Appendix 13.06a - Calculation of H2S Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	H2S Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated H2S Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	40.90	4,521
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	40.90	2,290
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	40.90	1,012
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F2	0.70	21
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	40.90	2,614
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	40.90	2,684
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	40.90	3,865
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F3	59.00	17,700
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F2	0.70	44
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F4	17.60	1,346
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F4	17.60	18,234
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F4	17.60	2,084
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F4	17.60	4,928
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	47.20	216,648
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	47.20	10,573
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F6	38.90	4,668
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F6	38.90	35,399
												328,632

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	SCISTW	2.20	86
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	SCISTW	2.20	779
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	SCISTW	2.20	655
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	SCISTW	2.20	792
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	SCISTW	2.20	317
												2,629

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	SCISTW	2.20	372
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	SCISTW	2.20	207
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	SCISTW	2.20	554
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	SCISTW	2.20	655
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	SCISTW	2.20	222
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9/F10	0.038	3
UV	5	1	12.4	3	N/A	186		3	186	F9/F10	0.038	7
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9/F10	0.038	2
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9/F10	0.038	2
												2,025

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F7	0.038	45
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F7	0.038	187
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.038	221
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F7	0.038	55
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F7	0.038	34
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F7	0.038	23
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9/F10	0.038	67
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9/F10	0.038	24
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9/F10	0.038	35
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9/F10	0.038	1
												692

Total H2S Emission Rate (ug/s)	**333,978**
H2S Emission from Sludge Treatment (ug/s)	**4,639**
Without 55% removal for non Sludge Treatment (ug/s)	**731,864**

Note:
(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.
(2) Average and Maximum H2S emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.
(3) The 55% H2S reduction is referred to the EP of Sha Tin Sewage Treatment Works, Stage 3 Extension for odour control.

(4) The H2S emission rate of sludge tanks and dewatering sludge is referred to the concentration values measured at Stonecutter Island STW for undigested sludge, assuming the same concentration values under flux hood sampling.

Appendix 13.06b - Calculation of NH3 Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	NH3 Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated NH3 Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.0663	7
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.0663	4
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.0663	2
Fine Screen Screenings Handling Area	1	2.5	6	5		75.0		3	30	F2	0.0720	2
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.0663	4
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.0663	4
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.0663	6
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F3	0.1366	41
Grit Handling Area	4	2	4.5	3.5		126.0		3	63	F2	0.0720	5
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F4	0.0522	4
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F4	0.0522	54
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F4	0.0522	6
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F4	0.0522	15
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.0570	262
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.0570	13
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F6	0.0738	9
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0		3	910	F6	0.0738	67
												504

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	SCISTW	0.0489	2
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	SCISTW	0.0489	17
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	SCISTW	0.0489	15
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	SCISTW	0.0489	18
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	SCISTW	0.0489	7

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	SCISTW	0.0489	8
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	SCISTW	0.0489	5
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	SCISTW	0.0489	12
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	SCISTW	0.0489	15
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	SCISTW	0.0489	5
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9/F10	0.0398	3
UV	5	1	14	3	N/A	210		3	210	F9/F10	0.0398	8
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9/F10	0.0398	2
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9/F10	0.0398	2
												848

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F7	0.0537	63
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F7	0.0537	264
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.039	229
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F7	0.0537	78
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F7	0.0537	49
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F7	0.0537	33
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9/F10	0.0398	70
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9/F10	0.0398	25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9/F10	0.0398	37
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9/F10	0.0398	1

Total NH3 Emission Rate (ug/s)	**1,472**

Note:
(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.
(2) Average and Maximum NH3 emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.
(3) The NH3 emission rate of sludge tanks and dewatering sludge is referred to the concentration values measured at Stonecutter Island STW for undigested sludge, assuming the same concentration values under flux hood sampling.

Appendix 13.06c - Calculation of SO2 Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	SO2 Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated SO2 Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.760	84
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.760	43
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.760	19
Fine Screen Screenings Handling Area	1	2.5	6	5		75.0		3	30	F2	0.253	8
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.760	49
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.760	50
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.760	72
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F3	1.640	492
Grit Handling Area	4	2	4.5	3.5		126.0		3	63	F2	0.253	16
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F4	0.749	57
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F4	0.749	776
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F4	0.749	89
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F4	0.749	210
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	1.165	5,347
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	1.165	261
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F6	0.706	85
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F6	0.706	642
												8,298

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F11 (Taking the max)	1.694	66
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F11 (Taking the max)	1.694	600
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F11 (Taking the max)	1.694	505
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F11 (Taking the max)	1.694	610
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F11 (Taking the max)	1.694	244
												2,024

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F11 (Taking the max)	1.694	287
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F11 (Taking the max)	1.694	159
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F11 (Taking the max)	1.694	427
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F11 (Taking the max)	1.694	505
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F11 (Taking the max)	1.694	171
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9/F10	0.149	13
UV	5	1	14	3	N/A	210		3	210	F9/F10	0.149	31
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9/F10	0.149	8
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9/F10	0.149	9
												1,609

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	115.5	2	N/A	1155.0		3	1,155	F7	0.073	84
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F7	0.073	358
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.111	646
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F7	0.073	106
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F7	0.073	66
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F7	0.073	45
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9/F10	0.149	262
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9/F10	0.149	93
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9/F10	0.149	139
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9/F10	0.149	3
												1,803

	Total SO2 Emission Rate (ug/s)	**13,735**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum SO2 emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of SO2 concentration at undigested sludge tanks, the SO2 emission rate of sludge tanks and dewatering sludge is referred tp the maximum SO2 emission rate conducted at existing STSTW.

Appendix 13.06d - Calculation of NO2 Emission Rate of CSTW

Methodology for Emission Rate:

In order to have more accurate values, NO_2 was sampled using the Ogawa Passive Sampler with detection limit of 16 ppbv (active sampling method using portable measurement is 2ppm). The average concentration levels of NO_2 measured at the existing STSTW were found to be below the recommneded chronic reference exposure level, 95 µg/m^3, except at the digested sludge holding tank and digester overflow box.

In light of these concentration levels of NO_2, the laboratory testing of NO_2 in the air bag collected by flux hood sampling is not appropriate due to the detection limit. Meanwhile, the direct connection of both flud hood sampler and ogawa passive sampler is not feasible because the outlet of flux hood sampler is much less than the ogawa passive sampler input and contamination of sampling air may be caused as a result.

Based on the situations discussed above, it is not appropriate to use the flux hood sampling method for emission rate of NO_2. In this connection, emission rates of NO_2 are not available, some assumptions shall be made for further calculation and assessment.

Assumption:

(1) Assume the concentration value of NO_2 at all emission sources are constant, say measured max. concentration value, and all the emissions enter into the deodourization units.

(2) Assume the proposed STW is in full load condition, and the concentration of NO_2 in the air flow to deodourization unit is the max. NO2 concentration measured.

