

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.

Trace Technologies, Inc.

P.O. Box 6817, 10 Radel Avenue
Bridgewater, New Jersey 08807
Telephone (201) 685-2100

April 7, 1989

Gist-Brocades Food Ingredients, Inc.
85 Main Street
East Brunswick, NJ 08816-4799

Attention: Mr. John W. Hogan

Re: Analytical Report

Dear Mr. Hogan,

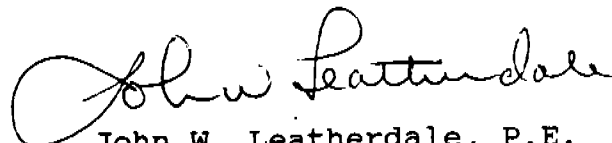
Attached are results of samples taken on February 6th and 13th on three fermenters. Sampling was conducted for 50 minutes of each hour of fermenter operating time. Each sample is composed of a liquid fraction and a gaseous fraction. A total for the run is provided. Units are expressed as $\mu\text{g/l}$ (micrograms/liter) of gas sampled. Unidentified peaks are quantitated with the same response factor as ethanol.

Analytical Methodology - The samples were analyzed by gas chromatography as follows:

Instrument - Hewlett Packard 5890
Detector - Flame Ionization (FID)
Column - 80/120 Carbowax B/6.6% carbowax 20M, 2Mx2mm ID, glass
Flow Rate - 20 ml/min (Nitrogen)
Oven Temperature - 80C 1 min, 4C/min to 200C, hold 3 min.
Injector temperature - 150C
Detector Temperature - 200C
Injection (Liquid) - HP 7673 Auto Sampler (1 microliter)
Injection (Gas) - 1 ml syringe

Should you have any questions regarding the sampling or analysis, please do not hesitate to call.

Very truly yours,
TRACE TECHNOLOGIES, INC.


John W. Leatherdale, P.E.
President

JWL/jl
DCN: 8904107

GIST-BROCADES
FERMENTER EMISSIONS
FRING (FEB 13)

ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED

RUN NO.	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9	RUN 10	RUN 11	RUN 12	RUN 13	RUN 14
DATE	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13
TIME START	6:40	7:45	8:45	9:40	10:45	11:45	12:45	13:45	14:45	15:45	16:45	17:45	18:45	19:45
TIME STOP	7:30	8:35	9:35	10:40	11:35	12:35	13:35	14:35	15:35	16:35	17:35	18:35	19:35	20:35
FLOW RATE	0.3	0.32	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
VOL SAMPLED - L	15	16	20	20	20	20	20	20	20	20	20	20	20	20
ACETONE														
LIQUID	4.6													
VAPOR	4.6	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL														
ETHYL ALCOHOL														
LIQUID	2520.7	2207.1	2835.4	2556.3	2705.5	2700.9	2636.7	2717.9	2524	2430.6	2324.4	2390.1	2425.5	2062.2
VAPOR	180.1	320.4	472.3	501.4	522.3	526.6	494.1	439.3	439.7	454.4	453	431.4	632.8	738.5
TOTAL	2700.8	2527.5	3307.7	3057.7	3227.8	3227.5	3130.8	3157.2	2963.7	2885	2777.4	2821.5	3058.3	2800.7
ISOPROPYL ALCOHOL														
LIQUID	6.6	4.3	4.9	4.2	5.2	3.8	4.4	3.9	3.8	3.5	3.7	3.1	3	3.5
VAPOR														
TOTAL	6.6	4.3	4.9	4.2	5.2	3.8	4.4	3.9	3.8	3.5	3.7	3.1	3	3.5
ETHYL ACETATE														
LIQUID														
VAPOR	12.2	12.6	13.8	13	12.9	12.6	12.1	11.6	12.2	13.2	13.5	14	17.2	17.9
TOTAL	12.2	12.6	13.8	13	12.9	12.6	12.1	11.6	12.2	13.2	13.5	14	17.2	17.9
ISOBUTYL ALCOHOL														
LIQUID	8.4	7.2	9.2	8.9	10.5	12.7	15.8	21.7	27.4	35	44.5	54.4	64.6	68.1
VAPOR														
TOTAL	8.4	7.2	9.2	8.9	10.5	12.7	15.8	21.7	27.4	35	44.5	54.4	64.6	68.1
ISORHYL ALCOHOL														
LIQUID	5.6	3.8	4.1	3.8	4.2	3.6	3.8	3.6	3.3	3.3	3.3	3	3	3.2
VAPOR														
TOTAL	5.6	3.8	4.1	3.8	4.2	3.6	3.8	3.6	3.3	3.3	3.3	3	3	3.2
TOTAL ALCOHOLS														
LIQUID	2541.3	2222.4	2853.6	2573.2	2725.4	2721	2660.7	2747.1	2558.5	2472.4	2375.9	2450.6	2496.1	2137
VAPOR	196.9	333	486.1	514.4	535.2	539.2	506.2	450.9	451.9	467.6	466.5	445.4	650	756.4
TOTAL	2738.2	2555.4	3339.7	3087.6	3260.6	3260.2	3166.9	3198	3010.4	2940	2842.4	2896	3146.1	2893.4
UNIDENTIFIED PEAKS (L)	3	3	2	3	3	3	3	3	4	4	4	5	5	4
UNIDENTIFIED PEAKS (G)	2	2	3	3	3	3	3	3	4	5	6	6	7	8
TOTAL LIQUID*	375.6	336.7	353.4	273.2	229.3	209.3	223.6	252.6	297.3	276.1	317.8	311.9	257.7	222.9
TOTAL VAPOR*	653.9	929.3	1303.1	1196.6	935.1	780.8	691	705.2	791.6	954	962.4	1038.7	1362.2	1261.1
TOTAL*	1029.5	1266	1656.5	1469.8	1164.4	990.1	914.6	957.8	1088.9	1230.1	1280.2	1350.6	1619.9	1484

* QUANTITIED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
FRING (FEB 13)

ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED

RUN NO.	RUN 15	RUN 16	RUN 17	RUN 18	RUN 19	RUN 20
DATE	FEB 13	FEB 13	FEB 13	FEB 13	FEB 14	FEB 14
TIME START	2045	2145	2245	2345	0045	137
TIME STOP	2135	2235	2335	0035	135	200
FLOW RATE	0.4	0.4	0.4	0.4	0.4	0.4
VOL SAMPLED - L	20	20	20	20	20	9.2
ACETONE						
LIQUID						
VAPOR						
TOTAL	0	0	0	0	0	0
ETHYL ALCOHOL						
LIQUID	2779.7	2814.5	3101.2	3378.8	3653.7	4113.1
VAPOR	825.3	1017.2	1098.8	1292.2	1031.1	1031.1
TOTAL	3605	3831.7	4200	4671	3653.7	5144.2
ISOPROPYL ALCOHOL						
LIQUID	2.8	2.6	2.1	2.2	2.3	4.9
VAPOR						
TOTAL	2.8	2.6	2.1	2.2	2.3	4.9
ETHYL ACETATE						
LIQUID	21.6	26.1	31.2	37.8		7.5
VAPOR	21.6	26.1	31.2	37.8	0	29.6
TOTAL						37.1
ISOBUTYL ALCOHOL						
LIQUID	101.9	110.1	136	148	180.6	250
VAPOR						
TOTAL	101.9	110.1	136	148	180.6	250
ISORHYL ALCOHOL						
LIQUID	3.1	42.6	51.2	54.9	65.9	91
VAPOR						
TOTAL	3.1	42.6	51.2	54.9	65.9	91
TOTAL ALCOHOLS						
LIQUID	2887.5	2969.8	3290.5	3583.9	3902.5	4466.5
VAPOR	846.9	1043.3	1130	1330	0	1060.7
TOTAL	3734.4	4013.1	4420.5	4913.9	3902.5	5527.2
UNIDENTIFIED PEAKS (L)	5	4	4	4	4	4
UNIDENTIFIED PEAKS (D)	8	8	8	9	10	10
TOTAL LIQUID	265.5	167.5	166	138	152.9	469.1
TOTAL VAPOR	1349.9	1358.3	1183.5	1206.5	667.8	667.8
TOTAL	1615.4	1525.8	1349.5	1344.5	152.9	1136.9

* QUANTIFIED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
#12 COMMERCIAL

ALL CONCENTRATIONS
ARE µG/L OF GAS
SAMPLED

RUN NO.	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9	RUN 10	RUN 11	RUN 12	RUN 13	RUN 14
DATE	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6
TIME START	930	1030	1115	1215	1315	1415	1515	1615	1715	1815	1915	2015	2115	2215
TIME STOP	1020	1047	1205	1305	1405	1505	1605	1705	1805	1905	2005	2105	2205	2305
FLOW RATE	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
VOL SAMPLED - L	20	7	20	20	20	20	20	20	20	20	20	20	20	20
ACETONE														
LIQUID														
VAPOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL														
ETHYL ALCOHOL														
LIQUID	329.54	648.68	539.29	501.22	676.71	453.98	515.43	537.27	426.92	338.41	272.09	150.83	84.85	48.98
VAPOR	67.34	58.65	107.2	100.55	126.3	109.99	108.89	118.61	109.86	100.34	99.48	82.61	58.86	42.24
TOTAL	396.88	707.33	646.49	601.77	803.01	563.97	624.32	655.88	536.78	438.75	371.57	233.44	143.71	91.22
ISOPROPYL ALCOHOL														
LIQUID	6.47	27.63	12	9.83	14.52	12.5	13.71	13.5	13.36	9.89	14.46	13.39	13.07	11.64
VAPOR														
TOTAL	6.47	27.63	12	9.83	14.52	12.5	13.71	13.5	13.36	9.89	14.46	13.39	13.07	11.64
ETHYL ACETATE														
LIQUID														
VAPOR					3.63	4.14	4.35	4.79	5.17	4.59	4.5	3.63		0
TOTAL	0	0	0	0	3.63	4.14	4.35	4.79	5.17	4.59	4.5	3.63		0
ISOBUTYL ALCOHOL														
LIQUID			11.98	19.56	33.63	37.68	45.57	54.87	58.13	57.65	56.42	49.89	42.17	26.64
VAPOR		0	11.98	19.56	33.63	37.68	45.57	54.87	58.13	57.65	56.42	49.89	42.17	26.64
TOTAL	0	0	11.98	19.56	33.63	37.68	45.57	54.87	58.13	57.65	56.42	49.89	42.17	26.64
ISORNYL ALCOHOL														
LIQUID	10.17	36.4	12.68	10.81	13.67	11.74	12.42	11.79	11.09	8.82	11.03	10.27	10.09	8.62
VAPOR														
TOTAL	10.17	36.4	12.68	10.81	13.67	11.74	12.42	11.79	11.09	8.82	11.03	10.27	10.09	8.62
TOTAL ALCOHOLS														
LIQUID	346.18	712.71	575.95	541.42	738.53	515.9	587.13	617.42	509.5	414.77	354	224.38	150.18	95.88
VAPOR	67.34	58.65	107.2	100.55	129.93	114.13	113.24	123.4	115.03	104.93	103.98	86.24	58.86	42.24
TOTAL	413.52	771.36	683.15	641.97	868.46	630.03	700.37	740.82	624.53	519.7	457.98	310.62	209.04	138.12
UNIDENTIFIED PEAKS (L)														
UNIDENTIFIED PEAKS (G)	4	2	5	4	7	6	7	7	6	4	5	6	5	3
TOTAL LIQUID	120.73	133.21	119.44	119.73	146.84	136.11	151.52	162.71	151.16	118.24	126.11	114.67	101.5	53.3
TOTAL VAPOR	67.51	65.35	240.5	197.61	186.5	177.48	211.6	190.77	137.34	156.34	153.87	99.09	68.94	14.3
TOTAL	188.24	198.56	359.94	317.34	333.34	313.59	363.12	353.48	288.5	274.58	279.98	213.76	170.44	67.6

