

Submitted to:



**Fluid Bed Incinerator O&M Plan
East Bank WWTP
of the
Sewerage and Water Board
Of New Orleans**

**Air Permit # 2140-00089-02, 1996 AI#4859
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SECTION One

Introduction

1.0 *GENERAL*

This Operation and Maintenance (O/M) Plan will ensure that the Fluidized Bed Incinerator (FBI) and its air pollution control devices are operated and maintained in a manner consistent with good air pollution control practices in minimizing emissions in accordance with 40 CFR Part 60, Subparts A & O and manufacturers' specifications and recommended procedures for the FBI and its air pollution control devices.

The operator will have a plan of action and procedures on the FBI continuous monitoring equipment when the FBI is firing sludge into the incinerator. This plan will better assist the operator in maintaining the performance of the FBI when burning sludge and staying in compliance of the permitting authority [40 CFR Part 60, Subparts A & O].

The Owner and Operators will be able to better maintain records for the required reports and the data that must be a part of the compliance reports.

1.1 *O&M PLAN ORGANIZATION*

This book consists of eight sections as follows:

Chapter 1 - Introduction includes overall general information about the FBI system, its components as design data.

Chapter 2 - Monitoring & Reporting includes information about the monitoring, record keeping and reporting activities required by Federal and State regulation.

Chapter 3 - Operations includes a description of system operation with emphasis on the operator's responsibilities in helping meet regulation requirements. This section also includes the Standard Operating Procedures (SOPs) for startup, normal operation, normal shutdown and emergency shutdown.

Chapter 4 - Emergency Response includes instructions for reacting to system operating problems.

Chapter 5 - Personnel Training includes a description of the plant-training program for the operating personnel.

Chapter 6 - Operations Records includes descriptions of the logs and forms maintained by the operators to document system operation.

Chapter 7 - Lab Sampling includes descriptions of the field and lab sampling program for monitoring system operation.

Chapter 8 - Preventive Maintenance includes PM system descriptions plus equipment and instruments preventive maintenance schedules and logs.

1.2 *OTHER O & M REFERENCES*

Numerous O & M references are located in the Control Room to help plant personnel in operating, controlling and maintaining the FBI system and air pollution control monitoring system. This reference includes:

The Solids SOP Book - This book is the basic day-to-day guide for system operation. Each operator is issued a personal copy of this book for reference to FBI and filter press operations to insure proper operating procedures are followed. The book is updated annually or when major system changes occur. A copy of the FBI SOP instructions (section F) is included in Chapter 3 of this manual. The master copy of the SOP is kept in the Control Room.

The Industrial Furnace Company O&M Manual on all replaced Equipment and Controls to the Fluid Bed Incinerator - This book will provide all the O&M procedures on all the new equipment and controls that were replaced. These books will also, supply us with equipment drawings, as-builts on the controls and electrical to the FBI system. These books will be kept in the Control Room and Maintenance Building.

NOTE: The system has gone through a major upgrade on all the controls. This system is more automated and updated on the latest controls and equipment.

The Dorr-Oliver O&M Manual on the Fluid Bed Incinerator - This book provides additional system information. Of primary importance are the general theory discussions on FBI operations, the expanded operating procedures write up, the routine maintenance instructions and instructions for operation of the heat exchanger. This manual is also located in the Control Room.

NOTE: Since preparation of the Dorr-Oliver O&M Manual, numerous changes have been made to this system. The most important changes are the addition of a new Venturi Scrubber, Schwing Pump Monitoring System and a Continuous Emission Monitoring System (CEM). The elimination of some systems from the FBI was made during incinerator rehab. The top feed system was changed to a side feed system. The cooling Air Blower was eliminated and the Fluidizing Air Blower is

used in its place. The Sand Make up System will be eliminated and the sand will be added by pneumatic truck.

The Dorr-Oliver FBI Equipment O&M Manual Volumes XI & XII (blue books) - These books include a copy of the previous mentioned Dorr-Oliver O&M Manual plus parts drawings and instructions for the FBI and its support systems (fluidizing air blower, heat exchanger, venturi scrubber, etc.). These books are important as sources of information on individual equipment operation and maintenance procedures. These books are kept in the Control Room and in the Maintenance Building.

Siemens Continuous Emission Monitoring (CEM) System O&M Manual - This book provides detailed instructions on setup, operation and maintenance on the CEM. **Only instrumentation personnel are allowed to calibrate and maintain the CEM system.** The operators will monitor the airflow, filter and log the pressure of the calibration gases. NOTE: If an operator at the CEM panel sees a red “NOT READY” light, this indicates that the system needs the attention of an Instrumentation Technician. The CEM system book is located in the Instrumentation Technician’s Office.

Schwing Pump and Flow Metering System O&M Manual - This manual provides information on the operator’s daily P/M checks and maintenance requirements. There is a troubleshooting guide included in the Control Room SOP Manual for the Schwing Pump System.

Metso Automation - Kajaani %TS, Dry Solids Content Transmitter O&M Manual – The manual provides installation, maintenance, calibration, and operation information. This information will be transmitted to the operational computer. The manual will be maintained in the Instrumentation Technician Office.

The Vortab FCI Flowmeter (gas), Waste, Oil and Yokogawa Oxygen Analyzer O&M Manuals - These books provide installation, operation, calibration, maintenance and troubleshooting instructions of individual pieces of equipment. These books are maintained in the Instrumentation Tech Office.

