



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE NO. NPF-47
ENERGY OPERATIONS, INC.
RIVER BEND STATION, UNIT 1
DOCKET NO. 50-458

1.0 INTRODUCTION

By application dated August 17, 1995, Entergy Operations, Inc. (EOI or the licensee) requested changes to the Technical Specifications (TSs) (Appendix A to Facility Operating License No. NPF-47) for the River Bend Station, Unit 1. The proposed changes would revise the TSs to allow the containment personnel air locks (PAL) to be open in Modes 4 and 5 during core alterations except for movement of recently irradiated fuel. The licensee provided additional information by letters dated November 22, and December 18, 20, and 27, 1995. These clarifications reflect current practices and did not change the initial no significant hazards determination.

The current TSs require that the PALs be operable during fuel movement and core alteration. This requirement is to prevent the release of radioactive material in the event of a fuel handling accident. EOI stated that because of the high level of modification, maintenance, and repair activities during outages, wear and tear on the two airlock doors to containment causes the doors to break down resulting in increased repair costs. These repairs also create a bottle neck situation for processing personnel and equipment in and out of the containment and drywell, including rerouting through the remaining door further delaying work.

The licensee's application dated August 17, 1995, also proposed changes for the secondary containment isolation instrumentation, control room fresh air system instrumentation, control room fresh air system, control room air conditioning system, primary containment during shutdown, fuel building, fuel building ventilation system, AC sources during shutdown, DC sources during shutdown, inverters during shutdown, and distribution systems during shutdown. The NRC is not acting on these changes pending further review. The action on these items is deferred, will continue to be pursued by the licensee and the NRC, and may be the subject of future licensing action.

2.0 BACKGROUND

By letter dated August 17, 1995, EOI proposed to amend Facility Operating License No. NPF-47 for the River Bend Station (RBS), by incorporating changes

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to their TSs. The licensee provided additional information by letter dated November 22, 1995, on control room analysis parameters and by letter dated December 18, 20, and 27, 1995, adding their administrative controls on air locks to their license as a license condition. The proposed changes will allow the containment personnel airlocks to be open during CORE ALTERATIONS within the containment after the reactor has been subcritical for a period of 11 days. These CORE ALTERATIONS, which include the movement of fuel, will be governed by conditions or specific language committed to by the licensee and added as a license condition. This condition states:

"Primary containment air lock doors may be open during CORE ALTERATIONS, except when moving recently irradiated fuel, (i.e., fuel that has occupied part of a critical reactor core within the previous 11 days), provided the following conditions exist:

- 1) One door in each air lock is capable of being closed.
- 2) Hoses and cables running through the air lock employ a means to allow safe, quick disconnect and are tagged at both ends with specific instructions to expedite removal.
- 3) There is a minimum of 23 feet of water over the core.
- 4) The air lock doors are not blocked open to allow expeditious closure.
- 5) A designated individual is available to expeditiously close the air lock doors.
- 6) Systems are available to filter and monitor releases from the containment."

In addition, the term recently irradiated fuel is defined in the bases of the technical specifications as "fuel that has occupied part of a critical core within the previous 11 days." This condition of prohibiting movement of irradiated fuels with less than 11 days decay, was a part of the larger review for opening containment, secondary containment, and other items and the 11 days directly relates to the fuel accident analysis for technical acceptance of all those provisions. Since the NRC is not prepared to address the overall proposed amendment, the 11 days for opening the air locks has been adopted for now. It is noteworthy that the NRC has accepted lesser times for other facilities where air locks are the single consideration and it is expected that the licensee may in the future, elect to establish a more appropriate time. Our analysis is on the 11 days which the licensee has proposed.

3.0 EVALUATION

The River Bend facility has a drywell and primary containment inside the secondary containment. There are two PALs on the secondary containment; one leading to the reactor building and the other leading to the spent fuel storage building. The reactor building and the spent fuel storage building have vented and filtered atmospheres and would be available for any radioactive fission products that might escape an open PAL during a fuel handling accident inside the containment. The River Bend facility has experienced outage delays due to the PAL door problems resulting from heavy use. EOI proposes that a designated individual be available to expeditiously and safely remove any hoses or cables running through the PAL, to ensure that

the doors are kept otherwise unblocked, and to be available to close one of the PAL doors in the event of an accident. Also, the minimum decay time prior to handling of irradiated fuel with the PAL doors open is established at 11 days, consistent with the revised fuel handling accident dose analysis which is discussed later in the safety evaluation.

