Emission Source/Operating Scenario Data **Page 1 of 3**

Boiler #7 - Operating Scenario #1 - Coal

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: **University of North Carolina at Chapel Hill**

Facility ID #: **6800043**
Permit #: **3069T17**
County: **Orange**
DAQ Region: **RRO**

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						**ES-002-Boiler #7**
2. **Emission Source Description**	**Coal / Natural Gas / No. 2 Fuel Oil Fired Circulating Fluidized Bed Combustion - Steam Generating Unit**					
3. **Operating Scenario Description**	**Operating Scenario #1 - Coal**					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	**323.17 MMBtu/hr**					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)		**56,878**				**tons/yr**
6. **Fuel Information** *(if fuel used)*	% Sulfur	**1.12%**	% Ash	**8.05%**	Heat Content (Btu/lb or mmCF)	**13,068 Btu/lb**

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	**100%**

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	**CD-004**	**Bagfilter with Calcium Carbonate ($CaCO_3$) Sorbent Injection**
ii.	**N/A**	**N/A**
iii.	**N/A**	**N/A**
iv.	**N/A**	**N/A**

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-14-136	**220**	**9**	**305**	**56.1**	**214,000**	**Vertical**
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10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	24	Days/Week	7	Weeks/Year	**50**	Hours/Year	**8,154 Total**
Typical Start & End Times in CY:				Start:	N/A	End:	N/A

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, MUST total 100%)

Jan-Feb, 2002 + Dec, 2002	**33.86%**	Mar-May	**18.93%**	June-Aug	**22.13%**	Sept-Nov	**25.08%**

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 3**

Boiler #7 - Operating Scenario #1 - Coal

If Emission Source has multiple Operating Scenarios, complete one form for each. (All permitted, insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-002-Boiler #7**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	511.90	8	N/A
NOx	NOx	271.30	1	N/A
PM Total	PM	1.41	8	99.80%
PM-2.5	PM-2.5	0.84	8	97.90%
PM-10	PM-10	1.41	8	99.60%
SO2	SO2	101.33	1	90.00%
VOC	VOC	1.42	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Acetaldehyde	750-07-0	32.42	8	N/A
Acetophenone	98-86-2	0.85	8	N/A
Acrolein	107-02-8	16.49	8	N/A
Arsenic	ARSENICCPDS	0.60	8	99.60%
Benzene	71-43-2	73.94	8	N/A
Benzo(a)pyrene	50-32-8	2.16E-03	8	N/A
Benzyl chloride	100-44-7	39.81	8	N/A
Beryllium	BERYLCPDS	27.95	8	N/A
Biphenyl	92-52-4	9.67E-02	8	N/A
Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	4.15	8	N/A
Bromine	7726-95-6	12.19	8	99.60%
Bromoform	75-25-2	2.22	8	N/A
Cadmium	CADMIUMCPDS	2.45E-02	8	99.60%
Carbon disulfide	75-10-0	7.39	8	N/A
2-Chloroacetophenone	532-27-4	0.40	8	N/A
Chlorobenzene	108-90-7	1.25	8	N/A
Chloroform	67-66-3	3.36	8	N/A
Chromium	CROMCPDS	0.96	8	99.60%
Chromium (VI)	CHROM6CPDS	0.96	8	99.60%
Cumene	98-82-8	0.30	8	N/A
Cyanide	CNC	142.19	8	N/A
Dibenzofurans	132-64-9	1.14E-02	8	N/A
Dimethyl sulfate	77-78-1	2.73	8	N/A
2,4-Dinitrotoluene	121-14-2	1.59E-02	8	N/A
Ethyl benzene	100-41-4	5.35	8	N/A
Ethyl chloride	75-00-3	2.39	8	N/A
Ethylene dibromide	106-93-4	6.83E-02	8	N/A
Ethylene dichloride	107-06-2	2.28	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Emission Source/Operating Scenario Data **Page 3 of 3**

Boiler #7 - Operating Scenario #1 - Coal

If Emission Source has multiple Operating Scenarios, complete one form for each. (All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-002-Boiler #7**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	N/A	N/A	N/A
NOx	NOx	N/A	N/A	N/A
PM Total	PM	N/A	N/A	N/A
PM-2.5	PM-2.5	N/A	N/A	N/A
PM-10	PM-10	N/A	N/A	N/A
SO2	SO2	N/A	N/A	N/A
VOC	VOC	N/A	N/A	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Formaldehyde	50-0-00	13.65	8	N/A
Hexane	HEXANEISO	3.81	8	N/A
Hydrogen Chloride ***	7647-01-0	120011.84	8	90% Control with $CaCO_3$
Hydrogen Fluoride ***	7664-39-3	2502.62	8	90% Control with $CaCO_3$
Isophorone	78-59-1	32.99	8	N/A
Lead	LEADCPDS	0.39	8	99.60%
Manganese	MANGCPDS	1.66	8	99.60%
Mercury***	MERCCPDS	2.12	8	N/A
Methyl bromide	74-83-9	9.10	8	N/A
Methyl chloride	74-87-3	30.15	8	N/A
Methyl ethyl ketone	78-93-3	22.18	8	N/A
Methyl hydrazine	60-34-4	9.67	8	N/A
Methyl methacrylate	80-62-6	1.14	8	N/A
Methyl tert butyl ether	1634-04-4	1.99	8	N/A
Methylene chloride	75-09-2	16.49	8	N/A
Naphthalene	91-20-3	0.74	8	N/A
Nickel	NICKCPDS	0.79	8	99.60%
Phenol	108-95-2	0.91	8	N/A
POM	POM	3.33	8	N/A
Propionaldehyde	123-38-6	21.61	8	N/A
Styrene	100-42-5	1.42	8	N/A
2,3,7,8-TCDD	1746-01-6	8.13E-07	8	N/A
Tetrachloroethylene	79-34-5	2.45	8	N/A
Toluene	108-88-3	13.65	8	N/A
1,1,1-Trichloroethane	79-00-5	1.14	8	N/A
Vinyl acetate	108-05-4	0.43	8	N/A
Xylenes	1330-20-7	2.10	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Emission Source/Operating Scenario Data **Page 1 of 2**

Boiler #7 - Operating Scenario #2 - Natural Gas

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, insignificant and/or Non-permitted Sources)

Facility Name: **University of North Carolina at Chapel Hill**

Facility ID #:	**6800043**
Permit #:	**3069T17**
County:	**Orange**
DAQ Region:	**RRO**

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						**ES-002-Boiler #7**
2. **Emission Source Description**	**Coal / Natural Gas / No. 2 Fuel Oil Fired Circulating Fluidized Bed Combustion – Steam Generating Unit**					
3. **Operating Scenario Description**	**Operating Scenario #2 - Natural Gas**					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	**323.17 MMBtu/hr**					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)		**3,425**				**1,000 ft^3/yr**
6. **Fuel Information** *(if fuel used)*	**% Sulfur**	**N/A**	**% Ash**	**N/A**	Heat Content (Btu/lb or mmCF)	**1,030 Btu/ft^3**

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	**100%**

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	**CD-004**	**Bagfilter with Calcium Carbonate ($CaCO_3$) Sorbent Injection**
ii.	**N/A**	**N/A**
iii.	**N/A**	**N/A**
iv.	**N/A**	**N/A**

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-14-136	**220**	**9**	**305**	**56.1**	**214,000**	**Vertical**
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10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	**24**	Days/Week	**7**	Weeks/Year	**50**	Hours/Year	**7,848 Total**
Typical Start & End Times in CY:				Start:	**N/A**	End:	**N/A**

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, MUST total 100%)

Jan-Feb, 2002 + Dec, 2002	**1.46%**	Mar-May	**57.81%**	June-Aug	**9.93%**	Sept-Nov	**30.80%**

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 2**

Boiler #7 - Operating Scenario #2 - Natural Gas

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-002-Boiler #7**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	0.14	8	N/A
NOx	NOx	0.64	1	N/A
PM Total	PM	0.01	8	N/A
PM-2.5	PM-2.5	0.01	8	N/A
PM-10	PM-10	0.01	8	N/A
SO2	SO2	0.00	1	N/A
VOC	VOC	0.01	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Arsenic	ARSENICCPDS	6.85E-04	8	N/A
Benzene	71-43-2	0.01	8	N/A
Cadmium	CADMIUMCPDS	3.77E-03	8	N/A
Chromium	CROMCPDS	4.80E-03	8	N/A
Chromium VI	CHROM6CPDS	4.80E-03	8	N/A
Dichlorobenzene	106-46-7	4.11E-03	8	N/A
Formaldehyde	50-00-0	0.26	8	N/A
Hexane	HEXANEISO	6.17E+00	8	N/A
Lead	LEADCPDS	1.71E-03	8	N/A
Manganese	MANGCPDS	1.30E-03	8	N/A
Mercury	MERCPDS	8.91E-04	8	N/A
Napthalene	91-20-3	2.09E-03	8	N/A
Nickel	NICKCPDS	0.01	8	N/A
POM	POM	2.27E-03	8	N/A
Toluene	108-88-3	0.01	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Emission Source/Operating Scenario Data **Page 1 of 2**

