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Office of Nuclear Reactor Regulation
Washington, DC 20555

2.10 Power Cycle

2.10.1 Turbine Main Steam System

Design Description

The Main Steam (MS) System (Figure 2.10.1) supplies steam generated in the reactor to the turbine. This Tier 1 entry addresses that portion of the MS System that ranges between, ~~but does not include, the outermost containment isolation valves and the turbine stop valves.~~ but does not include, the seismic restraint downstream or the outermost containment isolation valves and the turbine stop valves.

The MS System is not required to effect or support safe shutdown of the reactor or to perform in the operation of rector safety features; however, the MS System is designed:

(1) To ~~comply with applicable codes and standards in order to~~ accommodate operational stresses such as internal pressure and dynamic loads without ~~risk of~~ failures, ~~and consequential releases of radioactivity in excess of the established regulatory limits.~~

(2) ~~To accommodate normal and abnormal environmental limits.~~ Provide a leakage path to the main condensers under seismic conditions.

~~(3) To assure that failures of non-Seismic Category I equipment or structures, or pipe cracks or breaks in high or moderate piping in the MS will not preclude functioning of safety related equipment or structures in the plant.~~

(3) With suitable access to permit in-service testing and inspections.

The MS System main steam piping consists of four lines from the seismic restraint ~~outboard main steamline isolation valves~~ to the main turbine stop valves. The header arrangement upstream of the turbine stop valves allows them to be tested on-line with minimum load reduction and also supplies steam to the power cycle auxiliaries, as required.

The MS System is quality group D not safety related.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.1 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which sill be undertaken for the MS System.

Table 2.10.1: Main Steam System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Failures of non Seismic Category I equipment or structures, or pipe cracks or breaks in high or moderate piping in the MS System will not preclude functioning of safety related equipment or structures in the plant.~~	~~1. Visual inspection of the MS System will be performed.~~	~~1. No safety related systems or structures are in the vicinity or are protected from failures in the nonseismic portions of the MS System.~~
~~2. Access is provided for in-service testing and inspections.~~	~~2. Visual inspection of the MS System will be performed.~~	~~2 Confirmation that required in-service inspections can be accomplished.~~
1. A simplified configuration for the MS System is described in Section 2.10.1	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the MS System	1. The as-built configuration of the MS System is in accordance with the description in Section 2.10.1
2. MS Piping from the seismic restraint to the condenser inlet including drain pipe is analyzed to demonstrate leak-tightness under SSE loading conditions.	2. Perform analysis	2 Verify analysis performed.

