Environmental Assessment

And Finding of No Significant Impact

By The Office of Nuclear Reactor Regulation

Relating to the Spent Fuel Pool

Facility Operating License No. DPP-28

Vermont Yankee Nucelar Power Corporation

Vermont Yankee Nuclear Power Station

Docket No. 50-271

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Description of Proposed Action

By letter of April 25, 1986, the Vermont Yankee Nuclear Power Corporation (VY or the licensee) requested an amendment to Facility Operating License DPR-28 for the Vermont Yankee Nuclear Power Station to allow the expansion of the capacity of the spent fuel pool and the increased storage of spent fuel in the pool (Ref. 3). Further information was provided in letters dated August 15, September 26, October 21, November 24, and December 5, 1986; February 25, March 19, March 31, April 9, April 13, May 22, June 11, September 1, 1987; and March 2 and June 7, 1988.

The amendment would authorize the licensee to increase the capacity from the current 2000 fuel assemblies to the proposed capacity of 2870 fuel assemblies in the pool. The proposed expansion is to be achieved by removing the spent fuel racks currently in use from the pool and replacing them with new racks (i.e., reracking) in which the cells for the spent fuel assemblies are more closely spaced and by the addition of enhancements to the spent fuel pool cooling system. Both the current fuel storage arrangement and the proposed arrangement make use of free-standing racks containing a neutron absorber (Boral).

On May 20, 1988 the staff issued License Amendment No. 104, which authorized the licensee to place new racks in the pool to accommodate 2870 assemblies, and to store fuel in the racks not to exceed the presently authorized 2000 assemblies. On June 7, 1988, VY wrote a letter to the NRC forwarding a document relating to its commitment to provide an enhanced cooling system for spent fuel pool cooling. The staff has examined the environmental impacts to be expected from the installation and operation of such a system, with storage in the spent fuel storage pool of the proposed 2870 assemblies.

1.2 Need For Increased Storage Capacity

In September, 1977, Vermont Yankee (VY) received a license amendment to increase its spent fuel storage capacity in phases from 600 to 2000 assemblies. At the time it filed for the proposed amendment, VY had installed racks sufficient to store 1680 fuel assemblies. At that time, the racks in the pool were insufficient to maintain full core offload capability beyond cycle 13 startup (October 1987). Although VY's 1977 license amendment would permit the installation of additional racks to permit the storage of the 2000 assemblies authorized, the presence of additional racks in the pool would complicate the task of reracking.

At the time of the previous fuel pool expansion, it was anticipated that away-from-reactor storage would be available during the 1980's. However, in 1981, the Federal government announced that it intended to discontinue funding the away-from-reactor storage program, and utilities were given a clear mandate by the Department of Energy to develop their own storage programs.

The Nuclear Waste Policy Act of 1982 provides for limited away-from-reactor storage and stipulates that a spent fuel repository will be available by 1988. Since the Act does not require a repository before this date, it is not clear whether there will be any place to ship spent fuel in the 1980's or in the early to mid - 1990's. Therefore, VY has proposed to expand further its

existing spent fuel storage capacity to 2870 assemblies, which is projected to provide storage capacity until 1999 while still maintaining a full core offload capability.

1.3 Alternatives

Commercial reprocessing of spent fuel has not developed as anticipated. In 1975 the Nuclear Regulatory Commission directed the staff to prepare a Generic Environmental Impact Statement (GEIS, the Statement) on spent fuel storage. The Commission directed the staff to analyze alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing long range policy. The Statement was to consider alternative methods of spent fuel storage as well as the possible restriction or termination of the generation of spent fuel through nuclear power plant shutdown.

