

April 25, 1994

Docket Nos. 50-272
and 50-311

Mr. Steven E. Miltenberger
Vice President and Chief Nuclear
Officer
Public Service Electric & Gas
Company
Post Office Box 236
Hancocks Bridge, New Jersey 08038

Dear Mr. Miltenberger:

SUBJECT: ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT -
SPENT FUEL POOL MODIFICATION, SALEM NUCLEAR GENERATING STATION,
UNITS 1 AND 2 (TAC NOS. M85797 AND M85798)

By letter dated April 28, 1993, Public Service Electric and Gas Company (PSE&G) requested a license amendment to change the Technical Specifications related to the proposed expansion of the spent fuel pools at Salem, Units 1 and 2. Additional information was provided by letters dated August 12, 1993, November 17, 1993, February 2, 1994, and April 7, 1994.

Enclosed is our Environmental Assessment related to this proposed action. Based on our assessment, we have concluded that there are no significant radiological or nonradiological impacts associated with the proposed spent fuel pool expansion and it will have no significant impact on the quality of the human environment.

We have also enclosed a Notice of Issuance of Environmental Assessment and Finding of No Significant Impact. This notice is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by:
James C. Stone, Senior Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

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Enclosures:

- 1. Environmental Assessment
- 2. Notice of Issuance of Environmental Assessment

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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Sincerely,

A handwritten signature in cursive script that reads "James C. Stone".

James C. Stone, Senior Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Environmental Assessment
2. Notice of Issuance of
Environmental Assessment

cc w/enclosures:
See next page

Mr. Steven E. Miltenberger
Public Service Electric & Gas
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Units 1 and 2

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
ENVIRONMENTAL ASSESSMENT

BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO THE EXPANSION OF THE SPENT FUEL POOLS
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
FACILITY OPERATING LICENSE NO. DPR-70 AND DPR-75
SALEM NUCLEAR GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

1.1 Description of Proposed Amendment

By letter dated April 28, 1993, and supplemented by letters dated August 12, 1993, November 17, 1993, February 2, 1994, and April 7, 1994, the Public Service Electric & Gas Company (PSE&G or the licensee) requested amendments to change the Technical Specifications for expansion of the spent fuel pool (SFP) storage capacity at the Salem Generating Station (SGS) Units 1 and 2 by installation of new storage racks. The new racks would increase the total spent fuel storage capacity from 1170 to 1632 fuel assemblies and extend the projected storage capacity for spent fuel into the year 2008 and 2012 for Units 1 and 2, respectively.

1.2 Need for Increased Storage Capacity

The specific need to increase the limited existing spent fuel storage capacity at Salem Units 1 and 2 is based on the continuously increasing spent nuclear fuel supply and high level waste inventories, and the ability to maintain Operational Full Core Reserve (OFCR).

The current Salem SFP storage racks have a total storage capacity of 1170 cells for each unit. These racks provide adequate capacity for storage of spent fuel while maintaining an OFCR discharge capacity of 300 storage locations. OFCR includes both a full core fuel assembly reserve (193 storage locations) plus additional locations typically required for storage of non-fuel bearing components and maneuverability during refueling. Unit 1 will lose its OFCR capability in March of 1998 and Unit 2 by March of 2002. Therefore, to preclude this situation and to ensure that sufficient spent fuel storage capacity continues to exist at SGS, PSE&G plans to install poisoned, maximum density spent fuel storage racks. The SFP reracking will increase each SFP's capacity from 1170 cells to 1632 cells and provide an additional 10 years of storage. The expansion entails the retention of three Exxon Nuclear Corporation modules, containing 300 cells, and adding nine new Holtec modules containing 1332 cells. The new Holtec racks are free-standing, self-supporting, austenitic stainless steel modules whose design incorporates Boral as the neutron absorber in the cell walls.

2.0 ALTERNATIVES

2.1 Generic Environmental Impact Statement

Commercial reprocessing of spent fuel has not developed as originally anticipated. In 1975, the Commission directed the staff to perform a Generic Environmental Impact Statement (GEIS) for spent fuel storage. The Commission also directed the staff to evaluate alternatives for the handling and storage of spent light water power reactor fuel with particular emphasis on developing a long-range policy. The GEIS was to consider alternative methods of spent fuel storage as well as the possible restrictions on termination of the generation of spent fuel through reactor shutdown.

