Environmental Compliance Plan

For

Pensacola Christian College

Pensacola, FL

February 2006

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Introduction

This plan provides additional information demonstrating the owner's commitment to operating this facility in compliance. This Plan provides reasonable assurance that the continued operation of the facility will be in accord with applicable laws and rules.

The detail of the Plan is consistent with the complexity of the system. The Plan was developed in accordance with the unique requirements of the individual facility and provides the operator with adequate information and description regarding the design, operation and maintenance features of the facility. The Plan includes basic engineering design criteria for the facility. In addition, information concerning process control and performance evaluation for the facility, as well as equipment and procedural descriptions (including any notification/report requirements of appropriate agencies) for emergency operating conditions, is included. Regular maintenance and repair instructions for plant equipment and monitoring procedures are also included.

Management Commitment

Pensacola Christian College adheres to a strong, facility-wide environmental program which was developed to ensure the highest commitment and quality from the business operation as well as from employees, to protect and enhance the environment. This program includes an environmental policy, environmental auditing procedures and employee education and involvement.

Operator Training

This Plan represents continuing education program for all personnel concerning facility operation, permit and other regulatory requirements. A copy of the approved Plan will be available to the operators and maintenance personnel.

Personnel will be trained to operate facility in accordance to factory training manual and this Plan. Consequently, new employees will be trained within 90 days after commencement of employment and prior to unsupervised plant(s) operation. In addition, periodic safety meetings are planned for all pertinent personnel and often cover environmental topics including air permit requirements.

Environmental education is key to maintaining successful environmental stewardship. Education includes new hire orientation and training sessions. During orientation, new hires are educated about the various permits, permit conditions and monitoring requirements.

Training sessions will teach supervisory personnel and operators about air permit requirements and other environmental topics.

Facility Monitoring

This section establishes the use of parameters to monitor Co-gen and Standby Generation Plant. PCC conducts reasonable monitoring to assure continued compliance with the terms and conditions of their permit. The monitoring will be carried out in the manner prescribed in this procedure.

The performance parameters include such physical, chemical or electrical characteristics as are applicable to the particular emissions unit and which are indicators of the condition, operating rates and efficiencies. Such parameters generally include the following indicators:

For Co-Gen Unit (EUE 005- Engines 1 & 2 & EU003 – Engine 3)
Exhaust gas oxygen levels
Fuel (natural gas) consumption
Visible emissions

Standby Generation Plant (EU 009 – Engines 1-8)
Exhaust gas oxygen levels
Fuel (natural gas) consumption
Visible emissions
Density charge factor

Operation and Maintenance Plan

This section establishes a plant specific Operations and Maintenance (O & M) Plan. This element provides reasonable assurance that this facility can be effectively operated and maintained, through reasonable provisions for the operation and maintenance of the facility. Routine maintenance of equipment will be performed as needed to assure optimal operation.

The Plan contains inspection and maintenance schedules including periodic assessments of the condition of equipment and schedule for recording of performance parameter data.

Startup (typical for all engines)

Check cooling system

Check oil level

Push start button.

After engine is at full speed and at operating temperature, generators are loaded.

Check visible emissions

Shutdown (typical for all engines)

Unload generator

Stop the engine

O & M Plan

E.U 003 & EU 005, engines #1, #2 & #3

All three engines are tuned yearly by competent service contractor, engine manufacturer rep or equal substitute.

All three engines are tuned for equal NOX-CO emissions. Factory literature recommends that in order to achieve this, excess oxygen (02) in exhaust of each engines needs to be 0.3%

Proposed O & M Plan to prove compliance is as follows:

1. Have all 3 engines tuned yearly by competent contractor. Yearly tune-up reports on each engine will indicate 02 readings.
2. PCC co-generator operator will use PCC instrument to read 02.
3. PCC co-gen operator will record 02 readings for each engine at least one/month if engine(s) are running and record such readings on attached form.
4. Records will be kept in co-gen office for a period of 5 years.

Testing:
Once a year visible emissions testing on 3 engines will be conducted by certified VE reader and according to EPA Method 9.

