



Course Information Letter ---- OP304

OPERATOR CONTROLLABLE LOSSES OP304

How can we improve overall plant performance? You may consider boiler improvements, turbine cycle improvements, control system upgrades, or auxiliary power reductions. The word improvement is interesting as it implies capital investment, significant budgets and a lot of planning. One might consider a more immediate return on one's investment by investing in operating personnel. We find it interesting when we encounter a plant that is talking of major capital investment to improve overall efficiency, when in that plant, there remains a considerable amount of waste, waste that is a result of inattentiveness or lack of understanding of important heat rate concepts. Invest in operations personnel (first) by increasing their awareness of how operational decisions can and do affect overall plant performance. Improve plant heat rate! Reduce controllable losses! Do so through greater operator knowledge of the power plant cycle with emphasis on factors influencing efficiency.

This course is intended for operations, maintenance, and persons in supervisory roles that can benefit from day to day operations by opening up different ways of looking at the operating plant and what is causing efficiency losses. HPC presents this course as an open-enrollment (you come to us) session, on-site (at your place) presentations, and can customize course materials to your specific plant.

A **topical outline** includes discussion on Thermodynamics (what should be a review), Controlling Boiler Losses, Controlling Turbine Losses, Controlling Heat Exchanger Losses, and Controlling Condenser Losses.

OBJECTIVES:

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

1. Describe the thermodynamic processes involved with each component in the power plant cycle.
2. State the function of each component in the thermodynamic cycle.
3. Describe the different types of heat transfer and state where each type is used in the cycle.
4. Define the terms entropy, enthalpy, superheat, latent heat, and sensible heat.
5. State the major losses associated with the boiler with emphasis on how operating decisions can reduce these losses.
6. State the major losses associated with the steam turbine with emphasis on how operating decisions can reduce these losses.
7. State the heat transfer equations that apply to the various power plant heat exchangers.
8. State the effects of various changes on heat exchanger performance.

COURSE DATES/LOCATION/FEE

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

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COURSE OUTLINE

- I. **Introduction**
- II. **Thermodynamic Review:** Power Plant Cycle, Steam and Water Properties, Energy, Heat Transfer, Gross Heat Rate, Net Heat Rate
- III. **Controlling Boiler Losses:** Steam Generator Theory, Steam Generator Construction, Affect of Fuel Quality, Affect of Excess Air, Affect of Exit Gas Temperature, Affect of Attemperation, Combustion Losses, What is in Operator Control
- IV. **Controlling Turbine Losses:** Turbine Theory, Expansion and Nozzles, Turbine Stages, Turbine Construction, Turbine Losses (Heat Balance, Working Curves, Correction Factor Curves, Other Losses), Operator Control (High Backpressure Causes/Corrections and Steam Admission Mode)
- V. **Heat Exchanger Performance:** Heat Transfer Theory, Relationships, Heat Transfer Equation, Condensers (Theory, Support Systems, Factors Affecting Performance), Feedwater Heaters (Closed FW Heater Theory, Closed FW Heater Construction, Factors Affecting Performance), Deaerator (Deaerator Theory, Deaerator Construction, Factors Affecting Performance)

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? 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 for our rate sheets and any further information required.

WHAT YOU WILL RECEIVE:

1. 1 copy of HPC Technical Services' textbook, OP304, [Operator Controllable Losses](#).
2. A "Certificate of Completion" with 1.6 CEUs, authorized for issue by the International Associate of Continuing Education/Training.

POWER PLANT OPERATOR CERTIFICATION:

This 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, for detail on this certification program.

RECENT SATISFIED CLIENTS:

AES Corporation, American Bituminous, ALCOA Power Generation, Allegheny Power, American Electric Power, ATCO Electric, Austin (TX) Electric Department, Brownsville (TX) Public Utilities, Central Illinois Lighting Company, Central Power & Light, CMS Generation, CSW Energy, Detroit Edison, Duke Energy, Duke Fluor Daniel, Duquesne Lighting, Dynege Northeast, Entergy Operations, Lakeland (FL) Electric Department, Louisville Gas & Electric, MidAmerican Energy, Minnesota Power, Nova Scotia Power, Ogden Martin Systems, Ohio Valley Electric Cooperative, Omaha Public Power District, Ontario Power Generation, Orlando (FL) Utilities Commission, Panda Rosemary Cogen, Pfizer Inc., Public Service Oklahoma, San Diego Gas & Electric, SaskPower, Sithe Energies, Southern California Edison, Southwestern Electric Power, Springfield (MO) City Utilities, Texas Municipal Power Agency, Tractebel, United Power Association, UtiliCorp, West Texas Utilities

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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.

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.

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HPC TECHNICAL SERVICES
500 Tallevast Road, Suite 101, Sarasota, FL 34243
Telephone: 941-747-7733 FAX: 941-746-5374
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: _____ Email: _____

Student #2: _____ Email: _____

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

Student #3: _____ Email: _____

ENROLLED BY: _____ **Email:** _____

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: _____