



EnviroSolutions, Incorporated

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December 14, 2016

Sent via email and UPS

Mr. Todd Zynda
Environmental Engineer
MDEQ- Air Quality Division
3058 West Grand Blvd., Suite 2-300
Detroit, MI 48202-6058
(313) 456-2761

**SUBJECT: Response to Violation Notice (11/23/16)
Beaumont Hospital- Dearborn, 18101 Oakwood Blvd., Dearborn, MI
SRN: J4912, Wayne County**

Dear Mr. Zynda,

On behalf of Beaumont Hospital – Dearborn (BHD), EnviroSolutions, Inc. (EnviroSolutions) is submitting this response to the Violation Notice (Notice) for the above-referenced facility, dated November 23, 2016. BHD retained EnviroSolutions on December 5, 2016 to assist with an air compliance evaluation in order to respond to the Notice and subsequently correct the violations. EnviroSolutions has conducted a facility walk-through, interviewed the facility services director, and reviewed relevant records, the Permit to Install Application, and historical permits. As requested in the Notice, following is a summary of relevant background information and an itemized response to the violations identified in the Notice.

Background

EnviroSolutions obtained the Permit to Install (PTI) 57-13 Application package through a Freedom of Information Act (FOIA) request of the Michigan Department of Environmental Quality Air Quality Division (MDEQ-AQD). The PTI 57-13 Application was received by the MDEQ-AQD on April 4, 2013. The PTI 57-13 Application was submitted by a previous consultant in order to consolidate the following three permits:

- 1) Wayne County Air Pollution Control Division (WCAPCD) Permit C-8401;
- 2) WCAPCD Permit C-8402; and
- 3) MDEQ AQD PTI 198-04.

The permit conditions for WCAPCD Permits C-8401 and C-8402 were contained in a document dated February 9, 1989 (attached for reference). Based on this WCAPCD permit conditions document, following is a summary of the relevant source emission units and special conditions:

- Two Natural Gas/No. 2 Fuel Oil Fired Boilers;
- Maximum heat input shall not exceed 33.5 million BTU per hour (MMBTU/hr); and
- Maximum sulfur content of the No. 2 fuel oil shall not exceed 0.29 percent by weight.

PTI 198-04 was issued on November 17, 2004 for an additional boiler (identified as Boiler #3) and allowed for the replacement of three existing cogeneration engines with four standby emergency generators.

As stated above, the PTI 57-13 Application was submitted with the intent to combine the three existing air permits under a single PTI; however, it appears that through the permit process, certain operating conditions were not transferred to the new permit.

- 1) The original WCAPCD Permits correctly represented the actual boiler operating scenario, with the primary fuel source as natural gas, and the back-up fuel source as No. 2 fuel oil. Mistakenly and for unknown reasons, the PTI 57-13 Application language and emission calculations included natural gas as the only fuel that would be used to operate the three boilers. The PTI 57-13 Application should have included No. 2 fuel oil as a back-up fuel, which is how the boilers have operated since installation in 1988 (Boilers #1 and #2) and 2004 (Boiler #3).
- 2) The original WCAPCD Permits correctly represented Boilers #1 and #2 by limiting the maximum heat input to 33.5 MMBTU/hr. This limit was appropriate since Boilers #1 and #2 each have a maximum heat input of 33.476 MMBTU/hr, as indicated on the boiler nameplates. Mistakenly and for unknown reasons, the PTI 57-13 Application incorrectly stated the boilers had maximum heat inputs of 33.0 MMBTU/hr.
- 3) The manufacturer performance data for the two emergency generators (included in Flexible Group FG-EMGRICE1-2) was inaccurate. This error resulted in PTI 57-13 incorporating oxides of nitrogen (NO_x) and carbon monoxide (CO) emission rates to less than the actual manufacturer emission rates for the generators. The specifications from Caterpillar are also attached.

Given this background information, the following relevant explanation is provided below.

Emergency Generators

The Notice indicates the manufacturer's performance data for the two 2937 brake horsepower (bhp) diesel-fueled emergency engines, identified as Flexible Group FG-EMGRICE1-2, exceed the emission limits for both NO_x and CO. The PTI 57-13 identifies the NO_x emission limit as 5.4 g/bhp-hr and the CO emission limit as 0.30 g/bhp-hr. The manufacturer's performance data, provided to the MDEQ-AQD during the facility inspection on October 20, 2016 and also attached, indicated the engines emit 9.94 g/bhp-hr of NO_x and 0.70 g/bhp-hr of CO.

EnviroSolutions verified the manufacturer's performance data, which was provided to the MDEQ-AQD during the facility inspection, is the correct data associated with the emergency generators installed at the facility in 2004 (FG-EMGRICE1-2). EnviroSolutions has determined the manufacturer's performance data provided to MDEQ-AQD in the PTI 57-13 Application was not the correct set of specifications.



Proposed Action

Based on the information error described above, EnviroSolutions recommends BHD apply for a new PTI to replace PTI 57-13 in order to accurately represent the actual emergency generator operations. The new PTI would resolve the FG-EMGRICE1-2 violations as follows:

- 1) Accurately identify the maximum NOx emission rate; and
- 2) Accurately identify the maximum CO emission rate.

We believe this is the correct action to address this particular violation.

Boilers #1, #2, and #3

The Notice indicates the three 33 MMBTU/hr boilers, identified as Flexible Group FG-BOILER5-7, are using No. 2 fuel oil as a back-up emergency fuel. The PTI 57-13 allows only pipeline quality natural gas to be used for boiler operation. The Notice also stated PTI 57-13 restricts the heat input capacity for each boiler to not more than 33.0 MMBTU/hr; however, Boilers #1 and #2 slightly exceed this limit. The nominal maximum heat input for Boilers #1 and #2 are 33 MMBTU/hr, however the nameplate states 33.476 MMBTU/hr.

