Background Report Reference

AP-42 Section Number: 9.9.1

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Title: Air Pollution Emission Test

Cargill, Inc.
Seattle, Washington

January 1974

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AIR POLLUTION EMISSION TEST

Cargill, Inc.
(PLANT NAME)

Seattle, Washington
(PLANT ADDRESS)

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Water Programs
Office of Air Quality Planning and Standards
Emission Standards and Engineering Division
Emission Measurement Branch
Research Triangle Park, N. C. 27711

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Emission Testing Report
EMB Test No.: 73-GRN-8

C A R G I L L, I N C.

Seattle, Washington

Project Officer
Roger O. Pfaff

Environmental Protection Agency
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

January 1974

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INTRODUCTION

Under the Clean Air Act, as amended, the Environmental Protection Agency is responsible for establishing Federal performance standards for new stationary sources which contribute significantly to air pollution or cause or contribute to the endangerment of public health or welfare. Grain handling facilities have been included in a listing of such sources.

The Office of Air Quality Planning and Standards establishes performance standards from emission data gathered from the best demonstrated emission control systems. Source testing firms under contract to the Emission Measurement Branch perform source tests at facilities determined to be among those best controlled.

The shiploading and boxcar unloading facilities at Cargill, Inc. in Seattle, Washington were tested for particulates and particle size by Valentine, Fisher, and Tomlinson, Inc. Three particulate and one particle size test were taken at the inlet and outlet of each control system during the week of October 1, 1973. Both control systems consist of a Carter-Day 72RJ96 filter.

DISCUSSION OF RESULTS

During Run 1 at the car dump, testing was discontinued between each car dumping. Approximately five minutes out of every seven were used for actual dumping during periods of no delay. During Runs 2 and 3, testing was discontinued only when a delay would occur between cars. The result of this procedure is a possible higher emission rate measured during Run 1. The results do not follow this reasoning. Run 2 results are slightly lower than Run 1, but Run 3 inlet is higher. The average inlet emission rate is 112.3 lbs/hr, and the average emission rate at the outlet is 0.16 lb/hr.

Only two runs were accomplished at the shipload inlet because of plugging of the nozzle due to large particle sizes. Average inlet emission rate was 861.3 lbs/hr and average outlet rate was 0.27 lb/hr.

Due to an error in the analysis, ether-chloroform extractions were not performed on the samples as required by Method 5 in the August 17, 1971, Federal Register. Examination of previous test results show that the ether-chloroform extraction portion of the sample may be significant if back half weights are large in comparison to the total sample.

One particle size test was run at each test site. The inlet test at the ship loading facility was unsuccessful.

TABLE 1
Particulate Summary - English Units
Inlet to Car Dump Filter

Run Number	1	2	3	Average
Date	10-02-73	10-03-73	10-04-73	
Volume of Gas Sampled - DSCF[a]	142.99	76.03	79.45	
Percent Moisture by Volume	1.0	0.8	0.8	
Average Stack Temperature - °F	58.5	56.9	50.4	
Stack Volumetric Flow Rate - DSCFM[b]	20,882	21,141	21,739	21,254
Stack Volumetric Flow Rate - ACFM[c]	20,499	20,611	21,067	20,726
Percent Isokinetic	93.5	92.1	93.6	93.1
Particulates - probe, cyclone, and filter catch				
mg	5931.52	2614.18	3499.08	4014.93
gr/DSCF	0.639	0.530	0.678	0.616
gr/ACF	0.650	0.543	0.699	0.631
lb/hr	114.3	96.0	126.4	112.2
Particulates - total catch				
mg	5933.60	2618.19	3503.18	4018.32
gr/DSCF	0.639	0.530	0.679	0.616
gr/ACF	0.651	0.544	0.700	0.632
lb/hr	114.4	96.1	126.5	112.3
Percent impinger catch	0.0	0.2	0.1	0.1

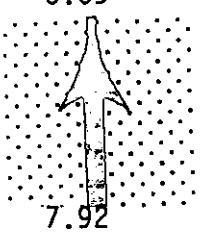
[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

[c] Actual cubic feet per minute

TABLE 2
Particulate Summary - English Units
Outlet of Car Dump Filter

Run Number	1	2	3	Average
Date	10-02-73	10-03-73	10-04-73	
Volume of Gas Sampled - DSCF[a]	125.43	127.38	132.38	
Percent Moisture by Volume	0.9	0.9	0.9	
Average Stack Temperature - °F	60.9	60.6	59.2	
Stack Volumetric Flow Rate - DSCFM[b]	19,336	19,676	19,877	19,629
Stack Volumetric Flow Rate - ACFM[c]	18,927	19,222	19,462	19,204
Percent Isokinetic	93.7	93.5	96.2	94.5
Particulates - probe, cyclone, and filter catch				
mg	5.96	4.28	3.61	4.62
gr/DSCF	0.00073	0.00052	0.00042	0.00056
gr/ACF	0.00075	0.00053	0.00043	0.00057
lb/hr	0.12	0.09	0.07	0.09
Particulates - total catch				
mg	10.12	8.70	4.95	7.92
gr/DSCF	0.00124	0.00105	0.00058	0.00096
gr/ACF	0.00127	0.00108	0.00059	0.00098
lb/hr	0.21	0.18	0.10	0.16
Percent impinger catch	41.1	50.8	27.1	39.7



[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

[c] Actual cubic feet per minute

TABLE 3
Particulate Summary - English Units
Inlet to Shipload Filter

Run Number	1	2	Average
Date	10-05-73	10-06-73	
Volume of Gas Sampled - DSCF[a]	86.97	67.12	
Percent Moisture by Volume	0.6	1.2	
Average Stack Temperature - °F	45.0	46.8	
Stack Volumetric Flow Rate - DSCFM[b]	21,733	17,243	19,488
Stack Volumetric Flow Rate - ACFM[c]	21,076	17,166	19,121
Percent Isokinetic	92.3	87.6	99.2
Particulates - probe, cyclone, and filter catch			
mg	30,061.49	21,552.24	25,806.86
gr/DSCF	5.32	4.94	5.13
gr/ACF	5.49	4.96	5.22
lb/hr	991.6	730.8	861.2
Particulates - total catch			
mg	30,063.33	21,556.62	25,809.97
gr/DSCF	5.32	4.95	5.13
gr/ACF	5.49	4.97	5.23
lb/hr	991.7	731.0	861.3
Percent impinger catch	0.0	0.0	0.0

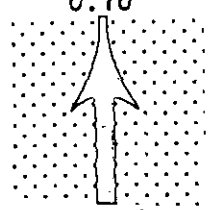
[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

[c] Actual cubic feet per minute

TABLE 4
Particulate Summary - English Units
Outlet of Shipload Filter

Run Number	1	2	3	Average
Date	10-05-73	10-05-73	10-06-73	
Volume of Gas Sampled - DSCF[a]	187.35	170.54	48.60	
Percent Moisture by Volume	0.5	0.9	1.1	
Average Stack Temperature - °F	54.8	56.5	58.5	
Stack Volumetric Flow Rate - DSCFM[b]	22,510	20,223	19,582	20,772
Stack Volumetric Flow Rate - ACFM[c]	21,956	20,186	19,662	20,602
Percent Isokinetic	96.2	97.5	97.4	97.1
Particulates - probe, cyclone, and filter catch				
mg	9.92	9.03	3.25	7.40
gr/DSCF	0.00082	0.00082	0.00103	0.00089
gr/ACF	0.00084	0.00082	0.00103	0.00089
lb/hr	0.16	0.14	0.17	0.16
Particulates - total catch				
mg	12.12	10.96	8.52	10.53
gr/DSCF	0.00100	0.00099	0.00270	0.00156
gr/ACF	0.00102	0.00099	0.00269	0.00157
lb/hr	0.19	0.17	0.45	0.27
Percent impinger catch	18.2	17.6	61.9	32.5



[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

[c] Actual cubic feet per minute

TABLE 5
Particulate Summary - Metric Units
Inlet to Car Dump Filter (Boxcar)

Run Number	1	2	3	Average
Date	10-02-73	10-03-73	10-04-73	
Volume of Gas Sampled - Nm^3 (a)	4.05	2.15	2.25	
Percent Moisture by Volume	1.0	0.8	0.8	
Average Stack Temperature - °C	14.7	13.8	10.2	
Stack Volumetric Flow Rate - Nm^3/min. (b)	591	599	616	602
Stack Volumetric Flow Rate - m^3/min. (c)	580	584	597	587
Percent Isokinetic	93.5	92.1	93.6	93.1
Particulates - probe, cyclone, and filter catch				
mg	5931.52	2614.18	3499.08	4014.93
mg/Nm^3	1461.90	1211.71	1552.04	1408.55
mg/m^3	1488.33	1242.17	1600.65	1443.71
kg/hr	51.87	43.52	57.33	50.91
Particulates - total catch				
mg	5933.60	2618.19	3503.18	4018.32
mg/Nm^3	1462.41	1213.57	1553.85	1409.95
mg/m^3	1488.86	1244.07	1602.52	1445.15
kg/hr	51.88	43.59	57.39	50.96
Percent impinger catch	0.0	0.2	0.1	0.1

[a] Dry normal cubic meter at 21.1°C, 760mm Hg.

[b] Dry normal cubic meters per minute at 21.1°C, 760mm Hg.

[c] Actual cubic meters per minute

TABLE 6
Particulate Summary - Metric Units
Outlet of Car Dump Filter (Boxcar)

Run Number	1	2	3	Average
Date	10-02-73	10-03-73	10-04-73	
Volume of Gas Sampled - Nm^3 (a)	3.55	3.61	3.75	
Percent Moisture by Volume	0.9	0.9	0.9	
Average Stack Temperature - °C	16.1	15.9	15.1	
Stack Volumetric Flow Rate - Nm^3/min. (b)	548	557	563	556
Stack Volumetric Flow Rate - m^3/min. (c)	536	544	551	544
Percent Isokinetic	93.7	93.5	96.2	94.5
Particulates - probe, cyclone, and filter catch				
mg	5.96	4.28	3.61	4.62
mg/Nm^3	1.67	1.18	0.96	1.27
mg/m^3	1.71	1.21	0.98	1.30
kg/hr	0.06	0.04	0.03	0.04
Particulates - total catch				
mg	10.12	8.70	4.95	7.92
mg/Nm^3	2.84	2.41	1.32	2.19
mg/m^3	2.90	2.46	1.35	2.24
kg/hr	0.09	0.08	0.04	0.07
Percent impinger catch	41.1	50.8	27.1	39.7

[a] Dry normal cubic meter at 21.1°C, 760mm Hg.

[b] Dry normal cubic meters per minute at 21.1°C, 760mm Hg.

[c] Actual cubic meters per minute

TABLE 7
Particulate Summary - Metric Units
Inlet to Shipload Filter

Run Number	1	2	Average
Date	10-05-73	10-06-73	
Volume of Gas Sampled - Nm^3 (a)	2.46	1.90	
Percent Moisture by Volume	0.6	1.2	
Average Stack Temperature - °C	7.2	8.2	
Stack Volumetric Flow Rate - Nm^3/min. (b)	615	488	556
Stack Volumetric Flow Rate - m^3/min. (c)	597	486	541
Percent Isokinetic	110.8	87.6	99.2
Particulates - probe, cyclone, and filter catch			
mg	30,061.49	21,552.24	25,806.86
mg/Nm^3	12,181.23	11,315.20	11,748.21
mg/m^3	12,553.80	11,359.52	11,956.66
kg/hr	449.79	331.50	390.65
Particulates - total catch			
mg	30,063.33	21,556.62	25,809.97
mg/Nm^3	12,181.97	11,317.50	11,749.74
mg/m^3	12,554.57	11,361.83	11,958.20
kg/hr	449.82	331.57	390.69
Percent impinger catch			

[a] Dry normal cubic meter at 21.1°C, 760mm Hg.

