ICE MANUA AND GUIDELINES

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Annexure – 1 General Guidelines for Service Engineers

- All service calls should be recorded in a service registration format for evaluation purposes.
- Engineers must return the call, understand the problem from the client, and identify the cause.
- as either electrical, mechanical, instrumentation, or process-related.
- The engineer must inform the client of the date of the service visit, confirm if charges are applicable, and plan the activity accordingly.
- The engineer must review old records from the service file and prepare for anticipated problems.
- Technicians must be informed of all relevant details, and they should return the call if the problem is not clearly identified.
- Service technicians should visit the site with all necessary tools and instruments to identify and troubleshoot the problem. If materials are required, a list should be prepared.
- Technicians must report back to the Service Engineer, verifying the actions taken during the service visit, especially for service call visits.
- Quotations should be submitted to the client within 24 hours, including all requirements and a clear identification of the problem.
- Job requests, servicing, and invoicing should be carried out according to company procedures.
- Maintain a history sheet of the plant at the client's location, and technicians must sign it with a record of the details of the work carried out for documentation purposes.

Annexure – 2: General Guidelines for Service Technicians

- Technicians should always wear a neat and clean uniform to reflect the company's professional image to clients.
- Technicians should be punctual and adhere to the agreed-upon time commitments
- Technicians should always carry necessary instrumentation, including:
- Calibrated pH and TDS meters
- Calibrated ammeter for current measurement
- Calibrated pressure gauges for quick testing when applicable
- Team leaders should have a proper toolbox and equipment for carrying out services
- Technician vehicles should be equipped with the minimum materials required for normal service at the site.
- Technicians should be capable of evaluating the problem and providing detailed information to the service engineer.
- Technicians must accurately fill out data sheets and service reports, paying attention to any abnormal variations observed.
- It is essential to avoid multiple visits to the same site for data collection. This saves time, effort, and minimizes client inconvenience.

Annexure – 3 General Guidelines for attending services calls and check list

- Check the cleanliness of equipment and clearly remark if the equipment is not properly maintained.
- Inspect the piping system (LP and HP) for leaks and identify the cause and location of the leakage for evaluation and record purposes.
- Perform a backwash of the media filter and inquire about the client's backwash procedure and frequency. Check the quality of the backwash water and record it if it is dirty.
- Consider increasing the frequency of backwashing if necessary.
- Assess the condition of bag and cartridge filters and inquire about the replacement frequency.
 Increase the replacement frequency if the last stage cartridge appears dirty.
- Examine the condition of all pressure gauges, ensuring they are not rusted and are functioning properly. Record any gauges that are not working.
- Verify the condition of the PH and TDS meters and calibrate them if needed. If a meter is not functioning, make a note of it in your report for further action.
- Evaluate the dosing tank and dosing pump, and obtain the following information:
 - a) Inquire about the method of chemical-water mixing.
 - b) Determine the time it takes for the solution to finish, as it indicates the dose rate.
 - c) Check if the solution is dirty and not properly mixed.
 - d) Inspect dosing tubes for any accumulation of dirt and dust.
- Measure the feed water TDS and reject water TDS and compare them with the recovery ratio to ensure accuracy.
- Inspect the condition of flow meters, ensuring they are properly calibrated. Note any faults in your report.
- Check all rotating parts for overheating.
- Measure and record the current consumed by the FP and HPP motors.
- Look for rust on the plant and advise the operator to clean it. Record this in the logbook.
- Measure the TDS of each vessel and record the readings.
- Test the TDS, pH, and post-chlorination level of the product water. Ensure that the product water is stored properly.
- Provide proper training to the operator to prevent problems.

- Verify the functioning of safety features such as feed water tank level, product tank level, flush tank level, and low-pressure switch.
- Check the maintenance and cleanliness of the control panel. Use a blower if it is dirty.
- Examine the stock of chemicals and consumables, advising the client to maintain a minimum stock for three months.
- Record the in-time and out-time for each visit.

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Check list for technician for service visit

S. No	Checklist	Result	Remarks
1	Check cleanliness of all equipments		
2	Check for leakage in low pressure piping and specify reason if any		
3	Check for leakage in HPP line and specify reason if any		
4	Check for working of all pressure gauges. Make and range if defective		
5	Check for working / calibration of TDS meter. Make and model no if defective		
6	Check for working of PH meter. Make and model no if defective		Q P
7	Check for working of flow meter and specify make and model if defective		
8	Check for working of all dosing pumps. Make and model if defective	A	
9	Check for vibration and overheating on feed pump motor. Measure current if overheating	3)	
10	Check for vibration and overheating on HP pump motor. Measure current if overheating		
11	Check for process parameters and record if they are as per design		
12	Check for media filter backwash and see condition of backwash water		
13	Open cartridge filter and check frequency of replacement based		

	on condition of filters	
14	Check solution preparation	
	method of chemical	
15	Verify consumption of chemical	
	and consumables	
16	Check for operator training level	
17	Check for safety device operation	
	like pressure and level switches	A O'
18	General comments on plant	
	operation	Y

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Parameters collection list for Technician

S no	Parameters	Unit	Value
1	Media filter inlet pressure	Bar	
2	Media filter outlet pressure	Bar	
3	CF1 outlet pressure	Bar	A
4	CF2 outlet pressure	Bar	
5	CF3 outlet pressure	Bar	
6	System Pressure	Bar	
7	Reject Pressure	Bar	
8	Product flow	GPM	
9	Reject flow	GPM	
10	Recovery by flow	%	
11	Feed TDS	PPM	
12	Product TDS	PPM	
13	Reject TDS	PPM	7
14	Recovery by TDS	%	Y
15	TDS Each vessel		
	PV – 1	1 PY	
	PV – 2		
	PV - 3	>	
	PV - 4		
	PV - 5		
	PV - 6		
	PV - 7		
	PV - 8		

Status of Electrical motor

S	Description of	KW	Max	Actual	Vibration	Heating
no	equipment	rating	allowed	Current		
			current			
1_	Feed pump					
2	Backwash pump					
3	High pressure pump					
4	Flush pump					

Indicate your remarks on the following condition	n/observation:
General Condition of plant:	
Media backwash observation:	
Cartridge filter Observation:	
Leakage Observations:	
Dosing check and comments:	
1	
Technician signature:	Service Engineer
Technician signature:	

Additional Parameters to be collected for service/reconditioning / service contract

Sno	Equipment details	Make	Model no	Specification	Qty
1	Feed pump				
2	High Pressure pump				4
3	Flush pump				1
4	Pressure Vessels				
4a.	Pressure vessel array				
5	Membranes				
6	Dosing pumps				
6a.	Pre chlorination			SY	
6b.	De chlorination				
6c.	Coagulant				
6d.	Antiscalant				
6e.	Acid		4		
6f.	Post PH correction				
6g.	Post chlorination				
7	Instrumentation				
7a.	Pressure Gauges				
7b.	Flow meter product		>		
7c.	Reject flow meter				
7d.	Feed / Product PH				
7e.	Feed / product TDS	O'			
7f.	Feed / product ORP	1			
8	Cartridge filter – 1				
9	Cartridge filter -2				
10	Cartridge filter -3				
11	Media Filter				
12	Media filter valves				
13	Backwash pump				
14	Backwash blower				
15	VFD details				
16	Control panel PLC				
17	High pressure control valve				
18	Reject control valve				

Piping size details and specification

SNo	Details	Suction	discharge	Туре
1	Feed pump			
2	Media filter			4
3	Cartridge filter			7
4	High pressure pump			
5	Main header on membranes	NA		
6	Pressure vessels	NA		
7	Product pipe	NA		
6	Reject pipe	NA		

Supplier name and det	tails:	
		<u>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</u>
Year of installation:		Las
time membrane repla	aced:	Why
need reconditioning: .		
	₹ .	
General condition of p	lant and Rémarks:	
Client specific requirer	nent:	
Technician	Service Engineer	Dept. Head

Pre-Start-Up Check and Commissioning Audit

After loading the elements into the pressure vessels and prior to starting up the membrane unit, it is crucial to ensure that the entire pre-treatment section is operating in accordance with the specified requirements. If the pre-treatment process involved altering the chemical characteristics of the raw water, a comprehensive analysis of the water entering the membrane unit should be conducted. Additionally, it is essential to determine the absence of chlorine, turbidity, and SDI (Silt Density Index). The stability of the raw water intake must be assessed in relation to the following parameters:

- Flow rate
- SDI
- Turbidity
- Temperature
- pH level
- Conductivity
- Bacteria count (standard plate count)

1. Pre-Startup Checks:

- Ensure all pre-treatment processes (filtration, chemical dosing, etc.) are operating correctly.
- Confirm that all necessary equipment, such as pumps, motors, and valves, are in good working condition.
- Verify that the RO membranes are installed properly and are free from any visible damage.
- Check the integrity of the hiping system and make sure there are no leaks.

2. System Flushing:

- Flush the entire RO system with clean water to remove any debris or contaminants.
- Open all flush valves and allow water to flow through the system for a sufficient duration.
- Close the flush valves once the water runs clear, indicating that the system is clean.

3. Pre-Startup Instrumentation Checks:

- Calibrate and verify the accuracy of all instruments, such as pressure gauges, flow meters, and conductivity meters.
 - Ensure that all sensors are properly installed and functioning correctly.
 - Check the power supply and control system for any issues.

4. Membrane Soaking:

 If required, soak the RO membranes in a compatible preservative solution as recommended by the membrane manufacturer.

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• Follow the manufacturer's instructions for the soaking duration and conditions.

5. System Start-Up:

- Gradually open the feed water supply valve to allow water into the system.
- Monitor the system pressures, flow rates, and other parameters to ensure they are within the specified range.
- Check for any abnormalities, such as excessive pressure drops or unusual noises
- Allow the system to stabilize and reach its operating conditions gradually.

6. Post-Startup Checks:

- Monitor the product water quality, including conductivity, pH, and any specific parameters relevant to the application.
- Verify that the system is producing the desired flow rate and recovery ratio.
- Check for any leaks or abnormal pressure fluctuations.
- Document and record all startup parameters and observations for future reference.

7. System Optimization:

- Fine-tune the operating parameters, such as feed pressure, recovery ratio, and reject flow, to optimize system performance.
- Monitor and adjust any necessary chemical dosing for proper system operation.
- Conduct regular sampling and analysis of the product water to ensure it meets the desired quality standards.

 Conduct regular sampling and analysis of the product water to ensure it meets the desired quality standards.

Sno	Check list	Result	Remakrs
1	Corrosion-resistant materials of construction are used for all		
	equipment from the supply source to the membrane		
	including piping, vessels, instrument, s and wetted parts of		
	pumps		
2	All piping and equipment is compatible with designed		
	pressure		
2			
3	All piping and equipment is compatible with designed pH		
	range (cleaning)		× () Y
4	A 1: 6:1:		
4	Media filters are backwashed and rinsed	C	Y
5	New/clean cartridge filter is installed directly upstream of		
	the high pressure pump		
6	Feed line, including RO feed manifold, is purged and		
	flushed, before pressure vessels are connected	>	
7	Chemical addition points are properly located		
8	Check/anti-siphon valves are properly installed in chemical		
	addition lines		
9	Provisions exist for proper mixing of chemicals in the feed		
	stream		
10	Provisions exist for preventing the RO system from		
	operating when the dosage pumps are shut		
	down		
11	Provisions exist for preventing the dosage pumps from		
	operating when the RO system is shut down		
12	If chlorine is used, provisions exist to ensure complete		
	chlorine removal prior to the membranes		
	Planned instrumentation allows proper operation and		
	monitoring of the pretreatment and RO		
	system		
13	Planned instrumentation is installed and operative		
14	Instrument calibration is verified		
15	Pressure relief protection is installed and correctly set		
16	Provisions exist for preventing the permeate pressure from		
	exceeding the feed/concentrate pressure		
	more than 5 psi (0.3 bar) at any time		

Sno	Check list	Result	Remakrs
17	Interlocks, time delay relays, and alarms are properly set		
18	Provisions exist for sampling permeate from individual modules		
19	Provisions exist for sampling raw water, feed, permeate and concentrate streams from each stage		
20	Pressure vessels are properly piped both for operation and cleaning mode		
21	Pressure vessels are secured to the rack or frame per the manufacturer's instructions		
22	Low pressure Pumps are ready for operation: aligned, lubricated, proper rotation		
23	High Pumps are ready for operation: aligned, lubricated, proper rotation		
24	Cleaning system is installed and operative	V	
25	Permeate line is open		
26	Permeate flow is directed to drain (In double-pass systems, provisions exist to flush first pass without permeate going through the second pass)		
27	The reject flow control valve is in open position		
28	A feed flow valve is throttled and/or the pump bypass valve is partly open to limit feed flow to less than 50% of the operating feed flow		
5	is partly open to limit feed flow to less than 50% of the operating feed flow		

General Guideline for Multi Media filters

A. Media Filling Details

Filling Details - Multimedia filter only

			Max std	Remarks
Media Details		Actual	guideline	
Gravel 3 - 6mm	50 Kg bag	10%	10%	Bottom layer
Gravel 1 - 2 mm	50 Kg bag	15%	10% - 20%	<u> </u>
Sand 0.8 - 1.2 mm	50 Kg bag	15%	10% - 20%	
Sand 0.3 - 0.6mm	50 Kg bag	35%	30% - 40%	
Sand 0.6 - 0.8mm	50 Kg bag	25%	20% - 40%	To pmost layer

Filling Details - Duel Media filter with Anthracite / Carbon

			_	
			Max std	Remarks
Media Details		Actual	guideline	>
Gravel 3 - 6mm	50Kg Bag	10%	10%	Bottom layer
Gravel 1 - 2 mm	50Kg Bag	15%	10% - 20%	
Sand 0.8 - 1.2 mm	50Kg Bag	15%	10% - 20%	
Sand 0.3 - 0.6mm	50Kg bag	35%	30% - 40%	
Anthracite 0.6 - 0.8mm	25Kg bag	25%	20% - 40%	Topmost layer

Filling Details - Carbon Media filter

			Max std	Remarks
Media Details		Actual	guideline	
Gravel 3 - 6mm	50Kg Bag	10%	10%	Bottom layer
Gravel 1 - 2 mm	50Kg Bag	15%	10% - 20%	
Sand 0.8 - 1.2 mm	50Kg Bag	15%	10% - 20%	
Activated Carbon	25Kg bag	60%	40% - 60%	Topmost layer

B. Media filling height should be 50% of the Media 'Total Height

C. Specific volume should be

1. Sand and Gravel: 1650 Kg/M3

2. Anthracite: 700Kg/M3

3. Activated Carbon: 450Kg/M3

D. Calculate the Each media quantity

- Check the diameter and height of the multimedia filter. The example diameter is 36" and the height is 72".
- Covert the diameter and heigh into meter (Inch x 2.54/100 = DIA 36"x2.54/100 = 0.9144Meter Height 72" x <math>2.54/100 = 1.82 meter)
- Calculate surface area = Dia (meter) x Dia(meter)*3.142/4 = 0.9144*0.9144*3.142/4 = 0.656M2

Diameter	36"	0.9144 meter
Height	72"	1.82 Meter
Surface area	0.656	M2

 Select the filling details for the MMF as per the table . For example for duel media filter is as below

Filling Details - Duel Media filter with Anthracite / Carbon

			Max std	Remarks
Media Details		Actual	guideline	
Gravel 3 - 6mm	50Kg Bag	10%	10%	Bottom layer
Gravel 1 - 2 mm	50Kg Bag	15%	10% - 20%	
Sand 0.8 - 1.2 mm	50Kg Bag	15%	10% - 20%	
Sand 0.3 - 0.6mm	50Kg bag	35%	30% - 40%	
Anthracite 0.6 - 0.8mm	25Kg bag	25%	20% - 40%	Topmost layer