A "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575, Volumes 1-3) was issued by the Commission in August 1979. The finding of the FGEIS is that the environmental costs of interim storage are essentially negligible, regardless of where 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 generation of nuclear power versus its replacement by oil-fired generation provides an even greater economic advantage. In the bounding case considered in the FGEIS, that of 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 the onsite fuel storage capacity by modification of the existing spent fuel pools. Over 100 applications for spent fuel pool expansion have either been approved or are under consideration by the Commission. 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 design and limitations caused by spent fuel already stored in the pools, the FGEIS recommended that licensing reviews be done on a case-by-case basis to resolve plant-specific concerns.

2.2 Shipment of Fuel to a Permanent Federal Fuel Storage/Disposal Facility

Shipment of fuel to a permanent Federal fuel storage disposal facility is an alternative to increasing the onsite spent fuel storage capacity. The Department of Energy (DOE) is developing a repository under the Nuclear Waste Policy Act of 1982 (NWPA). The facility, however, is not likely to be able to receive spent fuel until approximately 2010, at the earliest. Therefore, spent fuel acceptance and disposal by DOE is not an alternative to increased onsite pool storage capacity.

As an interim measure, shipment to a Monitored Retrievable Storage (MRS) facility is another alternative to increasing the onsite spent fuel storage capacity. The DOE, under the NWSA, has submitted its MRS proposal to Congress. Because Congress has not authorized an MRS, and one is not projected to be available before 1998, this alternative does not meet the near-term storage needs for Salem Units 1 and 2.

Under the NWSA, 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 spent fuel at a Federal Interim Storage (FIS) facility fall within those already assessed by the Commission in NUREG-0575. In enacting NWSA, Congress found that the owners and operators of nuclear power stations have the primary responsibility for providing interim storage for spent nuclear fuel. In accordance with the NWSA and 10 CFR Part 53, shipping of spent fuel to an FIS facility is considered to be a last resort alternative. At this time, the licensee cannot take advantage of FIS because existing storage capacity is not maximized. The alternative of shipment of spent fuel to an FIS is not available.

2.3 Shipment of Fuel to a Reprocessing Facility

Reprocessing of spent fuel from Salem Units 1 and 2 is not viable because there is no operating commercial reprocessing facility in the United States, nor is there the prospect of one in the foreseeable future.

2.4 Shipment of Fuel to Another Utility or Site for Storage

The shipment of fuel from Salem Unit 1 and 2 to the storage facility of another utility company could provide short-term relief from the storage capacity problem. However, the NWSA 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.

Intrasite shipment involves transferring spent fuel from Salem Unit 1 to the Unit 2 pool. All such shipments would occur within the existing secured area. Intrasite shipment only provides temporary relief from the overall spent fuel storage problem. It would improve the storage situation at one site, however, at the expense of the other.

2.5 Reduction of Spent Fuel Generation

Improved usage of fuel in the reactor and/or operation at a reduced power level would extend the life of the fuel in the reactor. Also, extended burnup of the fuel would increase the fuel cycle and reduce the number of off-loads. However, the current storage capacity would still be exhausted as discussed in Section 1.2. Operation at reduced power would not make effective use of available resources and would thus result in economic penalties. Therefore, the reduction of the amount of spent fuel generated is not a practical alternative.

2.6 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) similar to the existing pool, or a dry 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 the water pools has an insignificant impact on the environment." Dry storage facilities have been built and used at a few facilities, and the staff reviews have indicated that they do not have a significant impact on the environment.

While these alternatives are economically acceptable, such a new storage facility, either at Salem or offsite, would require new site-specific engineering and design, including equipment for the transfer of spent fuel. Commission review and evaluation of such a facility would also be required. It is not likely that this entire effort would be completed in time to meet the need for additional capacity. Furthermore, such construction would not utilize the expansion capabilities of the existing pool and thus would waste resources.

2.7 No Action Taken

If no action were taken, the spent fuel pool will lose OFCR capability in March 1998 and September 2002 for Units 1 and 2, respectively. The impact 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 and found to be undesirable. This alternative would be a waste of an available resource and would result in replacement power costs that far exceed the cost of increasing onsite spent fuel storage capacity. Therefore, it is not considered to be a viable alternative.

2.8 PSE&G Analysis

PSE&G determined that reracking is the most viable solution for Units 1 and 2 in comparison with other spent fuel storage alternatives. The key guidelines that PSE&G considered which led to the decision to rerack the Salem pools were:

1. Protect the public health and safety and the quality of the environment by implementing a technically well proven and an existing NRC licensed technology.
2. Increase onsite storage capacity in a timely manner to maintain plant operability.
3. Minimize licensing risk and increase public acceptance as Salem Unit 1 was previously reracked during 1978-1981.

