**INFORMATION COPY**

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**GENERAL OPERATING PROCEDURE**  
**MFIX-04**  
**MOBILE FILTRATION/IX SYSTEM OPERATIONS**

## 1.0 SCOPE

### 1.1 PURPOSE

The purpose of this procedure is to provide detailed instructions for the safe and efficient use of Diversified Technologies (DT) Mobile Filtration/IX (MFI) System.

### 1.2 APPLICABILITY

This procedure will normally be used by a Diversified Representative trained and qualified in accordance with Diversified's current QIP 20-09, Operator Training Procedure.

## 2.0 REFERENCE

2.1 Diversified Technologies Contract File; Site Contract.

## 3.0 REQUIREMENTS

### 3.1 Prerequisites

3.1.1 This procedure will be read in its entirety before proceeding with the next step.

3.1.2 The Utility will designate a Representative(s) to interface with DT personnel.

### 3.2 Utilities Requirements.

3.2.1 Waste feed of sufficient volume and pressure to supply LRW to system.

3.2.2 Service Water (SW) - 30-50 GPM at 90 PSI. Plant demineralized (DI) water is preferred.

3.2.3 Service Air (SA) - 40 SCFM at 90 PSI. Unfiltered air containing minimal water is desirable.

### 3.3 Safeguards

- 3.3.1 NOTIFY Utility Rep prior to any logic or system changes.
- 3.3.2 All Cam-lock connections must be safety-tied or wrapped prior to pressurization of any system component(s).
- 3.3.3 As a minimum, eye protection will be worn while working within three feet of any pressurized system component.
- 3.3.4 Higher than background radiation levels may be encountered. Normal ALARA (As Low As Reasonably Achievable) practices and safeguards should be practiced.
- 3.3.5 Do not connect or disconnect any portable lines during system operation.
- 3.3.6 Do not break any pressure point without first verifying absence of pressure indicated on any pressure gauge(s) not isolated from the pressure point being broken.

### 3.4 Attachment Lists

- 3.4.1 DT-95-001, Rev. B, Mobile Filtration/"IX" System P&ID Drawing.
- 3.4.2 MFIX-VCL, Valve Check List, Rev. 1.

## 4.0 OPERATING PROCEDURES

### 4.1 System operations

- 4.1.1 NOTIFY Utility Representative for verbal permission to process waste water.
- 4.1.2 OPEN Valves DT1, DT2, DT27 and DT31.
- 4.1.3 Start Sump Pump and verify flow to system.
- 4.1.4 START Booster Pump 1 and verify pressure increase on all non-isolated pressure gauges.
- 4.1.5 START Booster Pump 2 and verify pressure increase on all non-isolated pressure gauges.

- 4.1.6 ADJUST DT31 to obtain a reject flow rate of 1 gpm, as determined by the flow meter on the Reject Manifold.
  - 4.1.7 When flow is established, log the flow rate and the pressure drop across the filters and vessel(s).
  - 4.1.8 When processing is completed, SECURE the Booster Pump 2 and then Booster Pump 1.
  - 4.1.9 When flow has stopped and pressure is relieved, CLOSE DT1, DT2, DT27 & DT31.
  - 4.2 Media Sluicing: When the pressure drop becomes excessive resulting in an inadequate flow rate or the ion exchange capacity of the bed is depleted, the entire vessel may be sluiced.
    - 4.2.1 VERIFY DT1 & DT2 are closed.
    - 4.2.2 ATTACH Service Water (SW) to DT20 connection on the Booster Pump.
    - 4.2.3 BYPASS the filter by CLOSING DT110, and DT120. OPEN DT130.
    - 4.2.4 BYPASS the vessel not being sluiced by closing DT\*10 and DT\*20 and OPENING DT\*30 on the Control Manifold.
- NOTE: The numeric value of '\*' will be determined by vessel. E.g., Vessel #1 would be DT-110, DT-120, DT-130 and Vessel #2 would be DT-210, DT-220, DT-230.
- 4.2.5 ATTACH the sluice hose from the fitting on DT3 DT4 or DT5 of the vessel being sluiced to the fitting on DT6 of the sluice wand and direct the sluice wand to the receiving container.
  - 4.2.6 CLOSE DT\*10 and OPEN DT\*20 and DT\*30 on the Control Manifold of the vessel being sluiced.
  - 4.2.7 OPEN DT3, DT4 or DT5 of the vessel being sluiced and then OPEN DT6 after directing the sluice wand to the receiving container.
  - 4.2.8 Start flow of SW from supply line through the Booster Pump and into the effluent of the vessel. This will initiate the sluice through DT3, DT4 or DT5 and into the spent resin container.

