10.0 STEAM AND POWER CONVERSION SYSTEM

This chapter provides information concerning the Steam and Power Conversion System (SPCS). The SPCS includes the steam system, turbine generator, main condenser and other auxiliary subsystems.

This description is provided to allow an understanding of the SPCS with an emphasis on those aspects of the design and operation of the system that affect the reactor and its safety features. Information is provided to show the capability of the system to function without compromising the nuclear safety of the plant under both normal operating or transient conditions. The radiological aspects of the normal operation of the system are summarized in this chapter, and are presented in detail in Chapter 11.

10.1 SUMMARY DESCRIPTION

The SPCS converts a portion of the thermal energy of the steam produced in the two steam generators into electrical energy via a turbine generator. The steam is subsequently condensed and returned to the steam generators as heated feedwater.

The system also removes residual heat from the reactor core by bypassing steam to the main condenser or dumping to the atmosphere during the period of initial plant cooldown.

The steam generated in the two steam generators is supplied to the high pressure turbine. Steam leaving the high pressure turbine passes through the moisture separator-reheaters and then is admitted to the three low pressure turbines. A portion of the steam is extracted from the turbines for feedwater heating and for driving the steam generator feedwater pump turbines. Main steam is also available to drive the emergency feedwater pump turbine.

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Exhaust steam from the low pressure turbines is condensed and deaerated in the main condenser. The heat rejected to the main condenser is removed by the Circulating Water System. The condensate pumps take suction from the condenser "A" hotwell and delivers the condensate through three low and intermediate pressure feedwater heater trains of five stages each to the suction of the steam generator feedwater pumps. The steam generator feedwater pumps discharge the feedwater through three high pressure feedwater heater trains of one stage each to the two steam generators. Drains from the moisture separator-reheater shells and the three high pressure feedwater heaters are collected in the three intermediate pressure feedwater heaters No. 2 then pumped by the three heater drain pumps to the steam generator feedwater pumps' suction. Shell drains from the remaining two intermediate and two low pressure feedwater heater stages are cascaded to the next lower pressure feedwater heaters and ultimately to the main condensers. Alternate drains are also provided to automatically drain the high pressure, intermediate pressure and low pressure feedwater heaters directly to the main condensers.
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The Steam and Power Conversion System safety-related instrumentation is described in the following subsections:

Main Steam Flow (10.3.1),
Main Steam Isolation Valve (10.3.1 and 7.3.1.1.5),
Emergency Feedwater Pump Turbine (10.4.9.2),
Emergency Steam Generator Feedwater System (10.4.9, 7.3.1.1.6),
Condensate Storage Pool (10.4.9.2).

The remainder of the instrumentation systems in the Steam and Power Conversion System are not safety related.

The flow diagrams, design performance characteristics, and safety related design features of the SPCS are described in the remaining sections of Chapter 10.