APR 24 1979

Inter-Office Memorandum

GPU Service

Date April 24, 1979
TSG-095

Subject TMI-2 MODIFICATION CRITERIA FOR USE OF STEAM GENERATORS FOR LONG TERM COOLDOWN (REV.3)

To W. R. COBEAN (B&R)
R. RODGERS (GAI)

Location

Stello
For Info
T. Novak

Attached are revised criteria for use in designing plant modifications to use the "A" and "B" steam generators as high pressure water to water heat exchangers for decay heat removal.

The following significant changes have been made from Revision 2:

a. The "short term" low pressure criteria have been deleted for both steam generators due to lack of schedule advantage over the long term high pressure design approach.

b. The "A" steam generator criteria includes sketches for a feed to river water exchanger and for a feed to closed cooling water heat exchanger. The feed to river water scheme is preferred if a suitable heat exchanger is located.

c. Electrical requirements have been specified. These include physical and electrical separation between A and B steam generator cooldown systems, capability to operate from an one-site diesel generator set and non-class 1E classification.

d. Instrumentation and control requirements have been expanded. New requirements include separation, radiation monitoring on the closed cooling water outlet of the heat exchanger as well as the outlet of the steam generator, and provisions for future control room controls and indicators.

e. Additional requirements have been added regarding control of system leakage, control at low feedwater flows and system makeup requirements.

In order to minimize the impact of the installation of these systems on plant operation, it is necessary that tie ins for both the "A" and "B" generators be made at the same time. Tie in to the "A" generator feedwater system will require steaming with emergency feedwater during the interval that normal feedwater is disabled. A similar situation applies for cutting the cross connect between the "A" and "B" feed trains at the 6A and 6B feedwater heaters.

Per a meeting this date (4/23/79) between B&R, GAI, GPU, Pullman-Kellogg and Catalytic, it was agreed that the tie in spools for both the "A" and "B" generators were to receive top priority for fabrication and installation.

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Also per discussion between the writer and W. R. Cobean, it has been agreed that B&R will engineer the electrical work for a "A" generator scheme and will provide tie in points for GAI to use the in-plant condensate polishers (should it be decided to use the polishers).

for G. Capodanno

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Modification Criteria File

THREE MILE ISLAND UNIT

SYSTEM CRITERIA

FOR USE OF STEAM GENERATOR "A"

FOR SHORT AND LONG TERM

COOLDOWN

(REV. 3)

Approved

B & R Task ØTS 3
Tech. Mod. Ø16 a
Ø17 a

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1.0 SYSTEMS CRITERIA

2.0 (DELETED)

3.0 LONG TERM DESIGN BASIS

3.1 Functional Performance Requirements

3.2 Applicable codes and Standards

3.3 Design Basis

3.4 Sizing Requirements

3.5 Layout Requirements

3.6 Environmental Requirements

3.7 Sampling Requirements

3.8 Material Requirements

3.9 Electrical Requirements

3.10 Testing Requirements

3.11 Instrumentation and Control

3.12 Water Chemistry Requirements

THREE MILE ISLAND UNIT 2

System Criteria for Use of Steam Generator "A" for Short and Long Term Cooldown

1.0 SYSTEMS CRITERIA

This document defines the design for providing for water to water cooling in steam generator "A" to remove decay heat.

2.0 (DELETED)

3.0 LONG TERM BASIS

3.1 Functional Performance Requirements

Recirculation of high pressure closed cycle cooling water thru the secondary side of the "A" steam generator for removal of decay heat from the primary coolant. The ultimate heat sink shall be river water.

3.2 Applicable Codes and Standards

Piping	- ANSI B31.1
Heat Exchanger	- ASME Section VIII
Tanks	- ASME Section VIII
Pumps	- Hydraulic Institute Standards
Valves	- ANSI B16.5, B16.34

Note: ASME Section III components will be utilized when available.

3.3 Design Basis

3.3.1 The system may be designed as non-seismic category I.

3.3.2 The system shall be designed to operate with a loss of off-site power.

3.3.4 The system shall include a surge tank to accomodate changes in fluid volume and temperature in the closed loop. Surge volumes shall be adequate to prevent liquid or gaseous releases during system transients and startup.

3.3.5 The system shall have the capability to regulate the temperature and flow rate of cooling water entering the steam generator.

3.3.6 Provisions shall be available for preheating the feedwater when filling the steam generator (160°-180°F at 50 gpm).

3.3.7 The system shall be designed to be independent of the cooling system for "B" steam generator to the extent that a single active failure will not cause a loss of cooling of the reactor coolant system.

3.3.8 The system shall be equipped with sufficient test and instrumentation connections for system preoperational testing and normal operation.

3.3.9 The system shall be designed to supply cooled water to the steam generator through the main feedwater nozzle and receive heated water through the main steam nozzle.