- 4.2.9 When media flow is established for five minutes, SECURE the Service Water.
- 4.2.10 REMOVE the Service Water connection from the Booster Pump and ATTACH Service Air to the connection at DT20 on the Booster Pump.
- 4.2.11 OPEN DT\*10 and CLOSE DT\*20 and DT\*30 of the vessel being sluiced.
- 4.2.12 CYCLE DT20 open and closed (do not exceed 25 psi) to introduce SA to the vessel inlet through the CM until a small amount of air is noticed escaping from the vessel through the sluice wand, then Secure Service Air.
- 4.2.13 CONNECT Service Water to the Sparger Connection on the Vessel being Sluiced.
- 4.2.14 START flow of SW from supply line through the Sparger. This will wash down the vessel internally and remove the last of the resin.
- 4.2.15 When no more material is coming out the sluice line, the sluicing can be stopped by SECURING the SW supply, and DISCONNECTING the SW line from the Sparger Connection on the vessel.
- 4.2.16 VERIFY pressure is relieved by checking PI2, PI3, or PI4 of the vessel being sluiced and PI5 before CLOSING DT3, DT4 or DT5 and DT6.
- 4.3 Adding New Media: New media may be added to the PV by performing the following steps.
- 4.3.1 BLOW-DOWN Control Manifold (CM)
- 4.3.2 Bypass the PV to be loaded by OPENING DT\*30 and CLOSING DT\*10 and DT\*20.
- 4.3.3 OPEN DT2, DT27 and DT31 is open and that a piping lineup exists to allow water in Control Manifolds and Hoses to be routed to the Reject Receiving Tank or basement.
- 4.3.4 Initiate short bursts of Service Air to the Control Manifolds through the Booster Pump to blow the water in the Manifolds and Hoses to the Reject Receiving Tank.
- 4.3.5 VERIFY that lines are clear of water by observing the Sight Glass on the Effluent Manifold.

- 4.3.6 When purging is complete, SECURE Service Air and allow air pressure to vent off. Verify absence of pressure on PI5, PI7 and PI8.
- 4.3.7 CLOSE DT\*30 and CLOSING DT\*10 and DT\*20 of the vessel to loaded with media.
- 4.3.8 DISCONNECT the Jumper hoses from the Control Manifold of the vessel to be loaded.
- 4.3.9 CONNECT a transfer hose to the Inlet of the Control Manifold to the PV and direct the other end to the drums of resin to be added.
- 4.3.10 CONNECT a hose from the inlet of the Transfer Pump to the effluent side of the Control Manifold of the Vessel media is being added to. CONNECT SA to the Transfer Pump.
- 4.3.11 CONNECT a hose from the discharge of the Transfer Pump to the Inlet of the next Control Manifold in line or to the inlet of the Effluent Manifold if the last vessel is being loaded with media.
- 4.3.12 Set the opened shipping containers of new media in the process area. (30 Cubic Feet of media for a full PV loading.
- 4.3.13 Flood the shipping containers with Service Water (SW) using the Water Wand.
- 4.3.14 VERIFY DT2, DT27 and DT31 are open to provide a route for excess water to flow to the Reject Receiving Tank or drain.
- 4.3.15 OPEN DT\*10 and DT\*20 and CLOSE DT\*30 of the vessel being loaded with media.
- 4.3.16 To start the loading process, START the Transfer Pump and slowly lower the Sluice Wand into the water-filled shipping container. Care should be taken to suction an ample amount of water to assure a good slurry in the hoses.
- 4.3.17 Continue to add water with the Water Wand as water is being suctioned out of the shipping container.
- 4.3.18 When the pump and line is finally full of water, start to slowly lower the Sluice Wand into the submerged media. Do not plunge the Wand deeply into the media as this may result in plugging of the hoses.



- 4.3.19 CONTINUE this process until the shipping container is empty. Immediately SWITCH to the next shipping container. Try to minimize the amount of air suctioned during the transfer as this may result in loss of prime on the pump.
- 4.3.20 When all media is sluiced into the PV, allow the Transfer Pump to pump water for 2 minutes and then OPEN DT\*30 and CLOSE DT\*10 and DT\*20, to clear the hoses of water. SECURE the Transfer Pump.
- 4.3.21 Disconnect the hoses from the Transfer Pump and RECONNECT the hoses disconnected in steps 4.3.8 and 4.3.10.
- 4.3.22 RETURN all Valves to positions indicated on VCL.
- 4.3.23 After performing any required leak checks, the system is ready for operation.
- 4.3.24 When processing starts, vent excess air from the PV through the Sample Port.

