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EFD Ref. 97-(A)
AP42 Ref 63

HORIZON

A03-006-FR

Air Measurement Services, Inc.

LANDFILL GAS PARTICULATE AND METALS CONCENTRATION AND FLOW RATE

MOUNTAINGATE LANDFILL GAS RECOVERY PLANT

May 1992

Prepared for:

GSF ENERGY INC.
5455 Garden Grove Boulevard, Suite 355
Westminster, California 92683

Richard J. Vacherot

HORIZON
Air Measurement Services, Inc. (805) 498-8781

May 26, 1992

Dr. Wen Kuo
GSF Energy Inc.
5455 Garden Grove Boulevard, Suite 355
Westminster, California 92683

Dear Dr. Kuo:

Please find enclosed three copies of the Final Report entitled, "Landfill Gas Particulate and Metals Concentration and Flow Rate -- Mountaingate Landfill Gas Recovery Plant".

Please call me at (805) 498-8781 if you have any questions.

Sincerely,

HORIZON AIR MEASUREMENT SERVICES, INC.

Richard J. Vacherot
President

RV:lmg

Enclosures

TABLE OF CONTENTS

1. INTRODUCTION

At the request of Dr. Wen G. Kuo of GSF ENERGY INC. (Air Products PO # ZMM-0868), HORIZON AIR MEASUREMENT SERVICES, INC. conducted an emissions testing program to determine metals and particulate matter concentration and mass flow rate from the Mountaingate Landfill Gas (LFG) Recovery Plant in Los Angeles, California. Whole air samples were also collected using Tedlar bags and SUMMA canisters and submitted to AtmAA, Inc. for VOC speciation and reduced sulfur analyses.

The test program was conducted on May 18, 1992. Particulate matter and metals concentration determinations were made in accordance with SCAQMD Method 5.1 and CARB Draft Method 436, respectively, with one exception. Sample ports of adequate diameter did not exist that would allow for the use of a buttonhook nozzle in which to collect sample isokinetically per the Method. It was decided by Wen Kuo of GSF Energy to collect sample non-isokinetically through an existing sample port rather than modify the existing hardware. Thus, particulate and metals samples were collected non-isokinetically from the source.

Landfill gas flow rate was based upon the facility gas flow monitoring data. Fixed gas composition was analyzed on-site by plant personnel.

The results of the testing program are provided in Section 2. Section 3 provides all Sampling/Analytical Procedures. All pertinent documentation can be found in the Appendices.

2. SUMMARY OF RESULTS

The results of the testing program are provided in Table 2-1. The reported landfill gas flow rate is based upon facility flow monitoring data. Particulate and metals concentration is based upon one, non-isokinetically collected sample.

TABLE 2-1

Summary of Results
Mountaingate Landfill Gas Recovery Plant
May 18, 1992

LANDFILL GAS CHARACTERISTICS		
Temperature (°F)		85
Flow Rate (dscfm)		3375
EMISSIONS		
PARTICULATE MATTER		
	gr/dscf	0.0011
	lb/hr	0.032
METALS		
Antimony,	mg/dscf	0.00003
	lb/hr	0.00001
Arsenic,	mg/dscf	0.00003
	lb/hr	0.00001
Barium,	mg/dscf	<0.00011
	lb/hr	<0.000051
Beryllium,	mg/dscf	<0.00001
	lb/hr	<0.00001
Cadmium,	mg/dscf	<0.00001
	lb/hr	<0.00001
Chromium,	mg/dscf	<0.00001
	lb/hr	<0.00001
Copper,	mg/dscf	0.00002
	lb/hr	0.00001
Lead,	mg/dscf	0.00002
	lb/hr	0.00001
Manganese,	mg/dscf	0.00025
	lb/hr	0.00011

Note: All values preceded by "<" are detection limit values.

TABLE 2-1 (Cont.)

Summary of Results
Mountaingate Landfill Gas Recovery Plant
May 18, 1992

LANDFILL GAS CHARACTERISTICS		
METALS		
Mercury,	mg/dscf	0.000003
	lb/hr	0.000002
Nickel,	mg/dscf	<0.00002
	lb/hr	<0.00001
Selenium,	mg/dscf	<0.00001
	lb/hr	<0.00001
Silver,	mg/dscf	<0.00001
	lb/hr	<0.00001
Thallium,	mg/dscf	<0.00011
	lb/hr	<0.000051
Zinc,	mg/dscf	<0.00022
	lb/hr	<0.00010

Note: All values preceded by "<" are detection limit values.

3. SAMPLING/ANALYTICAL PROCEDURES

The following sampling/analytical procedures were utilized for the testing program.

3.1 Sample Location

Particulate and metals samples were collected non-isokinetically from the eight inch diameter landfill gas line through a 1.5 inch diameter port located 36 inches downstream and 26 inches upstream from a right angle bend in the pipe.

3.2 Landfill Gas Flow Rate

Landfill gas flow rate was based upon the facility air measurement system which monitors the following parameters:

- pressure drop (P)
- temperature (°F)
- static pressure
- landfill gas density

All flow rate calculations can be found in the Appendices.

3.3 Particulate Matter - SCAQMD Method 5.1

HORIZON used a sampling train which conforms to Method 5.1 specifications. Samples were withdrawn non-isokinetically from the eight inch diameter duct. Stack gases were withdrawn through a glass probe followed by 3/8" OD Teflon tubing and a series of four impingers. A 47 mm glass fiber filter was placed between the third and fourth impingers.

The third and fourth impingers were of the modified Greenburgh-Smith design, and the first and second were a standard type. The first and second impingers contained 100 ml of deionized (DI) water. The third impinger was empty. The last contained a preweighed amount of silica gel. An umbilical cord connected the last impinger to the flow control console

containing a leakless, lubricated vane pump, dry gas meter, calibrated orifice, and dual magnahelics.

