

7.0 INSTRUMENTATION AND CONTROL

7.1 INTRODUCTION

The plant systems are instrumented to provide information on plant conditions at selected locations, to protect equipment and personnel from undesirable conditions and to control the plant during startup, operation, and shutdown. The principal control station for the plant is in the Control Room.

The plant is started up and shut down under remote manual control. Annunciators, indicators, and recording devices will alert the operator and provide data on plant conditions.

Instrumentation and controls essential to plant safety are located in the Control Room. The instrumentation is arranged in groups on the control boards so that when corrective action is required, all pertinent indicators, recorders, and controllers are within easy reach of the operator. The control board is a duplex benchboard. Visible and audible alarms located on the superstructure over the main control board annunciate and identify abnormal operation conditions. Telephone systems provide both in-plant and external communication. The Control Room is a controlled temperature environment, kept well within the design ambient temperature requirements of the instruments. The computer room temperature and humidity are kept closely controlled.

To ensure reliability, components of established quality are selected and used in the instrumentation and control equipment. All protection systems that actuate reactor trip engineered safety features (ESFs), and auxiliary feedwater (AFW) components are designed to conform to the criteria of Institute of Electrical and Electronic Engineers (IEEE) 279 and those sections that are relevant from the Commission's proposed General Design Criteria, as published February 20, 1971. The Diverse Scram System (DSS) does not meet IEEE 279. The requirements for this system are established by 10 CFR 50.62 (Section 7.11). The protection instrumentation consists of four independent multiple channels to permit system testing without reducing the degree of protection provided. Reliable sources of electrical power are provided to ensure safe and reliable plant operation (Chapter 8).

The operation of the reactor within established limits is achieved by its inherent characteristics, instrumentation and control systems, and by operational procedures and administrative controls. Potential departures from these limits are audibly and visibly annunciated in the Control Room. A Reactor Protective System (RPS) is designed to protect the core and the Reactor Coolant System (RCS) pressure boundary and to initiate reactor trips.

The ESF instrumentation provides the equipment necessary to initiate the required safety features functions. This system also monitors the power sources acting to assure the availability of emergency power for operation of at least the minimum ESFs (Chapters 6 and 8). This system is provided with the necessary redundant circuitry and physical isolation so that a single failure within the system would not prevent the proper system action when required. This system is provided with test facilities and alarms to alert the operator when certain components trip, malfunction or are inoperable. The controls are designed to automatically provide the sequence of operations required to initiate ESF operation with or without off-site power available.

There are no RPS and ESFs instrumentation transmitters for which the trip setpoints are within 5% of the high or low end of the calibrated range, or within 5% of the overall instrument design range.