

## MONTENAY ENERGY RESOURCES OF MONTGOMERY COUNTY TRAINING MANUAL DEVELOPMENT

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### ABSTRACT

Montenay Energy Resources of Montgomery County Inc. (MERMCI) operates a two boiler, mass burn, 1200 tons per day, 32 MW waste to energy plant in Conshohocken, Pennsylvania. MERMCI has demonstrated a continuing dedication to safe, efficient, and environmentally safe plant operation. Plant management recognizes the impact that operators have on their success, and set forth to develop plant specific operator training materials, to ensure the continuing success of their operation. The development process was a joint effort. A training consultant worked with the plant staff to develop systems descriptions while the plant staff developed operating procedures. A development process was implemented that produced technically accurate, easy to use materials on schedule and on budget.

### PROJECT GOALS

The safe and efficient operation of a waste to energy plant depends on the correct and timely interaction of the various systems and components of the plant. A key component in the operation of the plant is the operating crew. Well trained operators are necessary to solve unusual, ill-defined problems and take the necessary actions to combat problems as they arise. The variety of equipment found in a modern waste-to-energy plant and the complexity of the overall operation clearly demand that an operator be effectively trained and have the ability to interpret resource material such that the operator's performance optimizes the man-machine interface. As demonstrated by the EPA's requirement for a plant manual that meets specific requirements, the cornerstone of any successful operation is complete and accurate documentation. This documentation, containing the information the operator uses on a daily basis in performing job activities, consists of detailed operations manuals.

In order to maintain their excellent operating record, MERMCI set forth to develop plant specific operator training materials.

The goal of the training manuals is four fold:

1. Provide comprehensive training materials for new operations personnel.
2. Provide a readily available source of information for use by the operators for day-to-day operation of the plant.
3. Satisfy the requirements of the Code of Federal Regulations "40 CFR Part 60 Section 60.56a(f)" that require all plants to have a comprehensive plant operations manual.
4. Provide a manual suitable for the QRO Board of Examinators to use in qualifying plant personnel.

### TRAINING MANUAL DESIGN

#### Training Manual Concerns

Prior to developing the new manuals, plant training was preformed using vendor manuals, plant drawings, and generic materials. These materials are well organized, in binders according to plant systems. While these documents contain valuable information, the information of interest to the operators is often scattered in the documents and difficult to find. The vendor materials are also stand-alone documents describing specific equipment. They usually offer little or no information on system operation. Since plant operation, especially from the control room, is based on controlling system parameters the vendor materials were totally inadequate. Also, the vendor materials were quite voluminous, over 36 binders. This made the task of locating specific information difficult.

A major goal in developing the training manuals was to produce materials that would not only serve as accurate, concise plant specific training materials, but that could also be used as readily available references for day to day plant operation.

Two factors justified the material development. First, the original operations staff had the benefit of the knowledge gained through plant start-up testing. New operators are selected carefully, and have power plant backgrounds. However, without the benefit of knowledge gained through experiencing the plant startup, there was a clear need identified for comprehensive plant specific training and reference materials. Secondly, plant management reviewed the requirements of the Code of Federal Regulations upon receipt of notification of the ASME plant specific operator certification examination requirements and application.

MERMCI management found that the Code of Federal Regulations "40 CFR Part 60 Section 60.56a(f)" plant manual requirements are quite consistent and compatible with the materials needed to ensure that operations personnel are properly trained not only in environmental regulation compliance, but also in plant operation, and safety concerns.

### **Training Manual Format**

The primary concerns in the design of the manuals was to ensure that the manuals:

1. Are designed in a uniform format for each section to make it easy for the operator to locate information.
2. Each major plant system is included.
3. Provide accurate procedures for performing operational tasks that meet equipment manufacturer recommendations, plant and company policies, and regulatory requirements.
4. Supply information on generic operational requirements, such as safety, environmental compliance, etc.
5. Provide the information needed to satisfy 40 CFR Part 60.56a(f) requirements.

MERMCI management conducted meetings with the training material vendor and designed a twenty one module manual, with uniform formatting of the individual modules. The following modules are included in the manual:

1. Plant Introduction and Overview
2. Municipal Waste Receiving and Handling (includes waste composition, policy and procedure)
3. Plant Combustion Systems
4. Combustion Air and Flue Gas System
5. Ash Handling Systems
6. Air Pollution Control Systems
7. Steam Generator
8. Condensate and Feedwater Systems
9. Condensate Makeup Water System
10. Steam Turbine/Generator
11. Circulating Water System
12. Steam Systems (including sampling & monitoring)
13. Electrical Distribution Systems
14. Compressed Air System
15. Fire Protection Systems
16. Cooling Water Systems
17. Waste Water Handling Systems
18. Integrated Plant Control System
19. Integrated Plant Operation