A leak check of the sampling train was conducted prior to and after each sampling run and prior to and after either changing any of the constituents of the train or disconnecting umbilical cords to facilitate transport of the trains.

Upon completion of each sampling run, the nozzle, probe and connective tubing was brushed and rinsed with DI water. The filter was replaced in its original container pending analyses. The impingers and all connecting glassware was collected and rinsed with DI water. All sample bottles and filter containers were sealed with chain-of-custody tape and all liquid levels marked. Analyses were conducted on the probe and impinger catch fraction and filter fraction in accordance with SCAQMD Method 5.1.

3.4 Multimetals - CARB Draft Method 436

Metal species emissions were determined in accordance with CARB Draft Method 436 "Determination of Multiple Metals Emissions from Stationary Sources" with the exception that sample was collected non-isokinetically. In this method the stack sample was withdrawn non-isokinetically from the source, with particulate emissions collected in the probe and on a heated filter and gaseous emissions collected in a series of chilled impingers containing a solution of dilute nitric acid in hydrogen peroxide in two impingers, and acidic potassium permanganate solution in two impingers. Sampling train components were recovered and digested in separate front and back half fractions. Materials collected in the sampling train were digested with acid solutions to dissolve inorganics and to remove organic constituents that may create analytical interferences. Acid digestion was performed using conventional Parr Bomb or microwave digestion techniques. The nitric acid and hydrogen peroxide impinger solution and the probe rinse and digested filter solutions were analyzed for mercury by cold vapor atomic absorption spectroscopy (CVAAS). Except for the permanganate solution, the remainder of the sampling train catches were analyzed for metal species by atomic absorption spectroscopy (AAS).

The sampling train consisted of a heated, three foot glass lined probe; a heated filter box (225° - 275°F) containing a 47 mm diameter quartz fiber (non-binded) filter in a glass holder and a 5/8" OD Teflon tube connecting the condensate portion of the sampling train.

The condensate portion of the sampling train consisted of a series of seven impingers; the first impinger was empty, the second and third each contained 100 mls of 5% HNO_3/10% H_2O_2 solution; the fourth was empty; the fifth and six contained 100 ml of 4% $KMnO_4$/10% H_2SO_4; and the seventh contained approximately 200 grams of silica gel. The second impinger was the standard Greenburg Smith impinger with all others being the modified type. All impingers were connected with leak-free ground glass fittings and glass U-bends.

An umbilical cord connected the last impinger to the flow control console consisted of a leakless, lubricated vane pump, dry gas meter and calibrated orifice. Flow rate was monitored using a calibrated magnahelic gauge. A leak check of the pitot tube lines and sampling trains was conducted prior to and after each sampling run and prior to and after either changing any of the constituents of the train or changing sample ports. Upon completion of the sampling run and post test leak check, the sample train was recovered according to the following procedures:

1. Container One: The probe, sample nozzle and front half of the filter housing was rinsed with 0.1 N nitric acid into a 500 ml Nalgene container.

2. Container Two: The quartz-fiber filter was removed and replaced in its original petri dish. The petri dish was labeled and sealed with Teflon tape.

3. Container Three: After volumetrically measuring the condensate volume, impingers one, two and three were collected into one liter Nalgene containers. Each impinger and all connecting glassware was rinsed with 0.1 N nitric acid. This rinse was combined with the impinger condensate. The container(s) were sealed, labeled and taped with all liquid levels marked.

4. Container Four: After volumetrically measuring the condensate volume, impinger four was rinsed with 0.1 N nitric acid into container #4 which was sealed with Teflon tape and labeled.

5. Container Five: After volumetrically measuring the condensate volume, impingers five and six, containing $KMnO_4$, was collected in 1 liter amber glass bottle(s). Each impinger and all connecting glassware was rinsed with 4% $KMnO_4$. The rinse was added to the condensate sample. The sample container(s) were sealed, labeled and taped with all liquid levels marked.

6. Container Six: The silica gel was recovered into its original bottle and the moisture gain determined gravimetrically.

Metal species concentration was determined using either graphite furnace or direct aspiration atomic absorption spectroscopy as described in the CARB 436 Multimetals Method. Mercury was determined using cold vapor atomic absorption spectroscopy (CVAAS). No field or blank train samples were collected at the request of Wen Kuo of GSF Energy, Inc.

APPENDIX

PLANT: MOUNTAINGATE LANDFILL GAS RECOVERY
LOCATION: LOS ANGELES, CA

		RUN
RUN NUMBER	******	1
DATE OF RUN	******	5-18-92
CLOCK TIME: INITIAL	******	1636
CLOCK TIME: FINAL	******	1736
AVG. STACK TEMPERATURE	DEGREES F	82
AVG. SQUARE DELTA P	INCHES H20	NM
NOZZLE DIAMETER	INCHES	NA
BAROMETRIC PRESSURE	IN. HG.	29.92
SAMPLING TIME	MIN.	60
SAMPLE VOLUME	CUBIC FEET	46.061
AVG. METER TEMP.	DEGREES F	82
AVG. DELTA H	IN. H20	1.79
DGM CALIB. FACTOR [Y]	******	1.0016
WATER COLLECTED	MILLITERS	0
CO 2	PERCENT	NM
O 2	PERCENT	NM
CO	PERCENT	NM
N 2	PERCENT	NM
STACK AREA	SQUARE INCHES	50
STATIC PRESSURE	INCHES WG.	NM
PITOT COEFFICIENT	******	NM
SAMPLE VOLUME DRY	DSCF	45.11
WATER AT STD.	SCF	0.0
MOISTURE	PERCENT	0.0
MOLE FRACTION DRY GAS	******	1.00
MOLECULAR WT.DRY	LB/LB MOLE	0.00
EXCESS AIR	PERCENT	ERR
MOLECULAR WT. WET	LB/LB MOLE	0.00
STACK GAS PRESSURE	INCHES HG.	29.92
STACK VELOCITY	APPM	ERR
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	3380
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	3472
ISOKINETIC RATIO	PERCENT	ERR

