SAXTON NUCLEAR EXPERIMENTAL CORPORATION

DOCKET NO. 50-146
LICENSE DPR-4

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CHANGE REQUEST NO. 29

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1. Applicant hereby submits Change Request No. 29 in compliance with paragraph 3B of License DPR-4 for change of the Technical Specifications to be authorized by the Commission as provided in 10 CFR 50.59.

SAXTON NUCLEAR EXPERIMENTAL COPPORATION

By /s/ R.E.Neidig
President

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2. LOOP LAYOUT

The supercritical loop, with the exception of two 3/8 inch sampling lines which are routed to the Saxton sampling room, and the high pressure gas compressor, are located completely within the reactor containment vessel. Locations of the supercritical loop components within the containment vessel are shown on Figure II-2. All loop controls are located outside the vapor container in or near the reactor control room. These controls are arranged so that they may be utilized without interfering with normal plant operation.

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which is rated at 5.3 gpm at the same discharge pressure. (A second two-speed pump, with the same characteristics, may be piped in parallel with the aforementioned two-speed pump.)

The standby pump is energized by the loop flow controller or manually from the plant control room. Electric power for the loop pump is provided from the supercritical loop 440 V bus. Electric power for the standby pump comes from the motor control center of the Saxton reactor electrical system. Each pump is a triplex positive-displacement type, with integral check valves. All parts in contact with the coolant are fabricated of austenitic stainless steel or equivalent corrosion-resistant material.

A leakoff is provided on the pump packing gland to collect coolant before it can leak to the reactor containment atmosphere. The coolant leakage is piped through a filter to the deaerator via the system collection header for return to the loop. The pump shaft is made long enough to prevent the oil-wetted portion from contacting the pump packing.

4.4 Heat Exchangers

Heater

The heater raises the coolant temperature to the required pressure tube inlet conditions and provides control to maintain this temperature constant. The total heater capacity is 650 kw. The unit consists of forty-two individual heater sections arranged in three identical parallel paths. Each section consists of a straight run of pipe containing a single

Cooling water flows to the vacuum pump seal water cooler and recombiner condenser in series. The component cooling water pressure relief valve, PSV-6, is set to relieve at 150 psig. In order to assure an adequate supply of component cooling water to both the Saxton System and the Supercritical loop, one of the 155 gpm component cooling pumps is to be replaced by a pump of the same type with the same design parameters but with a 260 gpm capacity.

5.2 Shutdown Cooling

Shutdown cooling utilizes the high pressure and low pressure coolers described in Section II-4, Supercritical Coolant System. The circulation is supplied by the condensate pumps. In addition, emergency cooling can be effected by using the emergency condenser described in Section II-5.4, Safety Injection System.

5.3 Coolant Makeup

The supercritical loop is filled by gravity with water supplied from the head tank. The water enters the loop piping at the suction of the supercritical coolant pumps. During filling, the standby loop pump is operated to circulate water through the loop.

The head tank provides NPSH for the loop pumps during operation of the supercritical loop. The tank is a vertical cylindrical vessel fabricated of stainless steel and is provided with an overflow. It is designed for a pressure of 65 psig or full vacuum at 312°F.

5.4 Safety Injection

The Safety Injection System contains the following equipment:

a) Coolant reservoir

b) Reservoir gas cylinder

c) Gas compressor

d) Emergency condenser

e) Coolant reservoir refill tank

During emergency conditions, i.e., loss of flow or loss of coolant, the supply of pressurized water held in the coolant reservoir is discharged automatically to the accumulator connection of the loop following loss of flow or to the pressure tube outlet line upon a loss of coolant upstream of the pressure tube. Driving pressure for this water injection is furnished by the gas cylinder. Once the pressure tube is filled with water, fuel cooling is accomplished by free convection, using the emergency condenser as a heat sink. After safety injection, the three-way valve at the outlet of the coolant reservoir closes the coolant reservoir port to prevent discharge of nitrogen into the loop. Simultaneously, the service water inlet port is opened thus allowing service water to flow into the loop through the safety injection line. This flow insures that the pressure tube will have an adequate supply of water during cooling with the emergency condenser. Steam produced by residual heat from the fuel assembly flows up the outlet pipe to the emergency condenser. The condensate returns to the pressure tube inlet by gravity flow. This process continues until the fuel assembly can be safely removed from the reactor.