3.3.10 The system design shall employ all welded connections to the greatest extent possible to minimize system leakage.

3.3.11 The system design shall include provisions for future addition of automatic controls and alarms.

3.3.12 The system design shall maintain containment integrity.

3.3.13 The system design shall provide means for monitoring and controlling cooling water chemistry requirements as specified by Section 3.12.

3.3.14 The system design shall minimize the use of auxiliary support systems (bearing cooling water, lubrication oil, instrument air). Loss of instrument air shall not change the operating parameters (flow and temperature) of the system.

3.3.15 The system pressure shall always be maintained at a pressure higher than the primary coolant pressure so there will be no leakage of primary water into the closed cooling system.

3.3.16 The system shall be designed to remove the required heat load with variations in the temperature of the ultimate heat sink shown in Section 3.4.

3.3.17 The system shall have provisions for installation of future water purification system with capability (resin disposal and shielding) to handle radioactive water. Installation and startup of this equipment shall not interrupt system function.

3.3.18 The system shall be provided with proper overpressure relief devices. The discharge of the overpressure relief devices shall be piped such that they minimize the spread of contaminated fluids. Surge tank relief valve(s) shall be sized to protect against failures of the makeup or blanketing gas valves as appropriate. Relief valves shall be capable of relieving the water expansion in the secondary side of the steam generator should the cooling water flow be lost. The maximum heatup rate is 50°F/hr.

3.3.19 The system shall have proper connections, pump suction strainer and other provisions for flushing of new piping and components prior to startup. New piping and components shall be in a clean and neutralized state when installed. Chemical cleaning shall not be used after installation.

3.3.20 The system shall be checked for correct valve alignment. Those items which could interfere with the proper function of the system shall be locked out. Vents and drains shall be provided.

3.3.21 Provisions shall be made to hold up any system leakage for sampling prior to release to uncontrolled drainage systems.

3.3.22 Provisions shall be made to make small incremental changes in feedwater flow (±25 GPM) to the steam generator and to reduce total flow to a maximum of 10-50 GPM, during steam generator filling.

3.3.23 The system shall have provisions for nitrogen addition during the filling of the seeam generator if required.

3.3.24 Provisions shall be made to manually supply makeup at system pressure without interruption of system operation. Demand shall be indicated by a low level alarm on the surge tank.

3.3.25 A recirculation line to meet the minimum flow requirements of the pump shall be provided.

3.4 Sizing Requirements

3.4.1 The system shall be designed to meet the following requirements:

(a)	flow through steam generator	3,000 to 5,000 gpm
(b)	steam generator inlet temperature	80°F
(c)	steam generator outlet temperature	80° to 250°F
(d)	design pressure at S/G inlet	650 psi
(e)	river water temperature	34° to 85°F
(f)	river water flow rate	as required to remove heat load
(g)	heat exchanger duty	30 x 10^6 BTU/Hr. (includes heat from 1 RC Pump)

3.5 Layout Requirements

3.5.1 The system equipment shall be located to facilitate construction and future modifications, and ease of access during operation.

3.5.2 The system flow path shall consist of cooled water entering the steam generator through the main feedwater nozzle, exiting the steam generator through a main steam line, entering the heat exchanger and returning back to the steam generator using the system pump. The ultimate heat sink shall be provided by the nuclear services river water systems.

On the river water side, the nuclear services river water system shall be cross-connected to the secondary services river water system to provide cooling.

Refer to figures 1 + 2 attached (OTSG) cooldown - steam generator A - high pressure.

3.6 Environment Requrirements

All equipment shall be located indoors except the alternate diesel generators.

3.7 Sampling Requirements

Adequate (size and quantity) sampling connections shall be provided for water chemistry and radiation monitoring.

3.8 Materials Requirements

All wetted materials shall be compatible with fluids having water chemistry specified in section 3.12.

3.9 Electrical Requirements

3.9.1 Electrical equipment shall be capable of being started and powered from an on-site diesel generator set in the event of a loss of off-site power. Loads shall be sequenced on to the diesel generator set manually. Criteria shall be established for the maximum allowable time to restore voltage after a loss of off-site power.

3.9.2 Electrical classification of the system is non-class IE

3.9.3 Components should have maximum practical physical separation from the opposite steam generator cooldown system components to provide protection against events such as fire and missiles from sources internal to the plant.

3.9.4 The system shall be electrically independent of the system for steam generator "B".

3.9.5 Vital loads in the system shall be suppled through bus 2-3 and the "gray" diesel generator.

3.9.6 Motor rated starting voltage shall be verified consistent with the voltage regulation capability for "gray" diesel generator. Motor feeders shall be protected consistent with original plant design and normal trips for overload, etc. shall be used.

3.9.7 Electrical load list (to be confirmed):

Load	HP	Voltage	Source
PGE Decay Heat Pump/WPPS	700	4000	Bus 2-3
Nuclear Services River Water Pump NR-P-1A or 1B	400	4000	Bus 2-3E

3.9.8 "Criteria for General Modification to the BOP Electrical System" are applicable. Also, refer to "Criteria for Loss of Offsite LOP Electrical Power."