- Total filling height (50%) of media height = 1.81/2 = 0.91 meter
- Calculate the media for each section
- A. Gravel 3 6mm = $10\% \times 0.91$ (filling height) x 0.656 (surface area) x 1450 (sand density) = 86 kg = 2 Bag(each bag 50 Kg)
- B. Gravel 1- 2mm = $15\% \times 0.91$ (filling height) x 0.656 (surface area) x 1450 (sand density) = 129 kg = 3 Bag(each bag 50 Kg)
- C. Sand $0.8 1.2 \text{ mm} = 15\% \times 0.91$ (filling height) $\times 0.656$ (surface area) $\times 1450$ (sand density) = 129kg = 3 Bag(each bag 50 Kg)
- D. Sand 0.3 0.6mm = 35% x 0.91 (filling height) x 0.656 (surface area) x 1450 (sand density) = 302.9 kg = 6 Bag(each bag 50 Kg)
- E. Anthracite $0.6 0.8 \text{ mm} = 25\% \times 0.91$ (filling height) $\times 0.656$ (surface area) $\times 750$ (sand density) = 111 kg = 4 Bag(each bag 25 Kg)

Commissioning Audit

1. System design

Product flow: ----- M3/hr

Recovery: 60%

Feed flow = -----M3/hr

Reject flow = ----- M3/hr

2. System information – designed.

Feed TDS designed :PPM Product TDS designed : ------ PPM Reject TDS designed : ----- PPM

3. System Information – Actual

Feed TDS Actual :PPM
Product TDS Actual : ------ PPM
Reject TDS Actual : ----- PPM

4. P&ID actual designed

5. Membrane Projection based on designed and actual

6. Audit the following critical parameters.

Sno	Critical Parameter	Unit	Min	Max	Actual	Remarks
1	Check Feed pressure.	Bar	3	5		
2	Check Pressure after MMF	Bar	3	5		
3	Check Pressure after the Cartridge filter – when HPP is operational at full flow	Bar	2.0	4.0		
4	Check the pressure at the High-pressure pump suction	Bar	1.0	2.0		
5	System pressure- Design & Actual	Bar				
6	Reject Pressure - Design & Actual	Bar				
7	Feed Flow - Design & Actual	M3/hr				
8	Product Pressure - Design & Actual	M3/hr				
9	Reject Flow- Design & Actual	M3/hr				
10	Feed TDS – Design & Actual	PPM				
11	Product TDS – Design & Actual	PPM				
12	Reject TDS – Design & Actual	PPM				

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Sno Critical Parameter	Unit	Min Max	Actual	Kemarks	
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13	Recovery flow based – Design &	%			
	Actual				
14	Recovery TDS based – Design &	%			
	Actual				
15	Feed PH		6.2	7.0	
16	Feed ORP	MV	60	120	
17	Product PH				~
18	Reject pressure after ERT/PX (if	Bar	1	1.5	
	applicable)				
19	Feed TDS – if PX applicable				
20	Feed TDS PX – HP side TDS				
21	Feed TDS – high pressure pump				

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1. RO Membrane Fouling Symptoms, Causes, and Corrective Measures:

Permeate Flow	Salt Passage		Direct Cause	Indirect Cause	Corrective Measure
				¹ Insufficient Hardness	Clean or Replace Element
				Removal or	¹ Check Water Softener or
Decrease	Increase	Increase	Scaling	² System Recovery too	Antiscalant injection.
				High	² Lower System Recovery
			Colloidal		Clean or Replace Element,
Decrease	Increase	Increase	Fouling	Insufficient	Improve
				Pretreatment	Pretreatment
				Contaminated Raw	
Decrease	Unchanged	Increase	Biofouling	Water, Insufficient	Clean or Replace Element,
				Pretreatment	Disinfection, Improve
			Organic	Oil; Cationic	Clean or Replace Element,
Decrease	Unchanged	Unchanged	Fouling	Polyelectrolytes 🔾	Improve Preatreatment
					Y
Decrease	Decrease	Unchanged	Compaction		Replace Element or Add
				Water Hammer	Elements
					Davidson Flancas I. Charl Carlos
			Ovidation	Francisco Ozono	Replace Element. Check Carbon
Increase	Increase	Unchanged	Oxidation	Free Chlorine, Ozone, KMnO4	or Sodium Bisulfite Injection Pretreatment.
IIICI ease	increase	Officialiged	Damage	NIVIIIO4	¹ Replace Element & Check
			Membrane	¹ Permeate	System
Increase	Increase	Unchanged		backpressure or	Design
inter case	mer case	/ lower	1	² Abrasion	² Replace Element & Check
			O-Ring		
Increase	Increase	Unchanged	Leak	Improper Installation	Check and/or Replace O-Rings
		Llower			
	^		Leaking		
Increase	Increase	Unchanged	_	Damaged During	Replace Element
		/ lower	Tube	Element Loading	

^{*}Items in red = Main Symptom

2. Common Foul ants and Their Associated Symptoms

Foulant	Symptoms	Cleaning Solution per Membrane T
Biological Growth	The element may have strong odor, possible mold growth on the scroll	Bio Cleaner CA:50C 6116 Kimberlite Alkaline Cleand CA:50B 8205 Kimberlite
Carbonate Scale	noticeably heavier than normal. The element will exhibit low permeate flow	Acid Cleaner CA:50A 8204 Kimberlite
Iron Fouling		Acid Cleaner CA:50A 8204 Kimberlite
Silt or Carbon Fines	Brown or black material on scroll end. Low flow, good rejection in early stages. High flow and very poor rejection in later stages due to the abrasive	Acid Cleaner CA:50A8204 Kimberlite Alka Cleaner CA:50B 8205 Kimberlite

3. RO Membrane Fouling Troubleshooting

How quickly did the fouling ta place?	ke Possible causes	Solution for possib
Overnight Fouling	Clay, Silt, Oils, Etc.	Alkaline Cleaner CA:50B 8205 Kimberlite
Intermediate Length Fouling (5 to 10 Days)	Microbiological Sources. Pre filters will show a slimy deposit.	. Bio Cleaner CA:50C 6116 Kimberlite Alkaline Cleaner CA:50B 8205 Kimberlite
Slow Fouling	Most common and most difficult to identify.	Follow regular membrane cleaning sequence: Flush Acid Cleaner CA:50A 8204 Kimberlite Flush Alkaline Clear CA:50B 8205 Kimberlite Flush
SAMPLE		

Annexure – 5 General Guidelines for dosing rate calculation and setting

Dosing chart table - A (quick selection)

Feed flow Capacity GPD GPM M3/hour		% solution at 50% recovery		Dose rate solution (LPH)			
				4ppm	5ppm	6ppm	
8.33	1.89	6,000	2%	0.37	0.47	0.56	
10.4	2.36	7,500	2%	0.47	0.59	0.709	
13.8	3.15	10,000	2%	0.63	0.79	0.94	
16.6	3.78	12,000	2%	0.76	0.94	1.13	
20.8	4.73	15,000	2%	0.94	1.18	1.41	
27.8	6.3	20,000	2%	1.26	1.57	1.89	
34.7	7.88	25,000	2%	1.57	1.97	2.36	
41.6	9.46	30,000	4%	0.94	1.18	1.42	
48.6	11.1	35,000	4%	1.1	1.38	1.65	
55.5	12.6	40,000	4% 🗸	1,26	1.58	1.89	
69.4	15.8	50,000	4%	1.57	1.97	2.36	
83.3	19	60,000	6%	1.26	1.57	1.89	
97.2	22	70,000	6%	1.47	1.83	2.2	
111.1	25.3	80,000	8%	1.26	1.57	1.89	
125	28.4	90,000	8%	1.42	1.77	2.12	
139	31.5	100,000	8%	1.57	1.97	2.36	
167	37.8	120,000	8%	1.89	2.36	2.83	
183	41(6	132,000	10%	1.66	2.08	2.49	
208	47.3	150,000	10%	1.89	2.36	2.83	
222	50.5	160,000	10%	2.01	2.52	3	
243	56	175,000	10%	2.2	2.75	3.31	
277.7	63	200,000	10%	2.52	3.15	3.78	
312	71	225,000	10%	2.83	3.54	4.25	
347	79	250,000	10%	3.15	3.94	4.73	
381	86.7	275,000	10%	3.46	4.33	5.2	
416.7	94.6	300,000	10%	3.78	4.73	5.67	
486.1	110.4	350,000	10%	4.41	5.51	6.62	
555.5	125.2	400,000	10%	5	6.3	7.57	
625	142	450,000	10%	5.67	7.09	8.51	
694	158	500,000	10%	6.3	7.88	9.46	

Solution preparation method:

Chemical Name		2%	4%	6%	8%	10%
Antiscalant	water	98	96	94	92	90
100% concentration	chemical	2	4	6	8	10
Sodium hypo cloride	water	84	67	51	35	82
12% concentration	chemical	16	33	49	65	18
Calcium hypo						
chloride	water	97	94	91	87	85
63% concentration	chemical	3	6	9	13	15
SMBS	water	98	96	93	91.5	89.5
93% concentration	chemical	2	4	7	8,5	10.5
NaoH	water	96	92	88	85	80
50% concentration	chemical	4	8	12	15	20
FeCl3 coagulant	water	94.5	89.5	85	79	74
37% concentration	chemical	5.5	10.5	15	21	26

Option – 1 Using dosing table

- Select the capacity of the plant as per Table A. Select the solution % from e A. Select the solution preparation method as per Table B

Example

- Capacity of the plant is 100,000 Gallon
- Select from Table A the followings
- 1. % solution = 8%
- 2. Dose rate = 1.57 LPH
 - Chemical Preparation table, check chemical preparation method at 8% as below

Antiscalant Chemical

92 Ltrs Water Chemical 8 Ltrs Dose rate : 1.57 LPH

Pump capacity : 6 LPH

 $= 1.57/6.0 \times 100 = 26.2\%$

SO DOSING PUMP WILL OPERATE AT 26%SPEED AND 100% STROKE

Option - 2 (By calculation Method)

- 3. Product flow = 100,000 US Gallon / day = 100000*3.785/1000 = 378.5M3/day = <math>15.77 M3/hr
- 4. Recovery = 50%
- 5. Feed flow = product flow / recovery *100 = 15.77/50*100 = 31.54 M3/hr
- 6. Dose rate for the chemicals
- A. Pre chlorination = 1 PPM
- B. De chlorination = 4PPM
- C. Coagulation = 3 PPM
- D. Antiscalant = 4 PPM
- E. Acid = 5 PPM
- F. Post chlorination = 0.5PPM
- G. Post PH = 5 PPM
- 7. Chemical as 100% = feed flow x ppm /1000 = 31.54*4/1000 = 0.126 as 100%
- 8. Chemical conc: 8%
- 9. Dose rate = 0.126/8*100 = 1.577

Note: In the case of post-dose rate calculation, please select product flow and calculate as steps 5 to 7.

How to Verify dosing rate as Actual

- 1. Take a calibrated flask of 500 ml
- 2. Run the dose pump at a selected speed allow it to dose as an actual to the system
- 3. Remove the suction from the dosing tank and put in the calibrated flask
- 4. Note down the amount of liquid consumed in 10 minutes.
- 5. For Example 100 ml is consumed in 10 min
- 6. Dose rate is = 100/10*60 = 600ML/hour = 600/1000 = 0.6LPH

Annexure – 6 Quick conversion formulas for service application

[Feed TDS – (Product TDS* recovery/100)] Reject TDS = ------

[1 – Recovery /100]

Recovery = Product flow / [Feed flow (product + reject flow)] KW of motor > HP /1.35

Test for determining Silt Density Index:

Equipment

Millipore[®] Filter Pad Holder with a 0.45 micron filter disc. 500 ml. Graduated cylinder Stopwatch

Procedure

- Unbolt the filter holder, wet it, and place a 0.45 micron filter on the back-up plate using the dull tweezers.
- Place the "O"-ring properly and then replace the top half of the filter holder and bolt loosely.
- Connect apparatus to the feed water line (minimum 30 PSIG) in a vertical, down flow position and open the needle valve a crack.
- Loosen two adjacent filter-holder bolts, tilt the apparatus and bleed out all trapped air, then retighten bolts and adjust the pressure to 30 PSI while starting the stopwatch.
- Immediately run the flow into the graduated cylinder and measure the time required to collect 500
- ml, maintaining a pressure of 30 PSIG during the run. Mark the time (t1) and keep the watch running.

- Repeat the previous step immediately after 5, 10, and/or 15 minutes of total elapsed time. Mark the collection times (t₅, t₁₀, t_F).
- Close the sample valve and disconnect the apparatus after the 15 minute reading. Remove the
- disk and place it in a plastic bag for later examination.

Calculation

Calculate the ratios $R = t_1/t_5$, t_1/t_{10} and/or t_1/t_F .

Estimate % P₃₀ at the selected time(s) from the following equation:

% $P_{30} = [1-R] \times 100$.

Estimate the Silt Density Index, SDI, from the following equation:

SDI = % P₃₀ ÷ Elapsed Time (minutes)

The 15-minute index will generally be the lowest of the three, and should be used for filter sizing purposes.

Conversion Tables

To Convert	Multiply By	To Obtain		
Acres	43,560	Sq. feet		
Acres	0.00405	8q. kilometer		
Acres	4047	Sq. meter		
Acres	4840	Sq. yards		
Acre-feet	325,851	Sq. feet		
Acre-feet	43560	Cu. feet		
Acre-feet	1233.5	m (cubed)		
Bar	14.5	Lb/sq.in.		
Bar	1019.7	g/cm (cubed)		
Bar	29.53	inches Hg at 0 degrees C		
Bushels (dry)	0.03524	msquared		
Centimeters (cm)	0.03281	Feet		
Centimeters	0.3937	Inches		
Centimeters	0.1094	Yards		
Centimeters	0.01	Meters		
Centimeters	10	Millimeters (ml)		
cm/sec	1.9685	ft/min		
cm/sec	0.0223694	MPH		
cm (cubed)	0.0610237	inch (cubed)		
Cubic feet	0.0283	Cu. meter		
Cubic feet	7.4805	Gallons		
Cubic feet	1728	Cubic inches		
Cubic feet	0.037	Cubic yards		
Cup	8	fl oz		
Feet (ft)	30.48	Centimeters		
Peet	0.3048	Meters		
Feet per minute	0.01136	MPH		
Feet head of water	0.433	PSI		
Foot candle	10.764	Lux		
Gallons (gal)	3.785	Liters		

Gal	3785	Millimeters	
Gal	128	Ounces (liquid)	
Gal/acre	9.354	Liters/hectare	
Gal/acre	2.938	Oz/1000 ftsquared (liquid)	
Gal/1000 ftsquared	4.0746	L/100 msquared	
Gal/minute	2.228 x 10 (-3)	Cubic feet/second	
Grams (g)	0.002205	Pounds	
Gram	0.035274	oz	
G/ha	0.000893	lbs/a	
Grams per liter	1000	PPM	
Grams per liter	10	Percent	
Grams/sq.meter	0.00020481	lb/sq.feet	
G/cm (cubed)	0.036127	lb/in (cubed)	
G/cm (cubed)	62.428	lb/ft (cubed)	
Hectares (ha)	2.471	Acres	
Inches	2.540	Centimeters	
Inches	0.0254	Meters	
Inches	25.40	Millimeters	
Insquared	6.4516	cmsquared	
In (cubed)	16.3871	cm (cubed)	

Kilograms (kg)	2.2046	Pounds
Kg/hectare	0.892	Pounds/acre
Kg/ha	0.02048	lb/1000 ftsquared
Kg/L	8.3454	lb/gal
Kilometers (Km)	100,000	Centimeters
Kilometers	3281	Feet
Kilometers	1000	Meters
Kilometers	0.6214	Miles
Kilometers	1094	Yards
Km/h	0.62137	МРН
Km/h	54.6807	ft/min
Kilopascals (kPa)	0.145	Pounds/sq.in. (psi)
Liters (l)	0.2642	Gallons
Liters	33.814	Ounces
Liters	2.113	Pints
Liters	1.057	Quarts
L/100 msquared	0.2454	gal/1000 ftsquared
Liters/hectare	0.107	Gallons/acre
Meters (m)	3.281	Feet
Meters	39.37	Inches
Meters	1.094	yards
Meters	100	Centimeters
Meters	0.001	Kilometers
Meters	1000	Millimeters
Meters/sec	2.2369	MPH
Msquared	10.764	ftsquared
M (cubed)	35.3147	ft (cubed)
M (cubéd)	1.30795	yd (cubed)
Miles (statute)	160,900	Centimeters
Miles	5280	Feet
Miles	1.609	Kilometers
Miles	1760	Yards
Miles/hour (mph)	1.467	Feet/second
Miles/hour	88	Feet/minute
Miles/hour	1.61	Kilometers/hour