A final "Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575), Volumes 1-3 (the FGEIS) was issued by the NRC in August 1979 (Ref. 2). The finding of the FGEIS is that the environmental costs of interim storage are negligible, regardless of where such spent fuel is stored. A comparison of the impact costs of various alternatives reflects the advantage of continued generation of nuclear power versus its replacement by coal-fired power generation. Continued nuclear generation of power versus its replacement by oil-fired generation provides an even greater economic advantage. The FGEIS also considered a bounding case, shutting down the reactor when the existing spent fuel storage capacity is filled. The cost of replacing nuclear stations before the end of their normal lifetime makes this alternative uneconomical. The storage of spent fuel as evaluated in NUREG-0575 is considered to be an interim action, not a final solution to permanent disposal.

One spent fuel storage alternative considered in detail in the FGEIS is the expansion of onsite fuel storage capacity by modification of the existing spent fuel pools. Applications for more than one hundred spent fuel pool expansions have been received and have been approved or are under review by the NRC. The finding in each case has been that the environmental impact of such increased storage capacity is negligible. However, since there are variations in storage designs and limitations caused by the spent fuel already stored in some of the pools, the FGEIS recommends that licensing reviews be done on a case-by-case basis to resolve plant-specific concerns.

The licensee has considered several alternatives to the proposed action of the spent fuel pool expansion (Ref. 3). The staff has evaluated these and certain other alternatives with respect to the need for the proposed action as discussed in Section 1.2 of this assessment. The following alternatives were considered:

(1) Shipment of spent fuel to a permanent fuel storage/disposal facility.

(2) Shipment of fuel to a reprocessing facility.

(3) Shipment of fuel to another utility for storage.

(4) Reduction of spent fuel generation.

(5) Construction of a new independent spent fuel storage installation (ISFSI).

(6) No Action taken.

Each of these alternatives is discussed below.

1. Shipment of Spent Fuel to a Federal Fuel Storage/Disposal Facility

Shipment to a permanent federal fuel storage/disposal facility is one possible alternative to increasing the onsite spent fuel storage capacity. The licensee has made contractual arrangements whereby spent nuclear fuel and/or high level nuclear waste will be accepted and disposed of by the U.S. Department of Energy (DOE). DOE is developing a repository under the Nuclear Waste Policy Act of 1982 (NWPA) (Ref. 1). However, the facility is not likely to be ready to receive spent fuel until 2003 at the earliest. Therefore, this alternative does not meet the near-team storage needs of Vermont Yankee Nuclear Power Corp. for the Vermont Yankee Plant.

As an interim measure, shipment to a Monitored Retrievable Storage (MRS) facility is another possible alternative to increasing the onsite spent fuel storage capacity. DOE, under the NWPA, has recently submitted its MRS proposal to Congress. Because Congress has not authorized an MRS and because one is not projected to be available before 1998, this alternative does not meet the near-term storage needs for the Vermont Yankee Plant.

Under NWPA the federal government has the responsibility to provide not more than 1900 metric tons capacity for the interim storage of spent fuel. The impacts of storing fuel at a Federal Interim Storage (FIS) facility fall within those already assessed by the NRC in NUREG-0575. In enacting the NWPA, Congress found that the owners and operators of nuclear power stations have the primary responsibility for providing interim storage of spent nuclear fuel. In accordance with the NWPA and 10 CFR PART 53, shipping of spent fuel to a FIS facility is considered a last resort alternative. The Commission's regulations in 10 CFR Part 53, see especially 10 CFR §53.30(8)(d), make it clear that FIS will be made available only to licensees who have exhausted all other storage alternatives, such as expansion of capacity by installation of high density racks and fuel rod compaction and construction of new spent fuel storage facilities at the reactor site. See 10 CFR §53.13(c). Thus the FIS alternative is not available to VY at this time.

2. Shipment of Fuel to a Reprocessing Facility

Reprocessing of spent fuel from the Vermont Yankee Plant is not a viable alternative because at the present time there is no operating commercial reprocessing facility in the United States, nor is there a prospect for one in the foreseeable future.