As described in the Background section above, the original WCAPCD Permits correctly represented the actual boiler operating scenario, with the primary fuel source as natural gas, and the back-up fuel source as No. 2 fuel oil. Mistakenly and for unknown reasons, the PTI 57-13 Application language and emission calculations included natural gas as the only fuel that would be used to operate the three boilers. The PTI 57-13 Application should have included No. 2 fuel oil as a back-up fuel, which is how the boilers have operated since installation in 1988 (Boilers #1 and #2) and 2004 (Boiler #3). The boilers must operate under emergency conditions to maintain critical hospital services. If the natural gas supply is interrupted, the boilers must operate using No. 2 fuel oil. This backup operating scenario is essential to maintain critical hospital services during times natural gas service is interrupted. This error resulted in PTI 57-13 allowing only natural gas to be combusted by the boilers.

Additionally, the original WCAPCD Permits correctly represented Boilers #1 and #2 by limiting the maximum heat input to 33.5 MMBTU/hr. This limit was appropriate since Boilers #1 and #2 each have a maximum heat input of 33.476 MMBTU/hr, as indicated on the boiler nameplates and as identified in the Notice. Mistakenly and for unknown reasons, the PTI 57-13 Application incorrectly stated Boilers #1 and #2 had maximum heat inputs of 33.0 MMBTU/hr. This error resulted in PTI 57-13 restricting the maximum heat inputs to less than the actual ratings for Boilers #1 and #2.

Proposed Action

Based on the information errors described above, EnviroSolutions recommends BHD apply for a new PTI to replace PTI 57-13 in order to accurately represent the actual boiler operations. The new PTI would resolve the violations as follows:

- 1) Boilers #1, #2, and #3 – accurately identify Fuel Oil #2 as the back-up fuel in the event of a natural gas supply disruption; and



- 2) Boilers #1 and #2 – accurately identify the maximum heat input as 33.476 MMBTU/hr.

We believe this is the correct action to address this particular violation.

Boiler #3

The Notice states Boiler #3 is not in compliance with the requirements of the federal Standards of Performance for New Sources (NSPS) as described in 40 Code of Federal Regulations (CFR) Part 60, Subpart Dc. Accordingly, the Notice identified the following concerns:

1. There is no record an initial performance test for opacity was completed (per 40 CFR 60.45c(a));
2. There is no record of subsequent opacity monitoring through either a continuous emissions monitor (COMS) or periodic performance tests (per 40 CFR 60.47c(a) & (a)(1));
3. Usage records have not been maintained for fuel oil combustion (per 40 CFR 60.48c(g)(2)); and
4. The opacity performance test data and excess emission reporting has not been submitted (per 40 CFR 60.48c(b) & (c)).

EnviroSolutions understands that fuel oil was first used to fire Boiler #3 during a natural gas supply disruption on July 2, 2016. Pursuant to 40 CFR 60.8, the initial performance test for opacity is due within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial startup of such facility. The boiler was operated using diesel fuel for just over fifteen hours. The boilers were not operating at the maximum production rate during this time frame. Thus, the initial test at maximum operational capacity was not feasible. Further, there has not been a subsequent operation of these boilers using diesel fuel. The 180 day time frame since firing the boilers expires on December 29, 2016. BHD can fire Boiler #3 at the maximum production rate and conduct opacity testing prior to this date, if appropriate.

EnviroSolutions has determined that BHD does maintain diesel fuel usage records; however, the recordkeeping process needs to be more formalized. Attached are records for 2015 and 2016.

Proposed Action

BHD will formalize the recordkeeping process to ensure relevant records are readily available and are maintained in accordance with the permit requirements. Additionally, the following actions are proposed:

1. Fire Boiler #3 at maximum production rate and conduct initial performance test;
2. Conduct subsequent performance/opacity testing, as required;
3. Prepare and conduct more formal diesel fuel recordkeeping; and
4. Provide reporting of the opacity performance test data upon completion.

Renewable Operating Program

The Notice stated the BHD facility is operating without a Renewable Operating Permit



(ROP), which is required since the Potential to Emit (PTE) of sulfur dioxide (SO₂) exceeds the major source threshold under Rule 211.

EnviroSolutions evaluated the PTE for SO₂ associated with combustion of No. 2 Fuel oil. BHD uses ultra low sulfur diesel containing 15 parts per million on a mass basis to fire their generators and boilers. Based on the maximum throughput for fuel oil associated with emergency generator and boiler operations, the calculated maximum PTE is 0.27 tons/year. Thus, the facility PTE for SO₂ does not exceed major source thresholds.

The PTE calculations are attached. The calculations utilize appropriate AP-42 emission factors for the boilers as well as emission rates as identified in the manufacturer's performance data for the generators.

Summary

BHD will submit a new Permit to Install application to include all relevant emergency generator emission limits, the upper maximum heat capacity for the boilers, usage of fuel oil in the boilers, and the underlying applicable requirements of 40 CFR 60 Subpart Dc that relate to the operation of Boiler #3. The following actions are also proposed for Boiler #3:

1. Fire Boiler #3 at maximum production rate and conduct initial performance test;
2. Conduct subsequent performance/opacity testing, as required;
3. Prepare and conduct more formal diesel fuel recordkeeping; and
4. Provide reporting of the opacity performance test data upon completion.

Additionally, BHD will implement a more formalized recordkeeping program for maintenance of diesel fuel usage, natural gas usage, and reporting requirements for the boilers and emergency generators. A permit application will be submitted to the MDEQ-AQD within 120 days of submittal of this response.

Thank you for the opportunity to reply to the concerns raised in the November 23, 2016 Notice. Please feel free to contact me via email (gkernosek@envirosolutionsinc.net) or telephone at (734) 641-2700 if you have any questions.

Sincerely,
EnviroSolutions, Inc.