Pensacola Christian College
Co-gen

O & M Record

Year: _____

	Engine #1	Engine #2	Engine #3
Tune up Date	_____	_____	_____
Service Contractor	_____	_____	_____
02 Reading by Service Contractor	_____	_____	_____
02 Reading by PCC Co-gen Operator	_____	_____	_____

Pensacola Christian College
Co-Gen

O2 Readings by Co-gen Operator

Year _____

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Engine #1												
Engine #2												
Engine #3												

*Did not run entire month

Pensacola Christian College
Co-Generation Plant

Scheduled Maintenance Procedures

Performed by PCC

1. Oil and filter change every 700 hours

Every Three months

2. Check plugs
3. Check gas regulator water column
4. Check compression

Routine test and adjustment as necessary for proper operation

Performed by Outside Contractor

Annual

1. Check 2301 Woodward governor
2. Change plugs
3. Set timing
4. Adjust air fuel ratio
5. Compression test
6. Check and replace carburetor diaphragms (if necessary)
7. Adjust valves, check push rods
8. Oil samples taken
9. Check magneto
10. 02 analyzer test

O & M Plan

EU 009, Standby Generation Plant – (engines #1-#8)

Tests measuring CO and NOX together with accompanying VE tests (conducted during CO and NOX tests) indicate that each engine is capable of operating at maximum capacity specified in construction permit without exceeding maximum allowable emissions for NOX and CO. To prove that each engine operated at near maximum capacity during compliance testing, heat inputs were measured by recording natural gas flows and calculating correspondent heat inputs (please note that engine manufacturer's data concerning heat content of natural gas when used in internally combusted engines is 925 CTU/CF). Natural gas flows were recorded two ways, one by recording Energy Services of Pensacola (gas supplier) gas meter at the beginning and at the end of each one-hour test (total of 3) for each engine and by taking instantaneous natural gas flows indicated by engine electronic controller/indicator. Instantaneous gas flows (CF/min) were taken several times during each hour of testing, averaged and multiplied by running time (minutes) to obtain flow in CF/given time. These two readings were close enough so that proposed future heat input readings will be accomplished using engine electronic controllers/indicators. These controllers/indicators also record and display, among other data, charge density factor indicating fuel to air ratio, rpms, temperatures, etc. These data can be recorded using computer software. Density charge information(s) recorded during compliance testing are attached. Also during compliance testing PCC operator measured oxygen content of exhaust gases using Bacharach combustion analyzer. This was done to compare his readings to readings recorded by compliance tester. Both readings were basically the same for each engine. Recording for density charge, 02 readings and engine heat inputs (measuring gas flows) are attached.

Recorded values during compliance testing are as follows:

	Density Charge	Exhaust Air 02	Av Gas Flow CFM
Engine #1	0.75	9.4	214
Engine #2	0.75	9.4	212
Engine #3	0.76	9.4	216
Engine #4	0.77	9.4	216
Engine #5	0.77	9.4	218
Engine #6	0.76	9.4	222
Engine #7	0.76	9.4	220
Engine #8	0.75	9.4	215
Av	0.76	9.4	217

Using all the above data, PCC proposes to conduct following O & M Plan to insure engine(s) optimal operation in lieu of yearly NOX and CO testing.

When Standby Generation Plant is not used to generate power, PCC plans to run all eight engines at least once a month.

Every month two engines (for example one months Engines #1 & #2) will be tested for the following:

1. Run "Charge Density" test using computer and software furnished by manufacturer (Caterpillar) for 30 minutes to record Charge Density as shown on attached samples
   Allowable Density Charge factor is 0.72 – 0.80
2. Check 02 content in exhaust gas using Bacharach Model 300,or equivalent, instrument (efficiency of combustion will also be recorded). See attached copies of previous tests.
   Allowable 02 range is 9.0 – 10.0%
3. Check visible emissions
4. Record gas consumption in CFMs using computer program.
5. Record engine running time
6. Compute engine gas consumption as follows: (test will run at least 30 minutes)
   Total CF used during test time = CF/min x test time in minutes.