Boiler #7 - Operating Scenario #3 - No. 6 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each. (All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						**ES-002-Boiler #7**
2. **Emission Source Description**	**Coal / Natural Gas / No. 6 Fuel Oil Fired Circulating Fluidized Bed Combustion - Steam Generating Unit**					
3. **Operating Scenario Description**	**Operating Scenario #3 - No. 6 Fuel Oil**					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	**323.17 MMBtu/hr**					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)		**0**				**gallons/yr**
6. **Fuel Information** *(if fuel used)*	% Sulfur	**2.10%**	% Ash	**0.10%**	Heat Content (Btu/lb or mmCF)	**150,000 Btu/gal**

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	**100%**

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	**CD-004**	**Bagfilter with Calcium Carbonate ($CaCO_3$) Sorbent Injection**
ii.	**N/A**	**N/A**
iii.	**N/A**	**N/A**
iv.	**N/A**	**N/A**

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-14-136	**220**	**9**	**305**	**56.1**	**214,000**	**Vertical**
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10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	**0**	Days/Week	**0**	Weeks/Year	**0**	Hours/Year	**0**
Typical Start & End Times in CY:				Start:	**N/A**	End:	**N/A**

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, **MUST** total 100%)

Jan-Feb, 2002 + Dec, 2002	**0.00%**	Mar-May	**#DIV/0!**	June-Aug	**#DIV/0!**	Sept-Nov	**#DIV/0!**

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 2**

Boiler #7 - Operating Scenario #3 - No. 6 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-002-Boiler #7**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	0.00	8	N/A
NOx	NOx		1	N/A
PM Total	PM	0.00	8	99.0%
PM-2.5	PM-2.5	0.00	8	99.0%
PM-10	PM-10	0.00	8	99.0%
SO2	SO2	0.00	1	90.00%
VOC	VOC	0.00	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Antimony	ANTIMONYCPDS	0.00E+00	8	99.0%
Arsenic	ARSENICCPDS	0.00E+00	8	99.0%
Benzene	71-43-2	0.00E+00	8	N/A
Beryllium	BERYLCPDS	0.00E+00	8	99.0%
Cadmium	CADMIUMCPDS	0.00E+00	8	99.0%
Chromium	CROMCPDS	0.00E+00	8	99.0%
Chromium VI	CHROM6CPDS	0.00E+00	8	99.0%
Cobalt	COBALTCPDS	0.00E+00	8	99.0%
Ethylbenzene	100-41-4	0.00E+00	8	N/A
Fluoride	16984-48-8	0.00	8	N/A
Formaldehyde	50-00-0	0.00	8	N/A
Lead	LEADCPDS	0.00E+00	8	99.0%
Manganese	MANGCPDS	0.00E+00	8	99.0%
Mercury	MERCPDS	0.00E+00	8	99.0%
Methyl chloroform	71-55-6	0.00E+00	8	N/A
Napthalene	91-20-3	0.000	8	N/A
Nickel	NICKCPDS	0.00E+00	8	99.0%
POM	POM	0.00E+00	8	99.0%
Selenium	SEC	0.00E+00	8	99.0%
Toluene	108-88-3	0.00	8	N/A
Xylene	1330-20-7	0.00E+00	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Emission Source/Operating Scenario Data **Page 1 of 2**

Boiler #7 - Operating Scenario #4 - No. 2 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each. (All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						**ES-002-Boiler #7**
2. **Emission Source Description**	**Coal / Natural Gas / No. 6 Fuel Oil Fired Circulating Fluidized Bed Combustion - Steam Generating Unit**					
3. **Operating Scenario Description**	**Operating Scenario #4 - No. 2 Fuel Oil**					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	**323.17 MMBtu/hr**					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)	**0**					**gallons/yr**
6. **Fuel Information** *(if fuel used)*	% Sulfur	**0.50%**	% Ash		Heat Content (Btu/lb or mmCF)	**137,006 Btu/gal**

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	**100%**

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	**CD-004**	**Bagfilter with Calcium Carbonate ($CaCO_3$) Sorbent Injection**
ii.	N/A	N/A
iii.	N/A	N/A
iv.	N/A	N/A

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-14-136	**220**	**9**	**305**	**56.1**	**214,000**	**Vertical**
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10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	**24**	Days/Week	**7**	Weeks/Year	**50**	Hours/Year	**7,848 Total**
Typical Start & End Times in CY:				Start:	N/A	End:	N/A

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, MUST total 100%)

Jan-Feb, 2002 + Dec, 2002	**#DIV/0!**	Mar-May	**#DIV/0!**	June-Aug	**#DIV/0!**	Sept-Nov	**#DIV/0!**

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 2**

Boiler #7 - Operating Scenario #4 - No. 2 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-002-Boiler #7**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	0.00	8	N/A
NOx	NOx	0.00	1	N/A
PM Total	PM	0.00	8	99.0%
PM-2.5	PM-2.5	0.00	8	99.0%
PM-10	PM-10	0.00	8	99.0%
SO2	SO2	0.00	1	90.00%
VOC	VOC	0.00	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Antimony	ANTIMONYCPDS	0.00E+00	8	99.0%
Arsenic	ARSENICCPDS	0.00E+00	8	99.0%
Benzene	71-43-2	0.00E+00	8	N/A
Beryllium	BERYLCPDS	0.00E+00	8	99.0%
Cadmium	CADMIUMCPDS	0.00E+00	8	99.0%
Chromium	CROMCPDS	0.00E+00	8	99.0%
Chromium VI	CHROM6CPDS	0.00E+00	8	99.0%
Cobalt	COBALTCPDS	0.00E+00	8	99.0%
Ethylbenzene	100-41-4	0.00E+00	8	N/A
Fluoride	16984-48-8	0.00	8	N/A
Formaldehyde	50-00-0	0.00	8	N/A
Lead	LEADCPDS	0.00E+00	8	99.0%
Manganese	MANGCPDS	0.00E+00	8	99.0%
Mercury	MERCPDS	0.00E+00	8	99.0%
Methyl chloroform	71-55-6	0.00E+00	8	N/A
Napthalene	91-20-3	0.000	8	N/A
Nickel	NICKCPDS	0.00E+00	8	99.0%
POM	POM	0.00E+00	8	99.0%
Selenium	SEC	0.00E+00	8	99.0%
Toluene	108-88-3	0.00	8	N/A
Xylene	1330-20-7	0.00E+00	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina

Orange County

Facility ID # 6800043

Permit # 03069T17

2004 Annual Emissions Inventory

Boiler #7

(ES-002-Boiler #7)

Emissions Calculations

SO_2 and NOx Emissions are Taken from CEMs data

HCl, HF, Hg emissions are based on stack test data

All other estimates are from DAQ Spreadsheets

Bituminous Coal Combustion

2004 Annual Emissions Inventory

Facility: **University of North Carolina at Chapel Hill**
City: **Chapel Hill**
County: **Orange County**

APP #/Fac ID: **6800043**
Input By: **RST Engineering**
Source ID: **Boiler #7**

Operating Scenario #1

(ES-002-Boiler #7)

Data Input

Maximum Heat Input	323.17	mmBtu/hr
Boiler Size/Type	Large Industrial	
Actual Fuel Usage	56,878	ton/yr
or	or	
Hours of Operation		hr/yr
and	and	
Heating Value	13,068	Btu/lb
		ton/yr
Sulfur Content	1.12	%
Ash Content :	8.1	%
(B)ituminous or (S)ubbituminous?	B	(B/S)
Calcium to Sulfur Ratio	2.22	

Boiler Type: 7

1) Pulverized/Dry Bottom
2) Pulverized/Wet Bottom
3) Cyclone Furnace
4) Spreader Stoker
5) Overfeed Stoker
6) Underfeed Stoker
7) Fluidized Bed Cir.
8) Fluidized Bed Bub.
9) Hand Fed

Control Device Efficiencies:

PM	99.80	%
PM-10	99.60	%
PM-2.5	97.90	%
SOx*	90.00	%
NOx*	0.00	%

SOx and NOx emission estimates were calculated using CEMS data. Please refer to the SOx and NOX emissions data presented in the following CEMs spreadsheets.

