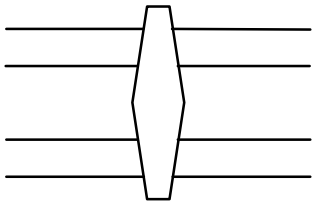

QA TASK GROUP PERFORMANCE EVALUATION REPORT
2004 - 2005

Participants:

AIM AVIATION	UNITED KINGDOM
AIM AVIATION	RENTON, WA
AIRBUS	GERMANY
AVIO INTERIORS	ITALY
BOEING	RENTON, WA
BOEING	EVERETT, WA
C&D AEROSPACE	LAPALMA, CA
CAAC Test Center	CHINA
CTA	SPAIN
DELSEN TESTING LABS	GLENDALE, CA
DGA/CEAT	FRANCE
DLR	GERMANY
FAA Wm. J. HUGHES TECH CENTER	AC AIRPORT, NJ
HERB CURRY, INC.	MT. VERNON, IN
BRITAX HEATH TECHNA	BELLINGHAM, WA
ISOVOLTA AG	AUSTRIA
JAMCO AMERICA, INC.	EVERETT, WA
LANTAL TEXTILES	SWITZERLAND
NORTH WEST COMPOSITES	MARYSVILLE, WA
SCHNELLER, INC.	KENT, OH
SCHNELLER, INC.	PINELLAS PARK, FL
SHOWA AIRCRAFT CO.	JAPAN
TESTCORP	MISSION VIEJO, CA
The Govmark Organization, Inc.	FARMINGTON, NY

This report compares results from OSU tests of two panel configurations (5524, 5596), NBS Smoke Density tests of one panel configuration (5596), and gas calibration factors from the OSU's. The 5524 panel is a 1/4th inch thick Nomex honeycomb sandwich panel with Epoxy/fiberglass prepregs. The 5596 panel is a crushed core graphite panel with a printed decorative. It has an initial fast peak. Each lab is assigned a random code letter.

Bar graphs rank the labs from the lowest to the highest. Lines representing the average +/- 2 Standard Deviations are superimposed on the graphs.

