MTX 24.6

FUNCTIONAL TEST

CONDENSATE POLISHER

DOT

MTX 24.6 ✓

CATEGORY B

DRAFT Rev. 0

CONDENSATE POLISHING SYSTEM
FUNCTIONAL TEST

PREPARED: Cognizant Engineer A D Pelini Date 2/26/76

APPROVED: Lead Engineer D T English Date 3/1/76

APPROVED: Technical Engineer M A Nelson Date 4/22/76

DOT APPROVAL FOR PERFORMANCE:

GPU DOT Representative M A Nelson Date 5/13/76

Met-Ed DOT Representative [illegible] Date 5/13/76

NSSS DOT Representative N.A. Date ——

or

A-E DOT Representative P P Bramwell Date 5/15/76

TEST RESULTS: Acceptable with the following test exceptions and deficiencies-
E/D -1 thru 13

Technical Engineer M A Nelson Date 8/23/77

DOT APPROVAL OF TEST RESULTS:

GPU DOT Representative M A Nelson Date 11/17/77

Met-Ed DOT Representative J T [illegible] Date 11/17/77

NSSS DOT Representative N.A. Date ——

or

A-E DOT Representative P P Bramwell Date 11/17/77

ENCLOSURES: 1. Test Exception and Deficiency List

2. Remote Regenerating Station - Automatic Valve Operating Sequence

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Duplicate Page 0

TABLE OF EFFECTIVE PAGES

Page	Effective
1	0
2	0
3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	0
12	0
13	0
14	0
15	0
16	0
17	0
18	0
19	0
20	0
21	0
22	0
23	0

Duplicate Page 0

TMI UNIT II
TP 276/4

1.0 PURPOSE

1.1 Verify the Condensate Polishers will accommodate approximately 2500 gpm per unit. (Normally seven units in operation and one unit in standby)

1.2 Verify that resin cannot be transferred from a polishing tank to the regenerating tank while a resin bed is being regenerated.

1.3 Verify the following options provided with the automatic regeneration of resins:

1.3.1 Any timed step may be extended or repeated if resin has not been or is not being transferred to another vessel.

1.3.2 Preselected elimination of chemical treatment.

1.4 Verify automatic resin transfer.

1.5 Verify the operability of the Ammonia and Hydrazine injection system to the effluent of the Condensate Polishers.

1.6 During the regeneration cycle, verify the automatic valves operate properly and record sequence step timer settings.

Duplicate Page 0

2.0 REFERENCES

2.1 Burns and Roe, Inc. Flow Diagrams

2.1.1 Make-Up Water Treatment and Condensate Polishing (2006, Rev. 18)

2.2 L*A Water Conditioning Company Flow Diagrams

2.2.1 Condensate Demineralizer Mixed Bed Polisher System (D-4519, Rev. E) (B+R # 15-00-0403)

2.2.2 Condensate Demineralizer External Regeneration System (D-4522, Rev. I) (B+R # 15-00-0406)

2.3 Vendor Manuals

2.3.1 L*A Water Purification System, Volume I (1500)

2.4 FSAR, Section 10.4.6, Amendment No. 56

2.5 2106-2.2, Condensate Polishing System, February, 1976

2.6 L*A Water Conditioning Co. Drawings

2.6.1 D-3835, Rev. F (15-00-0216)

2.6.2 D-3836, Rev. D (B+R # 15-00-0217)

2.6.3 D-4051, Rev. E (B+R # 15-00-0518)

2.6.4 D-4088, Rev. C (B+R # 15-00-0519)

2.6.5 D-4767, Rev. C (B+R # 15-00-0520)

Duplicate Page 0

3.0 TIME REQUIRED

3.1 Three men, three shifts.

Duplicate Page 0

4.0 PREREQUISITES

4.1 Tests

The following tests have been completed sufficiently to support performance of this test procedure.