Max. Concentration Measured at STSTW:	2,614	µg/m^3
Max. Air Flow to Deodourization Unit:	300,000	m^3/hr
Emission Rate of NO_2:	217,833	µg/s

Appendix 13.06e - Calculation of Tetrachloroethylene Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Tetrachloroethylene Emission	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Tetrachloroethylene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	1.357	150
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	1.357	76
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	1.357	34
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	1.357	41
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	1.357	87
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	1.357	89
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	1.357	128
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	1.357	407
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	1.357	85
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	1.357	104
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	1.357	1,406
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	1.357	161
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	1.357	380
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.007	32
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.007	2
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.007	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.007	6

3,188

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	1.357	53
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	1.357	480
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	1.357	404
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	1.357	489
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	1.357	195

1,621

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	1.357	230
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	1.357	128
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	1.357	342
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	1.357	404
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	1.357	137
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.126	11
UV	5	1	12.4	3	N/A	186		3	186	F9	0.126	23
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.126	7
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.126	7

1,289

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.114	134
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.114	560
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.114	664
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.114	166
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.114	103
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.114	70
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.126	222
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.126	78
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.126	118
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.126	2

2,117

Total Tetrachloroethylene Emission Rate (ug/s)	**8,216**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Tetrachloroethylene emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Tetrachloroethylene concentration at undigested sludge tanks, the Tetrachloroethylene emission rate of sludge tanks and dewatering sludge is referred tp the maximum Tetrachloroethylene emission rate conducted at existing STSTW.

Appendix 13.06f - Calculation of Trichloroethylene Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Trichloroethylene Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Trichloroethylene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.026	3
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.026	1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.026	1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.026	1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.026	2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.026	2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.026	2
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.026	8
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.026	2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.026	2
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.026	27
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.026	3
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.026	7
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.006	28
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.006	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.006	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.006	5

95

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.026	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.026	9
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.026	8
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.026	9
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.026	4

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.026	4
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.026	2
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.026	7
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.026	8
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.026	3
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.006	1
UV	5	1	12.4	3	N/A	186		3	186	F9	0.006	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.006	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.006	0

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.016	19
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.016	79
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.016	93
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.016	23
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.016	14
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.016	10
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.006	11
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.006	4
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.006	6
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.006	0

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Total Trichloroethylene Emission Rate (ug/s)	**411**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Trichloroethylene emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Trichloroethylene concentration at undigested sludge tanks, the Trichloroethylene emission rate of sludge tanks and dewatering sludge is referred tp the maximum Trichloroethylene emission rate conducted at existing STSTW.

Appendix 13.06g - Calculation of Xylenes Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height (m)	Internal Dimension (Unit)			Air Phase Volume (m^3)	Aeration Rate (Unit) (m^3/h)	Air Exchange Rate (Air Changes / hr) (2)	Xylenes Emission Area (m2)	Equivalent Sample Location ID	Specific Emission Rate (ug/m2/s)	Unmitigated Xylenes Emission Rate (ug/s)
			Length (m)	Width (m)	Diameters(m)							
Preliminary Treatment												
Inlet Chamber	1	1	6,7	16,5	N/A	110.6		3	111	F1	0,052	6
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0,052	3
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0,052	1
Fine Screen Screenings Handling Area	1	2,5	6	5	N/A	75.0		3	30	F1	0,052	2
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0,052	3
Distribution Channel 1	1	1	26,25	2.5	N/A	65.6		3	66	F1	0,052	3
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0,052	5
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0,052	16
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0,052	3
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0,052	4
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0,052	54
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118,4		3	118	F1	0,052	6
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280,0		3	280	F1	0,052	15
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590,0		3	4,590	F5	0,010	46
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0,010	2
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0,010	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910,0	4,500	3	910	F5	0,010	9

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0,052	2
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0,052	18
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0,052	15
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0,052	19
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0,052	7

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0,052	9
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0,052	5
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0,052	13
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0,052	15
Skip Room No. 2	7	1,5	6	2.4	N/A	151		3	101	F1	0,052	5
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0,010	1
UV	5	1	12.4	3	N/A	186		3	186	F9	0,010	2
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0,010	1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0,010	1

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179,0		3	1,179	F8	0,010	12
- Anoxic Zone	35	1	10,2	13,75	N/A	4908,8		3	4,909	F8	0,010	49
- Aerobic Zone	35	1	12,1	13,75	N/A	5823,1	151,680	3	5,823	F8	0,010	58
Biological Treatment Outlet Channel	5	1	145,5	2	N/A	1455,0		3	1,455	F8	0,010	15
Header Channel to DAF	2	1	226.3	2	N/A	905,2	4,500	3	905	F8	0,010	9
Header Distribution to DAF	4	1	77,25	2	N/A	618,0		3	618	F8	0,010	6
Final Treatment												
DAF Units	20	1	8	11	N/A	1760,0	4,100	3	1,760	F9	0,010	18
DAF Outlet	4	1	77,7	2	N/A	621,6		3	622	F9	0,010	6
Header Channel to UV	2	1	233,3	2	N/A	933,2	4,500	3	933	F9	0,010	9
Header Distribution to UV	1	1	9,8	2	N/A	19.6		3	20	F9	0,010	0

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Total Xylenes Emission Rate (ug/s)	**475**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Xylenes emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Xylenes concentration at undigested sludge tanks, the Xylenes emission rate of sludge tanks and dewatering sludge is referred to the maximum Xylenes emission rate conducted at existing STSTW.

Appendix 13.06h - Calculation of Chloroform Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height (m)	Internal Dimension (Unit)			Air Phase Volume (m^3)	Aeration Rate (Unit) (m^3/h)	Air Exchange Rate (Air Changes / hr) (2)	Chloroform Emission Area (m2)	Equivalent Sample Location ID	Specific Emission Rate (ug/m2/s)	Unmitigated Chloroform Emission Rate (ug/s)
			Length (m)	Width (m)	Diameters(m)							
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.187	21
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.187	10
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.187	5
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.187	6
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.187	12
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.187	12
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.187	18
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.187	56
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.187	12
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.187	14
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.187	194
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.187	22
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.187	52
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.007	32
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.007	2
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.007	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.007	6

475

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.187	7
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.187	66
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.187	56
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.187	67
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.187	27

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.187	32
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.187	18
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.187	47
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.187	56
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.187	19
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.018	2
UV	5	1	12.4	3	N/A	186		3	186	F9	0.018	3
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.018	1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.018	1

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179,0		3	1,179	F8	0,068	80
- Anoxic Zone	35	1	10,2	13,75	N/A	4908,8		3	4,909	F8	0,068	334
- Aerobic Zone	35	1	12,1	13,75	N/A	5823,1	151,680	3	5,823	F8	0,068	396
Biological Treatment Outlet Channel	5	1	145,5	2	N/A	1455,0		3	1,455	F8	0,068	99
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0,068	62
Header Distribution to DAF	4	1	77,25	2	N/A	618,0		3	618	F8	0,068	42
Final Treatment												
DAF Units	20	1	8	11	N/A	1760,0	4,100	3	1,760	F9	0,018	32
DAF Outlet	4	1	77,7	2	N/A	621.6		3	622	F9	0,018	11
Header Channel to UV	2	1	233,3	2	N/A	933.2	4,500	3	933	F9	0,018	17
Header Distribution to UV	1	1	9,8	2	N/A	19.6		3	20	F9	0,018	0

1,072

Total Chloroform Emission Rate (ug/s)	**1,948**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Chloroform concentration at undigested sludge tanks, the Chloroform emission rate of sludge tanks and dewatering sludge is referred to the maximum Chloroform emission rate conducted at existing STSTW.

