AP42 Section: 11.1

Reference Number: 215

Title: Summary Of Source Test Results At Granite Rock Co. San Jose, CA,

Bay Area Air Quality Management District, San Francisco, CA,

October 3, 1989.

AP-42 Section 11.1
Reference
Report Sect. 4
Reference 215

DISTRIBUTION:
Firm
Permit Services
Enforcement
Technical Services
Source Inventory
Planning
Requester
DAPCO

BAY AREA
AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street
San Francisco, California 94109
(415) 771-6000

SUMMARY OF SOURCE TEST RESULTS

Report No. 900
Test Date: 10/0
Test Times:
Run A: 1014-1108
Run B: 1124-1218
Run C: 1233-1337

SOURCE INFORMATION

Firm Name and Address
GRANITE ROCK COMPANY
100 Granite Way
San Jose, CA 95136

Firm Representative and Title
Douglas Tolbert,
Plant Operator
Phone No. (408) 281-8080

Source: S-1
Asphalt Plant Baghouse
Plant No. 651 Permit No.
Operates on demand

Permit Conditions
NONE

BAAQMD REPRESENTATIVES

Source Test Engineers
C. McClure/G. Colwell

Permit Services Division / Enforcement Division

Test Requested by:
CDS

Operating Parameters:
2500 tons of 3/4" and 1/2" aggregate produced on 10/3/89. Production rate 300 tons per hour.

Applicable Regulations: Reg. 10 Subpart I
VN Recommended: NO

Source Test Results and Comments:

METHOD:	TEST	RUN A	RUN B	RUN C	AVERAGE	LIMIT
ST-17	Volume Flowrate, SDCFM	28,400	27,000	29,100	28,200	
	Stack Gas Temperature, °F	271	258	262	264	
ST-23	Water Content, % volume	29	34	30	31	
ST-14	Oxygen, volume % (dry)	12.5	12.1	12.5	12.4	
ST-14	Carbon Dioxide, Volume %,dry	4.6	4.6	4.5	4.6	
ST-15	Particulate, gr/SDCF	0.033	0.038	0.038	0.036	0.04
	Particulate, lb/hr	8.0	8.9	9.6	8.8	
	Isokinetic Ratio, act/theo	0.98	0.95	0.92		
ST-6	Carbon Monoxide, PPM	>2000	>2000	>2000	>2000	
	Carbon Monoxide, lb/hr	>247	>235	>253	>245	
	*Carbon Monoxide, lb/day	>2050	>1950	>2100	>2030	

*Pound per day carbon monoxide emissions are based on the test parameters of 2500 tons at 300 tons per hour.

Source Test Team Leader	Date	Senior Source Test Engineer	Date	Approved by Source Test Manager	Date
C. J. McClure McClure	11/9/89	K. Kunaniec K. Kunaniec	11/14/89	G. Karels	11/16/89

SOURCE TEST LAB DATA SHEET

PLANT: GRANITE ROCK CO S/T #651
SOURCE OPERATION: ASPHALT PLANT
SOURCE TEST NO.:
FILTER MEDIA: FLAT FIBER FILTER 110mm

PAGE 1 OF 1
INITIAL COMB
TEST DATE 10/3/89

Drying Procedure: 105 °C 24 hours before and after test, desiccated

FILTER DATA

RUN NO.	FILTER NO.	TARE WEIGHT (g) 8/9	8/24	FINAL WEIGHT (g) 10/5	10/6	SAMPLE WEIGHT (g) (mg)
A	301	.6668	.6667	.6762	.6762	0.0094
B	302	.6612	.6613	.6718	.6717	0.0104
C	300	.6560	.6560	.6649	.6648	0.0088

PROBE & NOZZLE RINSE DATA (total all runs)

RUN NO.	~~FILTER NO.~~ FILTER SAMPLE WEIGHT	~~FILTER~~ JAR ~~TARE WEIGHT (g)~~	JAR SAMPLE FINAL WEIGHT (g)	TOTAL SAMPLE WEIGHT (g) (mg)
A	0.0094	301	0.0198	0.0292
B	0.0104	302	0.0212	0.0316
C	0.0088	300	0.0238	0.0326

