US EPA ARCHIVE DOCUMENT

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TCEQ

Table 1(a) Emission Point Summary (Worst Case)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
STK-101	CC-101	Unit 101 Combined Cycle (GT+HRSG)	NOx	32.7	
			NOx (startup/shutdown)	206.8	
			CO	11.7	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.9	
			$PM_{10}/PM_{2.5}$	29.7	
			H_2SO_4	5.5	
			NH_3	24.2	
			NH_3 (startup/shutdown)	34.0	
STK-102	CC-102	Unit 102 Combined Cycle (GT+HRSG)	NOx	32.7	
			NOx (startup/shutdown)	206.8	
			CO	11.7	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.9	
			$PM_{10}/PM_{2.5}$	29.7	
			H_2SO_4	5.5	
			NH_3	24.2	
			NH_3 (startup/shutdown)	34.0	
STK-101 & STK-102	CC-101 & CC-102	Unit 101 Combined Cycle (GT+HRSG) Unit 102 Combined Cycle (GT+HRSG)	NOx		208.7
			NOx (startup/shutdown)		
			CO		846.4
			CO (startup/shutdown)		
			VOC		142.9
			VOC (startup/shutdown)		
			SO_2		11.7
			$PM_{10}/PM_{2.5}$		109.5
			H_2SO_4		1.8
			NH_3		199.7
			NH_3 (startup/shutdown)		
LOVSTK-101	CC-101	Unit 101 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-102	CC-102	Unit 102 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-103	ST-103	ST Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.01	0.05

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary (Worst Case)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
ABLSTK-100	ABL-100	Auxiliary Boiler	NOx	1.7	2.8
			NOx (startup/shutdown)	4.8	
			CO	1.8	5.1
			CO (startup/shutdown)	17.9	
			VOC	0.3	0.3
			SO_2	0.03	0.03
			$PM_{10}/PM_{2.5}$	0.4	0.4
EGENSTK-100	EGEN-100	Emergency Generator	NOx	20.3	1.0
			CO	25.1	1.3
			VOC	2.9	0.14
			SO_2	2.7	0.1
			$PM_{10}/PM_{2.5}$	1.19	0.06
FWPSTK-100	FWP-100	Firewater Pump	NOx	10.7	0.5
			CO	3.6	0.2
			VOC	10.7	0.5
			SO_2	1.3	0.1
			$PM_{10}/PM_{2.5}$	0.5	0.03
CTW-100	CTW-100	Cooling Tower 1	PM_{10}	0.8	2.3
			$PM_{2.5}$	0.003	0.01
CTW-200	CTW-200	Cooling Tower 2	PM_{10}	0.05	0.24
			$PM_{2.5}$	0.0002	0.001
OWS-100	OWS-100	Oil Water Separator	VOC	1.0	0.2
TKSTK-101	TK-101	Diesel Tank (Emergency Generator)	VOC	0.03	0.0001
TKSTK-102	TK-102	Diesel Tank (Firewater Pump)	VOC	0.01	0.0001
TKSTK-103	TK-103	Gasoline Tank	VOC	2.89	0.01
FUGNG-100	FUGNG-100	Fugitive Natural Gas Service	VOC	0.1	0.4
FUGSCR-100	FUGSCR-100	Fugitive Ammonia Service	NH_3	0.01	0.04
FUGDS-100	FUGDS-100	Fugitive Diesel Service	VOC	0.05	0.24
PURG-100	PURG-100	MSS Fuel Purging Emissions	VOC	0.01	0.004
OFFWASH-100	CC-101 and CC-102	MSS Offline Turbine Washing	VOC	1.3	0.003
WELD	WELD	MSS Soldering, Welding, Brazing	$PM_{10}/PM_{2.5}$	0.1	0.04

EPN = Emission Point Number

FIN = Facility Identification Number

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary (Siemens Turbine)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
STK-101	CC-101	Unit 101 Combined Cycle (GT+HRSG)	NOx	32.4	
			NOx (startup/shutdown)	206.8	
			CO	11.7	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.3	
			$PM_{10}/PM_{2.5}$	29.7	
			H_2SO_4	5.4	
			NH_3	24.0	
			NH_3 (startup/shutdown)	34.0	
STK-102	CC-102	Unit 102 Combined Cycle (GT+HRSG)	NOx	32.4	
			NOx (startup/shutdown)	206.8	
			CO	11.7	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.3	
			$PM_{10}/PM_{2.5}$	29.7	
			H_2SO_4	5.4	
			NH_3	24.0	
			NH_3 (startup/shutdown)	34.0	
STK-101 & STK-102	CC-101 & CC-102	Unit 101 Combined Cycle (GT+HRSG) Unit 102 Combined Cycle (GT+HRSG)	NOx		208.7
			NOx (startup/shutdown)		
			CO		846.4
			CO (startup/shutdown)		
			VOC		142.9
			VOC (startup/shutdown)		
			SO_2		11.7
			$PM_{10}/PM_{2.5}$		99.4
			H_2SO_4		1.8
			NH_3		199.7
			NH_3 (startup/shutdown)		
LOVSTK-101	CC-101	Unit 101 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-102	CC-102	Unit 102 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-103	ST-103	ST Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.01	0.05

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary (Siemens Turbine)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
ABLSTK-100	ABL-100	Auxiliary Boiler	NOx	1.7	2.8
			NOx (startup/shutdown)	4.8	
			CO	1.8	5.1
			CO (startup/shutdown)	17.9	
			VOC	0.3	0.3
			SO_2	0.03	0.03
			$PM_{10}/PM_{2.5}$	0.4	0.4
EGENSTK-100	EGEN-100	Emergency Generator	NOx	20.3	1.0
			CO	25.1	1.3
			VOC	2.9	0.14
			SO_2	2.7	0.1
			$PM_{10}/PM_{2.5}$	1.19	0.06
FWPSTK-100	FWP-100	Firewater Pump	NOx	10.7	0.5
			CO	3.6	0.2
			VOC	10.7	0.5
			SO_2	1.3	0.1
			$PM_{10}/PM_{2.5}$	0.5	0.03
CTW-100	CTW-100	Cooling Tower 1	PM_{10}	0.8	2.3
			$PM_{2.5}$	0.003	0.01
CTW-200	CTW-200	Cooling Tower 2	PM_{10}	0.05	0.24
			$PM_{2.5}$	0.0002	0.001
OWS-100	OWS-100	Oil Water Separator	VOC	1.0	0.2
TKSTK-101	TK-101	Diesel Tank (Emergency Generator)	VOC	0.03	0.0001
TKSTK-102	TK-102	Diesel Tank (Firewater Pump)	VOC	0.01	0.0001
TKSTK-103	TK-103	Gasoline Tank	VOC	2.89	0.01
FUGNG-100	FUGNG-100	Fugitive Natural Gas Service	VOC	0.1	0.4
FUGSCR-100	FUGSCR-100	Fugitive Ammonia Service	NH_3	0.01	0.04
FUGDS-100	FUGDS-100	Fugitive Diesel Service	VOC	0.05	0.24
PURG-100	PURG-100	MSS Fuel Purging Emissions	VOC	0.01	0.004
OFFWASH-100	CC-101 and CC-102	MSS Offline Turbine Washing	VOC	1.3	0.003
WELD	WELD	MSS Soldering, Welding, Brazing	$PM_{10}/PM_{2.5}$	0.1	0.04

EPN = Emission Point Number

FIN = Facility Identification Number

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary (GE Turbine)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
STK-101	CC-101	Unit 101 Combined Cycle (GT+HRSG)	NOx	32.7	
			NOx (startup/shutdown)	206.8	
			CO	11.4	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.9	
			$PM_{10}/PM_{2.5}$	16.0	
			H_2SO_4	5.5	
			NH_3	24.2	
			NH_3 (startup/shutdown)	34.0	
STK-102	CC-102	Unit 102 Combined Cycle (GT+HRSG)	NOx	32.7	
			NOx (startup/shutdown)	206.8	
			CO	11.4	
			CO (startup/shutdown)	3,137.2	
			VOC	6.5	
			VOC (startup/shutdown)	359.7	
			SO_2	35.9	
			$PM_{10}/PM_{2.5}$	16.0	
			H_2SO_4	5.5	
			NH_3	24.2	
			NH_3 (startup/shutdown)	34.0	
STK-101 & STK-102	CC-101 & CC-102	Unit 101 Combined Cycle (GT+HRSG) Unit 102 Combined Cycle (GT+HRSG)	NOx		194.0
			NOx (startup/shutdown)		
			CO		837.3
			CO (startup/shutdown)		
			VOC		139.5
			VOC (startup/shutdown)		
			SO_2		11.0
			$PM_{10}/PM_{2.5}$		109.5
			H_2SO_4		1.7
			NH_3		185.0
			NH_3 (startup/shutdown)		
LOVSTK-101	CC-101	Unit 101 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-102	CC-102	Unit 102 GT Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-103	ST-103	ST Lube Oil Vent	$PM_{10}/PM_{2.5}$	0.01	0.05

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary (GE Turbine)

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA					
1. Emission Point			2. Component or Air Contaminant Name	3. Air Contaminant Emission Rate	
(A) EPN	(B) FIN	(C) NAME		(A) LB/HR	(B) TPY
ABLSTK-100	ABL-100	Auxiliary Boiler	NOx	1.7	2.8
			NOx (startup/shutdown)	4.8	
			CO	1.8	5.1
			CO (startup/shutdown)	17.9	
			VOC	0.3	0.3
			SO_2	0.03	0.03
			$PM_{10}/PM_{2.5}$	0.4	0.4
EGENSTK-100	EGEN-100	Emergency Generator	NOx	20.3	1.0
			CO	25.1	1.3
			VOC	2.9	0.14
			SO_2	2.7	0.1
			$PM_{10}/PM_{2.5}$	1.19	0.06
FWPSTK-100	FWP-100	Firewater Pump	NOx	10.7	0.5
			CO	3.6	0.2
			VOC	10.7	0.5
			SO_2	1.3	0.1
			$PM_{10}/PM_{2.5}$	0.5	0.03
CTW-100	CTW-100	Cooling Tower 1	PM_{10}	0.8	2.3
			$PM_{2.5}$	0.003	0.01
CTW-200	CTW-200	Cooling Tower 2	PM_{10}	0.05	0.24
			$PM_{2.5}$	0.0002	0.001
OWS-100	OWS-100	Oil Water Separator	VOC	1.0	0.2
TKSTK-101	TK-101	Diesel Tank (Emergency Generator)	VOC	0.03	0.0001
TKSTK-102	TK-102	Diesel Tank (Firewater Pump)	VOC	0.01	0.0001
TKSTK-103	TK-103	Gasoline Tank	VOC	2.89	0.01
FUGNG-100	FUGNG-100	Fugitive Natural Gas Service	VOC	0.1	0.4
FUGSCR-100	FUGSCR-100	Fugitive Ammonia Service	NH_3	0.01	0.04
FUGDS-100	FUGDS-100	Fugitive Diesel Service	VOC	0.05	0.24
PURG-100	PURG-100	MSS Fuel Purging Emissions	VOC	0.01	0.004
OFFWASH-100	CC-101 and CC-102	MSS Offline Turbine Washing	VOC	1.3	0.003
WELD	WELD	MSS Soldering, Welding, Brazing	$PM_{10}/PM_{2.5}$	0.1	0.04

EPN = Emission Point Number

FIN = Facility Identification Number

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Table 1(a) Emission Point Summary

Date:	February 28, 2014	Permit No.:	114911 - PSDTX1380	Regulated Entity No.:	RN100215979
Area Name:	Lon C Hill Power Station			Customer Reference No.:	CN602656688

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this Table.

AIR CONTAMINANT DATA			EMISSION POINT DISCHARGE PARAMETERS										
1. Emission Point			4. UTM Coordinates of Emission Point			Source							
						5. Building Height (Ft.)	6. Height Above Ground (Ft.)	7. Stack Exit Data			8. Fugitives		
EPN (A)	FIN (B)	Name (C)	Zone	East (Meters)	North (Meters)			Diameter (Ft.) (A)	Velocity (FPS) (B)	Temperature (°F) (C)	Length (Ft.) (A)	Width (Ft.) (B)	Axis Degrees (C)
STK-101	CC-101	Unit 101 Combined Cycle (GT+HRSG)	14	636481	3080988		152.0	22.0	44.6	195			
STK-102	CC-102	Unit 102 Combined Cycle (GT+HRSG)	14	636441	3081016		152.0	22.0	44.6	195			
LOVSTK-101	CC-101	Unit 101 GT Lube Oil Vent	14	636443	3080919		6.8	0.5	12.7	amb.			
LOVSTK-102	CC-102	Unit 102 GT Lube Oil Vent	14	636403	3080947		6.8	0.5	12.7	amb.			
LOVSTK-103	ST-103	ST Lube Oil Vent	14	636362	3080977		6.8	0.5	12.7	amb.			
ABLSTK-100	ABL-100	Auxiliary Boiler	14	636499	3081008		14.0	2.5	78.3	400			
EGENSTK-100	EGEN-100	Emergency Generator	14	636472	3081077		10.0	0.5	60.0	200			
FWPSTK-100	FWP-100	Firewater Pump	14	636499	3081113		10.0	0.5	60.0	200			
CTW-100	CTW-100	Cooling Tower 1	14	636271	3081221	41.0	59.0	28.0	34.6	107.5			
CTW-200	CTW-200	Cooling Tower 2	14	636302	3081306	45.0	50.0	12.0	44.3	106.7			
OWS-100	OWS-100	Oil Water Separator	14	636542	3081152		5.0	TBD	TBD	amb.			
TKSTK-101	TK-101	Diesel Tank (Emergency Generator)	14	636457	3081084		6.0	TBD	TBD	amb.			
TKSTK-102	TK-102	Diesel Tank (Firewater Pump)	14	636497	3081112		5.0	TBD	TBD	amb.			
TKSTK-103	TK-103	Gasoline Tank	14	636250	3080871		5.0	TBD	TBD	amb.			
FUGNG-100	FUGNG-100	Fugitive Natural Gas Service	14	636436	3080966					amb.	TBD	TBD	TBD
FUGSCR-100	FUGSCR-100	Fugitive Ammonia Service	14	636475	3081023					amb.	TBD	TBD	TBD
FUGDS-100	FUGDS-100	Fugitive Diesel Service	14	636474	3081095					amb.	TBD	TBD	TBD
PURG-100	PURG-100	MSS Fuel Purging Emissions	14	636436	3080966					amb.	TBD	TBD	TBD
OFFWASH-100	CC-101 and CC-102	MSS Offline Turbine Washing	14	636436	3080966					amb.	TBD	TBD	TBD
WELD	WELD	MSS Soldering, Welding, Brazing	14	636349	3081089					amb.	TBD	TBD	TBD

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FIN = Facility Identification Number

TABLE 2
MATERIAL BALANCE

This material balance table is used to quantify possible emissions of air contaminants and special emphasis should be placed on potential air contaminants, for example: If feed contains sulfur,show distribution to all products. Please relate each material (or group of materials) listed to its respective location in the process flow diagram by assigning point numbers (taken from the flow diagram) to each material.

LIST EVERY MATERIAL INVOLVED IN EACH OF THE FOLLOWING GROUPS	Point No. from Flow Diagram	Process Rate (lbs/hr or SCFM) standard conditions: 70°F 14.7 PSIA. Check appropiate column at right for each process.		Measurement	Estimation	Calculation
1. Raw Material - Input						
2. Fuels - Input						
Natural Gas		**5,214 MMBtu/hr (HHV)**				**X**
Distillate Oil No. 2		**13.70 MMBtu/hr (HHV)**				**X**
3. Products & By-Products - Outputs						
Energy		**740 MW (net)**			**X**	
4. Solid Wastes - Outputs						
5. Liquid Wastes - Outputs						
6. Airborne Waste (Solid) Output		**lb/hr**	**tpy**			**X**
PM_{10}		**62.5**	**112.6**			
$PM_{2.5}$		**61.6**	**110.1**			
7. Airborne Wastes (Gaseous) Output		**lb/hr**	**tpy**			
NO_x		**98.2**	**213.1**			**X**
NO_X (SU/SD)		**418.4**				
CO		**53.9**	**852.9**			**X**
CO (SU/SD)		**6,292.3**				
VOC		**32.2**	**144.8**			**X**
VOC (SU/SD)		**719.4**				
SO2		**75.9**	**12.0**			
H_2SO_4		**11.0**	**1.8**			**X**
NH_3		**48.5**	**199.7**			**X**
NH_3 (SU/SD)		**68.0**				

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COMBUSTION TURBINES

TURBINE DATA

Emission Point Number From Table 1(a) STK-101

APPLICATION		CYCLE	
X	Electric Generation		Simple Cycle
X	Base Load ____ Peaking		Regenerative Cycle
	Gas Compression		Cogeneration
	Other (Specify)	X	Combined Cycle

Manufacturer: Siemens or GE
Model No.: SCC6-5000F or S207FA.04
Serial No.: TBD

Model represented is based on:
X Preliminary Design ____ Contact Award
____ Other (specify) ____
See TNRCC Reg. VI, 116.116(a)

Manufacturer's Rated Output at Baseload, ISO (MW)(hp): 197 MW - 231 MW (Net)
Proposed Site Operating Range (MW)(hp): 624 MW - 740 MW (Net)
Manufacturer's Rated Heat Rate at Baseload, ISO (Btu/kW-hr): TBD

FUEL DATA

Primary Fuels:

X	Natural Gas		Process Offgas		Landfill/Digester Gas
	Fuel Oil		Refinery Gas		Other

Backup Fuels:

X	Not Provided		Process Offgas		Ethane
	Fuel Oil		Refinery Gas		Other (specify)

Attach fuel anaylses, including maximum sulfur content, heating value (specify LHV or HHV) and mole percent of gaseous constituents.

EMISSIONS DATA

Attach manufacturer's information showing emissions of NOx, CO, VOC and PM for each proposed fuel at turbine loads and site ambient temperatures representative of the range of proposed operation. The information must be sufficient to dteremine maximum hourly and annual emission rates. Annual emissions may be based on a conservativly low approximation of site annual average temperature. Provide emissions in pounds per hour and excempt for PM, parts per million by volume at actual conditions and corrected to dry, 15% oxygen conditions.

Method of Emisison Control:

X	Lean Premix Combustors	X	Oxidation Catalyst		Water Injection		Other
X	Other Low-NOx Combustor	X	SCR Catalyst		Steam Injection		

ADDITIONAL INFORMATION

On separate sheets attach the follow:

A. Details regarding principle of operation of emission controls. If add-on equipment is used, provide make and model and manufacturer's information. Example details include: controller imput varibles and operational algorithms for water or ammonia injection systems, combustion mode versus turbine load for variable mode combusters, etc.

B. Exhaust parameter information on Table 1(a).

C. If fired duct burners are used, information required on Table 6.

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COMBUSTION TURBINES

TURBINE DATA

Emission Point Number From Table 1(a) STK-102

APPLICATION		CYCLE	
X	Electric Generation		Simple Cycle
X	Base Load ______ Peaking		Regenerative Cycle
	Gas Compression		Cogeneration
	Other (Specify)	X	Combined Cycle

Manufacturer: Siemens or GE
Model No.: SCC6-5000F or S207FA.04
Serial No.: TBD

Model represented is based on:
X Preliminary Design ______ Contact Award
______ Other (specify) ______
See TNRCC Reg. VI, 116.116(a)

Manufacturer's Rated Output at Baseload, ISO (MW)(hp): 197 MW - 231 MW (Net)
Proposed Site Operating Range (MW)(hp): 624 MW - 740 MW (Net)
Manufacturer's Rated Heat Rate at Baseload, ISO (Btu/kW-hr): TBD

FUEL DATA

Primary Fuels:

X	Natural Gas		Process Offgas		Landfill/Digester Gas
	Fuel Oil		Refinery Gas		Other

Backup Fuels:

X	Not Provided		Process Offgas		Ethane
	Fuel Oil		Refinery Gas		Other (specify)

Attach fuel anaylses, including maximum sulfur content, heating value (specify LHV or HHV) and mole percent of gaseous constituents.

EMISSIONS DATA

Attach manufacturer's information showing emissions of NOx, CO, VOC and PM for each proposed fuel at turbine loads and site ambient temperatures representative of the range of proposed operation. The information must be sufficient to dteremine maximum hourly and annual emission rates. Annual emissions may be based on a conservativly low approximation of site annual average temperature. Provide emissions in pounds per hour and excempt for PM, parts per million by volume at actual conditions and corrected to dry, 15% oxygen conditions.

Method of Emisison Control:

X	Lean Premix Combustors	X	Oxidation Catalyst		Water Injection		Other
X	Other Low-NOx Combustor	X	SCR Catalyst		Steam Injection		

ADDITIONAL INFORMATION

On separate sheets attach the follow:

A. Details regarding principle of operation of emission controls. If add-on equipment is used, provide make and model and manufacturer's information. Example details include: controller imput varibles and operational algorithms for water or ammonia injection systems, combustion mode versus turbine load for variable mode combusters, etc.

B. Exhaust parameter information on Table 1(a).

C. If fired duct burners are used, information required on Table 6.

US EPA ARCHIVE DOCUMENT

TABLE 6

BOILERS AND HEATERS

Type of Device:	Duct Burner	Manufacturer:	TBD
Number from flow diagram:	CC-101	Model Number:	TBD

CHARACTERISTICS OF INPUT

Type Fuel	Chemical Composition (% by Weight)		Inlet Air Temp °F (after preheat)	Fuel Flow Rate (scfm* or lb/hr)	
				Average	Design Maximum
Natural Gas	Nitrogen	0.37%	ambient	11,594 lb/hr (HHV)	12,159 lb/hr (HHV)
	Carbon Dioxide	1.86%	Gross Heating Value of Fuel (specify units)	Total Air Supplied and Excess Air	
	Methane	91.84%		Average	Design Maximum
	Ethane	5.05%		scfm*	scfm*
	Propane	0.48%		% excess	% excess
	i-Butane	0.12%		(vol)	(vol)
	n-Butante	0.10%	23,250 Btu/lb (HHV)		
	i-Pentane	0.04%			
	n-Pentane	0.03%			
	n-Hexane	0.05%			
	n-Heptane	0.04%			
	n-Octane	0.02%			

HEAT TRANSFER MEDIUM

Type Transfer Medium (Water, oil, etc.)	Temperature °F		Pressure (psia)		Flow Rate (specify units)	
	Input	Output	Input	Output	Average	Design Maximum

OPERATING CHARACTERISTICS

Ave. Fire Box Temp. at max. firing rate	Fire Box Volume(ft.3), (from drawing)	Gas Velocity in Fire Box (ft/sec) at max firing rate	Residence Time in Fire Box at max firing rate (sec)
NA	NA	NA	NA

STACK PARAMETERS

Stack Diameters	Stack Height	Stack Gas Velocity (ft/sec)		Stack Gas Temp °F	Exhaust scfm
		(@Ave. Fuel Flow Rate)	(@Max. Fuel Flow Rate)		
22 Ft	152 Ft	45		195 ºF	

CHARACTERISTICS OF OUTPUT

Material	Chemical Composition of Exit Gas Released (% by Volume)
	See Table 1(a)

Attach an explanation on how temperature, air flow rate, excess air or other operating variables are controlled.

Also supply an assembly drawing, dimensioned and to scale, in plan, elevation, and as many sections as are needed to show clearly the

*Standard Conditions: 68°F, 14.7 psia

US EPA ARCHIVE DOCUMENT

TABLE 6

BOILERS AND HEATERS

Type of Device:	Duct Burner	Manufacturer:	TBD
Number from flow diagram:	CC-102	Model Number:	TBD

CHARACTERISTICS OF INPUT

Type Fuel	Chemical Composition (% by Weight)		Inlet Air Temp °F (after preheat)	Fuel Flow Rate (scfm* or lb/hr) Average	Fuel Flow Rate (scfm* or lb/hr) Design Maximum
Natural Gas	Nitrogen	0.37%	ambient	11,594 lb/hr (HHV)	12,159 lb/hr (HHV)
	Carbon Dioxide	1.86%	Gross Heating Value of Fuel (specify units)	Total Air Supplied and Excess Air	
	Methane	91.84%		Average	Design Maximum
	Ethane	5.05%		scfm*	scfm*
	Propane	0.48%		% excess	% excess
	i-Butane	0.12%		(vol)	(vol)
	n-Butante	0.10%			
	i-Pentane	0.04%	23,250 Btu/lb (HHV)		
	n-Pentane	0.03%			
	n-Hexane	0.05%			
	n-Heptane	0.04%			
	n-Octane	0.02%			

HEAT TRANSFER MEDIUM

Type Transfer Medium (Water, oil, etc.)	Temperature °F Input	Temperature °F Output	Pressure (psia) Input	Pressure (psia) Output	Flow Rate (specify units) Average	Flow Rate (specify units) Design Maximum

OPERATING CHARACTERISTICS

Ave. Fire Box Temp. at max. firing rate	Fire Box Volume(ft.3), (from drawing)	Gas Velocity in Fire Box (ft/sec) at max firing rate	Residence Time in Fire Box at max firing rate (sec)
NA	NA	NA	NA

STACK PARAMETERS

Stack Diameters	Stack Height	Stack Gas Velocity (ft/sec) (@Ave. Fuel Flow Rate)	Stack Gas Velocity (ft/sec) (@Max. Fuel Flow Rate)	Stack Gas Temp °F	Exhaust scfm
22 Ft	152 Ft	45		195 ºF	

CHARACTERISTICS OF OUTPUT

Material	Chemical Composition of Exit Gas Released (% by Volume)
	See Table 1(a)

Attach an explanation on how temperature, air flow rate, excess air or other operating variables are controlled.

Also supply an assembly drawing, dimensioned and to scale, in plan, elevation, and as many sections as are needed to show clearly the

*Standard Conditions: 68°F, 14.7 psia

US EPA ARCHIVE DOCUMENT

TABLE 6

BOILERS AND HEATERS

Type of Device:	Auxiliary Boiler	Manufacturer:	TBD
Number from flow diagram:	ABL-100	Model Number:	TBD

CHARACTERISTICS OF INPUT

Type Fuel	Chemical Composition (% by Weight)		Inlet Air Temp °F (after preheat)	Fuel Flow Rate (scfm* or lb/hr) Average	Fuel Flow Rate (scfm* or lb/hr) Design Maximum
Natural Gas	Nitrogen	0.37%	ambient	2,081 lb/hr (HHV)	2,081 lb/hr (HHV)
	Carbon Dioxide	1.86%	Gross Heating Value of Fuel (specify units)	Total Air Supplied and Excess Air	
	Methane	91.84%		Average	Design Maximum
	Ethane	5.05%		scfm*	scfm*
	Propane	0.48%		% excess	% excess
	i-Butane	0.12%		(vol)	(vol)
	n-Butante	0.10%			
	i-Pentane	0.04%	23,250 Btu/lb (HHV)		
	n-Pentane	0.03%			
	n-Hexane	0.05%			
	n-Heptane	0.04%			
	n-Octane	0.02%			

HEAT TRANSFER MEDIUM

Type Transfer Medium (Water, oil, etc.)	Temperature °F Input	Temperature °F Output	Pressure (psia) Input	Pressure (psia) Output	Flow Rate (specify units) Average	Flow Rate (specify units) Design Maximum

OPERATING CHARACTERISTICS

Ave. Fire Box Temp. at max. firing rate	Fire Box Volume(ft.3), (from drawing)	Gas Velocity in Fire Box (ft/sec) at max firing rate	Residence Time in Fire Box at max firing rate (sec)
NA	NA	NA	NA

STACK PARAMETERS

Stack Diameters	Stack Height	Stack Gas Velocity (ft/sec) (@Ave. Fuel Flow Rate)	Stack Gas Velocity (ft/sec) (@Max. Fuel Flow Rate)	Stack Gas Temp °F	Exhaust scfm
3 Ft	14 Ft	78		400 ºF	

CHARACTERISTICS OF OUTPUT

Material	Chemical Composition of Exit Gas Released (% by Volume)
	See Table 1(a)

Attach an explanation on how temperature, air flow rate, excess air or other operating variables are controlled.