3. Shipment of Fuel to Another Utility For Storage

The shipment of spent fuel from the Vermont Yankee Plant to the storage facility of another utility company could provide short-term relief for Vermont Yankee's storage capacity problem. However, the NWPA and 10 CFR Part 53 clearly place the responsibility for the interim storage of spent nuclear fuel with each owner or operator of a nuclear power plant. Moreover, transshipment of spent fuel to and its storage at another site would entail potential environmental impacts greater than those associated with the proposed increase in storage at the Vermont Yankee site. Therefore, shipment of spent fuel to another utility for storage is not a practical or reasonable alternative.

4. Reduced Spent Fuel Generation

Improved usage of fuel and/or operation at a reduced power level would extend the life of the fuel in the reactor. In the case of extended burnup of fuel assemblies, the fuel cycle would be extended and fewer offloads would take place. However, even if such an improvement were accomplished, the currently available storage capacity would be exhausted prior to 1999, as discussed in Section 1.2. Further, operation at reduced power would not make effective use of available resources, thus causing economic penalties.

5. Construction of a New Independent Spent Fuel Storage Installation

Additional storage capacity could be developed by building a new, independent spent fuel storage installation (ISFSI), either similar to the existing pool or dry cask storage installation. The NRC staff has generically assessed the impacts of the pool alternative and found, as reported in NUREG-0575, that "the storage of LWR spent fuels in water pools has an insignificant impact on the environment" (Ref. 2). A generic assessment for the dry cask alternative has not been made by the staff. However, assessments for the dry cask ISFSI at the Surry Power Station and the dry modular concrete ISFSI at the H.B. Robinson Steam Electric Plant Unit 2 resulted in a Finding of No Significant Impact (Ref. 20 and 21). While these alternatives are environmentally acceptable, such new storage facility, either at the Vermont Yankee site or at a location offsite, would require new site specific design and construction, including equipment for the transfer of spent fuel. NRC review evaluation and licensing of such a facility would also be required. There is little likelihood that this effort could be completed in time to meet the need for additional capacity, as discussed in Section 1.2. Furthermore, the expansion capacity of the existing pool is a resource that should be used.

6. No Action Taken

If no action were taken, i.e., if the spent fuel pool storage authorization would remain 2000 locations, the storage capacity would become exhausted, as discussed in Section 1.2, and Vermont Yankee would have to be shut down. This cessation of operations would result in no further generation of spent fuel, thereby eliminating the need for increased spent fuel storage capacity. However, the spent fuel already in the pool would remain there and thus would continue to impact the environment, albeit, insignificantly. The impacts of

terminating the generation of spent fuel by ceasing the operation of existing nuclear power plants (i.e., ceasing generation of electric power) when their spent fuel pools become filled was evaluated in NUREG-0575 (Ref. 2) and found to be undesirable. This alternative would be a waste of an available resource, the Vermont Yankee Plant itself, and is not, therefore, considered a reasonable alternative.

In summary, the only alternative to the proposed action that could resolve the Vermont Yankee Nuclear Power Corporation's spent fuel storage capacity problem is the construction of a new independent spent fuel storage installation at the Vermont Yankee site or at a location away from the site. Construction of such an additional spent fuel storage facility could provide long-term increased storage capacity for Vermont Yankee Nuclear Power Corporation. However, this alternative could not be implemented in time to meet the need for additional capacity for the Vermont Yankee Plant.

1.4 Fuel Reprocessing History; Storage at Reprocessing Facilities

No spent fuel is being reprocessed on a commercial basis in the United States. In 1972 the Nuclear Fuel Services (NFS) plant at West Valley, New York, was shut down for alterations and expansion. In September 1976, NFS informed the Commission that it was withdrawing from the nuclear fuel reprocessing business. The Allied General Nuclear Services (AGNS) plant in Barnwell, South Carolina, is not licensed to operate as a reprocessing facility. The General Electric Company (GE) Morris Operation (formerly Midwest Recovery Plant) in Morris, Illinois, is in a decommissioned condition.

On April 17, 1977, President Carter issued a policy statement on commercial reprocessing of spent nuclear fuel, which effectively eliminated reprocessing as part of the relatively near-term nuclear fuel cycle.

