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Results of VCI Personnel Monitoring Cross Check Program #4

by

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Results of VCI Personnel Monitoring Cross Check Program #4

The results of the vinyl chloride Bendix flasher tube cross check program #4 show that 7 out of 10 labs are within $\pm 30\%$ of the theoretical calculated loading. Three labs, Shawinigan, Henry, and ALGC (Desrosiers) are 60% or lower. Niagara Falls had trouble with their flasher and didn't report test results.

TABLE I

Summary of Cross Check #4 Results

<u>Laboratory</u>	<u>Average % Recovery</u>	<u>Standard Deviation</u>
Long Beach	113.0	3.06
Manufacturing Services (Whitney)	103.0	11.06
Calvert City	91.8	4.44
Brecksville	88.7	2.77
Louisville	88.4	1.96
ALTC	72.4	3.95
Pedricktown	70.0	9.06
Shawinigan	59.9	2.99
ALGC	49.1	2.46
Henry	42.7	2.56

Table II (at end of report) is the complete listing of all results. It is clear from this table that the variation in results between tubes within a lab is far less than between labs. This indicates that the greatest effect on variability is measurement at each lab rather than a random error throughout the samples. In other words, the effect of (1) shipping to a particular lab, (2) running on a particular GC, and/or (3) using a certain calibration factor is much more significant than variations in loading or individual peculiarities of each tube. Finally, the date of analysis seems to have less effect also, since Calvert City was the last to analyze their tubes and yet showed 92% recovery.

The cross check tubes were loaded 5 at a time from a 53 ppm gas cylinder. The VCI/air mixture went through a regulator, SS tubing, rotameter, teflon tubing, and the 5 port manifold. See Diagram 1. No vacuum source was used; the VCI/air was blown through the PMCC tube. While the tubes were being loaded, a soap film bubblemeter was connected to the exit stream of each tube and a flow reading made. At the end of a set time, (6 minutes), the five tubes were removed and capped. The theoretical loading was calculated according to the following formula:

$$\frac{\text{cc soap film traveled}}{\text{sec}} \times \frac{60 \text{ sec}}{1 \text{ min}} \times 6 \text{ min} \times \frac{53 \text{ ppm}}{391.2} = \mu\text{g loading}$$

After all PMCC's were loaded, they were all mixed together and then six tubes chosen at random for each plant. This was done to hopefully eliminate any extraneous effects due to time of loading, position in manifold, etc.

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The standards for the Brecksville lab were prepared in the same way except the 5 port manifold wasn't used. The teflon tubing from the rotameter was connected directly to an individual tube. The flow and total loading time was varied to achieve different loadings. Loadings were also made from a 508 ppm tank as well as the 53 ppm tank. The calibration curve obtained is linear, indicating the stated tank values are probably correct and that the loading variations in flow rate and time are quantitative.

At this time we aren't sure why we don't show 100% recovery at Brecksville. Since PMCC tubes were used to calibrate the instrument, theoretically the recovery should have been 100%. We are looking into this problem further. Apparently there was a difference in our method of loading 1 vs. 5 tubes or something else. In any case the closeness of (within lab) results vs. lab to lab results shows that the loading is much more consistent than the analysis.

We will immediately send another set of tubes to Shawinigan, ALGC, and Henry to try and correct their percent recovery.

