APU - Sample Calculation (3 Runway System)

Total Emission = Taxi-in Emission + Stand Movement Emission + Taxi-out Emission

Emission = Time in Mode (hr) * Emission Indices (kg/hr)

Table 1: Flight Record/Time In Mode (in Minutes)

Flight Key	Flight ID	Arrival (A)/ Departure (D)	IATA TYPE	IATA SUBTYPE	APU Model	Taxi-in/ Taxi-out Time [1]	Stand Movement 1 Time [2]	Stand Movement 2 Time [2]
513	A10KAOT06N	A	32S	320	APS3200	1		
514	A10HXML17N30	A	330	332	GTCP331-350	1	8	
516	D10BLAJN	D	350	351	HGT1700	5		2

Note:
[1] Taxi Time -1 minute for taxi-in (based on information from pilot) and 5 minutes for taxi-out (based on on-site survey of tractor operating time)
[2] Stand Movement 1 for Arrivals only, Stand Movement 2 for Departures Only (if any)

Table 2: Emission Indices (based on Information from IATA and EDMS)

Flight Key	APU Model	CO (kg/hr)	HC (kg/hr)	NOX (kg/hr)	SOX (kg/hr)	RSP (kg/hr)
513	APS3200	0.5645	0.0428	0.7680	0.1157	0.0930
514	GTCP331-350	0.3822	0.0473	2.0343	0.2055	0.1108
516	HGT1700	0.4136	0.0438	2.4967	0.2188	0.0997

Note:
[3] For aircrafts with APU Model of "NA", APU model is assumed to be model with the highest Nox emission rate (GTCP331-500)

Table 3a: Emission (Taxi-in + Taxi-out)

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg) [4, 5]	NO_x (kg)	SO_2 (kg) [6]	RSP (kg)	FSP (kg) [7]
513	0.02	0.01	0.00	0.01	0.00	0.00	0.00
514	0.02	0.01	0.00	0.03	0.00	0.00	0.00
516	0.08	0.03	0.00	0.21	0.02	0.01	0.01

Table 3b: Emission (Stand Movement)

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg) [4, 5]	NO_x (kg)	SO_2 (kg) [6]	RSP (kg)	FSP (kg) [7]
513	0.00	0.00	0.00	0.00	0.00	0.00	0.00
514	0.13	0.05	0.01	0.27	0.03	0.01	0.01
516	0.03	0.01	0.00	0.08	0.01	0.00	0.00

Notes:
[4] To convert THC to TOG, the conversion factor is 1.156234049. (Referenced from EDMS v5.1.4.1)
[5] To convert TOG to VOC, the conversion factor is 0.9947855. (Referenced from EDMS v5.1.4.1)
[6] To convert SO_x to SO_2, the conversion factor is 1.
[7] To convert RSP to FSP, the conversion factor is 1.0. (Referenced from EDMS v5.1.4.1)

Table 4: Total Emission of Typical Busy Day

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg)	NO_x (kg)	SO_2 (kg)	RSP (kg)	FSP (kg)
513	0.02	0.01	0.00	0.01	0.00	0.00	0.00
514	0.15	0.06	0.01	0.31	0.03	0.02	0.02
516	0.12	0.05	0.01	0.29	0.03	0.01	0.01

Table 5: Total Emission on 1 January, 2031

Flight Key	Busy Day Ratio	CO (kg)	VOC (kg)	NO_x (kg)	SO_2 (kg)	RSP (kg)	FSP (kg)
513	0.935	0.01	0.00	0.01	0.00	0.00	0.00
514	0.935	0.05	0.01	0.29	0.03	0.02	0.02
516	0.935	0.05	0.01	0.27	0.02	0.01	0.01

APU - Sample Calculation (2 Runway System)

Total Emission = Taxi-in Emission + Stand Movement Emission + Taxi-out Emission

Emission = Time in Mode (hr) * Emission Indices (kg/hr)

Table 1: Flight Record/Time In Mode (in Minutes)

Flight Key	Flight ID	Arrival (A)/ Departure (D)	IATA TYPE	IATA SUBTYPE	APU Model	Taxi-in/ Taxi-out Time [1]	Stand Movement 1 Time [2]	Stand Movement 2 Time [2]
586	D10CXOT03	D	350	351	HGT1700	5		5
596	A10VTJEK	A	77X	7X9	NA	1	7	
597	A10BHWK	A	330	333	GTCP331-350	1		

Note:
[1] Taxi Time -1 minute for taxi-in (based on information from pilot) and 5 minutes for taxi-out (based on on-site survey of tractor operating time)
[2] Stand Movement 1 for Arrivals only, Stand Movement 2 for Departures Only (if any)

Table 2: Emission Indices (based on Information from IATA and EDMS)

Flight Key	APU Model	CO (kg/hr)	HC (kg/hr)	NOX (kg/hr)	SOX (kg/hr)	RSP (kg/hr)
586	HGT1700	0.4136	0.0438	2.4967	0.2188	0.0997
596	NA	0.4595	0.0486	2.7741	0.2431	0.1108
597	GTCP331-350	0.3822	0.0473	2.0343	0.2055	0.1108

Note:
[3] For aircrafts with APU Model of "NA", APU model is assumed to be model with the highest Nox emission rate (GTCP331-500)

Table 3a: Emission (Taxi-in + Taxi-out)

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg) [4, 5]	NO_x (kg)	SO_2 (kg) [6]	RSP (kg)	FSP (kg) [7]
586	0.08	0.03	0.00	0.21	0.02	0.01	0.01
596	0.02	0.01	0.00	0.05	0.00	0.00	0.00
597	0.02	0.01	0.00	0.03	0.00	0.00	0.00

Table 3b: Emission (Stand Movement)

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg) [4, 5]	NO_x (kg)	SO_2 (kg) [6]	RSP (kg)	FSP (kg) [7]
586	0.00	0.00	0.00	0.00	0.00	0.00	0.00
596	0.12	0.05	0.01	0.32	0.03	0.01	0.01
597	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
[4] To convert THC to TOG, the conversion factor is 1.156234049. (Referenced from EDMS v5.1.4.1)
[5] To convert TOG to VOC, the conversion factor is 0.9947855. (Referenced from EDMS v5.1.4.1)
[6] To convert SO_x to SO_2, the conversion factor is 1.
[7] To convert RSP to FSP, the conversion factor is 1.0. (Referenced from EDMS v5.1.4.1)

Table 4: Total Emission of Typical Busy Day

Flight Key	Time in Mode (Hr)	CO (kg)	VOC (kg)	NO_x (kg)	SO_2 (kg)	RSP (kg)	FSP (kg)
586	0.08	0.03	0.00	0.21	0.02	0.01	0.01
596	0.13	0.06	0.01	0.37	0.03	0.01	0.01
597	0.02	0.01	0.00	0.03	0.00	0.00	0.00

Table 5: Total Emission on 2 April, 2031

Flight Key	Busy Day Ratio	CO (kg)	VOC (kg)	NO_x (kg)	SO_2 (kg)	RSP (kg)	FSP (kg)
586	1.028	0.04	0.00	0.21	0.02	0.01	0.01
596	1.028	0.06	0.01	0.38	0.03	0.02	0.02
597	1.028	0.01	0.00	0.03	0.00	0.00	0.00