TRC

Customer-Focused Solutions

January 26, 2005

Mr. Steve Riva
U.S. Environmental Protection Agency
Region 2
290 Broadway
New York, NY 10007

Mr. Kevin Kispert
New York State Department of Environmental Conservation
Division of Air Resources
625 Broadway
Albany, NY 12233-3255

Subject: **Caithness Bellport LLC - Caithness Bellport Energy Center**
Prevention of Significant Deterioration (PSD) and New York State Part 201 Air Permit Application for Proposed 346 MW Combined Cycle Facility

Gentlemen:

Enclosed please find three (3) copies of the PSD/New York State Part 201 Air Permit Application that we are submitting on behalf of Caithness Bellport, LLC (Caithness Bellport) for a 346 MW combined cycle facility to be known as the "Caithness Bellport Energy Center". The Caithness Bellport Energy Center will be located in the Town of Brookhaven, Suffolk County, Long Island, New York. This application addresses the air quality analyses required by the New York State Department of Environmental Conservation (NYSDEC) and US Environmental Protection Agency (USEPA) for air permitting purposes. The Caithness Bellport Project will represent a new major Part 201 source, and is seeking a construction/operation State Facility Permit under 201-5 with this application, and will apply for a Title V operating permit under 201-6 within one year of commencing operation. With this joint application, Caithness Bellport is also seeking a PSD Permit to Construct from USEPA Region 2, which presently has PSD review authority for PSD major source projects in New York State. The application was prepared in accordance with guidance received from USEPA and NYSDEC at our September 14, 2004 pre-application meeting.

The Caithness Bellport Energy Center combined cycle generating unit will consist of one gas and oil-fired Siemens Westinghouse Power Corporation Frame 501F combustion turbine generator, a heat recovery steam generator equipped with natural gas-fired duct burners for supplementary firing and a single stream turbine generator with an air-cooled condenser. Combined cycle unit emissions will be controlled by an oxidation catalyst

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and selective catalytic reduction and directed into a single 170-foot stack. Supporting auxiliary equipment includes a dual-fuel auxiliary boiler with low-NOx burners and flue gas recirculation, a forced-draft low-NO_x fuel gas dew point heater and an emergency diesel fire pump. The Project combined cycle unit will be designed to operate on a continuous basis, but may operate at partial loads between 75 to 100% when it is dispatched.

Should you have any questions regarding this PSD/State Facility Permit application, please do not hesitate to call David Shotts at 201.933.5541 ext. 112 or me at ext. 108.

Sincerely,

TRC Environmental Corporation

Kevin J. Maher, AICP
Project Manager

cc: Leon Sedefian, NYSDEC
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Caithness Bellport Energy Center
346 MW Combined Cycle Facility
PSD and Part 201 Air Permit Application

Prepared for:
Caithness Bellport, LLC
565 Fifth Avenue, 29th Floor
New York, NY 10017

Prepared by:

TRC Environmental Corporation
1200 Wall Street West, 2nd Floor
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January 2005

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VENDOR DATA

SIEMENS Westinghouse

Caithness - Bellport Energy Center

ESTIMATED W501F Gas Turbine Performance - Upgrad
Combined Cycle / Dry Low NOx Combusto
AeroPac II 2-102x196 / 0.90 Power Facto

