spent fuel pool, the fuel clad temperature becomes relatively cool, approximately 180°F. This substantial temperature reduction reduces the rate of release of fission products from the fuel pellets and decreases 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 information submitted to the NRC staff, there has not been any significant leakage of fission products from spent light water reactor fuel stored in the Morris Operation (MO) (formerly Midwest Recovery Plant) at

Morris Illinois, or at Nuclear Fuel Services' (NFS) storage pool at West Valley, New York. Spent fuel assemblies have been stored in these two pools which, while in a reactor, were determined to have significant leakage. After storage in the onsite spent fuel pool, these fuel assemblies were later shipped to either MO or NFS for extended storage. Although the fuel assemblies exhibited significant leakage at reactor operating conditions, there was no significant leakage from this fuel by the time it was shipped to these offsite storage facilities. Nor has there been subsequent significant leakage from the assemblies.*

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 (beyond 4 years) would be krypton-85. As discussed previously, experience has demonstrated that after spent fuel has decayed a few months, there is no significant release of fission products from defective fuel. However, as a measure of conservatism, we assumed that an additional 114 Curies per year of krypton-85 would be released from both units when the modified pools are completely filled. This assumption is based on the expected annual reload cycle and the total number of fuel assemblies that could be stored in the modified pool. This would result in an additional total body dose to an individual at the site boundary of less than 0.005 mrem/year. Such a dose would be insignificant when compared to the approximately 100 mrem/year that an individual receives from natural background radiation. Furthermore, the additional total body dose to the estimated population within a 50-mile radius of the plant that would result from this assumption would be less than 0.005 manrem/year. Such a dose would be less than the natural fluctuations in the annual dose that 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 station evaluated in the Salem 1/2 FES for an individual at the site boundary and the population. Based on the above scoping evaluation, we conclude that the proposed modifications will not have any significant impact on exposures offsite.

* NEDO 21326-I, January 1977, "Consolidated Safety Analysis Report for Morris Operations," Morris, Illinois, Vol. I.

ASME publication (Morris Operations) 77-JPGC-NE-15 by L. L. Denio, et al., "Control of Nuclear Fuel Storage Basin Water Quality by Use of Powered Ion Exchange Resins and Zeolites," June 19, 1977.

Assuming onsite storage 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 have decayed to negligible levels between refuelings for each unit. This will occur in the first 4 years of storage presently possible without these modifications. The storage of additional spent fuel assemblies is expected to increase the bulk water temperature above the 120°F during normal refuelings used in the design analysis. Based on our calculations and assuming one pump running at its design capacity, the peak bulk SFP water temperature may go as high as 134°F and may be above 120°F for as long as 32 days following the final incremental discharge of fuel that fills the pool to capacity. Most airborne releases from the plant result from leakage of reactor coolant which contains tritium and iodine in higher concentrations than would the SFP water. Therefore, even if there were a temporary higher evaporation rate from the spent fuel pool, the resulting increase in tritium and iodine released from the station would be small compared to the amount normally released from the station without these modifications as was previously evaluated in the FES. In addition, the station radiological effluent Technical Specifications, which will not be affected by this action, will limit the total releases of gaseous activity including those from stored spent fuel. If levels of airborne radioiodine become too high, the air over the SFP can be routed through charcoal filters for the removal of radioiodine before release to the environment.

5.3.3 Solid Radioactive Wastes

Without the proposed modifications, the concentration of radionuclides in each SFP is already controlled by the filter and the demineralizer and by decay of short-lived isotopes. Experience has shown that the activity will be highest during refueling operations while spent fuel is being removed from the core and while reactor coolant water is introduced into the pool. The activity decreases as the pool water is processed through the filters and demineralizer. The increase of radioactivity, if any, as a result of these modifications should be minor because the spent fuel affected is that which has already been in the SFP for 4 or more years. That fuel will already be relatively cool, thermally, and radionuclides in that 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 30 cubic feet of resin a year from the demineralizer (an additional resin bed/year) from each unit. Because neither Salem 1 or 2 has gone through a refueling, we do not consider the solid waste shipped from the station to date as being representative of what should be expected on the average from the two units each year in the future. The annual average amount of solid waste shipped from a representative number of pressurized water reactor sites during 1972 to 1976 is about 12,000 cubic feet per year. If the storage of additional spent fuel assemblies does increase the amount of solid waste from the SFP purification systems by the assumed 60 cubic feet per year, the increase in total solid waste volume shipped from the station would be about 0.5% and would not have any significant environmental impact.

