September 12, 2002

Mr. Michael Kansler
Sr. Vice President and Chief
Operating Officer
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: JAMES A. FITZPATRICK NUCLEAR POWER PLANT - AMENDMENT RE: TECHNICAL SPECIFICATION CHANGE TO THE REQUIREMENTS FOR HANDLING IRRADIATED FUEL ASSEMBLIES (TAC NO. MB5328)

Dear Mr. Kansler:

The Commission has issued the enclosed Amendment No. 276 to Facility Operating License No. DPR-59 for the James A. FitzPatrick Nuclear Power Plant. The amendment consists of changes to the Technical Specifications (TSs) in response to your application transmitted by letter dated June 7, 2002, as supplemented July 17, 2002.

The amendment changes the TSs to allow relaxation of secondary containment operability requirements while handling irradiated fuel in the secondary containment. The amendment replaces the current accident source term used in selected design basis radiological analyses with an alternative source term pursuant to 10 CFR 50.67, “Accident Source Term.”

A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's next regular biweekly *Federal Register* notice.

Sincerely,

Guy S. Vissing, Sr. Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-333

Enclosures: 1. Amendment No. 276 to DPR-59
2. Safety Evaluation

cc w/encls: See next page

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cc w/encls: See next page

**See previous concurrence.
*SEs provided, no major changes

Accession Number: ML022350228

OFFICE	PDI-1\PM	PDI-1\LA	OGC**	SPSB/SC*	SPLB/SC	PDI-1\SC
NAME	GVissing	SLittle	AFernandez	FReinhart	SWeerakkody*	RLaufer
DATE	9/11/02	9/11/02	9/10/02	8/28/02	8/8/02	9/12/02

Official Record Copy

DATED: September 12, 2002

AMENDMENT NO. 276 TO FACILITY OPERATING LICENSE NO. DPR-59 FITZPATRICK

PUBLIC
PDI-1 R/F
SRichards
RLaufer
OGC
GHill (2)
WBeckner
ACRS
BPlatchek, RI
GVissing
SLittle
SFLaVie
DCullison
cc: Plant Service list

ENTERGY NUCLEAR OPERATIONS, INC.

DOCKET NO. 50-333

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 276
License No. DPR-59

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Entergy Nuclear Operations, Inc. (the licensee) dated June 7, 2002, as supplemented July 17, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-59 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 276, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 12, 2002

ATTACHMENT TO LICENSE AMENDMENT NO. 276

FACILITY OPERATING LICENSE NO. DPR-59

DOCKET NO. 50-333

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove Pages	Insert Pages
3.3.6.2-4	3.3.6.2-4
3.3.7.1-1	3.3.7.1-1
3.6.4.1-1	3.6.4.1-1
3.6.4.1-2	3.6.4.1-2
3.6.4.2-1	3.6.4.2-1
3.6.4.2-3	3.6.4.2-3
3.6.4.3-1	3.6.4.3-1
3.6.4.3-2	3.6.4.3-2
3.7.3-1	3.7.3-1
3.7.3-2	3.7.3-2
3.7.3-3	3.7.3-3
3.7.4-1	3.7.4-1
3.7.4-2	3.7.4-2
3.7.4-3	3.7.4-3
3.8.2-1	3.8.2-1
3.8.2-2	3.8.2-2
3.8.2-3	3.8.2-3
3.8.5-1	3.8.5-1
3.8.8-1	3.8.8-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 276 TO FACILITY OPERATING LICENSE NO. DPR-59

ENTERGY NUCLEAR OPERATIONS, INC.