Also supply an assembly drawing, dimensioned and to scale, in plan, elevation, and as many sections as are needed to show clearly the

*Standard Conditions: 68°F, 14.7 psia

US EPA ARCHIVE DOCUMENT

Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data

Manufacturer:	Model No.	Serial No.	Manufacture Date:
TBD	TBD	TBD	TBD
Rebuilds Date:	No. of Cylinders:	Compression Ratio:	EPN:
	TBD		EGENSTK-100

Application: ☐ Gas Compression ☐ Electric Generation ☐ Refrigeration ☑ Emergency/Stand by

☐ 4 Stroke Cycle ☐ 2 Stroke Cycle ☐ Carbureted ☐ Spark Ignited ☐ Dual Fuel ☐ Fuel Injected

☑ Diesel ☐ Naturally Aspirated ☐ Blower/Pump Scavenged ☐ Turbo Charged and I.C. ☐ Turbo Charged

☐ Intercooled ☐ I.C. Water Temperature ☐ Lean Burn ☐ Rich Burn

Ignition/Injection Timing: Fixed: Variable:

Manufacture Horsepower Rating: Proposed Horsepower Rating: 1,340 hp

Discharge Parameters

Stack Height (ft.)	Stack Diameter (ft.)	Stack Temperature (°F)	Exit Velocity (FPS)
10.00	0.50	200	60

II. Fuel Data

Type of Fuel: ☐ Field Gas ☐ Landfill Gas ☐ LP Gas ☐ Natural Gas ☐ Digester Gas ☑ Diesel

Fuel Consumption (BTU/bhp-hr): Heat Value (HHV) (LHV)

Sulfur Content (grains/100scf - weight %): 0.05%

III. Emission Factors (Before Control)

NOx		CO		SO_2		VOC		Formaldehyde		PM_{10}	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
7		9		0.93		1.0		0.004		0.40	

Source of Emission Factors: ☐ Manufacture Data ☑ AP-42 ☑ Other (specify): NSPS IIII, Table 4 (NOx, CO, VOC and PM)

IV. Emission Factors Post Control

NOx		CO		SO_2		VOC		Formaldehyde		PM_{10}	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv

Method of Emission Control: ☐ NSCR Catalyst ☐ Lean Operation ☐ Parameter Adjustment

☐ Stratified Charge ☐ JLCC Catalyst ☐ Other (specify):

Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.

Is Formaldehyde included in the VOCs? ☐ Yes ☑ No

V. Federal and State Standards (Check all that apply)

☐ NSPS JJJJ ☑ MACT ZZZZ ☑ NSPS IIII ☐ Title 30 Chapter 117 - List County:

VI. Additional Information

1. Submit a copy of the engine manufacturer's site rating and general rating specification data.
2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents.
3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).

US EPA ARCHIVE DOCUMENT

US EPA ARCHIVE DOCUMENT

Texas Commission on Environmental Quality
Table 29 Reciprocating Engines

I. Engine Data

Manufacturer:	Model No.	Serial No.	Manufacture Date:
TBD	TBD	TBD	TBD
Rebuilds Date:	No. of Cylinders:	Compression Ratio:	EPN:
	TBD		FWPSTK-100

Application: ☐ Gas Compression ☐ Electric Generation ☐ Refrigeration ☑ Emergency/Stand by

☐ 4 Stroke Cycle ☐ 2 Stroke Cycle ☐ Carbureted ☐ Spark Ignited ☐ Dual Fuel ☐ Fuel Injected

☑ Diesel ☐ Naturally Aspirated ☐ Blower/Pump Scavenged ☐ Turbo Charged and I.C. ☐ Turbo Charged

☐ Intercooled ☐ I.C. Water Temperature ☐ Lean Burn ☐ Rich Burn

Ignition/Injection Timing: Fixed: Variable:

Manufacture Horsepower Rating: Proposed Horsepower Rating: 617 hp

Discharge Parameters

Stack Height (ft.)	Stack Diameter (ft.)	Stack Temperature (^{o}F)	Exit Velocity (FPS)
10.00	0.50	200	60

II. Fuel Data

Type of Fuel: ☐ Field Gas ☐ Landfill Gas ☐ LP Gas ☐ Natural Gas ☐ Digester Gas ☑ Diesel

Fuel Consumption (BTU/bhp-hr): Heat Value (HHV) (LHV)

Sulfur Content (grains/100scf - weight %): 0.05%

III. Emission Factors (Before Control)

NOx		CO		SO_2		VOC		Formaldehyde		PM_{10}	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv
8		3		0.93		8		0.004		0.40	

Source of Emission Factors: ☐ Manufacture Data ☑ AP-42 ☑ Other (specify): NSPS IIII, Table 4 (NOx, CO, VOC and PM)

IV. Emission Factors Post Control

NOx		CO		SO_2		VOC		Formaldehyde		PM_{10}	
g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv	g/hp-hr	ppmv

Method of Emission Control: ☐ NSCR Catalyst ☐ Lean Operation ☐ Parameter Adjustment

☐ Stratified Charge ☐ JLCC Catalyst ☐ Other (specify):

Note: Must submit a copy of any manufacturer control information that demonstrates control efficiency.

Is Formaldehyde included in the VOCs? ☐ Yes ☑ No

V. Federal and State Standards (Check all that apply)

☐ NSPS JJJJ ☑ MACT ZZZZ ☑ NSPS IIII ☐ Title 30 Chapter 117 - List County:

VI. Additional Information

1. Submit a copy of the engine manufacturer's site rating and general rating specification data.
2. Submit a typical fuel gas analysis, including sulfur content and heating value. For gaseous fuels, provide mole percent of constituents.
3. Submit description of air/fuel ratio control system (manufacturer information is acceptable).

US EPA ARCHIVE DOCUMENT

TABLE 7(a)

VERTICAL FIXED ROOF STORAGE TANK SUMMARY

I. Tank Identification (Use a separate form for each tank).

1. Applicant's Name: **Lon C Hill Power Station**
2. Location (indicate on plot plan and provide coordinates): **Refer to Table 1(a) Page 2**
3. Tank No. **Emergency Generator Diesel Tank** 4. Emission Point No. **TKSTK-101**
5. FIN **TK-101** CIN **N/A**
6. Status: ☑ New Tank ☐ Altered Tank ☐ Relocation ☐ Change of Service

Previous permit or exemption number(s) **N/A**

II. Tank Physical Characteristics

1. Dimensions
   - a. Shell Height: **6.00** ft
   - b. Diameter: **4.50** ft
   - c. Maximum Liquid Height **5.88** ft
   - d. Nominal Capacity or Working Volume: **700** gallons.
   - e. Turnovers per year: **9**
   - f. Net Throughput **6,220** gallons/year
   - g. Maximum Filling Rate: **700** gallons/hour.

2. Paint Characteristics
   - a. Shell Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - b. Shell Condition ☑ Good ☐ Poor
   - c. Roof Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - d. Roof Condition ☑ Good ☐ Poor

3. Roof Characteristics
   - a. Roof Type: ☑ Dome ☐ Cone
   - b. Roof Height: ft. (not including shell height)
   - c. Radius (Dome Roof Only): ft.
   - d. Slope (Cone Roof Only): ft/ft.

4. Breather Vent Settings				
Valve Type	Number	Pressure Setting (psig)	Vacuum Setting (psig)	SPECIFY "Atmosphere" or Discharging to: (name of abatement device)
Combination Vent Valve				
Pressure Vent Valve	**1**	**0.03**		**Atmosphere**
Vacuum Vent Valve	**1**		**-0.03**	
Open Vent Valve				

Table 7(a) VERTICAL FIXED ROOF TANK SUMMARY
Page 2
Permit I ______________ Tank No. Emergency Generator Diesel Tank

III. Liquid Properties of Stored Material

1. Chemical Category: ☐ Organic Liquids ☑ Petroleum Distillates ☐ Crude Oils
2. Single or Multi-Component Liquid
   - ☑ Single Complete Section III.3
   - ☐ Multiple Complete Section III.4
3. Single Component Information
   - a. Chemical Name: Distillate fuel oil no. 2
   - b. CAS Number: ______
   - c. Average Liquid Surface Temperature: 71.5 °F.
   - d. True Vapor Pressure at Average Liquid Surface Temperature: 0.01 psia.
   - e. Liquid Molecular Weight: 188
4. Multiple Component Information
   - a. Mixture Name: ______
   - b. Average Liquid Surface Temperature: ______ °F.
   - c. Minimum Liquid Surface Temperature: ______ °F.
   - d. Maximum Liquid Surface Temperature: ______ °F.
   - e. True Vapor Pressure at Average Liquid Surface Temperature: ______ psia.
   - f. True Vapor Pressure at Minimum Liquid Surface Temperature: ______ psia.
   - g. True Vapor Pressure at Maximum Liquid Surface Temperature: ______ psia.
   - h. Liquid Molecular Weight: ______
   - Vapor Molecular Weight:

j. Chemical Components Information

Chemical Name	CAS Number	Percent of Total Liquid Weight (Typical)	Percent of Total Vapor Weight (Typical)	Molecular Weight

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TABLE 7(a)

VERTICAL FIXED ROOF STORAGE TANK SUMMARY

I. Tank Identification (Use a separate form for each tank).

1. Applicant's Name: **Lon C Hill Power Station**
2. Location (indicate on plot plan and provide coordinates): **Refer to Table 1(a) Page 2**
3. Tank No. **Emergency Generator Diesel Tank** 4. Emission Point No. **TKSTK-102**
5. FIN **TK-102** CIN **N/A**
6. Status: ☑ New Tank ☐ Altered Tank ☐ Relocation ☐ Change of Service

Previous permit or exemption number(s) **N/A**

II. Tank Physical Characteristics

1. Dimensions
   - a. Shell Height: **5.00** ft
   - b. Diameter: **3.50** ft
   - c. Maximum Liquid Height **4.17** ft
   - d. Nominal Capacity or Working Volume: **300** gallons.
   - e. Turnovers per year: **10**
   - f. Net Throughput **2,864** gallons/year
   - g. Maximum Filling Rate: **300** gallons/hour.
2. Paint Characteristics
   - a. Shell Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - b. Shell Condition ☑ Good ☐ Poor
   - c. Roof Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - d. Roof Condition ☑ Good ☐ Poor
3. Roof Characteristics
   - a. Roof Type: ☑ Dome ☐ Cone
   - b. Roof Height: ____ ft. (not including shell height)
   - c. Radius (Dome Roof Only): ____ ft.
   - d. Slope (Cone Roof Only): ____ ft/ft.

4. Breather Vent Settings

Valve Type	Number	Pressure Setting (psig)	Vacuum Setting (psig)	SPECIFY "Atmosphere" or Discharging to: (name of abatement device)
Combination Vent Valve				
Pressure Vent Valve	**1**	**0.03**		**Atmosphere**
Vacuum Vent Valve	**1**		**-0.03**	
Open Vent Valve				

Table 7(a) VERTICAL FIXED ROOF TANK SUMMARY
Page 2
Permit No. ______ Tank No. Emergency Generator Diesel Tank

III. Liquid Properties of Stored Material

1. Chemical Category: ☐ Organic Liquids ☑ Petroleum Distillates ☐ Crude Oils
2. Single or Multi-Component Liquid
   - ☑ Single — Complete Section III.3
   - ☐ Multiple — Complete Section III.4
3. Single Component Information
   - a. Chemical Name: Distillate fuel oil no. 2
   - b. CAS Number: ______
   - c. Average Liquid Surface Temperature: 71.5 °F.
   - d. True Vapor Pressure at Average Liquid Surface Temperature: 0.01 psia.
   - e. Liquid Molecular Weight: 188
4. Multiple Component Information
   - a. Mixture Name: ______
   - b. Average Liquid Surface Temperature: ______ °F.
   - c. Minimum Liquid Surface Temperature: ______ °F.
   - d. Maximum Liquid Surface Temperature: ______ °F.
   - e. True Vapor Pressure at Average Liquid Surface Temperature: ______ psia.
   - f. True Vapor Pressure at Minimum Liquid Surface Temperature: ______ psia.
   - g. True Vapor Pressure at Maximum Liquid Surface Temperature: ______ psia.
   - h. Liquid Molecular Weight: ______
   - Vapor Molecular Weight:

j. Chemical Components Information

Chemical Name	CAS Number	Percent of Total Liquid Weight (Typical)	Percent of Total Vapor Weight (Typical)	Molecular Weight

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TABLE 7(a)

VERTICAL FIXED ROOF STORAGE TANK SUMMARY

I. Tank Identification (Use a separate form for each tank).

1. Applicant's Name: **Lon C Hill Power Station**
2. Location (indicate on plot plan and provide coordinates): **Refer to Table 1(a) Page 2**
3. Tank No. **Gasoline Storage Tank** 4. Emission Point No. **TKSTK-103**
5. FIN **TK-103** CIN **N/A**
6. Status: ☑ New Tank ☐ Altered Tank ☐ Relocation ☐ Change of Service

Previous permit or exemption number(s) **N/A**

II. Tank Physical Characteristics

1. Dimensions
   - a. Shell Height: **5.00** ft
   - b. Diameter: **3.00** ft
   - c. Maximum Liquid Height **4.73** ft
   - d. Nominal Capacity or Working Volume: **250** gallons.
   - e. Turnovers per year: **1**
   - f. Net Throughput **250** gallons/year
   - g. Maximum Filling Rate: **250** gallons/hour.

2. Paint Characteristics
   - a. Shell Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - b. Shell Condition ☑ Good ☐ Poor
   - c. Roof Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - d. Roof Condition ☑ Good ☐ Poor

3. Roof Characteristics
   - a. Roof Type: ☑ Dome ☐ Cone
   - b. Roof Height: ______ ft. (not including shell height)
   - c. Radius (Dome Roof Only): ______ ft.
   - d. Slope (Cone Roof Only): ______ ft/ft.

4. Breather Vent Settings				
Valve Type	Number	Pressure Setting (psig)	Vacuum Setting (psig)	SPECIFY "Atmosphere" or Discharging to: (name of abatement device)
Combination Vent Valve				
Pressure Vent Valve	**1**	**0.03**		**Atmosphere**
Vacuum Vent Valve	**1**		**-0.03**	
Open Vent Valve				

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Table 7(a) VERTICAL FIXED ROOF TANK SUMMARY
Page 2
Permit I________________ Tank No. **Gasoline Storage Tank**

III. Liquid Properties of Stored Material

1. Chemical Category: ☐ Organic Liquids ☑ Petroleum Distillates ☐ Crude Oils
2. Single or Multi-Component Liquid
   - ☑ Single Complete Section III.3
   - ☐ Multiple Complete Section III.4
3. Single Component Information
   - a. Chemical Name: **Gasoline (RVP 10)**
   - b. CAS Number: ________
   - c. Average Liquid Surface Temperature: **71.5** °F.
   - d. True Vapor Pressure at Average Liquid Surface Temperature: **6.7** psia.
   - e. Liquid Molecular Weight: **92**
4. Multiple Component Information
   - a. Mixture Name: ________
   - b. Average Liquid Surface Temperature: _____ °F.
   - c. Minimum Liquid Surface Temperature: _____ °F.
   - d. Maximum Liquid Surface Temperature: _____ °F.
   - e. True Vapor Pressure at Average Liquid Surface Temperature: _____ psia.
   - f. True Vapor Pressure at Minimum Liquid Surface Temperature: _____ psia.
   - g. True Vapor Pressure at Maximum Liquid Surface Temperature: _____ psia.
   - h. Liquid Molecular Weight: ________
   - Vapor Molecular Weight:
   - j. Chemical Components Information

Chemical Name	CAS Number	Percent of Total Liquid Weight (Typical)	Percent of Total Vapor Weight (Typical)	Molecular Weight

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TABLE 7(b)

HORIZONTAL FIXED ROOF STORAGE TANK SUMMARY

I. Tank Identification (Use a separate form for each tank).

1. Applicant's Name: **Lon C Hill Power Station**
2. Location (indicate on plot plan and provide coordinates): **Refer to Table 1(a) Page 2**
3. Tank No. **Ammonia Tank No. 1** 4. Emission Point No. **N/A**
5. FIN **TK-104** CIN **N/A**
6. Status: ☑ New Tank ☐ Altered Tank ☐ Relocation ☐ Change of Service

Previous permit or exemption number(s) **N/A**

II. Tank Physical Characteristics

1. Dimensions
   - a. Shell Height: **42.75** ft
   - b. Diameter: **10.00** ft
   - c. Nominal Capacity or Working Volume: **25,000** gallons.
   - d. Turnovers per year: **9**
   - e. Net Throughput **222,143** gallons/year
   - f. Maximum Filling Rate: **25,000** gallons/hour.
   - g. Is the tank underground: ☐ Yes ☑ No

2. Paint Characteristics
   - a. Shell Color/Shade ☑ White / White ☐ Aluminum/Specular ☐ Aluminum/Specular ☐ Gray / Light ☐ Gray / Medium ☐ Red / Primer ☐ Other, Describe
   - b. Shell Condition ☑ Good ☐ Poor

3. Breather Vent Settings*				
Valve Type	Number	Pressure Setting (psig)	Vacuum Setting (psig)	SPECIFY "Atmosphere" or Discharging to: (name of abatement device)
Combination Vent Valve				
Pressure Vent Valve				
Vacuum Vent Valve				
Open Vent Valve				

*** Pressurized tank**

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Table 7(b) HORIZONTAL FIXED ROOF STORAGE TANK SUMMARY
Page 2
Permit I ______________ Tank No. Ammonia Tank No. 1

III. Liquid Properties of Stored Material

1. Chemical Category: ☐ Organic ☐ Petroleum Distillates ☐ Crude Oils
2. Single or Multi-Component Liquid
   - Complete Section III.3 ☑ Single
   - Complete Section III.4 ☐ Multiple
3. Single Component Information
   - a. Chemical Name: Ammonia
   - b. CAS Number: 7664-41-7
   - c. Average Liquid Surface Temperature: ______ °F.
   - d. True Vapor Pressure at Average Liquid Surface Temperature: ______ psia.
   - e. Liquid Molecular Weight: 17.03
4. Multiple Component Information
   - a. Mixture Name: ______
   - b. Average Liquid Surface Temperature: ______ °F.
   - c. Minimum Liquid Surface Temperature: ______ °F.
   - d. Maximum Liquid Surface Temperature: ______ °F.
   - e. True Vapor Pressure at Average Liquid Surface Temperature: ______ psia.
   - f. True Vapor Pressure at Minimum Liquid Surface Temperature: ______ psia.
   - g. True Vapor Pressure at Maximum Liquid Surface Temperature: ______ psia.
   - h. Liquid Molecular Weight: ______
   - Vapor Molecular Weight:
   - j. Chemical Components Information

Chemical Name	CAS Number	Percent of Total Liquid Weight (Typical)	Percent of Total Vapor Weight (Typical)	Molecular Weight

LON C HILL RE$DEVELOPMENT PROJECT
LON C. HILL, LP

Combined Cycle Units Emission Rates Summary Table (1)

EPN	Air Pollutant	Siemens Turbine		GE Turbine		Worst Case	
		Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)	Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)	Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
STK-101	NOx	32.4	104.4	32.7	97.0	32.7	104.4
	NOx (startup/shutdown)	206.8		206.8		206.8	
	CO	11.7	423.2	11.4	418.6	11.7	423.2
	CO (startup/shutdown)	3,137.2		3,137.2		3,137.2	
	VOC	6.5	71.4	6.5	69.7	6.5	71.4
	VOC (startup/shutdown)	359.7		359.7		359.7	
	SO_2	35.3	5.9	35.9	5.5	35.9	5.9
	$PM_{10}/PM_{2.5}$	29.7	49.7	16.0	54.7	29.7	54.7
	H_2SO_4	5.4	0.9	5.5	0.8	5.5	0.9
	NH_3	24.0	99.9	24.2	92.5	24.2	99.9
	NH_3 (startup/shutdown)	34.0		34.0		34.0	
STK-102	NOx	32.4	104.4	32.7	97.0	32.7	104.4
	NOx (startup/shutdown)	206.8		206.8		206.8	
	CO	11.7	423.2	11.4	418.6	11.7	423.2
	CO (startup/shutdown)	3,137.2		3,137.2		3,137.2	
	VOC	6.5	71.4	6.5	69.7	6.5	71.4
	VOC (startup/shutdown)	359.7		359.7		359.7	
	SO_2	35.3	5.9	35.9	5.5	35.9	5.9
	$PM_{10}/PM_{2.5}$	29.7	49.7	16.0	54.7	29.7	54.7
	H_2SO_4	5.4	0.9	5.5	0.8	5.5	0.9
	NH_3	24.0	99.9	24.2	92.5	24.2	99.9
	NH_3 (startup/shutdown)	34.0		34.0		34.0	

Notes:
(1) Emission rates account for the maximum emission rate estimate for each evaluated scenario using Siemens or GE units.

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		WORST CASE CASE 39	CASE 17	CASE 18	CASE 19	CASE 39	CASE 1	CASE 2	CASE 3	CASE 40
SITE CONDITIONS										
Ambient Temperature	ºF	15.0	15.0	15.0	15.0	15.0	45.0	45.0	45.0	45.0
Relative Humidity	%	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS										
Plant Mode		2X1	2x1	2x1	2x1	2X1	2x1	2x1	2x1	2X1
Net Power Output	MW	736	374	562	674	736	377	567	679	738
GT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT Model		SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F
GT Load		Shaft Limit	Min. Load	75.00	Shaft Limit	Shaft Limit	Min. Load	75.00	Shaft Limit	Shaft Limit
GT Evap. Cooler Status	On/Off	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
GT Fuel Flow Rate	lb/hr	97,213	62,880	85,254	97,213	97,213	62,445	85,195	97,287	97,287
GT Heat Input (LHV)	MMBtu/hr	2,038	1,318	1,787	2,038	2,038	1,309	1,786	2,039	2,039
GT Heat Input (HHV)	MMBtu/hr	2,260	1,462	1,982	2,260	2,260	1,452	1,981	2,262	2,262
DB Status		ON	OFF	OFF	OFF	**ON**	OFF	OFF	OFF	**ON**
DB Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
DB Fuel Flow Rate	lb/hr	12,159	-	-	-	12,159	-	-	-	11,594
DB Heat Input (LHV)	MMBtu/hr	255	-	-	-	255	-	-	-	243
DB Heat Input (HHV)	MMBtu/hr	283	-	-	-	283	-	-	-	270
FUEL ANALYSIS										
Fuel Heat Content (LHV)	Btu/lb	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961
Fuel Heat Content (HHV)	Btu/lb	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
HRSG STACK EXHAUST GAS										
Exhaust Gas Temperature	ºF	185	191	193	198	185	188	190	200	187
Exhaust Gas Flow Rate	lb/hr	4,307,653	2,992,607	3,760,775	4,295,493	4,307,653	2,971,040	3,752,739	4,399,506	4,411,100
Exhaust Gas Flow Rate	lbmole/hr	151,687	104,943	132,066	150,939	151,687	104,314	131,939	154,727	155,436
Exhaust Oxygen, O2	vol%	11.2	13.3	12.6	12.2	11.2	13.2	12.5	12.4	11.4
Exhaust Carbon Dioxide, CO2	vol%	4.5	3.5	3.9	4.0	4.5	3.5	3.9	3.9	4.4
Exhaust Water, H2O	vol%	8.8	7.0	7.6	7.9	8.8	7.3	7.9	8.1	8.9
Exhaust Nitrogen, N2	vol%	74.6	75.3	75.1	75.0	74.6	75.1	74.8	74.8	74.4
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Molecular Weight (Exhaust Gases)	lb/lbmole	28.4	28.5	28.5	28.5	28.4	28.5	28.4	28.4	28.4

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		WORST CASE CASE 39	CASE 17	CASE 18	CASE 19	CASE 39	CASE 1	CASE 2	CASE 3	CASE 40
STACK EXHAUST EMISSION RATES										
NOx	ppmvd @ 15% O_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
NOx	ppmvd	5.1	3.9	4.3	4.5	5.1	3.9	4.3	4.4	5.0
NOx (as NO2)	lb/hr	**32.4**	17.6	24.3	28.8	32.4	17.5	24.2	28.9	32.3
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	2.9	2.2	2.5	2.6	2.9	2.3	2.5	2.5	2.8
CO	lb/hr	11.7	6.4	8.7	10.4	11.7	6.3	8.7	10.4	11.6
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.9	2.2	2.5	2.6	2.9	2.3	2.5	2.5	2.8
VOC (as CH4)	lb/hr	**6.5**	3.5	4.8	5.7	6.5	3.5	4.8	5.8	6.4
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SO2	lb/hr	**35.3**	20.3	27.5	31.4	35.3	20.2	27.5	31.4	35.2
Particulates (Back and Front)	lb/hr	**29.7**	16.6	21.8	24.8	29.7	16.4	21.7	25.1	29.7
SO3 Oxidation	%	10	10	10	10	10	10	10	10	10
SO3	lb/hr	4.4	2.5	3.4	3.9	4.4	2.5	3.4	3.9	4.4
Conversion SO3 to H2SO4	%	100	100	100	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	lb/hr	**5.4**	3.1	4.2	4.8	5.4	3.1	4.2	4.8	5.4
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	10.2	7.9	8.6	9.0	10.2	7.9	8.7	8.8	9.9
NH3	lb/hr	**24.0**	13.1	18.0	21.4	24.0	13.0	17.9	21.4	23.9
Formaldehyde, HCOH (GT Only)	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH (GT Only)	ppmvd	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH (GT Only)	lb/hr	**0.6**	0.3	0.4	0.5	0.6	0.3	0.4	0.5	0.6