Although no plants are licensed for reprocessing fuel, the storage pools at Morris and West Valley are licensed to store spent fuel. The storage pool at West Valley is not full, but the current licensee, New York Energy Research and Development Authority, is not accepting spent fuel for storage, even from those power generating facilities that had contractual arrangements with West Valley. Rather, spent fuel is being removed from NFS and returned to its owners. On May 4, 1982, the license held by GE for spent fuel storage activities at its Morris operation was renewed for another 20 years; however, GE is committed to accept for storage at this facility only limited quantities of additional spent fuel from Cooper and San Onofre Unit 1.

2.0 RADIOACTIVE WASTES

The Vermont Yankee plant contains radioactive waste treatment systems designed to collect and process the gaseous, liquid, and solid wastes that might contain radioactive material. The radioactive waste treatment systems have been previously evaluated and found acceptable, and are discussed in the Final Environmental Statement (FES) dated July 1972. There will be no change in the radioactive waste treatment systems as a result of the installation of the new storage racks. The conclusions of the previous evaluation of the radioactive waste treatment systems are unchanged by the installation of new spent fuel storage racks and their use to store spent fuel.

2.1 Radioactive Material Released to the Atmosphere

The principal radioactive materials that are considered with respect to non-accident releases are the noble gases, the halogens and tritium. Of these, the only radioactive gas of any significance is Krypton-85 (KR-85). This is the principal radioactive gas that is associated with the long term storage of spent fuel assemblies. It is released through fuel cladding defects. Experience has shown that after spent fuel has decayed 4 to 6 months, there may be some release of fission products, including Kr-85. However, Kr-85 release from non-defective fuel elements is insignificant in comparison with the overall releases from routine plant operations. To determine the average annual release of Kr-85, we assume that all of the K-85 released to the SFP will be released prior to the next refueling. That is, the release is associated with a batch of discharged fuel and not with the total inventory of the SFP. The enlarged capacity of the pool, therefore, has no effect on the calculated average annual Kr-85 released to the atmosphere.

The other gases are of little radioactive significance. With respect to the halogens, I-131 is the principal contributor. Iodine-131 releases from spent fuel assemblies to the SFP water will not be significantly increased by the expansion of the fuel storage capacity. The Iodine-131 inventory in the fuel will decay to negligible levels between refuelings. Hence, any significant releases are associated with a given fuel discharge batch rather than with the entire inventory of the SFP, so that SFP expansion does not affect I-131 releases.

A relatively small amount of tritium is produced during reactor operation by fissioning of the reactor fuel. It is released by diffusion through the fuel and the Zircaloy cladding. Tritium is released from the fuel while the fuel is hot, that is, during reactor operation and, to a limited extent, shortly after shutdown. Since its release is diminished to negligible levels thereafter, expanding the SFP capacity will not increase significantly the Tritium activity in the SFP.

Another effect on airborne activity is the potential for increased evaporation due to storing additional spent fuel assemblies in the SFP. However, this effect is not expected to be significant for the following reasons:

(1) storing additional spent fuel assemblies in the SFP will not significantly increase the bulk water temperature during normal refueling above the value used in the design analysis. Since the expected evaporation rate is about the same as before, the annual release of tritium or iodine by evaporation from the SFP is expected to be the same.

(2) On an annual basis, most airborne releases from Vermont Yankee are due to leakage of reactor coolant, which contains tritium and radioactive iodine in higher concentrations than the SFP. Therefore, even if there were higher evaporation rate from the SFP, the potential increase in the releases of tritium and iodine would be small compared to the amount normally released from the station and that which was previously evaluated in the Final Environmental Statement.

Aside from the above considerations, the station is limited in its total releases of gaseous activity by the Radiological Effluent Technical Specifications. The concentration of radionuclides in the pool water is continuously processed by the SFP cleanup demineralizer and decreased by the decay of short-lived isotopes. The activity is highest during refueling operations when reactor coolant water is introduced into the pool, and decreases as the pool water is processed through the demineralizer. Thereafter, the activity concentration has been and should continue to be dependent on the demineralizer resin cycle, with no long-term build-up. The increase of radioactivity, if a , due to the proposed SFP modification is expected to be minor, since the cleanup system can remove radioactivity continuously in the SFP water and, thus, keep it at acceptable levels.