Since the present spent fuel racks have not been contaminated, disposal at a licensed burial site need not be considered unless the proposed modifications are significantly delayed such that they could not be accomplished before the first refueling of the unit is required.

If the modification is not accomplished until after the first refueling for each unit, the spent fuel racks would be contaminated and would be disposed of at a licensed burial site. We have estimated that less than about 9000 cubic feet of low level solid radwaste would be removed from each SFP because of the proposed modification. Therefore, the total volume of solid radwaste shipped from the plant would be increased by less than 2% per year when averaged over the lifetime of the plant. This would not have any significant environmental impact.

5.3.4 Radioactivity Released to Receiving Waters

There should be no significant increase in the liquid release of radionuclides from the station as a result of the proposed modification. The amount of radioactivity in the pool water and on the SFP filter and demineralizer might slightly increase due to the additional spent fuel in the pool but because of the reasons discussed below, this increase of radioactivity should not result in a significant increase in radionuclides in liquid effluents processed from the station.

The cartridge filter and, to some extent, the mixed bed demineralizer remove mobile insoluble (solid) radioactive matter from the SFP water by way of the SFP cooling loop. The cartridge filter is periodically removed to the solid waste disposal area in a shielded cask and placed in a shipping container. Any insoluble matter that remains in the SFP water will be too small to be trapped on the cartridge filters or not mobile enough to be taken up in the SFP cooling loop.

The mixed bed demineralizer resins (which remove some of the soluble radioactive matter through ion exchange) are periodically flushed with water to the solid radwaste system. The water used to transfer the spent radioactive resin is returned to the liquid radwaste system for processing. If any activity should be transferred from the spent resin to this flush water, it would be removed by the liquid radwaste system rather than being released as plant liquid effluent.

Finally, leakage of water from the SFP, if any, will be collected in the spent fuel pool building sump. This water is also transferred to the liquid radwaste system. The radioactivity in the SFP water would not be released to the receiving waters except by way of the liquid radwaste system. All such releases will be limited by Technical Specifications which will not be affected by the proposed modifications.

5.3.5 Occupational Exposures

There should be no occupational radiation exposure for the removal and disposal of the present racks and the installation of the new racks because both spent fuel pools are dry and have never been contaminated with radioactivity.

If the modification is not accomplished until after the first refueling, there would be some occupational exposure to radiation. Experience at similar facilities where re-racking has occurred has demonstrated that such exposures can be kept to acceptably low levels. Prior experience indicates this should be from about 2 to 5 man-rems. This would represent a small fraction of the total man-rem burden from occupational exposure at the Salem Station.

We have estimated the increment in onsite occupational dose at both units resulting from the proposed increase in stored spent fuel assemblies on the basis of information supplied by the licensee and by using 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 will 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 modifications represents a negligible burden. Based on present and projected operations in the SFP area, we estimate that the proposed modifications should add less than one percent to the total annual occupational radiation exposure burden at both units. Thus, we conclude that storing additional fuel in the two pools (beyond the first four reloads) 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 modifications do not significantly change the radiological impact evaluated in the FES for Units 1 and 2.

5.4 Nonradiological Effluents

There will be no change in the chemical or biocidal effluents from the plant as a result of the proposed modifications. However, the plant thermal discharge will be increased somewhat by the proposed modifications. At present, each pool has the ability and would be permitted to contain, as a maximum heat load, 1/3 of a recently discharged core plus a subsequent off-loading of one full core. This heat load is to be discharged to the Delaware River via heat exchangers in the SFP cooling system and the component cooling water system.

With the proposed modifications, an additional maximum heat load could be present in each pool due to accumulating the spent fuel from the first 14 refueling cycles (the youngest being at least 4 years old and the oldest being at least 14 years old) with the final three being discharged simultaneously as a full core offload. This additional heat load would be 4.5×10^6 Btu/hr which represents the difference in peak heat loads for full core offloads that essentially fill the present and the modified pools. The total peak heat load resulting from a full core offload will be 42.1×10^6 Btu/hr for the modified SFP as compared to 37.6×10^6 Btu/hr for the existing rack design.