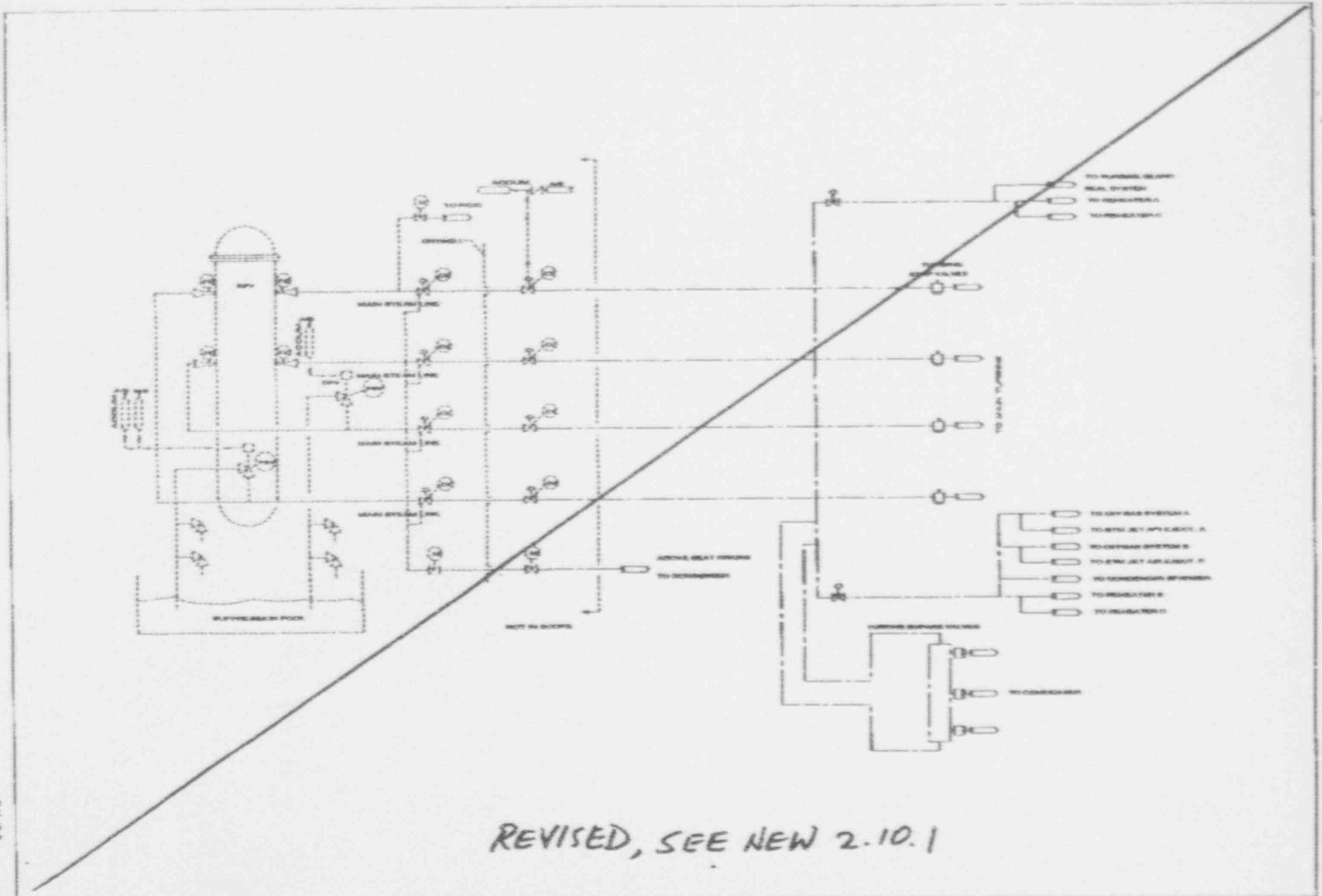


Figure 2.10.1 Main Steam System

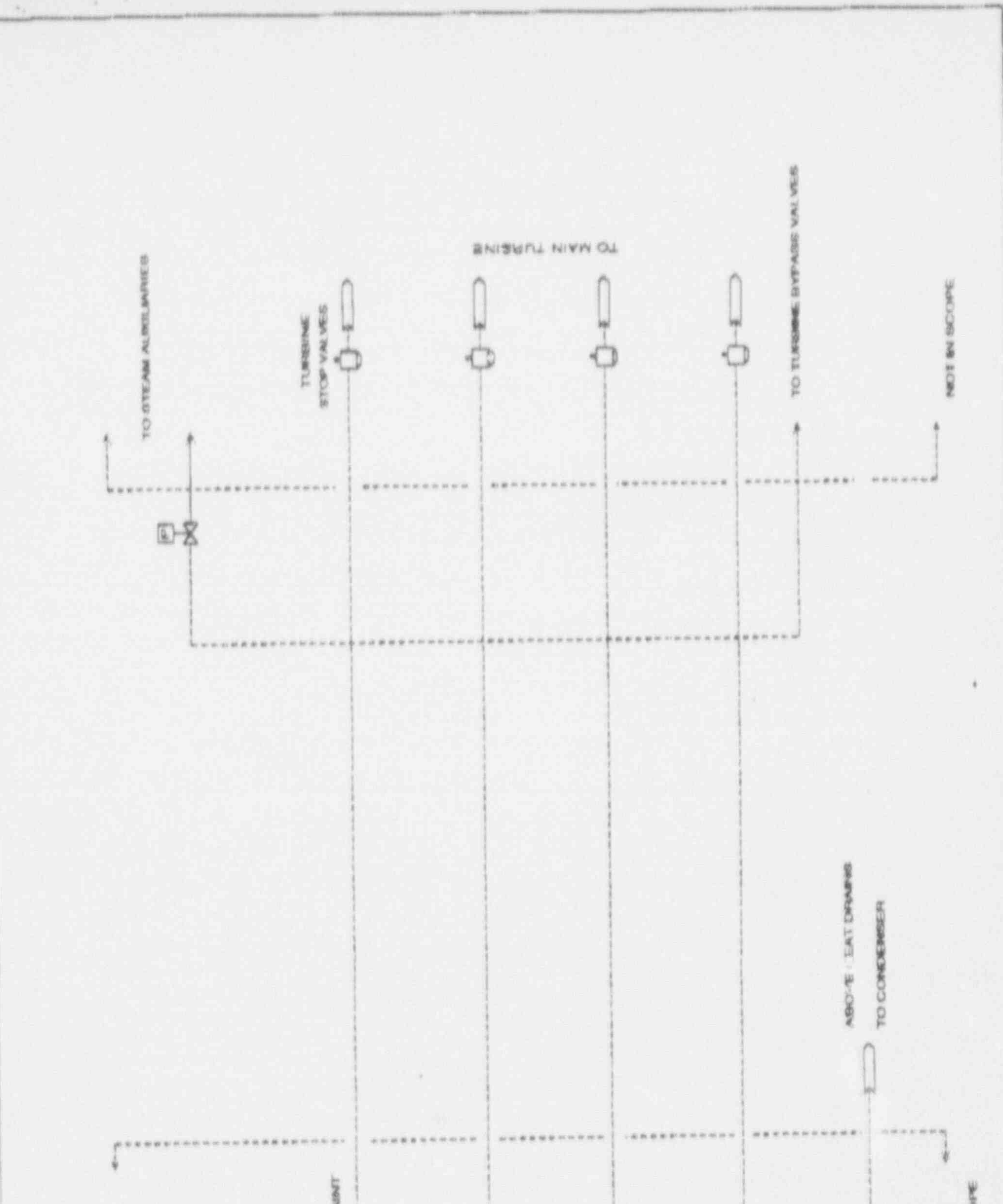


Figure 2.10.1 Turbine Main Steam System

2.10.2 Condensate Feedwater and Condensate Air Extraction System

The Condensate Feedwater and Condensate Air Extraction System ~~(CFDWA)~~ consists of two subsystems, the Condensate and Feedwater (CF) System and the Main Condenser Evacuation System (MCES).

Condensate and Feedwater System

Design Description

The function of the ~~Condensate and Feedwater (CF)~~ (Figure 2.10.2a) System is to receive condensate from the condenser hotwells, supply condensate to the cleanup system, and deliver ~~high-purity~~ feedwater to the reactor~~, at the required flow rate, pressure and temperature~~. Condensate is pumped from the main condenser hotwell by the condensate pumps, passes through the feedwater heaters to the feedwater pumps, and then is pumped through the high pressure heaters to the nuclear Steam Supply System.

The CF System boundaries ~~considered here~~ extend from the main condenser outlet to (but not including) the ~~second isolation valve~~ seismic restraint outside the containment and downstream of the outermost isolation valve. The CF System consists of the piping, valves, heat exchangers, controls and instrumentation, and the associated equipment and subsystems which supply the reactor with heated feedwater in a closed steam cycle utilizing regenerative feedwater heating.

The CF System does not serve or support any safety function and has no safety design basis. System analyses show that failure of this system cannot compromise any safety-related systems or prevent safe shutdown.

The CF System is designed to quality Group D non-safety related.

~~Portions of the system that are radioactive during operation are shielded with access control for inspections.~~

~~Leakage is minimized with welded construction used wherever practicable.~~

Relief discharges and operating vents are channeled through closed systems.

Operational system redundancy is provided with respect to feedwater heaters, pumps, or control valves by using multi-string arrangements and provisions for isolating and bypassing equipment and sections of the system.

The majority of the condensate and feedwater piping ~~considered in this section~~ is located within the turbine building which contains no safety-related equipment or systems. ~~The portion which connects to the second isolation valve outside the containment is located in the steam tunnel between the turbine and~~

reactor buildings. This portion of the piping is analyzed for dynamic effects from postulated events and safety/relief valve discharges.

The entire system piping is analyzed for waterhammer loads that could potentially result from anticipated flow transients.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.2a provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the CF System.

Main Condenser Evacuation System

Design Description

Noncondensable gases are removed from the power cycle by tThe Main Condenser Evacuation (MCE) System (Figure 2.10.2b). The MCE System removes the hydrogen and oxygen produced by the radiolysis of water in the reactor, and other power cycle noncondensable gases, and exhausts them to the offgas system during plant power operation, and to the turbine building compartment exhaust system at the beginning of each startup.

The MCE System does not serve or support any safety function and has no safety design basis.

The MCE System is designed to Quality Group D. Non-Safety Related

The MCE System consists of two 100% capacity, double stage, of redundant steam jet air ejectors (SJAE) units (complete with intercondenser) for power plant operation, and a mechanical vacuum pump for use during startup. The last stage of the SJAE unit is normally in operation and the other is on standby.

Steam supply to the second stage ejector SJAE is maintained at a minimum specified flow rate to ensure adequate dilution of the hydrogen and prevent the offgas from reaching the flammable limit of hydrogen.

