Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

Background Report Reference

AP-42 Section Number: 11.17

Background Chapter: 4

Reference Number: 4

Title: US Lime, Henderson,NV

Wesley D. Snowden

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Consulting Engineers

December 1974

11488

AP-42 Section 11.17
Reference NOT USED
Report Sect. 4
Reference 4

LIME

U.S. LIME
HENDERSON, NEVADA

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- NOT USED for E.F. CALC'S
- Sampling could not be performed in accordance w/ EPA requirements for 90-110% isokinetic flow.
- Process data was very limitted

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December 26, 1974

PURPOSE

Emissions samples were taken on the outlet duct at a lime hydrator located at Henderson, Nevada. The plant is owned and operated by U.S. Lime which is a division of Flintkote Co. The plant used a baghouse for particulate reduction purposes and was assumed to be one of the best controlled sources, in connection with this type of industrial process. Results of the tests are to be used by the EPA for evaluating and setting Nation-wide standards for this type of industrial process.

SUMMARY

The evaluation was performed on April 23/24, 1974. The outlet grain loadings for the four samples were 0.0126, 0.0209, 0.0161, and 0.0186 for the respective runs. The grain loading was not corrected for CO_2. The average percent moisture for the four runs was 82.24%. The percent isokinetic for the four respective runs was 153%, 194%, 155%, and 140%.

The standard cubic foot is defined at 70°F., 1 atmosphere pressure and dry.

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DISCUSSION OF RESULTS

The sampling team arrived on the afternoon of April 22, 1974. Due to U.S. Lime's early shutdown time of 4 P.M., work was not started until the morning of April 23, 1974. The sampling equipment was setup according to EPA Method 5 Procedures and a wet and dry bulb temperature was taken. The approximate moisture content of the stack gases was determined by using a high temperature psychrometric chart. This moisture content was 80%.

A nomograph was then set up using the collected data. The standard EPA nomograph for isokinetic sampling is based upon a maximum moisture content of 50%. This made it necessary to interpolate several values in order to arrive at an approximate "K" value on the nomograph. A short 25-minute sample was taken to confirm the moisture content and isokinetic sampling rate. The moisture content agreed with the psychrometeric chart, but preliminary calculations showed the precent isokinetic well below 100%. This was attributed to the high moisture content of the stack gases. During the next 4 runs the air flow rate through the dry gas meter was hand calculated for each point. At the completion of each test the isokinetic sampling rate was calculated and adjustments were made. A review of the data summary shows that the ideal 100% ± 10% isokinetic sampling rate was not reached.

The isokinetic sampling rates for all of the five runs were substantially above 100%. This discrepancy can be accounted for by considering two factors. The nomograph used was intended for moisture contents from 0% to 50%. This made it necessary to interpolate several values in order to arrive at an approximate "K" value on the nomograph, as mentioned above.
The second reason can be reviewed on the following graph. Curve No. 1 is comparing the percent moisture and the percent isokinetic for the first test at U.S. Lime. For this run the "C" value was only approximated and the sample was run to determine isokinetic values and percent moisture. As can be seen the slope of the curve is quite steep in the area between 90% and 110% isokinetic which are the allowable limits of EPA Method 5. If the original determination of the percent moisture of the stack gases is in excess of ± 3% of the actual, the percent isokinetic will be beyond the allowable limits. This compares with a tolerance of ± 11% moisture for stack gases in the vicinity of 5% moisture content (Curve No. 2) which is a more typical percent moisture.

To demonstrate how the high moisture content could have affected over isokinetic values, the following conditions could apply. If the same nomograph setting was used on Run No. 2 as on Run No. 1 the percent isokinetic for Run No. 2 would have been approximately 98% based upon the moisture correction. If the same nomograph setting was used on Run No. 3 the percent isokinetic would have been approximately 160% isokinetic. The conclusion is that when sampling stack gases with this high of moisture content continuous monitoring of the percent moisture with a wet bulb, dry bulb and psychrometric chart is necessary and the nomograph or equations should be readily available to make adjustments in the sampling flow rate.

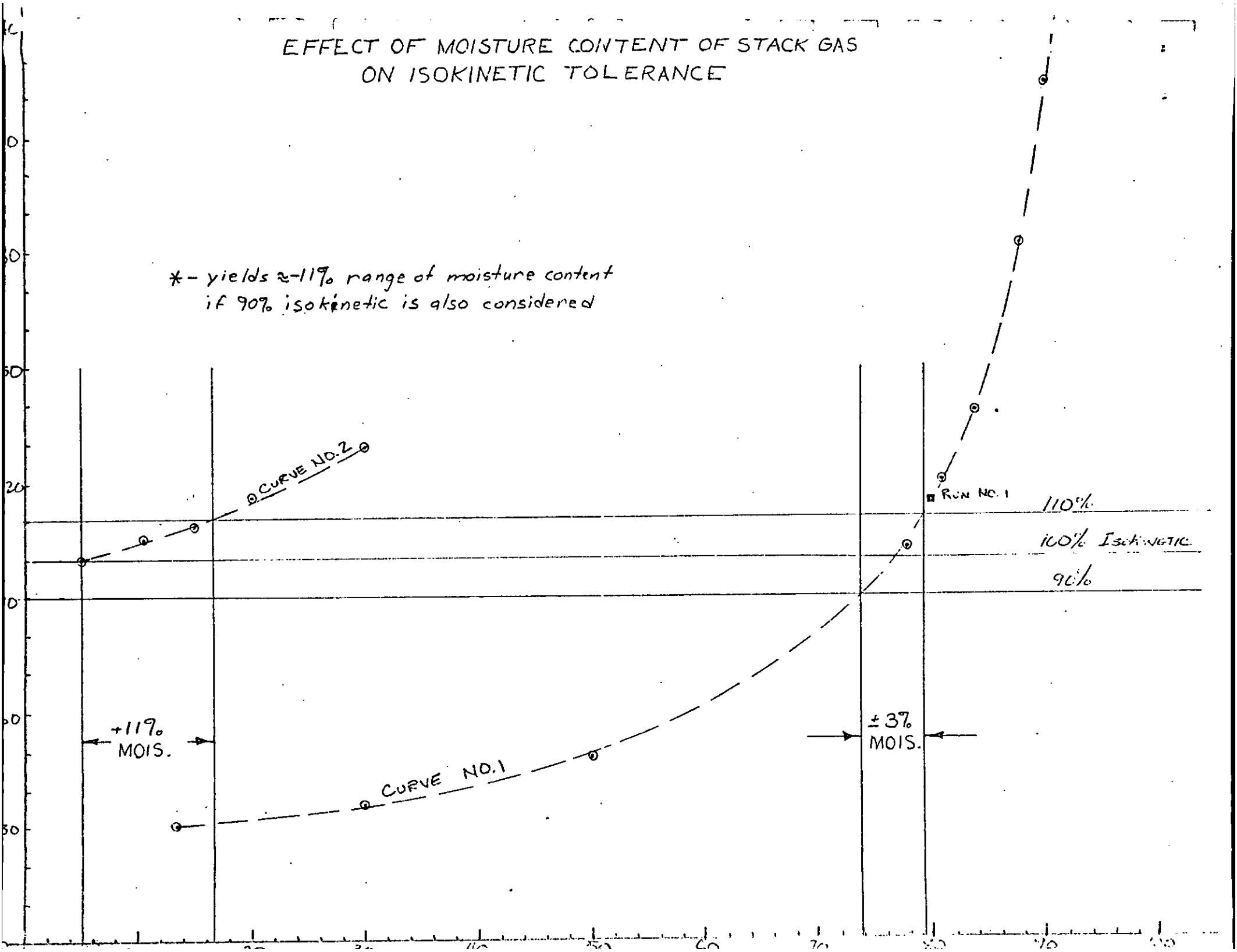
The existing outlet duct was modified with a duct extension, (Figure 3), and sampling was accomplished with this extension. A total of twelve (12) sampling points were selected, three (3) traverses with 4 points each, in the square stack. Data readings were taken every two and one-half minutes with 5 minutes per point for a total of one hour per sample. Due to the extremely high moisture content of the flue gases the impinger section of the sampling train would become completely filled with condensed water in approximately 30 minutes.

When this occured the sampling train was stopped and the backhalf of the sampling train (impingers) was completely removed and a new section installed. Approximately 25 pounds of ice were required for each one hour run, due to the high heat content of the nearly saturated gases.

CO_2 readings were taken during each run with a Fyrite. The maximum value which could accurately be read was 20% CO_2. Any value greater than this had to be read by visually extending the scale and interpolating the values. Due to the extremely high moisture content a correction was made for the moisture added to the fryrite solution, which could result in higher readings. The Fyrite was zeroed and a CO_2 reading was taken. After reading the CO_2 concentration, the Fyrite solution was released and allowed to return to its neutral level. The difference between the original zero and this final neutral level was deducted from the CO_2 reading and was assumed to be the fraction added by the water vapor. This correction quantity never exceeded 1% CO_2 and in most cases was zero.