The total station thermal discharge to the Delaware River without the proposed modifications would be approximately 15.3×10^9 Btu/hr. With the proposed modifications, it would be increased by no more than 9.0×10^6 Btu/hr (4.5×10^6 Btu/hr for each unit), which is less than .06% of the estimated total thermal discharge to the Delaware River.

5.5 Impacts on the Community

The new storage racks will be fabricated offsite and shipped to the facility. 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 typically associated with normal metal working activities.

No environmental impact on the community is expected to result from the fuel rack conversion or from the subsequent operation with the increased storage of spent fuel in the SFP.

6.0 Environmental Impact of Postulated Accidents

Although the new 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 Salem 1/2 FES dated April 1973.

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 necessary, the radiological consequences of such an event. Because the licensee will be prohibited from moving loads with weight in excess of 2500 pounds over spent fuel assemblies in the SFP, we have concluded that the likelihood of a heavy load handling accident is sufficiently small that the proposed modifications are acceptable and no additional restrictions on load handling operations in the vicinity of the SFP will be necessary as a result of these modifications.

7.0 Alternatives

With respect to Salem Unit 1 SFP, we have considered the following spent fuel storage alternatives:

(1) Increase storage capacity as proposed

(2) Reprocessing of spent fuel

(3) Storage at independent spent fuel storage installations (ISFSI)

(4) Onsite storage in Salem Unit 2 SFP

(5) Offsite storage in SFPs of other reactors

(6) Shutdown of facility (storage in reactor pressure vessel)

(7) Conservation measures

7.1 Increase the Storage Capacity of the SFP, as Proposed

The total estimated installed capital cost of the proposed Salem Unit 1 new storage is $3,000,000. Of this amount $2,100,000 is for the new racks, $600,000 is for construction costs (including removal and disposal of the existing racks) and $300,000 is for engineering and other indirect costs. This equates to about $3,300 for each additional proposed fuel assembly storage space. The estimated costs of each of the alternatives considered are discussed in the following sections, where applicable, and summarized in Table 7.0.

7.2 Reprocessing of Spent Fuel

As discussed earlier, none of the three commercial reprocessing facilities in the U.S. is currently operating. The Morris Operation (MO) is in a decommissioned condition. On September 22, 1976, Nuclear Fuel Services, Inc. (NFS) informed the Nuclear Regulatory Commission that it was "withdrawing from the nuclear fuel processing 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 which is essentially complete). On July 3, 1974, AGNS applied for a materials license to receive and store up to 400 metric tonnes of uranium (MTU) in spent fuel in the completed onsite storage pool. Hearings have not been completed on the materials license application. However, even if AGNS decides to proceed with operation of the Barnwell facility in light of the President's policy statement of April 7, 1977, discussed below, the separations plant will not be licensed until the issues presently being considered in the GESMO proceedings are resolved and the GESMO proceedings are complete.

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 NFRRC would include a storage pool that could store up to 7000 MTU in spent fuel. The Exxon application for the NFRRC construction permit is under review.

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 recyling 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."

On December 30, 1977 NRC ordered (42 FR 65334) the termination of the pending fuel cycle licensing actions involving GESMO (Docket No. RM-50-5), Barnwell Nuclear Fuel Plant Separations Facility, Uranium Hexafluoride Facility, and Plutonium Product Facility (Docket No. 50-332, 70-1327 and 70-1821), Exxon's NFRRC (Docket No. 50-564), the Westinghouse Electric Corporation Recycle Fuel Plants (Docket No. 70-1432), and the Nuclear Fuel Services, Inc. West Valley Reprocessing Plant (Docket No. 50-201). The Commission also announced that it would not at this time consider any other applications for commercial facilities for reprocessing spent fuel, fabricating mixed-oxide fuel, and related functions. At this time, any consideration of these or comparable facilities has been deferred for the indefinite future. Reprocessing is not a reasonable alternative to the proposed expansion of the Salem Unit No. 1 SFP. Accordingly, no estimate of cost is considered appropriate.