CALCULATIONS FOR GRAIN LOADING AND EMISSION RATES

TOTAL PARTICULATE	mg	3.2
PARTICULATE CONCENTRATION	gr/dscf	0.0011
PARTICULATE EMISSION RATE	lb/hr	0.032

XCNTAINGATE LANDFILL GAS RECOVERY

		RUN
ʌJN NUMBER	******	1
DATE OF RUN	******	5-18-92
ⅅCK TIME: INITIAL	******	1225
ⅅCK TIME: FINAL	******	1615
'''G. STACK TEMPERATURE	DEGREES F	88
'G. SQUARE DELTA P	INCHES H20	NM
NOZZLE DIAMETER	INCHES	NA
BAROMETRIC PRESSURE	IN. HG.	29.92
ⅅMPLING TIME	MIN.	230
..MPLE VOLUME	CUBIC FEET	180.507
AVG. METER TEMP.	DEGREES F	92
'G. DELTA H	IN. H20	1.79
ⅅ CALIB. FACTOR [Y]	******	1.0116
WATER COLLECTED	MILLITERS	0
⁓ 2	PERCENT	NM
2	PERCENT	NM
ω	PERCENT	NM
N 2	PERCENT	NM
'ACK AREA	SQUARE INCHES	50.3
ⅅATIC PRESSURE	INCHES WG.	NM
PITOT COEFFICIENT	******	NA
ⅅMPLE VOLUME DRY	DSCF	175.41
ⅅTER AT STD.	SCF	0.0
MOISTURE	PERCENT	0.0
MOLE FRACTION DRY GAS	******	1.00
ⅅLECULAR WT.DRY	LB/LB MOLE	0.00
ⅅCESS AIR	PERCENT	ERR
MOLECULAR WT. WET	LB/LB MOLE	0.00
'ACK GAS PRESSURE	INCHES HG.	29.92
'ACK VELOCITY	AFPM	ERR
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	3370
'''LUMETRIC FLOWRATE, ACTUAL	ACFM	3496
ⅅKINETIC RATIO	PERCENT	ERR

ALCULATIONS FOR GRAIN LOADING AND EMISSION RATES

MONTAINGATE LANDFILL GAS RECOVERY		RUN
RUN NUMBER	******	1
DATE OF RUN	******	5-18-92
CLOCK TIME: INITIAL	******	1225
CLOCK TIME: FINAL	******	1615

METALS EMISSION RATES

		WEIGHT (ug)	CONC. (mg/dscf)	EMISSION (lb/hr)
ANTIMONY		5	0.00003	0.00001
ARSENIC		5	0.00003	0.00001
BARIUM	*	20	0.00011	0.000051
BERYLLIUM	*	2	0.00001	0.00001
CADMIUM	*	2	0.00001	0.00001
CHROMIUM	*	2	0.00001	0.00001
COPPER		4.2	0.00002	0.000011
LEAD		3	0.00002	0.00001
MANGANESE		43	0.00025	0.00011
MERCURY		0.6	0.000003	0.000002
NICKEL	*	3	0.00002	0.00001
PHOSPHORUS	*	NA	0.00000	0.00000
SELENIUM	*	1	0.00001	0.00000
SILVER	*	2	0.00001	0.00001
THALLIUM	*	20	0.00011	0.000051
ZINC		38	0.00022	0.00010

* Below Detection Limit

COAST - TO - COAST ANALYTICAL SERVICES

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Santa Barbara Division
751 S. Kellogg, Goleta, California 93117

(805) 964-7838
FAX (805) 967-4386

Lab Number : GF-1631-1
Project : A03-006 Atm.A.A./
Mountain Air LFG Recovery Plant

CLIENT: Robert Halk
Horizon Air Measurement Services
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
A0306-MLFGRP-MM-PF/ A0306-MLFGRP-MM-PR	Aqueous	A.P.	05/18/92	05/19/92

CONSTITUENT	*PQL	RESULT	UNITS	METHOD	ANALYZED	BY	NOTES
Antimony, Level Found	1.	ND	µg	EPA 7041	05/26/92	NG	1
Arsenic, Level Found	1.	ND	µg	EPA 7060	05/26/92	NG	1
Barium, Level Found	20.	ND	µg	EPA 7080	05/26/92	NG	1
Beryllium, Level Found	2.	ND	µg	EPA 7090	05/26/92	NG	1
Cadmium, Level Found	2.	ND	µg	EPA 7130	05/26/92	NG	1
Chromium, Level Found	2.	ND	µg	EPA 7190	05/26/92	NG	1
Copper, Level Found	0.2	0.8	µg	EPA 7210	05/26/92	BC	1
Lead, Level Found	3.	ND	µg	EPA 7420	05/26/92	NG	1
Manganese, Level Found	1.	3.	µg	EPA 7460	05/26/92	NG	1
Mercury, Level Found	0.1	ND	µg	EPA 7470	05/26/92	AS	1
Nickel, Level Found	3.	ND	µg	EPA 7520	05/26/92	NG	1
Phosphorus, Level Found	80.	ND	µg	EPA 6010	05/27/92	AS	1
Selenium, Level Found	1.	ND	µg	EPA 7740	05/26/92	NG	1
Silver, Level Found	2.	ND	µg	EPA 7760	05/26/92	BC	1
Thallium, Level Found	20.	ND	µg	EPA 7840	05/26/92	NG	1
Zinc, Level Found	1.	6.	µg	EPA 7950	05/26/92	NG	1

Santa Barbara Division Lab Certifications: CAELAP #1204; L.A.Co.CSD#10186
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Sample Preparation on 05/22/92 by KJP using EPA Method 3020

