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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 173 TO FACILITY OPERATING LICENSE NO. DPR-31

AND AMENDMENT NO. 167TO FACILITY OPERATING LICENSE NO. DPR-41

FLORIDA POWER AND LIGHT COMPANY

TURKEY POINT UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

1.0 INTRODUCTION

By letter dated October 20, 1994, Florida Power and Light Company (FPL or the licensee) proposed a change to the Technical Specifications (TS) for Turkey Point Units 3 and 4. Three changes were requested involving refueling operations.

First, the definition of "core alteration" would be changed to more closely resemble the definition in the standard TS. In effect, this excludes movement of items not associated with reactivity from being considered a core alteration.

The second and most significant change involves allowing the personnel airlock (PAL) doors to remain open during fuel movement and core alterations under certain conditions. Movement of irradiated fuel in containment and core alterations will be referred to as "core alterations" for the remainder of this evaluation.

The last change would allow containment building penetrations to be open under "administrative controls." The current TS only allow these penetrations to be open under administrative controls for surveillance or testing requirements.

2.0 BACKGROUND

2.1 System Description

The containment serves to contain fission product radioactivity that may be released from the reactor coolant system following an accident, such that offsite radiation exposures are maintained well within the requirements of 10 CFR 100. Additionally, the containment provides radiation shielding from the fission products that may be present in the containment atmosphere following accident conditions.

With the primary plant above 200^{o}F and pressurized, the containment itself may become pressurized during an accident. Therefore, the containment and its

penetrations must be operable by being capable of withstanding the pressure and thus prevent excessive fission product release to the environment.

During refueling (mode 6) the potential for containment pressurization as a result of an accident is not likely; therefore, requirements to isolate the containment from the outside atmosphere can be less stringent. The required condition is referred to as "containment closure" rather than "containment operability." Containment closure means that all potential escape paths are closed or capable of being closed. The closure restrictions are sufficient to restrict fission product radioactivity release from containment due to an in-containment fuel handling accident (FHA) during refueling.

The containment air locks, which are also part of the containment pressure boundary, provide a means for personnel access. Each air lock has a door at both ends. The doors are normally interlocked to prevent simultaneous opening when containment "operability" is required. During periods of unit shutdown when containment closure is not required, the door interlock mechanism may be disabled, allowing both doors of an air lock to remain open for extended periods when frequent containment entry is necessary.

2.2 History

During core alterations one PAL door has historically been required to be closed at all times. This means that personnel must enter one door with the other shut, shut the door just passed, then open the other door. During the 1994 Turkey Point Unit 3 refueling outage, when the PAL doors were closed for core alterations, the licensee estimated that these doors were cycled over 300 times a day. The licensee also believes that the crowding of personnel in the PAL during shift changes may cause an increase in personnel contaminations. The excessive cycling of the PAL doors was not anticipated in the design. Frequent maintenance of the door hinge pin, the door seals, the packing of the equalizing valve, and other components have been necessary due to heavy use.

Other licensees have experienced similar difficulties. Calvert Cliffs Nuclear Power Plant submitted an amendment request dated November 5, 1993, which would, in part, allow the PAL doors to remain open during core alterations. The amendment was issued on August 31, 1994, based primarily on the fact that calculated offsite dose and control room operator doses are within acceptable limits with the PAL doors open following an FHA.

3.0 EVALUATION

During core alterations, the most severe radiological consequences result from an FHA. The FHA is a postulated event that involves damage to irradiated fuel. FHAs include dropping a single irradiated fuel assembly and handling tool or a heavy object onto other irradiated fuel assemblies. The TS requirements associated with refueling are intended to ensure that the release of fission product radioactivity, subsequent to an FHA, results in doses that are "well within" the guideline values specified in 10 CFR 100. Standard Review Plan (SRP), Section 15.7.4, Rev. 1, defines "well within" 10 CFR 100 to be 25% or less of the 10 CFR 100 values, i.e., 6 rem to the whole body and 75 rem to the thyroid.

