Pearl River Delta

Regional Air Quality Monitoring Network

January to March 2014

Statistical Summary of the First Quarter Monitoring Results

Report Number	**:**	**PRDAIR-2014-1**
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Security Classification	**:**	**Unrestricted**

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1. Foreword

Since the Pearl River Delta (PRD) Regional Air Quality Monitoring Network (the Network) came into operation on 30 November 2005, it has been reporting PRD Regional Air Quality Index (RAQI) to the public on daily basis. Starting from 2006, a half-yearly and an annual air quality monitoring reports were published every year.

In view of the needs of air pollution control and economic development of the region, the environmental protection departments of Guangdong and Hong Kong have worked in collaboration with the environmental protection cum meteorological authority of Macao to enhance the existing Network by extending the coverage of monitoring area to the 3 places, i.e. Guangdong, Hong Kong and Macao, in the second half of 2014. The Network will also increase the number of monitoring station from 16 to 23 to further improve the spatial distribution; and add two more monitoring parameters, i.e. carbon monoxide (CO) and fine suspended particulates ($PM_{2.5}$), to enrich the air quality monitoring information.

In conjunction with the enhancement of the Network and the update of ambient air quality standards, starting from 2014, we shall report real time monitoring data of the Network on hourly basis through a new internet platform and publish a quarterly air quality monitoring report every quarter and an annual monitoring report in a year to increase the reporting frequency of monitoring results. The quarterly report is mainly a brief statistical summary of the monitoring results of the regional air quality in a quarter while the annual report, in addition to the reporting of the relevant data, will provide a more detailed analysis and comparison of the condition of air quality in the year.

This report is the first one published in the form of quarterly report, i.e. Statistical Summary of the 2014 First Quarter Monitoring Results of PRD Regional Air Quality Monitoring Network.

2. Introduction to the Pearl River Delta Regional Air Quality Monitoring Network

The Pearl River Delta (PRD) Regional Air Quality Monitoring Network was jointly established by the Guangdong Provincial Environmental Monitoring Centre (GDEMC) and the Environmental Protection Department of the Hong Kong Special Administrative Region (HKEPD) from 2003 to 2005. The Network came into operation on 30 November 2005 and its data have been used for reporting Regional Air Quality Index (RAQI) to the public since then.

The Network comprises 16 automatic air quality monitoring stations (see Figure 2.1) across the PRD region. Ten of these stations are operated by the Environmental Monitoring Centres of the individual cities in Guangdong while the three stations located in Hong Kong are managed by the HKEPD. The remaining three regional stations in the Network are operated by the GDEMC.

All stations are installed with equipment to measure the ambient concentrations of respirable suspended particulates (PM_{10} or RSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2) and ozone (O_3).

Annexes A and B set out, respectively, the site information of the monitoring stations in the Network and the methods used for measuring air pollutant concentrations.

Figure 2.1：Spatial distribution of the PRD Regional Air Quality Monitoring Stations

3. Operation of the Network

Owing to the extensive renovation work at the Wanqingsha monitoring station in Guangzhou Nansha, the station was temporarily suspended from operation in the reporting period of first quarter 2014.

The operation of the Network was generally smooth in the reporting period. Excluding the suspended Wanqingsha station, the average data capture rates of all other monitoring stations in the Network was 95%.

4. Statistical Analysis of Pollutant Concentrations

Table 4.1a to Table 4.4 list the statistical summaries of monitoring results of the ambient concentrations of the four air pollutants (sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3) and particulate matter PM_{10}) during the reporting period in January to March 2014, and their brief comparisons with the short-term air quality indicators of the latest national "Ambient Air Quality Standards" (NAAQS) (GB3095-2012).

Table 4.1a：The monthly maxima and minima of hourly averages of Sulphur Dioxide

[Class 2 NAAQS (Hourly): 500 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Hours
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	2	79	0	53	3	52	0
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	0	87	4	40	2	72	0
Liyuan (Shenzhen)	3	55	2	38	1	63	0
Tangjia (Zhuhai)	3	67	2	39	3	39	0
Jinjuzui (Foshan)	5	116	3	84	3	84	0
Huijingcheng (Foshan)	11	197	6	127	9	123	0
Donghu (Jiangmen)	6	129	1	91	2	127	0
Chengzhong (Zhaoqing)	4	431	2	176	6	269	0
Xiapu (Huizhou)	0	60	9	33	7	42	0
Jinguowan (Huizhou)	8	68	9	27	4	77	0
Nanchengyuanling (Dongguan)	9	90	8	122	8	95	0
Zimaling Park (Zhongshan)	4	97	3	72	4	51	0
Tsuen Wan (HKSAR)	10	109	7	76	6	139	0
Tap Mun (HKSAR)	4	42	4	37	5	41	0
Tung Chung (HKSAR)	13	88	9	60	8	62	0