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		CASE 4	CASE 5	CASE 6	CASE 41	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
SITE CONDITIONS										
Ambient Temperature	ºF	60.0	60.0	60.0	60.0	75.0	75.0	75.0	75.0	75.0
Relative Humidity	%	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS										
Plant Mode		2x1	2x1	2x1	2X1	2x1	2x1	2x1	2x1	2x1
Net Power Output	MW	380	551	684	740	382	529	680	688	739
GT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT Model		SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F
GT Load		Min. Load	75.00	Shaft Limit	Shaft Limit	Min. Load	75.00	Base	Base	Base
GT Evap. Cooler Status	On/Off	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON
GT Fuel Flow Rate	lb/hr	62,328	82,922	97,922	97,922	62,312	79,943	97,812	98,784	98,772
GT Heat Input (LHV)	MMBtu/hr	1,306	1,738	2,053	2,053	1,306	1,676	2,050	2,071	2,070
GT Heat Input (HHV)	MMBtu/hr	1,449	1,928	2,277	2,277	1,449	1,859	2,274	2,297	2,296
DB Status		OFF	OFF	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
DB Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
DB Fuel Flow Rate	lb/hr	-	-	-	10,956	-	-	-	-	10,009
DB Heat Input (LHV)	MMBtu/hr	-	-	-	230	-	-	-	-	210
DB Heat Input (HHV)	MMBtu/hr	-	-	-	255	-	-	-	-	233
FUEL ANALYSIS										
Fuel Heat Content (LHV)	Btu/lb	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961
Fuel Heat Content (HHV)	Btu/lb	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
HRSG STACK EXHAUST GAS										
Exhaust Gas Temperature	ºF	186	189	200	192	185	189	204	204	196
Exhaust Gas Flow Rate	lb/hr	2,949,985	3,658,664	4,473,279	4,484,235	2,928,880	3,538,531	4,532,962	4,530,005	4,540,014
Exhaust Gas Flow Rate	lbmole/hr	103,880	128,995	157,736	158,395	103,463	125,135	160,287	160,349	160,952
Exhaust Oxygen, O2	vol%	13.0	12.4	12.3	11.4	12.8	12.3	12.3	12.2	11.4
Exhaust Carbon Dioxide, CO2	vol%	3.6	3.9	3.9	4.3	3.6	3.8	3.8	3.9	4.2
Exhaust Water, H2O	vol%	8.1	8.6	8.7	9.5	8.9	9.4	9.4	9.7	10.4
Exhaust Nitrogen, N2	vol%	74.5	74.3	74.2	73.9	73.8	73.7	73.7	73.5	73.2
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Molecular Weight (Exhaust Gases)	lb/lbmole	28.4	28.4	28.4	28.3	28.3	28.3	28.3	28.3	28.2

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		CASE 4	CASE 5	CASE 6	CASE 41	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
STACK EXHAUST EMISSION RATES										
NOx	ppmvd @ 15% O_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
NOx	ppmvd	4.0	4.3	4.4	4.9	4.0	4.4	4.3	4.4	4.9
NOx (as NO2)	lb/hr	17.5	23.6	29.0	32.3	17.5	22.7	29.0	29.3	32.3
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	2.3	2.5	2.5	2.8	2.3	2.5	2.5	2.5	2.8
CO	lb/hr	6.3	8.5	10.5	11.6	6.3	8.2	10.5	10.6	11.6
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.3	2.5	2.5	2.8	2.3	2.5	2.5	2.5	2.8
VOC (as CH4)	lb/hr	3.5	4.7	5.8	6.4	3.5	4.5	5.8	5.8	6.4
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SO2	lb/hr	20.1	26.8	31.6	35.2	20.1	25.8	31.6	31.9	35.1
Particulates (Back and Front)	lb/hr	16.4	21.1	25.3	29.7	16.3	20.4	25.3	25.5	29.5
SO3 Oxidation	%	10	10	10	10	10	10	10	10	10
SO3	lb/hr	2.5	3.3	4.0	4.4	2.5	3.2	3.9	4.0	4.4
Conversion SO3 to H2SO4	%	100	100	100	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	lb/hr	3.1	4.1	4.8	5.4	3.1	4.0	4.8	4.9	5.4
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.0	8.7	8.8	9.8	8.1	8.7	8.7	8.8	9.7
NH3	lb/hr	13.0	17.4	21.5	23.9	13.0	16.8	21.5	21.7	23.9
Formaldehyde, HCOH (GT Only)	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH (GT Only)	ppmvd	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH (GT Only)	lb/hr	0.3	0.4	0.5	0.6	0.3	0.4	0.5	0.5	0.6

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		CASE 12	CASE 13	CASE 14	CASE 15	CASE 16
SITE CONDITIONS						
Ambient Temperature	ºF	95.0	95.0	95.0	95.0	95.0
Relative Humidity	%	60.0	60.0	60.0	60.0	60.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS						
Plant Mode		2x1	2x1	2x1	2x1	2x1
Net Power Output	MW	380	486	626	655	689
GT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT Model		SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F
GT Load		Min. Load	75.00	Base	Base	Base
GT Evap. Cooler Status	On/Off	OFF	OFF	OFF	ON	ON
GT Fuel Flow Rate	lb/hr	62,254	75,151	91,374	95,315	95,356
GT Heat Input (LHV)	MMBtu/hr	1,305	1,575	1,915	1,998	1,999
GT Heat Input (HHV)	MMBtu/hr	1,447	1,747	2,124	2,216	2,217
DB Status		OFF	OFF	OFF	OFF	**ON**
DB Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
DB Fuel Flow Rate	lb/hr	-	-	-	-	6,899
DB Heat Input (LHV)	MMBtu/hr	-	-	-	-	145
DB Heat Input (HHV)	MMBtu/hr	-	-	-	-	160
FUEL ANALYSIS						
Fuel Heat Content (LHV)	Btu/lb	20,961	20,961	20,961	20,961	20,961
Fuel Heat Content (HHV)	Btu/lb	23,250	23,250	23,250	23,250	23,250
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0
HRSG STACK EXHAUST GAS						
Exhaust Gas Temperature	ºF	192	195	208	211	206
Exhaust Gas Flow Rate	lb/hr	2,899,472	3,348,961	4,243,843	4,381,438	4,388,337
Exhaust Gas Flow Rate	lbmole/hr	102,927	118,974	150,772	155,911	156,330
Exhaust Oxygen, O2	vol%	12.5	12.1	12.1	12.0	11.4
Exhaust Carbon Dioxide, CO2	vol%	3.6	3.8	3.8	3.8	4.1
Exhaust Water, H2O	vol%	10.2	10.5	10.6	11.0	11.5
Exhaust Nitrogen, N2	vol%	72.9	72.7	72.7	72.4	72.2
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0
Molecular Weight (Exhaust Gases)	lb/lbmole	28.2	28.1	28.1	28.1	28.1

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates per Unit

		CASE 12	CASE 13	CASE 14	CASE 15	CASE 16
STACK EXHAUST EMISSION RATES						
NOx	ppmvd @ 15% O_2	3.5	3.5	3.5	3.5	3.5
NOx	ppmvd	4.1	4.4	4.4	4.4	4.8
NOx (as NO2)	lb/hr	17.6	21.4	27.1	28.3	30.3
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	2.4	2.5	2.5	2.5	2.7
CO	lb/hr	6.4	7.7	9.8	10.2	10.9
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.4	2.5	2.5	2.5	2.7
VOC (as CH4)	lb/hr	3.5	4.3	5.4	5.6	6.0
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0
SO2	lb/hr	20.1	24.3	29.5	30.8	33.0
Particulates (Back and Front)	lb/hr	16.1	19.1	23.6	24.5	27.3
SO3 Oxidation	%	10	10	10	10	10
SO3	lb/hr	2.5	3.0	3.7	3.8	4.1
Conversion SO3 to H2SO4	%	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	lb/hr	3.1	3.7	4.5	4.7	5.1
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.3	8.7	8.7	8.9	9.5
NH3	lb/hr	13.0	15.8	20.1	20.9	22.4
Formaldehyde, HCOH (GT Only)	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH (GT Only)	ppmvd	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH (GT Only)	lb/hr	0.3	0.4	0.5	0.5	0.5

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates Example Calculations (Worst Case Scenario)

FACILITY CONDITIONS

GT Heat Input (MMBtu/hr) = GT Fuel Flow Rate (lb/hr) * Fuel Heat Content (Btu/lb) * 1 MMBtu/1,000,000 Btu
GT Heat Input (LHV) = 97,213 lb/hr * 20,961 Btu/lb * 1 MMBtu/1,000,000 Btu = 2,038 MMBtu/hr (LHV)
GT Heat Input (LHV) = 97,213 lb/hr * 23,250 Btu/lb * 1 MMBtu/1,000,000 Btu = 2,260 MMBtu/hr (LHV)

DB Heat Input (MMBtu/hr) = DB Fuel Flow Rate (lb/hr) * Fuel Heat Content (Btu/lb) * 1 MMBtu/1,000,000 Btu
DB Heat Input (LHV) = 12,159 lb/hr * 20,961 Btu/lb * 1 MMBtu/1,000,000 Btu = 255 MMBtu/hr (LHV)
DB Heat Input (LHV) = 12,159 lb/hr * 23,250 Btu/lb * 1 MMBtu/1,000,000 Btu = 283 MMBtu/hr (LHV)

FUEL ANALYSIS

HHV/LHV Ratio = Fuel Heat Content (HHV) (Btu/lb) / Fuel Heat Content (LHV) (Btu/lb)
HHV/LHV Ratio = 23,250 Btu/lb / 20,961 Btu/lb = 1.1

Fuel Heat Content (Btu/scf) = Fuel Heat Content (Btu/lb) * Fuel MW (lb/lbmole) / Standard Molar Volume (scf/lbmole)
Fuel Heat Content = 20,961 Btu/lb (LHV) * 16.8 lb/lbmole / 379 scf/lbmole = 926 Btu/scf (LHV)
Fuel Heat Content = 23,250 Btu/lb (HHV) * 16.8 lb/lbmole / 379 scf/lbmole = 1,027 Btu/scf (HHV)

HRSG STACK EXHAUST GAS

HRSG Stack Exhaust Gas Flow Rate (lbmole/hr) = HRSG Stack Exhaust Gas Flow Rate (lb/hr) / Exhaust Gases MW (lb/bmole)
HRSG Stack Exahust Gas Flow Rate = 4,307,653 lb/hr / 28.4 lb/lbmole = 151,687 lbmole/hr

Exhaust Gases Molecular Weight = Sum (Exhaust Vol% * MW)
Exhaust Gases MW = 11.2 O2 vol% * 32 lb/lbmole + 4.5 CO2 vol% * 44 lb/lbmole + 8.8 H2O vol% * 18 lb/lbmole + 74.6 N2 vol% * 28 lb/lbmole + 0.9 Ar vol% * 40 lb/lbmole = 28.4 lb/lbmole

STACK EXHAUST EMISSION RATES

NOx ppmvd = NOx ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NOx = 3.5 ppmvd * (20.95 - 11.2% vol / (1 - 8.8 %vol /100)) / (20.95 - 15) = 5.1 ppmvd

NOx (as NO2) (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * NOx ppmvd /1,000,000 * NO2 MW (lb/lbmole)
NOx (as NO2) = 151,687 lbmole/hr * (1 - 8.8 % vol / 100) * 5.1 ppmvd / 1,000,000 * 46 lb/lbmole = 32.4 lb/hr

CO ppmvd = CO ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
CO = 2.0 ppmvd * (20.95 - 11.2% vol / (1 - 8.8 %vol /100)) / (20.95 - 15) = 2.9 ppmvd

CO (lb/hr) as provided by vendor
CO = 11.7 lb/hr

VOC ppmvd = VOC ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
VOC = 2.0 ppmvd * (20.95 - 11.2% vol / (1 - 8.8 %vol /100)) / (20.95 - 15) = 2.9 ppmvd

VOC (as CH4) (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * VOC ppmvd /1,000,000 * CH4 MW (lb/lbmole)
VOC (as CH4) = 151,687 lbmole/hr * (1 - 8.8 % vol / 100) * 2.9 ppmvd / 1,000,000 * 16 lb/lbmole = 6.5 lb/hr

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Maximum Hourly Emission Rates Example Calculations (Worst Case Scenario)

SO2 (lb/hr) = Total S (grains/Hscf) * 1 Hscf/100 scf * 1lb/7,000 grains / MW S (lbS/lbmoleS) * 1 lbmoleSO2 / 1 lbmoleS * MW SO2 (lbSO2/lbmoleSO2) * (GT HI + DB HI) (MMBtu/hr) * 1,000,000 Btu/MMBtu / Fuel Heat Cont (Btu/scf)
SO2 = 5.0 grains/Hscf * Hscf/100 scf * 1 lb/7,000 grains / 32 lbS/lbmoleS * 1 lbmoleS/lbmoleSO2 * 64 lbSO2/lbmoleSO2 * (2,260 MMBtu/hr + 283 MMBtu/hr) * 1,000,000 Btu/MMBtu / 1,027 Btu/scf = 35.3 lb/hr

Particulates (back and front) as provided by vendor
PM10 = 29.7 lb/hr

SO3 (lb/hr) = SO2 (lb/hr) * % Oxidation * 1lbmole SO3/lbmoleSO2 * MW SO3 (lbSO3/lbmoleSO3) / MW SO2 (lbSO2/lbmoleSO2)
SO3 = 35.3 lb/hr * 10% oxidation/100 * 1 lbmoleSO3 / lbmoleSO2 * 80 lbSO3/lbmoleSO3 / 64 lbSO2/lbmoleSO2 = 4.4 lb/hr

H2SO4 (lb/hr) = SO3 (lb/hr) * % Oxidation * 1lbmoleH2SO4/lbmoleSO3 * MW H2SO4 (lbH2SO4/lbmoleH2SO4) / MW SO3 (lbSO3/lbmoleSO3)
H2SO4 = 4.4 lb/hr * 100% oxidation/100 * 1 lbmoleH2SO4 / lbmoleSO3 * 98 lbH2SO4/lbmoleH2SO4 / 80 lbSO3/lbmoleSO3 = 5.4 lb/hr

NH3 ppmvd = NH3 ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NH3 = 7.0 ppmvd * (20.95 - 11.2% vol / (1 - 8.8 %vol /100)) / (20.95 - 15) = 10.2 ppmvd

NH3 (lb/hr) = Exhaust Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * NH3 ppmvd /1,000,000 * NH3 MW (lb/lbmole)
NH3 = 151,687 lbmole/hr * (1 - 8.8 % vol / 100) * 10.2 ppmvd / 1,000,000 * 17 lb/lbmole = 24.0 lb/hr

HCHO ppmvd = HCHO ppbvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)* 1 ppmvd/1,000 ppbvd
HCHO = 91.0 ppbvd * (20.95 - 11.2% vol / (1 - 8.8 %vol /100)) / (20.95 - 15) * 1 ppmvd / 1,000 ppbvd = 0.1 ppmvd

HCHO (lb/hr) = Exhaust Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * HCHO ppmvd /1,000,000 * HCHO MW (lb/lbmole)
HCHO = 151,687 lbmole/hr * (1 - 8.8 % vol / 100) * 0.1 ppmvd / 1,000,000 * 32 lb/lbmole = 0.6 lb/hr

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates per Unit

		WORST CASE	COOLING TOWER								
		CASE 4 (Air Cond)	CASE 2	CASE 3	CASE 4	CASE 5	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
SITE CONDITIONS											
Ambient Temperature	ºF	13.0	13.0	13.0	13.0	13.0	60.0	60.0	60.0	60.0	60.0
Relative Humidity	%	45.0	45.0	45.0	45.0	45.0	70.0	70.0	70.0	70.0	70.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS											
Plant Mode		2x1	2x1	2x1	2x1	2x1	2x1	2x1	2x1	2x1	2x1
GT Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
GT Model		S207FA.13	S207FA.04	S207FA.05	S207FA.06	S207FA.07	S207FA.09	S207FA.10	S207FA.11	S207FA.12	S207FA.13
GT Load		BASE	BASE	BASE	BASE	62%	BASE	BASE	BASE	BASE	50%
GT Evap. Cooler Status (Cooling Tower)	On/Off	-	Off	Off	Off	Off	On	On	On	Off	Off
Inlet Chiller Status (Air Condenser)	On/Off	Off	-	-	-	-	-	-	-	-	-
GT Fuel Flow Rate	lb/hr	82,537	82,522	82,522	82,522	59,626	78,706	78,706	78,706	77,752	50,086
GT Heat Input (LHV)	MMBtu/hr	1,730	1,730	1,730	1,730	1,250	1,650	1,650	1,650	1,630	1,050
GT Heat Input (HHV)	MMBtu/hr	1,918	1,918	1,918	1,918	1,386	1,829	1,829	1,829	1,807	1,164
DB Status		100% DB Firing	97% DB Firing	10% DB Firing	Unfired	Unfired	10% DB Firing	10% DB Firing	Unfired	Unfired	Unfired
DB Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG	NG
DB Fuel Flow Rate	lb/hr	28,616	14,157	1,463	-	-	1,463	1,463	-	-	-
DB Heat Input (LHV)	MMBtu/hr	600	297	31	-	-	31	31	-	-	-
DB Heat Input (HHV)	MMBtu/hr	665	329	34	-	-	34	34	-	-	-
FUEL ANALYSIS											
Fuel Heat Content (LHV)	Btu/lb	20,964	20,964	20,964	20,964	20,964	20,964	20,964	20,964	20,964	20,964
Fuel Heat Content (HHV)	Btu/lb	23,239	23,239	23,239	23,239	23,239	23,239	23,239	23,239	23,239	23,239
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
HRSG STACK EXHAUST GAS											
Exhaust Gas Temperature	ºF	186	177	184	186	172	189	188	190	189	171
Exhaust Gas Flow Rate	lb/hr	3,775,600	3,761,200	3,748,500	3,747,000	2,704,000	3,582,500	3,582,500	3,581,000	3,547,000	2,388,000
Exhaust Gas Flow Rate	lbmole/hr	133,327	132,451	131,680	131,590	94,961	126,439	126,439	126,349	125,062	84,130
Exhaust Oxygen, O2	vol%	9.8	11.1	12.4	12.5	12.5	12.1	12.1	12.3	12.4	12.7
Exhaust Carbon Dioxide, CO2	vol%	5.2	4.5	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.7
Exhaust Water, H2O	vol%	10.1	8.9	7.8	7.7	7.7	9.0	9.0	8.9	8.7	8.3
Exhaust Nitrogen, N2	vol%	74.1	74.6	75.0	75.0	75.0	74.0	74.0	74.1	74.2	74.4
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Molecular Weight (Exhaust Gases)	lb/lbmole	28.3	28.4	28.5	28.5	28.5	28.3	28.3	28.3	28.4	28.4

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates per Unit

		WORST CASE	COOLING TOWER								
		CASE 4 (Air Cond)	CASE 2	CASE 3	CASE 4	CASE 5	CASE 7	CASE 8	CASE 9	CASE 10	CASE 11
STACK EXHAUST EMISSION RATES											
NOx	ppmvd @ 15% O_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
NOx	ppmvd	5.9	5.1	4.4	4.3	4.4	4.5	4.5	4.4	4.4	4.1
NOx (as NO2)	lb/hr	**32.7**	28.5	24.7	24.3	17.6	23.7	23.7	23.2	22.9	14.7
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	3.4	2.9	2.5	2.5	2.5	2.6	2.6	2.5	2.5	2.4
CO	lb/hr	**11.4**	9.9	8.6	8.5	6.1	8.2	8.2	8.1	8.0	5.1
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	3.4	2.9	2.5	2.5	2.5	2.6	2.6	2.5	2.5	2.4
VOC (as CH4)	lb/hr	**6.5**	5.7	4.9	4.8	3.5	4.7	4.7	4.6	4.6	2.9
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SO2	lb/hr	**35.9**	31.2	27.1	26.7	19.3	25.9	25.9	25.4	25.1	16.2
Particulates (Back and Front)	lb/hr	**16.0**	12.0	12.0	9.0	9.0	12.0	12.0	9.0	9.0	9.0
SO3 Oxidation	%	10	10	10	10	10	10	10	10	10	10
SO3	lb/hr	4.5	3.9	3.4	3.3	2.4	3.2	3.2	3.2	3.1	2.0
Conversion SO3 to H2SO4	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
H2SO4 (Sulfuric Acid Mist)	lb/hr	**5.5**	4.8	4.2	4.1	2.9	4.0	4.0	3.9	3.8	2.5
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	11.9	10.3	8.9	8.7	8.7	8.9	8.9	8.8	8.7	8.3
NH3	lb/hr	**24.2**	21.1	18.3	18.0	13.0	17.5	17.5	17.2	17.0	10.9
Formaldehyde, HCOH (GT Only)	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH (GT Only)	ppmvd	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH (GT Only)	lb/hr	**0.6**	0.5	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.3

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates per Unit

		AIR CONDENSER								
		CASE 4	CASE 5	CASE 6	CASE 7	CASE 9	CASE 10	CASE 11	CASE 12	CASE 13
SITE CONDITIONS										
Ambient Temperature	ºF	13.0	13.0	13.0	13.0	60.0	60.0	60.0	60.0	60.0
Relative Humidity	%	45.0	45.0	45.0	45.0	70.0	70.0	70.0	70.0	70.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS										
Plant Mode		2x1	2x1	2x1	2x1	2x1	2x1	2x1	2x1	2x1
GT Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG
GT Model		S207FA.13	S207FA.13	S207FA.13	S207FA.13	S207FA.13	S207FA.13	S207FA.13	S207FA.13	S207FA.13
GT Load		BASE	BASE	BASE	62%	BASE	BASE	BASE	BASE	50%
GT Evap. Cooler Status (Cooling Tower)	On/Off	-	-	-	-	-	-	-	-	-
Inlet Chiller Status (Air Condenser)	On/Off	Off	Off	Off	Off	On	On	On	Off	Off
GT Fuel Flow Rate	lb/hr	82,537	82,537	82,537	59,741	80,376	80,376	80,376	77,743	49,957
GT Heat Input (LHV)	MMBtu/hr	1,730	1,730	1,730	1,252	1,685	1,685	1,685	1,630	1,047
GT Heat Input (HHV)	MMBtu/hr	1,918	1,918	1,918	1,388	1,868	1,868	1,868	1,807	1,161
DB Status		100% DB Firing	10% DB Firing	Unfired	Unfired	97% DB Firing	10% DB Firing	Unfired	Unfired	Unfired
DB Fuel Type		NG	NG	NG	NG	NG	NG	NG	NG	NG
DB Fuel Flow Rate	lb/hr	28,616	2,862	-	-	27,626	2,862	-	-	-
DB Heat Input (LHV)	MMBtu/hr	600	60	-	-	579	60	-	-	-
DB Heat Input (HHV)	MMBtu/hr	665	67	-	-	642	67	-	-	-
FUEL ANALYSIS										
Fuel Heat Content (LHV)	Btu/lb	20,964	20,964	20,964	20,964	20,964	20,964	20,964	20,964	20,964
Fuel Heat Content (HHV)	Btu/lb	23,239	23,239	23,239	23,239	23,239	23,239	23,239	23,239	23,239
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
HRSG STACK EXHAUST GAS										
Exhaust Gas Temperature	ºF	186	197	198	185	185	194	196	194	180
Exhaust Gas Flow Rate	lb/hr	3,775,600	3,749,900	3,747,000	2,704,000	3,675,600	3,650,900	3,648,000	3,547,000	2,388,000
Exhaust Gas Flow Rate	lbmole/hr	133,327	131,765	131,590	94,961	130,205	128,704	128,528	125,062	84,130
Exhaust Oxygen, O2	vol%	9.8	12.2	12.5	12.5	9.6	12.1	12.4	12.4	12.7
Exhaust Carbon Dioxide, CO2	vol%	5.2	4.0	3.9	3.9	5.1	4.0	3.9	3.9	3.7
Exhaust Water, H2O	vol%	10.1	7.9	7.7	7.7	10.9	8.7	8.5	8.7	8.3
Exhaust Nitrogen, N2	vol%	74.1	74.9	75.0	75.0	73.4	74.3	74.4	74.2	74.4
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Molecular Weight (Exhaust Gases)	lb/lbmole	28.3	28.5	28.5	28.5	28.2	28.4	28.4	28.4	28.4

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates per Unit

		AIR CONDENSER								
		CASE 4	CASE 5	CASE 6	CASE 7	CASE 9	CASE 10	CASE 11	CASE 12	CASE 13
STACK EXHAUST EMISSION RATES										
NOx	ppmvd @ 15% O_2	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
NOx	ppmvd	5.9	4.5	4.3	4.4	6.0	4.5	4.4	4.4	4.1
NOx (as NO2)	lb/hr	32.7	25.2	24.3	17.6	31.8	24.5	23.7	22.9	14.7
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	3.4	2.6	2.5	2.5	3.4	2.6	2.5	2.5	2.4
CO	lb/hr	11.4	8.8	8.5	6.1	11.1	8.5	8.2	8.0	5.1
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	3.4	2.6	2.5	2.5	3.4	2.6	2.5	2.5	2.4
VOC (as CH4)	lb/hr	6.5	5.0	4.8	3.5	6.3	4.9	4.7	4.6	2.9
Total Sulfur in Fuel, S	grains/100scf	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
SO2	lb/hr	35.9	27.6	26.7	19.3	34.9	26.9	26.0	25.1	16.1
Particulates (Back and Front)	lb/hr	16.0	16.0	9.0	9.0	16.0	16.0	9.0	9.0	9.0
SO3 Oxidation	%	10	10	10	10	10	10	10	10	10
SO3	lb/hr	4.5	3.4	3.3	2.4	4.4	3.4	3.2	3.1	2.0
Conversion SO3 to H2SO4	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
H2SO4 (Sulfuric Acid Mist)	lb/hr	5.5	4.2	4.1	3.0	5.3	4.1	4.0	3.8	2.5
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	11.9	9.0	8.7	8.7	11.9	9.1	8.8	8.7	8.3
NH3	lb/hr	24.2	18.6	18.0	13.0	23.6	18.2	17.5	17.0	10.9
Formaldehyde, HCOH (GT Only)	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH (GT Only)	ppmvd	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Formaldehyde, HCOH (GT Only)	lb/hr	0.6	0.5	0.4	0.3	0.6	0.4	0.4	0.4	0.3

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates Example Calculations (Worst Case Scenario)

FACILITY CONDITIONS
GT Fuel Flow Rate (lb/hr) = GT Heat Input (MMBtu/hr) * 1,000,000 Btu/ 1 MMBtu / Fuel Heat Content (Btu/lb)
GT Fuel Flow Rate = 1,730 MMBtu/hr (LHV) * 1,000,000 Btu/MMBtu / 20,964 Btu/lb (LHV) = 82,537 lb/hr

GT Heat Input (MMBtu/hr) (HHV) = GT Heat Input (MMBtu/hr) (LHV) * HHV/LHV Ratio
GT Heat Input = 1,730 MMBtu/hr (LHV) * 1.1 = 1,918 MMBtu/hr (HHV)