PROBE & NOZZLE RINSE DATA (each run)

RUN NO.	PROBE/NOZZLE NOS.	JAR TARE WEIGHT (g)	JAR FINAL WEIGHT (g) 10/6	10/10	SAMPLE WEIGHT (g) (mg)
A	12	56.5379	56.5577	577	0.0198
B	13	54.5461	54.5673	674	0.0212
C	14	54.6190	54.6428	430	0.0238

IMPINGER DATA

SOLUTION	NO.	A TARE WEIGHT	B FILLED WEIGHT	C FINAL WEIGHT	C-A SAMPLE WEIGHT	C-B CONDENSATE WEIGHT	
H_2O	T-1	514.2	613.2	606.0	91.8	-<7.2	
	T-2	502.9	601.3	728.2	225.3	126.9	>119.7
	T-3	471.8	572.4	707.3	235.5	134.9	>136
	T-4	502.8	603.2	604.3	101.5	1.1	
	T-5	495.7	595.6	709.0	213.3	113.4	>114.2
	T-6	469.4	569.1	569.9	100.5	0.8	

GRANITE ROCK #651 10/3/89

CO EMISSIONS

Q_{OA} = 28391 SDCFM
Q_{OB} = 27018 SDCFM
Q_{OC} = 29068 SDCFM

$\overline{MW}$ C = 12.011
(+) O = 15.9994
$\overline{MW}$ = 28.0104

ALL 3 RUNS CO = >2000 PPM

$$lb/HR = \frac{(PPM)(\overline{MW})(60\ MIN/HR)(Q_O\ SDCFM)}{386.9 \times 10^6}$$

RUN A $lb/HR = \frac{>2000(28.01)(60)(28391)}{386.9 \times 10^6} = >246.65\ lb/HR\ CO_A$

RUN B lb/HR $\frac{(>2000)(28.01)(60)(27018)}{386.9 \times 10^6} = >234.72\ lb/HR\ CO_B$

RUN C lb/HR $\frac{(>2000)(28.01)(60)(29068)}{386.9 \times 10^6} = >252.53\ lb/HR\ CO_C$

AT PRODUCTION FOR 10/3/89 OF APPROX ± 2500 TONS AT 300 TON/HR OPERATION WAS 8.3 HOURS SO

8.3 HR X AVERAGE OF >244.6 lb/HR = >2030 lb FOR THE DAY

8.3 X 247 = >2050
8.3 X 235 = >1950
8.3 X 253 = >2100

GRANITE ROCK CO S/F 10/3/95

	RUN A	RUN B	RUN C
O_2	12.5%	12.1%	12.5%
CO_2	4.6%	4.6%	4.5%
CO	>2000 PPM	>2000PPM	>2000PPM

GRANITE ROCK S/J 10/3/89

RUN A

O_2	CO
5.1	2.27
5.13	2.19
6.25	2.18
5.27	2.12
5.33	2.04
5.75	2.08
5.7	2.1
5-2	2.1
5.2	~~2.08~~ 2.1
5.14	2.0
5.14	2.12
5.5	2.12
5.4	2.02
5.47	1.93
$\bar{M}$ = 5.327 UNITS	1.95
	$\bar{M}$ = 2.088 UNITS

CO
|
> 2,000 ppm

$$\frac{X\ CO_2\%}{2.088\ UNITS} = \frac{14.4\%}{6.6\ UNITS}$$

$$X_{CO_2}\% = 4.5556 = \underline{4.6\%}$$

$$\frac{X_{O_2}\%}{5.327\ UNITS} = \frac{4.92\%}{2.1\%\ UNITS}$$

$$X_{O_2}\% = 12.489\% = \underline{12.5\%}$$

GRANITE ROCK S/S 10/3/89

ROM B

O_2	CO_2
5.198	2.1
5.5	1.95
5.3	2.05
5.38	2.07
5.27	2.1
5.12	2.12
5.12	2.13
5.1	2.15
5.05	2.17
5.05	2.16
5.05	2.15
5.05	2.1
5.07	2.14
5.07	$\bar{M} = 2.107$