7. Compute engine heat input
   MM BTUH = (60 min / minutes tested) (CF used during test)(925 BTU/CF).
8. Compute operating capacity
   Maximum allowable heat input is 6,863 BTU/BHP,hr
   6,863 x 1,818 BHP = 12.5 MM BTUH
   Operating Capacity % = (Test MM BTUH / 12.5 MM BTUH) x 100 = % of load

Testing:

Once a year visible emissions testing will be conducted on all 8 engines by certified VE tester according to EPA Method 9

Pensacola Christian College
Standby Generation Plant

O & M Record

Year: _____

	Engine #1	**Engine #2**	**Engine #3**	**Engine #4**
Tune up Date	_____	_____	_____	_____
Service Contractor	_____	_____	_____	_____
02 Reading by Service Contractor	_____	_____	_____	_____
02 Reading by PCC Operator	_____	_____	_____	_____

Pensacola Christian College
Standby Generation Plant

O & M Record

Year: _____

	Engine #5	Engine #6	Engine #7	Engine #8
Tune up	_____	_____	_____	_____
Service Contract	_____	_____	_____	_____
02 Reading Service Contract	_____	_____	_____	_____
02 Reading PCC Operator	_____	_____	_____	_____

Pensacola Christian College
Standby Generation Plant

O2 Readings by Co-gen Operator

Year _____

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Engine #1												
Engine #2												
Engine #3												
Engine #4												
Engine #5												
Engine #6												
Engine #7												
Engine #8												

*Did not run entire month

Pensacola Christian College
Standby Generation Facility

Scheduled Maintenance Procedures

Weekly	➢ Check air inlet filter ➢ Verify automatic mode enabled ➢ Check battery charger operation & electrolyte level ➢ Check cooling system coolant level ➢ Inspect visible electrical connections ➢ Inspect electrohydraulic system ➢ Inspect air cleaner service indicator ➢ Check engine oil level ➢ Check fuel filter differential pressure ➢ Check jacket water heater ➢ Conduct walk-around inspection
Monthly	➢ Conduct operational engine testing ➢ Record engine charge density versus engine speed ➢ Record fuel consumption
Annually (conducted by Caterpillar authorized service technician)	➢ Drain aftercooler condensation ➢ Inspect alternator ➢ Lubricate generator ball bearings ➢ Inspect/adjust/replace belts ➢ Obtain coolant sample for laboratory analysis ➢ Test/add supplemental coolant additive (SCA) ➢ Measure record crankcase blowby ➢ Inspect crankshaft vibration damper ➢ Measure/record cylinder pressure ➢ Change electrohydraulic system oil ➢ Inspect/replace engine air cleaner element ➢ Clean engine crankcase breather ➢ Check engine mounts ➢ Obtain engine oil sample for laboratory analysis ➢ Change engine oil filter ➢ Conduct engine performance test ➢ Check engine protective devices ➢ Clean/inspect engine speed/timing sensor ➢ Adjust engine valve lash and bridge (at 250 hours) ➢ Inspect exhaust bypass ➢ Inspect exhaust piping ➢ Check fuel metering valve screen ➢ Drain gas pressure regulator condensation ➢ Test generator set ➢ Inspect generator set vibration ➢ Inspect/replace hoses and clamps

	➢ Check/adjust ignition system timing ➢ Inspect inlet air system ➢ Test insulation ➢ Clean radiator ➢ Inspect starting motor ➢ Check stator lead ➢ Measure/record valve stem projection ➢ Inspect water pump
Every three years	➢ Check rotating rectifier ➢ Inspect turbocharger

Records

Records of inspections, maintenance, operating parameters and operating hours for each unit shall be retained for a minimum of two years and shall be made available to DEP upon request. These records are kept in Co-gen office.

Records requirements shall include:

Records of engine(s) operating parameters
- Scheduled 02 readings
- Scheduled Charge Density factors
- Scheduled heat intake (gas consumption) recordings

Records of time(s) each engine operated
Operating hours shall not exceed the following:
EU 005 Co-gen engines #1 & #2 – 8,760 hr/yr/each
EU 003 – Co-gen engine #3 – 8,500 hr/yr
EU009 – Standby Generation Plant, engines 1-8 – 2,300 hr/yr/engine

Records of engine(s) malfunctions or failures and corrective actions taken

Records of scheduled maintenance by PCC and/or outside contractor

Results of compliance tests

Periodic Plan Review

This plan will be reviewed at least annually from date of approval. This review will evaluate the effectiveness of the Plan and will make any changes necessary for the Plan to be continuously administered.