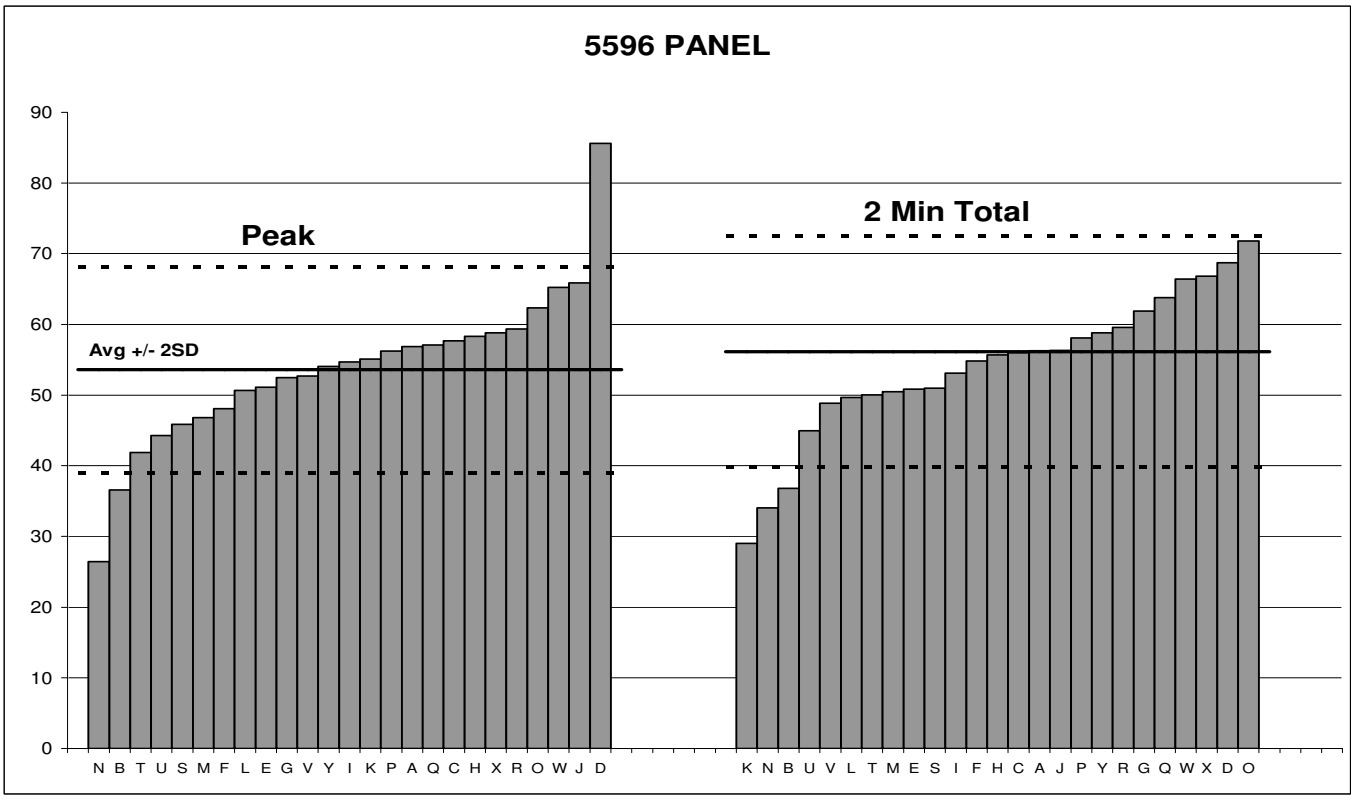

Figure 1

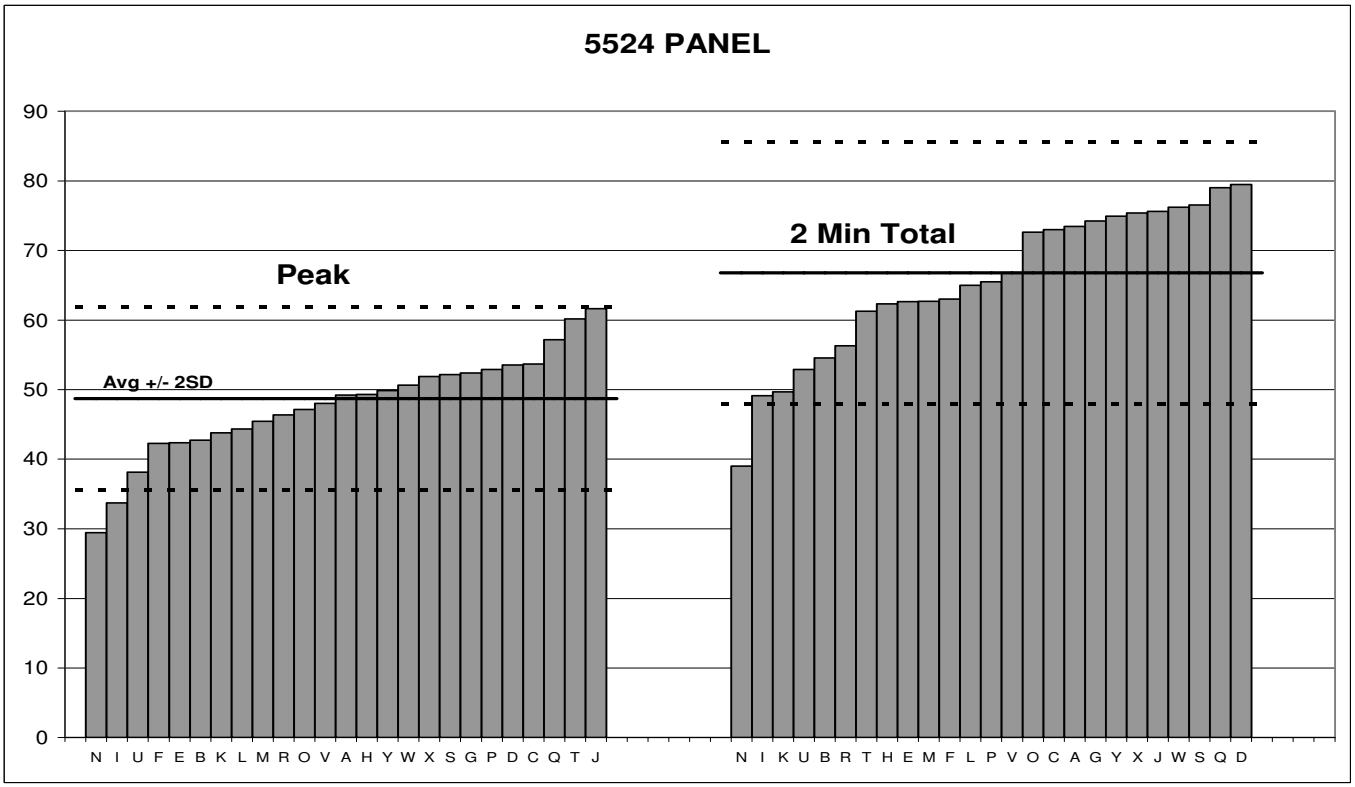

Figure 2

The next three figures can be used to diagnose why a lab got the results they did.

The peak time of the 5596 panel shown in figure 3 is an indicator of relative heat flux. The faster the peak time, the higher the heat flux. Peak time is also affected by other factors such as starting sequence technique, pilot flame position, and pilot flame aggressiveness. The peak time of the 5524 panel is not shown. It is a double peak panel with both peaks being similar in height. Since the peak time occurs at peak 1 for some tests and peak 2 for others, a comparison is not meaningful.

Where and when the heat flux gage was calibrated can certainly affect heat flux. So can methodology. The gage reading will keep drifting upward after it is inserted in the chamber for 30 to 60 seconds. This is due to hot air convection rolling off the face of the gage holder and contacting the gage. The 95% radiant heat response time of the gage is only 1 second according to Vatell.

If the gage is left in until the reading stabilizes after 30 plus seconds, the OSU heat flux will be set lower than other labs. The author's preferred method is to use a strip chart recorder set at 10 mv full scale and 12 cm/min. The gage is inserted and the doors closed. The gage is left in for 10 seconds. The average reading between 5 and 10 seconds is used.