06/01/92

MC/nfg/jst

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Nick F. Gaone

Nick Gaone, Inorganics Manager

M Carmel

Marissa Coronel
Laboratory Director

COAST-TO-COAST ANALYTICAL SERVICES

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Newport Beach, CA • Valparaiso, IN • Westbrook, ME

Santa Barbara Division
751 S. Kellogg, Goleta, California 93117

(805) 964-7838
FAX (805) 967-4386

Lab Number : GF-1631-2
Project : A03-006 Atm.A.A./
Mountain Air LFG Recovery Plant

CLIENT: Robert Halk
Horizon Air Measurement Services
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
A0306-MLFGRP-MM-IMP 1-3	Aqueous	A.P.	05/18/92	05/19/92

CONSTITUENT	*PQL	RESULT	UNITS	METHOD	ANALYZED	BY	NOTES
Antimony, Level Found	1.	5.	µg	EPA 7041	05/26/92	NG	1
Arsenic, Level Found	1.	5.	µg	EPA 7060	05/26/92	NG	1
Barium, Level Found	20.	ND	µg	EPA 7080	05/26/92	NG	1
Beryllium, Level Found	2.	ND	µg	EPA 7090	05/26/92	NG	1
Cadmium, Level Found	2.	ND	µg	EPA 7130	05/26/92	NG	1
Chromium, Level Found	2.	ND	µg	EPA 7190	05/26/92	NG	1
Copper, Level Found	0.2	3.4	µg	EPA 7210	05/26/92	BC	1
Lead, Level Found	3.	3.	µg	EPA 7420	05/26/92	NG	1
Manganese, Level Found	1.	40.	µg	EPA 7460	05/26/92	NG	1
Mercury, Level Found	0.1	ND	µg	EPA 7470	05/26/92	AS	1
Nickel, Level Found	3.	ND	µg	EPA 7520	05/26/92	NG	1
Phosphorus, Level Found	80.	ND	µg	EPA 6010	05/27/92	AS	1
Selenium, Level Found	1.	ND	µg	EPA 7740	05/26/92	NG	1
Silver, Level Found	2.	ND	µg	EPA 7760	05/26/92	BC	1
Thallium, Level Found	20.	ND	µg	EPA 7840	05/26/92	NG	1
Zinc, Level Found	1.	32.	µg	EPA 7950	05/26/92	NG	1

Santa Barbara Division Lab Certifications: CAELAP #1204; L.A.Co.CSD#10186
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Sample Preparation on 05/22/92 by KJP using EPA Method 3020

06/01/92

MC/nfg/jst

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Nick F. Gaore

Nick Gaore, Inorganics Manager

Marissa Coronel
Laboratory Director

COAST-TO-COAST ANALYTICAL SERVICES

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(805) 964-7838
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Lab Number : GF-1631-3
Project : A03-006 Atm.A.A./
Mountain Air LFG Recovery Plant

CLIENT: Robert Halk
Horizon Air Measurement Services
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED	DATE RECEIVED
A0306-MLFGRP-MM-IMP4/ A306-MLFGRP-MM-IMP 5&6	Aqueous	A.P.	05/18/92	05/19/92

CONSTITUENT	*PQL	RESULT	UNITS	METHOD	ANALYZED	BY	NOTES
Mercury, Level Found	0.1	0.6	µg	EPA 7470	05/26/92	AS	1

Santa Barbara Division Lab Certifications: CAELAP #1204; L.A.Co.CSD#10186
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Sample Preparation on 05/22/92 by KJP using EPA Method 3020

06/01/92

MC/nfg/jst

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Nick F. Gaone
Nick Gaone, Inorganics Manager

Marissa Coronel
Laboratory Director

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Lab Number : GF-1631-4
Project : A03-006 Atm.A.A./
Mountain Air LPG Recovery Plant

CLIENT: Robert Halk
Horizon Air Measurement Services
996 Lawrence Drive, Suite 108
Newbury Park, CA 91320

REPORT OF ANALYTICAL RESULTS

SAMPLE DESCRIPTION	MATRIX	SAMPLED BY	SAMPLED DATE	RECEIVED
A-306-MLPGRP-MM-RINSE HCL	Aqueous	A.P.	05/18/92	05/19/92

CONSTITUENT	*PQL	RESULT	UNITS	METHOD	ANALYZED	BY	NOTES
Mercury, Level Found	0.1	ND	µg	EPA 7470	05/26/92	AS	1

Santa Barbara Division Lab Certifications: CAELAP #1204; L.A.Co.CSD#10186
*RESULTS listed as 'ND' were not detected at or above the listed PQL (Practical Quantitation Limit)
(1) Sample Preparation on 05/22/92 by KJP using EPA Method 3020

06/01/92

MC/nfg/jst

Respectfully submitted,
COAST-TO-COAST ANALYTICAL SERVICES, INC.

Nick F. Gaone

Nick Gaone, Inorganics Manager

Marissa Coronel
Laboratory Director

DATE SHEET FOR PARTICULATE MATTER SCAQMD METHOD 5.1

CLIENT: ATMAA,INC. - GSF ENERGY
PLANT: MOUNTAINSIDE LANDFILL GAS RECOVERY
SOURCE: OULTET
JOB NUMBER: A03-006 RUN #1
DATE SAMPLED: 5-18-92
DATE EXTRACTED: 5-21-92