Coolant Reservoir

The coolant reservoir holds a supply of coolant under pressure for injection into the loop in case of loss-of-coolant or loss-of-flow accidents. The reservoir is a vertical cylinder constructed of carbon steel. All joints and connections are welded. The reservoir is designed for 5000 psig at 200°F and meets the ASME Boiler and Pressure Vessed Code, Section VIII. Its capacity is 25 gallons. The valves for initiating injection are located to minimize delay time for injection of coolant into the loop.

Coolant Reservoir Refill Tank

The coolant reservoir refill tank provides for remote refilling of the coolant reservoir during loop operation without depressurization of the coolant reservoir. The unit consists of a 2.25 gallon tank which is pressurized with the same energy source used to pressurize the coolant reservoir. It is located at a higher elevation than the coolant reservoir which allows filling by gravity flow of water from the refill tank to the coolant reservoir. Block valves prevent water from discharging from the coolant reservoir back to the refill tank during safety injection. The refill tank is designed for 5000 psig at 200°F and meets the ASME Boiler and Pressure Vessel Code, Section VIII.

5.5 Pressure Relief

General Description

The supercritical loop is protected from overpressure by relief valves on:

a) outlet line from the pressure tube,

b) discharge side of the loop pump and standby pump,

c) discharge side of the gas compressor,

d) demineralized water line supplying the coolant reservoir, and

e) component cooling water line.

Two rupture discs are also supplied. One protects the low pressure cooler from overpressure in the inlet. A second protects the deaerator from overpressure. An automatic valve is located between the pressure tube inlet and outlet lines to protect the interchanger in the event of blockage of the pressure tube. Upon receiving an excessive positive pressure drop signal, the valve automatically opens to permit the flow to bypass the pressure tube. This bypass is also used to flush out the pressure tube connectors before they are opened.

Pressure Relief Valves

The pressure relief valves are self-actuated, totally enclosed, spring-loaded valves.

The valves on the outlet line from the pressure tube, PSV-1 and PSV-2, discharge to the storage well below normal water level. Each valve is designed to relieve one-half of the maximum combined flow of the loop pump and the standby pump. The maximum set pressure for PSV-1 and PSV-2 is 3980 psig.

The valve on the discharge side of the loop pump, PSV-3, relieves to the suction side of the pump. The maximum set pressure for PSV-3 is 4800 psig.

5.6 Sampling

General Description

The Sampling System is shown on Figure II-7. Two types of samples are taken from the supercritical loop:

a) continuous crud samples

b) periodic liquid samples

Crud samples can be taken continuously from three points in the loop; immediately upstream of corrosion specimen holders 1 and 2 and downstream of corrosion specimen holder 3. Each sample stream flows through a sample cooler, then through a pressure-reducing restriction into a mixed bed sample ion exchanger. Impurities in the stream are retained in the ion-exchange resin. The sample stream is returned to the loop at the deaerator.

Periodic liquid samples are also taken upstream and downstream of the demineralizers and upstream of the low pressure cooler. Since these are cold, low pressure streams, they are routed to the plant sampling system, outside the vapor container, where normal sampling techniques may be used.

Sample Coolers

Three sample coolers are provided to reduce the sample stream temperature sufficiently to permit letdown without flashing. Each cooler is a double-pipe coil unit. The inner tube, which contains the sample stream, is made

6. RADIOACTIVE WASTE DISPOSAL

Liquid wastes from the supercritical loop are drained by a line downstream of the demineralizers to the Saxton Reactor Radioactive Waste Disposal System. Gaseous wastes from the supercritical loop are vented from the deaerator to the Saxton Reactor Radioactive Waste Disposal System.

The supercritical loop gaseous waste disposal system consists of a vacuum pump and its seal water system and a catalytic recombiner package.

The vacuum pump draws the gases from the deaerator and pumps them to the recombiner package. The residue of gases remaining after recombination of the radiolytic gases flows to the Saxton Reactor Radioactive Waste Disposal System. Diluent steam from the recombiner is condensed and flows back to the vacuum pump seal water reservoir.

Vacuum Pump

The vacuum pump removes a mixture of non-condensable gases and steam from the deaerator and maintains the required deaerator operating pressure. This pump is a single-stage, water-sealed type. The vacuum pump is cooled by the sealing water which circulates through a heat exchanger. The pumped vapor which condenses in the pump along with the water condensed from the recombiner is mixed with the seal water in a reservoir downstream of the vacuum pump. As the water level in the reservoir rises above the required seal water level, a level control opens a drain to the discharge tank restoring the proper water level. All pump parts in contact with the pumped fluid are bronze or cast iron. Closures and connections are either screwed, bolted or flanged with suitable gaskets.

