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Course Information Letter ---- B303

BOILER WATER CHEMISTRY FOR OPERATORS B303

Management of water chemistry can result in significant benefits, including reduced hydrogen damage, a reduction in the number of boiler tube failures, improved unit reliability, and the minimizing of corrosion deposition. Learn how to better manage water chemistry in this course. Learn what are the proper responses when chemical parameters are exceeded. Participants will also gain a better understanding of the consequences of operation while boiler and feed water chemistry limits are being exceeded.

This course is designed for fossil power plant operators and supervisors who are involved in testing feed water or boiler water, and making adjustments to chemical pumps based on their analysis. The course provides an understanding of the role of chemistry in a power plant and the effect of chemical controls on the operation of the system.

Unit efficiency, reliability, and availability can be adversely affected by improper boiler water chemistry. The results of a multi-million dollar overhaul can be negated during start-up due to improper boiler water chemistry. HPC instructors bring over 30 years of hands on experience to this training seminar.

COURSE DATES/LOCATION/FEE

For current dates / locations / prices, please see HPC's website, www.hpcnet.com.

FREQUENTLY ASKED QUESTIONS

- Will HPC Technical Services bring this course to our location for our personnel only? YES, call or email Stephen Parker, stparker@hpcnet.com for a price quotation.
- Will HPC Technical Services customize the presentation at our site to suit our particular needs? Yes.
- Is HPC Technical Services' textbook available for purchase as a reference document? No, not at this time.
- What is the cost for HPC Technical Service to deliver this course at our location? Well, of course that can vary, but generally speaking, if you're planning on having 6+ attend, when considering your T&L, it is to your advantage to perform the course at your plant (office). You gain from the customization and price.
- Can HPC Technical Services provide "Technical Assistance" in problem solving or chemistry audits? Yes we can. Call or contact Harold Parker, hparker@hpcnet.com for our rate sheets and any further information required.

WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, [Boiler Water Chemistry for Operators](#).
2. A "Certificate of Completion" with 1.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

OBJECTIVES: At the completion of this course the participant will be able to:

Boiler Water Chemistry for Operators

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1. Describe the various types of impurities found in water.
2. Describe the differences between elements, compounds, and mixtures.
3. Describe the Octet rule and valence shells.
4. Describe the difference between a solvent and a solute.
5. Describe the difference between acids and bases.
6. Describe the factors that effect corrosion.
7. Describe the methods to reduce or prevent corrosion.
8. Describe the various means of raw water treatment.
9. Describe the phase changes of water.
10. Describe the types and purposes of various types of feedwater and boilerwater chemical treatment.
11. Describe the various types of in-line analyzers.

COURSE OUTLINE

1. **Introduction:** Boiler Feedwater Treatment Developments, Treatment of Water, Impurities
2. **Chemistry Fundamentals:** Properties of Matter, States of Matter, Elements, Compounds, and mixtures, Energy Relationships, Atomic Structure and the Periodic Chart, Chemical Symbols, Chemical Formulas, Chemical Equations, Solutions and Solubility, Solution Concentrations, Solubility, Acids and Bases, Ionization of Water, Neutralization, Electrochemistry
3. **Corrosion:** Environmental Effects, Electrochemical Process, Factors Affecting Corrosion, The Chemistry of Corrosion, Galvanic Series, Electromotive Series, Alkaline and Acidic Solutions, Uniform & Location Corrosion, Pitting Corrosion, Stress Corrosion, Exfoliation: Corrosion Fatigue, Caustic Corrosion, Hydrogen Damage
4. **Make Up Water Treatment:** Clarification, Filtration, Water Softening, Demineralization, Types of Resins, Regeneration, Fouling, Reverse Osmosis
5. **Boiler Water Treatment:** Properties of Water, Boiler Water Treatment, Feedwater Treatment, Deaerator, Oxygen Scavengers, Contaminants
6. **Control Guidelines:** EPRI Guidelines, Boiler Water Analysis, Feedwater Analysis
7. **Instrumentation:** Analyzers, Sampling Water and Steam, On-Line Sample Panel, Conductivity Analyzers, pH Analyzer, Sodium Analyzers, Chloride Analyzers, Dissolved Oxygen Analyzers, Hydrazine Analyzers, Silica Analyzer

POWER PLANT OPERATOR CERTIFICATION:

This course is a requirement for Power Plant Operator Certification. Those who attend this course are automatically qualified to take HPC Technical Services' Certification Examination. This examination is offered at no additional expense to the participant. An 80% passing grade is required. The examination length will not exceed 2-hours. Those who complete this examination will receive a revised "certificate of completion" that recognizes this accomplishment along with two-copies of a "To Whom It May Concern" letter that states their accomplishment. (Two copies are provided, one for the participants' employer and one for the participants' personal file.)