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

1.0 INTRODUCTION

By letter dated June 7, 2002, as supplemented July 17, 2002, Entergy Nuclear Operations, Inc. (ENO or the licensee) submitted a request for changes to the James A. FitzPatrick Nuclear Power Plant (JAF) Technical Specifications (TSs). The requested changes would change the TSs to allow relaxation of secondary containment operability requirements while handling irradiated fuel in the secondary containment. The amendment would replace the current accident source term used in selected design basis radiological analyses limited to fuel-handling accident (FHA) analyses with an alternative source term (AST) pursuant to 10 CFR 50.67, "Accident Source Term." The July 17, 2002, letter provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

The licensee proposed revising a series of TSs to change the applicability from "when handling irradiated fuel" to read "when handling recently irradiated fuel." Changes to the TS bases define what time period must elapse before fuel is considered to be beyond "recently irradiated." The following TSs are proposed to be revised:

- TS 3.3.6.2, Isolation Actuation Instrumentation
- TS 3.3.7.1, Control Room Emergency Ventilation System Air Supply (CREVAS) System Instrumentation
- TS 3.6.4.1, Secondary Containment
- TS 3.6.4.2, Secondary Containment Isolation Valves (SCIVS)
- TS 3.6.4.3, Standby Gas Treatment (SGT) System
- TS 3.7.3, Control Room Emergency Ventilation System Air Supply (CREVAS) System
- TS 3.7.4, Control Room Air Conditioning (AC) System
- TS 3.8.2, AC Sources - Shutdown
- TS 3.8.5, DC Sources - Shutdown
- TS 3.8.8, Distribution Systems - Shutdown

The licensee has also proposed revising seven of the above listed TSs to delete the applicability for "core alterations." This change would apply to all the above listed except TS 3.8.2, 3.8.5, and 3.8.8.

Conforming changes were proposed to the bases.

2.0 REGULATORY EVALUATION

In December 1999, the U.S. Nuclear Regulatory Commission (NRC) issued a new regulation, 10 CFR 50.67, "Accident Source Term," which provided a mechanism for licensed power reactors to voluntarily replace the traditional accident source term used in their design-basis accident (DBA) analyses with ASTs. Regulatory guidance for the implementation of these ASTs is provided in Regulatory Guide (RG) 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors." Section 50.67 requires a licensee seeking to use an alternative source term to apply for a license amendment and requires that the application contain an evaluation of the consequences of DBAs. The present amendment request addresses these requirements in proposing selectively to use an AST in evaluating the offsite and control room radiological consequences of an FHA. This re-analysis involved several changes in selected analysis assumptions including revised values for atmospheric dispersion values for the control room outside air intakes.

The licensee is requesting the TS changes as a result of their selective implementation of AST guidance for evaluating the potential dose consequences of an FHA. Also, the requested TS changes are consistent with the TS changes discussed in TS Task Force Traveler 51 (TSTF). TSTF-51, Revision 2 was approved by the NRC on October 15, 1999. TSTF-51 allows the removal of TS requirements for engineered safety features (ESF) to be OPERABLE after sufficient radioactive decay has occurred to ensure off-site doses remain below a small fraction of 10 CFR Part 100 limits. The NRC staff has allowed the use of TSTF-51, where the licensee is using the AST guidance if exclusion area and low population zone dose limits in 10 CFR 50.67 are not exceeded. Fuel that is not sufficiently decayed to allow relaxation of OPERABILITY requirements is referred to as "recently" irradiated fuel. Recently irradiated fuel could still be moved but the appropriate ESF systems need to be OPERABLE. TSTF-51 also allows the deletion of OPERABILITY requirements for ESF mitigation features during CORE ALTERATIONS.

The Reviewer's Note in TSTF-51 requires that licensees adding the term "recently" make a commitment consistent with draft NUMARC 93-01, Revision 3, Section 11.2.6, "Safety Assessment for Removal of Equipment from Service During Shutdown Conditions," sub heading "Containment - Primary (PWR)/Secondary (BWR)." The commitment in the Reviewer's Note reads:

> The following guidelines are included in the assessment of systems removed from service during movement of irradiated fuel:
>
> - During fuel handling/core alterations, ventilation system and radiation monitor availability (as defined in NUMARC 91-06) should be assessed, with respect to filtration and monitoring of releases from the fuel. Following shutdown, radioactivity in the fuel decays fairly rapidly. The basis of the TS operability amendment is the reduction in doses due to such decay. The goal of

maintaining ventilation system and radiation monitor availability is to reduce doses even further below that provided by the natural decay.

