

**Florida
Power**
CORPORATION

October 31, 1989

3F1089-28

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Crystal River Unit 3
Docket No. 50-302
Operating License No. DPR-72
Technical Specification Change Request No. 175
Spent Fuel Pool Storage Capacity

Dear Sir:

Florida Power Corporation (FPC) hereby submits Technical Specification Change Request No. (TSCRN) 175, requesting an amendment to Appendix A of Operating License No. DPR-72. As part of this request, the proposed replacement pages for Appendix A and associated bases are provided.

This submittal requests an increase in the capacity of the spent fuel storage pool and an increase in the allowable fuel enrichment to 4.2 percent in fuel pool B. The rerack of storage pool B will support storage of fuel by means of a two region layout. Region 1 will support storage of fresh fuel of 4.2 w/o U-235 and Region 2 will support storage of fuel of initial enrichment of 4.2 w/o with credit for burnup.

Region 1 (174 locations) will consist of high density fuel assembly spacing obtained by utilizing a neutron absorbing material and will be reserved for core off loading. Region 2 (641 locations) will also consist of high density fuel assembly spacing and will provide normal storage for spent fuel assemblies.

During the rerack modification spent fuel in pool B will be stored in pool A with the transfer canal gate in place. Missile shields that are normally in place over the spent fuel pools will remain in place over pool A while the old racks are being removed and the new racks are installed in pool B.

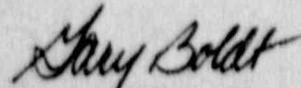
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Page 2

FPC requests this approval of this amendment prior to May 31, 1990 in order to accommodate receipt and installation of the new fuel racks after Refuel 7 (scheduled to begin March 1990).

Sincerely,



Gary Boldt, Vice President
Nuclear Production

GB/GMF/sdr

Attachment

xc: Regional Administrator, Region II
Senior Resident Inspector

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

IN THE MATTER)
) DOCKET NO. 50-302
FLORIDA POWER CORPORATION)

CERTIFICATE OF SERVICE

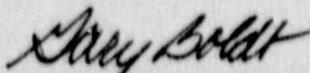
Gary Boldt deposes and says that the following has been served on the Designated State Representative and Chief Executive of Citrus County, Florida, by deposit in the United States mail, addressed as follows:

Chairman,
Board of County Commissioners
of Citrus County
Citrus County Courthouse
Inverness, FL 32650

Administrator
Radiological Health Services
Department of Health and
Rehabilitative Services
1323 Winewood Blvd.
Tallahassee, FL 32301

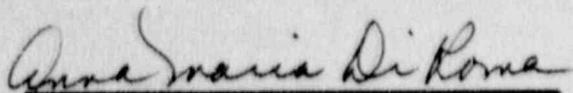
A copy of Technical Specification Change Request No. 175, requesting Amendment to Appendix A of Operating Licensing No. DPR-72.

FLORIDA POWER CORPORATION



Gary Boldt, Vice President
Nuclear Production

SWORN TO AND SUBSCRIBED BEFORE ME THIS 31st DAY OF OCTOBER, 1989.

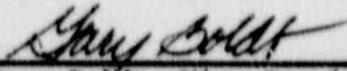

Anna Maria Di Roma
Notary Public

Notary Public, State of Florida at Large
My Commission Expires: 10/19/92

NOTARY PUBLIC, STATE OF FLORIDA AT LARGE
MY COMMISSION EXPIRES OCT. 19, 1992
BONDED THROUGH ASHTON AGENCY INC

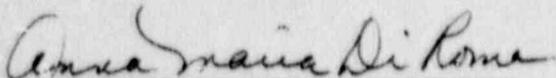
STATE OF FLORIDA
COUNTY OF CITRUS

Gary Boldt states that he is the Vice President, Nuclear Production for Florida Power Corporation; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission the information attached hereto; and that all such statements made and matters set forth therein are true and correct to the best of his knowledge, information, and belief.



Gary Boldt, Vice President
Nuclear Production

Subscribed and sworn to before me, a Notary Public in and for the State and County above named, this 31st day of October, 1989.



