



Course Information Letter ---- B309

HEAT RECOVERY STEAM GENERATOR O&M
B309

Proper operation of our Heat Recovery Steam Generator (HRSG) is critical to the safe and reliable operation of our combined cycle power plants. This course emphasizes the HRSG. It is essential for O & M personnel to maximize performance, minimize outage time, maximize reliability, and ensure safe operations. This course targets this overall objective of improved availability, reliability, and performance. To accomplish this we need to understand design considerations, we need to understand component functions and how they relate, we need to understand where the equipment may be at risk and how to minimize this risk, we need to implement reliable start-up procedures, we need to minimize the impact of operations upon the environment, and we need to accomplish these objectives in a safe manner. If these goals and the below objectives reflect your needs, then this course on Heat Recovery Steam Generator O & M is for you!

Recommended Prerequisites: CT101, Combined Cycle Power Plant Fundamentals

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

1. Describe the safety concerns when operating and maintaining an HRSG.
2. Describe the difference between horizontal and vertical HRSGs and the benefits of each.
3. Describe the flow through a Once Through Steam Generator (OTSG).
4. Describe the tube arrangement in the various sections of the HRSG and the purposes of each.
5. Describe the start-up scenarios and the stresses caused by each type of start-up.
6. Describe the damaging events during starts and stops of the HRSG.
7. Identify and describe duct burner operation.
8. Identify and describe attemperator systems.
9. Explain failure mechanisms as they pertain to HRSGs including:
 - a. Thermal Fatigue
 - b. Corrosion Fatigue
 - c. Flow-accelerated Corrosion
 - d. Under-deposit Corrosion
10. Explain how the affects of these failure mechanisms can be minimized or eliminated.
11. Describe the various types of emission control systems utilized on the HRSGs.
12. Describe the water treatment and testing found on the HRSGs.
13. Describe the various types of control systems found on the HRSGs.

COURSE TOPICAL OUTLINE

- I. Safety
- II. HRSG Design
- III. Steam System Operation
- IV. Water Treatment
- V. Environmental Systems
- VI. Maintenance
- VII. Ductwork, Dampers, and Stacks
- VIII. Control Systems

COURSE DATES/LOCATIONS/FEES

January 22-24, 2008	HPC Facilities in Sarasota FL	US \$1295
June 17-18, 2008	HPC Facilities in Sarasota FL	US \$1295
September 9-10, 2008	Tempe AZ	US \$1295
December 16-17, 2008	HPC Facilities in Sarasota FL	US \$1295

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.
- 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.

WHAT YOU WILL RECEIVE:

1. 1 copy of **HRSG Users Handbook**, a value of \$395.00. This text was developed by Robert C. Swanekamp, PE. Mr. Swanekamp is the Executive Director of the HRSG Users Group.
2. A "Certificate of Completion" with 1.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

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.

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www.hpcnet.com

INSTRUCTOR (S):



Dan Anderson. Mr Anderson 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.

Dana Elrod. 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

Robert Hayes. Mr. Hayes instructs HPC's Balance-of-Plant O&M courses as well as our popular "Power Plant Blackout Preparedness" course. Mr. Hayes, prior to early retirement, held several positions during his long tenure at Illinois Power: (1) Results Engineer, Results Supervisor. Mr. Hayes had responsibilities, which included equipment performance testing, and rotating machinery vibration analysis and correction. (2) Supervisor Plant Operations. Mr. Hayes had responsibilities which included startup and checkout of new equipment, supervision of four operating shifts, and coal receiving and handling group. (3) Power Plant Operations Specialist. Mr. Hayes had responsibilities, which included frequent visits to all five fossil power stations, participation in control replacement projects, participation in development and implementation of clean air compliance plans, and served as an internal consultant for fossil power generation operations. He led several technical teams that identified and recommended protective system improvements to the large generating units. He conducted root cause analysis of several major equipment failures.

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 #: _____