[b] Dry normal cubic meters per minute at 21.1°C, 760mm Hg.

[c] Actual cubic meters per minute

TABLE 8
Particulate Summary - Metric Units
Outlet of Shipload Filter

Run Number	1	2	3	Average
Date	10-05-73	10-05-73	10-06-73	
Volume of Gas Sampled - Nm^3 (a)	5.31	4.83	1.38	
Percent Moisture by Volume	0.5	0.9	1.1	
Average Stack Temperature - °C	12.7	13.6	14.7	
Stack Volumetric Flow Rate - Nm^3/min. (b)	637	573	554	588
Stack Volumetric Flow Rate - m^3/min. (c)	622	572	557	583
Percent Isokinetic	96.2	97.5	97.4	97.1
Particulates - probe, cyclone, and filter catch				
mg	9.92	9.03	3.25	7.40
mg/Nm^3	1.87	1.87	2.36	2.03
mg/m^3	1.91	1.87	2.35	2.04
kg/hr	0.07	0.06	0.08	0.07
Particulates - total catch				
mg	12.12	10.96	8.52	10.53
mg/Nm^3	2.28	2.26	6.18	3.57
mg/m^3	2.34	2.27	6.15	3.58
kg/hr	0.09	0.08	0.21	0.12
Percent impinger catch	18.2	17.6	61.9	32.5

[a] Dry normal cubic meter at 21.1°C, 760mm Hg.

[b] Dry normal cubic meters per minute at 21.1°C, 760mm Hg.

[c] Actual cubic meters per minute

Particle Size Results

Car Dump Inlet

Dp, Particle Diameter (Microns)	Weight % less than Dp
2.40	20.0
1.42	9.3
0.97	2.7
0.51	2.7
0.33	2.7

Car Dump Outlet

3.23	80.0
1.91	56.0
1.31	44.0
0.69	36.0
0.45	32.0

Ship Load Outlet

3.28	10.6
1.94	1.0
1.33	0
0.71	0
0.46	0

PROCESS DESCRIPTION

Boxcar Receiving - When railcars full of grain are received at the elevator, the type and grade of grain in each car is determined. This facility handles wheat almost exclusively. A list is compiled of the cars and their contents for each truck in the rail yard. The storage bin into which the wheat will be put is added to the list, next. The contents of each car is matched as closely as possible with the type and grade of wheat currently in the storage bin. A track of cars is selected and the cars are emptied in sequence even though this may mean alternating between boxcars and hopper cars. Hopper cars and boxcars are emptied on separate parallel tracks in the same dumpshed. Dust emissions from both processes are controlled by separate filter systems.

The boxcar to be unloaded is moved into the car dump shed and clamped to a movable section of track. The bifold doors on the north end of the shed close automatically. The sliding steel door of the car has already been opened. The grain is held in the car by a temporary "grain door" of reinforced paper or wood. The car and its contents are weighed. The "grain door" is then broken and the car is tilted to dump the grain into the receiving hopper. The grain is immediately conveyed from the hopper to its assigned storage bin. The tare weight of the empty car is then determined. As the grain is dumped into the receiving hopper, a sample is automatically conveyed pneumatically to Washington State offices. The official grade, moisture content, test weight (lb/bu) and dockage is determined here. Dockage is defined by the USDA as "weed seeds, weed stems, chaff, straw, grain other than wheat, sand, dirt, and any other material other than wheat, which can

be removed readily from the wheat by use of appropriate sieves and cleaning devices, also underdeveloped, shriveled, and small pieces of wheat kernels removed in properly separating the material other than wheat and which cannot be removed by properly rescreening or recleaning". Dockage ranging from 0.5 percent to 0.9 percent is expressed as 0.5 percent, from 1.0 percent to 1.4 percent is expressed as 1.0 precent, and from 1.5 percent to 1.9 percent is expressed as 1.5 percent, etc. The percent dockage was determined using a Carter Dockage Tester. A small fan aspirated that light materials from the sample and the large or small materials were separated from the wheat by screens. All of the material separated from the good wheat kernels is combined and its weight is ratioed with the weight of the total sample. Thus, although dockage is an indication of the foreign material in the wheat the largest part of dockage is small heavy particles of dirt, broken wheat kernels, and weed seeds.

Prior to starting the source tests the process cycle was timed. Although the cycle was fairly uniform the timing depended on the following variables:

1. The car dump operator
2. Whether the switch engine was waiting to push the next car into place or whether it was being used to switch other cars.
3. Whether or not paper and boards from the car had to be removed from the grate over the receiving hopper.
4. Whether the receiving conveyor belt and elevator leg were clear of grain.

In general, four to five minutes elapsed from the time the grain door was broken until the car was empty. Normally, the receiving hopper was empty and the conveyor belts were clear within 30 seconds after the car was emptied. As little as two seconds elapsed from the time the first car was emptied and the grain door on the next car was broken. When this process timing was followed the test trains ran continuously. The trains were shut off whenever delays occurred.

Ship Loading - Wheat from several storage bins is fed simultaneously onto the tunnel belts beneath the bins and conveyed to one of nine shipping bins. In this way, several grades of wheat are blended to arrive at the desired grade for shipping. Generally all wheat is shipped as #2 grade or better. Each of the nine shipping bins has a capacity of 1200 tons. Two bins at one time can be emptied onto two parallel conveyor systems which carry the wheat from the elevator to the pier. The wheat is discharged from the conveyor belt down one of five loading spouts. A bin of wheat (1200 tons) can be loaded into a ship in one hour, therefore, the maximum loading rate is 2400 tons/hr.

The loading spouts are capable of telescoping several feet and one or two, eight foot extensions can be added to the end of the spout. The ship loaded at the time of testing was a bulk carrier. The loading spouts were lowered deep into the hold and maintained close to the grain surface throughout the loading process. The normal loading procedure is to start a small pile of grain at one end of the hold and to raise the spout slowly

as the pile builds. The grain flows out into the rest of the hold. When the main pile reaches the desired height, the spout is slowly moved around the hold to level out the grain. Ideally, the end of the spout will be maintained about four inches into the grain surfaces throughout this process.

The filter system pulls about 7000 cfm of air into the end of the loading spout, countercurrent to the grain flow. A suction duct runs along the top of each spout and taps into the spout near the end. The dust is collected in a single Carter Day reverse jet filter.

Equipment Tested

Boxcar Dump System	Carter Day 72 RJ 96 filter
	20,000 cfm
	7" Δ P water gauge
	19 oz. dacron felt bags
Ship Loading System	Carter Day 72 RJ 120 filter
	19,000 cfm
	19 oz. dacron felt bags

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Cargill, Inc.
Seattle, WA

APPENDIX A

Complete Particulate Results

Sample Calculation
Run 1 - Inlet to Car Dump Filter

1. Volume of dry gas sampled at standard conditions[a], DSCF

$$V_{m_{std}} = \frac{17.7 \times V_m (P_b + \frac{P_m}{13.6})}{(T_m + 460)} = \frac{17.7 \times 143.63 (30.31 + \frac{4.05}{13.6})}{(84.5 + 460)} = 142.91 \text{ DSCF}$$

2. Volume of water vapor at standard conditions[b], SCF

$$V_{w_{gas}} = 0.0474 \times V_w = 0.0474 \times 31 = 1.47 \text{ SCF}$$

3. Percent moisture in stack gas

$$\% M = \frac{100 \times V_{w_{gas}}}{V_{m_{std}} + V_{w_{gas}}} = \frac{100 \times 1.47}{142.91 + 1.47} = 1.0$$

4. Mole fraction of dry gas

$$M_d = \frac{100 - \% M}{100} = \frac{100 - 1.0}{100} = 0.990$$

5. Molecular weight of dry stack gas

$$MW_d = (\%CO_2 \times \frac{44}{100}) + (\%O_2 \times \frac{32}{100}) + \left[(\%CO + \%N_2) \times \frac{28}{100} \right] =$$

$$(0 \times \frac{44}{100}) + (21 \times \frac{32}{100}) + (79 \times \frac{28}{100}) = 28.84$$

6. Molecular weight of wet stack gas

$$MW = MW_d \times M_d + 18\ (1 - M_d) = {}^{28.84}\times 0.990 + 18\ (1 - {}^{0.990}) = 28.73$$

7. Stack gas velocity at stack conditions, fpm[c]

$$V_s = 5128.8 \times Cp \times \sqrt{\Delta P_s \times (T_s + 460)} \left[\frac{1}{P_s \times MW}\right]^{1/2} =$$

$$5128.8 \times 0.94 \times 22.40 \left[\frac{1}{30.13 \times 28.73}\right]^{1/2} = 3670 \text{ fpm}$$

8. Stack gas volumetric flow rate at standard conditions[d], DSCFM

$$Q_s = \frac{0.123 \times V_s \times A_s \times M_d \times P_s}{(T_s + 460)} = \frac{0.123 \times 3670 \times 804.2 \times 0.990 \times 30.13}{(58.5 + 460)} = 20{,}884 \text{ DSCFM}$$

9. Stack gas volumetric flow rate at stack conditions, ACFM

$$Q_a = \frac{.05645 \times Q_s\ (T_s + 460)}{P_s \times M_d} = \frac{.05645 \times 20{,}884\ (58.5 + 460)}{30.13 \times 0.99} = 20{,}492 \text{ ACFM}$$

10. Percent isokinetic

$$\%I = \frac{1{,}032 \times (T_s + 460) \times V_{m_{std}}}{V_s \times T_t \times P_s \times M_d \times (D_n)^2} = \frac{1{,}032 \times (58.5 + 460) \times 142.91}{3670 \times 120 \times 30.13 \times 0.99 \times (0.25)^2} = 93.1$$

11. Particulate - probe, cyclone, and filter, gr/DSCF

$$C_{an} = 0.0154 \times \frac{m_f}{V_{m_{std}}} = 0.0154 \times \frac{5931.52}{142.91} = 0.639 \text{ gr/DSCF}$$

12. Particulate - total, gr/DSCF

$$C_{ao} = 0.0154 \times \frac{m_t}{V_{m_{std}}} = 0.0154 \times \frac{5933.60}{142.91} = 0.639 \text{ gr/DSCF}$$

13. Particulate - probe, cyclone, and filter at stack conditions, gr/ACF

$$C_{at} = \frac{17.7 \times C_{an} \times P_s \times M_d}{(T_s + 460)} = \frac{17.7 \times 0.639 \times 30.13 \times 0.99}{(58.5 + 460)} = 0.651 \text{ gr/ACF}$$

14. Particulate - total at stack conditions, gr/ACF

$$C_{aw} = \frac{17.7 \times C_{ao} \times P_s \times M_d}{(T_s + 460)} = \frac{17.7 \times 0.639 \times 30.13 \times 0.99}{(58.5 + 460)} = 0.651 \text{ gr/ACF}$$

15. Particulate - probe, cyclone, and filter, lb/hr

$$C_{aw} = 0.00857 \times C_{an} \times Q_s = 0.00857 \times 0.639 \times 20,884 = 114.4 \text{ lb/hr}$$

16. Particulate - total, lb/hr

$$C_{ax} = 0.00857 \times C_{ao} \times Q_s = 0.00857 \times 0.639 \times 20,884 = 114.4 \text{ lb/hr}$$

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[a] Dry standard cubic feet at 70°F, 29.92 in. Hg.