DB Fuel Flow Rate (lb/hr) = DB Heat Input (MMBtu/hr) * 1,000,000 Btu/ 1 MMBtu / Fuel Heat Content (Btu/lb)
DB Fuel Flow Rate = 665 MMBtu/hr (HHV) * 1,000,000 Btu/MMBtu / 23,239 Btu/lb (HHV) = 28,616 lb/hr

DB Heat Input (MMBtu/hr) (LHV) = GT Heat Input (MMBtu/hr) (HHV) / HHV/LHV Ratio
DB Heat Input = 665 MMBtu/hr (HHV) / 1.1 = 600 MMBtu/hr (LHV)

FUEL ANALYSIS
HHV/LHV Ratio = Fuel Heat Content (HHV) (Btu/lb) / Fuel Heat Content (LHV) (Btu/lb)
HHV/LHV Ratio = 23,239 Btu/lb / 20,964 Btu/lb = 1.1

Fuel Heat Content (Btu/scf) = Fuel Heat Content (Btu/lb) * Fuel MW (lb/lbmole) / Standard Molar Volume (scf/lbmole)
Fuel Heat Content = 20,964 Btu/lb (LHV) * 16.8 lb/lbmole / 379 scf/lbmole = 926 Btu/scf (LHV)
Fuel Heat Content = 23,239 Btu/lb (HHV) * 16.8 lb/lbmole / 379 scf/lbmole = 1,027 Btu/scf (HHV)

HRSG STACK EXHAUST GAS
HRSG Stack Exhaust Gas Flow Rate (lbmole/hr) = HRSG Stack Exhaust Gas Flow Rate (lb/hr) / Exhaust Gases MW (lb/bmole)
HRSG Stack Exahust Gas Flow Rate = 3,775,600 lb/hr / 28.3 lb/lbmole = 133,327 lbmole/hr

Exhaust Gases Molecular Weight = Sum (Exhaust Vol% * MW)
Exhaust Gases MW = 9.8 O_2 vol% * 32 lb/lbmole + 5.2 CO_2 vol% * 44 lb/lbmole + 10.1 H_2O vol% * 18 lb/lbmole + 74.1 N_2 vol% * 28 lb/lbmole + 0.9 Ar vol% * 40 lb/lbmole = 28.3 lb/lbmole

STACK EXHAUST EMISSION RATES
NOx ppmvd = NOx ppmvd @ 15% O_2 * (20.95-O_2 %vol/(1-H_2O% vol/100))/(20.95-15)
NOx = 3.5 ppmvd * (20.95 - 9.8% vol / (1 - 10.1 %vol /100)) / (20.95 - 15) = 5.9 ppmvd

NOx (as NO_2) (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H_2O vol%/100) * NOx ppmvd /1,000,000 * NO_2 MW (lb/lbmole)
NOx (as NO_2) = 133,327 lbmole/hr * (1 - 10.1 % vol / 100) * 5.9 ppmvd / 1,000,000 * 46 lb/lbmole = 32.7 lb/hr

CO ppmvd = CO ppmvd @ 15% O_2 * (20.95-O_2 %vol/(1-H_2O% vol/100))/(20.95-15)
CO = 2.0 ppmvd * (20.95 - 9.8% vol / (1 - 10.1 %vol /100)) / (20.95 - 15) = 3.4 ppmvd

CO (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H_2O vol%/100) * CO ppmvd /1,000,000 * CO MW (lb/lbmole)
CO = 133,327 lbmole/hr * (1 - 10.1 % vol / 100) * 3.4 ppmvd / 1,000,000 * 28 lb/lbmole = 11.4 lb/hr

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Maximum Hourly Emission Rates Example Calculations (Worst Case Scenario)

VOC ppmvd = VOC ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
VOC = 2.0 ppmvd * (20.95 - 9.8% vol / (1 - 10.1 %vol /100)) / (20.95 - 15) = 3.4 ppmvd

VOC (as CH4) (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * VOC ppmvd /1,000,000 * CH4 MW (lb/lbmole)
VOC (as CH4) = 133,327 lbmole/hr * (1 - 10.1 % vol / 100) * 3.4 ppmvd / 1,000,000 * 16 lb/lbmole = 6.5 lb/hr

SO2 (lb/hr) = Total S (grains/Hscf) * 1 Hscf/100 scf * 1lb/7,000 grains / MW S (lbS/lbmoleS) * 1 lbmoleSO2 / 1 lbmoleS * MW SO2 (lbSO2/lbmoleSO2) * (GT HI + DB HI) (MMBtu/hr) * 1,000,000 Btu/MMBtu / Fuel Heat Cont (Btu/scf)
SO2 = 5.0 grains/Hscf * Hscf/100 scf * 1 lb/7,000 grains / 32 lbS/lbmoleS * 1 lbmoleS/lbmoleSO2 * 64 lbSO2/lbmoleSO2 * (1,918 MMBtu/hr + 665 MMBtu/hr) * 1,000,000 Btu/MMBtu / 1,027 Btu/scf = 35.9 lb/hr

Particulates (back and front) as provided by vendor
PM10 = 16.0 lb/hr

SO3 (lb/hr) = SO2 (lb/hr) * % Oxidation * 1lbmole SO3/lbmoleSO2 * MW SO3 (lbSO3/lbmoleSO3) / MW SO2 (lbSO2/lbmoleSO2)
SO3 = 16.0 lb/hr * 10% oxidation/100 * 1 lbmoleSO3 / lbmoleSO2 * 80 lbSO3/lbmoleSO3 / 64 lbSO2/lbmoleSO2 = 4.5 lb/hr

H2SO4 (lb/hr) = SO3 (lb/hr) * % Oxidation * 1lbmoleH2SO4/lbmoleSO3 * MW H2SO4 (lbH2SO4/lbmoleH2SO4) / MW SO3 (lbSO3/lbmoleSO3)
H2SO4 = 4.5 lb/hr * 100% oxidation/100 * 1 lbmoleH2SO4 / lbmoleSO3 * 98 lbH2SO4/lbmoleH2SO4 / 80 lbSO3/lbmoleSO3 = 5.5 lb/hr

NH3 ppmvd = NH3 ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NH3 = 7.0 ppmvd * (20.95 - 9.8% vol / (1 - 10.1 %vol /100)) / (20.95 - 15) = 11.9 ppmvd

NH3 (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * NH3 ppmvd /1,000,000 * NH3 MW (lb/lbmole)
NH3 = 133,327 lbmole/hr * (1 - 10.1 % vol / 100) * 11.9 ppmvd / 1,000,000 * 17 lb/lbmole = 24.2 lb/hr

HCHO ppmvd = HCHO ppbvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)* 1 ppmvd/1,000 ppbvd
HCHO = 91.0 ppbvd * (20.95 - 9.8% vol / (1 - 10.1 %vol /100)) / (20.95 - 15) * 1 ppmvd / 1,000 ppbvd = 0.2 ppmvd

HCHO (lb/hr) = Exhast Gas Flow Rate (lbmole/hr) * (1- H2O vol%/100) * HCHO ppmvd /1,000,000 * HCHO MW (lb/lbmole)
HCHO = 133,327 lbmole/hr * (1 - 10.1 % vol / 100) * 0.2 ppmvd / 1,000,000 * 32 lb/lbmole = 0.6 lb/hr

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates per Unit

		Scenario 1			Scenario 2			Scenario 3		
		CASE 3	CASE 3	CASE 40	CASE 6	CASE 6	CASE 41	CASE 10	CASE 10	CASE 11
SITE CONDITIONS										
Ambient Temperature	ºF	45.0	45.0	45.0	60.0	60.0	60.0	75.0	75.0	75.0
Relative Humidity	%	45.0	45.0	45.0	70.0	70.0	70.0	70.0	70.0	70.0
Site Pressure	psia	14.656	14.656	14.656	14.656	14.656	14.656	14.656	14.656	14.656
FACILITY CONDITIONS										
		WITHOUT SU/SD	WITH SU/SD		WITHOUT SU/SD	WITH SU/SD		WITHOUT SU/SD	WITH SU/SD	
Annual Hours of Operation	hr/yr	4,385	3,813	4,375	4,385	3,813	4,375	4,385	3,813	4,375
Plant Mode		2x1	2x1	2X1	2x1	2x1	2X1	2x1	2x1	2x1
GT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT Model		SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F
GT Load		Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit	Base	Base	Base
GT Evap. Cooler Status	On/Off	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
GT Fuel Flow Rate	lb/hr	97,287	97,287	97,287	97,922	97,922	97,922	98,784	98,784	98,772
GT Heat Input (LHV)	MMBtu/hr	2,039	2,039	2,039	2,053	2,053	2,053	2,071	2,071	2,070
GT Heat Input (HHV)	MMBtu/hr	2,262	2,262	2,262	2,277	2,277	2,277	2,297	2,297	2,296
DB Status		OFF	OFF	ON	OFF	OFF	ON	OFF	OFF	ON
DB Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
DB Fuel Flow Rate	lb/hr	-	-	11,594	-	-	10,956	-	-	10,009
DB Heat Input (LHV)	MMBtu/hr	-	-	243	-	-	230	-	-	210
DB Heat Input (HHV)	MMBtu/hr	-	-	270	-	-	255	-	-	233
GT+DB Heat Input (HHV)	MMBtu/hr	2,262	2,262	2,531	2,277	2,277	2,531	2,297	2,297	2,529
FUEL ANALYSIS										
Fuel Heat Content (LHV)	Btu/lb	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961	20,961
Fuel Heat Content (HHV)	Btu/lb	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250	23,250
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
HRSG STACK EXHAUST GAS										
Exhaust Gas Temperature	ºF	200	200	187	200	200	192	204	204	196
Exhaust Gas Flow Rate	lb/hr	4,399,506	4,399,506	4,411,100	4,473,279	4,473,279	4,484,235	4,530,005	4,530,005	4,540,014
Exhaust Gas Flow Rate	MMlbmole/yr	678	590	680	692	601	693	703	611	704
Exhaust Oxygen, O2	vol%	12.4	12.4	11.4	12.3	12.3	11.4	12.2	12.2	11.4
Exhaust Carbon Dioxide, CO2	vol%	3.9	3.9	4.4	3.9	3.9	4.3	3.9	3.9	4.2
Exhaust Water, H2O	vol%	8.1	8.1	8.9	8.7	8.7	9.5	9.7	9.7	10.4
Exhaust Nitrogen, N2	vol%	74.8	74.8	74.4	74.2	74.2	73.9	73.5	73.5	73.2
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
MW (GT Exhaust Gases)	lb/lbmole	28.4	28.4	28.4	28.4	28.4	28.3	28.3	28.3	28.2

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates per Unit

		Scenario 1			Scenario 2			Scenario 3		
		CASE 3	CASE 3	CASE 40	CASE 6	CASE 6	CASE 41	CASE 10	CASE 10	CASE 11
STACK EXHAUST EMISSION RATES										
NOx	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NOx (as NO2)	lb/hr	17.1	17.1	19.1	17.2	17.2	19.1	17.3	17.3	19.1
NOx (as NO2)	tpy	37.5	32.6	41.8	37.7	32.8	41.8	37.9	33.0	41.8
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CO	lb/hr	10.4	10.4	11.6	10.5	10.5	11.6	10.6	10.6	11.6
CO	tpy	22.8	19.8	25.4	23.0	20.0	25.4	23.2	20.2	25.4
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.5	2.5	2.8	2.5	2.5	2.8	2.5	2.5	2.8
VOC (as CH4)	tpy	12.6	11.0	14.1	12.7	11.0	14.1	12.8	11.1	14.1
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
SO2	tpy	2.8	2.4	3.1	2.8	2.4	3.1	2.8	2.4	3.1
Particulates (Back and Front)	lb/hr	9.9	9.9	12.7	10.0	10.0	12.7	10.1	10.1	12.5
Particulates	tpy	21.7	18.9	27.8	21.9	19.1	27.8	22.1	19.3	27.3
SO3 Oxidation	%	10	10	10	10	10	10	10	10	10
SO3	tpy	0.3	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.4
Conversion SO3 to H2SO4	%	100	100	100	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	tpy	0.4	0.4	0.5	0.4	0.4	0.5	0.4	0.4	0.5
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.8	8.8	9.9	8.8	8.8	9.8	8.8	8.8	9.7
NH3	tpy	46.9	40.7	52.3	47.1	41.0	52.2	47.6	41.4	52.3
Formaldehyde, HCOH	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH	ppmvd	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH	tpy	1.1	1.0	1.3	1.2	1.0	1.3	1.2	1.0	1.3

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates per Unit

		Scenario 4 - 45°F			Scenario 4 - 60°F		
		CASE 3	CASE 3	CASE 40	CASE 6	CASE 6	CASE 41
SITE CONDITIONS							
Ambient Temperature	ºF	45.0	45.0	45.0	60.0	60.0	60.0
Relative Humidity	%	45.0	45.0	45.0	70.0	70.0	70.0
Site Pressure	psia	14.656	14.656	14.656	14.656	14.656	14.656
FACILITY CONDITIONS							
		WITHOUT SU/SD	WITH SU/SD		WITHOUT SU/SD	WITH SU/SD	
Annual Hours of Operation	hr/yr	2,949	2,613	2,188	1,437	1,200	2,188
Plant Mode		2x1	2x1	2X1	2x1	2x1	2X1
GT Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
GT Model		SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F	SCC6-5000F
GT Load		Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit	Shaft Limit
GT Evap. Cooler Status	On/Off	OFF	OFF	OFF	OFF	OFF	OFF
GT Fuel Flow Rate	lb/hr	97,287	97,287	97,287	97,922	97,922	97,922
GT Heat Input (LHV)	MMBtu/hr	2,039	2,039	2,039	2,053	2,053	2,053
GT Heat Input (HHV)	MMBtu/hr	2,262	2,262	2,262	2,277	2,277	2,277
DB Status		OFF	OFF	ON	OFF	OFF	ON
DB Fuel Type		Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
DB Fuel Flow Rate	lb/hr	-	-	11,594	-	-	10,956
DB Heat Input (LHV)	MMBtu/hr	-	-	243	-	-	230
DB Heat Input (HHV)	MMBtu/hr	-	-	270	-	-	255
GT+DB Heat Input (HHV)	MMBtu/hr	2,262	2,262	2,531	2,277	2,277	2,531
FUEL ANALYSIS							
Fuel Heat Content (LHV)	Btu/lb	20,961	20,961	20,961	20,961	20,961	20,961
Fuel Heat Content (HHV)	Btu/lb	23,250	23,250	23,250	23,250	23,250	23,250
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2
HRSG STACK EXHAUST GAS							
Exhaust Gas Temperature	ºF	200	200	187	200	200	192
Exhaust Gas Flow Rate	lb/hr	4,399,506	4,399,506	4,411,100	4,473,279	4,473,279	4,484,235
Exhaust Gas Flow Rate	MMlbmole/yr	456	404	340	227	189	346
Exhaust Oxygen, O2	vol%	12.4	12.4	11.4	12.3	12.3	11.4
Exhaust Carbon Dioxide, CO2	vol%	3.9	3.9	4.4	3.9	3.9	4.3
Exhaust Water, H2O	vol%	8.1	8.1	8.9	8.7	8.7	9.5
Exhaust Nitrogen, N2	vol%	74.8	74.8	74.4	74.2	74.2	73.9
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0
MW (GT Exhaust Gases)	lb/lbmole	28.4	28.4	28.4	28.4	28.4	28.3

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates per Unit

		Scenario 4 - 45°F			Scenario 4 - 60°F		
		CASE 3	CASE 3	CASE 40	CASE 6	CASE 6	CASE 41
STACK EXHAUST EMISSION RATES							
NOx	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
NOx (as NO2)	lb/hr	17.1	17.1	19.1	17.2	17.2	19.1
NOx (as NO2)	tpy	25.2	22.3	20.9	12.4	10.3	20.9
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
CO	lb/hr	10.4	10.4	11.6	10.5	10.5	11.6
CO	tpy	15.3	13.6	12.7	7.5	6.3	12.7
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.5	2.5	2.8	2.5	2.5	2.8
VOC (as CH4)	tpy	8.5	7.5	7.0	4.2	3.5	7.0
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2
SO2	tpy	1.9	1.6	1.5	0.9	0.8	1.5
Particulates (Back and Front)	lb/hr	9.9	9.9	12.7	10.0	10.0	12.7
Particulates	tpy	14.6	12.9	13.9	7.2	6.0	13.9
SO3 Oxidation	%	10	10	10	10	10	10
SO3	tpy	0.2	0.2	0.2	0.1	0.1	0.2
Conversion SO3 to H2SO4	%	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	tpy	0.3	0.3	0.2	0.1	0.1	0.2
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.8	8.8	9.9	8.8	8.8	9.8
NH3	tpy	31.5	27.9	26.1	15.4	12.9	26.1
Formaldehyde, HCOH	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH	ppmvd	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH	tpy	0.8	0.7	0.6	0.4	0.32	0.6

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates Example Calculations (Scenario 1)

FACILITY CONDITIONS
Annual Hours of Operation with no DB and no SU/SD = 8,760 - Hours of Operation with DB ON
Annual Hours of Operation with no DB and no SU/SD = 8,760 - 4,375 = 4,385 hr/yr

Annual Hours of Operation with no DB and SU/SD = 8,760 - Hours of Operation with DB ON - Hours of SU/SD
Annual Hours of Operation with no DB and no SU/SD = 8,760 - 4,375 - 572 = 3,813 hr/yr

GT Heat Input (MMBtu/hr) = GT Fuel Flow Rate (lb/hr) * Fuel Heat Content (Btu/lb) * 1 MMBtu/1,000,000 Btu
GT Heat Input (LHV) = 97,287 lb/hr * 20,961 Btu/lb * 1 MMBtu/1,000,000 Btu = 2,039 MMBtu/hr (LHV)
GT Heat Input (LHV) = 97,287 lb/hr * 23,250 Btu/lb * 1 MMBtu/1,000,000 Btu = 2,262 MMBtu/hr (LHV)

DB Heat Input (MMBtu/hr) = DB Fuel Flow Rate (lb/hr) * Fuel Heat Content (Btu/lb) * 1 MMBtu/1,000,000 Btu
DB Heat Input (LHV) = 11,594 lb/hr * 20,961 Btu/lb * 1 MMBtu/1,000,000 Btu = 243 MMBtu/hr (LHV)
DB Heat Input (HHV) = 11,594 lb/hr * 23,250 Btu/lb * 1 MMBtu/1,000,000 Btu = 270 MMBtu/hr (HHV)

GT + DB Heat Input (MMBtu/hr) = GT Heat Input (MMBtu/hr) + DB Heat Input (MMBtu/hr)
GT + DB Heat Input = 2,262 MMBtu/hr (HHV) + 270 MMBtu/hr (HHV) = 2,531 MMBtu/hr (HHV)

FUEL ANALYSIS
HHV/LHV Ratio = Fuel Heat Content (HHV) (Btu/lb) / Fuel Heat Content (LHV) (Btu/lb)
HHV/LHV Ratio = 23,250 Btu/lb / 20,961 Btu/lb = 1.1

Fuel Heat Content (Btu/scf) = Fuel Heat Content (Btu/lb) * Fuel MW (lb/lbmole) / Standard Molar Volume (scf/lbmole)
Fuel Heat Content = 20,961 Btu/lb (LHV) * 16.8 lb/lbmole / 379 scf/lbmole = 926 Btu/scf (LHV)
Fuel Heat Content = 23,250 Btu/lb (HHV) * 16.8 lb/lbmole / 379 scf/lbmole = 1,027 Btu/scf (HHV)

HRSG STACK EXHAUST GAS
HRSG Stack Exhaust Gas Flow Rate (MMlbmole/yr) = Stack Exhaust Gas Flow Rate (lb/hr) / Exhaust Gases MW (lb/bmole) * Hours of Operation (hr/yr) * 1 MMlbmole/1,000,000 lbmole
HRSG Stack Exahust Gas Flow Rate (DB ON Case 40) = 4,411,100 lb/hr / 28.4 lb/lbmole * 4,375 hr/yr * 1 MMlbmole/1,000,000 lbmole = 680 MMlbmole/yr

Exhaust Gases Molecular Weight = Sum (Exhaust Vol% * MW)
Exhaust Gases MW = 11.4 O_2 vol% * 32 lb/lbmole + 4.4 CO_2 vol% * 44 lb/lbmole + 8.9 H_2O vol% * 18 lb/lbmole + 74.4 N_2 vol% * 28 lb/lbmole + 0.9 Ar vol% * 40 lb/lbmole = 28.4 lb/lbmole

STACK EXHAUST EMISSION RATES
NOx (as NO_2) (lb/hr) as provided by vendor
NOx (as NO_2) (DB ON Case 40) = 19.1 lb/hr

NOx (as NO_2) (tpy) = NOx (as NO_2) (lb/hr) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
NOx (as NO_2) (DB ON Case 40) = 19.1 lb/hr * 4,375 hr/yr * 1 ton/2,000lb = 41.8 tpy

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates Example Calculations (Scenario 1)

CO (lb/hr) as provided by vendor
CO (DB ON Case 40) = 11.6 lb/hr

CO (tpy) = CO (lb/hr) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
CO (DB ON Case 40) = 11.6 lb/hr * 4,375 hr/yr * 1 ton/2,000lb = 25.4 tpy

VOC ppmvd = VOC ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
VOC (DB ON Case 40) = 2.0 ppmvd * (20.95 - 11.4% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 2.8 ppmvd

VOC (as CH4) (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * VOC ppmvd /1,000,000 * CH4 MW (lb/lbmole) * 1 ton/ 2,000 lb
VOC (as CH4) (DB ON Case 40) = 680 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 2.8 ppmvd / 1,000,000 * 16 lb/lbmole * 1 ton/2,000 lb = 14.1 tpy

SO2 (tpy) = Total S (grains/Hscf) * 1 Hscf/100 scf * 1lb/7,000 grains / MW S (lbS/lbmoleS) * 1 lbmoleSO2 / 1 lbmoleS * MW SO2 (lbSO2/lbmoleSO2) * GT+DB HI (MMBtu/hr) * 1,000,000 Btu/MMBtu / Fuel Heat Cont (Btu/scf) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
SO2 (DB ON Case 40) = 0.2 grains/Hscf * Hscf/100 scf * 1 lb/7,000 grains / 32 lbS/lbmoleS * 1 lbmoleS/lbmoleSO2 * 64 lbSO2/lbmoleSO2 * 2,531 MMBtu/hr * 1,000,000 Btu/MMBtu / 1,027 Btu/scf * 4,375 hr/yr * 1 ton/2,000 lb = 3.1 tpy

Particulates (back and front) as provided by vendor
PM10 (DB ON Case 40) = 12.7 lb/hr

PM10 (tpy) = PM10 (lb/hr) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
PM10) (DB ON Case 40) = 12.7 lb/hr * 4,375 hr/yr * 1 ton/2,000lb = 27.8 tpy

SO3 (tpy) = SO2 (tpy) * % Oxidation * 1lbmole SO3/lbmoleSO2 * MW SO3 (lbSO3/lbmoleSO3) / MW SO2 (lbSO2/lbmoleSO2)
SO3 (DB ON Case 40) = 3.1 tpy * 10% oxidation/100 * 1 lbmoleSO3 / lbmoleSO2 * 80 lbSO3/lbmoleSO3 / 64 lbSO2/lbmoleSO2 = 0.4 tpy

H2SO4 (lb/hr) = SO3 (tpy) * % Oxidation * 1lbmoleH2SO4/lbmoleSO3 * MW H2SO4 (lbH2SO4/lbmoleH2SO4) / MW SO3 (lbSO3/lbmoleSO3)
H2SO4 (DB ON Case 40) = 0.4 tpy * 100% oxidation/100 * 1 lbmoleH2SO4 / lbmoleSO3 * 98 lbH2SO4/lbmoleH2SO4 / 80 lbSO3/lbmoleSO3 = 0.5 tpy

NH3 ppmvd = NH3 ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NH3 (DB ON Case 40) = 7.0 ppmvd * (20.95 - 11.4% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 9.9 ppmvd

NH3 (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * NH3 ppmvd /1,000,000 * NH3 MW (lb/lbmole) * 1 ton/ 2,000 lb
NH3 (DB ON Case 40) = 680 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 9.9 ppmvd / 1,000,000 * 17 lb/lbmole * 1 ton/2,000 lb = 52.3 tpy

HCHO ppmvd = HCHO ppbvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)* 1 ppmvd/1,000 ppbvd
HCHO (DB ON Case 40) = 91.0 ppbvd * (20.95 - 11.4% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) * 1 ppmvd / 1,000 ppbvd = 0.1 ppmvd

HCHO (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * HCHO ppmvd /1,000,000 * HCHO MW (lb/lbmole) * 1 ton/ 2,000 lb
HCHO (DB ON Case 40) = 680 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 0.1 ppmvd / 1,000,000 * 32 lb/lbmole * 1 ton/2,000 lb = 1.3 tpy

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SIEMENS SCC6-5000F
Annual Average Emission Rates Summary Table per Unit

		Scenario 1 [2]		Scenario 2 [3]		Scenario 3 [4]		Scenario 4 [5]		Proposed Annual Emission Rate (tpy) [6]
Ambient Temperature		45 ºF		60 ºF		75 ºF		45 ºF - 60 ºF		
Evap. Coolers / Inlet Chillers		OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	
Duct Firing		ON	ON	ON	ON	ON	ON	ON	ON	
SU/SD Included?[1]		No	Yes	No	Yes	No	Yes	No	Yes	
NOx (as NO_2)	tpy	79.3	104.0	79.5	104.2	79.7	104.4	79.3	104.0	104.4
CO	tpy	48.2	422.8	48.4	423.0	48.6	423.2	48.2	422.9	423.2
VOC (as CH_4)	tpy	26.7	71.3	26.7	71.3	26.9	71.4	26.7	71.3	71.4
SO_2	tpy	5.8		5.9		5.9		5.8		5.9
$PM_{10}/PM_{2.5}$	tpy	49.5		49.7		49.5		49.6		49.7
H_2SO_4 (Sulfuric Acid Mist)	tpy	0.9		0.9		0.9		0.9		0.9
NH_3	tpy	99.1		99.3		99.9		99.2		99.9
Formaldehyde, HCOH	tpy	2.4		2.4		2.4		1.4		2.4

Notes:

(1) "Yes" case assumes 260 startups per year (572 hours per year startup and shutdown time, and 8,188 hrs/yr at base load).