7.3 Storage at Independent Spent Fuel Storage Installation

An alternative to expansion of onsite SFP storage would be the construction of new "independent spent fuel storage installations" (ISFSI). Such installations could provide storage space in excess of 1000 MTU of spent fuel assemblies. This is far greater than the capacities of onsite storage pools such as at Salem.

Fuel storage pools at MO and NFS are functioning as ISFSIs although this was not the original design intent. Likewise, if the receiving and storage station at the AGNS reprocessing plant is licensed to accept spent fuel, it also would be functioning as an ISFSI. The license for MO was amended on December 3, 1975 to increase the storage capacity to about 750 MTU; approximately 306 MTU are now stored in the pool.

We have discussed the status of MO with GE personnel and have been informed* that GE is primarily using the storage space there for GE-owned fuel (which had been leased to utilities) or for fuel which GE had previously contracted to reprocess. We were informed that the present GE policy is not to store spent fuel unless GE has previously committed to do so.**

* GE letter to NRC dated May 27, 1977.

** An application for an 1100 MTU capacity addition is pending. Present schedule calls for completion in 1980 if approved. However by motion dated November 8, 1977 General Electric Company requested the the Atomic Safety and Licensing Board to suspend idefinitely further proceedings on this application. This motion was granted.

There is no such commitment for Salem. 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, NFS has indicated that it is not accepting additional spent fuel for storage even from those reactor facilities with which it had reprocessing contracts.

Based on the above, we conclude that these MO, NFS and AGNS facilities are not available to Salem as ISFSIs.

We also considered under this alternative the 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, recognized this alternative and provided regulatory guidance for water-cooled ISFSIs. Pertinent sections of 10 CFR Parts 19, 20, 30, 40, 51, 70, 71 and 73 would also apply.

We estimated that at least 5 years would be required to construct an ISFSI. We assumed one year for preliminary design, 1 year in which to prepare the license application and environmental report, to obtain approval for construction licensing and to finalize the design, 2-1/2 years for construction and to obtain an NRC operating license, and 1/2 year for plant and equipment testing and startup.

Industry proposals for ISFSIs 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 with nuclear plants in 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 (ANS Transactions, 1975 Winter Meeting, Vol. 22, TANSAO 22-1-836, 1975). In 1974, E. R. Johnson Associates estimated construction costs would approximate $9000 per spent fuel assembly.

Several licensees have evaluated construction of a separate ISFSI. The Connecticut Yankee Atomic Power Company, for example, estimated that an ISFSI with a capacity of 1,000 MTU would cost approximately $54 million and take about 5 years to construct and have ready for operation. The Commonwealth Edison Company estimated the construction costs of an ISFSI at about $10,000 per spent 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 Engineering Corporation submitted a Topical Report requesting NRC approval for a standard design ISFSI intended for siting near nuclear power facilities. Based on discussions with Stone & Webster, we estimated that the present day cost for such a fuel storage installation would be about $24 million, exclusive of site preparation costs. On July 12, 1978 we concluded that the proposed approach and conceptual design are acceptable.

Based on the above facts, on a short-term basis (i.e., prior to 1985), an ISFSI is not available as an alternative. One would not be available in time to meet the licensee's needs. It is also unlikely that the environmental impacts of this alternative, on a delayed availability basis, would be less than the minor impacts associated with the proposed Salem modifications. This is based on the fact that offsite transportation would be involved and a structure, pool, and supporting systems would have to be erected and installed for an ISFSI, whereas for the Salem modifications, only new storage racks are involved.

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 could not be expected to be available until at least 1983 or 1984. A National Waste Repository could be available in the 1988-1993 time frame. The Salem Unit 1 SFP as presently designed would lose the ability to discharge a full core in the spring of 1980 and would have to shutdown instead of refueling in 1983 since the SFP would then be essentially full. The lack of a precise date that such Government-sponsored interim storage would be available makes this an unreliable alternative to consider for Salem Unit 1. Should such storage not be available when needed, Salem Unit 1 as presently designed would be forced to shutdown.

7.4 Onsite Storage in Salem Unit No. 2 SFP

Salem Unit No. 2 startup is scheduled for early 1979. The licensee has considered the possibility of using the Salem Unit No. 2 SFP for spent fuel storage from Unit No. 1. However, without the proposed modifications, the total storage capacity of both pools would provide for a maximum of eight reloads.

