

This document and the design it covers are the property of BECHTEL. They are merely loaned and on the borrower's express agreement that they will not be reproduced, copied, loaned, exhibited, or used except in the limited way and private use permitted by any written consent given by the lender to the borrower.

GPD-1322-A Rev. 1/77

SYSTEM DESCRIPTION

CONDENSATE POLISHING DEMINERALIZER SYSTEM

REFERENCES: P&ID 5177-088-M-3
P&ID 5177-088-M-5
P&ID 5177-090-M-3
P&ID 5177-086-M-3
FLOW DIAGRAM 5177-088-M-2

PC/M.78-81B/82B

△					
△					
△					
△	4.17.80	Reissued for Use	HLC	RP	JHK
△	4.17.79	Issued for Use	HLC	RP	JHK
No.	DATE	REVISION	BY	CH'K	GS
GAITHERSBURG POWER DIVISION		FLORIDA POWER & LIGHT COMPANY TURKEY POINT UNITS 3 & 4		SPEC. No.	
8007280 551				5177-088-M-1 Sheet 1 of 17	
				REV. 1	

This document and the design it covers are the property of BECHTEL. They are merely loaned and on the borrower's express agreement that they will not be reproduced, copied, loaned, exhibited, or used except in the limited way and private use permitted by any written consent given by the lender to the borrower.

ED-22 (3/74)



TPO

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

TABLE OF CONTENTS

- 1.0 FUNCTION
- 2.0 DESIGN BASES
 - 2.1 SAFETY DESIGN BASIS
 - 2.2 POWER GENERATION DESIGN BASIS
 - 2.3 CODES AND STANDARDS
- 3.0 DESCRIPTION
 - 3.1 GENERAL DESCRIPTION
 - 3.2 SYSTEM OPERATION
 - 3.3 COMPONENT DESCRIPTION
- 4.0 UNRESOLVED MATTERS
- 5.0 REFERENCES

NUMBER
5177-088-M-1

SHEET 2 OF 17

DATE

1.0 FUNCTION

- 1.1 The condensate polishing demineralizer system purifies the condensate by filtration and demineralization to provide high quality condensate water to Turkey Point Units 3 and 4 steam generators. When in use, the system treats full condensate flow discharged from the condensate pumps. The system is also operated during feedwater recirculation and secondary system wet layup operation.
- 1.2 In addition to the filter/demineralizers, the condensate polishing demineralizer system includes precoat and spent resin handling subsystems. The precoat subsystem is used to evenly distribute powdered resins across the resin retention elements within the filter/demineralizers. The spent resin handling subsystem is used to transfer exhausted resins out of the filter/demineralizers and provides a means to discard the exhausted resins.

1

1

2.0 DESIGN BASES

2.1 SAFETY DESIGN BASIS

The condensate polishing demineralizer system is not safety related and has no safety design basis. The system is designed to Quality Group D as defined in Reg. Guide 1.26.

2.2 POWER GENERATION DESIGN BASIS

- A. The system is designed to filter and demineralize the condensate at a normal operating flow rate of 13,880 gpm and normal operating temperature of 108.7 F with a maximum temperature of 140 F.
- B. The condensate polishing demineralizer system is designed to treat the condensate at a normal operating flow rate of 13,880 gpm, with flow rate not exceeding 3.5 gpm/ft² of ion exchange bed area.

1



TPO

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER

5177-088-M-1

SHEET

3

OF

17

DATE



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER 5177-088-M-1		
SHEET	4	OF 17
DATE		

C. The condensate polishing demineralizer system is designed to maintain required effluent quality during normal operation, startup operation and condenser leak conditions. The performance requirements under each operating condition are described below:

1. Startup Operation

<u>Constituent</u>	<u>Influent, ppb</u>	<u>Effluent, ppb</u>
Total Solids	500-10,000	250
Iron (as Fe)	2,000	100
Silica (as SiO)	500	25
pH	9.1-9.6	9.1-9.6