Miles/hour	0.447	meter/second
Milliliters (ml)	0.0338	Ounces (fluid)
Milliliters	0.0002642	Gallons
Millimeters (mm)	0.03937	Inches
1 mm Hg @ 0 C	0.13332	kPa
Ounces (fluid)	0.02957	Liters
Ounces (fluid)	29.573	Milliliters
Ounces (weight)	28.35	Grams
Parts per million (ppm)	2.719	lb ai/acre foot of water
PPM	0.001	Grams/l
PPM	8.34	Lb/million gal
PPM	1	mg/kg
PPM	0.013	Ounces/100 gal of water
PPM	0.3295	Gal/acre-foot of water
PPM	8.345	lbs/million gal of water
Percent (%)	10	g/kg
Pint	0.473	liter
pt/A	1.1692	L/ha
pt/A	0.3673	oz/1000 ftsquared

Pounds	0.4536	Kilograms
Pounds	453.6	Grams
Pounds/acre	1.12	Kg/hectare
Pounds/A	0.02296	lb/1000 ftsquared
Pounds/sq.ft.	4883	Grams/sq.meter
Pounds/1000 ftsquared	43.5597	lb/A
Pounds/yd (cubed)	0.0005937	G/cm (cubed)
Pounds/gallon	0.12	Kg/liter
PSI (lbs/sq.in.)	6.9	Kilopascals
PSI	0.06895	Bar
PSI	0.068046	atm
PSI	2.31	feet head of water
PSI	6.89	kPa
Quarts	0.9463	Liters
Qt/A	2.3385	L/ha
Qt/A	0.7346	oz/1000 ftsquared
Sq. centimeters	0.001076	Sq. feet
Sq. centimeters	0.1550	Sq. inches
Sq. feet	929	Sq. centimeters
Sq. feet	0.0929	Sq. meters
Sq. feet	9.294 x 10 (-6)	Hectares
Sq. inch	6.452	Sq. centimeters
Ton (2000 lbs)	907	kg
Yards	91.44	Centimeters
Yards	0.9144	Meters
Yards	914.4	Millimeters
yd (cubed)	27	ft (cubed)
yd (cubed)	0.7645	m (cubed)

Area Equivalents

1 acre = 43,560 ft squared = 4840 yd 2 = 0.4047 hectares = 160 rods squared = 4047 m 2 = 0.0016 sq. mile

1 hectare (ha) = 10,000 m 2 = 100 are = 2.471 acres = 107,639 ft squared

1 cubic foot (ft 3) = 1728 in 3 = 0.037 yd 3 = 0.02832 m 3 = 28,320 cm 3

1 square foot (ft 2) = 144 in 2 = 929.03 cm 2 = 0.09290 m 2

¹ acre-inch = 102.8 m 3 = 27,154 gal = 3630 ft 3

Units	Sq. In.	Sq. Ft.	Sq Yd.	Sq. cm	Sq. m
Sq. In.	1	0.006944	0.0007716	6.452	0.000645
Sq. Ft.	144	1	0.1111	929	0.0929
Sq Yd.	1296	9	1	8361	0.8361
Sq. cm	0.155	0.001076	0.0001196	1	0.0001
Sq. m	1550	10.76	1.196	10,000	

Length Equivalents

Centimeter (cm) = 0.3937 inch = 0.01 m = 0.03281 ft.

Meter (m) = 3.28 feet = 39.4 inches = 100 cm = 1.094 yds = 1000 mm

Kilometer = 0.621 statute mile = 1000 meters = 100,000 cm = 3281 ft = 39,370 in. inch = 2.54 cm = 25.4 mm = 0.0254 m = 0.08333 ft.

Foot = 0.3048 meters = 30.48 cm = 12 inches

Yard = 0.9144 meters = 3 feet = 36 inches = 91.44 cm

Statute mile = 1760 yards = 5280 feet = 1.61 kilometers = 1609 meters

Mixture Ratios

1 mg/g = 1000 ppm

1 fl.oz./gal = 7490 ppm

1 fl.oz./100 gal = 75 ppm

1 pt/100 gal = 1 teaspoons/1gal

1 qt/100 gal = 2 tablespoons/1 gal

Flow

1 gpm = 0.134 ft 3 /minute

1 ft (cubed) /min. (cfm) = 449 gal/hr. (gph) = 7.481 gal/min.

Weight Equivalents

```
1 ton (US) = 2000 lb = 0.907 metric tons = 907.2 kg
 1 metric ton = 10.6 g = 1000 kg = 2205 lb
 1 lb = 16 oz = 453.6 \, \text{grams} \, (g) = 0.4536 \, \text{kg}
 1 oz (weight) = 28.35 g = 0.0625 lb
 1 gram = 1000 \text{ mg} = 0.0353 \text{ oz} = 0.001 \text{ kg} = 0.002205 \text{ lb milligrams (mg)} = 0.001 \text{ grams}
 1 kilogram (kg) = 1000 \text{ grams} = 35.3 \text{ oz} = 2.205 \text{ lbs microgram (mg)} = 10 -6 \text{ grams} = 0.001 \text{ mg}
 nanogram (ng) = 10 -9 grams = 0.001 micrograms (mg)
 picogram = 10 -12 grams
 1 ppm= 0.0001%= 0.013 fl oz in 100 gal =1 mg/kg=1 mg/L=1 mg/g= 0.379 g in 100 gal water 8.34 x 10 -6
 lb/gal=1ml/l
 10 ppm = 0.001\% = 10 mg/L 100 ppm = 0.01\% = 100 mg/L1000 ppm = 1mg/g = 0.1\% = 1000 mg/L
 1 \text{ ppb} = 1 \text{ ug/kg or } 1 \text{ ug/L or } 1 \text{ ng/g}
 1 \text{ ppt} = 1 \text{ picogram/g}
SAMPLE COPY. ORCHINALIN PA
 1\% = 10,000 \text{ ppm} = 10g/L = 1g/100ml = 10g/kg = 1.33 \text{ oz by weight/gal water} = 8.34 lbs/100 gal water}
```

Leather Substance

The measurement of the thickness of a finished leather, in millimeters (1 mm. = 0.03937 inch), irons (1 iron = 1/48 inch), ounces (1 ounce = 1/64 inch):

Inch	Ounces	Irons	Millimeters
1/64 1/32 3/64 1/16 5/64 3/32 7/64 1/8 9/64 5/32 11/64 3/16 13/64 7/32 15/64 1/4 17/64 9/32	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	0.75 1.5 2.25 3.0 3.75 4.5 5.25 6.0 6.75 7.5 8.25 9.0 9.75 10.5 11.25 12.0 12.75 13.5	0.4 0.8 1.2 1.6 2.0 2.4 2.8 3.2 3.6 4.0 4.4 4.8 5.2 5.6 6.0 6.4 6.8 7.2

Annexure - 7 other related information

Quick Selection of Cable size selection

2 2.2 - 5.5KW Four core 4	2.5MM2 4mm2 6mm2
	6mm2
3 5.5 - 11KW Four core 6	
	0 0
4 11 - 18.5KW Four core 1	10mm2
5 18.5 - 26KW Four core 1	l6mm2
6 26 - 37KW Four core 2	25mm2
7 37 - 45KW Four core 3	35mm2
8 45-55KW Four core 5	50mm2
9 55 - 75KW Four core 7	⁷ 0mm2 <i>~</i>
10 75 - 90KW Four core 9	90mm2
11 90-110KW Four core 1	150mm2
12 110 - 132KW Four core 1	185mm2
13 160KW Four core 2	240mm2
14 200KW Four core	2x150mm2

Special Note:

- Cable size selection depends on length also, if length of cable is more than 50 meter, please select the next available size.
- Power supply is assumed as 410V / 3 Phase / 50Hz. For different rating in power supply, please refer to technical department.

Three phase motor loading chart.

The following table shows the load current drawn by three phase motors various power ratings and supply voltages. To read this table, look up the power of your motor in the either of the yellow columns and then read along to the appropriate voltage current. The value indicated is the full load current in amps.

Power		Current	in Amps a	at indicate	ed voltage	
KW	HP	220V	240V	380V	415V	440V
0.75	1	3.6	3.3	2.1	1.9	1.8
1.1	1.5	4.7	4.3	2.7	2.5	2.4
1.5	2	6.4	5.9	3.7	3.4	3
2.2	3	9.1	8.3	5.3	4.8	4.6
3	4	12.1	11	7	6.4	6.1
3.7	5	14.6	13.4	8.5	7.8	7.3
5.5	7.5	21.8	20	12.6	11.6	10.9
7.5	10	27.2	25	15.8	14.4	13.6
9.32	12.5	32.6	30.1	18.9	17.3	16.3
11	15	39.7	36.5	23	21.1	19.9
15	20	52	48	31	28	26
18.5	25	66	60	38	35	33
22	20	78	72	45	41	39
25	35	92	84	53	48	46
30	40	105	96	61	55	52
33	45	118	108	68	62	59
37	50	131	120	76	69	65
45	60	157	144	91	83	78
51	70	183	168	106	97	91
59	80	207	190	120	110	104
67	90	232	212	135	123	116
7 5	100	258	235	149	136	129
90	125	317	290	188	171	158
110	150	377	345	218	200	188

129	175	436	403	252	231	218
147	200	496	454	288	263	248
168	225			320	293	276
185	259			354	324	306
220	300			420	385	363
257	350			490	449	424
295	400			546	505	473

More addition

- 1. Check list for commissioning of rotating equipment.
- 2. Check list for preventive maintenance of the rotating equipment's
- 3. Check list for preventive maintenance.
- 4. Preventive maintenance check list

Annexure - 8 Sample Log sheet copy

	<u>Daily Opera</u>	tion and N	<u>laintenance Lo</u>	g sheet						
ROJE	CT: SWRO system - MMF			Date :						
: lient				Month:						
Capacit	ty: 3x 400,000 IGPD									
										_
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
)esign	<u>Limits</u>									
1	Plant capacity - 3x400,000 IGPD	M3/day	5400							
2	Designed TDS	PPM	45000 / 47000							
<u>3</u> 4	Designed Recovery Product flow - Total / Each stream	% M3/hr	40% 225 / 75	1					_(
5	Feed flow - Total / Each stream	M3/Hr	562.5/ 187.5							7
6	Reject flow - Total / Each stream	M3/hr	337.5 / 112.5							
7	System pressure	Bar	15.1							
	Reject TDS	PPM	74900 / 78316							
	- Feed water/ BW pumps/ Air blower	1								
1	Feed pump - MMF - Run hours P 101A/B/C 302M3/hr - 2D + 1 standby - 37KW	hours	P101A P101B					—		
	302W3/III - 2D + 1 Standby - 37KW		P 101C					<u> </u>		
2	Feed pump outlet pressure PG203/204/205	Bar	3 - 4					1		
3	Feed pump common pressure - PT 201	Bar	3 - 4				\			
4	Feed water tempreture - TS 201	Deg C	25 - 37 Deg C			7	Y			
5	Feed water flow- MMF- FI- 201	M3/hr	187.5 - 562.5				7			
6	Backwash pump run hours P 301A/B	hours	P301A	1			Y		-	
J	300M3/hr at 2 Bar - 30KW	hours	P301B	1	_		1		1	
7	Backwash pump pressure	Bar	2- 3 Bar							
8	BW pump outlet pressure PG 303/304	Bar	2 Bar							
9	BW pump common pressure - PT 301	Bar	2 Bar			/				
10	BW water flow- MMF- FI- 301	M3/hr	300	4	~					
11	Air Blower run hours AB 301A/B	Hours	AB301A		•					
	550M3/hr at 0.5 Bar - 15KW	Hours	AB301B							
12	Air blower Pressure	Bar	0.5 - 0.7							
<u>1MF S</u>	<u>Section</u>									
1	MMF 401 - Total Run hrs	hours	MMF 404							
	MMF 401 - outlet flow -FI 401	M3/hr	86 - 105	}						
	MMF inlet Pressure - PG 401 MMF outlet Pressure - PG 402	Bar Bar	1.5 - 2 Bar 1.5 - 2 Bar							
2	MMF 402 - Total Run hrs	hours	MMF 404							
	MMF 402 - Outlet flow -FI 402	M3/hr	86 - 105							
	MMF inlet Pressure - PG 403	Bar	1.5 - 2 Bar							
	MMF outlet Pressure - PG 404 MMF 403 - Total Run hrs	Bar	1.5 - 2 Bar							
3	MMF 403 - rotal Ruff fils MMF 403 - outlet flow -FI 403	hours M3/hr	MMF 404 86 - 105							
	MMF inlet Pressure - PG 405	Bar	1.5 - 2 Bar							
	MMF outlet Pressure - PG 406	Bar	1.5 - 2 Bar							
	Diffrential pressure swtich DPS -1	Bar	1.5 Bar							
_	MMS 404 Tatal Day has		MME 404							
4	MMF 404 - Total Run hrs MMF 404 - outlet flow -FI 404	hours M3/hr	MMF 404 86 - 105	+						
	MMF inlet Pressure - PG 407	Bar	1.5 - 2 Bar							
	MMF outlet Pressure - PG 408	Bar	1.5 - 2 Bar							
5	MMF 405 - Total Run hrs	hours	MMF 404							
	MMF 405 - Outlet flow -FI 405	M3/hr	86 - 105	1					ļ	
	MMF inlet Pressure - PG 409 MMF outlet Pressure - PG 410	Bar Bar	1.5 - 2 Bar 1.5 - 2 Bar							
6	MMF 406 - Total Run hrs	hours	1.5 - 2 Bar MMF 404	1						
	MMF 406 - outlet flow -FI 411	M3/hr	86 - 105							
	MMF inlet Pressure - PG 412	Bar	1.5 - 2 Bar							
	MMF outlet Pressure - PG 408	Bar .	1.5 - 2 Bar							
7	MMF 407 Total Run hrs MMF 407 Outlet flow -FI 407	hours M3/hr	MMF 404 86 - 105				-			
	MMF inlet Pressure - PG 413	Bar	1.5 - 2 Bar		<u> </u>		—		 	
	MMF outlet Pressure - PG 414	Bar	1.5 - 2 Bar							
8	Diffrential pressure swtich DPS -2	Bar	1.5 Bar							
<u> </u>	Feed waterTurbidity after MMF- AE 01	NTU	1 - 3							
10	Air Compressor run hours - common set 1	Hours	AC 401A	1	<u> </u>		-		-	
11	Air compressor pressure	Hours Bar	AC 401B 04-Jun				 		 	
	ection	T	0.000							
1	Feed water tank - LT 201	level - Mtrs	2- 4 Meter	1			1		1	
2	Intermediate water tank - LT 501	level - Mtrs	2- 4 Meter				1	1	1	
3	Reject water tank - LT 1101	level - Mtrs	2- 4 Meter							
4	Product water tank - LT 1001	level - Mtrs	2- 4 Meter							
5	Flush tank level 2.65M x 1.5M x 2M - LT 701	level - Mtrs	1 - 2Meter							
6	CIP tank level 2.65M x 1.5M x 2M - LT 702	level - Mtrs	1 - 2Meter	1						<u> </u>
	İ	1	1	1						<u> </u>

