ATTACHMENT #3

A

FUNCTIONAL DESIGN DESCRIPTION

FOR THE

QUALIFIED SAFETY PARAMETER DISPLAY SYSTEM

FOR

TURKEY POINT UNITS 3 AND 4

QA Status: Verified

The safety related design information contained in this document has been reviewed and satisfies (where applicable) the items contained on check-list(s) 2, ___, ___ of the Quality Assurance of Design Manual. This review is so certified.

Independent Reviewer: J. G. Castagno

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Nuclear Power Systems
COMBUSTION ENGINEERING, INC.
Windsor, Connecticut

Prepared By ______ Date Sept 23, 1982
G. W. Starkweather (Safety Status Monitoring Systems)

Independently Reviewed By ______ Date Sept 29 1982
J. G. Castagno (Lead Engineer, Safety Status Monitoring Systems)

Approved By ______ Date 9-30-82
K. R. Ronde (Supervisor, Safety Status Monitoring Systems)

Approved By ______ Date 10/1/82
J. L. Pdcak (Section Manager, Instrumentation Systems Design)

Approved By ______ Date 10/6/82
T. P. Gates (Project Manager)

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00	10/6/82	All	G.W.Starkweather	J.G.Castagno	K.R.Rohde J.L.Pucak

ABSTRACT

This document specifies the Qualified Safety Parameter Display System functional design for Turkey Point Units 3 and 4. This document is based upon the generic QSPDS functional design specification, NPROD-ICE-3201. Plant specific compliance with the generic functional design specification and plant specific differences are specified.

This document is quality assured according to the QAPD, Revision 16.

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1.0 PURPOSE AND SCOPE

The purpose of this document is to specify the plant specific design bases, functional requirements, and functional design of the QSPDS for Turkey Point Units 3 and 4. This document, in conjunction with the generic QSPDS functional design specification (Reference 1), comprises the functional design specification. Two other documents, the QSPDS data base document (Reference 2) and the QSPDS display design document (Reference 3), describe the plant specific input and data constants and displays.

2.0 REFERENCES

1. NPROD-ICE-3201, Revision 02, Functional Design Specification for a Qualified Safety Parameter Display System.

2. 16081-ICE-3219, Revision 00, QSPDS Data Base Document for Turkey Point Units 3 and 4.

3. 16081-ICE-3220, Revision 00, Functional Design Specification for the QSPDS Displays for Turkey Point Units 3 and 4.

3.0 DESIGN BASES

The design bases for the Turkey Point Units 3 and 4 QSPDS are a subset of the design bases of the generic QSPDS functional design specification (Reference 1). Briefly, these functions are:

1. Safety grade processing and display of the ICC variables.

2. Isolation of Class 1E inputs into the non Class 1E Safety Assessment System (SAS) which is not in C-E scope.

3. Human factor engineered display system.

3.1 DESIGN BASIS EVENTS

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

4.0 SYSTEM FUNCTIONAL REQUIREMENTS

Turkey Point Units 3 and 4 incorporate the ICC functional requirements contained in Section 4.1 of Reference 1. The backup SPDS function is not included in the Turkey Point Units 3 and 4 QSPDS design.

5.0 SYSTEM FUNCTIONAL DESCRIPTION

The Turkey Point Units 3 and 4 design is not part of the standard Accident Monitoring System configuration described in Reference 1. The QSPDS equipment is functionally the same as in Reference 1 (although some hardware differences exist). The QSPDS is not connected to the Critical Function Monitoring System as described in Reference 1. The QSPDS does data link the ICC inputs and calculated variables and any other input variables defined by FP&L. The reader must read the functional design documentation for the primary computer system, the Safety Assessment System (SAS) to which the QSPDS is connected, to understand the role of the QSPDS data link outputs.

The QSPDS has a capability of accepting the following types of inputs per channel:

1. 40 high level analogs
2. 12 high level SMM analog inputs
3. 31 Type K thermocouple inputs
4. HJTCS inputs (16 Type K inputs)

6.0 SYSTEM DESIGN REQUIREMENTS

Following are the QSPDS design requirements for Turkey Point Units 3 and 4 as compared to the generic system design requirements in Reference 1.

6.1 OVERALL SYSTEM DESIGN REQUIREMENTS

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.2 CODES AND STANDARDS

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.3 INPUT REQUIREMENTS

6.3.1 Input List

The actual list of inputs with the numbers of inputs, type of input, range, units, and specific comments are included in the Turkey Point Units 3 and 4 data base document (Reference 2). Following is a description of the types of inputs included in the Turkey Point Units 3 and 4 QSPDS for each channel as compared to the generic functional design specification of Reference 1.

The following change is made to ICC inputs as compared to Reference 1:

Hot and cold leg temperatures - One hot leg and one cold leg temperature is input from each of the three primary loops.

Non ICC variables are not included for Turkey Point Units 3 and 4.

6.3.2 Input Design Requirements

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.4 PROCESSING REQUIREMENTS

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1, with the following exceptions:

6.4.1 Probe Assembly

A split probe assembly will be used with two sensors in the upper section and six sensors in the lower section.

6.4.2 RCS Saturation Margin

Three RCS saturation margins will be calculated, one from each of the three loops (A, B, and C). Each of these three saturation margins will be displayed. The minimum subcooled margin (or maximum superheat) will be selected for display and will be used for the determination of the minimum of the RCS and upper head saturation margins.

6.5 DISPLAY REQUIREMENTS

6.5.1 QSPDS Variable Display Information

The Turkey Point Units 3 and 4 design includes the ICC detection information listed in Table 8-3 of Reference 1. Specific ranges and design information for the variables are contained in the data base document (Reference 2).

6.5.2 System Indication

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.5.3 Display Hierarchy

The upper level ICC page will contain the core heat removal variables. The ICC pages remain the same as in Reference 1. A directory page and a diagnostic page are also included in the upper level display pages. The following hierarchy shall be included:

Core Heat Removal

1. Saturation Margin
2. Reactor Vessel Level

   HJTC Temperatures
3. Core Exit Temperatures

   Core Map

For more information, refer to the display document, Reference 3.

6.5.4 Alarm Display

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.5.5 Display Resolution Requirement

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.5.6 Display Update

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1.

6.6 DATA LINK REQUIREMENTS

The Turkey Point Units 3 and 4 design is the same as specified in the generic functional design of Reference 1, except that the data link does not transmit to the CFMS. The list of inputs and variables to be data linked to the SAS is contained in the data base document, Reference 2. The data link is available for use by FP&L; however, no system test or integration is in the C-E scope.