4.1.1 TP 250/2 - Instrument Calibration - MTX 24.1

Signature _____ Date 5-3-77

4.1.2 TP 250/2 - Electrical Test - MTX 24.2

Signature _____ Date 5-3-77

4.1.3 TP 250/1 - Pressure Test - MTX 24.3

Signature _____ Date 5-3-77

4.1.4 TP 250/4 - Flush - MTX 24.4

Signature _____ Date 5-3-77

4.1.5 TP 250/2 - Preliminary Operational Test - MTX 24.5

Signature _____ Date 5-3-77

4.2 Construction Completion Status

4.2.1 Met-Ed has accepted the system for preoperational testing.

Signature _____ Date 5-3-77

Duplicate Page 0

4.3 Environmental Conditions

4.3.1 No special environmental conditions are required.

Signature _____ Date _____

Duplicate Page 0

5.0 TEST EQUIPMENT

5.1 None

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6.0 LIMITATIONS AND PRECAUTIONS

6.1 Remove a polisher from service when an alarm annunciates polisher low flow or high pressure drop across the resin trap, and ensure there has been no resin loss due to underdrain screen break.

6.2 Adequate safety precautions for strong chemical solutions must be observed when working with caustic or acid.

Duplicate Page 0

7.0 PLANT STATUS

7.1 Instrument Air available for the performance of this test.

Signature _____ Date 5-3-77

7.2 Service Air available for the performance of this test.

Signature _____ Date 5-3-77

7.3 Demineralized Service Water available for the performance of this test.

Signature _____ Date 5-3-77

7.4 Condensate System in operation to support the performance of this test.

Signature _____ Date 5-3-77

7.5 Secondary Sampling System in operation to support the performance of this test.

Signature _____ Date 5-3-77

Duplicate Page 0

8.1 The Condensate Polishing System is in normal operation in accordance with 2106-2.2 with polisher number one in standby status.

Signature [signature] Date 5-30-77

8.2 The spare resin bed is located in the mixing and storage tank.

Signature _____ Date _____

8.3 The hydrazine and ammonium hydroxide chemical injection is in operation.

Signature [signature] Date 5-30-77

9.0 TEST METHOD

NOTE: The sequence of testing of major sections is optional.

9.1 This section verifies that the Condensate Polishers will accommodate approximately 2500 gpm per unit.

NOTE: Depending on the plant conditions that exist at the time of this test any two polishers may be used in Sections 9.1.2 and 9.1.3.

9.1.1 Record in section 10.1.1 the flow rate through each in-service polisher, the differential pressure across each in-service polisher, and the outlet conductivity for each in-service polisher.

9.1.2 Place the standby polisher in-service and remove polisher number eight (CO-K-1A) from service per 2106-2?.

9.1.3 Record in section 10.1.3 the flow rate through polisher number one (CO-K-1H), the differential pressure across polisher number one, and the outlet conductivity for polisher number one.

Section 9.1 Accomplished Sat._____ Unsat._____

Signature_____Date_____

.2 This section verifies that resin cannot be transferred from a polishing tank to the regenerating tank while a resin bed is being regenerated.

9.2.1 On Panel 304, select and initiate module G (storage tank refill and final rinse).

Duplicate Page 0

9.2.2 With module G energized, attempt to OPEN valve C-1 (resin inlet to regenerating tank) using the valve control switch. Record results in Section 10.2.2.

Section 9.2 Accomplished Sat. ✓ Unsat. _____

Signature John C. Ulrich Date 8-4-77

9.3 This section verifies the following:

(a) Any timed step may be extended or repeated if resin has not been or is not being transferred to another vessel.

(b) Preselected elimination of chemical treatment.

(c) Automatic resin transfer.

(d) Automatic valves operate properly

(e) Sequence step timer settings are recorded.

A/D 9.3.1 Record all sequence step timer settings from Panel 304 in Section 10.3.1

Note: For all the following regeneration or transfer steps, observe that the automatic valves operate properly as per Enclosure 2.

E-11 E-6 E-5 E-2 9.3.2 Depress module J "Start" pushbutton. Observe that resin is automatically transferred to the regenerating tank. During regeneration record acid and caustic conductivity from panel 304. Take a grab sample ~~from sample~~ from sample valves located near the conductivity Elements to check acid and caustic specific gravity. Record data in Section 10.3.2.