HCl, HF, and Hg emissions based on stack test data.

Bituminous Coal Combustion

2004 Annual Emissions Inventory

Facility **University of North Carolina at Chapel Hill**
City **Chapel Hill**
County **Orange County**

APP #/Fac ID **6800043**
Input By **RST Engineering**
Source ID **Boiler #7**

Operating Scenario #1

(ES-002-Boiler #7)

ACTUAL CRITERIA EMISSIONS

Pollutant	Factor (lb poll./ton coal)	Emission Rates (lb/hr)	(lb/yr)	(tpy)
PM	17	0.61	2,821	1.41
PM-10	12.4	0.61	2,821	1.41
PM-2.5*	1.4	0.36	1,672	0.84
SO2	9.75	**	**	**
SO3*	0.07	**	**	**
NOx	3.90	**	**	**
VOC	0.05	0.62	2,844	1.42
CO	18	222.57	1,023,798	511.90

ACTUAL TOXIC EMISSIONS

Pollutant	Factor (lb poll./ton coal)	Emission Rates (lb/hr)	(lb/yr)	(tpy)
Acetaldehyde	5.70E-04	7.05E-03	3.24E+01	1.62E-02
Acetophenone	1.50E-05	1.85E-04	8.53E-01	4.27E-04
Acrolein	2.90E-04	3.59E-03	1.65E+01	8.25E-03
Arsenic	5.29E-03	1.31E-04	6.02E-01	3.01E-04
Benzene	1.30E-03	1.61E-02	7.39E+01	3.70E-02
Benzo(a)pyrene	3.80E-08	4.70E-07	2.16E-03	1.08E-06
Benzyl chloride	7.00E-04	8.66E-03	3.98E+01	1.99E-02
Beryllium	4.91E-04	6.08E-03	2.80E+01	1.40E-02
Biphenyl	1.70E-06	2.10E-05	9.67E-02	4.83E-05
Bis(2-ethylhexyl)phthalate (DEHP)	7.30E-05	9.03E-04	4.15E+00	2.08E-03
Bromine	1.07E-01	2.65E-03	1.22E+01	6.09E-03
Bromoform	3.90E-05	4.82E-04	2.22E+00	1.11E-03
Cadmium	2.15E-04	5.33E-06	2.45E-02	1.23E-05
Carbon disulfide	1.30E-04	1.61E-03	7.39E+00	3.70E-03
2-Chloroacetophenone	7.00E-06	8.66E-05	3.98E-01	1.99E-04
Chlorobenzene	2.20E-05	2.72E-04	1.25E+00	6.26E-04
Chloroform	5.90E-05	7.30E-04	3.36E+00	1.68E-03
Chromium	8.46E-03	2.09E-04	9.62E-01	4.81E-04
Chromium (VI)	8.46E-03	2.09E-04	9.62E-01	4.81E-04
Cumene	5.30E-06	6.55E-05	3.01E-01	1.51E-04
Cyanide	2.50E-03	3.09E-02	1.42E+02	7.11E-02
Dibenzofurans	2.01E-07	2.49E-06	1.14E-02	5.72E-06
Dimethyl sulfate	4.80E-05	5.94E-04	2.73E+00	1.37E-03
2,4-Dinitrotoluene	2.80E-07	3.46E-06	1.59E-02	7.96E-06
Ethyl benzene	9.40E-05	1.16E-03	5.35E+00	2.67E-03
Ethyl chloride	4.20E-05	5.19E-04	2.39E+00	1.19E-03
Ethylene dibromide	1.20E-06	1.48E-05	6.83E-02	3.41E-05
Ethylene dichloride	4.00E-05	4.95E-04	2.28E+00	1.14E-03
Formaldehyde	2.40E-04	2.97E-03	1.37E+01	6.83E-03
Hexane	6.70E-05	8.28E-04	3.81E+00	1.91E-03
Hydrogen Chloride ***	***2.11E+00***	2.61E+01	1.20E+05	6.00E+01
Hydrogen Fluoride ***	***4.40E-02***	5.44E-01	2.50E+03	1.25E+00
Isophorone	5.80E-04	7.17E-03	3.30E+01	1.65E-02
Lead	3.41E-03	8.44E-05	3.88E-01	1.94E-04

**SO_2 and NOx emissions were estimated using CEMS data, please refer to the attached data sheets entitled "Sulfur Dioxide Emissions from Boiler #7" and Nitrogen Dioxide Emissions from Boiler #7".

*** HCl, HF, and Hg emissions based on stack test data.

Bituminous Coal Combustion

2004 Annual Emissions Inventory

Facility	University of North Carolina at Chapel Hill	APP #/Fac ID	6800043
City	Chapel Hill	Input By	RST Engineering
County	Orange County	Source ID	Boiler #7

Operating Scenario #1 (ES-002-Boiler #7)

Actual Toxic Emissions (cont...)

Pollutant	Factor (lb poll./ton coal)	Emission Rates (lb/hr)	(lb/yr)	(tpy)
Manganese	1.46E-02	3.61E-04	1.66E+00	8.31E-04
Mercury***	***3.73E-05***	4.61E-04	2.12E+00	1.06E-03
Methyl bromide	1.60E-04	1.98E-03	9.10E+00	4.55E-03
Methyl chloride	5.30E-04	6.55E-03	3.01E+01	1.51E-02
Methyl ethyl ketone	3.90E-04	4.82E-03	2.22E+01	1.11E-02
Methyl hydrazine	1.70E-04	2.10E-03	9.67E+00	4.83E-03
Methyl methacrylate	2.00E-05	2.47E-04	1.14E+00	5.69E-04
Methyl tert butyl ether	3.50E-05	4.33E-04	1.99E+00	9.95E-04
Methylene chloride	2.90E-04	3.59E-03	1.65E+01	8.25E-03
Naphthalene	1.30E-05	1.61E-04	7.39E-01	3.70E-04
Nickel	6.95E-03	1.72E-04	7.91E-01	3.95E-04
Phenol	1.60E-05	1.98E-04	9.10E-01	4.55E-04
POM	5.85E-05	7.24E-04	3.33E+00	1.66E-03
Propionaldehyde	3.80E-04	4.70E-03	2.16E+01	1.08E-02
Styrene	2.50E-05	3.09E-04	1.42E+00	7.11E-04
2,3,7,8-TCDD	1.43E-11	1.77E-10	8.13E-07	4.07E-10
Tetrachloroethylene	4.30E-05	5.32E-04	2.45E+00	1.22E-03
Toluene	2.40E-04	2.97E-03	1.37E+01	6.83E-03
1,1,1-Trichloroethane	2.00E-05	2.47E-04	1.14E+00	5.69E-04
Vinyl acetate	7.60E-06	9.40E-05	4.32E-01	2.16E-04
Xylenes	3.70E-05	4.58E-04	2.10E+00	1.05E-03
Total HAPs		26.76	123,075.63	61.54

Version 5b-1.0k by Tony Pendola; 06/17/97

Notes :

1) Emission factors are from Supplement B to the 5th edition of AP-42, unless otherwise noted
2) Emission calculations will be based on the hours of operation only when actual fuel usage is not supplied
3) Particulate controls affect PM, PM-10, PM-2.5, and all toxics that are regulated as particulates except Mercury
4) VOC = NMTOC = TOC * (1-%METHANE)
5) PM-2.5 and SO3 do not currently need to be reported
6) Dibenzofurans = Polychlorinated dibenzo-p-furans
7) The Br emission factor is based on a mass balance generated from a 3 year coal analysis for Duke Power (1990-1992, 7 samples per year). The average concentration of bromine was 55.33 ppm (wet basis) and a heating value of 13,500 Btu/lb was assumed
8) For fluidized bed combustion the emission factor for underfeed stokers is utilized whenever the calcium-to-sulfur ratio is outside of the acceptable range of 1.5 to 7

Natural Gas Combustion Emissions Calculator NG2000 Revision C
2004 Annual Emissions Inventory
Boiler #7
(ES-002-Boiler #7)

