

Yaldhurst Air Quality Monitoring

Addendum: RCS flow correction update



Addendum

19 October 2018

Prepared for
Environment Canterbury

by Paul Baynham



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Addendum to Summary Report 22December 2017 - 21 April 2018

19 October 2018

Client: Environment Canterbury

Prepared by:

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Revision History

No.	Date	Author(s)	Reviewer(s)	Details
1	19 Oct 2018	Paul Baynham Senior Air Quality Specialist (Mote)	Brett Wells Managing Director (Mote)	Draft report to client for comment

This report has been prepared by Mote Ltd for Environment Canterbury in accordance with their specific instructions. No liability is accepted with respect to the use of this report by any other person.

Summary

In July 2018, we were advised by Environment Canterbury of unusual respirable crystalline silica (RCS) mass results from a number of Yaldhurst monitoring sites.

In response to this query, we reviewed the data from the RCS samplers in considerable detail and ultimately concluded that the MEMS flow sensor temperature correction which maintains the flow set point in the RCS samplers deviated from expectation (in a reproducible manner) when subjected to different ambient air temperatures. In particular it was found that the cooler air temperatures experienced during March and April resulted in lower sample flows than expected.

In response to this finding we re-deployed an RCS sampler with a MEMS flow sensor and co-located another RCS sampler with a much higher precision flow meter over a 10 week period. The results from this monitoring confirmed the impact of low air temperatures on sample flows.

We also tested each of the MEMS flow samplers in an air conditioned environment alongside a high precision instrument over a range of temperatures. These results confirmed the findings of the co-location trial and enabled us to correct the previous measured flows using the air temperature data which were recorded at each site.

To address this issue, we have amended Table 14 of the Summary report. The amended table includes two new columns which will allow the reader to view the original and revised flows and the impact of the flow changes on the resulting RCS concentration.

It should be noted that the amendments to the flow do not affect the conclusion of the original report regarding RCS concentrations. Specifically that the RCS concentrations monitored over the course of this programme remain well below the relevant guideline of 3 $\mu\text{g}/\text{m}^3$ as an annual average.

Table 14 RCS monitoring results for 22 Jan – 20 Apr 2018

Location	Date	Pre sample weight	Post sample weight	Mass (PM ₄)	Air sampled	Air Sampled (revised)	RCS	RCS Concentration	RCS Concentration (revised)
		(g)	(g)	(µg)	(m ³)	(m ³)	(µg)	(µg/m ³)	(µg/m ³)
Site 1	19-31 Jan	0.013673	0.014154	481	35.5	35.5	<20	<0.6	<0.6
Site 1	9-20 Feb	0.012564	0.013238	674	57.0	57.0	<20	<0.4	<0.4
Site 1	20 Feb - 20 Mar	0.011691	0.012581	890	83.5*	77.5	<20	<0.2	<0.3
Site 1	20 Mar - 20 Apr	0.011513	0.011773	260	97.8*	44.6	<20	<0.2	<0.5
Site 1 Average 19 Jan - 20 Apr 2018								<0.3*	<0.5*
Site 2	19 Jan - 20 Feb	0.011214	0.012274	1060	92.8	92.8	<20	<0.2	<0.2
Site 2	20 Feb - 20 Mar	0.012293	0.013466	1173	83.6*	38.8	<20	<0.2	<0.6
Site 2	20 Mar - 20 Apr	0.01211	0.012473	363	97.8*	26.6	<20	<0.2	<0.8
Site 2 Average 19 Jan - 20 Apr 2018								<0.2	<0.6*
Site 3	19 Jan - 20 Feb	0.010458	0.012374	1916	92.2	92.2	30	0.33	0.33
Site 3	20 Feb - 20 Mar	0.011066	0.01245	1384	83.7*	53.0	<20	<0.2	<0.4
Site 3	20 Mar - 20 Apr	0.011883	0.012547	664	97.8*	44.6	75	0.76	1.68

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		(g)	(g)	(µg)	(m ³)	(m ³)	(µg)	(µg/m ³)	(µg/m ³)
Site 3 Average 19 Jan - 20 Apr 2018								0.4	0.8
Site 4	19 Jan - 20 Feb	0.011389	0.012468	1079	92.1	92.1	<20	<0.2	<0.2
Site 4	20 Feb - 20 Mar	0.011488	0.012104	616	83.7*	41.5	<20	<0.2	<0.5
Site 4	20 Mar - 20 Apr	0.011795	0.011958	163	97.8*	27.9	<20	<0.2	<0.8
Site 4 Average 19 Jan - 20 Apr 2018								<0.2	<0.5
Site 5	19 Jan - 20 Feb	0.012501	0.014311	1810	92.2	92.2	<20	<0.2	<0.2
Site 5	20 Feb - 20 Mar	0.01606	0.01703	970	83.5	33.4	<20	<0.2	<0.6
Site 5	20 Mar - 20 Apr	0.012019	0.012451	432	97.8*	21.9	<20	<0.2	<0.9
Site 5 Average 19 Jan - 20 Apr 2018								<0.2	<0.6
Site 6	19 Jan - 20 Feb	0.012886	0.014078	1192	92.2	92.2	<20	<0.2	<0.2
Site 6	20 Feb - 20 Mar	0.011234	0.012096	862	83.5*	38.3	<20	<0.2	<0.6
Site 6	20 Mar - 20 Apr	0.012068	0.012252	184	97.8*	32.9	<20	<0.2	<0.6
Site 6 Average 19 Jan - 20 Apr 2018								<0.2	<0.5
Site 10	20 Feb - 20 Mar	0.01102	0.011765	745	83.6*	38.4	<20	<0.2	<0.6

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Location	Date	Pre sample weight (g)	Post sample weight (g)	Mass (PM ₄) (µg)	Air sampled (m ³)	Air Sampled (revised) (m ³)	RCS (µg)	RCS Concentration (µg/m ³)	RCS Concentration (revised) (µg/m ³)
Site 10	20 Mar - 20 Apr	0.011987	0.012245	258	97.8*	32.9	<20	<0.2	<0.6
Site 10 Average 19 Jan - 20 Apr 2018								<0.2	<0.6