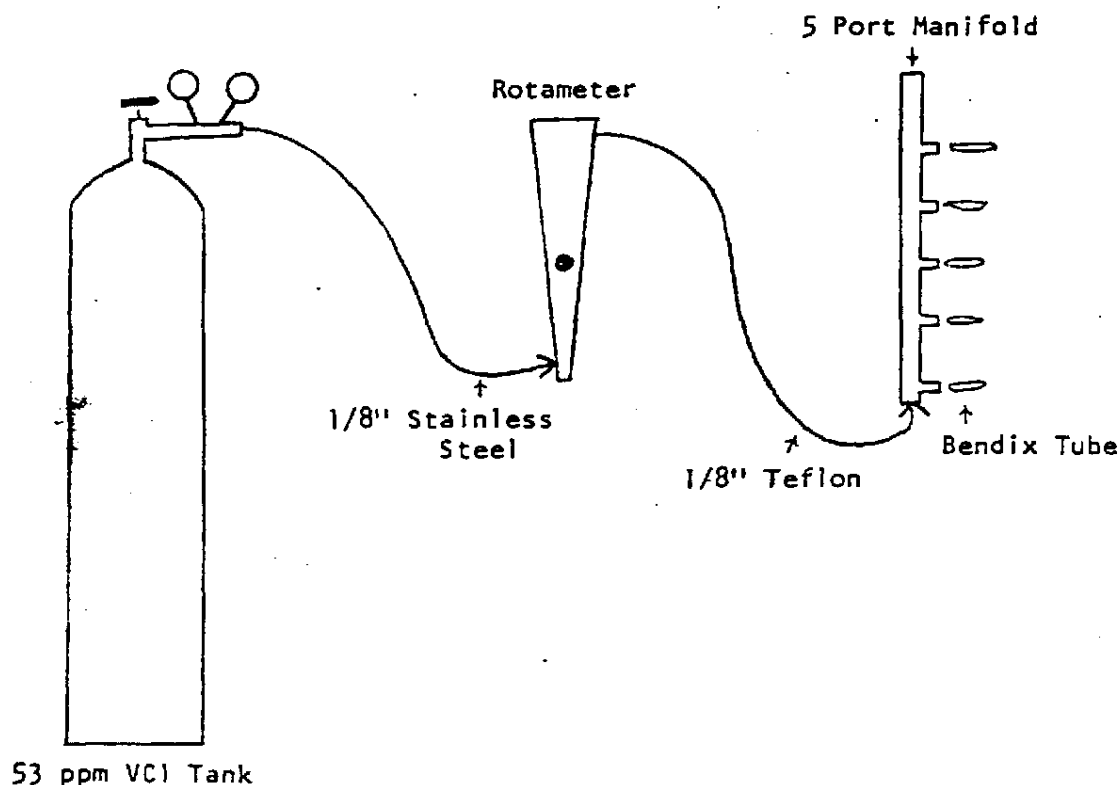
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DIAGRAM 1
VCI Loading Arrangement



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TABLE II

Lab Results Cross Check #4

Laboratory	Tube #	Measured Loading (µg)	% Recovery	Average % Recovery	Standard Deviation
ALTC	80	70.79	66.2	72.4	3.95
	3-9	61.27	74.4		
	3-3	46.84	73.7		
	7	22.01	77.2		
	T-1	55.34	73.5		
	67	38.07	69.3		
BRDC 8/23	3-14	68.21	89.5	90.4	3.15
	43	29.95	95.8		
	T-15	57.69	88.0		
	68	45.08	90.2		
	2	67.36	88.4		
BRDC 8/31	T-20	74.00	86.2	87.0	.53
	35	65.69	87.3		
	50	54.99	87.5		
	88	102.34	87.3		
	3-20	70.59	86.8		
Pedricktown 8/31	3-6	43.1	79.9	70.0	9.06
	T-19	71.9	73.1		
	31	31.0	71.7		
	79	48.8	52.8		
	26	56.9	71.8		
	86	42.3	70.8		
Long Beach 9/1	T-2	115.9	110.3	113.0	3.06
	T-8	80.8	110.0		
	T-17	88.3	111.5		
	21	48.6	118.0		
	39	89.7	114.8		
	77	52.4	113.4		
Louisville	42	32.87	87.3	88.4	1.96
	44	34.79	86.2		
	3-11	76.04	88.5		
	12	48.79	90.4		
	75	47.79	87.0		
	19	34.51	91.1		
ALGC 8/30	3-2	29.945	49.6	49.1	2.46
	T-10	42.355	47.9		
	87	19.785	44.8		
	15	47.757	49.3		
	38	33.273	51.3		
	30	35.210	51.4		

* Overall average of Brecksville results.

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TABLE 11 (continued)

<u>Laboratory</u>	<u>Tube #</u>	<u>Measured Loading (µg)</u>	<u>% Recovery</u>	<u>Average % Recovery</u>	<u>Standard Deviation</u>
Henry	90	21.81	40.8	42.7	2.56
	3-16	30.79	46.5		
	3-17	31.73	39.5		
	10	11.57	41.7		
	36	24.77	43.1		
	T-14	43.78	44.5		
Manufacturing Services (Whitney)	35	12.94	90.5	103.3	11.06
	28	14.40	103.5		
	T-3	16.26	110.6		
	48	14.11	94.6		
	3-3	34.48	117.3		
Shawinigan 9/7	37	39.5	62.8	59.9	2.99
	56	36.6	60.0		
	59	38.0	63.6		
	72	41.4	59.8		
	81	21.4	57.9		
	3-5	33.9	55.6		
Calvert City	T-18	63.22	90.2	91.8	4.44
	3-4	65.22	96.3		
	T-5	77.61	86.6		
	T-12	65.55	87.1		
	60	47.32	94.7		
	3-18	106.42	96.0		

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