## 5.0 RECORDS

- 5.1 Pertinent information, including times, dates, actions and contents of communications are commonly noted in Diversified's Daily Log though no records are required under this procedure. Some of the records which may be applicable to this procedure include:

### 5.1.1 Diversified's Daily Log.

- 5.1.1.1 One copy of Daily Log is kept on site. This Log is an internal, proprietary Diversified document, though Utility may request to review it.

- 5.1.1.2 A second copy of the Daily Log is retained at Diversified Corporate.

## 6.0 ABBREVIATIONS

- 6.1 For sake of brevity and clarity, certain abbreviations unique to Diversified's procedures are used in this, and other Diversified procedures.

DT	Diversified Technologies	CM	Control Manifold
LRW	Liquid Radwaste	QA	Quality Assurance
SA	Service Air	SG	Sight Glass
MFIX	Mobile Filtration/IX System	TP	Transfer Pump (PDP)
SW	Service Water		
RO	Reverse Osmosis		

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FINAL PAGE - END OF PROCEDURE

# **VALVE CHECK LIST** **MFIX-04-VCL** **MOBILE FILTRATION/IX (MFI) SYSTEM**

(Procedure Starting Positions)

VALVE #	DESCRIPTION	NORMAL POSITION	ACTUAL POSITION	INITIALS
DT1	Booster Pump 1 Isolation Valve	X	_____	_____
DT2	Effluent Manifold Discharge Valve	X	_____	_____
DT3	Vessel 1 Sluice Valve	X	_____	_____
DT4	Vessel 2 Sluice Valve	X	_____	_____
DT5	Vessel 3 Sluice Valve	X	_____	_____
DT6	Sluice Wand Isolation Valve	X	_____	_____
DT20	Booster Pump Injection Valve	X	_____	_____
DT21	Bag Filter 1 Drain Valve	X	_____	_____
DT22	Vessel 1 Sample Valve	X	_____	_____
DT23	Vessel 2 Sample Valve	X	_____	_____
DT24	Vessel 3 Sample Valve	X	_____	_____
DT25	Effluent Manifold Drain Valve	X	_____	_____
DT26	Effluent Manifold Injection Valve	X	_____	_____
DT27	Booster Pump 2 Discharge Valve	X	_____	_____
DT28	Reject Sample Valve	X	_____	_____
DT29	Product Sample Valve	X	_____	_____
DT30	Bag Filter 1 Sample Vent Port	X	_____	_____
DT31	Reject Isolation Valve	X	_____	_____
DT*10	Vessel Inlet (Control Manifold)	O	_____	_____
DT*20	Vessel Outlet (Control Manifold)	O	_____	_____
DT*30	Vessel Bypass (Control Manifold)	X	_____	_____