The PAL is provided for the purpose of permitting personnel to enter and exit the containment while maintaining the integrity of the containment pressure boundary. Each PAL contains two airlock doors with a personnel chamber between the doors. In reactor operational Modes 1, 2, and 3, at least one of the two doors must be closed. Mechanical interlocks ensure that both doors cannot be opened at the same time. During shutdown and refueling operations, both doors may be opened at the same time (the interlock mechanism is intentionally disabled) unless (a) core alterations are in progress, (b) during operations with a potential for draining the reactor vessel, or (c) during movement of irradiated fuel assemblies in the primary containment. The licensee does not propose to change the PALs operation during the potential for draining down the vessel.

Core alterations are defined in the TSs as follows:

"CORE ALTERATION shall be the movement of any fuel, sources, or reactivity control components within the reactor vessel with the vessel head removed and fuel in the vessel. The following exceptions are not considered to be CORE ALTERATIONS:

- a. Movement of source range monitors, local power range monitors, intermediate range monitors, traversing incore probes, or special movable detectors (including undervessel replacement);
and
- b. Control rod movement provided there are no fuel assemblies in the associated core cell.

Suspension of CORE ALTERATIONS shall not preclude completion of movement of a component to a safe position."

The Updated Final Safety Analysis Report for the River Bend facility includes an analysis of the accidents which can occur during core alterations. Those accidents postulated to occur during core alterations are: inadvertent criticality due to a control rod removal error, continuous control rod withdrawal error during refueling; and the inadvertent loading and operation of a fuel assembly in an improper location. These accidents are not postulated to result in fuel cladding integrity damage during shutdown. However, core alterations cover the movement of any fuel and the accident analysis of concern is the fuel handling accident. The licensee's original

fuel handling accident after 24 hours decay and with the containment closed except for certain vent and drain lines, has not been changed. The analysis for fuel handling accidents after the 11 day decay period as proposed by the licensee should bound any CORE ALTERATIONS with the PAL doors open. Therefore, for the PALs it is acceptable to delete core alterations for other than Modes 1, 2, or 3 based on an acceptable analysis for the fuel handling accident after the decay period proposed by the licensee.

The licensee has proposed a license condition to include provisions to expeditiously close one of the PAL doors in the event of a fuel handling accident. These provisions, which are acceptable, also include having a minimum of 23 feet of water over the core. TS 3.9.6 continues to require at least 23 feet of water above the reactor vessel flange for movement of irradiated fuel and TS 3.9.7 continues to require at least 23 feet of water above the core for movement of new fuel or control blades. Therefore, for CORE ALTERATIONS during shutdown or irradiated fuel movement, any release of radioactive fission products from damaged fuel will occur under water at a depth of at least 23 feet.

The minimum decay time of 11 days will assure that the release of fission product radioactivity, subsequent to a fuel handling accident, results in doses that are well within the guideline values specified in 10 CFR Part 100. Further guidance regarding limits for offsite radiation exposure are contained in Standard Review Plan Section 15.7.4, Rev. 1, which defines "well within" 10 CFR Part 100 to be 25% or less of the 10 CFR Part 100 values.

The staff has completed its evaluation of the potential radiological consequences of a fuel handling accident at River Bend Station, based upon the license condition and the proposed TS changes. In addition to reviewing the licensee's submittal, the staff performed an independent analysis to determine conformance with the requirements of 10 CFR Part 100 and General Design Criteria (GDC) 19 of Appendix A to 10 CFR Part 50. The staff's analysis utilized the accident source term given in Regulatory Guide 1.3, the assumptions contained in Regulatory Guide 1.25, and the review procedures specified in Standard Review Plan (SRP) Sections 15.7.4 and 6.4. The staff assumed an instantaneous puff release of noble gases and radioiodines from the gap and plenum of the broken fuel rods. These gas bubbles will pass through at least 23 feet of water covering the fuel prior to reaching the containment atmosphere. All airborne activity reaching the containment atmosphere is assumed to exhaust to the environment within 2 hours. As stipulated in the proposed TS change, the gap activity is assumed to have decayed for a period of 264 hours (11 days).

The staff computed the offsite doses for River Bend using the above assumptions and NRC computer code ACTICODE. Control room operator doses were determined using the methodology in SRP Section 6.4. The computed offsite doses and control room operator doses are within the acceptance criteria given

in SRP Section 15.7.4 and GDC 19. The assumptions used in calculating those doses and the resulting calculated values are attached in Tables 1 and 2.