Facility ID # 6800043
Permit # 03069T17

Operating Scenario #2

User Input	
Company Name:	University of North Carolina at Chapel Hill
Plant County:	Orange County
Plant City:	Chapel Hill
Permit Number:	03069T17
User:	TRC Environmental Corp.
Heat Input Capacity (mmBtu/hr):	323.17
Fuel Input Capacity (10^6 scf/hr):	0.32
Annual Fuel Throughput (10^6 scf):	3.43
Latest Construction/Modification Date:	N/A

Enter the boiler type below ⇲	
2	

Other NOx Control
4

Large Wall-Fired Boilers (=>100 mmBtu/hr)
1 = Uncontrolled (Pre-NSPS)
2 = Uncontrolled (Post-NSPS)
3 = Controlled - Low NOx burners
4 = Controlled - Flue gas recirculation (FGR)

Small Boilers (<100 mmBtu/hr)
5 = Uncontrolled
6 = Controlled - Low NOx burners
7 = Controlled - Low NOx burners/FGR

Tangential-Fired Boilers (All Sizes)
8 = Uncontrolled
9 = Controlled - FGR

Residential Furnaces (<0.3 mmBtu/hr)
10 = Uncontrolled

Emissions Output (for operation 19.22 hr/yr)

Criteria Pollutants

Pollutant	lb/hr	lb/yr	tpy	Emission Factor (lb/mmscf)
PM	2.4E+00	2.6E+01	1.3E-02	7.6E+00
PM-10	2.4E+00	2.6E+01	1.3E-02	7.6E+00
PM-2.5	2.4E+00	2.6E+01	1.3E-02	7.6E+00
NOx	**	**	**	1.9E+02
VOC	1.7E+00	1.9E+01	9.4E-03	5.5E+00
CO	2.7E+01	2.9E+02	1.4E-01	8.4E+01
SO2	**	**	**	6.0E-01
Total HAP	6.0E-01	6.5E+00	3.2E-03	1.9E+00
Largest HAP	5.7E-01	6.2E+00	3.1E-03	1.8E+00

Toxic/Hazardous Air Pollutants

Pollutant	lb/hr	lb/day	lb/yr	
Arsenic	6.3E-05	NA	6.9E-04	2.0E-04
Benzene	6.7E-04	NA	7.2E-03	2.1E-03
Cadmium	3.5E-04	NA	3.8E-03	1.1E-03
Chromium	4.4E-04	NA	4.8E-03	1.4E-03
Chromium VI	4.4E-04	NA	4.8E-03	1.4E-03
Dichlorobenzene	3.8E-04	NA	4.1E-03	1.2E-03
Formaldehyde	2.4E-02	NA	2.6E-01	7.5E-02
Hexane	5.7E-01	1.4E+01	6.2E+00	1.8E+00
Lead	1.6E-04	NA	1.7E-03	5.0E-04
Manganese	1.2E-04	2.9E-03	1.3E-03	3.8E-04
Mercury	8.2E-05	2.0E-03	8.9E-04	2.6E-04
Naphthalene	1.9E-04	NA	2.1E-03	6.1E-04
Nickel	6.7E-04	1.6E-02	7.2E-03	2.1E-03
POM	2.1E-04	NA	2.3E-03	6.6E-04
Toluene	1.1E-03	2.6E-02	1.2E-02	3.4E-03

** SOx and NOx emissions were estimated using CEMS data, please refer to the attached spreadsheets.
Hourly emission rates for all pollutants based on hourly rated capacity.
NG2000 Revision C dated March 9, 2000

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
2004 Annual Emissions Inventory
Boiler #7
(ES-002-Boiler #7)
Facility ID # 6800043
Permit # 03069T17

Operating Scenario #3

User Input	
Company Name:	University of North Carolina at Chapel Hill
Plant County:	Orange County
Plant City:	Chapel Hill
Permit Number:	03069T17
User:	RST Engineering
Heat Input Capacity (mmBtu/hr):	323.17
Fuel Input Capacity (10^3 gal/hr):	2.15
Annual Fuel Throughput (1000 gal):	0.00
Maximum fuel sulfur content (%)	2.1
Latest Construction/Modification Date:	N/A

Emissions Output

Criteria Pollutants

Pollutant	lb/hr[2]	tpy	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Total PM (FPM + CPM)	3.7	0.0000	0	2.49E+01
Filterable PM (FPM) rates @ 99% control	0.5	0.0000	0	2.34E+01
Condensable PM (CPM)[4]	3.2	0.0000	0	1.50E+00
Filterable PM-10[5]	0.4	0.0000	0	1.67E+01
Filterable PM-2.5[5]	0.3	0.0000	0	1.22E+01
NOx rates @ 39% control	**	**	**	4.70E+01
NMTOC	2	0.0000	0	7.60E-01
CO	11	0.0000	0	5.00E+00
SO2 rates @ 90% control	**	**	**	3.45E+02
Total HAP[6]	3.92E-01	0.0000	0	1.82E-01
Largest HAP[6]	1.82E-01	0.0000	0	8.45E-02

Toxic/Hazardous Air Pollutants.

Pollutant	lb/hr[2]	lb/day[7]	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Antimony rates @ 99% control	1.13E-04	NA	0.00E+00	5.25E-03
Arsenic rates @ 99% control	2.84E-05	NA	0.00E+00	1.32E-03
Benzene	4.61E-04	NA	0.00E+00	2.14E-04
Beryllium rates @ 99% control	5.99E-07	NA	0.00E+00	2.78E-05
Cadmium rates @ 99% control	8.57E-06	NA	0.00E+00	3.98E-04
Chromium rates @ 99% control	1.82E-05	NA	0.00E+00	8.45E-04
Chromium VI rates @ 99% control	5.34E-06	NA	0.00E+00	2.48E-04
Cobalt rates @ 99% control	1.30E-04	NA	0.00E+00	6.02E-03
Ethylbenzene	1.37E-04	NA	0.00E+00	6.36E-05
Fluoride	8.04E-02	1.93E+00	0.00E+00	3.73E-02
Formaldehyde	7.11E-02	1.71E+00	0.00E+00	3.30E-02
Lead rates @ 99% control	3.25E-05	NA	0.00E+00	1.51E-03
Manganese rates @ 99% control	6.46E-05	1.55E-03	0.00E+00	3.00E-03
Mercury	2.43E-04	5.84E-03	0.00E+00	1.13E-04
Methyl chloroform (1,1,1-Trichloroethane)	5.08E-04	1.22E-02	0.00E+00	2.36E-04
Naphthalene	2.43E-03	NA	0.00E+00	1.13E-03
Nickel rates @ 99% control	1.82E-03	4.37E-02	0.00E+00	8.45E-02
POM rates @ 99% control	1.31E-06	NA	0.00E+00	6.06E-05
Selenium rates @ 99% control	1.47E-05	NA	0.00E+00	6.83E-04
Toluene	1.34E-02	3.21E-01	0.00E+00	6.20E-03
Xylene	2.35E-04	5.64E-03	0.00E+00	1.09E-04

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
2004 Annual Emissions Inventory
Boiler #7
(ES-002-Boiler #7)
Facility ID # 6800043
Permit # 03069T17

Operating Scenario #4 - No.2 Fuel Oil

User Input	
Company Name:	University of North Carolina at Chapel Hill
Plant County:	Orange County
Plant City:	Chapel Hill
Permit Number:	03069T17
User:	RST Engineering
Heat Input Capacity (mmBtu/hr):	323.17
Fuel Input Capacity (10^3 gal/hr):	2.31
Annual Fuel Throughput (1000 gal):	0.00
Maximum fuel sulfur content (%)	0.5
Latest Construction/Modification Date:	N/A

Enter the boiler type below ⇲	
15	

Boilers =>100 mmBtu/hr		Boilers =>100 mmBtu/hr (cont'd)
1 = No. 6 oil fired, normal firing (U)		16 = No. 2 oil fired (C)
2 = No. 6 oil fired, normal firing (I)		17 = No. 2 oil fired, LNB/FGR (U,I)
3 = No. 6 oil fired, normal firing (C)		18 = No. 2 oil fired, LNB/FGR (C)
4 = No. 6 oil fired, normal firing, low NOx burner (U)		
5 = No. 6 oil fired, normal firing, low NOx burner (I)		19 = Vertical fired utility boiler
6 = No. 6 oil fired, normal firing, low NOx burner (C)		
7 = No. 6 oil fired, tangential firing (U)		**Small Boilers (<100 mmBtu/hr)**
8 = No. 6 oil fired, tangential firing, low NOx burner (U)		20 = No. 6 oil fired (I)
9 = No. 5 oil fired, normal firing (U)		21 = No. 6 oil fired (C)
10 = No. 5 oil fired, normal firing (I)		22 = No. 5 oil fired (C)
11 = No. 5 oil fired, tangential firing (U)		23 = No. 4 oil fired (C)
12 = No. 4 oil fired, normal firing (U)		24 = No. 2 oil fired (I)
13 = No. 4 oil fired, normal firing (I)		25 = No. 2 oil fired (C)
14 = No. 4 oil fired, tangential firing (U)		
15 = No. 2 oil fired (U,I)		26 = Residential Furnace

