

## 8.2 GENERATORS

The electrical generator of Unit 2 has a rating of a normal continuous 1280 MVA at 0.9 power factor (pre-uprated), 0.93 power factor (uprated), and 22 kV. The electrical generator of Unit 1 has a rating of a normal continuous 1330 MVA at 0.95 power factor and 22 kV. Each generator is hydrogen-cooled with liquid-cooled stator. For Unit 3, the generator has a normal continuous rating of 1332 MVA at 0.93 power factor and 22 kV. The generator neutral is grounded through a neutral transformer and a secondary loading resistor. The generator is equipped with a shaft-driven alternator exciter, an exciter field circuit breaker, rectifiers, and voltage regulating equipment. Current transformers are provided on the generator main and neutral terminals for relaying and metering. Each generator is connected through a generator breaker with force-cooled, isolated-phase bus to a bank of three single-phase transformers which step up the generator voltage from 22 to 500 kV. One spare transformer is provided.

### Generator and Transformer Protective Relays

High-speed, induction-type, percentage-differential relays protect the generator stator windings against faults, and an inverse-time overcurrent relay with voltage restraint protects it against abnormal overload. Generator or transformer grounds are detected by an induction-type overvoltage relay on the neutral transformer. Reverse power relays are provided to detect motoring of the generator. Additional protective relays provided for generator protection include loss of field relay, volts/hertz relay, negative sequence relay, generator field ground relays (for Units 2 and 3, the generator field ground relay annunciates and does not provide any protective feature upon detection of generator field ground), Phase Unbalance Relay (alarm only), and generator breaker failure relay.

The main power transformers are protected by variable percentage differential relays with harmonic-restraint units. The main power transformer differential relay zone includes the generator breaker, main power transformer, and the 500-kV power circuit breakers. The unit station service power transformers are protected by percentage differential relays and instantaneous overcurrent relays. The unit station service power transformers have additional ground fault protection with a long time overcurrent relay connected in the transformer neutral ground circuit. Sudden-pressure devices on the main power transformers energize the auxiliary relay for their respective transformers which then energizes the common trip auxiliary relay. The main power transformer or unit station service transformers common trip auxiliary relay operation (and differential relay operation) closes the turbine steam valves, removes generator excitation, opens the generator breaker and opens the associated power circuit breaker. The sudden pressure devices on the main power transformers and the unit station service power transformers energize an auxiliary relay which automatically operates the fire-protection water spray system surrounding the transformer. Thermal detectors around the perimeter of each

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transformer also provide for the automatic initiation of the fire-protection water spray system.

Generator backup protection is provided by two directional offset mho distance relays, arranged in two-out-of-two logic, connected to bushing current transformers on the high-voltage side of the main power transformer, and by a breaker failure relay for the generator breaker.