Steam pressure and flow is continuously monitored and controlled in the ejector steam supply lines. Redundant pressure controllers sense steam pressure at the second stage inlet and modulate the steam supply control valves upstream of the air ejectors. The steam flow transmitters provide inputs to logic devices. These logic devices provide for isolating the offgas flow from the air ejector unit on a two out of three logic, sShould the steam flow drop below acceptable limits for offgas stream dilution, the Off-gas System will be isolated.

The vacuum pump exhaust stream is discharged to the turbine building compartment exhaust system which provides for radiation monitoring of the

system effluents prior to their release to the monitored vent stack and the atmosphere.

The vacuum pump is tripped and its discharge valve is closed upon receiving a main steam high-high radiation signal.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.2b provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the MCE System.

Table 2.10.2a: Condensate and Feedwater System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The CF System will be analyzed to show that system failure will not compromise plant safety.	1. Review failure analysis design assumptions with respect to as built condition.	1. As built conditions are same as the design assumptions used in the analysis.
2. The CF System will be provided with shielding and access control.	2. Visual inspection of the CF System will be performed.	2. The as built CF System provides shielding and access control.
3. CF System leakage will be minimized by use of welded construction wherever practicable.	3. Visual inspection of the CF System will be performed.	3. Welded construction utilized as designed.
4. CF System relief valve discharges and operating vents will be channeled through closed systems.	4. Visual inspection of the CF System will be performed.	4. Relief valve discharges and operating vent lines are routed as required by certified design.
5. The CF System will operate with a feedwater heater, pump or control valve out of service.	5. Simulated signals to verify operational status maintained.	5. The CF System remains operational.
6. Failures of nonseismic Category I equipment or structures, or pipe cracks and breaks in high- or moderate piping in the CF System will not preclude functioning of safety related equipment or structures in the plant.	6. Visual inspection of the CF System will be performed.	6. No safety related systems or structures are in the vicinity or are protected from failure in the nonseismic portions of the CF System.
7. The CF System will be analyzed for potential waterhammer loads.	7. Review waterhammer analysis design assumptions with respect to as built condition.	7. As built conditions are same as the design assumptions used in the analysis.

Table 2.10.1a: Condensate and Feedwater System

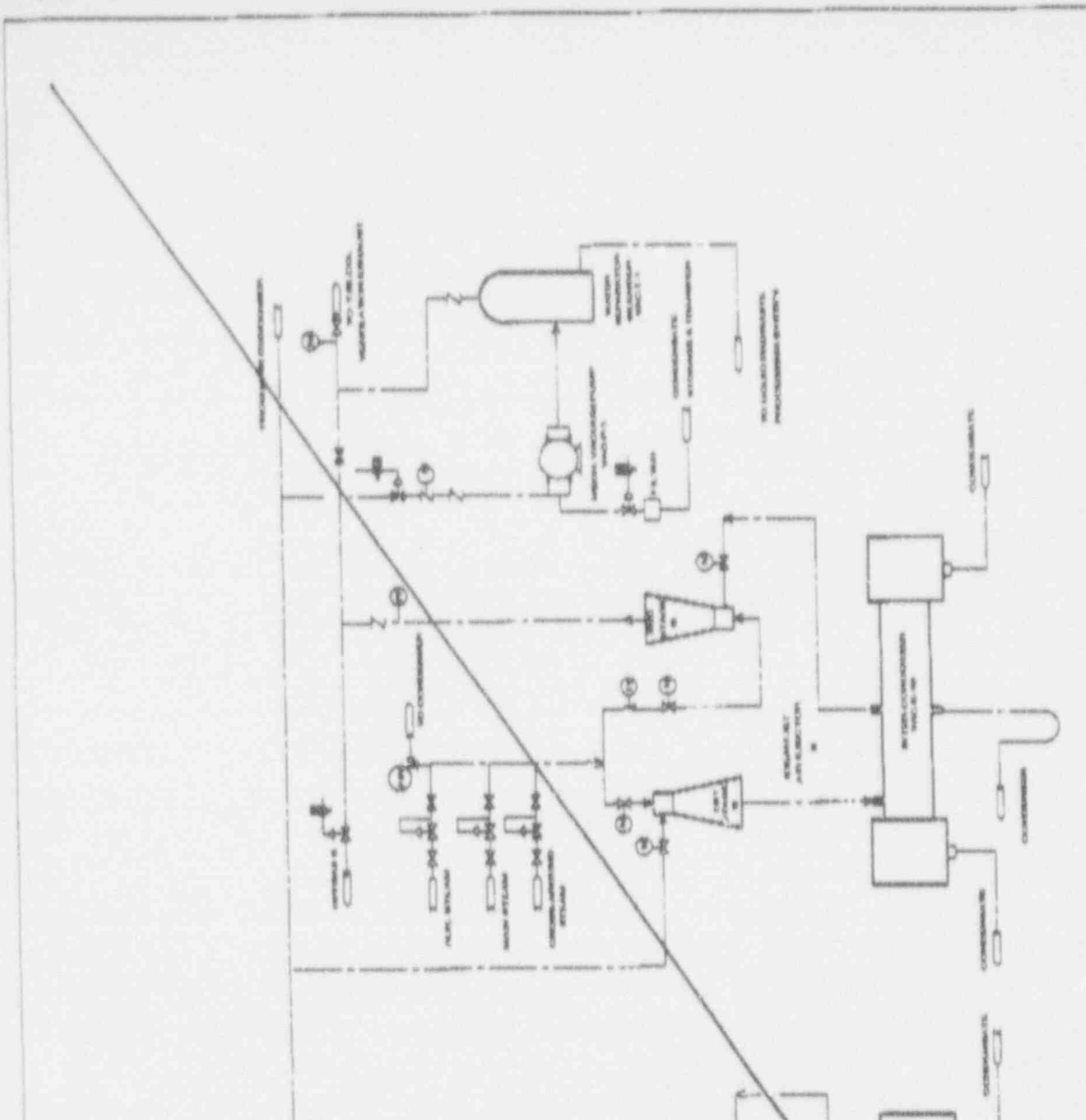
Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. A simplified configuration for the CF System is described in section 2.10.2.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the CF System.	1. The as-built configuration of the CF System is in accordance with the description in Section 2.10.2.

