MASAR مسار تقنيات Technologies, Inc.

Experience. Innovation. Performance. Leadership.

3-DAY TRAINING COURSE AGENDA

COURSE #1

MEMBRANE DESALINATION TECHNOLOGIES IN PRACTICE

DAY 1:

FEED WATER QUALITY & SOURCES

- *Raw Water Feed Analysis & Chemistry*
- *Wells & Open Intakes*

PRETREATMENT REQUIREMENTS

- *Philosophy and Overview*
- *Membrane Scaling & Fouling Potential*
- *Chemical Pretreatment Types*
  - *Disinfection – Chlorination, Chloramination*
  - *Coagulation & Flocculation*
  - *Acidification*
  - *Softening*
  - *Anti-Scalant Treatments*
- *Filtration Techniques – Design, Operation & Problems*
  - *Depth Filtration – Pressure Media & Gravity*
  - *Activated Carbon Filtration*
  - *Cartridge Filtration*

DAY 2

MEMBRANE TECHNOLOGIES OVERVIEW

- *Membrane Process Applications*
  - *Reverse Osmosis (RO) & Nanofiltration (NF)*
  - *Ultrafiltration (UF) & Microfiltration (MF)*
- *Membrane Materials – CA & PA & Configurations – HFF & SW*

PLANT OPERATION

- *Operational Parameters & Data Management*
- *Monitoring, Testing and Instrumentation*
- *Membrane Additions and Replacements*
- *Chemical Cleanings & Post-treatments*

SYSTEM OPTIMIZATION

- *Recovery Ratio Optimization – The Cost Impact*
- *Brine & Product Staging Configurations*
  - *Design Integration – Hybrid Plants*
- *Pilot Plants – Design, Operational, Monitoring & Evaluation*

PLANT PERFORMANCE MONITORING & EVALUATION

- *Data Collection and Utilization*
- *ASTM Standard Data Normalization and Trending*
- *Real-Time Membrane Fouling Monitoring & Detection*

MIDDLE-EAST RO PLANT CASE HISTORIES

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DAY 3

MEMBRANE FOULING IDENTIFICATION & CONTROL

BIOFOULING

- *Definition & Symptoms*
- *Biological Growth Phases, Monitoring & Measurement*
- *Effectiveness of Sterilization & Disinfection*
- *Control & Prevention Guidelines*

COLLOIDAL & SILICA FOULING

- *Definition & Symptoms*
- *Measurement*
- *Control & Prevention Guidelines*

ORGANIC FOULING

- *Definition & Symptoms*
- *Control & Prevention Guidelines*

CHEMICAL SCALING

- *Definition & Symptoms*
- *Control & Prevention Guidelines*

TROUBLE-SHOOTING AND TESTING

- *Symptoms & Possible Causes*
- *Specialized Testing Techniques*

PRACTICAL DESIGN, OPERATIONAL & MAINTENANCE GUIDELINES

OPEN DISCUSSION, QUESTIONS AND FEEDBACK

CONCLUSION

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MASAR ADVANCED COURSE AGENDA

COURSE #2

PRACTICAL UF-SWRO PLANT OPERATION OPTIMIZATION AND FOULING MANAGEMENT

Instructor: **Eng. Mohamad Amin Saad**

I. PRACTICAL PLANT OPERATION OPTIMIZATION

- ***Optimization Considerations & Criteria***
  - Why optimize plant operation?
  - Achieving maximum attainable conversion
  - Minimizing chemical & energy consumptions
  - Managing membrane additions, replacements & rejuvenation
  - Optimizing RO membrane cleanings
- ***UF Integration, Control Philosophy & Criteria***
  - Optimizing design & operational integrity with RO
  - Optimizing UF maintenance cleans - types and criteria

II. MEMBRANE PLANT FOULING MANAGEMENT

- ***Objectives of Effective Fouling Management***
- ***Identification of Fouling Types & Control Strategies***
  - Biological fouling
  - Organic & TEP fouling
  - Colloidal fouling
  - Fouling prevention strategies
- ***Fouling, Performance Measurement & Monitoring***
  - Trending-ASTM standard normalization
  - Real-time fouling detection, measurement UF/MF Permeability Monitor & SWRO/NF Fouling Monitor
  - The **SMART**™ technology solution
    - Fouling & non-fouling plant case studies