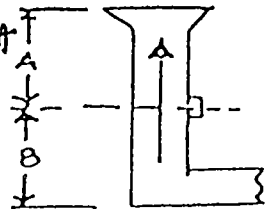
	SAMPLE ID	BEAKER/ FILTER ID	VOLUME	INITIAL	FINAL	NET WEIGHT(g)
A - FILTER CATCH	9205163	FILTER 235	NA	0.1466	0.1463	0
FILTER ACID						0
FILTER SULFATE						0
B - PROBE CATCH						0
PROBE ACID						
PROBE SULFATE						0
C - IMP. CATCH(INSOLUBLE)	9205164	FILTER 260	630	0.1470	0.1467	-0.0003
INSOLUBLE ACID						0
INSOLUBLE SULFATE						0
BLANK FILTER	FIELD BLANK	FILTER 257	250	0.1454	0.1447	-0.0007
D - IMP. CATCH(SOLUBLE)	9205164	BEAKER B5	630	112.2402	112.2462	0.0060
SOLUBLE ACID						0
SOLUBLE SULFATE						0
BLANK SOLUTION	FIELD BLANK	BEAKER D4	250	108.4026	108.4043	0.0043
E - ORGANIC EXTRACT	9205164	BEAKER D3	125	109.5761	109.5777	0.0016
BLANK EXTRACT	FIELD BLANK	BEAKER C4	125	108.9555	108.9560	0.0005

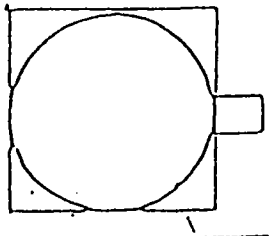
FILTER (PARTICULATE) TEMPERATURE GEATER THAN 200F

TOTAL PARTICULATE	(A+B+C+D+E)	0.0073
BLANK CORRECTED		0.0032
SOLID PARTICULATE	(A+B+C+D)	0.0057
BLANK CORRECTED		0.0021

1403-006

PLANT: Mountainside LFG Recovery Plant
LOCATION: LA, CA
COUNTY: SCAQMD
UNIT: Sanitary Gas Cover
DATE: 5/18/92
RUN NO./METHOD: 1 SCAQMD 5.1
COLD BOX NO.: 1
METER BOX NO.: 1
METER FACTOR: y = 1.0016 ΔH@ = 1.7959
PITOT #/ FACTOR: NA * refer to process data
PYROMETER #: Blue on " "
MAGNEHELIC FACTOR: ΔP — ΔH 0-5





FILTER NO.: 47-235
AMBIENT TEMP.:
BARAMETRIC PRESS.,IN.HG.:
ASSUMED MOISTURE:
HEATER BOX SETTING: /
PROBE LENGTH,FT.: 3' Glass
NOZZLE DIAMETER,IN.: /
PROBE HEATER SETTING: /
APPROX.WIND VEL.,MPH: 0-6
SAMPLE BOX TEMP.,(F): ~60
STATIC PREASURE: "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
Start				1636 00	84			1.79	378.930	80	80	4	58
				1641 05	83			1.75	382.7	83	79	5	56
				1646 10	83			1.75	386.4	86	78	5	54
				1651 15	82			1.79	390.2	88	78	5	54
				1656 20	82			1.79	394.1	88	78	5	55
				1701 25	82			1.79	398.0	87	79	5	55
				1706 30	82			1.79	401.8	87	78	5	56
				1711 35	82			1.79	405.5	87	78	5	58
				1716 40	82			1.79	409.7	87	79	5	57
				1721 45	82			1.79	413.1	87	78	5	58
				1726 50	82			1.79	417.0	87	78	5	59
				1731 55	82			1.79	421.0	88	78	5	59
Stop	ZERO			1736 60	82				424.991				
	SPAN									86.3	78.4		
AVERAGE					82.3			1.79	46.061	82.4			

PITOT LEAK CHECK:
BEFORE: TOP ΔP= NA ΔP= BOTTOM ΔP= NA ΔP=
AFTER: TOP ΔP= ΔP= BOTTOM ΔP= ΔP=

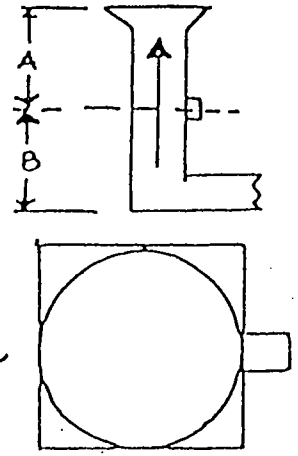
SAMPLE TRAIN LEAK:
BEFORE= Ø CFM@ 15 IN. HG.
AFTER= Ø CFM@ 5 IN. HG.

COMMENTS: PURGE

* Refer to process DATA

$\Sigma_1 = 190 - 200 = -10$ ml

PLANT: Mountainside LFG Recovery
LOCATION: Los Angeles, CA
COUNTY: SCAQMD
UNIT: Sales Gas Line
DATE: 5/18/92
RUN NO./METHOD: #1 CARB 436
COLD BOX NO.: 5
METER BOX NO.: 1
METER FACTOR: γ = 1.0016 HΔ = 1.7959
PITOT #/ FACTOR: * Process data used to calc. flow
PYROMETER #: Blue
MAGNEHELIC FACTOR: ΔP — ΔH @ 5



FILTER NO. 47-248
AMBIENT TEMP.:
BARAMETRIC PRESS.,IN.HG.:
ASSUMED MOISTURE:
HEATER BOX SETTING: 250
PROBE LENGTH,FT. 3' Glass
NOZZLE DIAMETER,IN.: N4
PROBE HEATER SETTING: 250
APPROX.WIND VEL.,MPH: 0-5 mph
SAMPLE BOX TEMP.,(F): <60
STATIC PREASURE: ~ +90 "H2O
OFFSET: 3 in. PORT DIA.: 1 in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME 198.345 (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
Sample Point				~~1130/1226~~	~~86~~ 79			1.79	~~196.708~~	95	84	6	57
				1230	~~84~~ 79			1.79	202.9	97	84	6	57
				1235	~~88~~ 80			1.79	207.6	98	85	6	57
				1240	87			1.79	211.2	99	87	6	56
				1245	89			1.79	215.3	100	88	6	56
				1250	88			1.79	~~219~~ 219.2	101	88	6	58
				1255	88			1.79	223.1	101	89	6	59
				1300	89			1.79	226.9	101	89	6	60
				1305	88			1.79	231.0	100	90	6	58
				1310	86			1.79	235.1	99	90	6	58
				1315	89			1.79	239.1	100	90	6	59
				1320	89			1.79	243.0	100	91	6	59
	ZERO			1325	86			1.79	246.9	100	91	6	60
	SPAN												
AVERAGE													