The outlet grain loadings were 0.0126, 0.0209, 0.0161 and 0.0186 grains per standard cubic foot for Runs 2 through 5. Run No. 2 has a substantially lower grain loading than the other three runs. This can be accounted for because of two factors. Approximately 660 ml of sample was lost, thus only 1610 ml of the original 2270 ml was analyzed. An approximate value for the particulate lost was calculated by determining the concentration of the particulate in the remaining solution and multiplying it times the quantity of solution lost. This can be considered only an approximation, as a review of the impinger washes of the other runs indicates that the particulate was not evenly distributed throughout the various sample bottles. The second point is that no acetone wash of the impingers and bubblers was performed on this run.

SCRAP RUN 2


EFFECT OF MOISTURE CONTENT OF STACK GAS
ON ISOKINETIC TOLERANCE
*- yields ≈-11% range of moisture content
if 90% isokinetic is also considered
CURVE NO. 2
CURVE NO. 1
RUN NO. 1
110%
100% ISOKINETIC
90%
+11% MOIS.
±3% MOIS.

DATA SUMMARY
LIME HYDRATOR - U.S. LIME
HENDERSON, NEVADA

RUN NO.	AIR FLOW ACFM	AIR FLOW SCFM	PERCENT MOISTURE	PERCENT ISOKINETIC	OUTLET GRAIN LOADING (FRONT HALF)*GR/SCF	PMR (FRONT HALF)* LB/HR
1**	5367	683	80.4	114	-	-
~~2~~	~~6175~~	~~939~~	~~76.2~~	~~153~~	~~0.0126~~	~~0.102~~
3	5791	581	86.4	194	0.0209	0.104
4	5378	675	80.7	155	0.0161	0.093
5	5895	539	85.7	140	0.0186	0.086

* Data based on particulate collected in front half of sampling train, uncorrected for non-isokinetic conditions. Calculated using ratio of front half particulate to Pt of data print-out.

** Sample collected to determine % moisture. Particulate collected was not analyzed.

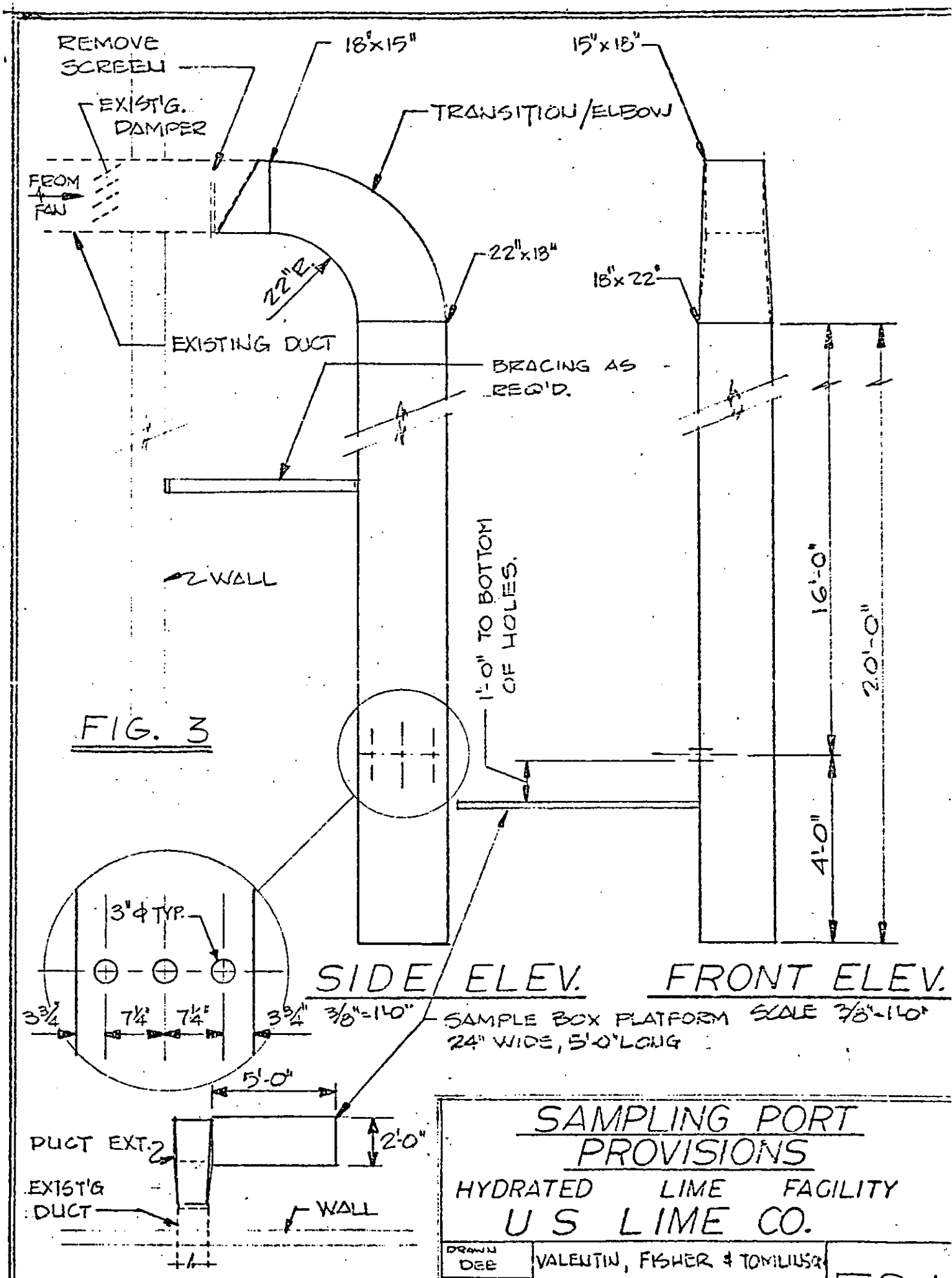

REMOVE SCREEN
EXIST'G. DAMPER
FROM FAN
18"x15"
15"x18"
TRANSITION/ELBOW
22"x18"
18"x22"
22"R
EXISTING DUCT
BRACING AS REQ'D.
WALL
1'-0" TO BOTTOM OF HOLES.
16'-0"
20'-0"
4'-0"
3"ϕ TYP.
3¾"
7¼"
7¼"
3¾"
3/8"=1'-0"
SIDE ELEV.
FRONT ELEV.
SAMPLE BOX PLATFORM 24" WIDE, 5'-0" LONG
SCALE 3/8"=1'-0"
5'-0"
2'-0"
DUCT EXT.
EXIST'G DUCT
WALL
PLAN VIEW 3/16"=1'-0"
SAMPLING PORT PROVISIONS
HYDRATED LIME FACILITY
U S LIME CO.
DRAWN DEE
CHECKED
DATE 3-29-74
VALENTIN, FISHER & TOMLINSON
CONSULTING ENGINEERS
SEATTLE WASHINGTON
ES-1
DWG NO.

FIG. 3

PROCEDURE

(PARTICULATE SAMPLING TRAIN)

Stack gas sampling equipment designed by the United States Environmental Protection Agency (EPA), Office of Air Programs was used on this evaluation. A schematic of the sampling equipment is included in this report.

Sampling was performed according to the following:
Sampling ports were selected and installed. The number of sampling points were determined considering the number of duct diameters between obstructions in the duct up stream and down stream of the sampling ports. Stack pressure, temperature moisture content and maximum velocity head readings were measured. An EPA designed nomograph was set up using this data and the correct nozzle diameter was selected using the nomograph.

The sampling train was prepared as follows:
An impinger was filled with approximately 500 gram of silica gel and weighed to the nearest 0.1 gram. A filter (MSA 1106-BH) was labeled and dessicated for at least 24 hours and weighed to the nearest 0.5 mg. 100 milligrams of water was placed in the first and second impingers. The third impinger was left dry. All three impingers were then weighed individually to the nearest 0.1 gram and recorded.

A leak test was preformed on the assembled sampling train. The leak rate did not exceed 0.02 cfm at a vacuum of 24 inches Hg. The probe was heated so that the gas temperature at the probe outlet was approximately 250°F. The filter was heated to approximately 250°F. to avoid condensation of moisture on the filter. Crushed ice was placed around the impingers at the beginning of the test with new ice being added as required to keep the gases leaving the sampling train below 70°F.

The train was operated as follows:
The Probe was inserted into the stack to the first traverse point with the nozzle tip pointing directly into the gas stream. The pump was started and immediately adjusted to sample at isokinetic velocities. Equal time was spent at selected points of equal elemental areas of the duct with the pertinent data being recorded from each time interval. The EPA nomograph was used to maintain isokinetic sampling throughout the sampling period. At the conclusion of the run the pump was turned off, the probe was removed, and the final readings were recorded.