Based on CTT-2393C Rev. 4c
November 22, 2004

SITE CONDITIONS:	**CASE 1**	**CASE 2**	**CASE 3**	**CASE 4**	**CASE 5**	**CASE 6**	**CASE 7**	**CASE 8**	**CASE 9**	**CASE 10**	**CASE 1 + DB**	**CASE 4 + DB**	**CASE 7 + DB**	**CASE 8 + DB**
FUEL TYPE	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
LOAD LEVEL	BASE	90.0%	75.0%	BASE	90.0%	75.0%	BASE	BASE	90.0%	75.0%	BASE	BASE	BASE	BASE
NET FUEL HEATING VALUE, Btu/lbm (LHV)	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438	20,438
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685	22,685
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF	OFF	OFF	OFF	OFF	OFF	85%	OFF	OFF	OFF	OFF	OFF	85%	OFF
AMBIENT DRY BULB TEMPERATURE, °F	0.0	0.0	0.0	51.0	51.0	51.0	100.0	100.0	100.0	100.0	0.0	51.0	100.0	100.0
AMBIENT RELATIVE HUMIDITY, %	66%	66%	66%	60%	60%	60%	45%	45%	45%	45%	66%	60%	45%	45%
BAROMETRIC PRESSURE, psia	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643
GAS TURBINE PERFORMANCE:														
FUEL FLOW, lbm/hr - GT Only	97,890	89,740	78,300	88,110	80,700	70,590	80,410	76,270	69,910	61,440	97,890	88,110	80,410	76,270
FUEL FLOW, lbm/hr - Duct Burners	0	0	0	0	0	0	0	0	0	0	21,777	21,777	21,777	21,777
DUCT BURNER STATUS/MAX. HEAT INPUT (MMBtu/hr, HHV)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	494	494	494	494
STACK EXHAUST TEMPERATURE, °F	190	190	180	185	185	180	195	195	195	190	175	175	185	185
STACK EXHAUST FLOW, lbm/hr - GT plus Duct Burners	4,398,394	4,094,507	3,451,126	4,052,023	3,768,300	3,181,541	3,690,590	3,550,159	3,342,486	2,893,462	4,420,170	4,073,800	3,712,367	3,571,936
EXHAUST GAS COMPOSITION (BY % VOL):														
OXYGEN	12.61	12.74	12.45	12.68	12.80	12.52	12.19	12.40	12.61	12.49	10.85	10.78	10.13	10.25
CARBON DIOXIDE	3.82	3.77	3.90	3.73	3.67	3.81	3.70	3.66	3.56	3.62	4.63	4.60	4.65	4.65
WATER	7.56	7.44	7.70	8.02	7.91	8.17	10.61	9.97	9.79	9.90	9.14	9.73	12.44	11.88
NITROGEN	75.11	75.16	75.06	74.68	74.72	74.62	72.63	73.09	73.17	73.12	74.49	74.01	71.93	72.36
ARGON	0.90	0.90	0.90	0.89	0.89	0.89	0.87	0.87	0.87	0.87	0.89	0.88	0.86	0.86
MOLECULAR WEIGHT	28.48	28.49	28.47	28.42	28.43	28.41	28.13	28.20	28.21	28.20	28.38	28.31	28.02	28.08
NET EXHAUST STACK EMISSIONS: Based on USEPA test methods														
NO_X, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
NO_X, lbm/hr as NO_2	16.7	15.3	13.4	15.0	13.8	12.1	13.7	13.0	11.9	10.5	20.4	18.7	17.4	16.7
NO_X, lbm/MMBtu	0.0076	0.0076	0.0076	0.0075	0.0076	0.0076	0.0076	0.0076	0.0075	0.0076	0.0076	0.0075	0.0075	0.0075
NH_3, ppmvd @ 15% O_2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH_3, lbm/hr as NO_2	15.5	14.2	12.4	13.9	12.7	11.2	12.7	12.1	11.1	9.7	18.9	17.4	16.1	15.5
CO, ppmvd @ 15% O_2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
CO, lbm/hr	10.2	9.3	8.2	9.2	8.4	7.4	8.4	7.9	7.3	6.4	12.3	11.4	10.6	10.2
CO, lbm/MMBtu	0.0046	0.0046	0.0047	0.0046	0.0046	0.0047	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046	0.0046
VOC, ppmvd @ 15% O_2 as CH_4	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.7	1.7	1.7	1.7
VOC, lbm/hr as CH_4	3.5	3.2	2.8	3.2	2.9	2.6	2.9	2.8	2.5	2.2	6.1	5.6	5.2	5.0
VOC, lbm/MMBtu as CH_4	0.0016	0.0016	0.0016	0.0016	0.0016	0.0017	0.0016	0.0017	0.0016	0.0016	0.0023	0.0023	0.0023	0.0023
SO_2, lbm/hr	2.4	2.2	1.9	2.1	2.0	1.7	2.0	1.9	1.7	1.5	2.9	2.7	2.5	2.4
SO_2, lbm/MMBtu	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011	0.0011
PARTICULATES, lbm/hr	11.7	10.9	9.2	10.7	10.0	8.5	9.6	9.3	8.7	7.6	17.0	16.1	15.0	14.6
PARTICULATES, lbm/MMBtu	0.0053	0.0054	0.0052	0.0054	0.0055	0.0053	0.0053	0.0054	0.0055	0.0055	0.0063	0.0065	0.0065	0.0066
H_2SO_4, lbm/hr	0.9	0.8	0.7	0.8	0.7	0.6	0.7	0.7	0.6	0.6	1.1	1.0	0.9	0.9

NOTES:

- All data is ESTIMATED and not guaranteed.
- Performance based on new and clean condition.
- Emission flowrates are calculated based on the maximum achievable exhaust flow. For further details on flowrate contact SWPC.
- NO_X emissions based on the use of an SCR.
- CO and VOC emissions based on the use of an oxidation catalyst.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH_4).
- Particulates are per US EPA Method 201A/202 (front and back half) and include H_2SO_4 and $(NH_4)_2SO_4$.
- H_2SO_4 emissions are a subset of the total Particulate emissions (i.e., NOT added to particulates).
- Emission estimates in units of lbm/MMBtu are based on the natural gas higher heating value (HHV).
- Gas fuel composition is 95.5219% CH4, 1.7391% C2H6, 0.1674% C3H8, 0.0193% iC4H10, 0.00313% nC4H10, 0.0057% iC5H12, 0.0037% nC5H12, 0.0046% nC6H14, 1.889% N2, 0.617% CO2 and 0.35 grains S/100 scf.
- Gas fuel must be in compliance with the Siemens Westinghouse Gas Fuel Spec (21T0306 Rev.11).
- Dry Low NOx combustor utilizing a gas fuel with an ethane content >5% vol. may produce a visible exhaust plume.
- Average temperature of the gas fuel is 266 °F. Sensible heat of the fuel is not included in the fuel heating values, heat input, or heat rate.
- IGV schedule may be adjusted during commissioning. Part load performance will be adjusted accordingly.
- Part load is achieved by modulating the IGVs and is based on percentage unrestricted power output.
- Emissions exclude ambient air contributions.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility. SWPC is available to review permit application data upon request.

SIEMENS Westinghouse

Caithness - Bellport Energy Center

ESTIMATED W501F Gas Turbine Performance - Upgrade
Combined Cycle / Dry Low NOx Combustor
AeroPac II 2-102x196 / 0.90 Power Factor