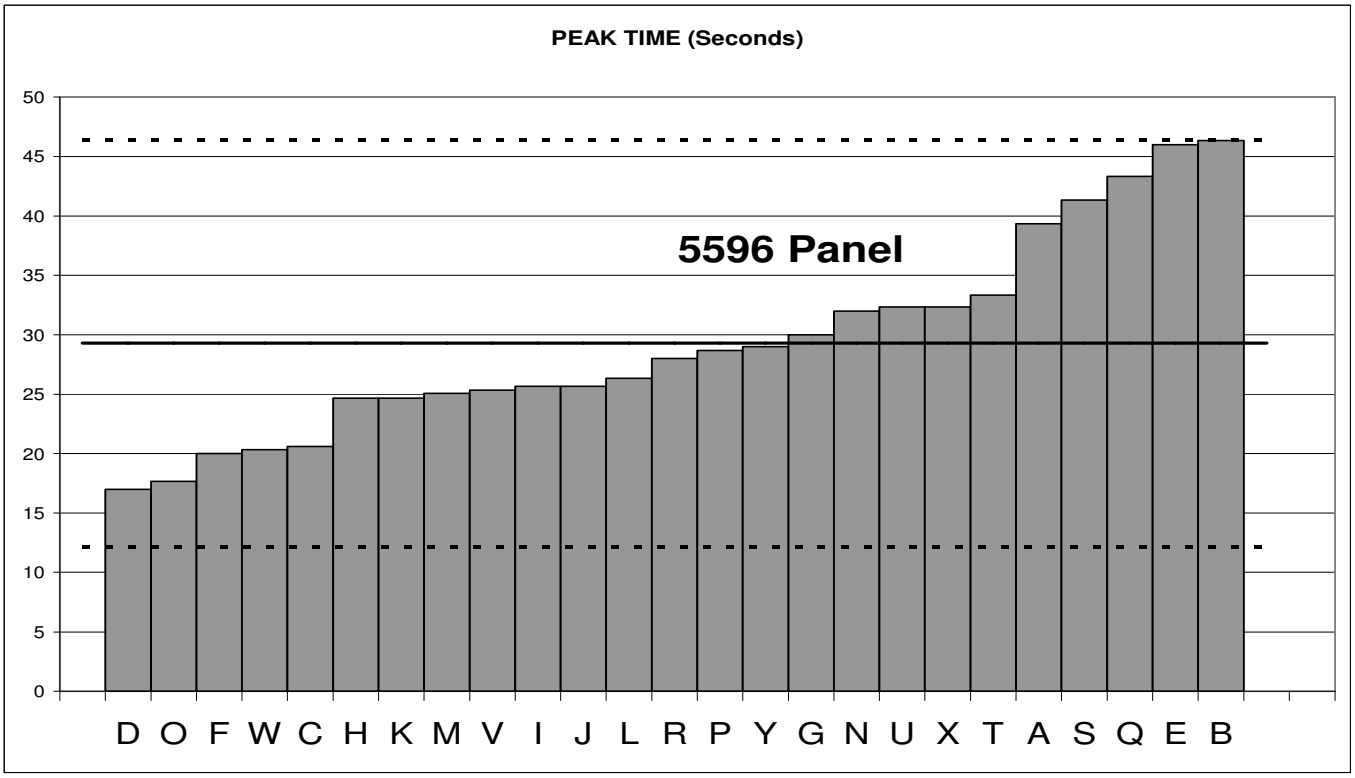

Figure 3

If a lab's Peak and 2 Minute Total values tend to be high or low, inspect the Kh value in Figure 4 to see if it also tends to be high or low. It has been shown in previous performance evaluation studies that the Kh factor can introduce variation in the results.

To get consistent calibration factors, make sure the methane is pure, the wet test meter is calibrated and running smoothly, and there is negligible backpressure from the meter to the burner. Clean the OSU interiors of soot and ash before calibration. If the meter has a sticking point, it is probably the totalizing gears binding. Either fix them or disconnect them, they are not needed.

The fire test handbook specifies a warm up at 8 L/Min for 2 minutes before starting the calibration. If the warm up is neglected, the calibration factor will be 2% to 3% low. If the methane is set at 8 L/Min for 10 minutes, the factor will be 2% too high.

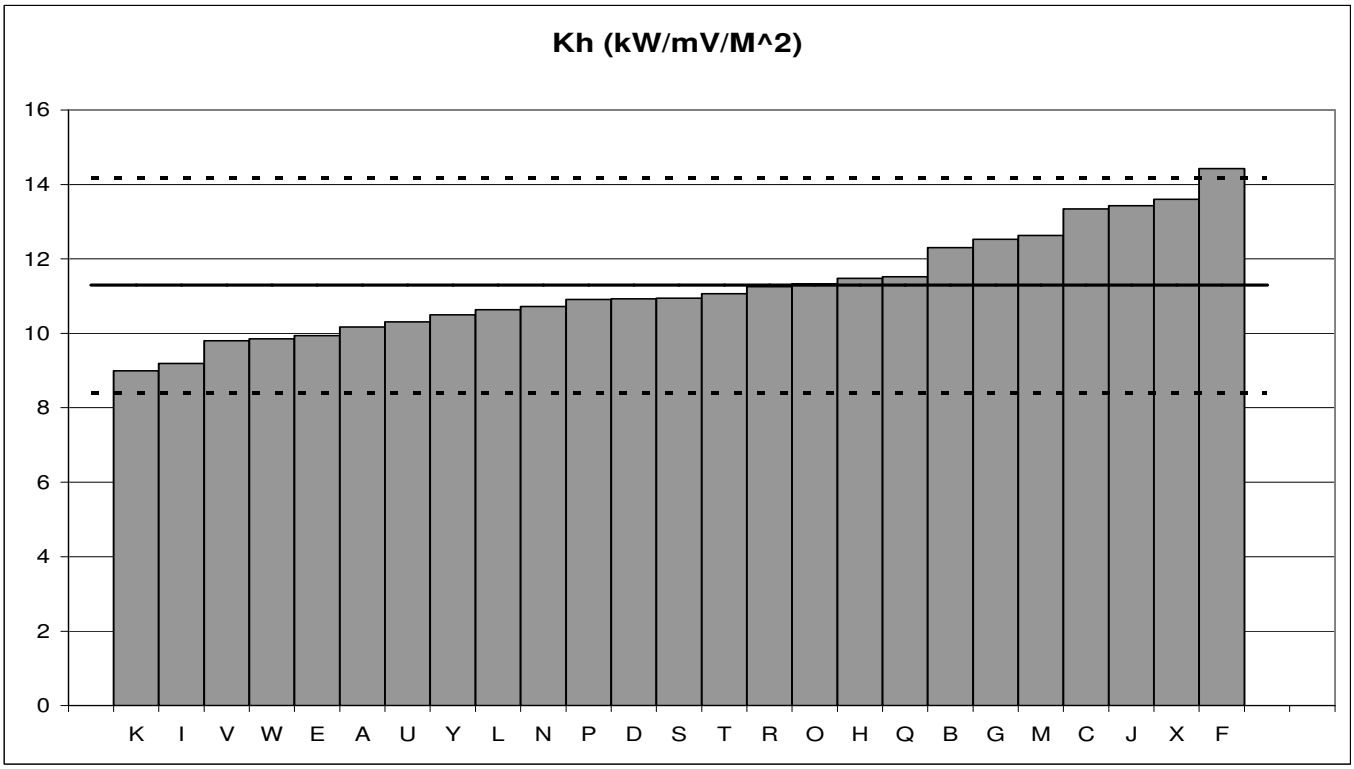

Figure 4

If OSU's have different fast transient peak responses, most panels won't show it since the burn curve is too gradual and smooth. The 5596 panel has a fast peak and shows this difference.

Figure 5 shows the ratio of peak/total for the 5596 panel. Factors that could influence the ratio are thermocouple bead size, metal gauges, soot buildup, airflow, and heat loss. If a lab is near the top of the curve, ensure the thermocouple bead size is 0.050 +/- 0.010 inches, not spot-welded. Make sure the two wires make first contact at the bead, not before.