Table 4.1b：The monthly maxima and minima of daily averages of Sulphur Dioxide

[Class 2 NAAQS (Daily): 150 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Days
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	10	38	2	24	5	28	0
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	4	54	4	17	4	30	0
Liyuan (Shenzhen)	7	31	3	11	3	16	0
Tangjia (Zhuhai)	10	37	4	25	6	19	0
Jinjuzui (Foshan)	13	58	4	41	8	43	0
Huijingcheng (Foshan)	20	88	9	67	15	82	0
Donghu (Jiangmen)	12	70	5	36	13	66	0
Chengzhong (Zhaoqing)	14	112	3	58	15	86	0
Xiapu (Huizhou)	14	46	10	20	7	23	0
Jinguowan (Huizhou)	11	31	9	18	5	45	0
Nanchengyuanling (Dongguan)	17	54	10	67	14	41	0
Zimaling Park (Zhongshan)	7	29	5	27	5	25	0
Tsuen Wan (HKSAR)	12	40	7	32	8	43	0
Tap Mun (HKSAR)	8	32	5	18	6	16	0
Tung Chung (HKSAR)	18	44	10	25	9	25	0

Remark : All concentration units are in micrograms per cubic metre.

Table 4.2a：The monthly maxima and minima of hourly averages of Nitrogen Dioxide
[Class 2 NAAQS (Hourly): 200 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Hours
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	10	215	1	164	17	162	2
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	0	71	7	70	1	100	0
Liyuan (Shenzhen)	7	268	4	178	1	223	11
Tangjia (Zhuhai)	5	144	1	76	1	69	0
Jinjuzui (Foshan)	15	199	7	190	15	168	0
Huijingcheng (Foshan)	20	265	8	183	12	226	33
Donghu (Jiangmen)	15	164	8	156	11	167	0
Chengzhong (Zhaoqing)	12	221	9	137	9	184	2
Xiapu (Huizhou)	0	202	12	83	11	89	1
Jinguowan (Huizhou)	1	36	4	67	0	82	0
Nanchengyuanling (Dongguan)	12	208	6	243	13	181	7
Zimaling Park (Zhongshan)	11	137	1	135	0	87	0
Tsuen Wan (HKSAR)	20	302	11	179	10	207	10
Tap Mun (HKSAR)	3	100	1	101	2	59	0
Tung Chung (HKSAR)	17	295	12	181	5	162	17

Table 4.2b：The monthly maxima and minima of daily averages of Nitrogen Dioxide
[Class 2 NAAQS (Daily): 80 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Days
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	33	131	11	88	33	82	14
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	2	42	8	44	5	56	0
Liyuan (Shenzhen)	26	167	16	77	11	92	8
Tangjia (Zhuhai)	22	70	8	65	8	32	0
Jinjuzui (Foshan)	31	136	17	119	35	88	15
Huijingcheng (Foshan)	46	157	24	106	41	129	29
Donghu (Jiangmen)	24	102	16	90	16	107	11
Chengzhong (Zhaoqing)	28	139	19	88	26	99	20
Xiapu (Huizhou)	15	108	17	57	17	50	3
Jinguowan (Huizhou)	5	14	6	21	8	36	0
Nanchengyuanling (Dongguan)	25	119	11	142	28	93	9
Zimaling Park (Zhongshan)	17	80	14	79	8	57	0
Tsuen Wan (HKSAR)	55	173	34	86	40	121	31
Tap Mun (HKSAR)	6	35	3	26	6	25	0
Tung Chung (HKSAR)	47	151	31	101	27	104	23

Remark : All concentration units are in micrograms per cubic metre.

Table 4.3a：The monthly maxima and minima of hourly averages of Ozone

[Class 2 NAAQS (Hourly): 200 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Hours
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	8	235	0	231	0	286	19
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	7	208	8	191	4	258	23
Liyuan (Shenzhen)	6	139	4	104	1	104	0
Tangjia (Zhuhai)	15	170	2	134	6	175	0
Jinjuzui (Foshan)	4	195	4	187	4	262	11
Huijingcheng (Foshan)	2	198	2	129	0	259	11
Donghu (Jiangmen)	2	182	6	121	7	203	1
Chengzhong (Zhaoqing)	1	178	1	155	1	204	3
Xiapu (Huizhou)	0	471	0	150	0	242	3
Jinguowan (Huizhou)	13	203	7	150	2	230	5
Nanchengyuanling (Dongguan)	2	226	2	204	2	277	21
Zimaling Park (Zhongshan)	1	157	1	99	0	129	0
Tsuen Wan (HKSAR)	6	172	6	120	5	117	0
Tap Mun (HKSAR)	31	220	9	158	6	178	12
Tung Chung (HKSAR)	5	186	5	132	5	128	0

Table 4.3b：The monthly maxima and minima of maximum daily 8-hour averages of Ozone [Class 2 NAAQS (Maximum Daily 8-hour): 160 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Days
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	50	184	17	164	18	178	8
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	91	193	18	157	23	222	14
Liyuan (Shenzhen)	39	124	17	84	21	96	0
Tangjia (Zhuhai)	50	138	11	114	24	139	0
Jinjuzui (Foshan)	21	168	8	121	14	198	4
Huijingcheng (Foshan)	23	174	6	116	3	193	5
Donghu (Jiangmen)	21	144	11	109	10	144	0
Chengzhong (Zhaoqing)	32	144	20	111	5	158	0
Xiapu (Huizhou)	48	172	15	118	20	167	2
Jinguowan (Huizhou)	66	183	35	140	35	166	7
Nanchengyuanling (Dongguan)	35	182	7	152	13	224	6
Zimaling Park (Zhongshan)	42	124	8	85	11	90	0
Tsuen Wan (HKSAR)	31	153	11	105	17	103	0
Tap Mun (HKSAR)	81	215	52	147	32	157	9
Tung Chung (HKSAR)	24	179	12	120	15	122	1

Remark : All concentration units are in micrograms per cubic metre.

