


Richmond 1 – Castelnau 2006 results of the roadside co-location study

Checking Precision and Accuracy of Triplicate Tubes



AEA Energy & Environment
From the AEA group

Period	Diffusion Tubes Measurements								Automatic Method		Data Quality Check		
	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm ⁻³	Tube 2 µgm ⁻³	Tube 3 µgm ⁻³	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	03/01/2006	31/01/2006	49.4	45.3	50.0	48	2.6	5	6.4	51.5	100	Good	Good
2	31/01/2006	27/02/2006	52.3	50.0	46.4	50	3.0	6	7.4	51.0	100	Good	Good
3	27/02/2006	04/04/2006	34.7	32.1	34.0	34	1.4	4	3.4	42.8	100	Good	Good
4	04/04/2006	02/05/2006	42.2	36.0	39.7	39	3.1	8	7.7	39.9	100	Good	Good
5	02/05/2006	30/05/2006	33.5	32.2	33.5	33	0.7	2	1.8	35.6	100	Good	Good
6	30/05/2006	27/06/2006	40.1	40.3	39.5	40	0.4	1	1.1	39.5	97	Good	Good
7	27/06/2006	01/08/2006	46.4	40.2	43.8	43	3.1	7	7.7	41.4	100	Good	Good
8	01/08/2006	05/09/2006	32.0	30.9	29.9	31	1.1	3	2.7	28.4	100	Good	Good
9	05/09/2006	03/10/2006	45.4	44.8	42.9	44	1.3	3	3.3	43.8	100	Good	Good
10	03/10/2006	31/10/2006	42.2	41.4	43.1	42	0.9	2	2.1	41.2	100	Good	Good
11	31/10/2006	27/11/2006	41.0	39.4	33.5	38	4.0	10	8.8	48.5	100	Good	Good
12	27/11/2006	02/01/2007	41.6	38.7	38.8	40	1.6	4	4.1	42.4	100	Good	Good
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It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Site Name/ID: 23 - Castelnau Library

Precision: 12 out of 12 periods have a CV smaller than 20% (Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
 Bias calculated using 12 periods of data
 Bias factor A: 1.05 (0.99 - 1.12)
 Bias B: -5% (-11% - 1%)

Diffusion Tubes Mean: 40 µgm⁻³
Mean CV (Precision): 5

Automatic Mean: 42 µgm⁻³
Data Capture for periods used: 100%

Adjusted Tubes Mean: 42 (40 - 45) µgm⁻³

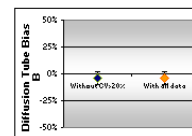
Accuracy (with 95% confidence interval) WITH ALL DATA
 Bias calculated using 12 periods of data
 Bias factor A: 1.05 (0.99 - 1.12)
 Bias B: -5% (-11% - 1%)

Diffusion Tubes Mean: 40 µgm⁻³
Mean CV (Precision): 5

Automatic Mean: 42 µgm⁻³
Data Capture for periods used: 100%

Adjusted Tubes Mean: 42 (40 - 45) µgm⁻³


Overall survey --> Good precision Good Overall DC



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Richmond 1 – Castelnau 2006 raw and bias adjusted NO2 diffusion tube results for kerbside and roadside sites 1-27.