$\bar{m} = 5.166$

CO
>2000PPM

1124
↓ 36
1218 18
54 MIN

$\frac{14.4\%}{6.6 \text{ UNITS}} = \frac{X\%}{2.107 \text{ UNITS}}$

$X_{CO_2}\% = 4.597 = 4.6\%$

$\frac{4.92\%}{2.1 \text{ UNITS}} = \frac{X\%}{5.166}$

$X_{O_2}\% = 12.1\%$

GRANITE ROCK COS/J 10/3/89

ROM C

O_2	CO_2	CO
5.08	2.13	>20000ppm
5.05	2.16	
5.12	2.1	
5.14	2.09	
5.1	~~2.0~~ 2.1	
5.42	~~[illegible]~~ 2.09	
5.75	2.02	
~~5.35~~ 5.60	2.04	
5.35	2.04	
5.44	2.01	
5.5	2.04	
5.45	$\bar{m} = 2.0745$	

$\bar{M} = 5.333$

(CO_2)

$$\frac{14.4\%}{6.64 \text{ UNITS}} = \frac{X\%_{CO_2}}{2.0745 \text{ UNITS}}$$

$$X\%_{CO_2} = 4.498\% \simeq 4.5\%$$

$$\frac{4.92\%}{2.1 \text{ UNITS}} = \frac{5.333}{X_{O_2}} \quad \therefore \quad X_{O_2} = \frac{5.333(2.1)}{4.92}$$

(O_2)

$$\frac{4.92\%}{2.1 \text{ UNITS}} = \frac{X_{O_2}\%}{5.333 \text{ UNITS}}$$

$$\therefore X_{O_2}\% = \frac{(4.92)(5.333)}{2.1}$$

$$\%O_2 = 12.49 \simeq 12.5\% O_2$$

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 · 771-6000

Source Test Data Sheet

Source Operation: GRANITE ROCK ASPLT.
Plant:
Sample Type: PART & GAS
Process Cycle: ASPHALT.
Duct Size: 42" ROUND
Duct Pressure: +3.0
ASSUMED H_2O: 25%

Source Test No.:
Run No.: T #1
Date: 10/3/89

3.2 mm Nozzle Diameter
0.85 Pitot Tube
UAM #12 Gas Collector No.
29.65 Barometric Pressur
Leak Rate @ 15"Hg
9 TIME EACH POINT
6 # OF POINTS
54 TIME EACH RUN

#301

IMPINGERS T, & T2

Sampling Train: NOTE RUN #1 USED FILTER #2 FROM BOX

SAMPLING #1 BOOTEN,

Traverse Point	Dist. From inches	INITIAL TRAVERSE Duct Temp °F 270	ΔP "H_2O	√ΔP	Traverse Point	h "H_2O	V_s FPS	Time 1014	METER Rate CFM	METER Temp °F	METER Volume Ft^3 566.73	Vac "Hg	Sat'd Gas Temp °F	T_s Duct Temp °F	ROTO CFH	REMARKS
P1	~~1.3~~	269°F			P3	.7	56.1	1023	.154	67	568.11 568.126	2.0 ~~1.6~~	41.0	280 740	9.2	~~1.396~~
2	~~1.8~~	730°R			P4	.6	56.9	1032	.142	67	569.406 569.424	2.0	40.6	280 740	8.5	~~1.298~~
3	1.1				P5	.52	AP.35	1041	.132	67	570.615 570.62	2.0	40.8	280 740	7.9	~~1.196~~
4	.8				P6	2.1	96.11	1050	.269	67	573.04 573.00	4.0	43.1	264 724	16.3	~~2.38~~
~~6~~ 5	1.5				P7	4.6	140.3	1059	.395	67	576.55 576.528	6.0	43.2	260 720	25.7	~~3.528~~
~~6~~	3.7				P8	5.0	AP3	1108	.415	67	580.26 580.29	6.5	42.4	264 724	24.9	~~3.762~~
~~7~~	4.8															~~13.56~~
~~8~~	5.0										13.56					13.56
~~9~~	5.2															
~~10~~	~~5.2~~															
	4.233															

730 .3948 .13238 .1536 .1422 .2689

$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2} = 3.64_{mm}$ Condensate ____ gm.