The Environmental Compliance Plan shall be updated as operations change, but no less frequently than upon renewal of permit. DEP shall be notified of changes to the this plan other than those required for routine maintenance. The Environmental Compliance Plan shall be revised when operational procedures change, to reflect any facility alterations performed or to reflect experience resulting from facility operation. PCC will periodically review and revise the operating protocol, as appropriate, to ensure satisfactory system performance.

Abnormal Events

In the event PCC is temporarily unable to comply with any of the conditions of DEP permit due to breakdown of equipment, power outages, destruction by hazard of fire, wind or other cause, PCC will notify DEP. Notification shall be made in person, by telephone, or other means within 24 hours of breakdown or malfunction. The telephone number to call to notify DEP is **850 595-8364 ext. 1220**. For emergencies involving a significant threat to human health or the environment, **the number is 850 320-0519.**

A written report of any noncompliance referenced above shall be submitted to the Florida **Department of Environmental Protection, 160 Governmental Center, Pensacola, FL 32502-5794**, within 30 days after its occurrence. The report shall describe the nature and cause of the breakdown or malfunction, the steps being taken or planned to be taken to correct the problem and prevent it's reoccurrence, emergency procedures in use pending correction of the problem and time when the facility will again be operating in accordance with permit conditions.

If an emergency arises or there is any condition, which prevents the continued operation or results in non-compliance with applicable regulations, the operator will:

Stop operation immediately

Notify proper official(s), as soon as practically possible, of the time, date and nature of the occurrence and the corrective action(s) taken

Ensure that the engines are in good working order before resuming operation

Attachments

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:49 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec19_Gen 1.sdf

Comments:

G3516 EPG-Standard (ZBC00138)

Parameter	Value
Equipment ID	Gen #1
Engine Serial Number	ZBC00138
ECM Serial Number	13956018AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:50 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec20_Gen 2.sdf

Comments:

G3516 EPG-Standard (ZBC00139)

Parameter	Value
Equipment ID	Gen #2
Engine Serial Number	ZBC00139
ECM Serial Number	13956038AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2000
1750
1500
1250
1000
750
500
0
2500
5000
7500
10000
12500
Time (in Seconds)

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:51 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec20_Gen 3.sdf

Comments:

G3516 EPG-Standard (ZBC00140)

Parameter	Value
Equipment ID	Gen #3
Engine Serial Number	ZBC00140
ECM Serial Number	13956013AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

[redacted]
[redacted]
Act Chg Density [] - G3516 EPG-Standard (ZBC0014
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0014
Act Chg Density [] - G3516 EPG-Standard (ZBC0014
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0014
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1250
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5000
7500
10000
12500
Time (in Seconds)

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:51 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec20_Gen 4.sdf

Comments:

G3516 EPG-Standard (zbc00135)

Parameter	Value
Equipment ID	Gen #4
Engine Serial Number	zbc00135
ECM Serial Number	07456007AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

[redacted]
[redacted]
Act Chg Density [] - G3516 EPG-Standard (zbc0013
Engine Speed [RPM] - G3516 EPG-Standard (zbc0013
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Engine Speed [RPM] - G3516 EPG-Standard (zbc0013
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1500
1250
1000
750
500
0
500
1000
1500
2000
2500
3000
3500
Time (in Seconds)

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:52 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec21_Gen 5.sdf

Comments:

G3516 EPG-Standard (ZBC00136)

Parameter	Value
Equipment ID	Gen #5
Engine Serial Number	ZBC00136
ECM Serial Number	13956037AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
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1250
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2500
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7500
10000
12500
Time (in Seconds)

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:52 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec21_Gen 6.sdf

Comments:

G3516 EPG-Standard (ZBC00134)

Parameter	Value
Equipment ID	Gen #6
Engine Serial Number	ZBC00134
ECM Serial Number	13856024AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
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0.2
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1250
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750
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500
1000
1500
2000
2500
3000
3500
Time (In Seconds)

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:53 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec21_Gen 7.sdf

Comments:

G3516 EPG-Standard (zbc00137)

Parameter	Value
Equipment ID	Gen #7
Engine Serial Number	zbc00137
ECM Serial Number	19256029AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Act Chg Density [] - G3516 EPG-Standard (zbc0013
Engine Speed [RPM] - G3516 EPG-Standard (zbc0013
Act Chg Density [] - G3516 EPG-Standard (zbc0013
Engine Speed [RPM] - G3516 EPG-Standard (zbc0013
Time (in Seconds)
0.0
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0.4
0.5
0.6
0.7
0.8
0.9
1.0
500
750
1000
1250
1500
1750
2000
0
500
1000
1500
2000
2500
3000
3500

