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AIR QUALITY, INC.

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MARCH 25, 1992

Prepared For:

BALL-INCON GLASS PACKAGING CORP.
SEATTLE PLANT
GLASS FURNACES #3, #4, AND #5
METHOD 5 TESTING
SEATTLE, WASHINGTON
FEBRUARY 5-6 AND 26, 1992

Submitted by:

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We certify that the information contained herein is accurate and complete to the best of our knowledge.

2.0

SUMMARY OF RESULTS

The results of the Method 5 tests for quantifying particulate matter emissions as collected at the #3, #4 and #5 Furnace stacks on February 5-6 and 26, 1992 are summarized in Table 2.1 below, and on pages 5-7 in a series of computer printouts titled "Summary of Results - Methods 1, 2, 3A, 4, and 5."

Table 2.1. Summary of particulate matter emission results collected at Furnace's #3, #4 and #5 at Ball-InCon Glass Packaging in Seattle, Washington on February 5-6 and 26, 1992.

Run #	Front-Half Partic. Matter (gr/dscf)	Back-Half Partic. Matter (gr/dscf)	Total Partic. Matter (gr/dscf)	Dilution Corrected Partic. Matter (gr/dscf)	Mass Emiss. Rate (lb/hr)	
Furnace #3						
Run 1	0.007	0.005	0.011	0.021	2.69	126.5 T/D
Run 2	0.007	0.003	0.011	0.018	2.66	
Run 3	0.006	0.002	0.008	0.013	1.97	
Average lb/ton	0.007	0.003	0.010	0.017	2.44	.46 #/T
Furnace #4						
Run 1	0.020	0.010	0.029	0.064	7.08	127.9 T/D
Run 2	0.035	0.009	0.044	0.098	10.5	
Run 3	0.017	0.010	0.027	0.060	6.49	
Average lb/ton	0.024	0.010	0.033	0.074	8.02	1.50 #/T
Furnace #5						
Run 1	0.022	0.009	0.031	0.064	3.16	111.1 T/D
Run 2	0.020	0.013	0.033	0.066	3.79	
Run 3	0.018	0.013	0.030	0.061	3.85	
Average lb/ton	0.020	0.012	0.031	0.064	3.60	0.78 #/T

The front-half, back-half, total and dilution corrected particulate matter emission concentrations in Table 2.1 are presented in units of grains per dry standard cubic foot (gr/dscf). The particulate matter mass emission rate is presented in pounds per

hour (lb/hr). An acceptable leak check of less than 0.02 cfm at the highest vacuum rate (or greater) used during the test preceded and followed each run. The average percentage isokinetics for each run were within the acceptable limits of 100 $\pm$ 10%. Computer printouts of the results from these tests are included in Appendix A of this report on pages 22-39.

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SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, AND 5
AM TEST - AIR QUALITY, INC.

FILE NAME: 145\BI#3SUM
CLIENT: BALL-INCON
LOCATION: SEATTLE, WASHINGTON

	#3 FURNACE STACK EXHAUST			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	1494	1495	1496	
DATE:	2/5/92	2/5/92	2/5/92	
START TIME:	08:45	11:31	14:38	
STOP TIME:	10:45	13:31	16:38	
SAMPLE LENGTH (minutes):	120.0	120.0	120.0	
PROCESS RATE (tons/day):	126.5	126.5	126.5	
VOLUME SAMPLED (cubic feet):	81.860	88.408	87.211	85.826
VOLUME SAMPLED (dry std. cubic feet):	84.899	90.944	89.434	88.426
VOLUME SAMPLED (dry std. cubic meters):	2.404	2.576	2.533	2.504
STACK GAS MOISTURE (percent):	3.15	3.87	3.61	3.54
BAROMETRIC PRESSURE (inches of Hg):	29.94	29.91	29.88	29.91
STATIC PRESSURE (inches of H2O):	-0.46	-0.46	-0.46	-0.46
STACK PRESSURE (inches of Hg):	29.91	29.88	29.85	29.88
STACK TEMPERATURE (degrees F.):	226.7	273.3	264.5	254.8
STACK TEMPERATURE (degrees R.):	686.7	733.3	724.5	714.8
CARBON DIOXIDE (percent):	1.5	2.1	1.8	1.8
OXYGEN (percent):	19.0	18.4	18.7	18.7
CARBON MONOXIDE (ppm):	0	0	0	0
MOLECULAR WEIGHT (dry, lb/lb-mole):	29.00	29.07	29.04	29.04
MOLECULAR WEIGHT (wet, lb/lb-mole):	28.65	28.64	28.64	28.64
AVERAGE VELOCITY HEAD (inches of H2O):	0.529	0.646	0.647	0.607
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet per second):	46.77	53.45	53.20	51.14
STACK DIAMETER (inches):	49.0	49.0	49.0	
STACK AREA (square feet):	13.10	13.10	13.10	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	27354.2	29027.6	29291.9	28557.9
DILUTION AIRFLOW (dscf/min):	12213.9	11959.7	11912.8	12028.8
STACK GAS AIRFLOW (actual cubic feet per min.):	36751.2	41994.8	41798.4	40181.5
NOZZLE DIAMETER (inches):	0.254	0.254	0.254	
ISOKINETICS (percent):	96	97	95	96
FRONT-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.007	0.007	0.006	0.007
BACK-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.005	0.003	0.002	0.003
TOTAL PARTICULATE EMISSION CONC. (gr/dscf):	0.011	0.011	0.008	0.010
TOTAL PARTICULATE EMISSION CONC. @ 7% O2 (gr/dscf):	0.084	0.059	0.050	0.064
DILUTION CORRECTED P.M. CONC. (gr/dscf):	0.021	0.018	0.013	0.017
TOTAL PARTICULATE EMISSION CONCENTRATION (mg/dscm):	26.2	24.5	18.0	22.9
PARTICULATE MATTER MASS EMISSION RATE (lb/hr):	2.69	2.66	1.97	2.44