2. Normal Operation

<u>Constituent</u>	<u>Influent, ppb</u>	<u>Effluent, ppb</u>
Total solids	100	10 max.
Iron (as Fe)	20	5 max.
Sodium (as Na)	25	1.0 max.
Silica (as SiO)	25	10 max.
pH	9.1-9.6	9.1-9.6
Cation Conductivity (micromho/cm)		0.1

3. Condenser Leak Operation

a. Condenser Leakage Criteria

- 1) Allowable leakage based on unit operation for one hour:

The condensate polishing demineralizer system is designed to allow 0.15 gpm maximum continuous condenser leakage without exceeding 0.15 ppm chloride in the steam generators.

This document and the design it covers are the property of BECHTEL. They are merely loaned and on the borrower's express agreement that they, ... reproduced, copied, loaned, exhibited, or used except in the limited way and private use permitted by any written consent given by the lender to the borrower.

2) Allowable leakage based on unit continuous operation:

The unit is designed to operate continuously under a maximum continuous condenser tube leakage rate of 0.01 gpm without exceeding 0.15 ppm chloride in the steam generators.

D. The condensate polishing demineralizer system is designed for the pressure drop, from system inlet to system outlet, not to exceed 13 psi with resin in clean condition, and 26 psi with resin dirty.

E. DELETED

F. In case of primary to secondary leakage, the system may be isolated by the operator upon receipt of a high radiation alarm from steam generator blowdown line. The main bypass valve can be opened to allow normal operation of the plant.

G. The precoat subsystem is designed to deliver powdered resin in a slurry form to the surface of the precoat retention media in the filter/demineralizer vessel to provide a uniform distribution of the resin on the retention media.

1
1
1



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER		
5177-088-M-1		
SHEET	5	OF 17
DATE		



The precoat subsystem is designed to use a mixture of powdered cation and anion resins in a ratio ranging from 3 cation/1 anion to 1 cation/1 anion. The subsystem is designed to precoat the filter/demineralizer vessels with powdered resins at a resin loading of 0.2 lb/ft² (dry weight). The subsystem is designed to precoat one filter/demineralizer vessel to the maximum resin loading of approximately 300 lb. dry weight, in one cycle of operation.

- H. The spent resin handling subsystem is designed to (1) process the backwashed resin slurry discharged from the filter/demineralizer vessel, (2) prepare the resin slurry in a concentrated form in a range of 30-50 percent (by weight) for disposal.
- I. The condensate polishing demineralizer system is unitized, one for Unit 3 and one for Unit 4.
- J. The system is designed to process full condensate flow of 13,880 gpm.
- K. The system is designed to assure that all vessels which are in service share the flow equally.
- L. Deleted
- M. Deleted

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER	5177-088-M-1	
SHEET	6	OF 17
DATE		



- N. The system is designed for normal power operation. In case of loss of power, the bypass valve will open.
- O. Shielding is not provided.
- P. The system component, piping, valves, etc., is constructed of carbon steel. The vessel in contact with ion exchange resin is provided with lining.

1

2.3 Codes and Standards

The condensate polishing demineralizer system is designed and constructed in accordance with the following codes and standards:

American Society for Testing and Materials
(ASTM)

American National Standards Institute (ANSI)

ASME Boiler and Pressure Vessel Code

Section II	Material Specifications
Section VIII	Division 1 - Pressure Vessels
Section IX	Welding Qualifications

Hydraulic Institute (HI)

National Electrical Manufacturers Association
(NEMA)

Institute of Electrical and Electronic Engineers
(IEEE)

Occupational Safety and Health Act Regulations
(OSHA)

Uniform Building Code (UBC)

American Petroleum Institute (API)

American Institute of Steel Construction
(AISC)

Steel Structures Painting Council (SSPC)

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1

SHEET 7 OF 17

DATE

Antifriction Bearing Manufacturers Association
(AFBMA)

Instrument Society of America (ISA)