This would fill both pools in early 1983 and Unit No. 1 could di.charge a fifth batch, or Unit No. 2 could discharge its fourth batch, but not both. In view of the uncertainty of the availability of an ISFSI capability by that time, this alternative, which would impact adversely ·ı Unit 2 operation, is considered to be only a short-time, temporary alternative. If this alternative were to be pursued it could foreclose the ability to expand the capacity of either of the Salem SFP's in an unirradiated condition. Extra handling of irradiated spent fuel and working in the presence of the contaminated racks would not be consistent with the objective of maintaining occupational exposures to as low as reasonably achievable.

Since only one year separates the anticipated first refuelings of Units 1 and 2 and would result in either Unit 1 or Unit 2 having to shutdown in the spring of 1983, this alternative in effect is a version of the alternative of reactor shutdown which is discussed below.

In conjunction with the above, we have also considered the possibility of expanding the Unit No. 2 SFP storage capacity rather than the Un.. No. 1 pool, and using the resultant additional storage locations for both units. This would provide a total of 1434 storage locations (264 in the Unit No. 1 pool and 1170 in the Unit No. 2 pool). Again assuming a refueling approximately once every 12 months for each unit, a maximum of 22 reloads would be possible. If these are divided equally between the two units, the Unit 1 pool would be full in the spring of 1982 and the Unit 2 pool in early 1989. Considering the extra handling of irradiated spent fuel that would be necessary to transport the Unit No. 1 spent fuel to the Unit No. 2 pool (which are located in separate fuel buildings) this alternative would not be consistent with the objective of maintaining occupational exposures as low as reasonably achievable. Since we have determined that the impacts associated with the proposed modifications for Salem Unit No. 1 are not significant, this alternative although may by itself have acceptable impacts would in effect result in greater environmental impacts than those associated with the present proposal.

7.5 Offsite Storage in SFPs of Other Reactors

The only other nuclear facilities owned by the licensee are the Hope Creek Units 1 and 2 currently under construction near the Salem facility on Artificial Island. The construction permits for Hope Creek 1 and 2 were issued on November 4, 1974. It is probable that these plants will not be in a position to accept spent fuel from Salem Unit 1 before both Salem SFP's (unmodified) would be full. Furthermore, the Hope Creek units are boiling water reactors (BWRs) whereas the Salem units are pressurized water reactors (PWRs). Due to the dissimilar dimensions of the BWR and PWR fuels, a portion of the Hope Creek spent fuel pool racks would have to be replaced with racks capable of accepting the Salem PWR fuel. Such an alternative, if followed, would then impact on the limited storage capacity presently provided in these other plants.

According to a survey conducted and documented by the Energy Research and Development Agency, up to 46% 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 assuredly rely on Salem Unit 2, the Hope Creek units or 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.

Based on the above facts, we have concluded that storage at another reactor site is not a realistic alternative at this time, or in the foreseeable future.

7.6 Shutdown of Facility

Upon filling the SFP as presently designed, there would be no ability to reload the core for the next operating cycle. When the 5th cycle of operation would be completed, Salem Unit No. 1 would be forced to shutdown for lack of space to store spent fuel. There would be a resultant energy availability loss and an associated loss of economic benefit from the facility, a cost associated with the purchase of replacement energy and the cost of maintaining the facility in a standby condition.

The licensee has estimated that a shutdown of Salem Unit No. 1 (rated at 1090 megawatts net electrical output) would result in replacement power costs alone of $500,000 per day. This is based on the differential costs of producing energy from Salem as compared to production from other available units in the PSE&G and Pennsylvania New Jersey Maryland (PJM) Interconnection systems. The licensee's estimates were based on the assumption that on a daily basis, with Salem Unit No. 1 operating at 100% power, the replacement costs would be about $500,000. In other words, Salem was assumed to have a 100% capacity factor.

We also have reviewed the differential costs of not operating Salem Unit No. 1, as well as other facilities in that area of the country. We believe that a more appropriate capacity factor to consider, on an annual basis, would be on the order of 60-70%. In view of this, the replacement costs associated with the Salem Unit No. 1, using the production costs provided by the licensee for alternate units, would be on the order of $300,000 to $350,000 per day. These costs still would be far in excess of the costs associated with the proposed modification, i.e., $3300 per assembly.