Based on CTT-2393C Rev. 4d
January 20, 2005

SITE CONDITIONS:	**CASE 1**	**CASE 2**	**CASE 3**	**CASE 4**	**CASE 5**	**CASE 6**	**CASE 7**	**CASE 8**	**CASE 9**	**CASE 10**	**CASE 1 + DB**	**CASE 4 + DB**	**CASE 7 + DB**	**CASE 8 + DB**
FUEL TYPE	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist	No. 2 Dist
LOAD LEVEL	BASE	90.0%	75.0%	BASE	90.0%	75.0%	BASE	BASE	90.0%	75.0%	BASE	BASE	BASE	BASE
NET FUEL HEATING VALUE, Btu/lbm (LHV)	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450	18,450
GROSS FUEL HEATING VALUE, Btu/lbm (HHV)	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680	19,680
EVAPORATIVE COOLER STATUS/EFFECTIVENESS	OFF	OFF	OFF	OFF	OFF	OFF	85%	OFF	OFF	OFF	OFF	OFF	85%	OFF
AMBIENT DRY BULB TEMPERATURE, °F	0.0	0.0	0.0	51.0	51.0	51.0	100.0	100.0	100.0	100.0	0.0	51.0	100.0	100.0
AMBIENT RELATIVE HUMIDITY, %	66%	66%	66%	60%	60%	60%	45%	45%	45%	45%	66%	60%	45%	45%
BAROMETRIC PRESSURE, psia	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643	14.643
INJECTION FLUID	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
INJECTION RATIO	0.4	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.4	0.4	0.4	0.4
GAS TURBINE PERFORMANCE:														
FUEL FLOW, lbm/hr - GT Only	107,970	98,420	84,170	97,050	88,550	75,890	88,490	83,900	76,790	66,360	107,970	97,050	88,490	83,900
FUEL FLOW, lbm/hr - Duct Burners (natural gas)	0	0	0	0	0	0	0	0	0	0	16,266	16,266	16,266	16,266
DUCT BURNER STATUS/MAX. HEAT INPUT (MMBtu/hr, HHV)	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	369	369	369	369
INJECTION RATE, lbm/hr	43,190	39,370	25,250	38,820	35,420	22,770	35,400	33,560	30,720	19,910	43,190	38,820	35,400	33,560
STACK EXHAUST TEMPERATURE, °F	290	290	290	285	285	285	290	290	290	290	280	275	280	280
STACK EXHAUST FLOW, lbm/hr	4,451,512	4,418,262	3,987,738	4,099,680	4,070,012	3,664,490	3,734,064	3,591,401	3,569,178	3,270,372	4,467,778	4,115,946	3,750,330	3,607,667
EXHAUST GAS COMPOSITION (BY % VOL):														
OXYGEN	12.74	13.41	13.86	12.82	13.46	13.87	12.34	12.54	13.16	13.62	11.59	11.57	10.98	11.14
CARBON DIOXIDE	5.05	4.65	4.41	4.92	4.53	4.32	4.88	4.82	4.44	4.20	5.79	5.72	5.75	5.72
WATER	6.32	5.81	5.18	6.80	6.32	5.73	9.39	8.77	8.31	7.70	7.00	7.54	10.18	9.59
NITROGEN	74.99	75.24	75.64	74.56	74.80	75.18	72.53	72.99	73.21	73.60	74.73	74.28	72.23	72.68
ARGON	0.90	0.90	0.90	0.89	0.89	0.90	0.87	0.87	0.88	0.88	0.89	0.89	0.86	0.87
MOLECULAR WEIGHT	28.81	28.82	28.86	28.74	28.75	28.79	28.45	28.51	28.52	28.56	28.81	28.74	28.45	28.52
NET EXHAUST STACK EMISSIONS: Based on USEPA test methods														
NO_X, ppmvd @ 15% O_2	6	6	6	6	6	6	6	6	6	6	8	8	8	8
NO_X, lbm/hr as NO_2	51.0	46.5	39.7	45.8	41.8	35.8	41.8	39.7	36.3	31.3	78.3	71.4	66.0	63.1
NO_X, lbm/MMBtu as NO_2	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.025	0.025	0.024	0.032	0.032	0.032	0.032
NH_3, ppmvd @ 15% O_2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
NH_3, lbm/hr as NO_2	15.8	14.4	12.3	14.2	12.9	11.1	12.9	12.3	11.2	9.7	18.1	16.6	15.3	14.6
CO, ppmvd @ 15% O_2	2	2	4	2	2	4	2	2	2	4	4	4	4	4
CO, lbm/hr	10.4	9.4	16.2	9.3	8.5	14.6	8.5	8.1	7.4	12.8	23.9	21.8	20.1	19.2
CO, lbm/MMBtu	0.005	0.005	0.010	0.005	0.005	0.010	0.005	0.005	0.005	0.010	0.010	0.010	0.010	0.010
VOC, ppmvd @ 15% O_2 as CH_4	6	6	6	6	6	6	6	6	6	6	8	8	8	8
VOC, lbm/hr as CH_4	17.8	16.2	13.9	16.0	14.6	12.5	14.6	13.9	12.7	11.0	27.3	24.9	23.1	22.1
VOC, lbm/MMBtu as CH_4	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.011	0.011	0.011	0.011
SO_2, lbm/hr	88.9	81.0	69.3	79.9	72.9	62.5	72.9	69.1	63.2	54.7	89.3	80.3	73.3	69.5
SO_2, lbm/MMBtu	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.042	0.036	0.036	0.035	0.035
PARTICULATES, lbm/hr	106.3	109.4	110.0	96.8	93.3	100.3	87.2	83.7	80.8	88.1	110.3	100.8	91.2	87.7
PARTICULATES, lbm/MMBtu	0.050	0.057	0.067	0.051	0.054	0.068	0.050	0.051	0.054	0.068	0.045	0.045	0.044	0.044
H_2SO_4, lbm/hr	31.8	29.0	24.8	28.6	26.1	22.4	26.1	24.7	22.6	19.6	31.9	28.7	26.2	24.8

NOTES:

- All data is ESTIMATED and not guaranteed.
- Performance based on new and clean condition.
- Emission flowrates are calculated based on the maximum achievable exhaust flow. For further details on flowrate contact SWPC.
- NO_X emissions based on the use of an SCR.
- CO and VOC emissions based on the use of an oxidation catalyst.
- VOC consist of total hydrocarbons excluding methane and ethane and are expressed in terms of methane (CH_4).
- Particulates are per US EPA Method 201A/202 (front and back half) and include H_2SO_4 and $(NH_4)_2SO_4$.
- The H_2SO_4 emissions estimates above are a subset of the total Particulate emissions estimates above (i.e., do NOT add these to the particulate emissions).
- Emission estimates in units of lbm/MMBtu are based on the natural gas higher heating value (HHV).
- Particulates for oil fuel are based on specific gravity and may vary depending on fuel.
- Fuel oil composition is 86.434% C, 13.5% H, 0.04% S, 0.015% FBN, and 0.001% ash.
- Liquid fuel must be in compliance with the Siemens Westinghouse Liquid Fuel Spec (21T4424 Rev.7).
- Injection ratios may be adjusted during plant commissioning to meet emissions. Performance will be adjusted to the actual injection rate.
- IGV schedule may be adjusted during commissioning. Part load performance will be adjusted accordingly.
- Part load is achieved by modulating the IGVs and is based on percentage unrestricted power output.
- Emissions exclude ambient air contributions.
- Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement are strictly the customer's responsibility. SWPC is available to review permit application data upon request.

Caithness - Bellport Energy Center - Total Estimated Startup and Shutdown Emissions

W501FD Upgrade in Combined Cycle Operation on Natural Gas - No Aux. Boiler - With Stack Damper - Rev. 03

Mode	Total Emissions (in pounds) @ 0 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	410	2,354	862	77
"Warm" Startup	384	2,346	857	56
"Hot" Startup	107	739	167	26
Shutdown	64	423	92	12

Mode	Total Emissions (in pounds) @ 51 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	375	2,164	790	75
"Warm" Startup	351	2,157	785	54
"Hot" Startup	98	685	153	26
Shutdown	59	393	84	12

General Notes

1.) All data is ESTIMATED, NOT guaranteed and is for ONE unit (GT and HRSG).
2.) SCR efficiency is based on the SCR and ammonia vaporization system being in service and properly operating at design temperatures.
3.) VOC consist of total hydrocarbons excluding methane and ethane and is expressed in terms of methane (CH_4).
4.) Particulate (PM) emissions are based on USEPA Methods 5/202 and assume a max. fuel sulfur content of 0.35 gr S/100 scf.
5.) Gas fuel must be in compliance with the SWPC Fuel Specifications.
6.) Emissions are at the HRSG exhaust stack outlet and exclude ambient air contributions.
7.) Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement is strictly the customer's responsibility. SWPC is available to review permit application data upon request.

Startup / Shutdown Emissions Notes

1.) "Cold" Startup emissions estimates are based on being shutdown ~ 5 days or longer with a Steam HP/IP metal temp. of ~ 122 °F and assumes it takes ~ 400 minutes to reach GT Base load.
2.) "Warm" Startup emissions estimates are based on being shutdown ~ 48 hours with a Steam Turbine HP/IP metal temp. of ~ 320/428 °F and assumes it takes ~ 275 minutes to reach GT Base load.
3.) "Hot" Startup emissions estimates are based on being shutdown ~ 12 hours with a Steam Turbine HP/IP metal temp. of ~ 662 °F and assumes it takes ~ 145 minutes to reach GT Base load.
4.) Shutdown emissions based on the following times: 12 minutes from 100% Base to 70% load; 18-minute hold at 70% load; 28 minutes from 70% to minimum load; and a 5-minute hold at minimum load (FSNL) prior to fuel cut-off.
5.) Startup emissions estimates are based on a maximum of approximately 208 "Hot", 48 "Warm" and 4 "Cold" startups per year (and the subsequent 260 shutdowns per year). Any change in this value could affect the startup ramp rate and hold times and hence the startup emissions.
6.) Startup/Shutdown times are subject to change depending on commercial terms and conditions.
7.) ESTIMATED NO_X emissions assume 92% SCR efficiency from $\geq$ 60% to Base load and 60% SCR efficiency from $\geq$ 50% to 60% load.
8.) ESTIMATED CO emissions assume 90% oxidation catalyst efficiency from > 25% to Base load, 80% efficiency from $\geq$ 20 to 25% load and 60% efficiency from $\geq$ 10 to 20% load.
9.) ESTIMATED VOC emissions assume 50% oxidation catalyst efficiency from $\geq$ 30% to Base load, 40% efficiency from > 25 to 30% load and 10% efficiency from $\geq$ 20 to 25% load.
10.) Emissions mass flow rates are based on ambient temperatures of 0 °F and 51 °F as noted above and will be higher at lower ambient temperatures.
11.) Air Cooled Condenser is ready for operation and condensate receiver tank is filled prior to GT startup.
12.) HRSG is filled and ready for operation prior to GT startup.
13.) Steam chemistry adequate for ST operation (no waiting time included).
14.) Assumes SWPC standard BOP water/steam system design and SWPC steam piping warm up concept.
15.) Major equipment items (GT/HRSG/ST) are operated at their startup ramp limits with no abnormal holds or transients.
16.) BOP/Auxiliary equipment operation does not extend startup or shutdown.
17.) Condenser Hogging: mechanical vacuum pumps; Condenser Holding: Steam Jet Air Ejectors
18.) NO auxiliary boiler.
19.) Stack damper to aid HRSG heat retention during shutdowns.
20.) Operator actions do not extend startup or shutdown.
21.) It is assumed that there is no restriction from the interconnected utility for loading the gas turbine from synchronization to 100% load within the time considered for the startups.