* QUANTIFIED AS
ETHYL ALCOHOL

GIST-BROCKDES
FERMENTER EMISSIONS
#12 COMMERCIAL

ALL CONCENTRATIONS
ARE µG/L OF GAS
SAMPLED

RUN NO. RUN 15 RUN 16
DATE FEB 6 FEB 7
TIME START 2315 0015
TIME STOP 0005 0105
FLOW RATE 0.4 0.4
VOL SAMPLED - L 20 20

ACETONE
LIQUID 0 0
VAPOR 0 0
TOTAL 0 0

ETHYL ALCOHOL
LIQUID 49.55
VAPOR 49.55
TOTAL 0

ISOPROPYL ALCOHOL
LIQUID 11.99 13.45
VAPOR 11.99 13.45
TOTAL

ETHYL ACETATE
LIQUID 0 0
VAPOR 0 0
TOTAL 0 0

ISOBUTYL ALCOHOL
LIQUID 17.14 9.15
VAPOR 17.14 9.15
TOTAL

ISORNYL ALCOHOL
LIQUID 8.76 8.86
VAPOR 8.76 8.86
TOTAL

TOTAL ALCOHOLS
LIQUID 87.44 31.46
VAPOR 0 0
TOTAL 87.44 31.46

UNIDENTIFIED PEAKS (L)
UNIDENTIFIED PEAKS (G)
TOTAL LIQUID 45.8 16.36
TOTAL VAPOR 4.72 4.96
TOTAL 50.52 21.32

M QUANTITATED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
#1 SEMI SEED

ALL CONCENTRATIONS ARE
IN MICROGRAMS/LITER OF
GAS SAMPLED

RUN NO.	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9	RUN 10	RUN 11	RUN 12	RUN 13	RUN 14	RUN 15
DATE	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 7	FEB 7	FEB 7	FEB 7	FEB 7	FEB 7
TIME START	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100	0200	0300	0400	0500
TIME STOP	1550	1650	1750	1850	1950	2050	2150	2250	2350	0050	0150	0250	0350	0450	0550
FLOW RATE	0.5	0.45	0.32	0.32	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
VOL SAMPLED - L	25	22.5	16	16	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
ACETONE															
LIQUID	38.21	31.3	34.78	17.22	19.57	6.67	12.87		12.23	7.26	11.83	10.87	10.35	10.18	9.58
VAPOR	38.21	31.3	34.78	17.22	19.57	6.67	12.87	0	12.23	7.26	11.83	10.87	10.35	10.18	9.58
TOTAL															
ETHYL ALCOHOL															
LIQUID	274.78	339.37	304.62	336	210.74	90.59	52.73		52.73						58.17
VAPOR	53.01	106	116.52	72.83	83.16	50.66	52.01		52.73		0	0	0	0	58.17
TOTAL	327.79	445.37	421.14	408.83	293.9	141.25	52.01								
ISOPROPYL ALCOHOL															
LIQUID	9.42	11.63	13.36	15.93	12.86	13.45	13.07	12.69	10.79	12.89	11.53	11.33	12.25	10.63	11.2
VAPOR	9.42	11.63	13.36	15.93	12.86	13.45	13.07	12.69	10.79	12.89	11.53	11.33	12.25	10.63	11.2
TOTAL															
ETHYL ACETATE															
LIQUID	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VAPOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL															
ISOBUTYL ALCOHOL															
LIQUID	4.54	7.76	11.72	20.32	20.34	19.55	14.56	10.97	6.76	4.58	3.18				
VAPOR	4.54	7.76	11.72	20.32	20.34	19.55	14.56	10.97	6.76	4.58	3.18	0	0	0	0
TOTAL															
ISOBUTYL ALCOHOL															
LIQUID	6.96	7.98	9.49	10.49	8.89	9.61	8.15	7.53	6.68	7.74	6.8	6.77	7.09	6.19	6.58
VAPOR	6.96	7.98	9.49	10.49	8.89	9.61	8.15	7.53	6.68	7.74	6.8	6.77	7.09	6.19	6.58
TOTAL															
TOTAL ALCOHOLS															
LIQUID	295.7	366.74	339.19	382.74	252.83	133.2	35.78	31.19	24.23	77.94	21.51	18.1	19.34	16.82	75.95
VAPOR	91.22	137.3	151.3	90.05	102.73	57.33	64.88	0	12.23	7.26	11.83	10.87	10.35	10.18	9.58
TOTAL	386.92	504.04	490.49	472.79	355.56	190.53	100.66	31.19	36.46	85.2	33.34	28.97	29.69	27	85.53
UNIDENTIFIED PEAKS (L)	4	1	1	1	3	1	2	1	0	0	2	0	1	1	1
UNIDENTIFIED PEAKS (G)	1	2	2	2	3	2	1	1	1	1	1	1	1	1	1
TOTAL LIQUID	36.99	50.6	66.3	81.74	42.88	40.04	4.42	2.61	0	0	4.98	0	3.63	1.05	5.53
TOTAL VAPOR	35.09	114.67	105.23	79.02	70.15	2.98	4.6	8.68	4.93	12.71	5.18	4.92	5.14	4.94	10.71
TOTAL	72.08	165.27	171.53	160.76	113.03	43.02	9.02	11.29	4.93	12.71	10.16	4.92	8.77	5.99	16.24

* QUANTITATED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
#1 SEMI-SEED (FEB 13)

