EXAMPLE PSD CALCULATION - STEAM TO NATURAL GAS CONVERSTION, OLD VS. NEW METHODOLOGY

	OLD Methodology				NEW Methodology			
Description	**Value**	**Units**	**Calculation Steps**	**Notes**	**Value**	**Units**	**Calculation Steps**	**Notes**
Total Maximum Steam to DIMLA	29,199	Lb/hr			24,500	Lb/hr		
	255,779	Mlbs/yr	29,119 lb/hr X 24 hr/day X 365 X 1 Mlb/1000 lbs = 255,779 Mlb	Assuming 24hr/day, 365 days/yr	214,620	Mlbs/yr	24,500 lb/hr X 24 hr/day X 365 X 1 Mlb/1000 lbs = 214,620 Mlb	Assuming 24hr/day, 365 days/yr
Heating Value of NG	1,023	BTU/SCF		Used in DIMLA PSD Calc, not sure of basis	1,028	BTU/SCF		Based on heating value generally used in EPA docs.
Riley and B&W Boilers Example Calc								
Steam Distribution: Steam from Riley/B&W Boilers	58%		Average of actual data	Based on Jan 2009 - Augt 2010 actual steam distribution	58%		Average of actual data	Based on Jan 2009 - Augt 2010 actual steam distribution
Steam Needs - Riley/B&W Boiler	16,935	Lb/hr	29,119 lb/hr x 0.58 = 16,935 lb/hr	58% of max steam to DIMLA	14,210	Lb/hr	29,200 lb/hr x 0.58 = 14,210 lb/hr	58% of max steam to DIMLA
	148,352	Mlbs/yr	255,779 Mlb/yr x 0.58 = 148,352 Mlb/yr	Assuming 24hr/day, 365 days/yr	124,480	Mlbs/yr	214,620 Mlb/yr x 0.58 = 124,480 Mlb/yr	Assuming 24hr/day, 365 days/yr
Actual Ratio of Mlbs of Steam to Mcf					0.74	Mlb Steam/ Mcf NG	Average of actual data	Based on actual 2008-2009 energy accounting data for the Riley and B&W Boilers
Average BTU/lb steam generated	1,106	BTU/lb	Average of actual data	Note from Mike Byram in DIMLA calculations: "Average from Jan 07 - Aug 10. This accounts for boiler efficiency"	1,398	BTU/lb	(1 cf NG/0.74 lb steam)*1,028 Btu/scf = 1,398 Btu/lb steam	Based on actual ratio of steam generated to natural gas used. Therefore, this value is an effective enthalpy, i.e, this already accounts for boiler efficiency.
Annual MMBTU to DIMLA	282,892	MMBtu/yr	1106 BTU/lb steam X 255,779 Mlb Steam X 1000 lb/Mlb / 10^6 Btu/MMBtu = 282,892 MMBTU		300,050	MMBtu/yr	1398 BTU/lb steam X 214,620 Mlb Steam X 1000 lb/Mlb / 10^6 Btu/MMBtu = 300,050 MMBTU	This calc is for comparison purposed only, i.e., this step is not needed for the new methodology.
Annual MMBTU from Riley and B&W Boilers	164,077	MMBtu/yr	282,892 MMBtu/yr x 58% = 164,077 MMBTU/yr		174,029	MMBtu/yr	300,050 MMBtu/yr x 58% = 174,029 MMBTU/yr	This calc is for comparison purposed only, i.e., this step is not needed for the new methodology.
