ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9002010168 DOC.DATE: 90/01/26 NOTARIZED: YES DOCKET #
FACIL:50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylva 05000387
50-388 Susquehanna Steam Electric Station, Unit 2, Pennsylva 05000388
AUTH.NAME AUTHOR AFFILIATION
KEISER,H.W. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
BUTLER,W.R. Project Directorate I-2

SUBJECT: Forwards application for amend to Licenses NPF-14 & NPF-22, deleting isolation function of Delta-T.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL __ SIZE: 5+42
TITLE: OR Submittal: General Distribution

NOTES:LPDR 1 cy Transcripts. 05000387
LPDR 1 cy Transcripts. 05000388

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD1-2 LA	1	1	PD1-2 PD	1	1
	THADANI,M	5	5			
INTERNAL:	ACRS	6	6	NRR/DET/ECMB 9H	1	1
	NRR/DOEA/OTSB11	1	1	NRR/DST 8E2	1	1
	NRR/DST/SELB 8D	1	1	NRR/DST/SICB 7E	1	1
	NRR/DST/SRXB 8E	1	1	NUDOCS-ABSTRACT	1	1
	OC/LEMB	1	0	OGC/HDS2	1	0
	REG FILE 01	1	1	RES/DSIR/EIB	1	1
EXTERNAL:	LPDR	1	1	NRC PDR	1	1
	NSIC	1	1			
NOTES:		2	2			

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 29 ENCL 27

RIDS/ADDS

RIDS/ADDS

AA-2

PP&L Pennsylvania Power & Light Company
Two North Ninth Street • Allentown, PA 18101-1179 • 215/770-5151

Harold W. Keiser
Senior Vice President-Nuclear
215/770-4194

JAN 26 1990

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

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED AMENDMENT NO. 127 TO NPF-14
AND PROPOSED AMENDMENT NO. 79 TO NPF-22
ELIMINATION OF DELTA-T INSTRUMENTATION
PLA-3330 FILES R41-2, A17-2

DOCKET NOS. 50-387
AND 50-388

Dear Dr. Butler:

The purpose of this letter is to propose changes to the Susquehanna SES Unit 1 and Unit 2 Technical Specifications to delete the isolation function of the differential temperature sensing system (delta-T).

DESCRIPTION OF CHANGE

This proposal results in the deletion of the delta-T circuit isolation functions that are presently associated with leak detection for those piping systems that interface with the reactor coolant pressure boundary (RCPB) but are outside the primary containment boundary. The Technical Specifications involved are portions of Sections 3/4.3.2, Tables 3.3.2-1, 3.3.2-2, 3.3.2-3 and 4.3.2.1-1, specifying delta-T circuit requirements. The changes are illustrated on the attached marked-up pages.

SAFETY ANALYSIS

Susquehanna SES (SSES) design features that monitor leak conditions supplement design features that monitor larger line break conditions. These features span a wide range of redundant and diverse functions, with temperature based instruments accounting for only a portion of those features. Temperature based instruments include high ambient temperature monitoring instruments in addition to the high delta-T type instruments. The temperature-based functions are described in the FSAR sections listed below.

Section 5.2 of the SSES FSAR discusses SSES features required for the integrity of the RCPB. Section 5.2.5 describes detection of leakage through the RCPP, and Section 5.2.5.1.3 specifically addresses the Detection of Abnormal Leakage Outside The Primary Containment. The areas discussed include

9002010168 900126
PDR ADOCK 05000387
P PDC

A001

all areas normally associated with leak detection issues. These are the rooms containing HPCI, RCIC, RHR, and RWCU equipment plus the Main Steam Tunnel. The design bases for these systems are described as the ability to initiate isolations at setpoints that are sufficiently higher than post LOCA operating temperatures to avoid an undesired isolation of the ECCS capability, while also assuring timely detection of leaks.

