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2 June 2016

Clerk to Panel on Environmental Affairs
Council Business Division 1
Legislative Council Secretariat
Legislative Council Complex
1 Legislative Council Road
Central, Hong Kong
(Attn.: Ms. Angel SHEK)

Dear Ms. Shek

**Panel on Environmental Affairs**
**List of follow-up actions**
**Item V - Work Plan of the Review of Air Quality Objectives ("AQOs")**

Please find in the Annex 1 information that Members requested at the meeting of the Panel on Environmental Affairs on 30 March 2016 during the discussion of "Work Plan of the review of Air Quality Objectives".

If necessary, please contact me on 2594 6300.

Yours sincerely,

(FONG Chi-ping)
for the Director of Environmental Protection

Encl.

**Annex 1**

**(a) – The Administration to provide information on the professional bodies to be included in the AQOs Review Working Group**

Members of the AQO Review Working Group are appointed ad personam. They include, among others, engineers, town planners, medical practitioners, air quality scientists and public health experts, who will advise from their professional perspectives.

**(b)(i) – Regarding a member's concern about the air pollution problem in Tung Chung, especially during summer time, the Administration to provide information on analysis of the hourly/annual average concentrations of air pollutants in Tung Chung as recorded by the Tung Chung Air Quality Monitoring Station, including the major sources of the pollutants, the average and maximum exceedance of each type of pollutants based on the prevailing Air Pollution Index and/or AQOs, and**

**(b)(ii) – In the light of the analysis above, whether and how the existing measures to reduce air pollution in Tung Chung are appropriate**

In terms of AQO compliance, Tung Chung is one of the best in Hong Kong. In 2015, Tung Chung was one of the two general air quality monitoring stations (AQMS) that could fully comply with the AQOs except ozone, outperforming the rest. Its tenth highest 8-hour averaged concentration was 176$\mu g/m^3$, higher than the corresponding limit of 160$\mu g/m^3$.

In the past five years, the air pollutant concentrations at Tung Chung were reduced by 12% to 38%, except ozone, whose concentration increased by 2%. Details are in Table 1.

Ozone is not emitted directly from pollution sources but is formed by photochemical reactions among nitrogen oxides (NOx) and volatile organic compounds (VOC) after their emission into the atmosphere. Ozone pollution often occurs far from the origin of these precursors and requires regional efforts for solution.

When the weather in the Pearl River Delta (PRD) region is sunny, hot and calm, ozone will build up in the PRD region via the photochemical reactions among NOx and VOCs emitted in the region. If the prevailing wind at the time is north-westerly, it will bring the regional ozone to Tung Chung, causing the ozone level in Tung Chung to high levels. That is why

the pollution rose[1] in Figure 1 showed that all the elevated ozone levels in Tung Chung were associated with light to moderate north-westerly wind.

Owing to the nature of photochemical reactions, ozone levels have a distinct diurnal pattern associated with the strength of sunlight. Ozone levels start building up before noon and peak in the afternoon. Tung Chung has the same diurnal pattern for ozone episodes as any other places. As shown in Figure 2, Tung Chung had been seeing the highest ozone levels between 1500 and 1600.

A study of the Hong Kong Polytechnic University has found that the ozone pollution produced from local emissions showed a decreasing trend in recent years while the increase in regional ozone level, mainly due to PRD-originating emissions and super-regional transport, has led to an overall increase in ambient ozone levels in Hong Kong.

To tackle effectively the ozone pollution in Hong Kong (including Tung Chung), we have to reduce the emission of NOx and VOCs in the PRD region. In this connection, the emission reduction targets for 2015 and 2020 that have been agreed by the governments of Guangdong and Hong Kong have included these two pollutants. As compared with the emission levels in Hong Kong and the PRD Economic Zone in 2010, the emission reduction targets/ranges for four major pollutants including NOx and VOC in 2015 and 2020 are shown below:

| **Pollutant** | **Area** | **2010 Emission (tonnes)** | **2015 Emission Reduction Targets* (%)** | **2020 Emission Reduction Ranges* (%)** |
|---|---|---|---|---|
| **Sulphur Dioxide ($SO_2$)** | **Hong Kong** | **35 490** | **-25%** | **-35% to -75%** |
| | **PRD Economic Zone** | **507 000** | **-16%** | **-20% to -35%** |
| **Nitrogen Oxides ($NO_x$)** | **Hong Kong** | **108 500** | **-10%** | **-20% to -30%** |
| | **PRD Economic Zone** | **889 000** | **-18%** | **-20% to -40%** |
| **Respirable Suspended Particulates (RSP)** | **Hong Kong** | **6 750** | **-10%** | **-15% to -40%** |
| | **PRD Economic Zone** | **637 000** | **-10%** | **-15% to -25%** |