In view of the above, the staff has concluded that for dose calculation purposes there will be no significant increase in the release of tritium or radioiodine due to evaporation from the SFP.

2.2 Solid Radioactive Wastes

The staff does not expect any significant increase in the amount of solid waste generated from the SFP cleanup system due to the proposed modification. If the amount of solid waste is assumed to increase by two additional filter-demineralizer spent resin beds per year due to the increased operation of the SFP cleanup system, the storage of additional spent fuel would increase the amount of solid waste by an average of about 8 cubic meters per year. The annual average volume of solid waste shipped offsite from Vermont Yankee for burial has been approximately 400 cubic meters. Thus, the increase in annual waste volume shipped from Vermont Yankee would be less than 2% of the total annual waste volume. This is a negligible increase and would not have any significant additional environmental impact.

2.3 Radioactive Material Released to Receiving Waters

It is not expected that there will be a significant increase in the liquid release of radionuclides from the plant as a result of the proposed modifications. Since the SFP cooling and cleanup systems operate as closed system, only water originating from cleanup of SFP floors and filter-demineralizer backflush need be considered as potential sources of radioactivity. It is expected that neither the quantity nor activity of the pool cleanup water will change as a result of these modifications. The SFP filter-demineralizer resin removes radioactive materials from the SFP water. These spent resins are periodically backflushed with water. The amount of radioactivity in the SFP filter demineralizer resin may increase slightly due to the additional spent fuel in the pool, but the spent powdered resin (backflushed) will be processed by the liquid radwaste system. After processing in the liquid radwaste system, the amount of radioactivity released to the environment as a result of the proposed modification would be negligible.

3.0 RADIOLOGICAL IMPACT ASSESSMENT

This section contains the staff's estimate of the impacts on the public from the proposed SFP modification. Major sources of radioactivity and principal environmental pathways were considered in preparing this section.

This section also contains the staff's evaluation of the estimate of the additional radiological impacts on the plant workers from the proposed operation of the modified SFP.

3.1 Public Radiation Exposure

In reference to SFP releases, the principal source of radiation doses to individual members of the general public is Krypton-85. The licensee expects no additional Kr-85 releases due to the SFP storage capacity modifications. The staff agrees that any additional Kr-85 release will be small and subsequent doses to the population will not be environmentally significant. In addition, the staff has determined that the proposed amendment does not authorize a change in effluent types or an increase in total amount of effluents. Nor does it involve an increase in power level. Thus, the proposed SFP modification will not result in any significant environmental impact in terms of radiation dose to the public.

The licensee set a dose goal of 23 person-rem for the SFP modification project before committing to add an enhanced fuel pool cooling system. The goal is based on information gained by reviews of the experience gained with similar projects at other plants. The redundant, seismically designed spent fuel pool cooling system, which would be operational prior to the time Vermont Yankee exceeds the existing 2000 spent fuel assembly storage limit, was proposed by the licensee to resolve all remaining staff concerns related to increasing the storage limit. By telephone conversations on July 7, 1988 the licensee informed the staff that the dose for installation of the enhanced spent fuel pool cooling system has been estimated very conservatively to add less than 10 person-rem to the original dose goal. This results in a dose goal for the entire SFP modification, including the enhanced SFP cooling system, of 33 person-rem. The staff finds this dose goal will not affect the licensee's ability to maintain individual occupational doses within the limits of 10 CFR 20, and as low as is reasonably achievable (ALARA). Normal radiation control procedures, in accordance with the guidelines of Regulatory Guide 8.18, should preclude any significant occupational radiation exposures.