40 CFR PART 60 BOOK – This book provides the information on the code of Federal Regulations. A copy of 40 CFR PART 60 A and O 60.153 “Monitoring of Operations” and 60.154 “Testing Methods and Procedures” and 60.155 “Reporting” are included in the chapter of the manual.

1.3 *SYSTEM OVERVIEW*

The FBI system was added to the East Bank Plant during 1978 for disposal of waste activated sludge (WAS) removed from the plant secondary treatment process. The system is designed for 24 hours/day, 7 days/week operations with scheduled shutdowns for system P/M, inspections, and maintenance repairs. The Dorr-Oliver FBI has a design capacity of 40.65 tons dry solids per day at 20% cake solids. The system design criteria and flow diagram are included at the end of this chapter.

Dewatered WAS from the plant sludge dewatering units is pumped (**Schwing Pump**) to the FBI on a continuous basis (not to exceed 1.66 dry tons per hour). The **FBI** is a refractory brick lined vessel that allows mixing of the cake into the hot fluidizing bed of sand at the bottom of the bed. The **FBI Sand Bed temperature** is maintained around 1300 degrees F to 1500 degrees F for complete burning of the sludge solids to inorganic ash.

The Fluid Bed Incinerator has three zones in operation. The **Windbox** is the zone where the fluidizing air goes into the incinerator. This zone is also where the incinerator is heated. The **BED** is the zone where the sand and sludge are pumped. This zone is also where we inject fuel oil or gas to maintain the system temperature. The last zone is the **Freeboard**. This zone is where all the off gases are burned up.

The sand bed is fluidized (kept in suspension) by a continuous supply of air from the **fluidizing air blower**. Under normal sludge burning operating conditions, this airflow is approximately 6000 - 8500 scfm. The fluidized sand bed is heated by the burning sludge and grease solids and also by auxiliary fuels (oil or gas), which are pumped into the bed. The action of the fluidized bed burns and grinds the sludge cake to small particles, which are more easily and completely burned.

The **FBI Heating System** includes the **Preheat Burner System**. This system is used to bring the FBI temperature up from a cooled start to the operating temperature. When the temperature reaches the low end of the operating range, the Incinerator interlock allows the start of the auxiliary fuels or when the temperature falls below 1150 degrees F (burning on oil) the interlock allows restart of the preheat burner to raise the bed temperature. The **auxiliary fuel (oil or gas) guns system** is used to maintain and control the incinerator bed temperature when sludge is being burned or when the unit is being heated. Once the auxiliary system is in use, the preheat burner is turned down to a controlled rate (as prescribed by the SOP or Dorr-Oliver Manual) and then shutdown.

The **Heat Exchanger** allows recovery of heat from the Incinerator exhaust gas to pass through a tube sheet where the air is preheated to 1150 – 1240 degrees

Fahrenheit and returns it to the **Incinerator Windbox**. This allows a more efficient FBI combustion process and energy saving.

The **Venturi** provides cooling of the gases and the removal of the ash particles in the Incinerator exhaust gas flow. The solids (ash) are trapped in the venturi throat area where water is injected at 170 to 210 GPM. The ash slurry drains to the base of the **Scrubber** and then to the **Ash Pumps** and discharge to the **Ash Lagoons** where it is dewatered. Water for the Venturi operation is provided from the **Plant Utility Water Pumps**.

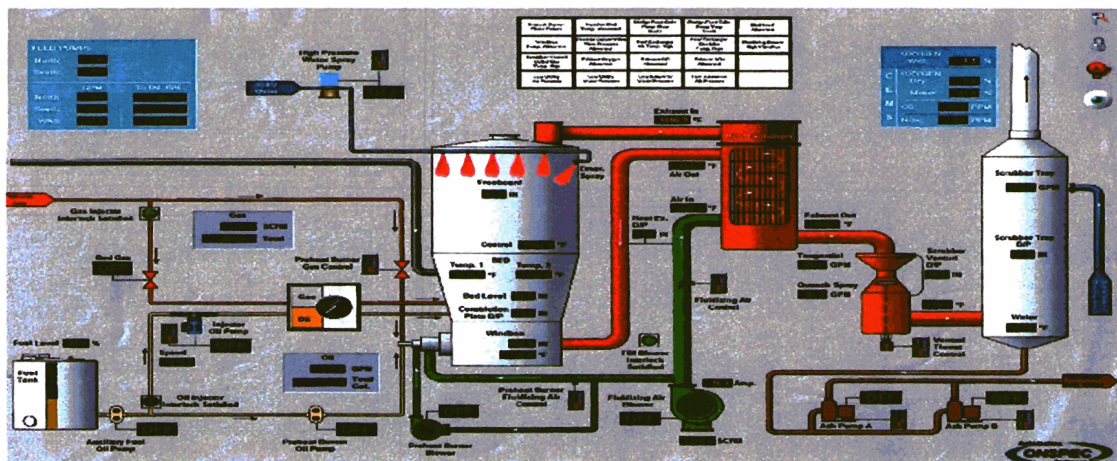
The **Scrubber** provides the last stage of the removal of the smaller particulate matter through four (4) water tray sections. The particulate matters are trapped in the water as it passes through each stage of the water trays. The Plant Utility water is injected at 650 to 850 GPM and is discharge into the effluent water channel.