The Main Steam Tunnel ambient temperature and delta-T leak detection functions are described further in FSAR Section 7.3.1.1a.2.4.1.3, Main Steam Line Tunnel High Temperature and Differential Temperature, as part of the Primary Containment and Reactor Vessel Isolation Control System (PCRVICS)

Isolation Actuation Instrumentation is discussed in Technical Specification Section 3/4.3.2. High differential temperature isolation signals for HPCI, RCIC, RHR, RWCU, and the Main Steam Line are listed in Technical Specification Tables 3/4.3.2-1. The Allowable Value and Trip Setpoints associated with these isolation signals are listed in Technical Specification Table 3.3.2-2.

In addition to temperature based instrumentation, the SSES design includes other leak and line break monitoring functions. ATTACHMENT 1 identifies the other isolation functions included in the SSES design. Backups are identified on a room by room basis, and specific instrument applications are identified. For every application of delta-T isolation functions, a high ambient temperature isolation function exists. With existing Technical Specification setpoints, both instruments were expected to function to detect leakage rates in the same range of leak sizes and initiate an isolation.

Additionally, other monitoring/isolation functions are provided. In the RCIC and HPCI rooms, high temperature at the inlet to the room cooler acts to isolate the respective system as an additional redundant function to the normal room high ambient temperature isolation functions. High system flow will cause isolations for all systems (RCIC, HPCI, RHR, RWCU, and Main Steam). High differential flow will isolate the RWCU system. Low steam supply pressure will isolate RCIC, HPCI, and Main Steam. Reactor Water Level will isolate the RHR at Rx Vessel Level 3, and the Main Steam System at Level 1. Although not necessarily leakage indications, high radiation will isolate the main steam system, high back pressure will isolate RCIC and HPCI turbines, and low condenser vacuum will isolate Main Steam.

All of the isolation actuation instruments identified in ATTACHMENT 1 are divisionalized signals, thus satisfying the redundancy requirements of GDC 54. ATTACHMENT 1 also provides information on the required trip logic configurations. For example, coincidence is required for some isolation functions (such as all Main Steam Isolation functions), while redundant single channel trip functions are used on others (e.g., RCIC room ambient temperature high functions).

The data presented in ATTACHMENT 1, with the explanations presented above, support the argument that removal of the steam leak detection delta-T isolation functions from SSES, and from the SSES Technical Specifications will not impact on SSES conformance to all applicable regulatory design criteria and guidance.

Pre-Isolation Alarm Functions

The intent of the steam leak detection circuitry at SSES is to allow detection of the steam leak before initiating an automatic isolation function. Information presented in ATTACHMENT 2 identifies the alarm functions in the Main Control Room that would result from leaks in the systems outside containment that connect to the RCPB. Every area containing these systems will initiate such alarms.

Each high ambient temperature monitoring system utilizes dual element thermocouples. In one division, the second element is spare; in the other, it serves as an input to a recorder based alarm function. A common alarm is used for the RCIC room high ambient temperature measurement, the RCIC room cooler high inlet temperature, and the RCIC piping area high ambient temperature. The alarms will actuate prior to the initiation of the high temperature based isolation function for the respective areas. A similar arrangement exists for the HPCI, RHR, RWCU, and Main Steam System areas.

In addition to the temperature based alarms, flood detectors will actuate Main Control Room alarms for flooding in the RCIC area, HPCI area, and the RHR area. Area radiation monitors will alarm on high radiation in the RCIC, HPCI, RHR, and RWCU areas. Main Steam Line Rad Monitors, which function to measure steam radioactivity more than area leakage, will alarm before initiating a MS Line isolation. Fire detection system sensors will generally alarm upon steam leak conditions. Depending upon coolant activity and leak size, vent stack monitors may indicate increasing stack release rates in the daily data printout. Developing leakage conditions are also detected and made known to the Operating staff by personnel making rounds, surveillance activities, etc.

The information presented in ATTACHMENT 2 and above, argue that adequate preisolation leakage alarm functions exist in the Main Control Room without consideration of the additional alarms associated with the delta-T functions.

