

FAQ 12-03

St. Lucie Unplanned Scram with Complications

Plant: St. Lucie Unit 1

Date of Event: March 31, 2012

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Performance Indicator: IE04, Unplanned Scrams with Complications (USwC)

Site-Specific FAQ (Appendix D)? YES

FAQ requested to become effective when approved. This FAQ concerns the St. Lucie Unit 1 March 31, 2012 manual reactor trip that was conservatively reported as an USwC. St. Lucie will revise the 1Q/2012 USwC occurrence data when this FAQ is approved.

Question Section

NEI 99-02 Guidance needing interpretation (include page and line citation):

- NEI 99-02, Rev 6, Page 21 Lines 2-13.
- NEI 99-02, Rev 6, Appendix H, Page H-5, Lines 36-46 and Page H-6, Lines 1-12

Event or circumstances requiring guidance interpretation:

On November 27, 2011, St. Lucie Unit 1 was shutdown and commenced a refueling and extended power uprate outage. As a result of the extended shutdown period and very low decay heat, the reactor coolant pump (RCP) was the main driver for heating up the reactor coolant system (RCS) to achieve and maintain normal operating pressure and temperature (NOP/NOT) conditions during the March 31, 2012 reactor startup.

During reactor start-up on March 31, 2012, at approximately 0020 hours, the unit was in Mode 1 and holding at 10% power to complete testing of the steam bypass control system (SBCS), when pressure control valve (PCV) 8802, one of the steam dump to condenser valves, opened unexpectedly. Operators attempted to manually close PCV-8802, but were unsuccessful. At 0022 hours, Operators inserted a manual scram of the reactor and entered emergency operating procedure (EOP) EOP-01, Standard Post Trip Actions, as a result of the manual reactor trip and to address the cooldown caused by PCV 8802 being open. A brief period after the manual scram, it was reported that PCV-8802 went closed after the trip, which terminated the excessive steam demand.

While in EOP-1, at 0030 hours, Operators closed the main steam isolation valves (MSIVs) as directed by contingency step 4.6.D.2.3.1 due to steam generator pressure being less than 750 psia, terminating the cooldown. At 0037 hours, Operations confirmed that the EOP-01 exit condition criteria were satisfied in accordance with section 3.1 and the EOP-01 Diagnostic Flow Chart and entered EOP-02, "Reactor Trip Recovery."

FAQ 12-03

St. Lucie Unplanned Scram with Complications

While in EOP-02, at 0044 hours, Operators noted that RCS T_{AVG} had increased to 506 °F (from a low of 504 °F) and was slowly rising, concurrently the procedure directed that the uncomplicated Reactor Trip Safety Function Status Check for RCS Heat Removal was not met because RCS temperature was below 525°F. As previously noted, during the reactor startup with very low decay heat in the new reactor core, the temperature increase was slow due to reliance on RCP heat. While in EOP-2, at 0049 hours, the operators secured steam generator blowdown to increase the rate of RCS heat up.

At 0058 hours, Operations completed the EOP-02 directed re-diagnoses of the event by re-performing the EOP-01 diagnostic flow chart. The Shift Manager then determined that EOP-05, "Excess Steam Demand," was the appropriate EOP as a result of not meeting the Reactor Trip Safety Function Status Check for RCS Heat Removal (RCS T_{AVG} was not between 525 and 535°F). Upon entering EOP-05 it was known that no actions were necessary and none would be taken.

At 0330 hours, EOP-05 was exited as RCP heat addition restored RCS temperature to greater than 525°F. No EOP-05 actions were performed by Operations other than diagnostic checks to confirm that the excess steam demand was terminated.

Although the Combustion Engineering EOP network directs the exit of EOP-02 if any safety function status checks are not satisfied, in this particular event no steps were taken outside of the EOP-01 and EOP-02 contingency actions to mitigate the event. Because no excess steam demand was in progress, FPL concludes that this event does not meet the definition of an Unplanned Scram with Complications, which is "that subset of unplanned automatic and manual scrams that require additional operator actions beyond that of the "normal" scram," since the plant responded as expected considering reactor coolant temperature was being restored solely by the heat addition from the RCPs.

If licensee and NRC resident/region do not agree on the facts and circumstances explain:

The St. Lucie Resident Inspectors are in agreement with the facts presented above. However, the Resident Inspectors believe NEI guidance wording requires that the scram be counted as an unplanned scram with complications because another EOP was entered.