3.10 Testing Requirements

Provisions shall be made for pre-operational testing of the system, including hydrostatic tests and flushing of new piping.

Flanges shall be provided at the new pump suction and discharge to isolate the pump during system hydrostatic testing if reqired to protect the pump seals.

3.11 Instrumentation and Control Requirements

3.11.1 The system shall be designed to provide instrumentation sufficient to monitor functional performance requirements including:

(a) pump discharge pressure, 0 - 800 psig
(b) steam generator inlet and outlet temperatures 50 - 250°F
(c) flow rate, nominally 3,000 gpm, maximum 5,000 gpm
(d) river water inlet and outlet temperatures 0 - 100°F
(e) surge tank high and low level indication and alarms.

3.11.2 Critical instrumentation shall be duplicated (specifically, steam generator inlet and outlet temperature and system flow rate).

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3.11.3 Area radiation monitoring shall be provided where the equipment and components are installed.

3.11.4 The attached list of instrumentation shall be operable when the system is placed in service.

3.11.5 Instruments, including power supply, shall be independent from instrumentation for steam generator B. Instruments shall be supplied from an odd-numbered plant instrument bus. If available, uninterruptable power shall be used.

3.11.6 Control circuits for existing equipment shall be reviewed to ensure that no spurious automatic, manual or interlock signals will cause incorrect operation of the system. Specifically, all automatic emergency feedwater actuation signals shall be defeated and all automatic control signals to the feedwater control valves shall be disabled.

3.11.7 Provisions shall be made for future installation of controls and remote indicators in the Unit 2 control room. (It is assumed a new panel will be used.)

3.11.8 Controls and indicators are to be segregated from those for steam generator B, using a separate panel or a separate section of a common panel.

3.11.9 Control shall be manual. Run/off/trip indicator lights shall be provided for motors and open/close/trip lights shall be provided for valves.

3.11.10 Control cables should have approximately 100% spare conductors to allow for future modifications.

3.11.11 "Loss of System Function" shall be alarmed locally and in the main control room.

3.11.12 Radiation monitoring and alarms shall be provided at the outlet of the steam generator and at the secondary services closed cooling water outlet of the new heat exchanger. The monitors shall be capable of detecting leakage from the reactor coolant system into the steam generator or the secondary services closed cooling water system.

3.11.13 Thermowells capable of using mercury glass thermometers shall be provided as close as practical to the steam generator inlet and outlet.

3.12 Water Chemistry

3.12.1 The system water chemistry for the steam generator shall be maintained in accordance with the following:

(a)	pH @ 77°F	9.3 - 10.5 (controlled by NH_4OH)
(b)	O_2 dissolved	100 ppb max. (OTSG < 300°F)
(c)	Cation conductivity	10 umho/ cm^2, max
(d)	Hydrazine	at least 300% of stoichiometric O_2 concentration
(e)	Surge tank level	

3.12.2 The makeup and fill water chemistry for the steam generator shall be in accordance with the following:

O_2 dissolved	100 ppb max., (OTSG < 300°F)
Cation conductivity	1 umho/ cm^2, max.

3.12.3 Means shall be provided to add ammonia hydroxide and hydrazine to the system. The chemical addition point shall be downstream of the future water purification system.

B. Secondary System

ITEM	MEASUREMENT	RANGE OF INTEREST	DESIRED ACCURACY	BACK-UP MEASUREMENT	COMMENTS
1	Steam Generator A Level	0-600"	± 30"		Comp. I.D. 0007 (Required only if steaming.)
2	Steam Generator B Level	0-600"	± 30"		Comp. I.D. 0001 (Required only if steaming.)
3	Steam Generator A Outlet Pressure	0-300 psig	± 15 psi	Item I.4	
4	Steam Generator B Outlet Pressure	0-300 psig	± 15 psi	Item I.3	
5	Steam Generator A Main Feedwater Flow	0-7000 gpm	± 50 gpm	Item II.B.1	
6	Steam Generator B Main Feedwater Flow	0-7000 gpm	± 50 gpm	Item II.B.2	
7	Steam Generator A Start-Up Feedwater Flow	0-500 gpm	± 10 gpm		(Required only if steaming.)
8	Steam Generator B Start-Up Feedwater Flow	0-500 gpm	± 10 gpm		(Required only if steaming.)
9	Steam Generator A Outlet Temperature	0-250 F	± 2 F		(Required only fo solid secondary.)
10	Steam Generator B Outlet Temperature	0-250 F	± 2 F		(Required only fo solid secondary.)
11	Steam Generator A Feed Temperature	0-150 F	± 2 F	Item II.B.10	Comp. I.D. 0491
12	Steam Generator B Feed Temperature	0-150 F	± 2 F	Item II.B.9	Comp. I.D. 0492
13	Steam Generator A Downcomer Temperature	0-150 F	± 2 F		Comp. I.D. 0459
14	Steam Generator B Downcomer Temperature.	0-150 F	± 2 F		Comp. I.D. 0470
15	surge tank level				
16	radiation monitor				