ALL CONCENTRATIONS ARE
WG/L GAS SAMPLED

RUN NO.	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9	RUN 10	RUN 11	RUN 12	RUN 13	RUN 14
DATE	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 13	FEB 14	FEB 14
TIME START	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	0000	0100
TIME STOP	1250	1350	1450	1550	1650	1750	1850	1950	2050	2150	2250	2350	0050	0150
FLOW RATE	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
VOL SAMPLED - L	20	20	20	20	20	20	20	20	20	20	20	20	20	20
ACETONE														
LIQUID	4.7													
VAPOR	4.7	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL														
ETHYL ALCOHOL														
LIQUID	148.2	182.2	230.2	114.3						47.3		45.8		65
VAPOR	50.7	58	63.4	60.6	46.5					47.3	43.2	42.9	47.9	47.6
TOTAL	198.9	240.2	293.6	174.9	46.5	0	0	0	0	0	43.2	88.7	47.9	112.6
ISOPROPYL ALCOHOL														
LIQUID														
VAPOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL														
ETHYL ACETATE														
LIQUID														
VAPOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL														
ISOBUTYL ALCOHOL														
LIQUID	2.9	4.6	8.7	12.7	10.4	5.8	4.13	3.2	2.7	4.7	3.1	2.9	2.5	2.6
VAPOR														
TOTAL	2.9	4.6	8.7	12.7	10.4	5.8	4.13	3.2	2.7	4.7	3.1	2.9	2.5	2.6
ISOMYL ALCOHOL														
LIQUID				6										
VAPOR	0	0	0	6	0	0	0	0	0	0	0	0	0	0
TOTAL				6										
TOTAL ALCOHOLS														
LIQUID	151.1	186.8	238.9	133	10.4	5.8	4.13	3.2	2.7	52	3.1	48.7	2.5	67.6
VAPOR	55.4	58	63.4	60.6	46.5	0	0	0	0	0	43.2	42.9	47.9	47.6
TOTAL	206.5	244.8	302.3	193.6	56.9	5.8	4.13	3.2	2.7	52	46.3	91.6	50.4	115.2
UNIDENTIFIED PEAKS (L)	1	1	2	1	0	0	0	0	0	0	0	0	3	1
UNIDENTIFIED PEAKS (G)	2	2	2	2	1	1	1	1	1	2	1	1	1	2
TOTAL LIQUID	4.5	17.4	35.7	3.4									31.9	11
TOTAL VAPOR	29.1	43	67.8	27.4	8.4	6	5.7	5.5	5.7	10.5	5.5	24.4	5.6	13.9
TOTAL	33.6	60.4	103.5	30.8	8.4	6	5.7	5.5	5.7	10.5	5.5	24.4	37.5	24.9

■ QUANTIFIED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
#1 SEMI-SEED (FEB 13)

ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED

RUN NO. RUN 15
DATE FEB 14
TIME START 0200
TIME STOP 0250
FLOW RATE 0.4
VOL SAMPLED - L 20

ACETONE
LIQUID
VAPOR
TOTAL 0

ETHYL ALCOHOL
LIQUID
VAPOR 49.1
TOTAL 49.1

ISOPROPYL ALCOHOL
LIQUID
VAPOR
TOTAL 0

ETHYL ACETATE
LIQUID
VAPOR
TOTAL 0

ISOBUTYL ALCOHOL
LIQUID
VAPOR
TOTAL 0

ISORHAYL ALCOHOL
LIQUID 7.1
VAPOR 7.1
TOTAL

TOTAL ALCOHOLS
LIQUID 7.1
VAPOR 49.1
TOTAL 56.2

UNIDENTIFIED PEAKS (L) 3
UNIDENTIFIED PEAKS (G)
TOTAL LIQUID 74.6
TOTAL VAPOR 73.3
TOTAL 147.9

* QUANTITATED AS
ETHYL ALCOHOL

**ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED**

■ QUANTITATED AS
ETHYL ALCOHOL

GIST-BROCADES
FERMENTER EMISSIONS
FRING

ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED

RUN NO.	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	RUN 9	RUN 10	RUN 11	RUN 12	RUN 13	RUN 14
DATE	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6	FEB 6
TIME START	932	1033	1133	1233	1333	1433	1533	1633	1733	1833	1933	2033	2133	2233
TIME STOP	1022	1123	1223	1323	1423	1523	1623	1723	1823	1923	2023	2123	2223	2323
FLOW RATE	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
VOL SAMPLED - L	15	15	15	15	15	15	15	15	15	15	15	15	15	15
ACETONE										2.2				
LIQUID														
VAPOR														
TOTAL	0	0	0	0	0	0	0	0	0	2.2	0	0	0	0
ETHYL ALCOHOL														
LIQUID	2988.2	2791.5	2895.8	2984	2928.5	2621.4	2569	2565.8	2589.9	2446.5	2361.2	2292.5	2334.7	2391.5
VAPOR	385.57	399	424.83	418.1	428.6	445.7	270.4	377.8	422.6	482.6	444.13	470.4	486.7	511.83
TOTAL	3373.77	3190.5	3320.63	3402.1	3357.1	3067.1	2839.4	2943.6	3012.5	2929.1	2805.33	2762.9	2821.4	2903.33
ISOPROPYL ALCOHOL														
LIQUID	12.8	13.2	11.8	11.3	9.8	11.7	11.1	10.4	12.7	10.84	7.8	8.4	7.4	8.7
VAPOR														
TOTAL	12.8	13.2	11.8	11.3	9.8	11.7	11.1	10.4	12.7	10.84	7.8	8.4	7.4	8.7
ETHYL ACETATE														
LIQUID														
VAPOR	16.1	15.5	14.8	14.2	13.9	13.7	9.9	12.3	13.9	14	15	15.6	16.8	18.2
TOTAL	16.1	15.5	14.8	14.2	13.9	13.7	9.9	12.3	13.9	14	15	15.6	16.8	18.2
ISOBUTYL ALCOHOL														
LIQUID	5.1	5.2	5.7	6.8	8	9.4	11.7	17.2	23.6	33.5	44.3	53.8	68.6	87.4
VAPOR														
TOTAL	5.1	5.2	5.7	6.8	8	9.4	11.7	17.2	23.6	33.5	44.3	53.8	68.6	87.4
ISOMYL ALCOHOL														
LIQUID	7.1	7.4	7.1	6.5	5.9	6.5	6.1	6	6.9	11.9	10.5	8.8	7.4	7.6
VAPOR														
TOTAL	7.1	7.4	7.1	6.5	5.9	6.5	6.1	6	6.9	11.9	10.5	8.8	7.4	7.6
TOTAL ALCOHOLS														
LIQUID	3013.2	2817.3	2920.4	3008.6	2952.2	2649	2597.9	2599.4	2633.1	2504.94	2423.8	2363.5	2418.1	2495.2
VAPOR	401.67	414.5	439.63	432.3	442.5	459.4	280.3	390.1	436.5	496.6	459.13	486	503.5	530.03
TOTAL	3414.87	3231.8	3360.03	3440.9	3394.7	3108.4	2878.2	2989.5	3069.6	3001.54	2882.93	2849.5	2921.6	3025.23
UNIDENTIFIED PEAKS (L)	5	5	5	5	5	5	4	4	4	6	5	4	5	5
UNIDENTIFIED PEAKS (G)	3	3	4	3	3	3	2	2	3	5	3	6	7	8
TOTAL LIQUID*	237.9	299.2	353.9	354.3	270.1	225	227.6	275.4	253.6	325.1	246.9	312.4	342.9	334.6
TOTAL VAPOR*	468.1	795.1	1006.1	1035.1	807.9	683.3	351.3	576.6	787	847.5	938.6	1053.3	1149.1	1150.6
TOTAL*	706	1094.3	1360	1389.4	1078	908.3	578.9	852	1040.6	1172.6	1185.5	1365.7	1492	1485.2