Gregory D. Kernosek, P.E.
Principal Engineer

Enclosure

Cc: Mr. Matthew Ronan, Beaumont Hospital – Dearborn



AIR POLLUTION CONTROL DIVISION

MAIN OFFICE: (313) 567-4100
2211 EAST JEFFERSON
DETROIT, MICHIGAN 48207
DOWNRIVER OFFICE: (313) 281-8398
152 ELM STREET
WYANDOTTE, MICHIGAN 48192



EDWARD H. MCNAMARA
COUNTY EXECUTIVE

VERNICE DAVIS-ANTHONY, MPH
HEALTH OFFICER

DONALD LAWRENCHUK, M.D., MPH
MEDICAL DIRECTOR

February 9, 1989

Mr. Gerald W. Smith
Project Manager
Oakwood Hospital
P. O. Box 2500
Dearborn, Michigan 48123-2500

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SR# J4912

SUBJECT: PERMIT CONDITIONS - AGREEMENT BY COUNTER SIGNATURE

PERMIT NUMBERS: C-8401 AND C-8402

SOURCE DESCRIPTION: TWO NATURAL GAS/NO. 2 FUEL OIL
FIRED BOILERS AND THREE NATURAL
GAS FIRED COGENERATION ENGINES

SOURCE LOCATION: 18101 OAKWOOD, DEARBORN

Dear Mr. Smith:

We have completed our review of the installation permit applications for compliance with all applicable Federal, State and Wayne County air pollution control regulations, rules and ordinances. We shall approve these permits subject to the following general conditions and with written concurrence by your organization with the following special conditions. Your written concurrence signifies your acknowledgement of and agreement to the special conditions.

GENERAL CONDITIONS

1. Not more than 30 days after completion of the installation, the applicant shall apply, in writing, for a Certificate of Operation. Written application should be sent to:
Mr. Michael Maillard, Director, Enforcement Services, Wayne County Department of Health, Air Pollution Control Division, 2211 East Jefferson, Detroit, Michigan 48207.
2. Trial operation of this emission source shall be allowed for 90 days, provided such operation is in compliance with all of the terms and conditions contained in the installation permit. If a Certificate of Operation has not been issued for an emission source prior to the expiration of the trial operation period, an extension of trial operation may be requested of the Division Director.

3. Operation of the emission source shall permanently cease upon denial of the Certificate of Operation by this Division.
4. The applicant shall demonstrate compliance with all Division regulation requirements and other applicable state and federal regulation requirements and with all general and special conditions of this permit prior to the issuance of the Certificate of Operation.
5. The applicant shall not reconstruct, alter, modify, expand or relocate this emission source unless plans, specifications and an application for an installation permit are submitted to and approved by this Division.
6. No emission source shall be operated for any other purpose or in any other manner than that for which the installation permit was approved and for which a Certificate of Operation has been issued unless otherwise authorized in writing by the Division. Such emission source shall also be maintained in a state of good repair.
7. Operation of this emission source shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant value or property, or which causes unreasonable interference with the comfortable enjoyment of life and property.
8. Operation of this emission source shall not interfere with the attainment or maintenance of the air quality standard for any air contaminant.
9. Operation of this emission source shall not result in significant deterioration of air quality.
10. The applicant shall provide notification of any abnormal conditions or malfunction of process or control equipment covered by this application, resulting in emissions in violation of Division requirements or of any permit conditions for more than two hours, to the Enforcement Section of this Division. Such notice shall be made as soon as reasonably possible, but not later than 9:00 a.m. of the next working day. The applicant shall also, within 10 days, submit to the Enforcement Section of this Division a written detailed report, including probable causes, duration of violation, remedial action taken and the steps which are being undertaken to prevent a reoccurrence.

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11. Approval of this application does not preclude the applicant from complying with any future regulations which may be promulgated.
12. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.
13. Act No. 53 - Applicant shall notify any public utility of any excavation, tunneling and discharging of explosives or demolition of buildings which may affect said utility's facilities in accordance with Act 53 of the Public Acts of 1974, being sections 460.701 to 460.718 of the Michigan Compiled Laws and comply with each of the requirements of that Act.
14. The restrictions and conditions of this installation permit shall apply to any person or legal entity which now or shall hereafter own or operate the emission source for which this installation permit is issued. Any new owner or operator shall immediately notify the Director of the Enforcement Section, in writing, of such change in ownership or principal operator status of this emission source.
15. If the installation, reconstruction, relocation or alteration of the emission source for which this permit has been approved has not commenced within, or has been interrupted for, 18 months, this permit shall become void unless otherwise authorized by this Division.

SPECIAL CONDITIONS

BOILERS

16. The maximum heat input to the boilers shall not exceed 33.5 million BTU per hour.
17. The maximum sulfur content of the No. 2 fuel oil shall not exceed 0.29 percent by weight.
18. The sulfur dioxide emission rate from the boilers shall not exceed 10.05 pounds per hour per boiler nor 7.34 tons per year.
19. The boilers shall not consume more than 978 gallons of No. 2 fuel oil per rolling 24-hour period.
20. The rate of No. 2 fuel oil consumption shall not exceed 244.5 gallons per hour 356,970 gallons per year.

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21. The nitrogen oxide emission rate from the boilers when operating on natural gas shall not exceed 0.18 pounds of nitrogen oxides per million BTU nor 6.03 pounds per hour.
22. The nitrogen oxide emission rate from the boilers when operating on number 2 fuel oil shall not exceed 0.29 pounds of nitrogen oxides per million BTU nor 9.72 pounds per hour.
23. There shall be no visible emissions from the operation of the boilers.
24. The applicant shall maintain records of boiler fuel usage for a period of two years and make the records available to the Division personnel upon request.
25. The exhaust gases from the boilers shall be exhausted unobstructed vertically upwards to the ambient air from a stack with a maximum diameter of 40 inches at an exit point not less than 104 feet above grade.
26. Within 180 days of the commencement of operation, verification of the nitrogen oxides and sulfur dioxide emission rates from the boiler stack by testing, at owner's expense, in accordance with Division requirements may be required for operating approval. Stack testing procedures and the location of stack testing ports must have the prior approval of the Chief of the Enforcement Section.