On the basis of present and projected operations in the SFP area, the staff estimates that the proposed operation of the modified SFP will add only a small fraction (less than one percent) to the total annual occupational radiation dose at this facility. The 33-person rem dose goal includes all activites necessary for the reracking operation including vacuum cleaning of the SFP walls and floor; shuffling fuel, installation of the new racks; removal of the old racks; cleaning decontamination, and any necessary cutting of old racks; and disposal of waste resulting from the rereacking operation, including the old racks.

In terms of radiation dose to workers, 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. However, one potential source of radiation to workers during the rerack operation is radioactive activation or corrosion products, which are referred to as crud. Crud may be released to the pool water because of fuel movement during the proposed SFP modification. This could increase radiation levels in the vicinity of the pool. The addition of crud to the pool water is greater during refuelings, when the spent fuel is first moved into the fuel pool. It is at this time that most of the additional crud is introduced into the pool water from the fuel assembly and from the introduction of primary coolant. However, significant releases of crud to the pool water during the rerack operation is not expected, since the new racks are cleaned prior to installation. In addition, the purification system for the pool, which keeps radiation levels in the vicinity of the pool at low levels, includes a filter to remove crud. This filter will be operating during the modification of the pool. Thus, we find that the proposed storage of spent fuel in the modified SFP will not result in any significant increase in dose received by workers.

3.3 Conclusions:

On the basis of its review of the proposed expansion of the spent fuel pool at Vermont Yankee, the staff concludes that:

(1) The increase in gaseous, solid and liquid radioactive material as a result of the spent fuel pool expansion itself, and the continued storage of the additional fuel assemblies will be negligible.

(2) There will be no impact on the public since there will be no increase in the calculated average annual quantities of Kr-85 released to the atmosphere.

(3) Total occupational exposure from the SFP modification will be only a very small fraction of the average total annual occupational dose, and the licensee has taken appropriate steps to ensure that occupational doses will be maintained as low as reasonably achievable within the limits of 10 CFR 20.

Therefore, the staff finds that any additional environmental radiological impact caused by the proposed reracking and spent fuel pool cooling system modification to increase the Vermont Yankee fuel storage capacity will be insignificant.

4. NON-RADIOLOGICAL IMPACT

The licensee plans to dispose of the fuel storage racks currently in use by transferring them to Fluor Corporation for shipment to the Barnwell, South Carolina site, where they can be disposed of as low level or nonradiological waste depending on the effectiveness of decontamination. The disposal of the Vermont Yankee storage racks will not require any unusual processing or handling and thus will not involve any significant environmental impact.

The new spent fuel racks were fabricated under subcontract with U.S. Tool and Die Co. Some of the racks have been shipped by truck to the Vermont Yankee Plant for installation in the pool. Others will be shipped at later dates. Such shipment has no impact on terrestrial resources not previously disturbed during the original construction.

The only non-radiological effluent affected by the spent fuel pool expansion is the waste heat rejected via the closed loop spent fuel pool cooling system, the Reactor Building Closed Cooling Water system and the Station Service Water system to the Connecticut River. Spent fuel assemblies freshly unloaded into the pool constitute the major heat source to the fuel pool. The rate of heat generation in the fuel assemblies decreases rapidly after removal of the fuel assemblies from the reactor. For example, the decay heat from spent fuel after 4 years of storage is less than 2 percent of the decay heat of freshly discharged spent fuel at the time of the initial transfer from the reactor to the pool.

The licensee has calculated the maximum decay heat load under the existing and expanded fuel pool configuration to obtain an estimate of the increase resulting from the proposed spent fuel pool expansion. This maximum load occurs with a full fuel pool immediately following full core discharge. For a full core discharge condition which fills the spent fuel pool to this current licensed capacity of 2,000 assemblies the licensee has calculated a heat load of 17.2×10^6 BTU/hr. This heat load was calculated to be 18.26×10^6 BTU/hr using the same assumptions for a full core discharge condition which fills the pool to the proposed 2,870 assemblies. The assumptions were consistent with standard review plan assumptions and included the following: the heat load was calculated at ten days following reactor shutdown; a 100% cumulative capacity factor was used and full power operation was assumed at 1,665 MWT.

