ATTACHMENT A
DARTMOUTH HITCHCOCK MEDICAL CENTER
FACILITY-WIDE SHORT AND LONG TERM EMISSION CALCULATIONS

Device	Fuel/Sulfur	Emission Factor Source	Size	Emission Factors: NOx	NO_2	CO	TSP^3	PM_{10}	$PM_{2.5}$	SO_2^4	VOC	Lead	Sulfuric Acid Mist	CO_2	Methane	N_2O
Institutional Boilers	Natural Gas	AP-42, Chapters 1.4-1 & 1.4-2 (7/98) *Natural Gas Combustion Small Boilers < 100 MMBtu/hr*	$lb/10^6 scf$	100	100	84	7.6	5.7	1.9	15.0	5.5	0.0005	0.29	120,000	2.3	2.2
Institutional Boilers	#2 FO 0.4% S	AP-42, Chapters 1.3-1 & 1.3-3, 1.3-6, 1.3-8, 1.3-11 & 1.3-12 (5/10) *Criteria Pollutant Emission Factors for Fuel Oil Combustion < 100 MMBtu/hr*	lb/kgal	20	20	5	2.00	1.00	0.25	56.8	0.2	0.00013	1.08	22,300	0.052	0.26
Institutional Boilers	#6 FO 1% S	AP-42, Chapters 1.3-1 & 1.3-3, 1.3-5, 1.3-8, 1.3-11 & 1.3-12 (5/10) *Criteria Pollutant Emission Factors for Fuel Oil Combustion < 100 MMBtu/hr*	lb/kgal	55	55	5	12.4	10.7	7.0	157.0	0.28	0.00151	3.00	25,000	1.00	0.53
Emergency Generators	#2 FO 0.4% S	AP-42, Chapter 3.4, (10/96) *Large Stationary Diesel & All Stationary Duel Fuel Engines > 600 hp*	lb/kgal	438.4	438.4	116.5	9.5	7.9	7.6	55.3	12.3	NA	NA	22,605	NA	NA
Emergency Generators	#2 FO 500 ppm (0.05 %S) until 10/01/10 then 15 ppm (0.0015 %S)	EPA Certified Tier 2 Emission Factors	g/kWh	6.4	6.4	3.5	0.2	0.2	0.2	---	6.4	NA	NA	NA	NA	NA
Emergency Generators	#2 FO 500 ppm (0.05 %S) until 10/01/10 then 15 ppm (0.0015 %S)	EPA Certified Tier 2 Emission Factors	lb/kgal	207	207	112	6.5	6.5	6.5	6.9	207	NA	NA	22,605	NA	NA
Residential Furnaces	#2 FO 0.4% S	AP-42, Chapters 1.3-1 & 1.3-2 & 1.3-7 (10/96) *Criteria Pollutant Emission Factors for Fuel Oil Combustion Residential Furnaces*	lb/kgal	18	18	5	2.00	1.00	0.83	56.8	0.713	0.00013	1.08	22,300	1.78	0.05
Residential Furnaces	LPG	AP-42, Chapter 1.5 (07/08) *Liquefied Petroleum Gas Combustion* Commercial Boilers	lb/kgal	13	13	7.5	0.7	0.5	0.2	0.50	0.8	NA	0.01	12,500	0.2	0.9

INSTITUTIONAL BOILERS Potential Short Term Emissions (lb/hr)