* QUANTIFIED AS
ETHYL ALCOHOL

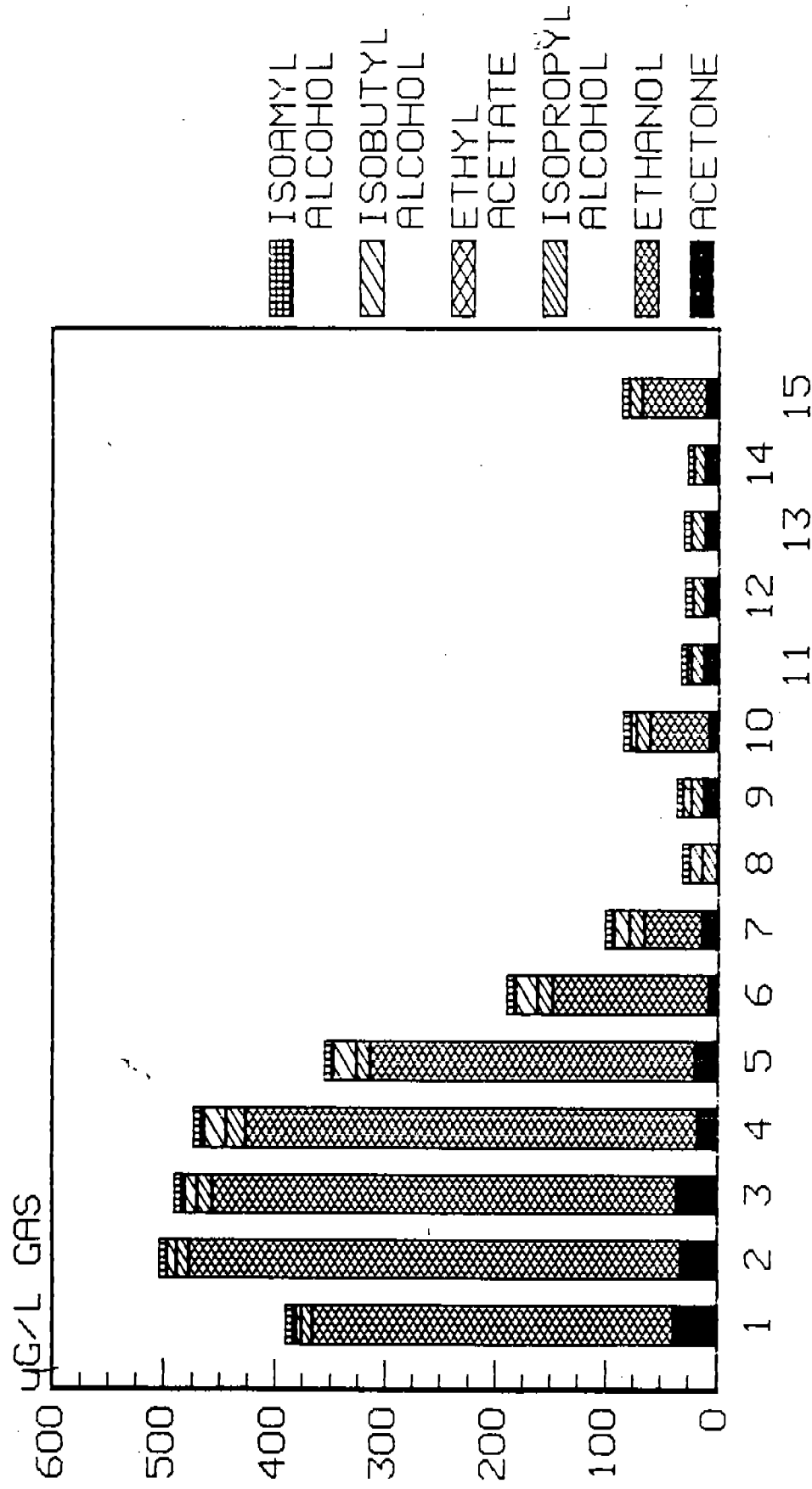
GIST-BROCADES
FERMENTER EMISSIONS
FRING

ALL CONCENTRATIONS ARE
UG/L GAS SAMPLED

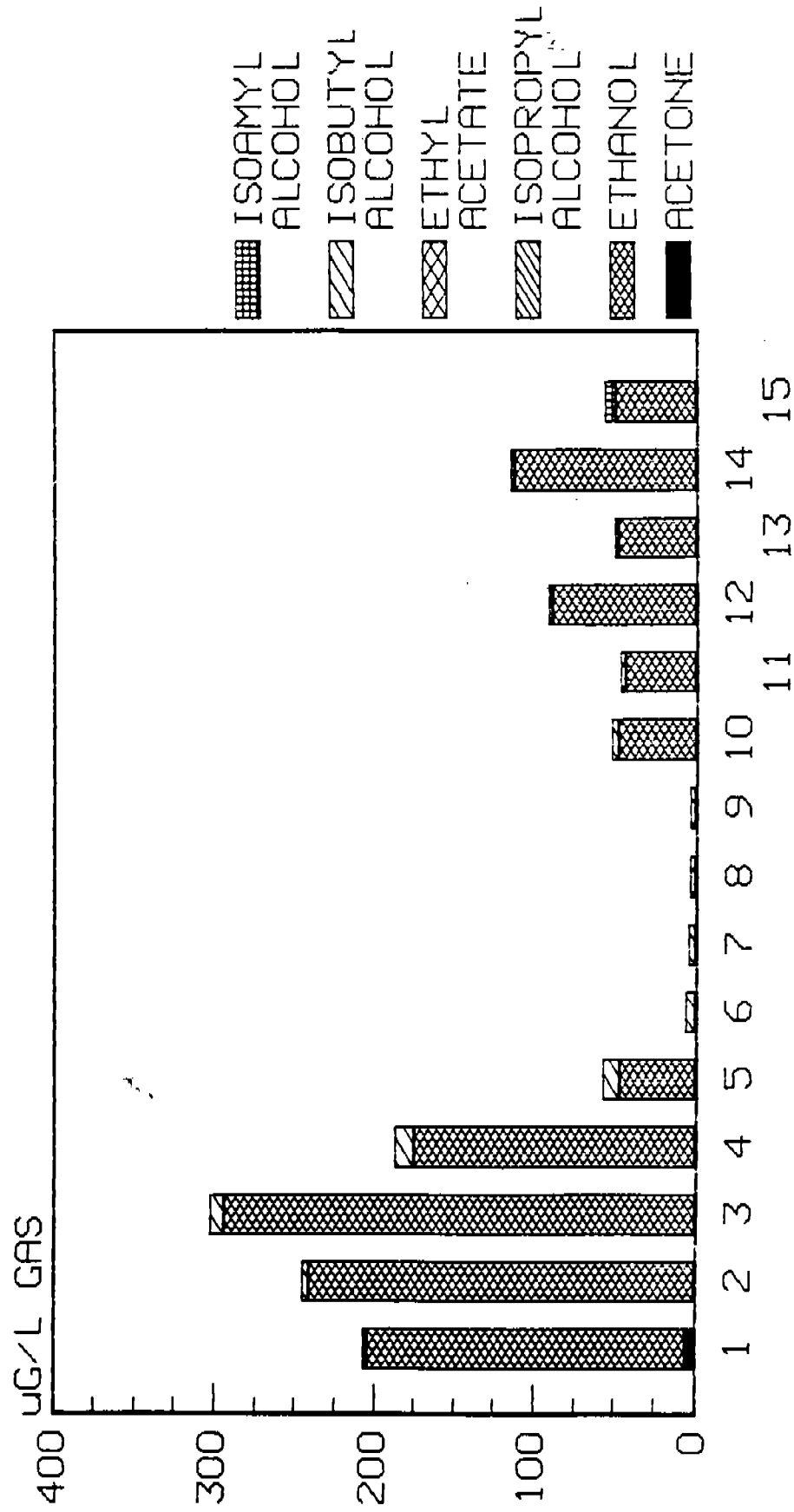
RUN NO.	RUN 15	RUN 16	RUN 17	RUN 18	RUN 19	RUN 20
DATE	FEB 6	FEB 7	FEB 7	FEB 7	FEB 7	FEB 7
TIME START	2333	0034	134	234	334	434
TIME STOP	0024	124	224	324	424	501
FLOW RATE	0.3	0.3	0.3	0.3	0.3	0.3
VOL SAMPLED - L	15	15	15	15	15	8.1
ACETONE						
LIQUID						
VAPOR	0	0	0	0.4	0	0
TOTAL						
ETHYL ALCOHOL						
LIQUID	2575.3	2616.5	3122.9	3125.1	3362.5	3972.7
VAPOR	591	647.6	740.6	907.8	952.2	874.6
TOTAL	3166.3	3264.1	3863.5	4032.9	4314.7	4847.3
ISOPROPYL ALCOHOL						
LIQUID	8.1	9.3	8.7	7.7	8.7	15.3
VAPOR						
