Devonport Air Quality Monitoring

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TRL installed an air quality monitoring station on behalf of MVV Umwelt GmbH at Devonport Docks, Plymouth, to continuously measure Oxides of Nitrogen (NO, NO_2 and NO_x), Sulphur Dioxide (SO_2) and particulate concentrations (PM_{10}), and to undertake monthly measurements of PAH, PCBs, Dioxins, Furans, and Heavy Metals.

This is the third report, and covers data collected between 3rd March 2011 and 16th June 2011.

UK Air Quality Objectives

Air quality standards and objectives are set out in the Air Quality (England) Regulations 2000 (as amended 2002) and the Air Quality Strategy (AQS). The limits contained within the AQS are based upon concentrations over a given period of time that are considered to be acceptable, in terms of the effects of each pollutant on human health. Table 1 outlines the Air Quality objectives for NO_2, SO_2 and PM_{10} as set out in the UK AQS published in July 2007.

Table 1. Air Quality Strategy Objectives

Objective	Compliance date
UK objectives for NO_2 set in regulations	
Hourly average concentration of 200 µg/m^3 not to be exceeded more than 18 times a year	31 December 2005
Annual mean of 40 µg/m^3	31 December 2005
UK objectives for SO_2 set in regulations	
Hourly average concentration of 350 µg/m^3 not to be exceeded more than 24 times a year	31 December 2004
UK objectives for Particles (PM_{10}) set in regulations	
24 hour running mean of 50 µg/m^3 not to be exceeded more than 35 times a year	31 December 2004
Annual mean concentration of 40 µg/m^3	31 December 2004

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Results for hourly ratified NO_x and SO_2 data at Devonport (03/03/2011 to 16/06/2011)

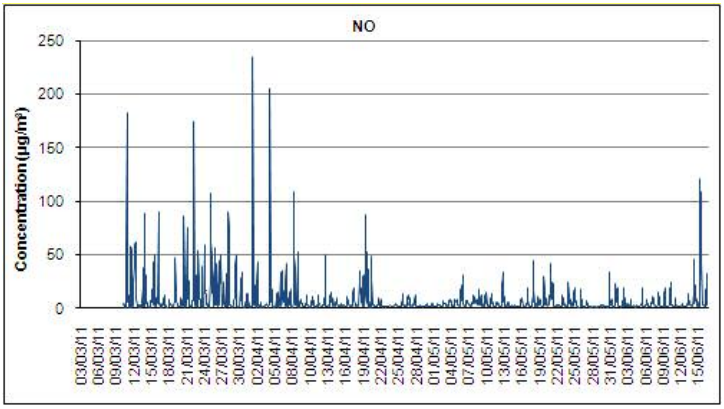

Figure 1: NO hourly data

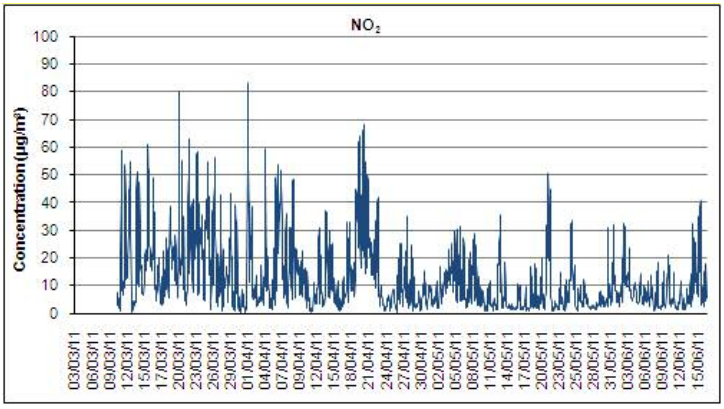

Figure 2: NO_2 hourly data

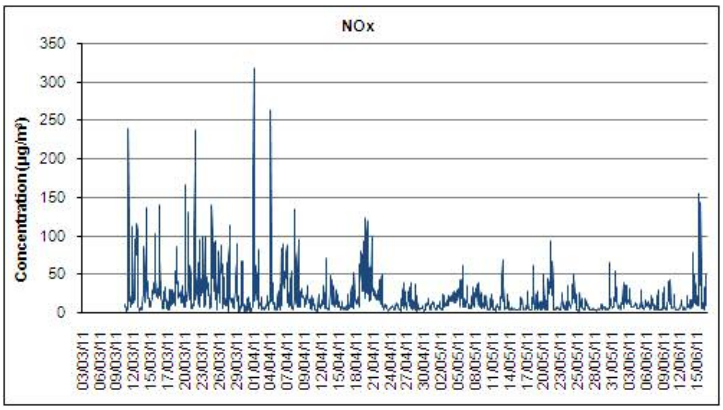

Figure 3: NO_x hourly data

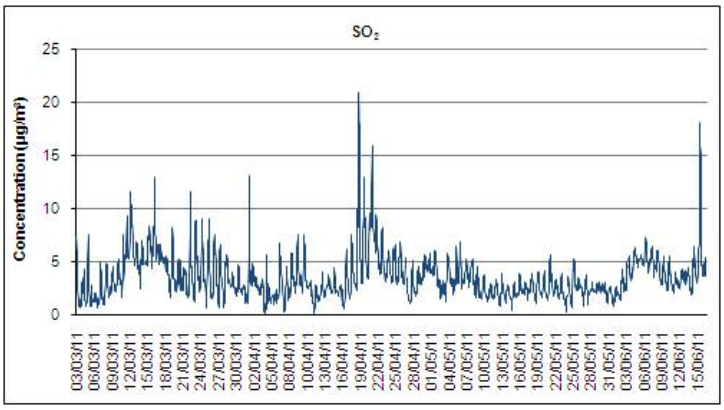

Figure 4: SO_2 hourly data

Table 2. Statistics for oxides of nitrogen and sulphur dioxide at Devonport (hourly average)