Notary Public

Notary Public, State of Florida at Large
My Commission Expires: 10/19/92

NOTARY PUBLIC, STATE OF FLORIDA AT LARGE
MY COMMISSION EXPIRES OCT. 19, 1992
BONDED THROUGH ASHTON AGENCY, INC.

**FLORIDA POWER CORPORATION
CRYSTAL RIVER UNIT 3
DOCKET NO. 50-302/LICENSE NO. DPR-72
REQUEST NO. 175, REVISION 0
SPENT FUEL POOL STORAGE CAPACITY**

LICENSE DOCUMENT INVOLVED: Technical Specifications

PORTIONS: XIV
3.9.11
3.9.13
4.9.13.3
4.9.13.4
Figure 3.9-2
5.6.1
5.6.3

DESCRIPTION OF REQUEST:

This Technical Specification Change Request is requesting:

1. a one time relief from Technical Specification 3.9.11 to allow removal of the missile shield for installation of high density spent fuel storage racks in pool B. This one time relief would be in effect for the duration of the spent fuel pool B rerack modification.
2. an increase in the allowable nominal fuel enrichment in weight percent of U-235 for spent fuel pool B.
3. an increase in the number of spent fuel storage locations from "1153" to "1357" for both pools, and decrease the number of failed fuel containers from 8 to 0 in pool B.
4. an expansion of Section 5.6.1 to indicate that the high density spent fuel racks in pool B will utilize a two region layout. Region 1 will have a 10.60 inch center-to-center spacing and Region 2 will have a 9.17 inch center-to-center spacing.

REASON FOR REQUEST:

Currently spent fuel pool B contains standard geometric reactivity control racks totaling 120 cells with center-to-center spacing of 21 1/8 inches. In addition, there are provisions to store eight failed fuel canisters. Each rack is mechanically fastened to studs protruding from the pool floor. The proposed modification will increase the storage capacity in the spent fuel pools and will consist of replacing existing fuel assembly racks with high density, free standing storage racks without changing the basic structural geometry of the spent fuel pool.

1. Florida Power Corporation (FPC) request a one time relief from Technical Specification 3.9.11 which requires that all missile

shields be maintained over the top of irradiated fuel assemblies seated in the storage racks when ever irradiated fuel assemblies are in the storage pool. This request will allow for installation of the high density spent fuel storage racks in spent fuel pool B (and removal of the present spent fuel racks).

2. Florida Power Corporation will utilize up to 4.2 weight percent enriched fuel during Cycle 9 and possibly subsequent cycles. Our current fuel storage analyses and Technical Specifications reflect a maximum 4.0 weight percent enrichment for storage pool B. This change supports an enrichment increase to 4.3% for storage pool B. (See item #3 below).
3. As a result of the uncertainty concerning the Department of Energy fulfilling its contractual obligations under the Nuclear Waste Policy Act (NWPA), Florida Power Corporation has decided to pursue the licensing and subsequent installation of high density fuel storage racks at Crystal River Unit 3 (CR-3). We feel that this course of action is required in order to protect our ability to continue to operate CR-3 until resolution of the spent fuel problem is achieved. Based on the current fuel storage capacity for pool B, CR-3 will lose full core reserve after Refuel 7 in March 1990. To achieve this goal, Florida Power Corporation has contracted Westinghouse to design, fabricate and install the high density fuel storage racks for Crystal River Unit 3.
4. Florida Power Corporation will utilize a two region design in spent pool B to differentiate the storage areas between the two types of fuel assemblies and the flexibility to provide additional fuel assembly storage capacity (using pin consolidation). Region 1 racks are poison racks designed to store fresh and spent fuel and consolidated arrays of fuel at a maximum ratio of 2:1. Region 2 racks are designed to take credit for burnup and to store consolidated arrays of fuel at a maximum ratio of 2:1.