The **Venturi / Scrubber** is not just an ash collection device. It should be recognized as an air pollution control device primarily used for **Particulate Matter (PM)** removal in order to improve ambient air quality. The ash is the **PM** that the scrubber removes from the **FBI's** exhaust gas stream.

The **High Pressure Water Spray Pump** provides a supply of atomizing quenching water to the gas inlet to the heat exchanger. This action reduces the temperature of the gases and protects the heat exchanger tube sheets against thermal expansion.

The **Utility Water System** provides high quality water to the incinerator high-pressure water pump and seal water to the scrubber ash pumps.

The **Utility Air** is provided for the cooling and purging the Roof Spray Guns system and for clearing out the oil guns for insertion and for withdrawing the gun



SECTION TWO

Monitoring & Reporting

2.0 GENERAL

The Fluidized Bed Incinerator (FBI) system operates under 40 CFR Part 60, Subparts A & O plus 40 CFR Part 503 regulations. These regulations dictate the monitoring, record keeping, and reporting requirements for the system.

2.1 MONITORING

2.1.1 Monitoring - FBI System

The FBI operation is monitored through various instruments. These includes

Wet Scrubber Differential Pressure Instrument - A differential pressure sensor/transmitter measures the pressure drop across the scrubber venturi and transmits the data to the recorder on the Control Panel and also to the Incinerator Data Log Computer. This data is continuously recorded to meet 40 CFR regulations. This instrument must be calibrated to +/- 1-inch water gauge accuracy. (See 40 CFR PART 60, Subpart O, 60.153 (b) (1))

Scrubber Exhaust O₂ Analyzer System - The Oxygen Analyzer system is used to run the Incinerator along with the CEM system. This probe is located just above the Scrubber exhaust. The analyzer provides a local % O₂ level readout with a data signal transmitted to the recorder on the Control Panel and also to the Incinerator Data Computer. This O₂ monitoring system must be calibrated every 24 hours (by the operator) to +/- 5% accuracy. **NOTE:** The calibration for this analyzer is done at the local panel (see Section 3 FBI's SOP, pages 9 & 10 for calibrating instructions). (See 40 CFR PART 60, Subpart O, 60.153 (b) (2))



Sludge Flow Meter - The waste sludge flow meter measures flow to the system and provide a signal for gpm at total gallons readouts and a chart flow record for the Control Panel. The data is also sent to the Incinerator Data Computer and to the Operations Computer. This meter is calibrated and checked with the portable flowmeter every six months or as needed or suspected discrepancy arises. There is a 5%

accuracy that must be maintained. Total solids test results are entered into the operations computer daily. The computer will determine tons of solids treated daily. (See 40 CFR PART 60, Subpart O, 60.153 (a) (1))

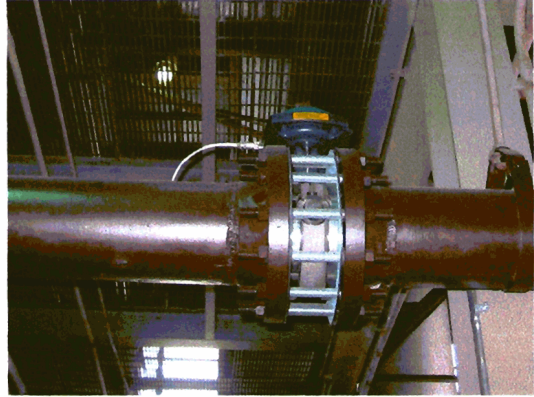
Bed & Exhaust Temperature - Thermocouples are provided for monitoring the temperature level in the fluidized bed and the reactor exhaust/heat exchanger inlet gas. The bed temperature is monitored by three thermocouples. The bed temperature signals are transmitted to the chart recorder on the Control Panel and the Incinerator Data Computer. All three of the bed temperatures are recorded with an average temperature computed and recorded by the computer. The reactor exhaust temperature is also transmitted to the chart recorder and the Incinerator Data Computer. The thermocouples electrical signals are tested every six months (or as needed if problems occur). A +/- 5% accuracy must be maintained. (See 40 CFR PART 60, Subpart O, 60.153 (b) (3))

Fuel Flow - Fuel oil or gas will be the primary fuel and either can be used. The fuel or gas can be selected by a switch. The only limiting factor is the temperature for burning.

Fuel oil or gas flow is measured by a meter located on the fuel line, with data transmitted to the gpm readout on the Control Panel and to the Incinerator and Operations Computers. The mechanical flow counter reading at the fuel oil pump or gas is recorded each shift. The daily counter total is used to check the computer meter total readout accuracy. A $\pm 5\%$ accuracy is required for this system. Any discrepancy results in issuance of a work order to check meter calibration. (See 40 CFR PART 60, Subpart O, 60.153 (b) (4))

The natural gas flow is measured by the FCI Flowmeter Vortab ST98-Flexmaster on the gas line, with data transmitted to scfm readout on the FBI's data log computer. The gas readings is also taking from the LCD window on the yellow nema type 4x enclosure located downstairs by the gas line on the ground level in the Solids Building. (See 40 CFR PART 60, Subpart O, 60.153 (d) (4)).