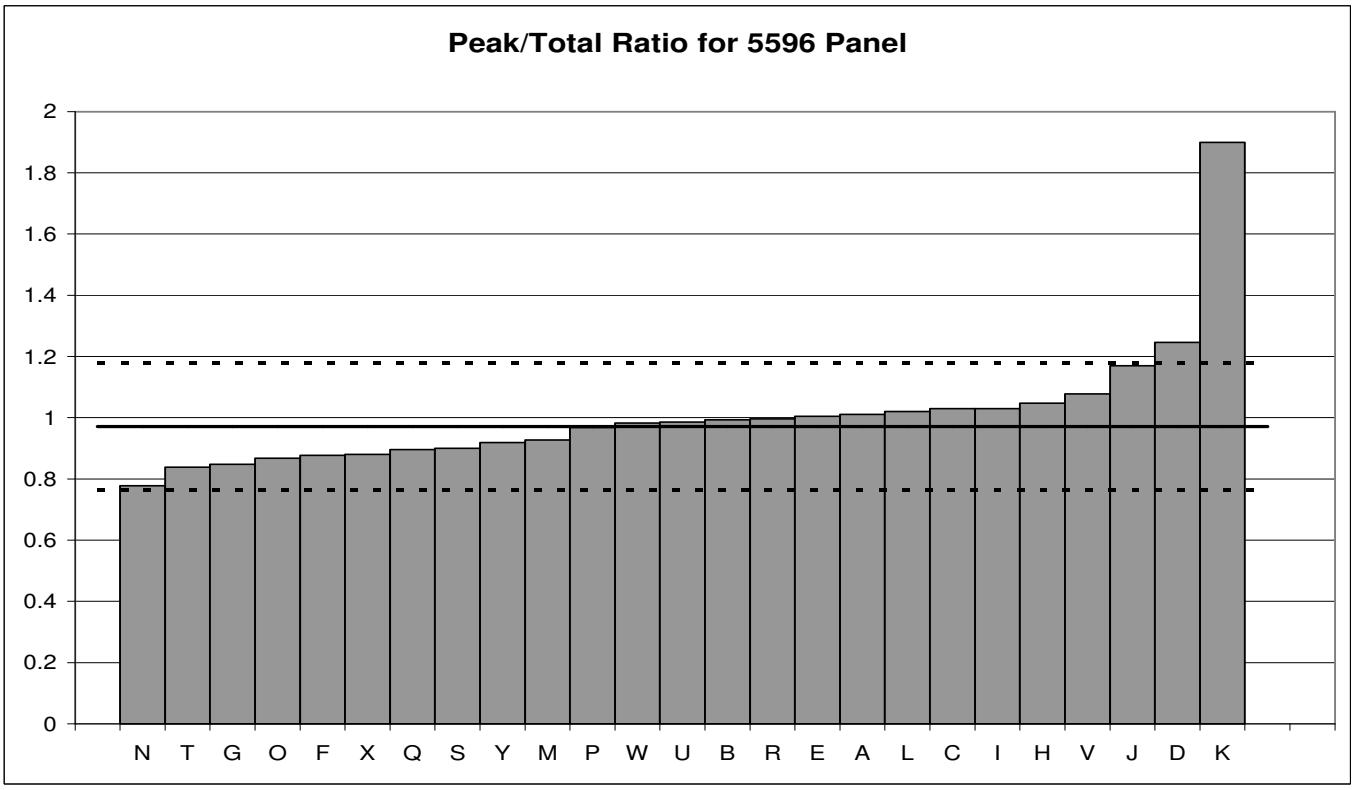

Figure 5

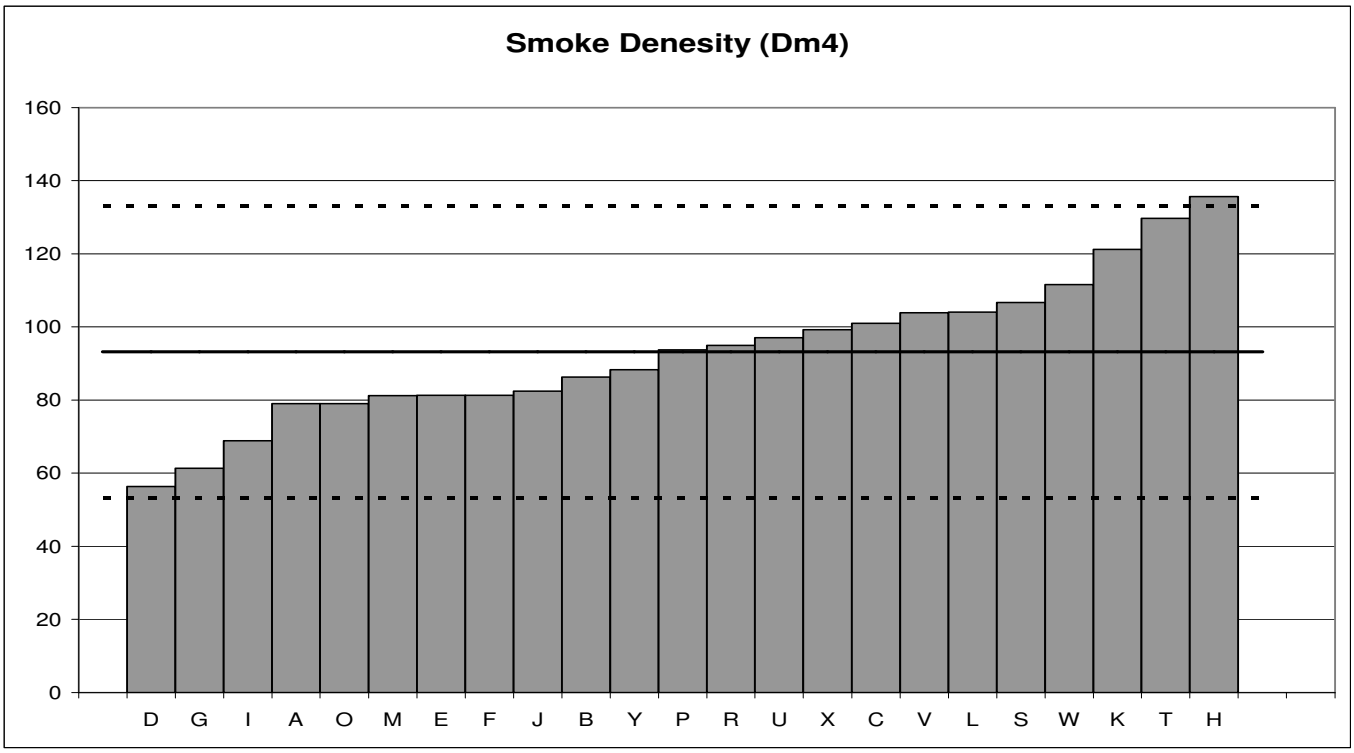

Figure 6

The last three graphs show each lab's percent deviation from the mean for up to the last 3 studies. Each lab's average deviation is bracketed by a +/- 2 SD interval. If a lab bracket doesn't cross the centerline, a chronic bias is indicated, assuming the lab has participated in more than one study.