Adjustment of SINGLE Tubes



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Site Name/ID	Diffusion Tube Measurements													Raw Mean	Valid periods
	Periods														
	1	2	3	4	5	6	7	8	9	10	11	12	13		
1	50.8	51.7	34.8	45.6	39.1	47.5	44.7	43.5	50.1	50.6	27.3	52.3	44.8	12	
2	42.7	41.4	29.2	31.9	28.3	32.4	35.3	29.0	29.4	36.0	26.0	38.4	33.3	12	
3	49.1	49.5	35.2	39.4	37.7	42.6	42.1	40.3	42.4	39.1	42.5	41.4	41.8	12	
4	52.9	50.8	38.7	41.9	37.4	44.4	47.7	37.7	46.7	44.5	26.4	47.1	43.0	12	
5	43.6	43.0	30.4	33.7	25.1	35.9	34.7	32.7	33.0	36.7	27.1	33.9	34.1	12	
6	49.7	52.0	42.4	36.9	40.4	48.7	50.6		42.2	46.1	39.1	36.3	44.0	11	
7	88.2	75.8	57.5	64.6	59.7	77.7	83.5	59.4	67.1	61.0	50.2	65.0	67.5	12	
8	42.3	46.6	33.9	33.5	29.7	30.9	32.9	30.4	38.6	37.0	37.0	39.6	36.0	12	
9	60.0	60.5	47.4	46.4	40.3	51.4	54.2	32.0	60.3	58.0	47.9	57.0	51.3	12	
10	52.9	57.9	38.3	39.6	39.1	47.8	49.3	41.9	36.4	45.8	35.1	40.7	43.7	12	
11	53.1	45.1	37.0	41.1	38.4	46.2	39.7	33.4	42.2	43.1	36.3	46.0	41.8	12	
12	56.2	59.9	39.2	43.8	40.1	40.5	46.2	38.3	47.2	42.3	31.0	48.8	44.5	12	
13	59.8	52.3	40.9	42.4	43.6	45.2	48.8	40.3	45.2	51.2	43.2	45.4	46.6	12	
14	57.8	59.4	40.5	39.5	39.0	4.2	43.3	37.0	54.9	52.5		41.1	42.7	11	
15	64.7	57.1	40.9	52.0	47.3	49.3	57.2	46.0	55.9		37.4	53.7	51.0	11	
16	48.5	51.4	38.9	45.0	35.9	36.6	42.6	43.0	46.5	44.2	51.7	53.5	44.8	12	
18	75.8	73.8	50.9	65.0	56.1	69.4	70.5	55.6	65.0	63.4	34.1		61.8	11	
19	60.5	59.4	47.0	56.4	53.0	54.5	64.1	52.4	52.2	54.0	50.8	55.1	55.0	12	
20	59.5	50.8	44.2	55.3	47.8	52.8	64.1	42.6	61.6	56.6	60.6	53.2	54.1	12	
21	55.5	55.4	41.2	50.0	40.5	45.7	48.7	39.2	38.0	43.7	31.9	44.2	44.5	12	
22	70.6	62.8	55.6	50.4	47.0	53.2	65.2	34.7	62.1	59.6	46.1	67.0	56.2	12	
24	50.1	47.4	34.5	40.6	36.9	39.8	40.7	31.4	42.3	44.0	33.9	37.2	39.9	12	
25	52.9	52.9		34.2	41.1	54.9	58.2	46.8	53.3	53.8	31.6	38.0	47.1	11	
26	56.4	58.4	43.0	46.3	40.3	44.7	46.2	41.6	48.0	44.8	44.5	45.1	46.6	12	
27	51.8	48.3	38.3	28.1	36.1	45.8	46.5	28.8	44.8	41.6	37.0	41.6	40.7	12	

Adjusted measurement (95% confidence interval) with all the data
 12 periods used in this calculations
 Bias Factor A: 1.05 (0.99 - 1.12)
 Bias B: -5% (-11% - 1%)

Tube Precision: 5 Automatic DC: 100%

Adjusted with 95% CI: **47 (44 - 50)**
 Adjusted with 95% CI: **35 (33 - 37)**
 Adjusted with 95% CI: **44 (41 - 47)**
 Adjusted with 95% CI: **45 (43 - 48)**
 Adjusted with 95% CI: **36 (34 - 38)**
 Adjusted with 95% CI: **46 (44 - 49)**
 Adjusted with 95% CI: **71 (67 - 76)**
 Adjusted with 95% CI: **38 (36 - 40)**
 Adjusted with 95% CI: **54 (51 - 57)**
 Adjusted with 95% CI: **46 (43 - 49)**
 Adjusted with 95% CI: **44 (41 - 47)**
 Adjusted with 95% CI: **47 (44 - 50)**
 Adjusted with 95% CI: **49 (46 - 52)**
 Adjusted with 95% CI: **45 (42 - 48)**
 Adjusted with 95% CI: **54 (51 - 57)**
 Adjusted with 95% CI: **47 (44 - 50)**
 Adjusted with 95% CI: **65 (61 - 69)**
 Adjusted with 95% CI: **58 (54 - 62)**
 Adjusted with 95% CI: **57 (54 - 61)**
 Adjusted with 95% CI: **47 (44 - 50)**
 Adjusted with 95% CI: **59 (56 - 63)**
 Adjusted with 95% CI: **42 (40 - 45)**
 Adjusted with 95% CI: **49 (47 - 53)**
 Adjusted with 95% CI: **49 (46 - 52)**
 Adjusted with 95% CI: **43 (40 - 46)**

The bias adjustment factor used in these calculations include all the data and no screening of data due to poor precision has been applied.