Table 2.10.2b: Main Condenser Evacuation System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The off-gas will be prevented from reaching a flammable limit of hydrogen.	1. Tests will be conducted using simulated signals to the SJAE flow control system.	1. Confirmation that the system isolates before flammability limits are reached.
1. On low steam flow Off-gas System isolates.	1. Tests will be conducted using simulated signals for low steam flow	1. Isolation valve closes on receipt of simulated signal.
2. Radioactive releases will be maintained within established limits.	2. Tests will be conducted using simulated signals to the vacuum pump isolation system.	2. Confirmation that the system isolates as required to limit releases.
2. One high radiation signal vacuum pump trips and discharge valve closes.	2. Tests will be conducted using simulated signals for high radiation	2. Vacuum pump trips and discharge valve closes.
3. A simplified configuration for the MCE System is described in Section 2.10.2.	3. Construction records will be reviewed and visual inspections will be conducted for the configuration of the MCE System.	3. The as-built configuration of the MCE System is in accordance with the description in Section 2.10.2.



REVISED, SEE FIGURE 2.10.2b

Figure 2.10.2 Main Condenser Evacuation System

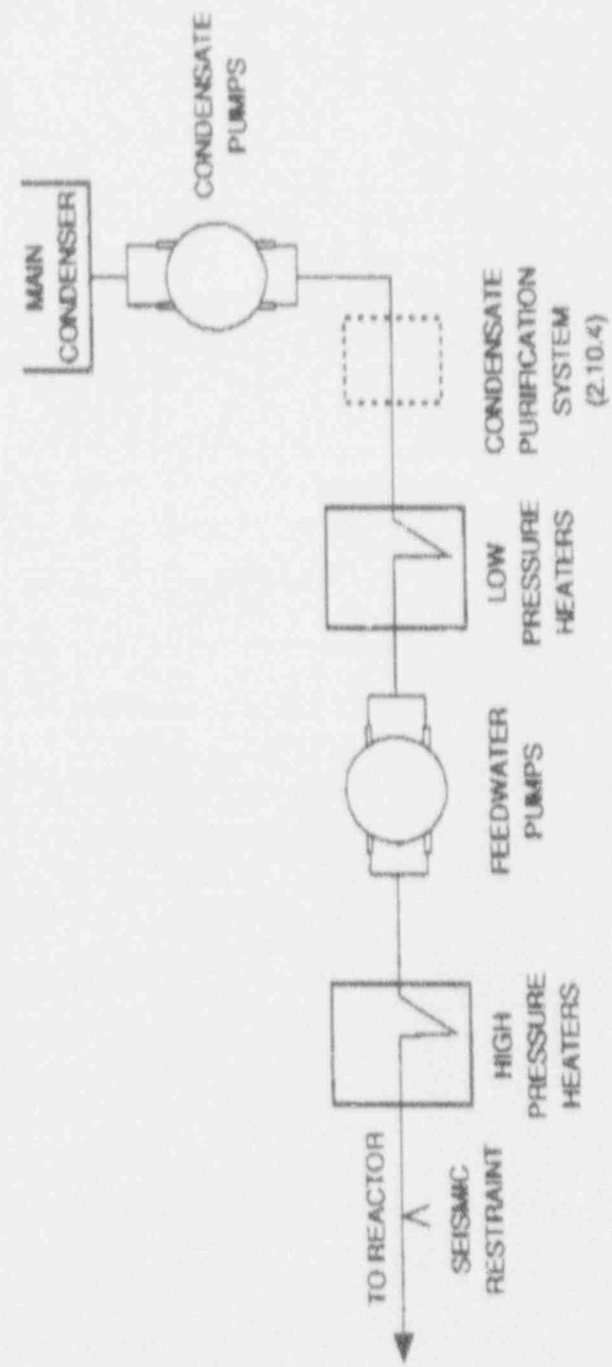


Figure 2.10.2a Condensate and Feedwater System

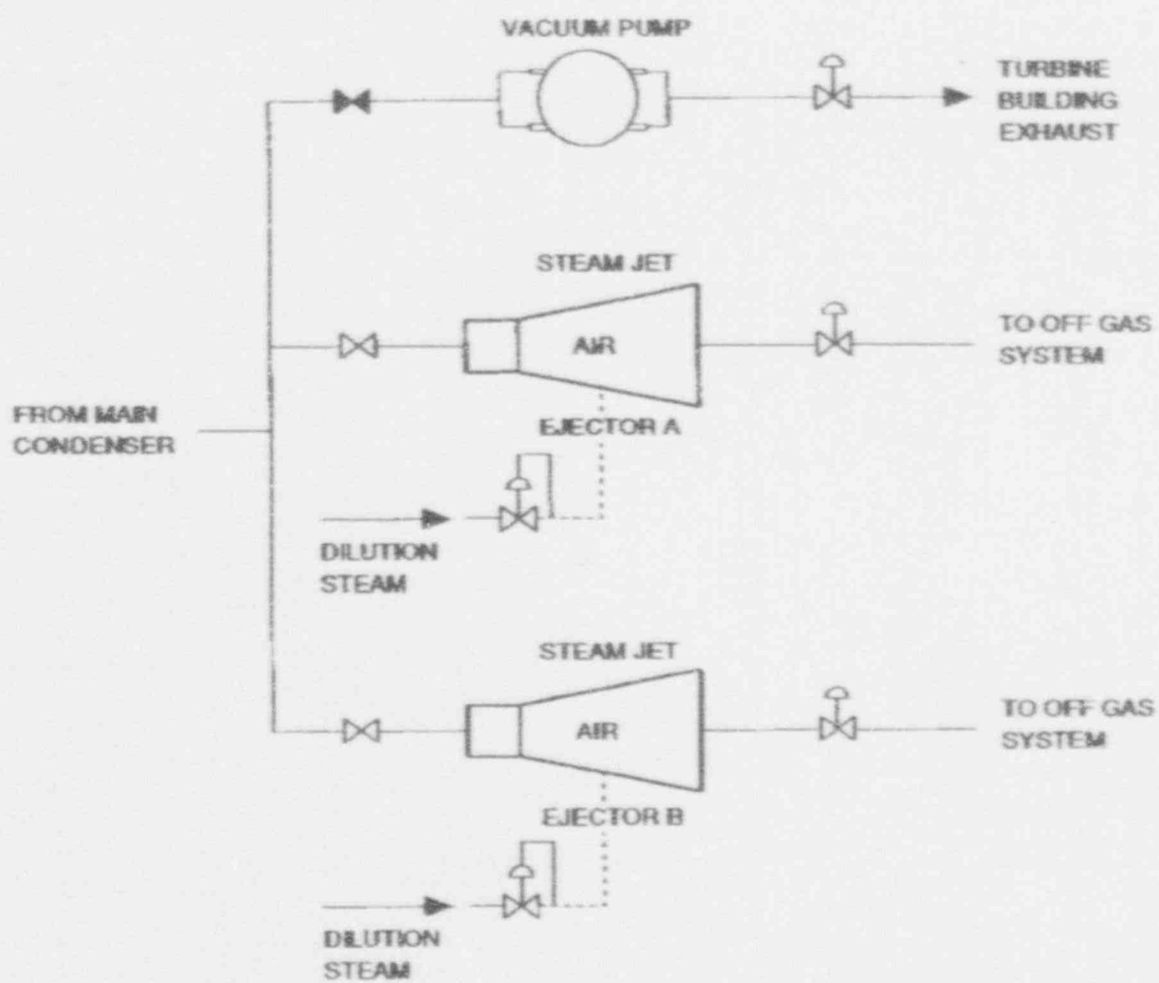


Figure 2.10.2b Main Condenser Evacuation System

2.10.4 Condensate Purification System

Design Description

The Condensate Purification (CP) System purifies and treats the condensate as required to maintain reactor feedwater purity, using filtration to remove insoluble solids corrosion products, ion exchange to remove soluble solids from condenser leakage and other impurities, and water treatment additions to minimise reduce corrosion/erosion releases in the power cycle.