Duplicate Page 0

9.3.3 Set the module H Selector Switch to the module C position.

Depress module H "Initiate" pushbutton. During the first timed step of module H (step 25), place the TIME - EXTEND Switch in the EXTEND position. Observe that timer THI stops. Extend this step for five minutes, then return the TIME - EXTEND Switch to the TIME position. Observe that timer THI starts. Record data in Section 10.3.3.

9.3.4 Depress the module H "Repeat" pushbutton. Observe that Step 25 is repeated. Record data in Section 10.3.4.

9.3.5 After the completion of section 9.3.4 verify that the Condensate Polishing Unit continues through the remaining steps automatically.

9.3.6 Verify Condensate Polishing Unit and the valves listed in Enclosure 2 operate properly by recording results in section 10.3.6.

9.3.7 After resin has been transferred to storage tk. verify the operation of module J.

Section 9.3 Accomplished Sat. ✓ Unsat. _____

Signature Andrej Domingue Date 8-4-77

Duplicate Page 0

9.4 This section verifies the operability of the Ammonia and Hydrazine injection system to the effluent of the Condensate Polishers.

E-12-

9.4.1 Note the reading on the Panel 310 recorder (SS-CR-3152) for hydrazine concentration at the condensate booster pump discharge. Note the reading on the Panel 310 recorder (SS-CR-3151) for pH at the polisher effluent.

9.4.2 Start chemical injection system by placing the Panel 305 control switches for AM-P-1A and AM-P-2 in AUTO.

9.4.3 Operate the chemical injection system for a period of eight hours to check for proper automatic operation. Record data in Section 10.4.3.

Section 9.4 Accomplished Sat._____ Unsat._____.

Signature_____Date_____

9.5 Return the system to Met-Ed for normal operation per 2106-2.2.

Signature Robert Dominguez Date 8-4-77

Duplicate Page 0

TP #	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT / ORG.	DATE
5.1.1	Polisher No. 2 flowrate	____gpm	~~≥ 2500 gpm~~		
	Polisher No. 2 inlet pressure	____psig	N.A.		
	Polisher No. 2 outlet pressure	____psig	N.A.		
5.5	Polisher No. 2 differential press = inlet press. - outlet press.	____psid	35-45 psid		
5.5	Polisher No. 2 outlet conductivity	____umhos	0.05 - 0.30 ~~0.12-0.15~~ umhos		
5.5	Polisher No. 3 flowrate	____gpm	~~≥ 2500 gpm~~		
	Polisher No. 3 inlet pressure	____psig	N.A.		
	Polisher No. 3 outlet pressure	____psig	N.A.		
5.5	Polisher No. 3 differential press = inlet press. - outlet press.	____psid	35-45 psid		
5.5	Polisher No. 3 outlet conductivity	____umhos	0.05 - 0.30 ~~0.12-0.15~~ umhos		

Duplicate Page 0

TP S.	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT / ORG.	DATE
D.1.1 E 5	Polisher No. 4 flowrate	____gpm	≥ 2500 gpm ~~≥ 2500 gpm~~		
	Polisher No. 4 inlet press.	____psig	N.A.		
	Polisher No. 4 outlet press.	____psig	N.A.		
E 5	Polisher No. 4 differential Press = inlet press. - outlet press.	____psid	20 35-45 psid		
E 5	Polisher No. 4 outlet conductivity	____umhos	0.05-0.30 ~~0.12-0.15~~ umhos		
E 5	Polisher No. 5 flowrate	____gpm	~~≥ 2500 gpm~~ ≥ 2500 gpm		
	Polisher No. 5 inlet press.	____psig	N.A.		
	Polisher No. 5 outlet press.	____psig	N.A.		
E 5	Polisher No. 5 differential press = inlet press. - outlet press.	____psid	20 35-45 psid		
E 5	Polisher No. 5 outlet conductivity	____umhos	0.05-0.30 ~~0.12-0.15~~ umhos		