[1] A pollution rose is a variant of wind rose that is useful for considering pollutant concentrations by wind directions and wind speeds.

| | | | | |
|---|---|---|---|---|
| **Volatile Organic Compounds (VOC)** | **Hong Kong** | **31 560** | **-5%** | **-15%** |
| | **PRD Economic Zone** | **903 000** | **-10%** | **-15% to -25%** |

* as compared with 2010 emission levels

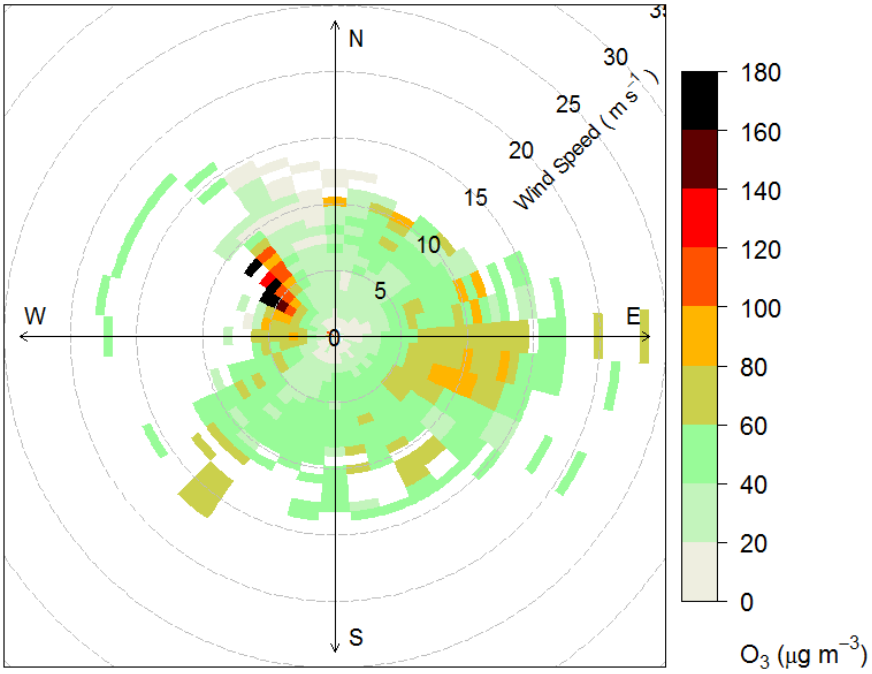
We are now undertaking a mid-term review of the emission reduction targets to conclude the emission reductions for 2015 and finalize the emission reduction targets for 2020.

To further improve regional air quality, we will also deepen our collaboration with the Mainland to draw up a regular volatile organic compounds monitoring programme to assist understanding on ozone formation, prevention and control. Upon the achievement of the emission reduction targets by both sides, the air quality in Tung Chung will be significantly improved.

**Table 1: Annual Average Concentration of Pollutants at Tung Chung from 2011 to 2015**

| **Air Pollutants** | **Annual Average Concentration (μg/$m^3$)** | | | | | **% Change between 2011 and 2015** |
|---|---|---|---|---|---|---|
| | **2011** | **2012** | **2013** | **2014** | **2015** | |
| **Respirable Suspended Particulates ($PM_{10}$)** | 47 | 45 | 42 | 39 | 36 | **-23%** |
| **Fine Suspended Particulates ($PM_{2.5}$)** | 32 | 28 | 26 | 24 | 22 | **-31%** |
| **Nitrogen Dioxide ($NO_2$)** | 51 | 43 | 49 | 45 | 40 | **-22%** |
| **Sulphur Dioxide ($SO_2$)** | 13 | 13 | 14 | 13 | 8 | **-38%** |
| **Ozone ($O_3$)** | 44 | 47 | 44 | 46 | 45 | **2%** |
| **Carbon Monoxide (CO)** | 660 | 671 | 665 | 546 | 583 | **-12%** |

**Figure 1: Pollution Rose with Hourly Average Ozone Concentrations in Tung Chung from 2011 to 2015**




The highest ozone levels are always coupled with north-westerly winds as shown in the pollution rose above.

**Figure 2: Diurnal Variation of Hourly Average Ozone Concentrations in Tung Chung from 2011 to 2015**