PITOT LEAK CHECK:
BEFORE: TOP ΔP= NA / ΔP= / BOTTOM ΔP= NA / ΔP=
AFTER: TOP ΔP= / ΔP= / BOTTOM ΔP= / ΔP=

SAMPLE TRAIN LEAK:
BEFORE= 0.010 CFM@ 15 IN. HG.
AFTER= 0 CFM@ 6 IN. HG.

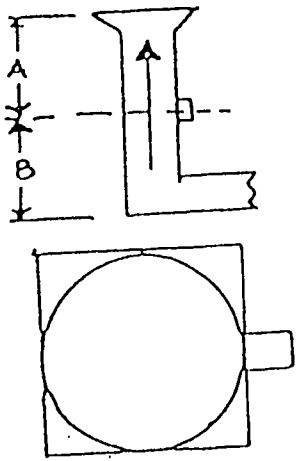
COMMENTS: PURGE

Imp = 374 - 400 = -26
Sigel 309.9 - 284.4 = 25.5 ml

-0.5 ml gain

HORIZON

PLANT: Moontainstate LFG Recovery
LOCATION:
COUNTY:
UNIT: Sales Gas Line
DATE: 5/16/92
RUN NO./METHOD: #1 CARB 4A (Conti)
COLD BOX NO.:
METER BOX NO.:
METER FACTOR:
PITOT #/ FACTOR:
PYROMETER #:
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO.
AMBIENT TEMP.:
BARAMETRIC PRESS.,IN.HG.:
ASSUMED MOISTURE:
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.:
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH:
SAMPLE BOX TEMP.,(F):
STATIC PREASURE: "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
Safe port				1330	89			1.79	250.3	100	91	6	62
				1335	89			1.79	254.2	100	91	6	58
				1340	89			1.79	258.2	100	90	6	56
				1345	89			1.79	~~266.2~~	100	90	6	56
				1350	89			1.79	266.2	100	90	6	57
				1355	89			1.79	269.9	99	90	6	57
				1400	89			1.79	273.7	98	90	6	57
				1405	89			1.79	278.0	97	90	6	56
				1410	89			1.79	282.3	96	90	6	56
				1415	89			1.79	286.3	96	89	6	56
				1420	89			1.79	289.5	96	89	6	57
				1425	89			1.79	293.3	96	88	6	56
				1430	89			1.79	297.1	96	88	6	56
	ZERO												
	SPAN												
AVERAGE													

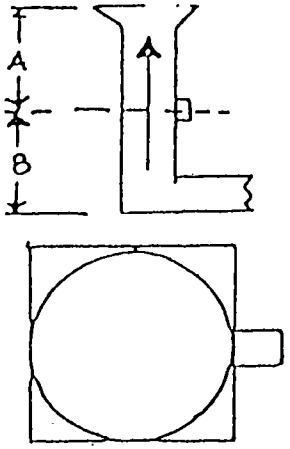
PITOT LEAK CHECK:
BEFORE: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=
AFTER: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=

SAMPLE TRAIN LEAK:
BEFORE= CFM@ IN. HG.
AFTER= CFM@ IN. HG.

COMMENTS: PURGE

HORIZON

PLANT: MOUNTAINGATE LFG Recovery
LOCATION:
COUNTY:
UNIT: Stack Gas Unit
DATE: 5/18/92
RUN NO./METHOD: #1 CARB 436 (cont'd)
COLD BOX NO.:
METER BOX NO.:
METER FACTOR:
PITOT #/ FACTOR:
PYROMETER #:
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO.
AMBIENT TEMP.:
BARAMETRIC PRESS.,IN.HG.:
ASSUMED MOISTURE:
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.:
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH:
SAMPLE BOX TEMP.,(F):
STATIC PREASURE: "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm).	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
Sample point				1435	88			1.79	301.0	96	87	6	56
				1440	89			1.79	305.2	97	87	6	56
				1445	89			1.79	309.0	96	87	6	56
				1450	89			1.79	312.8	96	87	6	57
				1455	89			1.79	316.6	95	87	6	57
				1500	89			1.79	320.5	95	87	6	57
				1505	88			1.79	324.4	95	87	6	57
				1510	88			1.79	328.3	96	87	6	57
				1515	88			1.79	332.2	94	87	6	58
				1520	88			1.79	336.1	94	86	6	59
				1525	88			1.79	339.9	94	86	6	59
				1530	88			1.79	343.8	94	86	6	59
	ZERO			1535	88			1.79	347.7	93	86	6	57
	SPAN												
AVERAGE													

PITOT LEAK CHECK:
BEFORE: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=
AFTER: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=

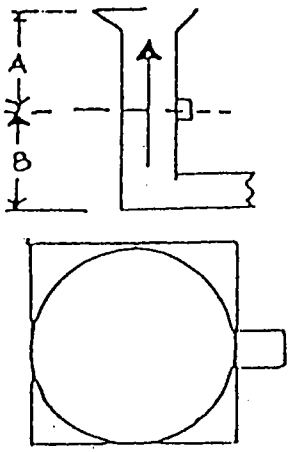
SAMPLE TRAIN LEAK:
BEFORE= CFM@ IN. HG.
AFTER= CFM@ IN. HG.