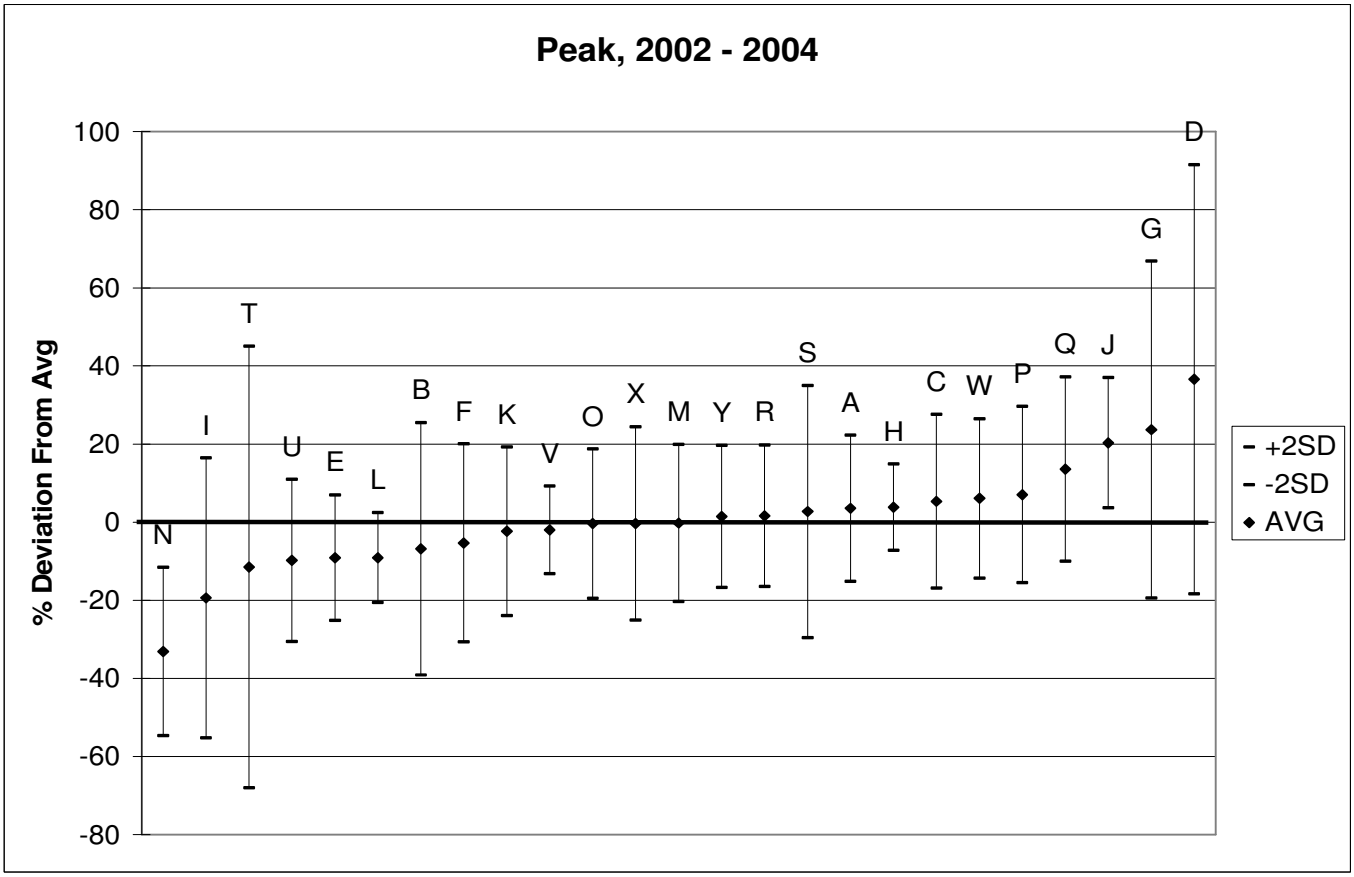

Figure 7

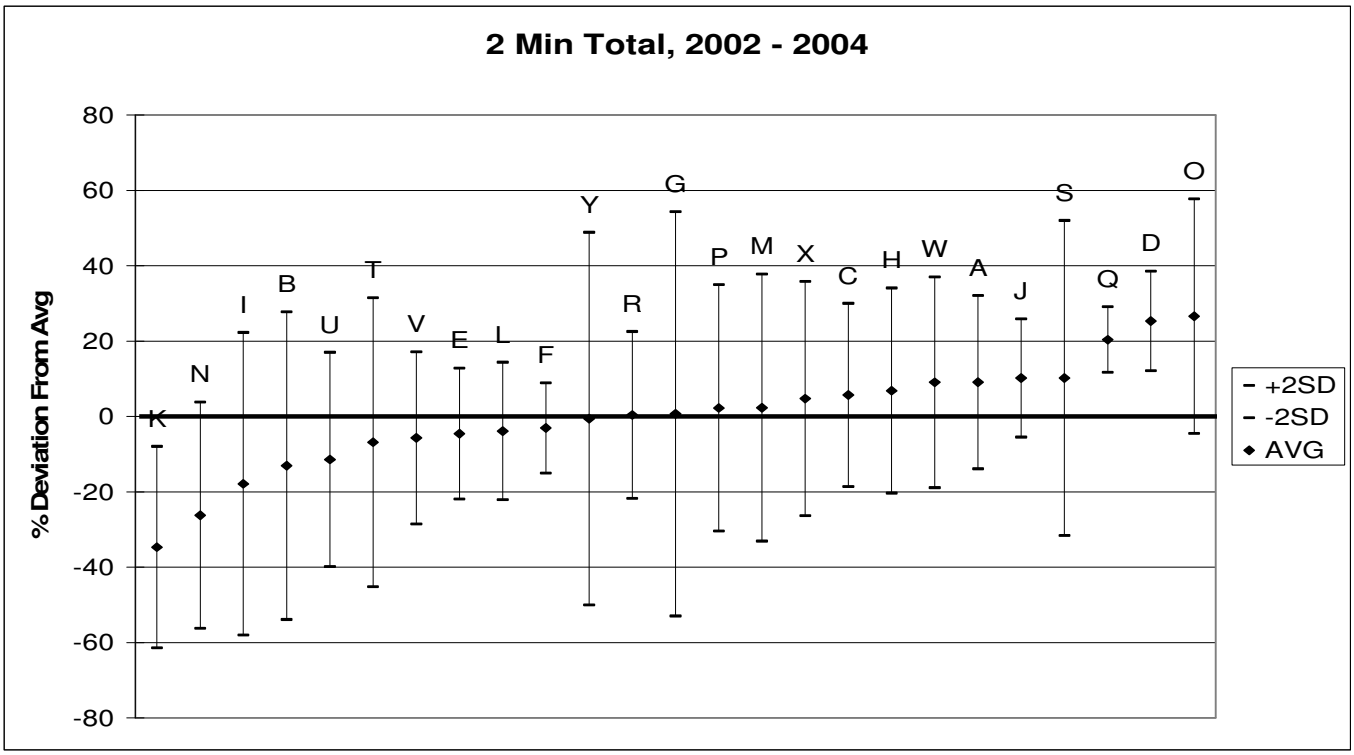

Figure 8

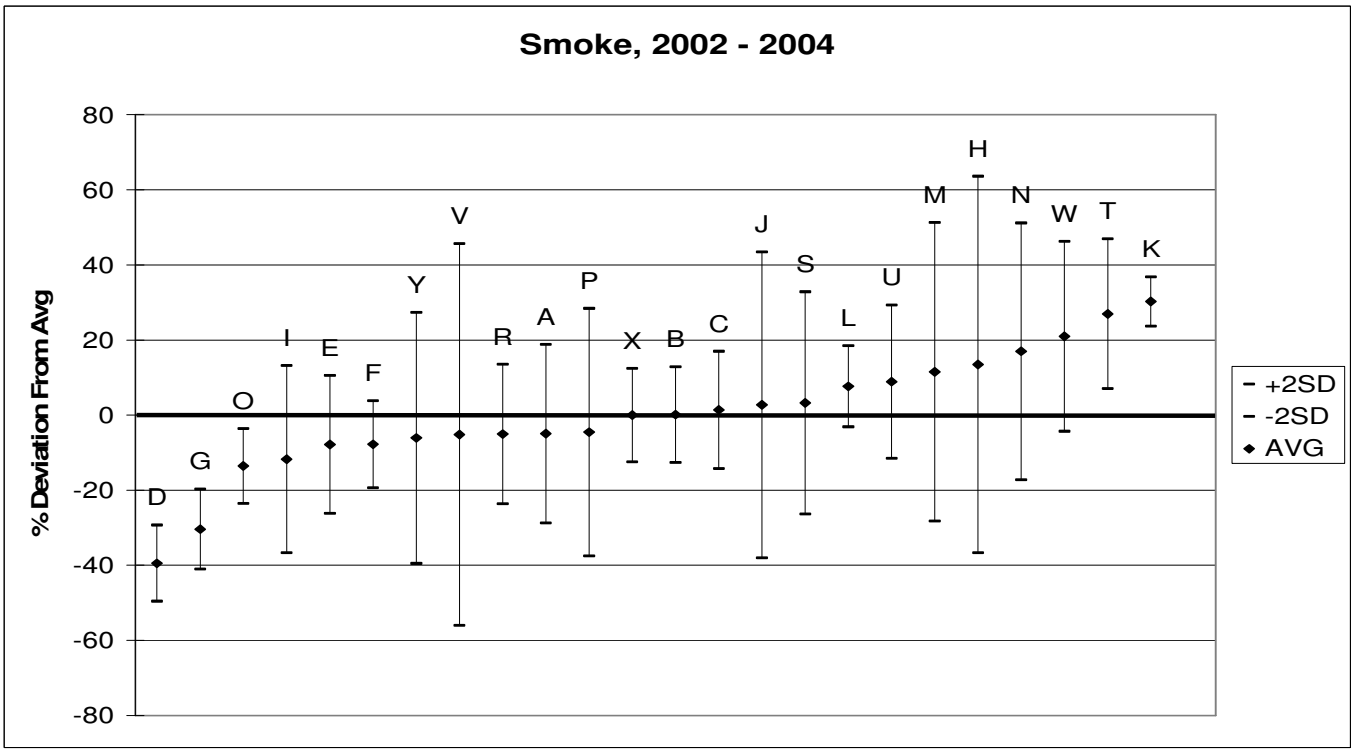

Figure 9

Parameter	Lab	Value1	Value2	Value3	Lab Mean	Difference	Z	NOTES		
5596	A	57.46	59.87	53.28	56.87	3.30	0.45		Population	
PEAK	B	34.07	37.23	38.36	36.55	-17.02	-2.34	3	Mean	53.57
(kW/sq.m)	C	61.00	53.00	59.00	57.67	4.10	0.56		StdDev	7.27
	D	91.56	79.96	85.31	85.61	32.04	4.41	1,2	Valid Results	23
	E	50.22	52.18	50.90	51.10	-2.47	-0.34			
	F	47.26	53.98	42.96	48.07	-5.50	-0.76			
	G	54.63	52.49	50.30	52.47	-1.10	-0.15			
	H	56.00	55.00	64.00	58.33	4.76	0.66			
	I	60.55	54.42	49.09	54.69	1.12	0.15			
	J	62.30	64.70	70.60	65.87	12.30	1.69			
	K	59.39	47.97	57.92	55.09	1.52	0.21			
	L	47.00	50.00	55.00	50.67	-2.90	-0.40			
	M	46.20	44.80	49.40	46.80	-6.77	-0.93			
	N	25.54	27.73	26.13	26.47	-27.10	-3.73	1,2		
	O	62.31	59.21	65.50	62.34	8.77	1.21			
	P	59.41	53.80	55.50	56.24	2.67	0.37			
	Q	48.70	61.60	61.00	57.10	3.53	0.49			
	R	61.26	55.72	61.07	59.35	5.78	0.80			
	S	43.40	45.40	48.80	45.87	-7.70	-1.06			
	T	38.05	54.08	33.60	41.91	-11.66	-1.60			
	U	41.80	44.80	46.30	44.30	-9.27	-1.28			
	V	50.10	54.80	53.10	52.67	-0.90	-0.12			
