

### 3.3 Initial Test Program

#### 3.3.1 Description

The U.S. EPR Initial Test Program (ITP) is a program that commences with the completion of construction and is concluded at commercial operation. The initial test program consists of a series of tests categorized as preoperational tests (prior to fuel load), and startup tests (during and after fuel load).

Construction and installation tests are prerequisite tests for preoperational tests and are performed prior to preoperational testing to verify the adequacy of construction, installation, and preliminary operation of components and systems. Mechanical, electrical, and instrument and control (I&C) tests are performed which include system cleaning and flushing, hydrostatic testing, electrical checks, operability checks, and I&C loop calibration. The completion of the construction and installation test program demonstrates that the individual components and associated systems are ready for preoperational testing.

The preoperational testing phase of the ITP will consist of those tests activities conducted prior to fuel loading. Preoperational tests are performed for each system after construction and installation tests, but prior to initial fuel loading to demonstrate and document that the performance of equipment and systems meet or exceed their design criteria. This rigorous preoperational test program ensures that initial fuel loading, initial criticality, and subsequent power operation can be performed safely. Preoperational tests include, as appropriate, logic and interlock tests, control and instrumentation functional tests, equipment functional tests, system and component operational and performance tests, and equipment and system vibration tests, and system dynamic tests.

Startup tests begin with pre-core load prerequisite tests and initial fuel loading and extend to commercial operation. Startup tests are performed to validate the capability of individual systems and confirm that integrated plant performance meets performance requirements at various power levels. Startup testing is conducted in four phases:

- Tests required pre-core load related to initial fuel loading.
- Tests performed after initial fuel loading but prior to initial criticality.
- Tests related to initial criticality and tests performed at low power (less than 5 percent).
- And tests performed at power levels greater than 5 percent (ascension to power tests).

Startup tests include a prescriptive controlled fuel load, reactor core and component performance and analysis tests, initial criticality and low power physics tests, control system tuning and performance demonstration, protection system operational tests, and plant and system performance tests, both steady-state and transient.

Preoperational and startup tests are performed utilizing step-by-step test procedures to control conduct of each test. Such test procedures delineate established test methods to be used in the conduct of the ITP and the applicable acceptance criteria against which

performance is evaluated. The test procedures are developed from preoperational and startup test specifications. Test specifications and test procedures are developed and reviewed by qualified personnel as delineated by site specific administrative procedures. Copies of the preoperational and startup specifications are made available to the NRC. Preoperational test procedures are made available to NRC personnel 60 days prior to the scheduled performance of these tests. Copies of test procedures for startup tests are provided to NRC inspection personnel 60 days prior to the scheduled fuel loading date. Site specific administrative procedures are used to control the conduct of the Initial Test Program; the review, evaluation and approval of test results; and all test record retention.

### **Inspections, Tests, Analyses and Acceptance Criteria**

This section represents a commitment that COL applicants that reference the certified design will implement an Initial Test Program that meets the objectives presented above.

#### **3.3.2 Integrated Tests**

The preoperational test phase of the ITP will include integrated tests. Integrated tests are conducted to evaluate the integrated response of multiple systems to achieve a desired function. The integrated tests must be performed after successful completion of the individual system preoperational tests. The individual system tests are described in Tier 1, Chapter 2. Step-by-step procedures are used to conduct each integrated test. Acceptance criteria are specified for each test to establish the limit of performance for the systems. Integrated tests are listed in Table 3.3.1-1 lists the ITP ITAAC.

Integrated tests will be performed to confirm the following commitments:

- 1.0 The integrated leak rate from containment does not exceed the maximum allowable leakage rate.
- 2.0 Safety injection pumped flow will be delivered to the RCS before the maximum elapsed time.
- 3.0 Containment isolation for valves other than the HVAC valves in Item 5.0 below is completed within the maximum acceptable time.
- 4.0 Upon SIS actuation, the MSRT controlled secondary system cooldown is at a pre-defined rate.
- 5.0 Containment isolation for the following HVAC valves is completed within the maximum acceptable time: 30KLA10AA001, 30KLA10AA003, 30KLA20AA001, 30KLA20AA003, 30KLA30AA002, 30KLA30AA003, 30KLA40AA001, 30KLA40AA002.

**Table 3.3-1—ITP ITAAC**

	<b>Commitment Wording</b>	<b>Inspections, Tests, Analyses</b>	<b>Acceptance Criteria</b>
1.0	The integrated leak rate from containment does not exceed the maximum allowable leakage rate.	A test will be performed to evaluate the containment leakage rate.	The maximum allowable leakage rate does not exceed 0.25% of containment air mass per day at containment pressure of 55 psig.
2.0	Safety injection pumped flow will be delivered to the RCS before the maximum elapsed time.	Tests will be performed to determine the safety injection pumped flow delivery time.	Time for safety injection flow to reach full flow does not exceed 15 seconds with offsite power available or 40 seconds with loss of offsite power.
3.0	Containment isolation for valves other than the HVAC valves in Item 5.0 below is completed within the maximum acceptable time.	A test will be performed to determine the time when the containment isolation valves other than the HVAC valves in Item 5.0 are closed.	The containment isolation valves other than the HVAC valves in Item 5.0 close within 60 seconds of isolation initiating event.
4.0	Upon SIS actuation, the MSRT controls secondary system cooldown at a pre-defined rate.	A test and analysis will be performed to confirm the cooldown rate.	A report exists and concludes that the test and analysis results indicate that the pressure control set-point is ramped from 1414.7 psia to 900 psia within 19 minutes.
5.0	Containment isolation for the following HVAC valves is completed within the maximum acceptable time: 30KLA10AA001 30KLA10AA003 30KLA20AA001 30KLA20AA003 30KLA30AA002 30KLA30AA003 30KLA40AA001 30KLA40AA002	Tests will be performed to determine the time when the containment isolation valves are closed.	The containment isolation valves close within 10 seconds of the actuation signal.