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SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, AND 5
AM TEST - AIR QUALITY, INC.

FILE NAME: 145\BI#4SUM
CLIENT: BALL-INCON
LOCATION: SEATTLE, WASHINGTON

	#4 FURNACE STACK EXHAUST			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	1497	1498	1499	
DATE:	2/6/92	2/6/92	2/6/92	
START TIME:	08:36	11:13	13:30	
STOP TIME:	10:40	13:18	15:56	
SAMPLE LENGTH (minutes):	120.0	120.0	120.0	
PROCESS RATE (tons/day):	127.9	127.9	127.9	
VOLUME SAMPLED (cubic feet):	77.543	74.156	74.207	75.302
VOLUME SAMPLED (dry std. cubic feet):	78.770	74.520	73.830	75.707
VOLUME SAMPLED (dry std. cubic meters):	2.231	2.110	2.091	2.144
STACK GAS MOISTURE (percent):	4.16	4.52	4.46	4.38
BAROMETRIC PRESSURE (inches of Hg):	29.91	29.94	29.94	29.93
STATIC PRESSURE (inches of H2O):	-1.3	-1.4	-1.45	-1.38
STACK PRESSURE (inches of Hg):	29.81	29.84	29.83	29.83
STACK TEMPERATURE (degrees F.):	509.5	496.3	500.1	502.0
STACK TEMPERATURE (degrees R.):	969.5	956.3	960.1	962.0
CARBON DIOXIDE (percent):	2.3	2.1	2.3	2.2
OXYGEN (percent):	18.3	17.9	18.0	18.1
CARBON MONOXIDE (ppm):	2	1	NA	
MOLECULAR WEIGHT (dry, lb/lb-mole):	29.10	29.05	29.09	29.08
MOLECULAR WEIGHT (wet, lb/lb-mole):	28.64	28.55	28.59	28.59
AVERAGE VELOCITY HEAD (inches of H2O):	1.603	1.548	1.557	1.569
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet per second):	96.87	94.65	95.08	95.53
STACK DIAMETER (inches):	41.5	41.5	41.5	
STACK AREA (square feet):	9.39	9.39	9.39	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	28395.0	28042.5	28073.1	28170.2
DILUTION AIRFLOW (dscf/min):	15550.1	15555.1	15499.7	15535.0
STACK GAS AIRFLOW (actual cubic feet per min.):	54596.5	53344.2	53587.0	53842.6
NOZZLE DIAMETER (inches):	0.202	0.202	0.202	
ISOKINETICS (percent):	98	94	93	95
FRONT-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.020	0.035	0.017	0.024
BACK-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.010	0.009	0.010	0.010
TOTAL PARTICULATE EMISSION CONC. (gr/dscf):	0.029	0.044	0.027	0.033
TOTAL PARTICULATE EMISSION CONC. @ 7% O2 (gr/dscf):	0.155	0.202	0.129	0.162
DILUTION CORRECTED P.M. CONC. (gr/dscf):	0.064	0.098	0.060	0.074
TOTAL PARTICULATE EMISSION CONCENTRATION (mg/dscm):	66.5	99.9	61.7	76.0
PARTICULATE MATTER MASS EMISSION RATE (lb/hr):	7.08	10.5	6.49	8.02

AMTEST
AIR QUALITY, INC.

SUMMARY OF RESULTS - METHODS 1, 2, 3A, 4, AND 5
AM TEST - AIR QUALITY, INC.

