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SUBJECT: Forwards proposed Amends 145 & 99 to Licenses NPF-14 & NPF-22,respectively.Amends change Tech Specs to revise isolation setpoints for leak detection temp function in turbine bldg main steam tunnel.

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Director of Nuclear Reactor Regulation
Attention: Dr. W. R. Butler, Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENTS 145 TO LICENSE
NO. NPF-14 AND 99 TO LICENSE NO. NPF-22:
REVISION TO LEAK DETECTION TEMPERATURE
SETPOINT IN TURBINE BUILDING MAIN
STEAM TUNNEL

Docket Nos. 50-387
and 50-388

PLA-3563 FILE A17-2, R41-2

Dear Dr. Butler:

The purpose of this letter is to propose changes to the Susquehanna SES Unit 1 and Unit 2 Technical Specifications to revise the isolation setpoint for the leak detection temperature function in the Turbine Building main steam tunnel.

DESCRIPTION OF CHANGE

This proposal results in a revision to the isolation setpoint associated with the leak detection temperature function in the Turbine Building main steam tunnel. The Technical Specifications involved are Item 3i of Table 3.3.2-2, which specifies the temperature requirements, and Section 3/4.3.2 of the bases. The changes are illustrated on the attached marked-up pages.

SAFETY ANALYSIS

A. Background

A design basis analysis of the leak detection system temperature setpoints was initiated in response to violations involving mislocation of the Reactor Building Main Steam Tunnel differential temperature elements. A model of the Turbine Building Main Steam Tunnel was prepared using the Compartment Transient Temperature Analysis Program (COTTAP). The model calculates the temperature rise in each room due to a steam leak.



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The thermal model assumes a uniform temperature throughout the room volume and calculates the rise in average temperature resulting from a leak. Actual data for normal operation shows a large temperature gradient, increasing from the reactor end to the turbine end of the tunnel. The HVAC air supply enters at the reactor end, is heated as it travels the length of the tunnel and is exhausted at the turbine end. A temperature gradient may also exist vertically in the tunnel. The leak detection temperature elements (TE's) are installed at the outlet end where they are consistently exposed to higher temperatures. The data shows the temperature at the TE's to be 20°F to 25°F higher than the average temperature. The gradient is expected to remain the same or increase in the presence of a leak. The present model is not sophisticated enough to calculate the local temperature response at the TE's. The setpoint calculation accounts for the gradient to realistically estimate the leak rate corresponding to setpoints.

The system presently operates with little margin between the isolation setpoint and the normal maximum operating temperature. The temperature at the TE's reaches 145°F to 150°F during normal operation, leaving less than 30° margin to isolation. Non-leak disturbances (such as a reduction in air flow) or small (packing-sized) leaks could unnecessarily isolate the main steam line and cause a full-power reactor scram. The setpoints have been increased to provide margin comparable to the Reactor Building main steam tunnel and to assure that non-leak conditions, such as loss of HVAC, will not cause main steam line isolation.

B. Systems Affected

The condition affects the main steam piping and ambient temperature switches TSH-10100A, B, C, & D and TSH-20100A, B, C & D for the Unit 1 and 2 Turbine Building Main Steam Line Tunnel. The switch setpoints determine the actuation point of the MSIV's. The temperature instruments and MSIV's are part of the Primary Containment and Reactor Vessel Isolation Control System (PCRVICS) described in FSAR Section 7.3.1.1a.2.4.1.3.

C. Safety Function of Affected Systems

The reactor coolant pressure boundary and connected systems, including the main steam lines, are designed to retain reactor coolant for conditions anticipated during plant operation. Leak detection is one of several measures which assures the integrity of the pressure boundary piping.

The leak detection system, as part of the PCRVICS, is an Engineered Safety Feature (ESF). FSAR Section 7.3.1.1a.2.1 states that "the purpose of the system is to prevent the gross release of radioactive material in the event of a breach in the RCPB by automatically isolating the appropriate pipelines that penetrate the primary containment." The temperature switches and isolation valves limit the leakage of reactor coolant outside containment.

Temperature monitoring provides an early indication of leakage to prevent development of a steam line break accident (FSAR Section 15.6.4). The setpoints must also be established high enough to prevent an inadvertent MSIV isolation (FSAR Section 15.2.4). Flow, pressure and reactor water level are also monitored to detect, annunciate and isolate larger leaks and pipe breaks. Regulatory Guide 1.45 and GDC 30 define leak detection requirements, but do not specifically mandate temperature measurement and automatic system isolation.