ENGINES

27. The heat input to each engine shall not exceed 5.60 million BTU per hour (based upon natural gas at 1000 BTU per cubic foot).
28. The rate of natural gas consumption shall not exceed 5600 cubic feet per hour per engine nor 147,168,000 cubic feet per year.
29. The nitrogen oxides emission rate shall not exceed 2.38 pounds per hour per engine nor 31.3 tons per year.
30. There shall be no visible emissions from the operation of the engines.
31. The total carbon monoxide emission rate shall not exceed 31.57 tons per year.

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Gerald W. Smith
Permits C-8401 and C-8402

-5-

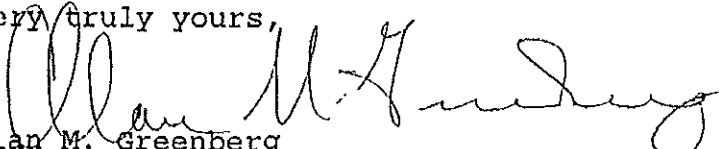
February 9, 1989

32. The applicant shall not operate the engines unless the catalytic converters are installed and operating properly.
33. The applicant shall maintain records of engine fuel usage for a period of two years and make the records available to the Division personnel upon request.
34. The exhaust gases from the engines shall be exhausted unobstructed vertically upwards to the ambient air from a stack with a maximum diameter of 40 inches at an exit point not less than 104 feet above grade.
35. Within 180 days of the commencement of operation, verification of the nitrogen oxides emission rate from the engine stack by testing, at owner's expense, in accordance with Division requirements will be required for operating approval. Stack testing procedures and the location of stack testing ports must have the prior approval of the Chief of the Enforcement Section.
36. Upon commencement of operation of the new powerhouse the applicant shall discontinue use of the 1952 boilerroom.
37. Total nitrogen oxide emissions from the powerhouse shall not exceed 57.7 tons per year.

Please indicate written concurrence to these special conditions by signing and dating the confirmation copies of this letter by an authorized representative of your organization and returning both copies to this Division by March 9, 1989, retaining the original for your files. We shall approve these permits upon receipt of the signed and dated confirmation copies of this letter.

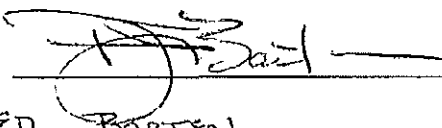
Thank you for your cooperation in this matter.

Very truly yours,


Alan M. Greenberg
Director

AMG:RHK/rhk *AK*
(a:86196.rk2)

Enclosures

SIGNATURE 
NAME FRED BARTEN
TITLE EXECUTIVE VICE-PRESIDENT
DATE 2-23-89

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GEN SET PACKAGE PERFORMANCE DATA
[1HZ02981]

OCTOBER 24, 2016

(1HZ02981)-ENGINE (1HN00849)-GENERATOR (FDN01667)-GENSET

For Help Desk Phone Numbers [Click here](#)

Performance Number: DM4692

Change Level:

Sales Model: 3516BDITA Combustion: DI

Aspr: TA

Engine Power:

2000 W/F 2060 W/O F
 EKW EKW

Speed: 1,800 RPM

After Cooler: SCAC

2,876 HP

Manifold Type: DRY

Governor Type: ADEM

After Cooler Temp(F): 86

Turbo Quantity: 4

Engine App: GP

Turbo Arrangement: Parallel

Hertz: 60

Application Type: PACKAGE-DIE Engine Rating: PGS

Strategy: Low BSFC Strategy

Rating Type: STANDBY

Certification:

General Performance Data

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	ENGINE BMEP PSI	FUEL BSFC LB/BHP-HR	FUEL RATE GPH	INTAKE MFLD TEMP DEG F	INTAKE MFLD P IN-HG	INTAKE AIR FLOW CFM	EXH MFLD TEMP DEG F	EXH STACK TEMP DEG F	EXH GAS FLOW CFM
2,000	100	2885	301.39	0.33	135.73	134.6	71.87	6,052.94	1,119.38	841.82	15,206.51
1,800	90	2601	271.8	0.33	121.57	128.66	65.33	5,759.83	1,052.78	791.06	13,882.21
1,600	80	2320	242.51	0.33	108.71	123.98	58.69	5,420.81	999.68	757.22	12,706.23
1,500	75	2181	227.86	0.33	102.05	121.82	54.55	5,187.73	973.4	743.9	12,031.72
1,400	70	2041	213.21	0.33	95.39	119.84	50.37	4,954.65	947.66	731.84	11,357.21
1,200	60	1763	184.2	0.33	82.87	115.52	42.26	4,492.03	900.5	711.86	10,103.54
1,000	50	1487	155.34	0.33	70.88	111.2	34.44	4,029.41	854.42	692.78	8,902.84
800	40	1215	126.91	0.34	59.39	107.24	27.04	3,577.38	805.28	672.08	7,748.05
600	30	938	98.05	0.36	47.79	104.36	19.96	3,128.88	739.04	641.66	6,586.19
500	25	798	83.4	0.37	41.95	103.1	16.58	2,909.93	699.8	622.4	6,010.56
400	20	657	68.6	0.38	36.06	101.84	13.33	2,690.98	655.7	599.18	5,434.93
200	10	369	38.58	0.46	24.15	99.86	7.73	2,341.36	532.4	507.74	4,318.99

General Performance Data 2

GEN W/F EKW	PERCENT LOAD	ENGINE POWER BHP	COMPRESS OUT PRESS IN-HG	COMPRESS OUT TEMP DEG F
2,000	100	2885	74.95	429.44
1,800	90	2601	68.35	398.84
1,600	80	2320	61.6	370.22
1,500	75	2181	57.33	353.66
1,400	70	2041	53.04	337.1
1,200	60	1763	44.63	304.52
1,000	50	1487	36.54	272.3
800	40	1215	28.84	240.26
600	30	938	21.53	207.32
500	25	798	18.03	190.58
400	20	657	14.66	173.66
200	10	369	8.85	143.42