287M3/hr : 2 Feed pump 3 Feed pump 4 Feed water 5 CF inlet pre 6 CF inlet pre 7 Feed Water 8 Feed water 10 Feed water 10 Feed water 11.1 HPP suction 11.2 Systen pre 11.3 Reject pres 11.4 Diffrential p 11.5 Product floo 11.6 Reject flow 11.7 Product Pr 11.8 Product co 11.9 Reject cond 11.9.1 Feed cond 11.9.1 Feed cond 12.2 Systen pre 12.3 Reject pres 12.4 Diffrential p 12.5 Product flow 12.7 Product Pr 12.8 Product co 12.9 Reject cond 12.9 Reject flow 12.7 Product flow 12.7 Product flow 13.1 HPP suction 12.9 Reject cond 13.1 HPP suction 13.2 Systen pre 13.3 Reject pres 13.4 Diffrential p 13.5 Product to 13.9 Reject cond 13.9 Reject cond 13.1 HPP suction 13.2 Systen pre 13.3 Reject pres 13.4 Diffrential p 13.5 Product flow 13.7 Product Pr 13.8 Product co 13.9 Reject cond 14 Flushing / Charles 15 Product Pr 17 M3/hr 18 Feed pump 18 Feed pump 19 Pressure b 17 Reject cond 17 Reject cond 18 Reject cond 19 Reject cond 20 Reject fran 17 M3/hr 17 M3/hr 18 Feed pump 18 Feed pum	Imp - RO system - Run hours P 501A/B/C hr- 3.5Bar - 2D + 1 standby - 45KW imp outlet pressure PG503/504/505 imp common pressure - PT 501 ater flow- RO plant- FI- 501 pressure CF 601A/B/C (287M3/hr - 2D + 1 st pressure CF 601A/B/C (287M3/hr - 2D + 1 st ater PH level - AIT 602 ater Conductivity - AIT 602 ater OPR level - AIT 603 ater OPR level - AIT 604 operating Parameters ction pressure - PT 701 pressure - PT 702 pressure - PT 702 pressure - PT 701 low meter - FI 702 PH - AIT 701 conductivity - AIT 702 conductivity - AIT 702 productivity - AIT 602 by based on flow - (11.5/(11.5+11.6) pressure - PG 804 pressure - PT 801 pressure - PT 801 pressure - PG 804 pressure - PG 804		P501A P501B P501C 3 - 4 3 - 4 3 - 4 187.5 - 562.5 3.0 - 4.0 2.0 - 3.5 6.4 - 7.5 50 - 55,000 150 - 200 > 1.5 64 - 66 62 - 64 2 - 3.5 75 112.5 6.8 - 7.8 300 - 800 78000 55000						3	
287M3/hr : 2 Feed pump 3 Feed pump 4 Feed water 5 CF inlet pre 6 CF inlet pre 7 Feed Water 8 Feed water 10 Feed water 10 Feed water 11.1 HPP suction 11.2 Systen pre 11.3 Reject pres 11.4 Diffrential p 11.5 Product floo 11.6 Reject flow 11.7 Product Pr 11.8 Product co 11.9 Reject cond 11.9.1 Feed cond 11.9.1 Feed cond 12.2 Systen pre 12.3 Reject pres 12.4 Diffrential p 12.5 Product flow 12.7 Product Pr 12.8 Product co 12.9 Reject cond 12.9 Reject flow 12.7 Product flow 12.7 Product flow 13.1 HPP suction 12.9 Reject cond 13.1 HPP suction 13.2 Systen pre 13.3 Reject pres 13.4 Diffrential p 13.5 Product to 13.9 Reject cond 13.9 Reject cond 13.1 HPP suction 13.2 Systen pre 13.3 Reject pres 13.4 Diffrential p 13.5 Product flow 13.7 Product Pr 13.8 Product co 13.9 Reject cond 14 Flushing / Charles 15 Product Pr 17 M3/hr 18 Feed pump 18 Feed pump 19 Pressure b 17 Reject cond 17 Reject cond 18 Reject cond 19 Reject cond 20 Reject fran 17 M3/hr 17 M3/hr 18 Feed pump 18 Feed pum	hr- 3.5Bar - 2D + 1 standby - 45KW Imp outlet pressure PG503/504/505 Imp common pressure - PT 501 ater flow- RO plant- FI- 501 pressure CF 601A/B/C (287M3/hr - 2D + 1 st	Bar Bar M3/hr Bar J Bar conductivity MV MV Bar Bar Bar Bar Bar Bar micro simens/cm micro simens/cm %	P501B P501C 3 - 4 3 - 4 3 - 4 187.5 - 562.5 3.0 - 4.0 2.0 - 3.5 6.4 - 7.5 50 - 55,000 150 - 200 >> 1.5 64 - 66 62 - 64 2 - 3.5 75 112.5 6.8 - 7.8 300 - 800 78000						3	
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11.3 Reject pres 11.4 Diffrential p 11.5 Product for 11.6 Reject flow 11.7 Product P 11.8 Product of 11.9 Reject cond 11.9 Reject cond 12 RO - 2 ope 12 RO - 2 ope 12.1 HPP suctic 12.2 Systen pre 12.3 Reject pres 12.4 Diffrential p 12.5 Product for 12.6 Reject flow 12.7 Product P 12.8 Product D 12.9 Reject cond 12.9 Reject cond 12.9 Reject cond 13.1 HPP suctic 13.2 Systen pre 13.3 Reject pres 13.3 Reject pres 13.4 Diffrential p 13.5 Product flow 13.7 Product P 13.8 Product cond 13.9 Reject cond 17 Flushing / C 18 Reject train 172 M3/hr 18 Feed pump 1	oressure - PG 704 all pressure across membranes flow meter - FI 701 low meter - FI 702 PH - AIT 701 conductivity - AIT 702 conductivity - AIT 1101 conductivity - AIT 602 y based on flow - (11.5/(11.5+11.6) operating Parameters ction pressure - PT - 801 pressure - PT - 802	Bar Bar M3/hr M3/Hr micro simens/cm micro simens/cm micro simens/cm % Bar	62- 64 2- 3.5 75 112.5 6.8 - 7.8 300 - 800 78000							
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11.5 Product flor 11.6 Reject flow 11.7 Product PI 11.8 Product oc 11.9 Reject com 11.9 Reject com 11.9.1 Feed condi Recovery b 12 RO - 2 ope 12.1 HPP Suctic 12.2 Systen pre 12.3 Reject pres 12.4 Diffrential p 12.5 Product flor 12.6 Reject flow 12.7 Product PI 12.8 Product co 12.9 Reject cond 13.1 HPP suctic 13.2 Systen pre 13.3 Reject pres 13.4 Diffrential p 13.5 Product flor 13.6 Reject flow 13.7 Product flor 13.8 Product flor 13.9 Reject cond 13.9 Reject flow 13.9 Reject flow 13.9 Reject cond 14 Plushing / 15 Product flor 15 Product flor 16 Recovery b 17 Product flor 17 Product flor 18 Product flor 198M3/hr a	flow meter - FI 701 low meter - FI 702 PH - AIT 701 conductivity - AIT 702 conductivity - AIT 1101 onductivity - AIT 602 y based on flow - (11.5/(11.5+11.6) operating Parameters ction pressure - PT 801 pressure - PT - 802	M3/hr M3/Hr micro simens/cm micro simens/cm micro simens/cm % Bar	75 112.5 6.8 - 7.8 300 - 800 78000							
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Recovery b	onductivity - AIT 1101	micro simens/cm	55000					+ +		
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13.5 Product flor 13.6 Reject flow 13.7 Product Pr 13.8 Product oc 13.9 Reject cond 14 Flushing / (198M3/hr a 172 M3/hr 2 Reject tram 172 M3/hr 2 Reject cond 172 M3/hr 172 M3/hr 173 Reject cond 3 Drain trans 50 M3/hr 2 Reject flow 13.7 Product flow 13.8 Product flow 13.8 Product flow 13.8 Product flow 14.8 Product flow 15.8	oressure - PG 894	Bar	62- 64	Y						
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13.7 Product P- 13.8 Product O- 13.9 Reject cont 13.9.1 Feed cond. Recovery b Person Feed pump Pressure b PH - AIT 70 Reject tran 172 M3/hr Feed pump Foed	flow meter - FI 901	M3/hr	75							
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Recovery b Recovery b Flushing / 0 1 Flushing / 0 198M3/hr a Feed pump Pressure b PH - AIT 70 2 Reject tran 172 M3/hr Feed pump Feed pump Feed water Reject cond 3 Drain transi 50 M3/hr 2	onductivity - AIT 1101	micro simens/cm	78000 55000					1		
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198M3/hr a Feed pump Pressure b PH - AIT 70 2 Reject tran 172 M3/hr Feed pump Feed pump Feed pump Feed water Reject con 3 Drain transi 50 M3/hr 2	g / CIP system - Run hrs - P701A/B	Hrs	P 701A					+ +	+	
Feed pump Pressure b PH - AIT 70 Reject tran 172 M3/hr- Feed pump Feed pump Feed water Reject cond Drain trans 50 M3/hr- Seed pump	hr at 4.5 Bar - 37KW	1113	P 701A							
PH - AIT 7(Reject tran 172 M3/hr- Feed pump Feed water Reject cond 3 Drain trans 50 M3/hr- 2	imp outlet pressure PG 707/708	Bar	4 - 4.5 Bar							
PH - AIT 7(Reject tran 172 M3/hr- Feed pump Feed pump Feed water Reject cond Drain trans 50 M3/hr- 2	re before and after CF - PG 709 / 710	Bár	1.5 Bar diff							
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Feed pump Feed pump Feed water Reject cond 3 Drain transi										
Feed pump Feed pump Feed water Reject cond 3 Drain trans 50 M3/hr 2	ransfer pump - Run hours - P 1101 A/B/C	hours	P 1101 A							
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Feed pump Feed water Reject cond 3 Drain transi 50 M3/hr-2			P 1101 C					.	\longrightarrow	
Feed water Reject cond 3 Drain trans 50 M3/hr-2		Bar	2 - 3Bar					+	\longrightarrow	
Reject cond 3 Drain trans 50 M3/hr- 2	ump outlet pressure PG1101 / 1102 / 1103	Bar	2 - 3 Bar	 		-		++	-+	
3 Drain trans	ımp common pressure - PT 1101	M2/br	175 - 335 M3/hr					+ +	$-\!+$	
50 M3/hr- 2	ump common pressure - PT 1101 ater flow- RO plant- FI- 1101	M3/hr Micro simens/cm	68000 79000	•				+ +	-+	
50 M3/hr- 2	ımp common pressure - PT 1101	M3/hr Micro simens/cm	68000 - 78000					+ +		
	imp common pressure - PT 1101 ater flow- RO plant- FI- 1101 conductivity - AIT 1101							1	-	
	imp common pressure - PT 1101 ater flow- RO plant/ FI- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B	Micro simens/cm	P801A						-	
- 1	imp common pressure - PT 1101 ater flow- RO plant- FI- 1101 conductivity - AIT 1101	Micro simens/cm								
	imp common pressure - PT 1101 ater flow- RO plant/ FI- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B 1- 2.0 Bar - 1D + 1 standby - 5.5 KW	Micro simens/cm Hrs Hrs	P801A P801 B							
hemical Preparation	imp common pressure - PT 1101 ater flow- RO plant/Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if - 2.0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807	Micro simens/cm Hrs Hrs	P801A P801 B							
Sno Chemical o	imp common pressure - PT 1101 ater flow- RO plant-FI- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B ir 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar				3 / 1 trains ope			
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	imp common pressure - PT 1101 ater flow- RO plant/FI- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if - 2.0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 ation RO system and dose orination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12%	0	100 100	1 PPM 10 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH	Note 30 min on and 30 min on and	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant FI- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system and dose contaction dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar attion - Ferric chloride - 9 LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37%	0 0 0	100 100 100	1 PPM 10 PPM 3 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH	Note 30 min on and 30 min on and 37% direct solu	8 hours off	
	imp common préssure - PT 1101 atter flow- RO plant- Fl- 1101 conductivity - AIT 101 ansfer system Run hours P 801A/B ic 2.0 Bar - 1D + 1 standby - 5.5 KW imp common pressure - PG 807 Hon RO system ald dose crination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar tition - Ferric rolloride - 9 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63%	0 0 0 100	100 100 100 15	1 PPM 10 PPM 3 PPM 4 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution	8 hours off	
	imp common pressure - PT 1101 atter flow- RO planty Fl- 1101 conductivity - AIT 101 ansfer system Run hours P 801A/B fr. 2.0 Bar - 1D + 1 standby - 5.5 KW imp common pressure - PG 807 and ose control of the co	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33%	0 0 0 100 0	100 100 100 15 100	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant/Fl- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if- 2.0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 ation RO system ation dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ition - Ferric chloride - 9 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar lant - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100%	0 0 0 100 0 50	100 100 100 15 100 50	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant-Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system ald dose prination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ation - Ferric chloride - 9 LPH @ 6 Bar sing system - HCL - 9LPH @ 6 Bar lant - 9LPH @ 6 Bar de correction - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
Note	imp common pressure - PT 1101 ater flow- RO plant/Fl- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if- 2.0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 ation RO system ation dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ition - Ferric chloride - 9 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar ination - SMBS - 30 LPH @ 6 Bar lant - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100%	0 0 0 100 0 50	100 100 100 15 100 50	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant-Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system ald dose prination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ation - Ferric chloride - 9 LPH @ 6 Bar sing system - HCL - 9LPH @ 6 Bar lant - 9LPH @ 6 Bar de correction - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant-Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system ald dose prination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ation - Ferric chloride - 9 LPH @ 6 Bar sing system - HCL - 9LPH @ 6 Bar lant - 9LPH @ 6 Bar de correction - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
	imp common pressure - PT 1101 ater flow- RO plant-Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system ald dose prination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ation - Ferric chloride - 9 LPH @ 6 Bar sing system - HCL - 9LPH @ 6 Bar lant - 9LPH @ 6 Bar de correction - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
TEST CONE	imp common pressure - PT 1101 atter flow- RO planty Fil- 1101 conductivity - AIT 101 ansfer system Run hours P 801A/B fr. 2.0 Bar - 1D + 1 standby - 5.5 KW imp common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807	Micro simens/cm Hrs Hrs Bar Dosing tank	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM 0.5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH 1.88 - 0.63 LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
055	imp common pressure - PT 1101 ater flow- RO plant-Fi- 1101 conductivity - AIT 1101 ansfer system Run hours P 801A/B if 2 0 Bar - 10 + 1 standby - 5.5 KW imp common pressure - PG 807 if on RO system ald dose prination dosing - 15LPH @ 6 Bar Chlorination - 50LPH@ 6 Bar ation - Ferric chloride - 9 LPH @ 6 Bar sing system - HCL - 9LPH @ 6 Bar lant - 9LPH @ 6 Bar de correction - 9LPH @ 6 Bar	Micro simens/cm Hrs Hrs Bar Dosing tank	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM	solu. Consp 1.56 - 4.69LPH 1.56 - 4.69LPH 4.56 - 1.52LPH 22.5 - 7.5LPH 8.52 - 2.84LPH 4.5 - 1.5 LPH 7.5 - 2.5LPH 1.88 - 0.63 LPH	Note 30 min on and 30 min on and 37% direct solu 10% solution 20% solution 50% solution 15% solution	8 hours off	
OEM	imp common pressure - PT 1101 atter flow- RO planty Fil- 1101 conductivity - AIT 101 ansfer system Run hours P 801A/B fr. 2.0 Bar - 1D + 1 standby - 5.5 KW imp common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807 Affon RO system and dose common pressure - PG 807	Micro simens/cm Hrs Hrs Bar Dosing tank	P801A P801 B 1 - 2 Bar Neat Chemical % 12% 12% 37% 63% 33% 100% 50%	0 0 0 100 0 50	100 100 100 100 15 15 100 50 30	1 PPM 10 PPM 3 PPM 4 PPM 5 PPM 4 PPM 5 PPM 0.5 PPM	solu. Consp 1.56 - 4.69LP+ 1.56 - 4.69LP+ 4.56 - 1.52LP+ 2.55 - 7.5LPH 8.52 - 2.84LP+ 4.5 - 1.5 LPH 1.88 - 0.63 LP+ Y:	Note 30 min on and 37% direct solt 10% solution 20% solution 20% solution 15% solution 12% solution	8 hours off	