Annual MMcf to Riley and B&W Boilers	160.4	MMcf/yr	164,077 MMBTU/yr / 1,023 BTU/SCF = 160.4 MMcf/yr		169.3	MMcf/yr	(124,480 Mlb Steam/yr / 0.74 Mlb Steam/Mcf NG) / 1000 Mcf/MMcf = 168.3 MMcf/yr	
Example NOx Emissions Calc - Riley and B&W Boilers								
NOx Emission factor	280	lb/MM cf		AP-42 Section 1.4, Natural Gas Comubstion	280	lb/MM cf		AP-42 Section 1.4, Natural Gas Comubstion
NOx Emissions	22.45	TPY	280 lb/MMcf X 160.4 MMcf/yr / 2000lb/ton = 22.45 TPY		23.70	TPY	280 lb/MMcf X 169.3 MMcf/yr / 2000lb/ton = 23.70 TPY	
Cogen Units Example Calc								
Steam Distribution: Steam from Cogen Units	42%		Average of actual data	Based on Jan 2009 - Augt 2010 actual steam distribution	42%		Average of actual data	Based on Jan 2009 - Augt 2010 actual steam distribution
Steam Needs - from Cogen Units	12,263	Lb/hr	29,119 lb/hr x 0.42 = 12,263 lb/hr	42% of max steam to DIMLA	10,290	Lb/hr	24,500 lb/hr x 0.42 = 10,290 lb/hr	42% of max steam to DIMLA
	107,427	Mlbs/yr	255,779 Mlb/yr x 0.42 = 107,427 Mlb/yr	Assuming 24hr/day, 365 days/yr	90,140	Mlbs/yr	214,620 Mlb/yr x 0.42 = 90,140 Mlb/yr	Assuming 24hr/day, 365 days/yr
Ratio of Mlbs of Steam to Mcf					0.79	Mlb Steam/ Mcf NG	Average of actual data	Based on actual 2010-2011 energy accounting data for the Cogen Boilers
Average BTU/lb steam generated	1,106	BTU/lb	Average of actual data	Note from Mike Byram in DIMLA calculations: "Average from Jan 07 - Aug 10. This accounts for boiler efficiency"	1,302	BTU/lb	(1 cf NG/0.79 lb steam)*1,028 Btu/scf = 1,302 Btu/lb steam	Based on actual ratio of steam generated to natural gas used. Therefore, this value is an effective enthalpy, i.e, this already accounts for boiler efficiency.
Annual MMBTU to DIMLA	282,892	MMBtu/yr	1106 BTU/lb steam X 255,779 Mlb Steam X 1000 lb/Mlb / 10^6 Btu/MMBtu = 282,892 MMBTU		279,450	MMBtu/yr	1302 BTU/lb steam X 214,620 Mlb Steam X 1000 lb/Mlb / 10^6 Btu/MMBtu = 279,450 MMBTU	This calc is for comparison purposed only, i.e., this step is not needed for the new methodology.
Annual MMBTU from Cogen Units	118,815	MMBtu/yr	282,892 MMBtu/yr x 42% = 118,815 MMBTU/yr		117,369	MMBtu/yr	279,450 MMBtu/yr x 58% = 117,369 MMBTU/yr	This calc is for comparison purposed only, i.e., this step is not needed for the new methodology.
Annual MMcf to Cogen Units	116.1	MMcf/yr	118,815 MMBTU/yr / 1,023 BTU/SCF = 116.1 MMcf/yr		114.2	MMcf/yr	(90,140 Mlb Steam/yr / 0.79 Mlb Steam/Mcf NG) / 1000 Mcf/MMcf = 114.2 MMcf/yr	
Example NOx Emissions Calc - Cogen Units								
NOx Emission factor	0.148	lb/ Mlbs steam		Site-specific Test Data for Gogen Units (Annual Air Emissions Test Report Nov 2009 - Jan 2010)	0.148	lb/ Mlbs steam		Site-specific Test Data for Gogen Units (Annual Air Emissions Test Report Nov 2009 - Jan 2010)
NOx Emissions	7.95	TPY	0.148 lb/Mlb Steam X 107,427 Mlbs Steam / 2000lb/ton = 7.95 TPY		6.67	TPY	0.148 lb/Mlb Steam X 90,140 Mlbs Steam / 2000lb/ton = 6.67 TPY	

Difference in NOx emissions (New - Old)	**0.03**	**TPY**	**Note: Difference is base on total emissions from the Riley, B&W, and cogen boilers.**