



Multiple Hearth Furnace Operator Training Course
(Expanded Syllabus)

Instructor: Chavond-Barry Engineering Corp
Facility: Facility Title of City, State

Course Rationale

This course is designed to provide a basic understanding of the scientific principles behind the operation and function of a multiple hearth sewage sludge incinerator, in addition to proper operation and maintenance of the incinerator, APC equipment, and ancillary equipment. The goal is to provide incinerator operators with the knowledge and understanding necessary to safely and efficiently run their incinerator. Successful completion of this course and the included examination will qualify operators in accordance with, and meet the requirements of, 40CFR60.5130.

Learning Objectives

By the end of this course, operators and personnel should have a basic understanding of: combustion and how it applies to the reaction(s) inside the incinerator, heat transfer and the balance of energy within the incinerator, incinerator emissions and their causes, and incinerator controls and operation.

Required Materials

Multiple Hearth Furnace Operator Training & Qualification document (provided)
Multiple Hearth Furnace Operator Training Course presentation slides handout (provided)

Please note: these items are intended to serve as reference materials. Copies should be maintained on-site and be made available to all operators. (40CFR60.5230)

Schedule

Day 1: Classroom Lecture, covering the items shown in the course outline
Day 2: Finish Lecture (as needed), facility walk around identifying equipment & controls, and discussion of site specific scenarios & equipment
Day 3: Review, Q&A, Final Examination

Basis of Final Grade

Attendance is required for ALL sessions! Participation will be considered for up to 10% the final grade. An exam will be administered at the end of the course, and count for 90% of the final

grade.

Course Outline

- I. Basic Definitions**
 - Definitions & Abbreviations
 - Common Abbreviations
 - Key Regulatory & Reporting Definitions
 - Heat Transfer
 - Modes of Heat Transfer
 - Overall heat transfer
 - Material Balance
 - Energy balance

- II. “Environmental concerns, including types of emissions.”**
 - Environmental Concerns
 - Spills & leaks
 - Incinerator Emissions
 - Types of Emissions
 - Air Contaminants
 - Metals
 - HAPS
 - VOC
 - Particulate
 - Acid Gasses
 - Actual Emissions
 - Allowable Emissions
 - Potential Controlled Emissions
 - Potential Uncontrolled Emissions
 - Other Emissions

- III. “Basic combustion principles, including products of combustion.”**
 - Basic Combustion Principles
 - Fire Triangle
 - Heating Value
 - Moisture Content
 - Temperature
 - Residence Time
 - Air (Oxygen)
 - Surface Area
 - Products of Combustion
 - Complete Combustion
 - Incomplete Combustion
 - SSI Combustion Products

IV. “Operation of the specific type of incinerator to be used by the operator, including proper startup, sewage sludge feeding, and shutdown procedures.”

- Basic Process Description
- Operation of a MHF
 - Startup
 - Cold Startup
 - Warm Startup
 - Sludge Feed
 - Shutdown
 - Short-Term Shutdown
 - Long-Term Shutdown
 - Emergency Shutdown & Potential Flash Burning
 - Emergency Bypass & Burnouts
 - General Operation
 - Permit Operating Limits
 - Equipment Operating Limits
 - Common Operating Scenarios

V. “Combustion controls and monitoring.”

- Combustion Process Controls
 - Sludge Feed
 - Hearth Burners
 - Combustion Air
 - Other Process Controls
 - Improvements in Combustion Efficiency
- Operator Controls & Interface
 - Electronic / Automatic Controls
 - Manual Controls
- Monitoring
 - SCADA
 - CEMS

VI. “Operation of Air Pollution Control (APC) equipment and factors affecting performance (if applicable).”

- APC Equipment, General Description
- APC Equipment Operation
 - Afterburner (and/or RTO)
 - Venturi Scrubber (or Cyclone)
 - Tray Scrubber
 - Wet Electrostatic Precipitator (WESP)
 - Activated Carbon Adsorption System

VII. “Inspection and maintenance of the incinerator and air pollution control devices.”

- Incinerator Inspection & Maintenance
 - Incinerator & Equipment Inspection
 - Visual Inspection
 - Annual Inspection
 - Hearth Slope Measurement
 - Drop hole & Pier Inspection
 - Basic Incinerator & Equipment Maintenance
 - Burner Slag Removal
 - APC Equipment Inspection & Maintenance
 - Visual Inspection
 - Annual Inspection
 - Afterburner (or RTO) Maintenance
 - Venturi (or Cyclone) Maintenance
 - Tray Scrubber Maintenance
 - WESP Maintenance
 - Carbon Adsorber Maintenance

VIII. “Actions to prevent malfunctions or to prevent conditions that may lead to malfunctions.”

- Ways to Prevent malfunction
- Preventative Maintenance

IX. “Bottom fly ash characteristics and handling procedures.”

- Incinerator Ash Characteristics
- Ash Handling & Disposal
 - Wet Ash Handling
 - Dry Ash Handling

X. “Applicable Federal, State, and Local regulations, including Occupational Safety and Health Administration workplace standards.”

- State Regulations
- Operating Permit & Title V
- Federal Regulations
 - 40CFR60 Subparts MMMM & LLLL
 - 40CFR60 Subpart O
 - 40CFR503 Subpart E
 - OSHA / PEOSH
 - Personal Protective Equipment (PPE)
 - Confined Space
 - Right To Know

XI. “Pollution Prevention.”

- Air Pollution Prevention
- Other Pollution Prevention Measures