Caithness - Bellport Energy Center - Total Estimated Startup and Shutdown Emissions

W501FD Upgrade in Combined Cycle Operation on No. 2 Fuel Oil - No Aux. Boiler - With Stack Damper - Rev. 03

Mode	Total Emissions (in pounds) @ 0 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	874	2,890	975	745
"Warm" Startup	832	2,852	953	497
"Hot" Startup	213	1,169	227	266
Shutdown	120	654	125	113

Mode	Total Emissions (in pounds) @ 51 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	799	2,661	894	684
"Warm" Startup	761	2,627	874	458
"Hot" Startup	195	1,087	209	243
Shutdown	110	608	115	104

General Notes

1.) All data is ESTIMATED, NOT guaranteed and is for ONE unit (GT and HRSG).
2.) SCR efficiency is based on the SCR and ammonia vaporization system being in service and properly operating at design temperatures.
3.) VOC consist of total hydrocarbons excluding methane and ethane and is expressed in terms of methane (CH_4).
4.) Particulate (PM) emissions are based on USEPA Methods 5/202 and assume a max. fuel sulfur content of 0.35 gr S/100 scf.
5.) Gas fuel must be in compliance with the SWPC Fuel Specifications.
6.) Emissions are at the HRSG exhaust stack outlet and exclude ambient air contributions.
7.) Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement is strictly the customer's responsibility. SWPC is available to review permit application data upon request.

Startup / Shutdown Emissions Notes

1.) "Cold" Startup emissions estimates are based on being shutdown ~ 5 days or longer with a Steam HP/IP metal temp. of ~ 122 °F and assumes it takes ~ 400 minutes to reach GT Base load.
2.) "Warm" Startup emissions estimates are based on being shutdown ~ 48 hours with a Steam Turbine HP/IP metal temp. of ~ 320/428 °F and assumes it takes ~ 275 minutes to reach GT Base load.
3.) "Hot" Startup emissions estimates are based on being shutdown ~ 12 hours with a Steam Turbine HP/IP metal temp. of ~ 662 °F and assumes it takes ~ 145 minutes to reach GT Base load.
4.) Shutdown emissions based on the following times: 12 minutes from 100% Base to 70% load; 18-minute hold at 70% load; 28 minutes from 70% to minimum load; and a 5-minute hold at minimum load (FSNL) prior to fuel cut-off.
5.) Startup emissions estimates are based on a maximum of approximately 208 "Hot", 48 "Warm" and 4 "Cold" startups per year (and the subsequent 260 shutdowns per year). Any change in this value could affect the startup ramp rate and hold times and hence the startup emissions.
6.) Startup/Shutdown times are subject to change depending on commercial terms and conditions.
7.) ESTIMATED NO_X emissions assume 92% SCR efficiency from $\geq$ 60% to Base load and 60% SCR efficiency from $\geq$ 50% to 60% load.
8.) ESTIMATED CO emissions assume 90% oxidation catalyst efficiency from > 25% to Base load, 80% efficiency from $\geq$ 20 to 25% load and 60% efficiency from $\geq$ 10 to 20% load.
9.) ESTIMATED VOC emissions assume 50% oxidation catalyst efficiency from $\geq$ 30% to Base load, 40% efficiency from > 25 to 30% load and 10% efficiency from $\geq$ 20 to 25% load.
10.) Emissions mass flow rates are based on ambient temperatures of 0 °F and 51 °F as noted above and will be higher at lower ambient temperatures.
11.) Air Cooled Condenser is ready for operation and condensate receiver tank is filled prior to GT startup.
12.) HRSG is filled and ready for operation prior to GT startup.
13.) Steam chemistry adequate for ST operation (no waiting time included).
14.) Assumes SWPC standard BOP water/steam system design and SWPC steam piping warm up concept.
15.) Major equipment items (GT/HRSG/ST) are operated at their startup ramp limits with no abnormal holds or transients.
16.) BOP/Auxiliary equipment operation does not extend startup or shutdown.
17.) Condenser Hogging: mechanical vacuum pumps; Condenser Holding: Steam Jet Air Ejectors
18.) NO auxiliary boiler.
19.) Stack damper to aid HRSG heat retention during shutdowns.
20.) Operator actions do not extend startup or shutdown.
21.) It is assumed that there is no restriction from the interconnected utility for loading the gas turbine from synchronization to 100% load within the time considered for the startups.

Caithness - Bellport Energy Center - Total Estimated Startup and Shutdown Emissions

W501FD Upgrade in Combined Cycle Operation on Natural Gas - With Aux. Boiler - With Stack Damper - Rev. 01

Mode	Total Emissions (in pounds) @ 0 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	162	901	238	52
"Warm" Startup	136	893	233	31
"Hot" Startup	105	738	166	25
Shutdown	64	423	92	12

Mode	Total Emissions (in pounds) @ 51 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	147	833	219	51
"Warm" Startup	125	826	214	30
"Hot" Startup	96	685	153	24
Shutdown	59	393	84	12

General Notes

1.) All data is ESTIMATED, NOT guaranteed and is for ONE unit (GT and HRSG).
2.) SCR efficiency is based on the SCR and ammonia vaporization system being in service and properly operating at design temperatures.
3.) VOC consist of total hydrocarbons excluding methane and ethane and is expressed in terms of methane (CH_4).
4.) Particulate (PM) emissions are based on USEPA Methods 5/202 and assume a max. fuel sulfur content of 0.35 gr S/100 scf.
5.) Gas fuel must be in compliance with the SWPC Fuel Specifications.
6.) Emissions are at the HRSG exhaust stack outlet and exclude ambient air contributions.
7.) Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant design and/or performance relative to contractual commitments. Data included in any permit application or Environmental Impact Statement is strictly the customer's responsibility. SWPC is available to review permit application data upon request.