Duplicate Page 0

	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT./ORG.	DATE
.1.1	Polisher No. 6 flowrate	____gpm	≥ 2500 gpm		
	Polisher No. 6 inlet press.	____psig	N.A.		
	Polisher No. 6 outlet press.	____psig	N.A.		
	Polisher No. 6 differential press = inlet press. - outlet press.	____psid	35-45 psid		
	Polisher No. 6 outlet conductivity	____umhos	0.12-0.15 umhos		
	Polisher No. 7 flowrate	____gpm	≥ 2500 gpm		
	Polisher No. 7 inlet press.	____psig	N.A.		
	Polisher No. 7 outlet press.	____psig	N.A.		
	Polisher No. 7 differential press. = inlet press. - outlet press.	____psid	35-45 psid		
	Polisher No. 7 outlet conductivity	____umhos	0.12-0.15 umhos		

Duplicate Page 0

...UP ...O.	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	UNIT / ORG.	DATE
).1.1 C 5	Polisher No. 8 flowrate	____gpm	≥ 2500 gpm [illegible]		
	Polisher No. 8 inlet press.	____psig	N.A.		
	Polisher No. 8 outlet press.	____psig	N.A.		
5	Polisher No. 8 differential press. = inlet press. - outlet press..	____psid	35-45 psid		
5	Polisher No. 8 outlet conductivity	____umhos	0.05-0.30 ~~0.12-0.15~~ umhos		
11.3 5	Polisher No. 1 flowrate	____gpm	~~≥ 2500 gpm~~ [illegible]		
	Polisher No. 1 inlet press.	____psig	N.A.		
	Polisher No. 1 outlet press.	____psig	N.A.		
5	Polisher No. 1 differential press. = inlet press. - outlet press.	____psid	35-45 psid		
5	Polisher No. 1 outlet conductivity	____umhos	0.05-0.30 ~~0.12-0.15~~ umhos		

Duplicate Page 0

	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT / ORG.	DATE
.2.2	Feedwater transfer to the regenerated tank is prevented with module G energized.	✓ Yes ___ No.	Yes	AID / GPU	8-2-77
.3.1	Step 16 timer setting	15 min.	N.A.	AID / GPU	8-2-77 ~~7-8-77~~
	Step 16A timer setting	2 min.	N.A.	AID / GPU	8-2-77 ~~7-8-77~~
	Step 17 timer setting	10 min.	N.A.	AID / GPU	8-2-77 ~~7-8-77~~
	Step 18 timer setting	15 min.	N.A.	AID / GPU	8-2-77 ~~7-8-77~~
	Step 19 timer setting	100 min.	N.A.	AID / GPU	7-8-77
	Step 20 timer setting	60 min.	N.A.	AID / GPU	7-8-77
	Step 21 timer setting	20 min.	N.A.	AID / GPU	7-8-77
	Step 10 timer setting	0 min.	N.A.	AID / GPU	7-8-77
	Step 11 timer setting	0 min.	N.A.	AID / GPU	7-8-77

Duplicate Page 0

ID	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT / ORG.	DATE
.3.1	Step 12 timer setting	0 min.	N.A.	P/D / GPU	7-8-77
	Step 13 timer setting	0 min.	N.A.	P/D / GPU	7-8-77
	Step 14 timer setting	20 min.	N.A.	P/D / GPU	7-8-77
	Step 15 timer setting	20 min.	N.A.	P/D / GPU	7-8-77
	Step 25 timer setting	30 min.	N.A.	P/D / GPU	7-8-77
	Step 26 timer setting	10 min.	N.A.	P/D / GPU	7-8-77
	Step 27 timer setting	25 min.	N.A.	P/D / GPU	7-8-77
5.13	Step 28 timer setting	120 min.	N.A.	P/D / GPU	7-8-77
	Step 29 timer setting	30 min.	N.A.	P/D / GPU	7-8-77
	Step 21 timer setting	20 min.	N.A.	P/D / GPU	7-8-77