	NO	NO_x	NO_2	SO_2
NO_2 1 hour mean objective (200 µg/m^3, 18 exceedences/year)	-	-	**0**	-
SO_2 1 hour mean objective (350 µg/m^3, 24 exceedences/year)	-	-	-	**0**
Minimum (µg/m^3)	0.4	1.0	0.2	0.0
Average (µg/m^3)	7.4	19.2	11.9	3.5
Standard deviation (µg/m^3)	15.6	24.6	11.6	2.0
Median (µg/m^3)	2.7	11.1	7.7	3.0
Maximum (µg/m^3)	234.3	317.5	83.1	21.0
Data capture (%)	92.9	92.9	92.9	99.5

Results for PM_{10} data at Devonport (03/03/2011 to 15/06/2011)

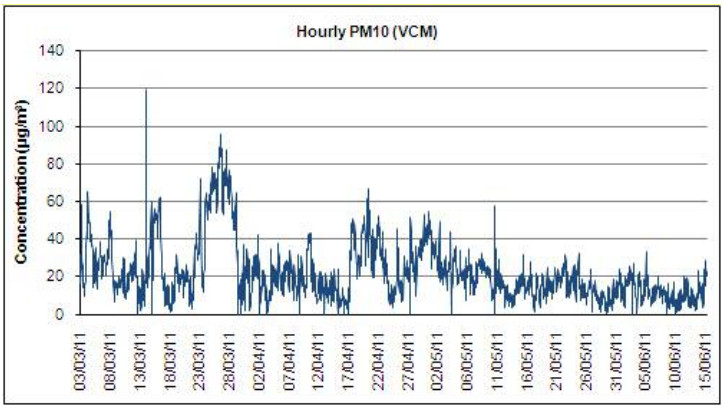

Figure 5: VCM corrected PM_{10} hourly data

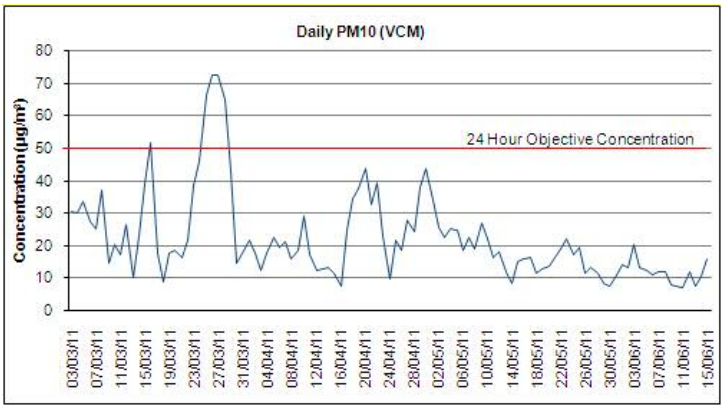

Figure 6: VCM corrected PM_{10} 24 hour average data

Table 3. Statistics for PM_{10} at Devonport (24 hour average)

	Adjusted PM_{10}	VCM Corrected PM_{10}
PM_{10} 24 hour mean objective (50 µg/m^3, 35 exceedences/year)	**0**	**5**
Minimum (µg/m^3)	7.3	7.0
Average (µg/m^3)	20.2	22.1
Standard deviation (µg/m^3)	7.2	13.6
Median (µg/m^3)	19.3	18.4
Maximum (µg/m^3)	37.0	72.8
Data capture (%)	100.0	100.0

Discussion

Air quality monitoring began at the Devonport Docks site in August 2010. This report presents the data collected from 3rd March to 16th June 2011. In addition to this, the provisional calibrated and ratified data, on which the statistics in this report are based, have been provided to URS/Scott Wilson.

The data capture rates have been good over the monitoring period, with rates of 92.9% for NOx, 99.5% for SO_2 and 100% for particulates being achieved. The data capture rate for NOx was lower than expected due to a fault occurring with the analyser at the beginning of March which could not be rectified on site. Subsequently the analyser was removed for repair and replaced on site the following week.

As shown in Table 2, there have been no exceedances of the hourly NO_2 objective of 200 µg/m^3, or the hourly SO_2 objective of 350 µg/m^3 during the monitoring period presented in this report. The period mean NO_2 concentration of 11.9 µg/m^3 is well below the annual mean objective limit of 40 µg/m^3, and is not anticipated to exceed the objective this year. The peaks and troughs in NO_2 data, as shown in Figure 2, correspond well with those at the AURN monitoring site in Plymouth Centre.

Table 3 shows that there have been 5 exceedances of the VCM corrected PM_{10} 24 hour mean objective of 50 µg/m^3 over this period, and the average VCM corrected PM_{10} concentration of 22.1 µg/m^3 at this site is lower than the annual mean objective of 40 µg/m^3. The peaks in hourly PM_{10} concentrations shown in Figure 5 were also experienced at the Plymouth Centre site.