

# Interpreting Water Analyses

## Understanding Common Water Treatment Issues



Courtesy: Orange County



City of Ft. Myers



Pfizer



E-Cell

### WHERE & WHEN

For a list of where and when this seminar is being presented, click [here](#).  
This seminar can also be presented at your facility.

### DAILY SCHEDULE

8:00 a.m. - 11:30 a.m.

Lunch Break

12:30 p.m. - 5:00 p.m.

### WHO SHOULD ATTEND

Anyone involved in, or going to be involved in, the design, installation, operation, maintenance and/or management of a water treatment system. The information, tips and techniques presented apply to all water treatment systems and all industries, including POU-POE, municipal drinking water, beverage, power generation, pharmaceutical/biotech, semiconductor and all others.

### WHY YOU SHOULD ATTEND

Most water treatment professionals haven't had much formal training on water treatment chemistry and biology. Advanced and expert level understanding of water treatment theory, monitoring and troubleshooting requires an excellent knowledge of water treatment chemistry and biology.

This advanced level course will provide you with the knowledge needed to understand a complete water analysis report and many of the common water treatment problems/issues that most of us will face at some time.

### WHAT YOU'LL RECEIVE

8 hours of interesting, practical, easy-to-understand biofouling control training

8 hours of the latest in multimedia training including 3-D animations

A highly illustrated workbook

Break refreshments

## INSTRUCTOR



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Barring unforeseen circumstances, David Paul will instruct this training program. David was an operator for 2.5 years, first-level supervisor for 1 year and manager for 8 years of one of the most advanced water treatment systems in the world. He then began David H. Paul, Inc. (DHP) and has trained and consulted since 1988. David is the author of over 130 published articles on advanced water treatment, has developed and administers a 4,000 page correspondence training program on advanced water treatment, and has created and administers on-campus *Associate Degree in Advanced Water Treatment* programs at three different colleges in the United States. David is the President of DHP, an advanced water treatment training and consulting firm located in Farmington, New Mexico, USA. DHP has trained over 13,000 water treatment professionals worldwide since 1988.

## OVERVIEW OF TOPICS

- Source Waters
- Water Contaminants
- How to Read a Complete Water Analysis Report
- Evaluating Scaling Potentials
- Evaluating Non-Living Fouling Potentials
- Evaluating Living Fouling Potentials

## WHAT YOU'LL LEARN

- The characteristics of ground water and surface water
- The characteristics of fresh water, brackish water and seawater
- Water treatment chemistry
- Water treatment biology
- To critically evaluate water analysis reports to discover potential problems
- An advanced level of understanding of common water treatment problems



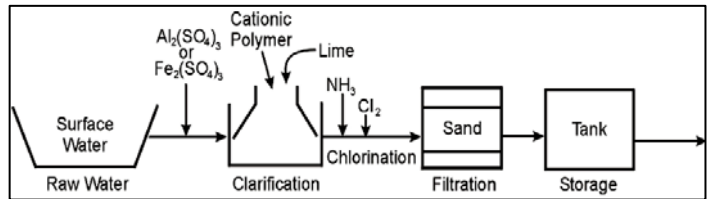
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# DETAILED AGENDA

- 7:45 Refreshments (Provided)
- 8:00 Introductions
- Workshop 1: Attendees' Water Analyses
- Source Waters (with examples)

- Fresh
- Brackish
- Seawater
- Well water, surface water



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### Contaminants

- Dissolved, suspended, colloidal
- Cations, anions, gases, organics, silica
- pH, conductivity
- mg/L, ppm, µg/L, ppb, ng/L, ppt
- Oxidizing agents, reducing agents

### How to Read a Complete Water Analysis Report

- Solution neutrality, charge balance, ppm as CaCO<sub>3</sub>, meq/L
- Cations, anions
- Total Hardness
- Alkalinity

CATIONS	FEED	
	PPM	MEQ/L
ALUMINUM	0.00	0.00
BARIUM	0.01	0.00
CALCIUM	247.83	12.37
CHROMIUM	0.00	0.00
COPPER	0.00	0.00
IRON	0.00	0.00
LEAD	0.00	0.00
MAGNESIUM	115.20	9.48
MANGANESE	0.00	0.00
POTASSIUM	7.28	0.19
SODIUM	165.78	7.21
STRONTIUM	27.86	0.64
ZINC	0.01	0.00
<b>TOTAL</b>	<b>563.97</b>	<b>29.89</b>
<b>ANIONS</b>		
BICARBONATE	51.24	0.84
CHLORIDE	327.54	9.24
FLUORIDE	1.30	0.07
NITRATE	1.11	0.02
PHOSPHATE	0.00	0.00
SULFATE	855.30	17.82
<b>TOTAL</b>	<b>1236.49</b>	<b>27.99</b>
<b>GRAND TOTAL</b>	<b>1800.46</b>	<b>57.88</b>