Emission Controls

Particulate controls

Enter the control type below ⇲	Message Area	Or enter a PM control efficiency below to override built in values.
3		User Input PM Cont. Effic.
		Message Area

Control Device	Avg. Cont. Effic.
0 = None/other	
1 = ESP	
2 = Scrubber	
3 = Bagfilter	99.0
4 = Multiple cyclone	

Postcombustion SO_2 controls

Enter the control type below ⇲	Message Area	Or enter an SO_2 control efficiency below to override built in values.
0		User Input SO_2 Cont. Effic.
		90.0

Control Technology/Process		User entered control efficiency may be overestimated and should be documented.
0 = None/other		
1 = Wet scrubber, Lime/limestone	Avg. Cont. Effic.	
2 = Wet scrubber, Sodium carbonate	0.0	
3 = Wet scrubber, Magnesium oxide/hydroxide		
4 = Wet scrubber, Dual alkali	Remarks	
5 = Spray drying, calcium hydroxide slurry, vap. in spray vessel	NA	
6 = Furnace injection, Dry calcium carbonate/hydrate inj. in upper furn. cavity		
7 = Duct injection, Dry sorbent injection into duct, sometimes combined with water spray		

NO_x controls

Enter the control type below ⇲	Message Area	Or enter a NO_x control efficiency below to override built in values.
0		User Input NO_x Cont. Effic.
		0.0

Control Technology/Process		Message Area
0 = None/other		
1 = Low excess air (LEA)	Avg. Cont. Effic.	
2 = Staged combustion (SC)	0.0	
3 = Burners out of service (BOOS)		
4 = Flue gas recirculation (FGR)	Remarks	
5 = Flue gas recirculation plus staged combustion	NA	
6 = Low NOx burners (LNB)		
7 = Reduced air preheat (RAP)		
8 = Selective noncatalytic reduction (SNCR)		
9 = Conventional selective catalytic reduction (SCR)		

Emissions Output (for operation 6.79 hr/yr)

Criteria Pollutants

Pollutant	lb/hr[2]	tpy	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Total PM (FPM + CPM)	3.0	0.0000	0	3.30E+00
Filterable PM (FPM) rates @ 99% control	0.0	0.0000	0	2.00E+00
Condensable PM (CPM)[4]	3.0	0.0000	0	1.30E+00
Filterable PM-10[5]	0.0	0.0000	0	1.00E+00
Filterable PM-2.5[5]	0.0	0.0000	0	2.50E-01
NOx rates uncontrolled	**	**	**	2.40E+01
NMTOC	0	0.0000	0	2.00E-01
CO	12	0.0000	0	5.00E+00
SO2 rates @ 90% control	**	**	**	2.98E+02
Total HAP[6]	4.17E-01	0.0000	0	1.81E-01
Largest HAP[6]	1.84E-01	0.0000	0	7.97E-02

Toxic/Hazardous Air Pollutants.

Pollutant	lb/hr[2]	lb/day[7]	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Antimony rates @ 99% control	0.00E+00	NA	0.00E+00	0.00E+00
Arsenic rates @ 99% control	1.29E-05	NA	0.00E+00	5.60E-04
Benzene	6.35E-03	NA	0.00E+00	2.75E-03
Beryllium rates @ 99% control	9.70E-06	NA	0.00E+00	4.20E-04
Cadmium rates @ 99% control	9.70E-06	NA	0.00E+00	4.20E-04
Chromium rates @ 99% control	9.70E-06	NA	0.00E+00	4.20E-04
Chromium VI rates @ 99% control	2.85E-06	NA	0.00E+00	1.23E-04
Cobalt rates @ 99% control	0.00E+00	NA	0.00E+00	0.00E+00
Ethylbenzene	1.89E-03	NA	0.00E+00	8.17E-04
Fluoride	8.61E-02	2.07E+00	0.00E+00	3.73E-02
Formaldehyde	1.11E-01	2.66E+00	0.00E+00	4.80E-02
Lead rates @ 99% control	2.91E-05	NA	0.00E+00	1.26E-03

Manganese rates @ 99% control	1.94E-05	4.65E-04	0.00E+00	8.40E-04
Mercury	9.70E-04	2.33E-02	0.00E+00	4.20E-04
Methyl chloroform (1,1,1-Trichloroethane)	5.45E-04	1.31E-02	0.00E+00	2.36E-04
Napthalene	7.69E-04	NA	0.00E+00	3.33E-04
Nickel rates @ 99% control	9.70E-06	2.33E-04	0.00E+00	4.20E-04
POM rates @ 99% control	7.62E-05	NA	0.00E+00	3.30E-03
Selenium rates @ 99% control	4.85E-05	NA	0.00E+00	2.10E-03
Toluene	1.84E-01	4.41E+00	0.00E+00	7.97E-02
Xylene	3.23E-03	7.76E-02	0.00E+00	1.40E-03

[1]Emission factors represent AP-42 uncontrolled values. Emission rates are reflective of controls where applicable.

[2]Hourly emission rates for all pollutants are based on hourly rated capacity.

[3]Annual emission rates for all pollutants are based on maximum annual fuel throughput.

[4]Wet scrubbers are assumed to control CPM whereas other PM control devices are assumed to only control FPM.

[5]AP-42 assumes PM-10 and PM-2.5 assumes these pollutants are controlled with the same efficiency as total PM.

[6]Total and largest HAP factors and emission rates do not reflect control of metals. Individual metal emission rates are reflective of particulate matter controls where applicable.

[7]Daily emission rates are based on operation 24 hours per day at rated capacity.

**SO2 and NOx emissions were estimated using CEMS data, please refer to the attached spreadsheets.

FO2000 Revision A dated March 9, 2000

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina
Orange County
Facility ID # 6800043
Permit # 03069T17

2004 Annual Emissions Inventory

Sulfur Dioxide Emissions from Boiler #7 (ES-002-Boiler #7)

The exhaust duct at Boiler #7 is equipped with a continuous emissions monitor (CEMs) for SO_2 emissions. For the 2004 calendar year, 30 day facility averages for the SO_2 emission rate measured by the CEM are as follows:

Month	30 day average CEM reading (lb/MMBtu)
January 2004	0.146
February 2004	0.138
March 2004	0.139
April 2004	0.138
May 2004	0.178
June 2004	0.139
July 2004	0.135
August 2004	0.136
September 2004	0.106
October 2004	0.123
November 2004	0.127
December 2004	0.128
Annual Average	***0.136***

This average includes SO_2 emissions from coal, fuel oil, and natural gas within Boiler #6 over the entire year, representing a composite average for all fuels combusted.

Fuel Inputs to Boiler #7 for 2004

Boiler #7			
Coal Tons/yr	**Gas 1,000cf/yr**	**No. 6 Oil Gallons/yr**	**No. 2 Oil Gallons/yr**
56,878	**3,425**	**0**	**0**
Coal (13,068 btu/lb)	Nat. Gas (1,030 btu/cf)	Oil (150,000 btu/gal)	Oil (137,006 btu/gal)
MMBtu/year			
1.49E+06	3.53E+03	0.00E+00	0.00E+00

Total for Boiler #7 (MMBtu/yr)	1.49E+06

Total SO_2 Emissions from Boiler #7 (lb/yr)	202,651
Total SO_2 Emissions from Boiler #7 (ton/yr)	**101.3**

SO_2 Emissions Associated with Coal Combustion (ton/yr)	**101.3**
SO_2 Emissions Associated with No. 6 Fuel Oil Combustion (ton/yr)	**0.0**
SO_2 Emissions Associated with No. 2 Fuel Oil Combustion (ton/yr)	**0.00**

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina
Orange County
Facility ID # 6800043
Permit # 03069T17

2004 Annual Emissions Inventory

Nitrogen Dioxide Emissions from Boiler #7 (ES-002-Boiler #7)

The exhaust duct at Boiler #7 is equipped with a continuous emissions monitor (CEMs) for NOx emissions. For the 2004 calendar year, 30 day facility averages for the NOx emission rate measured by the CEM are as follows:

Month	30 day average CEM reading (lb/MMBtu)
January 2004	0.49
February 2004	0.46
March 2004	0.35
April 2004	0.33
May 2004	0.31
June 2004	0.33
July 2004	0.29
August 2004	0.30
September 2004	0.30
October 2004	0.40
November 2004	0.40
December 2004	0.42
Annual Average	***0.37***

This average includes NOx emissions from coal, fuel oil, and natural gas within Boiler #7 over the entire year, representing a composite average for all fuels combusted.

