

St. Lucie Unit 1
Docket No. 50-335
Proposed License Amendment
High Rate of Change of Power Trip

ATTACHMENT 1

St. Lucie Unit 1 Marked-up Technical Specification Pages

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TABLE 3.3-1 (Continued)

REACTOR PROTECTIVE INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NO. OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>APPLICABLE MODES</u>	<u>ACTION</u>
11. Wide Range Logarithmic Neutron Flux Monitor					
a. Startup and Operating-- Rate of Change of Power - High	4	2(d)	3	1, 2 and *	2# 5#
b. Shutdown	4	0	2	3, 4, 5	3
12. Reactor Protection System Logic	4	2	4	1, 2*	4
13. Reactor Trip Breakers	4	2	4	1, 2*	4



TABLE 3.3-1 (Continued)

ACTION STATEMENTS

- b. Within one hour, all functional units receiving an input from the inoperable channel are also placed in the same condition (either bypassed or tripped, as applicable) as that required by a. above for the inoperable channel.
- c. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 48 hours while performing tests and maintenance on that channel provided the other inoperable channel is placed in the tripped condition.

ACTION 3 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, verify compliance with the SHUTDOWN MARGIN requirements of Specification 3.1.1.1 or 3.1.1.2, as applicable, within 1 hour and at least once per 12 hours thereafter.

ACTION 4 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, be in HOT STANDBY within 6 hours; however, one channel may be bypassed for up to 1 hour for surveillance testing per Specification 4.3.1.1.1.

INSERT NEW ACTION 5

ACTION 5 - With the number of channels OPERABLE one less than the total number of channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. If the inoperable channel is bypassed, the desirability of maintaining this channel in the bypassed condition shall be reviewed in accordance with Specification 6.5.1.6.m. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.



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SAFETY ANALYSIS

PURPOSE

Provide the analysis for the proposed license amendment to revise Technical Specification 3.3.1.1 to allow an inoperable channel of the High Rate of Change of Power (HRCP) trip to be placed in the bypassed condition, with the approval of the Facility Review Group, for an unspecified amount of time. This evaluation is only applicable to the HRCP trip. No changes are proposed for any other trip functions.

BACKGROUND

St. Lucie Unit 1 has experienced periodic difficulties with the High Rate of Change of Power trip circuit of the reactor protective system (RPS). Technical Specification 3.3.1.1 requires an inoperable channel to be placed in the tripped condition within 48 hours. With one channel of HRCP placed in the tripped condition, the RPS will actuate if one of the remaining three channels of HRCP provides a trip signal. As a result, the RPS has been unnecessarily actuated several times on spurious signals (Ref. LERS 335-87-16, 335-87-17 and 335-91-01) resulting in two unit trips.

ANALYSIS

Unit 1 Technical Specification 3.3.1.1 requires the HRCP trip to be enabled whenever both of the following conditions are present:

1. The plant is operating in Modes 1 or 2, or with the RPS trip breakers closed and the control element assembly (CEA) drive system capable of CEA withdrawal.
2. Power level is $\geq 10\%$ and $\leq 15\%$ of rated thermal power.

The specification requires four channels of HRCP for normal operation when the above conditions are satisfied. If one channel becomes inoperable, the action statement requires that the channel be placed either in the bypassed or tripped condition within one hour. If placed in bypass, the inoperable channel must be placed back in operation within 48 hours or be placed in the tripped



condition. This requirement ensures a 2 out of 4 logic for a reactor trip (except for the 48 hours of allowed operation in the bypassed condition, which results in a 2 out of 3 logic required to trip the reactor).

With one channel of HRCP placed in the tripped condition, the RPS will actuate if one of the remaining three channels of HRCP provides a trip signal. As a result, the RPS has been unnecessarily actuated several times on spurious signals (Ref. LERs 335-87-16, 335-87-17 and 335-91-01) resulting in two unit trips. The proposed change would have prevented these trips since a spurious signal would not have actuated a plant trip.

Additionally, in NRC Generic Letter 91-18, Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability, dated November 7, 1991, the NRC has stated that "continued operation with an inoperable channel in the tripped condition is not advisable because a subsequent failure will result in a plant trip that will challenge plant safety equipment." The proposed change meets the intent of this statement since it results in reduced operation with an inoperable channel in the tripped condition.