EVALUATION OF REQUEST:

1. An evaluation has been performed to determine the consequences of tornado-generated missiles impacting the spent fuel pool while performing fuel rack densification work in pool B. During the rerack modification all spent fuel will be in pool A, the missile shielding above pool B will be removed, the transfer canal gate between the pools and the A pool missile shielding will be installed. The evaluation has determined that the missile spectrum utilized in the Crystal River FSAR analyses will not impact the spent fuel stored in this configuration.
2. The purpose of limiting the combination of allowable fuel enrichment and burnup of assemblies stored in storage pool B is to ensure sufficient safety margin exists to prevent

inadvertent criticality. These limits assure a K_{eff} equal to or less than 0.95 is maintained under all conditions. The attached analysis indicates that storage of fuel up to 4.2 initial weight percent enrichment in storage pool B will not cause K_{eff} to exceed 0.95. Administrative controls shall be used to prevent storage of fuel assemblies having less than an acceptable combination of fuel enrichment and burnup.

The design of the racks is such that K_{eff} remains less than or equal to 0.95 under all conditions, including fuel handling accidents. The close spacing of the racks precludes insertion of fuel assemblies in other than design storage locations, except in an area south of the Region 1 racks where a fuel assembly may be inserted between the pool wall and the racks. Such inadvertent insertion of a fuel into this location, or the placement of a fuel assembly across the top of a fuel rack, is considered a postulated accident, and as such, realistic initial conditions such as boron in the water can be taken into account. This condition has an acceptable K_{eff} of less than 0.95.

3. Increasing the capacity of the Crystal River spent fuel pool will not effect the environment nor increase the doses to personnel from radionuclide concentrations in the spent fuel pool area. The effects of additional loads on the existing pool structure due to the high capacity storage racks have been examined. The pool structural integrity is assured by conformance with the original FSAR acceptance criteria. The spent fuel racks are Seismic Category I equipment. Therefore, they are required to remain functional during and after an SSE. No significant increase in volume of solid radioactive wastes is expected to be generated.
4. The spent fuel storage racks provide safe subcritical storage of fuel assemblies by providing sufficient center-to-center spacing or a combination of spacing and poison to assure K_{eff} is equal to or less than 0.95 for normal operations and postulated accidents. The spent fuel racks consist of two designs with varying storage capability. Region 1 consists of high density fuel assembly spacing obtained by utilizing a neutron absorbing material and is reserved for core off loading. Region 2 also consists of high density fuel assembly spacing and provides normal storage for spent fuel assemblies. Region 1 will have a 10.60 inch center-to-center spacing and is designed to accommodate non-irradiated, 4.2 weight percent U^{235} enriched fuel. Region 2 will have a 9.17 inch center-to-center spacing and is designed to accommodate irradiated fuel. In either case, spacing is sufficient to maintain a subcritical condition when flooded.

ATTACHMENT 1

SHOLLY EVALUATION

Missile Shield Removal:

Using the standards in 10 CFR 50.92, Florida Power Corporation concludes this amendment will not involve a significant hazards consideration for the following reasons:

1. This amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated. During the rerack modification spent fuel in pool B will be stored in pool A with the transfer canal gate and the missile shields in place over spent fuel pool A. This rerack modification will not increase the probability of tornado-generated missiles impacting the spent fuel pool. An evaluation has been performed to determine the consequences of tornado-generated missiles impacting the spent fuel pool gate while performing fuel rack densification work in pool B. The evaluation has determined that the missile spectrum utilized in the Crystal River FSAR analyses will not impact the spent fuel stored in this configuration.
2. This amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed rerack amendment has no effect on the possibility of creating a new or different kind of accident from any accident previously evaluated. The proposed change requires the missile shields to be removed and installed over the A pool with the transfer canal gate in place during rerack of the B pool. All fuel will be stored in the A pool during this modification. This change cannot create a new or different accident from those previously evaluated.
3. This amendment will not involve a significant reduction in a margin of safety. This is a one time relief from Technical Specification 3.9.11 to allow removal of the missile shield for installation of high density spent fuel storage racks in pool B. The missile shields and the transfer canal gate are Class I structures and are designed for the protection of other safety-related systems for a postulated accident. Since the missile shields will be in place over pool A with the transfer canal gate separating Pool A and B, this will prevent any damage to any of the spent fuel assemblies. Therefore, the rerack modification will not involve a reduction in a margin of safety.