Fuel Inputs to Boiler #7 for 2004

Boiler #7			
Coal Tons/yr	**Gas 1,000cf/yr**	**No. 6 Oil Gallons/yr**	**No. 2 Oil Gallons/yr**
56,878	**3,425**	**0**	**0**
Coal (13,068 btu/lb)	Nat. Gas (1,030 btu/cf)	Oil (150,000 btu/gal)	Oil (137,006 btu/gal)
MMBtu/year			
1.49E+06	3.53E+03	0.00E+00	0.00E+00

Total for Boiler #7 (MMBtu/yr)	1.49E+06

NOx Emissions from Boiler #7 (lb/yr)	543,880
NOx Emissions from Boiler #7 (ton/yr)	**271.9**

NOx Emissions Associated with Coal Combustion (ton/yr)	**271.30**
NOx Emissions Associated with Fuel Oil No. 6 Combustion (ton/yr)	**0.0**
NOx Emissions Associated with Fuel Oil No. 2 Combustion (ton/yr)	**0.00**
NOx Emissions Associated with Natural Gas Combustion (ton/yr)	**0.64**

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina

Orange County

Facility ID # 6800043

Permit # 03069T17

2004 Annual Emissions Inventory

Boiler #8
(ES-003-Boiler #8)

Operating Scenario #1 - Natural Gas Firing
Operating Scenario #2 - No. 2 Fuel Oil Firing

Emission Source/Operating Scenario Data **Page 1 of 1**

Boiler #8 - Operating Scenario #1 - Natural Gas

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #:	6800043
Permit #:	3069T17
County:	Orange
DAQ Region:	RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						ES-003-Boiler #8
2. **Emission Source Description**	Natural Gas / No. 2 Fuel Oil Fired Boiler					
3. **Operating Scenario Description**	Operating Scenario #1 - Natural Gas					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	338.0 MMBtu/hr					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)		94,162				1,000 ft^3/yr
6. **Fuel Information** *(if fuel used)*	% Sulfur	N/A	% Ash	N/A	Heat Content (Btu/lb or mmCF)	1,030 Btu/ft^3

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	N/A

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	None	None
ii.	None	None
iii.	None	None
iv.	None	None

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-4	208	6	300	47.2	80073	Boiler Stack
--	--	--	--	--	--	--
--	--	--	--	--	--	--

10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	Standby	Days/Week	Standby	Weeks/Year	Standby	Hours/Year	1,833 Total
Typical Start & End Times in CY:				Start:	N/A	End:	N/A

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, MUST total 100%)

Jan-Feb, 2002 + Dec, 2002	3%	Mar-May	42%	June-Aug	2%	Sept-Nov	53%

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 2**

Boiler #8 - Operating Scenario #1 - Natural Gas

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-003-Boiler #8**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	3.95	8	N/A
NOx	NOx	3.39	8	N/A
PM Total	PM	0.36	8	N/A
PM-2.5	PM-2.5	0.36	8	N/A
PM-10	PM-10	0.36	8	N/A
SO2	SO2	0.03	8	N/A
VOC	VOC	0.26	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Arsenic	ARSENICCPDS	1.88E-02	8	N/A
Benzene	71-43-2	0.20	8	N/A
Cadmium	CADMIUMCPDS	1.04E-01	8	N/A
Chromium	CROMCPDS	1.32E-01	8	N/A
Chromium VI	CHROM6CPDS	1.32E-01	8	N/A
Dichlorobenzene	106-46-7	1.13E-01	8	N/A
Formaldehyde	50-00-0	7.06	8	N/A
Hexane	HEXANEISO	1.69E+02	8	N/A
Lead	LEADCPDS	4.71E-02	8	N/A
Manganese	MANGCPDS	3.58E-02	8	N/A
Mercury	MERCPDS	2.45E-02	8	N/A
Napthalene	91-20-3	5.74E-02	8	N/A
Nickel	NICKCPDS	0.20	8	N/A
POM	POM	6.23E-02	8	N/A
Toluene	108-88-3	0.32	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Emission Source/Operating Scenario Data **Page 1 of 1**

Boiler #8 - Operating Scenario #2 - No. 2 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, insignificant and/or Non-permitted Sources)

Facility Name: **University of North Carolina at Chapel Hill**

Facility ID #: **6800043**
Permit #: **3069T17**
County: **Orange**
DAQ Region: **RRO**

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

1. **Emission Source ID No.** *(same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant*)*						**ES-003-Boiler #8**
2. **Emission Source Description**	**Natural Gas / No. 2 Fuel Oil Fired Boiler**					
3. **Operating Scenario Description**	**Operating Scenario #2 - No. 2 Fuel Oil**					
4. **Maximum Permitted Operating Rate** With Units (Ex. gal/hr, mmBtu/hr)	**338.0 MMBtu/hr**					
5. **Throughput in CY** (e.g. production or fuel use) With Units (Ex. lbs/yr, gal/yr)		**133,691**				**gallons/year**
6. **Fuel Information** *(if fuel used)*	% Sulfur	**0.50%**	% Ash		Heat Content (Btu/lb or mmCF)	**135,344 Btu/gal**

If you do not provide annual throughput/fuel use, your inventory will be deemed incomplete and returned to you.

7. **Capture Efficiency** *(% Emissions from Emission Source Vented to Control Device or Stack)*	N/A

8. **Control Device Information,** if none, write "none"

	Control Device ID # (as listed in permit)	Control Device Description
i. (nearest stack)	N/A	N/A
ii.	N/A	N/A
iii.	N/A	N/A
iv.	N/A	N/A

9. Stack Information (sources vented to more than one stack use additional entry lines)

Stack ID #	Height (in whole feet)	Diameter (feet) Circle (enter #), Rectangle (L#, W#) (in 0.1 feet)	Temperature (F)	Velocity (feet/sec)	Volume Flow Rate (acfm)	Release Point Description (Fugitive, Vertical, Vertical w/ cap, Horizontal, Downward - *see instructions*)
EP-4	**208**	**6**	**300**	**47.2**	**80073**	**Boiler Stack**
--	--	--	--	--	--	--
--	--	--	--	--	--	--

10. **Operating Schedule** (Source/Operating Scenario that best characterizes calendar year)

Hours/Day	**Standby**	Days/Week	**Standby**	Weeks/Year	**Standby**	Hours/Year	**1,833 Total**
Typical Start & End Times in CY:				Start:	**N/A**	End:	**N/A**

11. **Seasonal Periods Percent Annual Throughput** (for Emission Source in CY, MUST total 100%)

Jan-Feb, 2002 + Dec, 2002	**100%**	Mar-May	**0%**	June-Aug	**0%**	Sept-Nov	**0%**

To review instructions or get a blank copy, go to web page: http://daq.state.nc.us/Offices/Planning/Attainment/est.html

Copy and Use additional Sheets as needed

Emission Source/Operating Scenario Data **Page 2 of 2**

Boiler #8 - Operating Scenario #2 - No. 2 Fuel Oil

If Emission Source has multiple Operating Scenarios, complete one form for each.
(All permitted, Insignificant and/or Non-permitted Sources)

Facility Name: University of North Carolina at Chapel Hill

Facility ID #: 6800043
Permit #: 3069T17
County: Orange
DAQ Region: RRO

North Carolina Department of Environment and Natural Resources
Division of Air Quality
Air Pollutant Point Source Emissions Inventory - Calendar Year 2004

Emissions: **Attach calculations and documentation of emission factors or other estimation methods used.**

Emission Source ID No. (*same as in permit* - Use "U" prefix for non-permitted and "I" for insignificant) **ES-003-Boiler #8**