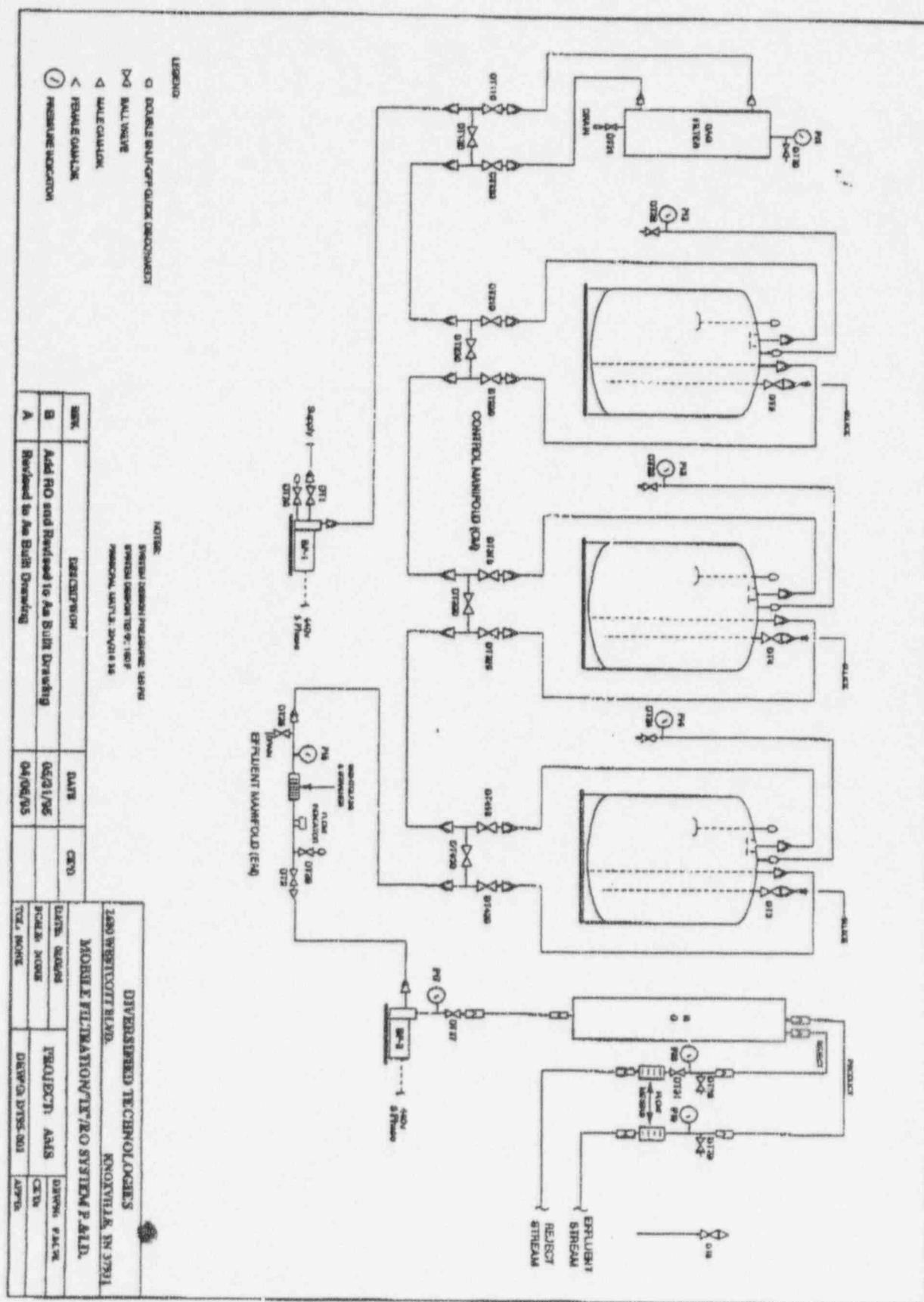
**NOTE:**

The numeric value of "\*" will be determined by the Vessel or Filter. E.g., Vessel #1 is DT110, DT120, and DT130, Filter #1 is DT210, DT220, and DT230, Filter #2 is DT310, DT320, and DT330, and Vessel #2 is DT410, DT420 and DT430.

Performed By \_\_\_\_\_

Date \_\_\_\_\_





# FILMTEC® Membranes

## BW30-330 8" Brackish Water RO Element†

### Performance Specifications

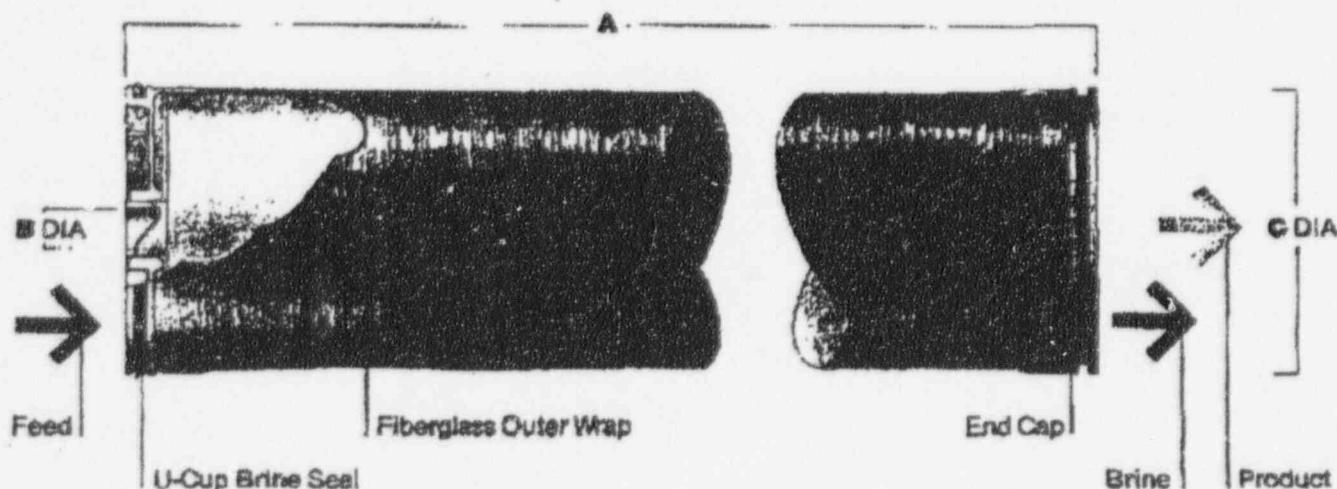
	Nominal Surface Area (ft <sup>2</sup> )	Product Water Flow Rate gpd (m <sup>3</sup> /d)	Salt Rejection CR (%)
BW30-330	330	7500 (28)	99