The design function of the HRCP trip is to protect against an exceedingly high reactivity insertion rate, commonly referred to as a high startup rate. As such, the trip is only enabled during periods of low power operation. The Technical Specification requirement for the HRCP trip setpoint is ≤ 2.49 decades per minute. A review of the safety analyses of the relevant events (boron dilution, uncontrolled CEA withdrawal, and CEA ejection) shows that, as stated below, no credit was taken for the protection provided by the HRCP trip. Protection for these events is provided by variable high power and other reactor trip functions.

Section 7.2.1.2 of the Final Update Safety Analysis Report (FUSAR) describes the HRCP trip as an equipment protective trip that is not required in the accident analyses of chapter 15. Section 2.2.1 of the Unit 1 Technical Specifications describes the HRCP trip as follows:

The Rate of Change of Power - High trip is provided to protect the core during startup operations and its use serves as a backup to the administratively enforced startup rate limit. Its trip setpoint does not correspond to a Safety Limit and no credit was taken in the accident analyses for operation of this trip. Its functional capability at the specified trip setting is required to enhance the overall reliability of the Reactor Protection System.

Although the HRCP trip is not credited in any of the chapter 15 analyses, it is implicitly credited that it is the only automatic

reactor trip required by Technical Specifications to be available in lower Modes of operation. For such events, the small increase in risk due to operating with this trip in a 2-out-of-3 logic is outweighed by the decreased risk from not having to operate with 1-out-of-3 logic, i.e., with one channel in trip.

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NO SIGNIFICANT HAZARDS CONSIDERATION

10 CFR 50.91 requires that, when requesting a license amendment, a licensee provide a consideration of no significant hazards using the standards provided in section 50.92. Specifically, an analysis must be performed to determine if operation of the facility in accordance with the proposed license amendment will 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 previously evaluated; or 3) involve a significant reduction in a margin of safety.

The results of this analysis are summarized as follows in response to the standards put forth in 10 CFR 50.92(c):

1. *Will the operation of the facility in accordance with the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?*

The high rate of change of power (HRCP) trip is a part of the reactor protection system (RPS) and is not considered to be an accident initiator. Although the HRCP trip is specified in the Technical Specifications, it is not credited in any accident analysis. Section 7.2.1.2 of the Unit 1 Final Updated Safety Analysis Report describes the HRCP trip as an equipment protective trip that is not required in the accident analyses of Chapter 15.

The proposed change will allow an inoperable channel of HRCP to be maintained in the bypassed condition rather than in the tripped condition. The resulting trip logic is 2 out of 3 channels to trip (inoperable channel in bypass) rather than 1 out of 3 (inoperable channel in trip). The proposed change will enhance RPS operation since the plant will be protected from unnecessary reactor trips caused by spurious signals from a single HRCP channel.

Therefore, the proposed amendment : 1) does not increase the probability of an accident previously evaluated since the safety analysis does not credit the HRCP trip circuit as an accident initiator; and 2) does not increase the consequences

of any accident previously evaluated since the HRCP trip is not a mitigating factor in any accident analysis.

2. *Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?*

Allowing a channel of HRCP to be placed in the bypassed condition for an unspecified amount of time will not create a new or different kind of accident. No new failure modes are introduced to the plant. The purpose of the HRCP trip is to provide a backup to the administratively enforced startup rate limit. Its trip setpoint does not correspond to a Safety Limit and no credit was taken in the accident analyses for operation of this trip.

3. *Does the proposed change involve a significant reduction in the margin of safety?*

The margin of safety is not reduced since no credit was taken in the accident analyses for operation of this trip. The proposed amendment allows for an inoperable channel of HRCP to be maintained in the bypassed condition rather than in the tripped condition. The resulting trip logic is 2 out of 3 channels to trip (inoperable channel in bypass) rather than 1 out of 3 (inoperable channel in trip).

The proposed change will enhance RPS operation since the plant will be protected from unnecessary reactor trips and corresponding safety system challenges caused by a spurious signal from a single HRCP channel.

CONCLUSION

Based on the above evaluation, it is concluded that the proposed license amendment does not involve a significant hazards consideration pursuant to the requirements of 10 CFR 50.92(c).