TOTAL	8.1	9.3	8.7	7.7	8.7	15.3
ETHYL ACETATE						
LIQUID						
VAPOR	21	23.4	29.9	35.1	40.6	36.9
TOTAL	21	23.4	29.9	35.1	40.6	36.9
ISOBUTYL ALCOHOL						
LIQUID	111.7	126.2	159.9	171.7	197.5	256.4
VAPOR						
TOTAL	111.7	126.2	159.9	171.7	197.5	256.4
ISORNYL ALCOHOL						
LIQUID	7.2	7.2	7	6.3	6.5	10.9
VAPOR						
TOTAL	7.2	7.2	7	6.3	6.5	10.9
TOTAL ALCOHOLS						
LIQUID	2702.3	2759.2	3298.5	3310.8	3575.2	4255.3
VAPOR	612	671	770.5	942.9	992.8	911.5
TOTAL	3314.3	3430.2	4069	4253.7	4568	5166.8
UNIDENTIFIED PEAKS (L)						
LIQUID	6	5	5	6	5	5
VAPOR	8	8	8	8	11	9
TOTAL LIQUID	332.5	313.6	300	280.4	291.4	364.3
TOTAL VAPOR	1223	1150.3	1147.1	1128	1106	825.9
TOTAL*	1555.5	1463.9	1447.1	1408.4	1397.4	1190.2