† Previously the BW30-8040 element.

\* Permeable flow and salt rejection based on the following standard conditions: 2000 ppm NaCl, 225 psi (1.6 MPa), 77°F (25°C), pH 8, and 15% recovery.

\* Flow rates for individual elements may vary but will be no more than 15% below the value shown.

\* Minimum salt rejection for individual elements is 95.0%.



### Operating Limits

Membrane Type	Thin-Film Composite
Maximum Operating Pressure	800 psi (4.1 MPa)
Maximum Operating Temperature	115°F (45°C)
Maximum Feed Turbidity	1 NTU
Free Chlorine Tolerance	<0.1 ppm
pH Range:	
Continuous operation	2-11
Short-term (30 min.), cleaning	1-12
Maximum Feed Flow	70 gpm (266 lpm)
Maximum Feed Silt Density Index	SDI 5

Single Element Recovery (Permeate  
Flow to Feed Flow):

	Recovery	Element Length (Inches)	A	B	C
BW30-330	0.15	40.0	1.125	7.9	

\* Consult the most recent DESIGN GUIDELINES for multiple element applications and recommended element recovery rates for various feed sources.

\* Elements to fit 8.00 inch I.D. pressure vessel.

# FILMTEC<sup>®</sup>

## MEMBRANES

For more information about  
FILMTEC membranes, call  
The Dow Chemical Company  
at 1-800-447-4369.

### Important Operating Information

1. Keep elements moist at all times after initial wetting.
2. If operating specifications given in this Technical Bulletin are not strictly followed, the warranty will be null and void.
3. Permeate obtained from first hour of operation should be discarded.
4. To prevent biological growth during storage, shipping, or system shutdowns it is recommended that FILMTEC RO elements be immersed in a protective solution. The standard storage solution contains 18 percent (by weight) propylene glycol and 1.0 percent (by weight) sodium metabisulfite. This solution also provides protection from freeze damage. For short-term storage of one week or less, a 1.0 percent (by weight) sodium bisulfite solution is adequate for the inhibition of biological growth. See Technical Bulletin "Biological Protection and Disinfection" for further details.
5. Elements must be in use for at least six hours before formaldehyde is used as a biocide. If the elements are exposed to formaldehyde before being in use for this period of time, a loss in flux may result.
6. The membrane shows some resistance to short-term attack by chlorine (hypochlorite). Continuous exposure, however, may damage the membrane and should be avoided.
7. The customer is fully responsible for the effects of incompatible chemicals on FILMTEC elements. Their use will void the element warranty.

**NOTICE:** Dow and FilmTec believe the information and recommendations herein to be accurate and reliable as of October, 1993. However, since any assistance furnished by Dow or FilmTec with reference to the proper use and disposal of its products is provided without charge, and since use conditions and disposal are not within its control, Dow and FilmTec assume no obligation or liability for such assistance and do not guarantee results from use of such products or other information herein; no warranty, express or implied, is given nor is freedom from any patent owned by Dow or FilmTec or others to be inferred. Information herein concerning laws and regulations is based on U.S. federal laws and regulations except where specific reference is made to those of other jurisdictions. Since use conditions and governmental regulations may differ from one location to another and may change with time, it is the Buyer's responsibility to determine whether these products are appropriate for Buyer's use, and to ensure Buyer's workplace and disposal practices are in compliance with laws, regulations, ordinances, and other governmental enactments applicable in the jurisdiction(s) having authority over Buyer's operations.

FilmTec Corporation is a wholly owned subsidiary of The Dow Chemical Company.