[b] Standard conditions at 70°F, 29.92 in. Hg.

[c] $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔPs) and the absolute stack temperature from each sampling point.

[d] Dry standard cubic feet per minute at 70°F, 29.92 in. Hg.

Inlet to Car Dump Filter
English Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-02-73	10-03-73	10-04-73	
STACK AREA	FT2	5.585	5.585	5.585	
NET TIME OF RUN	MIN	120.0	64.0	64.0	
BAROMETRIC PRESSURE	IN.HG	30.31	30.36	30.15	
AVG ORIFICE PRES DROP	IN.H2O	4.050	4.100	4.300	
VOL DRY GAS-METER COND	DCF	143.63	78.24	79.34	
AVG GAS METER TEMP	DEG.F	84.5	98.8	78.8	
VOL DRY GAS-STD COND	DSCF	142.99	76.03	79.45	
TOTAL H2O COLLECTED	ML	31.0	13.0	13.0	
VOL H2O VAPOR-STD COND	SCF	1.47	0.62	0.62	
PERCENT MOISTURE BY VOL		1.0	0.8	0.8	
MOLE FRACTION DRY GAS		0.990	0.992	0.992	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.73	28.75	28.76	
AVG STACK TEMPERATURE	DEG.F	58.5	56.9	50.4	
STACK PRESSURE, ABSOLUTE	IN.HG	30.13	30.18	29.97	
AVG STACK GAS VELOCITY	FPS	61.175	61.509	62.870	61.851
STK FLOWRATE, DRY, STD CN	DSCFM	20882.	21141.	21739.	21254.
ACTUAL STACK FLOWRATE	ACFM	20499.	20611.	21067.	20726.
PERCENT ISOKINETIC		93.5	92.1	93.6	93.1
PARTICULATE WT-PARTIAL	MG	5931.52	2614.18	3499.08	4014.93
PARTICULATE WT-TOTAL	MG	5933.60	2618.19	3503.18	4018.32
PERC IMPINGER CATCH		0.0	0.2	0.1	0.1
PART. LOAD-PTL, STD CN	GR/DSCF	0.63884	0.52951	0.67823	0.61552
PART. LOAD-TTL, STD CN	GR/DSCF	0.63906	0.53032	0.67902	0.61613
PART. LOAD-PTL, STK CN	GR/ACF	0.65039	0.54282	0.69947	0.63089
PART. LOAD-TTL, STK CN	GR/ACF	0.65062	0.54365	0.70029	0.63152
PARTIC EMIS-PARTIAL	LB/HR	114.34	95.95	126.38	112.23
PARTIC EMIS-TOTAL	LB/HR	114.38	96.10	126.53	112.34

Outlet of Car Dump Filter
English Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-02-73	10-03-73	10-04-73	
STACK AREA	FT2	7.876	7.876	7.876	
NET TIME OF RUN	MIN	160.0	160.0	160.0	
BAROMETRIC PRESSURE	IN.HG	30.31	30.36	30.20	
AVG ORIFICE PRES DROP	IN.H2O	2.200	2.300	2.300	
VOL DRY GAS-METER COND	DCF	125.42	130.17	130.87	
AVG GAS METER TEMP	DEG.F	79.6	92.5	71.7	
VOL DRY GAS-STD COND	DSCF	125.43	127.38	132.38	
TOTAL H2O COLLECTED	ML	24.0	25.0	25.0	
VOL H2O VAPOR-STD COND	SCF	1.14	1.18	1.18	
PERCENT MOISTURE BY VOL		0.9	0.9	0.9	
MOLE FRACTION DRY GAS		0.991	0.991	0.991	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.74	28.74	28.74	
AVG STACK TEMPERATURE	DEG.F	60.9	60.6	59.2	
STACK PRESSURE, ABSOLUTE	IN.HG	30.32	30.37	30.21	
AVG STACK GAS VELOCITY	FPS	40.055	40.678	41.187	40.640
STK FLOWRATE, DRY, STD CN	DSCFM	19336.	19676.	19877.	19629.
ACTUAL STACK FLOWRATE	ACFM	18927.	19222.	19462.	19204.
PERCENT ISOKINETIC		93.7	93.5	96.2	94.5
PARTICULATE WT-PARTIAL	MG	5.96	4.28	3.61	4.62
PARTICULATE WT-TOTAL	MG	10.12	8.70	4.95	7.92
PERC IMPINGER CATCH		41.1	50.8	27.1	39.7
PART. LOAD-PTL, STD CN	GR/DSCF	0.00073	0.00052	0.00042	0.00056
PART. LOAD-TTL, STD CN	GR/DSCF	0.00124	0.00105	0.00058	0.00096
PART. LOAD-PTL, STK CN	GR/ACF	0.00075	0.00053	0.00043	0.00057
PART. LOAD-TTL, STK CN	GR/ACF	0.00127	0.00108	0.00059	0.00098
PARTIC EMIS-PARTIAL	LB/HR	0.12	0.09	0.07	0.09
PARTIC EMIS-TOTAL	LB/HR	0.21	0.18	0.10	0.16

Inlet to Shipload Filter
English Units

DESCRIPTION	UNITS	1	2	Average
DATE OF RUN		10-05-73	10-06-73	
STACK AREA	FT2	4.909	4.909	
NET TIME OF RUN	MIN	62.0	64.0	
BAROMETRIC PRESSURE	IN.HG	29.95	29.46	
AVG ORIFICE PRES DROP	IN.H2O	4.200	3.600	
VOL DRY GAS-METER COND	DCF	85.82	67.07	
AVG GAS METER TEMP	DEG.F	68.8	66.0	
VOL DRY GAS-STD COND	DSCF	86.97	67.12	
TOTAL H2O COLLECTED	ML	11.0	17.0	
VOL H2O VAPOR-STD COND	SCF	0.52	0.81	
PERCENT MOISTURE BY VOL		0.6	1.2	
MOLE FRACTION DRY GAS		0.994	0.988	
MOLECULAR WT-DRY STK GAS		28.84	28.84	
MOLECULAR WT-STK GAS		28.78	28.71	
AVG STACK TEMPERATURE	DEG.F	45.0	46.8	
STACK PRESSURE, ABSOLUTE	IN.HG	29.58	29.09	
AVG STACK GAS VELOCITY	FPS	71.562	58.287	64.924
STK FLOWRATE, DRY, STD CN	DSCFM	21733.	17243.	19488.
ACTUAL STACK FLOWRATE	ACFM	21076.	17166.	19121.
PERCENT ISOKINETIC		92.3	87.6	99.2
PARTICULATE WT-PARTIAL	MG	30061.49	21552.24	25806.86
PARTICULATE WT-TOTAL	MG	30063.33	21556.62	25809.97
PERC IMPINGER CATCH		0.0	0.0	0.0
PART. LOAD-PTL, STD CN	GR/DSCF	5.32309	4.94464	5.13386
PART. LOAD-TTL, STD CN	GR/DSCF	5.32341	4.94565	5.13453
PART. LOAD-PTL, STK CN	GR/ACF	5.48589	4.96400	5.22495
PART. LOAD-TTL, STK CN	GR/ACF	5.48623	4.96502	5.22562
PARTIC EMIS-PARTIAL	LB/HR	991.60	730.83	861.22
PARTIC EMIS-TOTAL	LB/HR	991.66	730.98	861.32

Outlet to Shipload Filter
English Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-05-73	10-05-73	10-06-73	
STACK AREA	FT2	6.305	6.305	6.305	
NET TIME OF RUN	MIN	160.0	160.0	47.1	
BAROMETRIC PRESSURE	IN.HG	29.95	29.46	29.46	
AVG ORIFICE PRES DROP	IN.H2O	4.300	3.200	2.970	
VOL DRY GAS-METER COND	DCF	187.38	173.78	49.47	
AVG GAS METER TEMP	DEG.F	76.1	75.9	75.0	
VOL DRY GAS-STD COND	DSCF	187.35	170.54	48.60	
TOTAL H2O COLLECTED	ML	21.0	31.0	11.0	
VOL H2O VAPOR-STD COND	SCF	1.00	1.47	0.52	
PERCENT MOISTURE BY VOL		0.5	0.9	1.1	
MOLE FRACTION DRY GAS		0.995	0.991	0.989	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.78	28.75	28.72	
AVG STACK TEMPERATURE	DEG.F	54.8	56.5	58.5	
STACK PRESSURE, ABSOLUTE	IN.HG	29.96	29.47	29.47	
AVG STACK GAS VELOCITY	FPS	58.041	53.362	51.977	54.460
STK FLOWRATE, DRY, STD CN	DSCFM	22510.	20223.	19582.	20772.
ACTUAL STACK FLOWRATE	ACFM	21956.	20186.	19662.	20602.
PERCENT ISOKINETIC		96.2	97.5	97.4	97.1
PARTICULATE WT-PARTIAL	MG	9.92	9.03	3.25	7.40
PARTICULATE WT-TOTAL	MG	12.12	10.96	8.52	10.53
PERC IMPINGER CATCH		18.2	17.6	61.9	32.5
PART. LOAD-PTL, STD CN	GR/DSCF	0.00082	0.00082	0.00103	0.00089
PART. LOAD-TTL, STD CN	GR/DSCF	0.00100	0.00099	0.00270	0.00156
PART. LOAD-PTL, STK CN	GR/ACF	0.00084	0.00082	0.00103	0.00089
PART. LOAD-TTL, STK CN	GR/ACF	0.00102	0.00099	0.00269	0.00157
PARTIC EMIS-PARTIAL	LB/HR	0.16	0.14	0.17	0.16
PARTIC EMIS-TOTAL	LB/HR	0.19	0.17	0.45	0.27

Inlet to Car Dump Filter
Metric Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-02-73	10-03-73	10-04-73	
STACK AREA	M2	0.519	0.519	0.519	
NET TIME OF RUN	MIN	120.0	64.0	64.0	
BAROMETRIC PRESSURE	MM.HG	769.87	771.14	765.81	
AVG ORIFICE PRES DROP	MM.H2O	102.870	104.140	109.220	
VOL DRY GAS-METER CN	DM3	4.07	2.22	2.25	
AVG GAS METER TEMP	DEG.C	29.2	37.1	26.0	
VOL DRY GAS-STD COND	DNM3	4.05	2.15	2.25	
TOTAL H2O COLLECTED	ML	31.0	13.0	13.0	
VOL H2O VAPOR-STD COND	NM3	0.04	0.02	0.02	
PERCENT MOISTURE BY VOL		1.0	0.8	0.8	
MOLE FRACTION DRY GAS		0.990	0.992	0.992	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.73	28.75	28.76	
AVG STACK TEMPERATURE	DEG.C	14.7	13.8	10.2	
STACK PRESSURE, ABSOLUTE	MM.HG	765.30	766.57	761.24	
AVG STACK GAS VELOCITY	M/S	18.646	18.748	19.163	18.852
STK FLOWRATE, DRY, STD CN	DNM3/M	591.	599.	616.	602.
ACTUAL STACK FLOWRATE	AM3/M	580.	584.	597.	587.
PERCENT ISOKINETIC		93.5	92.1	93.6	93.1
PARTICULATE WT-PARTIAL	MG	5931.52	2614.18	3499.08	4014.93
PARTICULATE WT-TOTAL	MG	5933.60	2618.19	3503.18	4018.32
PERCE IMPINGER CATCH		0.0	0.2	0.1	0.1
PART. LOAD-PTL, STD CN	MG/NM3	1461.90	1211.71	1552.04	1408.55
PART. LOAD-TTL, STD CN	MG/NM3	1462.41	1213.57	1553.85	1409.95
PART. LOAD-PTL, STK CN	MG/AM3	1488.33	1242.17	1600.65	1443.71
PART. LOAD-TTL, STK CN	MG/AM3	1488.86	1244.07	1602.52	1445.15
PARTIC EMIS-PARTIAL	KG/HR	51.87	43.52	57.33	50.91
PARTIC EMIS-TOTAL	KG/HR	51.88	43.59	57.39	50.96