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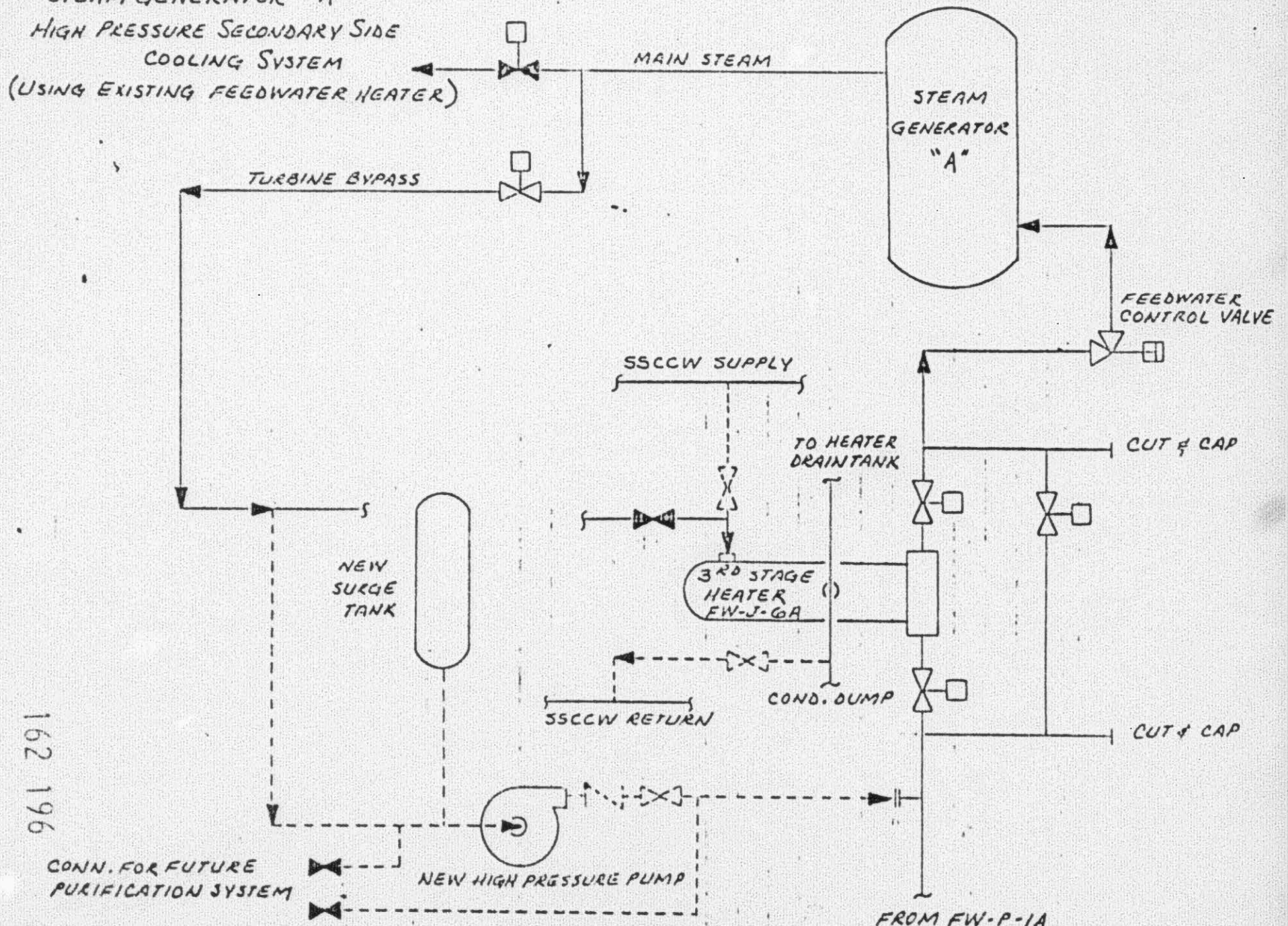
FIGURE 1. (LONG TERM)

STEAM GENERATOR "A"
HIGH PRESSURE SECONDARY SIDE
COOLING SYSTEM
(USING EXISTING FEEDWATER HEATER)