Undefined Margin to Leakage Detection Isolation Setpoints

The delta-T instruments respond to a variety of influences in addition to steam leak conditions. Since the cold leg of the thermocouple (T/C) pair is mounted directly in front of the incoming HVAC air, it will generally sense outside air temperature except as follows: When outside air is below 60 degrees F, duct heaters energize and maintain incoming air at approximately 60 degrees F; when outside air is hotter than 85 degrees F, duct coolers will energize and cool the supply air to 85 degrees F. Consequently, the cold leg T/C will fluctuate with outside air within the limits of about 60 degrees F to 85 degrees F.--a range of approximately 25 degrees F. The hot leg T/C response to outside air temperature changes has a substantial time lag and is attenuated due to the rate of room air turnover and due to room heat capacities.

The result is a range of "normal" delta-T which is a significant percentage of the existing isolation setpoints, and creates a substantial problem in assuring a proper degree of margin is maintained between the maximum room operating or post LOCA differential temperature, and the isolation setpoint temperature.

This problem may be compounded by the design of the HVAC system ductwork arrangements, and the nominal HVAC flow rates associated with different rooms. Although program thermal calculations have not been completed for the RHR and RWCU rooms, substantial difficulty is expected in selection of delta-T setpoints to assure adequate margin between maximum normal operating temperatures and initiation of system isolation on leak conditions.

For these reasons, it is concluded that the variances in actual room differential temperature values for non accident, non steam leak plant operation result in setpoints which have either excessive or inadequate margins to the desired isolation actuation.

NO SIGNIFICANT HAZARDS CONSIDERATIONS

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

As discussed above, SSES is provided with redundant and diverse methods of detecting, alarming, and automatically isolating leakage in systems which interface with the reactor coolant pressure boundary. Those systems which interact with the RCPB outside containment are the HPCI, RCIC, RHR, RWCU, and Main Steam. The backup instrument systems, enumerated in ATTACHMENT 1, provide compliance with all applicable Appendix A General Design Criteria, and Regulatory Guidance without dependance on the differential temperature based isolation functions.

In addition to the automatic isolation signals discussed above, other instruments provide alarms which allow for detection of a reactor coolant pressure boundary leak in the subject rooms. These alarm functions are listed in ATTACHMENT 2 and are discussed above. Adequate alarm notification of developing leakage conditions is available to the SSES operator without dependance upon the differential temperature based circuits.

There is no FSAR Chapter 15 accident analysis dealing specifically with small steam leaks from the Reactor Coolant System or connected systems. These leakage conditions are enveloped by the Instrument Line Break Analyses (Section 15.6.2) and Steam System Piping Break Outside of Containment (Section 15.6.4). Elimination of differential temperature monitoring does not affect these analyses, nor does it affect FSAR Section 3.6A dealing with high energy line breaks, (HELB). Further extrapolation of leakage calculation results to HELB conditions suggest that delta-T instrumentation would not be functional under HELB conditions. This would be due to room pressurization effects causing either flow reversal in the HVAC duct cold air supply, or actual backdraft isolation damper closure.

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

Eliminating differential temperature isolation functions from the SSES design reduces the gross number of loops acting to detect and to isolate a leak, but does not change the probability of successful detection and isolation of the leak by the remaining redundant instruments because of the high reliability of the remaining instruments. Further, elimination of the differential temperature based isolation instruments will eliminate the potential for undesired isolations of ECCS equipment caused by perturbations in the outside air temperature, HVAC system perturbations, or other affects not related to actual steam leak.

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

The intent of the leak detection design is: To ensure early detection of leak conditions; to identify the leak, if possible, to allow manual isolation of the leak or other appropriate action; and to initiate an automatic isolation when the leak reaches certain magnitudes if the leak is in a system that can be isolated. The elimination of the delta-T isolation functions does not affect any accident analysis nor does it have any effect on performance characteristics of safety systems since sufficient redundant and diverse leak detection instrumentation to detect steam leaks exists. Also since this change will increase the reliability of the leak detection system by eliminating spurious trips, overall plant safety will be slightly increased.

Any questions on this submittal should be directed to Mr. C. T. Coddington at (215)770-7915.

Very truly yours,

H. W. Keiser

cc: NRC Document Control Desk (original)
NRC Region I
Mr. G. S. Barber, NRC Sr. Resident Inspector - SSES
Mr. M. C. Thadani, NRC Project Manager - White Flint
Mr. T. M. Gerusky, Pennsylvania DER