Appendix 3.5a Detailed Calculation of Emissions from Existing WENT Landfill

Scenario 1 - Operation Year in 2019

Landfill gas used in gas engines for landfill site load	750	m3/hr
Landfill gas used in leachate recovery plant boilers	4500	m3/hr
Landfill gas to flare	48887	m3/hr
Therefore,		
Peak landfill gas generation from WENT landfill	54137	m3/hr

With reference to Table 4-4 of USEPA Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed Standards and Guidelines, March 1991 ((EPA-450/3-90-011a):

Secondary NOx emission from enclosed flare/incinerator	4.9	lb/MM scf LFG
Secondary NOx emission from gas turbine	26.4	lb/MM scf LFG
Secondary NOx emission from boiler	70	lb/MM scf LFG

Unit conversion:

	1	MM scf
=	1000000	scf
=	28316.847	scm
	1	lb/MM scf
=	452.5	g/MM scf
=	0.0159799	g/scm

Standard conditions (US standard):

	60	F
=	15.555556	C
=	288.55556	K

Assume LFG at typical ambient temperature:

	25	C
=	298	K

Therefore,		1	m3 at 25C
	=	0.9683072	scm

Therefore,

Landfill gas to flare		48887	m3/hr
	=	47337.636	scm/hr
	=	13.149343	scm/sec
NOx from flare			
	=	1.0296126	g/sec total of 2 stacks
Landfill gas used in gas engines for landfill site load		750	m3/hr
	=	726.23043	scm/hr
	=	0.2017307	scm/sec
NOx from gas engines			
	=	0.0851039	g/sec total of 2 gas engines exhaust
Landfill gas used in leachate recovery plant boilers		4500	m3/hr
	=	4357.3826	scm/hr
	=	1.210384	scm/sec
NOx from boilers			
	=	1.353926	g/sec total of 2 boiler exhaust

With reference to Table 4-4 of USEPA Air Emissions from Municipal Solid Waste Landfills - Background Information for Proposed

Secondary SO2 emission from enclosed flare/incinerator	3.0	lb/MM scf LFG
Secondary SO2 emission from gas turbine	3.0	lb/MM scf LFG
Secondary SO2 emission from boiler	3.0	lb/MM scf LFG
Secondary PM emission from enclosed flare/incinerator	Negligible	lb/MM scf LFG
Secondary PM emission from gas turbine	37.0	lb/MM scf LFG
Secondary PM emission from boiler	Negligible	lb/MM scf LFG
Secondary CO emission from enclosed flare/incinerator	58.0	lb/MM scf LFG
Secondary CO emission from gas turbine	12.5	lb/MM scf LFG
Secondary CO emission from boiler	17.0	lb/MM scf LFG
Secondary HCL emission from enclosed flare/incinerator	12.0	lb/MM scf LFG
Secondary HCL emission from gas turbine	12.0	lb/MM scf LFG
Secondary HCL emission from boiler	12.0	lb/MM scf LFG

Therefore,

SO2 from flare			
	=	0.630375	g/sec total of 2 stacks
SO2 from gas engines			
	=	0.0096709	g/sec total of 2 gas engines exhaust
SO2 from boilers			
	=	0.0580254	g/sec total of 2 boiler exhaust
PM from flare			
	=	Negligible	g/sec total of 2 stacks
PM from gas engines			
	=	0.1192744	g/sec total of 2 gas engines exhaust
PM from boilers			
	=	Negligible	g/sec total of 2 boiler exhaust
CO from flare			
	=	12.187251	g/sec total of 2 stacks
CO from gas engines			
	=	0.0402954	g/sec total of 2 gas engines exhaust
CO from boilers			
	=	0.3288106	g/sec total of 2 boiler exhaust
HCL from flare			
	=	2.5215002	g/sec total of 2 stacks
HCL from gas engines			
	=	0.0386836	g/sec total of 2 gas engines exhaust
HCL from boilers			
	=	0.2321016	g/sec total of 2 boiler exhaust