– A single normal or contingency method to promptly close primary or secondary containment penetrations should be developed. Such prompt methods need not completely block the penetration or be capable of resisting pressure.

The purpose of the "prompt methods" mentioned above are to enable ventilation systems to draw the release from a postulated fuel handling accident in the proper direction such that it can be treated and monitored.

Since TSTF-51, Revision 2, was approved, NUMARC 93-01, Revision 3, was issued. The requirements of the draft Section 11.2.6 are now located in the final Section 11.3.6 "Containment - Primary (PWR)/Secondary (BWR)."

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the changes proposed by the licensee in their submittal of June 7, 2002. The NRC staff performed confirmatory calculations for the FHA and did a confirmatory evaluation of the atmospheric dispersion parameters used in the dose analyses. The licensee stated, and the staff concurs, that the FHA is the limiting event with regard to the proposed TS changes. Since only the FHA was revised to use the AST, the JAF implementation of the AST is considered a selective application applicable only to the FHA analyses. The following sections of this safety evaluation (SE) provide the results of the staff's review of the licensee's analyses. Table 1 tabulates the analysis inputs and assumptions found acceptable to the staff. Although the staff did confirmatory analyses, the staff's approval of this amendment is based on the information docketed by the licensee and on the staff's finding that the methods, inputs, and assumptions used in the licensee's analyses are acceptable.

3.1 FHA Radiological Consequences

The licensee evaluated the consequences of this event. The FHA analysis postulates that a spent fuel assembly is dropped during refueling, damaging 125 fuel rods. This accident is postulated to occur inside the containment (CNMT) as JAF does not have a separate fuel building.

The inventory of fission products in the reactor core is a function of the reactor power, the duration of the at-power operation, and the time after shutdown prior to spent fuel movement. ENO determined the core inventory assuming a power level of 2587 MWt (102% of the rated thermal power), an extended period of operation sufficient for significant radionuclides to reach equillibrium, and a decay period of 96 hours following shutdown. To account for differences in power distribution across the core, a peaking factor of 1.6 is applied to the average inventory. The majority of the fission products produced during operation are contained within the fuel pellet, however, some migrate to void spaces, known as "gap," within the fuel rods. ENO assumed that 8 percent of the I-131 inventory of the core was in the fuel rod gap, along with 10 percent of the Kr-85, 12 percent for alkali metals, and 5 percent of all other iodines and noble gases.

For the purposes of establishing the quantity of fuel damaged in the event, ENO assumes that a General Electric (GE) 8x8 fuel assembly is dropped over the reactor vessel, resulting in a total of 125 damaged rods. The GE-8 core contains 33,600 fuel rods in 560 assemblies. This corresponds to a fractional gap release of 0.37 percent. However, the JAF core contains fuel of different fuel types and the total number of fuel rods vary with core load. Although the actual number of failed fuel rods would increase for later fuel types, so does the total number of fuel rods in the core. Analyses by the fuel vendor have shown that the fractional gap release is bounded by the GE-8 analysis. This event is postulated to occur over the reactor vessel. The event could also occur over the spent fuel pool. However, ENO states that fewer fuel rods (i.e., 81) would be damaged in the latter case due to reduced drop height.