Vacuum Pump Seal Water Reservoir

The vacuum pump seal water reservoir receives the mixture of water, steam and non-condensable gases discharged by the vacuum pump and provides a volume for separation of the gas and liquid phases. In addition, the unit acts as a standpipe to maintain an adequate supply of seal water for the vacuum pump. An electrically heated auxiliary steam generator is connected to the reservoir to provide diluent for the radiolytic gases flowing to the recombiner. The reservoir and steam generator are vertical sections of stainless steel pipe with all connections socket-welded.

Vacuum Pump Seal Water Cooler

The vacuum pump seal water cooler removes the heat added to the seal water by the pump and maintains the seal water at a constant temperature as it enters the pump. The cooler is a double-pipe coil with the seal water in the inner tube and cooling water in the annulus. The inner tube is stainless steel and the outer tube is copper.

Catalytic Recombiner

The catalytic recombiner removes radiolytic hydrogen and oxygen from the off-gas stream by recombining them into water vapor. Diluent steam from the auxiliary steam generator, along with the water vapor produced in the recombiner, is condensed in the recombiner condenser and drains back into the vacuum pump seal water reservoir. The unit is designed to the ASME Boiler and Pressure Vessel Code, Section VIII, Nuclear Case 1270N.

A low pressure supply of air is provided as required to provide an excess of oxygen for recombination of any excess hydrogen produced. In addition, a sample point is provided in the discharge line from the vapor container to periodically sample the off gasses from the loop. An alarm will be sounded in the control room upon failure of the heaters supplying diluent steam to the off-gases from the loop.

7. INSTRUMENTATION AND CONTROL

7.1 Inlet Heat Content Control

Heater Control, QC-X1

The heater control regulates the pressure tube inlet temperature by varying the heater power. This is done by comparing the heater outlet temperature with the set point on the temperature recorder-controller, TRC-X9. If a differential exists, a control signal is transmitted to a power controller which supplies a direct-current control voltage to the saturable reactor. The saturable reactor adjusts heater electrical supply to the required level.

In the event of a loss-of-flow or loss-of-coolant accident, a signal from the instrument detecting the accident (see PRC-X4, PRC-X6, FRC-X1) to the heater control shuts off the heater. Heater shutoff signals are also generated by instruments detecting excessive pressure tube differential pressure (PC-X26, PC-X28), high pressure tube outlet temperature TRC-X4, and low flow from the nozzle bleed cooler flow FRC-X9.

Heater Power, QRC-X3

A thermal converter on the saturable reactor generates a signal proportional to heater power. This signal is recorded on the loop control board.

Heater Inlet Temperature, TRC-X10

A temperature detector on the heater inlet sends a temperature signal to a recorder on the loop control board.

Heater Outlet Temperature, TRC-X9

A temperature recorder-controller on the heater outlet provides a set-point signal for the heater control, QC-X1. The set point signal is a function of the desired temperature and the difference between it and the actual temperature.

The unit also provides an alternate control signal for the interchanger bypass valve when experimental conditions call for the use of this valve. The heater outlet temperature is recorded on the loop control board.

7.2 Flow Control

Loop Flow Control, FRC-X1, FA-X2, FA-X7

A flow recorder-controller on the loop pump discharge line maintains the required flow during normal loop operation and initiates protective measures in the event of a loss-of-flow accident.

During normal operation of the supercritical loop, the instrument receives and transmits the following signals:

1. A manual input signal which sets the nominal flow rate for the particular experiment.
2. An input signal from the loop flow detector. This signal is compared with the set point value in the controller.
3. An output signal to the loop pump bypass valve operator, which adjusts the valve position to maintain the correct flow.
4. An output signal to a flow recorder mounted on the loop control board.

During a partial loss-of-flow accident (defined as reduction in flow to between 80% and 50% of set point value), the instrument receives and transmits the following signals:

1. A manual input signal which sets the nominal flow rate for the particular experiment.
2. An input signal from the loop flow detector. This signal is compared with the limit set points to define the accident.
3. An output signal to the heater control, QC-X1, to shut off the heater.
4. An output signal to the standby pump motor starter to start the pump if it is not already operating.
5. An output signal to activate a partial loss-of-flow alarm on the loop control board.
6. An output signal to a flow recorder mounted on the loop control board.