Clean up of the sample train and analysis of the samples was performed according to the enclosed clean up and analysis procedure.

PROCEDURE (continued)

The weight of the dust per volume and weight of dust per time were calculated as follows:

The Concentration Method:

The condentration of dust entering the sampling nozzle is calculated and then multiplied by the volumetric flow rate of the stack gases to obtain the Pollutant Mass Rate (PMR).

Concentration in Nozzle x Volumetric Flow Rate = Pollutant Mass Rate On Concentration Basis.

$$(P_T/VOL_{STD}) \times Q_{os} = PMR_p$$

Assuming the nozzle velocity is greater than the average stack gas velocity (V_n greater than V_o), the calculated Pollutant Mass Rate will be less than the true Pollutant Mass Rate because the heavier dust particles will leave their streamline and not enter the nozzle. If V_n is less than V_o then the calculated PMR will be greater than the true PMR.

CLEAN-UP AND ANALYSIS

Clean-up of the EPA train was performed by carefully removing the filter and placing it in a container marked "Run X, Container A". Distilled water and brushes were used to clean the nozzle, glass probe and pre-filter connections. The water wash was placed in a container marked "Run X, Container B". The volume of water in the impinger and bubblers (glassware) was weighed in their respective containers to the nearest 0.1 gram. The original weights which included approximately 100 ml. of water in the bubbler and 100 ml. of water in the impinger were then subtracted and the difference added with the water weight gain of the silica gel. This represented the amount of water collected during the run. The water from the glassware and a water rinse of the glassware was placed in a container marked "Run X, Container C". An acetone rinse of the glassware and all post-filter glassware (not including the silica gel container) was performed and placed in a container marked "Run X, Container D".

Analysis of the samples in each container was performed according to the following:

Run X, Container A - Transfer the filter and any loose particulate from the sample container to a tared glass weighing dish and desiccated for 24 hours in a desiccator or constant humidity chamber containing a saturated solution of calcium chloride or its equivalent. Weighed to a constant weight and report the results to the nearest 0.1 milligram.

Run X, Container B - Measure the volume to the nearest 0.1 milliliter. Transfer water washings from container into a tared beaker and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours and weigh to a constant weight. Report the result to the nearest 0.1 milligram.

Run X, Container C - Measure the volume to the nearest 0.1 milliliter. Extract organic particulate from the water solution with three 25 milliliter portions of chloroform and three 25 milliliter portions of ethyl ether. Combine the ether and chloroform extracts and transfer to a tared beaker. Evaporate until no solvent remains at about 70°F. This can be accomplished by blowing air that has been filtered through activated charcoal over the sample. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 milligram. After the extraction, evaporate the remaining water to dryness and report the results to the nearest 0.1 milligram.

Run X, Container D - Measure the volume to the nearest 0.1 milliliter. Transfer the acetone washings to a tared beaker and evaporate to dryness at ambient temperature and pressure. Desiccate for 24 hours and weigh to a constant weight. Report the results to the nearest 0.1 milligram.

Blanks were taken on the deionized water, ether and chloroform and subtracted from the respective sample volumes. The filter paper used with the EPA train was a Mine Safety Appliance 1106 BH, heat treated glass fiber filter mat.

The following sample identification numbers were assigned to samples collected at U.S. Lime Company, Henderson, Nevada:

RUN NO.	ANALYSIS #	CLEAN-UP #	DESCRIPTION
2	2A	13A	Filter
	2B	13B	Front Half Acetone Wash
	2C	13C	Back Half Water
	$2C_x$		Ether-Chloroform Extraction
	2D	13D	Back Half Acetone Wash
3	3A	14A	Filter
	3B	14B	Front Half Acetone Wash
	3C	14C	Back Half Water
	$3C_x$		Ether-Chloroform Extraction
	3D	14D	Back Half Acetone Wash
4	4A	15A	Filter
	4B	15B	Front Half Acetone Wash
	4C	15C	Back Half Water
	$4C_x$		Ether-Chloroform Extraction
	4D	15D	Back Half Acetone Wash
5	5A	16A	Filter
	5B	16B	Front Half Acetone Wash
	5C	16C	Back Half Water
	$5C_x$		Ether-Chloroform Extraction
	5D	16D	Back Half Acetone Wash

PROCESS
DESCRIPTION AND PROCESSS

Limestone consists primarily of calcium carbonate or combinations of calcium and magnesium carbonate with varying amounts of impurities. Lime is calcined or burned form of limestone, commonly divided into two basic products - quicklime and hydrated lime. Calcination expels carbon dioxide from the raw limestone, leaving calcium oxide (quicklime). With the addition of water, calcium hydroxide (hydrated lime) is formed.

The basic processes in production are (1) quarrying the limestone raw material, (2) preparing the limestone for kilns by crushing and sizing, (3) calcining the limestone, and (4) optionally processing the quicklime further by additional crushing and sizing and then hydration.

The Flintkote Company dolomitic lime plant at Henderson, Nevada, operates a pressure hydration unit controled by a baghouse.

To prevent condensation of moisture on the bag filters, the offgases from the hydrator are heated to between 300 and 350°F. by a gas burner before passing through the baghouse. The pressure drop across the baghouse ranged from 2.3 to 4.1 in H_2O. The gas exiting from the baghouse contains approximately 79% H_2O and 15% CO_2. This gas exits through the fan exhaust directly to the atmosphere. A summary of the operating variables is presented in the following Table. Process feed rates were not obtained because the isokinetic sampling was not successful.

For these tests an extension duct was added to allow sampling according to EPA prescribed methods. Addition of this ducting increased back pressure on the baghouse and resulted in condensation of water vapor on the filters. The exhaust fan shaft speed was increased from the normal rate of 1835 RPM to 2080 RPM to overcome the condensation problem.

Sampling performed consisted of four one-hour particulate samples. More extensive testing was abandoned when calculations indicated that sampling could not be performed in accordance with EPA requirements for 90 to 110 percent isokinetic flow. The extremely high moisture content, approximately 80% by volume, was the source of this difficulty. Future attempts to sample this plant must be preceded by a revision of EPA particulate sampling procedures. Visual observation of the residual plume indicates that the baghouse is doing a very good job of controlling particulate emissions.

A five minute collection of hydrate caught in the baghouse indicated that it was recovering approximately 100 pounds of lime per hour.

SUMMARY OF PRESSURE HYDRATOR AND
BAGHOUSE OPERATING DATA
DURING SAMPLING

Date	4/24/74	4/24/74	4/25/74
Test No.	1	1	3, 4, & 5
Lime Feed Rate (tons/hr)			
Water Feed Rate (tons/hr)			
Hydrated Feed Rate (tons/hr)			
Baghouse Pressure Drop (inches H_2O)	3.9-4.1	3.3-3.5	2.3-3.35
Baghouse Inlet Temp. (°F)	318-356	324-347	305-351

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COMPUTER PRINT-OUT OF ATMOSPHERIC EMISSION DATA

JOB NAME EPA U.S. LIME DATE April 23, 1974

PREPARED BY Michael Dick APPROVED PAGE OF

SUBJECT % MOISTURE & ISOKINETIC CALCULATIONS RUN #1

11·169	VOLm	0·13	VH	VH		
27·53	Pm	752	Ts	Ts	10·082174	Ka
530	Tstd	9·887365				
557	Tm				0·85	Cp
		0·16	VH	VH	32·522288	Vo
9·778665	VOLstd	752	Ts	Ts	2·75	As
		10·969047				
40·03	VOLw				5367·332526	Qo
		0·15				
80·367500	M	752			530	TSTD
		10·620734			752	Ts
0·196325	MF				27·5	PSN
31·44	Wd	0·15				
		752			682·595217	QOS
20·638608	Ww	10·620734				
					752	Ts
1·184360	Cd	0·14			530	TSTD
27·5	Psn	752			27·5	PSN
		10·260604			25	T
1·043072	Cs				0·001364	An
		0·14				
		752			37·581072	Vn
		10·260604			115·529955	I
		0·14				
		752				
		10·260604				
		0·17				
		752				
		11·306635				
		0·19				
		752				
		11·953242				