	W	67.33	65.89	62.52	65.25	11.68	1.61			
	X	61.80	51.80	62.90	58.83	5.26	0.72			
	Y	51.98	58.52	51.66	54.05	0.48	0.07			
5596	A	40.00	52.00	26.00	39.33	10.04	1.17		Population	
TIME	B	77.00	30.00	32.00	46.33	17.04	1.99		Mean	29.29
SECONDS	C	21.00	19.80	21.00	20.60	-8.69	-1.01		StdDev	8.57
	D	17.00	17.00	17.00	17.00	-12.29	-1.43		Valid Results	24
	E	63.00	48.00	27.00	46.00	16.71	1.95			
	F	21.00	20.00	19.00	20.00	-9.29	-1.08			
	G	40.00	26.00	24.00	30.00	0.71	0.08			
	H	28.00	25.00	21.00	24.67	-4.62	-0.54			
	I	25.00	24.00	28.00	25.67	-3.62	-0.42			
	J	25.00	26.00	26.00	25.67	-3.62	-0.42			
	K	24.00	25.00	25.00	24.67	-4.62	-0.54			
	L	25.00	24.00	30.00	26.33	-2.96	-0.35			
	M	27.24	24.00	24.00	25.08	-4.21	-0.49			
	N	45.00	29.00	22.00	32.00	2.71	0.32	1		
	O	19.00	15.00	19.00	17.67	-11.62	-1.36			
	P	28.00	29.00	29.00	28.67	-0.62	-0.07			
	Q	73.00	25.00	32.00	43.33	14.04	1.64			
	R	26.00	28.00	30.00	28.00	-1.29	-0.15			
	S	32.00	60.00	32.00	41.33	12.04	1.41			
	T	23.00	51.00	26.00	33.33	4.04	0.47			
	U	35.00	30.00	32.00	32.33	3.04	0.36			
	V	24.00	27.00	25.00	25.33	-3.96	-0.46			
	W	20.00	20.00	21.00	20.33	-8.96	-1.05			
	X	29.00	38.00	30.00	32.33	3.04	0.36			
	Y	31.00	27.00	29.00	29.00	-0.29	-0.03			