### 20. Safety

- a. Respirators (OSHA 1910.134)
- b. Emergency Response
- c. Noise Exposure (OSHA 1910.95)
- d. Fire Protection: Fire Brigades (OSHA 1910.156)
- e. Fire Protection: Fire Extinguishers (OSHA 1910.157)
- f. Fire Protection: Standpipe and Hose Systems (OSHA 1910.158)
- g. Fire Protection: Automatic Sprinkler Systems (OSHA 1910.159)
- h. Fire Protection: Fixed Extinguishing Systems (OSHA 1910.160, 161, 162, and 163)
- i. Fire Protection: Employee Alarm Systems (OSHA 1910.165)
- j. Hazard Communication Program (OSHA 1910.1200)
- k. Overhead Cranes (OSHA 1910.179)
- l. Powered Industrial Trucks (OSHA 1910.178)
- m. Control of Hazardous Energy Sources (Lockout/Tagout) (OSHA 1910.147)
- n. Confined Space Entry [OSHA 1910.146, 1910.94(d), 252(f)]
- o. Hot Work Practices (OSHA 1910.252)
- p. Electrical (OSHA 1910.333)

### 21. Environmental (includes CEMs, permit limits, and environmental public relations)

Modules 2 through 17 are system modules that lend themselves very well to a standard format. The format was designed to guide the reader through the text in a manner that started with a basic overview and progressed through detailed system operating procedures.

Each system description is sequentially numbered and consists of the following sections:

- . **Title Page** - Review signatures, revision number, and date.
- 1.0 **Introduction** - An introduction stressing the importance and contribution of the system to plant operation including basic theory of operation.
- 2.0 **System Description** - The system including a definitive, but not overly detailed description of the major system flow paths function and interconnections. Major components are discussed in terms of their functional purpose to the system. Theoretical discussions are included to describe the operation of the system and components as required by 40 CFR Part 60 Section 60.56a(f). Simplified flow drawings are also included in this section.
- 3.0 **Component Descriptions** - Each major component is described in its order in the system flow path. Component information includes functional and operations descriptions that are useful to the operator, as well as theoretical information as required by 40 CFR Part 60 Section 60.56a(f). Off-the-shelf equipment drawings supplied by the training vendor and drawings copied from equipment vendor materials were inserted in the text as needed to provide clear understanding of equipment design and operation. The control logic and/or Bailey Infi-90 control schemes are also described in this section.

- 4.0 System Operation - This section includes an introduction followed by subsections for Normal Startup, Normal Operations, Normal Shutdown, and Abnormal/Emergency Procedures.
- 5.0 References - All manuals and drawings used in the development of the section are listed.

**MANUAL DEVELOPMENT METHODOLOGY**

A development methodology was implemented that not only ensured that the manual was developed on schedule, within budget, but also that the manual meets the needs of the plant staff. The first step in the development process was to develop a pilot module. The pilot module was then used to identify exact format, depth of information, level of the writing, and how well it meets the needs of the operators. A pilot module was developed by the training vendor, and reviewed by designated plant personnel. Reviewers included plant management, as well as shift supervisors.

A review meeting was then held with the training vendor to discuss Montenay's comments, and to finalize the format. Following acceptance of the pilot module, full scale development started.

**Development Steps**

A well-organized step-by-step approach was implemented in the development of each module. The following steps integrated work by the training vendor and the plant staff:

- Step 1 Review Existing Documentation - Existing plant drawings, and vendor and plant procedures were reviewed by the training vendor in order to become familiar with the system and equipment.
- Step 2 Develop Draft System Description - The training vendor developed the first draft module in the format and detail as the pilot module. This development included simplifying plant Piping & Instrument Diagrams to make them more suitable for training purposes, and inserting equipment drawings. Following an internal quality review, the module is delivered to the plant for review and validation.
- Step 3 Produce Operating Procedures - The operating procedures were developed by the plant staff. Following a review by plant management, the procedures were sent to the training vendor for formatting and insertion into the appropriate modules. An integrated schedule was implemented to coordinate the development of the procedures by the plant staff with the associated systems descriptions by the training vendor. Once formatted, the procedures were sent to the plant for validation and approval.

- Step 4 Insert Validation Comments - As review and validation of individual modules were completed by the plant staff, they were sent to the training vendor for incorporation of changes. The vendor incorporated the changes, performed an internal review, and resubmitted the modules to Montenay for approval.
- Step 5 Final Delivery - Once each module was approved by the plant, it was filed as a final document. Upon completion of all the modules, they were inserted into plant specific binders with tabs for each section and a table of contents. Montenay was supplied with a copy of the word processing computer files. This will allow the plant to make changes to the materials, as changes in plant equipment and/or procedures are implemented.

**Project Schedule**

A concern of the plant was the effort required for the plant operations staff to write the operating procedures, and perform reviews and validation of the materials while performing their regular duties. A development schedule was designed that allowed time for comprehensive plant review of modules while ensuring a steady flow of work that would complete the project in a six month time period.

The schedule specified that three draft modules be delivered every two weeks. The plant staff was allotted a three week turn-around time in reviewing modules and returning them to the vendor.

Communications between Montenay and the development vendor consisted of a kick-off meeting, pilot review meeting, and telephone and fax conversations throughout the development process.

**SUMMATION**

Montenay Energy Resources of Montgomery County Inc. took a dynamic step in ensuring proper operation of their plant in developing the plant training manual. A concerted effort was made in planning, developing materials, and validating materials developed by the training vendor.

This effort resulted in a comprehensive training and reference manual designed specifically for use by the operations staff. The manual is accurate and easy to use, and the mechanism for upgrade training as needed. The planning and effort by the plant staff produced a high quality manual at a reasonable cost.