Sludge Analysis - The representative sludge samples that charge the incinerator are collected from the Schwing (sludge) Pump discharged cylinder located on the level 45.50 in the Solids Building. The procedures for collection is that each of the three shifts will grab samples for analysis on the daily grab sample of the sludge to be fired in the incinerator and shall be done in accordance with 40 CFR PART 60, Subpart O, 60.153 (a) (2) & (b) (5) also 60.154 (b) (4 & 5)



We have added an inline sludge **Kajaani TS dry solids content Transmitter (Metso Automation)**. This transmitter will continuously monitor the sludge that is being pumped into the incinerator. A $\pm 1\%$ accuracy is its repeatability. Sampling, accuracy checks with the laboratory, and adjusting the calibration as needed calibrate this system.

2.1.2 Monitoring Emissions

The emissions from the scrubber are monitored for oxygen (O_2) in two areas and carbon monoxide (CO) and NOX levels to ensure compliance with 40 CFR Part 503 regulations. The emissions are monitored through the Continuous Emission Monitoring System (CEM) with components for monitoring O_2 , CO and NOX levels. O_2 , CO and NOX level readouts are provided at the CEM with signals transmitted to the Incinerator Operation's Computer for recording.

Note 1: The CEM automatically calibrates its span every 24 hours during the morning shift. The CEM must be performance tested quarterly according to 40 CFR, Part 60, Appendix B, Sections 2, 3 and 6. **This system is tested monthly.** Testing is started by request.

Note 2: The CEM reports are generated automatically on a monthly basis and include all required data.

Note 3: **Only the Instrument Technicians are allowed to operate the system.**

2.2 RECORD KEEPING

As noted above, all continuously recorded data is transmitted to one or both of the computers. The Incinerator Data Computer data logging systems provide daily, monthly, quarterly and semi-annual reports in accordance with 40 CFR Part 60, Subpart A 60.7 and O, 60.153 (c) & (d).

NOTE: The record keeping provisions of 60.153 (c) but not the record keeping exemptions of 60.153 (b), become applicable whenever the Particulate Matter (PM) emission rate exceeds 0.38 kg/Mg (0.75 lb/ton) dry sludge input during any subsequent FBI performance test. The record keeping procedures are different depending on whether the measured PM emission rate is above or below 0.38 kg/Mg (0.75 lb/ton) dry sludge input.

The Incinerator Data Computer generates reports and maintains records of the occurrence and duration of any startup, shutdown, of malfunction and record keeping in accordance with 40 CFR Part 60, Subpart A & O and Part 503. (40 CFR Part 60, Subpart A, 60.7 (b & f))

Additional data that must be maintained and reported on the semiannual report when these limits are exceeded include: 40 CFR PART 60, Subpart O, 60.153)

1. Scrubber pressure drop averaged over each hour of incinerator operation. See 60.153 (c) (1)
2. Scrubber exhaust oxygen level averaged over each hour of incinerator operation. See 60.153 (c) (2)
3. Temperature of the Bed and Freeboard zones averaged over each hour of incinerator operation. . See 60.153 (c) (3)
4. The rate of sludge charged to the incinerator averaged over each hour of incinerator operation. . See 60.153 (c) (3)
5. The incinerator fuel usage averaged over each 8 hours. See 60.153 (c) (3)
6. The moisture and volatile solids content of the sludge charged to the incinerator over that period. . See 60.153 (c) (3)

As noted, the CEM data is automatically transmitted to the computer data logging system for automatic monthly printouts. In addition to the operating data and calibration result printout, a CEM maintenance log is maintained to record all calibration and maintenance activities. Also, any downtime of the CEM must be documented, i.e., record the time period out of service with the reason.

NOTE: If the system is down for more than 72 hours, the DEQ should be contacted. Provide information on the known or presumed reason for the trouble, steps being taken to correct the trouble, the expected duration of CEM shutdown and the length of time the incinerator will operate during the shutdown. All reasonable

efforts must be taken to return the CEM to service as quickly as possible.

The Oxygen Analyzer Daily Calibration log is kept in Incinerator Data Computer. Calibration information is entered in the computer be accessed at any time. A permanent record will be printed out once at the end of each month into a Log Book.

In addition to instrument-generated data recorded on charts or the computers, operator logs are maintained for backup and operations control purposes. The Incinerator Log Book log data is collected and recorded hourly over each shift.

All logs and routine maintenance records must be maintained for at least 2 years.

2.3 Reporting

Reports on system operations and maintenance are required to be sent to DEQ on a scheduled basis. These reports are prepared by the Plant Manager. The reporting schedule is as follows:

2.3.1 Every Three Months

Submit the CEMS Performance testing reports generated by the computer (see 40 CFR Part 60 Appendix B Sections 2, 3 and 6)

2.3.2 Every Six Months

Submit scrubber differential pressure and/or exhaust O₂ level data for periods that data is out of range (pressure less than 26" W.C. for more than 15 minutes or O₂ level about 6.4% firing on fuel oil or 6.1% firing on gas for more than 1 hour). Data on bed and exhaust temperatures, sludge feed rates and fuel feed rates must also be included (see 40 CFR Part 60, Subpart A, 60.7 and O, 60.153 and Part 503).

Submit information on preventive maintenance, training and operating procedures used to ensure system meets operating requirements. (See 40 CFR Part 60, Subpart A 60.7 and O, 60.153 and Part 503).