The nominal total station heat load to the river for the entire plant is estimated to be 3×10^9 BTU/hr. The maximum spent fuel decay heat load with or without the spent fuel storage expansion will be about 6 tenths of one percent of the total station heat discharge and the increase in the decay heat load due to the proposed spent fuel storage expansion will be about three one hundredths of one percent of the total station heat discharge. This will effect an increase in station discharge temperature of about 0.01 degrees Fahrenheit. The enhanced fuel pool cooling system will not affect the station discharge temperature. The increase in waste heat from the additional storage of spent fuel will have a negligible effect on the Connecticut River water temperature near the discharge. No impact on aquatic biota is anticipated.

The licensee has not proposed any change in the use or discharge of chemicals in conjunction with the expansion of the fuel pool. The licensee has informed the staff that the proposed fuel pool expansion will not require any change in the NPDES permit.

The staff concludes that the nonradiological environmental impacts of expanding the spent fuel pool including the addition of the enhanced fuel pool cooling systems will be insignificant.

5.0 ACCIDENT CONSIDERATIONS

5.1 Design Basis Events

The staff, in its Safety Evaluation issued in conjunction with the issuance of Amendment No. 104, which authorized the installation of new racks (Ref. 23), has addressed both the safety and environmental aspects of a fuel handling accident, an event which bounds the potential adverse consequences of accidents attributable to operation of a spent fuel pool with high density racks. A fuel handling accident may be viewed as a "reasonably foreseeable" design basis event which the pool and its associated structures, systems and components (including the racks) are designed and constructed to prevent. The environmental impacts of this accident were found not to be significant.

5.2 Severe Accidents

The staff has considered accidents whose consequences might exceed a fuel handling accident, that is, beyond design basis events. Such occurrences include a criticality accident and a zircaloy cladding fire caused by overheating following the loss of spent fuel pool cooling caused by a pool failure. Compliance with General Design Criteria 61, "Fuel Storage and Handling and Radioactivity Control" and 62, "Prevention of Criticality in Fuel Storage and Handling" of 10 CFR Part 50, Appendix A, and adherence to approved industry codes and standards as set forth in the licensee's rerack application (which includes compliance with certain design and construction criteria contained in the Final Safety Analysis Report) provide assurance that such events are of very low probability by ensuring that pool and rack integrity and pool cooling capability are maintained. Acceptance criteria for the General Design Criteria consider all reasonably foreseeable events. For example, in this case, criticality is prevented by providing very strong racks, which will maintain the proper spacing between fuel assemblies; the spent fuel pool walls are made of reinforced concrete four or more feet thick, rendering pool wall failure a very unlikely event.

The environmental impacts of criticality and pool wall failure could be significant; however, neither of these events is considered to be reasonably foreseeable in light of the design of the spent fuel pool racks and of the pool walls themselves. Therefore, the staff concludes that the reasonably foreseeable impacts attributable to severe accidents are not significant.

6.0 SUMMARY

The Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel (Ref. 2) concludes that the cost of the various alternatives reflects the advantage of continued generation of nuclear power with the accompanying spent fuel storage. Because of the differences in SFP designs, the FGEIS recommends environmental evaluation of SFP expansions on a case-by-case basis.

For the Vermont Yankee Nuclear Power Station, the expansion of the storage capacity of the SFP will not create any significant additional radiological effects or measurable non-radiological environmental impacts. The additional whole body doses that might be received by an individual at the site boundary is less than 0.1 millirem per year; the estimated dose to the population within a 50 mile radius is estimated to be less than 0.1 person-rem per year. These doses are small compared to the fluctuations in the annual dose this population receives from exposure to background radiation. The occupational radiation dose for the proposed operation of the expanded spent fuel pools is estimated by the staff to be less than one percent of the total annual occupational radiation exposure for this facility.