The staff's dose calculation was based on the assumption that all of the radioactive material released to the containment escapes the containment within 2 hours. However, the staff has historically required plant technical specifications to maintain containment closure during core alterations and fuel handling as a defense-in-depth measure to further limit releases. Recently the staff has allowed changes to plant technical specifications to keep both doors to a containment air lock open during core alterations and fuel handling with provisions in place to close one door quickly, thereby reestablishing containment closure. The provisions described in the Background Section of this safety evaluation provide reasonable assurance that containment closure as a defense-in-depth measure can be reestablished quickly to limit releases much lower than assumed in the dose calculations.

The staff has reviewed the licensee's analysis and has performed an independent assessment of the radiological consequences resulting from a fuel handling accident during refueling operations with the containment air locks open. The staff concludes that the radiological consequences associated with this accident are within the acceptance criteria set forth in 10 CFR Part 100 and the control room operator dose criteria specified in GDC-19 of Appendix A to 10 CFR Part 50 and are acceptable.

4.0 TECHNICAL SPECIFICATIONS/LICENSE CONDITIONS

The licensee in their original request had proposed changes to the TSs to allow the PALs to be open during CORE ALTERATIONS except for movement of recently irradiated fuel (fuel that has been critical in the past 11 days). The licensee's proposal was made as part of a larger consideration for removal of systems during refueling based on technical merits, however, the staff is not prepared at this time to act on those considerations and has deferred most of the request pending further review. The wording of the TSs proposed by the licensee reflects that larger consideration (i.e., during the period the PALs could be open, the TSs would not be applicable and the PAL doors would not be required to be operable), but does not reflect consideration of containment integrity. While the staff is prepared to accept the operation of PALs with both doors open during specific times during refueling, additional controls in the license to assure prompt reestablishment of containment are necessary. The licensee's commitment in their December 18, and 27, 1995, letters clarified those actions or controls, however, the commitment to add these to the bases of the TSs did not provide sufficient assurance. The licensee by letter dated December 20, 1995, proposed adding the controls to the license as a license condition. These controls and actions are consistent with the licensee's intent and original proposal and are being proposed by the licensee to provide clarification. The amended TSs and the license condition provide

the necessary assurance for reestablishment of containment integrity during CORE ALTERATIONS and movement of fuels. We find the proposed TSs and license condition acceptable.

5.0 STATE CONSULTATION

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

6.0 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 (60 FR 47619). 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.

7.0 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.

Attachments: 1. Table 1
2. Table 2

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TABLE 1
CALCULATED RADIOLOGICAL CONSEQUENCES
 (rem)

<u>Exclusion Area Boundary</u>	<u>Dose</u>	<u>SRP 15.7.4 Limits</u>
Whole Body	0.17	6
Thyroid	45.2	75
 <u>Control Room Operator</u>	 <u>Dose</u>	 <u>GDC-19 Limits</u>
Whole Body	<0.1	5
Thyroid	8.5	Equivalent to 5 rem whole body*

* Guideline doses provided in Standard Review Plan Section 6.4 define the dose-equivalent as 30 rem to the thyroid.

TABLE 2

ASSUMPTIONS USED FOR CALCULATING RADIOLOGICAL CONSEQUENCES

<u>Parameters</u>	<u>Quantity</u>
Power Level, Mwt	3,039
Number of Fuel Rods Damaged (1 assembly plus 32 rods)	123
Total Number of Rods	38,688
Shutdown time, hours	264
Power Peaking Factor	1.5
Fission Product Release Duration*	2 hours
Release Fractions*	
Iodine	0.10
Noble Gases	0.30
Pool Decontamination Factors*	
Iodine	100
Noble Gases	1
Iodine Forms*	
Elemental	75%
Organic	25%
Core Fission Product Inventories per TID-14844	
<u>Receptor Point Variables**</u>	
<u>Exclusion Area Boundary</u>	
Atmospheric Relative Concentration, X/Q (sec/m ³) 0-2 hours	8.58 x 10 ⁻⁴
<u>Low Population Zone</u>	
Atmospheric Relative Concentration, X/Q (sec/m ³) 0-2 hours	1.13 x 10 ⁻⁴
8-24 hours	Not Used
1-4 days	Not Used
4-30 days	Not Used
<u>Control Room</u>	
Atmospheric Relative Concentration, X/Q (sec/m ³)	1.62 x 10 ⁻⁴
Control Room Volume, cubic feet	2.45 x 10 ⁴
Maximum Infiltration Rate, ft ³ /min	39.5
Geometry Factor	17.8
Iodine Protection Factor	Not Used

Note: Dose conversion factors from ICRP-30 were utilized for all calculations

* Regulatory Guide 1.25

** River Bend FSAR