Criteria (NAAQS) Pollutants	Pollutant Code	Emissions Criteria (Tons/Year)	Emissions Estimation Method Code (see instructions for code)	Control Efficiency (Net after all controls)
Carbon Monoxide	CO	0.33	8	N/A
NOx	NOx	0.64	8	N/A
PM Total	PM	0.22	8	N/A
PM-2.5	PM-2.5	0.02	8	N/A
PM-10	PM-10	0.07	8	N/A
SO2	SO2	1.64	8	N/A
VOC	VOC	0.01	8	N/A
HAP/TAP Pollutants (In Alphabetical Order)	**CAS #** (or other code - see instructions)	**Emissions HAP/TAP** (Pounds/Year)	**Emissions Estimation Method Code** (see instructions for code)	**Control Efficiency** (Net after all controls)
Arsenic	ARSENICCPDS	7.49E-02	8	N/A
Benzene	71-43-2	3.68E-01	8	N/A
Beryllium	BERYLCPDS	5.62E-02	8	N/A
Cadmium	CADMIUMCPDS	5.62E-02	8	N/A
Chromium	CROMCPDS	5.62E-02	8	N/A
Chromium VI	CHROM6CPDS	1.65E-02	8	N/A
Ethylbenzene	100-41-4	1.09E-01	8	N/A
Fluoride	16984-48-8	4.99	8	N/A
Formaldehyde	50-00-0	6.42	8	N/A
Lead	LEADCPDS	1.68E-01	8	N/A
Manganese	MANGCPDS	1.12E-01	8	N/A
Mercury	MERCPDS	5.62E-02	8	N/A
Methyl chloroform	71-55-6	3.16E-02	8	N/A
Napthalene	91-20-3	0.0445	8	N/A
Nickel	NICKCPDS	5.62E-02	8	N/A
POM	POM	4.41E-01	8	N/A
Selenium	SEC	2.81E-01	8	N/A
Toluene	108-88-3	10.65	8	N/A
Xylene	1330-20-7	1.87E-01	8	N/A

Emissions and data on this form required to report or verify emissions cannot be held confidential.

To review instructions or get a blank copy, go to web page: **http://daq.state.nc.us/Offices/Planning/Attainment/est.html**

Copy and Use additional Sheets as needed.

Natural Gas Combustion Emissions Calculator NG2000 Revision C
2004 Annual Emissions Inventory
Boiler #8
(ES-003-Boiler #8)

Facility ID # 6800043
Permit # 03069T17

Operating Scenario #1

User Input

Company Name:	University of North Carolina at Chapel Hill
Plant County:	Orange County
Plant City:	Chapel Hill
Permit Number:	03069T17
User:	RST Engineering
Heat Input Capacity (mmBtu/hr):	338
Fuel Input Capacity (10^6 scf/hr):	0.33
Annual Fuel Throughput (10^6 scf):	94.16
Latest Construction/Modification Date:	N/A

Enter the boiler type below ⇲	
3 + 4	

Other NOx Control
Enter 1 below if SNCR is applied to the boiler.
0

Large Wall-Fired Boilers (=>100 mmBtu/hr)
1 = Uncontrolled (Pre-NSPS)
2 = Uncontrolled (Post-NSPS)
3 = Controlled - Low NOx burners
4 = Controlled - Flue gas recirculation (FGR)

Small Boilers (<100 mmBtu/hr)
5 = Uncontrolled
6 = Controlled - Low NOx burners
7 = Controlled - Low NOx burners/FGR

Tangential-Fired Boilers (All Sizes)
8 = Uncontrolled
9 = Controlled - FGR

Residential Furnaces (<0.3 mmBtu/hr)
10 = Uncontrolled

Emissions Output

Criteria Pollutants

Pollutant	lb/hr	lb/yr	tpy	Emission Factor (lb/mmscf)
PM	2.5E+00	7.2E+02	3.6E-01	7.6E+00
PM-10	2.5E+00	7.2E+02	3.6E-01	7.6E+00
PM-2.5	2.5E+00	7.2E+02	3.6E-01	7.6E+00
NOx	**	**	**	1.9E+02
VOC	1.8E+00	5.2E+02	2.6E-01	5.5E+00
CO	2.8E+01	7.9E+03	4.0E+00	8.4E+01
SO2	2.0E-01	5.6E+01	2.8E-02	6.0E-01
Total HAP	6.3E-01	1.8E+02	8.9E-02	1.9E+00
Largest HAP	6.0E-01	1.7E+02	8.5E-02	1.8E+00

Toxic/Hazardous Air Pollutants

Pollutant	lb/hr	lb/day	lb/yr	
Arsenic	6.6E-05	NA	1.9E-02	2.0E-04
Benzene	7.0E-04	NA	2.0E-01	2.1E-03
Cadmium	3.6E-04	NA	1.0E-01	1.1E-03
Chromium	4.6E-04	NA	1.3E-01	1.4E-03
Chromium VI	4.6E-04	NA	1.3E-01	1.4E-03
Dichlorobenzene	4.0E-04	NA	1.1E-01	1.2E-03
Formaldehyde	2.5E-02	NA	7.1E+00	7.5E-02
Hexane	6.0E-01	1.4E+01	1.7E+02	1.8E+00
Lead	1.7E-04	NA	4.7E-02	5.0E-04
Manganese	1.3E-04	3.0E-03	3.6E-02	3.8E-04
Mercury	8.6E-05	2.1E-03	2.4E-02	2.6E-04
Naphthalene	2.0E-04	NA	5.7E-02	6.1E-04
Nickel	7.0E-04	1.7E-02	2.0E-01	2.1E-03
POM	2.2E-04	NA	6.2E-02	6.6E-04
Toluene	1.1E-03	2.7E-02	3.2E-01	3.4E-03

** NOx emissions were estimated using CEMS data, please refer to the attached spreadsheets.
Hourly emission rates for all pollutants based on hourly rated capacity.
NG2000 Revision C dated March 9, 2000

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
Boiler #8
2004 Annual Emissions Inventory
(ES-003-Boiler #8)
Facility ID # 6800043
Permit # 03069T17

Operating Scenario #2

User Input	
Company Name:	**University of North Carolina at Chapel Hill**
Plant County:	**Orange County**
Plant City:	**Chapel Hill**
Permit Number:	**03069T17**
User:	**RST Engineering**
Heat Input Capacity (mmBtu/hr):	**338**
Fuel Input Capacity (10^3 gal/hr):	2.41
Annual Fuel Throughput (1000 gal):	**133.69**
Maximum fuel sulfur content (%)	**0.50**
Latest Construction/Modification Date:	**N/A**

Enter the boiler type below ↘	
17	

Boilers =>100 mmBtu/hr
1 = No. 6 oil fired, normal firing (U)
2 = No. 6 oil fired, normal firing (I)
3 = No. 6 oil fired, normal firing (C)
4 = No. 6 oil fired, normal firing, low NOx burner (U)
5 = No. 6 oil fired, normal firing, low NOx burner (I)
6 = No. 6 oil fired, normal firing, low NOx burner (C)
7 = No. 6 oil fired, tangential firing (U)
8 = No. 6 oil fired, tangential firing, low NOx burner (U)
9 = No. 5 oil fired, normal firing (U)
10 = No. 5 oil fired, normal firing (I)
11 = No. 5 oil fired, tangential firing (U)
12 = No. 4 oil fired, normal firing (U)
13 = No. 4 oil fired, normal firing (I)
14 = No. 4 oil fired, tangential firing (U)
15 = No. 2 oil fired (U,I)

Boilers =>100 mmBtu/hr (cont'd)
16 = No. 2 oil fired (C)
17 = No. 2 oil fired, LNB/FGR (U,I)
18 = No. 2 oil fired, LNB/FGR (C)

19 = Vertical fired utility boiler

Small Boilers (<100 mmBtu/hr)
20 = No. 6 oil fired (I)
21 = No. 6 oil fired (C)
22 = No. 5 oil fired (C)
23 = No. 4 oil fired (C)
24 = No. 2 oil fired (I)
25 = No. 2 oil fired (C)

26 = Residential Furnace

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
Boiler #8
2004 Annual Emissions Inventory
(ES-003-Boiler #8)
Facility ID # 6800043
Permit # 03069T17

Operating Scenario #2

User Input	
Company Name:	University of North Carolina at Chapel Hill
Plant County:	Orange County
Plant City:	Chapel Hill
Permit Number:	03069T17
User:	RST Engineering
Heat Input Capacity (mmBtu/hr):	338
Fuel Input Capacity (10^3 gal/hr):	2.41
Annual Fuel Throughput (1000 gal):	133.69
Maximum fuel sulfur content (%)	0.50
Latest Construction/Modification Date:	N/A