Fuel Enrichment:

Using the standards in 10 CFR 50.92, Florida Power Corporation concludes this amendment will not involve a significant hazards consideration for the following reasons:

1. This amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated.

An increase in fuel enrichment will not by itself affect the mixture of fission product nuclides. A change in fuel cycle design which makes use of an increased enrichment may result in fuel burnup consisting of a somewhat different mixture of nuclides. The effect in this instance is insignificant because:

- a) The isotopic mixture of the irradiated assembly is relatively insensitive to the assembly's initial enrichment.
 - b) Most accident doses are such a small fraction of 10 CFR 100 limits, a large margin exists before any change becomes significant.
 - c) The change in Pu content which would result from an increase in burnup would produce more of some fission product nuclides and less of other nuclides. Small increases in some doses are offset by reductions in other doses. The radiological consequences of accidents are not significantly changed.
2. This amendment will not create the possibility of a new or different kind of accident from any accident previously evaluated.

As indicated in the enclosed analyses, an unplanned criticality event will not occur as K_{eff} will not exceed 0.95 with the maximum allowable enriched fuel in pool B, and flooded with unborated water.

3. This amendment will not involve a significant reduction in a margin of safety.

While the increased enrichment in pool B may lessen the margin to criticality, this reduction is not significant because the overall safety margin is within NRC criteria of K_{eff} less than or equal to 0.95 (NRC Standard Review Plan, Section 9.1.2).

Spent Fuel Pool Rerack:

Florida Power Corporation (FPC) presents this evaluation of the hazards considerations involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92 (c) as quoted below:

"The Commission may make a final determination, pursuant to the procedures in 50.91, that a proposed amendment to an operating license for a facility licensed under 50.21(b) or 50.22 or for a testing facility involves no significant hazards considerations, unless it finds that operation of the facility in accordance with the proposed amendment would:

1. Involved a significant increase in the probability or consequences of an accident previously evaluated; or
2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or
3. Involve a significant reduction in a margin of safety."

FPC submits that the activities associated with this amendment request do not meet any of the significant hazards consideration standards of 10 CFR 50.92(c) and, accordingly, a no significant hazards consideration finding is justified. In support of this determination, necessary background information is first provided, followed by a discussion of each of the significant safety hazards consideration factors with respect to the proposed amendments.

Background:

The Crystal River Plant was designed and constructed with two spent fuel storage pools. These facilities had capacity for 240 spent fuel assemblies (equivalent to 1-2/3 of the full core fuel load). The Crystal River Unit 3 Final Safety Analysis Report (FSAR) addressed the safety implications of the facility and included relevant parameters associated with criticality, structural integrity, and cooling. The Crystal River Unit 3 Safety Evaluation Report (Docket No. 50-302) found the environmental and safety impacts of storage in these facilities to be acceptable.

In 1978, a request to amend the Crystal River operating license for increased spent fuel storage was submitted by FPC. By letter dated November 17, 1980, the Commission approved Amendment 36 to facility operating license DPR-72 for modification to Crystal River Unit 3 spent fuel storage facility. This modification consisted of reracking the Unit 3 spent fuel pools with high density fuel storage racks which increased the storage capacity from 240 fuel assemblies to 1153 fuel assemblies. Approval of the amendment

included a detailed review and analysis of all relevant storage parameters and potential accidents. The analyses resulted in a finding that environmental and safety impacts were negligible.

The safety evaluation performed in support of the 1978 request to amend the Crystal River operating license to allow reracking of the Unit 3 fuel pools addressed the following:

1. Structural and Seismic Analysis
2. Nuclear Criticality Analysis
3. Thermal-Hydraulic Analysis
4. Accident Analyses
5. Radiation Exposures
6. Spent Fuel Cask Drop Accident

It was determined that the proposed modifications to the Unit 3 spent fuel pools would be acceptable because: (1) the rack structural design would withstand conditions during normal operation combined with the maximum earthquake, (2) the rack design would preclude criticality for any moderating condition, (3) the existing spent fuel cooling system was determined to adequately cool the increased heat load, (4) the increase radiation doses, both onsite and offsite would be negligible, and (5) spent fuel cask handling operations would not change from the original design.