	Daily Opera	tion and M	laintenance Lo	a sheet						
	<u>Dany Operal</u>	ion and w	idintendince Lo	y sneet						
PROJE	CT: SWRO system - MMF			Date :						
Client :				Month:						
Capaci				IVIOITEIT .						
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
Design	Limits									
1	Plant capacity - 5x416.6 M3/day	M3/day	416.6							
3	Designed TDS Designed Recovery	PPM %	45000 / 36000 30%							_
4	Product flow	M3/hr	17.4							
5	Feed flow	M3/Hr	57.9							
7	Reject flow System pressure	M3/hr Bar	40.5 15.1		1					
8	Reject TDS	PPM	64285 / 51428						4	
MMF S	Section (Set - 1))
1	Feed pump Run hours	hours	P101A							
			P101B P 101C							
2	Feed pump outlet pressure	Bar	3 - 4						7	
3	MMF outlet pressure - S101 A/B	Bar	3 - 4					^)	
	MMF outlet pressure - S101 C/D MMF outlet pressure - S101 E/F	Bar	3 - 4				4			
4	Backwash pump run hours	Bar hours	3 - 4 P102A					()		
		hours	P102B					Y		
5 6	Backwash pump presusre Backwash flow	Bar M3/hr	2- 3 Bar 118	1	1) ′		
7	Air Blower run hours	Hours	AB201A		Ì	4		1	1	
		Hours	AB201B							
8	Air blower Pressure	Bar	0.5 - 0.7							
	Section (Set - 2)		D.C.	1	ļ		y	ļ		
1	Feed pump Run hours	hours	P101D P101E							
			P 101F							
2	Feed pump outlet pressure	Bar	3 - 4					<u> </u>		
3	MMF outlet pressure - S101 G/H MMF outlet pressure - S101 I/J	Bar Bar	3 - 4 3 - 4	1	<u> </u>			1		
4	Backwash pump run hours- common set 1	hours	P102A			7				
			P102B							
5 6	Backwash pump presusre Backwash flow	Bar M3/hr	2- 3 Bar 118							
7	Air Blower run hours - common set 1	Hours	AB201A							
		Hours	AB201B	4	7					
8	Air blower Pressure	Bar	0.5 - 0.7							
1	Section (Set - 3) Feed pump Run hours	hausa	P101G							
	r eed pump rear rious	hours	P101H 🔏							
2	Feed pump outlet pressure	Bar	3 - 4							
3	MMF outlet pressure - S101 K/L MMF outlet pressure - S101 M/N	Bar Bar	3 - 4		+					
4	Backwash pump run hours- common set 1	hours	P102C							
			P102D							
5 6	Backwash pump presusre Backwash flow	Bar M3/hr	2- 3 Bar 118							
7	Air Blower run hours - common set 1	Hours	AB201C							
		Hours	AB201D							
8	Air blower Pressure	Bar	0.5 - 0.7							
1	RO Run hours	Hrs	RO 1							
2	BO 4 energing Resembles		RO 2							
2.1	RO - 1 operating Parameters CF Inlet Pressure	CF - Bar								
	CF intermediate pressure									
2.2	CF outlet Pressure	CF - Bar	Min 2.0 Bar							
2.2	Feed flow Feed TDS	M3/Hr PPM	57.8 < 45000	1				<u> </u>	1	
2.3	Feed water ORP	MV	110- 150							
2.4	Feed water PH HPP operating hours	P103A	<7.2	1	1					
	This operating notice	P103A P103B		1	1					
		P103C								
2.6	HPP outlet pressure	Bar	30 - 42							
2.7	System Pressure RO 1 Reject Pressure RO 1	Bar Bar	<68	†	 					
2.9	Pressure drop	Bar	<1.5							
2.9.1	Product flow RO 1	M3/hr	41.7							
	Beleet flew BO1	M3/hr	13.9	1	1	1		 	1	
2.9.2	Reject flow RO1 TDS product RO 1	PPM	<500							
2.9.2 2.9.3 2.9.4	Reject flow RO1 TDS product RO 1 PH product RO 1	PPM	<500 <7.8							
2.9.2 2.9.3 2.9.4 3	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters									
2.9.2 2.9.3 2.9.4	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF Intel Pressure	PPM CF - Bar								
2.9.2 2.9.3 2.9.4 3	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters	CF - Bar CF - Bar								
2.9.2 2.9.3 2.9.4 3 3.1	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF Intel Fressure CF intermediate pressure CF joutlet Pressure	CF - Bar CF - Bar M3/Hr	<7.8 Min 2.0 Bar 57.8							
2.9.2 2.9.3 2.9.4 3 3.1	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter Pressure CF intermediate pressure CF, outlet Pressure Feed flow Feed flow Feed flow	CF - Bar CF - Bar M3/Hr PPM	<7.8 Min 2.0 Bar 57.8 < 45000							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF Intel Fressure CF intermediate pressure CF joutlet Pressure	CF - Bar CF - Bar M3/Hr	<7.8 Min 2.0 Bar 57.8 < 45000 110-150							
2.9.2 2.9.3 2.9.4 3 3.1	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter Pressure CF intermediate pressure CF, outlet Pressure Feed TDS Feed More	CF - Bar CF - Bar M3/Hr PPM MV	<7.8 Min 2.0 Bar 57.8 < 45000							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF Inlet Pressure CF Internediate pressure CF, outlet Pressure Feed flow Feed TDS Feed water ORP Feed water PH	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B	<7.8 Min 2.0 Bar 57.8 < 45000 110-150							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inlet Pressure CF intermediate pressure CF intermediate pressure Feed Tos Feed Tos Feed Tos Feed Water ORP Feed water PH HPP operating hours	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B P103C	<7.8 Min 2.0 Bar 57.8 < 45000 110-150 < 7.2							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6	Reject flow RO1 TDS product RO 1 PH product RO 1 PH product RO 1 RO -2 operating Parameters CF inlet Pressure CF interhediate pressure CF outlet Pressure Feed flow Feed flow Feed TDS Feed water ORP Efod yater PH HPP operating hours HPP outlet pressure System Pressure RO 2	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B	<7.8 Min 2.0 Bar 57.8 < 45000 110-150							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter Pressure CF intermediate pressure CF outlet Pressure Feed, flow Feed TDS Feed water ORP Feed water ORP Feed water PH HPP operating hours HPP outlet pressure RO 2 Reject Pressure RO 2	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B P103C Bar Bar	<7.8 Min 2.0 Bar 57.8 < 45000 110-150 < 7.2 30 - 42 < 68							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter bressure CF interhediate pressure CF outlet pressure Feed TDS Feed water ORP Feed water PH RPP operating hours HPP outlet pressure System Pressure RO 2 Reject Pressure RO 2 Pressure RO 2 Pressure RO 9	CF - Bar CF - Bar M3/Hr PPM MV P103A P103C Bar Bar Bar Bar	<7.8 Min 2.0 Bar 57.8 < 45000 110-150 <7.2 30 - 42 <68 <<1.5							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter Pressure CF intermediate pressure CF outlet Pressure Feed, flow Feed TDS Feed water ORP Feed water ORP Feed water PH HPP operating hours HPP outlet pressure RO 2 Reject Pressure RO 2	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B P103C Bar Bar	<7.8 Min 2.0 Bar 57.8 < 45000 110-150 < 7.2 30 - 42 < 68							
2.9.2 2.9.3 2.9.4 3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 1 3.9.1 3.9.2	Reject flow RO1 TDS product RO 1 PH product RO 1 RO - 2 operating Parameters CF inter Pressure CF intermediate pressure CF intermediate pressure Feed flow Feed flow Feed flow Feed water ORP Feed water ORP Feed water PH HPP outlet pressure System Pressure RO 2 Reject Pressure RO 2 Pressure drop Product flow RO 2	CF - Bar CF - Bar M3/Hr PPM MV P103A P103B P103C Bar Bar Bar Bar	<7.8 Min 2.0 Bar 57.8 < 45000 110-150 < 7.2 30 - 42 < 68 < 1.5 41.7							

<u>O Sec</u>	tion - SET 2(RO 3&4)	<u></u>	· · · · · · · · · · · · · · · · · · ·	<u> </u>		· · · · · ·	l			1
1	RO Run hours	Hrs	RO 3		<u></u>			<u> </u>	<u> </u>	
			RO 4							
2	RO - 3 operating Parameters									
2.1	CF Inlet Pressure	CF - Bar								
	CF intermediate pressure									
2.2	CF outlet Pressure	CF - Bar	Min 2.0 Bar		-			<u> </u>		
2.3	Feed flow Feed TDS	M3/Hr PPM	57.8 < 45000							
2.3	Feed water ORP	MV	110- 150							
2.4	Feed water PH		<7.2					i e		
2.5	HPP operating hours	P103D	1							
	, ,	P103E								
		P103F								
2.6	HPP outlet pressure	Bar	30 - 42							
2.7	System Pressure RO 3	Bar	<68							
2.8	Reject Pressure RO 3	Bar								~
2.9	Pressure drop	Bar	<1.5							
.9.1	Product flow RO 3	M3/hr	41.7		1				-	
.9.2	Reject flow RO3 TDS product RO 3	M3/hr PPM	13.9 <500							,
.9.4	PH product RO 3	PPIVI	<7.8							
3	RO - 4 operating Parameters		V1.0							_
3.1	CF Inlet Pressure	CF - Bar								
	CF intermediate pressure			1			1		7	
	CF outlet Pressure	CF - Bar	Min 2.0 Bar						L	
3.2	Feed flow	M3/Hr	57.8							
3.3	Feed TDS	PPM	< 45000					A.		
3.4	Feed water ORP	MV	110- 150							
3.5	Feed water PH		<7.2					Y		
3.6	HPP operating hours	P103A			!			1)		
		P103B		 	 				-	
2.7	UDD autlet assesses	P103C	20 40	1					1	
3.7	HPP outlet pressure System Pressure RO 4	Bar	30 - 42		1				1	1
3.8 3.9	System Pressure RO 4 Reject Pressure RO 4	Bar	<68		 		$\overline{}$		-	
.9.1	Pressure drop	Bar Bar	<1.5	1		,			1	1
.9.1	Product flow RO 4	Bar M3/hr	<1.5 41.7	 			V	1	 	
.9.3	Reject flow RO 4	M3/hr	13.9		_		1		1	1
.9.4	TDS product RO 4	PPM	<500	1	1 1	ノレ	1			1
	PH product RO 4		<7.8	1	1		1	1		
	tion - SET 3(RO 5)									
	RO Run hours	l lee	BO 5							
1	RO - 5 operating Parameters	Hrs	RO 5					1		
2 2.1	CF Inlet Pressure	CF - Bar	 				+	l	1	1
4.1	CF intermediate pressure	Ci - Dai		 				1		
	CF outlet Pressure	CF - Bar	Min 2.0 Bar	A			t	1	 	1
2.2	Feed flow	M3/Hr	57.8							
2.3	Feed TDS	PPM	< 45000							
2.3	Feed water ORP	MV	110- 150		1		1	1		
2.4	Feed water PH		<7.2	VY						
2.5	HPP operating hours	P103G	_ \					<u> </u>		
		P103H								
2.6	HPP outlet pressure	Bar	30 - 42							
2.7	System Pressure RO 5	Bar	₹68					1		
2.8	Reject Pressure RO 5	Bar	AY		L			ļ		
2.9	Pressure drop	Bar	<1.5		.				ļ	
.9.1	Product flow RO 5	M3/hr	41.7							
.9.2	Reject flow RO 5	M3/hr	13.9							
.9.3	TDS product RO 5	PPM	<500							
.9.4	PH product RO 5		<7.8	 	!		-	1	1	
)	-	 		+	1	1	
			/		1		-	1	1	-
10	Pressure drop second pass (7-8)	Bor	1.1	 	1		 	1	1	
10	Inlet flow - HPP2	Bar M3/hr	1.1 55 - 56	 	1		+	ł	1	1
12	System Pressure RO 2	Bar	14-16	 	1			1		
13		Bar	14-10	 	1			1		
	Inter stage pressure RO2	Bar		1	-					1
	Inter stage pressure RO 2 Reject Pressure RO 2									l
14	Reject Pressure RO 2		1.1							
14 15	Reject Pressure RO 2 Pressure drop 1st Pass(12-13)	Bar	1.1 1.1							
14 15 16	Reject Pressure RO 2		1.1 1.1 41.7							
14 15 16 17	Reject Pressure RO 2 Pressure drop 1st Pass(12-13) Pressure drop second pass (12 - 14)	Bar Bar	1.1							
14 15 16 17 18	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2	Bar Bar M3/hr	1.1 41.7							
14 15 16 17	Reject Pressure RO 2 Pressure drop 1st Pass(12-13) Pressure drop second pass (12 - 14) Product flow RO 1 Reject flow RO1 Product flow RO 2 Reject flow RO2	Bar Bar M3/hr M3/hr	1.1 41.7 13.9							
14 15 16 17 18 17 18	Reject Pressure RO 2 Pressure drop 1st Pass(12-13) Pressure drop second pass (12 - 14) Product flow RO 1 Product flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 1 8 RO 2	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 8 RO 2 Blend flow	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20 21	Reject Pressure RO 2 Pressure drop 1st Pass(12-13) Pressure drop second pass (12 - 14) Product flow RO 1 Reject flow RO 2 Reject flow RO 2 Cumulative flow RO 2 Blend flow Product TDS	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20 21	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 8 RO 2 Blend flow	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20 21	Reject Pressure RO 2 Pressure drop 1st Pass(12-13) Pressure drop second pass (12 - 14) Product flow RO 1 Reject flow RO 2 Reject flow RO 2 Cumulative flow RO 2 Blend flow Product TDS	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20 21 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12 - 14) Product flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product PH	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr	1.1 41.7 13.9 41.7 13.9							
14 15 16 17 18 17 18 19 20 21 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Product flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 1 & RO 2 Blend flow Product TDS Product TPH	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr PPM	1.1 41.7 13.9 41.7 13.9 1 - 2 120 - 200							
14 15 16 17 18 17 18 19 20 21 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 2 Reject flow RO 2 Cumulative flow RO 2 Cumulative flow RO 2 Product TDS Product TDS Product TDS Preparation UF system Chemical dose	Bar Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr PPM	1.1 41.7 13.9 41.7 13.9 1 - 2 120 - 200	Water	Chemical	Dose rate	solu. Consp	Note		
14 15 16 17 18 17 18 19 20 21 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TPS Preduct PH Preparation UF system Chemical dose Pre chlorination dosing - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs	1.1 41.7 13.9 41.7 13.9 1 - 2 120 - 200	90	10	1 PPM	4.8 LPH	Dosing for 3		
14 15 16 17 18 17 18 19 20 21 22 <i>mical</i> 500 1	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 2 Blend flow Product TDS Product TDS Product PH Preparation UF System Chemical dose Pre chlorihation dosing - 6LPH @ 6 Bar Cooglyalistor, Ferric chloride - 10 LPH @ 6 Bar	Bar Bar Ma/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr PPM Dosing tank 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33%	90 90	10 10	1 PPM 2 PPM	4.8 LPH 3.50 LPH	Dosing for 3	1	
14 15 16 17 18 17 18 19 20 21 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Cumulative flow RO 1 & RO 2 Blend flow Product TDS Product TDS Product TDS Product PH Preparation UF System Chemical dose Coaglinitori, Ferric chloride - 10 LPH @ 6 Bar Coaglinitori, - SMBS - 6 LPH @ 6 Bar Dechlorination - SMBS - 6 LPH @ 6 Bar	Bar Bar M3/hr M3/h	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63%	90 90 90	10 10 10	1 PPM 2 PPM 4 PPM	4.8 LPH 3.50 LPH 3.56 LPH	Dosing for 3 10% solution 10% solution	1	Not requ
14 15 16 17 18 17 18 19 20 21 22 21 22 22	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Product flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 2 Blend flow Product TDS Product TDS Product PH Preparation UF System Chemical dase Pre chlorination dosing - 6LPH @ 6 Bar Dechlorination - 5MBS - 6 LPH @ 6 Bar Dechlorination - 5MBS - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33%	90 90 90 100	10 10	1 PPM 2 PPM 4 PPM 5 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH	Dosing for 3	1	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 mical	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 8 RO 2 Blend flow Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorination dosing - 6LPH @ 6 Bar Cooglylation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar	Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr PPM Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 100%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution	1 1 1	Not requ
14 15 16 17 18 17 18 19 20 21 22 <i>mical</i> 500 1 2 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 <i>mical</i> 500 1 2 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Cumulative flow RO 8 RO 2 Blend flow Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorination dosing - 6LPH @ 6 Bar Cooglylation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar	Bar M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr M3/hr PPM Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 100%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 22 23 4 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 22 23 4 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 22 22 3 4 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 22 22 3 4 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	Not requ
14 15 16 17 18 17 18 19 20 21 22 22 22 22 3 4 3 4	Reject Pressure RO 2 Pressure drop 1st Pass (12-13) Pressure drop second pass (12-14) Product flow RO 1 Reject flow RO 1 Product flow RO 2 Reject flow RO 2 Reject flow RO 2 Blend flow Product TDS Product TDS Product TDS Product TDS Product PH Preparation UF system Chemical dose Pre chlorinate dosing - 6LPH @ 6 Bar Coagulation - Ferric chloride - 10 LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar And dosing system - 6LPH @ 6 Bar Aprils galant - 6LPH @ 6 Bar	Bar Bar M3/hr Dosing tank 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs 300 Ltrs	1.1 41.7 13.9 41.7 13.9 41.7 13.9 1 - 2 120 - 200 Neat Chemical % 12% 33% 63% 33% 63% 50%	90 90 90 100 90	10 10 10 20 10	1 PPM 2 PPM 4 PPM 5 PPM 4 PPM 1 PPM	4.8 LPH 3.50 LPH 3.56 LPH 4.38 LPH 2.31 LPH 2.45 LPH 1.73 LPH	Dosing for 3 10% solution 10% solution 20% solution 10% solution as per PH va	n n n n	y 4 hour Not requ

