



## Course Information Letter ---- OP101

### POWER PLANT FUNDAMENTALS OP101

This course targets two specific audiences:

- (1) Those personnel who are just entering the power plant industry. For you, this initial experience can be overwhelming, and this course is designed such that at the conclusion the relationship of components to the generation of electrical power will make sense.
- (2) Those personnel who have worked at the power plant, perhaps experienced at their jobs, but have a need to put the equipment in perspective. As an example, it could be maintenance personnel who would appreciate better understanding why this particular pump is so vital to placing the unit in service.

The course is oriented so it follows the four phases of the steam cycle: Generation, Expansion, Condensation and Feed. The process as well as machinery is explained. The result will be a clear understanding of what takes place in a power plant and why.

**Topics include:** Introduction to Steam Power Plants • Fuels and Combustion • Boilers • Combustion Air • Flue Gas • Ash Handling • Air Pollution Controls • Circulating Water • Steam • Condensate • Feedwater • Turbine

**OBJECTIVES:** It is the overall objective of this course to familiarize personnel with the operational design of a modern fossil fueled power plant.

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

1. Describe the phases of a basic steam cycle, including; Generation, Expansion, Condensation and Feed
2. Identify the components in each phase of the basic steam cycle.
3. Demonstrate an understanding of the theory of operation of each identified component of the basic steam cycle.
4. Describe the flow of a drop of water/steam through the cycle and describe what happens in each phase.
5. List the major mechanical components found in a power plant.
6. For each listed major components, describe how each component relates to the basic steam cycle.

### COURSE OUTLINE:

1. **Overview of the Steam Cycle:** Generation, Expansion, Condensation, Feed
2. **Generation Phase:** Boiler Theory, Basic Thermodynamics, Heat Transfer, Properties of Water, Circulation, Types of Boilers, Types of Fuels and Combustion Theory, Saturated and Superheated Steam Tables, Boiler Operation
3. **Expansion Phase:** Turbine Theory, Impulse vs. Reaction, Condensing vs. Non-Condensing, Reheat vs. Non-Reheat, Single Flow vs. Multi-Flow, Extraction vs. Non-Extraction, Steam Turbine Operation
4. **Condensation Phase:** Condensation Theory, Types of Heat Exchangers, Cooling Towers, Condensate Pumps, Low Pressure Feedwater Heaters, Steam Traps, Make-up Water System
5. **Feed Phase:** Feed Pumps, HP Feedwater Heaters, Deaerators, Economizers, Basic Water Chemistry
6. **Connection of the Phases --** Trace a Drop Through the Basic Steam Cycle

## **COURSE DATES/LOCATION/FEE**

For current dates / locations / prices, please see HPC's website, [www.hpcnet.com](http://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](mailto: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? Yes. \$95 + S&H.
- 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 conducting functional checkouts or troubleshooting problems? Yes we can. Call or contact Harold Parker, [hparker@hpcnet.com](mailto:hparker@hpcnet.com) for our rate sheets and any further information required.

## **WHAT YOU WILL RECEIVE:**

1. 1 copy of HPC Technical Services' textbook, OP101, Power Plant Fundamentals.
2. A "Certificate of Completion" with 1.9 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

## **POWER PLANT OPERATOR CERTIFICATION:**

This course is one of the courses required 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](http://www.hpcnet.com), for detail on this certification program.

## **RECENT SATISFIED CLIENTS:**

Alabama Power, Alstom Power, Ameren UE, Babcock Services, CMS Generation, Constellation Energy, Dynegy Power, EPCOR Castleton, First Light Power, Florida Power & Light, FPL Generation, Gerber Foods, Gulf Power, Holland Energy Constellation, Hovensa Oil Refinery, KJC Operating Company, Korea Electric Power Company, MidAmerican Energy, PPL, Reliant Energy, SaskPower, Seminole Electric, Southeast Public Service Authority of Virginia, Southern Company, SSI Services, TransAlta, US Department of Homeland Security, US Sugar, Valero Refinery, Zebra Controls GSA

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www.hpcnet.com

## 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.

### **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

### **Hayes, Robert**

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.

### **Militello, Ray**

Mr. Militello has approximately 30-years experience maintaining steam turbine generator equipment. He has worked as a Field Representative for GE Installation & Service Department, was employed as a Supervisor - Maintenance and Maintenance Planning with Southern California Edison Company. Ray also worked as Manager, Maintenance Training Services with HPC Technical Services for 4-years before deciding to become independent. Now Ray instructs specific turbine maintenance courses for HPC, depending upon availability.

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**HPC TECHNICAL SERVICES**  
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Website: [www.hpcnet.com](http://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: \_\_\_\_\_