COMMENTS: PURGE

HORIZON

Ref SOP 378.3

PLANT: MOUNTAINGATE LFG Recovery
LOCATION:
COUNTY:
UNIT: Sales Gas Line
DATE: 5/18/92
RUN NO./METHOD: #1 CARB 436 (Cont'd)
COLD BOX NO.:
METER BOX NO.:
METER FACTOR:
PITOT #/ FACTOR:
PYROMETER #:
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO.
AMBIENT TEMP.:
BARAMETRIC PRESS.,IN.HG.:
ASSUMED MOISTURE:
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.:
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH:
SAMPLE BOX TEMP.,(F):
STATIC PREASURE: "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
Sgle Pt				1940	88			1.79	351.6	92	86	6	54
				1545	88			1.79	355.6	92	85	6	54
				1550	88			1.79	359.5	93	84	6	53
				1555	88			1.79	363.4	93	84	6	54
				1600	88			1.79	367.2	93	84	6	54
				1605	87			1.79	371.1	92	84	6	54
				1610	87			1.79	374.9	92	83	6	54
			STOP	1615	85			1.79	378.852	91	83	6	54
	ZERO												
	SPAN									96.6	87.5		
AVERAGE					87.8			1.79	180.507	92.05			

PITOT LEAK CHECK:
BEFORE: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=
AFTER: TOP ΔP= BOTTOM ΔP=
ΔP= ΔP=

SAMPLE TRAIN LEAK:
BEFORE= CFM@ IN. HG.
AFTER= CFM@ IN. HG.

COMMENTS: PURGE

HORIZON

Landfill Gas Flow Rate

Multimetals (1226 – 1605)

PSI = 6.65

T = 7.6 (86.6°F)

ΔP = 9.40

Correction Factor 79.7018

Temp correction Factor ~~0.9853~~ 0.9753

$(9.40) \times (6.65) \times (79.7018) \times (0.9753) = 4,859$ mmcfd

0.202 mmcfh

0.00337 mmcfm

Particulate Matter (1636 – 1736)

PSI = 6.65

T = 7.5 (84.4°F)