The radionuclides are assumed to be released from the damaged fuel rods, pass through the water in the reactor cavity or spent fuel pool, and enter the building atmosphere instantaneously. As the released gases rise through the overlaying water, halogens are scrubbed by the water column, resulting in an effective halogen decontamination factor of 200. No decontamination of noble gases or organic iodine forms was assumed. As a result of these differences in scrubbing efficiencies, ENO projects that the iodine species fractions for the fuel pool release to be 57 percent elemental and 43 percent organic. The guidance in RG 1.183 allows an effective halogen decontamination factor of 200 when the overlaying water column is at least 23 feet. This pre-condition is met for the reactor cavity, but not for the spent fuel pool, where the water depth is only 21 feet 7 inches. ENO stated that the implied reduction in scrubbing efficiency is offset by the reduced number of fuel rods (i.e., 81 vs. 125) that are projected to be damaged by a fuel assembly drop over the spent fuel pool. The effective decontamination factor in RG 1.183 is based on an exponential function. In this function, the more scrubbing occurs at the bottom of the water column than at the top of the water column. As such, a pool level of 21 feet 7 inches, a reduction of about 6 percent in pool depth, would result in a reduction in scrubbing efficiency of less than 6 percent. This is less than the 35 percent reduction in the amount of damaged rods, and hence the radionuclides released. The staff finds the licensee's conclusion that the consequences of an FHA over the reactor cavity bounds those for an FHA over the spent fuel pool to be acceptable.

ENO assumes that the fission products released to the reactor building are released to the environment via the reactor building vent over a 2-hour period. ENO considered possible release points and concluded that there were two of interest--the reactor building vent and the reactor building truck bay doors–since the proposed relaxation in secondary containment operability requirements would allow both to remain open during refueling with the standby gas treatment system inoperable. Since ENO has taken no credit for engineered safeguards features for isolation or filtration of releases to the environment and assumes a release rate that is independent of the release path, the only parameter that differentiates the release points is the atmospheric dispersion. The releases from both release points were treated as ground level releases for determining the exclusion area boundary (EAB), low population zone (LPZ), and control room doses. For the control room assessment, the reactor building vent dispersion is more limiting than that for the reactor building truck bay doors. Since the distances to the EAB and LPZ are large in comparison to the distance between the release points, differences in the offsite dispersion factors are negligible and can be ignored. As such, the consequences of releases via the reactor building vent bound those for the reactor building truck bay door.

ENO assumes a release rate based on the release of 99 percent of the radionuclides in the reactor building to the environment over a 2-hour period. ENO determined this rate to be equivalent to a release flow rate of 99,800 cfm.

The licensee evaluated the dose to operators in the control room. For this assessment, ENO assumed no ESF response occurred and that the control room ventilation system remained in a normal outside air makeup mode of operation. In this mode, 2112 cubic feet per minute (cfm) of unflitered outside air is assumed to be drawn into the control room for the duration of the event. This flow rate represents the normal flow rate during that part of the year in which heating, ventilation, and air conditioning (HVAC) chillers are operated. For the remainder of the year, the outside air intake is moderated between 0 and 15,000 cfm to control temperature. A sensitivity analysis determined that the dose rate did not change significantly with the change in flow rate. This phenomenon can be explained by noting that although the increased flow rate causes a faster increase in the dose rate, a dilution effect keeps the concentration (and hence the dose) at an equilibrium value. ENO did not model any unfiltered infiltration since no credit was taken in these analyses for isolation or pressurization of the control room envelope. ENO stated that the effects of any additional unfiltered air intake as a result of infiltration would not be significant for the reasons noted above. The staff believes there is adequate assurance that the radiation doses to the control room personnel will not impede response actions necessary to protect the public. The staff has issued, for public comment, four draft RGs on control room habitability issues and a generic communication that will request licensees to provide information related to control room habitability issues. The staff's acceptance of the ENO's unfiltered inleakage conclusion does not exempt the licensee from future regulatory actions that may become applicable due to the generic initiative.

Details on the assumptions found acceptable to the staff are presented in Table 1. The staff performed a confirmatory analysis. The doses estimated by the licensee for the postulated FHA were found to be acceptable.

3.2 Atmospheric Relative Concentration Estimates

ENO calculated new control room relative concentration (X/Q) estimates for the reactor building vent and reactor building truck lock door release points. Attachment 3 of the licensee's submittal documents the development of the X/Q values. ENO used the guidance of the draft guide DG-1111, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," in developing these values.