Regulatory Guide (RG) 1.25 provides acceptable assumptions that may be used in evaluating the radiological consequences of an FHA. The licensee's FHA analysis did not previously incorporate all of the assumptions of RG 1.25 since the design basis was established prior to the issuance of this RG. The licensee recalculated the doses and is revising the design basis for the FHA analysis to be consistent with RG 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors." Neither the current nor the revised design basis FHA analysis takes credit for the containment building barriers. The licensee's analysis calculated the doses for the 0-2 hour period at the exclusion area boundary to be 0.008 rem to the whole body and 2.5 rem to the thyroid. These calculated doses are within the SRP criteria of 6 rem to the whole body and 75 rem to the thyroid.

Control room habitability following an FHA must also be considered using the dose criteria in 10 CFR 50, Appendix A General Design Criteria 19 (GDC 19). The Turkey Point control room is designed with an emergency ventilation system, which is actuated by various safety signals and the Process Radiation Monitoring System (PRMS). The PRMS was designed to control the radioactive release from the plant under accident conditions such as a Loss of Coolant Accident (LOCA). The licensee stated that, since the doses expected from a LOCA event are significantly higher than the doses expected from an FHA, the requirements of GDC 19 are satisfied by the Process Radiation Monitoring System. TS 3/4.9.13 requires containment radiation monitors which initiate containment and control room ventilation isolation be operable during core alterations. If these monitors are not operable the control room emergency ventilation system must be isolated and operated in the recirculation mode.

The staff did not validate the licensee's analysis, but instead performed an independent analysis. The staff's analysis used the accident source term given in RG 1.4, assumptions contained in RG 1.25, and the review procedures specified in SRP, Section 15.7.4. The staff assumed an instantaneous puff release of noble gases and radioiodine from the gap of the broken fuel rods as gas bubbles pass up through the 23 feet of water covering the fuel. All airborne radioactivity reaching the containment atmosphere is exhausted within 2 hours into the environment. As stipulated in the proposed TS change request, all radioactive material in the fuel rod gap is assumed to have decayed for a period of 100 hours. Consistent with current practice, the staff assumed an entire fuel assembly (15 X 15) of 225 fuel rods is damaged by the FHA rather than the 15 that the licensee assumed.

The staff computed the offsite doses for the Turkey Point exclusion area boundary using the above assumptions and the NRC computer code, ACTICODE. The control room operator doses were estimated using the methodology given in SRP, Section 6.4. These computed offsite and control room operator doses are within the acceptance criteria given in SRP, Section 15.7.4 and GDC 19, respectively. GDC-19 specifies that adequate radiation protection is to be provided to permit access and occupancy of the control room under accident conditions without personnel exposures in excess of 5 rem to the whole body or

its equivalent to any part of the body for the duration of the accident (30 rem to the thyroid). The resulting calculated values of the offsite and control room operator dose are listed in Table 1, and the assumptions used by the staff in calculating these doses are given in Table 2.

3.1 Change to the Definition of Core Alteration

The licensee proposed to change the definition of a core alteration from "the movement or manipulation of any component within the reactor pressure vessel with the vessel head removed and fuel in the vessel" to "movement of any fuel, sources, reactivity control components, or other components affecting reactivity within the reactor vessel with the vessel head removed and fuel in the vessel." The revised definition would more closely resemble the definition in the standard TS. In effect, this excludes movement of items not associated with reactivity from being considered a core alteration.

Core alterations are referenced in TS 3/4.9 "Refueling Operations." During core alterations TS require additional controls concerning such items as communications between the control room and the refueling station, the containment ventilation isolation system, and containment radiation monitors. In addition, core alterations must be terminated if such items as source range neutron flux monitors are not adequate. These requirements involve controlling and monitoring reactivity changes during refueling and mitigating the effects of an FHA. Therefore, movement of items which cannot affect reactivity or cause an FHA can be excluded from the definition of core alterations. The staff finds this change acceptable.

The licensee also proposed deleting the word "conservative" from the TS statement "suspension of core alterations shall not preclude completion of movement of a component to a safe conservative position." The staff considers the word "conservative" to be redundant to the word "safe" in this statement. This change is administrative and is, therefore, acceptable. The staff notes that the change is consistent with the standard TS.