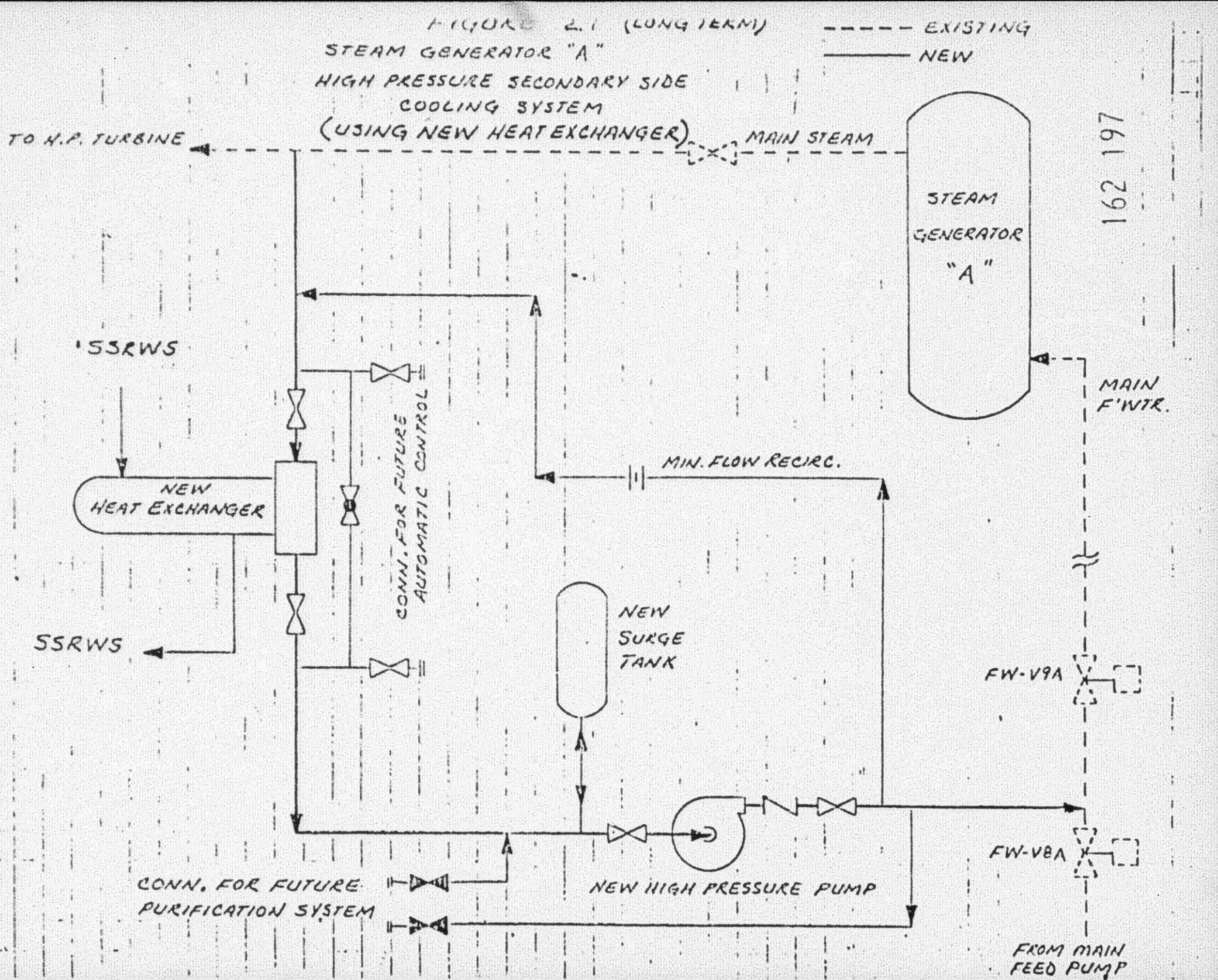


FIGURE 2.1 (LONG TERM)
STEAM GENERATOR "A"
HIGH PRESSURE SECONDARY SIDE
COOLING SYSTEM
(USING NEW HEAT EXCHANGER)
EXISTING
NEW
TO H.P. TURBINE
MAIN STEAM
STEAM GENERATOR "A"
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SSRWS
MAIN F'WTR.
MIN. FLOW RECIRC.
NEW HEAT EXCHANGER
CONN. FOR FUTURE AUTOMATIC CONTROL
SSRWS
NEW SURGE TANK
FW-V9A
FW-V8A
CONN. FOR FUTURE PURIFICATION SYSTEM
NEW HIGH PRESSURE PUMP
FROM MAIN FEED PUMP

THREE MILE ISLAND UNIT 2

SYSTEM CRITERIA

FOR USE OF STEAM GENERATOR "B"

FOR COOLDOWN AT

HIGH PRESSURE

(REV 3)

B&R Task #TS 3

Tech. Mod. #16 b
#17 b

APPROVED

I N D E X

THREE MILE ISLAND UNIT 2

System Criteria for Use of Steam

Generator "B" for Cooldown

at High Pressure

1.0 SYSTEMS CRITERIA

This document defines the design criteria for providing for water to water cooling in steam generator "B" to remove decay heat on a long term basis.

2.0 FUNCTIONAL PERFORMANCE REQUIREMENTS

Recirculation of high pressure closed cycle cooling water thru the secondary side of the steam generators for removal of decay heat from the primary coolant. The ultimate heat sink shall be river water. Intermediate cooling is provided by the secondary services closed cooling water system.