(2) Assumes an effective average ambient temperature of 45 °F.
NOx (Scenario 1 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 1 SU/SD Not Included) = 37.5 tpy + 41.8 tpy = 79.3 tpy
NOx (Scenario 1 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 1 SU/SD Included) = 32.6 tpy + 41.8 tpy + 29.6 tpy = 104.0 tpy

(3) Assumes an effective average ambient temperature of 60 °F.
NOx (Scenario 2 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 2 SU/SD Not Included) = 37.7 tpy + 41.8 tpy = 79.5 tpy
NOx (Scenario 2 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 2 SU/SD Included) = 32.8 tpy + 41.8 tpy + 29.6 tpy = 104.2 tpy

(4) Assumes an effective average ambient temperature of 75 °F with evap coolers and/or chillers on.
NOx (Scenario 3 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 3 SU/SD Not Included) = 37.9 tpy + 41.8 tpy = 79.7 tpy
NOx (Scenario 3 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 3 SU/SD Included) = 33.0 tpy + 41.8 tpy + 29.6 tpy = 104.4 tpy

(5) Assumes an average ambient temperature from April to October of 45 °F (simulates inlet cooling) and an average temperature from November to March of 60 °F. Details provided in the table below.
NOx (Scenario 4 SU/SD Not Included) = NOx (April - October) + NOx (November - March)
NOx (as NO2) (Scenario 4 SU/SD Not Included = 46.1 tpy + 33.2 tpy = 79.3 tpy
NOx (Scenario 4 SU/SD Included) = NOx (April - October) + NOx (November - March)
NOx (as NO2) (Scenario 4 SU/SD Included = 60.6 tpy + 43.5 tpy = 104.0 tpy

(6) Proposed Annual Emission Rate = Maximum Annual Emission Rate for scenarios (1) through (4)

Scenario 4 Details

		Scenario 4			
		Apr-Oct		Nov-March	
Ambient Temperature (ºF)		45	45	60	60
SU/SD Included?		No	Yes	No	Yes
NOx (as NO_2)	tpy	46.1	60.6	33.2	43.5
CO	tpy	28.0	247.7	20.2	175.2
VOC (as CH_4)	tpy	15.5	41.7	11.2	29.6
SO_2	tpy	3.4		2.4	
PM	tpy	28.5		21.1	
H_2SO_4 (Sulfuric Acid Mist)	tpy	0.5		0.4	
NH_3	tpy	57.6		41.5	
Formaldehyde, HCOH	tpy	1.4		-	

Notes:

April - October (45 ºF)
NOx (Scenario 4 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 4 SU/SD Not Included) = 25.2 tpy + 20.9 tpy = 46.1 tpy
NOx (Scenario 4 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 4 SU/SD Included) = 22.3 tpy + 20.9 tpy + 17.4 tpy = 60.6 tpy

November - March (60 ºF)
NOx (Scenario 4 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 4 SU/SD Not Included) = 12.4 tpy + 20.9 tpy = 33.2 tpy
NOx (Scenario 4 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 4 SU/SD Included) = 10.3 tpy + 20.9 tpy + 12.2 tpy = 43.5 tpy

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Annual Average Emission Rates per Unit

		COOLING TOWER					
		Scenario 1			Scenario 2		
		CASE 4	CASE 4	CASE 2	CASE 9	CASE 9	CASE 7
SITE CONDITIONS							
Ambient Temperature	ºF	13.0	13.0	13.0	60.0	60.0	60.0
Relative Humidity	%	45.0	45.0	45.0	70.0	70.0	70.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS							
		WITHOUT SU/SD	WITH SU/SD		WITHOUT SU/SD	WITH SU/SD	
Annual Hours of Operation	hr/yr	4,385	3,813	4,375	4,385	3,813	4,375
Plant Mode		2x1	2x1	2x1	2x1	2x1	2x1
GT Fuel Type		NG	NG	NG	NG	NG	NG
GT Model		S207FA.04	S207FA.04	S207FA.04	S207FA.04	S207FA.04	S207FA.04
GT Load		BASE	BASE	BASE	BASE	BASE	BASE
GT Evap. Cooler Status (Cooling Tower) Inlet Chiller Status (Air Condenser)	On/Off	Off	Off	Off	On	On	On
GT Fuel Flow Rate	lb/hr	82,522	82,522	82,522	78,706	78,706	78,706
GT Heat Input (LHV)	MMBtu/hr	1,730	1,730	1,730	1,650	1,650	1,650
GT Heat Input (HHV)	MMBtu/hr	1,918	1,918	1,918	1,829	1,829	1,829
DB Status		Unfired	Unfired	97% DB Firing	Unfired	Unfired	10% DB Firing
DB Fuel Type		NG	NG	NG	NG	NG	NG
DB Fuel Flow Rate	lb/hr	-	-	14,157	-	-	1,463
DB Heat Input (LHV)	MMBtu/hr	-	-	297	-	-	31
DB Heat Input (HHV)	MMBtu/hr	-	-	329	-	-	34
GT+DB Heat Input (HHV)	MMBtu/hr	1,918	1,918	2,247	1,829	1,829	1,863
FUEL ANALYSIS							
Fuel Heat Content (LHV)	Btu/lb	20,964	20,964	20,964	20,964	20,964	20,964
Fuel Heat Content (HHV)	Btu/lb	23,239	23,239	23,239	23,239	23,239	23,239
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Annual Average Emission Rates per Unit

		COOLING TOWER					
		Scenario 1			Scenario 2		
		CASE 4	CASE 4	CASE 2	CASE 9	CASE 9	CASE 7
HRSG STACK EXHAUST GAS							
Exhaust Gas Temperature	ºF	186	186	177	190	190	189
Exhaust Gas Flow Rate	lb/hr	3,747,000	3,747,000	3,761,200	3,581,000	3,581,000	3,582,500
Exhaust Gas Flow Rate	MMlbmole/yr	577	502	579	554	482	553
Exhaust Oxygen, O2	vol%	12.5	12.5	11.1	12.3	12.3	12.1
Exhaust Carbon Dioxide, CO2	vol%	3.9	3.9	4.5	3.9	3.9	3.9
Exhaust Water, H2O	vol%	7.7	7.7	8.9	8.9	8.9	9.0
Exhaust Nitrogen, N2	vol%	75.0	75.0	74.6	74.1	74.1	74.0
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0
MW (GT Exhaust Gases)	lb/lbmole	28.5	28.5	28.4	28.3	28.3	28.3
STACK EXHAUST EMISSION RATES							
NOx	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
NOx	ppmvd	2.5	2.5	2.9	2.5	2.5	2.6
NOx (as NO2)	tpy	30.5	26.5	35.6	29.1	25.3	29.6
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	2.5	2.5	2.9	2.5	2.5	2.6
CO	tpy	18.5	16.1	21.7	17.7	15.4	18.0
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.5	2.5	2.9	2.5	2.5	2.6
VOC (as CH4)	tpy	10.6	9.2	12.4	10.2	8.8	10.3
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2
SO2	tpy	2.3	2.0	2.7	2.2	1.9	2.3
Particulates (Back and Front)	lb/hr	9.0	9.0	12.0	9.0	9.0	12.0
Particulates	tpy	19.7	17.2	26.3	19.7	17.2	26.3
SO3 Oxidation	%	10.0	10.0	10.0	10.0	10.0	10.0
SO3	tpy	0.3	0.3	0.3	0.3	0.2	0.3
Conversion SO3 to H2SO4	%	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	tpy	0.4	0.3	0.4	0.3	0.3	0.3
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.7	8.7	10.3	8.8	8.8	8.9
NH3	tpy	39.5	34.3	46.1	37.7	32.8	38.3
Formaldehyde, HCOH	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH	ppmvd	0.1	0.1	0.1	0.1	0.1	0.1
Formaldehyde, HCOH	tpy	1.0	0.8	1.1	0.9	0.8	0.9

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Annual Average Emission Rates per Unit

		AIR CONDENSER					
		Scenario 3			Scenario 4		
		CASE 6	CASE 6	CASE 4	CASE 11	CASE 11	CASE 9
SITE CONDITIONS							
Ambient Temperature	ºF	13.0	13.0	13.0	60.0	60.0	60.0
Relative Humidity	%	45.0	45.0	45.0	70.0	70.0	70.0
Site Pressure	psia	14.7	14.7	14.7	14.7	14.7	14.7
FACILITY CONDITIONS							
		WITHOUT SU/SD	WITH SU/SD		WITHOUT SU/SD	WITH SU/SD	
Annual Hours of Operation	hr/yr	4,385	3,813	4,375	4,385	3,813	4,375
Plant Mode		2x1	2x1	2x1	2x1	2x1	2x1
GT Fuel Type		NG	NG	NG	NG	NG	NG
GT Model		S207FA.15	S207FA.15	S207FA.13	S207FA.20	S207FA.20	S207FA.18
GT Load		BASE	BASE	BASE	BASE	BASE	BASE
GT Evap. Cooler Status (Cooling Tower) Inlet Chiller Status (Air Condenser)	On/Off	Off	Off	Off	On	On	On
GT Fuel Flow Rate	lb/hr	82,537	82,537	82,537	80,376	80,376	80,376
GT Heat Input (LHV)	MMBtu/hr	1,730	1,730	1,730	1,685	1,685	1,685
GT Heat Input (HHV)	MMBtu/hr	1,918	1,918	1,918	1,868	1,868	1,868
DB Status		Unfired	Unfired	100% DB Firing	Unfired	Unfired	97% DB Firing
DB Fuel Type		NG	NG	NG	NG	NG	NG
DB Fuel Flow Rate	lb/hr	-	-	28,616	-	-	27,626
DB Heat Input (LHV)	MMBtu/hr	-	-	600	-	-	579
DB Heat Input (HHV)	MMBtu/hr	-	-	665	-	-	642
GT+DB Heat Input (HHV)	MMBtu/hr	2,249	2,249	2,247	2,254	2,254	2,252
FUEL ANALYSIS							
Fuel Heat Content (LHV)	Btu/lb	20,964	20,964	20,964	20,964	20,964	20,964
Fuel Heat Content (HHV)	Btu/lb	23,239	23,239	23,239	23,239	23,239	23,239
HHV/LHV Ratio		1.1	1.1	1.1	1.1	1.1	1.1
Fuel Molecular Weight	lb/lbmole	16.8	16.8	16.8	16.8	16.8	16.8
Fuel Heat Content (LHV)	Btu/scf	926	926	926	926	926	926
Fuel Heat Content (HHV)	Btu/scf	1,027	1,027	1,027	1,027	1,027	1,027
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2

US EPA ARCHIVE DOCUMENT

LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

GE S207FA.04
Annual Average Emission Rates per Unit

		AIR CONDENSER					
		Scenario 3			Scenario 4		
		CASE 6	CASE 6	CASE 4	CASE 11	CASE 11	CASE 9
HRSG STACK EXHAUST GAS							
Exhaust Gas Temperature	ºF	198	198	186	196	196	185
Exhaust Gas Flow Rate	lb/hr	3,747,000	3,747,000	3,775,600	3,648,000	3,648,000	3,675,600
Exhaust Gas Flow Rate	MMlbmole/yr	577	502	583	564	490	570
Exhaust Oxygen, O2	vol%	12.5	12.5	9.8	12.4	12.4	9.6
Exhaust Carbon Dioxide, CO2	vol%	3.9	3.9	5.2	3.9	3.9	5.1
Exhaust Water, H2O	vol%	7.7	7.7	10.1	8.5	8.5	10.9
Exhaust Nitrogen, N2	vol%	75.0	75.0	74.1	74.4	74.4	73.4
Exhaust Argon, Ar	vol%	0.9	0.9	0.9	0.9	0.9	0.9
Total	vol%	100.0	100.0	100.0	100.0	100.0	100.0
MW (GT Exhaust Gases)	lb/lbmole	28.5	28.5	28.3	28.4	28.4	28.2
STACK EXHAUST EMISSION RATES							
NOx	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
NOx	ppmvd	2.5	2.5	3.4	2.5	2.5	3.4
NOx (as NO2)	tpy	30.5	26.5	40.9	29.7	25.8	39.8
CO	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
CO	ppmvd	2.5	2.5	3.4	2.5	2.5	3.4
CO	tpy	18.5	16.1	24.9	18.1	15.7	24.2
VOC	ppmvd @ 15% O_2	2.0	2.0	2.0	2.0	2.0	2.0
VOC (non-methane, non-ethane)	ppmvd	2.5	2.5	3.4	2.5	2.5	3.4
VOC (as CH4)	tpy	10.6	9.2	14.3	10.4	9.0	13.9
Total Sulfur in Fuel, S	grains/100scf	0.2	0.2	0.2	0.2	0.2	0.2
SO2	tpy	2.7	2.4	2.7	2.7	2.4	2.7
Particulates (Back and Front)	lb/hr	9.0	9.0	16.0	9.0	9.0	16.0
Particulates	tpy	19.7	17.2	35.0	19.7	17.2	35.0
SO3 Oxidation	%	10.0	10.0	10.0	10.0	10.0	10.0
SO3	tpy	0.3	0.3	0.3	0.3	0.3	0.3
Conversion SO3 to H2SO4	%	100	100	100	100	100	100
H2SO4 (Sulfuric Acid Mist)	tpy	0.4	0.4	0.4	0.4	0.4	0.4
NH3	ppmvd @ 15% O_2	7.0	7.0	7.0	7.0	7.0	7.0
NH3	ppmvd	8.7	8.7	11.9	8.8	8.8	11.9
NH3	tpy	39.5	34.3	53.0	38.5	33.4	51.6
Formaldehyde, HCOH	ppbvd @ 15% O_2	91.0	91.0	91.0	91.0	91.0	91.0
Formaldehyde, HCOH	ppmvd	0.1	0.1	0.2	0.1	0.1	0.2
Formaldehyde, HCOH	tpy	1.0	0.8	1.3	0.9	0.8	1.3

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Annual Average Emission Rates Example Calculations (Scenario 1)

FACILITY CONDITIONS
Annual Hours of Operation with no DB and no SU/SD = 8,760 - Hours of Operation with DB ON
Annual Hours of Operation with no DB and no SU/SD = 8,760 - 4,375 = 4,385 hr/yr

Annual Hours of Operation with no DB and SU/SD = 8,760 - Hours of Operation with DB ON - Hours of SU/SD
Annual Hours of Operation with no DB and no SU/SD = 8,760 - 4,375 - 572 = 3,813 hr/yr

GT Fuel Flow Rate (lb/hr) = GT Heat Input (MMBtu/hr) * 1,000,000 Btu/ 1 MMBtu / Fuel Heat Content (Btu/lb)
GT Fuel Flow Rate = 1,730 MMBtu/hr (LHV) * 1 MMBtu/1,000,000 Btu / 20,964 Btu/lb (LHV) = 82,522 lb/hr

GT Heat Input (MMBtu/hr) (HHV) = GT Heat Input (MMBtu/hr) (LHV) * HHV/LHV Ratio
GT Heat Input = 1,730 MMBtu/hr (LHV) * 1.1 = 1,918 MMBtu/hr (HHV)

DB Fuel Flow Rate (lb/hr) = DB Heat Input (MMBtu/hr) * 1,000,000 Btu/ 1 MMBtu / Fuel Heat Content (Btu/lb)
DB Fuel Flow Rate = 329 MMBtu/hr (HHV) * 1,000,000 Btu/MMBtu / 23,239 Btu/lb (HHV) = 14,157 lb/hr

DB Heat Input (MMBtu/hr) (LHV) = GT Heat Input (MMBtu/hr) (HHV) / HHV/LHV Ratio
DB Heat Input = 329 MMBtu/hr (HHV) / 1.1 = 297 MMBtu/hr (LHV)

GT + DB Heat Input (MMBtu/hr) = GT Heat Input (MMBtu/hr) + DB Heat Input (MMBtu/hr)
GT + DB Heat Input = 1,918 MMBtu/hr (HHV) + 329 MMBtu/hr (HHV) = 2,247 MMBtu/hr (HHV)

FUEL ANALYSIS
HHV/LHV Ratio = Fuel Heat Content (HHV) (Btu/lb) / Fuel Heat Content (LHV) (Btu/lb)
HHV/LHV Ratio = 23,239 Btu/lb / 20,964 Btu/lb = 1.1

Fuel Heat Content (Btu/scf) = Fuel Heat Content (Btu/lb) * Fuel MW (lb/lbmole) / Standard Molar Volume (scf/lbmole)
Fuel Heat Content = 20,964 Btu/lb (LHV) * 16.8 lb/lbmole / 379 scf/lbmole = 926 Btu/scf (LHV)
Fuel Heat Content = 23,239 Btu/lb (HHV) * 16.8 lb/lbmole / 379 scf/lbmole = 1,027 Btu/scf (HHV)

HRSG STACK EXHAUST GAS
HRSG Stack Exhaust Gas Flow Rate (MMlbmole/yr) = Stack Exhaust Gas Flow Rate (lb/hr) / Exhaust Gases MW (lb/bmole) * Hours of Operation (hr/yr) * 1 MMlbmole/1,000,000 lbmole
HRSG Stack Exahust Gas Flow Rate (DB ON Case 2) = 3,761,200 lb/hr / 28.4 lb/lbmole * 4,375 hr/yr * 1 MMlbmole/1,000,000 lbmole = 579 MMlbmole/yr

Exhaust Gases Molecular Weight = Sum (Exhaust Vol% * MW)
Exhaust Gases MW = 11.1 O2 vol% * 32 lb/lbmole + 4.5 CO2 vol% * 44 lb/lbmole + 8.9 H2O vol% * 18 lb/lbmole + 74.6 N2 vol% * 28 lb/lbmole + 0.9 Ar vol% * 40 lb/lbmole = 28.4 lb/lbmole

STACK EXHAUST EMISSION RATES
NOx ppmvd = NOx ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NOx (DB ON Case 2) = 2.0 ppmvd * (20.95 - 11.1% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 2.9 ppmvd

NOx (as NO2) (tpy) = Exhast Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * NOx ppmvd /1,000,000 * NO2 MW (lb/lbmole) * 1 ton/ 2,000 lb
NOx (DB ON Case 2) = 579 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 2.9 ppmvd / 1,000,000 * 46 lb/lbmole * 1 ton/2,000 lb = 35.6 tpy

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Annual Average Emission Rates Example Calculations (Scenario 1)

CO ppmvd = CO ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
CO (DB ON Case 2) = 2.0 ppmvd * (20.95 - 11.1% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 2.9 ppmvd

CO (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * CO ppmvd /1,000,000 * CO MW (lb/lbmole) * 1 ton/ 2,000 lb
CO (DB ON Case 2) = 579 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 2.9 ppmvd / 1,000,000 * 28 lb/lbmole * 1 ton/2,000 lb = 21.7 tpy

VOC ppmvd = VOC ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
VOC (DB ON Case 2) = 2.0 ppmvd * (20.95 - 11.1% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 2.9 ppmvd

VOC (as CH4) (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * VOC ppmvd /1,000,000 * CH4 MW (lb/lbmole) * 1 ton/ 2,000 lb
VOC (as CH4) (DB ON Case 2) = 579 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 2.9 ppmvd / 1,000,000 * 16 lb/lbmole * 1 ton/2,000 lb = 12.4 tpy

SO2 (tpy) = Total S (grains/Hscf) * 1 Hscf/100 scf * 1lb/7,000 grains / MW S (lbS/lbmoleS) * 1 lbmoleSO2 / 1 lbmoleS * MW SO2 (lbSO2/lbmoleSO2) * GT+DB HI (MMBtu/hr) * 1,000,000 Btu/MMBtu / Fuel Heat Cont (Btu/scf) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
SO2 (DB ON Case 2) = 0.2 grains/Hscf * Hscf/100 scf * 1 lb/7,000 grains / 32 lbS/lbmoleS * 1 lbmoleS/lbmoleSO2 * 64 lbSO2/lbmoleSO2 * 2,247 MMBtu/hr * 1,000,000 Btu/MMBtu / 1,027 Btu/scf * 4,375 hr/yr * 1 ton/2,000 lb = 2.7 tpy

Particulates (back and front) as provided by vendor
PM10 (DB ON Case 2) = 12.0 lb/hr

PM10 (tpy) = PM10 (lb/hr) * Hours of Operation (hr/yr) * 1 ton/2,000 lb
PM10) (DB ON Case 2) = 12.0 lb/hr * 0 hr/yr * 1 ton/2,000lb = 26.3 tpy

SO3 (tpy) = SO2 (tpy) * % Oxidation * 1lbmole SO3/lbmoleSO2 * MW SO3 (lbSO3/lbmoleSO3) / MW SO2 (lbSO2/lbmoleSO2)
SO3 (DB ON Case 2) = 2.7 tpy * 10% oxidation/100 * 1 lbmoleSO3 / lbmoleSO2 * 80 lbSO3/lbmoleSO3 / 64 lbSO2/lbmoleSO2 = 0.3 tpy

H2SO4 (lb/hr) = SO3 (tpy) * % Oxidation * 1lbmoleH2SO4/lbmoleSO3 * MW H2SO4 (lbH2SO4/lbmoleH2SO4) / MW SO3 (lbSO3/lbmoleSO3)
H2SO4 (DB ON Case 2)= 0.3 tpy * 100% oxidation/100 * 1 lbmoleH2SO4 / lbmoleSO3 * 98 lbH2SO4/lbmoleH2SO4 / 80 lbSO3/lbmoleSO3 = 0.4 tpy

NH3 ppmvd = NH3 ppmvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)
NH3 (DB ON Case 2) = 7.0 ppmvd * (20.95 - 11.1% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) = 10.3 ppmvd

NH3 (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * NH3 ppmvd /1,000,000 * NH3 MW (lb/lbmole) * 1 ton/ 2,000 lb
NH3 (DB ON Case 2) = 579 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 10.3 ppmvd / 1,000,000 * 17 lb/lbmole * 1 ton/2,000 lb = 46.1 tpy

HCHO ppmvd = HCHO ppbvd @ 15% O2 * (20.95-O2 %vol/(1-H2O% vol/100))/(20.95-15)* 1 ppmvd/1,000 ppbvd
HCHO (DB ON Case 2) = 91.0 ppbvd * (20.95 - 11.1% vol / (1 - 8.9 %vol /100)) / (20.95 - 15) * 1 ppmvd / 1,000 ppbvd = 0.1 ppmvd

HCHO (tpy) = Exhaust Gas Flow Rate (MMlbmole/yr) * 1,000,000 lbmole/1 MMlbmole * (1- H2O vol%/100) * HCHO ppmvd /1,000,000 * HCHO MW (lb/lbmole) * 1 ton/ 2,000 lb
HCHO (DB ON Case 2) = 579 MMlbmole/yr * 1,000,000 lbmole/MMlbmole * (1 - 8.9 % vol / 100) * 0.1 ppmvd / 1,000,000 * 32 lb/lbmole * 1 ton/2,000 lb = 1.1 tpy

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Annual Average Emission Rates Summary Table per Unit

		Cooling Tower				Air Condenser				Proposed Annual Emission Rate (tpy) [6]
		Scenario 1 [2]		Scenario 2 [3]		Scenario 3 [4]		Scenario 4 [5]		
Ambient Temperature		13 ºF		60 ºF		13 ºF		60 ºF		
Evap. Coolers / Inlet Chillers		OFF	OFF	ON	ON	OFF	OFF	ON	ON	
Duct Firing		ON	ON	ON	ON	ON	ON	ON	ON	
SU/SD Included?[1]		No	Yes	No	Yes	No	Yes	No	Yes	
NOx (as NO_2)	tpy	66.1	91.7	58.7	84.5	71.4	97.0	69.5	95.2	97.0
CO	tpy	40.2	415.4	35.7	411.0	43.5	418.6	42.3	417.5	418.6
VOC (as CH_4)	tpy	23.0	67.9	20.5	65.4	24.9	69.7	24.2	69.1	69.7
SO_2	tpy	5.1		4.5		5.5		5.5		5.5
$PM_{10}/PM_{2.5}$	tpy	46.0		46.0		54.7		54.7		54.7
H_2SO_4 (Sulfuric Acid Mist)	tpy	0.8		0.7		0.8		0.8		0.8
NH_3	tpy	85.6		76.0		92.5		90.0		92.5
Formaldehyde, HCOH	tpy	2.1		1.9		2.3		2.2		2.3

Notes:

(1) "Yes" case assumes 260 startups per year (572 hours per year startup and shut down time, and 8,188 hrs/yr at base load).

(2) Assumes an effective average ambient temperature of 13 ^{o}F with units couple with a cooling tower.
NOx (Scenario 1 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 1 SU/SD Not Included) = 30.5 tpy + 35.6 tpy = 66.1 tpy
NOx (Scenario 1 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 1 SU/SD Included) = 26.5 tpy + 35.6 tpy + 29.6 tpy = 91.7 tpy

(3) Assumes an effective average ambient temperature of 60 ^{o}F with units couple with a cooling tower and evap. coolers on.
NOx (Scenario 2 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 2 SU/SD Not Included) = 29.1 tpy + 29.6 tpy = 58.7 tpy
NOx (Scenario 2 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 2 SU/SD Included) = 25.3 tpy + 29.6 tpy + 29.6 tpy = 84.5 tpy

(4) Assumes an effective average ambient temperature of 13 ^{o}F with unit couple with an air condenser.
NOx (Scenario 3 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 3 SU/SD Not Included) = 30.5 tpy + 40.9 tpy = 71.4 tpy
NOx (Scenario 3 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 3 SU/SD Included) = 26.5 tpy + 40.9 tpy + 29.6 tpy = 97.0 tpy

(5) Assumes an effective average ambient temperature of 60 ^{o}F with units couple with an air condenser and inlet chillers on.
NOx (Scenario 4 SU/SD Not Included) = NOx (DB OFF NO SU/SD) + NOx (DB ON)
NOx (as NO2) (Scenario 4 SU/SD Not Included) = 29.7 tpy + 39.8 tpy = 69.5 tpy
NOx (Scenario 4 SU/SD Included) = NOx (DB OFF w/ SU/SD) + NOx (DB ON) + NOx (SU/SD)
NOx (as NO2) (Scenario 4 SU/SD Included) = 25.8 tpy + 39.8 tpy + 29.6 tpy = 95.2 tpy

(6) Proposed Annual Emission Rate = Maximum Annual Emission Rate for scenarios (1) through (4)

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Natural Gas Fuel Analysis

Compound	Formula	MW (lb/lbmole)	Raw mol%	Normalized mol%	Weight %	Hydrocarbons Pseudo-Formula	
						# C x mol%	#H x mol%
Nitrogen	N2	28.0	0.22	0.22	0.37	-	-
Carbon Dioxide	CO2	44.0	0.71	0.71	1.86	-	-
Methane	CH4	16.0	95.97	95.97	91.84	0.96	3.84
Ethane	C2H6	30.1	2.82	2.81	5.05	0.06	0.17
Propane	C3H8	44.1	0.18	0.18	0.48	0.005	0.01
i-Butane	i-C4H10	58.1	0.03	0.03	0.12	0.001	0.003
n-Butante	n-C4H10	58.1	0.03	0.03	0.10	0.001	0.003
i-Pentane	i-C5H12	72.1	0.01	0.01	0.04	0.0005	0.001
n-Pentane	n-C5H12	72.1	0.01	0.01	0.03	0.0003	0.001
n-Hexane	n-C6H14	86.2	0.01	0.01	0.05	0.0005	0.001
n-Heptane	n-C7H16	100.2	0.01	0.01	0.04	0.0005	0.001
n-Octane	n-C8H18	114.2	0.003	0.003	0.02	0.0003	0.001
	Total	**16.77**	**100.00**	**100.00**	**100.00**	**1.03**	**4.03**

Notes:
1. Composition per Siemens Performance Data.