These estimates were generated using the NRC-sponsored ARCON96 computer code (NUREG/CR-6331, Rev. 1, "Atmospheric Relative Concentrations in Building Wakes"). ENO used meteorological data obtained from the Nine Mile Point Nuclear Station (NMPNS) meteorological measurements program. ENO stated that the meteorological measurement program was maintained to comply with the recommendations in RG 1.23, "Onsite Meteorological Programs." ENO states that this program is based on the guidance of RG 1.23 and includes quality assurance provisions consistent with Appendix B to 10 CFR Part 50. ENO states that the data are representative of the common site shared by JAF and NMPNS and are free from local effects such as building and cooling tower wakes, brush, and vegetation, or terrain.

ENO modeled the reactor building vent and the reactor building truck lock door release points as ground level point sources without credit for plume rise or diffuse source considerations. The NRC staff reviewed the development of the values input to the ARCON96 code and found them to acceptably represent the source-to-receptor configurations being assessed. The staff also evaluated the values determined by ENO for reasonableness using review experience for similar source-to-receptor configurations. Based on these reviews, and ENO's description of the meteorological data set pedigree, the staff finds the X/Q values listed in Table 1 to be acceptable. Note that although Attachment 3 developed X/Q values for the turbine building as an exercise to confirm code operation, the staff did not consider these values and this SE makes no finding as to their acceptability.

3.3 TS Changes

3.3.1 The licensee proposed revising the TS for selected systems to relax operability requirements during core alterations and during the movement of irradiated fuel that has decayed for at least 96 hours. These changes affect the operability requirements and required actions for the affected systems listed below.

- TS Table 3.3.6.2-1, "Secondary Containment Isolation Instrumentation," footnote b,
- TS 3.3.7.1, "Control Room Emergency Ventilation Air Supply (CREVAS) System Instrumentation"
- TS 3.6.4.1, "Secondary Containment"
- TS 3.6.4.2, "Secondary Containment Isolation Valves (SCIVs)"
- TS 3.6.4.3, "Standby Gas Treatment (SGT) System"
- TS 3.7.3, "Control Room Emergency Ventilation Air Supply (CREVAS) System"
- TS 3.7.4, "Control Room Air Conditioning (SC) System"

For these TSs, the licensee proposes to delete "During CORE ALTERATIONS" from the Applicability statement and the TS Required Actions. In addition, the licensee is proposing to add the term "recently" in front of "irradiated" in the statement "During movement of irradiated fuel assemblies in the secondary containment" in the Applicability statement and TS Required Actions.

The FHA is the only event during CORE ALTERATIONS that is postulated to result in fuel damage and radiological release. The limiting condition for operation and Required Actions will remain applicable during activities which could result in an FHA with fuel damage and radiological release. Therefore, the deletion of CORE ALTERATIONS is acceptable. These changes are consistent with the current FHA analysis and TSTF-51. Also, in accordance with the Reviewers Note in TSTF-51 mentioned above, the licensee committed to the containment closure guidelines located in NUMARC 93-01. Therefore, these proposed changes to the above listed TSs are acceptable, subject to the acceptance of the radiological consequences as noted below.

The re-analysis of the FHA did not credit action by any system addressed by the above listed TSs. The FHA re-analysis was performed assuming a 96-hour decay period, consistent with the definition of "recently irradiated fuel," and acceptable dose results were obtained, with the subject systems inoperable. As such, the proposed revisions are acceptable from an accident radiological consequence perspective.

3.3.2 The licensee proposed revising the TSs to relax operability requirements and actions required to be taken in the event of certain conditions associated with electrical power systems during shutdown periods. The changes will limit the current requirement to suspend the movement of irradiated fuel to only recently irradiated fuel.