Engine Heat Rejection Data

GEN W/F EKW	PERCENT LOAD	REJ TO JW BTU/MN	REJ TO ATMOS BTU/MN	REJ TO EXHAUST BTU/MN	EXH RCOV TO 350F BTU/MN	FROM OIL CLR BTU/MN	FROM AFT CLR BTU/MN	WORK ENERGY BTU/MN	LHV ENERGY BTU/MN	HHV ENERGY BTU/MN
2,000	100	41,685.6	7,734.3	106,972.2	55,789.4	14,558.7	31,562.8	122,327.1	291,287.5	310,282.1
1,800	90	38,557.8	7,108.7	94,802.1	47,258.9	13,023.2	27,468.2	110,327.6	261,203.4	278,207.5
1,600	80	35,429.9	6,710.6	84,167.4	40,775.7	11,658.3	23,373.5	98,384.9	232,882.2	248,066.4
1,500	75	33,837.6	6,540.0	79,219.7	37,704.7	10,975.9	21,383.1	92,470.4	219,176.5	233,507.7
1,400	70	32,302.1	6,369.4	74,442.7	34,804.4	10,236.6	19,392.6	86,556.0	205,641.5	219,062.8
1,200	60	29,174.2	6,028.2	65,172.9	29,799.8	8,871.7	15,582.3	74,783.9	179,026.4	190,741.6
1,000	50	25,989.5	5,743.9	56,187.4	25,193.4	7,620.6	11,999.5	63,068.7	152,923.1	162,875.3
800	40	22,691.1	5,459.5	47,486.4	20,928.1	6,369.4	8,758.0	51,524.1	127,616.0	135,975.9
600	30	19,222.0	5,118.3	38,785.3	16,492.3	5,118.3	5,971.3	39,808.9	102,252.0	108,962.7
500	25	17,402.2	5,004.5	34,406.3	14,274.3	4,492.7	4,777.1	33,837.6	89,570.1	95,427.7
400	20	15,525.5	4,833.9	30,027.3	11,999.5	3,867.1	3,639.7	27,866.2	76,831.2	81,892.6
200	10	11,601.5	4,492.7	21,155.6	6,483.2	2,616.0	1,876.7	15,639.2	51,410.4	54,765.7

EXHAUST Sound Data: 4.92 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,000	100	116	107	121	117	109	108	109	109	107
1,800	90	116	106	121	117	109	107	108	108	106
1,600	80	114	105	119	115	107	106	107	107	105
1,500	75	114	104	119	115	107	105	107	107	105
1,400	70	113	104	118	114	106	105	106	106	104
1,200	60	112	103	117	113	105	104	105	105	103
1,000	50	111	101	116	112	104	103	104	104	102
800	40	110	100	115	111	103	101	102	102	100
600	30	108	98	113	109	101	100	101	101	99
500	25	107	98	112	108	100	99	100	100	98
400	20	106	97	111	107	99	98	99	99	97
200	10	104	94	109	105	97	96	97	97	95

EXHAUST Sound Data: 22.97 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,000	100	103	95	111	105	97	95	96	96	93
1,800	90	102	94	110	104	96	94	95	95	92
1,600	80	101	93	109	103	95	93	94	94	91
1,500	75	101	92	109	103	94	93	93	93	90
1,400	70	100	91	108	102	94	92	93	93	90
1,200	60	99	90	107	101	92	91	92	91	89
1,000	50	98	89	106	100	91	90	90	90	87
800	40	96	88	104	98	90	88	89	89	86
600	30	95	86	103	97	88	87	87	87	85
500	25	94	85	102	96	88	86	87	86	84
400	20	93	84	101	95	87	85	86	86	83
200	10	91	82	99	93	84	83	83	83	81

EXHAUST Sound Data: 49.21 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,000	100	96	88	104	99	90	88	89	89	86
1,800	90	96	87	104	98	89	88	88	88	85
1,600	80	94	86	102	97	88	86	87	87	84
1,500	75	94	85	102	96	88	86	87	87	84
1,400	70	93	85	101	96	87	85	86	86	83
1,200	60	92	84	100	94	86	84	85	85	82
1,000	50	91	82	99	93	85	83	84	84	81
800	40	90	81	98	92	83	82	82	82	79
600	30	88	80	96	90	82	80	81	81	78
500	25	87	79	95	90	81	79	80	80	77
400	20	86	78	94	89	80	78	79	79	76
200	10	84	76	92	86	78	76	77	77	74

MECHANICAL Sound Data: 3.28 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,000	100	122	110	119	128	119	110	104	99	103
1,800	90	122	110	119	128	119	110	104	99	103
1,600	80	122	110	119	128	119	110	104	99	103
1,500	75	122	110	119	128	119	110	104	99	103
1,400	70	122	110	119	128	119	110	104	99	103
1,200	60	122	110	119	128	119	110	104	99	103
1,000	50	122	110	119	128	119	110	104	99	103
800	40	122	110	119	128	119	110	104	99	103
600	30	122	110	119	128	119	110	104	99	103
500	25	122	110	119	128	119	110	104	99	103
400	20	122	110	119	128	119	110	104	99	103
200	10	122	110	119	128	119	110	104	99	103

MECHANICAL Sound Data: 22.97 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCJ 8000HZ DB
2,000	100	108	96	105	114	105	96	91	88	92
1,800	90	108	96	105	114	105	96	91	88	92
1,600	80	108	96	105	114	105	96	91	88	92
1,500	75	108	96	105	114	105	96	91	88	92
1,400	70	108	96	105	114	105	96	91	88	92
1,200	60	108	96	105	114	105	96	91	88	92
1,000	50	108	96	105	114	105	96	91	88	92
800	40	108	96	105	114	105	96	91	88	92
600	30	108	96	105	114	105	96	91	88	92
500	25	108	96	105	114	105	96	91	88	92
400	20	108	96	105	114	105	96	91	88	92
200	10	108	96	105	114	105	96	91	88	92

MECHANICAL Sound Data: 49.21 FEET

GEN W/F EKW	PERCENT LOAD	OVERALL SOUND DB(A)	OBCF 63HZ DB	OBCF 125HZ DB	OBCF 250HZ DB	OBCF 500HZ DB	OBCF 1000HZ DB	OBCF 2000HZ DB	OBCF 4000HZ DB	OBCF 8000HZ DB
2,000	100	101	89	99	108	99	90	86	82	86
1,800	90	101	89	99	108	99	90	86	82	86
1,600	80	101	89	99	108	99	90	86	82	86
1,500	75	101	89	99	108	99	90	86	82	86
1,400	70	101	89	99	108	99	90	86	82	86
1,200	60	101	89	99	108	99	90	86	82	86
1,000	50	101	89	99	108	99	90	86	82	86
800	40	101	89	99	108	99	90	86	82	86
600	30	101	89	99	108	99	90	86	82	86
500	25	101	89	99	108	99	90	86	82	86
400	20	101	89	99	108	99	90	86	82	86
200	10	101	89	99	108	99	90	86	82	86

EMISSIONS DATA

Certification:

To properly apply this data you must refer to performance parameter DM1176 for additional information...