Recorded data should be reported in the required semi-annual report in accordance with Subpart O, 60.155 (a) or 60.155 (b) and Subpart A, 60.7 (b), (c) and (f) as follows:

If the Particulate Matter emission rate was found to be below 0.38 kg/Mg (0.75 lb/ton) dry sludge input during the last FBI's performance test, then only the data required to be reported under submitted.

If the Particulate Matter emission rate was found to exceed 0.38 kg/Mg (0.75 lb/ton) dry sludge input during the last FBI's performance test. Then all of the data required to reported under Subpart O. 60.155 (a) (1) (ii) and (a) (2) (Note: but not 60.155 (a) (1) (i)) and 60.155 (b) (1) thru (b) (6) is to be submitted.

NOTE: The number that trigger reporting under 40 CFR Part 60, Subpart O, 60.155 (a) (1) and (a) (2) were determined during the FBI's performance test conducted November 30 through December 2, 1994 and the most present test of March 31, 1998. The measured of Particulate Matter emission rates were below 0.38 kg/Mg (0.75 lb/ton) dry sludge input.

2.3.3 Every Twelve Months - (On February 19th)

Submit CEM Report with average monthly concentrations of oxygen and carbon monoxide. Also include CEM calibration and maintenance logs (see 40 CFR Part 60, subpart A & 0 Part 503).

SECTION Three Operations

3.0 GENERAL

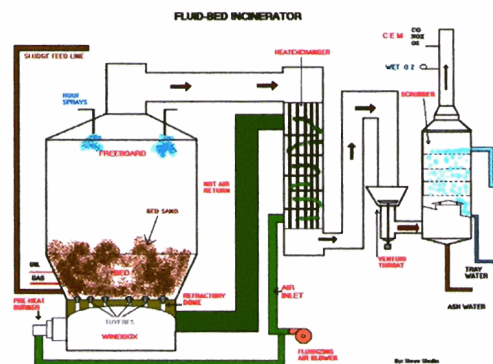
As noted in Section 1, the operations for the FBI's system are provided in Section F of the Solids SOP Rev. 3 Book. The SOPs include detailed instructions for the operation of the FBI system. They are intended to be used as necessary as a reference and guide for day-to-day operations of the system. For this reason, each operator is provided with a personal copy of the SOPs.

These SOPs are also included in this section for reference. The major SOP instructions include:

System Startup -	Page 1
Normal Operation Procedure -	Page 6
Normal Shutdown Procedure -	Page 14
Furnace Interlocks and Controls -	Page 16
Log Book and Sampling -	Page 18
Troubleshooting -	Attachment I
Electrical Interlock Diagram -	Attachment II
Process Diagram -	Attachment III
O ₂ System Troubleshooting -	Attachment IV

3.1 OPERATOR RESPONSIBILITY

The operators are required to maintain a smooth steady operating environment with a minimum of changes to sludge air and fuel feed rates. The main operating goal for an operator is to handle a shift run of sludge (up to 1.7 dry tons/hour as long as Exhaust O₂ Analyzer readings remain in range and CO & NO_x stays under 100ppm) while meeting all regulatory standards. Additional important guidelines are:



- Maintain a Bed temperature in the 1300 - 1450 degree F range for maximum efficiency and savings of fuel.
- Frequently check air flow, temperature levels, pressure readouts, O₂ level and Fuel oil and Gas consumption.
- Monitor and control process in direct relation to the O₂ analyzer level.

- Monitor and control the process to maintain the CO & NOX level below 100 ppm.
- Make sure O₂ analyzer is calibrated once every 24 hours (usually 1st shift and recorded on the chart with date, time and operators initials (See page 8 of SOP). Also, in the operators' log book.
- The checking of the stack Plume daily and logging the information in the FBI's Plume Logbook.

3.1.1 The parameters (wet scrubber pressure drop and exhaust gas Oxygen content) and numbers that trigger reporting under 40 CFR Part 60, Subpart O, 60.155 (a) (1) and (a) (2) were determined during the FBI's performance test conducted November 30 through December 2, 1994 and March 31, 1998. The numbers resulting from that test are subject to change with the most recent performance test.

Recorded data should be reported in the required semi-annual report in accordance with Subpart O, 60.155 (a) or 60.155 (a) & (b) and Subpart A, 60.7 (b, c, d and f) as follows:

If the Particulate Matter emission rate was found to be below 0.38 kg/Mg (0.75 lb/ton dry sludge input during the last FBI's performance test, then only the data required to be reported under Subpart O, 60.155 (a) (1) (i) and 60.155 (a) (2) is to be submitted.

If the Particulate Matter emission rate was found to exceed 0.38 kg/Mg (0.75 lb/ton) dry sludge input during the last FBI's performance test. Then all of the data required to be reported under Subpart O. 60.155 (a) (1) (ii) and (a) (2) (note: but not 60.155 (a) (1) (i) and 60.155 (b) (1) thru (b) (6) is to be submitted.

3.1.2 *Important System Compliance* To ensure compliance with *Federal Regulations* for operation of the Fluid Bed Incinerator, the operator must pay close attention to the several monitoring systems as explained below.