Duplicate Page 0

TP	DESCRIPTION OF DATA REQUIRED	DATA	ACCEPTANCE CRITERIA	INIT. / ORG.	DATE
.3.1	Step 21A timer setting	~~5~~ 4 min. 0	N.A.	A/D / GPU	8-2-77 ~~7-8-77~~
	Step 21B timer setting	10 min.	N.A.	A/D / GPU	7-8-77
	Step 22 timer setting	10 min.	N.A.	A/D / GPU	7-8-77
	Step 23 timer setting	5 min.	N.A.	A/D / GPU	7-8-77
	Step 24 timer setting	20 min.	N.A.	A/D / GPU	7-8-77
	Step 34 timer setting	0 min.	N.A.	A/D / GPU	7-8-77
E-11 .3.2	Resin transfer to regenerating tank completed satisfactorily (Resin visible in upper sight glass)	___Yes ___No	Yes		
C-5	Acid Conductivity	~~5~~ 6.0	5.5 to 6.5 7.5 to 8.5 on scale	A/D / GPU	8-3-77
	Caustic Conductivity	~~5~~ 4.5	4.5 to 5.5 on scale	~~A/D~~ A/D / GPU	8-2-77 ~~7-8-77~~

Duplicate Page 0

Step No.	Description of Data Required	Data	Acceptance Criteria	Initials / Org.	Date
10.3.2 (Cont'd) C 5	Acid Specific Gravity	[illegible]	1.048 to 1.059	R/D GPU	8-3-77
D-9	Caustic Specific Gravity	1.049	1.049 to 1.056	[illegible] GPU	8-2-77 [illegible]
10.3.3	Step 25 timer stops when in EXTEND mode	✓ Yes ___ No	Yes	R/D GPU	7-8-77
	Step 25 timer starts when in TIME mode	✓ Yes ___ No	Yes	R/D GPU	7-8-77
10.3.4	Step 25 is repeated	✓ Yes ___ No	Yes	R/D GPU	7-8-77
10.3.6	Condensate Polishing Unit and auto. valves operate properly	✓ Yes ___ No	Yes	[illegible] GPU	8-4-77
10.4.3 C 2	pH valve maintained by injection system (SS-CR-3151)	___ pH	Section 11.2		

Duplicate Page 0

Step No.	Description of Data Required	Data	Acceptance Criteria	Initials / Org.	Date
10.4.3 (cont'd)	N_2H_4 conc. maintained by injection system (SS-CR-3152)	_____ppb	Section 11.2		

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11.0 ACCEPTANCE CRITERIA

11.1 With the exception of 11.2 all acceptance criteria is included in Section 10.0.

11.2 The chemical injection system should maintain the pH at the Condensate Polisher effluent in the range 9.3 - 9.5. The chemical injection system should maintain the hydrazine concentration at the Condensate Booster Pumps discharge in the range 40 - 60 ppb.

Duplicate Page 0

ENCLOSURE 1 OF TP 276/4

COVER PAGE

The exception and deficiency consists of the following pages: 1, 2, 3

E/D	Par.	Description/Initial/Date	Justification/Resolution	Justified/ Completed Signoff	Date
E	2.1.1 2.4 2.6	[illegible] 5-7-77	Doesn't change scope or intent of TP	[illegible]	[illegible]
E	9.1.2 9.3.2	Correct typing errors to make procedure read correctly. [illegible] 5-20-77	Doesn't change the intent of the TP	[illegible]	5-[illegible]
E	8.2	[illegible]	Doesn't change the scope or intent of the TP.	[illegible]	[illegible]
E	7.4 9.1 8.1	[illegible]	Doesn't change the intent of the TP. See E-12 for final closeout for E-4 [illegible]	[illegible]	5-8-[illegible]