Outlet of Car Dump Filter
Metric Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-02-73	10-03-73	10-04-73	
STACK AREA	M2	0.732	0.732	0.732	
NET TIME OF RUN	MIN	160.0	160.0	160.0	
BAROMETRIC PRESSURE	MM.HG	769.87	771.14	767.08	
AVG ORIFICE PRES DROP	MM.H2O	55.880	58.420	58.420	
VOL DRY GAS-METER CN	DM3	3.55	3.69	3.71	
AVG GAS METER TEMP	DEG.C	26.4	33.6	22.1	
VOL DRY GAS-STD COND	DNM3	3.55	3.61	3.75	
TOTAL H2O COLLECTED	ML	24.0	25.0	25.0	
VOL H2O VAPOR-STD COND	NM3	0.03	0.03	0.03	
PERCENT MOISTURE BY VOL		0.9	0.9	0.9	
MOLE FRACTION DRY GAS		0.991	0.991	0.991	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.74	28.74	28.74	
AVG STACK TEMPERATURE	DEG.C	16.1	15.9	15.1	
STACK PRESSURE, ABSOLUTE	MM.HG	770.13	771.40	767.33	
AVG STACK GAS VELOCITY	M/S	12.209	12.399	12.554	12.387
STK FLOWRATE, DRY, STD CN	DNM3/M	548.	557.	563.	556.
ACTUAL STACK FLOWRATE	AM3/M	536.	544.	551.	544.
PERCENT ISOKINETIC		93.7	93.5	96.2	94.5
PARTICULATE WT-PARTIAL	MG	5.96	4.28	3.61	4.62
PARTICULATE WT-TOTAL	MG	10.12	8.70	4.95	7.92
PERCE IMPINGER CATCH		41.1	50.8	27.1	39.7
PART. LOAD-PTL, STD CN	MG/NM3	1.67	1.18	0.96	1.27
PART. LOAD-TTL, STD CN	MG/NM3	2.84	2.41	1.32	2.19
PART. LOAD-PTL, STK CN	MG/AM3	1.71	1.21	0.98	1.30
PART. LOAD-TTL, STK CN	MG/AM3	2.90	2.46	1.35	2.24
PARTIC EMIS-PARTIAL	KG/HR	0.06	0.04	0.03	0.04
PARTIC EMIS-TOTAL	KG/HR	0.09	0.08	0.04	0.07

Inlet to Shipload Filter
Metric Units

DESCRIPTION	UNITS	1	2	Average
DATE OF RUN		10-05-73	10-06-73	
STACK AREA	M2	0.456	0.456	
NET TIME OF RUN	MIN	52.0	64.0	
BAROMETRIC PRESSURE	MM.HG	760.73	748.28	
AVG ORIFICE PRES DROP	MM.H2O	106.680	91.440	
VOL DRY GAS-METER CN	DM3	2.43	1.90	
AVG GAS METER TEMP	DEG.C	20.4	18.9	
VOL DRY GAS-STD COND	DNM3	2.46	1.90	
TOTAL H2O COLLECTED	ML	11.0	17.0	
VOL H2O VAPOR-STD COND	NM3	0.01	0.02	
PERCENT MOISTURE BY VOL		0.6	1.2	
MOLE FRACTION DRY GAS		0.994	0.988	
MOLECULAR WT-DRY STK GAS		28.84	28.84	
MOLECULAR WT-STK GAS		28.78	28.71	
AVG STACK TEMPERATURE	DEG.C	7.2	8.2	
STACK PRESSURE, ABSOLUTE	MM.HG	751.33	738.89	
AVG STACK GAS VELOCITY	M/S	21.812	17.766	19.789
STK FLOWRATE, DRY, STD CN	DNM3/M	615.	488.	556.
ACTUAL STACK FLOWRATE	AM3/M	597.	486.	541.
PERCENT ISOKINETIC		110.8	87.6	99.2
PARTICULATE WT-PARTIAL	MG	30061.49	21552.24	25806.86
PARTICULATE WT-TOTAL	MG	30063.33	21556.62	25809.97
PERCE IMPINGER CATCH		0.0	0.0	0.0
PART. LOAD-PTL, STD CN	MG/NM3	12181.23	11315.20	11748.21
PART. LOAD-TTL, STD CN	MG/NM3	12181.97	11317.50	11749.74
PART. LOAD-PTL, STK CN	MG/AM3	12553.80	11359.52	11956.66
PART. LOAD-TTL, STK CN	MG/AM3	12554.57	11361.83	11958.20
PARTIC EMIS-PARTIAL	KG/HR	449.79	331.50	390.65
PARTIC EMIS-TOTAL	KG/HR	449.82	331.57	390.69

Outlet of Shipload Filter
Metric Units

DESCRIPTION	UNITS	1	2	3	Average
DATE OF RUN		10-05-73	10-05-73	10-06-73	
STACK AREA	M2	0.586	0.586	0.586	
NET TIME OF RUN	MIN	160.0	160.0	47.1	
BAROMETRIC PRESSURE	MM.HG	760.73	748.28	748.28	
AVG ORIFICE PRES DROP	MM.H2O	109.220	81.280	75.438	
VOL DRY GAS-METER CN	DM3	5.31	4.92	1.40	
AVG GAS METER TEMP	DEG.C	24.5	24.4	23.9	
VOL DRY GAS-STD COND	DNM3	5.31	4.83	1.38	
TOTAL H2O COLLECTED	ML	21.0	31.0	11.0	
VOL H2O VAPOR-STD COND	NM3	0.03	0.04	0.01	
PERCENT MOISTURE BY VOL		0.5	0.9	1.1	
MOLE FRACTION DRY GAS		0.995	0.991	0.989	
MOLECULAR WT-DRY STK GAS		28.84	28.84	28.84	
MOLECULAR WT-STK GAS		28.78	28.75	28.72	
AVG STACK TEMPERATURE	DEG.C	12.7	13.6	14.7	
STACK PRESSURE, ABSOLUTE	MM.HG	760.98	748.54	748.54	
AVG STACK GAS VELOCITY	M/S	17.691	16.265	15.843	16.599
STK FLOWRATE, DRY, STD CN	DNM3/M	637.	573.	554.	588.
ACTUAL STACK FLOWRATE	AM3/M	622.	572.	557.	583.
PERCENT ISOKINETIC		96.2	97.5	97.4	97.1
PARTICULATE WT-PARTIAL	MG	9.92	9.03	3.25	7.40
PARTICULATE WT-TOTAL	MG	12.12	10.96	8.52	10.53
PERCE IMPINGER CATCH		18.2	17.6	61.9	32.5
PART. LOAD-PTL, STD CN	MG/NM3	1.87	1.87	2.36	2.03
PART. LOAD-TTL, STD CN	MG/NM3	2.28	2.26	6.18	3.57
PART. LOAD-PTL, STK CN	MG/AM3	1.91	1.87	2.35	2.04
PART. LOAD-TTL, STK CN	MG/AM3	2.34	2.27	6.15	3.58
PARTIC EMIS-PARTIAL	KG/HR	0.07	0.06	0.08	0.07
PARTIC EMIS-TOTAL	KG/HR	0.09	0.08	0.21	0.12

APPENDIX B

Complete Particle Size Results

CASCADE IMPACTOR CALCULATIONS

V_o = $(8465.41)(VOL_m)\ (P_m)\ /\ (T_m)\ (TIME) + (22.6417)(VOL_w)\ /\ (TIME)$

a = $(234.0)\ (\mu^2)\ /\ (\rho)\ (P_2)$

b = $(2.05 \times 10^8)\ (\mu)\ (P_2)\ /\ (\rho_p)\ (V_o)\ (P_o)$

D_{pc} = $\sqrt{a + bD_c^3} - \sqrt{a}$

V_o = Gas flow at inlet to impactor at 25° C. and 14.7 psia, cc per second.

VOL_m = Dry gas meter volume at meter temperature and pressure, dry acf

P_m = Dry gas meter pressure, "Hg

T_m = Dry gas meter temperature, °R

TIME = Sampling time, minutes

VOL_w = Volume of water collected, ml

μ = Viscosity of gas in impactor, gm / (cm) (sec)

ρ = Density of gas in impactor, gm per cc

P_2 = Average pressure in impactor, atm.

ρ_p = Density of aerosal particle, gm per cc

P_o = Pressure at inlet to impactor, atm.

D_{pc} = Characteristic diameter of aerosol particle for impactor stage, microns

D_c = Diameter of impactor jet, cm.

VALENTINE, FISHER & TOMLINSON ● CONSULTING ENGINEERS

COMPUTATION & DESIGNING SHEET

JOB NAME CARGILL CO - SEATTLE DATE 10-19-73

PREPARED BY M. DICK PAGE ____ OF ____

SUBJECT PARTICLE SIZE DISTRIBUTION

CAR DUMP OUTLET

VOL_m = 137.47 cu.ft

P_m = 30.313 IN. Hg

T_m = 533. °R

TIME = 330. MIN.

VOL_w = 7.56 ml

$V_o = (8465.41)(VOL_m)(P_m)/(T_m)(TIME) + (22.6417)(VOL_w)/(TIME)$

$= (8465.41)(37.47)(30.313)/(533)(330) + (22.6417)(7.56)/(330)$

V_o = 55.184972

ρ_p = 0.77 gm/cc

P_o = 1.013 atm.

μ = 0.000176 gm/(cm)(sec)

ρ = 0.001222 gm/cc

P_2 = 0.846 atm.

$a = (234.0)(\mu^2)/(\rho)(P_2)$

$= (234.0)(0.000176^2)/(0.001222)(0.846)$

a = 0.006770

$b = (2.05 \times 10^8)(\mu)(P_2)/(\rho_p)(V_o)(P_o)$

$= (2.05 \times 10^8)(0.000176)(0.846)/(0.77)(55.184972)(1.013)$

b = 709.113747

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COMPUTATION & DESIGNING SHEET

JOB NAME CARGILL CO - SEATTLE DATE 10-19-73

PREPARED BY M. DICK PAGE ____ OF ____

SUBJECT PARTICLE SIZE DISTRIBUTION

CAR DUMP OUTLET CONTINUED

$D_c = 0.249$ Cm

$$D_{pc} = \sqrt{a + bD_c^3} - \sqrt{a}$$

$$= \sqrt{(0.006770) + (709.1137147)(0.249)^3} - \sqrt{0.006770}$$

$$= 3.227413$$

IN THE ABOVE EQUATION THE VALUE OF D_c VARIES WITH EACH OF FIVE IMPACTOR JETS. THESE VALUE SHOULD BE SUBSTITUTED INDIVIDUALLY INTO THE EQUATION TO GET THEIR RESPECTIVE D_{pc}.