- TS 3.8.1, “AC Sources–Shutdown”
- TS 3.8.5, “DC Sources–Shutdown”
- TS 3.8.6, “Distribution Systems–Shutdown”

The re-analysis of the FHA was performed assuming a 96-hour decay period, consistent with the definition of “recently irradiated fuel,” and acceptable dose results were obtained with the subject systems inoperable. As such, the revision is acceptable from an accident radiological consequence perspective.

3.4 Techical Conclusions

The NRC staff has reviewed the AST implementation proposed by ENO for the JAFNPP. The staff also reviewed the proposed changes to the TSs associated with this license amendment request. In doing this review, the staff relied upon information placed on the docket by the licensee, staff experience in doing similar reviews and, where deemed necessary, on staff confirmatory calculations.

This licensing action is considered a selective implementation of the AST. While the licensee adopted all characteristics of the AST, their assessment was limited to the consequences of an FHA. With the approval of this amendment, the AST, the total effective dose equivalent (TEDE) criteria, and the analysis methods, assumptions and inputs become the licensing basis for the assessment of radiological consequences of FHA DBAs. All future radiological analyses done to show compliance with DBA dose acceptance criteria shall use this approved licensing basis. This approval is limited to this specific application. The AST and TEDE criteria may not be extended to other aspects of plant design or operation without prior NRC review pursuant to 10 CFR 50.67.

The staff reviewed the assumptions, inputs, and methods used by the licensee to assess the radiological impacts of the proposed changes. The staff finds that the licensee used analysis methods and assumptions consistent with the guidance of RG 1.183, with the exceptions discussed and accepted earlier in this SE. The staff compared the radiation doses estimated by the licensee to the applicable acceptance criteria and to the results estimated by the staff in its confirmatory calculations. The staff finds, with reasonable assurance, that the licensee’s estimates of the TEDE due to FHA accidents will comply with the requirements of 10 CFR 50.67 and are in accord with the guidance of RG 1.183.

The staff finds reasonable assurance that the JAFNPP will continue to provide sufficient safety margins with adequate defense in depth to address unanticipated events and to compensate for uncertainties in accident progression and in analysis assumptions and parameters. The staff concludes that the proposed AST implementation and the associated TS changes are acceptable from the standpoint of radiological consequences.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New York State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (67 FR 45568). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Attachment: Table 1, Analysis Assumptions

Principal Contributors: S. F. LaVie
D. Cullison

Date: September 12, 2002

TABLE 1

ANALYSIS ASSUMPTIONS

Core power (includes 2% uncertainty penalty), MWt	2587
Radial peaking factor	1.6
Number of damaged fuel pins	125
Number of pins in core	33,600
Decay time, hours	96
Fuel rod gap fractions	
I-131	0.08
Kr-85	0.10
All other noble gases, iodines	0.05
Alkali metals	0.12
Iodine species fractions	
Elemental	0.9985
Organic	0.0015
Particulates	none
Water depth, ft	23
Pool scrubbing factor, effective	200
Release modeling	
Immediate release from fuel through pool to building	
100% release from building in 2 hours	
No credit for building holdup or filtration prior to release	
Control Room Volume, ft^3	101,000
CREVAS start delay time, minutes	No credit taken for CREVAS
Unfiltered outside air makeup, cfm	2112
CREVAS filter efficiency, %	No credit taken
Control room occupancy factors	
0-24 hr	1.0
24-96 hr	0.6
96-720 hr	0.4
Control room breathing rate, m^3/s	3.5E-4
Offsite breathing rate, m^3/s	
0-8 hrs	3.5E-4

Atmospheric dispersion factors, s/m^3

	X/Q Value, sec/m^3			
Time, hrs	**EAB**	**LPZ**	**RB Vent**	**RBTB Door**
0-2	1.79E-4		3.52E-3	9.07E-4
2-8			3.31E-3	8.27E-4
0-8		2.00E-5		
8-24		1.34E-5	1.43E-3	3.59E-4
24-96		5.59E-6	7.73E-4	2.33E-4
96-720		1.60E-6	6.07E-4	2.03E-4

FitzPatrick Nuclear Power Plant

cc:

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