III. PLANT & MEMBRANE DIAGNOSTIC DEMONSTRATIONS

- ***Seven Golden Troubleshooting Rules-Seven Signs of Trouble***
- ***Seven Practical Diagnostic Techniques***
- ***Membrane Autopsy & Fouling Inspection Demonstration***

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TWO-DAY TRAINING COURSE AGENDA

COURSE #3

Membrane Desalination Plants Design, Operation & Performance

Monitoring, Optimization & Innovative Fouling Solutions

Day 1	0900-1700
WELCOME & INTRODUCTION – COURSE & CD REVIEW	0900-0915
I. MEMBRANE PLANT DESIGN CONSIDERATIONS ❖ Technical Parameters ❖ Feed Chemistry & Characteristics ❖ Feed Sources –Wells & Open Intakes	0915-1030
 REFRESHMENTS BREAK 	1030-1100
❖ Pretreatment Requirements ➢ Value & Objectives of Pretreatment ➢ Biological Control ♦ Disinfection ➢ Colloidal Control ♦ Filtration Systems ♦ Coagulation & Flocculation ➢ Scale Control ♦ Acidification ♦ Softening ➢ Anti-Scale Treatments	1100-1230
 LUNCH BREAK 	1230-1400
II. SYSTEM OPERATION OPTIMIZATION ❖ Membrane System ➢ Recovery Ratio Impact ➢ Optimization Considerations ➢ Brine & Product Staging Configurations ➢ System Integration – Hybrid Plants ➢ Pilot Systems – Surface Seawater RO Plants ➢ Membrane Selection, Additions & Replacements	1400-1530
III. ENERGY CONSUMPTION OPTIMIZATION ❖ Energy Recovery	1530-1630
OPEN DISCUSSION, QUESTIONS AND FEEDBACK **CONCLUSION**	1630-1700 1700

MASAR تقنيات مسار Technologies, Inc.

Membrane Desalination Plants Design, Operation & Performance

Monitoring, Optimization & Innovative Fouling Solutions

TWO-DAY TRAINING COURSE AGENDA

By: Eng. Mohamad Amin Saad - MASAR Technologies, Inc., USA

http://www.masar.com/training/cdorder/

Day 2	0900-1700
IV. PERFORMANCE MONITORING & EVALUATION ❖ Data Collection, Monitoring & Reporting ❖ ASTM Data Normalization ❖ Performance Trending ❖ Real-Time, Early-Warning Monitoring & Fouling Detection ➢ Silent Alarm™ Monitoring & Optimization Technology ➢ MASAR® Program Applications	0900-1030
REFRESHMENTS BREAK	1030-1100
V. MEMBRANE FOULING CONTROL STRATEGIES ❖ Control & Prevention Philosophy ❖ Types of Fouling & Scaling ➢ Biological Fouling ➢ Organic Fouling ➢ Colloidal Fouling ➢ Metal Oxide Fouling ➢ Scaling (Chemical Fouling)	1100-1230
LUNCH BREAK	1230-1400
VI. RO PLANT CASE STUDIES ❖ Case Study A: Fouling Seawater RO Plant ❖ Case Study B: Fouling Brackish RO Plant ❖ Case Study C: Non-Fouling Brackish RO Plant	1400-1430
VII. SYSTEM TROUBLE-SHOOTING GUIDELINES ❖ 7 Golden Rules ❖ Symptoms & Solutions ❖ Specialized Testing	1430-1530
VIII. TOP 30 PRACTICAL PLANT GUIDELINES ❖ Design ❖ Operation ❖ Maintenance	1530-1600
OPEN DISCUSSION, QUESTIONS AND FEEDBACK	1600-1630
CERTIFICATE AWARDS	1630-1700
CONCLUSION	1700