	<u>Daily Opera</u>	tion and M	laintenance Lo	g sheet						
ROJE	CT: BWRO system - MMF			Date :						
Client										
				Month:						
apacı	ty: 2x1000M3/day									
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AN
Design	Limits									
1	Plant capacity - 2x1000M3/day	M3/day	1000							
2	Designed TDS	PPM	3000							
3	Designed Recovery	%	75%							<u>)</u>
4	Product flow	M3/hr	41.7							
5 6	Feed flow Reject flow	M3/Hr M3/hr	55.6 13.9					7	Y	
7	System pressure	Bar	15.1							
8	Reject TDS	PPM	12000							
	Section									
1	Feed pump Run hours	hours	P101A / P101B							
2	Feed pump VFD freequency Point 1& Point 2	Hz	30-35 / 45 -50					,		
3	Feed pump outlet pressure	Bar	3 - 4				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
4	MMF outlet pressure	Bar	3 - 4							
5	Diffrential pressure - MMF (1-2)	Bar	0.5 - 1.0							
6	Backwash pump run hours	hours	P101A / P101B	ļ					.	
7	Backwash pump presusre	Bar Ma//	2- 3 Bar	1					-	
9	Backwash flow Air Blower run hours	M3/hr Hours	45 AB101A / AB101B			<i> </i>			-	
10	Air Blower run nours Air blower Pressure	Bar	0.5 - 0.7						 	
O Sec		Jui	0.0 - 0.1	_						
	RO Run hours	Urc	RO 1 / RO 2							
2	CF outlet Pressure	Hrs CF - Bar	Min 2.0 Bar		· ·					
3	Feed water ORP	MV	110- 150	A						
4	Feed water PH		110 100							
5	Inlet flow - HPP1	M3/hr	55 - 56							
6	System Pressure RO 1	Bar	14-16	(·						
7	Inter stage pressure RO 1	Bar								
8	Reject Pressure RO 1	Bar								
9	Pressure drop 1st Pass(6-7)	Bar	1.1							
10 11	Pressure drop second pass (7-8) Inlet flow - HPP2	Bar M3/hr	1,1 55 - 56							
12	System Pressure RO 2	Bar	14-16							
13	Inter stage pressure RO 2	Bar	14-10							
14	Reject Pressure RO 2	Bar	,							
15	Pressure drop 1st Pass(12-13)	Bar	1.1							
16	Pressure drop second pass (12 - 14)	Bar 🎤	1.1							
17	Product flow RO 1	M3/hr	41.7							
18	Reject flow RO1	M3/hr	13.9							
17	Product flow RO 2	M3/hr	41.7							
18 19	Reject flow RO2 Cumulative flow RO 1 & RO 2	M3/hr M3/hr	13.9	1					 	
20	Blend flow	M3/hr	1 - 2							
21	Product TDS	PPM	120 - 200							
22	Product PH									
	A A 1						-			
	Preparation UF system					_			.	
Sno	Pre chlorination dosing - 6LPH @ 6 Bar	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note	0 min	. 1 h s
2	Dechlorination - SMBS - 10 LPH @ 6 Bar	200 Ltrs 200 Ltrs	12% 63%	80 85	20 10	2 PPM 4 PPM	4.3 LPH 6.15 LPH	Dosing for 3 10% solution		, 4 nour ai
3	Antiscalant - 6LPH @ 6 Bar	200 Ltrs	100%	90	10	4 PPM	2.2 LPH	15% solution		
4	Post PH correction - 6LPH @ 6 Bar	200 Ltrs	50%	90	10	5 PPM	4.17 LPH	as per dose		
5	Post Chlorination 6LPH @ 6 Bar	200 Ltrs	12%	95	5	0.5 PPM	3.77 LPH	as per dose		
	<u></u>									
Note	7									
1	Dosing pump 1st set will work if RO 1 is working									
2	Dosing pump 2nd pump will work if RO 2 is working	ational								
3	Both dosing pump will be on if both RO 1 and RO open TEST CONDUCTED BY:					WITNESSED B	v·			
	ILST CONDUCTED BT	-				ANTITIVE 22ED B	1			
	OEM					Client / Consu	ltant			

Client: Capacity Sno E UF Secti 1	Y: Equipment Details Etion UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level	Time interval Hours P 101 - Bar P 101 - Hz Bar Bar M3/hr NTU Psig Psig Psig P-102 - Bar Psig Psig Psig Psig Run/BW/ MC Min Min	Design Value 125 M3/hr @ 3bar 122 M3/hour <1.2 218m3/hr - 3Bar <1.2 30 after 20 cycle after 30 cycle Chemical % 12%	Date: Month: 8:00 AM Water	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
Sno E	Equipment Details Fion UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet - PT 02 Pressure at UF Inlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Acid tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	8:00 AM Water	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
Sno E Client : Capacity Sno E Capacity Capac	Equipment Details Fion UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet - PT 02 Pressure at UF Inlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Acid tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	8:00 AM Water	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
Capacity Sno E UF Secti 1	Equipment Details Fion UF system Run hours - surface area 26x70 = 1820m2 UF Feed pump Pressure UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet - PT 02 Pressure at UF outlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hol) - 2.2 PH level to maintain Coagulant tank level Acid tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
Sno E UF Section	Equipment Details Fion UF system Run hours - surface area 26x70 = 1820m2 UF Feed pump Pressure UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet - PT 02 Pressure at UF outlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hol) - 2.2 PH level to maintain Coagulant tank level Acid tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	Water	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
UF Section UF Se	UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump VF freequency Pressure - self Cleaning filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Pressure at UF lnlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filtreation cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	Water	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
UF Section UF Se	UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump VF freequency Pressure - self Cleaning filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Pressure at UF lnlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filtreation cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Hours P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	125 M3/hr @ 3bar 122 M3/hour 122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %	Water	22.00 TM	Z.SOTWI				, , , , , , , , , , , , , , , , , , ,
1	UF system Run hours - surface area 26x70 =1820m2 UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Turbidity at UF inlet - PT 02 Pressure at UF Inlet - PT 02 Pressure at UF Inlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
2 L 3 L 3 L 4 P 5 E 6 II 7 T 8 P 9 P 10 T 11 E 12 E 12 T 13 L 14 F 16 C 17 C 19 C 20 C 21 A 22 III Chemical Pi 2 C 3 N 4 N 5 H	UF Feed pump Pressure UF Feed pump VFD freequency Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hol) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	P 101 - Bar P 101 - Hz Bar M3/hr NTU Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
4 P 5 C 6 II 7 T 8 P 9 P 10 T 11 B 12 B 14 F 15 B 16 C 17 C 20 C 21 A 22 II Chemical P Sno C 1 P 2 C 3 N 4 N 5 H	Pressure - self cleanign filter out Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaOH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Bar Bar M3/hr NTU Psig Psig Psig Psig Psig Psig Psig Psig	122 M3/hour < 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
5 C C C C C C C C C C C C C C C C C C C	Diffrential Pressure - SCF Instant flow - UF inlet Turbidity at UF inlet Pressure at UF onlet Pressure at UF outlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure-BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hol) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Bar M3/hr NTU Psig Psig Psig Psig P-102 - Bar Psig Run/ BW/ MC Min Min cycle cycle Cycle Dosing tank	< 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
6	Instant flow - UF inlet Turbidity at UF inlet Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure-BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	M3/hr NTU Psig Psig Psig P-102 - Bar Psig Psig Run/ BW/ MC Min Min cycle cycle Cycle	< 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
7 T T 8 P P P P P P P P P P P P P P P P P	Turbidity at UF inlet Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (INd) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	NTU Psig Psig Psig Psig Psig Psig Psig Psig	< 1.2 218m3/hr - 3Bar < 1.2 30 after 20 cycle after 30 cycle Chemical %							
8 P P P P P P P P P P P P P P P P P P P	Pressure at UF Inlet - PT 02 Pressure at UF outlet - PT 03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure - BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Psig Psig Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle cycle Dosing tank	218m3/hr - 3Bar <1.2 30 after 20 cycle after 30 cycle Chemical %							
9 P P 10 T 11 B 12 P 12 T 13 L 14 F 15 B 16 C 17 C 20 C 21 A 22 II P 2 C 18 S 10 C 19 C	Pressure at UF outlet - PT-03 TMP UF - filtreation mode (PT02 - PT 03) Backwash pump pressure-BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaOH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Psig psig P-102 - Bar Psig psig Run/ BW/ MC Min Min cycle cycle cycle Dosing tank	218m3/hr - 3Bar <1.2 30 after 20 cycle after 30 cycle Chemical %							
11 B 12 B 12 T 12 T 13 L 14 F 15 B 16 C 17 C 19 C 17 P 19 C 12 D 17 P 19 C 17 P 19 P 19 C 17 P 19 P	Backwash pump pressure-BW flux 230 LMH Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	P - 102 - Bar Psig psig Run/BW/ MC Min Min cycle cycle cycle Dosing tank	218m3/hr - 3Bar <1.2 30 after 20 cycle after 30 cycle Chemical %							
12 B 12 T 13 L 14 F 15 B 16 C 17 C 19 C 20 C 21 A 22 III C 19 C 20 C 21 A 22 III C 19 C 20 C 21 A 25 III C 19 C 20 C 21 A 25 III C 20 C 20 III P 2 C 20 C 20 C 20 C 20 C 20 C 20 III P 2 C 20	Backwash effective pressure - PT 01 TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hd) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Psig psig Run/ BW/ MC Min Min cycle cycle cycle Dosing tank	<1.2 30 after 20 cycle after 30 cycle Chemical %		\					
12 T 13 L 14 F 15 B 16 C 17 C 19 C 20 C 21 A 22 III C 14 P 2 C 3 N 1	TMP - Backwash cycle (PT01-PT03) Unit status Filteration cycle time Backwash cycle time Backwash cycle time CEB 1.2 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	psig Run/ BW/ MC Min Min cycle cycle cycle Dosing tank	30 after 20 cycle after 30 cycle Chemical %		X					
13	Unit status Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Run/ BW/ MC Min Min cycle cycle cycle Dosing tank	30 after 20 cycle after 30 cycle Chemical %		X					
14 F F F F F F F F F F F F F F F F F F F	Filteration cycle time Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Min Min cycle cycle cycle Dosing tank	after 20 cycle after 30 cycle Chemical %							
15 B 16 C 17 C 19 C 20 C 21 A 22 II C 22 II C 22 C 23 N N 5 F Sno E 5	Backwash cycle time CEB 1.1 freequency (NaoH + 200PPM hypo chloride CEB 1.2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Min cycle cycle cycle Dosing tank	after 20 cycle after 30 cycle Chemical %							
17 C 19 C 20 C 21 A 22 III Chemical Pi P 2 C 2 C 3 N 4 N 5 H 5 F 6 F 6 C C 5 No E 5 N	CEB 1. 2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	cycle Dosing tank	after 30 cycle		>					
19 C 20 C 21 A 22 II Chemical PI Sno C 3 N 4 N 5 I Sno E	Coagulant tank level Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride	Dosing tank	Chemical %		Y	<i>Y</i>				
20 C 21 A 22 II Chemical Pi Sno C 1 P 2 C 3 N 4 N 5 H	Caustic tank level Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride				>					
21 A 22 II Chemical Pi Sno C 1 P 2 C 3 N 4 N 5 H Sno E	Acid tank level Intermediate tank level Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride									
22 II Chemical Pi Sno C 1 P 2 C 3 N 4 N 5 F Sno E	Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride									
Chemical PI	Preparation UF system Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride				P					
Sno C 1 P 2 C 3 N 4 N 5 H	Chemical dose Pre chlorination dosing Coagulant dosing pump - Ferric chloride									
1 P 2 C 3 N 4 N 5 H	Pre chlorination dosing Coagulant dosing pump - Ferric chloride									
2 C 3 N 4 N 5 H	Coagulant dosing pump - Ferric chloride	100 l trs	12%		Chemical	Dose rate	solu. Consp	Note		
3 N 4 N 5 H			220/	0	100	5 PPM	4.34 LPH	intermittent		
4 N 5 H		100 Ltrs	33% 12%	80 0	20 100	3 PPM 200 PPM	4.75 LPH 182 LPH	20 Itrs chemi		
5 F	NaOH - CEB 1.1 - 125PPM-pump capacity 50LPH	100 Ltrs	50%	0	100	125 PPM	28 LPH	CEB flow rat		
	Hcl - CEB 1.2 - 550PPM-pump capacity 460LPH	100 Ltrs	33%	0	200	550 PPM	181 LPH	CEB flow rat		
	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 Al
RII SPET	• •	Time interval	Design value	0.00 AIVI	12.001141	2.001101	0.001141	10.001101	IL.OU AIVI	4.00 AI
		Hrs								
		P 103 - Bar	104 M3/hr @ 3.5 bar							
	CF outlet Pressure	CF - Bar	., .							
	Feed water ORP	MV	120- 150							
		P 104 A - Hz								
		Bar Bar								
	RO Reject pressure RO Booster pump VFD Freequency	P 106 A & B - Hz								
		M3/hr	104 M3/hr							
10 P	PX high pressure flow	M3/hr	62.5 M3/hr							
		M3/hr	62.5 M3/hr							<u></u>
		M3/hr	41.67 M3/hr							——
		PPM PPM								
	1	PPM								
	Product PH									
	Antiscalant tank level									
18 P	Post PH tank level									
19 S	SMBS tank level				ļ			<u> </u>		
Chamical	Preparation RO system									
		Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note		
	Dechlorination - SMBS - 6LPH @ 6 Bar	100 Ltrs	63%	85	15	4 PPM	4.27 LPH	15% solution	n l	
	Antiscalant	100 Ltrs	100%	90	10	4 PPM	4.20 LPH	10% solution		
3 N	NaOH	100 Ltrs	50%	0	100	5 PPM	0.50 LPH	as per dose	rate	
Т						WITNESSED B	Y:			
	TEST CONDUCTED BY:									
	TEST CONDUCTED BY:					Client / CONS				