The ***Scrubber Differential Pressure*** is automatically controlled by a set point to maintain a 37" W.C. level. The differential pressure level must never fall below 26" W C for more than 15 minutes. If a low level occurs; check for low air flow, check the sludge feed for low solids, a low pumping rate and check for a mechanical problem at the piston disc controller. **NOTE:** If this problem persists, the incinerator will need to be shut down and the venturi disk inspected. If a high level occurs, check for too high airflow, high water flow (gpm) to venturi throat, clogging of the pressure taps or mechanical problems with the piston disc controller. If problems persist, contact the supervisor or maintenance.

The ***Exhaust O₂*** level must not exceed 6.1% (natural gas auxiliary heating) or 6.4% (fuel oil auxiliary heating) for more than 1 hour.

NOTE: This exhaust O₂ levels are at a normal burning rate of above 30 to 40 dry tons per day. Under half loading of the FBI the O₂ reading will be higher. The O₂ level is function of air, sludge and fuel flow rates. At high O₂ levels, check the sludge feed rate and solids levels or adjust the air flow (keep in mind a maximum air flow of 8500 cfm). Also, recheck the calibration and the O₂ probe. If a low O₂ level occurs, reduce the feed rate of the sludge and/or makeup fuel, check the air flow rate and verify that the O₂ analyzer calibration is correct. If problems persist, contact the supervisor or maintenance. (See FBI's SOP, pages SOP-13 and SOP-14)

Note: The O₂ monitoring system is a two part system. The O₂ analyzer at the scrubber exhaust has a specific O₂ probe (and is calibrated once every 24 hours). The CEM includes an O₂ monitoring system to backup the O₂ analyzer readout.

The O₂ analyzer has a local readout plus the data recorded on the control panel strip recorded and on the computer data system. The CEM has a local readout plus the data is recorded in the computer data system.

The CEM also provides continuous readout and recording of the exhaust carbon monoxide (CO) & NOX level. The CO & NOX level must not exceed 100 ppm when averaged over a 4 hour period. If a high CO or NOX a level occurs, check for excess solids or fuel rates, check for airflow rate too low and check the CEM filters and See FBI's SOP. If the problem seems to be at the CEM, notify the supervisor and the instrument tech for recalibration.

The Fuel Oil feed system is equipped with two-flow measurement and recording systems. At the end of each shift, check the two meter readouts for a discrepancy of 5% or greater. If a difference occurs between the fuel oil mechanical flow meter and the computer readouts, issue a work order to check both systems calibration.

The Sludge Feed System is equipped with two-sludge flow metering systems; the waste sludge flow meter and the Schwing Pump feed monitoring system. At the end of each shift, compare the sludge feed totals of two systems. If a difference of 10% or greater occurs, issue a work order to check both systems for recalibration.

The remainder of this section is the FBI SOPs:

System Startup -	Page 1
Normal Operation Procedure -	Page 6
Normal Shutdown Procedure -	Page 14
Furnace Interlocks and Controls -	Page 16
Log Book and Sampling -	Page 18
Troubleshooting -	Attachment I

Electrical Interlock Diagram -	Attachment II
Process Diagram -	Attachment III
O ₂ System Troubleshooting -	Attachment IV

SECTION Four

Emergency Response

4.0 GENERAL

The operation of the FBI System is monitored through various sensors, relays, interlocks and other devices for improper operating conditions and levels. Most operating emergency situations are alarmed at the Annunciator on the Control Computer. The main exception is failure of the CEM, which is indicated by the CEM Panel "Not Ready" light, which is checked hourly on each shift as discussed in subsection 4.4

The Annunciator alarms provide the operator with information that is important in a quick reaction to the trouble and a faster correction of the problem.

In the case of a potentially and dangerous condition of the FBI system, **stopping the fluidizing air blower** immediately brings the system under control. The operator is then to evaluate the situation and contact the right people. An operator does not need to have prior approval for this action; his judgment is sufficient to take such an action.

4.1 ANNUNCIATOR ALARMS

The following alarms (with set points, if applicable) are indicated by a flashing indicator and the alarm on the Control Computer and on the Incinerator Data Computer flow diagram.

Annunciator Alarm/Set Point

Flame Failure

Windbox Temperature Abnormal -Below 800F; Above 1800F

Bed Temperature Abnormal -Below 1250F (oil) or 1350F (gas); Above 1560F

Heat Exchanger High gas inlet Temperature - Above 1560F

Heat Exchanger Air Outlet High Temperature - Above 1250F

Scrubber Venturi Gas Outlet High Temperature - Above 250F

High Exhaust Oxygen - Above 6%

Low Exhaust Oxygen - Below 2%

Reactor Constriction Plate Pressure Drop Abnormal - Below 18" or Above 42"

Low Utility Air Pressure - Below 30 psig

Low City Water Pressure - Below 30 psig

Sludge Cake Feed Pump - Stopped

Low Instrument Air Pressure - Below 30 psig

Low Utility Water Pressure - Below 30 psig

The probable causes and remedies for these problems are listed in Attachment I (Troubleshooting Guide) of the SOP (in Section 3). Acknowledge any alarms when they occur and then investigate and correct the problem in a timely manner.

It should be noted that the “Sludge Cake Feed Pump Stopped” alarms serve as a general alarm for the unannounced alarms included in the furnace interlock system (included on pages 16 & 17 of the SOP). The furnace interlock system initiates unplanned shutdowns of the fuel system in use plus the feed pump in service. The “Sludge Cake Feed Pump Stopped” alarm is then indicated and steps must be taken to determine which interlock alarm condition shut down the pump (see pages 16 and 17 of the SOP).