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- 9:00 Break (Refreshments Provided)
- 9:15 How to Read a Complete Water Analysis Report
  - Carbon dioxide
  - Total Dissolved Solids (TDS)
  - Temperature

### 10:15 Break (Refreshments Provided)

### 10:30 Evaluating Scaling Potentials

- Scaling
  - Carbonate scaling potential
    - Hardness
    - Alkalinity
    - pH
    - Temperature
    - Langelier Saturation Index (LSI), Stiff & Davis Saturation Index
  - Non-carbonate scaling potential
    - Cation concentration
    - Anion concentration
    - Temperature
    - Ionic strength
    - Solubility product constant
  - Silica scaling potential
    - Silica concentration
    - Temperature
    - pH



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- Using free software programs to calculate scaling potential
- 11:30 Lunch (Not Provided)

12:30 Workshop 2: Evaluating Scaling Potentials  
How to Read a Complete Water Analysis Report

- Heterotrophic Plate Count (HPC)
- Membrane filtration count
- Direct counts
- Chemical Oxygen Demand (COD)
- Biological Oxygen Demand (BOD)
- Total Organic Carbon (TOC)
- Total Suspended Solids (TSS)
- Turbidity



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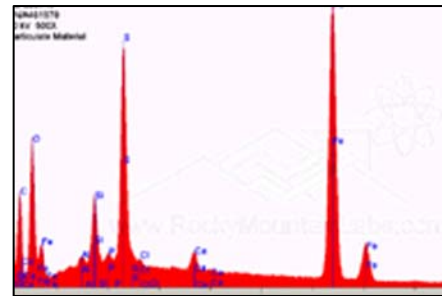
1:45 Break (Refreshments Provided)

2:00 Evaluating Non-Living Fouling Potentials

- Fouling Overview
- Turbidity
- TSS
- Silt Density Index (SDI)
- Oxidation, reduction
- Iron (Fe)
- Manganese (Mn)
- Aluminum (Al)

Evaluating Living Fouling Potentials

- Ideal Conditions
  - pH
  - Temperature
  - Food
  - pH
  - Flow Rate
  - Osmotic pressure
  - Oxygen



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3:15 Break (Refreshments Provided)

3:30 Evaluating Living Fouling Potentials

- Chlorination/dechlorination
- TOC
- BOD
- AOC
- Biocounts
- Nitrate
- Phosphate
- SDI



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Workshop 3: Evaluating Fouling Potentials

Workshop 4: Attendees' Water Analyses

4:45 Summary & Conclusions  
Final Questions & Answers  
Seminar Evaluation

5:00 End

## CERTIFICATE OF COMPLETION

Each attendee will receive a DHP *Certificate of Completion* following the seminar.

### WHAT ATTENDEES SAY ABOUT DHP TRAINING SEMINARS

DHP has trained over 13,000 water treatment professionals worldwide since 1988. Trainees include industrial, governmental and drinking water clients. The average rating given by attendees for all DHP seminars 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:

“Learned so much my brain hurt.”

Harold (Budji) McDill, System Operator, Monterey Bay Aquarium

“Excellent course material/presentation-lays a solid foundation to build upon. Very high emphasis on students understanding the volume of information given.”

Robert Markle, Boiler Area Leader, Proctor& Gamble

“Course should be required prior to installing & operating RO systems.”

Kim Price, Sr. Plant Engineer, Lucent Technologies

“Excellent info and presentation.”

W.R. Schulz, Manager of Product Development, Isco Industries

“Very good course, even if you have some background in RO.”

Kevin Simmons, Mechanical Project Engineer, US Filter (Siemens)

“Excellent! Very helpful.”

Stan Brooks, President, MoBetta Water Inc.

“Great! Workshops really helped on my troubleshooting skills.”

Gerald Lands, Operator, Duke Energy

“Great seminar! Came in knowing very little about reverse osmosis, left with a good understanding of RO and RO units.”

Chris Greer, Technical Sales Rep., Ashland Specialty Chemical

“This class was extremely enlightening even for someone with RO experience.”

Lionel Fontes, Chemist, SRP

“Great course- I would recommend this course to everyone in this field of work.”

Mike Wilkey, UPW/IWS Tech., Intel-Colorado Springs

“The flow and concentration of information was excellent.”

Joe Turner, Plant Utility Operator, Amgen-Longmont

“Very informative, very in depth, and very helpful.”

Martin Wix, Instrument Tech., BOC Gases