REFERENCE EXHAUST STACK DIAMETER	8 IN
WET EXHAUST MASS	27,491.6 LB/HR
WET EXHAUST FLOW (840.20 F STACK TEMP)	15,217.10 CFM
WET EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	5,790.00 STD CFM
DRY EXHAUST FLOW RATE (32 DEG F AND 29.98 IN HG)	5,304.27 STD CFM
FUEL FLOW RATE	135 GAL/HR

RATED SPEED "Potential site variation"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,000	100	2885	63.2100	4.4700	2.3700	.8200	10.5000	1.4000	1.2800
1,500	75	2181	46.5900	3.8500	1.1800	.6100	11.8000	1.1000	1.2800
1,000	50	1487	33.5500	3.2100	.8700	.4800	12.8000	1.2000	1.2800
500	25	798	17.4400	2.5600	.7900	.5500	14.3000	2.2000	1.2800
200	10	369	8.9600	4.9500	1.0200	.4800	16.3000	2.3000	1.2800

RATED SPEED "Nominal Data"

GEN PWR EKW	PERCENT LOAD	ENGINE POWER BHP	TOTAL NOX (AS NO2) LB/HR	TOTAL CO LB/HR	TOTAL HC LB/HR	TOTAL CO2 LB/HR	PART MATTER LB/HR	OXYGEN IN EXHAUST PERCENT	DRY SMOKE OPACITY PERCENT	BOSCH SMOKE NUMBER
2,000	100	2885	52.6700	2.4800	1.7900	3,021.1	.5900	10.5000	1.4000	1.2800
1,500	75	2181	38.8200	2.1400	.8900	2,268.1	.4400	11.8000	1.1000	1.2800
1,000	50	1487	27.9600	1.7800	.6600	1,572.3	.3400	12.8000	1.2000	1.2800
500	25	798	14.5400	1.4200	.5900	924.8	.3900	14.3000	2.2000	1.2800
200	10	369	7.4700	2.7500	.7700	533.7	.3500	16.3000	2.3000	1.2800

Altitude Capability Data(Corrected Power Altitude Capability)

Ambient Operating Temp.	50 F	68 F	86 F	104 F	122 F	NORMAL
Altitude						
0 FT	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp
984.25 FT	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp
1,640.42 FT	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp
3,280.84 FT	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,876.49 hp	2,808.1 hp	2,876.49 hp
4,921.26 FT	2,876.49 hp	2,876.49 hp	2,816.14 hp	2,726.29 hp	2,641.81 hp	2,876.49 hp
6,561.68 FT	2,834.92 hp	2,737.02 hp	2,647.17 hp	2,562.69 hp	2,483.57 hp	2,762.5 hp
8,202.1 FT	2,663.27 hp	2,572.08 hp	2,487.59 hp	2,407.13 hp	2,333.37 hp	2,624.38 hp
9,842.52 FT	2,499.66 hp	2,415.18 hp	2,334.72 hp	2,260.96 hp	2,189.89 hp	2,491.62 hp
10,498.69 FT	2,436.63 hp	2,353.49 hp	2,277.05 hp	2,203.3 hp	2,134.9 hp	2,440.66 hp

The powers listed above and all the Powers displayed are Corrected Powers

Identification Reference and Notes

Engine Arrangement:	1955874	Lube Oil Press @ Rated Spd(PSI):	55.8
Effective Serial No:	1HZ02922	Piston Speed @ Rated Eng SPD(FT/Min):	2,173.2
Primary Engine Test Spec:	0K2964	Max Operating Altitude(FT):	5,249.3
Performance Parm Ref:	TM5739	PEEC Elect Control Module Ref	
Performance Data Ref:	DM4692	PEEC Personality Cont Mod Ref	
Aux Coolant Pump Perf Ref:			
Cooling System Perf Ref:		Turbocharger Model	BTV8501-1.23
Certification Ref:		Fuel Injector	2563663
Certification Year:		Timing-Static (DEG):	--
Compression Ratio:	14.0	Timing-Static Advance (DEG):	--
Combustion System:	DI	Timing-Static (MM):	--
Aftercooler Temperature (F):	86	Unit Injector Timing (MM):	64.3
Crankcase Blowby Rate(CFH):	2,874.6	Torque Rise (percent)	--
Fuel Rate (Rated RPM) No Load(Gal/HR):	13.1	Peak Torque Speed RPM	--
Lube Oil Press @ Low Idle Spd(PSI):	20.0	Peak Torque (LB.FT):	--

Reference Number: DM4692 7/19/2005 RAN DATASET TO ADD HEAT REJECTION DATA

Parameters Reference: TM5739 **GEN SET - PACKAGED - DIESEL**

TOLERANCES:

AMBIENT AIR CONDITIONS AND FUEL USED WILL AFFECT THESE VALUES. EACH OF THE VALUES MAY VARY IN ACCORDANCE WITH THE FOLLOWING TOLERANCES.