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GT SU/SD Emission Rates per Unit Summary Table (1)

Air Pollutant	Max. Hourly Emission Rate (lb/hr)(2)	Annual Emission Rate (tpy)(3)
NOx	206.80	29.60
CO	3,137.20	377.59
VOC	359.70	46.24
NH_3	34.00	-

Notes
(1) Proposed emission rates per gas turbine startup/shutdown.
(2) Proposed maximum hourly emissions represent the maxium 1-hr emission rates due to any startup or shutdown event.
- Data as provided by vendor
- Hourly SO_2, PM_{10}/$PM_{2.5}$ and H_2SO_4 emission rates are expected to be within the routine operations limits, therefore no SU/SD hourly emission rates are proposed for these pollutants.
- Hourly NH_3 emissions rate could exceed routine operation levels during certain startup scenarios. Based on operational data from a similar facility, startup emission rates may be as high as 34 lb/hr. Because the frequency of events is limited, annual emission rates are not impacted.

(3) Annual emissions represent the sum of total proposed annual startups and shutdowns.
- Annual SO_2, PM_{10}/$PM_{2.5}$, H_2SO_4, and NH_3 emission rates will not be higher than those occuring during routine operations, therefore no SU/SD annual emission rates are proposed for these pollutants.

Startup/Shutdown Events Characteristics

Air Pollutant	Cold Startup				Warm Startup				Hot Startup				Shutdown			
	Max. Emission Rate (lb/hr) (1)	Emission Factor (lb/event) (1)	Event Duration (min) (2)	No. Events per Year (3)	Max. Emission Rate (lb/hr) (1)	Emission Factor (lb/event) (1)	Event Duration (min) (2)	No. Events per Year (3)	Max. Emission Rate (lb/hr) (1)	Emission Factor (lb/event) (1)	Event Duration (min) (2)	No. Events per Year (3)	Max. Emission Rate (lb/hr) (1)	Emission Factor (lb/event) (1)	Event Duration (min) (2)	No. Events per Year (3)
NOx	207	351			206	240			158	171			37	37		
CO	3,137	4,161	241	10	2,961	3,021	136	50	2,168	2,198	93	200	473	473	25	260
VOC	360	482			351	354			260	262			68	68		

Notes:
(1) Maximum emission rate (lb/hr) and emission factors (lb/events) per vendor data times a 10% safety factor.
(2) Event duration per vendor data.
(3) No. of events per year based on vendor data.

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Combined Cycle Units HAPs Emission Rates Summary Table

EPN	Max. Individual HAP (tpy)	Total Combined HAP (tpy)
STK-101	2.57	8.24
STK-102	2.57	8.24

Speciated HAP Emission Rates per Unit Summary Table

Hazardous Air Pollutants (HAPs)	Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
1,3-Butadiene	< 9.95E-04	< 0.004
Acetaldehyde	0.09	0.41
Acrolein	0.01	0.06
Benzene	0.03	0.12
Dichlorobenzene	7.83E-04	1.71E-03
Ethylbenzene	0.07	0.32
Formaldehyde	0.59	2.44
Hexane	**1.17**	**2.57**
Naphthalene	0.003	0.01
PAHs	0.01	0.02
Propylene Oxide	< 0.07	< 0.29
Toluene	0.30	1.32
Xylenes	0.15	0.65
Arsenic	1.30E-04	2.85E-04
Beryllium	< 7.83E-06	< 1.71E-05
Cadmium	7.18E-04	1.57E-03
Chromium	9.13E-04	2.00E-03
Cobalt	5.48E-05	1.20E-04
Manganese	2.48E-04	5.42E-04
Nickel	1.37E-03	0.003
Selenium	< 1.57E-05	< 3.42E-05
Max. Individual HAP (Hexane):		**2.57**
Total HAPs:		**8.24**

GT HAPs Emission Rates

Hazardous Air Pollutants (HAPs)	Emission Factor (lb/MMBtu) (2)	Emission Factor (lb/MMBtu) (3)	Max. Hourly Emission Rate (lb/hr) (4)	Annual Emission Rate (tpy) (5)
1,3-Butadiene	< 4.30E-07	< 4.33E-07	< 0.001	< 0.004
Acetaldehyde	4.00E-05	4.03E-05	0.09	0.41
Acrolein	6.40E-06	6.45E-06	0.01	0.06
Benzene	1.20E-05	1.21E-05	0.03	0.12
Ethylbenzene	3.20E-05	3.22E-05	0.07	0.32
Formaldehyde (1)	-	-	-	-
Naphthalene	1.30E-06	1.31E-06	0.003	0.01
PAHs	2.20E-06	2.22E-06	0.01	0.02
Propylene Oxide	< 2.90E-05	< 2.92E-05	< 0.07	< 0.29
Toluene	1.30E-04	1.31E-04	0.30	1.32
Xylenes	6.40E-05	6.45E-05	0.15	0.65

GT Characteristics

		Siemens SCC6-5000F	GE S207FA.04
Fuel Heating Content (HHV)	Btu/scf	1,027	1,027
Max. GT Heat Rate (HHV) (6)	MMBtu/hr	2,297	1,918
Annual GT Heat Rate (HHV) (7)	MMBtu/hr	2,297	1,918
GT Annual Hours of Operation	hr/yr	8,760	8,760

Notes:
(1) Formaldehyde: refer to combined cycle hourly and annual calculations.
(2) Emission factors as published by US EPA AP42, Chapter 3.1, Table 3.1-3 (April, 2000)
(3) Per AP 42 Chapter 3.1, Table 3.1-3 note c. Emission factors can be converted to actual natural gas heating values by multiplying the given emission factor by the ratio of the specified heating value to 1,020 Btu/scf.
(4) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Max. GT Heat Rate (MMBtu/hr)
Max. Benzene Emission Rate = 1.21E-05 lb/MMBtu * 2,297 MMBtu/hr = 0.03 lb/hr
(5) Annual Emission Rate (tpy) = Emission Factor (lb/MMBtu) * Annual GT Heat Rate (MMBtu/hr) * GT Annual Hours of Operation (hr/yr) * 1ton/2,000lb
Annual. Benzene Emission Rate = 1.21E-05 lb/MMBtu * 2,297 MMBtu/hr * 8,760 hr/yr * 1ton/2,000lb = 0.12 tpy
(6) Maximum Heat Rate for all cases.
(7) Maximum Annual Heat Rate for evaluated scenarios.

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DB HAPs Emission Rates

Hazardous Air Pollutants (HAPs)	Emission Factor (lb/MMscf) (3)	Emission Factor (lb/MMscf) (4)	Max. Hourly Emission Rate (lb/hr) (5)	Annual Emission Rate (tpy) (6)
2-Methylnaphthalene (1)	2.40E-05	2.42E-05	1.57E-05	3.42E-05
3-Methylchloranthrene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
7,12-Dimethylbenz(a)anthracene (1)	1.60E-05	1.61E-05	1.04E-05	2.28E-05
Acenaphthene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Acenaphthylene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Anthracene (1)	< 2.40E-06	< 2.42E-06	< 1.57E-06	< 3.42E-06
Benz(a)anthracene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Benzene	2.10E-03	2.11E-03	1.37E-03	3.00E-03
Benzo(a)pyrene (1)	< 1.20E-06	< 1.21E-06	< 7.83E-07	< 1.71E-06
Benzo(b)fluoranthene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Benzo(g,h,i)perylene (1)	< 1.20E-06	< 1.21E-06	< 7.83E-07	< 1.71E-06
Benzo(k)fluoranthene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Chrysene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Dibenzo(a,h)anthracene (1)	< 1.20E-06	< 1.21E-06	< 7.83E-07	< 1.71E-06
Dichlorobenzene	1.20E-03	1.21E-03	7.83E-04	1.71E-03
Fluoranthene (1)	3.00E-06	3.02E-06	1.96E-06	4.28E-06
Fluorene (1)	2.80E-06	2.82E-06	1.83E-06	4.00E-06
Formaldehyde (2)	-	-	-	-
Hexane	1.80	1.81	1.17	2.57
Indeno(1,2,3-cd)pyrene (1)	< 1.80E-06	< 1.81E-06	< 1.17E-06	< 2.57E-06
Naphthalene	6.10E-04	6.14E-04	3.98E-04	8.70E-04
Phenanathrene (1)	1.70E-05	1.71E-05	1.11E-05	2.43E-05
Pyrene (1)	5.00E-06	5.04E-06	3.26E-06	7.13E-06
Toluene	3.40E-03	3.42E-03	2.22E-03	4.85E-03
Arsenic	2.00E-04	2.01E-04	1.30E-04	2.85E-04
Beryllium	< 1.20E-05	< 1.21E-05	< 7.83E-06	< 1.71E-05
Cadmium	1.10E-03	1.11E-03	7.18E-04	1.57E-03
Chromium	1.40E-03	1.41E-03	9.13E-04	2.00E-03
Cobalt	8.40E-05	8.46E-05	5.48E-05	1.20E-04
Manganese	3.80E-04	3.83E-04	2.48E-04	5.42E-04
Nickel	2.10E-03	2.11E-03	1.37E-03	3.00E-03
Selenium	< 2.40E-05	< 2.42E-05	< 1.57E-05	< 3.42E-05

DB Characteristics

		Siemens SCC6-5000F	GE S207FA.04
Fuel Heating Content (HHV)	Btu/scf	1,027	1,027
Max. DB Heat Rate (HHV) (7)	MMBtu/hr	283	665
Annual DB Heat Rate (HHV) (8)	MMBtu/hr	270	665
DB Annual Hours of Operation	hr/yr	4,375	4,375

Notes:
(1) HAP because it is Polycyclic Aromatic Hydrocarbon (PAH).
(2) Formaldehyde: refer to combined cycle hourly and annual calculations.
(3) Emission factors as published by US EPA AP42, Chapter 1.4, Tables 1.4-3 and 1.4-4 (July 1998)
(4) Per AP 42 Chapter 1.4 Tables 1.4-3 and 1.4-4 emission factors are based on 1,020 Btu/scf heating value. Emissions factor have been adjusted to actual heat content by multiplying the given emission factor by the ratio of the specified heating value to 1,020 Btu/scf.
(5) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMscf) * Max. DB Heat Rate (MMBtu/hr) / Fuel Heating Content (Btu/scf)
Max. DB Benzene Emission Rate = 2.11E-03 lb/MMscf * 665 MMBtu/hr / 1,027 Btu/scf = 1.37E-03 lb/hr
(6) Annual Em. Rate (tpy) = Em. Factor (lb/MMscf) * Annual DB Heat Rate (MMBtu/hr) / Fuel Heating Cont. (Btu/scf) * DB Hours of Op. (hr/yr) * 1ton/2,000lb
Annual DB Benzene Emission Rate = 2.11E-03 lb/MMscf * 665 MMBtu/hr / 1,027 Btu/scf * 4,375 hr/yr * 1ton/2,000lb = 3.00E-03 tpy
(7) Maximum Heat Rate for all cases.
(8) Maximum Annual Heat Rate for evaluated scenarios.

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LON C HILL REDEVELOPMENT PROJECT
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LUBE OIL DEMISTERS

Lube Oil Demister Emission Rates Summary Table

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr)(1)	Annual Emission Rate (tpy)(2)
LOVSTK-101	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-102	$PM_{10}/PM_{2.5}$	0.003	0.01
LOVSTK-103	$PM_{10}/PM_{2.5}$	0.01	0.05

Notes:
(1) Max. Hrl Em. Rate (lb/hr) = Oil Flow Rate w/o Demister (qt/hr) / 4qt/gal * Lube Oil Density (lb/gal) * (1 - Mist Elim. Efficiency%) * No. Vents
Max. Hourly Emission Rate = 1.50 qt/hr / 4 qt/gal * 7.00 lb/gal * (1 - 0.999) * 1 = 0.003 lb/hr
(2) Annual Emission Rate (tpy) = Max. Hourly Emission Rate * Annual Hours of Operation (hr/yr) * 1ton/2,000lb
Annual Emission Rate = 0.003 lb/hr * 8,760 hr/yr * 1ton/2,000lb = 0.01 tpy

Lube Oil Demister Characteristics (1)

Parameter	Units	Maximum
Oil Flow Rate without Demister	qt/hr	1.50
Mist Eliminator Efficiency	%	99.9%
Lube Oil Density	lb/gal	7
Number of Lube Oil Vents per GT	-	1
Number of Lube Oil Vents per ST	-	4
Annual Hours of Operation	hr/yr	8,760

Notes:
(1) Data based on engineering knowledge.

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AUXILIARY BOILER

Auxiliary Boiler Emission Rates Summary Table

EPN	Air Pollutant	Emission Factor (lb/MMBtu)	Max. Hourly Emission Rate (lb/hr)[4]	Annual Emission Rate (tpy)[5]
ABLSTK-100	NOx [1]	0.036	1.74	1.99
	CO [2]	0.04	1.79	2.05
	VOC [3]	0.01	0.26	0.30
	SO_2 [3]	0.001	0.03	0.03
	$PM_{10}/PM_{2.5}$ [3]	0.01	0.36	0.42

Auxiliary Boiler HAPs Emission Rates Summary Table

EPN	Max. Individual HAP (tpy)	Total Combined HAP (tpy)
ABLSTK-100	0.10	0.10

Notes:

(1) NOx emission factor from TCEQ Air Quality Standard Permit for Boilers (Effective November 3, 2006) limit of 0.036 lb/MMBtu, for boilers with a maximum heat input of less than 100 MMBtu/hr and an annual capacity factor of 0.30 or less (2,628 hr/yr).

(2) CO emisison factor as established in TCEQ Air Quality Standard Permit for Boilers (Effective November 3, 2006).

CO Emission Factor, Cd =	50	ppmvd @ 3% O2, per TCEQ Air Quality Standard Permit for Boilers
CO Molecular Weight =	28	g/gmole
Standard Molar Volume =	24.05	l/gmole @ 1atm, 68F
CO Emission Factor, Cd =	3.63E-06	lb/dscf @ 1atm, 68F

Where,

Cd (lb/dscf) = Cd (ppmvd) / 1,000,000 * MW (g/gmole) * 1/Std Molar Volume (l/gmole) * 1000 l/1 m^3 * 1 lb/453.59237 g * (0.3048 m/ft)^3

Cd = 50 ppmvd / 1,000,000 * 28 g/gmole * 1/ 24.05 l/gmole * 1000 l/1 m^3 * 1 lb/453.59237 g * (0.3048 m/ft)^3 = 3.63E-06 lb/dscf

Emission factor was converted to lb/MMBtu following 40 CFR 60, Appendix A, Method 19, Equation 19-1

CO Emission Factor, Cd =	3.63E-06	lb/dscf @ 1atm, 68F, as calculated above.
Fd =	8,710	dscf/MMBtu, per 40 CFR 60, Appendix A, Method 19, Table 19-2, for Natural Gas Fuel
O2 =	3	%, per TCEQ Air Quality Standard Permit for Boilers
E =	0.04	lb/MMBtu

Where,

E (lb/MMBtu) = Cd (lb/dscf) * Fd (dscf/MMBtu) * (20.9/(20.9-%O2))

E = 3.63E-06 lb/dscf * 8,710 dscf/MMBtu * (20.9/(20.9 - 3)) = 0.04 lb/MMBtu

(3) VOC, SO_2 and $PM_{10}/PM_{2.5}$ emission factors based on US EPA AP 42, Chapter 1.4 Natural Gas Combustion, Tables 1.4-2 and 1.4-3. PM_{10} and $PM_{2.5}$ emissions assumed equivalent to PM emissions. Emissions factors were converted from lb/MMscf to lb/MMBtu by dividing by 1,020 Btu/scf and converted to actual fuel gas heating values by multiplying the given emission factor by the ratio of the fuel gas heating value to 1,020 Btu/scf, per Table 1.4-2 footnote a.

(4) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Max. Firing Rate (MMBtu/hr)

Max. Hourly NOx Emission Rate = 0.036 lb/MMBtu * 48.4 MMBtu/hr = 1.74 lb/hr

(5) Annual Em. Rate (tpy) = Em. Factor (lb/MMBtu) * Max. Firing Rate (MMBtu/hr) * Annual Op. Hours (hr/yr) * 1ton/2,000lb

Annual NOx Emission Rate = 0.036 lb/MMBtu * 48.4 MMBtu/hr * 2,288 hr/yr * 1ton/2,000lb = 1.99 tpy

Auxiliary Boiler Characteristics [1]

Parameter	Unit	Value
Fuel Type		Natural gas
Fuel Heat Content (HHV)	Btu/scf	1,027
Heat Rate (HHV)	MMBtu/hr	48.39
Annual Operating Hours [2]	hr/yr	2,288

Notes:

(1) Data based on engineering knowledge.

(2) Annual operating hours adjusted to meet a 0.3 annual capacity factor per TCEQ Boiler Standard Permit minus the MSS operating hours.

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LON C HILL REDEVELOPMENT PROJECT
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AUXILIARY BOILER

Speciated HAP Emission Rates Summary Table

Hazardous Air Pollutants (HAPs)	Emission Factor (lb/MMscf) (1)	Emission Factor (lb/MMscf)(2)	Max. Hourly Emission Rate (lb/hr)(4)	Annual Emission Rate (tpy)(5)
2-Methylnaphthalene(3)	2.40E-05	2.42E-05	1.14E-06	1.30E-06
3-Methylchloranthrene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
7,12-Dimethylbenz(a)anthracene(3)	1.60E-05	1.61E-05	7.59E-07	8.68E-07
Acenaphthene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Acenaphthylene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Anthracene(3)	< 2.40E-06	< 2.42E-06	< 1.14E-07	< 1.30E-07
Benz(a)anthracene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Benzene	2.10E-03	2.11E-03	9.96E-05	1.14E-04
Benzo(a)pyrene(3)	< 1.20E-06	< 1.21E-06	< 5.69E-08	< 6.51E-08
Benzo(b)fluoranthene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Benzo(g,h,i)perylene(3)	< 1.20E-06	< 1.21E-06	< 5.69E-08	< 6.51E-08
Benzo(k)fluoranthene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Chrysene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Dibenzo(a,h)anthracene(3)	< 1.20E-06	< 1.21E-06	< 5.69E-08	< 6.51E-08
Dichlorobenzene	1.20E-03	1.21E-03	5.69E-05	6.51E-05
Fluoranthene(3)	3.00E-06	3.02E-06	1.42E-07	1.63E-07
Fluorene(3)	2.80E-06	2.82E-06	1.33E-07	1.52E-07
Formaldehyde	0.08	0.08	3.56E-03	4.07E-03
Hexane	**1.80**	**1.81**	**0.09**	**0.10**
Indeno(1,2,3-cd)pyrene(3)	< 1.80E-06	< 1.81E-06	< 8.54E-08	< 9.77E-08
Naphthalene	6.10E-04	6.14E-04	2.89E-05	3.31E-05
Phenanathrene(3)	1.70E-05	1.71E-05	8.06E-07	9.23E-07
Pyrene(3)	5.00E-06	5.04E-06	2.37E-07	2.71E-07
Toluene	3.40E-03	3.42E-03	1.61E-04	1.85E-04
Arsenic	2.00E-04	2.01E-04	9.49E-06	1.09E-05
Beryllium	< 1.20E-05	< 1.21E-05	< 5.69E-07	< 6.51E-07
Cadmium	1.10E-03	1.11E-03	5.22E-05	5.97E-05
Chromium	1.40E-03	1.41E-03	6.64E-05	7.60E-05
Cobalt	8.40E-05	8.46E-05	3.98E-06	4.56E-06
Manganese	3.80E-04	3.83E-04	1.80E-05	2.06E-05
Nickel	2.10E-03	2.11E-03	9.96E-05	1.14E-04
Selenium	< 2.40E-05	< 2.42E-05	< 1.14E-06	< 1.30E-06
			Max. Individual HAP (Hexane):	**0.10**
			Total HAPs:	**0.10**

Notes:
(1) Emission factors as published by US EPA AP42, Chapter 1.4, Tables 1.4-3 and 1.4-4 (July 1998)
(2) Per AP 42 Chapter 1.4 Tables 1.4-3 and 1.4-4 emission factors are based on 1,020 Btu/scf heating value. Emissions factor have been adjusted to actual heat content by multiplying the given emission factor by the ratio of the specified heating value to 1,020 Btu/scf.
(3) HAP because it is Polycyclic Aromatic Hydrocarbon (PAH).
(4) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMscf) * Heat Rate (MMBtu/hr) / Fuel Heating Content (Btu/scf)
Max. Hexane Emission Rate = 1.81 lb/MMscf * 48.39 MMBtu/hr / 1,027 Btu/scf = 0.09 lb/hr
(5) Annual Em. Rate (tpy) = Hourly Emission Rate (lb/hr) * Hours of Op. (hr/yr) * 1ton/2,000lb
Annual Hexane Emission Rate = 0.09 lb/hr * 2,288 hr/yr * 1ton/2,000lb = 0.10 tpy

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AUXILIARY BOILER SU/SD

Auxiliar Boiler SU/SD Emission Rates Summary Table (1)

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr)(2)	Annual Emission Rate (tpy)(3)
ABLSTK-100	NOx	4.84	0.82
	CO	17.88	3.04

Notes
(1) Proposed emission rates per startup/shutdown.
(2) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Max. Firing Rate (MMBtu/hr)
Max. Hourly NOx Emission Rate = 0.10 lb/MMBtu * 48.4 MMBtu/hr = 4.84 lb/hr
(3) Annual Em. Rate (tpy) = Hourly Emission Rate (lb/hr) * [Cold Event Duration (hr/event) * No. Cold Events (events/yr) + Warm Event Duration (hr/event) * No. Warm Events (events/yr) + Shutdown Duration (hr/event) * No. Shutdowns (events/yr)] * 1ton/2,000lb
Annual NOx Emission Rate = 4.84 lb/hr * [8 hr/event * 10 events/yr + 4 hr/event * 50 events/yr + 1 hr/event * 60 events/yr] * 1ton/2,000lb = 0.82 tpy

Startup/Shutdown Events Characteristics

Air Pollutant	Emission Factor (lb/MMBtu) (1)	Cold Startup		Warm Startup		Shutdown	
		Event Duration (hr/event) (1)	No. Events per Year (2)	Event Duration (hr/event) (1)	No. Events per Year (2)	Event Duration (hr/event) (1)	No. Events per Year (2)
NOx	0.10	8	10	4	50	1	60
CO (3)	0.37						

Notes:
(1) Per TCEQ Air Quality Standard Permit for Boilers (Effective November 3, 2006) Section (4) General Requirements subsection (D) Maintenance, Startup, and Shutdown.
(2) No. of events per year based on projected operating scenario.
(3) CO emisison factor from TCEQ Boiler Standard Permit limit of 500 ppmvd @ 3% O2.
Emission factor was converted to lb/MMBtu following 40 CFR 60, Appendix A, Method 19, Equation 19-1
E (lb/MMBtu) = Cd (lb/dscf) * Fd (dscf/MMBtu) * (20.9/(20.9-%O2))

Standard Molar Volume	24.05	l/gmole @ 1atm, 68F
Fd =	8,710	dscf/MMBtu
1 ppm CO =	7.27E-08	lb/dscf @ 1atm, 68F

Fd value per 40 CFR 60, Appendix A, Method 19, Table 19-2, for Natural Gas Fuel

Auxiliary Boiler Characteristics (1)

Parameter	Unit	Value
Fuel Type		Natural gas
Fuel Heat Content (HHV)	Btu/scf	1,027
Heat Rate (HHV)	MMBtu/hr	48.4
Annual Operating Hours (2)	hr/yr	2,288

Notes:
(1) Data based on engineering knowledge.
(2) Annual operating hours adjusted to meet a 30% annual capacity factor per TCEQ Boiler Standard Permit.

LON C HILL REDEVELOPMENT PROJECT
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EMERGENCY GENERATOR

Emergency Generator Emission Rates Summary Table

EPN	Air Pollutant	Emission Factor (g/kWh)	Emission Factor (lb/kWh)	Max. Hourly Emission Rate (lb/hr)[3]	Annual Emission Rate (tpy)[4]
EGENSTK-100	NOx [1]	9.2	0.02	20.28	1.01
	CO [1]	11.4	0.03	25.13	1.26
	VOC [1]	1.3	0.003	2.87	0.14
	SO_2 [2]	2.05E-03 lb/hp-hr	0.003	2.75	0.14
	$PM_{10}/PM_{2.5}$ [1]	0.54	0.001	1.19	0.06

Emergency Generator HAPs Emission Rates Summary Table

EPN	Max. Individual HAP (tpy)	Total Combined HAP (tpy)
EGENSTK-100	0.001	0.003

Notes:

(1) Emission factor for NOx, CO, VOC, and $PM_{10}/PM_{2.5}$ are based on EPA Tier 1 emission factors for diesel engines as per NSPS IIII §60.4205(b) (§60.4202(a)(2) - §89.112 - Table 1) for emergency stationary CI ICE with a displacement of less than 10 liters per cylinder. This provides the worst case scenario and is used for permitting purposes only.

(2) SO_2 emission factor per US EPA AP 42 Chapter 3.3 (10/96) Table 3.3-1 Diesel fired engines.

(3) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/kWh) * Engine Rate (kW)
Max. Hourly NOx Emission Rate = 0.02 lb/kwh* 1,000 kW= 20.28 lb/hr

(4) Annual Em. Rate (tpy) = Em. Factor (lb/kWh) * Engine Rate (kW) * Annual Op. Hours (hr/yr) * 1ton/2,000lb
Annual NOx Emission Rate = 0.02 lb/kWh * 1,000 kW *100 hr/yr * 1ton/2,000lb = 1.01 tpy

Emergency Generator Characteristics [1]

Parameter	Unit	EMGEN-1
Model Year		TBD
Fuel Type		Diesel
Displacement		TBD
Engine Rating	kW	1,000
Heat Input [2]	MMBtu/hr	9.38
Annual Operating Hours [3]	hr/yr	100

Notes:

(1) Data based on engineering knowledge.