Cat Electronic Technician 2005B v1.0
Data Log Viewer

01/06/2006 10:54 AM

C:\Program Files\Caterpillar Electronic Technician\Datalog\PCC\logDec22_Gen 8.sdf

Comments:

G3516 EPG-Standard (ZBC00130)

Parameter	Value
Equipment ID	Gen #8
Engine Serial Number	ZBC00130
ECM Serial Number	12956057AL
Personality Module Part Number	2723600-00
Personality Module Release Date	JUN 0
Personality Module Description	G3516B60 w/CD V1.9 PROD
Engine Configuration	Data Invalid

Graphed Parameter(s)

Act Chg Density
Engine Speed

Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
Act Chg Density [] - G3516 EPG-Standard (ZBC0013
Engine Speed [RPM] - G3516 EPG-Standard (ZBC0013
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2000
1750
1500
1250
1000
750
500
0
2500
5000
7500
10000
12500
Time (in Seconds)

RUN #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: CAT #1

DATE: 12/19/05

TIME: 1350 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 56
STACK TEMP(F): 976

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 528

% EFFICIENCY: 56.1
% STACK LOSS: 43.9

TEST PERFORMED BY:

COMMENTS ....

RUN #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: CAT #1

DATE: 12/19/0

TIME: 2:20 pm/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 62
STACK TEMP(F): 976

% OXYGEN: 9.5
% EXCESS AIR: 74

% CARBON - DIOXIDE: 6.4
PPM CARBON - MONOXIDE: 515

% EFFICIENCY: 56.1
% STACK LOSS: 43.9

TEST PERFORMED BY:

COMMENTS ....

RUN #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #1

DATE: 12/19/05

TIME: 1525 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 55
STACK TEMP(F): 975

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 527

% EFFICIENCY: 56.1
% STACK LOSS: 43.9

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #2

DATE: 12/20/05

TIME: 0820 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 39
STACK TEMP(F): 984

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 500

% EFFICIENCY: 55.2
% STACK LOSS: 44.8

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #2

DATE: 12/20/05

TIME: 0929 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 61
STACK TEMP(F): 983

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 499

% EFFICIENCY: 56.0
% STACK LOSS: 44.0

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #2

DATE: 12/20/05

TIME: 1002 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 65
STACK TEMP(F): 981

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 493

% EFFICIENCY: 56.3
% STACK LOSS: 43.7

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #2

DATE: 12/20/05

TIME: 1035 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 64
STACK TEMP(F): 982

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 495

% EFFICIENCY: 56.2
% STACK LOSS: 43.8

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #3

DATE: 12/20/05

TIME: 1140 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 65
STACK TEMP(F): 972

% OXYGEN: 9.3
% EXCESS AIR: 71

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 501

% EFFICIENCY: 56.9
% STACK LOSS: 43.1

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #3

DATE: 12/20/05

TIME: 1220 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 73
STACK TEMP(F): 973

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 510

% EFFICIENCY: 56.9
% STACK LOSS: 43.1

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #3

DATE: 12/20/05

TIME: 1300 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 88
STACK TEMP(F): 976

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 488

% EFFICIENCY: 57.3
% STACK LOSS: 42.7

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #3

DATE: 12/20/05

TIME: 1325 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 88
STACK TEMP(F): 974

% OXYGEN: 9.2
% EXCESS AIR: 69

% CARBON - DIOXIDE: 6.6
PPM CARBON - MONOXIDE: 485

% EFFICIENCY: 57.9
% STACK LOSS: 42.1

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #3

DATE: 12/20/05

TIME: 1340 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 88
STACK TEMP(F): 976

% OXYGEN: 9.2
% EXCESS AIR: 69

% CARBON - DIOXIDE: 6.6
PPM CARBON - MONOXIDE: 518

% EFFICIENCY: 57.8
% STACK LOSS: 42.2

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #4

DATE: 12/20/04

TIME: 1533 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 50
STACK TEMP(F): 982

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 499

% EFFICIENCY: 55.7
% STACK LOSS: 44.3

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #4

DATE: 12/20/04

TIME: 1710 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 52
STACK TEMP(F): 983

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 479

% EFFICIENCY: 55.7
% STACK LOSS: 44.3

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #4

DATE: ~~12/20~~ 12/20/05

TIME: 1736 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 50
STACK TEMP(F): 983

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 478

% EFFICIENCY: 55.7
% STACK LOSS: 44.3

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #4

DATE: 12/20/05

TIME: 1813 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 49
STACK TEMP(F): 982

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 470

% EFFICIENCY: 55.7
% STACK LOSS: 44.3

TEST PERFORMED BY:

COMMENTS ....