The CP System does not serve or support any safety function and has no safety design basis.

The CP System is designed to Quality Group D non-safety-related standards.

The CP System consists of full flow high efficiency particulate filters followed by full flow deep bed demineralizers.

Shielding is provided for the CP System.

Vent gases and other wastes from the CP System are collected in radiation controlled areas and sent to the radwaste system for treatment and/or disposal.

The CP System is located in the tTurbine bBuilding., and piping or equipment failures will not affect plant safety.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.4 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the CP System.

Table 2.10.4: Condensate Purification System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Shielding will be provided for the CP System.~~	~~1. Visual inspection of the as built CP System will be performed.~~	~~1. Installed equipment is shielded in accordance with certified design.~~
1. A simplified configuration for the CP System is described in Section 2.10.4.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the CP System.	1. The as-built configuration of the CP System is in accordance with the description in Section 2.10.4.
~~2. No safety-related equipment will be in the visinity of the CP System.~~	~~2. Visual inspection of the as-built CP System will be performed.~~	~~2. Equipment is located as specified by certified design.~~
2. CP system wastes ~~will be~~ is collected in radiation controlled areas	2. Visual inspection of the as-built CP System will be performed.	2. Compliance with certified design commitment.
~~3. CP System wastes will be collected in controlled areas.~~	~~3. Visual inspection of the as-built CP System will be performed.~~	~~3. Compliance with certified design commitment.~~

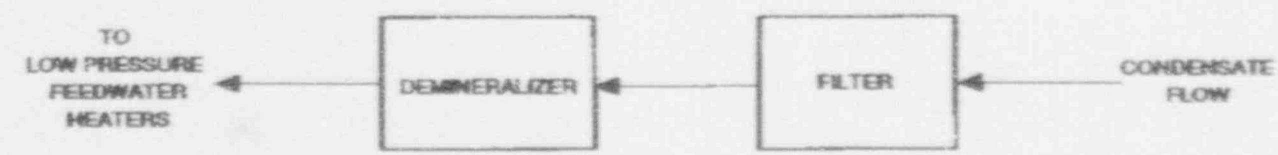


Figure 2.10.4 Condensate Purification System

2.10.7 Main Turbine

Design Description

The main Turbine Generator (TG) System converts the energy in steam from the nuclear steam supply system into electrical energy.

The TG System does not serve nor support any safety function and has no safety design basis. However, the TG System is a potential source of high energy missiles that could damage safety related equipment or structures.

The TG System is designed to prevent overspeed and thus ~~minimize~~ reducing the possibility of high energy missile generation from TG System moving parts.

The following ~~component~~ instrumentation, controls and valving redundancies are employed to guard against overspeed:

(1) Main stop valves (MSV)/Control valves (CV) [MSVs trip/CVs modulate].

(2) Intermediate stop valves/Intercept valves (CIVs) [CIVs trip].

(3) Primary speed control/Backup speed control.

(4) Fast acting solenoid valves/Emergency trip fluid system (ETS).

(5) Speed control/Overspeed trip/Backup overspeed trip.

Temperature, pressure and speed indications, as well as overspeed alarm are provided in the main control room.

The TG System is enclosed within the ~~t~~Turbine ~~b~~Building, which contains no safety-related equipment or structures. The turbine generator is orientated within the turbine building to be inline with the ~~r~~Reactor and ~~c~~Control ~~b~~Buildings to ~~minimize~~ reduce the potential for any high energy TG System generated missiles from damaging any safety-related equipment or structures.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.7 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the TG System.

2.10.7 Main Turbine

Design Description

The main Turbine Generator (TG) System converts the energy in steam from the nuclear steam supply system into electrical energy.

The TG System does not serve nor support any safety function and has no safety design basis. However, the TG System is a potential source of high energy missiles that could damage safety related equipment or structures.

The TG System is designed to prevent overspeed and thus ~~minimise~~ reducing the possibility of high energy missile generation from TG System moving parts.

The following ~~component~~ instrumentation, controls and valving redundancies are employed to guard against overspeed:

(1) Main stop valves (MSV)/Control valves (CV) [MSVs trip/CVs modulate].

(2) Intermediate stop valves/Intercept valves (CIVs) [CIVs trip].

(3) Primary speed control/Backup speed control.

(4) Fast acting solenoid valves/Emergency trip fluid system (ETS).

(5) Speed control/Overspeed trip/Backup overspeed trip.

Temperature, pressure and speed indications, as well as overspeed alarm are provided in the main control room.

The TG System is enclosed within the ~~t~~Turbine ~~b~~Building, which contains no safety-related equipment or structures. The turbine generator is orientated within the turbine building to be inline with the ~~r~~Reactor and ~~c~~Control ~~b~~Buildings to ~~minimise~~ reduce the potential for any high energy TG System generated missiles from damaging any safety-related equipment or structures.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.7 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the TG System.