The current spent fuel storage capacity at Crystal River consists of 542 storage positions in spent fuel pool A and 120 storage positions in spent fuel pool B. With this application, FPC is requesting approval to rerack the Crystal River spent fuel storage pool B to increase the storage capacity as set forth in the attached Safety Analysis Report.

Evaluation:

The following evaluation demonstrates (by reference to the analysis contained in the attached Safety Analysis Report) that the proposed amendment does not exceed any of the three significant hazards consideration standards. The analysis of this proposed reracking has been accomplished using current accepted codes and standards as specified in Section 3.4 of the attached Safety Analysis Report. The results of the analysis meet the specified acceptance criteria in these standards as presented in the Safety Analysis Report.

- (1) Involve a significant increase in the probability or consequences of an accident previously evaluated.

In the course of the analysis, FPC has identified the following potential accident scenarios:

1. A spent fuel assembly drop in the spent fuel pool.
2. Loss of spent fuel pool cooling system flow.
3. A seismic event.
4. A spent fuel cask drop.
5. A construction accident.

The probability of any of the first four accidents is not affected by the racks themselves; thus reracking cannot increase the probability of these accidents. As for the construction accident, FPC does not intend to carry any rack directly over the stored spent fuel assemblies. All work in the spent fuel pool area will be controlled and performed in strict accordance with specific written procedures. The spent fuel cask crane which will be used to access the spent fuel pool area has been addressed in FPC's response to the NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants". This response demonstrated Crystal River compliance with Phase I of the NUREG-0612 criteria. By letter dated July 13, 1984, the NRC concluded that the control of heavy loads program (Phase I) at the Crystal River Plant was in compliance with the requirements of NUREG-0612. This program provides for the safe handling of heavy loads in the vicinity of the Spent Fuel Pool.

Accordingly, the proposed rerack will not involve a significant increase in the probability of an accident previously evaluated.

The consequences of (1) A spent fuel assembly drop in the spent fuel pool are discussed in the attached Safety Analysis Report. For this accident condition, the criticality acceptance criterion is not violated. The radiological consequences of a fuel assembly drop are not changed from that described in Chapter 14 of the Crystal River Updated FSAR. Thus, the consequences of this type accident will not be significantly increased from previously evaluated spent fuel assembly drops, and have been found acceptable by the NRC.

The consequences of (2) Loss of spent fuel pool cooling system flow, have been evaluated and are described in Section 2.2.4 of the Safety Analysis Report. As indicated in Section 2.2.4

and 4.4 there is sufficient time to provide an alternate means for cooling in the event of a failure in the cooling system. Thus, the consequences of this type accident will not be significantly increase from previously evaluated loss of cooling system flow accidents. Additionally, the NRC has previously accepted in the SER for the last rerack (dated 11/17/80), that the cooling capacity for the CR-3 Spent fuel pools will be sufficient to handle the incremental heat load that will be added by the rerack modification.

The consequences of (3) A seismic event, have been evaluated and are described in Section 3.5 of the attached Safety Analysis Report. The new racks will be designed and fabricated to meet the requirements of applicable portions of the NRC Regulatory Guides and published standards listed in Section 3.4 of the Safety Analysis Report. Each new rack module is provided with leveling pads which contact the spent pool floor or pool floor plates and are remotely adjustable from above, through the cells, at installation. The modules are neither anchored to the floor nor braced to the pool walls. The new racks are designed so that the floor loading from the racks filled with spent fuel assemblies does not exceed the structural capacity of the Spent Fuel Building. The Spent Fuel Building and pool structure have been designed in accordance with the criteria outlined in Section 5.2 of the Crystal River Updated FSAR and previously accepted by the NRC. Thus, the consequences of a seismic event will not increase from previously evaluated events.

The consequences of (4) A spent fuel cask drop have been discussed in Section 5.3 of the Safety Analysis Report. Based on the improvements in heavy loads handling obtained from implementation of NUREG-0612 (Phase I), further action is not required to reduce the risks associated with the handling of heavy loads. The NRC concluded that the guidelines of Phase I are adequately providing the intended level of protection against load drop accidents. Thus, the consequences of a cask drop accident will not be significantly increased from previously evaluated accident analysis.