7.7 Conservation Measures and Extended Operating Cycles

Although there is no certainty that there are realistic alternatives at this time to the action proposed, the licensee investigated energy conservation measures and extended operating cycles for Salem Unit No. 1 as alternatives to the proposed expansion.

Salem Unit No. 1 is the most economical to operate of the PSE&G units and therefore would be used as a "base load" unit (operated at constant maximum power) even with any energy conservation program envisioned. If, instead, this nuclear unit were preferentially operated at reduced power, as permitted by any net reductions in power demand, the cost of power from less economical units would result in a higher cost per kW-hr to the consumer of the power delivered. In essence, this alternative is equivalent to the shutdown alternative. Assuming that conservation and reduced loading of Salem Unit No. 1 could have the benefit of extending operation of Unit 1 by a factor of two, the increased differential costs to the consumer would still be significant ($4.5 to $5 million/month) in that the kw-hr replacement power would extend for twice the time period, but at half the rate.

We have considered the potential for Salem Unit 1 to be operated with extended operating cycles, i.e., 18 months between refuelings rather than the present cycle of approximately 12 months. To do so, however, would involve higher fuel utilization, or burnups, which would necessitate a reconsideration of the potential results of accidents. This has not yet been assessed by the NRC and therefore the extended operating cycle is not available as an alternative at this time. The amount of savings realized under such a program would be consistent with the extra power taken from each fuel assembly. The extension of a fuel cycle to 18 months, but at a lower average power level, results in no benefits because the amount of fuel discharged to the SFP over the long run is not decreased. Such an option is therefore not a true alternative.

7.8 Summary of Alternatives

In summary, alternatives (2) and (3) above are either presently not available to the licensee or could not be made available in time to meet the licensee's needs. Alternative (3) would be more expensive than the proposed modification. Alternatives (4) and (5) would preempt storage space needed by another facility. Alternative (4) may also have additional, although acceptable impacts. Alternative (6), the shutdown of Salem Unit 1, would be much more expensive than the proposed action because of the need to provide replacement power. Conservatism is not predictably available. If available, Alternative (7) would not be economically attractive because Salem Unit 1 is the licensee's most economical unit to operate and is equivalent to shutdown. Operation of Salem Unit 1 to higher burnup, and thus longer fuel cycles, has not yet been evaluated and therefore is not available as an alternative.

We have also determined that the expansion of the storage capacities of the SFP for the Salem Unit No. 1 plant would have a negligible environmental impact. Accordingly, considering the economic advantages of the proposed action, deferral or severe restriction of the action here proposed would result in substantial harm to the public interest.

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 Unit 1 or the Unit 2 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 each of these SFPs will not create any significant additional radiological effects. As discussed in Section 5.3, the additional total body dose that might be received by an individual at the site boundary or by the estimated population within a 50-mile radius is less than 0.005 mrem/yr and 0.005 man-rem/yr, respectively, and is less than the natural fluctuations in the dose this population would receive from background radiation. There should be no occupational exposure of workers during removal of the present storage racks and installation of the new racks because the pools are not contaminated with radioactivity. Operation of the stations with additional aged spent fuel in the two SFPs is expected to increase the occupational radiation exposure by less than one percent of the total annual occupational exposure at the two units.

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 SFPs will not change the evaluation of long-term use of the land as described in the FES for Salem Units 1 and 2. In the short term, the proposed modifications would permit the expected benefits (i.e., production of electrical energy and minimizing reliance upon foreign oil) 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 Salem Units 1 and 2. No additional allocation of land would be made. The land area now used for the Unit 1 SFP would be used more efficiently by adopting the proposed action; this conclusion also applies to the proposed modification of the Unit 2 SFP.

8.3.2 Material Resources

It is not likely that the licensing action here proposed would constitute a commitment 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 6-9 months; our estimate of the time necessary to complete the generic environmental statement. The action here proposed may have significant effects on whether similar actions should be taken at Salem Unit 2 and Hope Creek Units 1 and 2 since it will affect the availability of short-time storage facilities for those reactors. The added SFP capacity proposed for Salem Unit 1 will not 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 stainless steel, aluminum boron and carbide. These materials are readily available in abundant supply. In the context of this criterion, we conclude that the amount of material (aluminum, stainless steel, boron, and carbon) required for the racks for Salem Units 1 and 2 is insignificant and does not represent an irreversible commitment of natural resources.