The small increase in radiation dose should not affect the licensee's ability to maintain individual occupational dose at Vermont Yankee Nuclear Power Station within the limits of 10 CFR Part 20, and as low as reasonably achievable.

The only non-radiological effluent affected by the SFP expansion is the waste heat rejected to the Connecticut River. The increase in total plant waste heat is less than 0.1%. Thus, there is no significant environmental impact attributable to the waste heat from the plant due to the SFP expansion.

6.1 Alternative Use of Resources

This action does not involve the use of resources not previously considered in connection with the Nuclear Regulatory Commission's Final Environmental Statement dated July 1972, related to Vermont Yankee Nuclear Power Station (Ref. 26).

6.2 Alternative to the Proposed Action

Because the Commission has concluded that no significant environmental effects will result from the proposed action, alternatives need not be evaluated. Further, as discussed above, alternatives to the proposed action would have equal or greater environmental impacts.

6.3 Agencies and Persons Consulted

The NRC staff reviewed the licensee's request. No other agencies or persons were consulted.

7.0 FINDING OF NO SIGINIFICANT IMPACT

The staff has reviewed the proposed spent fuel pool modifications to the

Vermont Yankee Nuclear Power Station relative to the requirements set forth in 10 CFR Part 51. Based upon the environmental assessment, the staff has concluded that there are no significant radiological or non-radiological impacts associated with the proposed action and that the proposed license amendment will not have a significant effect on the quality of the human environment. Therefore, the Commission has determined, pursuant to 10 CFR 51.31, not to prepare an environmental impact statement for the proposed amendment.

Dated: JUL 25 1988

Principal Contributors:

M. Lamastra	Plant Systems Branch, NRR
J. Lee	Plant System Branch, NRR
F. Sturz	Fuel Cycle Safety Branch, NMSS
R. Samworth	Division of Reactor Projects III, IV, and V
V. Rooney	Division of Reactor Projects I/II

8.0 REFERENCES

1. Nuclear Waste Policy Act of 1982, Section 302(a)(5), Public Law 97-425.

2. U.S. Nuclear Regulatory Commission, Report NUREG-0575, "Final Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel," Volumes 1, 2, and 3, August 1979.

3. Letter (and attachment) from W.P. Murphy, VYNPC, to H. Denton, NRC, dated April 25, 1986, "Proposed Technical Specification Change for Spent and New Fuel Storage."

4. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated September 26, 1986, "Response to Request for Additional Information."

5. Letter from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated October 21, 1986, "Response to Request for Additional Information."

6. NEDE-24011-P-A-8, May 1986, "General Electric Standard Application for Reactor Fuel."

7. Brooks and Perkins Report No. 571, "The Suitability of Brooks and Perkins Spent Fuel Storage Module for Use in BWR Storage Pool," July 31, 1978.

8. Czajkowski, C., J. P. Week and S. R. Porter, "Corrosion of Structural and Poison Material in Spent Fuel Storage Pools," Paper No. 113, National Association of Corrosion Engineers, Corrosion/8/Conference, April 6-10, 1986.

9. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated August 15, 1986, "Response to Request for Additional Information."

10. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated May 22, 1987, "Vermont Yankee Proposed Change No. 133 Spent Fuel Pool Expansion - Response to Request for Additional Information - Proposed Change No. 133, Spent Fuel Pool Expansion."

11. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated March 19, 1986, "Response to Request for Additional Information - Proposed Change No. 133, Spent Fuel Pool Expansion."

12. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated November 24, 1986, "Response to Request for Additional Information - Proposed Change No. 133, Spent Fuel Pool Expansion."

13. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated April 9, 1987, "Response to Request for Additional Information Concerning the Spent Fuel Pool Cooling Systems Maximum Temperature Limit."

14. Letter (and attachment) from R. W. Capstick, VYNPC, to V. L. Rooney, NRC, dated April 13, 1987, "Vermont Yankees' Proposed Change No. 133, Spent Fuel Pool Expansion - Response to Request for Additional Information (Rack Lifting Rig Designs)."