(2) An average brake-specific consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr, per AP42, Footnote A of Table 3.3-1 "Emisson Factors for Uncontrolled Gasoline and Diesel Industrial Engines".
1,000 kW * 1.34 hp/kW * 7,000 Btu/hp-hr * 1MMBtu/1,000,000 Btu = 9.38 MMBtu/hr

(3) Estimated annual operating hours to cover plant outage (± 2 months)

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EMERGENCY GENERATOR

Speciated HAP Emission Rates Summary Table

Hazardous Air Pollutants (HAPs)	Emission Factor (lb/MMBtu) (1)	Max. Hourly Emission Rate (lb/hr)(4)	Annual Emission Rate (tpy)(5)
Benzene (2)	9.33E-04	8.75E-03	4.38E-04
Toluene (2)	4.09E-04	3.84E-03	1.92E-04
Xylenes (2)	2.85E-04	2.67E-03	1.34E-04
Propylene	2.58E-03	**0.02**	**0.001**
1,3-Butadiene (2)	< 3.91E-05	< 3.67E-04	< 1.83E-05
Formaldehyde (2)	1.18E-03	1.11E-02	5.53E-04
Acetaldehyde (2)	7.67E-04	7.19E-03	3.60E-04
Acrolein (2)	< 9.25E-05	< 8.68E-04	< 4.34E-05
Naphthalene (2),(3)	8.48E-05	7.95E-04	3.98E-05
Acenaphthylene (3)	< 5.06E-06	< 4.75E-05	< 2.37E-06
Acenaphthene (3)	< 1.42E-06	< 1.33E-05	< 6.66E-07
Fluorene (3)	2.92E-05	2.74E-04	1.37E-05
Phenanthrene (3)	2.94E-05	2.76E-04	1.38E-05
Anthracene (3)	1.87E-06	1.75E-05	8.77E-07
Fluoranthene (3)	7.61E-06	7.14E-05	3.57E-06
Pyrene (3)	4.78E-06	4.48E-05	2.24E-06
Benzo(a)anthracene (3)	1.68E-06	1.58E-05	7.88E-07
Chrysene (3)	3.53E-07	3.31E-06	1.66E-07
Benzo(b)fluoranthene (3)	< 9.91E-08	< 9.30E-07	< 4.65E-08
Benzo(k)fluoranthene (3)	< 1.55E-07	< 1.45E-06	< 7.27E-08
Benzo(a)pyrene (3)	< 1.88E-07	< 1.76E-06	< 8.82E-08
Indeno(1,2,3-cd)pyrene (3)	< 3.75E-07	< 3.52E-06	< 1.76E-07
Dibenz(a,h)anthracene (3)	< 5.83E-07	< 5.47E-06	< 2.73E-07
Benzo(g,h,l)perylene (3)	< 4.89E-07	< 4.59E-06	< 2.29E-07
		Max. Individual HAP (Propylene):	**0.001**
		Total HAPs:	**0.003**

Notes:
(1) Emission factors as published by US EPA AP42, Chapter 3.3 Tables 3.3-2 (October 1996)
(2) Hazardous air pollutnat listed in the Clean Air Act.
(3) HAP because it is Polycyclic Aromatic Hydrocarbon (PAH).
(4) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input (MMBtu/hr)
Max. Propylene Emission Rate = 2.58E-03 lb/MMBtu * 9.38 MMBtu/hr = 0.02 lb/hr
(5) Annual Em. Rate (tpy) = Hourly Emission Rate (lb/hr) * Hours of Op. (hr/yr) * 1ton/2,000lb
Annual Propylene Emission Rate = 0.02 lb/hr * 100 hr/yr * 1ton/2,000lb = 0.001 tpy

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FIREWATER PUMP ENGINE

Firewater Pump Engine Emission Rates Summary Table

EPN	Air Pollutant	Emission Factor (g/kWh)	Emission Factor (lb/kWh)	Max. Hourly Emission Rate (lb/hr)(3)	Annual Emission Rate (tpy)(4)
FWPSTK-100	NOx (1)	10.5	0.02	10.66	0.53
	CO (1)	3.5	0.01	3.55	0.18
	VOC (1)	10.5	0.02	10.66	0.53
	SO_2 (2)	2.05E-03 lb/hp-hr	0.003	1.26	0.06
	$PM_{10}/PM_{2.5}$ (1)	0.5	0.001	0.55	0.03

Firewater Pump Engine HAPs Emission Rates Summary Table

EPN	Max. Individual HAP (tpy)	Total Combined HAP (tpy)
FWPSTK-100	0.0006	0.001

Notes:

(1) NOx, CO VOC and $PM_{10}/PM_{2.5}$ emission factors are based on the limits provided in NSPS Subpart IIII (Table 4) per 60.4205(c) for fire pump engines, model year 2008 and earlier. This provides the worst case scenario and is used for permitting purposes only.

(2) SO_2 emission factor per US EPA AP 42 Section 3.3 (10/96) Table 3.3-1 Diesel fired engines.

(3) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/kWh) * Engine Rate (kWh)
Max. Hourly NOx Emission Rate = 0.02 lb/kWh * 460 kW = 10.66 lb/hr

(4) Annual Em. Rate (tpy) = Em. Factor (lb/kWh) * Engine Rate (kW) * Annual Op. Hours (hr/yr) * 1ton/2,000lb
Annual NOx Emission Rate = 0.02 lb/kWh * 460.4 kW *100 hr/yr * 1ton/2,000lb = 0.53 tpy

Firewater Pump Engine Characteristics (1)

Parameter	Unit	Value
Model Year		TBD
Fuel Type		Diesel
Displacement		TBD
Engine Rating	kW	460
Heat Input (2)	MMBtu/hr	4.32
Annual Operating Hours (3)	hr/yr	100

Notes:

(1) Data based on engineering knowledge.

(2) An average brake-specific consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr, per AP42, Footnote A of Table 3.3-1.

(3) Per §60.4211(f)(2)(i) an emergency engine can operate for up to 100 hr/yr for maintenance and testing, emergency demand response, and operation in non-emergency situations for 50 hours per year (accounted to in the 100 hr/yr total).

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FIREWATER PUMP ENGINE

Speciated HAP Emission Rates Summary Table

Hazardous Air Pollutants (HAPs)	Emission Factor (lb/MMBtu) [1]	Max. Hourly Emission Rate (lb/hr)[4]	Annual Emission Rate (tpy)[5]
Benzene [2]	9.33E-04	4.03E-03	2.01E-04
Toluene [2]	4.09E-04	1.77E-03	8.83E-05
Xylenes [2]	2.85E-04	1.23E-03	6.15E-05
Propylene	2.58E-03	**0.01**	**0.001**
1,3-Butadiene [2]	< 3.91E-05	< 1.69E-04	< 8.44E-06
Formaldehyde [2]	1.18E-03	5.10E-03	2.55E-04
Acetaldehyde [2]	7.67E-04	3.31E-03	1.66E-04
Acrolein [2]	< 9.25E-05	< 4.00E-04	< 2.00E-05
Naphthalene [2],[3]	8.48E-05	3.66E-04	1.83E-05
Acenaphthylene [3]	< 5.06E-06	< 2.19E-05	< 1.09E-06
Acenaphthene [3]	< 1.42E-06	< 6.13E-06	< 3.07E-07
Fluorene [3]	2.92E-05	1.26E-04	6.31E-06
Phenanthrene [3]	2.94E-05	1.27E-04	6.35E-06
Anthracene [3]	1.87E-06	8.08E-06	4.04E-07
Fluoranthene [3]	7.61E-06	3.29E-05	1.64E-06
Pyrene [3]	4.78E-06	2.06E-05	1.03E-06
Benzo(a)anthracene [3]	1.68E-06	7.26E-06	3.63E-07
Chrysene [3]	3.53E-07	1.52E-06	7.62E-08
Benzo(b)fluoranthene [3]	< 9.91E-08	< 4.28E-07	< 2.14E-08
Benzo(k)fluoranthene [3]	< 1.55E-07	< 6.69E-07	< 3.35E-08
Benzo(a)pyrene [3]	< 1.88E-07	< 8.12E-07	< 4.06E-08
Indeno(1,2,3-cd)pyrene [3]	< 3.75E-07	< 1.62E-06	< 8.10E-08
Dibenz(a,h)anthracene [3]	< 5.83E-07	< 2.52E-06	< 1.26E-07
Benzo(g,h,l)perylene [3]	< 4.89E-07	< 2.11E-06	< 1.06E-07
		Max. Individual HAP (Propylene):	**0.0006**
		Total HAPs:	**0.001**

Notes:
(1) Emission factors as published by US EPA AP42, Chapter 3.3 Tables 3.3-2 (October 1996)
(2) Hazardous air pollutnat listed in the Clean Air Act.
(3) HAP because it is Polycyclic Aromatic Hydrocarbon (PAH).
(4) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/MMBtu) * Heat Input (MMBtu/hr)
Max. Propylene Emission Rate = 2.58E-03 lb/MMBtu * 4.32 MMBtu/hr = 0.01 lb/hr
(5) Annual Em. Rate (tpy) = Hourly Emission Rate (lb/hr) * Hours of Op. (hr/yr) * 1ton/2,000lb
Annual Propylene Emission Rate = 0.01 lb/hr * 100 hr/yr * 1ton/2,000lb = 0.001 tpy

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COOLING TOWERS

Cooling Towers Emission Rates Summary Table[1]

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
CTW-100	PM_{10} [2]	0.81	2.29
	$PM_{2.5}$ [3]	0.003	0.01
CTW-200	PM_{10} [2]	0.05	0.24
	$PM_{2.5}$ [3]	0.0002	0.0013

Notes:

(1) All solids in the cooling tower drift are assumed to become PM_{10}/$PM_{2.5}$

(2) PM_{10} Emission Rate = PM Emission Rate * % Mass Drift for PM_{10}

Hourly PM10 emission Rate = 0.99 lb/hr * 82% = 0.81 lb/hr

Annual PM10 emission Rate = 0.59 lb/hr * 8,760 hr/yr * 1 ton/2,000 lb * 88% = 2.29 tpy

(3) $PM_{2.5}$ Emission Rate = PM Emission Rate * % Mass Drift for $PM_{2.5}$

Hourly PM2.5 emission Rate = 0.99 lb/hr * 0.30% = 0.003 lb/hr

Annual PM2.5 emission Rate = 0.59 lb/hr * 8,760 hr/yr * 1ton/2,000 lb * 0.47% = 0.01 tpy

Cooling Tower Characteristics

		CTW-100		CTW-200	
Parameter	Units	Maximum	Average	Maximum	Average
Cooling Water Flow Rate[1]	gpm	197,000	197,000	10,000	10,000
Drift Rate Factor[2]	%	0.001	0.001	0.0005	0.0005
Total Dissolved Solids (TDS)[3], [4]	ppm	1,000	600	2,500	2,500
Total Drift Rate[5]	gpm	1.97	1.97	0.05	0.05
Total Particulate Emissions [6]	lb/hr	0.99	0.59	0.06	0.06

Notes:

(1) Cooling Tower Flow Rate per engineering knowledge.

(2) CTW-100 drift rate factor per TCEQ Tier 1 BACT for Cooling Towers. CTW-200 drift rate factor per vendor data.

(3) CTW-100 Total Dissolved Solids data per Corpus Christi Water Department Report 2012-2013.

(4) CTW-200 Total Dissolved Solids data per vendor information.

(5) Total Drift Rate (gpm) = Flow Rate (gpm) * Drift Rate Factor (%)

Total Drift Rate = 197,000 gpm * 0.001% = 1.97 gpm

(6) Max. Hourly PM Emission Rate (lb/hr) = Max. Drift Rate (gpm) * TDS (ppm)/10^6 * 8.34 lb/gal * 60 min/hr

Average PM Emission Rate (lb/hr) = Avg. Drift Rate (gpm) * TDS (ppm)/10^6 * 8.34 lb/gal * 60 min/hr

Max. PM Hourly Emission Rate = 1.97 gpm * 1,000 ppm/10^6 * 8.34 lb/gal * 60 min/hr = 0.99 lb/hr

Average PM Emission Rate = 1.97 gpm * 600 ppm/10^6 * 8.34 lb/gal * 60 min/hr = 0.59 lb/hr

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COOLING TOWERS

Particle Size Calculation

Typical Cooling Tower Droplet Size [1]		Calculated Particle Size, Dp (microns) [2]	
Mean, Dd (microns)	Distribution (% Mass Smaller than)	Maximum Case	Annual Average
10	-	0.769	0.648
20	0.196	1.538	1.297
30	0.226	2.307	1.945
40	0.514	3.076	2.594
50	1.816	3.844	3.242
60	5.702	4.613	3.891
70	21.348	5.382	4.539
90	49.812	6.920	5.836
110	70.509	8.458	7.133
130	82.023	9.995	8.430
150	88.012	11.533	9.727
180	91.032	13.840	11.673
210	92.468	16.147	13.618
240	94.091	18.453	15.564
270	94.689	20.760	17.509
300	96.288	23.066	19.455
350	97.011	26.911	22.697
400	98.340	30.755	25.940
450	99.071	34.600	29.182
500	99.071	38.444	32.425
600	100.000	46.133	38.910

Parameter	Particle Size (microns)	Maximum Mass % [3]	Average Mass % [3]
% Mass Drift	10	82.0	88.4
% Mass Drift	2.5	0.30	0.47

Notes:

(1) Typical cooling tower droplet size as published by Joel Reisman and Gordon Frisbie
Calculating Realistic PM_{10} Emissions from Cooling Towers.
http://www.energy.ca.gov/sitingcases/palomar/documents/applicants_files/Data_Request_Response/Air%20Quality/Attachment%204-1.pdf

(2) Dp (microns) = Dd (microns) * ((ρd/ρp) * TDS /1,000,000))^$^{(1/3)}$

Water density, ρd	1	g/cm^3
Density of TDS, ρp	2.2	g/cm^3 (surrogated to Sodium Chloride density)

Dp (Maximum Case 10 microns) = 10 * ((1 / 2.2) * 1,000 /1,000,000)^(1/3) = 0.769 microns

(3) Linear Interpolation is used to calculate the % of PM emissions equal to or less than PM_{10} and $PM_{2.5.}$

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OIL/WATER SEPARATOR

Oil/Water Separator Emission Rates Summary Table

EPN	Air Pollutant	Emission Factor (lb/1000 gal) (1)	Max. Hourly Emission Rate (lb/hr)(2)	Annual Emission Rate (tpy)(3)
OWS-100	VOC	5.00	1.00	0.24

Notes:
(1) Emission factor per US EPA AP 42, Chapter 5.1 (1/95), Table 5.1-2 "Emission Factors for Petroleum Refineries"
(2) Max. Hourly Emission Rate (lb/hr) = Emission Factor (lb/gal) * Hourly Throughput (gal/hr)
Max. Hourly Emission Rate = 5.00 lb/1,000gal * 1000gal/ 1,000 gal * 200 gal/hr = 1.00 lb/hr
(3) Annual Em. Rate (tpy) = Em. Factor (lb/gal) * Annual Throughput (gal/yr) * 1ton/2,000lb
Annual Emission Rate = 5.00 lb/1,000gal * 1,000gal/ 1,000 gal * 96,000 gal/yr * 1ton/2,000lb = 0.24 tpy

Oil/Water Separator Characteristics (1)

Parameter	Unit	Value
Hourly Throughput	gph	200
Annual Throughput	gpy	96,000

Notes:
(1) Data based on engineering knowledge.

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STORAGE TANKS

Tanks Emission Rates Summary Table

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr)[(1)]	Annual Emission Rate (tpy) [(2)]
TKSTK-101	VOC	0.03	0.0001
TKSTK-102	VOC	0.01	0.00006
TKSTK-103	VOC	2.89	0.01

Notes:
(1) Max. Hourly Emission Rate calculated based on TCEQ Technical guidance Package for Storage Tanks, RG-166, February 2001, as follows:

$L_{MAX}= L_W * FR_M / (N * T_{CG} * K_N)$
L_{MAX}: maximum hourly emission rate (lb/hr)
L_W: working loss calculated at maximum liquid surface temperature (lb/yr)
FR_M: maximum filling rate (gph)
N: number of turnovers per year (1/yr)
T_{CG}: tank capacity (gallons)
K_N: Turnover factor

Max. Hourly Emission Rate = 0.22 lb-VOC/yr * 700 gal/hr / (9/yr * 700 gal) = 0.03 lb-VOC/hr

(2) Annual emission Rate = (Standing Lossess (lb/yr) + Working Losses (lb/yr)) * 1ton/2,000lb

Annual Emission Rate = (0.03 lb-VOC/yr + 0.19 lb-VOC/yr) * 1ton/2,000lb = 0.0001 VOC-tpy

Tanks General Information

Tank ID	TK-101	TK-102	TK-103
Tank Description	Emergency Generator Diesel Tank	Firewater Pump Diesel Tank	Gasoline Storage Tank
Tank Content	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Gasoline (RVP 10)
Tank Type	Vertical Fixed Roof Tank	Vertical Fixed Roof Tank	Vertical Fixed Roof Tank
Height (ft)	6.00	5.00	5.00
Diameter (ft)	4.50	3.50	3.00
Tank Capacity (gal)	700	300	250
Annual Throughput (gpy)	6,220	2,864	250
Standing Losses (lb/yr) [(1)]	0.03	0.03	16.86
Working Losses (lb/yr) [(1)]	0.19	0.09	2.63
Working Losses at max temp (lb/yr) [(2)]	0.22	0.10	2.89
Number of Turnovers, N (1/yr) [(3)]	8.9	9.5	1.0
Turnover Factor K_N [(4)]	1	1	1
Max. Filling Rate (gph) [(5)]	700	300	250

Notes:
(1) Working losses and standing losses as calculated using US EPA TANKS 4.09D software with annual average liquid temperature.
(2) Working loss calculated at the daily maximum liquid surface temperature using AP 42 Fifth Edition, Chapter 7.1 Organic Liquid Storage Tanks (11/06), equation (1-29) "Working Losses"
(3) The number of turnovers is calculated based on the diesel fuel demand for the emergency generator (EGEN-100) and the firewater pump (FWP-100) and the diesel heat content of 150,800 Btu/gal
The turnovers for the gasoline tank is the entire anticipated annual throughput.
(4) If N > 36 then $K_N = (180+N)/(6*N)$, else $K_N = 1$
(5) This method assumes each tank may be refueled within a single one-hour refueling event. For the gasoline tank, this conservatively represents the entire annual throughput.

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STORAGE TANKS

TKSTK-103 Hazardous Air Pollutants Emission Rates

Hazardous Air Pollutants	Partial Pressure (psi) (1)	Vapor Molar Fraction (2)	MW (lb/lbmole)	Weight Fraction (3) (%)	Annual Emission Rate (tpy) (4)
Benzene	1.68	0.25	78.11	0.58	0.0001
Toluene	0.50	0.07	92.14	0.20	0.00002
Xylene, m-	0.20	0.03	106.17	0.09	0.00001
Xylene, o-	0.11	0.02	106.17	0.05	0.00001
Xylene, p-	0.15	0.02	106.17	0.07	0.00001
				Max. Individual HAP (Benzene):	**0.0001**
				Total HAPs:	**0.0002**

Notes:
(1) Partial pressure at average liquid surface temperature (per TANKS 4.09D run output) and using Antoine Equation coefficients [Table 7.1-5, US EPA AP42, Chapter 7.1 organic Liquid Storage Tanks]
(2) Vapor molar fraction, yi, equals the partial pressure of the component divided by the total vapor pressure of the mixture. Where gasoline total vapor pressure (TANKS 4.09D run output) = 6.69 psi
(3) Weight Fraction equals the number of moles times the molecular weight divided by the total weight
Benzene Weight Fraction = 0.25 lbmole * 78.11 lb/lbmole / 33.86 lb = 0.58
(4) The amount of each omponent emitted is equal o the wight fraction times the total VOC emitted
Benzene Annual Emission Rate = 0.58 wt% * 0.01 tpy VOC = 0.0001 tpy

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FUGITIVE EMISSIONS

Fugitive Emission Rates Summary Table

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
FUGNG-100	VOC	0.09	0.40
FUGSCR-100	NH_3	0.01	0.04
FUGDS-100	VOC	0.05	0.24

Natural Gas Service

Component Type	Component Service	Component Count (cpte)(1)	Emission Factor (lb/hr-cpte)(2)	Hours in Service (hr/yr)	Control Efficiency (%)(3)	Max. Hourly Emission Rate (lb/hr)(4)	Annual Emission Rate (tpy)(5)
Valves	Gas/Vapor	520	0.0089	8,760	0.0%	4.63	20.27
Flanges/Connectors	Gas/Vapor	1,460	0.0029	8,760	0.0%	4.23	18.54
Compressors	Gas/Vapor	3	0.5027	8,760	0.0%	1.51	6.61

Service Total		10.37	45.42
Weight Percentage VOC	0.88%	0.09	0.40

Ammonia Service (SCR)

Component Type	Component Service	Component Count (cpte)(1)	Emission Factor (lb/hr-cpte)(2)	Hours in Service (hr/yr)	Control Efficiency (%)(3)	Max. Hourly Emission Rate (lb/hr)(4)	Annual Emission Rate (tpy)(5)
Valves	Light Liquid	250	0.0035	8,760	97.0%	0.03	0.11
Flanges/Connectors	Light Liquid	626	0.0005	8,760	97.0%	0.01	0.04
Pumps	Light Liquid	4	0.0386	8,760	93.0%	0.01	0.05

Service Total		0.05	0.20
Weight Percentage NH_3	19%	0.01	0.04

Diesel Service

Component Type	Component Service	Component Count (cpte)(1)	Emission Factor (lb/hr-cpte)(2)	Hours in Service (hr/yr)	Control Efficiency (%)(3)	Max. Hourly Emission Rate (lb/hr)(4)	Annual Emission Rate (tpy)(5)
Pumps	Heavy Liquid	1	0.0161	8,760	0.0%	0.02	0.07
Valves	Heavy Liquid	5	0.0007	8,760	0.0%	0.004	0.02
Flanges/Connectors	Heavy Liquid	15	0.00007	8,760	0.0%	0.001	0.005
Relief Valves	Heavy Liquid	1	0.0007	8,760	0.0%	0.001	0.003
Sampling Connections	All	1	0.033	8,760	0.0%	0.03	0.14

Service Total		0.05	0.24
Weight Percentage VOC	100%	0.05	0.24

Notes:

(1) Component counts are based on preliminary design information.
- Components in natural gas service account for the 2 combined cycle units.
- Components in ammonia service account for SCR distribution lines and a 25,000 gallon ammonia storage tank.
- Componets in the diesel service account for the emergency generator and firewater pump diesel tanks.

(2) "SOCMI without ethylene factors" were used for all services.
For relief valves associated with ammonia service, the emission factors used are for valves in light liquid service per Item II on page 8 of the TCEQ Equipment Leak Fugitives guidance document.

(3) No control efficiency is claimed for natural gas and diesel services. For ammonia service, "AVO" is claimed. Audio, visual, and olfactory walk-through inspections are applicable for inorganic/odorous and low vapor pressure compounds.
Visual check ups will be conducted every 4hrs.

(3) Max. Hourly Emission Rate (lb/hr) = Component Count (cpte) * Emission Factor (lb/hr-cpte) * (1 - Control Eff%)
Max. Hourly Emission Rate Valves in NG Service = 520 cpte * 0.0089 lb/hr-cpte * (1 - 0.0%) = 4.63 lb/hr

(4) Annual Emission Rate (tpy) = Max. Hourly Emission Rate (lb/hr) * Hours in Service (hr/yr) * 1ton,2,000lb
Annual Emission Rate Valves in NG Service = 4.63 lb/hr * 8,760 hr/yr * 1ton/2,000lb = 20.27 tpy

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MAINTENANCE FUEL PURGING

Fuel Purging Rates Summary Table (both Units Combined)(1)

EPN	Air Pollutant	VOC Content (wt%)(2)	Max. Hourly Emission Rate (lb/hr)(3)	Annual Emission Rate (tpy)(4)
PURG-100	VOC	0.88%	0.01	0.004

Notes:
(1) Occasionally during startup, shutdown, or maintenance activities, natural gas is purged to the atmosphere to reduce the header pressure. Fuel purging emissions are base on the Universal Ideal Gas Law, with the assumption that in one hour, the entire length of pipe is purged once and the purging takes place for every startup and shutdown of the units.
(2) VOC content per Fuel Analysis (non-methane, non-ethane)
(3) Max. Hourly Emission Rate = Sum NG Max. Hourly Emission Rates * VOC wt%
Max. Hourly Emission Rate = (1.22 lb/hr + 0.33 lb/hr + 0.005 lb/hr) * 0.88% = 0.014 lb/hr
(4) Annual Emission Rate = Sum NG Annual Emission Rates * VOC wt%
Annual Emission Rate = (0.32 tpy + 0.09 tpy + 0.001 tpy) * 0.88% = 0.004 tpy

Purge Line Characteristics

Parameter	Units	Gas Turbine	Duct Burner	Pilot
Line Diameter(1)	in	3.00	6.00	1.00
Line Length(1)	ft	10.00	5.00	5.00
Line Pressure(1)	psig	450	40	15
Line Temperature(1)	ºF	125	42	42
Natural Gas MW(2)	lb/lbmole	16.77	16.77	16.77
Line Volume(3)	cf	0.49	0.98	0.03
NG Moles in Line (4)	lbmole	0.04	0.01	0.0002
NG Pounds in Line(5)	lb/purge	0.61	0.17	0.003
Purge Duration(6)	hr/purge	0.002	0.001	0.001
Hourly No. of Purges(7) (both units combined)	purges/hr	2	2	2
Annual No. of Purges(8) (both units combined)	purges/yr	1,040	1,040	1,040
NG Max. Hourly Emission Rate(9) (both units combined)	lb/hr	1.22	0.33	0.005
NG Annual Emission Rate(10) (both units combined)	tpy	0.32	0.09	0.001

Notes:
(1) Line characteristics per engineering knowledge.
(2) Natural gas molecular weight (MW) per Natural Gas Fuel Analisys.
(3) Line Volume = pi()/4 * D^2 * L
Gas Turbine Line Volume = pi()/4 * (3.00 inch * 1ft/12inch)^2 * 10.00 ft = 0.49 cf
(4) Universal Ideal Gas Law
Gas Turbine Moles in Line = n = P * V / (R * T) = (450 + 14.656) psia * 0.49 cf / (10.73 * (125 + 459.67) R) = 0.036 lbmole
(5) Pounds in Line (lb) = Moles in Line (lbmole) * Molecular Weight (lb/lbmole)
Gas Turbine Pounds in Line = 0.036 lbmole * 16.77 lb/lbmole = 0.61 lb
(6) Purge duration per engineering knowledge.
(7) Max. Purges per Hour per engineering knwoledge.
(8) Annual No. of Purges = Annual No. of Startups and Shutdowns
(9) If Purge Duration < 1hr
NG Max. Hourly Emission Rate (lb/hr) = NG Pounds in Line (lb/purge) * Hourly No. Purges (purge/hr)
If Purge Duration > 1hr
NG Max. Hourly Emission Rate (lb/hr) = NG Pounds in Line (lb/purge) / Purge Duration (hr/purge) * Hourly No. Purges (purge/hr)
GT NG Max. Hourly Emission Rate = 0.61 lb/purge * 2 purges/hr = 1.22lb/hr
(10) NG Annual Emission Rate (tpy) = NG Pounds in Line (lb/purge) * Annual No. of Purges (purges/yr) * 1ton/2,000lb
GT NG Annual Emission Rate = 0.61 lb/purge * 1,040 purges/yr * 1ton/2,000lb = 0.317 tpy

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OFFLINE TURBINE WASHING

Offline Turbine Washing Emission Rates Summary Table [1]

EPN	Air Pollutant	Max. Hourly Emission Rate (lb/hr) [2]	Annual Emission Rate (tpy) [3]
OFFWASH-100	VOC	1.28	0.003

Notes:
(1) Offline water washing can potentially release small VOC vapors into the atmosphere. Emission rates are calculated using a mass balance approach and are based on the chemical soap throughput and VOC content.
(2) Max. Hourly Emission Rate (lb/hr) = Soap Throughput (gallons/wash) * Soap Density (lb/gallon) * VOC wt% / Wash Duration (hr/wash)
Max. Hourly Emission Rate = 10 gallon * 8.50 lb/gallon * 1.5% / 1 hr/wash = 1.28 lb/hr
(3) Annual Emission Rate (tpy) = Soap Throughput (gallons/wash) * Soap Density (lb/gallon) * VOC wt% * Annual No. of Washes (wash/yr) * 1ton/2,000lb
Annual Emission Rate = 10 gallon * 8.50 lb/gallon * 1.5% * 4 wash/yr * 1ton/2,000lb = 0.003 tpy

Chemical Soap Characteristics

Total Chemical Throughput per Wash [1]	10	gallon/wash
Chemical Density [2]	8.50	lb/gallon
Total VOC wt% in Chemical [2]	1.5%	
Wash Duration [3]	1	hr/wash
Annual No. of Washes [4]	4	wash/yr

Notes:
(1) Total chemical throughput per wash per enginering knowledge.
(2) ZOK 27 Gas Turbine Compressor Cleaner or equivalent will be used. Chemical density and VOC wt% per October 1997 MSDS.
(3) Wash duration is assumed to be of 1 hour.
(4) Assumed 2 washes per unit per year.