During a total loss-of-flow accident (defined as reduction in flow to below 50% of set point) the instrument receives and transmits the same signals as during a partial loss-of-flow with the following additions:

1. An output signal to scram the reactor and activate an alarm on the reactor scram panel. If the flow is brought above the 50% limit before a preset delay time elapses, the scram signal is blocked.
2. An output signal to the coolant reservoir isolation valve operator to open the valve.
3. A second loss of flow signal is actuated as the flow drops below 30% of the flow set point. This signal is identical to the 50% loss of flow signal but does not have a time delay. This signal will initiate a reactor scram and forward safety injection.

Sample Flow, FR-X15, FR-X16, FR-X17

Sample flow in each sample path is controlled by a fixed flow restricting device. The flow is recorded on the loop control board. The records are used in making quantitative studies of crud level in the sample streams.

Reactor Head Nozzle Bleed Flow, FIC-X9

A flow controller on the bleed line from the reactor regulates a control valve to maintain a constant cooling flow through the reactor head nozzle which supports the pressure tube. The flow rate is indicated on the control board with an alarm activated when the flow is reduced to 50% of the set point. A heat shutoff signal is also generated at no flow conditions.

7.3 Loop Pressure Control, PRC-X6, PA-X3, PA-X7

A pressure recorder-controller on the pressure tube inlet regulates the control valve between the high pressure and low pressure coolers to maintain a constant inlet pressure.

This instrument also provides a reactor scram signal in the event of a loss-of-coolant accident. An alarm on the loop control board is actuated to warn of high pressure or low pressure conditions, and a second alarm is activated by the loss-of-coolant scram signal. In addition, an output signal is sent to the heater control, QC-X1, to shut off the heater upon loss of pressure. The pressure is recorded on the loop control board.

The normal pressure control function of this instrument is suppressed during loss-of-coolant by an override signal. When coolant is to be injected into the pressure tube outlet, the differential pressure controller, PRC-X4, closes the pressure control valve to a preset mechanical stop so that most of the injection flow passes through the pressure tube. The pressure controller is reset manually.

7.4 Supercritical Loop Protection System

Pressure Tube Differential Pressure, PRC-X4, PA-X5

A differential pressure recorder-controller across the pressure tube controls coolant injection and provides a reactor scram signal in the event of a loss-of-coolant accident. Under normal operating conditions, pressure drop across the tube is positive (i.e., inlet pressure exceeds outlet pressure.) However, a pipe break between the loop pump and the pressure tube inlet will result in a rapid flow reversal and a concurrent pressure

drop reversal. Upon detecting this change, the controller opens the coolant injection valve to the pressure tube outlet (FIC-X3), closes the loop pressure control valve (PRC-X6), sends a heater shutoff signal to the heater control (QC-X1), and activates an alarm on the loop control board. The differential pressure signal is also recorded on the loop control board.

Pressure Tube Outlet Pressure, PC-X14, PA-X12

A pressure switch at the outlet of the pressure tube actuates an alarm on the loop control board when the pressure falls below a set value. The alarm provides an independent verification of the occurrence of a loss-of-coolant accident or high or low pressure.

Pressure Tube Differential Pressure, PC-X26, PC-X28, PA-X29

Two differential pressure switches across the pressure tube protect the interchanger tube against excessive differential pressure if flow through the pressure tube is blocked. The first switch is set below the tube external design pressure and the second is set at that pressure. When the set point of the first switch is reached, the heater is shut off. If the differential pressure increases to the set point of the second switch, the pressure tube bypass valve is opened and an alarm on the loop control board is actuated.

Pressure Tube Outlet Temperature, TR-X4, TA-X19

A temperature recorder measures the temperature at the pressure tube outlet. The temperature is recorded on the loop control board. An alarm in the control room is actuated and the heater is turned off if the temperature approaches its maximum permissible value.

High Pressure Cooler Outlet Temperature, TRC-X11, TA-X20

A temperature recorder-controller on the outlet of the high pressure cooler controls component cooling water flow to the cooler to maintain a constant outlet temperature. The temperature is also recorded on the loop control board. An alarm is actuated if the temperature of the loop coolant at the outlet of the cooler is too high.