$D_c = 0.249$ cm

$D_c = 0.1775$ cm

$D_c = 0.1396$ cm

$D_c = 0.0946$ cm

$D_c = 0.0731$ cm

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COMPUTATION & DESIGNING SHEET

JOB NAME CARGILL CO - SEATTLE DATE 10-19-73

PREPARED BY M DICK PAGE ____ OF ____

SUBJECT PARTICLE SIZE DISTRIBUTION

CAR DUMP OUTLET

IMPACTOR JET No.	FINAL WT. (gm)	TARE W.T. (gm)	PARTICULATE COLLECTED (mg)
1	3.5872	3.5867	0.5
2	3.5346	3.5340	0.6
3	3.6571	3.6568	0.3
4	3.5300	3.5298	0.2
5	3.5143	3.5142	0.1
BACK-UP FILTER	3.1924	3.1916	0.8

CAR DUMP INLET

1	3.7643	3.7583	6.0
2	3.9734	3.9726	0.8
3	3.3204	3.3199	0.5
4	3.4534	3.4534	0.0
5	3.7478	3.7478	0.0
BACK-UP FILTER	3.1610	3.1608	0.2

VALENTINE, FISHER & TOMLINSON ● CONSULTING ENGINEERS

COMPUTATION & DESIGNING SHEET

DATE 10-19-73

JOB NAME CARGILL CO - SEATTLE

PAGE _____ OF _____

PREPARED BY M DICK

SUBJECT PARTICLE SIZE DISTRIBUTION

SWIP LOAD OUTLET

IMPACTOR JET NO.	FINAL WT. (gm)	TARE WT. (gm)	PARTICULATE COLLECTED (mg)
1	3.2341	3.2257	8.4
2	3.3014	3.3005	0.9
3	3.4269	3.4268	0.1
4	3.1787	3.1787	0.0
5	3.2889	3.2889	0.0

SWIP LOAD INLET

1	3.4230	3.4230	0.0
2	3.1916	3.1916	0.0
3	3.8779	3.8779	0.0
4	3.3731	3.3731	0.0
5	3.3800	3.3800	0.0

VALENTINE, FISHER & TOMLINSON ● CONSULTING ENGINEERS

COMPUTATION & DESIGNING SHEET

JOB NAME CARGILL CO. – SEATTLE DATE 10-19-73

PREPARED BY M. DICK PAGE ____ OF ____

SUBJECT PARTICLE SIZE DISTRIBUTION – CAR DUMP

CAR DUMP – OUTLET

IMPACTOR JET NO.	D_P (= D_{PC}) (MICRONS)	PARTICULATE COLLECTED (mg)	WT. % COLLECTED	CUMM. WT. % < D_P
1	3.23	0.5	20.0	80.0
2	1.91	0.6	24.0	56.0
3	1.31	0.3	12.0	44.0
4	0.69	0.2	8.0	36.0
5	0.45	0.1	4.0	32.0
BACK-UP FILTER		0.8	32.0	0.0
		2.5		

CAR DUMP – INLET

1	2.40	6.0	80.0	20.0
2	1.42	0.8	10.7	9.3
3	0.97	0.5	6.7	2.7
4	0.51	0.0	0.0	2.7
5	0.33	0.0	0.0	2.7
BACK-UP FILTER		0.2	2.7	0.0
		7.5		

VALENTINE, FISHER & TOMLINSON ● CONSULTING ENGINEERS

COMPUTATION & DESIGNING SHEET

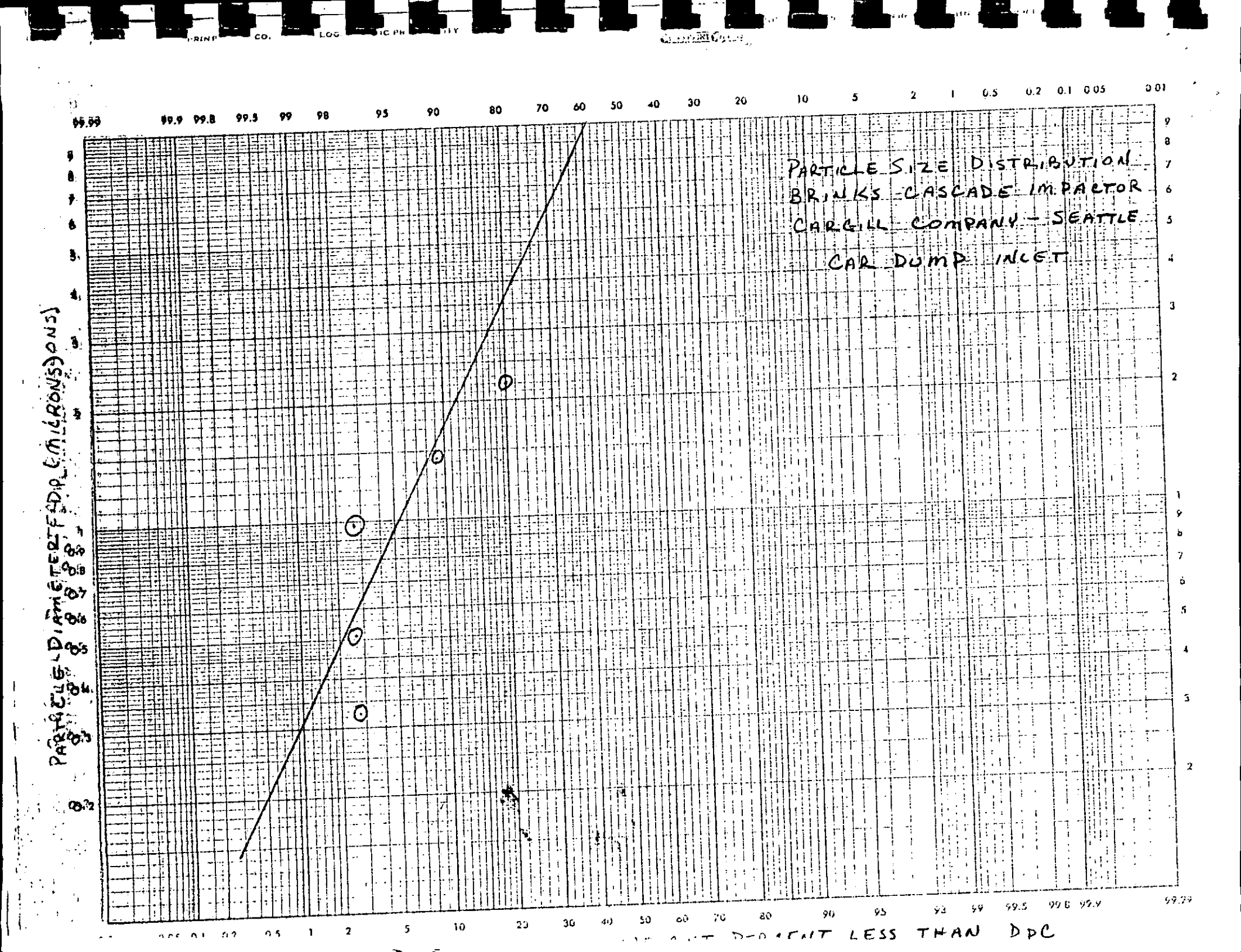
JOB NAME CARGILL CO. — SEATTLE DATE 10-19-73