The consequences of (5) A construction accident are enveloped by the spent fuel cask drop analysis described in Section 5.3 of the Safety Analysis Report. Missile shields that are normally in place over the spent fuel pool will remain in place over pool A, while pool B is being reracked. In addition, all movements of heavy loads handled during the rerack operation will comply with the NRC guidelines and ANSI 14.6. Thus, the consequences of a construction accident will not be significantly increased from previously evaluated accident analysis.

Thus, it is concluded that the proposed amendment to rerack the spent fuel pools will not involve a significant increase in the probability or consequences of an accident previously evaluated.

- (2) Create the possibility of a new or different kind of accident from any accident previously evaluated.

FPC has evaluated the proposed reracking in accordance with the guidance of the NRC position paper entitled, "OT Position for Review and Acceptance of Spent Fuel Storage and Handling Applications", appropriate NRC Regulatory Guides, appropriate NRC Standard Review Plans, and appropriate Industry Codes and Standards as listed in Section 3.4 of the attached Safety Analysis Report. In addition, FPC has reviewed several previous NRC Safety Evaluation Reports for rerack applications similar to our proposal. As a result of this evaluation and these reviews, FPC finds that the proposed reracking does not, in any way, create the possibility of a new or different kind of accident from any accident previously evaluated for the Crystal River Spent Fuel Storage Facility.

- (3) Involve a significant reduction in a margin of safety.

The NRC Staff Safety Evaluation review process has established that the issue of margin of safety, when applied to a reracking modification, will need to address the following areas:

1. Nuclear criticality considerations
2. Thermal-Hydraulic considerations
3. Mechanical, material and structural considerations

The established acceptance criteria for criticality is that the neutron multiplication factor in spent fuel pools shall be less than or equal to 0.95, including all uncertainties, under all conditions. This margin of safety has been adhered to in the criticality analysis methods for the new rack design as discussed in Section 2.2 of the attached Safety Analysis Report.

The methods to be used in the criticality analysis conform with the applicable portions of the codes, standards, and specifications listed in Section 3.4 of the Safety Analysis Report. In meeting the acceptance criteria for criticality in the spent fuel pool, such that keff is always less than 0.95, including uncertainties at a 95/95 probability confidence level, the proposed amendment to rerack the spent fuel pools

will not involve a significant reduction in the margin of safety for nuclear criticality.

Conservative methods are used to calculate the maximum fuel temperature and the increase in temperature of the water in the spent fuel pool. The thermal-hydraulic evaluation uses the methods described in Section 2.2 of the Safety Analysis Report in demonstrating the temperature margins of safety are maintained. The proposed reracking will allow an increase to the heat load in the spent fuel pool. The evaluation in Section 2.2 of the Safety Analysis Report shows that the existing spent fuel cooling system will maintain the pool temperature margins of safety for the calculated increase in pool heat load. Thus, there is no significant reduction in the margin of safety for thermal-hydraulic or spent fuel cooling concern.

The main safety function of the spent fuel pool and the racks is to maintain the spent fuel assemblies in a safe configuration through all normal and abnormal loadings, such as an earthquake, impact due to a spent fuel cask drop, drop of a spent fuel assembly, or drop of any other heavy object. The mechanical, material, and structural considerations of the proposed rerack are described in Section 3.0 of the attached Safety Analysis Report. As described in Section 3.0 of the Safety Analysis Report, the proposed racks are to be designed in accordance with applicable portions of the "NRC Position for Review and Acceptance of Spent Fuel Storage and Handling Application", dated April 14, 1978, as modified January 18, 1979; Standard Review Plan 3.8.4; and the Crystal River Updated FSAR. The rack materials used are compatible with the spent fuel pool and the spent fuel assemblies. The structural considerations of the new racks address margins of safety against tilting and deflection or movement, such that the racks do not impact each other or the pool walls, damage spent fuel assemblies, or cause criticality concerns. Thus, the margins of safety are not significantly reduced by the proposed rerack.

In summation, it has been shown that the proposed spent fuel storage facility modifications do not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated; or
2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or
3. Involve a significant reduction in a margin of safety.

Attachment 1 cont.

FPC has determined and submits that the proposed amendments described do not involve a significant safety hazard and that the standards in 10 CFR 50.92 have been met.