3.2 Changes to Containment Building Penetrations TS

The licensee proposed to change TS 3.9.4 to allow both doors of the containment personnel airlock to be open if at least one door is capable of being closed, the plant is in mode 6 with at least 23 feet of water above the fuel, and a designated individual is available outside the personnel airlock to close the door. The licensee also proposed to allow cables or hoses across the PAL doors provided quick-disconnects are provided. Administrative guidelines would be established describing the responsibilities and appropriate actions of the designated individual, in the event of an FHA with the PAL doors open.

The staff finds the proposed changes acceptable since the consequences of an FHA with the PAL doors open meet the applicable acceptance criteria discussed previously in section 3.0. However, the lines and hoses run through the PAL should be minimized to ensure timely closing of a PAL door. The licensee should also ensure that these lines and hoses do not serve any personnel or equipment safety function which could be interrupted by disconnection.

The administrative guidelines should clearly identify responsibility for disconnecting these lines. The quick disconnects must be located near the PAL to allow timely closure of the PAL.

The licensee also proposed to change the footnote to this TS which previously allowed opening certain valves and airlocks necessary to perform surveillance or testing requirements provided that administrative controls were administered. The proposed change would extend this allowance for reasons other than surveillance or testing.

The licensee stated that this was acceptable since the change was administrative in nature. The staff has reviewed this proposal and disagrees that the change is administrative. In fact, since this proposed change affects systems other than air locks, the staff is considering this proposal, along with other similar requests from other licensees, in the context of the staff's ongoing study of shutdown operations. Therefore, the staff chooses not to approve the licensee's request at this time. The staff is actively pursuing with the industry the broader issue of what controls are necessary during shutdown, and what controls may be relaxed or eliminated. The licensee may resubmit this request in the future once the staff and the industry have resolved these broader issues.

We find the requested changes acceptable, with the one exception noted, since the radiological consequences of an FHA meet the dose acceptance criteria with the proposed changes.

4.0 CONCLUSION

Based on the evaluations performed by the licensee and the staff, the staff concludes that the radiological consequences of not having a closed containment following a fuel handling accident are acceptable. The steps taken by the licensee to optimize the ability of plant personnel to close the personnel airlock, if needed, provide assurance that offsite radiological consequences will be minimized to the extent practical. Based on these reasons, the staff approves the proposed changes to TS 3.9.4, with the exception of the change to the footnote.

5.0 STATE CONSULTATION

Based upon the written notice of the proposed amendments, the Florida State official had no comments.

6.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the 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 amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (59 FR 55869). Accordingly, these amendments meet 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 amendments.

Principal Contributors: J. Minns, R. Croteau
Date: May 11, 1995

Table 1

CALCULATED RADIOLOGICAL CONSEQUENCES
(rem)

Exclusion Area Boundary	Dose	SRP Limits
Whole Body	0.1	6
Thyroid	34	75
Control Room Operator		**GDC-19 Limits**
Whole Body	0.1	5
Thyroid	11	Equivalent to 5 rem WB*

*Section 6.4 of the SRP defines the dose limit to the thyroid as 30 rem.

TABLE 2

ASSUMPTIONS USED FOR CALCULATING RADIOLOGICAL CONSEQUENCES

Parameters	Quantity
Power Level, Mwt	2300
Number of Fuel Rods Damaged	225
Shutdown Time, hours	100
Power Peaking Factor	1.5
Fission-Product Release Fractions, %	
Iodine	10
Noble gases	30
Pool Decontamination Factors	
Iodine	100
Noble gases	1
Iodine Forms, %	
Elemental	75
Organic	25
Atmospheric Relative Concentration, sec/m^3	1.54E-4
Fission-Product Release Duration, hours	2
Dose Conversion Factors	ICRP-30
CONTROL ROOM	
Atmospheric Relative Concentration, sec/m^3	9.58E-4
Filter Recirculation Rate, cfm	650
Unfiltered Inleakage, cfm	10
Filter Efficiency, %	95
Iodine Protection Factor	20.6
Geometry Factor	31.8
Control Room Volume, cubic feet	43,026