Duplicate Page 0

[illegible]	E/D	Par.	Description/Initial/Date	Justification/Resolution	Justified/Completed Signoff	D.
5		[illegible] D.S.R. Encl 2	[illegible] changed [illegible] changes made [illegible] [illegible]	[illegible] limits in [illegible] 1.1.2 and [illegible] of [illegible] 2 [illegible] Table 2B. Change in accordance [illegible]: Polisher Flow Rate: [illegible] ≤ Flow ≤ 2500 [illegible] Polisher Differential Pressure: 20 - 45 psid Polisher Outlet Conductivity .05 - .30 umhos Acid Conductivity 5.5 - 6.5 on scale Acid Specific Gravity 1.029 - 1.035	[illegible]	
6	E	9.3.2	Module J was not used and resin transfer was not [illegible]fied. A/D/7-8-77	Resin was manually transferred from polisher to receiving TK for this test since the spare bed has not been loaded. Module J will be verified after 9.3.6 in added step 9.3.7.	A. Dominguez	7-8
7	E	Encl 2 pg 1	Steps 10 thru 13 were not verified. A/D/7-8-77	Sulfite injection is no longer performed due to B&W recommendation.	A. Dominguez	7-8
8	E	Encl 2 pg 2	Step 16 a not verified. A/D/7-8-77	Step 16a is no longer used due to change in operating procedure and philosophy during caustic addition	A. Dominguez	7-8

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T/P 276/[illegible]

Page 2

Duplicate Page

POOR ORIGINAL

No.	E/D	Par.	Description/Initial/Date	Justification/Resolution	Justified/Completed Signoff	Date
9	D	10.3.2	Caustic specific gravity out of spec. Recorder will be calibrated and caustic SG rechecked during subsequent caustic injection R/D/7-8-77	Recorder was calibrated. Recorded also ^ controlling measurement of S.G. to be equal to S.G. = 1.056 which is acceptable. Initial SG was not temp. corrected.	R. J. Demaigney	7-...
10	E	Encl 2 pg 3	Step Sequence No 30 and 31 not verified JWB 7/5/77	Steps 30 & 31 are not used due to change in operating procedure and philosophy during ammonia addition	J. W. ...rson	7/5/77
11	E	Encl 2 10.3.2	MEC 2106-2.2 has a PCR ^mA which has made the changes reflected in the TP. JCW 7-31-77	Changed Encl 2 to reflect latest PCR ^mA	J. C. Ullrick	7-31-77
12	E	9.1 9.4	Paragraphs 9.1 & 9.4 can not be done pre-operationally & will not be performed CES 8/8/77 Conditions required can not be obtained prior to PET CES 9/1/77	Performance of the polishers will be monitored during PET and afterwards by MET-Ed Chemistry Control & operating procedures. Data taken could be of no ... in assessing unit performance.	C E Stutts	8/1/7...
13	E	10.3.1	Maximum timer setting is 120 minutes but enclosure 2 requires 150 minutes. JCW 8-17-77	Per MEC's OP the timer is put on time extend for 30 minutes or the timer is reset for 30 extra minutes to accomplish this step	J. C. Ullrick	8-17-...

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T/P 2116/4

Page 3

Duplicate Page 8

POOR ORIGINAL

MODULE		
C	Step 10	0 Min
C	Step 11	0 Min
C	Step 12	0 Min
C	Step 13	0 Min
C	Step 14	20 Min
C	Step 15	20 Min
D	Step 16	0 Min
D	Step 16A	0 Min
D	Step 17	0 Min
D	Step 18	0 Min
D	Step 19	100 Min
D	Step 20	60 Min
F	Step 21	20 Min
F	Step 21A	0 Min
F	Step 21B	10 Min
F	Step 22	10 Min
G	Step 23	5 Min
G	Step 24	20 Min
H	Step 25	30 Min
H	Step 26	10 Min
H	Step 27	25 Min
E	Step 28	120 Min
E	Step 29	30 Min