Parameter	Lab	Value1	Value2	Value3	Lab Mean	Difference	Z	NOTES		
5596	A	62.88	55.54	50.42	56.28	0.16	0.02		Population	
TOTAL	B	38.07	38.67	33.65	36.80	-19.32	-2.37	3	Mean	56.12
(kW-min/sq.m)	C	60.00	55.00	53.00	56.00	-0.12	-0.01		StdDev	8.17
	D	72.86	66.32	66.92	68.70	12.58	1.54		Valid Results	23
	E	51.80	53.85	46.90	50.85	-5.27	-0.65			
	F	55.90	56.13	52.35	54.79	-1.33	-0.16			
	G	66.54	60.98	58.15	61.89	5.77	0.71			
	H	53.00	60.00	54.00	55.67	-0.45	-0.06			
	I	48.98	50.61	59.66	53.08	-3.04	-0.37			
	J	48.70	58.80	61.50	56.33	0.21	0.03			
	K	33.68	24.10	29.25	29.01	-27.11	-3.32	1,2		
	L	50.00	49.00	50.00	49.67	-6.45	-0.79			
	M	51.00	51.90	48.50	50.47	-5.65	-0.69			
	N	39.84	34.01	28.20	34.02	-22.10	-2.71	1,3		
	O	72.03	67.61	75.84	71.83	15.71	1.92			
	P	55.57	62.08	56.67	58.11	1.99	0.24			
	Q	62.80	66.60	61.90	63.77	7.65	0.94			
	R	62.85	55.67	60.21	59.58	3.46	0.42			
	S	46.70	54.20	52.00	50.97	-5.15	-0.63			
	T	49.70	54.20	46.21	50.04	-6.08	-0.74			
	U	37.00	49.90	48.00	44.97	-11.15	-1.37			
	V	37.30	55.30	54.00	48.87	-7.25	-0.89			
	W	70.94	63.25	65.01	66.40	10.28	1.26			
	X	68.70	62.00	69.80	66.83	10.71	1.31			
	Y	53.01	58.45	65.05	58.84	2.72	0.33			
5524	A	52.35	44.89	50.43	49.22	0.52	0.08		Population	
PEAK	B	46.01	41.17	41.02	42.73	-5.97	-0.91		Mean	48.70
(kW/sq.m)	C	53.00	53.00	55.00	53.67	4.97	0.76		StdDev	6.57
	D	53.40	53.06	54.21	53.56	4.86	0.74		Valid Results	24
	E	41.88	41.68	43.57	42.38	-6.32	-0.96			
	F	42.19	41.76	42.79	42.25	-6.45	-0.98			
	G	50.28	54.56	52.27	52.37	3.67	0.56			
	H	51.00	47.00	50.00	49.33	0.63	0.10			
	I	33.36	32.45	35.38	33.73	-14.97	-2.28	3		
	J	61.90	59.10	63.90	61.63	12.93	1.97			
	K	47.74	42.15	41.45	43.78	-4.92	-0.75			
	L	44.00	46.00	43.00	44.33	-4.37	-0.66			
	M	43.00	44.20	49.10	45.43	-3.27	-0.50			
	N	27.94	32.30	28.11	29.45	-19.25	-2.93	1,3		
	O	49.38	46.23	45.83	47.15	-1.55	-0.24			
	P	55.89	52.97	49.90	52.92	4.22	0.64			
	Q	56.40	54.50	60.60	57.17	8.47	1.29			
	R	50.27	47.80	41.06	46.38	-2.32	-0.35			
	S	52.50	51.30	52.70	52.17	3.47	0.53			
	T	89.94	49.09	41.47	60.17	11.47	1.75			
	U	37.70	38.80	37.80	38.10	-10.60	-1.61			
	V	47.50	46.70	49.90	48.03	-0.67	-0.10			
	W	50.50	50.50	50.98	50.66	1.96	0.30			
	X	54.70	52.60	48.40	51.90	3.20	0.49			
	Y	49.70	49.96	49.94	49.87	1.17	0.18			

