June 5, 2006 TSTF-06-11

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Response to NRC Request for Additional Information Regarding TSTF-484, Revision 0, "Use of TS 3.10.1 for Scram Time Testing Activities," dated April 7, 2006

REFERENCE: Letter from Thomas H. Boyce to the Technical Specifications Task Force, "Request for Additional Information Regarding TSTF-484, Revision 0, 'Use of TS 3.10.1 for Scram Time Testing Activities'," dated April 7, 2006.

Dear Sir or Madam:

In the referenced letter, the NRC provided a Request for Additional Information (RAI) regarding TSTF-484, Revision 0, "Use of TS 3.10.1 for Scram Time Testing Activities." TSTF-484, Revision 0, was submitted to the NRC by the TSTF on May 5, 2005. This letter responds to the NRC's referenced request. Our responses are attached.

Should you have any questions, please do not hesitate to contact us.

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Enclosure

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Response to NRC Request for Additional Information Regarding TSTF-484, Revision 0, "Use of TS 3.10.1 for Scram Time Testing Activities," dated April 7, 2006

RAI #1 LCO 3.10.1 Rev 3.1a would allow testing in Mode 4 with average reactor coolant temperature drifting greater than 200F as a result of decay heat. Primary containment requirements are relaxed in LCO 3.10.1 Rev 3.0 with the reasoning in the TS Bases that average reactor coolant temperature is greater than 200F as a result of testing and not due to significant decay heat. Please explain why it is acceptable to be in Mode 4 (with average reactor coolant temperature greater than 200F) vice Mode 3 with the presence of decay heat contributing to an increase in the average reactor coolant temperature.

Response There is some confusion with regard to our original justification. The justification did not intend to imply that the temperature drift was due to excessive decay heat in the core. It was intended to show that by comparison, the amount of heat addition by running the main recirculation pumps during this testing is larger than that of decay heat in the reactor core. Because these tests are performed at the end of refueling outages, typically 3 to 4 weeks after reactor shutdown, plus the replacement of a substantial fraction of the reactor fuel with new, un-irradiated bundles, the amount of decay heat present in the core during this testing is small. Consequently, pump heat from the main recirculation pump is used to establish the minimum coolant temperature requirements, per LCO 3.4.10, "RCS P/T Limits," for this testing, not decay heat. Also, recall that RHR – Shutdown Cooling (SDC) is secured during the Class 1 leak test, as the Reactor Coolant System (RCS) pressure is above the system isolation setpoint (nominally 135 psig); thus, there is no easy means to lower RCS temperature. Therefore, temperature is controlled primarily by controlling the rate of heat addition by adjusting the speed of the main recirculation pumps (or flow control valve (FCV) position in Boiling Water Reactor (BWR) 5 & 6 plant designs). Once test conditions are initially established, steady state temperature control requires adjusting the main recirculation pump speed (or FCV position) to offset the decay heat in the core. Consequently, reactor coolant temperature will tend to drift upwards during the Class 1 leak test, which takes several hours to perform. Depending on the required minimum test temperature from the Pressure/Temperature (P/T) curves, there could be a small window between this minimum test temperature and the [200°F] demarcation between Modes 3 and 4. In addition, plants will set a conservative target temperature range above the minimum temperature limit of the P/T curves for the test to ensure that sufficient margin exists to maintain compliance with the P/T limits. In such circumstances, the transition between Mode 4 to Mode 3 is, in all practical terms, unavoidable. This causes a verbatim compliance problem with the current Technical Specification (TS) wording. Specifically, because the original target pressure/temperature for the leak test did not require the use of LCO 3.10.1, a subsequent invocation of it during the actual test has been determined to be prohibited[1]. The current TS creates an operational hardship that was not realized when the original LCO 3.10.1 was written and is not consistent with LCO 3.0.7 to allow voluntary use of the Section 3.10 specifications.

1 Susquehanna Unit 1 Licensee Event Report (LER) 2002-008, dated February 2, 2004.

The above allowance for temperature drift above [200°F] while remaining in Mode 4 does not create a safety concern because:

- RCS pressure is being held essentially constant (pressure control is much easier in this configuration than temperature control), and increasing RCS temperature results in increased margin to the P/T curve limits, i.e., moving further away from the curve in the conservative direction;

- RCS conditions during this testing are approximately 1025 psig and 200°F; thus, the reactor coolant is substantially sub-cooled. Therefore, the available stored energy in the reactor is very low, leading to a prompt depressurization of the RCS upon any significant leak;

- Reactor coolant inventory is assured because the low pressure Emergency Core Cooling System (ECCS) is required to be Operable per LCO 3.5.2, "ECCS – Shutdown"; and,

- LCO 3.10.1 requires secondary containment integrity to be established, which ensures that any potential coolant leakage is contained and does not result in any significant offsite dose consequences.

RAI #2 LCO 3.4.7 "RCS Specific Activity," is normally not required in Mode 4 because the Reactor is normally not pressurized. Please provide justification for not including LCO 3.4.7 under LCO 3.10.1 Rev 3.1a requirements when in Mode 4 with average reactor coolant temperature greater than 200F.