Startup / Shutdown Emissions Notes

1.) "Cold" Startup emissions estimates are based on being shutdown ~ 7 days or longer with a Steam HP/IP metal temp. of ~ 122 °F and assumes it takes ~ 300 minutes to reach GT Base load.
2.) "Warm" Startup emissions estimates are based on being shutdown ~ 48 hours with a Steam Turbine HP/IP metal temp. of ~ 320/428 °F and assumes it takes ~ 170 minutes to reach GT Base load.
3.) "Hot" Startup emissions estimates are based on being shutdown ~ 12 hours with a Steam Turbine HP/IP metal temp. of ~ 662 °F and assumes it takes ~ 135 minutes to reach GT Base load.
4.) Shutdown emissions based on the following times: 12 minutes from 100% Base to 70% load; 18-minute hold at 70% load; 28 minutes from 70% to minimum load; and a 5-minute hold at minimum load (FSNL) prior to fuel cut-off.
5.) Startup emissions estimates are based on a maximum of approximately 208 "Hot", 48 "Warm" and 4 "Cold" startups per year (and the subsequent 260 shutdowns per year). Any change in this value could affect the startup ramp rate and hold times and hence the startup emissions.
6.) Startup/Shutdown times are subject to change depending on commercial terms and conditions.
7.) ESTIMATED NO_X emissions assume 92% SCR efficiency from $\geq$ 60% to Base load and 60% SCR efficiency from $\geq$ 50% to 60% load.
8.) ESTIMATED CO emissions assume 90% oxidation catalyst efficiency from > 25% to Base load, 80% efficiency from $\geq$ 20 to 25% load and 60% efficiency from $\geq$ 10 to 20% load.
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17.) Condenser Hogging: mechanical vacuum pumps; Condenser Holding: Steam Jet Air Ejectors
18.) Auxiliary boiler sized to supply pegging steam to HRSG and seal steam to ST.
19.) Stack damper to aid HRSG heat retention during shutdowns.
20.) Operator actions do not extend startup or shutdown.
21.) It is assumed that there is no restriction from the interconnected utility for loading the gas turbine from synchronization to 100% load within the time considered for the startups.

Caithness - Bellport Energy Center - Total Estimated Startup and Shutdown Emissions

W501FD Upgrade in Combined Cycle Operation on No. 2 Fuel Oil - With Aux. Boiler - With Stack Damper - Rev. 01

Mode	Total Emissions (in pounds) @ 0 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	318	1,370	320	557
"Warm" Startup	276	1,333	298	311
"Hot" Startup	209	1,166	225	246
Shutdown	120	654	125	113

Mode	Total Emissions (in pounds) @ 51 °F Ignition to Gas Turbine Base Load			
	NO_X	CO	VOC	PM
"Cold" Startup	290	1,271	294	509
"Warm" Startup	253	1,237	274	285
"Hot" Startup	192	1,084	207	225
Shutdown	110	608	115	104

General Notes

1.) All data is ESTIMATED, NOT guaranteed and is for ONE unit (GT and HRSG).
2.) SCR efficiency is based on the SCR and ammonia vaporization system being in service and properly operating at design temperatures.
3.) VOC consist of total hydrocarbons excluding methane and ethane and is expressed in terms of methane (CH_4).
4.) Particulate (PM) emissions are based on USEPA Methods 5/202 and assume a max. fuel sulfur content of 0.35 gr S/100 scf.
5.) Gas fuel must be in compliance with the SWPC Fuel Specifications.
6.) Emissions are at the HRSG exhaust stack outlet and exclude ambient air contributions.
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19.) Stack damper to aid HRSG heat retention during shutdowns.
20.) Operator actions do not extend startup or shutdown.
21.) It is assumed that there is no restriction from the interconnected utility for loading the gas turbine from synchronization to 100% load within the time considered for the startups.

Cleaver-Brooks Boiler Expected Steam Performance Data

BACKGROUND INFORMATION				
Date	12/14/04			
Author	L.C. Banks			
Customer	TRC-Caithness Bellport			
City & State	Long Island			
Boiler Model	CEW(LN)			
Design Pressure (psig)	150			
Furnace Volume (cuft)	254.22			
Heating Surface (sqft)	3472			
ENTHALPY				
Steam Enthalpy, (Btu/lbm)	1193	1193	1193	1193
Feedwater Enthalpy, hfw (Btu/lbm)	196	196	196	196
LOAD				
Operating BHP	**800**	**600**	**400**	**200**
Steam Flow Rate, (lbm/hr)	26,866	20,149	13,433	6,716
Firing Rate	100%	75%	50%	25%
Fuel Type	**Natural Gas**	**Natural Gas**	**Natural Gas**	**Natural Gas**
EXCESS AIR				
Excess Air Leaving Boiler	25.0%	25.0%	25.0%	25.0%
O2 Leaving Boiler	4.5%	4.5%	4.5%	4.5%
CO2 Leaving Boiler	9.2%	9.2%	9.2%	9.2%
PRESSURE				
Steam Operating Pressure, (psig)	125	125	125	125
TEMPERATURES				
Flue Gas Temp. Leaving Boiler (F)	427	414	400	386
Feedwater Temperature, T fw (°F)	227	227	227	227
Combustion Air Temperature (°F)	80	80	80	80
Steam Temperature (°F)	353	353	353	353
ENERGY				
Heat Output , (Btu/hr)	26,780,000	20,085,000	13,390,000	6,695,000
HHV Fuel-to-Steam Efficiency (%)	81.73	81.97	82.12	81.86
HHV Heat Input (Btu.hr)	32,765,980	24,501,785	16,306,184	8,178,752

* The data contained in the Firetube Performance Sheet is based on the condition outlined in Cleaver-Brooks document CB 7767-Rev. 1 "Efficiency Facts".