Table 2.10.7: Main Turbine Generator System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
1. The TG System ~~will be~~ is designed to prevent the turbine generator rotor from exceeding the design overspeed with redundant instrumentation, controls and valving, ~~such that a single failure of any component will not cause the rotor speed to exceed its design value.~~	1a. Conduct ~~V~~visual inspection and review construction records of the installed equipment, ~~together with simulated testing~~ 1b. Test the control logic of the as-built overspeed protection systemwith simulated overspeed signals.	1. a. Following ~~Design~~ provisions to prevent overspeed are in place~~.~~: (1) Main stop valves/control valves (2) Intermediate stop valves/Intercept valves (CIVs) (3) Primary speed control/backup speed control (4) Fast acting solenoid/Emergency trip fluid system (ETS) (5) Speed control/Overspeed trip/Backup overspeed trip b. Valves that supply steam to turbine close upon receipt of overspeed signal.
2. ~~The turbine building will contain no safety related equipment or structures.~~ The turbine generator ~~will be~~ is orientated to ~~minimize~~ reduce the potential for low trajectory high energy TG System missiles from damaging safety-related equipment or structures.	2. Conduct ~~V~~visual inspection of the as-built turbine building and plant arrangements.	2. Turbine generator ~~arrangements per approved plant design.~~ is in line with the reactor and control building.
3. Control room indicators are provided for TG System parameters defined in section 2.10.7.	3. Inspections will be performed to verify the presence of control room indicators for the TG System.	3. Instrumentation is present in the Control room as defined in Section 2.10.7.
4. Turbine stop valve will close in ≥ 0.10 sec	4. Perform test	4. Test results in closure time ≥ 0.10 sec
5. Turbine control valve fast close in ≥ 0.15 sec.	5. Perform test	5. Test results in closure time ≥ 0.15 sec

2.10.9 Turbine Gland Steam System

Design Description

The Turbine Gland Sealing (TGS) System (Figure 2.10.9) prevents the escape of radioactive steam from the turbine shaft/casing penetrations and valve stems and prevents air inleakage through subatmospheric turbine glands.

The TGS System consists of a sealing steam pressure regulator, sealing steam header, a gland steam condenser, with two full capacity exhaust blowers, and the associated piping, valves and instrumentation.

The TGS System does not serve or support any safety function and has no safety design basis.

The TGS System is designed to Quality Group D standards non-safety-related.

~~The outer portion of all glands of the turbine and main steam valves is connected to the gland steam condenser, which is maintained at a slight vacuum by the exhauster blower. During plant operation, the gland steam condenser and one of the two installed 100% capacity motor driven blowers are in operation. The exhauster blower to the turbine building compartment exhaust system effluent stream is continuously monitored prior to being discharged.~~

~~During normal operation, the steam seal header is supplied from the main steam path. The auxiliary steam system provides a 100% steam supply backup when high radiation levels are detected in the blower exhaust or the main steam path source(s) are unavailable.~~

~~A site specific radiological analysis will be required to determine what actions and at what level t~~The TGSS steam supply ~~should~~ will be switched to the auxiliary source~~.~~ if the discharge steam radiation level exceeds setpoint.

Relief valves on the seal steam header prevent excessive seal steam pressure.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.9 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the TGS System.

Table 2.10.9: Turbine Gland Steam System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Radiological releases will be maintained within established limits.~~	~~1. Visual inspection of the installed equipment coupled with a site specific radiological analysis and simulated signals to verify that the TGS System switches to auxiliary steam on high radiation levels.~~	~~1. System switches to auxiliary steam as required to limit radiological releases.~~
1. A simplified configuration for the TGS System is described in Section 2.10.9	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the TGS System.	1. The as-built configuration of the TGS System in accordance with the description in Section 2.10.9

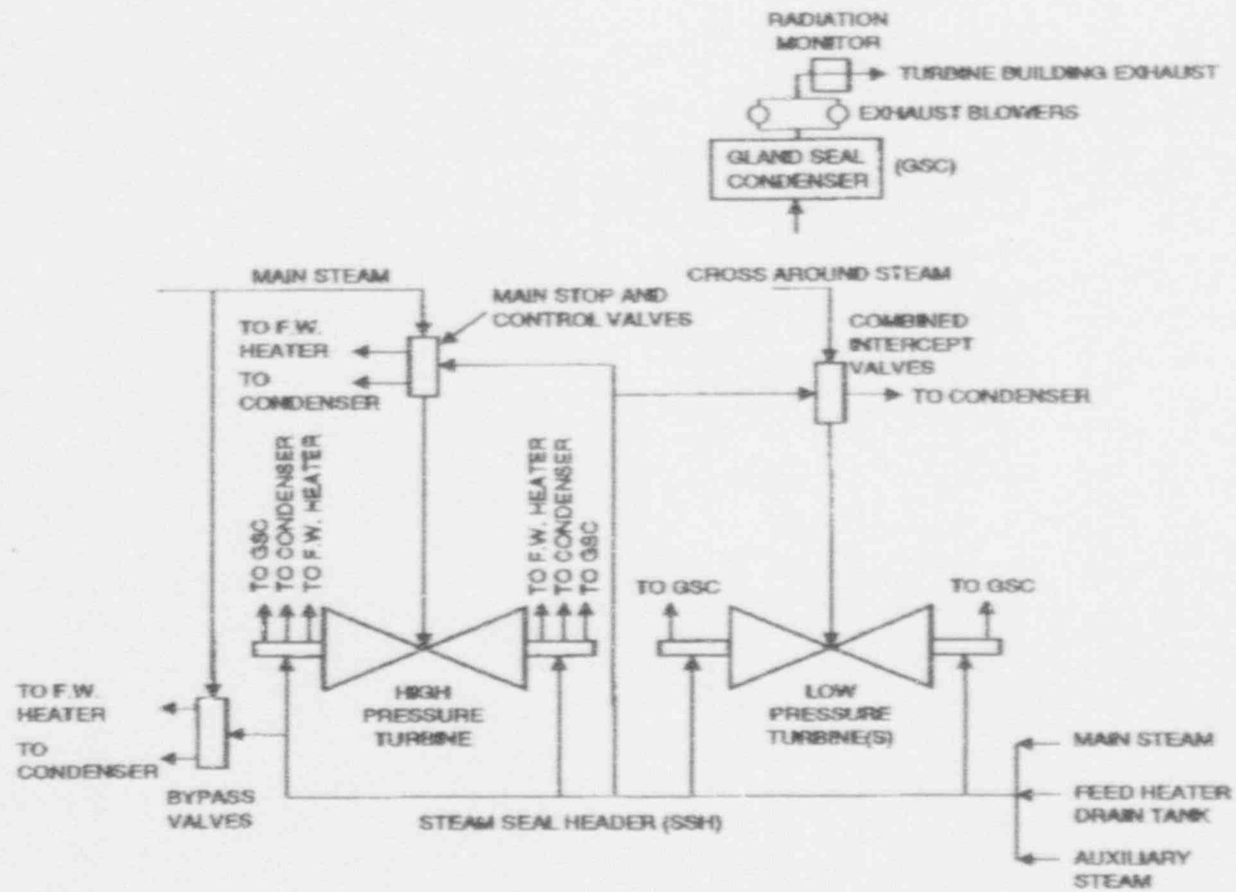


Figure 2.10.9 Turbine Gland Seal

2.10.13 Turbine Bypass System

Design Description

The Turbine Bypass (TB) System provides capability to discharge main steam from the reactor directly to the condenser to minimize step load reduction transients effects on the reactor coolant system. The system is also used to discharge main steam during reactor hot standby and cooldown operations.