Florida Industrial Commission Department of
Industrial Safety

South Florida Building Code

3.0 DESCRIPTION

3.1 General Description

The condensate polishing demineralizer system is a four vessel, powdered ion exchange resin system. The system, as shown on P&IDs 5177-088-M-3 and 4, consists of the following subsystems:

Filter/demineralizer
Precoat
Spent Resin Handling

- A. The filter/demineralizer subsystem consists of four condensate filter/demineralizer vessels, each with an individual hold pump, and an individual flow control valve. The filter/demineralizer vessels contain the resin and/or filter media. The hold pumps maintain the minimum condensate flow that is required for proper resin and/or filter media retention. The individual hold pump loop for each vessel can be isolated from the main condensate system. The flow control valves for the subsystem maintain an even distribution of the condensate flow through all on line units. All four filter/demineralizer units are piped in parallel.
- B. The precoat subsystem is used to place resin or filter media charges into the filter/demineralizer vessels. This subsystem consists of precoat tank and precoat pump. The precoat tank is provided with agitator to assure proper mixture of resin or filter media slurries.

1

1

1

1

1



TPO

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1
SHEET 8 OF 17
DATE



The precoat tank holds the resin mixture for precoating the filter/demineralizer unit.

- C. The spent resin handling subsystem consists of Mott PHP filter system and pressure dewatering filter system. Each system can be operated individually for batch operation. The pressure dewatering filter system is to retain larger powdex particles, while the Mott PHP filter is to retain smaller particles that the pressure dewatering filter system is unable to retain.

3.2 System Operation

A. Filter/Demineralizer Operation

The condensate polishing demineralizer system includes four filter/demineralizer vessels. Three vessels in parallel are normally used at the design flow rate. At lower flow rates either one, two, or three units may be used. The flow control valves for the system automatically divide the flow among the units in service. The master controllers for these valves may be switched to obtain either the lowest total system differential pressure possible, or a constant system differential pressure; at the operator's discretion.

During normal operation the condensate will be pumped from the condenser hotwell by the condensate pumps, through the filter/demineralizer prior to entering the air ejector inter- and after-condensers and the main turbine gland seal condenser. Condensate leaving the filter/demineralizers will pass through five stages of feedwater heaters. From there, the steam

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER	
5177-088-M-1	
SHEET	OF
9	17
DATE	



generator feed pumps deliver the water through the high-pressure feedwater heaters and then to the shell side of the steam generators.

During secondary system wet layup operation, the wet layup flow is passing through the condensate polishing system at a flow rate of 1000 gpm. One or two filter/demineralizers will be in service.

When any one of the filter/demineralizer vessels is exhausted, as determined by either total volume throughput high conductivity, high differential pressure, or high sodium content in the effluent, an alarm is given. Upon the annunciation of this alarm, or after the maximum recommended vessel run length has been attained, the standby filter/demineralizer vessel is put in service by remote manual push button, and the exhausted filter/demineralizer vessel is removed from service. Supervisory control is provided by the automatic vessel mode controllers. All vessel control and service mode selection will be from the condensate polishing demineralizer system control panel. The system influent, effluent, and bypass valves are remotely operated from this control panel.

At the operator's discretion the exhausted vessel can be either placed in the "hold" mode for testing to confirm exhaustion, backwashed and left clean without a precoat, or backwashed, precoated, and placed in the "hold" position as a standby.

B. Precoat Operation

In the precoat subsystem, resin is manually loaded into the precoat tank where it is mixed with demineralized water from the backwash pump discharge. From the precoat pump the resin slurry flows to a filter/demineralizer vessel. The resin is retained on the resin retention media

1

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER	
5177-088-M-1	
SHEET	OF
10	17
DATE	



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

inside the unit by the flow through it, and the water from the slurry returns to the precoat pump suction combined with the incoming resin slurry from the precoat tank, returned to the filter/demineralizer unit.

The precoat operation is terminated by a timer set at a predetermined time, which is determined during initial startup based on completion of the resin injection and indicated by clarity of the water in the precoat tank.