Appendix 13.06i - Calculation of Naphthalene Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Naphthalene Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Naphthalene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.00130	0
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.00130	0
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.00130	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.00130	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.00130	0
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.00130	0
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.00130	0
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.00130	0
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.00130	0
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.00130	0
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.00130	1
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.00130	0
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.00130	0
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.00081	4
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.00081	0
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.00081	0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.00081	1

8

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.00130	0
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.00130	0
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.00130	0
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.00130	0
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.00130	0

2

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.00130	0
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.00130	0
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.00130	0
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.00130	0
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.00130	0
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.00081	0
UV	5	1	12.4	3	N/A	186		3	186	F9	0.00081	0
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.00081	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.00081	0

2

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.00081	1
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.00081	4
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.00081	5
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.00081	1
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.00081	1
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.00081	1
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.00081	1
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.00081	1
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.00081	1
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.00081	0

15

Total Naphthalene Emission Rate (ug/s)	**26**

Notes:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Naphthalene emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Naphthalene concentration at undigested sludge tanks, the Naphthalene emission rate of sludge tanks and dewatering sludge is referred tp the maximum Naphthalene emission rate conducted at existing STSTW.

Appendix 13.06j - Calculation of Carbon Disulphide Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Carbon Disulfide Emission	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Carbon Disulphide Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.007	1
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.007	0
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.007	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.007	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.007	0
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.007	0
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.007	1
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.007	2
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.007	0
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.007	1
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.007	7
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.007	1
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.007	2
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.003	14
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.003	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.003	0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.003	3

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.007	0
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.007	2
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.007	2
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.007	3
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.007	1

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.007	1
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.007	1
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.007	2
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.007	2
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.007	1
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.003	0
UV	5	1	12.4	3	N/A	186		3	186	F9	0.003	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.003	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.003	0

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.007	8
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.007	34
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.007	41
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.007	10
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.007	6
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.007	4
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.003	5
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.003	2
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.003	3
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.003	0

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Total Carbon Disulfide Emission Rate (ug/s)	**164**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of carbon disulphide concentration at undigested sludge tanks, thecarbon disulphide emission rate of sludge tanks and dewatering sludge is referred to the maximum carbon disulphide emission rate conducted at existing STSTW.

Appendix 13.06k - Calculation of Ethylbenzene Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Ethylbenzene Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Ethylbenzene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.015	2
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.015	1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.015	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.015	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.015	1
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.015	1
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.015	1
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.015	5
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.015	1
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.015	1
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.015	16
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.015	2
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.015	4
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.005	23
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.005	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.005	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.005	5

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.015	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.015	5
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.015	4
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.015	5
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.015	2

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.015	3
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.015	1
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.015	4
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.015	4
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.015	2
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.005	0
UV	5	1	12.4	3	N/A	186		3	186	F9	0.005	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.005	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.005	0

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.005	6
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.005	25
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.005	29
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.005	7
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.005	5
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.005	3
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.005	9
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.005	3
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.005	5
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.005	0

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Total Ethylbenzene Emission Rate (ug/s)	**189**

Notes:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of ethylbenzene concentration at undigested sludge tanks, the ethylbenzene emission rate of sludge tanks and dewatering sludge is referred to the maximum ethylbenzene emission rate conducted at existing STSTW.

Appendix 13.06l - Calculation of Methanol Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Methanol Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Methanol Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.255	28
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.255	14
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.255	6
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.255	8
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.255	16
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.255	17
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.255	24
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.255	77
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.255	16
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.255	20
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.255	264
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.255	30
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.255	71
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.100	459
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.100	22
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.100	12
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.100	91

1,176

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.255	10
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.255	90
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.255	76
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.255	92
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.255	37

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.255	43
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.255	24
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.255	64
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.255	76
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.255	26
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.100	9
UV	5	1	12.4	3	N/A	186		3	186	F9	0.100	19
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.100	6
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.100	6

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.100	118
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.100	491
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.100	582
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.100	146
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.100	91
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.100	62
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.100	176
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.100	62
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.100	93
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.100	2

1,822

Total Methanol Emission Rate (ug/s)	**3,575**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of methanol concentration at undigested sludge tanks, the methanol emission rate of sludge tanks and dewatering sludge is referred to the maximum methanol emission rate conducted at existing STSTW.

Appendix 13.06m - Calculation of Methylene Chloride Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Methylene Chloride Emission	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Methylene Chloride Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.024	3
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.024	1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.024	1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.024	1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.024	2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.024	2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.024	2
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.024	7
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.024	2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.024	2
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.024	25
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.024	3
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.024	7
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.004	18
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.004	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.004	0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.004	4

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.024	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.024	8
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.024	7
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.024	9
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.024	3

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.024	4
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.024	2
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.024	6
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.024	7
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.024	2
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.004	0
UV	5	1	12.4	3	N/A	186		3	186	F9	0.004	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.004	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.004	0

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.020	24
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.020	98
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.020	116
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.020	29
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.020	18
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.020	12
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.004	7
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.004	2
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.004	4
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.004	0

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Total Methylene Chloride Emission Rate (ug/s)	**442**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Methylene Chloride concentration at undigested sludge tanks, the Methylene Chloride emission rate of sludge tanks and dewatering sludge is referred to the maximum Methylene Chloride emission rate conducted at existing STSTW.

Appendix 13.06n - Calculation of Toluene Emission Rate of CSTW

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Equivalent Sample Location ID	Specific Emission Rate	Unmitigated Toluene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)		(ug/m2/s)	(ug/s)
Preliminary Treatment												
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	F1	0.031	3
Fine Screen	4	1	7	2	N/A	56.0		3	56	F1	0.031	2
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	F1	0.031	1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	F1	0.031	1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	F1	0.031	2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	F1	0.031	2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	F1	0.031	3
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	F1	0.031	9
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	F1	0.031	2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	F1	0.031	2
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	F1	0.031	32
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	F1	0.031	4
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	F1	0.031	9
Primary Treatment												
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	F5	0.006	28
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	F5	0.006	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	F5	0.006	1
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	F5	0.006	5

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment												
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	F1	0.031	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	F1	0.031	11
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	F1	0.031	9
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	F1	0.031	11
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	F1	0.031	4

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment												
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	F1	0.031	5
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	F1	0.031	3
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	F1	0.031	8
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	F1	0.031	9
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	F1	0.031	3
Final Treatment												
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	F9	0.006	1
UV	5	1	12.4	3	N/A	186		3	186	F9	0.006	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	F9	0.006	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	F9	0.006	0

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment												
Biological Treatment Tank												
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	F8	0.004	5
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	F8	0.004	20
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	F8	0.004	23
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	F8	0.004	6
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	F8	0.004	4
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	F8	0.004	2
Final Treatment												
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	F9	0.006	11
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	F9	0.006	4
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	F9	0.006	6
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	F9	0.006	0

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Total Toluene Emission Rate (ug/s)	**254**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method.

(2) Average and Maximum Chloroform emission rates of secondary/sludge treatment facilities are assumed with reference to Shatin STW.

(3) Since there is no measurement or relevant record of Toluene concentration at undigested sludge tanks, the Toluene emission rate of sludge tanks and dewatering sludge is referred to the maximum Toluene emission rate conducted at existing STSTW.