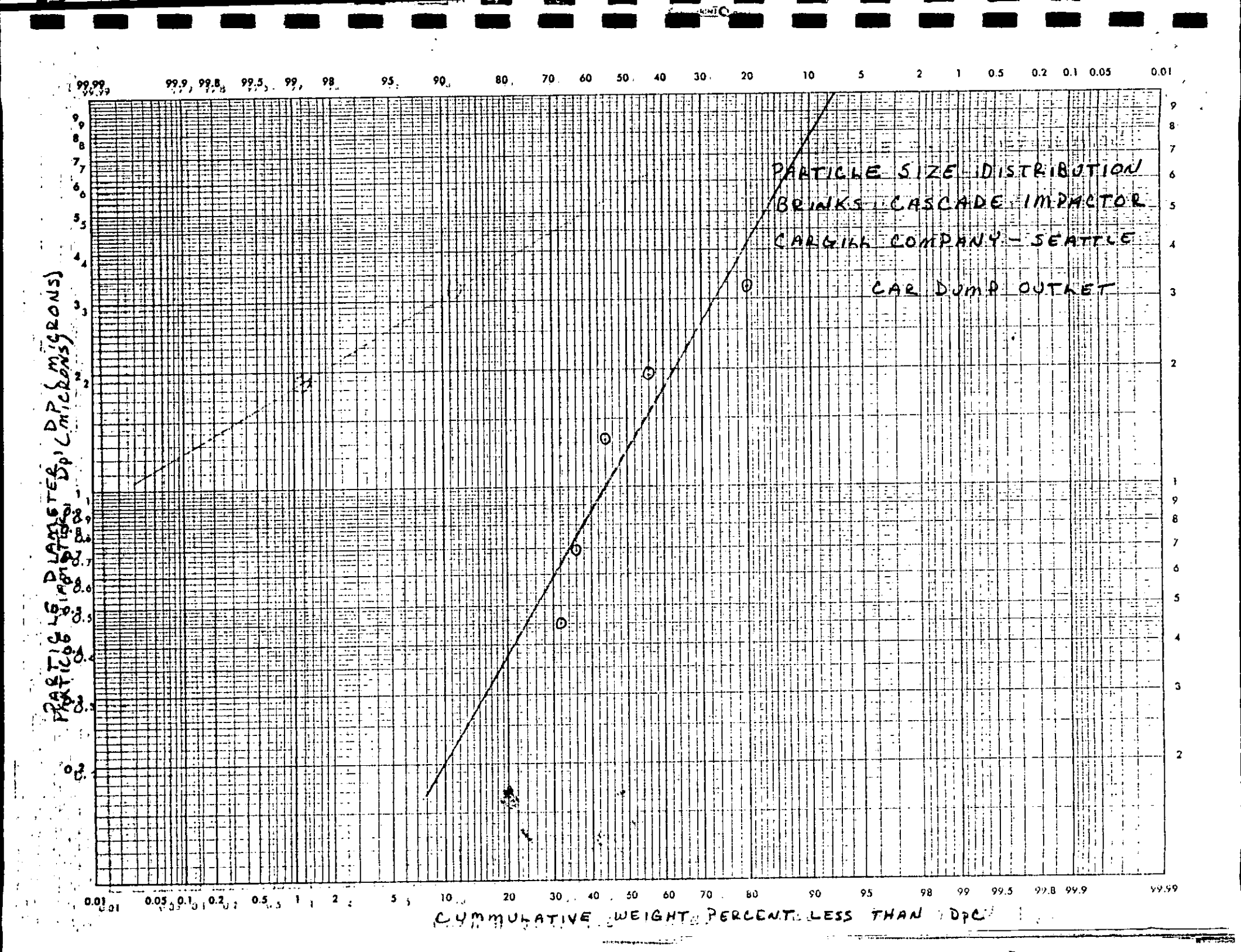
PREPARED BY M. DICK PAGE ____ OF ____

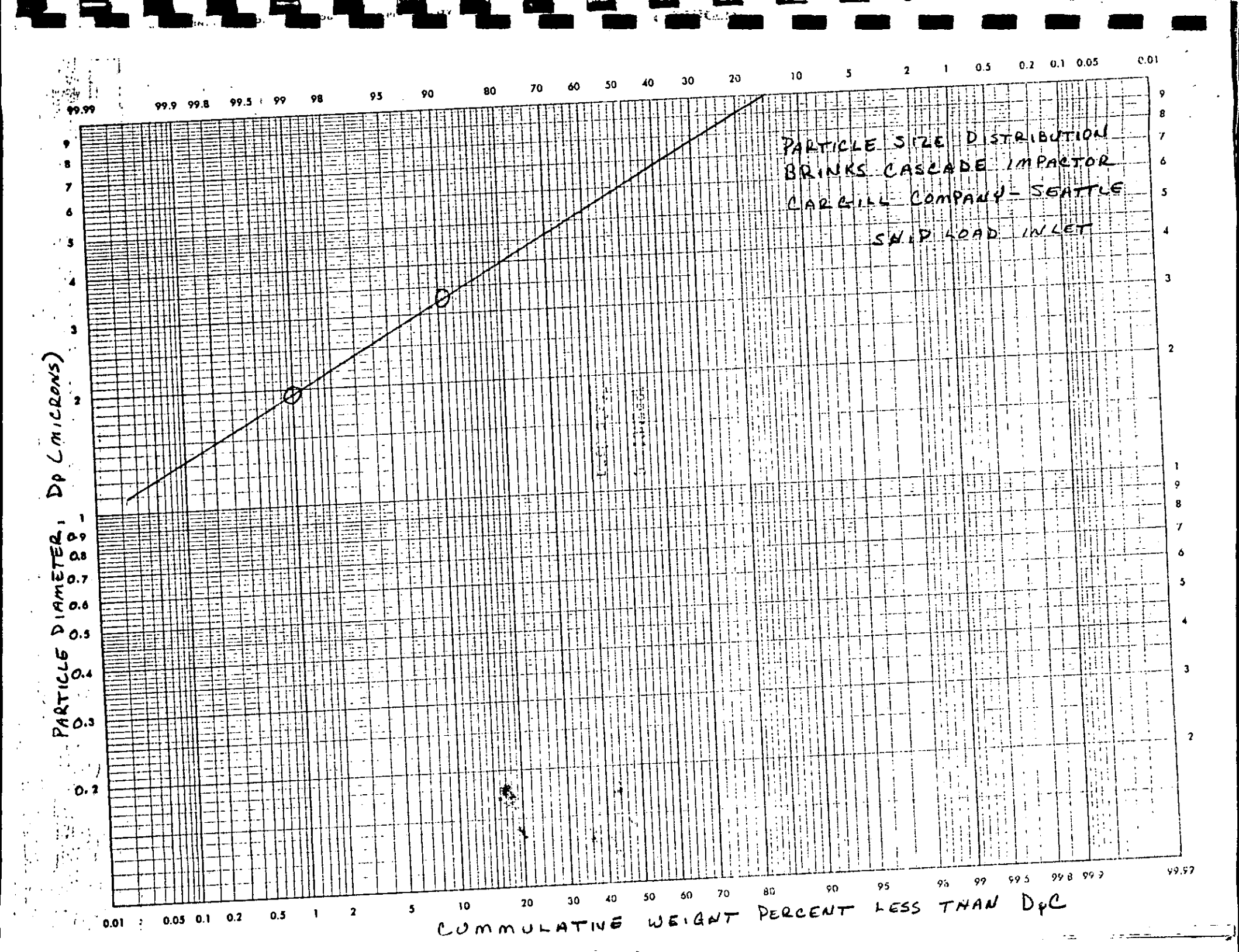
SUBJECT PARTICLE SIZE DISTRIBUTION

HIPLOAD INLET

IMPACTOR JET NO.	Dp (= Dpc) (MICRONS)	PARTICULATE COLLECTED (mg)	WT % COLLECTED	Com. WT. % < Dp
1	3.28	8.4	89.4	10.6
2	1.94	0.9	9.6	1.0
3	1.33	0.1	1.0	0.0
4	0.71	0.0	0.0	0.0
5	0.46	0.0	0.0	0.0
		9.4		


PARTICLE SIZE DISTRIBUTION
BRINKS-CASCADE IMPACTOR
CARGILL COMPANY - SEATTLE
CAR DUMP INLET
PARTICLE DIAMETER (MICRONS)
99.99 99.9 99.8 99.5 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
PERCENT LESS THAN DPC


PARTICLE SIZE DISTRIBUTION
BRINKS CASCADE IMPACTOR
CARGILL COMPANY - SEATTLE
CAR DUMP OUTLET
PARTICLE DIAMETER Dp (MICRONS)
CUMMULATIVE WEIGHT PERCENT LESS THAN DpC

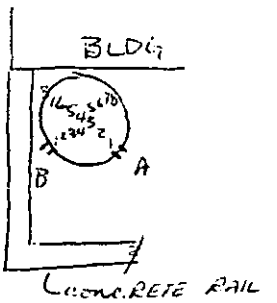

PARTICLE SIZE DISTRIBUTION
BRINKS CASCADE IMPACTOR
CARGILL COMPANY - SEATTLE
SN: P LOAD INLET
PARTICLE DIAMETER, Dp (MICRONS)
CUMMULATIVE WEIGHT PERCENT LESS THAN Dpc
99.99
99.9 99.8 99.5 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 0.1 0.05 0.01
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.5 99.8 99.9 99.99

APPENDIX C

Field Data

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CARGILL - SEATTLE
DATE 10-2-73
SAMPLING LOCATION CARDUMP - INLET
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) N/A
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) N/A
STACK I.D., (DISTANCE A - DISTANCE B) 32"
NEAREST UPSTREAM DISTURBANCE 8'
NEAREST DOWNSTREAM DISTURBANCE ~30'
CALCULATOR MICHAEL DICK

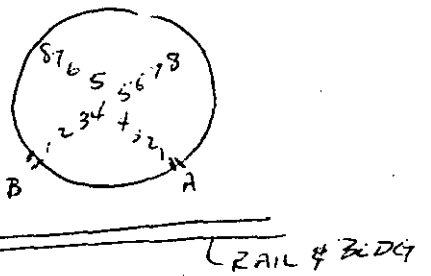


SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.033	32"	1.056	N/A	1.056
2	0.105	32	3.36		3.36
3	0.194	32	6.21		6.21
4	0.323	32	10.34		10.34
5	0.677	32	21.7		21.7
6	0.806	32	25.8		25.8
7	0.895	32	28.6		28.6
8	0.967	32	30.9		30.9
PARTICLE SIZER					
1	0.333	32	10.666	N/A	10.666

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CARGILL - SEATTLE
DATE 10-2-73
SAMPLING LOCATION CARDUMP - OUTLET
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A) N/A
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B) N/A
STACK I.D., (DISTANCE A - DISTANCE B) 38"
NEAREST UPSTREAM DISTURBANCE 10 ø's
NEAREST DOWNSTREAM DISTURBANCE 2 ø's
CALCULATOR MICHAEL DOK



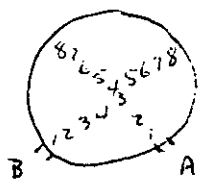
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.033	38"	1.25	N/A	1.25
2	0.105	38	3.99		3.99
3	0.194	38	7.37		7.37
4	0.323	38	12.3		12.3
5	0.677	38	25.7		25.7
6	0.806	38	30.6		30.6
7	0.895	38	34.0		34.0
8	0.967	38	36.7		36.7
PARTICLE SIZER					
1	0.333	38	12.7		12.7"

EPA (Dur) 232
4/72

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CARGILL - SEATTLE
DATE 10-4-73
SAMPLING LOCATION INLET - SHIPLOAD
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 30"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) N/A
STACK I.D., (DISTANCE A - DISTANCE B) 30"
NEAREST UPSTREAM DISTURBANCE 9 ø's
NEAREST DOWNSTREAM DISTURBANCE 2 ø's
CALCULATOR M. Dick



RAIL

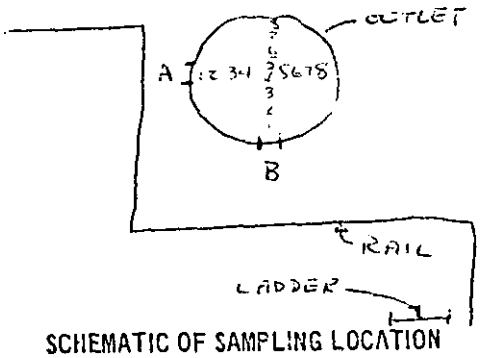
SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.033	30"	0.99	N/A	0.99
2	0.105		3.15		3.15
3	0.194		5.82		5.82
4	0.323		9.69		9.69
5	0.677		20.31		20.31
6	0.807		24.2		24.2
7	0.895		26.9		26.9
8	0.967		29.0		29.0
PARTICLE SIZER					
1	0.333	30"	10.0		10.0

EPA (Dur) 232
4/72

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CARGILL - SEATTLE
DATE 10-4-73
SAMPLING LOCATION OUTLET SUPLEAD
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 34"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) N/A
STACK I.D., (DISTANCE A - DISTANCE B) 34"
NEAREST UPSTREAM DISTURBANCE ~~8~~ 8 ø's
NEAREST DOWNSTREAM DISTURBANCE 10 ø's
CALCULATOR M. Dick



SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	0.033	34"	1.122	N/A	1.122
2	0.105		3.57		3.57
3	0.194		6.60		6.60
4	0.323		10.98		10.98
5	0.677		23.0		23.0
6	0.806		27.4		27.4
7	0.895		30.4		30.4
8	0.967		32.9		32.9
PARTICLE SIZER					
1	0.333	34	11.3		11.3

NOMOGRAPH DATA

PLANT CARGILL - SEATTLE

DATE 10-4-73

SAMPLING LOCATION INLET SHIPLOAD RUN #1

METER BOX #1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.652
AVERAGE METER TEMPERATURE (AMBIENT + 20°F), °F	$T_{m_{avg.}}$	75°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.15
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in. H_2O)	P_s	29.79
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.988
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	46
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.4
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.6
C FACTOR		0.95
CALCULATED NOZZLE DIAMETER, in.		0.18
ACTUAL NOZZLE DIAMETER, in.		0.25
REFERENCE Δp, in. H_2O		0.45

NOMOGRAPH DATA

PLANT CARGILL - SEATTLE

DATE 10-4-73

SAMPLING LOCATION INLET SHIPLOAD RUN #2&3

METER BOX # 3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.8162
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	75°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.15
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	29.79
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.988
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	46
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	1.4
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.6
C FACTOR		1.03
CALCULATED NOZZLE DIAMETER, in.		0.177
ACTUAL NOZZLE DIAMETER, in.		0.250
REFERENCE Δp, in. H_2O		0.42

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4/72

NOMOGRAPH DATA

PLANT CARGILL

DATE 10-4-73

SAMPLING LOCATION SHIPCAD - OUTLET RUN #1

METER BOX 3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.8162
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	75°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.15
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	30.16
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	55
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.85
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.0
C FACTOR		1.08
CALCULATED NOZZLE DIAMETER, in.		0.20
ACTUAL NOZZLE DIAMETER, in.		0.25
REFERENCE Δp, in. H_2O		0.41

EPA (Dur) 234
4/72

NOMOGRAPH DATA

PLANT CARGILL - SEATTLE

DATE 10-4-73

SAMPLING LOCATION SHIPLOAD - OUTLET RUN #2 & 3

METER BOX 1

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.652
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	75°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.15
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	30.16
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.00
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	55
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.85
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.0
C FACTOR		0.97
CALCULATED NOZZLE DIAMETER, in.		0.205
ACTUAL NOZZLE DIAMETER, in.		0.250
REFERENCE Δp, in. H_2O		0.44

EPA (Dur) 234
4/72

NOMOGRAPH DATA

PLANT CARGILL - SEATTLE

DATE 10-2-73

SAMPLING LOCATION CARDUMP - INLET

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.652
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70°
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2 %
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.31
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	30.13
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	.994
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	60
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.85
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	1.2
C FACTOR		0.95
CALCULATED NOZZLE DIAMETER, in.		
ACTUAL NOZZLE DIAMETER, in.		0.250
REFERENCE Δp, in. H_2O		0.43