138.1 75

$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\ D_{AVG}^2\right]\frac{V_s}{T_s}$

V_o ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLEN COLWELL

$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$

SAY 4.3 = ΔP_{AVG} 138.1 FPS – VAVG.
T_s = 730

FIG V-59
77a

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

Source Test Data Sheet

Source Operation: BAGHOUSE EXH.
Plant: GRANITE ROCK/AMP
Sample Type: PARTICULATE & GAS
Process Cycle: ASPHALT
Duct Size: 42" ROUND
Duct Pressure: + 3.0" H_2O
ASSUMED H_2O: ~~25%~~ ≈ 30%
120 mL H_2O COND.
ZONE A

Source Test No.:
Run No.: #2
Date: 10/28/89

3.2 Nozzle Diameter
0.85 Pitot Tube
UBA #12 Gas Collector No.
29.65 Barometric Pressure
0.01 @ 20 Leak Rate @ 15" Hg
9 TIME EACH POINT
12 # OF POINTS
54 TIME EACH RUN

Sampling Train: IMPINGERS T 38.74
FILTER #3 - #302 BAGHOUSE EXIT T = 268°F

Traverse Point	Dist. From inches	INITIAL TRAVERSE Duct Temp °F	ΔH H_2O	$\sqrt{\Delta h}$	Traverse Point	Δh H_2O	V_s FPS	Time 1124	METER Rate CFM	METER Temp °F	METER Volume Ft^3 580.44	Vac "Hg	Sat'd Gas Temp °F	T_s Duct Temp °F	ROTO CFH	REMARKS
					P_3	.75	57.1	1133	.162	67	581.66	2.0	36.8	256 716	9.6	1.22
					P_4	.63	52.5	1142	.138	67	582.902	2.0	39.4	261 721	8.2	1.242
					P_5	.5	32.9	1151	.083	67	584.005	2.0	39.6	254 714	5.2	1,103
					P_6	2.0	93.3	1200	.246	67	586.218	3.8	40.0	257 717	14.8	2.213
					P_7	4.3	137.1	1209	.360	67	589.45	5.5	43.7	260 720	21.6	3.232
					P_8	5.0	148	1218	.388	67	592.94 593.057	7.0	45.4	261 721	23.3	3.607
											12.617					12.617

.0872 .1377 .1616 .1476 .12334

$$D_n = 13.7\left[\frac{.2462}{T_s + 460}\right]^{1/2}$$

Condensate ____ gm.

V_o ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

5.688 / 13.56+5.688

$H_2O + = V_o = 13.56 + 120$

Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLENN COLWELL

$$Q_m = \left[(2.638 \times 10^{-3})\ (100-\%H_2O)\ D_{nozz}^2\right]\frac{V_s}{T_s}$$

$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$

$\frac{(.0474)(120)}{13.56+(.0474)(120)} \times 100 = 29\ \%H_2O$ RUN A

FIG V-59
77A

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
939 Ellis Street, San Francisco, Calif. 94109 • 771-6000

Source Test Data Sheet

Source Operation: BAGHOUSE
Plant: GRANITE ROCK S/I
Sample Type: PART+GAS O_2 CO CO_2
Process Cycle: ASPHALT
Duct Size: 42" DIA.
Duct Pressure: +3.0" H_2O
ASSUMED H_2O: 30%

Source Test No.:
Run No.: #3
Date: 10/18/89

3.2 Nozzle Diameter
0.85 Pitot Tube
UMV#12 Gas Collector No.
29.65 Barometric Pressur
0.01@21 Leak Rate @ 15"Hg
9 TIME EACH POINT
6 # OF POINTS
54 TIME EACH RUN

FILTER#300 IMPINGERS T-5, T-6

300T/Hr ½ & 3/4"

Sampling Train:

Traverse Point	Dist. From inches	INITIAL TRAVERSE Duct Temp°F	INITIAL TRAVERSE H H_2O	INITIAL TRAVERSE √h	Traverse Point	h H_2O	V_s FPS	Time 1233	METER Rate CFM	METER Temp °F	METER Volume Ft^3 593.19	Vac "Hg	Sat'd Gas Temp°F	T_s Duct Temp°F	Roto CFH	REMARKS
					P_3	.75	57.2	12.42	.151	67	594.65 594.545	2.0	40.9	258 718	9.1	1.355
					P_4	.65	53.7	12.51	.139	67	595.8 595.805	2.0	45.1	271 731	8.3	1.26
					P_5	.55	49.1	1300	.129	67	596.96 596.915	3.0	43.7	261 721	7.7	1.11
					P_6	2.0	93.2	13199 1309	.246	68	599.13 599.15	3.0	43.3	258 712	14.8	2.235
					P_7	4.5	140.4	1328 1328	.368	68	602.46 602.57	5.0	44.6	261 721	22.1	3.42
					P_8	5.5	155.9	1337 1337	.405	68	606.215 606.22	6.0	46.2	268 728	24.3	3.652
											13.032 13.032					13.032

2500ST.

$$D_n = 13.7\left[\frac{T_s + 460}{V_s(100-\%H_2O)}\right]^{1/2} \quad .15065 \quad .13899 \quad .12874 \quad .2465 \quad (.36824)$$

Condensate ____ gm.

$$Q_m = \left[(2.638 \times 10^{-3})\,(100-\%H_2O)\,D_{nun}^2\,\frac{V_s}{T_s}\right]$$

$V_s = 2.9(K_p)\sqrt{T_s \cdot h_{H_2O}}$

V_o ____
$\%H_2O$ ____
$\%CO_2$ ____
$\%CO$ ____
$\%O_2$ ____

Source Test Team
CHUCK McCLURE
Source Test Engineer I
GLEN COLWELL

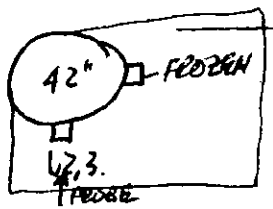

FIG V-59
77a

GRANITE ROCK CO #651
10-12-90 S-1

$CO_{PPM} \rightarrow CO_{LB/HR}$

$$CO_{LB/HR} = \frac{(PPM)(MW)(60)(Q)}{386.9 \times 10^6}$$

$\overline{MW}_{CO} = 28.01$

$Q = 37,805$ SDCFM

$$CO_{A\ LB/HR} = \frac{(>2000)(28.01)(60)(37805)}{386.9 \times 10^6}$$

$CO_{A\ LB/HR} = 328.4\ LB/HR$

$$CO_{B\ LB/HR} = \frac{(1708)(28.01)(60)(37805)}{386.9 \times 10^6}$$

$CO_{B\ LB/HR} = 280.5\ LB/HR$

$$CO_{C\ LB/HR} = \frac{(1882)(28.01)(60)(37805)}{386.9 \times 10^6}$$

$CO_{C\ LB/HR} = 325.5\ LB/HR$

$CO_{AVG\ LB/HR} = 311.5$

ISOKINETIC RATIO'S

$$R_I = \frac{(T_S)(V_m)(100)}{(60)(100 - \%H_2O)(A_n)(V_S)(TIME)(T_m)}$$

$D_n = 3.9\ MM = .39\ CM$

$A_n = 0.0002691\ \pi\ (D_n\ CM)^2\ FT^2$

$A_n = 0.0002691\ \pi\ (.39\ CM)^2\ FT^2$

$A_n = 0.0001286\ FT^2$

$A_n = 1.286 \times 10^{-4}\ FT^2$

(RUN A) $T_S = 717.8°R$ $V_m = 21.83\ FT^3$ $V_S = 103.3\ FPS$ $TIME = 50\ MIN$ $T_m = 522.4°R$

$\%H_2O = 19.9$ $100 - \%H_2O = 80.1$

$$R_A = \frac{(717.8)(21.83)(100)}{(60)(80.1)(1.286 \times 10^{-4})(103.3)(50)(522.4)} = 0.9396 = \boxed{0.94} > A$$