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COMPUTER PRINT-OUT OF ATMOSPHERIC EMISSION DATA

JOB NAME EPA US LIME DATE APRIL 23, 1974

PREPARED BY MICHAEL DICK APPROVED _____ PAGE _____ OF _____

SUBJECT EPA U.S. LIME PARTICULATE CONCENTRATION RUN #2

28.52	VOLm	0.19	VH	0.21	VH		
27.54	Pm	765	Ts	775	Ts	12.466563	K_a
530	Tstd	12.056118		12.757356			
577	Tm					0.05	C_p
		0.17	VH	0.15	VH	37.424266	V_o
24.113037	VOLstd	765	Ts	760	Ts	2.75	A_s
		11.463946		10.677078			
77.0	VOLw					6175.169460	Q_o
		0.18		0.21			
		770		760		530	T_{std}
76.152300	M	11.772850		12.633289		764	T_s
						27.5	P_{sn}
0.230477	MF	0.19		0.19			
31.60	Wd	770		760		938.954992	Q_{os}
		12.095453		12.016655			
21.243287	Ww						
		0.17		0.18			T_s
1.167382	Cd	770		760		764	T_{std}
27.50	Psn	11.441153		11.696153		530	P_{sn}
						27.5	T
1.043072	Cs					60	A_n
		0.18		0.25		0.000767	
		770		760			
		11.772850		13.784048		57.421986	V_n
						153.459265	I
		0.18		0.26			
		770		760		99.14	P_f
		11.772850		14.057026		0.018613	C_o
	0.15	0.18		0.29			
	760	770		760		12	N
	10.677078	11.772850		14.845074		0.01861	C
	0.16	0.20		0.29		0.149763	PMRp
	760	770		760			
	11.027239	12.409673		14.845074			
		0.22		0.25			
		770		750			
		13.015375		13.693063			
		0.22		0.26			
		775		750			
		13.057564		13.964240			

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COMPUTER PRINT-OUT OF ATMOSPHERIC EMISSION DATA

JOB NAME EPA - U.S. LIME DATE APRIL 23, 1974

PREPARED BY MICHAEL DICK APPROVED PAGE OF

SUBJECT EPA U.S. LIME PARTICULATE CONCENTRATION RUN #3

21.339	VOLm	0.15	VH	0.20	VH		
27.65	Pm	760	Ts	770	Ts	11.403676	Ka
530	Tstd	10.677078		12.409673			
554.6	Tm					0.75	Cp
		0.16	VH	0.17	VH	35.999333	Vo
18.045324	VOLstd	760	Ts	770	Ts	2.75	As
		11.027239		11.441153			
102.4	VOLw					5721.409900	Qo
		0.16		0.17			
84.456800	M	750		770		530	TSTD
		10.954451		11.441153		750	Ts
0.155432	MF					27.62	PSN
31.6	Wd	0.15		0.16			
		750		770		581.031144	Qos
20.113875	Ww	10.606601		11.099549			
						750	Ts
1.193709	Cd	0.14		0.16		530	TSTD
27.62	Psn	750		770		27.62	PSN
		10.246950		11.099549		60	T
1.040803	Cs					0.000767	An
		0.14		0.19			
		750		770		68.029378	Vn
		10.246950		12.095453		193.816261	I
		0.17		0.21		41.56	PT
		750		770		0.033961	Co
		11.291589		12.716131			
		0.17		0.22		12	N
		750		750		0.033961	C
		11.291589		12.845232			
						0.169126	PMRp
		0.19		0.22			
		750		750			
		11.937336		12.845232			
	0.11	0.19		0.20			
	760	750		750			
	9.143303	11.937336		12.247448			
	0.115	0.20		0.20			
	760	770		760			
	9.348796	12.409673		12.328828			

VALENTINE, FISHER & TOMLINSON
CONSULTING ENGINEERS

COMPUTER PRINT-OUT OF ATMOSPHERIC EMISSION DATA

JOB NAME EPA U.S. LIME DATE APRIL 23, 1974

PREPARED BY MICHAEL DICK APPROVED PAGE OF

SUBJECT EPA U.S. LIME PARTICULATE CONCENTRATION RUN # 4

20·617	VOLm	0·13	VH	0·09	VH		
27·64	Pm	760	Ts	770	Ts	10·714856	Ka
530	Tstd	9·939818		8·324662			
577	Tm					0·05	Cp
		0·13	VH	0·11	VH	32·592003	Vo
17·494517	VOLstd	760	Ts	730	Ts	2·75	As
		9·939818		8·961026			
73·1	VOLw					5377·680480	Qo
		0·16		0·13			
80·689200	M	760		730		530	TSTD
		11·027239		9·741663		753	Ts
0·193108	MF					27·62	PSN
31·44	Wd	0·14		0·18			
		760		735		674·742768	Qos
20·595371	Ww	10·315037		11·502173			
						753	Ts
1·105603	Cd	0·13		0·19		530	TSTD
27·62	Psn	760		735		27·62	PSN
		9·939818		11·817360		60	T
1·040803	Cs					0·000767	An
		0·12		0·26			
		760		735		50·496436	Vn
		9·549869		13·823892		154·935049	I
		0·14		0·26		38·29	PT
		760		740		0·033705	Co
		10·315037		13·870832			
		0·14		0·25		12	N
		760		740		0·033705	C
		10·315037		13·601470			
		0·18		0·24			
		770		740			
		11·772850		13·326664			
	0·10	0·17		0·22			
	765	770		740			
	8·746427	11·441153		12·759310			
	0·10	0·09		0·11			
	760	770		750			
	8·717797	8·324662		9·082951			

VALENTINE, FISHER & TOMLINSON
CONSULTING ENGINEERS

COMPUTER PRINT-OUT OF ATMOSPHERIC EMISSION DATA

JOB NAME EPA U. S. LIME DATE APRIL 23, 1974

PREPARED BY Michael Dick APPROVED PAGE OF

SUBJECT EPA U.S LIME PARTICULATE CONCENTRATION RUN # 5

14.767 VOLm
27.63 Pm
530 Tstd
573 Tm

12.613418 VOLstd

75.7 VOLw

85.717400 M

0.142826 MF
31.84 Wd

19.976711 Ww

1.203821 Cd
27.62 Psn

1.040803 Cs

0.14 VH
780 Ts
10.449880

0.14 VH
780 Ts
10.449880

0.15
780
10.816653

0.15
780
10.816653

0.14
780
10.449880

0.14
780
10.449880

0.15
775
10.781929

0.16
775
11.135528

0.20
770
12.409673

0.20
770
12.409673

0.19
760
12.016655

0.19 VH
760 Ts
12.016655

0.18 VH
760 Ts
11.696153

0.18
760
11.696153

0.16
760
11.027239

0.16
760
11.027239

0.23
760
13.221195

0.23
750
13.133925

0.24
750
13.416407

0.22
750
12.845232

0.24
745
13.371611

0.23
745
13.090072

0.11
780
9.262828

0.12
780
9.674709

11.560404 Ka

0.05 Cp
35.732082 Vo
2.75 As

5895.793500 Qo

530 TSTD
765 Ts
27.62 PSN

538.550033 QOS

765 Ts
530 TSTD
27.62 PSN
60 T
0.000767 An

50.009322 Vn
139.956361 I

38.43 PT
0.046920 Co

12 N
0.046920 C

0.216570 PMRp

TABLE 1

PARTICULATE CONCENTRATION AND PMR CALCULATION TERMINOLOGY

VOL_m	= Dry gas meter volume @ meter temperature and pressure, dry - acf
P_m	= Dry gas meter pressure (recorded as inlet deflection accross orifice meter) - "Hg
T_m	= Dry gas meter temperature (average of inlet and outlet)
P_{STD}	= Standard atmospheric pressure (29.92" Hg)
T_{STD}	= Standard Temperature (520 or 530° R)
VOL_w	= Volume of water collected (expressed as vapor at standard temperature and pressure) - scf
M	= % water, calculated from amount the train collected in impinger, bubblers, and on silica gel
MF	= Mole fraction of dry gas
W_D	= Molecular weight of dry stack gas - lb/lb mole
W_W	= Molecular weight of wet stack gas - lb/lb mole
W_a	= Molecular weight of air - lb/lb mole
C_D	= Velocity correction coefficient for gas density
P_{SN}	= Stack pressure (static + barometric) - "Hg
C_S	= Velocity correction coefficient for stack pressure
VH_n	= Pitot tube pressure differential - "H_2O
V_o	= Stack velocity @ stack conditions - fps
Q_o	= Stack flow rate at stack conditions - acfm
T_s	= Average stack temperature - °R
Q_{OS}	= Stack flow rate at standard conditions - scfm
T	= Time over which sample was collected - minutes
V_n	= Velocity of gases inside nozzle during sampling - fps
I	= % isokinetic (± 10% desirable)
C_O	= Particulate concentration - grains/scf
N	= % CO_2 by volume in stack (12 indicates no % CO_2 correction is to be made)

TABLE 1

PARTICULATE CONCENTRATION AND PMR CALCULATION TERMINOLOGY

C	= Particulate concentration corrected to 12% CO_2
PMR_p	= Pollutant mass rate - "concentration method" - lb/hr
P_T	= Total Particulate collected by sampling train - mg
A_s	= Area of Stack - FT^2
A_n	= Area of Nozzle - FT^2
VH	= Velocity head readings for pitot tube - inches water
VOL_{STD}	= Standardized gas that passed through the sampling train - cubic feet, 70° F., 1 atmosphere pressure, and dry.
C_p	= Velocity correction coefficient for type pitot tube - dimensionless 0.83 to 0.87 for "S" type pitot tube normally and 1.0 for "P" type pitot tube.