Condensate Pump Discharge Temperature, TR-X2-6, TA-X12

A temperature detector is located on the condensate pump discharge line. The temperature is recorded by the multipoint recorder on the loop control board. An alarm is actuated if the temperature exceeds the maximum allowable demineralizer inlet temperature.

Fuel Assembly Temperatures, TR-X1 - 1 to 12

Coolant temperatures at various points within the pressure tube are monitored continually by a multipoint temperature recorder. Up to twelve temperatures may be measured. The recorder is located on the loop control board. The recorder will alarm upon excessive temperature readings at the coolant channel outlets. The recorder is set to record coolant channel inlet and outlet temperatures alternately to minimize the time between the reading of outlet temperatures. This recorder incorporates a burn-out feature so that failure of a thermocouple will cause the recorder to read downscale and not sound a false alarm.

Component Cooling Water Temperatures, TR-X2-5, 7

Temperature detectors are located on the component cooling water supply (TR-X2-5) and return (TR-X2-7) lines. These temperatures are recorded by the multipoint recorder on the loop control board.

Deaerator Level, LIC-X3, IA-X9

A level indicator-controller regulates a control valve (LIC-X3V) to maintain a constant liquid level in the deaerator. The valve throttles the condensate pump discharge to match the inflow to the deaerator. A continuous level indication is provided on the loop control board. Also the LIC-X3 signal will actuate a shut-off valve (PRC-X22V), which prevents water overflow to the vacuum pump by closing the pump inlet valve if liquid level exceeds a fixed value. The instrument simultaneously actuates a high level alarm (IA-X9) on the loop control board.

Vacuum Pump Seal Water Reservoir Level, LIC-X10

A level indicator-controller regulates a drain valve to maintain the water level in the vacuum pump seal water reservoir between high and low limits. The water level is indicated on the control board.

e) Interlocks

Pressure Tube Isolation and Loop Bypass Valves, HC-X24, HC-X25, HC-X26

The pressure tube isolation and loop bypass valve controls are interlocked to prevent accidental isolation of the main process line. The interlock does not permit the isolation valves, HC-X24 and HC-X26, to be closed until the bypass valve, HC-X25, is open.

7.6 Radiation Monitors

Condensate Pump Outlet Stream Radiation Level, RIC-X1, RA-X2

A radiation monitor in the line downstream of the condensate pumps sends a signal to an indicator on the loop control board. This instrument also actuates an alarm on the loop control board upon detecting a high radiation level. The indication is a measure of the deaerator efficiency and of the demineralizer inlet conditions. This monitor warns of excessive leakage from the fuel elements by alarming on high radiation level. The alarm is audible in both the control room and in the containment vessel.

III. OPERATION

1. LOOP STARTUP

Loop startup is defined as the sequence of operations which bring the supercritical loop from cold shutdown to predetermined operating conditions.

Prior to initiation of Saxton reactor heatup, the main coolant piping and equipment, coolant reservoir, safety injection lines, and head tank are filled with demineralized water. The system is vented to atmosphere until water appears at all system vent points. The system is deaerated by operating the vacuum pump and the condensate pumps until the deaerator pressure reaches a constant value. At the same time, the gas compressor is operated to fill the reservoir gas cylinder and precharge the accumulator. When these operations are completed, the loop pump is started and flow and pressure are established. As soon as component cooling flow to the coolers is established, the loop is ready for heatup.

Using the heater control, the temperature of the loop coolant at the heater outlet is controlled to maintain the loop temperature. The supercritical loop will not be heated above 550°F without the reactor nozzle bleed cooler in operation. This will keep the nozzle temperature well below the design limit of 650°F. After the reactor is at hot standby conditions and the loop is at the test conditions, not to exceed 1000°F and 3600 psi maximum, the reactor may be brought to power.

As power generation in the supercritical fuel assembly begins, adjustments are made to the control settings to compensate for the additional heat input. Once reactor conditions have been stabilized, final trim adjustments are made and the loop is placed under full automatic control.

2. OPERATION AT POWER

Normal operation includes steady-state experimental operation at supercritical pressures and hot standby operation. Steady-state operation includes all transients imposed on the loop by normal reactor plant load changes.

2.1 Supercritical Pressure Operation

Since the supercritical fuel power level is directly dependent on reactor power and may not be separately controlled, the loop temperature controller, TRC-X9, compensates for power level changes by varying the heater power. During steady state supercritical operation, coolant pressure is held constant or near a specified value by pressure control valve PRC-X6. When test conditions are to be changed, a step-wise procedure is used to assure that no operating limitations will be exceeded. The primary control variable is the fuel element outlet temperature for a given flow rate. This is regulated by adjusting the heater outlet temperature, TRC-X9, to obtain the required fuel exit temperature for maximum steady state reactor power.