C. Spent Resin Handling Subsystem Operation

The spent resin handling subsystem consists of Mott PHP filter system (PHPS) and Pressure Dewatering Filter System (PDFS).

The Subsystem arrangement is shown in P&ID 5177-088-M5.

After the resin slurry has been collected in the backwash receiver tank from the F/D vessel, the PDFS is actuated to transfer the slurry into the top of the filter media. The clean liquid returns to the receiver tank while the filter cake (30-50% dry wt. resin) is collected in the Tote Box for disposal.

The PHP system will be initiated either prior to or immediately after the termination of the PDFS operation. This system is to retain the smaller size resin particles the PDFS is unable to retain. The PHP vessel houses the filter elements constructed of porous stainless steel (Porous size as small as 0.5 m). The filter is capable of retaining all the 200-400 mesh resin (74-47 micron). The resin retained on the element will be backwashed, discharged to the receiver tank and eventually collected in the PDFS in the subsequent filtration operation.

NUMBER	
5177-088-M-1	
SHEET	OF
11	17
DATE	

3.3 Component Description (Each Unit)

A. Filter/Demineralizer Vessels (3T66A, B, C & D; 4T66A, B, C & D)

1. Quantity 4
2. Type Vertical, cylindrical
3. Active ion exchange area when precoated 1500 ft²
4. Maximum recommended flow rate 3.5 gpm/ft²
5. Minimum flow rate for resin retention (Later) gpm/ft²
6. Shell material/Size CS/78" ϕ .x.7'-10" St.
7. Lining material Plaste 7155
8. Number of filter elements
9. Element O.D./spacing between elements 2/1 inch/inch
10. Length of element 70 inch
11. Vessel design pressure/temperature 545/600 psig/F
12. Vessel weight empty/operating 16,000/33,000 lbs/lbs
13. Code ASME VIII, Div. 1
14. Location Outdoor
15. Manufacturer Graver

B. Hold Pumps (3P86A, B, C & D; 4P86A, B, C & D)

1. Quantity 4
2. Type Horizontal, centrifugal
3. Total capacity/TDH/NPSH, gpm/ft/ft
 - design 165/60/(Later)
 - shutoff 0/72/NA
4. NPSH available at 165 gpm (Later) ft
5. Fluid Condensate
6. Design pressure 545 psig
7. Design temperature 200 F
8. BHP at design 2.8
9. Material:Casing/Impeller Cast Steel/SS
10. Design Hydraulic Institute
11. Pump motor
 - characteristics 460V, 3 ϕ , 60HZ
 - classification NEMA B Insulation
12. Total weight (Later) lbs
13. Location Outdoor
14. Manufacturer (Later)



TPO

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER

5177-088-M-1

SHEET

12

OF

17

DATE

- C. Backwash Pump (3P88A, 4P88A)
1. Quantity
 2. Type
 3. Total capacity/TDE/NPSH,
 - design
 - shutoff
 4. NPSH available
 5. Fluid
 6. Design pressure
 7. Design temperature
 8. BHP at design
 9. Material: Casing/Impeller
 10. Design Standard
 11. Pump motor
 - characteristics
 - classification
 12. Total weight
 13. Location
 14. Manufacturer
- D. Deleted

Horizontal, centrifugal
gpm/ft/ft

375/60/Later
0/72/NA

(Later) ft
Condensate
150 psig
(Later) F
7.1
Ductile Iron/S.S.
Hydraulic Institute

460V, 3Ø 60HZ
NEMA B Insulation
(Later) lbs
Outdoor
(Later)



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1

SHEET 13 OF 17

DATE

ED-22 (3/74)