Cleaver-Brooks Boiler Expected Steam Performance Data

BACKGROUND INFORMATION				
Date	12/14/04		* The data contained in the Firetube Performance Sheet is based on the condition outlined in Cleaver-Brooks document CB 7767-Rev. 1 "Efficiency Facts".	
Author	L.C. Banks			
Customer	TRC-Caithness Bellport			
City & State	Long Island			
Boiler Model	CEW(LN)			
Design Pressure (psig)	150			
Furnace Volume (cuft)	254			
Heating Surface (sqft)	3472			
HEAT LOSS				
Dry Gas (%)	6.74	6.46	6.18	5.90
H2 and H2O in Fuel (%)	11.14	11.08	11.02	10.96
Moisture in Air (%)	0.09	0.08	0.08	0.08
Radiation (%)	0.30	0.40	0.60	1.20
Total Heat Loss (%)	18.27	18.03	17.88	18.14
FLOW RATES				
Gas LHV (Btu/SCF)	903	903	903	903
Gas HHV (Btu/SCF)	1,000	1,000	1,000	1,000
HHV Gas Flow Rate (SCFH)	32,754	24,493	16,300	8,176
Gas LHV (Btu/lbm)	19,088	19,088	19,088	19,088
Gas HHV (Btu/lbm)	21,136	21,136	21,136	21,136
Gas Flow Rate (lbm/hr)	1,550	1,159	771	387
Dry Air Weight (lbm/lbm fuel)	19.13	19.13	19.13	19.13
Air for Combustion (lbm/hr)	29,650	22,172	14,755	7,401
Flue Gas to Stack (lbm/hr)	31,200	23,331	15,527	7,788
RESISTANCE				
Furnace Pressure (in WC)	12.97	7.26	3.21	0.81
Net Resistance (in WC)	12.97	7.26	3.21	0.81
HEAT RELEASE				
Furnace Heat Release (Btu/hr/cuft)	128,888	96,380	64,142	32,172
Furnace Heat Release Rate (Btu/hr/sqft)	112,986	84,489	56,228	28,203
Heat Absorption Rate (Btu/hr/sqft)	7,713	5,785	3,857	1,928

MODEL CEW-LN 200-800-150ST BOILER FIRING NATURAL GAS:

	NATURAL GAS AVAILABLE NT TECHNOLOGY								
POLLUTANT	PPM Lbs/MMBtu								
CO	50 0.04								
Nox	9 0.011								
Sox	0.3 0.0005								
HC/VOC	15 0.006								
PM	NA 0.0033								

PPM LEVELS ARE GIVEN ON A DRY VOLUME BASIS AND CORRECTED TO 3% OXYGEN (15% EXCESS AIR)

Cleaver-Brooks Boiler Estimated Exhaust/Emission Performance Data

Boiler Summary Data

Boiler Model:	CEW-LN 200-800 150#	Steam/Hot Water:	Steam
Fuel:	No. 2 Oil	Steam Pressure, psig:	125
Input, Btu/hr:	33,475,000	LE Option, ppm:	9

		Firing Rate			
		25%	**50%**	**75%**	**100%**
Horsepower		200	400	600	800
Btu/hr		8,368,750	16,737,500	25,106,250	33,475,000
Emission Performance					
CO	ppm	50	50	50	50
	lb/MMBtu	0.039	0.039	0.039	0.039
	lb/hr	0.32	0.65	0.97	1.30
	tpy	1.42	2.84	4.27	5.69
NOx	ppm	75	75	75	75
	lb/MMBtu	0.10	0.10	0.10	0.10
	lb/hr	0.84	1.67	2.51	3.35
	tpy	3.7	7.3	11.0	14.7
SOx	ppm	22	22	22	22
	lb/MMBtu	0.041	0.041	0.041	0.041
	lb/hr	0.34	0.69	1.03	1.38
	tpy	1.5	3.0	4.5	6.0
HC/VOCs	ppm	60	60	60	60
	lb/MMBtu	0.03	0.03	0.03	0.03
	lb/hr	0.251	0.502	0.753	1.004
	tpy	1.10	2.20	3.30	4.40
PM	ppm	N/A	N/A	N/A	N/A
	lb/MMBtu	0.015	0.015	0.015	0.015
	lb/hr	0.124	0.248	0.372	0.496
	tpy	0.54	1.09	1.63	2.17
Exhaust Data					
Temperature, F		365	375	414	427
Flow	ACFM	3,083	5,283	8,296	11,225
	SCFM	1,981	3,355	5,032	6,710
	lb/hr	8,911	15,090	22,635	30,180
Velocity	ft/sec	16.35	28.03	44.01	59.55
	ft/min	981.2	1681.8	2640.6	3573.1

Notes: All ppm levels are corrected to 3% oxygen

No. 2 Oil emission levels are based on the following fuel constituent levels:

Ash Content	0.001 %, by weight
Fuel-bound Nitrogen Content	0.015 %, by weight
Sulfur Content	0.04 %, by weight

If any of the actual fuel constituent levels are different than indicated above, the emission levels will change.

