DSAR-7.5

Instrumentation and Control

Instrumentation Systems

Rev 1

Safety Classification:

Safety

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Information

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Preparer:	**J. Carlson**

Fort Calhoun Station

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7.5 Instrumentation Systems

7.5.1 Process Instrumentation

7.5.1.1 Design Bases

The process instrumentation measures the Spent Fuel Pool temperature and level and the Missouri River level.

7.5.1.2 System Description

The process instrumentation described below is associated the river and Spent Fuel Pool:

Temperature

Temperature measurements of the Spent Fuel Pool are made with precision resistance temperature detectors (RTDs) and installed at multiple depths. The RTDs are connected to the Distributed Control System (DCS) which provides readout on multiple DCS workstations located in the Control Room.

Level

Spent Fuel Pool level is indicated locally using a pressure gauge connected to a bubbler system. A redundant pair of guided wave radar level transmitters (contacting) are connected to the DCS. Spent Fuel Pool level indication is available on multiple Control Room DCS workstations.

Missouri River level is provided by a pressure transmitter connected to a bubbler system and non-contacting radar level instrumentation. These instruments are connected to the DCS. River level indication is available on multiple Control Room DCS workstations.

7.5.2 Deleted

7.5.3 Deleted

7.5.4 Deleted

7.5.5 Plant Computer (ERF System)

7.5.5.1 Design Bases

The Emergency Response Facilities (ERF) System is used to monitor and log plant parameters and equipment status.

The function of the computer is to assimilate plant data. The computer provides both a record of plant data and a means of readily providing the operator with information of the following type:

- The current status of certain plant switches, relay contacts, values, or plant parameters
- The displayed value or trend of selected plant parameters or calculated values

7.5.5.2 System Description

The computer is a real time digital processing system which collects and organizes plant data for reference and display in the Control Room. The ERF computer is composed of a Foxboro IA Distributed Control System (DCS) and redundant DEC Alpha host computers. The Foxboro IA DCS performs the data acquisition and critical timing functions (such as sequence of events). The DEC Alpha hosts perform most of the computations and provides the user interface.

User interaction with the computer is through the host. Display selections and other system options are made through the host user interface. The host controls storage of on-line history files and audit trails. It also performs other system functions, such as security protection and communication with external data systems.

The system provides supplementary information for assistance in plant status and provides logic for automatic identification and alarm of off-normal conditions.

The system scans numerous analog inputs (flow, temperature, pressure and level), and digital inputs (including the position of valves, relay contacts, circuit breakers and switches). It provides indication and alarm of off-normal conditions.

An analog input can be simultaneously selected for direct observation on a two pen recorder; two such recorders are provided.

7.5.5.3 User Interface Description

The system contains numerous workstations to provide communication between the user and the computer. The computer executes various functions in response to commands entered at the workstations.

7.5.5.4 Program Functions

Scanning and Display

The computer system checks digital inputs from valves, relay contacts and position switches and initiates an alarm in the event of an improper change in status.

The system also checks analog inputs for the following:

- Operability of sensors and instrument transmitters. Signal in proper range
- Comparison of sensor output to alarm setpoints for alarm initiation

Calculations

The system performs functions necessary for conversion of inputs to engineering units (linearization of thermocouple inputs, square root extraction, integration and averaging).

The computer performs functions necessary for conversion of inputs to engineering units and preparation of the plant performance calculations, e.g., linearization of thermocouple inputs, scale factoring, zero-suppression, square root extraction, integration and averaging.

7.5.6 Deleted