4. Maintain maximum flexibility, avoid over-expansion and over-commitment of funds to increase onsite storage capacity. This protects the interests of the ratepayers by ensuring prudent expenditures.
5. Meet the near-term and long-term storage needs and maintain an incremental expansion capability. This would allow PSE&G to maintain sufficient pressure on the Federal Program in meeting its contractual obligation. It would also protect the interests of the ratepayers by avoiding excess expenditures for onsite spent fuel storage.

PSE&G found reracking to be the most viable alternative with respect to each of these guidelines when compared with the alternatives of intrasite shipment (pool-to-pool), in-pool rod consolidation, conversion of Hope Creek Unit 2 Reactor Building into spent fuel storage pool, cask storage, horizontal or vertical concrete modules (vaults).

2.9 Fuel Reprocessing History

Currently commercial nuclear fuel is not being reprocessed in the United States. The Nuclear Fuel Services (NFS) plant in West Valley, New York, was shut down in 1972 for alterations and expansion. In September 1976, NFS informed the Commission that it was withdrawing from the nuclear fuel reprocessing business.

The proposed Allied General Nuclear Services plant in Barnwell, South Carolina, is not licensed to operate. The General Electric Company facility in Morris, Illinois, has been abandoned as a fuel reprocessing facility.

In 1977, President Carter issued a policy statement on commercial reprocessing of spent nuclear fuel that effectively eliminated reprocessing as a part of the 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. However, the Morris and West Valley facilities are no longer accepting additional spent fuel.

3.0 RADIOACTIVE WASTES

The Unit 1 and 2 radioactive waste management (radwaste) systems have been designed to provide for the controlled handling and treatment of radioactive liquid, gaseous and solid wastes. The radioactive waste management systems are evaluated in the Final Environmental Statement (FES), in the current Updated Final Safety Analysis Report (UFSAR), and in the Safety Evaluation Report (SER) dated October 1974. The proposed rerack will not involve any changes in the radwaste systems described in the FES, UFSAR, and SER.

3.1 Radioactive Material Released to the Atmosphere (Gaseous Radwaste)

The gaseous fission products that have significant impacts on the off-site doses following short fuel cooling periods are the short-lived nuclides of iodine and xenon, which reach saturation inventories during in-core operation. These inventories depend primarily on the fuel specific power over the few months immediately preceding reactor shutdown. After 168 hours of cooling time, most of the thyroid dose comes from Iodine-131, while most of the whole-body dose comes from Xenon-133. Though these iodine and xenon isotopes are the major contributors to offsite doses, the contributions from other radionuclides are calculated and included in the overall dose values.

During fuel reload operations, typical SFP radionuclide concentrations are expected to increase due to crud deposits spalling from the primary system. PSE&G operating experience has shown that there have been negligible concentrations of airborne radioactivity and no increases are expected as a result of the expanded storage capacity. Airborne activity monitors are available in the immediate vicinity of the SFP.

As a result of the assessment, PSE&G determined that the exclusion area boundary doses from the specified fuel handling accidents for the storage of additional fuel in the spent fuel pool were well within the exposure guideline values of 10 CFR Part 100.

3.2 Solid Radwaste

The necessity for resin replacement is primarily determined by the requirement for water clarity. Normally the resin is changed about once a year. Fuel pool storage expansion activities may result in the generation of a small amount of additional resins due to pool cleanup requirements. However, no significant increase in the volume of solid radioactive waste is expected with the proposed expanded storage capacity.

During the reracking activities, the existing storage racks will be removed and washed down in preparation for packaging and shipment. Shipping containers and procedures will conform to Federal Department of Transportation (DOT) regulations and to the requirements of any state through which the shipment may pass, as set forth by the State DOT office.

3.3 Radioactive Material Released to Receiving Water

No significant increase in the liquid release of radionuclides from the plant is expected as a result of the reracking.

The Spent Fuel Pool Cooling System is designed to remove from the spent fuel pool the heat generated by stored spent fuel elements, clarify and purify spent fuel pool, transfer pool, and refueling water. Its maximum duty occurs during the refueling operation when the decay heat from the spent fuel is the

highest. Any increase of radioactivity due to the reracking should be minor because of the capability of SFP cooling system to continuously remove radioactivity from the SFP water and lower radioactivity to acceptable levels.