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1
SHEET 14 OF 17
DATE

- E. Precoat Tank (3T67, 4T67)
1. Quantity 1
 2. Type Vertical, cylindrical
 3. Design pressure Atmospheric
 4. Design temperature (Later) F
 5. Capacity (Later) gal
 6. Tank material/Size CS/60" ϕ x 5'-0" High
 7. Lining material Plasite 7155
 8. Weight, empty/operating (Later) lbs/(Later) lbs
 9. Agitator motor HP $\frac{1}{2}$
 10. Code API-650 as design guide
 11. Location Indoor
 12. Manufacturer (Later)
- F. Precoat Pumps (3P87, 4P87)
1. Quantity 1
 2. Type Horizontal, centrifugal
 3. Total capacity/TDE/NPSH, gpm/ft/ft
 - design 1940/60/Later
 - shutoff 0/75/NA
 4. NPSH available (Later) ft
 5. Fluid Condensate
 6. Design pressure 150 psig
 7. Design temperature (Later) F
 8. BHP at design 33.8
 9. Material:Casing/Impeller Ductile Iron/SS
 10. Design standard Hydraulic Institute
 11. Pump motor
 - characteristics 460V, 3 ϕ 60 HZ
 - classification NEMA B Insulation
 12. Total weight (Later) lbs
 13. Location Indoor
 14. Manufacturer (Later)
- G. Air Surge Reservoir (3T68, 4T68)
1. Quantity 1
 2. Type Vertical, cylindrical
 3. Design pressure 125 psig
 4. Design temperature 110 F
 5. Capacity (Later) gal
 6. Tank material CS/96" ϕ x 10'-0" St.
 7. Weight, empty/operating (Later) lbs/(Later) lbs
 8. Code ASME SECT. VIII, Div. 1
 9. Location Outdoor
 10. Manufacturer (Later)

H. through N. eted

O. Backwash Receiver Tank

- | | |
|------------------------------|---------------------------|
| 1. Quantity | |
| 2. Type | Vertical, cylindrical |
| 3. Design pressure | Atmospheric |
| 4. Design temperature | 200F |
| 5. Capacity | 10,000 gallons |
| 6. Tank material | CS |
| 7. Lining material | Platsite 7155 |
| 8. Size | 144" ϕ x 13'-0" High |
| 9. Weight, empty / operating | (Later) |
| 10. Code | API-650 as design guide |
| 11. Location | Outdoor |
| 12. Manufacturer | (Later) |

P. Liquid Backwash Filter

- | | |
|-----------------------|--------------------------------------|
| 1. Quantity | 1 |
| 2. Type | Mott PHP filter, Cat. No.
(Later) |
| 3. Design pressure | 150 |
| 4. Design temperature | 200 |
| 5. Capacity | (Later) |
| 6. Housing diameter | (Later) |
| 7. Porous length | (Later) |
| 8. Material | CS |
| 9. Filter grade | (Later) Micron |

Q. PHP Filter Pump

- | | |
|---------------------------------------|-------------------------|
| 1. Quantity | 1 |
| 2. Type | Horizontal, centrifugal |
| 3. Total capacity/TDH/NPSH, gpm/ft/ft | |
| - design | (Later) |
| - shutoff | (Later) |
| -runout | (Later) |



SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1
SHEET 15 OF 17
DATE

This document and the design it covers are the property of BECHTEL. They are merely loaned and on the borrower's express agreement that they will not be reproduced, copied, loaned, exhibited, or used except in the limited way and private use permitted by any written consent given by the lender to the borrower.

ED-22 (3/74)



Q. Cont.

- | | |
|-----------------------|---------------------|
| 4. NPSH available | (Later) ft |
| 5. Fluid | Condensate |
| 6. Design pressure | (Later) psig |
| 7. Design temperature | (Later) F |
| 8. BHP at design | (Later) |
| 9. Material | (Later) |
| 10. Design standard | Hydraulic Institute |
| 11. Pump motor | |
| - characteristics | (Later) |
| - classification | (Later) |
| 12. Total Weight | (Later) lbs |
| 13. Location | Outdoor |
| 14. Manufacturer | (Later) |

R. Pressure Dewatering Filter

- | | |
|-------------------------|---------|
| 1. Quantity | 1 |
| 2. Type | (Later) |
| 3. Model | (Later) |
| 4. Filter area | (Later) |
| 5. Dimension, L x W x H | (Later) |
| 6. Capacity | (Later) |