ΔP = 9.40

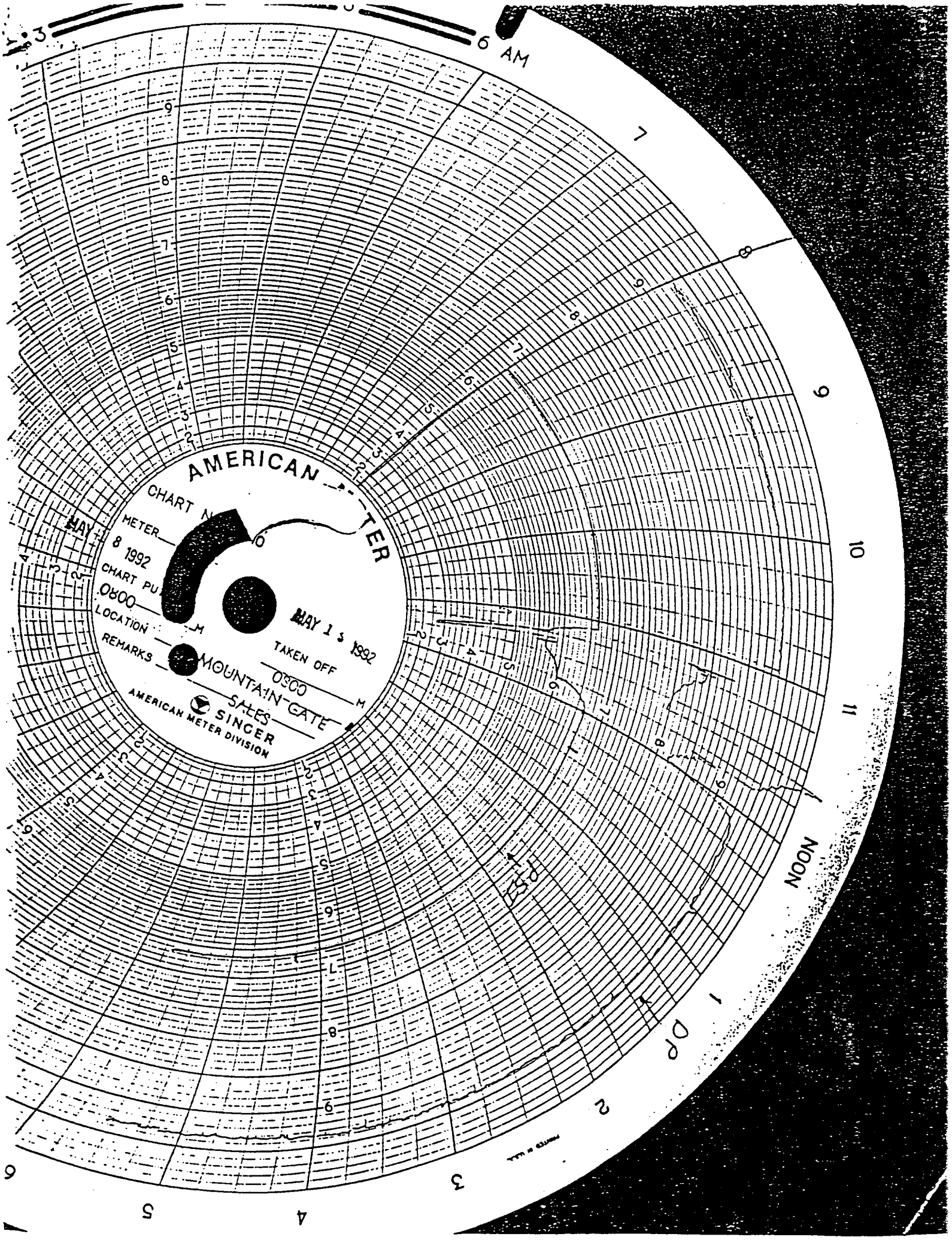
Correction Factor = 79.7018

Temp CF = 0.9774

$(9.40)(6.65)(79.7018)(0.9774) = 4870$ mmcfd

0.203 mmcfh

0.00338 mmcfm


AMERICAN
CHART
METER
8 1992
CHART PU
0800
LOCATION
REMARKS
MOUNTAIN GATE
SALES
SINGER
AMERICAN METER DIVISION
MAY 1 3 1992
TAKEN OFF
0800
M
6 AM
NOON
1 PM
2
3
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5
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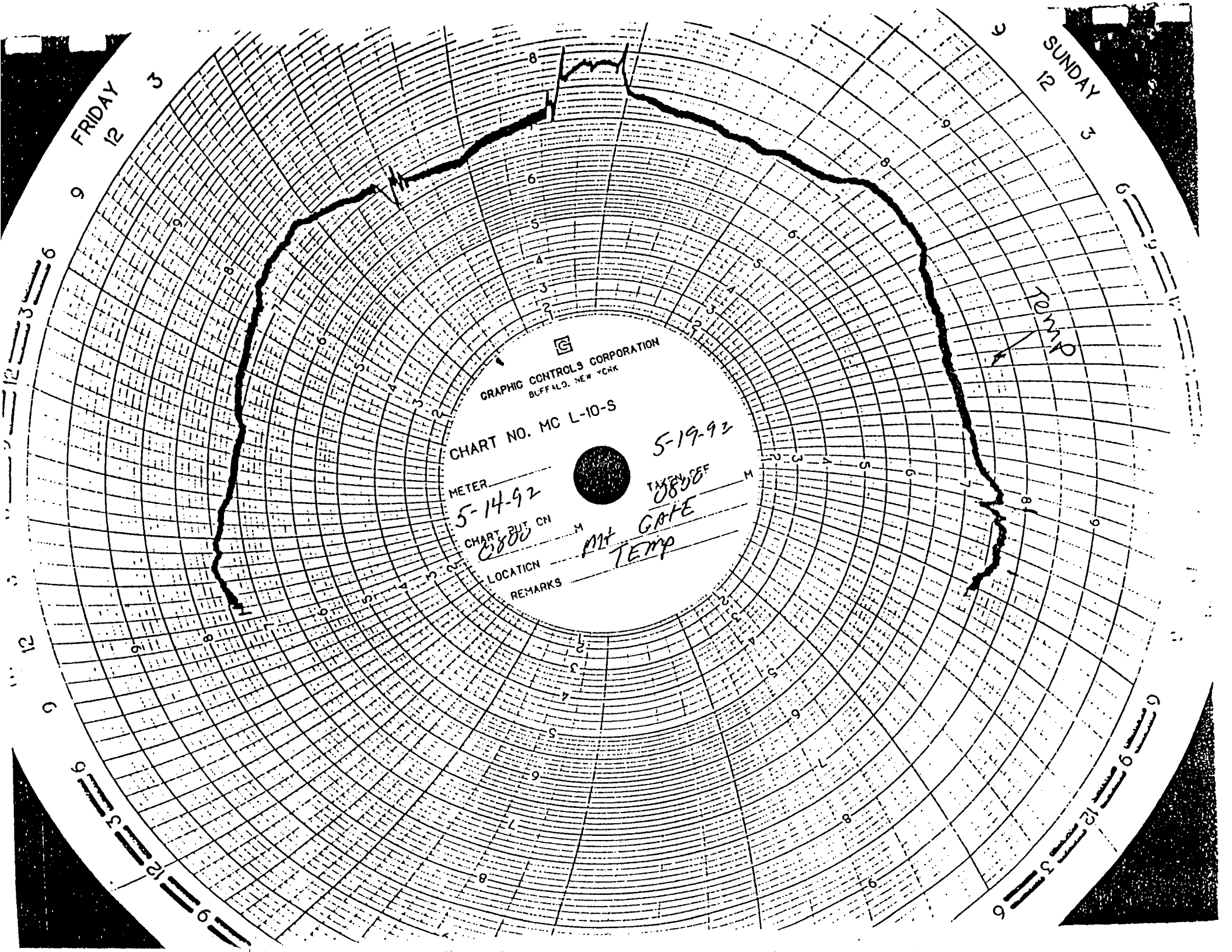
8
9
10
11


FRIDAY
SUNDAY
GRAPHIC CONTROLS CORPORATION
BUFFALO, NEW YORK
CHART NO. MC L-10-S
METER 5-14-92
CHART PUT ON 0800 M
LOCATION Mt GOKE
REMARKS TEMP
TAKEN OFF 0800 M 5-19-92
TEMP
F

MOUNTAINGATE PLANT

SALES GAS TEMPERATURE COEFFICIENT

Sales Gas Chart Reading	Temperature °F	Temperature Coefficient
6.0	54.0	1.0058
6.1	55.8	1.0041
6.2	57.7	1.0023
6.3	59.5	1.0005
6.4	61.4	0.9986
6.5	63.4	0.9968
6.6	65.3	0.9949
6.7	67.3	0.9930
6.8	69.4	0.9911
6.9	71.4	0.9892
7.0	73.5	0.9873
7.1	75.6	0.9853
7.2	77.8	0.9834
7.3	79.9	0.9826
7.4	82.1	0.9794
7.5	84.4	0.9774
7.6	86.6	0.9753
7.7	88.9	0.9733
7.8	91.3	0.9712
7.9	93.6	0.9692
8.0	96.0	0.9671
8.1	98.4	0.9650
8.2	100.9	0.9629
8.3	103.3	0.9608
8.4	105.8	0.9586
8.5	108.4	0.9565

Mountaingate Coefficient = 79.7018 based on 0° - 150° scale.