FILE NAME: 145\BI#5SUM
CLIENT: BALL-INCON
LOCATION: SEATTLE, WASHINGTON

	#5 FURNACE STACK EXHAUST			
	RUN #1	RUN #2	RUN #3	AVERAGE
LAB #:	1564	1565	1566	
DATE:	2/26/92	2/26/92	2/26/92	
START TIME:	10:03	13:07	16:03	
STOP TIME:	12:11	15:12	18:06	
SAMPLE LENGTH (minutes):	120.0	120.0	120.0	
PROCESS RATE (tons/day):	111.1	111.1	111.1	
VOLUME SAMPLED (cubic feet):	80.550	89.469	100.968	90.329
VOLUME SAMPLED (dry std. cubic feet):	82.250	90.416	102.269	91.645
VOLUME SAMPLED (dry std. cubic meters):	2.329	2.561	2.896	2.595
STACK GAS MOISTURE (percent):	6.31	6.37	7.00	6.56
BAROMETRIC PRESSURE (inches of Hg):	30.44	30.38	30.34	30.39
STATIC PRESSURE (inches of H2O):	-0.45	-0.45	-0.45	-0.45
STACK PRESSURE (inches of Hg):	30.41	30.35	30.31	30.36
STACK TEMPERATURE (degrees F.):	489.0	488.0	498.2	491.7
STACK TEMPERATURE (degrees R.):	949.0	948.0	958.2	951.7
CARBON DIOXIDE (percent):	2.9	3.0	2.9	2.9
OXYGEN (percent):	16.6	16.4	16.5	16.5
CARBON MONOXIDE (ppm):	0	4	3	2
MOLECULAR WEIGHT (dry, lb/lb-mole):	29.13	29.14	29.12	29.13
MOLECULAR WEIGHT (wet, lb/lb-mole):	28.43	28.43	28.35	28.40
AVERAGE VELOCITY HEAD (inches of H2O):	0.281	0.348	0.443	0.357
PITOT TUBE Cp:	0.84	0.84	0.84	
STACK GAS VELOCITY (feet per second):	39.88	44.44	50.48	44.93
STACK DIAMETER (inches):	41.5	41.5	41.5	
STACK AREA (square feet):	9.39	9.39	9.39	
STACK GAS AIRFLOW (dry std. cubic feet per min.):	11909.5	13246.3	14769.3	13308.4
DILUTION AIRFLOW (dscf/min):	6179.1	6560.3	7440.1	6726.5
STACK GAS AIRFLOW (actual cubic feet per min.):	22479.3	25044.1	28450.7	25324.7
NOZZLE DIAMETER (inches):	0.311	0.311	0.311	
ISOKINETICS (percent):	103	101	103	102
FRONT-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.022	0.020	0.018	0.020
BACK-HALF PARTICULATE EMISSION CONC. (gr/dscf):	0.009	0.013	0.013	0.012
TOTAL PARTICULATE EMISSION CONC. (gr/dscf):	0.031	0.033	0.030	0.031
TOTAL PARTICULATE EMISSION CONC. @ 7% O2 (gr/dscf):	0.100	0.103	0.096	0.100
DILUTION CORRECTED P.M. CONC. (gr/dscf):	0.064	0.066	0.061	0.064
TOTAL PARTICULATE EMISSION CONCENTRATION (mg/dscm):	70.8	76.3	69.6	72.2
PARTICULATE MATTER MASS EMISSION RATE (lb/hr):	3.16	3.79	3.85	3.60

FAX

Ball-InCon Glass Packaging Corp.
Muncie Operations FAX 317/741-7110

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Date: **February 19, 1992**
To: **Angela** 206-883-3495
Location: **Amtest**
From: **Marv Gridley**
Number of Pages: 1

Operating data for Seattle #3 and #4 furnace source tests:

	2-5-92 #3 Furnace	2-6-92 #4 Furnace
Pull Rate (T/D)	126.5	127.9
Natural Gas (CFH)	15000	24500
Elect. Boost (KWH/hr)	1960	2100
% Cullet	50	40
Color	Flint	Dead Leaf Green
Sidgewall Temp. (deg F)	2650	2625
Batch		
Lane. Mt. Sand	4729 lb.	4724 lb.
Emmett Sand	1599	1596
Soda Ash	1941	1998
Limestone	1667	1663
Salt Cake	59.69	-
Carbocite	3.00	8.90
Decolorizer Mix	1.25	-
Powder Blue	1.70	-
Iron Chromite	-	3.94
Iron Pyrites	-	5.50

Marv

#5 TANK STACK TEST 2/26/92

OPERATING DATA

2025 KW
19,000 CUBIC FEET HOUR GAS AVERAGE
245,000 CUBIC FEET HOUR AIR
O_2 - 8% EXCESS
GLASS COLOR - EMERALD GREEN
PRESSURE .03" H_2O
FURNACE PULL 111.1 TONS/24 HOURS
CULLET 40% BY BATCH WEIGHT