3.0 APPLICABLE CODES AND STANDARDS

Piping	-ANSI B31.1
Heat Exchangers	-ASME Section VIII
Tanks	-ASME Section VIII
Pumps	-Hydraulic Institute Standards
Valves	-ANSI B16.5, B16.34

Note: ASME Section III components will be utilized when available.

4.0 DESIGN BASIS

4.1 The system may be designed as non-seismic category I.

4.2 The system shall be designed for long term continuous cooling for a minimum of two years.

4.3 The system shall be designed to operate with a loss of off-site power.

4.4 The system shall include a surge tank to accommodate changes in fluid volume and temperature in the closed loop. Surge volumes shall be adequate to prevent liquid or gaseous releases during system transients and startup.

4.5 The system shall have the capability to regulate the temperature and flow rate of cooling water entering the steam generator.

4.6 The system shall have the capability to preheat the feedwater to 160-180°F at flow up to 50 GPM during the filling of the steam generator.

4.7 The system shall operate independently of any cooling system for steam generator "A" to the extent that single active ... failures will not preclude cooling of the primary system.

4.8 The system shall be equipped with sufficient test and instrumentation connections for system preoperational testing and normal operation.

4.9 The system shall be designed to supply cooled water to the steam generator through the main feedwater nozzle and receive heated water through the main steam nozzle.

4.10 The system design shall employ all welded connections to the greatest extent possible to minimize system leakage.

4.11 The system shall include provisions for future addition of automatic controls and alarms without interruption of system function.

4.12 The system design shall maintain containment integrity.

4.13 The system design shall provide means for monitoring and controlling cooling water chemistry requirements as specified in Section 13.

4.14 The system design shall minimize dependence on auxiliary support systems (bearing cooling water, lubrication oil, instrument air). Loss of instrument air shall not change the operating parameters (flow and temperature) of the system.

4.15 The system pressure shall always be maintained at a pressure higher than the primary coolant pressure so there will be no leakage of primary water into the closed cooling system.

4.16 The system shall be designed to remove the required heat load with ... the variations in the temperature of the ultimate heat sink shown in Section 5.1.

4.17 This system shall have provisions for installation of a future water purification system with capability (discharge and shielding) to handle radioactive resin. Installation and startup of this equipment shall not interrupt system function.

4.18 The system shall be provided with proper overpressure relief devices. The discharge from overpressure relief devices shall be piped so as to minimize the spreading of contaminated fluids. Surge tank relief valve(s) shall be sized to protect against failures of the makeup or blanketing gas valves as applicable.

4.19 Relief valves shall also be capable of relieving the water expansion in the secondary side of the steam generator should the cooling water flow be lost. The maximum heatup rate is 50°F/Hr. The system shall have proper connections, pump suction strainer, and other provisions for flushing of new piping and components prior to startup. New piping and components shall be in a clean and neutralized state when installed. Chemical cleaning shall not be used after installation.

4.20 The cooling water systems for steam generator "B" shall be isolated from the steam generator "A" cooling water systems on both sides of the new heat exchanger.

4.12 The system shall be checked for correct valve alignment. Those items which could interfere with the proper function of the system shall be locked out. Vents and drains shall be provided.

4.22 Provision shall be made to hold up any system leakage or drainage (on feedwater and SSCCW sides) prior to release to uncontrolled drainage systems.

4.23 Provisions shall be made to make small incremental changes in feedwater flow (± 25 gpm) to the steam generator and to reduce total flow to a maximum of 10-50 gpm during filling.

4.24 The system shall have provisions for nitrogen addition during fill of the steam generator if required.

4.25 Provisions shall be made to manually supply makeup at system pressure without interruption of system operation. Demand shall be indicated by a low level alarm on the surge tank.

4.26 A recirculation line to meet the minimum flow requirements of the pump shall be provided.

4.27 Loss of system function shall be alarmed in the control room.

5.0 SIZING REQUIREMENTS

5.1 The system shall be designed to meet the following requirements:

(a)	flow through steam generator	3000 to 5000 gpm
(b)	steam generator inlet temperature	80°F
(c)	steam generator outlet temperature	80°F-250°F
(d)	design pressure	650 psi
(e)	river water temperatures	34° to 85°F
(f)	river water flow rate	as required to remove heat load
(g)	heat exchanger duty	30 x 10^6Btu/hr. (includes heat from 1 RC Pump)

6.0 LAYOUT REQUIREMENTS

6.1 The system equipment shall be located to facilitate construction and future modifications, and ease the access during operation.

6.2 The system flow path shall consist of cooled water entering the steam generator through the main feedwater nozzle exiting the steam generator through a main steam line, entering the new heat exchanger (cooler), and returning to the steam generator using the new system pump.