Emissions Data: Fuel Gas Heater

Project Name: North Bellport
Customer: Caithness
Location: Long Island, NY
Date: July 15, 2004

Heater Summary Data

Total Nominal Heat Duty:	3.6	MMBtu/hr
Total Actual Heat Duty:	3.516	MMBtu/hr
Thermal Efficiency:	70	%
Excess Air:	25	%
Exit Gas Temp:	850	^{o}F
Stack Diameter, OD:	24	in
Stack Height:	18	ft
Fuel Gas Heat Content	1000	Btu/SCF (HHV)
Air / Fuel Ratio	11.62	ft3/ft3
Flue / Fuel Rtio	10.47	ft3/ft3
Fuel Comsumption:	5,022.86	scfh
Exit Gas Volume:	71,512.93	scfh
Actual Flue Gas Rate	180,157.57	acfh (including excess air)
Stack Exit Area	3.1134	ft^2
Actual Stack Velocity	16.0738	ft/sec

Estimated Emissions Data

PROVIDED BY SIEMENS WESTINGHOUSE

NOx	lb/hr	0.5022857
CO	lb/hr	0.4219200
THC	lb/hr	0.0552514
SO_2	lb/hr	0.0030137
PM (filterable)	lb/hr	0.0095434
PM (condensable)	lb/hr	0.0286303

NOx Emission Control Data

CALCULATIONS BY TRC REFLECT REVISED SWPC NOx DATA FOR FORCED DRAFT BURNER

Fuel Comsumption:	4,357.00	scfh	listed in SWPC e-mail dated 10/18/2004
NOx	50	lb/mmscf	listed in SWPC e-mail dated 10/18/2004
NOx (with control)	0.218	lb/hr	calculated / no margin added
Accuracy (control)	15%		listed in SWPC e-mail dated 10/18/2004
NOx (with control)	0.251	lb/hr	calculated (includes margin for +/- 15% accuracy)
NOx (with control)	0.050	lb/mmbtu	calculated (includes margin for +/- 15% accuracy)

Notes and Assumptions:

1. All data is ESTIMATED, NOT guaranteed and is for ONE unit.
2. Stack height and diameter subject to change.
3. Corrections may be required based on site or ambient conditions.
4. Data is subject to change on final vendor selection.
5. SO_2 based on 0.2 gr HS / 100 scf of fuel.
6. Equipment sizing is subject to change based on final plant requirements.
7. Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant desig

Emissions Data: 275 Hp Fire Pump Engine

Project Name: North Bellport
Customer: Caithness
Location: Long Island, NY
Date: July 15, 2004

Fire Pump Engine Data

Fuel:	Diesel Oil	**Cylinders:**	6
Power:	275 Hp	**Cycle:**	4
		Emissions:	Lean Burn

Estimated Operating Data

RPM	1470	1760	2100	2350
BHP	220	265	275	275
Fuel, gph	13.2	14.2	14.8	16.0
Air / Fuel Ratio	20.01	26.31	31.76	34.44

Estimated Emissions Data

NOx	grams/Hp/hr	6.7	6.7	6.0	6.0
CO	grams/Hp/hr	0.29	0.29	0.28	0.28
HC	grams/Hp/hr	0.32	0.23	0.28	0.28
SO_2	grams/Hp/hr	0.18	0.17	0.15	0.09
PM	grams/Hp/hr	0.07	0.07	0.08	0.08
O_2	%	5.8	9.5	10.7	12.4

Estimated Exhaust Data

Temperature	^oF	990	840	750	737
Flow	CFM	1107	1404	1644	1908
Time Retard	degrees	9.3	9.3	9.3	9.3

Notes and Assumptions:

1. HC is a measure of total hydrocarbons, inclusing Non Methane Hydrocarbons (NMHC)
2. PM is a measure of total particulates, including PM_{10}.
3. Sulfur Dioxide based on 0.05% sulfer content in fuel (by weight).
4. All data is ESTIMATED, NOT guaranteed and is for ONE unit.
5. Corrections may be required based on site or ambient conditions.
6. Data is subject to change based on final vendor selection.
7. Data valid for fuels meeting the vendor fuel criteria.
8. Equipment sizing is subject to change based on final plant requirements.
9. Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant desi

Emissions Data: 300 Hp Fire Pump Engine

Project Name: North Bellport
Customer: Caithness
Location: Long Island, NY
Date: July 15, 2004

Fire Pump Engine Data

Fuel:	Diesel Oil	**Cylinders:**	6
Power:	275 Hp	**Cycle:**	4
		Emissions:	Lean Burn

Estimated Operating Data

RPM	1470	1760	2100	2350
BHP	240	290	300	300
Fuel, gph	13.0	13.5	14.2	14.5
Air / Fuel Ratio	22.79	29.35	34.47	40.97

Estimated Emissions Data

NOx	grams/Hp/hr	5.6	5.7	5.2	5.2
CO	grams/Hp/hr	0.24	0.25	0.27	0.27
HC	grams/Hp/hr	0.1	0.08	0.15	0.15
SO_2	grams/Hp/hr	0.17	0.14	0.14	0.15
PM	grams/Hp/hr	0.07	0.07	0.09	0.09
O_2	%	7.6	10.8	12.3	13.6

Estimated Exhaust Data

Temperature	^oF	1030	855	770	738
Flow	CFM	1276	1506	1740	2058
Time Retard	degrees	9.7	9.7	9.7	9.7

Notes and Assumptions:

1. HC is a measure of total hydrocarbons, inclusing Non Methane Hydrocarbons (NMHC)
2. PM is a measure of total particulates, including PM_{10}.
3. Sulfur Dioxide based on 0.05% sulfer content in fuel (by weight).
4. All data is ESTIMATED, NOT guaranteed and is for ONE unit.
5. Corrections may be required based on site or ambient conditions.
6. Data is subject to change based on final vendor selection.
7. Data valid for fuels meeting the vendor fuel criteria.
8. Equipment sizing is subject to change based on final plant requirements.
9. Please be advised that the information contained in this transmittal has been prepared and is being transmitted per customer request specifically for information purposes only. Such information is not intended to be used for evaluation of plant desi