Appendix 13.06o - Calculation of 1,1,2,2-Tetrachloroethane Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for carcinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated 1,1,2,2-Tetrachloroethane Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	6.9	3.5	0.004	0
Fine Screen	4	1	7	2	N/A	56.0		3	56	6.9	3.5	0.004	0
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	6.9	3.5	0.004	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	6.9	3.5	0.004	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	6.9	3.5	0.004	0
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	6.9	3.5	0.004	0
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	6.9	3.5	0.004	0
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	6.9	3.5	0.004	1
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	6.9	3.5	0.004	0
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	6.9	3.5	0.004	0
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	6.9	3.5	0.004	4
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	6.9	3.5	0.004	0
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	6.9	3.5	0.004	1
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	6.9	3.5	0.004	18
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	6.9	3.5	0.004	1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	6.9	3.5	0.004	0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	6.9	3.5	0.004	4

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	6.9	3.5	0.004	0
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	6.9	3.5	0.004	1
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	6.9	3.5	0.004	1
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	6.9	3.5	0.004	1
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	6.9	3.5	0.004	1

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	6.9	3.5	0.004	1
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	6.9	3.5	0.004	0
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	6.9	3.5	0.004	1
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	6.9	3.5	0.004	1
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	6.9	3.5	0.004	0
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	6.9	3.5	0.004	0
UV	5	1	12.4	3	N/A	186		3	186	6.9	3.5	0.004	1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	6.9	3.5	0.004	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	6.9	3.5	0.004	0

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	6.9	3.5	0.004	5
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	6.9	3.5	0.004	20
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	6.9	3.5	0.004	23
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	6.9	3.5	0.004	6
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	6.9	3.5	0.004	4
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	6.9	3.5	0.004	2
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	6.9	3.5	0.004	7
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	6.9	3.5	0.004	2
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	6.9	3.5	0.004	4
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	6.9	3.5	0.004	0

Total 1,1,2,2-Tetrachloroethane Emission Rate (ug/s)	116

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06p - Calculation of 1,2-Dichloroethane Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for carcinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated 1,2-Dichloroethane Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	4	2	0.002	0
Fine Screen	4	1	7	2	N/A	56.0		3	56	4	2	0.002	0
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	4	2	0.002	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	4	2	0.002	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	4	2	0.002	0
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	4	2	0.002	0
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	4	2	0.002	0
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	4	2	0.002	1
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	4	2	0.002	0
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	4	2	0.002	0
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	4	2	0.002	2
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	4	2	0.002	0
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	4	2	0.002	1
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	4	2	0.002	9
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	4	2	0.002	0
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	4	2	0.002	0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	4	2	0.002	2

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	4	2	0.002	0
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	4	2	0.002	1
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	4	2	0.002	1
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	4	2	0.002	1
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	4	2	0.002	0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	4	2	0.002	0
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	4	2	0.002	0
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	4	2	0.002	1
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	4	2	0.002	1
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	4	2	0.002	0
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	4	2	0.002	0
UV	5	1	12.4	3	N/A	186		3	186	4	2	0.002	0
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	4	2	0.002	0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	4	2	0.002	0

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	4	2	0.002	2
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	4	2	0.002	10
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	4	2	0.002	12
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	4	2	0.002	3
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	4	2	0.002	2
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	4	2	0.002	1
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	4	2	0.002	4
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	4	2	0.002	1
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	4	2	0.002	2
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	4	2	0.002	0

Total 1,2-Dichloroethane Emission Rate (ug/s)	58

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06q - Calculation of Acetaldehyde Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for carcinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Acetaldehyde Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	36	18	0.019	2
Fine Screen	4	1	7	2	N/A	56.0		3	56	36	18	0.019	1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	36	18	0.019	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	36	18	0.019	1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	36	18	0.019	1
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	36	18	0.019	1
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	36	18	0.019	2
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	36	18	0.019	6
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	36	18	0.019	1
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	36	18	0.019	1
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	36	18	0.019	20
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	36	18	0.019	2
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	36	18	0.019	5
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	36	18	0.019	89
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	36	18	0.019	4
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	36	18	0.019	2
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	36	18	0.019	18

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	36	18	0.019	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	36	18	0.019	7
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	36	18	0.019	6
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	36	18	0.019	7
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	36	18	0.019	3

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	36	18	0.019	3
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	36	18	0.019	2
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	36	18	0.019	5
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	36	18	0.019	6
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	36	18	0.019	2
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	36	18	0.019	2
UV	5	1	12.4	3	N/A	186		3	186	36	18	0.019	4
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	36	18	0.019	1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	36	18	0.019	1

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	36	18	0.019	23
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	36	18	0.019	95
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	36	18	0.019	113
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	36	18	0.019	28
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	36	18	0.019	18
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	36	18	0.019	12
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	36	18	0.019	34
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	36	18	0.019	12
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	36	18	0.019	18
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	36	18	0.019	0

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Total Acetaldehyde Emission Rate (ug/s)	**559**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06r - Calculation of Benzene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for carcinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Benzene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	3.2	1.6	0.0015	0.2
Fine Screen	4	1	7	2	N/A	56.0		3	56	3.2	1.6	0.0015	0.1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	3.2	1.6	0.0015	0.0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	3.2	1.6	0.0015	0.0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	3.2	1.6	0.0015	0.1
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	3.2	1.6	0.0015	0.1
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	3.2	1.6	0.0015	0.1
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	3.2	1.6	0.0015	0.5
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	3.2	1.6	0.0015	0.1
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	3.2	1.6	0.0015	0.1
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	3.2	1.6	0.0015	1.6
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	3.2	1.6	0.0015	0.2
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	3.2	1.6	0.0015	0.4
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	3.2	1.6	0.0015	6.9
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	3.2	1.6	0.0015	0.3
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	3.2	1.6	0.0015	0.2
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	3.2	1.6	0.0015	1.4

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	3.2	1.6	0.0015	0.1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	3.2	1.6	0.0015	0.5
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	3.2	1.6	0.0015	0.4
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	3.2	1.6	0.0015	0.5
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	3.2	1.6	0.0015	0.2

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	3.2	1.6	0.0015	0.3
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	3.2	1.6	0.0015	0.1
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	3.2	1.6	0.0015	0.4
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	3.2	1.6	0.0015	0.4
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	3.2	1.6	0.0015	0.2
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	3.2	1.6	0.0015	0.1
UV	5	1	12.4	3	N/A	186		3	186	3.2	1.6	0.0015	0.3
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	3.2	1.6	0.0015	0.1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	3.2	1.6	0.0015	0.1

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	3.2	1.6	0.0015	1.8
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	3.2	1.6	0.0015	7.4
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	3.2	1.6	0.0015	8.7
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	3.2	1.6	0.0015	2.2
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	3.2	1.6	0.0015	1.4
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	3.2	1.6	0.0015	0.9
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	3.2	1.6	0.0015	2.6
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	3.2	1.6	0.0015	0.9
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	3.2	1.6	0.0015	1.4
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	3.2	1.6	0.0015	0.0

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Total Benzene Emission Rate (ug/s)	**43**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06s - Calculation of Carbon Tetrachloride Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Carbon tetrachloride Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	6.3	3.2	0.0035	0.4
Fine Screen	4	1	7	2	N/A	56.0		3	56	6.3	3.2	0.0035	0.2
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	6.3	3.2	0.0035	0.1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	6.3	3.2	0.0035	0.1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	6.3	3.2	0.0035	0.2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	6.3	3.2	0.0035	0.2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	6.3	3.2	0.0035	0.3
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	6.3	3.2	0.0035	1.1
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	6.3	3.2	0.0035	0.2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	6.3	3.2	0.0035	0.3
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	6.3	3.2	0.0035	3.6
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	6.3	3.2	0.0035	0.4
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	6.3	3.2	0.0035	1.0
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	6.3	3.2	0.0035	16.1
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	6.3	3.2	0.0035	0.8
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	6.3	3.2	0.0035	0.4
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	6.3	3.2	0.0035	3.2

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	6.3	3.2	0.0035	0.1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	6.3	3.2	0.0035	1.2
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	6.3	3.2	0.0035	1.0
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	6.3	3.2	0.0035	1.3
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	6.3	3.2	0.0035	0.5