The TB System does not serve or support any safety function and has no safety design basis. The TB System is designed to Quality Group D non-safety related.

~~There is no safety related equipment in the vicinity of the TB System. All high energy lines of t~~The TB System ~~are~~ is located in the turbine building ~~and no failure of high energy lines in the TB System will affect safety related equipment~~.

~~The TB System consists of (1) a three valve chest that is connected to the main steamlines upstream of the turbine stop valves, and (2) three dump lines that connect separately each regulating valve outlet to one condenser shell. The TB System is designed to bypass nominally 33% of the rated main steam flow directly to the condenser.~~

~~The TB System, in combination with the reactor systems, provides the capability to shed 40% of the turbine generator rated load without reactor trip.~~

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.13 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the TB System.

Table 2.10.13: Turbine Bypass System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Failure of high energy lines in the TB System will not affect safety-related equipment.~~	~~1. Visual inspection of the installed TB System will be conducted.~~	~~1. Confirmation that high energy line breaks will not jeopardize any safety-related equipment.~~
1. A simplified configuration for the TB System is described in Section 2.10.13.	1. Construction records will be reviewed and visual inspections will be conducted for the configuration of the TB System.	1. The as-built configuration of the TB System is in accordance with the description in Section 2.10.13.

2.10.21 Main Condenser

Design Description

The main condenser is designed to condense and deaerate the exhaust steam from the main turbine and provide a heat sink for the Turbine Bypass (TB) System.

The main condenser does not serve or support any safety function and has no safety design basis. It is, however, designed with necessary shielding and controlled access to protect plant personnel from radiation.

The condenser is designed to Quality Group D non-safety related. The main condenser is designed to be supported under seismic conditions.

The main condenser is a multi shell type deaerating unit with a shell located directly beneath each of the low pressure turbines. Each shell has tube bundles through which circulating water flows. The condensing steam is collected in the condenser hotwells (the lower shell portion) which provide suction to the condensate pumps.

Since the main condenser operates at a vacuum, any leakage is into the shell side of the main condenser. Tubeside or circulating water inleakage is detected by measuring the conductivity of sample water extracted beneath the tube bundles. In addition, conductivity is continuously monitored at the discharge of the condensate pumps and alarms provided in the main control room.

A signal is provided to the reactor protection system on loss of vacuum.

In all operational modes, the condenser is at vacuum and consequently no radioactive releases can occur. Loss of vacuum sequentially leads to control room alarm, turbine trip and eventually bypass and main steam isolation valve closure to prevent condenser overpressurization. Additionally, to avoid a turbine trip on high condenser backpressure reactor recirculation runback is automatically initiated and, on a site specific basis setting, on a combination of high condenser backpressure and loss of a circulating water pump.

Ultimate overprotection is provided by rupture diaphragms on the turbine exhaust hoods.

The instrumentation and control features that monitor the performance to ensure that the condenser is in the correct operating mode include:

(1) Hotwell Water Level—Automatically controlled within preset limits. During normal full load operation with nominal hotwell levels, the main condenser provides a four minute active condensate storage volume and has a two minute surge capacity. At minimum normal

operating hotwell water level, and normal full load condensate flow rate, the condenser provides a two minute minimum holdup time for N-16 decay.

(2) Condenser Pressure—Key overall performance indicator that initiates alarms and trips at preset levels.

(3) Low Pressure Turbine Exhaust Hood Temperature—Automatically initiates turbine exhaust water sprays to protect the turbine.

(4) Inlet and Outlet Circulating Water Temperature—Monitors performance only

(5) Conductivity within the condenser and at the discharge of the condensate pumps—Initiates alarms at preset levels.

The main condenser potential for flooding is less than the Circulating Water (CW) System and, consequently flooding protection is the same as the CW System (2.10.23). Condenser pressure indicators are located above design basis any potential flood level.

Spray pipes and baffles are designed to protect the main condenser internals from high energy flow inputs.

Hydrogen buildup during operation is provided by continuous evacuation of the main condenser. Hydrogen sources are excluded during shutdown.

Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.21 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the main condenser.

Table 2.10.21: Main Condenser

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Overpressurization of the condenser will be prevented by condenser isolation from high energy sources.~~	~~1. Tests will be performed using simulated signals to verify that the system isolates.~~	~~1. System isolation occurs.~~
1. Condenser pressure sensors and transmitters are located above any potential flood levels.	1. Visual inspections of the as-built system will be conducted.	1. Condenser pressure indicators and transmitters are located above flood levels.
~~2. Condenser pressure indicators and transmitters will be located above any potential flood levels.~~	~~2. Visual inspections of the as-built system will be conducted.~~	~~2. Installed equipment is in compliance with the design commitment.~~
2. Control room features are provided for Main Condenser System parameters defined in Section 2.10.21	2. Inspections will be performed to verify the presence of control room indicators for the Main Condenser System	2. Instrumentation is present in the Control room as defined in Section 2.10.21
~~3. Shielding and controlled access shall be provided for the main condenser.~~	~~3. Visual inspections of the as-built system will be conducted.~~	~~3. Installed equipment meets the shielding and access control provisions of the certified design.~~
3. Main condenser supports are analyzed to demonstrate no gross failure under seismic conditions	3. Perform analysis.	3. Verify analysis performed.

2.10.23 Circulating Water System

Design Description

The Circulating Water (CW) System (Figure 2.10.23) provides a ~~continuous~~ supply of cooling water to the main condenser to remove the heat rejected by the turbine cycle and auxiliary systems.

The CW System does not serve or support any safety function and has no safety design basis.

To prevent flooding of the turbine building, the CW System is designed to automatically isolate in the event of ~~gross~~ system leakage. The circulating water pumps are tripped and the pump and condenser valves are closed in the event of a system isolation signal from the condenser area high-high level switches. A condenser area high level alarm is provided in the main control room.

~~A reliable logic scheme will be adopted to minimize potential for spurious isolation trips (e.g., 2 out of 3 logic).~~

The CW System is designed to ~~and constructed in accordance~~ with Quality Group D ~~specifications~~ non-safety related.