* QUANTIFIED AS
ETHYL ALCOHOL

GIST-BROCADES
#1 SEMI-SEED FERMENTER
ALCOHOL CONCENTRATIONS VS TIME

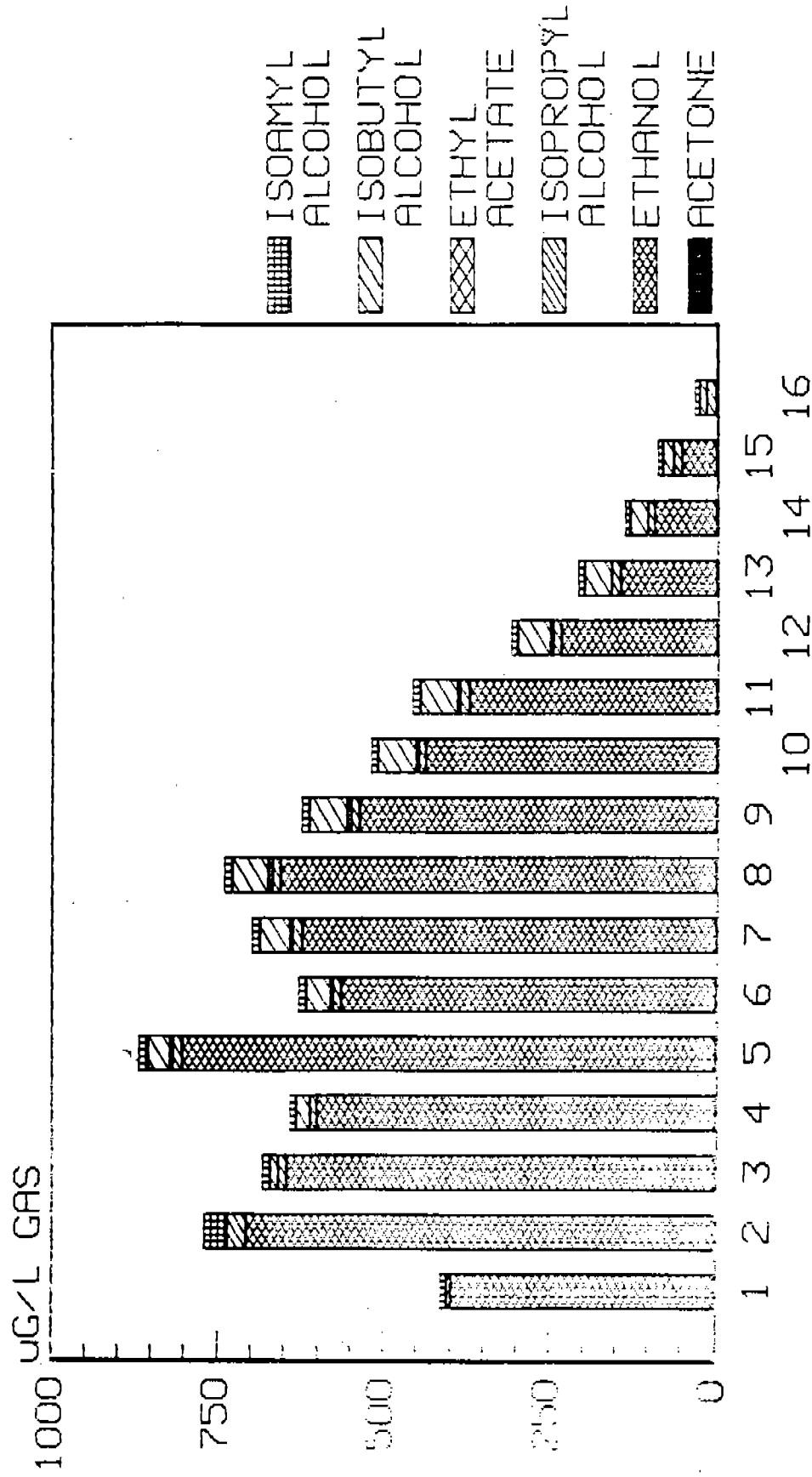


GIST-BROCADES
#1 SEMI-SEED (FEB 13)
ALCOHOL CONCENTRATIONS VS TIME



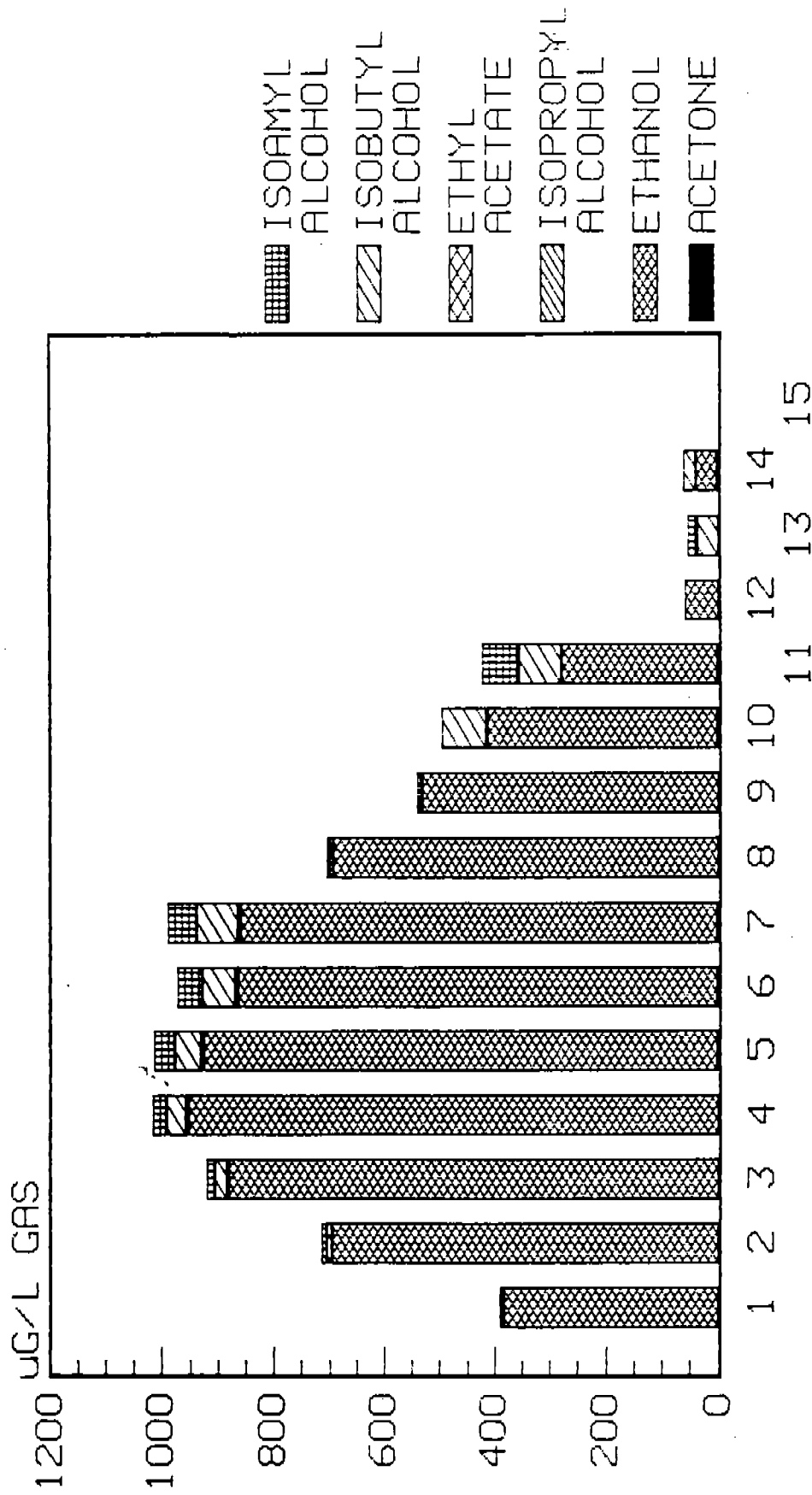
TIME - HOURS

GIST-BROCADES