EU Identification	Fuel	Sulfur Content (gr/100 scf or wt %)	MMBtu/hr	Fuel Flow Rate (scf/hr or gals/hr)	NOx lbs/hr	NO_2 lbs/hr	CO lbs/hr	TSP lb/hr	PM10 lbs/hr	PM2.5 lbs/hr	SO2 lbs/hr	VOC lbs/hr	Lead lb/hr	Sulfuric Acid Mist lb/hr	CO_2 lb/hr	Methane lb/hr	N_2O lb/hr	CO_2e lb/hr
Boiler #1 (EU01)	NG	5.0	46.197	45,291	4.53	4.53	3.80	0.34	0.26	0.09	0.68	0.25	2.26E-05	0.01	5,435	0.10	0.10	5,468
Boiler #2 (EU02)	NG	5.0	46.197	45,291	4.53	4.53	3.80	0.34	0.26	0.09	0.68	0.25	2.26E-05	0.01	5,435	0.10	0.10	5,468
Boiler #3 (EU03)	NG	5.0	46.197	45,291	4.53	4.53	3.80	0.34	0.26	0.09	0.68	0.25	2.26E-05	0.01	5,435	0.10	0.10	5,468
Boiler #1 (EU01)	#2 FO	0.4	46.197	330	6.60	6.60	1.65	0.66	0.33	0.08	18.74	0.07	4.16E-05	0.36	7,359	0.02	0.09	7,385
Boiler #2 (EU02)	#2 FO	0.4	46.197	330	6.60	6.60	1.65	0.66	0.33	0.08	18.74	0.07	4.16E-05	0.36	7,359	0.02	0.09	7,385
Boiler #3 (EU03)	#2 FO	0.4	46.197	330	6.60	6.60	1.65	0.66	0.33	0.08	18.74	0.07	4.16E-05	0.36	7,359	0.02	0.09	7,385
Boiler #1 (EU01)	#6 FO	1.0	46.197	308	16.94	16.94	1.54	3.83	3.29	2.14	48.35	0.09	4.65E-04	0.92	7,700	0.31	0.16	7,757
Boiler #2 (EU02)	#6 FO	1.0	46.197	308	16.94	16.94	1.54	3.83	3.29	2.14	48.35	0.09	4.65E-04	0.92	7,700	0.31	0.16	7,757
Boiler #3 (EU03)	#6 FO	1.0	46.197	308	16.94	16.94	1.54	3.83	3.29	2.14	48.35	0.09	4.65E-04	0.92	7,700	0.31	0.16	7,757

EMERGENCY GENERATORS Potential Short Term Emissions (lb/hr)

EU Identification	Fuel	Installation Date	Engine Output Rating (hp)	MMBtu/hr	gals/hr	NOx lbs/hr	NO_2 lbs/hr	CO lbs/hr	TSP lb/hr	PM10 lbs/hr	PM2.5 lbs/hr	SO2 lbs/hr	VOC lbs/hr	Lead lb/hr	Sulfuric Acid Mist lb/hr	CO_2 lb/hr	Methane lb/hr	N_2O lb/hr	CO_2e lb/hr
EG #1 (EU04)	#2 FO	1988/1991	1809	12.82	91.6	40.16	40.16	10.67	0.87	0.72	0.70	5.07	1.13			2,071			2,071
EG #2 (EU05)	#2 FO	1988/1991	1809	12.82	91.6	40.16	40.16	10.67	0.87	0.72	0.70	5.07	1.13			2,071			2,071
EG #3 (EU06)	#2 FO	1988/1991	1809	12.82	91.6	40.16	40.16	10.67	0.87	0.72	0.70	5.07	1.13			2,071			2,071
EG #4 (EU07)	#2 FO	1988/1991	1809	12.82	91.6	40.16	40.16	10.67	0.87	0.72	0.70	5.07	1.13			2,071			2,071
EG #5 (EU08)	#2 FO	2008/2009	1072	8.29	59.2	12.25	12.25	6.63	0.38	0.38	0.38	0.41	12.25			1,338			1,338
EG #6 (EU09)	#2 FO	2012	2011	14.65	104.61	21.65	21.65	11.72	0.68	0.68	0.68	0.72	21.65			2,365			2,365

Institutional Boilers

INSTITUTIONAL BOILERS Permitted Long Term Emissions (TPY based on 3,000,000 gal/yr permit limit)