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #6

DATE: 12/21/05

TIME: 1310 AM/PM

FUEL: NATURAL GAS

PRIMRY TEMP(F): 85
STACK TEMP(F): 984

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 524

% EFFICIENCY: 56.9
% STACK LOSS: 43.1

TEST PERFORMED BY:

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #6

DATE: 12/21/05

TIME: 1420 AM/PM

FUEL: NATURAL GAS

PRIMRY TEMP(F): 77
STACK TEMP(F): 984

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 531

% EFFICIENCY: 56.6
% STACK LOSS: 43.4

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #7

DATE: 12/21/05

TIME: 1550 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 51
STACK TEMP(F): 982

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 517

% EFFICIENCY: 55.7
% STACK LOSS: 44.3

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #7

DATE: 12/21/05

TIME: 1653 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 58
STACK TEMP(F): 982

% OXYGEN: 9.3
% EXCESS AIR: 71

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 500

% EFFICIENCY: 56.3
% STACK LOSS: 43.7

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #7

DATE: 12/21/05

TIME: 1732 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 54
STACK TEMP(F): 981

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 496

% EFFICIENCY: 55.9
% STACK LOSS: 44.1

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #7

DATE: 12/21/05

TIME: 1756 am/pm

FUEL: NATURAL GAS

PRIMRY TEMP(F): 52
STACK TEMP(F): 983

% OXYGEN: 9.3
% EXCESS AIR: 71

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 496

% EFFICIENCY: 56.0
% STACK LOSS: 44.0

TEST PERFORMED BY:

COMMENTS ....

Run #1

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #8

DATE: 12/22/05

TIME: 0856 AM/PM

FUEL: NATURAL GAS

PRIMRY TEMP(F): 59
STACK TEMP(F): 977

% OXYGEN: 9.3
% EXCESS AIR: 71

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 513

% EFFICIENCY: 56.5
% STACK LOSS: 43.5

TEST PERFORMED BY:

COMMENTS ....

Run #2

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #8

DATE: 12/22/05

TIME: 0948 AM/PM

FUEL: NATURAL GAS

PRIMRY TEMP(F): 97
STACK TEMP(F): 977

% OXYGEN: 9.3
% EXCESS AIR: 71

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 496

% EFFICIENCY: 57.8
% STACK LOSS: 42.2

TEST PERFORMED BY:

COMMENTS ....

Run #3

BACHARACH MODEL 300
****
COMBUSTION ANALYZER

ID: Cat #8

DATE: 12/22/05

TIME: 1033 AM/PM

FUEL: NATURAL GAS

PRIMRY TEMP(F): 71
STACK TEMP(F): 977

% OXYGEN: 9.4
% EXCESS AIR: 72

% CARBON - DIOXIDE: 6.5
PPM CARBON - MONOXIDE: 490

% EFFICIENCY: 56.7
% STACK LOSS: 43.3

TEST PERFORMED BY:

COMMENTS ....

12/19/2005
EPU Engine No. 1

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
12:25	176,600	---	---	---
13:15	187,400	10,800	50	216
13:25	189,300	1,900	10	190
13:37	191,600	2,300	12	192
13:57	196,400	4,800	20	240
14:37	204,900	8,500	40	213
14:49	207,300	2,400	12	200
15:38	217,800	10,500	49	214
15:49	220,200	2,400	11	218
TOTAL		43,600	204	214

