ELECTRODEIONIZATION WATER TREATMENT

877.711.4347

CONTENT

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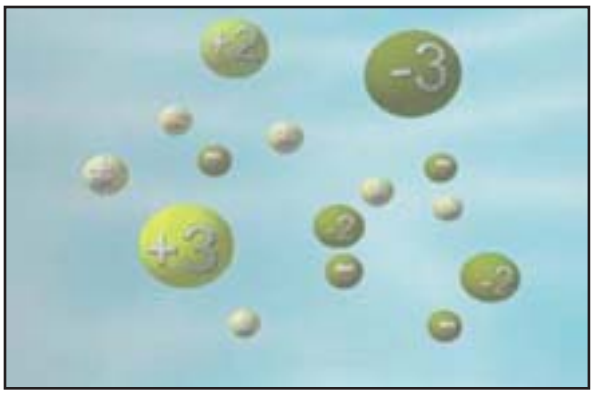

Courtesy Photos: David H. Paul, Inc.

Courtesy Photos: Siemens

Electrodeionization Water Treatment

EDI is an electrically regenerated ion exchange technology. No regeneration chemicals are required. In some cases this eliminates the need to store/ handle hazardous regeneration chemicals. There is a great reduction, or even elimination, of regeneration wastes requiring neutralization and disposal. There are a lot of intricacies to operating EDI units that you don't get from salespeople, installers and even an O & M Manual.

Who Should Attend

This seminar provides valuable knowledge to operators, maintenance personnel, technicians, management and engineering personnel who want to understand the operation, controls and monitoring of reverse osmosis pretreatment, reverse osmosis units and electrodeionization. If you learn by doing, this is the class for you. Aside from a small amount of classroom time in the morning and in the afternoon, this class is mostly hands-on working with live pretreatment, reverse osmosis units and electrodeionization units.

Why You Should Attend

Improper operations can lead to increased maintenance, problematic performance and possible downtime. Correct operation contributes to reduced maintenance, less frequent membrane and/or EDI cell replacement and an increase in overall plant efficiency. It is vital to understand the impacts of valve adjustment and feed water changes, even if you're operating an automated system. The information, tips and techniques you'll learn in this seminar are practical and immediately usable to improve the performance of your system(s).

What You'll Receive

- 16 hrs of enjoyable, interesting, easy-to-understand EDI water treatment training
- 16 hrs of the latest in multimedia training including 3-D animations
- A highly illustrated workbook

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Instructors

David Paul has provided consulting services at several SWRO plants around the world including at the Tampa Bay Desal Plant in the United States. He is the author of over 150 published articles on membrane water treatment, has developed and administers a 4,000 page correspondence training program on advanced water treatment, and has created and administered on-campus Associate Degree in Advanced Water Treatment programs at four different locations in the United States. David is the President of David H. Paul, Inc. (DHP), an advanced water treatment training and consulting firm located in the USA. DHP has trained over 16,000 water treatment professionals worldwide since 1988.

Bill Dees provides water treatment training and consulting services for David H. Paul, Inc. (DHP). He has over 18 years of design, installation, operation,maintenance,trouble-shooting, training and consulting experience of water treatment systems including membrane, ion exchange, pretreatment and post-treatment equipment. Bill is also the Technical Services Manager for DHP, responsible for membrane module autopsies and consulting. Bill holds an Associate of Applied Science Degree in Industrial Water Treatment from San Juan College, DHP's first on-campus, college degree program.

Certificate of Completion

Each attendee will receive a DHP certificate of completion following the course.

What Others Say About DHP Training Seminars

DHP has trained over 16,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental and drinking water clients. The average rating given by attendees for all DHP seminars, including this one, is over 9 (on a scale of 1-10, with 1 being a terrible rating and 10 being an outstanding rating).

The following are typical comments from attendees of DHP Seminars:

"Fantastic course. I've learned a lot and look forward to getting back to the plant with a new perspective on our equipment."
Rob O'Connell, O&M Tech, Athens Generating

"Very good course. David is a great instructor and very knowledgeable."
Lloyd Joppie, Senior Chemist, Austin Energy

"Until this course the E in E-CELL was for Enigma, because it was hard to understand."
Wally Smith, Outside Operator, Clark Public Utilities

"The course was well organized and easy to follow. Thank you!"
Jim Brown, Utility Operator, Genentech

"Great Course - Excellent overview of EDI process and troubleshooting."
John O'Donnell, Chemical Engineer, Intel

"This is one heck of a course-Excellent! DHP is an excellent teacher and well versed in the material. I've learned the most I ever have about EDI and now believe I understand all about EDI ! Thanks! Very good interactive participation."
Jerry Cunningham, Area Supervisor, Lower Colorado River Authority

David H. Paul, Inc. | P.O. Box 2590, Farmington, NM 87499 | 505.599.0248 | 877.711.4347 | dhptraining.com

ELECTRODEIONIZATION WATER TREATMENT

Detailed Agendum

Day 1

7:45 **Refreshments (Provided)**

8:00 **Introductions**

Workshop 1: Process Flows

Ionic Contaminants

- Cations
- Anions
- pH

9:00 **Break**

9:15 **Ionic Contaminants (continued)**

- Hardness, alkalinity, conductivity
- Charged & uncharged organics
- Charged & uncharged silica
- CO^2 & scaling

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10:15 **Break**

10:30 **Fundamentals of Ion Exchange**

- Electrical neutrality
- Ion exchange
- Ion exchange resins: beads & sheets
- Strong acids & strong bases
- SAC & SBA resins
- Selectivity

Workshop 2: Ion Exchange

11:30 **Lunch**

12:30 **Strong Acid Cation & Strong Base Anion Resin Beads & Resin Sheets**

Transitions from Dual-Bed Ion Exchange to Reverse Osmosis-EDI

1:45 **Break**

2:00 **Electrical Potential Driven Membrane Water Treatment**

- Electrodialysis (ED) & Electrodialysis Reversal (EDR) Predecessors to EDI

Electrodeionization (EDI) Fundamentals

- Module Components
- Deionization Process
- Voltage, Current, Resistivity
- Dilute filled, all filled
- Brine injection, brine recirculation

Courtesy: GE Ionics

3:15 **Break**

3:30 **EDI Fundamentals (continued)**

- Module features
- Module dynamics

Workshop 3: EDI Fundamentals

4:30 **Final Questions & Answers**

5:00 **End**

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Day 2

8:00 **Workshop 4: Day 1 Review**

Overview of Different EDI Units

- Electropure
- GE
- Ionpure
- DOW
- Tenergy-Christ

9:00 **Break**

9:15 **EDI Potential Problems**

- Scaling
- Fouling
- Chemical Attack
- Leaks
- Overheating
- Shorting

Pretreatment to Minimize EDI Problems

- RO membrane performance
  - o Single pass
  - o Double pass

10:15 **Break**

10:30 **Pretreatment to Minimize EDI Problems (continued)**

- Scaling control
- Fouling control
- Chemical attack control

Workshop 5: EDI Pretreatment

11:30 **Lunch**

12:30 **EDI System Monitoring Requirements**

- Instrumentation required
- Performance data collection (daily, weekly, etc)

Troubleshooting

- Performance data analysis
- Catching problems at an early stage

1:45 **Break**

2:00 **Chemical Cleaning**

Cleaning procedures

- Heat Sanitization

Module autopsy to identify where problems show up

3:15 **Break**

3:30 **Workshop 6: EDI**

4:00 **Summary & Conclusions**

- Final Questions & Answers
- Seminar evaluation

5:00 **End**