E1

4.1.3 Place Logic Module Selector Switches in the following positions:

I MI II
TP 27614
Enclosure 2
Page 1 of 4

TABLE 2B Duplicate Page 0

STEP	FUNCTION	TIME (MINS)	OPEN	CLOSE	FLOW (GPM)	REMARKS
14	Slow Backwash (Remove Fines)	20	C5 ✓ C13 ✓ X1 ✓	X2 ✓	100	If fines are not removed within 20 minutes, place extend cycle step control switch in "Extend" and allow backwash to continue until fines are removed. Then place switch back to "TIME" position and allow timer to Time Out. NOTE: Be carefull not to exceed 100 GPM in order to prevent resin loss as Outlet for this backwash is unscreened.
15	Fast Backwash	20	C5 ✓ C12 ✓ X1 ✓	X2 ✓	140	Resin separation takes place during this step. Interface can be seen in lower sightglass. It should be approximately "2" from top of glass. Anion on top, cation on bottom. Vibrator energized to prevent resin from blocking flow at screened outlet.
16	Inject Caustic NOTE: This Step in Manual. Follow 4.1.8	45	C5 ✓ C9 ✓ R5 ✓ R6 ✓ R8 ✓ X2 ✓ WT-V-320G ✓	R7 ✓ X1 ✓	Dilution 31.2 Blocking 15	Caustic concentration: 4% - 5%, Use dilute caustic conductivity recorder (Red Pen). Reading should be 4.5 - 5.5. Dilution Temp - 120°F ± 5
17	Displace Caustic NOTE: This Step is manual. Follow 4.1.9	40	C5 ✓ C9 ✓ R8 ✓ R7 ✓ X2 ✓ WT-V-320G ✓	R5 ✓ R6 ✓ X1 ✓	Dilution 31.2 Blocking 15	Dilution Temperature 120°F. X1 and X2 will cycle when waste outlet conductivity reaches 500 umho (Green Pen on conductivity recorder) If cycling is excessive place control switch for X1 and X2 in the middle position. This will keep X2 open and X1 Closed. Leave this way until conductivity is below 500 umho and then return switch to "AUTO" X1 should stay open now and X2 should stay Closed.

TABLE 2B

Duplicate Page 0

STEP	FUNCTION	TIME (MINS)	OPEN	CLOSE	FLOW (GPM)	REMARKS
18	Rinse Caustic NOTE: This Step is manual. Follow 4-2-7	25	C14 X1 WT-V-320G	X2	120	Normal rinse time is 25 minutes. If conductivity is not < 10 umho, continue rinse until it is. Use Green Pen on Conductivity Recorder.
19	Inject Acid	100	R1 R2 R4 C3 C4 X2	R3 WT-V-320G X1	Dilution 42.5 5-4	Acid Concentration: 6%, Use Dilute acid conductivity recorder (Blue Pen). Reading should be 3 - 10. Adjust WT-P-14 stroke as necessary to obtain correct concentration. Throttle WT-V-318B to obtain 42.5 GPM dilution flow as read on dilution flow recorder (Red Pen). WT-P-14 will automatically start at beginning and stop at end.
20	Displace Acid	60	R3 R4 C3 C4 X2	R1 R2 WT-V-320G X1	42.5 5-4 135-140	If Cation regeneration is good, the waste conductivity recorder (Green Pen) will remain on the upper peg. (> 1000 umho)
28	Inject Ammonia	120	R1 R2 C4 X2	X1	4.5	ENTER
29	Displace Ammonia	30	R1 C4 X2	R1 X1	45	ENTER
25	Air Lance Receiving Tank	30 10	C6 C12		145 SCFM	Mechanical Cleaning (Scrubbing).
26	Backwash Vibrate Screen	10	C5 C12		140	Backwash Impurities removed from Air Lance

IF RECORDER NOT WORKING HAVE TECH SP GR.

E-11

E-11

E-11

E-11

TAI H Unit II
TP 276/1
Enclosure 2
Page 4 of 11

TABLE 2B

Duplicate Page 0

CYCLE	STEP	FUNCTION	TIME (MINS)	OPEN	CLOSE	FLOW (GPM)	REMARKS
	27	Backwash Screen	5	C16 ✓ C4 ✓ X1 ✓	X2 ✓	70-140	Unit will automatically shift from backwash to backwash after 5 minutes.
		Unscreened Backwash	20	C5 ✓ C13 ✓ X1 ✓	X2 ✓	100	Be carefull not to exceed 100 GPM during unscreened backwash in order to prevent loss of resin
F	21	Transfer Resin to Storage Tank	20	S2 ✓ S6 ✓ C11 ✓ C8 ✓ C7 ✓ X1 ✓	X2 ✓	Sluice 75 Air 56 SCFM	~~See note preceding 212~~
	21A	Partial Refill Storage Tank	80	S11 S2		75	~~May not be used. See note preceding 212~~
	21B	Air Mix	10	S2 ✓ S7 ✓		145 SCFM	Mix anion and cation resins
F	22	Air Mix Drain Storage Tank	10	S2 ✓ S4 ✓ S7 ✓ X1 ✓	X2 ✓	145 SCFM	~~See note 2 at end of 212~~
	23	Refill Storage Tank	5	S2 ✓ S5 ✓		200	Fill for 5 minutes or until water issues from vent.
	24	Final Rinse	20	S5 ✓ S6 ✓ X1 ✓	X2 ✓	200	Final conductivity rinse to remove trace chemicals