EU Identification	Fuel	% Sulfur	MMBtu/hr each boiler	gals/hr or scf/hr each boiler	Combined 3 Boilers gals/yr[2] or scf/yr	NOx TPY	NO_2 TPY	CO TPY	TSP TPY	PM10 TPY	PM2.5 TPY	SO2 TPY	VOC TPY	Lead TPY	Sulfuric Acid Mist TPY	CO_2 TPY	Methane TPY	N_2O TPY	CO_2e TPY
Boiler #1, #2 and #3 (EU01, EU02 & EU03) combined	#2 FO	0.4	46.197	330.0	3,000,000	30.0	30.0	7.5	3.0	1.5	0.4	**85.2**	0.3	0.0002	**1.63**	33,450	0.1	0.4	33,573
Boiler #1, #2 and #3 (EU01, EU02 & EU03) combined	#6 FO	1.0	46.197	308.0	3,000,000	**82.50**	**82.50**	**7.50**	**18.64**	**16.02**	**10.44**	**235.50**	**0.42**	**0.002**	**4.50**	**37,500**	**1.50**	**0.80**	**37,778**
Boiler #1, #2 and #3 (EU01, EU02 & EU03) combined	NG	5 gr/dscf	46.197	45,291	1,190,252,118	**59.5**	**59.5**	**50.0**	**4.5**	**3.4**	**1.1**	8.9	**3.3**	**0.0003**	0.1705	**71,415**	**1.4**	**1.3**	**71,850**

Emergency Generators

EMERGENCY GENERATORS Permitted Long Term Emissions (TPY based on 500 hrs/yr)

EU Identification	Fuel	Installation Date	Engine Output Rating (hp)	MMBtu/hr	gals/hr	NOx TPY	NO_2 TPY	CO TPY	TSP TPY	PM10 TPY	PM2.5 TPY	SO2 TPY	VOC TPY	Lead TPY	Sulfuric Acid Mist TPY	CO_2 TPY	Methane TPY	N_2O TPY	CO_2e TPY
EG #1 (EU04)	#2 FO	1988/1991	1809	12.82	91.6	10.04	10.04	2.67	0.22	0.18	0.17	1.27	0.28			518			518
EG #2 (EU05)	#2 FO	1988/1991	1809	12.82	91.6	10.04	10.04	2.67	0.22	0.18	0.17	1.27	0.28			518			518
EG #3 (EU06)	#2 FO	1988/1991	1809	12.82	91.6	10.04	10.04	2.67	0.22	0.18	0.17	1.27	0.28			518			518
EG #4 (EU07)	#2 FO	1988/1991	1809	12.82	91.6	10.04	10.04	2.67	0.22	0.18	0.17	1.27	0.28			518			518
EG #5 (EU08)	#2 FO	2008/2009	1072	8.29	59.2	3.06	3.06	1.66	0.10	0.10	0.10	0.10	3.06			335			335
EG #6 (EU09)	#2 FO	2012	2011	14.65	104.61	5.41	5.41	2.93	0.17	0.17	0.17	0.18	5.41			591			591

CURRENT

CURRENT Facility-Wide Total Potential Emissions (Boilers - 3,000,000 gallons #6 fuel oil/yr) (EGs - 500 hours) (Insignificant Devices - 8760 hrs/yr)

EU Identification	Fuel	MMBtu/hr	gals/hr	Annual gals	NOx TPY	NO_2 TPY	CO TPY	TSP TPY	PM10 TPY	PM2.5 TPY	SO2 TPY	VOC TPY	Lead TPY	Sulfuric Acid Mist TPY	CO_2 TPY	Methane TPY	N_2O TPY	CO_2e TPY
Boiler #1, #2 and #3 (EU01, EU02 & EU03) combined	#6 FO	46.197	308.0	3,000,000	82.5	82.5	7.5	18.6	16.0	10.4	235.5	0.4	0.002	4.50	37,500	1.5	0.8	37,778
EG #1 - #5 (EU04 - EU08)	#2 FO				43.22	43.22	12.32	0.97	0.82	0.79	5.17	4.19			2,405			2,405
FHW Furnace/Boiler DHART	#2 FO	0.768	5.5	48,055	0.43	0.43	0.12	0.05	0.02	0.02	1.36	0.02	3.03E-06	0.03	536	0.04	0.001	537
FHW Furnace/Boiler DHART	#2 FO	0.768	5.5	48,055	0.43	0.43	0.12	0.05	0.02	0.02	1.36	0.02	3.03E-06	0.03	536	0.04	0.001	537
FHW Furnace/Boiler Grounds	#2 FO	0.098	0.7	6,132	0.06	0.06	0.02	0.01	0.003	0.003	0.17	0.002	3.86E-07	0.003	68	0.01	0.000	69
FHW Furnace/Boiler Grounds	#2 FO	0.098	0.7	6,132	0.06	0.06	0.02	0.01	0.003	0.003	0.17	0.002	3.86E-07	0.003	68	0.01	0.000	69
FHW Furnace/Boiler Childcare Center	#2 FO	0.480	3.4	30,034	0.27	0.27	0.08	0.03	0.02	0.01	0.85	0.01	1.89E-06	0.02	335	0.03	0.001	336
FHW Furnace/Boiler Childcare Center	#2 FO	0.480	3.4	30,034	0.27	0.27	0.08	0.03	0.02	0.01	0.85	0.01	1.89E-06	0.02	335	0.03	0.001	336
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Total					**130.87**	**130.87**	**22.34**	**19.97**	**17.06**	**11.36**	**245.60**	**4.90**	**0.0023**	**4.59**	**45,278**	**1.71**	**1.05**	**45,640**
Title V Major Source Thresholds					**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**50.00**						
PSD Major Source Thresholds					**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**				**100,000**