10.8 Electrical load list (to be confirmed):

Load	Hp	Voltage	Source
a) PGE Decay Heat Pump/WPPS	700	4000	Bus 2-4
b) Nuclear Services River Water Pump NR-P-1C or 1D	400	4000	Bus 2-4E
c) Secondary Services Closed Cooling Water Pump SC-P-1B or 1C	200	460	Bus 2-41B

10.9 "Criteria for General Modification to the BOP Electrical System" are applicable. Also refer to "Criteria for Loss of Off-Site BOP Electrical Power."

11.0 TESTING REQUIREMENTS

Provisions shall be made for preoperational testing of the system, including hydrostatic tests and flushing of new piping.

Flanges shall be provided at the new pump suction and discharge to isolate the pump during system hydrostatic testing if required to protect the pump seals.

12.0 INSTRUMENTATION AND CONTROL REQUIREMENTS

12.1 The system shall be designed to provide instrumentation sufficient to monitor functional performance requirements including:

(a) pump discharge pressure, 0-800 psig
(b) steam generator inlet and outlet temperatures, 50-250°F
(c) flow rate, nominally 3000 gpm, maximum 5000 gpm
(d) river water inlet and outlet temperatures, 0-100°F
(e) surge tank high and low indication and alarms

12.2 Critical instrumentation shall be duplicated, specifically, independent sensors and indicators for steam generator inlet and outlet temperatures and system flow rate.

12.3 Area radiation monitoring shall be provided where the equipment and components are installed.

12.4 The attached list of instrumentation shall be operable when the system is placed in service.

12.5 Instruments, including power supply, shall be independent from instrumentation for steam generator "A". Instruments shall be supplied from an even-numbered plant instrument bus. If available, uninterruptible power shall be used.

12.6 Control circuits for existing equipment shall be reviewed to ensure that no spurious automatic, manual, or interlock signals will cause incorrect operation of the system. Specifically, all automatic emergency feedwater actuation signals shall be defeated and all automatic control signals to the feedwater control valves shall be disabled.

12.7 Provisions shall be made for locating controls and remote indicators in the Unit 2 control room (future).

12.8 Controls and indicators are to be segregated from those for steam generator "A", using a separate panel or a separate section of a common panel.

12.9 Control shall be manual. Run/off/trip indicator lights shall be provided for motors; open/close/trip lights shall be provided for valves.

12.10 Control cables should have 50%, and preferable 100%, to allow for future modifications.

12.11 Radiation monitoring and alarms shall be provided at the outlet of the steam generator and at the secondary services closed cooling water outlet of the new heat exchanger. The monitors shall be capable of detecting leakage from the reactor coolant system into the steam generator or the secondary services closed cooling water system.

12.12 Thermowells capable of using mercury glass thermometers shall be provided as close as practical to the steam generator inlet and outlet.

13.0 WATER CHEMISTRY

13.1 The system water chemistry for the steam generator shall be maintained in accordance with the following:

(a)	pH @ 77°F	9.3-10.5 (controlled by NH_4 OH addition)
(b)	O_2 dissolved	100 ppb Max. $_2$ (OTSG 300°F)
(c)	Cation conductivity	10 umho / cm, Max
(d)	Hydrazine	At least 300% of stoichiometric O_2 concentration

13.2 The makeup and fill water chemistry for the steam generator shall be in accordance with the following:

O_2 dissolved	100 ppb Max$_2$ (OTSG 300°F)
Cation conductivity	1 umho / cm Max.

13.3 Means shall be provided to add ammonia hydrozide and hydrazine to the system associated with the steam generator. The chemical addition point shall be downstream of the future water purification system.

B. Secondary System

ITEM	MEASUREMENT	RANGE OF INTEREST	DESIRED ACCURACY	BACK-UP MEASUREMENT	COMMENTS
1	Steam Generator A Level	0-600"	± 30"		Comp. I.D. 0009 (Required only if steaming.)
2	Steam Generator B Level	0-600"	± 30"		Comp. I.D. 0001 (Required only if steaming.)
3	Steam Generator A Outlet Pressure	0-300 psig	± 15 psi	Item I.4	
4	Steam Generator B Outlet Pressure	0-300 psig	± 15 psi	Item I.5	
5	Steam Generator A Main Feedwater Flow	0-7000 gpm	± 50 gpm	Item II.B.1	
6	Steam Generator B Main Feedwater Flow	0-7000 gpm	± 50 gpm	Item II.B.2	
7	Steam Generator A Start-Up Feedwater Flow	0-500 gpm	± 10 gpm		(Required only if steaming.)
8	Steam Generator B Start-Up Feedwater Flow	0-500 gpm	± 10 gpm		(Required only if steaming.)
9	Steam Generator A Outlet Temperature	0-250 F	± 2 F		(Required only for solid secondary.)
10	Steam Generator B Outlet Temperature	0-250 F	± 2 F		(Required only for solid secondary.)
11	Steam Generator A Feed Temperature	0-150 F	± 2 F	Item II.B.10	Comp. I.D. 0491
12	Steam Generator B Feed Temperature	0-150 F	± 2 F	Item II.B.9	Comp. I.D. 0492
13	Steam Generator A Downcomer Temperature	0-150 F	± 2 F		Comp. I.D. 0459
14	Steam Generator B Downcomer Temperature	0-150 F	± 2 F		Comp. I.D. 0470
15	surge tank level				
16	radiation monitor				