Response The LCO Applicability for LCO 3.4.7 (RCS Specific Activity) is Mode 3, with any Main Steam Line (MSL) not isolated. As stated in the TS Bases for LCO 3.4.7, the Applicability is only during those periods when the MSLs are open, as the event of concern is a MSL break outside containment. During the testing performed under LCO 3.10.1, the MSLs are isolated in order to pressurize the RCS. Therefore, the Applicability of LCO 3.4.7 is not met and it is not necessary to include LCO 3.4.7 under LCO 3.10.1.

RAI #3 The Bases for TS 3.10.1 Rev 3.1a discusses conducting other unnamed testing while the TS 3.10.1 Rev 3.1a specifically mentions conducting only inservice leak or hydrostatic tests and control rod scram time tests. Please elaborate on the intent of the TS and Bases as written with regards to "other testing."

Response The TS Bases reference to "other testing" is intended to allow other testing, not directly related to the Class 1 leak test or scram time testing, to be conducted in parallel with those tests, as long as it did not interfere with the performance of those tests and does not extend the period of time LCO 3.10.1 is in use. This wording was included to avoid any confusion regarding whether other testing could be conducted

while the leak test and scram time testing are underway, similar to the current confusion regarding scram time testing after the completion of the Class 1 leak test. The TSTF revision is just a clarification of that original intent. A good example of this other testing that might be conducted while LCO 3.10.1 is in use is Excess Flow Check Valves (EFCV) testing per SR 3.6.1.3.10. (Note: NUREG-1434 (BWR/6) does not contain EFCV testing.) However, inclusion of a list of examples of other testing was viewed as creating additional confusion, because it is not practical to list all the other SRs in the TS that could be conducted in parallel with the Class 1 leak test or scram time testing.

RAI #4 The use of the verbiage "as a consequence of" in the LCO under TS 3.10.1 Rev 3.1a could result in steady state Mode 4 with reactor coolant temperature > 200F even though testing is over and no longer being conducted. This seems to be the reasoning for eliminating the statement in the Bases for TS 3.10.1 Rev 3.0 which states that normal Mode 4 requirements are in effect immediately prior to and immediately after LCO 3.10.1 operations. Please elaborate on what would require returning to normal Mode 4 requirements after testing is completed.

Response As noted, the elimination of the identified verbiage will correct the existing hardship that scram time testing must cease promptly upon completion of the Class 1 leak test. The resumption of "normal Mode 4 requirements" is not affected by the length of time spent above [200°F]. There is no safety concern with remaining in this condition for any specific period of time. This is consistent with LCO 3.0.7 which allows the voluntary entry and exit of the Special Operations LCOs in Section 3.10. There is no limitation as to how long a plant may remain under a specific Section 3.10 provision, provided all the stated conditions are met or are being addressed by that specific LCO's Actions. Allowing scram time testing to continue after the completion of the Class 1 leak test does not change how the plant would lower reactor pressure (and temperature) after the completion of testing, i.e., re-enter "normal Mode 4."

The request to extend the test duration, and LCO 3.10.1 allowances, to encompass scram time testing of control rods (SRs 3.1.4.1 and 3.1.4.4) is considered to be a safety enhancement because the reactor is sub-critical during the Class 1 leak test (all control rods are inserted in Modes 3 and 4). Scram time testing during or following the Class 1 leak test causes negligible perturbations to the reactor and fuel because only one control rod is tested at a time under the allowance of LCO 3.10.4 (Single Control Rod Withdrawal – Cold Shutdown). The alternative is to perform scram time testing in Mode 1 or 2, when reactor pressure meets the SR requirement (>800 psig). But the reactor is also critical at this point, which means that scram time testing causes power perturbations in the core. To minimize the perturbations to the reactor (and, in turn, the rest of the power plant), scram time testing is generally performed in Mode 1, with reactor power above 25% of Rated Thermal Power (RTP) (stable, at-power conditions) but prior to the 40% RTP limit of SR 3.1.4.1 or 3.1.4.4. In a BWR, individual control rod worth, which determines the amount of

power perturbation, is much lower at power (Mode 1) than during startup (Mode 2). While at-power scram time testing is acceptable, performing the testing in conjunction with the leak or hydrostatic test is preferable. Hence, the Traveler proposes TS Bases wording in SR 3.1.4.4 to allow scram time testing to be performed during the Class 1 (hydrostatic) leak test. Because similar wording is not found in the Bases for LCO 3.10.1, it has been determined that such testing is not currently permitted beyond the completion of the Class 1 leak test[2], resulting in the requested change in TSTF-484 to allow scram time testing to be completed subsequent to the Class 1 leak test under LCO 3.10.1.

The specific system line-ups for performing the Class 1 leak test, i.e., establishment of the test boundary for pressurizing the RCS, would not allow the plant to begin a normal plant startup and resumption of power operation, notwithstanding any other ancillary testing being done. Consequently, the licensee has no incentive to remain in this configuration any longer than necessary. The desire to proceed with plant startup will drive declaring the testing complete, exiting LCO 3.10.1, and returning to "normal Mode 4."

2 NRC Inspection Report 5000331/2005011, dated July 1, 2005.