FUTURE

FUTURE Facility-Wide Total Potential Emissions (Boilers - the higher emissions from either 3,000,000 gallons #2 fuel oil/yr or unlimited NG) (EGs - 500 hours) (Insignificant Devices - 8760 hrs/yr)

EU Identification	Fuel	MMBtu/hr	gals/hr	Annual gals	NOx TPY	NO_2 TPY	CO TPY	TSP TPY	PM10 TPY	PM2.5 TPY	SO2 TPY	VOC TPY	Lead TPY	Sulfuric Acid Mist TPY	CO_2 TPY	Methane TPY	N_2O TPY	CO_2e TPY
Boiler #1, #2 and #3 (EU01, EU02 & EU03) combined	#6 FO				59.5	59.5	50.0	4.5	3.4	1.1	85.2	3.3	0.0003	1.63	71,415	1.4	1.3	71,850
EG #1 - #6 (EU04 - EU09)	#2 FO				48.63	48.63	15.25	1.14	0.99	0.96	5.35	9.61			2,996			2,996
FHW Furnace/Boiler DHART	#2 FO	0.768	5.5	48,055	0.43	0.43	0.12	0.05	0.02	0.02	1.36	0.02	3.03E-06	0.03	536	0.04	0.001	537
FHW Furnace/Boiler DHART	#2 FO	0.768	5.5	48,055	0.43	0.43	0.12	0.05	0.02	0.02	1.36	0.02	3.03E-06	0.03	536	0.04	0.001	537
FHW Furnace/Boiler Grounds	#2 FO	0.098	0.7	6,132	0.06	0.06	0.02	0.01	0.003	0.003	0.17	0.002	3.86E-07	0.003	68	0.01	0.000	69
FHW Furnace/Boiler Grounds	#2 FO	0.098	0.7	6,132	0.06	0.06	0.02	0.01	0.003	0.003	0.17	0.002	3.86E-07	0.003	68	0.01	0.000	69
FHW Furnace/Boiler Childcare Center	#2 FO	0.480	3.4	30,034	0.27	0.27	0.08	0.03	0.02	0.01	0.85	0.01	1.89E-06	0.02	335	0.03	0.001	336
FHW Furnace/Boiler Childcare Center	#2 FO	0.480	3.4	30,034	0.27	0.27	0.08	0.03	0.02	0.01	0.85	0.01	1.89E-06	0.02	335	0.03	0.001	336
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Boiler 2009 Building	LPG	2.000	21.3	186,383	1.21	1.21	0.70	0.07	0.05	0.02	0.05	0.07		0.001	1,165	0.02	0.08	1,191
Total					**113.30**	**113.30**	**67.76**	**6.03**	**4.60**	**2.22**	**95.48**	**13.16**	**0.0003**	**1.72**	**79,784**	**1.57**	**1.57**	**80,303**
Title V Major Source Thresholds					**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**50.00**						
PSD Major Source Thresholds					**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**	**250.00**				**100,000**

[1]Daily permit limit is in the current Title V permit and was required to meet the standard for SO_2 when burning #6 fuel oil.