The Senior Resident further stated that since EOP-05 was not executed and no actions were taken, it is reasonable to consider that this reactor trip is uncomplicated.

Potentially relevant existing FAQ numbers:

FAQ 481, proposed response page H-20, lines 18-46 and page H-21, lines 1-7, discussion includes the following:

"In the case of a routine scram the procedure entered will be exited fairly rapidly after verifying that the reactor is shutdown, excessive cooling is not in progress, electric power is available and reactor coolant pressures and temperatures are at expected values and controlled."

FAQ 12-03
St. Lucie Unplanned Scram with Complications

As discussed above, the excess steam demand transient was terminated once EOP-01 directed closure of the MSIVs, and the reactor coolant temperature response was being restored as expected considering the power history of the core and temperature addition via the RCPs.

Response Section:

Proposed Resolution of FAQ:

This FAQ is proposed as a plant specific exemption [NEI 99-02, Rev. 6, page E-1, lines 18-19] from the guidance of NEI 99-02 because of the unique circumstances that lead to the condition. As previously described, St Lucie Unit 1 was in start up from an extended refuel outage in which a substantial amount of reactor fuel was replaced with new fuel. The result was very low decay heat available at the time of the reactor scram, which resulted in a slower temperature response.

As detailed above, the scram response procedure (EOP-01) was exited to the Reactor Trip Recovery procedure (EOP-02). Due to the RCS heat removal temperature band criteria not being met, the Operators entered another EOP during post trip recovery solely because of direction from another EOP, but no actions were required as a result of that EOP. EOP-02, Step 4.7.1, contingency action, directs restoration RCS temperature to within the band of 525 °F and 535 °F. This contingency action was fully met with no other actions required because the RCS temperature was being restored via RCP heat.

EOP-02, Step 4.1 is a continuous action step that has the operators re-verify the “uncomplicated Reactor Trip Safety Function Status Check” acceptance criteria every 15 minutes with the contingency action by re-diagnosing the trip in accordance with the EOP-01 Diagnostic Flow Chart. The RCS Heat Removal control contingency action in EOP-02 is “CONTROL SBCS or ADVs to restore RCS T_{AVG} to between 525 and 535°F” which is different than the EOP-01 contingency action to “ENSURE SBCS or ADVs are restoring RCS T_{AVG} to between 525 and 535°F.” The lowest RCS temperature noted was 504°F and it was rising due to RCP heat to restore RCS T_{AVG} to the required band.

Operators were aware that no excess steam demand was in progress because closure of the ADVs and MSIVs in EOP-01 terminated the cooldown. However, as a result of inconsistencies in RCS heat removal operator actions with EOP-01 and EOP-02, EOP-05 was required to be entered, but no actions were required.

FPL concludes that although the re-diagnosis of the event directed the operators to enter the most appropriate operational response procedure, the excess steam demand EOP was not “required” in that the EOP did not direct the operators to mitigate or stabilize the transient via the manipulation of any SSCs while within EOP-05.

FAQ 12-03
St. Lucie Unplanned Scram with Complications

This is consistent with NEI 99-02, page 21, lines 6-8:

“This step is used to determine if the scram was uncomplicated by counting if additional procedures beyond the normal scram response required entry after the scram.” [Emphasis added]

Additionally, NEI 99-02, Appendix H, page H-6, lines 1-3, also addresses the concept of “required” with respect to transition to another EOP during scram response procedures:

“The criteria in this question are used to verify there were no other conditions that developed during the stabilization of the plant in the scram response that required re-entry into the EOPs or transition to a follow on EOP.” [Emphasis added]

Based on the above, the St. Lucie Unit 1 manual trip of March 31, 2012 should not be counted as an unplanned scram with complications because of the following unique conditions (very low decay heat):

- Extended refuel outage from Nov 2011 thru March 2012
- Replacement of approximately 50 % of the reactor core and
- The only reactor coolant system heat addition was via the reactor coolant pumps

Operators entered EOP-05 as a result of not being able to meet the RCS heat removal safety function. FPL has entered this event into the corrective action program and is working with Westinghouse to clarify the EOP-02 RCS Heat Removal Safety Function to address RCS temperature based upon the time in core life.

As provided by NEI 99-02, Appendix D and Appendix E, this FAQ is requesting an exception to the guidance as written because of the unique circumstances that lead to the entry into an additional EOP. As previously stated, while the EOP was entered, no actions were directed.