Emission Controls

Particulate controls

Enter the control type below ⇲	Message Area	Or enter a PM control efficiency below to override built in values.
0		User Input PM Cont. Effic. 0.0

Control Device	Avg. Cont. Effic.
0 = None/other	0.0
1 = ESP	
2 = Scrubber	
3 = Bagfilter	0.0
4 = Multiple cyclone	

Message Area

Postcombustion SO_2 controls

Enter the control type below ⇲	Message Area	Or enter an SO_2 control efficiency below to override built in values.
0		User Input SO_2 Cont. Effic. 0.0

Control Technology/Process	Avg. Cont. Effic.
0 = None/other	
1 = Wet scrubber, Lime/limestone	0.0
2 = Wet scrubber, Sodium carbonate	
3 = Wet scrubber, Magnesium oxide/hydroxide	
4 = Wet scrubber, Dual alkali	Remarks
5 = Spray drying, calcium hydroxide slurry, vap. in spray vessel	NA
6 = Furnace injection, Dry calcium carbonate/hydrate inj. in upper furn. cavity	
7 = Duct injection, Dry sorbent injection into duct, sometimes combined with water spray	

Message Area

NO_x controls

Enter the control type below ⇲		Or enter a NO_x control efficiency below to override built in values.
5 + 6		User Input NO_x Cont. Effic. 0.0

Control Technology/Process	Avg. Cont. Effic.
0 = None/other	
1 = Low excess air (LEA)	0.0
2 = Staged combustion (SC)	
3 = Burners out of service (BOOS)	
4 = Flue gas recirculation (FGR)	Remarks
5 = Flue gas recirculation plus staged combustion	NA
6 = Low NOx burners (LNB)	
7 = Reduced air preheat (RAP)	
8 = Selective noncatalytic reduction (SNCR)	

Message Area

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
Boiler #8
2004 Annual Emissions Inventory
(ES-003-Boiler #8)
Facility ID # 6800043
Permit # 03069T17

Operating Scenario #2

User Input	
Company Name:	**University of North Carolina at Chapel Hill**
Plant County:	**Orange County**
Plant City:	**Chapel Hill**
Permit Number:	**03069T17**
User:	**RST Engineering**
Heat Input Capacity (mmBtu/hr):	**338**
Fuel Input Capacity (10^3 gal/hr):	2.41
Annual Fuel Throughput (1000 gal):	**133.69**
Maximum fuel sulfur content (%)	**0.50**
Latest Construction/Modification Date:	**N/A**

Emissions Output

Criteria Pollutants

Pollutant	lb/hr[2]	tpy	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Total PM (FPM + CPM)	8.0	0.2206	441	3.30E+00
Filterable PM (FPM) rates uncontrolled	4.8	0.1337	267	2.00E+00
Condensable PM (CPM)[4]	3.1	0.0869	174	1.30E+00
ilterable PM-10[5]	2.4	0.0668	134	1.00E+00
-ilterable PM-2.5[5]	0.6	0.0167	33	2.50E-01
NOx rates uncontrolled	**	**	**	2.40E+01
NMTOC	0	0.0134	27	2.00E-01
CO	12	0.3342	668	5.00E+00
SO2 rates uncontrolled	59.2	1.6377	3,275	2.45E+01
Total HAP[6]	4.36E-01	0.0121	24	1.81E-01
Largest HAP[6]	1.92E-01	0.0053	11	7.97E-02

***NOx emissions based on CEMs data.*

Toxic/Hazardous Air Pollutants.

Pollutant	lb/hr[2]	lb/day[7]	lb/yr[3]	Emission Factor[1] (lb/10^3 gal)
Antimony rates uncontrolled	0.00E+00	NA	0.00E+00	0.00E+00
Arsenic rates uncontrolled	1.35E-03	NA	7.49E-02	5.60E-04
Benzene	6.64E-03	NA	3.68E-01	2.75E-03
Beryllium rates uncontrolled	1.01E-03	NA	5.62E-02	4.20E-04
Cadmium rates uncontrolled	1.01E-03	NA	5.62E-02	4.20E-04
Chromium rates uncontrolled	1.01E-03	NA	5.62E-02	4.20E-04
Chromium VI rates uncontrolled	2.98E-04	NA	1.65E-02	1.23E-04
Cobalt rates uncontrolled	0.00E+00	NA	0.00E+00	0.00E+00
Ethylbenzene	1.97E-03	NA	1.09E-01	8.17E-04
Fluoride	9.01E-02	2.16E+00	4.99E+00	3.73E-02
Formaldehyde	1.16E-01	2.78E+00	6.42E+00	4.80E-02
Lead rates uncontrolled	3.04E-03	NA	1.68E-01	1.26E-03
Manganese rates uncontrolled	2.03E-03	4.87E-02	1.12E-01	8.40E-04
Mercury	1.01E-03	2.43E-02	5.62E-02	4.20E-04
ethyl chloroform (1,1,1-Trichloroethane)	5.70E-04	1.37E-02	3.16E-02	2.36E-04
Naphthalene	8.04E-04	NA	4.45E-02	3.33E-04
Nickel rates uncontrolled	1.01E-03	2.43E-02	5.62E-02	4.20E-04
POM rates uncontrolled	7.97E-03	NA	4.41E-01	3.30E-03
Selenium rates uncontrolled	5.07E-03	NA	2.81E-01	2.10E-03
Toluene	1.92E-01	4.62E+00	1.07E+01	7.97E-02
Xylene	3.38E-03	8.12E-02	1.87E-01	1.40E-03

Fuel Oil Combustion Emissions Calculator FO2000 Revision A
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Plant City:	Chapel Hill
Permit Number:	03069T17
User:	RST Engineering
Heat Input Capacity (mmBtu/hr):	338
Fuel Input Capacity (10^3 gal/hr):	2.41
Annual Fuel Throughput (1000 gal):	133.69
Maximum fuel sulfur content (%)	0.50
Latest Construction/Modification Date:	N/A

[1]Emission factors represent AP-42 uncontrolled values. Emission rates are reflective of controls where applicable.
[2]Hourly emission rates for all pollutants are based on hourly rated capacity.
[3]Annual emission rates for all pollutants are based on maximum annual fuel throughput.
[4]Wet scrubbers are assumed to control CPM whereas other PM control devices are assumed to only control FPM.
[5]AP-42 assumes PM-10 and PM-2.5 assumes these pollutants are controlled with the same efficiency as total PM.
[6]Total and largest HAP factors and emission rates do not reflect control of metals. Individual metal emission rates are reflective of particulate matter controls where applicable.
Daily emission rates are based on operation 24 hours per day at rated capacity.
SO2 and NOx emissions were estimated using CEMS data, please refer to the attached spreadsheets.
FO2000 Revision A dated March 9, 2000

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina
Orange County
Facility ID # 6800043
Permit # 03069T17

2004 Annual Emissions Inventory

Nitrogen Dioxide Emissions from Boiler #8 (ES-003-Boiler #8)

The exhaust duct at Boiler #8 is equipped with a continuous emissions monitor (CEMs) for NOx emissions. For the 2004 calendar year, 30 day facility averages for the NOx emission rate measured by the CEM are as follows:

Month	30 day average CEM reading (lb/MMBtu)
January 2004	0.06
February 2004	0.06
March 2004	0.06
April 2004	0.06
May 2004	0.05
June 2004	0.05
July 2004	0.05
August 2004	0.05
September 2004	0.05
October 2004	0.07
November 2004	0.07
December 2004	0.07
Annual Average	***0.07***

This average includes NOx emissions from coal, fuel oil, and natural gas within Boiler #8 over the entire year, representing a composite average for all fuels combusted.

Fuel Inputs to Boiler #8 for 2004

Boiler #8	
Gas 1,000cf/yr	**Oil Gallons/yr**
94,162	**133,691**
Nat. Gas (1,030 btu/cf)	Oil (137,006 btu/gal)
MMBtu/yr	
9.70E+04	1.83E+04

Total for Boiler #8 (MMBtu/yr)	1.15E+05

NOx Emissions from Boiler #8 (lb/yr)	8,071
NOx Emissions from Boiler #8 (ton/yr)	**4.0**

NOx Emissions Associated with Fuel Oil Combustion (ton/yr)	**0.64**
NOx Emissions Associated with Natural Gas Combustion (ton/yr)	**3.39**

University of North Carolina at Chapel Hill

Chapel Hill, North Carolina

Orange County

Facility ID # 6800043

Permit # 03069T17

2004 Annual Emissions Inventory

Coal Crusher/Conveyor Building
(ES-010A)