S. Diaphragm Pump

- | | |
|-----------------------|-------------------------|
| 1. Quantity | 1 |
| 2. Type | Horizontal, centrifugal |
| 3. Total capacity | (Later) |
| 4. TDH | (Later) |
| 5. NPSH | (Later) |
| 6. Fluid | Resin slurry |
| 7. Design pressure | (Later) |
| 8. Design temperature | (Later) |
| 9. Material | (Later) |
| 10. Pump driver | Compressed Air |
| 11. Total weight | (Later) |
| 12. Location | Outdoor |
| 13. Manufacturer | (Later) |

4.0 UNRESOLVED MATTERS

4.1 Deleted

4.2 Parameters in Section 3.3 for the equipment/component will be available from Seller.

4.3 Spent Resin Handling subsystem.

4.4 & 4.5 Deleted

SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER

5177-088-M-1

SHEET

16

OF

17

DATE

This document and the design it covers are the property of BECHTEL. They are merely loaned and on the borrower's express agreement that they will not be reproduced, copied, loaned, exhibited, or used except in the limited way and private use permitted by the lender to the borrower.

GPD-27092-A 9/78 (ED-22)

5.0 REFERENCES

5.1 Drawings

A. Process and Instrument Diagrams

1. P&ID 5177-088-M-3, Condensate Polishing Demineralizer System
2. P&ID 5177-088-M-5, Condensate Polishing Demineralizer Spent Resin Handling System
3. P&ID 5610-M-2, Condensate and Feedwater System
4. P&ID 5177-090-M-3, Demineralized Water Storage and Deaeration System
5. P&ID 5177-086-M-3, Secondary System Wet Lay-up System
6. 5610-M-21, Heat Balance, 100% of Rated Flow