PARTICULATE CONCENTRATION & PMR CALCULATIONS

1. $VOL_{STD} = \frac{(VOL_m)\ (P_m)\ (T_{STD})}{(P_{STD}*)\ (T_m)}$

2. $M = \frac{(100)\ (VOL_w)}{VOL_{STD} + VOL_w}$

3. $MF = \frac{100 - M}{100}$

4. $W_w = (W_D)\ (MF) + 18\ (1-MF)$

5. $C_D = \sqrt{\frac{W_a*}{W_w}}$

6. $C_S = \sqrt{\frac{P_{STD}}{P_{SN}}}$

7. $K = \frac{\sum\sqrt{VH_n \times T_{S_n}}}{n}$

8. $V_o = 2.9\ (K_a)\ (C_p)\ (C_D)\ (C_S)$

9. $Q_o = (V_o)\ (A_S)\ (60)$

10. $Q_{OS} = \frac{Q_o\ (T_{STD})\ (P_{SN})\ (MF)}{(T_S)\ (P_{STD})}$

11. $V_n = \frac{(VOL_{STD})\ (P_{STD})(T_S)}{(MF)\ (T_{STD})\ (P_{SN})\ (T)\ (A_N)\ (60)}$

12. $I = (100)\ \frac{V_n}{V_o}$

13. $C_O = \frac{P_T}{VOL_{STD}}\ (0.0154)$

14. $C = \frac{C_O\ (12\%)}{N}$

15. $PMR_p = (C_O)\ (Q_{OS})\ (0.008571)$

16. $PMR_{AR} = \frac{P_T}{T}\ \frac{A_s}{A_n}\ (0.000132)$

17. $PMR_{AVG} = \frac{PMR_p + PMR_{AR}}{2}$

18. $C' = \frac{PMR_{AVG}}{Q_{OSN}}\ (1400)$

* P_{STD} = 29.92" Hg.

* W_a = 28.95 LB/LB MOLE

APPENDIX

FIELD DATA

PLANT EPA (?) US. LIME LAS VEGAS
DATE 4/23/24
SAMPLING LOCATION [illegible]
SAMPLE TYPE [illegible]
RUN NUMBER 1
OPERATOR [illegible]
AMBIENT TEMPERATURE 85
BAROMETRIC PRESSURE 27.5
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s) 1 349.9 mg

PROBE LENGTH AND TYPE 3' 5"
NOZZLE I.D. [illegible] 0.001364 f^2
ASSUMED MOISTURE, % 28
SAMPLE BOX NUMBER RED
METER BOX NUMBER 1
METER $\Delta H_@$ 1.632
C FACTOR [illegible] 0.0
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp .21

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5/7½ MINUTES

Area of stack = 2.75 f^2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	860.101									
1 1	2.5	—	0.13	1.1	1.1	292	89	91	15	300	—
* 2 1	5.0 (6.25)	— (864.100)	—	—	—	—	—	—	—	—	—
3 2	7.5	864.84	0.16	—	0.68	292	96	92	6	300	90
4 2	10.0	866.45	0.15	—	0.53	292	98	96	5	300	90
5 3	12.5	866.99	0.15	—	0.3	292	98	93	2	370	90
6 3	15.0	867.83	0.14	—	0.3	—	98	94	3	370	90
7 4	17.5	866.66	0.14		0.3	—	100	94	3	290	84
8 4	20.0	869.50	0.14		0.3	—	101	96	3	250	82
9 5	22.5	870.56	0.17		0.54	—	102	98	3	—	—
10 5	25.0	871.27	.19		0.35	—	104	100	3	—	—
11 6	27.5										
12 6	30.0										
7	32.5										
7	35.0										
8	37.5										
8	40.0										
9	42.5										
9	45.0										
10	47.5										
10	50.0										
11	52.5				0.47" Hg						
11	55.0				0.03" Hg	292°F		97°F			
		11.169		P_m = 27.53		752°R		557°R			

COMMENTS:

* Rule set by isokinetic (R_m) equation R_m = 0.37 ohm

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ANALYTICAL DATA

PLANT U. S. LIME

DATE 4-23-74

SAMPLING LOCATION OUTLET BAGHOUSE

SAMPLE TYPE % MOISTURE DETERMINATION & % ISOKINETIC

RUN NUMBER 1

SAMPLE BOX NUMBER RED

CLEAN-UP MAN BILL STOLBERG

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

FILTER NUMBER 1 — 349.9 mg — CONTAINER _____ _____ mg

FRONT HALF SUBTOTAL _____ mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

ETHER-CHLOROFORM EXTRACTION _____ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER _____ _____ mg

BACK HALF SUBTOTAL _____ mg

TOTAL WEIGHT _____ mg

MOISTURE

IMPINGERS

			FINAL	TARE
FINAL VOLUME	2025.5 ml	BUBBLE	632.3	462.5
INITIAL VOLUME	1216.9 ml	IMPINGER	735.2	457.3
NET VOLUME	808.6 ml	BUBBLE	658.0	297.1
			2025.5	1216.9

SILICA GEL

FINAL WEIGHT	749.0 g	702.0 g	_____ g
INITIAL WEIGHT	716.2 g	698.8 g	_____ g
NET WEIGHT	32.8 g	3.2 g	_____ g

TOTAL MOISTURE 844.6

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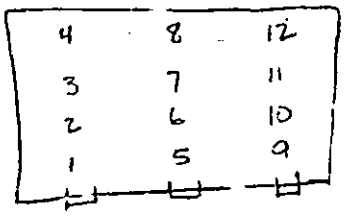
Blue box silica gel changed tared box at 6:25 min
time 698.8 gm

PRELIMINARY VELOCITY TRAVERSE

PLANT US Lime
DATE 4/21/74
LOCATION Hanover, NFU
STACK I.D. 18" x 22" rect
BAROMETRIC PRESSURE, in. Hg 29.55
STACK GAUGE PRESSURE, in. H_2O
OPERATORS Lutack & Dick



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F
1	.12	292°F
2	.13	
3	.14	
4	.13	
5	.14	
6	.15	
7	.15	
8	.15	
9	.16	
10	.19	
11	.18	
12	.16	
AVERAGE	0.15	

TRAVERSE POINT NUMBER	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMPERATURE (T_s), °F

NOMOGRAPH DATA

Run #1

PLANT US Lime

DATE 4/23/74

SAMPLING LOCATION outlet bag house

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.652
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	100
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	~~.78~~ .8
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	27.55
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	-.004 27.55
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	292
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	.15
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	.19
C FACTOR		off scale
CALCULATED NOZZLE DIAMETER, in. ~~measured~~ estimated		½"
ACTUAL NOZZLE DIAMETER, in.		½"
REFERENCE Δp, in. H_2O		.21

Dry bulb 292°F
wet bulb₁ - 200°F
wet bulb₂ = 200°F
% H_2O = 78%

.80

27.55

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FIELD DATA

PLANT US Lime
DATE 4/23/74
SAMPLING LOCATION Outlet baghouse
SAMPLE TYPE Methods
RUN NUMBER 2
OPERATOR [illegible]
AMBIENT TEMPERATURE [illegible]
BAROMETRIC PRESSURE [illegible]
STATIC PRESSURE, (P_s) [illegible]
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3'
NOZZLE I.D. [illegible] 0.000767 f^2
ASSUMED MOISTURE, % [illegible]
SAMPLE BOX NUMBER [illegible]
METER BOX NUMBER 1
METER $\Delta H_@$ [illegible]
C FACTOR [illegible]
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp [illegible]

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 2½ MINUTES

Area of stack 2.75 f^2

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	%CO2
		1328	871.395										
1	2.5		872.37	.15	.18	.42	300 960	104	102	5.0	270	—	
1	5.0		873.38	.16	.43	.41	— 960	104	104	3.0	—	—	22%
2	7.5		874.43	.19	.51	.49	300 965	106	104	4.0	220	95	
2	10.0		875.54	.17	.47	.52	— 965	108	104	5.0	—	—	
3	12.5		876.62	.18	.48	.49	310 970	109	104	5.0	275	110	
3	15.0		877.73	.19	.51	.4	— 970	110	104	5	—	—	
4	17.5		878.82	.17	.47	.48	310 970	112	106	5	240	140	23%
4	20.0		879.91	.18	.48	.48	—	114	107	5	—	—	
5	22.5	1403	881.33	.18	.48	.48	310	112	109	4	250	80	
5	25.0		882.41	.18	.48	.48	—	115	110	4	—	—	
6	27.5		883.68	.20	.55	.50	310	116	110	4	270	80	
6	30.0		884.75	.22	.59	.55	—	120	110	6	—	—	
7	32.5		885.97	.22	.59	.59	315 975	122	112	6	240	68	
7	35.0		887.20	.21	.57	.55	—	124	114	6	—	—	
8	37.5		888.38	.15	.40	.30	300 960	126	116	4	270	90	
8	40.0		889.54	.21	.59	.48	—	128	116	3	—	—	
9	42.5	1424	890.69	.19	.51	.51	300	126	118	4	280	78	
9	45.0		891.68	.18	.48	.50	—	131	120	4	—	—	
10	47.5		893.01	.25	.67	.64	300	131	120	2	250	64	
10	50.0		894.34	.26	.70	.67	—	132	120	2	—	—	
11	52.5		895.74	.29	.78	.75	300	134	122		250	60	
11	55.0		897.21	.29	.78	.79	—	136	123	2	—	—	

COMMENTS: * Changed impingers

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TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
12	75	8.98.50	.25	.61	.70	290 950	138	125	2	240	68
12	80.0 7443	8.99.91	.26	.73	.72	—	140	123		—	—
					.55		117				
					0.55						
						304°F					
						764°R					
					0.55	"H_2O					
		28.515			0.04	"Hg		117°F			
				P_w = 27.54				577°R			

ANALYTICAL DATA

PLANT US Lime Henderson Nev.