~~The CW System consists of the following components (Figure 2.10.23):~~

~~(1) Intake screens located in a screen house~~

~~(2) Pumps~~

~~(3) Condenser water boxes~~

~~(4) Piping and valves~~

~~(5) Tube side of the main condenser~~

~~(6) Water box fill and drain subsystem~~

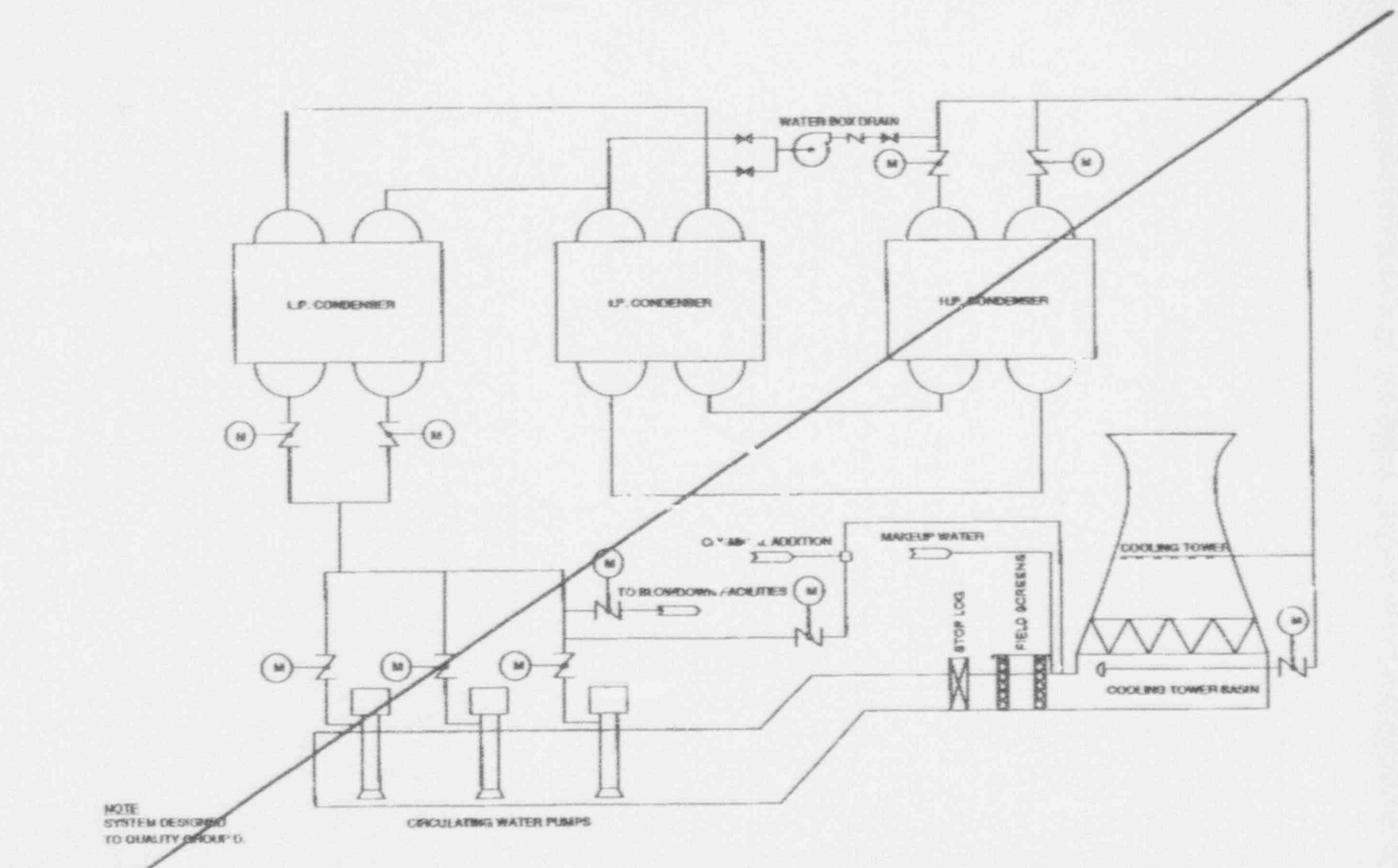
Inspections, Tests, Analyses and Acceptance Criteria

Table 2.10.23 provides a definition of the inspections, tests, and/or analyses, together with associated acceptance criteria which will be undertaken for the CW System.

Table 2.10.23: Circulating Water System

Inspections, Tests, Analyses and Acceptance Criteria

Certified Design Commitment	Inspections, Tests, Analyses	Acceptance Criteria
~~1. Flooding of the turbine building will be prevented by CW System isolation in the event of gross system leakage.~~ Upon receipt of an isolation signal, the circulating water pumps will trip and the condenser valves close.	1. Testing of the ~~Visual inspection of the installed equipment coupled with the analyses of the leakage/flooding characteristics of the~~ as-built CW System will be performed using simulated signals to verify system isolates on high level.	1. ~~CW System isolates upon receipt of an isolation signal.~~ Pumps trip and condenser valves close.
2. A simplified configuration for the CW System is described in Section 2.10.23.	2. Construction records will be reviewed and visual inspections will be conducted for the configuration of the CW System.	2. The as-built configuration of the CW System is in accordance with the description in Section 2.10.23.
3. Control room sensors are provided for CW System parameters defined in Section 2.10.23.	3. Inspections will be performed to verify the presence of control room indicators for the 2.10.23 System.	3. Instrumentation is present in the Control room as defined in Section 2.10.23.



REVISED, SEE NEW FIG. 2.10.23

Figure 2.10.23 Circulating Water System

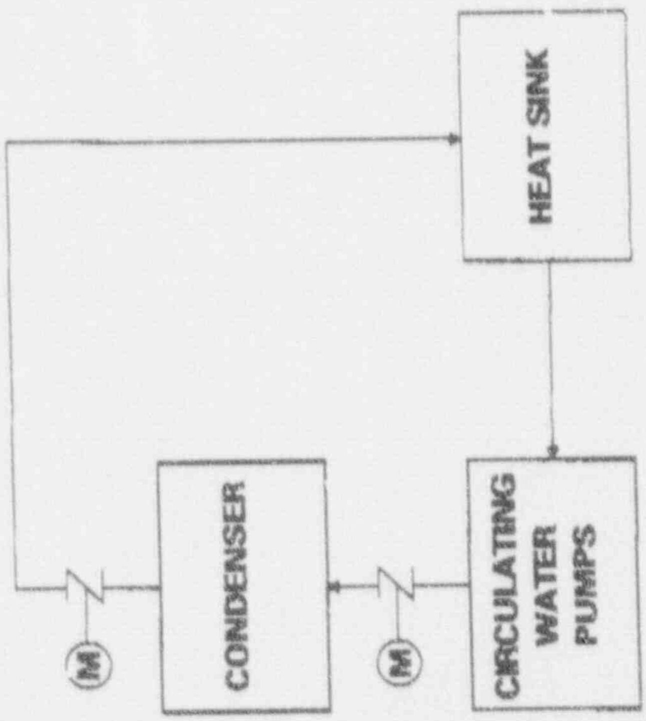


Figure 2.10.23 Circulating Water System