The reracking, cleanup or transportation of the existing spent fuel storage racks, and disposition of the resulting material will not have any significant additional environmental impact.

4.0 RADIOLOGICAL IMPACT STATEMENT

All of the operations involved in reracking will utilize detailed procedures prepared with full consideration of ALARA principles to minimize radiation exposure to personnel.

The occupational exposure for the reracking operation is estimated to be between 6 and 12 person-rem. It is not expected that the small increase in radiation dose will affect the licensee's ability to maintain individual occupational doses within the limits of 10 CFR 20, and as low as reasonably achievable.

5.0 NON-RADIOLOGICAL IMPACT

The only non-radiological effluent affected by the SFP expansion is the additional spent fuel heat load. The total increase in heat load will be small in comparison to the total plant heat loss. Thus, the increased heat loss and water vapor emission will have a negligible effect on the environment.

6.0 ACCIDENT CONSIDERATIONS

In its application, the licensee evaluated the possible consequences of postulated accidents, including means for avoiding them in the design and operation of the facility, and recommended means for mitigating their consequences should they occur. The licensee has evaluated the effect of the changes on the calculated consequences of a spectrum of postulated design basis accidents (i.e., fuel handling accidents) and concludes that the effect of the proposed TS change is small and that the calculated consequences are within regulatory requirements and staff guidelines on dose values. The addition of poison pins or removal of blocking devices will not have any effect on the probability of occurrence of a fuel handling accident. Since the licensee proposes to utilize extended burnup fuel, the staff reevaluated the fuel handling accident for Salem to consider the effect of increased burnups.

In its evaluation for Salem, issued on October 11, 1974, the staff conservatively estimated offsite doses due to radionuclides released to the atmosphere from a fuel handling accident. The staff concluded that the plant mitigative features would reduce the doses for this DBA to below the doses specified in Standard Review Plan (SRP) Section 15.7.4.

Since the licensee intends to utilize extended burnup fuel, the staff reanalyzed the fuel handling DBA for this case. The licensee proposes to increase fuel enrichment to 5.0 weight percent U-235 with a maximum burnup of 60,000 MWD/T. In Table 1, the new and old DBA doses are presented and compared to the guideline doses in SRP Section 15.7.4 (established on the basis of 10 CFR Part 100). The licensee had requested approval for extended burnup to 65,000 MWD/T in its April 28, 1993, submittal. That was later reduced to 60,000 MWD/T in the April 7, 1994 letter.

Table 1
Radiological Consequences of Fuel
Handling Design Basis Accident (rem)

	<u>Thyroid</u>	
	<u>Exclusion Area</u>	<u>Low Population Zone</u>
Staff Evaluation October 11, 1974	11	1
Bounding Estimates for Extended Burnup Fuel ¹	13	1.2
Regulatory Guideline (NUREG-0800 Section 15.7.4)	75	75

The staff concludes that the only potential increased doses resulting from the fuel handling accidents with extended burnup fuel is the thyroid doses; these doses remain well within the dose limits given in NUREG-0800 and are, therefore, acceptable.

7.0 SUMMARY

The FGEIS on Handling and Storage of Spent Light Water Reactor Fuel concluded 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 spent fuel pool designs, the FGEIS recommended environmental evaluation of spent fuel pool expansions on a case-by-case basis.

¹ According to NUREG/CR-5009, increasing fuel enrichment to 5.0 weight percent U-235 with a maximum burnup of 60,000 MWD/T increases the doses for a fuel handling accident by a factor of 1.2.

The occupational radiation dose for the proposed operation of the expanded fuel pool is extremely small compared to the annual occupational exposure for a facility of this type. The small increase in radiation dose is not expected to affect the licensee's ability to maintain individual occupational doses at Salem within the limits of 10 CFR Part 20 and ALARA program guidelines. Furthermore, the non-radiological impacts of expanding the spent fuel pool will be insignificant, and none of the alternatives are practical or reasonable.

7.1 Alternative Use of Resources

This action does not involve the use of resources not previously considered in connection with the Commission's Final Environment Statement, dated April 1973, in connection with Salem.

8.0 AGENCIES AND PERSONS CONSULTED

The NRC staff reviewed the licensee's request. The NRC staff also consulted the New Jersey Official regarding the environmental impact of the proposed action. By letter dated March 25, 1994, the state notified the NRC that they had no comments on the licensee's application. No other agencies or persons were consulted.