DATE 4/23/74

SAMPLING LOCATION Baghouse Outlet

SAMPLE TYPE Particulate

RUN NUMBER 2

SAMPLE BOX NUMBER Red

CLEAN-UP MAN L3

COMMENTS:

FRONT HALF

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER

FILTER NUMBER 150 361.7

LABORATORY RESULTS

CONTAINER 13 B 9.78 mg

CONTAINER 13 A 10.00 mg

FRONT HALF SUBTOTAL 19.78 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER

CONTAINER 13 C 4.86 mg

ETHER-CHLOROFORM EXTRACTION 4.5 mg

CONTAINER — — mg

BACK HALF SUBTOTAL 9.36 mg

TOTAL WEIGHT 29.14 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

	TARE	FINAL	
BUBBLER	384.0	587.9	203.7
IMPINGER	434.7	705.0	270.3
BUBBLER	325.2	536.2	211.0

SILICA GEL

FINAL WEIGHT	232.5 g	670.7 g	~~654.6~~ 61.8 g	61.8
INITIAL WEIGHT	202.8 g	648.0 g	4.8 g	4.8
NET WEIGHT	_____ g	_____ g	_____ g	

TOTAL MOISTURE (1625.3)

#2	422.1	670.8	248.7
	436.4	714.1	277.7
	321.6	624.7	347.1
	~~417.5~~		1625.3
#3	~~[illegible]~~		

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DRY MOLECULAR WEIGHT DETERMINATION

PLANT U. S. LIME
DATE 4-23-74
SAMPLING TIME (24-hr CLOCK) 1333 - 1348
SAMPLING LOCATION KILN No 2
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD FERRITE
AMBIENT TEMPERATURE
OPERATOR MICHAEL DICK

COMMENTS: CORRECTED FOR MOISTURE

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	23		22				22.5	44/100	9.9
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)							0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							77.5	28/100	21.7
								TOTAL	31.6

EPA (Dur) 230

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA - U.S. LIME DATE OF ANALYSIS MAY 1-7

EVALUATION LOCATION LAS VEGAS RUN NO. 2

EVALUATION DATE 4-23-74 CLEAN-UP SET NO. _____

I. EVAPORATION OF 120 (ml) OF WATER

RINSE & BRUSHING OF NOZZLE, PROBE AND GLASSWARE BEFORE FILTER.

FINAL 78293.8 (mg) - TARE 78281.5 (mg)

-BLANK ((0.021 mg/ml) (120 ml) = 2.52 mg) = 9.78 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 371.7 (mg) - TARE 361.7 (mg) = 10.00 mg.

III. HYDROCARBON OBTAINED BY ETHER-CHLOROFORM EXTRACTION ON WATER IN IMPINGER AND BUBBLERS.

FINAL 80662.1 (mg) - TARE 80652.8 (mg)

-BLANK (4.8 mg) - 4.5 mg.

2270:660 BROKEN SAMPLE

IV. PARTICULATE FROM EVAPORATION OF 2270 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

102798.0 102789.8

FINAL 97973.8 (mg) - TARE 97968.9 (mg) 8.2 4.9 5.3 18.4

-BLANK ((0.021 mg/ml) (2270 ml initial

- 1625.3 ml CONDENSED = 644.7 ml) = 13.54 mg) = 4.86 mg.

V. PARTICULATE FROM _____ (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

NO ACETONE WASH OF BACK HALF ON THIS RUN

FINAL _____ (mg) - TARE _____ (mg)

-BLANK ((_____ mg/ml) (_____ ml) = _____ mg) = — mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 29.14 mg.

BLANKS

ACETONE = 2.6 mg/ 384 ml = 0.0067 mg/ml FINAL 79186.1 mg. TARE 79183.5 mg.

ETHER-CHLOROFORM = 4.8 mg.(FINAL 79839.5 mg - TARE 79834.7 mg)

WATER = 6.2 mg/ 293 ml = 0.021 mg/ml. FINAL 77723.9 mg. TARE 77717.7 mg.

VFT/AP9 A IV(CONT) 13.1 mg/1610 ml = 0.008 mg/ml

0.008 mg/ml (660 ml) = 5.3 mg

FIELD DATA

PLANT US Lime Las Vegas
DATE 4/24/74
SAMPLING LOCATION outlet baghouse
SAMPLE TYPE methods part
RUN NUMBER 27 3
OPERATOR Lorack, Dick
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 27.62
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 9149 363.6 mg

PROBE LENGTH AND TYPE 3'
NOZZLE I.D. 0.375 0.000767
ASSUMED MOISTURE, % 90
SAMPLE BOX NUMBER RED
METER BOX NUMBER 1
METER $\Delta H_@$ 1.650
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

AREA of STACK 2.75 f^2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	900.32									
1	2.5	901.01	0.11	*	0.31	300	75	74	3.2	250	80
1	5	901.66	0.115	*	0.20	300	77	75	3.0	250	80
2	7.5	902.43	0.15	0.28	0.30	300	79	75	3.0	210	69
2	10	903.30	0.16	0.32	0.32	300	80	76	3.0	210	79
3	12.5	904.07	0.16	0.32	0.30	290	84	78	3	300	74
3	15	904.91	0.15	0.30	0.32	270	86	80	3	250	68
4	17.5	905.72	0.14	0.29	0.30	—	88	81	3	—	—
4	20	906.52	0.14	0.29	0.31	—	89	82	3	—	—
+ 5	22.5	907.39	0.17	0.34	0.35	290	92	89	5	200	72
5	25	908.26	0.17	0.34	0.33	—	94	86	5	—	—
+ A 6	27.5	909.16	0.19	0.38	0.35	—	97	90	8	—	—
6	30	910.06	0.19	0.38	0.38	—	98	94	7	3.0	72
7	32.5	910.92	0.20	0.40	0.41	310	100	94	7	—	—
7	35	911.88	0.20	0.40	0.41	—	102	96	7	350	78
8	37.5	912.82	0.17	0.34	0.35	—	104	97	5	—	—
8	40.0	913.71	0.17	0.34	0.33	—	104	98	6	—	—
9	42.5	914.54	0.16	0.32	0.29	310	105	99	4	250	94
9	45.0	915.38	0.16	0.32	0.32	—	106	100	5	—	—
10	47.5	916.27	0.19	0.38	0.34	310	109	102	5	200	80
A 10	50.0	917.37	0.21	0.42	.41	—	110	104	5	—	—
11	52.5	918.29	0.22	0.44	.42	290	110	107	5	275	74
11	55.0	919.35	0.22	0.44	.45	—	112	108	7	—	—

COMMENTS:
* Sampling rate set from meter reading, then nomograph set on resulting ΔH
+ Stopped to move train
A [illegible]

EPA (Dur) 235

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
12	57.5	920.38	0.20	0.40	0.44	290	114	108	17	230	66
12	60.0	921.391	0.2	0.40	0.40	300	115	109	17	260	72
						298°F					
						758°R					
								~~189°F~~	94.6°F		
								649°R			
		21.339			0.35"	H_2O					
					0.03	"Hg					
				P_m	= 2[illegible].[illegible]5 "Hg						

EPA (Dur) 275

ANALYTICAL DATA

PLANT U.S. LIME HENDERSON NEV. COMMENTS:

DATE 4-23-74

SAMPLING LOCATION BAGHOUSE OUTLET

SAMPLE TYPE PARTICULATE

RUN NUMBER 3

SAMPLE BOX NUMBER RED

CLEAN-UP MAN 14 BILL STOLBERG

FRONT HALF

			LABORATORY RESULTS
ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER		CONTAINER 14B	13.41 mg
FILTER NUMBER #149	363.6 mg	CONTAINER 14A	12.2 mg
		FRONT HALF SUBTOTAL	25.61 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER	CONTAINER 14C	6.25 mg
	ETHER-CHLOROFORM EXTRACTION	4.8 mg
ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER	CONTAINER 14D	4.9 mg
	BACK HALF SUBTOTAL	15.95 mg
	TOTAL WEIGHT	41.56 mg

MOISTURE

#1

IMPINGERS			TARE	FINAL	
FINAL VOLUME ____ ml		BUBBLER	417.5	546.1	128.6
INITIAL VOLUME ____ ml		IMPINGER	432.0	627.4	195.4
NET VOLUME ____ ml		BUBBLER	328.6	703.1	374.5

SILICA GEL			
FINAL WEIGHT	910.6 ~~1646~~ g	854.8 g	____ g
INITIAL WEIGHT	684.6 g	721.9 g	____ g
NET WEIGHT	226 g	132.9 g	____ g

TOTAL MOISTURE (2160.9) g

EPA (Dur) 231
4/72

#2

BUB	340.4	720.2	329.8
IMP	430.4	~~541.6~~ 652.7	222.3
BUB	297.0	585.4	288.4
BUBBLER	328.8	571.8	243

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA - U.S. Lines DATE OF ANALYSIS May 1-7

EVALUATION LOCATION Las Vegas RUN NO. 3

EVALUATION DATE 4-24-74 CLEAN-UP SET NO. _____

I. EVAPORATION OF 90 (ml) OF WATER

RINSE & BRUSHING OF NOZZLE, PROBE AND GLASSWARE BEFORE FILTER.