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	6.3	3.2	0.0035	0.6
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	6.3	3.2	0.0035	0.3
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	6.3	3.2	0.0035	0.9
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	6.3	3.2	0.0035	1.0
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	6.3	3.2	0.0035	0.4
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	6.3	3.2	0.0035	0.3
UV	5	1	12.4	3	N/A	186		3	186	6.3	3.2	0.0035	0.7
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	6.3	3.2	0.0035	0.2
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	6.3	3.2	0.0035	0.2

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	6.3	3.2	0.0035	4.1
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	6.3	3.2	0.0035	17.2
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	6.3	3.2	0.0035	20.4
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	6.3	3.2	0.0035	5.1
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	6.3	3.2	0.0035	3.2
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	6.3	3.2	0.0035	2.2
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	6.3	3.2	0.0035	6.2
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	6.3	3.2	0.0035	2.2
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	6.3	3.2	0.0035	3.3
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	6.3	3.2	0.0035	0.1

Total Carbon tetrachloride Emission Rate (ug/s)	**101**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06t - Calculation of Diethyl Sulphide Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Diethyl Sulphide Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	368.7	184.4	0.1982	22
Fine Screen	4	1	7	2	N/A	56.0		3	56	368.7	184.4	0.1982	11
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	368.7	184.4	0.1982	5
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	368.7	184.4	0.1982	6
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	368.7	184.4	0.1982	13
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	368.7	184.4	0.1982	13
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	368.7	184.4	0.1982	19
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	368.7	184.4	0.1982	59
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	368.7	184.4	0.1982	12
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	368.7	184.4	0.1982	15
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	368.7	184.4	0.1982	205
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	368.7	184.4	0.1982	23
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	368.7	184.4	0.1982	56
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	368.7	184.4	0.1982	910
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	368.7	184.4	0.1982	44
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	368.7	184.4	0.1982	24
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	368.7	184.4	0.1982	180

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	368.7	184.4	0.1982	8
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	368.7	184.4	0.1982	70
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	368.7	184.4	0.1982	59
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	368.7	184.4	0.1982	71
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	368.7	184.4	0.1982	29

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	368.7	184.4	0.1982	34
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	368.7	184.4	0.1982	19
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	368.7	184.4	0.1982	50
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	368.7	184.4	0.1982	59
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	368.7	184.4	0.1982	20
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	368.7	184.4	0.1982	17
UV	5	1	12.4	3	N/A	186		3	186	368.7	184.4	0.1982	37
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	368.7	184.4	0.1982	11
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	368.7	184.4	0.1982	12

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	368.7	184.4	0.1982	234
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	368.7	184.4	0.1982	973
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	368.7	184.4	0.1982	1,154
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	368.7	184.4	0.1982	288
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	368.7	184.4	0.1982	179
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	368.7	184.4	0.1982	123
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	368.7	184.4	0.1982	349
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	368.7	184.4	0.1982	123
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	368.7	184.4	0.1982	185
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	368.7	184.4	0.1982	4

Total Diethyl Sulphide Emission Rate (ug/s)	**5,725**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06u - Calculation of Formaldehyde Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Formaldehyde Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	24.6	12.3	0.0132	1
Fine Screen	4	1	7	2	N/A	56.0		3	56	24.6	12.3	0.0132	1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	24.6	12.3	0.0132	0
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	24.6	12.3	0.0132	0
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	24.6	12.3	0.0132	1
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	24.6	12.3	0.0132	1
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	24.6	12.3	0.0132	1
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	24.6	12.3	0.0132	4
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	24.6	12.3	0.0132	1
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	24.6	12.3	0.0132	1
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	24.6	12.3	0.0132	14
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	24.6	12.3	0.0132	2
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	24.6	12.3	0.0132	4
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	24.6	12.3	0.0132	61
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	24.6	12.3	0.0132	3
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	24.6	12.3	0.0132	2
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	24.6	12.3	0.0132	12

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	24.6	12.3	0.0132	1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	24.6	12.3	0.0132	5
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	24.6	12.3	0.0132	4
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	24.6	12.3	0.0132	5
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	24.6	12.3	0.0132	2

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	24.6	12.3	0.0132	2
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	24.6	12.3	0.0132	1
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	24.6	12.3	0.0132	3
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	24.6	12.3	0.0132	4
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	24.6	12.3	0.0132	1
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	24.6	12.3	0.0132	1
UV	5	1	12.4	3	N/A	186		3	186	24.6	12.3	0.0132	2
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	24.6	12.3	0.0132	1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	24.6	12.3	0.0132	1

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	24.6	12.3	0.0132	16
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	24.6	12.3	0.0132	65
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	24.6	12.3	0.0132	77
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	24.6	12.3	0.0132	19
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	24.6	12.3	0.0132	12
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	24.6	12.3	0.0132	8
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	24.6	12.3	0.0132	23
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	24.6	12.3	0.0132	8
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	24.6	12.3	0.0132	12
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	24.6	12.3	0.0132	0

Total Formaldehyde Emission Rate (ug/s)	382

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06v - Calculation of 1,4-Dichlorobenzene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated 1,4-Dichlorobenzene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	6.0	3.0	0.0035	0.4
Fine Screen	4	1	7	2	N/A	56.0		3	56	6.0	3.0	0.0035	0.2
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	6.0	3.0	0.0035	0.1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	6.0	3.0	0.0035	0.1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	6.0	3.0	0.0035	0.2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	6.0	3.0	0.0035	0.2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	6.0	3.0	0.0035	0.3
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	6.0	3.0	0.0035	1.1
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	6.0	3.0	0.0035	0.2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	6.0	3.0	0.0035	0.3
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	6.0	3.0	0.0035	3.6
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	6.0	3.0	0.0035	0.4
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	6.0	3.0	0.0035	1.0
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	6.0	3.0	0.0035	16.1
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	6.0	3.0	0.0035	0.8
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	6.0	3.0	0.0035	0.4
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	6.0	3.0	0.0035	3.2

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	6.0	3.0	0.0035	0.1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	6.0	3.0	0.0035	1.2
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	6.0	3.0	0.0035	1.0
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	6.0	3.0	0.0035	1.3
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	6.0	3.0	0.0035	0.5

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	6.0	3.0	0.0035	0.6
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	6.0	3.0	0.0035	0.3
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	6.0	3.0	0.0035	0.9
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	6.0	3.0	0.0035	1.0
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	6.0	3.0	0.0035	0.4
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	6.0	3.0	0.0035	0.3
UV	5	1	12.4	3	N/A	186		3	186	6.0	3.0	0.0035	0.7
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	6.0	3.0	0.0035	0.2
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	6.0	3.0	0.0035	0.2

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	6.0	3.0	0.0035	4.1
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	6.0	3.0	0.0035	17.2
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	6.0	3.0	0.0035	20.4
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	6.0	3.0	0.0035	5.1
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	6.0	3.0	0.0035	3.2
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	6.0	3.0	0.0035	2.2
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	6.0	3.0	0.0035	6.2
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	6.0	3.0	0.0035	2.2
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	6.0	3.0	0.0035	3.3
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	6.0	3.0	0.0035	0.1