4.2 LOW WET SCRUBBER DIFFERENTIAL PRESSURE PROCEDURE

The scrubber system controls are preset to maintain a 37"W.C. pressure differential across the Venturi. The system must not be operated for extended periods at a level of 26"W.C. or below. Therefore, the system alarm is actuated at a 27"W.C. level. When this alarm occurs:

1. Investigate the problem - check for low or no sludge feed, low air flow, piston control stuck in the open position or other mechanical failure.
2. Correct the problem while the system remains in service, if possible.
3. If the problem cannot be corrected, advise the Plant Manager and shut down the system. Once the problem is corrected, restart the system.
4. Log the system failure in the Operators Log.
5. The probable causes and remedies for these problems are listed in Attachment I (Troubleshooting Guide) of the SOP

NOTE: If the alarm condition lasts more than 15 minutes, the problem and actions taken must be summarized in the Semiannual Report to DEQ as discussed in Section 2.

4.3 *HIGH SCRUBBER EXHAUST O₂ LEVEL PROCEDURE*

The scrubber exhaust oxygen level must be kept below 6.4% when firing oil or 6.1% when firing natural gas. The system alarm is set at 6.0% to alert the operator before the alarm limit is exceeded.

NOTE: This exhaust O₂ levels are at a normal burning rate of above 30 to 40 dry tons per day. Under half loading of the FBI the O₂ reading will be higher.

When this alarm occurs:

1. Check the process indicators for low sludge feed, excess air flow, low oil (or gas) feed or mechanical problems with the sludge feed system (belt press or sludge cake feed pumps).
2. Adjust system feeds accordingly to bring oxygen level back into range (usually the best operation occurs in the 3 to 4% range under normal operating conditions. This reading will be higher when we are burning below 30 dry tons per day).
3. If the system does not respond to these adjustments or the oxygen level continues on a steady increase, check the readout of the O₂ Analyzer with the CEM O₂ readout. If the Analyzer readout is not within 2% of the CEM readout, check the probe for a clogged filter and/or check the calibration.

NOTE: If the alarm condition lasts for more than 1 hour, the problem and actions taken must be summarized on the Semiannual Report to DEQ as discussed in Section 2.

4.4 *CONTINUOUS EMISSIONS MONITORING (CEM) SYSTEM PROCEDURES*

The CEM system is a combination of oxygen (O₂) and carbon monoxide (CO) & NOX monitoring. The reaction to the system alarm for the oxygen will be similar to the steps outlined above for the O₂ Analyzer alarm.

The alarm for CO & NOX has its own guidelines. The main guideline is that the CO & NOX remains under 100 ppm as averaged over a 4-hour period of incinerator operation.

1. Investigate the problem - check for low air flow, excessive sludge feeding and excessive oil (or gas) feed.

2. Correcting the problem requires adjusting the sludge feed, increase the air supply and/or fuel feeds.
3. If the system does not respond to these adjustments, notify the Instrument Technician for a calibration check.

NOTE: If at any time the “Not Ready” light is on, contact the Instrument Technician. Procedures to follow for logging and reporting CEM trouble are discussed in Section 2.2.

SECTION Five

Personnel Training

5.0 GENERAL

A high level of training is provided to ensure the FBI system operates efficiently and in a manner necessary to meet all regulatory requirements. The plant management maintains training schedules and training records to ensure each individual has the knowledge and skills to perform any assigned tasks plus be able to react to any situation.

5.1 NEW EMPLOYEE TRAINING

Each new operator is provided with 20 hours of intensive classroom and hands-on instructions in the operation of the system equipment. Then the new operator is paired with an experienced operator for at least 2 to 3 weeks of additional hands-on training. The new operator remains in this training relationship until the operator demonstrates the ability and confidence needed to troubleshoot system problems. Plant supervisors and operators are available at all times to assist recently hired operators when the need arises.

5.2 CONTINUING TRAINING

Annual training schedules are prepared for each operator. Each operator must complete at least 16 hours of state certification training every 2 years.

In addition the operators are surveyed every two years to evaluate their weak areas. Then training requirements are determined for each individual for improvement of their operating skills.

5.3 TRAINING RECORDS

Records are maintained in the Plant Office for each operator. The training records include an attendance record of each course completed, both in-plant and state certification courses.

SECTION Six

Operations Records

6.0 GENERAL

NOTE: For monitoring reports and records, see Section 2. For preventive maintenance records, see Section 8.

The operators are required to maintain various hand written Log Book (Journal) and to make a few entries to the computer system. Plant operations monitored by the Incinerator Data Computer are logged automatically and shift logs are printed every 8 hours.

6.1 OPERATOR LOGS

The two types of written logs maintained are the Incinerator Log Sheet and the Log Book (Journal). The Log Sheet is a preprinted form for hourly entry of instrument readouts and end of shift computation of the amount of sludge handled, average sludge flow rate and the amount of polymer used. Each reading is entered during the operator's hourly inspection of the system. At the end of each shift the Operation Computer averages all readings. At the end of the day the three shift logs are gathered and the data averaged for entry to the Ops Data Computer. A copy of this form is included at the end of this section.