NOMOGRAPH DATA

PLANT CARGILL - SEATTLE

DATE 10-2-73

SAMPLING LOCATION CARDUMP; OUTLET DUCT; RUN #1, 2, 3

CALIBRATED PRESSURE DIFFERENTIAL ACROSS ORIFICE, in. H_2O	$\Delta H_@$	1.9143
AVERAGE METER TEMPERATURE (AMBIENT + 20 °F), °F	$T_{m_{avg.}}$	70
PERCENT MOISTURE IN GAS STREAM BY VOLUME	B_{wo}	2%
BAROMETRIC PRESSURE AT METER, in. Hg	P_m	30.31
STATIC PRESSURE IN STACK, in. Hg ($P_m \pm 0.073$ x STACK GAUGE PRESSURE in in. H_2O)	P_s	30.31
RATIO OF STATIC PRESSURE TO METER PRESSURE	P_s/P_m	1.0
AVERAGE STACK TEMPERATURE, °F	$T_{s_{avg.}}$	60
AVERAGE VELOCITY HEAD, in. H_2O	$\Delta p_{avg.}$	0.53
MAXIMUM VELOCITY HEAD, in. H_2O	$\Delta p_{max.}$	0.60
C FACTOR		1.1
CALCULATED NOZZLE DIAMETER, in.		.232
ACTUAL NOZZLE DIAMETER, in.		1/4" (.250)
REFERENCE Δp, in. H_2O		0.41

FIELD DATA

Probe 1 side 2

Point 3B start at 1:45 PM
10/3/73

PLANT EPA AT CARGILL
DATE 10/2/73
SAMPLING LOCATION INLET GARBDUMP
SAMPLE TYPE PARTICULATE
RUN NUMBER 1 - INLET
OPERATOR BROUSSEAU
AMBIENT TEMPERATURE 53°F
BAROMETRIC PRESSURE 30.31
STATIC PRESSURE, (P_s) -2.4" H_2O
FILTER NUMBER (s) 69 - 337.6 mg

PROBE LENGTH AND TYPE 3 FT. Heated
NOZZLE I.D. 1/4" (0.000341)
ASSUMED MOISTURE, % 2%
SAMPLE BOX NUMBER Yellow
METER BOX NUMBER 1
METER $\Delta H_@$ 1.652
C FACTOR .95
PROBE HEATER SETTING 60
HEATER BOX SETTING 250
REFERENCE Δp .44

1:30:27

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 4' MINUTES

STACK Φ 32" Φ = 5.585 ft²

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	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
	0	10:20	875.770									
1 A~~E~~	~~0~~ 4	10:30	879.840	.65	2.8	2.8	55	56	50	3	220	48
1 A~~2~~	~~4~~ 8		883.125	.65	2.8	2.8	55	63	50	3	210	44
2 A~~E~~	~~8~~ 12		887.060	.84	3.6	3.6	57	71	65	3.5	215	44
2 A~~4~~	~~12~~ 16		891.580	.84	3.6	3.6	57	74	66	3.5	220	42
3 A~~F~~	~~16~~ 20		896.280	.95	4.0	4.0	58	82	65	4.1	220	46
3 A~~6~~	~~20~~ 24		901.180	.95	4.0	4.0	57	85	66	4.1	210	48
4 A~~4~~	~~24~~ 28		906.130	1.1	4.5	4.5	59	85	68	4.5	230	48
4 A~~8~~	~~28~~ 32		911.270	1.1	4.5	4.5	59	91	69	4.5	230	48
5 A	~~32~~ 36		916.400	1.1	4.5	4.5	58	93	70	5.0	230	48
5 A	~~36~~ 40		921.530	1.1	4.5	4.8	59	98	74	5.0	235	46
6 A	~~40~~ 44		927.600	1.2	4.8	4.8	59	100	74	5.5	210	54
6 A	~~44~~ 48		932.100	1.2	4.8	4.8	59	106	75	5.5	225	56
7 A	~~48~~ 52		937.170	1.0	4.2	4.2	59	110	78	4.5	215	58
7 A	~~52~~ 56		942.32	1.1	4.5	4.5	59	112	79	4.5	240	58
8 A	~~56~~ 60		~~946.980~~	0.86	3.7	3.7	59	114	81	4.5	245	58
8 A	~~60~~	0	946.980	~~.76~~	END	1 ST	TRAVERSE					
1 B	~~64~~	1 HR 4	951.420	.76	3.2	3.2	59	102	81	3.9	215	60
1 B	~~68~~	1-8	955.720	.70	3.0	3.0	57	105	82	3.9	250	60
2 B	~~72~~	1-12	960.000	.74	3.2	3.2	60	110	84	4.0	205	60
2 B	~~76~~	1-16	964.500	.80	3.5	3.5	60	110	85	4.5	220	60
3 B	~~80~~	1-20	969.540	.88	3.6	3.6	60	108	85	4.5	250	60
3 B	~~84~~	1-24	974.180	.88	3.6	3.6	60	111	86	4.5	210	60
4 B	~~88~~	1-28	979.080	1.1	4.5	4.5	59	79	70	5.5	210	48

COMMENTS: Stop 4 min 30 sec 10:28³⁰ Start again at 2:30 PM Stop 2:40 Start 2:45

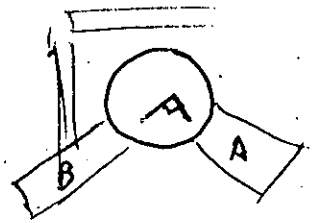
TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
4B	~~42~~ 1-32	984.110	1.1	4.5	4.5	60	80	69	5.5	240	48
5B	~~36~~ 1-36	989.040	1.1	4.5	4.5	63	89	70	6.0	210	60
5B	~~40~~ 1-40	MISSED IT	1.1	4.5	4.5	60	96	70	5.75	250	60
6B	~~44~~ 1-44	998.910	1.1	4.5	4.5	56	102	72	5.5	220	60
6B	~~48~~ 1-48	1003.980	1.1	4.5	4.5	59	106	74	6.0	255	65
7B	~~52~~ 1-52	1009.500	1.1	4.5	4.5	57	110	76	6.0	200	66
7B	~~56~~ 1-56	1014.400	1.2	5.0	5.0	59	115	78	6.5	245	66
8B	~~60~~ 1-60	1019.400	1.0	4.1	4.1	57	118	80	5.5	225	67
8B	~~64~~ ~~-~~		~~2.1~~			1765	2877	2492			
					121.5/3						
					(4.05)/13.6						
	120 min	14363 ft^3			0.30 "Hg						
			P_m =	30.61		58.5°F	84.5°F				
						518.5°R	544.5°R				
			P_{SR} =	30.31 + 0.18 = 30.13							

EPA (Dur) 236
4-72

3:20
3:45
4:20

FIELD DATA

PLANT EPA AT CARGILL
DATE 10/3/73
SAMPLING LOCATION INLET CAT Dump
SAMPLE TYPE PARTICULATE
RUN NUMBER 2 - INLET
OPERATOR BROUSSEAU
AMBIENT TEMPERATURE 60
BAROMETRIC PRESSURE 30.36
STATIC PRESSURE, (P_s) -3.4" H_2O
FILTER NUMBER (s) 1B - 301.2mg



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3FT.
NOZZLE I.D. 1/4" (0.000341)
ASSUMED MOISTURE, % 2%
SAMPLE BOX NUMBER GREEN
METER BOX NUMBER 1
METER $\Delta H_@$ 1.652
C FACTOR .95
PROBE HEATER SETTING 50
HEATER BOX SETTING 250
REFERENCE Δp .44

READ AND RECORD ALL DATA EVERY 4 MINUTES

STACK ϕ 32" = 5.585 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		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			
1A	0 / 3:05	1020.590									
2A	4	1024.370	.68	2.8	2.8	60	94	82	4.5	260	50
3A	8	1028.640	.81	3.5	3.5	59	98	82	4.5	265	50
4A	12	1033.400	.97	4.0	4.0	60	98	80	7.0	260	44
5A	16	1038.320	1.0	4.1	4.1	60	104	81	7.0	240	50
6A	20	1043.470	1.1	4.5	4.5	60	110	82	8.0	250	68
7A	24	1048.670	1.1	4.5	4.5	60	115	84	8.0	260	62
8A	28	1054.000	1.1	4.5	4.5	60	118	86	8.0	255	64
—	—	—	.97	3.9	3.9	61	122	88	7.0	260	62
1B	32	1058.870	—	—	—	—	—	—	—	—	—
2B	36	1063.050	.67	2.8	2.8	55	118	88	5.0	255	62
3B	40	1067.370	.74	3.1	3.1	55	120	90	5.5	250	63
4B	44	1072.220	.97	4.1	4.1	54	100	88	7.0	230	40
5B	48	1077.470	1.1	4.5	4.5	53	108	88	7.5	210	46
6B	52	1083.000	1.2	5.0	5.0	55	114	88	9.0	220	46
7B	56	1088.230	1.2	5.0	5.0	53	118	88	9.0	230	56
8B	60	1093.750	1.2	5.0	5.0	53	122	90	9.0	230	58
	64	1098.830	1.1	4.5	4.5	53	125	91	8.0	240	60
						517°R	1784	1376			
				(4.1)(13.6) = .30			(78.5)				
				P_m = 30.36 + .30				559°R			
				= 30.66							
	64 min	78.24 f^3		P_{bar} = 30.36 − .018 = 30.18							

COMMENTS:

elap. time 64
M. FT. 79.34
DRY GAS T 539°R
P_M 30.46
P_{SN} 29.98
T_s 510°R

FIELD DATA

PLANT EPA AT CARGILL
DATE 10-4-73
SAMPLING LOCATION INLET - E.P.
SAMPLE TYPE PARTICULATE
RUN NUMBER 3- INLET
OPERATOR BROWSCALL
AMBIENT TEMPERATURE 65 °F
BAROMETRIC PRESSURE 30.15
STATIC PRESSURE, (P_s) -2.4" H_2O
FILTER NUMBER (s) 77 - 332.3Mg

PROBE LENGTH AND TYPE 3FT.
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 20%
SAMPLE BOX NUMBER red
METER BOX NUMBER 1
METER $\Delta H_@$ 1.652
C FACTOR .995
PROBE HEATER SETTING NOT HEATED
HEATER BOX SETTING 250
REFERENCE Δp .44

AN .00 0341

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 4 MINUTES

A_s 5.585

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			
1A	0 / 10:20	102.190									
2A	4	106.520	.85	3.5	3.5	50	70	68	4.0	150	60
3A	8	110.680	.72	3.0	3.0	50	76	68	4.0	175	52
4A	12	115.350	.92	3.8	3.8	50	82	68	4.5	230	60
5A	16	120.680	1.2	5.0	5.0	50	90	70	6.0	270	80
6A	20	126.000	1.3	5.0	5.0	50	98	70	6.0	240	95
7A	24	131.670	1.3	5.5	5.5	50	105	74	6.5	260	100
8A	28	137.170	1.2	5.0	5.0	50	110	78	6.0	245	110
		—	1.1	4.4	4.4	50	115	80	5.5	110	105
1B	32	142.270	—	—	—	—	—	—	—	—	—
2B	36	146.850	~~.76~~	3.2	3.2	50	104	86	4.0	170	60
3B	40	151.300	.80	3.3	3.3	50	110	88	3.8	250	60
4B	44	155.880	.96	4.0	4.0	52	96	68	4.5	250	40
5B	48	161.170	1.2	5.0	5.0	52	82	68	5.5	245	40
6B	52	166.470	1.2	5.0	5.0	52	89	68	5.5	285	50
7B	56	171.680	1.2	5.0	5.0	50	60	51	6.0	270	50
8B	60	176.670	1.1	4.4	4.4	50	70	52	5.5	205	44
END	64	181.530	.97	4.1	4.1	50	74	52	5.0	240	50
	(64)	(79.34)		ave	4.32	50.3 °F					
						Field	ave	79.3			