Power	+/- 3%
Exhaust Stack Temperature	+/- 8%
Generator Power	+/- 5%
Inlet Airflow	+/- 5%
Intake Manifold Pressure-gage	+/- 10%
Exhaust Flow	+/- 6%
Specific Fuel Consumption	+/- 3%
Fuel Rate	+/- 5%
Heat Rejection	+/- 5%
Heat Rejection - Exhaust Only	+/- 10%

T4i Tolerance Exceptions

C15: Power Tolerance +4%, -0%
C27: Power Tolerance +0%, -4%

CONDITIONS:

ENGINE PERFORMANCE IS CORRECTED TO INLET AIR STANDARD CONDITIONS OF 99 KPA (29.31 IN HG) AND 25 DEG C (77 DEG F).

THESE VALUES CORRESPOND TO THE STANDARD ATMOSPHERIC PRESSURE AND TEMPERATURE IN ACCORDANCE WITH SAE J1349. ALSO INCLUDED IS A CORRECTION TO STANDARD FUEL GRAVITY OF 35 DEGREES API HAVING A LOWER HEATING VALUE OF 42,780 KJ/KG (18,390 BTU/LB) WHEN USED AT 29 DEG C (84.2 DEG F) WHERE THE DENSITY IS 838.9 G/L (7.002 LB/GAL).

THE CORRECTED PERFORMANCE VALUES SHOWN FOR CATERPILLAR ENGINES WILL APPROXIMATE THE VALUES OBTAINED WHEN THE OBSERVED PERFORMANCE DATA IS CORRECTED TO SAE J1349, ISO 3046-2 & 8665 & 2288 & 9249 & 1585, EEC 80/1269 AND DIN70020 STANDARD REFERENCE CONDITIONS.

ENGINES ARE EQUIPPED WITH STANDARD ACCESSORIES; LUBE OIL, FUEL PUMP AND JACKET WATER PUMP. THE POWER REQUIRED TO DRIVE AUXILIARIES MUST BE DEDUCTED FROM THE GROSS OUTPUT TO ARRIVE AT THE NET POWER AVAILABLE FOR THE EXTERNAL (FLYWHEEL) LOAD. TYPICAL AUXILIARIES INCLUDE COOLING FANS, AIR COMPRESSORS, AND CHARGING ALTERNATORS.

RATINGS MUST BE REDUCED TO COMPENSATE FOR ALTITUDE AND/OR AMBIENT TEMPERATURE CONDITIONS ACCORDING TO THE APPLICABLE DATA SHOWN ON THE PERFORMANCE DATA SET.

ALTITUDE:

ALTITUDE CAPABILITY - THE RECOMMENDED REDUCED POWER VALUES FOR SUSTAINED ENGINE OPERATION AT SPECIFIC ALTITUDE LEVELS AND AMBIENT TEMPERATURES.

COLUMN "N" DATA - THE FLYWHEEL POWER OUTPUT AT NORMAL AMBIENT TEMPERATURE.

AMBIENT TEMPERATURE - TO BE MEASURED AT THE AIR CLEANER AIR INLET DURING NORMAL ENGINE OPERATION.

NORMAL TEMPERATURE - THE NORMAL TEMPERATURE AT VARIOUS SPECIFIC ALTITUDE LEVELS IS FOUND ON TM2001.

THE GENERATOR POWER CURVE TABULAR DATA REPRESENTS THE NET ELECTRICAL POWER OUTPUT OF THE GENERATOR.

GENERATOR SET RATINGS*EMERGENCY STANDBY POWER (ESP)*

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE ESP RATING. TYPICAL OPERATION IS 50 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 200 HOURS PER YEAR.

STANDBY POWER RATING

OUTPUT AVAILABLE WITH VARYING LOAD FOR THE DURATION OF AN EMERGENCY OUTAGE. AVERAGE POWER OUTPUT IS 70% OF THE STANDBY POWER RATING. TYPICAL OPERATION IS 200 HOURS PER YEAR, WITH MAXIMUM EXPECTED USAGE OF 500 HOURS PER YEAR.

PRIME POWER RATING

OUTPUT AVAILABLE WITH VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70% OF THE PRIME POWER RATING. TYPICAL PEAK DEMAND IS 100% OF PRIME RATED EKW WITH 10% OVERLOAD CAPABILITY FOR EMERGENCY USE FOR A MAXIMUM OF 1 HOUR IN 12. OVERLOAD OPERATION CANNOT EXCEED 25 HOURS PER YEAR.

CONTINUOUS POWER RATING

OUTPUT AVAILABLE WITH NON-VARYING LOAD FOR AN UNLIMITED TIME. AVERAGE POWER OUTPUT IS 70-100% OF THE CONTINUOUS POWER RATING. TYPICAL PEAK DEMAND IS 100% OF CONTINUOUS RATED EKW FOR 100% OF OPERATING HOURS.

SOUND DEFINITIONS:

Sound Power : [DM8702](#)

Sound Pressure : [TM7080](#)

Date Released : 03/14/12

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Natural Gas Readings and Actual Boiler Emissions

Year	Month	Natural Gas Usage (MCF)	Rolling 12-Month Natural Gas Usage (MCF)	Rolling 12-Month Natural Gas Usage (CF)	NOX Emission Factor (lb/scf)	Rolling 12-Month NOX Emissions (tons)	SO2 Emission Factor (lb/scf)	Rolling 12-Month SO2 Emissions (tons)	CO Emission Factor (lb/scf)	Rolling 12-Month CO Emissions (tons)
2014	Jan	28,408	-	-	0.0001	-	0.000006	-	0.000084	-
	Feb	21,654	-	-	0.0001	-	0.000006	-	0.000084	-
	Mar	21,868	-	-	0.0001	-	0.000006	-	0.000084	-
	Apr	19,734	-	-	0.0001	-	0.000006	-	0.000084	-
	May	14,651	-	-	0.0001	-	0.000006	-	0.000084	-
	Jun	12,266	-	-	0.0001	-	0.000006	-	0.000084	-
	Jul	13,309	-	-	0.0001	-	0.000006	-	0.000084	-
	Aug	10,488	-	-	0.0001	-	0.000006	-	0.000084	-
	Sep	13,144	-	-	0.0001	-	0.000006	-	0.000084	-
	Oct	15,053	-	-	0.0001	-	0.000006	-	0.000084	-
	Nov	17,443	-	-	0.0001	-	0.000006	-	0.000084	-
	Dec	21,396	-	-	0.0001	-	0.000006	-	0.000084	-
2015	Jan	24,255	205,261	205,261,000	0.0001	10.26	0.000006	0.616	0.000084	8.62
	Feb	23,781	207,388	207,388,000	0.0001	10.37	0.000006	0.622	0.000084	8.71
	Mar	21,629	207,149	207,149,000	0.0001	10.36	0.000006	0.621	0.000084	8.70
	Apr	17,492	204,907	204,907,000	0.0001	10.25	0.000006	0.615	0.000084	8.61
	May	12,921	203,177	203,177,000	0.0001	10.16	0.000006	0.610	0.000084	8.53
	Jun	13,062	203,973	203,973,000	0.0001	10.20	0.000006	0.612	0.000084	8.57
	Jul	11,572	202,236	202,236,000	0.0001	10.11	0.000006	0.607	0.000084	8.49
	Aug	10,836	202,584	202,584,000	0.0001	10.13	0.000006	0.608	0.000084	8.51
	Sep	12,191	201,631	201,631,000	0.0001	10.08	0.000006	0.605	0.000084	8.47
	Oct	14,368	200,946	200,946,000	0.0001	10.05	0.000006	0.603	0.000084	8.44
	Nov	14,807	198,310	198,310,000	0.0001	9.92	0.000006	0.595	0.000084	8.33
	Dec	20,833	197,747	197,747,000	0.0001	9.89	0.000006	0.593	0.000084	8.31
2016	Jan	22,205	195,697	195,697,000	0.0001	9.78	0.000006	0.587	0.000084	8.22
	Feb	20,265	192,181	192,181,000	0.0001	9.61	0.000006	0.577	0.000084	8.07
	Mar	20,452	191,004	191,004,000	0.0001	9.55	0.000006	0.573	0.000084	8.02
	Apr	17,378	190,890	190,890,000	0.0001	9.54	0.000006	0.573	0.000084	8.02
	May	14,401	192,370	192,370,000	0.0001	9.62	0.000006	0.577	0.000084	8.08
	Jun	13,614	192,922	192,922,000	0.0001	9.65	0.000006	0.579	0.000084	8.10
	Jul	10,690	192,040	192,040,000	0.0001	9.60	0.000006	0.576	0.000084	8.07
	Aug	12,118	193,322	193,322,000	0.0001	9.67	0.000006	0.580	0.000084	8.12
	Sep	11,206	192,337	192,337,000	0.0001	9.62	0.000006	0.577	0.000084	8.08
	Oct				0.0001		0.000006		0.000084	
	Nov				0.0001		0.000006		0.000084	
	Dec				0.0001		0.000006		0.000084	

Tank Volume Readings - 30,000 gallon tank for Boilers and 2 500kW Generators

Date	Tank Volume Reading	Difference in Volume from Previous Month
1/5/2015	27665	-
1/30/2015	27585	-80
3/3/2015	27900	315
4/3/2015	27881	-19
5/4/2015	27619	-262
6/2/2015	27664	45
7/15/2015	27723	59
8/6/2015	27759	36
9/14/2015	27746	-13
10/1/2015	27745	-1
11/6/2015	27680	-65
12/1/2015	27376	-304
1/7/2016	27284	-92
2/1/2016	27211	-73
3/4/2016	27066	-145
4/30/2016	27063	-3
5/2/2016	27065	2
6/3/2016	27086	21
7/15/2016	25053	-2033
8/5/2016	25089	36
9/12/2016	25084	-5
10/6/2016	25060	-24
11/1/2016	24897	-163

**Potential to Emit Calculations
Beaumont Hospital - Dearborn**

Table 1. Boilers operating with Natural Gas (Normal Operation, 8760 hours/year)

Emission Unit	Maximum Rated Heat Input (BTU/hr)	Natural Gas Heating Value (BTU/scf)	Maximum Natural Gas Usage (scf/year)	SO2 Emission Factor (lb/scf)	SO2 Potential to Emit (tons/year)
Boiler 1	33,476,000	1020	287,499,764.7	0.0000006	0.086
Boiler 2	33,476,000	1020	287,499,764.7	0.0000006	0.086
Boiler 3	32,659,000	1020	280,483,176.5	0.0000006	0.084
Total					0.257

Table 1 Notes:

- 1) SO2 Emission Factor for boilers from AP-42; EF = 0.6 lbs/1,000,000 scf
- 2) Conservatively assumes continuous operation at 100% capacity

Table 2. Generators operating with Diesel (Emergency or Back-up Operation for 500 hours/year)

Emission Unit	Operating Hours (hrs/year)	Maximum Diesel Fuel Usage (gal/hr)	SO2 Emission Factor (lb/gal)	SO2 Potential to Emit (tons/year)
Generator 2MEG1	500	135.73	0.000203	0.0069
Generator 2MEG2	500	135.73	0.000203	0.0069
Cummins 500kW	500	-	-	-
Cummins 500kW	500	-	-	-
Total				0.0137

Table 2 Notes:

- 1) SO2 Emission Factors calculated based on 15 ppm sulfur
 $(15 \text{ lb sulfur}/1,000,000 \text{ lb diesel}) \times (6.76 \text{ lb/gal}) \times (64.064 \text{ lb SO}_2/32.066 \text{ lb sulfur}) = 0.0002026 \text{ lb SO}_2/\text{gal diesel}$
- 2) This assumes emergency operations occur for a maximum of 500 hours/year
- 3) Conservatively assumes operation at 100% capacity

Table 3. Total Facility Potential to Emit

Emission Unit	SO2 Potential to Emit (tons/year)
Boilers	0.257
Generators	0.0137
Total	0.270

Table 3 Notes:

- 1) Assumes emergency generators operate a maximum of 500 hours/year
- 2) Conservatively assumes boilers and generators operate at 100% capacity