Gas removal equipment operates continuously during supercritical operation to maintain constant deaerator pressure. When corrosion specimens are undergoing test, the specimen holder sample trains are also in continuous operation. Demineralizer samples are taken on a regular schedule, which may be modified by results of the sample analysis.

The range of conditions over which the loop is permitted to operate is illustrated in Figure III-1, which represents the allowable range for a full-power fuel assembly and an assembly generating 69.5% of full power.

2.2 Hot Standby

If the reactor plant is at power, heat is generated in the supercritical loop fuel assembly. Thus, even though experimental operation of the

3. LOOP SHUTDOWN

Loop shutdown is defined as the sequence of operations which brings the supercritical loop from steady-state operation or hot standby to cold shutdown for maintenance or refueling. Any shutdown of the reactor necessitates a concurrent supercritical loop shutdown.

Prior to the initiation of reactor plant shutdown, the supercritical loop is brought to a hot standby condition. Cooling flow is maintained in the loop during the reactor cooldown procedure.

During the shutdown operation, demineralized water is automatically added to the head tank to compensate for the reduction in loop water volume as temperatures are reduced. Gas removal operations continue until the loop is depressurized. Although sampling is normally not required during shutdown, individual samples may be taken at the discretion of the operator.

After the loop is depressurized to near atmospheric, the loop pump is shut off and circulation continued by the condensate pumps alone. By periodically stopping these pumps and observing pressure tube coolant temperature, the operator can determine if heat transfer across the pressure tube wall is sufficient to remove supercritical fuel residual heat. When this condition is attained, the condensate pumps are stopped and maintenance operations can begin.

At this time, the flow is temporarily stopped and a resin sample is taken and analyzed. If the sample shows the bed to be unsaturated, the circulation phase is ended. If the bed is saturated, it must be flushed and refilled with fresh resin. Circulation then resumes until it can be conclusively established, using the above methods, that all ionic impurities have been removed.

Following the circulation phase, a radiation survey is made and radiation levels due to supercritical loop activity determined. If those levels are below those due to main plant activity, the cleanup operation is completed. If the levels are still too high, decontamination is required to remove deposited activity.

Loop decontamination begins with the preparation of suitable decontamination solutions in the feed tank. Prior to filling the loop with solution, the demineralizer is isolated by opening the bypass valve and closing the outlet stop valve. Decontamination solution can be added to the loop in two ways; either by setting up drain and isolation valves as for flushing and operating the loop pump until slightly more than one system volume has been discharged, or by draining the system and then refilling the gravity flow from the feed tank.

When the loop is filled, the bypass around the loop pump and standby pump is opened, the pumps stopped and the two condensate pumps started. Circulation continues until chemical analysis of the solution indicates satisfactory decontamination. The solution is drained to waste disposal and drummed for storage and shipment. Following circulation and drainage of the decontamination solution, the loop is flushed with demineralized water to remove any remaining decontamination solution.

5. EMERGENCY OPERATION

5.1 Loss of Coolant Flow

Loss of coolant flow results from a malfunction or shutdown of the loop pump due to a manual or automatic tripout, mechanical failure, excessive leakage through packing, or power failure. On the basis of required corrective action, two types of loss-of-flow accidents have been defined:

a) Partial loss of coolant flow is defined as a reduction in measured flow to less than 80%, but not less than 50%, of the loop flow control set point at the time of the accident.

b) Complete loss of coolant flow is defined as a reduction in measured flow to less than 50% of the loop flow control set point at the time of the accident.

A partial loss of coolant flow condition will result in automatic shutdown of the heater and startup of the standby pump.

A complete loss of coolant flow will result in reactor scram, and automatic injection of water from the coolant reservoir, in addition to the automatic actions initiated by a partial loss of flow.

5.2 Loss of Electrical Power

Loss of electrical power to the supercritical loop results in essentially the same automatic actions as a complete loss of coolant flow. If all power is lost, the situation is handled in a manner similar to the loss of flow with the standby pump inoperable. A total loss of power is not considered credible, in view of the reliability of the Saxton plant power supplies. If only the main supercritical power supply fails, the situation is handled similar to the loss of flow with the standby pump operable.