The Log Book is a 3-ring notebook with preprinted log sheets (see example at the end of this section). Entries are made at the beginning of each shift and during the shift per instructions listed in the SOP (see pages 18 & 19 in the SOP included in Section 3). Entry examples are process changes, problems, repairs, etc.

NOTE: A very important entry to the logs is the confirmation of the calibration of the Scrubber Exhaust O2 Analyzer. This is done automatic by the O2 system daily. A print out can be made at any time on the daily calibration.

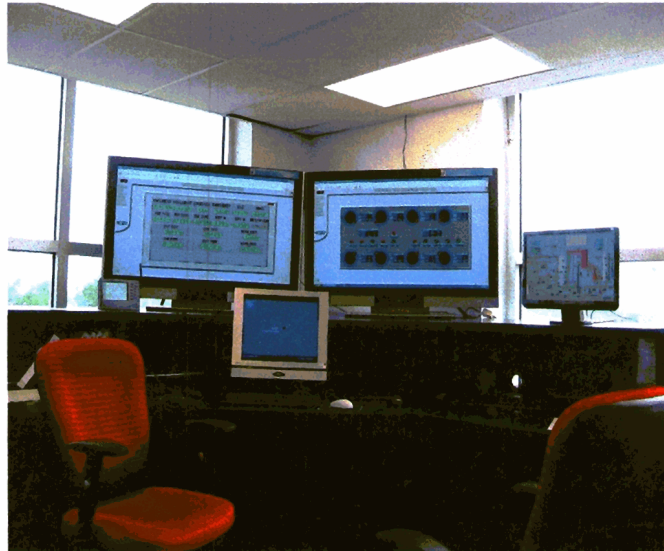
The operators are also responsible for initiating work orders (see the copy of the form at the end of this section). Work orders provide information on the maintenance needs on the system equipment and instruments. Work order entries must be clear and concise for easy understanding by the maintenance workers.

The operators log on and off the computer at the start and end of each shift. The only other entries consist of brief descriptions of problems when the system goes out of the normal operating range and actions taken to bring the system back into proper operating range.

6.2 *COMPUTER PRINTOUTS*

As mentioned, the computer automatically logs process data. A computer generated shift log is automatically generated every 8 hours. CEM daily reports are generated every 24 hours. Other reports may be generated by request. All reports are maintained on file at the plant. All reports and logs are stored in boxes indefinitely (regulations require all logs and reports to be held for a period of 2 years).

Computer files are backed up on a second hard drive automatically and then at a minimum interval of two weeks the data is backed up on an archive tape. All computer data is archived allowing retrieval of any and all computer logged data and entries.



SECTION Seven

Lab Sampling

7.1 FIELD SAMPLING

The operators perform field tests on the waste sludge flows and sludge cake, i.e., and total dry solids determinations on the moisture balance machine. A minimum of 3 samples of each flow and cake are taken each shift (two hours apart). Additional tests may be run if the operator wants more data or wishes to maintain closer control of the process.

Each sample tested is logged on the Log Sheet and in the Log Book (Journal) including the time of the test and the test results.

7.2 LAB SAMPLING

The operators also provide three individual sludge cake samples per shift and a waste sludge composite sample made up of 3 grab samples taken 2 hours apart (See 40 CFR Part 60 Subpart O, 60.153, (a) (2) and (b) (5)). These samples are delivered to the plant lab personnel for total solids and volatile solids testing. The lab personnel enter the test results into the Lab Ops Process Computer for computation of the amount of sludge handled daily. This information received from the Lab is the data reported to the state in regard to the sludge loading of the incinerator.

In addition to the daily sludge samples, the operators are responsible for taking samples for the annual hazardous waste metals tests. The lab provides instructions to perform the sampling.

SECTION Eight

Preventive Maintenance

8.0 GENERAL

DataStream Maintenance Management Software Program MP2 for Windows XP is used to control the plant maintenance activities. The software (in the Maintenance Computer) automatically generates maintenance tasks sheets on a weekly basis to ensure all maintenance scheduled to be performed is accomplished on schedule (whether daily, weekly, monthly, etc or on an operating run time basis). In addition to scheduling all required preventive maintenance, the MP2 software also provides the following functions:

1. Maintains accurate equipment information and history
2. Processes scheduled and unscheduled work orders
3. Controls parts inventory
4. Provides system analysis, reports and graphs
5. Provides equipment calibrations and instrumentation calibrations

8.1 PREVENTIVE MAINTENANCE TASK HANDLING

All required equipment and instrument inspections, adjustments, lubrication and other preventive maintenance activities are logged in the software. The software tracks maintenance activities and continuously compares those to maintenance requirements. Each week, the software generates maintenance task printouts. Two examples of the task printouts are included at the end of this section. The Maintenance Manager assigns the tasks to the mechanics and instrument techs. As the tasks are completed, the signed off task sheets are returned to the data entry clerk. Completed tasks are logged into the computer and the computer automatically reschedules the next date for those tasks.

A listing of the FBI system preventive maintenance tasks is provided at the end of this section.

The plant maintenance record system uses a standardized numbering system to identify each piece of equipment and instrument. The explanation of the numbering system codes is included at the end of the section.

8.2 PREVENTIVE MAINTENANCE RECORDS

The computer software maintains a log of all maintenance performed on the system equipment and instruments. Every six months a report is generated for submittal to DEQ to confirm that the system is being properly maintained.