FINAL 75337.0 (mg) - TARE 75321.7 (mg)

-BLANK ((0.021 mg/ml) (90 ml) = 1.79 mg) = 13.41 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 375.8 (mg) - TARE 363.6 (mg) = 12.2 mg.

III. HYDROCARBON OBTAINED BY ETHER-CHLOROFORM EXTRACTION ON WATER IN IMPINGER AND BUBBLERS.

77347.9 77345.2
FINAL 75429.1 (mg) - TARE 75428.8 (mg)

-BLANK (4.8 mg) = ~~0~~ mg.

IV. PARTICULATE FROM EVAPORATION OF 2230 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

97115.0 97110.0 5.0
FINAL 104265.2 (mg) - TARE 104262.5 (mg) 2.7

-BLANK ((0.021 mg/ml) (2230 ml initial

- 2160.9 ml CONDENSED = 69.1 ml) = 1.45 mg) = 6.25 mg.

V. PARTICULATE FROM 75 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 77243.1 (mg) - TARE 77237.7 (mg)

-BLANK ((0.0067 mg/ml) (75 ml) = 0.50 mg) = 4.9 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 41.56 mg.

BLANKS

ACETONE = 2.6 mg/ 384 ml = 0.0067 mg/ml FINAL 79186.1 mg. TARE 79183.5 mg.

ETHER-CHLOROFORM = 4.8 mg.(FINAL 79839.5 mg - TARE 79834.7 mg)

WATER = 6.2 mg/ 293 ml = 0.021 mg/ml. FINAL 77723.9 mg. TARE 77717.7 mg.

VFT/AP9 A

FIELD DATA

PLANT: US Lime
DATE: 4/24/74
SAMPLING LOCATION: [illegible]
SAMPLE TYPE: Wet 5"
RUN NUMBER: #4 [illegible]
OPERATOR: [illegible]
AMBIENT TEMPERATURE: 70
BAROMETRIC PRESSURE: [illegible]
STATIC PRESSURE, (P_s):
FILTER NUMBER (s): 151

PROBE LENGTH AND TYPE: 3'
NOZZLE I.D.: 0.375 — 0.000767 f^2
ASSUMED MOISTURE, %: 70
SAMPLE BOX NUMBER: BLUE
METER BOX NUMBER:
METER $\Delta H_@$: 1.657
C FACTOR:
PROBE HEATER SETTING:
HEATER BOX SETTING:
REFERENCE Δp:

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 2 1/2 MINUTES

Area of Stack 2.75 f^2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
		921.5.00										
1	2 1/2	922.21	.1	—	—	365° 765	115	114	2"	275°	64°	
1	~~[illegible]~~ 5	922.909	.1	—		300 760	115	114	2"	275	60	
2	~~[illegible]~~ 7 1/2	923.71	.13	—	—	—	115	114	2.5	—	—	
2	~~[illegible]~~ 10	924.41	.13	.26	—	300	115	113	3	280	60	
3	~~[illegible]~~ 12 1/2	925.17	.16	.26	—	300	114	115	3"	275	72	
3	~~[illegible]~~ 15	926.00	.14	.28	.3	300	116	115	3.25	250	75	
4	17 1/2	926.80	.13	.26	.26	300	117	115	3.0	225	75	
4	20	927.57	.12	.24	.24	—	117	115	2.5	—	—	
5	22 1/2	928.56	.14	.28	.27	300	117	116	2.0	250	10	
5	25	929.13	.14	.28	.27	—	118	116	2.0	—	—	
6	27 1/2	930.01	.18	.36	.36	310 770	118	116.5	2.5	270	65	
6	30	930.92	.170	.34	.33	—	119	117	3 1/2	—	—	
* 7	32 1/2	931.74	.09	.18	.18	—	119	117	.5	—	—	
7	35	932.74	.09	.18	.18		119	117	.5	—	—	
8	37.5	933.55	.11	.22	.30	270 735	116	114	1	225	70	CO_2 - 19%
8	40.0	934.38	.13	.26	.20	—	116	114	1	—	—	Pyrite
9	42.5	935.51	.18	.36	.28	275 735	116	114	6	275	60	
9	45	935.99	.19	.38	.32	—	116	115	[illegible]	—	—	
10	47.5	937.01	.26	.53	.47	—	118	116	7	—	—	
10	50	938.12	.26	.53	.48	280 [illegible]	120	116	6	275	60	
11	52.5	939.25	.25	.50	.48	—	122	117	5	—	—	
11	55	940.32	.24	.48	.40	280 [illegible]	121	117	4	225	120	CO_2 - 24%

COMMENTS:

EPA (Oar) 235 * stop to change impingers Meter vol. 931.47

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
12	57.5	941.27	.22	.44	.30	[illegible]	124	112	.5	—	—
12	60.0 1128	942.117	.11	.22	.30	[illegible]	124	118	.5	[illegible]	110
			.16	.31							
		20.617									
						293°F					
						753°R					
					0.31	"H_2O		117°F			
					0.02	"Hg					
		20.617	Pm = 27.64 "Hg					577°R			

EPA (Dur) 226

DRY MOLECULAR WEIGHT DETERMINATION

PLANT U. S. Lime
DATE 4.24.74
SAMPLING TIME (24-hr CLOCK)
SAMPLING LOCATION Run # 4
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD FRYRITE
AMBIENT TEMPERATURE
OPERATOR Michael Dick

COMMENTS:

RUN / GAS	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	19		24				21.5	44/100	9.46
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)							0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							78.5	28/100	21.98
								TOTAL	31.44

EPA (Dur) 230

ANALYTICAL DATA

PLANT U.S. LIME

DATE 4-24-74

SAMPLING LOCATION BAGHOUSE OUTLET

SAMPLE TYPE PARTICULATE

RUN NUMBER 4

SAMPLE BOX NUMBER BLUE

CLEAN-UP MAN 15 BILL STOUSBERG

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 15B — 9.6 mg

FILTER NUMBER 151 — CONTAINER 15A — 8.7 mg

FRONT HALF SUBTOTAL 18.3 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 15C — 7.57 mg

ETHER-CHLOROFORM EXTRACTION — 6.7 mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 15D — 5.72 mg

BACK HALF SUBTOTAL 19.99 mg

TOTAL WEIGHT 38.29 mg

MOISTURE

		TARE	FINAL	
IMPINGERS #1				
FINAL VOLUME ml	BUBBLER	347.4	590.0	142.6
INITIAL VOLUME ml	IMPINGER	398.1	666.1	268
NET VOLUME ml	BUBBLER	324.9	590.9	265.5

SILICA GEL

FINAL WEIGHT	787.4 g	715.8 g	g
INITIAL WEIGHT	701.6 g	689.6 g	g
NET WEIGHT	85.8 g	26.2 g	g

TOTAL MOISTURE 1542.4 g

#2	BUBBLER	342.2	620.6	278.4
	IMPINGER	391.3	729.0	347.7
	BUBBLER	328.6	456.8	128.2

EPA (Dur) 231
4/72

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VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA - U.S. LIME DATE OF ANALYSIS MAY 1-7

EVALUATION LOCATION LAS VEGAS RUN NO. 4

EVALUATION DATE 4-24-74 CLEAN-UP SET NO. _____

I. EVAPORATION OF 100 (ml) OF WATER

RINSE & BRUSHING OF NOZZLE, PROBE AND GLASSWARE BEFORE FILTER.

FINAL 76556.9 (mg) - TARE 76545.2 (mg)

-BLANK ((0.021 mg/ml) (100 ml) = 2.1 mg) = 9.6 mg.