AVG. HEAT VALUE (MMBTU/hr)	11.86
AVG. LOAD PERCENTAGE (%)	94.9%

12/20/2005
EPU Engine No. 2

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
7:19	230,500	---	---	---
7:24	231,400	900	5	180
7:48	236,200	4,800	24	200
8:22	243,600	7,400	34	218
8:35	246,600	3,000	13	231
8:40	247,500	900	5	180
9:13	254,500	7,000	33	212
9:30	258,100	3,600	17	212
9:40	260,300	2,200	10	220
10:02	264,700	4,400	22	200
10:29	270,500	5,800	27	215
10:47	274,500	4,000	18	222
TOTAL		44,000	208	212

AVG. HEAT VALUE (MMBTU/hr)	11.74
AVG. LOAD PERCENTAGE (%)	93.9%

12/20/2005
EPU Engine No. 3

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
11:23	280,400	---	---	---
11:42	284,400	4,000	19	211
12:13	291,300	6,900	31	223
12:24	293,500	2,200	11	200
12:30	294,900	1,400	6	233
13:02	301,800	6,900	32	216
13:28	307,300	5,500	26	212
14:19	318,900	11,600	51	227
14:41	323,200	4,300	22	195
TOTAL		42,800	198	216

AVG. HEAT VALUE (MMBTU/hr)	12.00
AVG. LOAD PERCENTAGE (%)	96.0%

12/20/2005
EPU Engine No. 4

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
15:09	326,900	---	---	---
15:26	330,700	3,800	17	224
15:34	332,600	1,900	8	238
15:47	335,400	2,800	13	215
17:06	352,400	17,000	79	215
17:14	353,800	1,400	8	175
17:20	355,700	1,900	6	317
17:38	359,000	3,300	18	183
18:14	366,900	7,900	36	219
TOTAL		40,000	185	216

AVG. HEAT VALUE (MMBTU/hr)	12.00
AVG. LOAD PERCENTAGE (%)	96.0%

12/21/2005
EPU Engine No. 5

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
7:28	383,700	---	---	---
7:48	388,000	4,300	20	215
8:07	392,300	4,300	19	226
8:25	396,100	3,800	18	211
8:35	398,300	2,200	10	220
9:12	406,500	8,200	37	222
9:34	411,400	4,900	22	223
10:18	420,700	9,300	44	211
10:44	426,400	5,700	26	219
TOTAL		42,700	196	218

AVG. HEAT VALUE (MMBTU/hr)	12.09
AVG. LOAD PERCENTAGE (%)	96.7%

12/21/2005
EPU Engine No. 6

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
11:15	431,400	---	---	---
11:36	435,900	4,500	21	214
12:14	444,600	8,700	38	229
13:13	457,600	13,000	59	220
13:22	459,900	2,300	9	256
14:10	470,600	10,700	48	223
14:21	472,900	2,300	11	209
14:28	474,300	1,400	7	200
TOTAL		42,900	193	222

AVG. HEAT VALUE (MMBTU/hr)	12.34
AVG. LOAD PERCENTAGE (%)	98.7%

12/21/2005
EPU Engine No. 7

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
15:04	480,800	---	---	---
15:55	492,200	11,400	51	224
16:02	493,600	1,400	7	200
16:10	495,500	1,900	8	238
17:05	507,400	11,900	55	216
17:16	509,700	2,300	11	209
18:03	520,100	10,400	47	221
18:15	522,900	2,800	12	233
TOTAL		42,100	191	220

AVG. HEAT VALUE (MMBTU/hr)	12.23
AVG. LOAD PERCENTAGE (%)	97.9%

12/22/2005
EPU Engine No. 8

TIME	GAS METER READING (scf)	GAS USED (scf)	DURA-TION (min)	FLOW RATE (scfm)
7:57	528,600	---	---	---
8:30	535,500	6,900	33	209
8:49	539,800	4,300	19	226
9:02	542,400	2,600	13	200
9:39	550,300	7,900	37	214
10:09	556,500	6,200	30	207
10:26	560,500	4,000	17	235
10:46	564,900	4,400	20	220
11:18	571,700	6,800	32	213
TOTAL		36,300	169	215

AVG. HEAT VALUE (MMBTU/hr)	11.92
AVG. LOAD PERCENTAGE (%)	95.4%

BACHARACH®

INSTRUCTION 24-9223
MODEL 300
COMBUSTION ANALYZER
(Standard Efficiency Equations, Siegert Efficiency Equations, and NSX Version)

Operation/Maintenance
Rev. 1 – November 1995

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