The longer term storage of spent fuel assemblies withdraws the unburned fissionable material from the fuel cycle for a longer period of time. The usefulness of this material as a resource in the future, however, would not be changed. The provision of longer onsite storage would not result in any cumulative effects due to plant operation since the throughput of materials would 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 <u>Commission Policy Statement Regarding Spent Fuel Storage</u>

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 weighed in the context of the required environmental statement or appraisal.

a. It is 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 Salem Unit No. 1 contains 193 fuel assemblies. In its revised submittal of February 14, 1978, the licensee presented its estimated schedule for refueling. The facility is scheduled to be refueled at approximately 12-month intervals with about 65 fuel assemblies generally scheduled to be replaced at each refueling. 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 about one year prior to shipment to a reprocessing facility. Therefore, a pool storage capacity for 264 assemblies in the pool (about one and one-third of the full core load) was considered adequate. This provided for complete unloading of the reactor core even if the spent fuel from the previous refueling were still 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 intervals or because of other operational considerations.

Salem Unit No. 1 began commercial operation on June 30, 1977, and will complete its first operating cycle in the spring of 1979. With the present spent fuel storage racks, Unit 1 will not have sufficient room to store an additional normal discharge of spent fuel by the spring of 1983. 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, Salem Unit No. 1 will have to shutdown in 1983 or before cycle 5 operations.

The proposed licensing action (i.e., approve installing new racks of a design that permits storing more assemblies in the same space) would allow Salem Unit No. 1 to continue to operate beyond the spring of 1983 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 Salem Unit No. 1 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 used in the expansion of the Unit 1 SFP.

The increased storage capacity of the Salem Unit No. 1 SFP was considered as a nonmaterial resource and was evaluated relative to proposed similar licensing actions within a 6-9 month 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 Unit 1 SFP is only a measure to allow for continued operation and to provide operational flexibility at the facility, and will not foreclose 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 1996, at which time the modified pool is estimated to be full if no fuel is removed.

We conclude that the expansion of the SFP at Salem Unit No. 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.

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?

We have considered the potential nonradiological and radiological impacts resulting from the fuel racks conversion and subsequent operation of the expanded SFPs at this station.

We find that there will be no environmental impacts on the environs outside the spent fuel storage building during removal of the existing noncontaminated racks and installation of the new racks. We conclude that the impacts within this building will be limited to those normally associated with metal working activities and with the occupational radiation attributable to these activities.

The potential nonradiological environmental impact attributable to the additional heat load in the SFP was determined by us 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 allowed by the facility license.

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

Yes. We believe that this Environmental Impact Appraisal and the accompanying Safety Evaluation have responded to all technical issues concerning health, safety and the environment which have arisen during our review.

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

We have evaluated the impact of deferral of the proposed action as it relates to the public interest. As we have seen, there are significant economic advantages associated with this proposed action, and expansion of the storage capacity of the SFP will have a negligible environmental impact. Therefore, it is clear that the proposed action itself is in the public interest.

Deferral of this action until the publication of the Final Generic Environmental Impact Statement (GEIS) would not be in the public interest. First, there is nothing in the Draft GEIS which is in conflict with the conclusions presented here - that the proposed rack modification is both a cost-effective and environmentally benign approach to the spent fuel storage problem as an interim measure. Further, there is nothing to suggest at this point that the Final GEIS will reach any different conclusions in this regard.

Second, while it is true that Salem Unit 1 does not face certain shutdown until 1983, there are other factors which weigh in favor of issuing the proposed amendments now. Following the refueling of Salem Unit 1 in the Spring of 1980, the existing SFP will not have sufficient room to accommodate a full core (193 assemblies) should this be necessary to effect repairs, for example, to return the unit to service. Therefore, after this point in time Salem faces the possibility of shutdown at any time due to lack of a full core reserve in the SFP. While no serious adverse consequences to the public health and safety or the environment would likely result from this action itself, the reactor shutdown would, of course, remove the unit from service, and this in turn could adversely affect the licensee's ability to meet electrical energy needs, or force the operation of other plants which are less economical to operate or which have greater environmental impact, and thereby result in substantial harm to the public interest.