B. System Flow Diagram

5177-088-M-2, Condensate Polishing Demineralizer System

5.2 Specification

1. 5177-088-M-112, Condensate Polishing Demineralizer
2. Deleted

5.3 Turkey Point Units 3 & 4 Plant Design and Mechanical Design Criteria, 5177-M-000

5.4 PC/M 78-81B/82B Condensate Polishing Demineralizer System



TPO

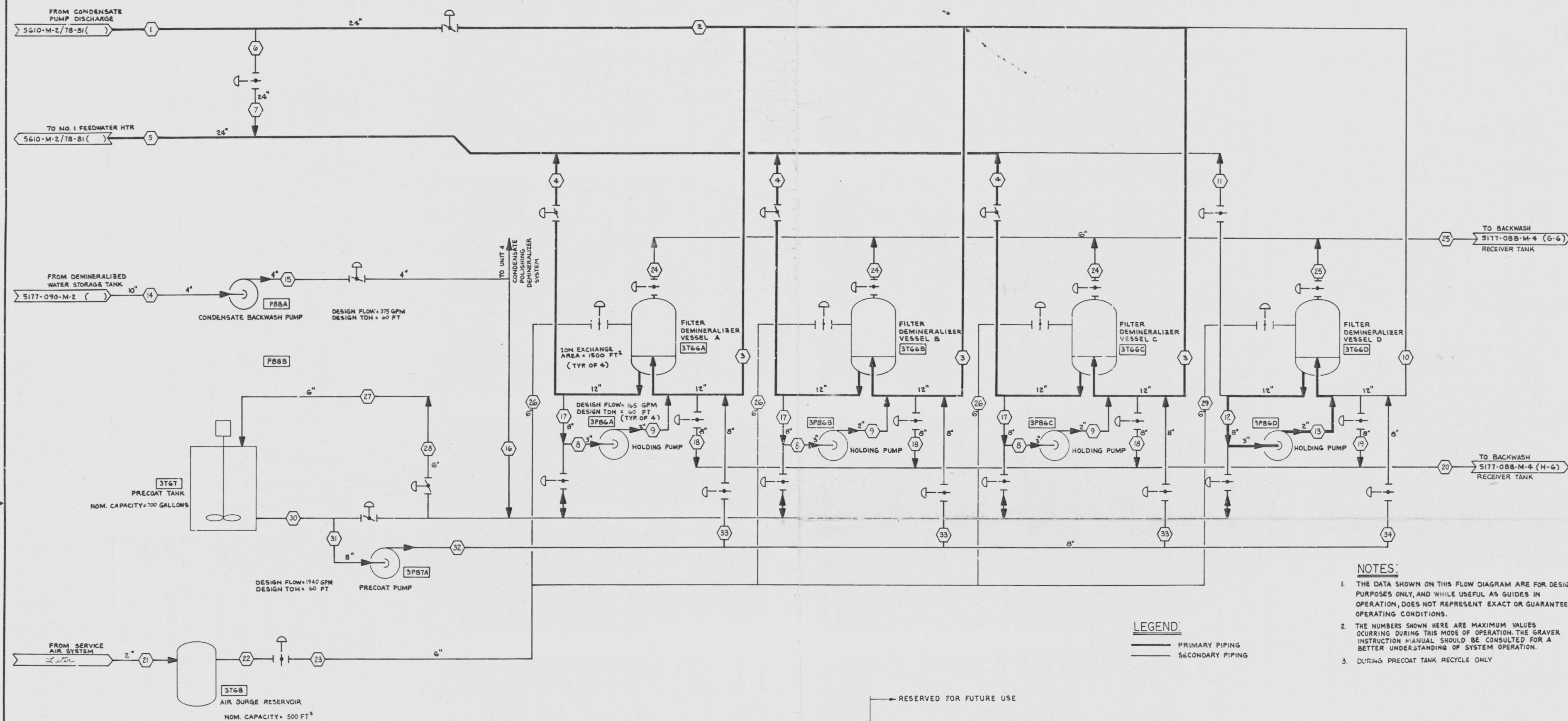
SYSTEM DESCRIPTION
CONDENSATE POLISHING
DEMINERALIZER SYSTEM

NUMBER
5177-088-M-1

SHEET 17 OF 17

DATE

5177-088-M-2



NOTES

1. THE DATA SHOWN ON THIS FLOW DIAGRAM ARE FOR DESIGN PURPOSES ONLY, AND WHILE USEFUL AS GUIDES IN OPERATION, DOES NOT REPRESENT EXACT OR GUARANTEED OPERATING CONDITIONS.
2. THE NUMBERS SHOWN HERE ARE MAXIMUM VALUES OCCURRING DURING THIS MODE OF OPERATION. THE GRAVER INSTRUCTION MANUAL SHOULD BE CONSULTED FOR A BETTER UNDERSTANDING OF SYSTEM OPERATION.
3. DURING PRE-COAT TANK RECYCLE ONLY

LEGEND

PRIMARY PIPING
SECONDARY PIPING

[illegible]

PC/M 78-81B/82B

28	FILE NUMBER:
----	--------------

TERA
APERTURE
CARD

1	5286	GENERAL UPDATE	WN 424	17	83	44
0	8177	ISSUED FOR USE	PB	INC 4	44	4247
DATE	DATE	REVISION	DATE	DATE	DATE	DATE

BECHTEL

GATHERS, MARYLA'D

FLORIDA POWER & LIGHT COMPANY

TURKEY POINT NUCLEAR UNITS

UNIT NO. 3 1970-780 MW INSTALLATION

UNIT NO. 4 1971-760 MW INSTALLATION

SYSTEM DIAGRAM

CONDENSATE POLISHING

DEMINERALIZED SYSTEM

DESIGN	PG	DATE	DATE	DATE	DATE	DATE
DATE		DRAWING NO				
1/29/79		5177-088-M-2				

FILE NUMBER:

I certify that the image contained on this frame was made in the normal and regular course of business, on the date stated below and that it is an accurate reproduction of the document(s) submitted to Micrographics.

DATE 5-21-80 OPERATOR Bruce Kroger SUPERVISOR A. J. [Signature]

8007280551