[2]Annual permit limit is in the current Title V permit and will remain. This limit is for #6 fuel oil, #2 fuel oil and both combined. Natural gas has no annual fuel limit.

[3] In order to evaluate PSD applicability, the particulate matter emission rates listed in this spreadsheet reflect filterable and condensible.

[4]AP-42 SO_2 emission rate for natural gas assumes sulfur content is 2,000 grains/10^6 scf. The SO_2 emission factor in the table can be converted to other natural gas sulfur contents by multiplying the SO_2 emission factor by the ratio of the site-specific sulfur content (grains/10^6 scf) to 2,000

ATTACHMENT B
DARTMOUTH HITCHCOCK MEDICAL CENTER
MAJOR MODIFICATION APPLICABILITY DETERMINATION FOR NON-ATTAINMENT NSR

Pollutant	Program	Emission Basis[3]		Maximum Heat Input Rate (MMBtu/hr)			Maximum Hourly Emissions (lb/hr)			Maximum Annual Emissions (TPY)[1]			Potentials after the change Post - Project Emissions (TPY)	Actuals before the change Boilers #1, #2 & #3 2010-2011 Actual Emissions	Net Change (+ = increase) (- = decrease)	Significant Emissions/Major Source Threshold (TPY)	Proposed Modification Significant? (T/F)
		lb/MMBTU[2]	lb/MMCF or lb/kgal	Boiler #1	Boiler #2	Boiler #3	Boiler #1	Boiler #2	Boiler #3	Boiler #1	Boiler #2	Boiler #3					
NATURAL GAS																	
NOx	NSR	0.10	100.0	46.2	46.2	46.2	4.53	4.53	4.53	19.84	19.84	19.84	59.5	57.6	1.9	40	FALSE
VOC	NSR	0.01	5.5	46.2	46.2	46.2	0.25	0.25	0.25	1.09	1.09	1.09	3.3	0.3	3.0	40	FALSE
#2 FUEL OIL																	
NOx	NSR	0.14	20.0	46.2	46.2	46.2	6.60	6.60	6.60	10.00	10.00	10.00	30.0	57.6	-27.6	40	FALSE
VOC	NSR	0.001	0.2	46.2	46.2	46.2	0.07	0.07	0.07	0.10	0.10	0.10	0.3	0.3	0.0	40	FALSE
#6 FUEL OIL																	
NOx	NSR	0.37	55.0	46.2	46.2	46.2	16.94	16.94	16.94	27.50	27.50	27.50	82.5	57.6	24.9	40	FALSE
VOC	NSR	0.002	0.28	46.2	46.2	46.2	0.09	0.09	0.09	0.14	0.14	0.14	0.4	0.3	0.1	40	FALSE

[1] Dartmouth Hitchcock Medical Center is currently limited by permit TV-OP-0011 Table 4, Item 6 to a fuel consumption (#2, #6 or both) for all three boilers combined to 3,000,000 gallons during any consecutive 12-month period. Since all three boilers are identical in size and emission rates, the table above appropriates 1,000,000 gal/yr of #2 fuel or #6 fuel to each boiler with a total potential emission level based on all 3 totalled.

[2] The hourly fuel rate is set assuming a heating value of 1,020 Btu/scf for natural gas, 140,000 Btu/gal for #2 fuel oil, and 150,000 Btu/gal for #6 fuel oil.

[3] The emission rates are based on the following AP-42 sections:

When burning #2 and #6 fuel oil - United States Environmental Protection Agency (USEPA) AP-42 (5th Edition 5/10), Section 1.3 Fuel Oil Combustion, Tables 1.3-1, 1.3-3, 1.3-5, 1.3-6, 1.3-8, 1.3-11 and 1.3-12.

When burning natural gas - United States Environmental Protection Agency (USEPA) AP-42 (5th Edition 7/98), Section 1.4 Natural Gas Combustion, Tables 1.4-1 and 1.4-2.