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STEP SEQUENCE NO.	UNIT & STEP FUNCTION	VALVES OPENED	INITIALS/DATE	TIME MIN.
E-7 10.	Inject Sulfite, Receiving Tank	R9 R10 C10 C13		40
E-7 11.	Sulfite Soak Period, Receiving Tank			30
E-7 12.	Displace Sulfite, Receiving Tank	R10 C10, C13 C5		50
E-7 13.	Fast Rinse, Receiving Tank	C14 C4		5
14.	Backwash No. 1, Receiving Tank	C5 C13	11/7-8-11	20
15.	Screened Backwash, Receiving Tank	C5 C12	11/7 8 11	20

NOTE: The following options are available in this series of steps.

1. Pushbutton: Repeat Steps 10 through 15.
2. Pushbutton: Repeat Steps 13, 14, 15.
3. Pushbutton: Repeat Steps 14, 15.
4. Pushbutton: Repeat Step 15.

Step 15 may be selected to precede Step 14.

16.	Inject Caustic, Receiving Tank	R8 R5, R6 R7 closed C9, C4	11/7-8-11	45

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STEP SEQUENCE NO.	UNIT & STEP FUNCTION	VALVES OPENED	INITIALS/DATE	TIME MIN.
E-8 16a.	Backwash, Receiving Tank	C5 C13		20
17.	Displace Caustic, Receiving Tank	R8 C9, C4	[illegible]	40
18.	Rinse Caustic, Receiving Tank	C14 C4	[illegible]	25
19.	Inject Acid, Receiving Tank	R4 R1, R2 C3, C4	[illegible]	80
20.	Displace Acid, Receiving Tank	R4 C3, C4	[illegible]	50
21.	Transfer Resin, Receiving to Storage Tank	S2, S6, X1, C11, C8 C7		20
21a.	Partial Refill, Storage Tank	S11 S2		8
21b.	Air Mix	S7 S2		10
22.	Air Mix & Drain, Storage Tank	S2, S4, S7		10
23.	Refill. Storage Tank	S2 S5		5
24.	Final Rinse, Storage Tank	S5 S6, X1		20

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& STEP NCTION	VALVES OPENED	INITIALS/DATE	TIME MIN.
ance, ving Tank	C12, C6		10
wash & Vibrate en, Receiving	C12 C5		10
flush Screen, eiving Tank	C16, C4 X1		5
kwash Unscreened, eiving Tank	C5, C13, X1		20
ject Ammonia rough Full Bed, ceiving Tank	R12, C17, C4 R11		30
isplace Ammonia hrough Full Bed, eceiving Tank	R12, C17, C4		20
			33
nject Ammonia hrough Cation Bed, Receiving Tank	R12, R11, C2, C4		10
Displace Ammonia hrough Cation Bed, Receiving Tank	R12, C2, C4		

E-5

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TMI UNIT II
TP 276/4
Enclosure 2
Page 3 of 4

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STEP SEQUENCE NO.	UNIT & STEP FUNCTION	VALVES OPENED	INITIALS/DATE	TIME MIN.
32. (Optional) (Manual)	Backwash, Storage Tank	S9, S10		10
33. (Optional) (Manual)	Air Mix and Drain, Storage Tank	S2, S4, X1, S7		10
34. (Optional) (Manual)	Resin Return to Receiving Tank	S11, C15, C4, C12, S1		20

E-5

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