Total 1,4-Dichlorobenzene Emission Rate (ug/s)	101

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06w - Calculation of Styrene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Styrene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	4.3	2.2	0.0025	0.3
Fine Screen	4	1	7	2	N/A	56.0		3	56	4.3	2.2	0.0025	0.1
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	4.3	2.2	0.0025	0.1
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	4.3	2.2	0.0025	0.1
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	4.3	2.2	0.0025	0.2
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	4.3	2.2	0.0025	0.2
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	4.3	2.2	0.0025	0.2
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	4.3	2.2	0.0025	0.8
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	4.3	2.2	0.0025	0.2
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	4.3	2.2	0.0025	0.2
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	4.3	2.2	0.0025	2.6
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	4.3	2.2	0.0025	0.3
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	4.3	2.2	0.0025	0.7
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	4.3	2.2	0.0025	11.5
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	4.3	2.2	0.0025	0.6
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	4.3	2.2	0.0025	0.3
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	4.3	2.2	0.0025	2.3

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	4.3	2.2	0.0025	0.1
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	4.3	2.2	0.0025	0.9
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	4.3	2.2	0.0025	0.7
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	4.3	2.2	0.0025	0.9
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	4.3	2.2	0.0025	0.4

3

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	4.3	2.2	0.0025	0.4
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	4.3	2.2	0.0025	0.2
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	4.3	2.2	0.0025	0.6
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	4.3	2.2	0.0025	0.7
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	4.3	2.2	0.0025	0.3
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	4.3	2.2	0.0025	0.2
UV	5	1	12.4	3	N/A	186		3	186	4.3	2.2	0.0025	0.5
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	4.3	2.2	0.0025	0.1
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	4.3	2.2	0.0025	0.1

3

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	4.3	2.2	0.0025	2.9
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	4.3	2.2	0.0025	12.3
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	4.3	2.2	0.0025	14.6
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	4.3	2.2	0.0025	3.6
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	4.3	2.2	0.0025	2.3
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	4.3	2.2	0.0025	1.5
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	4.3	2.2	0.0025	4.4
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	4.3	2.2	0.0025	1.6
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	4.3	2.2	0.0025	2.3
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	4.3	2.2	0.0025	0.0

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Total Styrene Emission Rate (ug/s)	**72**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06x - Calculation of Benzo(a)Pyrene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Benzo(a)Pyrene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	0.75	0.38	4.1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0.75	0.38	4.1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0.75	0.38	4.1E-04	0.01
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	0.75	0.38	4.1E-04	0.01
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	0.75	0.38	4.1E-04	0.03
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	0.75	0.38	4.1E-04	0.03
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	0.75	0.38	4.1E-04	0.04
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	0.75	0.38	4.1E-04	0.12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0.75	0.38	4.1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	0.75	0.38	4.1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0.75	0.38	4.1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0.75	0.38	4.1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	0.75	0.38	4.1E-04	0.11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	0.75	0.38	4.1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0.75	0.38	4.1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0.75	0.38	4.1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0.75	0.38	4.1E-04	0.37

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	0.75	0.38	4.1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0.75	0.38	4.1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	0.75	0.38	4.1E-04	0.15
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	0.75	0.38	4.1E-04	0.06

0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	0.75	0.38	4.1E-04	0.07
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	0.75	0.38	4.1E-04	0.04
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	0.75	0.38	4.1E-04	0.10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0.75	0.38	4.1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	0.75	0.38	4.1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0.75	0.38	4.1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0.75	0.38	4.1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0.75	0.38	4.1E-04	0.02

1

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0.75	0.38	4.1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0.75	0.38	4.1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	0.75	0.38	4.1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0.75	0.38	4.1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0.75	0.38	4.1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0.75	0.38	4.1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0.75	0.38	4.1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0.75	0.38	4.1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0.75	0.38	4.1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0.75	0.38	4.1E-04	0.01

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Total Benzo(a)Pyrene Emission Rate (ug/s)	**12**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06y - Calculation of Benz(a)anthracene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Benz(a)anthracene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16,5	N/A	110.6		3	111	0,75	0,38	4,1E-04	0.0
Fine Screen	4	1	7	2	N/A	56.0		3	56	0,75	0,38	4,1E-04	0.0
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0,75	0,38	4,1E-04	0.0
Fine Screen Screenings Handling Area	1	2,5	6	5	N/A	75.0		3	30	0,75	0,38	4,1E-04	0.0
Fine Screen Outlet Channel	1	1	14,2	4,5	N/A	63,9		3	64	0,75	0,38	4,1E-04	0,0
Distribution Channel 1	1	1	26.25	2,5	N/A	65.6		3	66	0,75	0,38	4,1E-04	0.0
Distribution Channel 2	1	1	13,5	7	N/A	94.5		3	95	0,75	0,38	4,1E-04	0.0
Aerated Grit Channels	5	1	15,00	4.00	N/A	300.0	2,400	3	300	0,75	0,38	4,1E-04	0,1
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0,75	0,38	4,1E-04	0,0
Aerated Grit Channel Outlet Channel	2	1	17	2,25	N/A	76,5		3	77	0,75	0,38	4,1E-04	0,0
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0,75	0,38	4,1E-04	0.4
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0,75	0,38	4,1E-04	0.0
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2,5	N/A	280.0		3	280	0,75	0,38	4,1E-04	0,1
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590,0		3	4,590	0,75	0,38	4,1E-04	1.9
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0,75	0,38	4,1E-04	0.1
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0,75	0,38	4,1E-04	0.0
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0,75	0,38	4,1E-04	0.4

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2,2	6,5	2	N/A	86		3	39	0,75	0,38	4,1E-04	0.0
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0,75	0,38	4,1E-04	0.1
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0,75	0,38	4,1E-04	0,1
Direct Dewatering Facilities	10	3,2	10	3,6	N/A	1152		3	360	0,75	0,38	4,1E-04	0.1
Skip Room No. 1	10	1,5	6	2,4	N/A	216		3	144	0,75	0,38	4,1E-04	0,1

0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9,4	N/A	169		3	169	0,75	0,38	4,1E-04	0,1
Thickening Centrate Tank	1	1	10	9,4	N/A	94		3	94	0,75	0,38	4,1E-04	0.0
Direct Dewatering Facilities	7	3,2	10	3,6	N/A	806		3	252	0,75	0,38	4,1E-04	0,1
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0,75	0,38	4,1E-04	0,1
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0,75	0,38	4,1E-04	0.0
Final Treatment													
UV Distribution Channel	1	1	10.5	8,1	N/A	85		3	85	0,75	0,38	4,1E-04	0.0
UV	5	1	12.4	3	N/A	186		3	186	0,75	0,38	4,1E-04	0.1
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0,75	0,38	4,1E-04	0.0
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0,75	0,38	4,1E-04	0.0

1

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0,75	0,38	4,1E-04	0.5
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0,75	0,38	4,1E-04	2.0
- Aerobic Zone	35	1	12.1	13.75	N/A	5823,1	151,680	3	5,823	0,75	0,38	4,1E-04	2.4
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0,75	0,38	4,1E-04	0.6
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0,75	0,38	4,1E-04	0.4
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0,75	0,38	4,1E-04	0,3
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0,75	0,38	4,1E-04	0.7
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0,75	0,38	4,1E-04	0.3
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0,75	0,38	4,1E-04	0.4
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0,75	0,38	4,1E-04	0.0