#12 COMMERCIAL (FEB 6)
ALCOHOL CONCENTRATION VS TIME

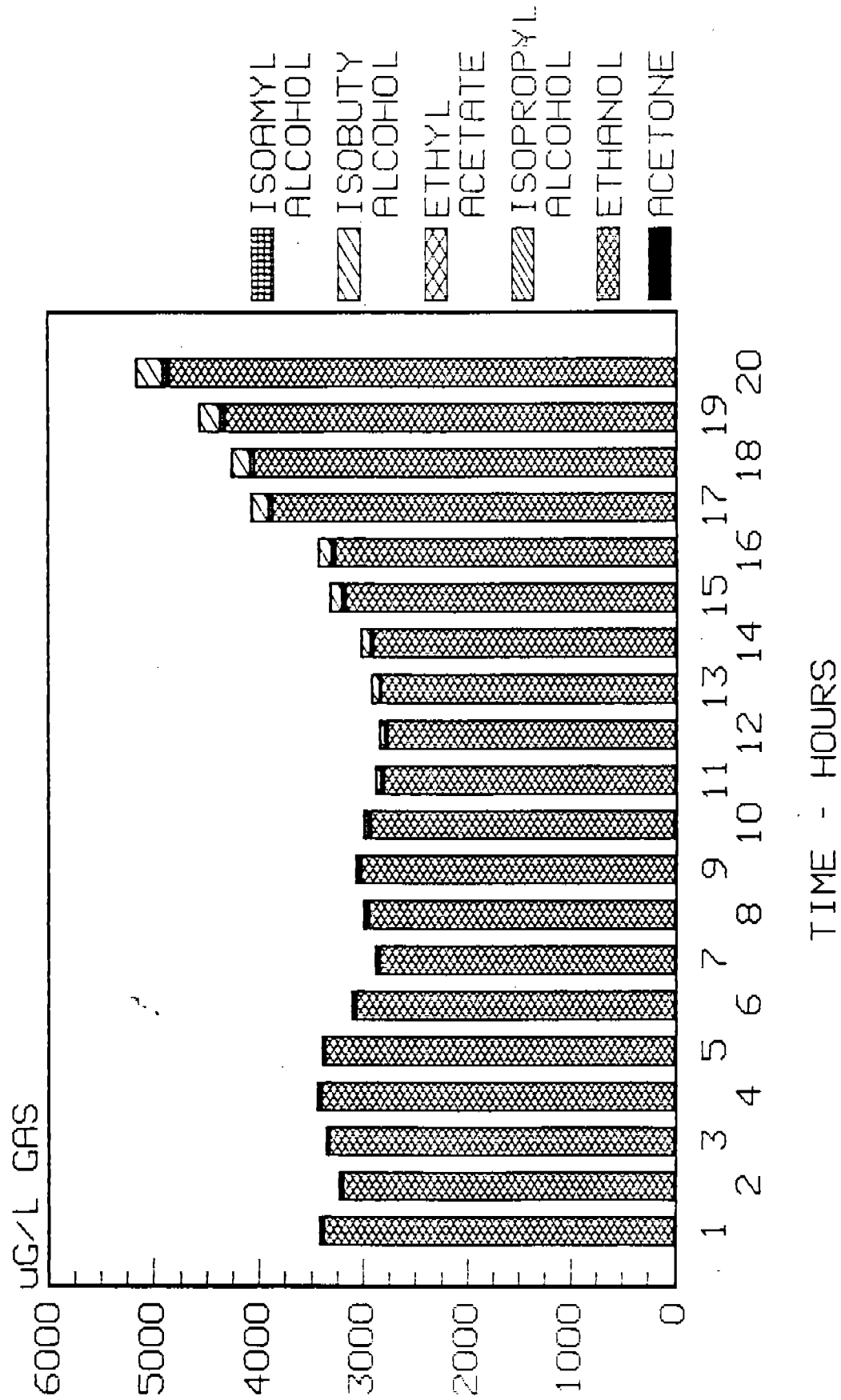


TIME - HOURS

GIST-BROCADES
#12 COMMERCIAL (FEB 13)
ALCOHOL CONCENTRATION VS TIME



GIST-BROCADES FRING (FEB 6) ALCOHOL CONCENTRATION VS TIME



GIST-BROCADES FRING (FEB 13) ALCOHOL CONCENTRATION VS TIME