	Daily Opera	ntion and N	laintenance Lo	g sheet						
ROJE	CT: SWRO system - MMF- PX			Date :						
: lient				Month:						
Capaci [*]	ty: 1200M3/day									
										_
	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AN
<u>esign</u>	<u>Limits</u>									
1	Plant capacity	M3/day	1200							<u> </u>
2	Designed TDS	PPM	20,000.00							<u></u>
3 4	Designed Recovery Product flow	% M3/hr	50% 50		-					
5	Feed flow	M3/Hr	100					~		
6	Reject flow	M3/hr	50					(
7	System pressure	Bar	37							
ИMF S	Section						A	1		
1	MMF inlet Pressure	Bar	3 - 4		1					
2	MMF outlet pressure	Bar	3 - 4			_				
3	Diffrential pressure - MMF (1-2)	Bar	0.5 - 1.0							
4	MMF backwash time remaining	Hours	24 Hours Max							
5	Cartridge filter Out Pressure	Bar	Min 2.0 Bar							ļ
6	Diffrential pressure - CF (2-5)	Bar	Max. 1.5 Bar							
7	Feed flow meter - normal Service	M3/Hr	100			VY				
8	Feed flow metter - Rinse Backwash flow	M3/Hr	100			<i>Y Y</i>				
9		M3/hr	45							
RO Sec										
1	RO Run hours	Hrs				-				
3	CF outlet Pressure Feed water ORP	CF - Bar MV	Min 2.0 Bar 110- 150	,						
4	RO HP pump VFD Freequency (4655 RPM)	HPP 101- Hz	150 - 160Hz							
5	RO system pressure	Bar	37							
6	RO Reject pressure	Bar	36							
7	RO Booster pump VFD Freequency	Hz	48							
8	PX inlet flow	M3/hr	50 M3/hr							
9	PX high pressure flow	M3/hr	50.5 M3/hr							<u> </u>
10	Reject flow	M3/hr	50 M3/hr							
11	Product flow	M3/hr	50 M3/hr							
12	Feed TDS	PPM	20000							
13 14	Reject TDS Product TDS	PPM PPM	40000 120							
15	Product PH	11101	7-8.5							
16	Flow totalizer - product	M3/hr	-							
	Preparation UF system_	Y								
Sno	Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note	<u> </u>	
1	Pre chlorination dosing - 6LPH @ 6 Bar	100 Ltrs 100 Ltrs	12%	50	50	2 PPM	3.3 LPH	Dosing for 3		4 hour ar
3	Dechlorination - SMBS - 10 LPH @ 6 Bar Antiscalant - 6LPH @ 6 Bar		63% 100%	85 90	10 10	4 PPM 5 PPM	6.15 LPH	10% solution		
4	Post PH correction - 6LPH @ 6 Bar	100 Ltrs 100 Ltrs	50%	85	15	5 PPM		15% solution as per dose		
5	Post Chlorination 6LPH @ 6 Bar	100 Ltrs	12%	90	10	0.5 PPM	2.08 LPH	as per dose		
	TEST CONDUCTED BY:					WITNESSED B	Y:			
	OEM					CONSULTANT		L		

	<u>Daily Opera</u>	tion and N	<u>laintenance Lo</u>	g sheet						
PROJE	CT: 1000 M3/day -UF - SWRO system			Date :						
Client	:			Month:						
Capaci	ty: 1000M3/day									
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
UF Sec	<u> </u>	Time interve	Design value	5.567		2.001.11.	0.001	20.00		
1	UF system Run hours - surface area 26x70 =1820m2	Hours								1
2	UF Feed pump Pressure	P 101 - Bar	125 M3/hr @ 3bar						_	
3	UF Feed pump VFD freequency	P 101 - Hz								
5	Pressure - self cleanign filter out Diffrential Pressure - SCF	Bar Bar								,
6	Instant flow - UF inlet	M3/hr	122 M3/hour							
7	Turbidity at UF inlet	NTU	122 1/15/11001					.(1		
8	Pressure at UF Inlet - PT 02	Psig								
9	Pressure at UF outlet - PT-03	Psig					_			
10	TMP UF - filtreation mode (PT02 - PT 03)	psig	< 1.2							
11 12	Backwash pump pressure-BW flux 230 LMH Backwash effective pressure - PT 01	P -102 - Bar Psig	218m3/hr - 3Bar	-		-				
12	TMP - Backwash cycle (PT01-PT03)	psig	<1.2					_		
13	Unit status	Run/ BW/ MC								
14	Filteration cycle time	Min	30							
15	Backwash cycle time	Min								
16	CEB 1.1 freequency (NaoH + 200PPM hypo chloride		after 20 cycle	-				-		-
17 19	CEB 1. 2 freequency (Hcl) - 2.2 PH level to maintain Coagulant tank level	cycle	after 30 cycle			Y				
20	Caustic tank level					· ·				
21	Acid tank level									
22	Intermediate tank level									
	Preparation UF system Chemical dose	Danis ataul	Chaminal of	4 14/-4	Chamiaal	D	lu Causa	N-4-		
Sno 1	Pre chlorination dosing	Dosing tank	Chemical %	Water 0	Chemical 100	Dose rate 5 PPM	solu. Consp 4.34 LPH	Note	chlorinati	on is used - 10
2	Coagulant dosing pump - Ferric chloride	100 Ltrs	33%	80	20	3 PPM	4.75 LPH	20 Itrs chem		
3	NaoCl - CEB 1.1 - 200 PPM- pump capacity 280 LPH	100 Ltrs	12%	0	100	200 PPM	182 LPH	CEB flow rat		
4	NaOH - CEB 1.1 - 125PPM-pump capacity 50LPH	100 Ltrs	50%	0	100	125 PPM	28 LPH			<u>/hour</u> -check
5	Hcl - CEB 1.2 - 550PPM-pump capacity 460LPH	100 Ltrs	33%	0	200	550 PPM	181 LPH	CEB flow rat	te = 109M3 _/	<u>/hour</u> -check
- Cno	Equipment Details	Time internal	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10.00 084	12:00 AM	4:00 AM
Sno	Equipment Details	Time interval	Design value	8:00 AIVI	12:00 PIVI	2:00 PIVI	6:00 PIVI	10:00 PIVI	12:00 AIVI	4:00 AIV
RO Sec		Line								
2	RO run hours RO Feed pump Pressure	Hrs P 103 - Bar	104 M3/hr @ 3.5 bar							
3	CF outlet Pressure	CF - Bar	\$04 WIS/111 @ 3.5 But							
4	Feed water ORP	MV	120- 150							
5	RO HP pump VFD Freequency	P 104 A - Hz								
6	RO system pressure	Bar						ļ		
7	RO Reject pressure	Bar D 106 A 9 D Ha						-		
9	RO Booster pump VFD Freequency PX inlet flow	P 106 A & B - Hz M3/hr	104 M3/hr					-		
10	PX high pressure flow	M3/hr	62.5 M3/hr					<u> </u>		
11	Reject flow	M3/hr	62.5 M3/hr							
12	Product flow	M3/hr	41.67 M3/hr							
13	Feed TDS	PPM						-		
14	Reject TDS	PPM PPM				-		1		
15 16	Product TDS Product PH	FPIVI								
17	Antiscalant tank level									
18	Post PH tank level									
19	SMBS tank level									
<i>a</i>										
<u>Chemica</u> Sno	Preparation RO system_ Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note		
1	Dechlorination - SMBS - 6LPH @ 6 Bar	100 Ltrs	63%	water 85	15	4 PPM	4.27 LPH	15% solution	n	
2	Antiscalant	100 Ltrs	100%	90	10	4 PPM	4.20 LPH	10% solution		
3	NaOH	100 Ltrs	50%	0	100	5 PPM	0.50 LPH	as per dose		
	TEST CONDUCTED BY:	-				WITNESSED E	iY:			
	OEM					CONSULTANT	REPRESENTAT	TIVE		

	<u>Daily Operat</u>	tion and N	<u>laintenance Lo</u>	g sheet						
ROJE	CT: 2x500,000 SWRO - UF system			Date :						
lient										
				Month:						
apacı	ity: 1000M3/day									
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
JF Sec	1									
1	UF system Run hours - surface area 3640M2	Hours							_	
2	UF Feed pump Pressure	P 101 - Bar	238M3/hr @ 3bar							
3	UF Feed pump VFD freequency	P 101 - Hz)
4	Pressure - self cleanign filter out	Bar								
5 6	Diffrential Pressure - SCF Instant flow - UF inlet	Psig M3/hr	238 M3/hour		-				Y	
7	Turbidity at UF inlet	NTU	236 1913/11001							
8	Pressure at UF Inlet	Psig								
9	Pressure at UF outlet	Psig								
10	Backwash pump pressure	P -102A - Bar	210m3/hr - 3Bar							
		P-102 B - Bar	210m3/hr - 3Bar			_				
11	Backwash pump total flow BW flux 230 LMH Backwash effective pressure	M3/hour Psig	420M3/hour		 					
13	Unit status	Run/ BW/ MC								
14	Filteration time	Min	30							
15	Backwash time	Min								
16	CEB 1.1 freequency (NaoH + 200PPM hypo chloride		after 20 cycle			\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				
17 19		cycle	after 30 cycle	-	X					
20	Coagulant tank level Caustic tank level			_						
21	Acid tank level									
22	Intermediate tank level				<i>Y</i>					
				4						
	Preparation UF system					_				
Sno 1	Chemical dose	Dosing tank	Chemical %	Water 100	Chemical 50	Dose rate	solu. Consp	Note intermittent	chlorinati	on is used
2	Pre chlorination dosing Coagulant dosing pump - Ferric chloride	200 Ltrs	40%	0	100	0.8 PPM 4 PPM	4.75 LPH 4.75 LPH	50% chemic		
3	NaoCl - CEB 1.1 - 200 PPM- pump capacity 600LPH	200 Ltrs	12%	0	200	200 PPM	600 LPH	detect chlor		
4	NaOH - CEB 1.1 - 125PPM-pump capacity 100LPH	200 Ltrs	50%	0	200	125 PPM	100 LPH	check PH is 9		
5	Hcl - CEB 1.2 - 550PPM-pump capacity 750LPH	200 Ltrs	33%	0	200	550 PPM	732 LPH	check PH is 2	2.5 at the o	utlet
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 A
O Sec										
2	RO run hours	Hrs P 103 - Bar	200M3/hr @ 3.5 bar		-					
3	RO Feed pump Pressure CF outlet Pressure	CF - Bar	2001VIS/TIT @ 5.5 Dat							
			120- 150							
4 5	Feed water ORP	MV	120- 150							
4			120- 150							
4 5	Feed water ORP RO HP pump VFD Freequency	MV P 104 A - Hz	120- 150							
4 5 6 7 8	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency	MV P 104 A - Hz Bar Bar P 106 A & B - Hz								
4 5 6 7 8 9	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow	MV P 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr	118 M3/hr							
4 5 6 7 8 9	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow	MV P 104 A - Hz Bar P 106 A & B - Hz M3/hr M3/hr	118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow	MV P 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow	MV P 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr	118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow	MV P 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS	MV P 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product PH	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15 16	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPF Antiscalant tank level	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product FD Antiscalant tank level Post PH tank level	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15 16	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPF Antiscalant tank level	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product FD Antiscalant tank level Post PH tank level	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr							
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Booster pump VFD Freequency PX inlet flow PX high pressure flow Reject flow Product flow Product flob Reject TDS Reject TDS Product TDS Product PH Antiscalant tank level Post PH tank level SMBS tank level	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM	118 M3/hr 118 M3/hr 118 M3/hr	Water	Chemical	Dose rate	solu. Consp	Note		
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr Chemical %	85	15	4 PPM	8.33 LPH	15% solution		
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject prossure PY inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant	MV P 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM	8.33 LPH 7.88 LPH	15% solution 10% solution	ı	
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS	MV B 104 A - Hz Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr Chemical %	85	15	4 PPM	8.33 LPH	15% solution	ı	
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject prossure PY inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant	MV P 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM	8.33 LPH 7.88 LPH	15% solution 10% solution	ı	
4 5 6 7 8 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject prossure PY inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant	MV P 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM	8.33 LPH 7.88 LPH	15% solution 10% solution	ı	
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject prossure PY inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant	MV P 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM	8.33 LPH 7.88 LPH	15% solution 10% solution	ı	
4 5 6 7 8 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject prossure PY inlet flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant	MV B 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM	8.33 LPH 7.88 LPH 5.27 LPH	15% solution 10% solution	ı	
4 5 6 7 8 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant NaOH	MV B 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM 5 PPM WITNESSED B	8.33 LPH 7.88 LPH 5.27 LPH	15% solution 10% solution as per dose	ı	
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	Feed water ORP RO HP pump VFD Freequency RO system pressure RO Reject pressure RO Beject pressure RO Beject flow PX high pressure flow Reject flow Product flow Feed TDS Reject TDS Product TDS Product TPS Product PH Antiscalant tank level Post PH tank level SMBS tank level Preparation RO system Chemical dose Dechlorination - SMBS Antiscalant NaOH	MV B 104 A - Hz Bar Bar Bar P 106 A & B - Hz M3/hr M3/hr M3/hr PPM PPM PPM PPM Dosing tank 200 Ltrs 200 Ltrs	118 M3/hr 118 M3/hr 118 M3/hr 78.85 M3/hr 78.85 M3/hr Chemical % 63% 100%	85 90	15 10	4 PPM 4 PPM 5 PPM	8.33 LPH 7.88 LPH 5.27 LPH	15% solution 10% solution as per dose	ı	

	<u> Бану Орег</u>	ation and iv	laintenance Lo	<u>g sneet</u>						
ROJE	ECT: 2x3250 m ³ /Day TSE Polishing Pl	ant		Date :						
ient	:			Month:						,
anac	ity: 3250 M3/day			INIOITEIT.						1
apac	1015, 3230 1013, day								_^	\rightarrow
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:0
	ction		J					_)
		P 101 A - Bar								
1	UF Feed pump Pressure	P 101 B - Bar						7()	7	
		P 101 C - Bar								
		P 101 A - Hz					_			
2	UF Feed pump VFD freequency	P 101 B - Hz								
		P 101 C - Hz								
3	UF feed water flow before SCF	FIT01-M3/hr	250m3/hr							
		FIT 01-M3/hr SCF01A- bar	250m3/hr				Y			
4	Pressure inlet / outlet Self cleaning Filter	SCF01A- bar								
-		MMF101A- Bar								
		MMF101B- Bar								
5	Drassure inlet/outlet of NANAE	MMF101C- Bar								
5	Pressure inlet/outlet of MMF	MMF102A- Bar								
		MMF102B- Bar			4					
		MMF102C- Bar								
6	Pressure Backwash pump inlet /outlet	P 102 A - Bar								
7	Backwash water flow	P 102 B - Bar FIT03- M3/hr	150-160M3/Hr		<i>></i>					
	Backwasii watei ilow	AB 101 A - Bar	0.7bar							
8	UF Air blower Pressure	AB 101 B - Bar	0.7bar							
		AB 101 C - Bar	0.7bar							
9	Inlet / outlet Pressure across UF 1	PT01- Bar		7						
	·	PT02- Bar								
10	Diffrential pressure - TMP - UF 1	PT02-PT01-Bar	<1.5 Bar							
11	UF treated water flow - UF 1	FIT04- M3/hr	250 M3/Hr							
12	UF 1- status	Run/ BW/ MC								
13	Total Run hours - total UF1	Hours PT03- Bar	24							
14	Inlet / outlet Pressure across UF 2	PT04- Bar								
15	Diffrential pressure - TMP - UF 2	PT04-PT03-Bar	<1.5 Bar							
16	UF treated water flow - UF2	FIT05- M3/hr	250 M3/Hr							
17	UF 2- status	Run/ BW/ MC	,							
18	Total Run hours - total UF2	Hours	24							
19	Max. air flow	M3/hr	790 M3/hr							
20	Max air pressure	Bar	0.6 Bar							
21	RC Pump flow	M3/hr	126.4 M3/hr	-						
22	RC / CIP pump pressure	P 103A- Bar P 103B- Bar	219M3/hr		-					
23	Chlroine dose rate - MC 1	LPH	189		 					
24	Caustic dose rate - MC 1	LPH	199.6		1					
25	Acid dose rate - H2So4 - MC 2	LPH	104.1							
26	Chlroine dosing tank level - DTK 1	Ltrs								
27	Alkali dosing tank level - DTK 2	Itrs								
28	Acid dosing tank level - DTK 3	ltrs								
	7									
	al Preparation UF system					_				
Sno	Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note	and Co	FCI.
1	NaoCl- MC 1 - 350LPH - 1D+1SB	500 Ltrs	8%	0	200	110 PPM	342LPH	Fill neat che Fill neat che		ECU uni
2	NaOH - MC 1 - 350LPH - 1D+1SB Hcl - 200LPH- 1D+1SB	500 Ltrs 500 Ltrs	50% 33%	0	200	700PPM 840 PPM	346 LPH 200 LPH	Fill neat che		
3	INCI - ZOOLETIE TOTTOD	JUU LUS	35%	U	200	040 F 7 IVI	ZUU LP II	i iii neat che	iiiicai	4:0