Following the Spring 1979 refueling, spent fuel in the pool would increase the difficulty of re-racking the pool and could have an impact on the occupational exposure to workers involved in this operation. In addition, 9000 ft^3 of low level solid radwaste would need to be disposed of at a licensed burial site. For these reasons, delay until after refueling is undesirable from a public interest standpoint.

Based on the foregoing, we conclude that public interest consideration weighs in favor of taking the proposed action now.

We have applied, balanced, and weighed the five specific factors and have concluded that this action to expand the spent fuel pool is in the public interest.

9.0 Cost-Benefit 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. Table 7.0 presents a tabular comparison of these costs and benefits. The benefit from two of these alternatives, if available, would be the continued operation of Salem Unit No. 1 or other production of demanded electrical energy. The remaining alternatives (i.e., reprocessing of the spent fuel or storage at other nuclear plants, conservation measures) 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 Salem Units No. 1 and 2 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.

Date: January 15, 1979

TABLE 27.0

SUMMARY OF COST vs. BENEFITS

	Alternatives	Cost	Benefits
(1)	Increase Storage Capacity of Salem Unit 1 SFP	$3,300/assembly	Continued operation of Salem Unit No. 1 and production of electrical energy.
(2)	Reprocessing of Spent Fuel	N/A	None. This alternative is not available either now or in the foreseeable future.
(3)	Storage at ISFSI	$9,000 to $10,000 per assembly	This alternative may not be available when needed. If available it would allow continued operation and production of electrical energy at Salem Unit No. 1.
(4)	Onsite Storage in the Salem 2 Spent Fuel Pool	Comparable, but greater than storage at Salem Unit 1. It would also involve additional radiation exposure at both facilities.	Effectively none. This alternative would provide storage locations for Salem Unit 1 only until 1983, thus extending shutdown of Unit 1 by one year, but at the expense of a Salem Unit 2 shutdown 1 year early.
(5)	Offsite Storage in SFPs of other Reactors	---	None (before 1985). This is not available on a short-term basis (i.e., before about 1985).
(6)	Shutdown of Facility	$9 to $10 million/month	None. No production of electrical energy.
(7)	Conservation Measures	$4.5 to $5 million/month (assuming extension of operating cycle by factor of two)	Would stretch out refueling. SFP capacity would last longer. Would require somewhat fewer assemblies for a given amount of power - but not yet approved.

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Edwin I. Hatch Nuclear Plant

Georgia Power
the southern electric system

January 30, 1979
PM 79-109

PLANT E. I. HATCH
Unit 1 Scram of 1/24/79

Mr. James P. O'Reilly
United States Regulatory Commission
Office of Inspection and Enforcement
Region II
Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Sir:

Per the telephone conversation this A.M. between Mr. Hugh Dance, Mr. Harvey Nix and myself, this letter gives the events leading to the Hatch Unit 1 scram of 1/24,79.

On 1/23/79 during operation and on 1/24/79 during a shutdown, high pressures of 200 to 300 psig were observed to exist in the Hatch Unit 1 RHR heat exchangers A and B. The Heat exchangers were vented to the torus via the heat exchanger vent valves. This was successful for B, but it was necessary on both days to vent A via torus spray valve E11-F024A. On the 24th, the water being vented from exchanger A flashed to steam in the torus. As a result of this the torus pressure rose and caused the Torus to Drywell vacuum breakers to function which culminated in a reactor scram due to the rise in drywell pressure.

Investigation indicated that the pressure rise in the heat exchangers was probably due to a slow leak past the E11-F015A valve. Thus, the valve internals were removed, repaired (valve seat was lapped) and replaced.

We are in the process of leak rate testing the E11-F015A valve by pressurizing between the inboard manual isolation valve (E11-F060A) and the E11-F015A valve. We also plan to visually inspect the torus spray header, the spray header piping, and its hangers for any possible damage before making a determination on proceeding with plant startup.

M. Manry
M. Manry
Plant Manager

TLE/bm

xc: Harvey Nix
Stan Baxley
Richard Nix
Tom Greene
File M-58 & E-11

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