Table 4.4：The monthly maxima and minima of daily averages of PM_{10}

[Class 2 NAAQS (Daily): 150 ug/m^3]

Month	Jan 2014		Feb		Mar		Exceedance Days
	Min	Max	Min	Max	Min	Max	
Luhu Park (Guangzhou)	55	217	9	186	25	211	9
Wanqingsha (Guangzhou)	--	--	--	--	--	--	--
Tianhu (Guangzhou)	32	136	3	75	8	102	0
Liyuan (Shenzhen)	34	184	8	71	25	102	1
Tangjia (Zhuhai)	41	173	12	87	12	120	4
Jinjuzui (Foshan)	52	193	25	210	30	179	8
Huijingcheng (Foshan)	54	211	32	179	30	195	13
Donghu (Jiangmen)	61	202	14	137	35	161	8
Chengzhong (Zhaoqing)	49	247	9	230	26	209	13
Xiapu (Huizhou)	46	173	15	88	21	110	4
Jinguowan (Huizhou)	40	143	14	62	21	87	0
Nanchengyuanling (Dongguan)	40	178	9	204	22	146	4
Zimaling Park (Zhongshan)	45	140	14	81	19	141	0
Tsuen Wan (HKSAR)	37	126	15	86	20	102	0
Tap Mun (HKSAR)	43	159	23	73	22	112	3
Tung Chung (HKSAR)	39	136	16	68	17	91	0

Remark : All concentration units are in micrograms per cubic metre.

Annex A：Site Information of Monitoring Stations

Monitoring Stations	Address	Area Type	Sampling Height (Above P.D.)	Above Ground	Date Commenced Operation
Luhu Park (Guangzhou)	Inside Jufong Garden of Luhu Park (Big yard, No. 11 Luhu Park)	City	30m	9m	1993
Wanqingsha (Guangzhou)	Wanqingsha Secondary School, Nansha	Mixed educational/ commercial and residential/industrial	13m	12m	Oct 2004
Tianhu (Guangzhou)	Tianhu Park, Conghua City	Background : rural	251m	13m	Oct 2004
Liyuan (Shenzhen)	Shennan Zhong Road, Shenzhen City	City	38m	12m	Sep 1997
Tangjia (Zhuhai)	Qiao Island Mangrove Monitoring Station, Tangjia County	Mixed educational/ commercial and residential/industrial	13m	13m	Jan 2010
Jinjuzui (Foshan)	Roof-top of Educational Building, Foshan City Communist Party Shunde Jinjuzui	Tourist and cultural /educational	27m	17m	Oct 1999
Huijingcheng (Foshan)	No. 127, Fenjiang Nan Road, Chancheng Area	Urban: mixed residential/commercial/ industrial	24m	14m	Feb 2000
Donghu (Jiangmen)	Inside Donghu Park, Jiangmen City	City	17.5m	5m	Nov 2001
Chengzhong (Zhaoqing)	No. 17, Qintian Road, Zhaoqing City	Urban: mixed residential/commercial	21m	16m	Jun 2001
Xiapu (Huizhou)	No. 4 Xiabuhengjiang Road No. 3, Huicheng Area	Urban: commercial	49m	20m	Dec 1999
Jinguowan (Huizhou)	Jinguowan Ecological Farm, Huizhou City	Residential	77m	8m	Oct 2004
Nancheng-yuanling (Dongguan)	Nanchengyuanling Community, Dongguan City	Mixed residential/ commercial/industrial	33 m	18m	Sep 2010
Zimaling Park (Zhongshan)	Zimaling Park, Zhongshan City	Mixed residential/ commercial	45 m	7m	Aug 2002
Tsuen Wan (HKSAR)	60 Tai Ho Road, Tsuen Wan	Urban: mixed residential/commercial/ industrial	21m	17m	Aug 1988
Tap Mun (HKSAR)	Tap Mun Police Station	Background: rural	26m	11m	Apr 1998
Tung Chung (HKSAR)	6 Fu Tung Street, Tung Chung	New Town: residential	34.5m	27.5m	Apr 1999

Annex B：Measurement Methods of Air Pollutant Concentration

Pollutants	**Measuring Principles**
Sulphur Dioxide	UV fluorescence / Differential Optical Absorption Spectroscopy
Nitrogen Dioxide	Chemiluminescence / Differential Optical Absorption Spectroscopy
Ozone	UV absorption / Differential Optical Absorption Spectroscopy
Respirable Suspended Particulates	Oscillating microbalance (TEOM) Beta particulate monitor