11.4 MAIN CONDENSER GAS REMOVAL AND TURBINE SEALING SYSTEMS

11.4.1 Power Generation Objective

The objective of the Main Condenser Gas Removal System is to remove noncondensible gases from the main condenser and deliver these gases to the Gaseous Radwaste System (modified) (see Subsection 9.5).

The objective of the Turbine Sealing System is to prevent the leakage of steam into the Turbine Building and also prevent the leakage of air into the main condenser.

11.4.2 Power Generation Design Basis

1. The Main Condenser Gas Removal System shall be capable of handling the oxygen and hydrogen produced by disassociation of water in the reactor and the estimated air inleakage rate.

2. The Turbine Sealing System shall provide adequate sealing steam to the main turbine and the three reactor feed pump turbines with double clearances on all shaft seals.

11.4.3 System Description

Two full-capacity steam jet air ejectors complete with inter-condensers are provided for each unit. Two half-capacity, motor-driven, rotary vacuum pumps are provided to establish the vacuum for the condenser-turbine system at startup. These vacuum pumps discharge into the same pipe system as the steam-packing exhauster blowers. Additional air ejector and mechanical vacuum pump system details are shown in the Offgas System Flow Diagram (Figures 9.5-1 sheets 1, 2, 3, 4, 5, and 6, 9.5-2, 9.5-3, and 9.5-4).

Each Turbine Sealing System includes a steam seal regulator with the necessary valves to maintain a constant positive pressure in the steam seal supply header and a single steam-packing exhauster condenser equipped with two full-capacity blowers to prevent steam leakage at the turbine shaft seals.

The Turbine Sealing System is operated in a semi-automatic mode.

During normal power operations, a pressure regulator valve and two self-regulating seal steam header unloader valves maintain the seal steam header pressure approximately 4 psig. To regulate the seal steam header pressure, the unloader valves divert excess seal steam to the Main Condenser. The pressure regulator valve provides the ability for online seal steam header pressure adjustments.

The unloader valves are augmented with a manually-positioned, motor-operated throttle unloader valve which provides additional unloading capacity during operating periods where excessive seal steam is present.

During operating periods where low-pressure seal steam is available, such as initial condenser vacuum operations on auxiliary boiler steam, a motor-operated bypass valve is used to bypass the pressure regulator valve. The manual bypass valve reduces the flow restriction caused by the pressure regulator valve by opening an additional steam flow path. This action ensures adequate low-pressure steam is available to the Turbine Sealing System during initial reactor startups.

11.4.4 Inspection and Testing

The SJAE was shop-tested in accordance with Heat Exchanger Institute (HEI) steam jet ejector section requirements.

The mechanical vacuum pumps were shop-tested to verify the capacity and horsepower requirements over the entire operating range.