	JLILV	ICL MI	NUAL ANI	Juon	LELLI	ILS		1		1
RO Sec	<u>ction</u>									
		P 104 A - Bar								
1	RO Feed pump Pressure	P 104 B - Bar								
-	no recu pump ressure	P 104 C - Bar								
		CF -102 A - Bar								
2	CF Inlet / outlet Pressure	CF -102 B - Bar								
-	or meet, successore	CF -102 C - Bar								
3	RO stream -1 Feed SDI	AIT -02	<2							
4	RO stream -1 Feed ORP	AIT -03	<150							
5	RO stream -1 Feed TDS	AIT -04	<1500							
6	RO stream -1 Feed PH	AIT -05	<7.0							
7	RO stream -2 Feed SDI	AIT -02	<2							
8	RO stream -2 Feed ORP	AIT -03	<150							4
9	RO stream -2 Feed TDS	AIT -04	<1500							
10	RO stream -2 Feed PH	AIT -05	<7.0							
		HPP101A - Bar	<10 Bar							
11	RO High pump Pressure In/ out	HPP101B - Bar	<10 Bar) ′
		HPP101C - Bar	<10 Bar					Á		
12	RO stream1-Product flow	FIT06-m3/hr	125M3/hr							
13	RO stream 1 -Reject flow	FIT 07 - m3/hr	53.5M3/hr					7,		
14	RO stream 1 - feed pressure	PT05 - Bar								
15	RO stream 1 - Reject pressure pressure	PT06 - Bar								
16	RO stream 1 - Diffrential pressure	PT06-PT05	<1 Bar							
17	RO stream 1 - Product TDS	AIT 06	<100							
18	RO stream 1 - Product PH	AIT 07	7-8							
19	RO stream2-Product flow	FIT09-m3/hr	125M3/hr				Y			
20	RO stream 2 -Reject flow	FIT 10 - m3/hr	53.5M3/hr							
21	RO stream 2 - feed pressure	PT08 - Bar								
22	RO stream 2 - Reject pressure pressure	PT09 - Bar								
23	RO stream 2 - Diffrential pressure	PT08-PT09	<1 Bar							
24	RO stream 2 - Product TDS	AIT 06A	<100							
25	RO stream 2 - Product PH	AIT 07A	7-8							
26	RO stream -Blend flow	FIT 08 - m3/hr	20.83 M3/hr		1					
27	RO stream -blended TDS	AIT 08	<150							
28	RO stream -Blend chlorine	AIT 09	<0.2							
29	Antiscalant dose rate	PPM	4							
30	Post PH dose rate	PPM		A			-			
31 32	SMBS dose rate	PPM								
33	Antiscalant tank									
34	Post PH dose rate SMBS dose rate		()	7		-	-			
34	SIVIBS GOSE Tate									
Chamical	Preparation RO system									
Sno	Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note		
1	Pre chlorination dosing - 5LPH - 2D + 1 SB	ECU unit tank	8%	0	ECU tank	1PPM	3.2LPH		ing and 4 h	ours off (Nea
2	Membrane Biocide dosing - 15LPH - 2D + 1 SB	200 Ltrs	100%	0	50	40PPM	3.2LPH 10 LPH		_	after 12 hour
3	De Chlorination dosing - 15LPH - 2D + 1 SB	200 Ltrs			200	4 PPM	10 LPH		n to be pre	
			15%	180						
4			15% 15%	180 170		4 PPM				to be prepar
<u>4</u>	Antiscalant - 10LPH - 2D + 1 SB	200 Ltrs	15%	170	30	4 PPM 4 PPM	6.67 LPH	15% chemic	al solution	
5 6		200 Ltrs 200 Ltrs			30 18	4 PPM		15% chemic	al solution tic solution	to be prepar to be prepa ink
5	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB	200 Ltrs	15% 20%	170 82	30	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB adysis report	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB Post Chlorination - 6LPH - 2D + 1 SB Indysis report	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB Post Chlorination - 6LPH - 2D + 1 SB allysis report PH TDS	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3	Antiscalant - 10LPH - 2D + 1 SB Post PH - 6LPH - 2D + 1 SB Post Chlorination - 6LPH - 2D + 1 SB allysis report PH TDS TSS	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB ealysis report PH TDS TSS COD	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB ralysis report PH TDS TSS COD TOC	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5 6	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB ralysis report PH TDS TSS COD TOC Feed turbidity	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5 6 7	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB Inlysis report PH TDS TSS COD TOC Feed turbidity Permeate turbidity	200 Ltrs 200 Ltrs	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5 6 7	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB Inlysis report PH TDS TSS COD TOC Feed turbidity Permeate turbidity	200 Ltrs 200 Ltrs ECU unit tank	15% 20%	170 82	30 18	4 PPM	6.67 LPH 6.29 LPH 0.84 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5 6 7	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2	200 Ltrs 200 Ltrs ECU unit tank	15% 20%	170 82	30 18	4 PPM 0.5 PPM	6.67 LPH 6.29 LPH 0.84 LPH	15% chemic 20% of caus	al solution tic solution	to be prepa
5 6 Water an 1 2 3 4 5 6 7	Antiscalant - 10LPH - 2D + 1SB Post PH - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2D + 1SB Post Chlorination - 6LPH - 2	200 Ltrs 200 Ltrs ECU unit tank	15% 20%	170 82	30 18	4 PPM 0.5 PPM WITNESSED B	6.67 LPH 6.29 LPH 0.84 LPH	15% chemic 20% of caus direct from	al solution tic solution	to be prepa

	Daily Opera	tion and N	laintenance Lo	g sheet						
Client :	CT: 2x1750 m³/Day TSE Polishing Plan	t		Date :						
	ty: 1750M3/day			Month:						
Capaci	Ly. 1730W37day									
Sno UF Sec	Equipment Details tion	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00 AM
1		P 101 A - Bar P 101 B - Bar								
2	UF Feed pump VFD freequency	P 101 A - Hz P 101 B - Hz								
3	Feed water tempreture	Deg C				-			 	
4 5	Pressure After Disc Filter Instant flow - Disc filter inlet	Bar								
6	Diffrential Pressure - Disc filter	M3/hr) ′
7	UF - filtreaiton - inlet Pressure - PIT 01	Psig								
<u>8</u> 9		Psig Psig								
10	UF - backwash - inlet Pressure - PIT 03	Psig								
11 12		Psig Psig					 		1	
13	Instant flow - UF outlet	M3/hr	133 M3/hour							
14 15		M3/hr Hours	113.6 M3/hr 24			 	_	(\mathbf{X})		-
16	UF run hours - production cycle	Hours	19.9					Y		
17 18		Run/ BW/ MC Min	30			1		\cup	\vdash	<u> </u>
19	Max. air flow	M3/hr	456.3 M3/hr					*		
20	Air scoure time	Min	4.53 Min			_		<u> </u>		
21		Bar M3/hr	0.6 Bar 126.4 M3/hr	 				 	 	
23	RC / CIP pump pressure	Bar	,				y			
24 25	RC / CIP pump pressure after CF Chlroine dose rate - MC 1	Bar LPH	189			A Y	_	 	\vdash	
26	Caustic dose rate - MC 1	LPH	199.6			VY				
27 28	Acid dose rate - H2So4 - MC 2 Intermediate tank level	LPH %	104.1		_			-	\vdash	
29	CIP flow meter - cumulatuive	M3								
30	Chlroine dosing tank level - DTK 1	Ltrs		_						
31 32	Alkali dosing tank level - DTK 2 Acid dosing tank level - DTK 3	ltrs ltrs			\					
				_	7					
Chemical Sno	Preparation UF system Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note	$\vdash \vdash \vdash$	—
1	NaoCl - MC 1	200 Ltrs	12%	0	200	180 PPM	189 LPH	Fill neat che		
3	NaOH H2So4	200 Ltrs 200 Ltrs	50% 98%	.0	200 200	790 PPM 840 PPM	199.6LPH 104.1 LPH	Fill neat che Fill neat che		
Sno	Equipment Details	Time interval	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM		12:00 AM	4:00 AM
RO Sec										
1	RO Feed pump Pressure	P 102 A - Bar P 102 B - Bar				1	—	 	\vdash	<u> </u>
	CF and at December	S - 401 A - Bar	\sim					 		
2	CF outlet Pressure	S - 401 B - Bar	105.50					<u> </u>		
5	Total Flow - RO inlet Feed water conductivity	M3 US/cm	106.69 1800	 		 	 	 	\vdash	
6	Feed water ORP	MV)							
7	RO HP pump VFD Freequency	P 103 A - Hz P 103 B - Hz		-		 	<u> </u>	 	\vdash	
8	RO HP pump Pressure	P 103 A Bar	9.8 Bar							
<u> </u>	RO inter stage pressure	P 103 B - Bar Bar	8.6 Bar			\vdash		 	\vdash	
9	RO Reject pressure	Bar /	7.6 Bar							
10	RO product flow	M3/hr	66.4	1593.6	476			1		
11		M3/hr M3/hour	4.54 35.75	108.96 858	1702.56	 	<u> </u>	 	 	
13	RO product conductivity (with blending)	US/cm	162	102.15						
14 15	RO product conductivity (without blending) RO Reject conductivity	US/cm	50 5050	0.650024474		\vdash	 	 	\vdash	
16	RO product PH		7.5							
17 18	Antiscalant dose rate Post PH dose rate	PPM PPM	4			 	<u> </u>	 	 	
19	SMBS dose rate	PPM								
20	Antiscalant tank							1		
21	Post PH dose rate SMBS dose rate							 	\vdash	
Chemical Sno	Preparation RO system Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note	\vdash	
1	Antiscalant	200 Ltrs	100%	90	10	4 PPM	4.09 LPH	Prepare che		
2	SMBS	200 Ltrs	63% 50%	90	10	4 PPM		Prepare che		
3	NaOH	200 Ltrs	50%	90	10	5 PPM	5.27 LPH	Prepare che	mical at 50	rrisievel
water an	alysis report									
1	РН									
3	TDS TSS									
4	COD									
5	TOC									
6 7	Feed turbidity Permeate turbidity									
8	RO feed water SDI									
	TEST CONDUCTED BY:	-				WITNESSED B	Y:			
	OEM					CONSULTANT	REPRESENTAT	IVE		

			Date :						
Client :			Month:						
DM Plant Capacity: 20 M3/Day									
Parameter	Unit	Design Value	8:00 AM	12:00 PM	2:00 PM	6:00 PM	10:00 PM	12:00 AM	4:00
I		Ĭ						1	
MMF inlet Pressure	Bar	3 - 4						- 1	
MMF outlet pressure	-						_		
Cartridge filter Outlet Pressure	Bar								
RO Run hours	Hrs						4) (
RO system pressure	Bar								
RO Reject pressure	Bar						\		
RO product flow	LPM	14							
RO reject flow	LPM	4.7				~)		
RO feed flow	LPM	18.7				A			
Feed TDS	PPM	<500				X			
Product TDS	PPM	< 20				Y			
Product PH		7-8.5							
FEDI inlet pressure						`			
FEDI oulet pressure									
FEDI concentrate inlet pressure					Y				
FEDI concentrate out pressure					<u> </u>				
FEDI outlet flow	LPM	18		AY	7				
FEDI concentrate outlet flow	LPM	2.5		V)	/				
FEDI voltage	V			Y					
FEDI current	A								
	_	-							
			y						
· · · · · · · · · · · · · · · · · · ·	Every 15 days		7				1	1	
	Every Month			 					
		-	y	 					
<u>tion</u>		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \							
Preparation_									
Chemical dose	Dosing tank	Chemical %	Water	Chemical	Dose rate	solu. Consp	Note		
Antiscalant - 6LPH @ 6 Bar	40 Ltrs	100%	39	1	5 PPM	0.55 LPH	1% solution	stroke Set	at 12%
		/							
OPERATOR					ENGINEER				
	MMF inlet Pressure MMF outlet pressure Cartridge filter Outlet Pressure RO Run hours RO Reject pressure RO product flow RO reject flow RO feed flow RO fl	MMF inlet Pressure MMF outlet pressure MMF outlet pressure Bar MMF outlet pressure Bar RO Run hours RO Reject pressure RO Product flow RO reject flow RO feed flow LPM RO feed flow LPM RO feed flow EEDI outlet pressure EEDI outlet pressure EEDI concentrate inlet pressure EEDI concentrate out pressure EEDI concentrate outlet flow LPM EEDI voltage V EEDI concentrate FEDI concentrate outlet flow LPM EEDI concentrate outlet flow LPM EEDI concentrate EEDI outlet flow LPM EEDI concentrate EEDI outlet flow EEDI concentrate Outlet fl	MMF inlet Pressure MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar Min 2.0 Bar Min	MMF inlet Pressure MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 Min 2.0 Bar RO Run hours RO Run hours RO Reject pressure Bar RO Reject pressure Bar RO Reject flow LPM 14 RO reject flow LPM 18.7 Rofeded flow LPM Rofed flow Rofeded	MMF inlet Pressure MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 Min 2.0 Bar XO Run hours RO System pressure Bar RO Reject pressure Bar RO reject flow LPM 14 RO reject flow LPM 15 LPM 18.7 Red TDS MMF inlet Pressure MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 Min 2.0 Bar Min 2.0 Bar RO Run hours Hrs RO Reject pressure Bar RO Reject pressure Bar RO Product flow LPM 14 LPM 18.7 Roded flow LPM 18.7 Roduct TDS PPM CS00 Product TDS PPM CS00 Product PH PM PM PM PM PM PM PM PM PM	MMF inlet Pressure MMF outlet pressure Bar 3 - 4 MMF outlet pressure Bar 3 - 4 Min 2.0 Bar Min 2.0 Bar Min 2.0 Bar KO System pressure Bar KO system pressure Bar KO product flow LPM LPM 4.7 KO reject flow LPM 18.7 Led To System LPM 4.7 LOOR feed flow LPM 18.7 LED Loncetrate outlet pressure LED Loncetrate outlet pressure LED Loncetrate outlet flow LPM 18 LED Loncetrate outlet flow LPM 2.5 LED Loncetrate outlet flow LPM 3.7 LED Loncetrate outlet flow LPM	MMF inlet Pressure	MMF oldet pressure	

MAINTENANCE CHECK LIST - PUMPS

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the pump; here followings the list of pump inception check

Sr. N	Pump Inspection and Maintenance Schedule	Routinely	Monthly	Quartile	Every 6 Month	Every 1 Year
1	Check Discharge Pressure rating in gauge	✓	-	-	ā C	-
2	Check of Discharge Flow in line	✓	-	-	(-)	-
3	Check pump Unusual noise if any	✓	-		<u> </u>	-
4	Visual inspection of lifting Piping Connections	✓	-	<u> </u>	-	-
5	Check motor direction and rotation	✓	- 🗸	7-7	-	-
6	Check tightness and fixation of the pump	✓	-	y -	-	-
7	Check that the pump is properly grouted	✓	0-	-	-	-
8	Check functionality of the pump logic / controls,	1	<u> </u>	-	-	-
9	Safety devices and operation	-	√	-	-	-
10	Checking the power cables & connections		✓	-	-	-
11	Check Discharge Pressure rating in gauge	/ -	✓	-	-	-
12	Emergency stop push button	-	✓	-	-	-
13	Check the correct electrical termination and availability of electric power	-	✓	-	-	-
14	Check pump skid / base plate leveling	-	✓	-	-	-
15	Check oil leaks at the gaskets	-	-	✓	-	-
16	Add oil to the bearing reservoirs, if required	-	-	✓	-	-
17	Oil level of the pump	-	-	√	-	-
18	Clean & oil linkage & valve stems	-	-	✓	-	-
19	Inspect the impeller for corrosion or excessive wear (anytime a pump is opened,)	-	-	✓	-	-
20	Mechanical seal (should be no leakage)	-	-	✓	-	-
21	Check coupling alignment and integrity	-	-	✓	-	-
22	Add grease to pump anti-friction bearings	-	-	-	✓	-
23	Add oil to the bearing reservoirs, if required	-	-	-	✓	-
26	Make sure that the oil level is the correct distance from the shaft centerline. Adjust if necessary.	-	-	-	√	-
27	Change anti-friction bearing oil	-	-	-	-	√
27	Inspect the impeller running clearance.	-	-	-	_	√

28	Inspect operation of all valves in system	-	-	1	-	✓
29	Tightness of foundation and hold-down bolts	-	-	-	-	✓
30	Change Pump Oil	-	-	-	-	✓
31	Inspect the impeller corrosion or excessive wear	-	-	-	-	✓

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