7

Total Benz(a)anthracene Emission Rate (ug/s)	**12**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06z - Calculation of Chrysene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Chrysene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16,5	N/A	110.6		3	111	0,75	0,38	4,1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0,75	0,38	4,1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0,75	0,38	4,1E-04	0.01
Fine Screen Screenings Handling Area	1	2,5	6	5	N/A	75.0		3	30	0,75	0,38	4,1E-04	0.01
Fine Screen Outlet Channel	1	1	14,2	4,5	N/A	63,9		3	64	0,75	0,38	4,1E-04	0,03
Distribution Channel 1	1	1	26.25	2,5	N/A	65.6		3	66	0,75	0,38	4,1E-04	0.03
Distribution Channel 2	1	1	13,5	7	N/A	94.5		3	95	0,75	0,38	4,1E-04	0.04
Aerated Grit Channels	5	1	15,00	4.00	N/A	300.0	2,400	3	300	0,75	0,38	4,1E-04	0,12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0,75	0,38	4,1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2,25	N/A	76,5		3	77	0,75	0,38	4,1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0,75	0,38	4,1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0,75	0,38	4,1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2,5	N/A	280.0		3	280	0,75	0,38	4,1E-04	0,11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590,0		3	4,590	0,75	0,38	4,1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0,75	0,38	4,1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0,75	0,38	4,1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0,75	0,38	4,1E-04	0.37

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2,2	6,5	2	N/A	86		3	39	0,75	0,38	4,1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0,75	0,38	4,1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0,75	0,38	4,1E-04	0.12
Direct Dewatering Facilities	10	3,2	10	3,6	N/A	1152		3	360	0,75	0,38	4,1E-04	0.15
Skip Room No. 1	10	1,5	6	2,4	N/A	216		3	144	0,75	0,38	4,1E-04	0.06

0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9,4	N/A	169		3	169	0,75	0,38	4,1E-04	0,07
Thickening Centrate Tank	1	1	10	9,4	N/A	94		3	94	0,75	0,38	4,1E-04	0.04
Direct Dewatering Facilities	7	3,2	10	3,6	N/A	806		3	252	0,75	0,38	4,1E-04	0,10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0,75	0,38	4,1E-04	0,12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0,75	0,38	4,1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8,1	N/A	85		3	85	0,75	0,38	4,1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0,75	0,38	4,1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0,75	0,38	4,1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0,75	0,38	4,1E-04	0.02

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0,75	0,38	4,1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0,75	0,38	4,1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823,1	151,680	3	5,823	0,75	0,38	4,1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0,75	0,38	4,1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0,75	0,38	4,1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0,75	0,38	4,1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0,75	0,38	4,1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0,75	0,38	4,1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0,75	0,38	4,1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0,75	0,38	4,1E-04	0.01

7

Total Chrysene Emission Rate (ug/s)	**12**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06aa - Calculation of Benzo(b)fluoranthene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Benzo(b)fluoranthene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	0.75	0.38	4.1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0.75	0.38	4.1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0.75	0.38	4.1E-04	0.01
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	0.75	0.38	4.1E-04	0.01
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	0.75	0.38	4.1E-04	0.03
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	0.75	0.38	4.1E-04	0.03
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	0.75	0.38	4.1E-04	0.04
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	0.75	0.38	4.1E-04	0.12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0.75	0.38	4.1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	0.75	0.38	4.1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0.75	0.38	4.1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0.75	0.38	4.1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	0.75	0.38	4.1E-04	0.11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	0.75	0.38	4.1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0.75	0.38	4.1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0.75	0.38	4.1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0.75	0.38	4.1E-04	0.37

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	0.75	0.38	4.1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0.75	0.38	4.1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	0.75	0.38	4.1E-04	0.15
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	0.75	0.38	4.1E-04	0.06

0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	0.75	0.38	4.1E-04	0.07
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	0.75	0.38	4.1E-04	0.04
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	0.75	0.38	4.1E-04	0.10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0.75	0.38	4.1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	0.75	0.38	4.1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0.75	0.38	4.1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0.75	0.38	4.1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0.75	0.38	4.1E-04	0.02

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0.75	0.38	4.1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0.75	0.38	4.1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	0.75	0.38	4.1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0.75	0.38	4.1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0.75	0.38	4.1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0.75	0.38	4.1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0.75	0.38	4.1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0.75	0.38	4.1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0.75	0.38	4.1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0.75	0.38	4.1E-04	0.01

7

Total Benzo(b)fluoranthene Emission Rate (ug/s)	**12**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06bb - Calculation of Benzo(k)fluoranthene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Benzo(k)fluoranthene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	0.75	0.38	4.1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0.75	0.38	4.1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0.75	0.38	4.1E-04	0.01
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	0.75	0.38	4.1E-04	0.01
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	0.75	0.38	4.1E-04	0.03
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	0.75	0.38	4.1E-04	0.03
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	0.75	0.38	4.1E-04	0.04
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	0.75	0.38	4.1E-04	0.12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0.75	0.38	4.1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	0.75	0.38	4.1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0.75	0.38	4.1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0.75	0.38	4.1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	0.75	0.38	4.1E-04	0.11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	0.75	0.38	4.1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0.75	0.38	4.1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0.75	0.38	4.1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0.75	0.38	4.1E-04	0.37

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	0.75	0.38	4.1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0.75	0.38	4.1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	0.75	0.38	4.1E-04	0.15
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	0.75	0.38	4.1E-04	0.06

0

Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	0.75	0.38	4.1E-04	0.07
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	0.75	0.38	4.1E-04	0.04
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	0.75	0.38	4.1E-04	0.10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0.75	0.38	4.1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	0.75	0.38	4.1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0.75	0.38	4.1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0.75	0.38	4.1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0.75	0.38	4.1E-04	0.02

1

Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0.75	0.38	4.1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0.75	0.38	4.1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	0.75	0.38	4.1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0.75	0.38	4.1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0.75	0.38	4.1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0.75	0.38	4.1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0.75	0.38	4.1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0.75	0.38	4.1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0.75	0.38	4.1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0.75	0.38	4.1E-04	0.01

7

Total Benzo(k)fluoranthene Emission Rate (ug/s)	**12**

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06cc - Calculation of Indeno(1,2,3-cd)pyrene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Indeno(1,2,3-cd)pyrene Emission
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	0.75	0.38	4.1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0.75	0.38	4.1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0.75	0.38	4.1E-04	0.01
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	0.75	0.38	4.1E-04	0.01
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	0.75	0.38	4.1E-04	0.03
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	0.75	0.38	4.1E-04	0.03
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	0.75	0.38	4.1E-04	0.04
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	0.75	0.38	4.1E-04	0.12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0.75	0.38	4.1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	0.75	0.38	4.1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0.75	0.38	4.1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0.75	0.38	4.1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	0.75	0.38	4.1E-04	0.11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	0.75	0.38	4.1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0.75	0.38	4.1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0.75	0.38	4.1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0.75	0.38	4.1E-04	0.37

3

Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	0.75	0.38	4.1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0.75	0.38	4.1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	0.75	0.38	4.1E-04	0.15
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	0.75	0.38	4.1E-04	0.06

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	0.75	0.38	4.1E-04	0.07
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	0.75	0.38	4.1E-04	0.04
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	0.75	0.38	4.1E-04	0.10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0.75	0.38	4.1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	0.75	0.38	4.1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0.75	0.38	4.1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0.75	0.38	4.1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0.75	0.38	4.1E-04	0.02

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0.75	0.38	4.1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0.75	0.38	4.1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	0.75	0.38	4.1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0.75	0.38	4.1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0.75	0.38	4.1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0.75	0.38	4.1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0.75	0.38	4.1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0.75	0.38	4.1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0.75	0.38	4.1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0.75	0.38	4.1E-04	0.01

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Total Indeno(1,2,3-cd)pyrene Emission Rate (ug/s)	12

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$

Appendix 13.06dd - Calculation of Dibenz(a,h)anthracene Emission Rate of CSTW

According to the Sampling and Testing Analysis (Appendix 13.05), this chemical is not detected. As a conservative approach, it is assumed that 50% of the detection limit is the concentration of this chemical emitted from each location with potential emission. And the calculation of the total emission rate based on this assumption is used for cardinogenic risk assessment.