Parameter	Lab	Value1	Value2	Value3	Lab Mean	Difference	Z	NOTES		
5524	A	78.00	74.00	94.00	82.00	27.26	0.91		Population	
TIME	B	29.00	29.00	27.00	28.33	-26.41	-0.89		Mean	54.74
SECONDS	C	24.00	22.20	19.80	22.00	-32.74	-1.10		StdDev	29.80
	D	20.00	22.00	20.00	20.67	-34.07	-1.14		Valid Results	24
	E	100.00	84.00	21.00	68.33	13.59	0.46			
	F	111.00	104.00	108.00	107.67	52.93	1.78			
	G	22.00	23.00	21.00	22.00	-32.74	-1.10			
	H	24.00	23.00	24.00	23.67	-31.07	-1.04			
	I	27.00	87.00	25.00	46.33	-8.41	-0.28			
	J	22.00	24.00	22.00	22.67	-32.07	-1.08			
	K	20.00	18.00	18.00	18.67	-36.07	-1.21			
	L	28.00	30.00	28.00	28.67	-26.07	-0.87			
	M	23.00	89.00	25.00	45.67	-9.07	-0.30			
	N	93.00	108.00	97.00	99.33	44.59	1.50	1		
	O	101.00	21.00	94.00	72.00	17.26	0.58			
	P	80.00	27.00	27.00	44.67	-10.07	-0.34			
	Q	87.00	29.00	75.00	63.67	8.93	0.30			
	R	25.00	26.00	27.00	26.00	-28.74	-0.96			
	S	80.00	90.00	93.00	87.67	32.93	1.10			
	T	93.00	80.00	83.00	85.33	30.59	1.03			
	U	108.00	96.00	30.00	78.00	23.26	0.78			
	V	25.00	22.00	74.00	40.33	-14.41	-0.48			
	W	94.00	105.00	102.00	100.33	45.59	1.53			
	X	99.00	75.00	98.00	90.67	35.93	1.21			
	Y	88.00	87.00	90.00	88.33	33.59	1.13			
5524	A	75.67	66.99	77.72	73.46	6.70	0.71		Population	
TOTAL	B	56.87	50.88	55.96	54.57	-12.19	-1.29		Mean	66.76
(kW-min/sq.m)	C	70.00	71.00	78.00	73.00	6.24	0.66		StdDev	9.43
	D	78.80	83.47	76.14	79.47	12.71	1.35		Valid Results	24
	E	60.69	64.10	63.16	62.65	-4.11	-0.44			
	F	61.59	62.61	64.87	63.02	-3.74	-0.40			
	G	70.85	76.39	75.37	74.20	7.44	0.79			
	H	59.00	66.00	62.00	62.33	-4.43	-0.47			
	I	50.04	48.38	48.98	49.13	-17.63	-1.87			
	J	69.20	79.70	77.90	75.60	8.84	0.94			
	K	49.91	50.02	49.11	49.68	-17.08	-1.81			
	L	60.00	70.00	65.00	65.00	-1.76	-0.19			
	M	60.80	61.50	65.80	62.70	-4.06	-0.43			
	N	36.19	40.46	40.43	39.03	-27.73	-2.94	1,3		
	O	72.69	73.08	72.03	72.60	5.84	0.62			
	P	69.59	65.79	61.13	65.50	-1.26	-0.13			
	Q	82.40	76.50	78.20	79.03	12.27	1.30			
	R	57.42	56.90	54.56	56.29	-10.47	-1.11			
	S	76.50	78.30	74.80	76.53	9.77	1.04			
	T	60.04	64.88	58.94	61.29	-5.47	-0.58			
	U	52.40	54.50	51.80	52.90	-13.86	-1.47			
	V	68.80	62.10	69.30	66.73	-0.03	0.00			
	W	75.21	75.50	77.90	76.20	9.44	1.00			
	X	75.00	80.00	71.10	75.37	8.61	0.91			
	Y	76.80	73.37	74.60	74.92	8.16	0.87			

Parameter	Lab	Value1	Value2	Value3	Lab Mean	Difference	Z	NOTES		
5596	A	76.00	81.00	80.00	79.00	-14.21	-0.71		Population	
4DM (Smoke)	B	88.36	86.69	83.72	86.26	-6.95	-0.35		Mean	93.21
	C	99.00	99.00	105.00	101.00	7.79	0.39		StdDev	19.96
	D	51.00	60.00	58.00	56.33	-36.88	-1.85		Valid Results	23
	E	81.00	89.00	74.00	81.33	-11.88	-0.60			
	F	88.00	83.00	73.00	81.33	-11.88	-0.60			
	G	62.00	64.00	58.00	61.33	-31.88	-1.60			
	H	136.00	137.00	134.00	135.67	42.46	2.13	3		
	I	69.93	66.83	69.71	68.82	-24.39	-1.22			
	J	73.10	87.10	86.90	82.37	-10.84	-0.54			
	K	124.50	118.50	120.60	121.20	27.99	1.40			
	L	106.00	103.00	103.00	104.00	10.79	0.54			
	M	83.60	76.80	83.20	81.20	-12.01	-0.60			
	O	75.34	74.73	87.08	79.05	-14.16	-0.71			
	P	95.00	102.00	84.00	93.67	0.46	0.02			
	R	93.60	88.20	103.10	94.97	1.76	0.09			
	S	102.00	109.00	109.00	106.67	13.46	0.67			
	T	132.00	127.00	130.00	129.67	36.46	1.83			
	U	91.00	106.00	94.00	97.00	3.79	0.19			
	V	104.00	103.80		103.90	10.69	0.54			
	W	113.06	100.60	120.91	111.52	18.31	0.92			
	X	100.40	95.20	102.00	99.20	5.99	0.30			
	Y	88.00	87.00	90.00	88.33	-4.88	-0.24			
Kh	A				10.17	-1.12	-0.78		Population	
(kW-min/mV/sq.m)	B				12.30	1.01	0.70		Mean	11.29
	C				13.34	2.05	1.42		StdDev	1.44
	D				10.93	-0.36	-0.25		Valid Results	24
	E				9.94	-1.35	-0.94			
	F				14.42	3.13	2.17	3		
	G				12.53	1.24	0.86			
	H				11.48	0.19	0.13			
	I				9.19	-2.10	-1.46			
	J				13.43	2.14	1.48			
	K				8.99	-2.30	-1.60			
	L				10.63	-0.66	-0.46			
	M				12.63	1.34	0.93			
	N				10.72	-0.57	-0.40	1		
	O				11.33	0.04	0.03			
	P				10.91	-0.38	-0.26			
	Q				11.52	0.23	0.16			
	R				11.25	-0.04	-0.03			
	S				10.95	-0.34	-0.24			
	T				11.06	-0.23	-0.16			
	U				10.31	-0.98	-0.68			
	V				9.80	-1.49	-1.04			
	W				9.85	-1.44	-1.00			
	X				13.60	2.31	1.60			
	Y				10.49	-0.80	-0.55			

In the note column: 1 = data not included in statistical calculations, 2 = test result outside 3 sigma range, 3 = test result outside 2 sigma range.

Data are rejected from statistical calculations by Chauvenet's criterion, which rejects data with less than a 1/(2*N) chance of occurring on the first pass. The Z value is the number of standard deviations from the population mean. The closer to zero the better.

The next performance evaluation will start in the fall.

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