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

SOLDERING, BRAZING AND WELDING

Soldering, Brazing and Welding Emission Rates Summary Table[1]

EPN	Air Pollutant	Usage Amount (lb/hr)[2]	Usage Amount (lb rod/yr)[2]	Emission Factor (lb-PM/1,000lb rod)[3]	Max. Hourly Emission Rate (lb/hr)[4]	Annual Emission Rate (tpy)[5]
WELD	$PM_{10}/PM_{2.5}$	1	1,000	81.6	0.08	0.04

Welding HAPs Emission Rates Summary Table

EPN	Max. Individual HAP (tpy)	Total Combined HAP (tpy)
WELD	0.012	0.015

Notes:
(1) Temporary maintenance facilities may be used for soldering, brazing and welding.
The use of lead containing rods will be prohibited at Lon C Hill Power Station.
(2) Estimated usage of welding rod per process knowledge.
(3) Emissions factor as published by EPA AP 42, Fifth Edition, Chapter 12.19 (July 1997), Table 12.19-1 for worst case scenario PM emission.
Shielded metal arc welding (SMAW), 14Mn-4Cr (worst case welding rod)
(4) Max. Hourly Emission Rate (lb/hr) = Hourly Usage Amount (lb/hr) * Emission Factor (lb/lb rod)
Hourly PM10 Emission Rate = 1 lb/hr * 81.6 lb/1,000lbrod * 1,000lbrod/1,000 lb rod = 0.08 lb/hr
(5) Annual Emission Rate (tpy) = Annual Usage Amount (lb/yr) * Emission Factor (lb/lb rod) * 1ton/2,000lb
Annual PM10 Emission Rate = 1,000 lb/yr * 81.6 lb/1,000lbrod * 1,000lbrod/1,000 lb rod * 1ton/2,000lb = 0.04 tpy

Speciated HAP Emission Rates Summary Table [1]

Air Pollutant	Usage Amount (lb/hr)[2]	Usage Amount (lb rod/yr)[2]	Emission Factor (lb/1,000lb rod)[3]	Max. Hourly Emission Rate (lb/hr)[4]	Annual Emission Rate (tpy)[4]
Cr	1	1,000	2.5	0.003	0.001
Cr (VI)			1.9	0.002	0.001
Co			0.001	0.000001	0.000001
Mn			23.2	0.02	0.012
Ni			1.7	0.002	0.001
				Max. Individual HAP (Mn):	**0.012**
				Total HAPs:	**0.015**

Notes:
(1) Temporary maintenance facilities may be used for soldering, brazing and welding. The use of lead containing rods will be prohibited at Lon C Hill Power Station.
(2) Estimated usage of welding rod per process knowledge.
(3) Emissions factor as published by EPA AP 42, Fifth Edition, Chapter 12.19 (July 1997), Table 12.19-2 for worst case scenario for each HAP emission.
(4) Max. Hourly Emission Rate (lb/hr) = Hourly Usage Amount (lb/hr) * Emission Factor (lb/lb rod)
Hourly Mn Emission Rate = 1 lb/hr * 23.2 lb/1,000lbrod * 1,000lbrod/1,000 lb rod = 0.02 lb/hr
(5) Annual Emission Rate (tpy) = Annual Usage Amount (lb/yr) * Emission Factor (lb/lb rod) * 1ton/2,000lb
Annual Mn Emission Rate = 1,000 lb/yr * 23.2 lb/1,000lbrod * 1,000lbrod/1,000 lb rod * 1ton/2,000lb = 0.012 tpy

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LON C HILL REDEVELOPMENT PROJECT
LON C. HILL, LP

Filter Changeout
When a coalescer filter is replaced, the filter housing is opened to the atmosphere, possibly releasing very small quantities of vapors. Emission rate calculations are not required due to the low vapor pressure of the turbine oil associated with the coalescer.

According to a TCEQ Memo dated September 19, 1996 from Victoria Hsu, emission rate calculations are not required if the vapor pressure is below 0.01 mmHg (0.0002 psia) at a temperature not to exceed 40°C (104°F).

Shell Turbo Oil J32 (MSDS # 10085)					
Vapor Pressure at 68°F: <	0.5	Pa	=	0.00375	mmHg

TCEQ Memo 9/19/96: Vapor pressumre must be less than		
Vapor Pressure at 68°F: <	0.01	mmHg

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TABLE 1F
AIR QUALITY APPLICATION SUPPLEMENT

Permit No.:	114911 - PSDTX1380	Application Submittal Date:	2/28/2014
Company:	Lon C. Hill, LP.		
RN:	RN100215979	Facility Location:	3501 Callicoatte Rd, Corpus Christi, Texas
City:	Corpus Christi	County:	Nueces
Permit Unit I.D.:	TBD	Permit Name:	Lon C Hill Power Station
Permit Activity:	☒ New Source	☐ Modification	

Complete for all Pollutants with a Project Emission Increase.	POLLUTANTS							
	Ozone		CO	PM_{10}	$PM_{2.5}$	NO_X	SO_2	Other[1] H_2SO_4
	VOC	NO_x						
Nonattainment Potentially Applicable?	No	No	No	No	No	No	No	No
PSD Potentially Applicable?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Existing site PTE (tpy)?	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proposed project emission increases (tpy from 2F[2])	144.8	213.1	852.9	112.6	110.1	213.1	12.0	1.8
Is the existing site a major source?	No	No	No	No	No	No	No	No
If not, is the project a major source by itself?	Yes	Yes	Yes	Yes	Yes	Yes	No	No
If site is major source, is project increase significant?	Yes	Yes	Yes	Yes	Yes	Yes	No	No
If netting required, estimated start of construction:			01-May-15					
5 years prior to start of construction contemporaneous period			01-May-10					
Estimated start of operation			01-Apr-17					
Net contemporaneous change, including proposed project, from Table 3F. (tpy)	144.8	213.1	852.9	112.6	110.1	213.1	N/A	N/A
Major NSR Applicable?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**

	Asset Manager	02/28/2014
Signature	***Title***	***Date***

[1] Other pollutants. [Pb, H_2S, TRS, H_2SO_4, Fluoride excluding HF, etc.]
[2] Sum of proposed emissions minus baseline emissions, increases only.
The representations made above and on the accompanying tables are true and correct to the best of my knowledge.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	NOx	Permit:	114911 - PSDTX1380
Baseline Period:	to		

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	104.4		104.4		104.4
2	CC-102	STK-102	TBD		0.0	104.4		104.4		104.4
3	ABL-100	ABLSTK-100	TBD		0.0	2.8		2.8		2.8
4	EGEN-100	EGENSTK-100	TBD		0.0	1.0		1.0		1.0
5	FWP-100	FWPSTK-100	TBD		0.0	0.5		0.5		0.5
6										
7										
8										
9										
									Page Subtotal[9]	213.1

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	CO	Permit:	114911 - PSDTX1380
Baseline Period:	to		

					A	B				
Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	Baseline Emissions[4]	Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	423.2		423.2		423.2
2	CC-102	STK-102	TBD		0.0	423.2		423.2		423.2
3	ABL-100	ABLSTK-100	TBD		0.0	5.1		5.1		5.1
4	EGEN-100	EGENSTK-100	TBD		0.0	1.3		1.3		1.3
5	FWP-100	FWPSTK-100	TBD		0.0	0.2		0.2		0.2
6										
7										
8										
9										
									Page Subtotal[9]	852.9

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	VOC	Permit:	114911 - PSDTX1380
Baseline Period:	to		

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	71.4		71.4		71.4
2	CC-102	STK-102	TBD		0.0	71.4		71.4		71.4
3	ABL-100	ABLSTK-100	TBD		0.0	0.3		0.3		0.3
4	EGEN-100	EGENSTK-100	TBD		0.0	0.14		0.14		0.14
5	FWP-100	FWPSTK-100	TBD		0.0	0.5		0.5		0.5
6	OWS-100	OWS-100	TBD		0.0	0.2		0.2		0.2
7	TK-101	TKSTK-101	TBD		0.0	0.0001		0.0001		0.0001
8	TK-102	TKSTK-102	TBD		0.0	0.00006		0.00006		0.00006
9	TK-103	TKSTK-103	TBD		0.0	0.01		0.01		0.01
10	FUGNG-100	FUGNG-100	TBD		0.0	0.4		0.4		0.4
11	FUGDS-100	FUGDS-100	TBD		0.0	0.24		0.2		0.2
12	PURG-100	PURG-100	TBD		0.0	0.004		0.004		0.004
13	CC-101 and CC-102	OFFWASH-100	TBD		0.0	0.003		0.003		0.003
14										
									Page Subtotal[9]	144.8

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	SO_2	**Permit:**	114911 - PSDTX1380
Baseline Period:	to		

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	5.9		5.9		5.9
2	CC-102	STK-102	TBD		0.0	5.9		5.9		5.9
3	ABL-100	ABLSTK-100	TBD		0.0	0.03		0.03		0.03
4	EGEN-100	EGENSTK-100	TBD		0.0	0.14		0.1		0.1
5	FWP-100	FWPSTK-100	TBD		0.0	0.1		0.1		0.1
6										
7										
8										
9										
									Page Subtotal[9]	12.0

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	PM10	Permit:	114911 - PSDTX1380
Baseline Period:		to	

	Affected or Modified Facilities[2]		Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	54.7		54.7		54.7
2	CC-102	STK-102	TBD		0.0	54.7		54.7		54.7
3	CC-101	LOVSTK-101	TBD		0.0	0.01		0.01		0.01
4	CC-102	LOVSTK-102	TBD		0.0	0.01		0.01		0.01
5	ST-103	LOVSTK-103	TBD		0.0	0.05		0.05		0.05
6	ABL-100	ABLSTK-100	TBD		0.0	0.4		0.4		0.4
7	EGEN-100	EGENSTK-100	TBD		0.0	0.06		0.06		0.06
8	FWP-100	FWPSTK-100	TBD		0.0	0.03		0.03		0.03
9	CTW-100	CTW-100	TBD		0.0	2.3		2.3		2.3
10	CTW-200	CTW-200	TBD		0.0	0.2		0.2		0.2
11	WELD	WELD	TBD		0.0	0.04		0.04		0.04
12										
									Page Subtotal[9]	112.6

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	$PM_{2.5}$	Permit:	114911 - PSDTX1380
Baseline Period:	to		

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	54.7		54.7		54.7
2	CC-102	STK-102	TBD		0.0	54.7		54.7		54.7
3	CC-101	LOVSTK-101	TBD		0.0	0.01		0.01		0.01
4	CC-102	LOVSTK-102	TBD		0.0	0.01		0.01		0.01
5	ST-103	LOVSTK-103	TBD		0.0	0.05		0.05		0.05
6	ABL-100	ABLSTK-100	TBD		0.0	0.4		0.4		0.4
7	EGEN-100	EGENSTK-100	TBD		0.0	0.06		0.06		0.06
8	FWP-100	FWPSTK-100	TBD		0.0	0.03		0.03		0.03
9	CTW-100	CTW-100	TBD		0.0	0.01		0.01		0.01
10	CTW-200	CTW-200	TBD		0.0	0.001		0.001		0.001
11	WELD	WELD	TBD		0.0	0.04		0.04		0.04
12										
									Page Subtotal[9]	110.1

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 2F
PROJECT EMISSION INCREASE

Pollutant[1]:	H_2SO_4	Permit:	114911 - PSDTX1380
Baseline Period:	to		

Affected or Modified Facilities[2]			Permit No.	Actual Emissions[3]	A Baseline Emissions[4]	B Proposed Emissions[5]	Projected Actual Emissions	Difference (B-A)[6]	Correction[7]	Project Increase[8]
	FIN	EPN								
1	CC-101	STK-101	TBD		0.0	0.9		0.9		0.9
2	CC-102	STK-102	TBD		0.0	0.9		0.9		0.9
3										
4										
5										
6										
7										
8										
9										
									Page Subtotal[9]	1.8

[1] Individual Table 2F's should be used to summarize the project emission increase for each criteria pollutant
[2] Emission Point Number as designated in NSR Permit or Emissions Inventory
[3] All records and calculations for these values must be available upon request
[4] Correct actual emissions for currently applicable rule or permit requirements, and periods of non-compliance. These corrections, as well as any MSS previously demonstrated under 30 TAC 101, should be explained in the Table 2F supplement
[5] If projected actual emission is used it must be noted in the next column and the basis for the projection identified in the Table 2F supplement
[6] Proposed Emissions (column B) minus Baseline Emissions (column A)
[7] Correction made to emission increase for what portion could have been accommodated during the baseline period. The justification and basis for this estimate must be provided in the Table 2F supplement
[8] Obtained by subtracting the correction from the difference. Must be a positive number.
[9] Sum all values for this page.

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TABLE 3F
PROJECT CONTEMPORANEOUS CHANGES[1]

Company:	Lon C. Hill, LP		
Permit Application Number:	114911 - PSDTX1380	**Criteria Pollutant:**	NOx

	Project Date[2]	Facility at Which Emission Change Occurred[3] FIN	Facility at Which Emission Change Occurred[3] EPN	Permit No.	Project Name or Activity	Baseline Period (years)	A Proposed Emissions (tons/year)[4]	B Baseline Emissions (tons/year)[5]	Difference (A-B)[6]	Creditable Decrease or Increase[7]
1	TBD	CC-101	STK-101	TBD	Unit 101 Combined Cycle (GT+HRSG)	NA	104.4	0.0	104.4	104.4
2	TBD	CC-102	STK-102	TBD	Unit 102 Combined Cycle (GT+HRSG)	NA	104.4	0.0	104.4	104.4
3	TBD	ABL-100	ABLSTK-100	TBD	Auxiliary Boiler	NA	2.8	0.0	2.8	2.8
4	TBD	EGEN-100	EGENSTK-100	TBD	Emergency Generator	NA	1.0	0.0	1.0	1.0
5	TBD	FWP-100	FWPSTK-100	TBD	Firewater Pump	NA	0.5	0.0	0.5	0.5
6										
7										
8										
9										
Page Subtotal[8]							**213.1**	**0.0**	**213.1**	**213.1**
Summary of Contemporaneous Changes Total							**213.1**	**0.0**	**213.1**	**213.1**

[1] Individual Table 3F's should be used to summarize the project emission increase and net emission increase for each criteria pollutant.
[2] The start of operation date for the modified or new facilities. Attach Table 4F for each project reduction claimed.
[3] Emission Point No. as designated in NSR Permit or Emissions Inventory.
[4] All records and calculations for these values must be available upon request.
[5] All records and calculations for these values must be available upon request.
[6] Proposed (column A) - Baseline (column B).
[7] If portion of the decrease not creditable, enter creditable amount.
[8] Sum all values for this page.

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TABLE 3F
PROJECT CONTEMPORANEOUS CHANGES[1]

Company:	Lon C. Hill, LP		
Permit Application Number:	114911 - PSDTX1380	**Criteria Pollutant:**	CO

Project Date[2]		Facility at Which Emission Change Occurred[3]		Permit No.	Project Name or Activity	Baseline Period (years)	A Proposed Emissions (tons/year)[4]	B Baseline Emissions (tons/year)[5]	Difference (A-B)[6]	Creditable Decrease or Increase[7]
		FIN	EPN							
1	TBD	CC-101	STK-101	TBD	Unit 101 Combined Cycle (GT+HRSG)	NA	423.2	0.0	423.2	423.2
2	TBD	CC-102	STK-102	TBD	Unit 102 Combined Cycle (GT+HRSG)	NA	423.2	0.0	423.2	423.2
3	TBD	ABL-100	ABLSTK-100	TBD	Auxiliary Boiler	NA	5.1	0.0	5.1	5.1
4	TBD	EGEN-100	EGENSTK-100	TBD	Emergency Generator	NA	1.3	0.0	1.3	1.3
5	TBD	FWP-100	FWPSTK-100	TBD	Firewater Pump	NA	0.2	0.0	0.2	0.2
6										
7										
8										
9										
Page Subtotal[8]							**852.9**	**0.0**	**852.9**	**852.9**
Summary of Contemporaneous Changes Total							**852.9**	**0.0**	**852.9**	**852.9**

[1] Individual Table 3F's should be used to summarize the project emission increase and net emission increase for each criteria pollutant.
[2] The start of operation date for the modified or new facilities. Attach Table 4F for each project reduction claimed.
[3] Emission Point No. as designated in NSR Permit or Emissions Inventory.
[4] All records and calculations for these values must be available upon request.
[5] All records and calculations for these values must be available upon request.
[6] Proposed (column A) - Baseline (column B).
[7] If portion of the decrease not creditable, enter creditable amount.
[8] Sum all values for this page.

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TABLE 3F
PROJECT CONTEMPORANEOUS CHANGES[1]

Company:	Lon C. Hill, LP		
Permit Application Number:	114911 - PSDTX1380	**Criteria Pollutant:**	VOC

Project Date[2]		Facility at Which Emission Change Occurred[3]		Permit No.	Project Name or Activity	Baseline Period (years)	A Proposed Emissions (tons/year)[4]	B Baseline Emissions (tons/year)[5]	Difference (A-B)[6]	Creditable Decrease or Increase[7]
		FIN	EPN							
1	TBD	CC-101	STK-101	TBD	Unit 101 Combined Cycle (GT+HRSG)	NA	71.4	0.0	71.4	71.4
2	TBD	CC-102	STK-102	TBD	Unit 102 Combined Cycle (GT+HRSG)	NA	71.4	0.0	71.4	71.4
3	TBD	ABL-100	ABLSTK-100	TBD	Auxiliary Boiler	NA	0.3	0.0	0.3	0.3
4	TBD	EGEN-100	EGENSTK-100	TBD	Emergency Generator	NA	0.14	0.0	0.14	0.14
5	TBD	FWP-100	FWPSTK-100	TBD	Firewater Pump	NA	0.5	0.0	0.5	0.5
6	TBD	OWS-100	OWS-100	TBD	Oil Water Separator	NA	0.2	0.0	0.2	0.2
8	TBD	TK-101	TKSTK-101	TBD	Diesel Tank (Emergency Generator)	NA	0.0001	0.0	0.0001	0.0001
9	TBD	TK-102	TKSTK-102	TBD	Diesel Tank (Firewater Pump)	NA	0.0001	0.0	0.0001	0.0001
10	TBD	TK-103	TKSTK-103	TBD	Gasoline Tank	NA	0.01	0.00	0.01	0.01
11	TBD	FUGNG-100	FUGNG-100	TBD	Fugitive Natural Gas Service	NA	0.4	0.0	0.4	0.4
12	TBD	FUGDS-100	FUGDS-100	TBD	Fugitive Diesel Service	NA	0.2	0.0	0.2	0.2
13	TBD	PURG-100	PURG-100	TBD	MSS Fuel Purging Emissions	NA	0.004	0.0	0.004	0.004
14	TBD	CC-101 and CC-102	OFFWASH-100	TBD	MSS Offline Turbine Washing	NA	0.003	0.0	0.003	0.003
16										
						Page Subtotal[8]	**144.8**	**0.0**	**144.8**	**144.8**
						Summary of Contemporaneous Changes Total	**144.8**	**0.0**	**144.8**	**144.8**

[1] Individual Table 3F's should be used to summarize the project emission increase and net emission increase for each criteria pollutant.

[2] The start of operation date for the modified or new facilities. Attach Table 4F for each project reduction claimed.

[3] Emission Point No. as designated in NSR Permit or Emissions Inventory.

[4] All records and calculations for these values must be available upon request.

[5] All records and calculations for these values must be available upon request.

[6] Proposed (column A) - Baseline (column B).

[7] If portion of the decrease not creditable, enter creditable amount.

[8] Sum all values for this page.

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TABLE 3F
PROJECT CONTEMPORANEOUS CHANGES[1]

Company: Lon C. Hill, LP	
Permit Application Number: 114911 - PSDTX1380	**Criteria Pollutant:** PM_{10}

Project Date[2]		Facility at Which Emission Change Occurred[3]		Permit No.	Project Name or Activity	Baseline Period (years)	A Proposed Emissions (tons/year)[4]	B Baseline Emissions (tons/year)[5]	Difference (A-B)[6]	Creditable Decrease or Increase[7]
		FIN	EPN							
1	TBD	CC-101	STK-101	TBD	Unit 101 Combined Cycle (GT+HRSG)	NA	54.7	0.0	54.7	54.7
2	TBD	CC-102	STK-102	TBD	Unit 102 Combined Cycle (GT+HRSG)	NA	54.7	0.0	54.7	54.7
3	TBD	CC-101	LOVSTK-101	TBD	Unit 101 GT Lube Oil Vent	NA	0.01	0.0	0.01	0.01
4	TBD	CC-102	LOVSTK-102	TBD	Unit 102 GT Lube Oil Vent	NA	0.01	0.0	0.01	0.01
5	TBD	ST-103	LOVSTK-103	TBD	ST Lube Oil Vent	NA	0.05	0.0	0.05	0.05
6	TBD	ABL-100	ABLSTK-100	TBD	Auxiliary Boiler	NA	0.4	0.0	0.4	0.4
7	TBD	EGEN-100	EGENSTK-100	TBD	Emergency Generator	NA	0.06	0.0	0.06	0.06
8	TBD	FWP-100	FWPSTK-100	TBD	Firewater Pump	NA	0.03	0.0	0.03	0.03
9	TBD	CTW-100	CTW-100	TBD	Cooling Tower 1	NA	2.3	0.0	2.3	2.3
10	TBD	CTW-200	CTW-200	TBD	Cooling Tower 2	NA	0.2	0.0	0.2	0.2
13	TBD	WELD	WELD	TBD	MSS Soldering, Welding, Brazing	NA	0.04	0.0	0.04	0.04
14										
Page Subtotal[8]							**112.6**	**0.0**	**112.6**	**112.6**
Summary of Contemporaneous Changes Total							**112.6**	**0.0**	**112.6**	**112.6**

[1] Individual Table 3F's should be used to summarize the project emission increase and net emission increase for each criteria pollutant.
[2] The start of operation date for the modified or new facilities. Attach Table 4F for each project reduction claimed.
[3] Emission Point No. as designated in NSR Permit or Emissions Inventory.
[4] All records and calculations for these values must be available upon request.
[5] All records and calculations for these values must be available upon request.
[6] Proposed (column A) - Baseline (column B).
[7] If portion of the decrease not creditable, enter creditable amount.
[8] Sum all values for this page.

US EPA ARCHIVE DOCUMENT

TABLE 3F
PROJECT CONTEMPORANEOUS CHANGES[1]

Company:	Lon C. Hill, LP		
Permit Application Number:	114911 - PSDTX1380	Criteria Pollutant:	$PM_{2.5}$

Project Date[2]		Facility at Which Emission Change Occurred[3] FIN	EPN	Permit No.	Project Name or Activity	Baseline Period (years)	A Proposed Emissions (tons/year)[4]	B Baseline Emissions (tons/year)[5]	Difference (A-B)[6]	Creditable Decrease or Increase[7]
1	TBD	CC-101	STK-101	TBD	Unit 101 Combined Cycle (GT+HRSG)	NA	54.7	0.0	54.7	54.7
2	TBD	CC-102	STK-102	TBD	Unit 102 Combined Cycle (GT+HRSG)	NA	54.7	0.0	54.7	54.7
3	TBD	CC-101	LOVSTK-101	TBD	Unit 101 GT Lube Oil Vent	NA	0.01	0.0	0.01	0.01
4	TBD	CC-102	LOVSTK-102	TBD	Unit 102 GT Lube Oil Vent	NA	0.01	0.0	0.01	0.01
5	TBD	ST-103	LOVSTK-103	TBD	ST Lube Oil Vent	NA	0.05	0.0	0.05	0.05
6	TBD	ABL-100	ABLSTK-100	TBD	Auxiliary Boiler	NA	0.4	0.0	0.4	0.4
7	TBD	EGEN-100	EGENSTK-100	TBD	Emergency Generator	NA	0.06	0.0	0.06	0.06
8	TBD	FWP-100	FWPSTK-100	TBD	Firewater Pump	NA	0.03	0.0	0.03	0.03
9	TBD	CTW-100	CTW-100	TBD	Cooling Tower 1	NA	0.01	0.0	0.01	0.01
10	TBD	CTW-200	CTW-200	TBD	Cooling Tower 2	NA	0.001	0.0	0.001	0.001
13	TBD	WELD	WELD	TBD	MSS Soldering, Welding, Brazing	NA	0.04	0.0	0.04	0.04
14										
						Page Subtotal[8]	**110.1**	**0.0**	**110.1**	**110.1**
						Summary of Contemporaneous Changes Total	**110.1**	**0.0**	**110.1**	**110.1**

[1] Individual Table 3F's should be used to summarize the project emission increase and net emission increase for each criteria pollutant.
[2] The start of operation date for the modified or new facilities. Attach Table 4F for each project reduction claimed.
[3] Emission Point No. as designated in NSR Permit or Emissions Inventory.
[4] All records and calculations for these values must be available upon request.
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[6] Proposed (column A) - Baseline (column B).
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[8] Sum all values for this page.