The calculation of emission rate is based on the 50% detection limit.

Table A - Design Flow Rate of to Deodourisation System No.1

Location	No. of Units (Duty)	Air Phase Height	Internal Dimension (Unit)			Air Phase Volume	Aeration Rate (Unit)	Air Exchange Rate	Toluene Emission Area	Detection Limit (LOR)	Concentration (50% LOR)	Specific Emission Rate	Unmitigated Dibenz(a,h)anthracene Emission Rate
		(m)	Length (m)	Width (m)	Diameters(m)	(m^3)	(m^3/h)	(Air Changes / hr) (2)	(m2)	(ug/m2)	(ug/m2)	(ug/m2/s)	(ug/s)
Preliminary Treatment													
Inlet Chamber	1	1	6.7	16.5	N/A	110.6		3	111	0.75	0.38	4.1E-04	0.04
Fine Screen	4	1	7	2	N/A	56.0		3	56	0.75	0.38	4.1E-04	0.02
Fine Screen By Pass	1	1	16.5	1.5	N/A	24.8		3	25	0.75	0.38	4.1E-04	0.01
Fine Screen Screenings Handling Area	1	2.5	6	5	N/A	75.0		3	30	0.75	0.38	4.1E-04	0.01
Fine Screen Outlet Channel	1	1	14.2	4.5	N/A	63.9		3	64	0.75	0.38	4.1E-04	0.03
Distribution Channel 1	1	1	26.25	2.5	N/A	65.6		3	66	0.75	0.38	4.1E-04	0.03
Distribution Channel 2	1	1	13.5	7	N/A	94.5		3	95	0.75	0.38	4.1E-04	0.04
Aerated Grit Channels	5	1	15.00	4.00	N/A	300.0	2,400	3	300	0.75	0.38	4.1E-04	0.12
Grit Handling Area	4	2	4.5	3.5	N/A	126.0		3	63	0.75	0.38	4.1E-04	0.03
Aerated Grit Channel Outlet Channel	2	1	17	2.25	N/A	76.5		3	77	0.75	0.38	4.1E-04	0.03
Header Channel to Primary Sedimentation Tank	2	1	259	2	N/A	1036.0	4,500	3	1,036	0.75	0.38	4.1E-04	0.42
Header Distribution Channel to Primary Sedimentation Tank 1	8	1	7.4	2	N/A	118.4		3	118	0.75	0.38	4.1E-04	0.05
Header Distribution Channel to Primary Sedimentation Tank 2	4	1	28	2.5	N/A	280.0		3	280	0.75	0.38	4.1E-04	0.11
Primary Treatment													
Primary Sedimentation Tank	10	1	51	9	N/A	4590.0		3	4,590	0.75	0.38	4.1E-04	1.86
Primary Sedimentation Weir	4	1	28	2	N/A	224.0		3	224	0.75	0.38	4.1E-04	0.09
Primary Sedimentation Tank Outlet Channel	4	1	15	2	N/A	120.0		3	120	0.75	0.38	4.1E-04	0.05
Header Channel to Biological Treatment	2	1	227.5	2	N/A	910.0	4,500	3	910	0.75	0.38	4.1E-04	0.37

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Table B - Design Flow Rate of to Deodourisation System No.2

Sludge Treatment													
Thickening Facilities	3	2.2	6.5	2	N/A	86		3	39	0.75	0.38	4.1E-04	0.02
Thickened Sludge Holding Tank No.1	1	1	N/A	N/A	N/A	354		3	354	0.75	0.38	4.1E-04	0.14
Thickened Sludge Holding Tank No.2	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Direct Dewatering Facilities	10	3.2	10	3.6	N/A	1152		3	360	0.75	0.38	4.1E-04	0.15
Skip Room No. 1	10	1.5	6	2.4	N/A	216		3	144	0.75	0.38	4.1E-04	0.06

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Table C - Design Flow Rate of to Deodourisation System No.3

Dewatering Treatment													
Primary Sludge Holding Tank	1	1	18	9.4	N/A	169		3	169	0.75	0.38	4.1E-04	0.07
Thickening Centrate Tank	1	1	10	9.4	N/A	94		3	94	0.75	0.38	4.1E-04	0.04
Direct Dewatering Facilities	7	3.2	10	3.6	N/A	806		3	252	0.75	0.38	4.1E-04	0.10
Thickened Sludge Holding Tank No.3	1	1	N/A	N/A	N/A	298		3	298	0.75	0.38	4.1E-04	0.12
Skip Room No. 2	7	1.5	6	2.4	N/A	151		3	101	0.75	0.38	4.1E-04	0.04
Final Treatment													
UV Distribution Channel	1	1	10.5	8.1	N/A	85		3	85	0.75	0.38	4.1E-04	0.03
UV	5	1	12.4	3	N/A	186		3	186	0.75	0.38	4.1E-04	0.08
UV Outlet Channel	2	1	12.7	2.2	N/A	56		3	56	0.75	0.38	4.1E-04	0.02
UV Outlet Channel	1	1	34.9	1.7	N/A	59		3	59	0.75	0.38	4.1E-04	0.02

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Table D - Design Flow Rate to Deodourisation System No.4

Secondary Treatment													
Biological Treatment Tank													
Header Distribution to Biological Treatment	5	1	117.9	2	N/A	1179.0		3	1,179	0.75	0.38	4.1E-04	0.48
- Anoxic Zone	35	1	10.2	13.75	N/A	4908.8		3	4,909	0.75	0.38	4.1E-04	1.99
- Aerobic Zone	35	1	12.1	13.75	N/A	5823.1	151,680	3	5,823	0.75	0.38	4.1E-04	2.36
Biological Treatment Outlet Channel	5	1	145.5	2	N/A	1455.0		3	1,455	0.75	0.38	4.1E-04	0.59
Header Channel to DAF	2	1	226.3	2	N/A	905.2	4,500	3	905	0.75	0.38	4.1E-04	0.37
Header Distribution to DAF	4	1	77.25	2	N/A	618.0		3	618	0.75	0.38	4.1E-04	0.25
Final Treatment													
DAF Units	20	1	8	11	N/A	1760.0	4,100	3	1,760	0.75	0.38	4.1E-04	0.71
DAF Outlet	4	1	77.7	2	N/A	621.6		3	622	0.75	0.38	4.1E-04	0.25
Header Channel to UV	2	1	233.3	2	N/A	933.2	4,500	3	933	0.75	0.38	4.1E-04	0.38
Header Distribution to UV	1	1	9.8	2	N/A	19.6		3	20	0.75	0.38	4.1E-04	0.01

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Total Dibenz(a,h)anthracene Emission Rate (ug/s)	12

Note:

(1) Specific emission rate is referred to the TAP sampling and testing conducted at the exsiting STSTW using flux hood sampling method (based on 50% of the detection limit for calculation of the emission rate).

The Specific Emission Rate (SER) at each area source of each chemical was calculated by the following equation:

$$SER\ (ug/m^2.s) = \frac{\text{concentration } (ug/m^3) \times \text{Air flow rate inside hood } (0.00016667\ m^3/s)}{\text{Covered water surface area } (0.155\ m^2)}$$