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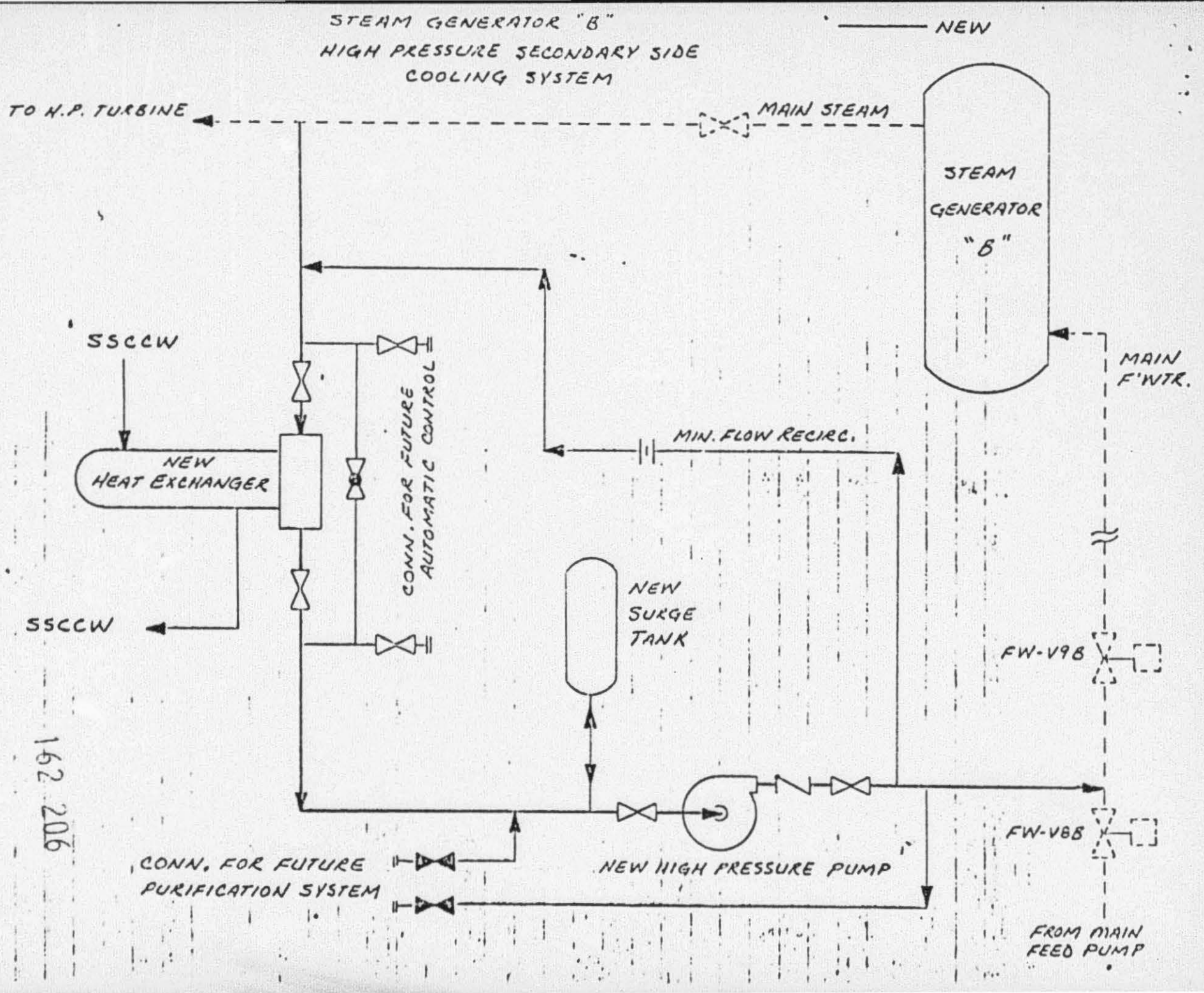
STEAM GENERATOR "B"
HIGH PRESSURE SECONDARY SIDE
COOLING SYSTEM
NEW
TO H.P. TURBINE
MAIN STEAM
STEAM GENERATOR "B"
MAIN F'WTR.
SSCCW
NEW HEAT EXCHANGER
CONN. FOR FUTURE AUTOMATIC CONTROL
MIN. FLOW RECIRC.
SSCCW
NEW SURGE TANK
FW-V9B
FW-V8B
CONN. FOR FUTURE PURIFICATION SYSTEM
NEW HIGH PRESSURE PUMP
FROM MAIN FEED PUMP
162 206