9.0 BASIS AND CONCLUSION FOR NOT PREPARING AN ENVIRONMENTAL IMPACT STATEMENT

The staff has reviewed the proposed spent fuel pool modification to Salem relative to the requirements set forth in 10 CFR Part 51. Based on 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.

Principal Contributors: J. Zimmerman
J. Stone
J. Minns

Date: April 25, 1994

UNITED STATES NUCLEAR REGULATORY COMMISSION
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
DOCKET NOS. 50-272 AND 50-311
NOTICE OF ISSUANCE OF ENVIRONMENTAL ASSESSMENT
FINDING OF NO SIGNIFICANT IMPACT

The U.S. Nuclear Regulatory Commission (the Commission) is considering issuance of amendments to Facility Operating Licenses No. DPR-70 and DPR-75, issued to Public Service Electric and Gas Company (the licensee), for the operation of Salem Nuclear Generating Station, Units 1 and 2.

Identification of Proposed Action:

The amendments would consist of changes to the Technical Specifications (TS) that would authorize an increase to the storage capacity of the spent fuel pools (SFP) from 1170 fuel assemblies to 1632 fuel assemblies at each Salem unit.

The amendments to the TS are responsive to the licensee's application dated April 28, 1993, as supplemented by letters of August 12, 1993, November 7, 1993, February 2, 1994, and April 7, 1994. The NRC staff has prepared an Environmental Assessment of the proposed action, "Environmental Assessment by the Office of Nuclear Reactor Regulation Relating to the Expansion of the Spent Fuel Pools, Public Service Electric and Gas Company, Facility Operating License No. DPR-70 and DPR-75, Salem Nuclear Generating Station, Units 1 and 2, Docket Nos. 50-272 and 50-311," dated April 25, 1994.

Summary of Environmental Assessment:

The "Final Generic Environmental Impact Statement (FGEIS) on Handling and Storage of Spent Light Water Power Reactor Fuel" (NUREG-0575), concluded that

the environmental impact of interim storage of spent fuel was negligible and the cost of the various alternatives reflects the advantage of continued generation of nuclear with the accompanying spent fuel storage. Because of the differences in SFP designs, the FGEIS recommended licensing SFP expansion on a case-by-case basis.

For Salem Units 1 and 2, the SFP modification will not create any significant additional radiological effects or measurable nonradiological environmental impacts.

In the event of a fuel handling accident, the whole body dose and thyroid dose that might be received by an individual at the site boundary is well within regulatory requirements. It is not expected that an increase in the occupational radiation dose will result from the operation of the expanded spent fuel pools. For the modification of the pools, the occupational exposure is estimated to be less than 4% of the total annual occupational exposure at the facility. To assure as low as reasonably achievable (ALARA) goals are met, during the SFP expansion activities, work, personnel traffic and movement of equipment will be monitored and controlled. Therefore, the staff concludes that the exposure to workers is ALARA and is acceptable.

The only nonradiological impact affected by the expansion of the spent fuel pools is the waste heat rejected. The increase in total plant waste heat is insignificant (less than 0.05% of the total plant heat loss to the environment). There is no significant environmental impact attributed to the waste heat from the plant because of the expansion of the spent fuel pools.

FINDING OF NO SIGNIFICANT IMPACT

The staff has reviewed this proposed facility modification relative to the requirements set forth in 10 CFR Part 51. Based on this assessment, the staff concludes that there are no significant radiological or nonradiological impacts associated with the proposed action and that the issuance of the proposed amendments to the licenses will have no significant impact 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 amendments.

For further details with respect to this action, see (1) the application for amendments to the Technical Specifications dated April 28, 1993, as supplemented by letters of August 12, 1993, November 17, 1993, February 2, 1994, and April 7, 1994, (2) the FGEIS on Handling and Storage of Spent Light Water Power Reactor Fuel (NUREG-0575), (3) the Final Environmental Statement for Salem Nuclear Generating Station, Units 1 and 2, issued April 1973, and (4) the Environmental Assessment dated April 25, 1994. These documents are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC 20555, and at the local public document room located in the Salem Free Public Library, 112 West Broadway, Salem, New Jersey 08079.

Dated at Rockville, Maryland this 25th day of April 1994.

FOR THE NUCLEAR REGULATORY COMMISSION

Charles L. Miller

Charles L. Miller, Director
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation