BK

ND Dept. of Health Emission Inventory Summary Year: **2014**

Company:	**Great River Energy**	AIRS/AFS Source Code:	38-093-00041
PTO Number:	PTC07026	Annual Permit Fee Billing:	**YES**
Unit or Station	Spiritwood Station	Reviewed By:	KDH

Individual Emission Sources

EU	Source Unit	PM10	$PM_{2.5}$	CPM	SO2	NOX	CO	VOC
1	Unit 1 Boiler	7.0	2.9	13.4	41.1	63.0	103.7	4.9
13	Package Boiler B					0.1	0.3	
14	Package Boiler C						0.1	
2	Coal Unloading Bag House	0.3	0.1					
3	Coal Silo Bag House	0.1						
4	Coal Silo Discharge Bag House							
5	Coal Bunker Bag House							
6	Limestone Unloading Bag House							
7	Lime Silo Bag House							
8	Bed Material Silo Bag House							
9	Recycle Ash Silo Bag House	0.1						
10	Waste Ash Silo Bag House							
11	Waste Ash Loadout Bag House							
15	Fire Water Pump Engine					0.2		
17	Propane Vaporizer							
Total Facility Emissions (Tons/yr) - Less HAPs		7.5	3.0	13.4	41.1	63.3	104.1	4.9

Hazardous Air Pollutants (Tons)				
Pollutant/Chemical Name	Unit 1			Total
Hydrogen Chloride	2.7			2.7
Hydrogen Floride	0.3			0.3
Sulfuric Acid (Aerosol)	50.1			50.1
Manganese compounds	0.5			0.5
Cyanide	0.1			0.1
Plant Totals	53.7	0	0	53.7

Fuel Combusted & Process/Production Qty	
Coal (Tons)	91,017
Natural Gas (mmbtu)	40,671
LPG/Propane (Gal)	2,503
Low Sulfur Diesel (Gal)	490
Distillate Oil (Gal)	
Residual Oil (Gal)	
Gross Generation (MWe)	91,610

Special Pollutants		NH3	Hg
Emission Process		(tons)	(lbs)
Unit 1		1.6	8.0

Action	Date	Initial
Scanned		
Checked		
Data Base		

MANUFACTURING OR PROCESSING EQUIPMENT
ANNUAL EMISSION INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8537 (11-10)

SK

GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4718
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Actual Hours of Operation 252.8	
Source Unit Description Coal Unloading Bag House (360 tph)		Emission Unit Number 2	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Lignite Coal	91,017 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	4.11 lb/hr	Vendor Guarantee	0.5
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.3
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.1
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

* Submit SFN 19839 for Hazardous Air Pollutants if applicable.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report Steve Richter	Title Manager, Fuels & Services	Email srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

MANUFACTURING OR PROCESSING EQUIPMENT
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NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8537 (11-10)

8K

GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Actual Hours of Operation	
Spiritwood Station	Spiritwood, ND 58481	606.8	
Source Unit Description		Emission Unit Number	
Coal Silo (150 tph), Bag House		3	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Lignite Coal	91,017 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.36 lb/hr	Vendor Guarantee	0.1
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.1
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	606.8	
Source Unit Description		**Emission Unit Number**	
Coal Silo Discharge (150 tph), Bag House		4	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Lignite Coal	91,017 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.09 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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SFN 8537 (11-10)

81C

GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	587.2	
Source Unit Description		**Emission Unit Number**	
Coal Bunker (155 tph), Bag House		5	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Lignite Coal	91,017 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate - Total	0.21 lb/hr	Vendor Guarantee	0.1
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	261.6	
Source Unit Description		**Emission Unit Number**	
Limestone Unloading/Limestone Silo (30 tph), Bag House		6	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Limestone	7,847 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate - Total	0.15 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4718
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Actual Hours of Operation 32.8	
Source Unit Description Lime Unloading/Lime Silo (30 tph), Bag House		Emission Unit Number 7	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Lime	492.0 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate - Total	0.17 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	45.1	
Source Unit Description		**Emission Unit Number**	
Bed Material Silo (13 tph), Bag House		8	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Bed Material	293.3 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate - Total	0.12 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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DIVISION OF AIR QUALITY
SFN 8537 (11-10)

SIC

GENERAL

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	2,892	
Source Unit Description		**Emission Unit Number**	
Recycle Ash Silo (53 tph), Bag House		9	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Recycle Ash	153,276 hrs

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.06 lb/hr	Vendor Guarantee	0.1
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.1
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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Great River Energy	PTC 07026	2014	
Mailing Address	**City**	**State**	**Zip Code**
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	**Facility Location**	**Actual Hours of Operation**	
Spiritwood Station	Spiritwood, ND 58481	1,611	
Source Unit Description		**Emission Unit Number**	
Waste Ash Silo (13 tph), Bag House		10	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Waste Ash	10,470 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate - Total	0.14 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

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12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Actual Hours of Operation	
Spiritwood Station	Spiritwood, ND 58481	149.6	
Source Unit Description		Emission Unit Number	
Waste Ash Loadout (70 tph), Bag House		11	

RAW MATERIAL INFORMATION

Raw Materials Introduced into Process	Quantity (Specify Units)
Waste Ash	10,470 tons

FUELS USED

		Primary Fuel	Auxiliary Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		N/A	N/A
Percent Sulfur	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum	N/A	N/A
	Minimum	N/A	N/A
	Average	N/A	N/A

STACK EMISSIONS

Air Contaminant *	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.03 lb/hr	Vendor Guarantee	0.0
PM_{10} (Particulate < 10 microns)	0.67 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	EPA AP-42 Lignite Combustion Table 1.7-7	0.0
Sulfur Dioxide	N/A	N/A	
Nitrogen Oxides	N/A	N/A	
Carbon Monoxide	N/A	N/A	
Total Organic Compounds: Nonmethane	N/A	N/A	

* Submit SFN 19839 for Hazardous Air Pollutants if applicable.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Services	srichter@GREnergy.com
Signature: Steve Richter	Telephone Number	Date
	701-745-5297	03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188
SFN 8537 (11-10)

COMPRESSOR/INDUSTRIAL ENGINES
ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 11829 (11-10)

BK

GENERAL

Name of Film or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	PTC 07026	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Emission Unit Number	
Spiritwood Station	Spiritwood, ND 58481	15 – Fire Water Pump Engine	

EQUIPMENT INFORMATION

☐ Stationary Gas Turbine ☐ Reciprocating Engine ☐ 2-Stroke Lean Burn ☐ Dual Fuel Engine ☐ Spark Ignition

☒ Stationary Large Bore Diesel ☐ 4-Stroke Lean Burn ☐ 4-Stroke Rich Burn ☐ Other, Specify_____ ☒ Compression Ignition

Manufacturer of Unit	Model Number	Actual Hours of Operation
Clarke – John Deere	JW6H-UF48	36.3
Maximum Rating	Design Capacity	
13.5 gal/hr	290 BHP at 1760 RPM	

FUELS USED

Natural Gas (if applicable)	Thousand Cu. Ft. N/A	Btu/Cu. Ft. N/A	Percent H_2S N/A
Diesel (if applicable) Low sulfur diesel	Gallons **490.1**	Btu/Gal **139,000**	Percent Sulfur – Average **0.05%**
LP Gas (if applicable)	Gallons N/A	Btu/Gal N/A	
Other (Specify)	Specify N/A	Btu/Unit N/A	

COMPRESSOR STATION FLARE STACK EMISSIONS

Quantity Flared Thousand Cu. Ft./Yr	Average H_2S Content	SO_2 Emissions Tons/Yr

TOTAL STACK EMISSIONS (USE THIS TABLE FOR SINGLE FUEL USAGE. USE OTHER SIDE IF MULTIPLE FUELS ARE USED AND SUMMARIZE THE TOTAL TONS ON THIS TABLE.)

Air Contaminant	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	2.20×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
PM_{10} (Particulate < 10 microns)	2.20×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	2.20×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
Sulfur Dioxide	2.05×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
Nitrogen Oxides	3.1×10^{-2} lb/Hp-hr	AP-42 Table 3.3-1	0.2
Carbon Monoxide	6.68×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
Total Organic Compounds: Nonmethane	2.47×10^{-3} lb/Hp-hr	AP-42 Table 3.3-1	0.0
Hazardous Air Pollutants	You must also submit SFN 19839 for Hazardous Air Pollutants (include formaldehyde and total hazardous air pollutant emissions.)		

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Services	srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

HAZARDOUS AIR POLLUTANT ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 19839 (11-11)

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	T5-F82006	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Emission Unit Number	
Spiritwood Station	Spiritwood, ND 58481	15 – Fire Water Pump	
Amount of Material Processed (material used, etc.)			
490.1 gals of No. 2 Fuel Oil @ 139,000 BTU/gal @ 0.05% Sulfur			
Hours of Operation:	Air Pollution Control Equipment:		
36.3	N/A		

HAZARDOUS AIR POLLUTANT EMISSIONS:

CHEMICAL EMITTED TO AIR	CAS NUMBER	EMISSIONS QUANTITY	
		Emission Factor (include units)	TONS
Benzene	71-43-2	6.531E-06 lb/Hp-hr	0.00
Toluene	108-88-3	2.863E-06 lb/Hp-hr	0.00
Xylenes	1330-20-7	1.995E-06 lb/Hp-hr	0.00
Propylene	115071	1.806-05 lb/Hp-hr	0.00
Formaldehyde	50000	2.737E-07 lb/Hp-hr	0.00
Acetaldehyde	75070	8.260E-07 lb/Hp-hr	0.00
Acrolein	107028	5.369E-07 lb/Hp-hr	0.00

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Materials	srichter@GREnergy.com
Signature Steve Richter	Telephone Number	Date
	701-745-5297	03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188
SFN 19839 (11-11) Page 2

Basis for quantities listed above; provide calculations (use additional sheets if necessary):

See Attached Worksheets for Calculations.

FUEL BURNING EQUIPMENT USED FOR INDIRECT HEATING
ANNUAL EMISSION INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8536 (11-10)

BK

GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4178
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Emission Unit Number 1 – (Unit 1)	

EQUIPMENT INFORMATION

Manufacturer of Unit Babcock & Wilcox	Model Number 193T	Maximum Heat Input (Btu/hr) $1,280 \times 10^6$
Boiler Type: ☐ Pulverized Tangential ☐ Cyclone ☐ Spreader Stoker ☐ Pulverized Wall Fired ☒ Fluidized Bed ☐ Other	Electricity Generated (MWe)* ~~121,610~~ 91,610	Actual Hours of Operation 2,892

*Electric utility only.

FUELS USED		Primary Fuel	Standby Fuel	Other Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		Lignite	Natural Gas	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		91,017 tons	32,063 mmBTU	N/A
Percent Ash (Coal Only)	Maximum Minimum Average	12.95 12.24 12.67	N/A	N/A
Percent Sulfur	Maximum Minimum Average	0.70 0.68 0.69	0.2 gr/cu.ft. N/A N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum Minimum Average	7,400 7,188 7,358	1000 Btu/cu.ft.(see Note A) 1000 Btu/cu.ft. 1000 Btu/cu.ft.	N/A
Percent Sodium in Coal Ash Average		1.77	N/A	N/A

TOTAL STACK EMISSIONS

(USE THE TABLE ABOVE FOR SINGLE FUEL USAGE; USE OTHER SIDE IF MULTIPLE FUELS ARE USED AND THEN SUMMARIZE THE TOTAL EMISSIONS PER YEAR ON THE FOLLOWING TABLE.)

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			10.4
PM_{10} (Particulate < 10 microns)			7.0
$PM_{2.5}$ (Particulate < 2.5 microns)			2.9
Sulfur Dioxide			41.1
Nitrogen Oxides			63.0
Carbon Monoxide			103.7
Total Organic Compounds: Nonmethane			4.9
Mercury***			0.00
Ammonia***			1.6

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report Steve Richter	Title Manager, Fuels & Services	Email srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
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918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

$$CPM = \frac{0.02\ lb}{mm\ btu} \times \frac{7358\ btu}{lb} \times \frac{91{,}017\ tons}{yr} = 13.4$$

STACK EMISSIONS --- PRIMARY FUEL --- FUEL TYPE: **Lignite**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.225 lb/ton Coal	Vendor Guarantee	10.2
PM_{10} (Particulate < 10 microns)	0.67 (Total)	AP-42 Table 1.7-7	6.9
$PM_{2.5}$ (Particulate < 2.5 microns)	0.27 (Total)	AP-42 Table 1.7-7	2.8
Sulfur Dioxide (Note B)	11.3 lb/ton coal @ 92% removal	AP-42 Table 1.7-1	41.1
Nitrogen Oxides (Note B)	3.6 lb/ton Coal @ 62% removal	AP-42 Table 1.7-1	61.4
Carbon Monoxide	2.25 lb/ton Coal	Vendor Guarantee	102.4
Total Organic Compounds: Nonmethane	0.105 lb/ton Coal	Vendor Guarantee	4.8
Mercury***	8.3×10^{-5} lb/ton Coal	AP-42 Table 1.7-14	0.00
Ammonia***	3.7 lb/trillion Btu (coal fuel input) plus Ammonia Slip Calculation	Dept. of Energy Study	1.6

STACK EMISSIONS --- STANDBY FUEL --- FUEL TYPE: **Natural Gas**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	7.5×10^{-3} lb/mmBtu	AP-42 Table 1.4-2	0.1
PM_{10} (Particulate < 10 microns)	7.5×10^{-3} lb/mmBtu	AP-42 Table 1.4-2	0.1
$PM_{2.5}$ (Particulate < 2.5 microns)	7.5×10^{-3} lb/mmBtu	AP-42 Table 1.4-2	0.1
Sulfur Dioxide (Note B)	5.9×10^{-4} lb/mmBtu	AP-42 Table 1.4-1&1.4-2	0.0
Nitrogen Oxides (Note B)	9.8×10^{-2} lb/mmBtu	AP-42 Table 1.4-1&1.4-2	1.6
Carbon Monoxide	8.2×10^{-2} lb/mmBtu	AP-42 Table 1.4-1&1.4-2	1.3
Total Organic Compounds: Nonmethane	8.6×10^{-3} lb/mmBtu	AP-42 Table 1.4-1&1.4-2	0.1
Mercury***	2.5×10^{-7} lb/mmBtu	AP-42 Table 1.4-4	0.00
Ammonia***	N/A	N/A	N/A

STACK EMISSIONS --- OTHER FUEL --- FUEL TYPE: **N/A**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			
PM_{10} (Particulate < 10 microns)			
$PM_{2.5}$ (Particulate < 2.5 microns)			
Sulfur Dioxide			
Nitrogen Oxides			
Carbon Monoxide			
Total Organic Compounds: Nonmethane			
Mercury***			
Ammonia***			

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only.

Provide calculations for quantities listed above. Use additional sheets if necessary.

Note A: Natural gas heating values are typical and not actual values.
Note B: 2014 Reported values are calculated from AP-42 factors, and will not match the reported values in the Electronic Data Report which included "Max Potential Values" until 1200 hours on October 6, 2014.

SEE APPENDIX A FOR EMISSIONS CALCULATIONS.

HAZARDOUS AIR POLLUTANT ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 19839 (11-11)

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	T5-F82006	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Emission Unit Number	
Spiritwood Station	Spiritwood, ND 58481	1 – Unit 1 Boiler	
Amount of Material Processed (material used, etc.)			
91,017 Tons of Pulverized Lignite; 32,063 mmBTU of Natural Gas			
Hours of Operation:	Air Pollution Control Equipment:		
2,892	Bag House, Dry Lime Spray Absorber, Ammonia Injection		

HAZARDOUS AIR POLLUTANT EMISSIONS:

CHEMICAL EMITTED TO AIR	CAS NUMBER	EMISSIONS QUANTITY	
		Emission Factor (include units)	TONS
Ammonia	7664417	3.7 lb/trillion Btu (coal fuel input) plus Ammonia Slip Calculation	1.6
Cyanide	57125	2.5E-03 lb/ton of Coal	0.1
Hydrogen Chloride	7647010	1.2 lb/ton Coal, Control EF 95%	2.7
Hydrogen Fluoride	7664393	0.15 lb/ton Coal, Control EF 95%	0.3
Sulfuric Acid (aerosol)	7664939	13.75 lb/ton Coal, Control EF 92%	50.1
Manganese compounds	7439965	4.9E-04 lb/ton of Coal	0.5
Mercury	7439976	8.3E-05 lb/ton of Coal	0.004

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Materials	srichter@GREnergy.com
Signature: Steve Richter	Telephone Number: 701-745-5297	Date: 03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

Basis for quantities listed above; provide calculations (use additional sheets if necessary):

See Attached Worksheets for Calculations.

FUEL BURNING EQUIPMENT USED FOR INDIRECT HEATING
ANNUAL EMISSION INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8536 (11-10)

BK

GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4178
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Emission Unit Number 13 – (Package Boiler B)	

EQUIPMENT INFORMATION

Manufacturer of Unit Rentech	Model Number Type "O"	Maximum Heat Input (Btu/hr) 281×10^6
Boiler Type: ☐ Pulverized Tangential ☐ Cyclone ☐ Spreader Stoker ☐ Pulverized Wall Fired ☐ Fluidized Bed ☒ Other	Electricity Generated (MWe)* N/A	Actual Hours of Operation 75.2

*Electric utility only.

FUELS USED		Primary Fuel	Standby Fuel	Other Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		Natural Gas	Propane	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		7,269 mmBtu	694 Gals	N/A
Percent Ash (Coal Only)	Maximum Minimum Average	N/A	N/A	N/A
Percent Sulfur	Maximum Minimum Average	0.02 gr/cu.ft. N/A N/A	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum Minimum Average	1000 Btu/cu.ft.(see Note A) 1000 Btu/cu.ft. 1000 Btu/cu.ft.	N/A	N/A
Percent Sodium in Coal Ash Average		N/A	N/A	N/A

TOTAL STACK EMISSIONS

(USE THE TABLE ABOVE FOR SINGLE FUEL USAGE; USE OTHER SIDE IF MULTIPLE FUELS ARE USED AND THEN SUMMARIZE THE TOTAL EMISSIONS PER YEAR ON THE FOLLOWING TABLE.)

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			0.0
PM_{10} (Particulate < 10 microns)			0.0
$PM_{2.5}$ (Particulate < 2.5 microns)			0.0
Sulfur Dioxide			0.0
Nitrogen Oxides			0.1
Carbon Monoxide			0.3
Total Organic Compounds: Nonmethane			0.0
Mercury***			0.00
Ammonia***			N/A

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report Steve Richter	Title Manager, Fuels & Services	Email srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

STACK EMISSIONS --- PRIMARY FUEL --- FUEL TYPE: **Natural Gas**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
PM_{10} (Particulate < 10 microns)	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
Sulfur Dioxide	6.0×10^{-3} lb/mmBtu	PTC Application	0.0
Nitrogen Oxides	3.5×10^{-2} lb/mmBtu	PTC Application	0.1
Carbon Monoxide	8.0×10^{-2} lb/mmBtu	PTC Application	0.3
Total Organic Compounds: Nonmethane	5.0×10^{-3} lb/mmBtu	PTC Application	0.0
Mercury***	2.5×10^{-7} lb/mmBtu	AP-42 Table 1.4-4	0.00
Ammonia***	N/A	N/A	N/A

STACK EMISSIONS --- STANDBY FUEL --- FUEL TYPE: **Propane**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
PM_{10} (Particulate < 10 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
Sulfur Dioxide	0.10S lb/1000 gals	AP-42 Table 1.5-1	0.0
Nitrogen Oxides	13 lb/1000 gals	AP-42 Table 1.5-1	0.0
Carbon Monoxide	7.5lbs/100 gals	AP-42 Table 1.5-1	0.0
Total Organic Compounds: Nonmethane	1.0 lb/1000 gals	AP-42 Table 1.5-1	0.0
Mercury***	N/A	N/A	N/A
Ammonia***	N/A	N/A	N/A

STACK EMISSIONS --- OTHER FUEL --- FUEL TYPE: **N/A**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			
PM_{10} (Particulate < 10 microns)			
$PM_{2.5}$ (Particulate < 2.5 microns)			
Sulfur Dioxide			
Nitrogen Oxides			
Carbon Monoxide			
Total Organic Compounds: Nonmethane			
Mercury***			
Ammonia***			

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only

Provide calculations for quantities listed above. Use additional sheets if necessary.

Note A: Natural gas heating values are typical and not actual values.

SEE APPENDIX A FOR EMISSIONS CALCULATIONS.

HAZARDOUS AIR POLLUTANT ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 19839 (11-11)

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	T5-F82006	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Emission Unit Number	
Spiritwood Station	Spiritwood, ND 58481	13 – Package Boiler B	
Amount of Material Processed (material used, etc.)			
7,269 mmBTU of Natural Gas, 63.5 mmBTU of Propane			
Hours of Operation:	Air Pollution Control Equipment:		
75.2	N/A		

HAZARDOUS AIR POLLUTANT EMISSIONS:

CHEMICAL EMITTED TO AIR	CAS NUMBER	EMISSIONS QUANTITY	
		Emission Factor (include units)	TONS
Arsenic	7440382	2.0E-07 lb/million Btu (fuel input)	0.00
Beryllium	7440417	1.2E-08 lb/million Btu (fuel input)	0.00
Cadmium	7440439	1.1E-06 lb/million Btu (fuel input)	0.00
Chromium	7440473	1.4E-06 lb/million Btu (fuel input)	0.00
Lead	7439921	4.9E-07 lb/million Btu (fuel input)	0.00
Manganese	7439965	3.7E-07 lb/million Btu (fuel input)	0.00
Mercury	7439976	2.5E-07 lb/million Btu (fuel input)	0.00
Nickel	7440020	2.1E-06 lb/million Btu (fuel input)	0.00
Selenium	7782492	2.4E-08 lb/million Btu (fuel input)	0.00

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Materials	srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
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Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

Basis for quantities listed above; provide calculations (use additional sheets if necessary):

See Attached Worksheets for Calculations.

FUEL BURNING EQUIPMENT USED FOR INDIRECT HEATING
ANNUAL EMISSION INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8536 (11-10)

BK

GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4178
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Emission Unit Number 14 – (Package Boiler C)	

EQUIPMENT INFORMATION

Manufacturer of Unit Rentech	Model Number Type "O"	Maximum Heat Input (Btu/hr) 281×10^6
Boiler Type: ☐Pulverized Tangential ☐ Cyclone ☐Spreader Stoker ☐ Pulverized Wall Fired ☐ Fluidized Bed ☒ Other	Electricity Generated (MWe)* N/A	Actual Hours of Operation 22.2

*Electric utility only.

FUELS USED		Primary Fuel	Standby Fuel	Other Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		Natural Gas	Propane	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		1,339 mmBtu	793 Gals	N/A
Percent Ash (Coal Only)	Maximum Minimum Average	N/A	N/A	N/A
Percent Sulfur	Maximum Minimum Average	0.02 gr/cu.ft. N/A N/A	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum Minimum Average	1000 Btu/cu.ft.(see Note A) 1000 Btu/cu.ft. 1000 Btu/cu.ft.	N/A	N/A
Percent Sodium in Coal Ash Average		N/A	N/A	N/A

TOTAL STACK EMISSIONS

(USE THE TABLE ABOVE FOR SINGLE FUEL USAGE; USE OTHER SIDE IF MULTIPLE FUELS ARE USED AND THEN SUMMARIZE THE TOTAL EMISSIONS PER YEAR ON THE FOLLOWING TABLE.)

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			0.0
PM_{10} (Particulate < 10 microns)			0.0
$PM_{2.5}$ (Particulate < 2.5 microns)			0.0
Sulfur Dioxide			0.0
Nitrogen Oxides			0.0
Carbon Monoxide			0.1
Total Organic Compounds: Nonmethane			0.0
Mercury***			0.00
Ammonia***			N/A

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report Steve Richter	Title Manager, Fuels & Services	Email srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
North Dakota Department of Health
Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

STACK EMISSIONS --- PRIMARY FUEL --- FUEL TYPE: **Natural Gas**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
PM_{10} (Particulate < 10 microns)	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	7.0×10^{-3} lb/mmBtu	PTC Application	0.0
Sulfur Dioxide	6.0×10^{-3} lb/mmBtu	PTC Application	0.0
Nitrogen Oxides	3.5×10^{-2} lb/mmBtu	PTC Application	0.0
Carbon Monoxide	8.0×10^{-2} lb/mmBtu	PTC Application	0.1
Total Organic Compounds: Nonmethane	5.0×10^{-3} lb/mmBtu	PTC Application	0.0
Mercury***	2.5×10^{-7} lb/mmBtu	AP-42 Table 1.5-1	0.00
Ammonia***	N/A	N/A	N/A

STACK EMISSIONS --- STANDBY FUEL --- FUEL TYPE: **Propane**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
PM_{10} (Particulate < 10 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
Sulfur Dioxide	0.10S lb/1000 gals	AP-42 Table 1.5-1	0.0
Nitrogen Oxides	13 lb/1000 gals	AP-42 Table 1.5-1	0.0
Carbon Monoxide	7.5lbs/100 gals	AP-42 Table 1.5-1	0.0
Total Organic Compounds: Nonmethane	1.0 lb/1000 gals	AP-42 Table 1.5-1	0.0
Mercury***	N/A	N/A	N/A
Ammonia***	N/A	N/A	N/A

STACK EMISSIONS --- OTHER FUEL --- FUEL TYPE: **N/A**

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total			
PM_{10} (Particulate < 10 microns)			
$PM_{2.5}$ (Particulate < 2.5 microns)			
Sulfur Dioxide			
Nitrogen Oxides			
Carbon Monoxide			
Total Organic Compounds: Nonmethane			
Mercury***			
Ammonia***			

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only

Provide calculations for quantities listed above. Use additional sheets if necessary.

Note A: Natural gas heating values are typical and not actual values.

SEE APPENDIX A FOR EMISSIONS CALCULATIONS.

HAZARDOUS AIR POLLUTANT ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 19839 (11-11)

Name of Firm or Organization Great River Energy	Permit to Operate Number T5-F82006	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4718
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Emission Unit Number 14 – Package Boiler C	
Amount of Material Processed (material used, etc.) 1,389 mmBTU of Natural Gas, 72.5 mmBTU of Propane			
Hours of Operation: 22.2	Air Pollution Control Equipment: N/A		

HAZARDOUS AIR POLLUTANT EMISSIONS:

CHEMICAL EMITTED TO AIR	CAS NUMBER	EMISSIONS QUANTITY	
		Emission Factor (include units)	TONS
Arsenic	7440382	2.0E-07 lb/million Btu (fuel input)	0.00
Beryllium	7440417	1.2E-08 lb/million Btu (fuel input)	0.00
Cadmium	7440439	1.1E-06 lb/million Btu (fuel input)	0.00
Chromium	7440473	1.4E-06 lb/million Btu (fuel input)	0.00
Lead	7439921	4.9E-07 lb/million Btu (fuel input)	0.00
Manganese	7439965	3.7E-07 lb/million Btu (fuel input)	0.00
Mercury	7439976	2.5E-07 lb/million Btu (fuel input)	0.00
Nickel	7440020	2.1E-06 lb/million Btu (fuel input)	0.00
Selenium	7782492	2.4E-08 lb/million Btu (fuel input)	0.00

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report Steve Richter	Title Manager, Fuels & Materials	Email srichter@GREnergy.com
Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

Return completed form to:
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Division of Air Quality
918 E Divide, 2nd Floor
Bismarck, ND 58501-1947
Telephone: (701)328-5188

Basis for quantities listed above; provide calculations (use additional sheets if necessary):

See Attached Worksheets for Calculations.

FUEL BURNING EQUIPMENT USED FOR INDIRECT HEATING
ANNUAL EMISSION INVENTORY REPORT
NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 8536 (11-10)

GENERAL

Name of Firm or Organization Great River Energy	Permit to Operate Number PTC 07026	Year of Emissions 2014	
Mailing Address 12300 Elm Creek Blvd	City Maple Grove	State MN	Zip Code 55369-4178
Facility Name Spiritwood Station	Facility Location Spiritwood, ND 58481	Emission Unit Number 17 – (Propane Vaporizer)	

EQUIPMENT INFORMATION

Manufacturer of Unit Algas-SDI	Model Number Q10000H	Maximum Heat Input (Btu/hr) 14×10^6
Boiler Type: ☐Pulverized Tangential ☐ Cyclone ☐Spreader Stoker ☐ Pulverized Wall Fired ☐ Fluidized Bed ☒ Other	Electricity Generated (MWe)* N/A	Actual Hours of Operation 7.0

*Electric utility only.

FUELS USED		Primary Fuel	Standby Fuel	Other Fuel
Type (ex. lignite, natural gas, LPG No. 2 fuel oil, No. 6 fuel oil. etc.)		Propane	N/A	N/A
Quantity of Fuel per Year (Specify Units: ex. ton, gal, cu.ft., etc.)		93 mmBtu	N/A	N/A
Percent Ash (Coal Only)	Maximum Minimum Average	N/A	N/A	N/A
Percent Sulfur	Maximum Minimum Average	0.02 gr/cu.ft. N/A N/A	N/A	N/A
Btu per Unit (Specify lb, ton, gal, etc.)	Maximum Minimum Average	1000 Btu/cu.ft.(see Note A) 1000 Btu/cu.ft. 1000 Btu/cu.ft.	N/A	N/A
Percent Sodium in Coal Ash Average		N/A	N/A	N/A

TOTAL STACK EMISSIONS (USE THE TABLE ABOVE FOR SINGLE FUEL USAGE; USE OTHER SIDE IF MULTIPLE FUELS ARE USED AND THEN SUMMARIZE THE TOTAL EMISSIONS PER YEAR ON THE FOLLOWING TABLE.)

Air Contaminant **	Emission Factor (Include Units)	Emission Factor Source (Include Test Date if Applicable)	Tons
Particulate – Total	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
PM_{10} (Particulate < 10 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
$PM_{2.5}$ (Particulate < 2.5 microns)	0.7 lb/1000 gals	AP-42 Table 1.5-1	0.0
Sulfur Dioxide	0.10S lb/1000 gals	AP-42 Table 1.5-1	0.0
Nitrogen Oxides	13 lb/1000 gals	AP-42 Table 1.5-1	0.0
Carbon Monoxide	7.5lbs/100 gals	AP-42 Table 1.5-1	0.0
Total Organic Compounds: Nonmethane	1.0 lb/1000 gals	AP-42 Table 1.5-1	0.0
Mercury***	N/A	N/A	N/A
Ammonia***	N/A	N/A	N/A

**Submit SFN 19839 for Hazardous Air Pollutants if applicable.
***Title V units only.

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

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Signature Steve Richter	Telephone Number 701-745-5297	Date 03/13/2015

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HAZARDOUS AIR POLLUTANT ANNUAL EMISSIONS INVENTORY REPORT

NORTH DAKOTA DEPARTMENT OF HEALTH
DIVISION OF AIR QUALITY
SFN 19839 (11-11)

Name of Firm or Organization	Permit to Operate Number	Year of Emissions	
Great River Energy	T5-F82006	2014	
Mailing Address	City	State	Zip Code
12300 Elm Creek Blvd	Maple Grove	MN	55369-4718
Facility Name	Facility Location	Emission Unit Number	
Spiritwood Station	Spiritwood, ND 58481	17 – Propane Vaporizer	
Amount of Material Processed (material used, etc.)			
93.0 mmBTU of Propane			
Hours of Operation:	Air Pollution Control Equipment:		
7	N/A		

HAZARDOUS AIR POLLUTANT EMISSIONS:

CHEMICAL EMITTED TO AIR	CAS NUMBER	EMISSIONS QUANTITY	
		Emission Factor (include units)	TONS
Arsenic	7440382	2.0E-07 lb/million Btu (fuel input)	0.00
Beryllium	7440417	1.2E-08 lb/million Btu (fuel input)	0.00
Cadmium	7440439	1.1E-06 lb/million Btu (fuel input)	0.00
Chromium	7440473	1.4E-06 lb/million Btu (fuel input)	0.00
Lead	7439921	4.9E-07 lb/million Btu (fuel input)	0.00
Manganese	7439965	3.7E-07 lb/million Btu (fuel input)	0.00
Mercury	7439976	2.5E-07 lb/million Btu (fuel input)	0.00
Nickel	7440020	2.1E-06 lb/million Btu (fuel input)	0.00
Selenium	7782492	2.4E-08 lb/million Btu (fuel input)	0.00

I declare under the penalties of perjury that this report has been examined by me and to the best of my knowledge is a true, correct and complete report.

Print Name of Person Submitting Report	Title	Email
Steve Richter	Manager, Fuels & Materials	srichter@GREnergy.com
Signature: Steve Richter	Telephone Number: 701-745-5297	Date: 03/13/2015

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SFN 19839 (11-11) Page 2

Basis for quantities listed above; provide calculations (use additional sheets if necessary):

See Attached Worksheets for Calculations.

Criteria Pollutant Emissions for Spiritwood Station

EUID Description

1 Main Boiler

	Coal		NG		Total	
Hours of Operation	2,892	hours				
Throughput	91017	tons	32,063	mmBtu		
PM_{total}	10.2	tons	0.1	tons	10.4	tons
PM_{10}	6.9	tons	0.1	tons	7.0	tons
$PM_{2.5}$	2.8	tons	0.1	tons	2.9	tons
SO_2	41.1	tons	0.0	tons	41.1	tons
NOx	61.4	tons	1.6	tons	63.0	tons
CO	102.4	tons	1.3	tons	103.7	tons
TOC(NM)	4.8	tons	0.1	tons	4.9	tons
Mercury	0.0038	tons	0.000	tons	0.00	tons
Ammonia	1.60	tons	0.000	tons	1.60	tons

13 Package Boiler B

					Total	
Hours of Operation	68.2	hours	7.0	hours		
Throughput	7,269	mmBtu	694	Gals, Propane		
PM_{total}	0.0	tons	0.0	tons	0.0	tons
PM_{10}	0.0	tons	0.0	tons	0.0	tons
$PM_{2.5}$	0.0	tons	0.0	tons	0.0	tons
SO_2	0.0	tons	0.0	tons	0.0	tons
NOx	0.1	tons	0.0	tons	0.1	tons
CO	0.3	tons	0.0	tons	0.3	tons
Total VOC	0.0	tons	0.0	tons	0.0	tons
Mercury	0.00	tons	0.0	tons	0.00	tons
Ammonia	0.00	tons	0.0	tons	0.00	tons

14 Package Boiler C

					Total	
Hours of Operation	14.2	hours	8.0	hours		
Throughput	1,339	mmBtu NG	793	Gals, Propane		
PM_{total}	0.0	tons	0.0	tons	0.0	tons
PM_{10}	0.0	tons	0.0	tons	0.0	tons
$PM_{2.5}$	0.0	tons	0.0	tons	0.0	tons
SO_2	0.0	tons	0.0	tons	0.0	tons
NOx	0.0	tons	0.0	tons	0.0	tons
CO	0.1	tons	0.0	tons	0.1	tons
Total VOC	0.0	tons	0.0	tons	0.0	tons
Mercury	0.00	tons	0.0	tons	0.00	tons
Ammonia	0.00	tons	0.0	tons	0.00	tons

15 Diesel Fire Pump

Hours of Operation	36.3	hours
Distillate Throughput	490.1	gals
PM_{total}	0.0	tons
PM_{10}	0.0	tons
$PM_{2.5}$	0.0	tons
SO_2	0.0	tons
NOx	0.2	tons
CO	0.0	tons
TOC(NM)	0.0	tons
Mercury	0.0	tons
Ammonia	0.0	tons

17 Propane Vaporizer

Hours of Operation	7	hours
Propane	1,016	gals
PM_{total}	0.0	tons
PM_{10}	0.0	tons
$PM_{2.5}$	0.0	tons
SO_2	0.0	tons
NOx	0.0	tons
CO	0.0	tons
Total VOC	0.0	tons

2 Coal Unloading Bag House	Hours of Operation	253	hours	
	Coal Throughput	91,017	tons	
	PM_{total}	0.5	tons	
	$PM_{10 = PMtotal * 0.67}$	0.3	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5 = PMtotal * 0.27}$	0.1	tons	From AP-42 Table 1.7-7 Cummulative Mass %
3 Coal Silo Bin Vent	Hours of Operation	606.8	hours	
	Coal Throughput	91,017	tons	
	PM_{total}	0.1	tons	
	PM_{10}	0.1	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
4 Coal Silo Discharge Baghouse	Hours of Operation	606.8		
	Coal Throughput	91,017	tons	
	PM_{total}	0.0	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
5 Coal Bunker Baghouse	Hours of Operation	587.2	hours	
	Coal Throughput	91,017	tons	
	PM_{total}	0.1	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
6 Limestone Silo Bin Vent	Hours of Operation	261.6		
	Lime Throughput	7,847	tons	
	PM_{total}	0.02	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
7 Lime Unloading Silo Bin Vent	Hours of Operation	32.8	hours	
	Lime Throughput	492.0	tons	
	PM_{total}	0.00	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
8 Bed Material Silo	Hours of Operation	45.1	hours	
	Bed Material Throughput	293.3	tons	
	PM_{total}	0.00	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
9 Recycle Ash Silo	Hours of Operation	2,892	hours	
		153,276	tons	
	PM_{total}	0.09	tons	
	PM_{10}	0.1	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
10 Waste Ash Silo	Hours of Operation	1611	hours	
	Ash Throughput	10470	tons	
	PM_{total}	0	tons	
	PM_{10}	0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
11 Waste Ash Loadout	Hours of Operation	149.6	hours	
	Ash Throughput	10,470	tons	
	PM_{total}	0.00	tons	
	PM_{10}	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %
	$PM_{2.5}$	0.0	tons	From AP-42 Table 1.7-7 Cummulative Mass %

Main Boiler

			Coal Emissions		Nat Gas Emissions		Total Emissions		Rounded to tenths
	Coal only	Acetaldehyde	0.026	Tons			2.59E-02	Tons	0.00
	Coal only	Acetophenone	0.001	Tons			6.83E-04	Tons	0.00
	Coal only	Acrolein	0.013	Tons			1.32E-02	Tons	0.00
	Coal only	**Ammonia**	**0.002**	**Tons**	**1.60E+00**	**Tons**	**1.60E+00**	**Tons**	**1.60**
		Benzene	0.059	Tons	3.30E-05	Tons	5.92E-02	Tons	0.10
		Benzo(a)anthracene	0.000	Tons	2.83E-08	Tons	3.67E-06	Tons	0.00
		Benzo(a)pyrene	0.000	Tons	1.89E-08	Tons	1.75E-06	Tons	0.00
		Benzo(b,j,k)fluoranthene	0.000	Tons	2.83E-08	Tons	5.03E-06	Tons	0.00
	Coal only	Benzyl chloride	0.032	Tons			3.19E-02	Tons	0.00
	Coal only	Biphenyl	0.000	Tons			7.74E-05	Tons	0.00
	Coal only	Bis(2-ethylhexyl)phthalate (DEHP)	0.003	Tons			3.32E-03	Tons	0.00
	Coal only	Bromoform	0.002	Tons			1.77E-03	Tons	0.00
	Coal only	2-Chloroacetophenone	0.000	Tons			3.19E-04	Tons	0.00
	Coal only	Carbon disulfide	0.006	Tons			5.92E-03	Tons	0.00
	Coal only	Chlorobenzene	0.001	Tons			1.00E-03	Tons	0.00
	Coal only	Chloroform	0.003	Tons			2.69E-03	Tons	0.00
		Chrysene	0.000	Tons	2.83E-08	Tons	4.58E-06	Tons	0.00
	Coal only	Cumene	0.000	Tons			2.41E-04	Tons	0.00
	Coal only	**Cyanide compounds**	**0.114**	**Tons**			**1.14E-01**	**Tons**	**0.10**
	Coal only	2,4-Dinitrotoluene	0.000	Tons			1.27E-05	Tons	0.00
		Dibenzo(a,h)anthracene	0.011	Tons	1.89E-08	Tons	1.09E-02	Tons	0.00
	NG only	Dichlorobenzene		Tons	1.89E-05	Tons	1.89E-05	Tons	0.00
	Coal only	Dimethyl sulfate	0.002	Tons			2.18E-03	Tons	0.00
	Coal only	Ethyl benzene	0.004	Tons			4.28E-03	Tons	0.00
	Coal only	Ethyl chloride	0.002	Tons			1.91E-03	Tons	0.00
	Coal only	Ethylene dichloride	0.002	Tons			1.82E-03	Tons	0.00
	Coal only	Ethylene dibromide	0.000	Tons			5.46E-05	Tons	0.00
		.Formaldehyde	0.011	Tons	1.18E-03	Tons	1.21E-02	Tons	0.00
		Hexane	0.003	Tons	2.83E-02	Tons	3.13E-02	Tons	0.00
		Indeno(1,2,3-cd)pyrene	0.000	Tons	2.83E-08	Tons	2.80E-06	Tons	0.00
	Coal only	Isophorone	0.026	Tons			2.64E-02	Tons	0.00
	Coal only	5-Methyl chrysene	0.000	Tons			1.00E-06	Tons	0.00
	Coal only	Methyl bromide	0.007	Tons			7.28E-03	Tons	0.00
	Coal only	Methyl chloride	0.024	Tons			2.41E-02	Tons	0.00
	Coal only	Methyl ethyl ketone	0.018	Tons			1.77E-02	Tons	0.00
	Coal only	Methyl hydrazine	0.008	Tons			7.74E-03	Tons	0.00
	Coal only	Methyl methacrylate	0.001	Tons			9.10E-04	Tons	0.00
	Coal only	Methyl tert butyl ether	0.002	Tons			1.59E-03	Tons	0.00
	Coal only	Methylene chloride	0.013	Tons			1.32E-02	Tons	0.00
		Naphthalene	0.001	Tons	9.59E-06	Tons	6.01E-04	Tons	0.00
	NG only	PAH Total		Tons	1.39E-06	Tons	1.39E-06	Tons	0.00
	Coal only	Phenol	0.001	Tons			7.28E-04	Tons	0.00
	NG only	Polycyclic organic matter (POM)		Tons	1.39E-06	Tons	1.39E-06	Tons	0.00
	Coal only	Propionaldehyde	0.017	Tons			1.73E-02	Tons	0.00
	Coal only	Tetrachloroethylene	0.002	Tons			1.96E-03	Tons	0.00
		Toluene	0.011	Tons	5.34E-05	Tons	1.10E-02	Tons	0.00
	Coal only	1,1,1-Trichloroethane	0.001	Tons			9.10E-04	Tons	0.00
	Coal only	Styrene	0.001	Tons			1.14E-03	Tons	0.00
	Coal only	Xylenes	0.002	Tons			1.68E-03	Tons	0.00
	Coal only	Vinyl acetate	0.000	Tons			3.46E-04	Tons	0.00
Metals	Coal only	Antimony	0.001	Tons			8.19E-04	Tons	0.00
		Arsenic (7440-38-2)	0.019	Tons	3.14E-06	Tons	1.87E-02	Tons	0.00
		Beryllium (744-43-0-9)	0.001	Tons	1.89E-07	Tons	9.56E-04	Tons	0.00
		Cadmium (7440-43-9)	0.002	Tons	1.73E-05	Tons	2.34E-03	Tons	0.00
		Chromium	0.012	Tons	2.20E-05	Tons	1.19E-02	Tons	0.00
	Coal only	.Chromium (VI)	0.004	Tons			3.60E-03	Tons	0.00
		Cobalt	0.005	Tons	1.32E-06	Tons	4.55E-03	Tons	0.00
		Lead	1.911	Tons	7.86E-06	Tons	1.91E+00	Tons	1.90
	Coal only	**Magnesium**	**0.501**	**Tons**			**5.01E-01**	**Tons**	**0.50**
		Manganese (74439-96-5)	0.022	Tons	5.97E-06	Tons	2.23E-02	Tons	0.00
		Mercury (7439-97-6)	**0.004**	**Tons**	**4.09E-06**	**Tons**	**3.78E-03**	**Tons**	**0.004**
		Nickel (7440-02-0)	0.013	Tons	3.30E-05	Tons	1.28E-02	Tons	0.00
		Selenium (7782-49-2)	0.059	Tons	3.77E-07	Tons	5.92E-02	Tons	0.10
Acid gases		**Hydrochloric acid**	**2.731**	**Tons**			**2.73E+00**	**Tons**	**2.70**
		Hydrogen flouride (hydrofluoric acid	**0.341**	**Tons**			**3.41E-01**	**Tons**	**0.30**
		H2SO4(mist)	**50.059**	**Tons**			**5.01E+01**	**Tons**	**50.10**

Package Boiler B (EU13)

	NG		Propane		
Benzene	7.48E-06	Tons	6.53E-08	Tons	0.00
Dichlorobenzene	4.28E-06	Tons	3.73E-08	Tons	0.00
.Formaldehyde	2.67E-04	Tons	2.33E-06	Tons	0.00
Hexane	6.41E-03	Tons	5.60E-05	Tons	0.00
.Naphthalene	2.17E-06	Tons	1.90E-08	Tons	0.00
.Toluene	1.21E-05	Tons	1.06E-07	Tons	0.00
Benzo(a)anthracene	6.41E-09	Tons	5.60E-11	Tons	0.00
Benzo(a)pyrene	4.28E-09	Tons	3.73E-11	Tons	0.00
Benzo(b)fluoranthene	6.41E-09	Tons	5.60E-11	Tons	0.00
Benzo(k)fluoranthene	6.41E-09	Tons	5.60E-11	Tons	0.00
Chrysene	6.41E-09	Tons	5.60E-11	Tons	0.00
Dibenzo(a,h)anthracene	4.28E-09	Tons	3.73E-11	Tons	0.00
Indeno(1,2,3-cd)pyrene	6.41E-09	Tons	5.60E-11	Tons	0.00
PAH Total	3.14E-07	Tons	2.74E-09	Tons	0.00
Polycyclic organic matter (POM)	3.14E-07	Tons	2.74E-09	Tons	0.00
.Arsenic (7440-38-2)	7.13E-07	Tons	6.22E-09	Tons	0.00
.Beryllium (744-43-0-9)	4.28E-08	Tons	3.73E-10	Tons	0.00
.Cadmium (7440-43-9)	3.92E-06	Tons	3.42E-08	Tons	0.00
.Chromium	4.99E-06	Tons	4.36E-08	Tons	0.00
Cobalt	2.99E-07	Tons	2.61E-09	Tons	0.00
.Manganese (74439-96-5)	1.35E-06	Tons	1.18E-08	Tons	0.00
.Mercury (7439-97-6)	9.26E-07	Tons	8.09E-09	Tons	0.00
.Nickel (7440-02-0)	7.48E-06	Tons	6.53E-08	Tons	0.00
Selenium (7782-49-2)	8.55E-08	Tons	7.47E-10	Tons	0.00

Package Boiler C (EU14)

	NG		Propane		
Benzene	1.378E-06	Tons	7.467E-08	Tons	0.00
Dichlorobenzene	7.875E-07	Tons	4.267E-08	Tons	0.00
.Formaldehyde	4.922E-05	Tons	2.667E-06	Tons	0.00
Hexane	1.181E-03	Tons	6.400E-05	Tons	0.00
.Naphthalene	4.003E-07	Tons	2.169E-08	Tons	0.00
.Toluene	2.231E-06	Tons	1.209E-07	Tons	0.00
Benzo(a)anthracene	1.181E-09	Tons	6.400E-11	Tons	0.00
Benzo(a)pyrene	7.875E-10	Tons	4.267E-11	Tons	0.00
Benzo(b)fluoranthene	1.181E-09	Tons	6.400E-11	Tons	0.00
Benzo(k)fluoranthene	1.181E-09	Tons	6.400E-11	Tons	0.00
Chrysene	1.181E-09	Tons	6.400E-11	Tons	0.00
Dibenzo(a,h)anthracene	7.875E-10	Tons	4.267E-11	Tons	0.00
Indeno(1,2,3-cd)pyrene	1.181E-09	Tons	6.400E-11	Tons	0.00
PAH Total	5.788E-08	Tons	3.136E-09	Tons	0.00
Polycyclic organic matter (POM)	5.788E-08	Tons	3.136E-09	Tons	0.00
.Arsenic (7440-38-2)	1.313E-07	Tons	7.111E-09	Tons	0.00
.Beryllium (744-43-0-9)	7.875E-09	Tons	4.267E-10	Tons	0.00
.Cadmium (7440-43-9)	7.219E-07	Tons	3.911E-08	Tons	0.00
.Chromium	9.188E-07	Tons	4.978E-08	Tons	0.00
Cobalt	5.513E-08	Tons	2.987E-09	Tons	0.00
.Manganese (74439-96-5)	2.494E-07	Tons	1.351E-08	Tons	0.00
.Mercury (7439-97-6)	1.706E-07	Tons	9.244E-09	Tons	0.00
.Nickel (7440-02-0)	1.378E-06	Tons	7.467E-08	Tons	0.00
Selenium (7782-49-2)	1.575E-08	Tons	8.533E-10	Tons	0.00

Diesel Fire Pump (EU15)

Benzene	3.44E-05	Tons	0.00
Toluene	1.51E-05	Tons	0.00
Xylenes	1.05E-05	Tons	0.00
1,3-Butadiene	1.44E-06	Tons	0.00
Formaldehyde	4.35E-05	Tons	0.00
Acetaldehyde	2.83E-06	Tons	0.00
Acrolein	3.41E-05	Tons	0.00
Naphthalene	3.12E-06	Tons	0.00
Benzo(a)anthracene	6.19E-08	Tons	0.00
Chrysene	1.30E-08	Tons	0.00
Benzo(b)fluoranthene	3.65E-09	Tons	0.00
Benzo(k)fluoranthene	5.71E-09	Tons	0.00
Benzo(a)pyrene	6.93E-09	Tons	0.00
Indeno(1,2,3-cd)pyrene	1.38E-08	Tons	0.00
Dibenzo(a,h)anthracene	2.15E-08	Tons	0.00
PAH Total	6.19E-06	Tons	0.00
Polycyclic organic matter (POM)	6.19E-06	Tons	0.00

Ammonia Slip - Basic Calculation

Flow Rate:	8698092	scfh	Molar gas volume at STP:	359	ft^3/lbmol
Ammonia concentration:	5	ppmv	STP:	68	F
Ammonia injection duration:	2000	hours		29.92	in Hg
Molecular weight NH3:	17.03	lb/lbmol	Molar gas volume at stack T:	463	ft^3/lbmol
Average Stack Temp:	193.5	F			
Barometric pressure:	28.54	in Hg			
Stack Pressure:	28.69	in Hg			

Equation for ammonia:

$$NH_3 \frac{lb}{hr} = NH_3 (ppm_v) \times 10^{-6} (lb_{exhaust}) \times Flow\ (dscfh) \times \frac{1}{molar_gas_vol \left({}^{scf}/_{lbmol} \right)} \times MW_{NH3} \left(\frac{lb}{lbmol} \right)$$

NH4 lb/hr	1.598	lbs/hr
At 2000 hrs:	3196.31	lbs
	1.60	tons

GRE Spiritwood Station
Emission Factors for
Annual Emissions Inventory

Assumptions
From permit application
Red numbers were utilized in PTC application calcs.

