April 12, 2012

MEMORANDUM TO: Robert B. Elliot, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

FROM: Greg A. Casto, Chief ***/RA/***
Balance of Plant Branch
Division of Safety Systems
Office of Nuclear Reactor Regulation

SUBJECT: BALANCE OF PLANT REQUEST REMOVAL OF THE PROVISION IN TSTF-412 FOR 24 HOURS COMPLETION FOR AN INOPERABLE MOTOR-DRIVEN AUXILIARY FEEDWATER PUMP COINCIDENT WITH ONE INOPERABLE STEAM SUPPLY TO THE STEAM-DRIVEN AUXILIARY FEEDWATER PUMP.

During the review of Technical Specification (TS) 3.7.5 Auxiliary Feedwater System (AFWS) for the incorporation of changes based upon Technical Specification Task Force (TSTF) Traveler Number 412, Balance of Plant (SBPB) staff found the TSTF allows 24 hours for a plant condition where the remaining plant equipment can no longer meet the minimum design AFW flow to mitigate the accidents described in Final Safety Analysis Report, Chapter 15, Transient and Accident Analysis. Therefore, Balance of Plant Staff requests the provision allowing 24 hours for this condition be withdrawn from TSTF-412.

Please note that the specific review applied to a Westinghouse pressurized water reactor (PWR). The staff will also review other PWR nuclear steam supply system designs in regard to this TSTF and provide additional comments.

Enclosure:
As stated

Contact: Stanley J. Gardocki, NRR/DSS/SBPB
301-415-1023

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REMOVAL OF THE PROVISION IN TSTF-412 FOR 24 HOURS COMPLETION FOR AN INOPERABLE MOTOR-DRIVEN AUXILIARY FEEDWATER PUMP COINCIDENT WITH ONE INOPERABLE STEAM SUPPLY TO THE STEAM-DRIVEN AUXILIARY FEEDWATER PUMP.

Balance of Plant (SBPB) staff is currently reviewing incorporation of changes based upon Technical Specification Task Force (TSTF) Traveler Number 412 into Technical Specification (TS) 3.7.5 Auxiliary Feedwater System (AFWS) for one of the operating nuclear plants.

TSTF-412 recommends two different completion times (48 hours or 24 hours) for a condition when one steam supply to the steam-driven auxiliary feedwater (AFW) pump is inoperable in coincident with one inoperable motor driven auxiliary feedwater (AFW) pump. The basis for which completion time is appropriate is whether the capacity of the remaining motor driven AFW pump can supply 100% of the required feedwater flow to the steam generator(s) based upon the requirements to mitigate transients and accident analyses identified in the licensee's Safety Analysis Report, typically Chapter 15.

If the remaining motor-driven AFW pump can supply 100% of the design flow requirement, then TSTF recommends a 48 hour completion time. If the remaining motor-driven AFW pump cannot meet the design required flow, the TSTF recommends a 24 hour completion time. TSTF-412 evaluation provides the follow basis for recommending the 24 hour completion time:

> … However, for some plant designs there are scenarios in which the combination of an inoperable motor driven AFW train and the turbine driven AFW train inoperable due to an inoperable steam supply can lead to less than 100% AFW flow to the steam generators (SGs). Consider, for example, a four loop plant where the steam supplies for the turbine driven AFW train come from two of the SGs. The turbine driven train feeds all four SGs, and each motor driven train feeds two SGs. If one steam supply is inoperable, and the SG with the remaining steam supply becomes faulted due to a Feedline Break (FLB) or Main Steamline Break (MSLB) (whichever is limiting from the standpoint of AFW flow requirements and assuming no single failures), the turbine driven AFW train may not be able to perform its function. If the motor driven AFW train that feeds the two intact SGs is also inoperable, the remaining motor driven AFW train will be feeding only one intact SG. **This may not meet safety analysis requirements.** Similar scenarios are possible for three loop plants that require two motor driven AFW trains to mitigate a FLB or MSLB. For plants with this design, a Completion Time of 24 hours is proposed for new Required Actions C.1 and C.2.

The technical evaluation states the following:

Condition A is modified to indicate that the turbine driven AFW train is inoperable due to one steam supply inoperable. With one steam supply inoperable, the turbine driven AFW train is considered inoperable but is still capable of performing its specified function. A new Condition C is proposed that will require restoring an AFW train to OPERABLE status in 24 hours if one motor driven AFW train is inoperable and the turbine driven AFW train is inoperable due to one steam supply inoperable.

ENCLOSURE

This Completion Time is applicable when the condition could result in the inability of the AFW system to provide 100% of the flow required by the safety analysis for the FLB or the MSLB, whichever is most limiting, assuming no additional single failure. **This Completion Time is reasonably based on the remaining OPERABLE motor driven AFW train, the remaining OPERABLE steam supply to the turbine driven AFW pump, the turbine driven AFW pump still being capable of performing its specified function, and the low probability of an event that would result in the inability of the AFW system to provide 100% of the required flow.**

> The proposed new Condition C addresses the ability of the AFW system to mitigate the most limiting design basis events (e.g., a FLB or MSLB), excluding a single failure, with one inoperable steam supply to the turbine driven train and an inoperable motor driven train. For example, a typical Westinghouse three-loop design feeds all three steam generators with two motor driven AFW trains and a turbine driven train. The turbine driven AFW steam supplies are taken from two of the steam generators. If the turbine driven AFW train is inoperable due to one steam supply inoperable and a motor driven AFW train is inoperable, and the steam generator with the remaining steam supply is faulted, the remaining motor driven train will be able to feed two intact steam generators. Therefore, the design basis may be met, and the Completion Time of 48 hours is appropriate. **However, if due to plant design, there are scenarios where 2 out of 3 AFW trains are required for a three loop plant, the more limiting Completion Time of new Condition C (24 hours) is appropriate.** For the two loop design, there must be a remaining motor driven train capable of feeding the remaining intact steam generator.

TSTF-412 recommendation for a 24 hours completion is based upon the low probability of a particular event occurring during that time and results in the steam-driven AFW pump being unavailable to supplement the remaining motor-driven pump, which cannot provide the required feedwater flow to mitigate the design basis accident. Hence, the basis for the 24-hour completion time is based upon the risk to the plant during those 24 hours.

Current guidance to the staff's directs the acceptability of TS to be based upon a risk-informed basis, not on a risk-based approach. It appears this 24-hour completion time is risk-based. The staff does not find adequate justification for allowing the plant to continue operation in this condition. Therefore, the SBPB staff request the 24-hour completion time recommended in TSTF-412 be withdrawn for an inoperable steam supply to the steam-driven AFW pump in coincident with an inoperable motor-driven AFW pump.