II. FILTER CATCH WSA 1106 PH (Media Type)

FINAL 371.7 (mg) - TARE 363.0 (mg) = 8.7 mg.

III. HYDROCARBON OBTAINED BY ETHER-CHLOROFORM EXTRACTION ON WATER IN IMPINGER AND BUBBLERS.

78319.1 78312.7 6.4
FINAL 77599.9 (mg) - TARE 77594.8 (mg) 5.1

-BLANK (4.8 mg) = 6.7 mg.

(910 ml in ea)

IV. PARTICULATE FROM EVAPORATION OF 1820 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

106034.2 106030.0 4.2
FINAL 94850.7 (mg) - TARE 94841.5 (mg) 9.2

-BLANK ((0.021 mg/ml) (1820 ml initial

- 1542.4 ml CONDENSED = 277.6 ml) = 5.83 mg) = 7.57 mg.

V. PARTICULATE FROM 102 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 80928.8 (mg) - TARE 80922.4 (mg)

-BLANK ((0.0067 mg/ml) (102 ml) = 0.68 mg) = 5.72 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 38.29 mg.

BLANKS

ACETONE = _____ mg/_____ ml = 0.0067 mg/ml FINAL _____ mg. TARE _____ mg.

ETHER-CHLOROFORM = 4.8 mg.(FINAL _____ mg - TARE _____ mg)

WATER = _____ mg/_____ ml = 0.021 mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

FIELD DATA

PLANT US Lime Las Vegas
DATE 9/24/74 0
SAMPLING LOCATION outlet Baghouse
SAMPLE TYPE Method 5 [illegible]
RUN NUMBER 5
OPERATOR DJL, M Dick
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 27.02
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3'
NOZZLE I.D. [illegible] 0.000767
ASSUMED MOISTURE, % 60
SAMPLE BOX NUMBER 1
METER BOX NUMBER [illegible]
METER $\Delta H_@$ [illegible]
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

AREA of STACK 2.75 ft^2

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24 hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
	0	942.238									
1	2.5	942.25	.11	* —	—	320	110	108	2	250	80
1	5.0	943.32	.12	—	.12	—	110	107	1	—	—
2	7.5	943.78	.14	—	.12	320	110	107	1	280	70
2	10.0	944.24	.14	—	.12	—	109	107	1	—	—
3	12.5	944.76	.15	.15	.16	320	109	107	1.5	250	65
3	15.0	945.30	.15	.15	.15	—	110	107	2.0	—	—
4	17.5	945.83	.14	.14	.15	320	110	107	2.0	280	65
4	20.0	946.36	.14	.14	.15	—	110	108	2.0	—	—
5	22.5 1252	946.57	.15	.15	.15	315	110	108	2.0	250	70
5	25.0	947.42	.16	.17	.15	—	110	109	2.0	—	—
6	27.5	948.05	.20	.21	.21	310	112	110	3.0	240	60
6	30	948.72	.20	.21	.22	—	113	110	3.0	—	—
7	32.5	949.41	.19	.20	.22	300	114	112	3.0	270	65
7	35	950.08	.19	.20	.22	—	115	113	3.0	—	—
8	37.5	950.75	.18	.18	.20	300	116	113	3.0	250	70
** 8	40	951.40	.18	.18	.20	—	116	115	3.0	—	—
9	42.5	952.09	.16	.16	.20	300	116	116	3.0	250	90
9	45	952.88	.16	.16	.17	—	117	116	3.0	—	—
** 10	47.5	953.36	.4	—	.23	300	119	117	1.5	250	75
10	50	954.06	.23	.24	.22	290	119	118	2.0	275	90
11	52.5	954.77	.24	.25	.25	290	120	118	3.0	270	65
11	55	955.53	.22	.23	.23	—	120	118	3.0	—	—

CO_2 = 24% Fluid

COMMENTS:
* Meter rate calculated by isokinetic formula - then nomograph set
** Changed impingers
*** Source [illegible]

EPA (Dur) 235

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
12	52.5	956.71	.24	.25	.24	285 745	121	120	.3	240	70
12	60.0	957.005	.23		.24	—	122	120	.3	—	—
						305°F					
						765°R					
					0.19	"H_2O		113°F			
					0.01	"Hg		573°R			
	60 min	14.767		Pm = 2	.63						

EPA (Dur) 236

ANALYTICAL DATA

PLANT U.S. LIME

DATE 4-24-74

SAMPLING LOCATION BAGHOUSE OUTLET

SAMPLE TYPE PARTICULATE

RUN NUMBER 5

SAMPLE BOX NUMBER RED

CLEAN-UP MAN 16 BILL STOLBERG

COMMENTS:

FRONT HALF

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER

FILTER NUMBER #148 361.1

LABORATORY RESULTS

CONTAINER 16B 8.17 mg

CONTAINER 16A 7.10 mg

FRONT HALF SUBTOTAL 15.27 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER

CONTAINER 16C 11.34 mg

ETHER-CHLOROFORM EXTRACTION 6.80 mg

CONTAINER 16D 5.02 mg

BACK HALF SUBTOTAL 23.16 mg

TOTAL WEIGHT 38.43 mg

MOISTURE

IMPINGERS

FINAL VOLUME _____ ml

INITIAL VOLUME _____ ml

NET VOLUME _____ ml

#1	TARE	FINAL	
BUBBLER	372.9	654.6	281.7
IMPINGER	390.8	786.7	395.9
BUBBLER	326.6	684.6	358.0

SILICA GEL

FINAL WEIGHT	664.2 g	685.7 g	_____ g
INITIAL WEIGHT	637.8 g	676.2 g	_____ g
NET WEIGHT	26.4 g	9.5 g	_____ g

TOTAL MOISTURE 1597.2 g

0.0474 = 75.7

EPA (Dur) 231
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#2			
BUBBLER	344.4	584.2	239.8
IMPINGER	388.7	644.4	255.7
BUBBLER	328.7	358.9	30.2

DRY MOLECULAR WEIGHT DETERMINATION

PLANT U. S. LIME
DATE 4-7 4-74
SAMPLING TIME (24-hr CLOCK) 1242
SAMPLING LOCATION RUN # 5
SAMPLE TYPE (BAG, INTEGRATED, CONTINUOUS)
ANALYTICAL METHOD EPPRITE
AMBIENT TEMPERATURE
OPERATOR MICHAEL DICK

COMMENTS:

GAS \ RUN	1		2		3		AVERAGE NET VOLUME	MULTIPLIER	MOLECULAR WEIGHT OF STACK GAS (DRY BASIS) M_d, lb/lb-mole
	ACTUAL READING	NET	ACTUAL READING	NET	ACTUAL READING	NET			
CO_2	24						24	44/100	10.56
O_2 (NET IS ACTUAL O_2 READING MINUS ACTUAL CO_2 READING)							0	32/100	
CO (NET IS ACTUAL CO READING MINUS ACTUAL O_2 READING)							0	28/100	
N_2 (NET IS 100 MINUS ACTUAL CO READING)							76	28/100	21.28
								TOTAL	31.84

EPA (Rev. 2)

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA U.S. Lime DATE OF ANALYSIS May 1-7

EVALUATION LOCATION LAS Vegas RUN NO. 5

EVALUATION DATE 4-24-74 CLEAN-UP SET NO. _____

I. EVAPORATION OF 92 (ml) OF WATER

RINSE & BRUSHING OF NOZZLE, PROBE AND GLASSWARE BEFORE FILTER.

FINAL 76880.4 (mg) - TARE 76870.3 (mg)

-BLANK ((0.021 mg/ml) (92 ml) = 1.92 mg) = 8.17 mg.

II. FILTER CATCH WSA 1106 BH (Media Type)

FINAL 368.2 (mg) - TARE 361.1 (mg) = 7.10 mg.

III. HYDROCARBON OBTAINED BY ETHER-CHLOROFORM EXTRACTION ON WATER IN IMPINGER AND BUBBLERS.

79551.4 79546.4 5.0
FINAL 66129.5 (mg) - TARE 66122.9 (mg) 6.6

-BLANK (11.8 mg) = 6.80 mg.

IV. PARTICULATE FROM EVAPORATION OF 1824 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

104367.9 104360.0 7.9
FINAL 97046.6 (mg) - TARE 97038.4 (mg) 8.2

-BLANK ((0.021 mg/ml) (1824 ml initial

- 1597.2 ml CONDENSED = 226.8 ml) = 4.76 mg) = 11.34 mg.

V. PARTICULATE FROM 102 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 78694.5 (mg) - TARE 78688.8 (mg)

-BLANK ((0.0067 mg/ml) (102 ml) = 0.68 mg) = 5.02 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 38.43 mg.

BLANKS

ACETONE = _____ mg/_____ ml = 0.0067 mg/ml FINAL _____ mg. TARE _____ mg.

ETHER-CHLOROFORM = 4.8 mg.(FINAL _____ mg - TARE _____ mg)

WATER = _____ mg/_____ ml = 0.021 mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A