HHV
15 mmBtu/ton Coal

EU	EU Description	Pollutant	Emission Factor uncontrolled	EF Units	Control Efficiency	AP-42 Table	Note	Vendor Guarantee	Calc. from Vendor Guar.
1	Main Boiler Coal Combustion	PM_{total}	0.07A	lb/ton Coal		1.7-5	EF for ESP	0.015 lb/mmBtu	0.225 lb/ton coal
		PM_{10}	67	% of total PM		1.7-7		0.03 lb/mmBtu	0.151 lb/ton coal
		$PM_{2.5}$	27	% of total PM		1.7-7			
		SO_2	11.3	lb/ton Coal	92	1.7-1	EF is uncontrolled	0.06 lb/mmBtu	0.9 lb/ton coal
		NOx	3.6	lb/ton Coal	62.5	1.7-1	EF is uncontrolled	0.09 lb/mmBtu	1.35 lb/ton coal
		CO	0.15	lb/ton Coal		1.7-1		0.15 lb/mmBtu	2.25 lb/ton coal
		TOC(NM)	0.03	lb/ton Coal		1.7-1		0.007 lb/mmBtu	0.105 lb/ton coal
		Ammonia	3.7	lb/trillion BTU	Plus Ammonia Slip Calculation		Only T5 units		
		CO_2	96.36	kg/mmBtu			Use GHG rule calcs. BAMM-Tier 2		
		CH4	1.10E-02	kg/mmBtu			Use GHG rule calcs. BAMM-Tier 2		
		N2O	1.60E-03	kg/mmBtu			Use GHG rule calcs. BAMM-Tier 2		
		HCl	1.2	lb/ton Coal	95	1.7-15			1.2 lb/ton coal
		HF	0.15	lb/ton Coal	95	1.7-15			0.15 lb/ton coal
		H2SO4(mist)	13.75	lb/ton Coal	92	PTC App		0.006 lb/mmBtu	0.09 lb/ton coal
		Lead	4.2E-02	lb/ton Coal		1.7-14			
		Biphenyl	1.7E-06	lb/ton Coal		1.7-10			
		Benzo(a)anthracene	8.0E-08	lb/ton Coal		1.7-10			
		Benzo(a)pyrene	3.8E-08	lb/ton Coal		1.7-10			
		Benzo(b,j,k)fluoranthene	1.1E-07	lb/ton Coal		1.7-10			
		Chrysene	1.0E-07	lb/ton Coal		1.7-10			
		Indeno(1,2,3-cd)pyrene	6.1E-08	lb/ton Coal		1.7-10			
		5-Methyl chrysene	2.2E-08	lb/ton Coal		1.7-10			
		Naphthalene	1.3E-05	lb/ton Coal		1.7-10			
		Acetaldehyde	5.7E-04	lb/ton Coal		1.7-11			
		Acetophenone	1.5E-05	lb/ton Coal		1.7-11			
		Acrolein	2.9E-04	lb/ton Coal		1.7-11			
		Benzene	1.3E-03	lb/ton Coal		1.7-11			
		Benzyl chloride	7.0E-04	lb/ton Coal		1.7-11			
		Bis(2-ethylhexyl)phthalate (DEHP)	7.3E-05	lb/ton Coal		1.7-11			
		Bromoform	3.9E-05	lb/ton Coal		1.7-11			
		Carbon disulfide	1.3E-04	lb/ton Coal		1.7-11			
		2-Chloroacetophenone	7.0E-06	lb/ton Coal		1.7-11			
		Chlorobenzene	2.2E-05	lb/ton Coal		1.7-11			
		Chloroform	5.9E-05	lb/ton Coal		1.7-11			
		Cumene	5.3E-06	lb/ton Coal		1.7-11			
		Cyanide compounds	2.5E-03	lb/ton Coal		1.7-11			
		2,4-Dinitrotoluene	2.8E-07	lb/ton Coal		1.7-11			
		Dimethyl sulfate	4.8E-05	lb/ton Coal		1.7-11			
		Ethyl benzene	9.4E-05	lb/ton Coal		1.7-11			
		Ethyl chloride	4.2E-05	lb/ton Coal		1.7-11			
		Ethylene dichloride	4.0E-05	lb/ton Coal		1.7-11			
		Ethylene dibromide	1.2E-06	lb/ton Coal		1.7-11			
		.Formaldehyde	2.4E-04	lb/ton Coal		1.7-11			
		Hexane	6.7E-05	lb/ton Coal		1.7-11			
		Isophorone	5.8E-04	lb/ton Coal		1.7-11			
		Methyl bromide	1.6E-04	lb/ton Coal		1.7-11			
		Methyl chloride	5.3E-04	lb/ton Coal		1.7-11			
		Methyl ethyl ketone	3.9E-04	lb/ton Coal		1.7-11			
		Methyl hydrazine	1.7E-04	lb/ton Coal		1.7-11			
		Methyl methacrylate	2.0E-05	lb/ton Coal		1.7-11			
		Methyl tert butyl ether	3.5E-05	lb/ton Coal		1.7-11			
		Methylene chloride	2.9E-04	lb/ton Coal		1.7-11			
		Phenol	1.6E-05	lb/ton Coal		1.7-11			
		Propionaldehyde	3.8E-04	lb/ton Coal		1.7-11			
		Tetrachloroethylene	4.3E-05	lb/ton Coal		1.7-11			
		Toluene	2.4E-04	lb/ton Coal		1.7-11			
		1,1,1-Trichloroethane	2.0E-05	lb/ton Coal		1.7-11			
		Styrene	2.5E-05	lb/ton Coal		1.7-11			
		Xylenes	3.7E-05	lb/ton Coal		1.7-11			
		Vinyl acetate	7.6E-06	lb/ton Coal		1.7-11			
		Antimony	1.8E-05	lb/ton Coal		1.7-14			
		Arsenic (7440-38-2)	4.1E-04	lb/ton Coal		1.7-14			
		Beryllium (744-43-0-9)	2.1E-05	lb/ton Coal		1.7-14			
		Cadmium (7440-43-9)	5.1E-05	lb/ton Coal		1.7-14			
		Chromium	2.6E-04	lb/ton Coal		1.7-14			
		.Chromium (VI)	7.9E-05	lb/ton Coal		1.7-14			
		Cobalt	1.0E-04	lb/ton Coal		1.7-14			
		Magnesium	1.1E-02	lb/ton Coal		1.7-14			
		Manganese (74439-96-5)	4.9E-04	lb/ton Coal		1.7-14			
		Mercury (7439-97-6)	8.3E-05	lb/ton Coal		1.7-14	Only T5 units		
		Nickel (7440-02-0)	2.8E-04	lb/ton Coal		1.7-14			
		Selenium (7782-49-2)	1.3E-03	lb/ton Coal		1.7-14			
		Hydrochloric acid	6.0E-02	lb/ton Coal		1.7-15	Controlled EF at 95% control		
		Hydrogen flouride (hydrofluoric acid)	7.5E-03	lb/ton Coal		1.7-15	Controlled EF at 95% control		
		H2SO4(mist)	1.1E+00	lb/ton Coal		PTC App			

GRE Spiritwood Station
Emission Factors for
Annual Emissions Inventory

1	Main Boiler		NG Conversion Factor	1000 MMBtu/10^6 scf		
	NG Combustion	Lead	4.9E-07	lb/mmBtu	1.4-4	
		Total PM.	7.6E-03	lb/mmBtu	1.4-2	footnote to table all PM numbers less than 1 mirometer in diameter.
		PM10	7.6E-03	lb/mmBtu	1.4-2	Use same value for PMtotal
		PM2.5	7.6E-03	lb/mmBtu	1.4-2	Use same value for PMtotal
		Sulfur Dioxide	5.9E-04	lb/mmBtu	1.4-1 &1.4-2	
		Total VOC	5.4E-03	lb/mmBtu	1.4-1 &1.4-2	
		TOC-Methane (TOC(NM))	8.7E-03	lb/mmBtu	1.4-2	Subtract methane from TOC EF
		Nitrogen Oxides	9.8E-02	lb/mmBtu	1.4-1 &1.4-2	
		Carbon Monoxide	8.2E-02	lb/mmBtu	1.4-1 &1.4-2	
		Carbon Dioxide (CO2)	53.02	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		CH4	1.0E-03	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		N2O	1.0E-04	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		.Benzene	2.1E-06	lb/mmBtu	1.4-3	
		Dichlorobenzene	1.2E-06	lb/mmBtu	1.4-3	
		Formaldehyde	7.4E-05	lb/mmBtu	1.4-3	
		Hexane	1.8E-03	lb/mmBtu	1.4-3	
		.Naphthalene	6.0E-07	lb/mmBtu	1.4-3	
		.Toluene	3.3E-06	lb/mmBtu	1.4-3	
		Benzo(a)anthracene	1.8E-09	lb/mmBtu	1.4-3	
		Benzo(a)pyrene	1.2E-09	lb/mmBtu	1.4-3	
		Benzo(b)fluoranthene	1.8E-09	lb/mmBtu	1.4-3	
		Benzo(k)fluoranthene	1.8E-09	lb/mmBtu	1.4-3	
		Chrysene	1.8E-09	lb/mmBtu	1.4-3	
		Dibenzo(a,h)anthracene	1.2E-09	lb/mmBtu	1.4-3	
		Indeno(1,2,3-cd)pyrene	1.8E-09	lb/mmBtu	1.4-3	
		PAH Total	8.6E-08	lb/mmBtu	1.4-3	
		Polycyclic organic matter (POM)	8.6E-08	lb/mmBtu	1.4-3	
		.Arsenic (7440-38-2)	2.0E-07	lb/mmBtu	1.4-4	
		.Beryllium (744-43-0-9)	1.2E-08	lb/mmBtu	1.4-4	
		.Cadmium (7440-43-9)	1.1E-06	lb/mmBtu	1.4-4	
		.Chromium	1.4E-06	lb/mmBtu	1.4-4	
		Cobalt	8.2E-08	lb/mmBtu	1.4-4	
		.Manganese (74439-96-5)	3.7E-07	lb/mmBtu	1.4-4	
		.Mercury (7439-97-6)	2.5E-07	lb/mmBtu	1.4-4	
		.Nickel (7440-02-0)	2.1E-06	lb/mmBtu	1.4-4	
		Selenium (7782-49-2)	2.4E-08	lb/mmBtu	1.4-4	
12&13	Package Boiler					
	NG Combustion	lead	4.9E-07	lb/mmBtu	1.4-1&2	
		PM10	7.0E-03	lb/mmBtu		Use same value for PMtotal
		Total PM.	7.0E-03	lb/mmBtu		BACT Limit/Vendor Guarantee
		PM2.5	7.0E-03	lb/mmBtu		Use same value for PMtotal
		Sulfur Dioxide	6.0E-03	lb/mmBtu		BACT Limit/Vendor Guarantee
		Total VOC	5.0E-03	lb/mmBtu		BACT Limit/Vendor Guarantee
		Nitrogen Oxides	3.5E-02	lb/mmBtu		BACT Limit/Vendor Guarantee
		Carbon Monoxide	8.0E-02	lb/mmBtu		BACT Limit/Vendor Guarantee
		Carbon Dioxide (CO2)	53.02	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		CH4	1.0E-03	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		N2O	1.0E-04	kg/mmBtu		Use GHG rule calcs. BAMM-Tier 2
		Benzene	2.1E-06	lb/mmBtu	1.4-3	
		Dichlorobenzene	1.2E-06	lb/mmBtu	1.4-3	
		.Formaldehyde	7.4E-05	lb/mmBtu	1.4-3	
		Hexane	1.8E-03	lb/mmBtu	1.4-3	
		.Naphthalene	6.0E-07	lb/mmBtu	1.4-3	
		.Toluene	3.3E-06	lb/mmBtu	1.4-3	
		Benzo(a)anthracene	1.8E-09	lb/mmBtu	1.4-3	
		Benzo(a)pyrene	1.2E-09	lb/mmBtu	1.4-3	
		Benzo(b)fluoranthene	1.8E-09	lb/mmBtu	1.4-3	
		Benzo(k)fluoranthene	1.8E-09	lb/mmBtu	1.4-3	
		Chrysene	1.8E-09	lb/mmBtu	1.4-3	
		Dibenzo(a,h)anthracene	1.2E-09	lb/mmBtu	1.4-3	
		Indeno(1,2,3-cd)pyrene	1.8E-09	lb/mmBtu	1.4-3	
		PAH Total	8.6E-08	lb/mmBtu	1.4-3	
		Polycyclic organic matter (POM)	8.6E-08	lb/mmBtu	1.4-3	
		.Arsenic (7440-38-2)	2.0E-07	lb/mmBtu	1.4-4	
		.Beryllium (744-43-0-9)	1.2E-08	lb/mmBtu	1.4-4	
		.Cadmium (7440-43-9)	1.1E-06	lb/mmBtu	1.4-4	
		.Chromium	1.4E-06	lb/mmBtu	1.4-4	
		Cobalt	8.2E-08	lb/mmBtu	1.4-4	
		.Manganese (74439-96-5)	3.7E-07	lb/mmBtu	1.4-4	
		.Mercury (7439-97-6)	2.5E-07	lb/mmBtu	1.4-4	
		.Nickel (7440-02-0)	2.1E-06	lb/mmBtu	1.4-4	
		Selenium (7782-49-2)	2.4E-08	lb/mmBtu	1.4-4	
12&13	Package Boiler					
	Propane Combustion					
	Industrial Boilers	Total PM.	7.0E-01	lb/1000 gals	1.5-1	
		PM10	7.0E-01	lb/1000 gals	1.5-1	Use same value for PMtotal
		PM2.5	7.0E-01	lb/1000 gals	1.5-1	Use same value for PMtotal
		Sulfur Dioxide	0.10S	lb/1000 gals	1.5-1	
		Nitrogen Oxides	1.3E+01	lb/1000 gals	1.5-1	
		N2O	9.0E-01	lb/1000 gals	1.5-1	
		Carbon Dioxide (CO2)	1.25E+04	lb/1000 gals	1.5-1	
		Carbon Monoxide	7.5E+00	lb/1000 gals	1.5-1	
		TOC	1.0E+00	lb/1000 gals	1.5-1	
		CH4	2.0E-01	lb/1000 gals	1.5-1	