Consult HPC's website, www.hpcnet.com, for detail on this certification program.

RECENT SATISFIED CLIENTS:

American Electric Power, ATCO Electric (Canada), Baltimore Gas & Electric, Boise Cascade, Daishowa-Marubeni International (Canada), Duke Energy, East Syracuse Generating, Entergy Operations, EPCOR (Canada), Florida Power & Light, Grand Bahama Power, Great River Energy, Hach Company, Korea (South Korea) Midland Electric Power Company, MidAmerican Energy, Minot State College, Ocean State Power, Ponderosa Pine Energy Partners, PP&L, SaskPower (Canada), Sheritt International, SSI Services, Tallahassee Electric Department, Tractebel Power, TransCanada, UAE Corporation, Viking Energy, Viridan, Wisconsin Public Service

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INSTRUCTOR (S):



Dan Anderson is the primary instructor for this course. Dan started his career in the US Navy as a Boiler Technician. After his discharge Dan was a civilian instructor for the US Navy at Great Lakes Naval Training Center. While there Dan instructed Navy personnel in the four-phase steam cycle including balance of plant equipment. In 1990 Dan returned to Minnesota and received his Minnesota State Chief A Engineers license. After a few years in the position as Chief Boiler Engineer For Green Giant Co. and Maintenance Manager for Minnesota Energy, Dan went to work for Hutchinson Utilities Commission in Hutchinson, Minnesota. His position there was Operator 1. His operational responsibilities included GE LM 6000 Combined Cycle, GE Frame 5 Simple Cycle, and a GE Frame 3 Combined Cycle. He also had operations of 6 Diesel Engines for power production. Dan joined HPC Technical Services, June 2001. His main area of instruction is Gas Turbine/Combine Cycle Fundamental, Steam Turbine/Generator Fundamentals, Mechanical Maintenance Courses, and The Boiler Training. Dan currently holds a Chief A Engineers License for Minnesota, A Chief NIULPE Certificate, NIULPE Instructor and Examiners Certificate, Chief ASOPE Certificate, and is a Member of ASME. He is also the on-line instructor (on this same topic) for the Bismarck State College Power Technologies degree program.

Elrod, Dana: Mr. Elrod has near 30-years experience in operating large electrical power plant facilities. From 1979 thru 2000, MidAmerican Energy Company in Council Bluffs IA employed Dana. Positions held include that of Operations Superintendent, Shift Supervisor, Training & Safety Supervisor and Environmental Specialist. From 1974 thru 1979 Mr. Elrod was employed as an Environmental Specialist for the State of Iowa Department of Environmental Quality. Mr. Elrod holds a BS in Management from Drake University, 1985. He resides in the beautiful Ozarks in the state of Missouri.

Ruby, LeRoy: Mr. Ruby provides chemistry training programs and laboratory procedures. His expertise is boiler water chemistry, cycling operations and plant chemistry instrumentation. He has provided expert witness testimony in the areas of coal sampling and analysis and boiler water treatment. Mr. Ruby supervised the development of chemistry training programs, laboratory procedures and conducted audits in both water chemistry and fossil fuel analysis. While working for a major Midwestern USA utility, Mr. Ruby performed the duties of a Chemist, Lab Supervisor and Station Lab Manager. Mr. Ruby is an active member of ASTM, D-05 Committee. Mr. Ruby served as a member on various task groups within ASTM, in the areas of sampling, laboratory QA inspections and method for instrumental analysis of coal and coke. Mr. Ruby is the original developer of this course and currently enjoys retirement (instructing for HPC occasionally) and resides in Baltimore MD.

HPC TECHNICAL SERVICES
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Website: www.hpcnet.com

REGISTRATION FORM

Company: _____

Plant: _____

Address: _____

City/State/Zip: _____

Telephone: _____ FAX: _____

Course Number/Title: _____

Course Dates: ____/____/____ Thru ____/____/____

Course Location: _____ Course Fee: _____

Please enroll the following individual(s) listed below:

Student #1: _____

Student #2: _____

Taking advantage of HPC's 3-4-2 Policy: Send 3, Pay for 2 when paying in advance.

Student #3: _____

Enrolled by: _____

Date: _____

METHOD OF PAYMENT

Check to Follow: _____

Check Enclosed #: _____

MC/Visa/AMEX #: _____

Expiration Date: _____ CV Code: _____

Purchase Order #: _____

Please advise how you found out about this course initially.

- Website search
- Fax advertisement
- Magazine advertisement
- Familiar with HPC
- HPC mailing
- Other: _____