Emission rates for United Christian Hospital

Diesel Combustion [1]

With reference to the USEPA AP-42 Section 1.3:

NOx emission factor =	20	lb/1000 gal	[ref. USEPA AP-42 Section 1.3, Table 1.3-1]
RSP emission factor =	2	lb/1000 gal	[ref. USEPA AP-42 Section 1.3, Table 1.3-1]
FSP emission factor =	0.83	lb/1000 gal	[ref. USEPA AP-42 Section 1.3, Table 1.3-7]

According to AP42, a conversion factor of 0.12 is applied on the emission factors to convert the emission rate from lb / 1000 gal to kg / 1000 L. Hence:

NOx emission factor =	2.40	kg/1000 L	=	2.40	g/L
RSP emission factor =	0.24	kg/1000 L	=	0.24	g/L
FSP emission factor =	0.10	kg/1000 L	=	0.10	g/L

As provided by the operators, the three chimneys are connected to individual boilers with maximum fuel consumption rate of 200L/hour diesel.
Therefore, the maximum fuel consumption rate for each chimneys:

Fuel oil consumption [1] =	200	L/hr	=	0.06	L/s

Therefore, the emission rate of each chimney:

NOx emission rate =	1.333E-01	g/s
RSP emission rate =	1.333E-02	g/s
FSP emission rate =	5.533E-03	g/s

[1] As there was no specific diesel type can be provided by the operator, hence the fuel type of "Distillate Ol" in USEPA AP-12 is selected. This assumption has also been adopted in the approved EIA study "North East New Territories New Development Areas" (AEIAR-175/2013) .

Towngas Combustion

NO_x Emission Factor =	0.22	g/kWh	[ref. (AEIAR 142/2009) Provision of a Poultry Slaughtering Centre in Sheung Shui]
	0.06	g/MJ	

As provided by the operators, the three chimneys are connected to individual boilers with maximum fuel consumption rate of 509 m^3/hour towngas.
Therefore, the maximum fuel consumption rate for each chimneys:

Towngas consumption =	509	m^3/hour	
	0.14	m^3/s	
	2.44	MJ/s	(The Calorific Value of towngas = 17.27 MJ / m^3)
			[ref. Hong Kong and China Gas (http://www.towngas.com/Eng/Corp/AbtTG/HKBus/Production.aspx)]

Therefore, the emission rate of each chimney:

NOx emission rate =	1.492E-01	g/s

Adopted Emission Rate for Model Input

According to the operator, the boiler consume either diesel or towngas only during operation, the maximum emission rate of each pollutants are adopted for model for conservative purpose.
Therefore, the adopted emission rate:

NOx emission rate =	1.492E-01	g/s
RSP emission rate =	1.333E-02	g/s
FSP emission rate =	5.533E-03	g/s

Emission Inventory for Chimney Emission

Source	Source ID	Type	X (m)	Y (m)	Base Elevation (mPD)	Exit Temperature (K)	Exit velocity (m/s)	Internal diameter (m)	Stack Height / Release Height (mAG)	Emission Rate NO_x (g/s)	Emission Rate RSP (g/s)	Emission Rate FSP (g/s)
United Christian Hospital	UCH-001	POINT	841511	820377	61.0	482	6	0.9	93.6	1.492E-01	1.333E-02	5.533E-03
	UCH-002	POINT	841507	820382	61.0	483	6	0.9	93.6	1.492E-01	1.333E-02	5.533E-03
	UCH-003	POINT	841503	820377	61.0	483	6	0.9	93.6	1.492E-01	1.333E-02	5.533E-03
Famous Restaurant [1][2][3]	FAR-001	POINT	841251	821375	112.0	373	6	0.500	23.7	4.440E-02	4.400E-03	1.826E-03
	FAR-002	POINT	841263	821372	112.0	373	6	0.500	23.7	4.440E-02	4.400E-03	1.826E-03
	FAR-003	POINT	841256	821364	112.0	373	6	0.500	23.7	4.440E-02	4.400E-03	1.826E-03
Shun On Restaurant [1][2][3]	SOR-001	POINT	841403	821070	108.4	373	6	0.200	17.0	1.333E-01	1.330E-02	5.520E-03

Note:

[1] Exit temperature and velocities of Chimney FAR-001, FAR-002, FAR-003 and SOR-001 are not available from the operator. Hence an exit temperature of 100^{o}C and velocity of 6m/s are assumed based on EPD's guidelines "Guidelines on Choice of Models and Model Paramet

[2] No fuel consumption and emission information for Famous Restaurant and Shun On Restaurant is provided by the operators, therefore emission rates are referenced to another same type restaurant in Appendix 4.9 of approved EIA study "Central Kowloon Route (AEIAR-171/2013)" due to the similar nature and operating mode.

[3] According to the Table 1.3-7 of AP42, the FSP emission factor is 23% of the particulate matters emission factor (1.92A/8.34A = 0.23 where A= constant derived from fuel sulphur content) for residual oil, and the FSP emission factor is 41.5% of the particulate matters emission factor (0.83/2.00 = 0.415) for distillate oil. Therefore, a conversion factor of 0.415 is applied on the RSP emission rate to generate FSP emission rate as conservative approach.