GRE Spiritwood Station
Emission Factors for
Annual Emissions Inventory

15 Diesel Fire Pump
Distillate

Diesel Engine Conversion Factor 0.00647069 MMBtu/HP-hr

Nitrogen Oxides	3.1E-02	lb/Hp-hr		3.3-1	Footnote to AP-42 Table 3.4-1
Carbon Monoxide	6.68E-03	lb/Hp-hr		3.3-1	brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
Sulfur Dioxide	2.05E-03	lb/Hp-hr		3.3-1	brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
PM10	2.20E-03	lb/Hp-hr		3.3-1	brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
Total PM	2.20E-03	lb/Hp-hr		3.3-1	brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
Total VOC	2.47E-03	lb/Hp-hr		3.3-1	brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
Carbon Dioxide (CO2)	73.96	kg/mmBtu			brake-specific fuel consumption factor (BSFC) 0.007 mmBtu/Hp-hr
CH4	3.0E-03	kg/mmBtu			Use GHG rule calcs. BAMM-Tier 2
N2O	6.0E-04	kg/mmBtu			Use GHG rule calcs. BAMM-Tier 2
Benzene	6.531E-06	lb/Hp-hr		3.3-2	Use GHG rule calcs. BAMM-Tier 2
Toluene	2.863E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Xylenes	1.995E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Propylene	1.806E-05	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
1,3-Butadiene	2.737E-07	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Formaldehyde	8.260E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Acetaldehyde	5.369E-07	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Acrolein	6.475E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Naphthalene	5.936E-07	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Benzo(a)anthracene	1.176E-08	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Chrysene	2.471E-09	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Benzo(b)fluoranthene	6.937E-10	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Benzo(k)fluoranthene	1.085E-09	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Benzo(a)pyrene	1.316E-09	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Indeno(1,2,3-cd)pyrene	2.625E-09	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Dibenzo(a,h)anthracene	4.081E-09	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
PAH Total	1.1764347E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
Polycyclic organic matter (POM)	1.1764347E-06	lb/Hp-hr		3.3-2	Multiply EF on table by 0.007 mmBtu/Hp-hr
VOC - Tank (500 gal)	9.1E-06	lb/Hp-hr			Multiply EF on table by 0.007 mmBtu/Hp-hr

20 EPA TANKS

16 Cooling Towers
No fuel

Total PM	1.02E-02	lb/1000gal		Chapt.13-4
PM10	3.264E-03	lb/1000gal		Chapt.13-4

17 Propane Vaporizor
Propane

Total PM.	7.0E-01	lb/1000 gals		1.5-1	
PM10	7.0E-01	lb/1000 gals		1.5-1	Use same value for PMtotal
PM2.5	7.0E-01	lb/1000 gals		1.5-1	Use same value for PMtotal
Sulfur Dioxide	0.105	lb/1000 gals		1.5-1	
Nitrogen Oxides	1.3E+01	lb/1000 gals		1.5-1	
N2O	9.0E-01	lb/1000 gals		1.5-1	
Carbon Dioxide (CO2)	1.25E+04	lb/1000 gals		1.5-1	
Carbon Monoxide	7.5E+00	lb/1000 gals		1.5-1	
TOC	1.0E+00	lb/1000 gals		1.5-1	
CH4	2.0E-01	lb/1000 gals		1.5-1	

22 Rail car heaters **Not Installed**

Dust Collecting Baghouses and Bin Vents

		Controlled EF		
	PM(total)	0.005	gr/dscf	Vendor guarantee
2	Coal Unloading Baghouse	4.1143	lb/hr	
3	Coal Silo Bin Vent	0.3643	lb/hr	
4	Coal Silo Discharge Baghouse	0.0943	lb/hr	
5	Coal Bunker Baghouse	0.2143	lb/hr	
6	Limestone Unloading Silo Bin Vent	0.1500	lb/hr	
7	Lime Silo Bin Vent	0.1714	lb/hr	
8	Bed Material Silo Bin Vent	0.1200	lb/hr	
9	Recycle Ash Silo Bin Vent	0.0643	lb/hr	
10	Waste Ash Silo	0.1371	lb/hr	
11	Waste Ash Loadout Baghouse	0.0343	lb/hr	

Tioga Air Heaters

NG HHV in 40CFR98	1.028	mmBtu/scf	
Carbon Dioxide (CO2)	53.02	kg/mmBtu	Use GHG rule calcs.
CH4	1.0E-03	kg/mmBtu	Use GHG rule calcs.
N2O	1.0E-04	kg/mmBtu	Use GHG rule calcs.

GREAT RIVER
ENERGY

Spiritwood Station • 3366 93rd Ave SE • Spiritwood, North Dakota 58481 • 701-253-7916 • Fax 701-253-7985

March 13, 2015

Received
Air Quality

Mr. Terry L. O'Clair
Director, Division of Air Quality
North Dakota Department of Health
918 East Divide, 2nd Floor
Bismarck, ND 58501-1947

Dear Mr. O'Clair:

Enclosed you will find the Spiritwood Station Annual Emissions Inventory for 2014.

As per the "2014 Request for Additional Annual Emissions Data, Prevention of Significant Deterioration", an Excel data file was down-loaded onto the Department of Health ftp site. The data file is for Unit 1, year 2014; starting at 1200 hours on October 6, 2014. This was the hour and day that the CEMS data was first considered "Conditionally Valid" by 40CFR75 regulations. All CEMS data before 1200 hours on October 6, 2014, was "Considered Invalid", and were reported as Max Potentials.

As per the "Request for Additional Annual Emissions Data" for PM2.5 and Mercury, the emission values were included in form SFN 8536 (11-10), Fuel Burning Equipment Used for Indirect Heating Annual Emission Inventory Report.

If you should have any questions regarding the information contained in this report, please contact Ron McLeod at 701-442-7065.

Sincerely,

GREAT RIVER ENERGY

Steve Richter

Steve Richter
Manager, Fuels and Services

Enclosures
c: Diane Stockdill
c/enc: Deb Nelson
Route/File:Environmental\Air\PT\2014 Annual Emissions Inventory

Hinnenkamp, Keith D.

From: Bachman, Tom A.
Sent: Monday, March 23, 2015 2:23 PM
To: Hinnenkamp, Keith D.
Subject: FW: Coal Creek and Spiritwood AEIRs

Keith:

F.Y.I. – Note the correction for the Spiritwood plant.

Tom Bachman, P.E.
Manager; Air Quality
Planning Program
ND Dept. of Health
(701) 328-5188

From: Mcleod, Ron GRE-CC [mailto:RMcleod@GREnergy.com]
Sent: Monday, March 23, 2015 8:51 AM
To: Bachman, Tom A.
Subject: RE: Coal Creek and Spiritwood AEIRs

Tom,

The yearly totals for Gross and Net Generation are as follows:

	Gross MW	Net MW
CCS Unit 1:	4,704,456	4,364,037
CCS Unit 2:	4,847,951	4,516,761
SWS Unit 1:	91,610*	70,381

* I found that I had incorrectly entered a Gross Megawatt number in the spreadsheet I used for the Spiritwood Annual Emissions Inventory.
The Gross megawatt value for Spiritwood was reported as 121,610 in the FUEL BURNING EQUIPMENT USED FOR INDIRECT HEATING, ANNUAL EMISSION INVENTORY REPORT
SFN 8536, it was actually 91,610.

Please let me know if you need additional information or re-submittal of the Spiritwood Report.

Thank you,
Ron McLeod
Air Compliance Specialist
Great River Energy
Office: 701-442-7065
Email: rmcleod@grenergy.com