D. Effects on Safety Functions

The proposed setpoints increase the margin above normal operating temperature and greatly reduce the risk of an inadvertent MSIV isolation. The setpoints correspond to a leak rate of 65 gpm, rather than 25 as stated in the FSAR. Although the leak rate is higher than presently specified, it is far below the rate for critical crack size. FSAR Figure 5.2-10 correlates leak rate to flaw size for a saturated water system. The setpoints continue to perform their safety function by isolating leakage prior to development of a steam line break, and, therefore, do not affect the integrity of the main steam piping or the function of PCRVICS.

E. Acceptability of Consequences

The proposed setpoints and design basis changes do not affect the safety function of the leak detection temperature switches or the main steam piping. The higher setpoints reduce the risk of inadvertent main steam line isolation. The higher leakage rate of 65 gpm on which the setpoints are based is well below critical crack flow of 383 gpm. The switches will detect and isolate leakage from a pipe flaw before critical crack length is reached and a catastrophic pipe break occurs.

The existing recorder pre-isolation alarms (single channel, non-safety related) provide advance warning to the operators of a leak. The alarm setpoint of 157°F will detect leaks of approximately 25 gpm in the turbine building main steam tunnel. The alarm allows the operators to take corrective action to limit the leakage. Operator action may avoid the severe transient on the reactor caused by automatic main steam line

isolation. For larger leaks or other circumstances where operator action may not be effective, the temperature switches will initiate automatic isolation.

The radiological effects of a 65 gpm (32,500 lbm/hr) leak are well below the values listed in the FSAR and the Standard Review Plan for the previously analyzed steam line break accident.

NO SIGNIFICANT HAZARDS CONSIDERATION

I. The proposed change does not involve a significant increase in the probability or consequence of an accident previously evaluated.

The FSAR does not analyze small leaks on which the temperature setpoints are based. This type of leak falls into the "Decrease in Reactor Coolant Inventory" (FSAR Section 15.6) accident category. Similar type accidents which result in coolant leakage outside containment are analyzed in FSAR Sections 15.6.2 (Instrument Line Break) and 15.6.4 (Steam System Piping Break Outside Containment). Both of these are postulated accidents with no causes identified and are categorized as limiting faults.

According to FSAR Subsection 7.3.1.1a.2.4.1.3, the leak detection high temperature trips "provide early indication of a steam line break." The system detects a precursor condition, i.e. through-wall pipe crack, which can potentially result in a steam line break accident. The impact of the proposed change is, therefore, evaluated compared to the steam piping break accident.

The radiological consequences of a 65 gpm leak fall well below the SRP acceptance criteria and below the dose for the steam line break accident analysis in the FSAR and SER (Table 15.6-9). A 65 gpm leak does not, therefore, increase the consequences of an accident as previously evaluated.

Increasing the temperature switch setpoints allows for higher leakage without automatically isolating the main steam line. The setpoints are low enough to isolate the leak prior to development of a catastrophic pipe break. The temperature switches thereby continue to form their safety function by preventing a main steam line break accident. The higher setpoints also reduce the risk of an inadvertent MSIV isolation accident (FSAR Section 15.2.4). The setpoint change, therefore, produces a net improvement in the safety performance of the system.

II. The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

Although small leaks of up to 65 gpm are not specifically analyzed in the FSAR, they are not a new type of accident. Leakage is a symptom of a precursor condition (through-wall crack) for a steam line break accident, analyzed in Section 15.6.4. The proposed change does not, therefore, create the possibility of an accident or malfunction of a different type than any evaluated previously in the FSAR.

III. The proposed change does not involve a significant reduction in a margin of safety.

The temperature switches and setpoints are listed in Technical Specification Section 3.3.2, "Isolation Actuation Instrumentation." The existing system does not satisfy the Technical Specification basis statement that "the setpoints ... are established at a level away from the normal operating range to prevent inadvertent actuation of the system involved." The proposed change reduces the risk of inadvertent isolation and, therefore, supports the Technical Specification basis.

We request that these amendments be approved by December 2, 1991. Any questions on this submittal should be directed to Mr. C. T. Coddington, at (215) 774-7915.

Very truly yours,

H. W. Keiser

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