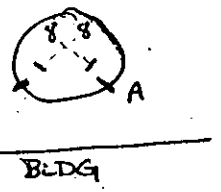
COMMENTS: 79.34 cu ft. .31 P_m = 30.46

elap Time 160 min
cu. FT. 125.42
Dry Gas T 537°R
P_M 30.15
P_{SN} 30.16
T_S 520°R

FIELD DATA

Probe 7 side 2

PLANT CARGILL - SEATTLE
DATE 10-2-73
SAMPLING LOCATION OUTLET CARDUMP
SAMPLE TYPE PARTICULATE
RUN NUMBER 1
OPERATOR DICK - JENS
AMBIENT TEMPERATURE 55
BAROMETRIC PRESSURE 30.31
STATIC PRESSURE, (P_s) 0.2 " H_2O
FILTER NUMBER (s) 71 339.2



PROBE LENGTH AND TYPE S-TYPE 4.5'
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER BLACK
METER BOX NUMBER 2
METER $\Delta H_@$ 1.9143
C FACTOR 1.1
PROBE HEATER SETTING 80
HEATER BOX SETTING
REFERENCE Δp 0.41

38 = 7.876 ΔP^2

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

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			
	0 1022	599.70									
1 A	5 1027	602.86	.37	1.68	1.68	59	65	59	3.3	305	38
1	10 *~~1032~~	605.67	.37	1.68	1.68	59	70	60	3.3	250	38
2	15 ** 10:53	609.43	.46	2.10	2.10	59	77	62	3.8	270	
2	20 11:13	613.29	.46	2.10	2.10	59	78	64		250	42
3	25 11:18	617.13	.47	2.10	2.10	59	79	67	3.8	250	42
3	30 11:23	621.10	.50	2.27	2.27	60	88	69	3.8	290	
4	35 1128	625.19	.58	~~2.40~~	2.40	60	95	71	4.0	260	48
4	40 ~~MISSING~~	629.28	.50	2.27	2.27	60	100	73	4.0	235	49
5	45 P1440	633.48	.53	2.4	2.4	61	72	63	4.0	265	40
5	50 1445	637.42	.53	2.4	2.4	62	79	63	4.0	240	45
6	55 1508	641.47	.51	2.35	2.35	62	83	65	4.0	260	50
6	60 1523	645.59	.51	2.35	2.35	61	84	69	4.0	230	50
7	65 1538	649.59	.49	2.2	2.2	61	87	71	3.8	260	53
7	70 1543	653.61	.47	2.1	2.1	61	89	73	3.6	285	56
8	75 1548	657.29	.45	2.1	2.1	61	95	74	3.6	271	63
8	80 1553	661.22	.48	2.18	2.18	61	99	75	3.6	250	68
1 B	85 1558	664.85	.39	1.75	1.75	61	99	77	3.3	220	68
1	90 1619	668.44	.39	1.75	1.75	61	104	79	3.2	270	68
2	95 1624	672.38	.48	2.18	2.18	61	99	81	3.8	280	65
2	100 1629	676.36	.48	2.18	2.18	61	104	82	3.9	245	72
3	105 1643	680.50	.51	2.3	2.3	61	109	84	4.0	240	65
3	110 1345 10-3	684.76	.54	2.45	2.45	61	104	86	4.0	240	56
4	115 1350	688.97	.59	2.65	2.65	62	61	57	4.2	240	56

COMMENTS: 1020 TORD OFF PUMPS PROCESS STOPPED * OFF 10:57 = 0.1 11.1.3 PRESSURE DROP ACROSS BAGHOUSE 7.5" H_2O

CARGILL - SEATTLE RUN #1 OUTLET PARTICULATE

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			
	115 1350	688.97									
4	120 1403	693.20	0.58	2.6	2.6	62	71	57	4.2	250	60
5	125 1408	697.46	0.55	2.5	2.5	62	77	59	4.1	260	68
5	130 1413	701.54	0.55	2.5	2.5	62	84	61	4.0	250	70
6	135 1418	705.64	0.52	2.35	2.35	62	90	64	4.0	230	71
6	140 1423	709.66	0.50	2.25	2.25	62	95	67	3.9	230	70
7	145 1428	713.58	0.48	2.15	2.15	62	100	70	3.8	270	68
7	150 1433	717.50	0.48	2.15	2.15	62	104	74	3.8	237	71
8	155 1438	721.33	0.45	2.0	2.0	62	109	79	3.5	240	72
8	160 1443	725.12	0.45	2.0	2.0	61	111	80	3.5	275	72
	160	125.72		2.20 av.	13.6	62 av.	av.	77.34			

EPA (Dur) 236
4-72

elap. Time 160
cu. FT. 130.17
Dry Gas T. 553°R
Pm 30.52
Psn 30.37
Ts 521°R

FIELD DATA

PLANT CARGILL
DATE 10-3-73
SAMPLING LOCATION CARDUMP
SAMPLE TYPE PARTICULATE
RUN NUMBER #2 OUTLET
OPERATOR Dick
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 30.36
STATIC PRESSURE, (P_s) 0.2
FILTER NUMBER (s) 75-329.4

PROBE LENGTH AND TYPE 4.5' P-TYPE
NOZZLE I.D. 1/4
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER RED
METER BOX NUMBER 2
METER $\Delta H_@$ 1.9143
C FACTOR 1.1
PROBE HEATER SETTING 600
HEATER BOX SETTING 250
REFERENCE Δp 0.41

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

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			
	0 / 1500	725.24									
1B	5 / 1505	728.95	.42	1.9	1.9	62	97	85	3.9	200	*
1	10 / 1521	732.70	.42	1.9	1.9	62	104	86	3.9	230	
2	15 / 1526	736.71	.51	2.3	2.3	62	102	85	4.5	210	
2	20 / 1531	740.86	.51	2.3	2.3	62	107	86	4.5	265	
3	25 / 1536	745.22	.56	2.55	2.55	62	112	87	4.9	260	
3	30 / 1541	749.55	.56	2.55	2.55	62	115	89	4.9	255	
4	35 / 1546	754.05	.58	2.65	2.65	62	119	90	5.1	280	
4	40 / 1551	758.41	.58	2.65	2.65	62	121	92	4.8	260	
5	45 / 1621	762.72	.56	2.55	2.55	62	123	93	4.8	235	
5	50 / 1626	767.09	.58	2.65	2.65	61	103	87	4.9	260	
6	55 / 1631	771.49	.57	2.6	2.6	61	108	88	4.8	250	
6	60 / 1636	775.77	.54	2.45	2.45	61	112	88	4.6	230	
7	65 / 1641	779.90	.51	2.3	2.3	61	114	89	4.4	250	
7	70 / 1948	784.08	.51	2.3	2.3	61	116	90	4.4	270	
8	75 / 1953	787.93	.47	2.15	2.15	60	68	59	4.3	280	
8	80 / 1958	791.79	.47	2.15	2.15	60	73	60	4.2	255	
1A	85 / 2007	795.06	.36	1.6	1.6	60	76	62	3.8	230	
1	90 / 2012	798.40	.36	1.6	1.6	60	82	63	3.6	290	
2	95 / 2017	802.08	.45	2.0	2.0	60	89	66	4.2	282	
2	100 / 2022	805.81	.44	1.95	1.95	60	95	69	4.2	220	
3	105 / 2027	809.83	.49	2.2	2.2	60	99	72	4.3	270	
3	110 / 2032	813.83	.49	2.2	2.2	60	104	75	4.5	285	
4	115 / 2037	818.09	.55	2.5	2.5	60	109	78	4.8	265	

COMMENTS: * ICE BATH TEMP BELOW 70°F

[redacted] top [redacted] (sampling)

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			
	115	2037	818.09									
4	120	2042	822.36	.54	2.47	2.47	60	113	81	4.8	220	
5	125	2045	826.61	.54	2.47	2.47	60	117	84	4.8	240*	
.5	130	2050	830.85	.54	2.47	2.47	60	119	86	4.8	180	
6	135	2114	835.09	.50	2.25	2.25	60	122	90	4.5	140	
6	140	2124	839.31	.53	2.4	2.4	58	95	85	4.5	160	
7	145	2129	843.39	.50	2.25	2.25	59	103	85	4.5	120	
7	150	2134	847.45	.50	2.25	2.25	60	105	86	4.5	150	
8	155	2139	851.44	.48	2.15	2.15	60	109	85	4.2	140	
8	160	2144	855.411	~~.50~~ .48	2.15	2.15	59	112	87	4.2	150	
	160		130.17		2.01 / 13.6 =		.16	93 av.				
							61 ave.					

EPA (Dur) 236
4/72

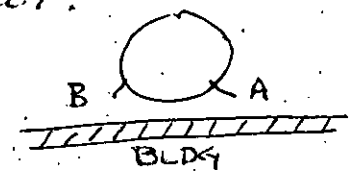
* BOX TEMP TURNED DOWN TO 150° OFF AT 2054 - 2119 due to plant shutdown

**

CLAP TIME 160 min
cu ft. 130.87
dry gas T 532
RM 30.37
PSN 30.21
Ts 519°R

FIELD DATA

PLANT CARGILL - SEATTLE
DATE 10-4-73
SAMPLING LOCATION CARDIMP OUTLET.
SAMPLE TYPE PARTICULATE
RUN NUMBER #3
OPERATOR DICK
AMBIENT TEMPERATURE 58
BAROMETRIC PRESSURE 30.20
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) #76 - 332.0mg
Cup # 18



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 4.5' P-TYPE
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER BLACK
METER BOX NUMBER 2
METER $\Delta H_@$ 1.9145
C FACTOR 1.1
PROBE HEATER SETTING N/A
HEATER BOX SETTING 300
REFERENCE Δp 0.41

READ AND RECORD ALL DATA EVERY _____ MINUTES

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			
	0 / 1020	855.53									
1 A	5 / 1027	859.04	.40	1.8	1.8	60	57	53	3.1	350	54
1	10 / 1032	862.52	.40	1.8	1.8	60	62	53	3.1	190	53
2	15 / 1037	866.36	.48	2.2	2.2	60	71	54	3.8	290	57
2	20 / 1042	870.51	.49	2.21	2.21	60	78	56	3.8	210	68
3	25 / 1047	874.42	.53	2.4	2.4	60	87	60	4.0	170	81
3	30 / 1052	878.68	.53	2.4	2.4	60	92	62	4.0	130	88
4	35 / 1110	882.86	.55	2.5	2.5	60	98	67	4.0	80	93
4	40 / 1457	887.14	.57	2.6	2.6	60	93	73	4.0	230	63
5	45 / 1502	891.32	.55	2.5	2.5	60	69	59	4.0	230	45
5	50 (1455) 0012	896.01	.55	2.5	2.5	60	76	59	4.0	260	45
6	55 / 0017	899.66	.55	2.5	2.5	56	57	52	4.0	240	49
6	60 / 0022	903.82	.52	2.4	2.4	59	68	52	4.0	220	50
7	65 / 0027	908.00	.52	2.4	2.4	58	75	53	3.9	240	60
7	70 / 0032	912.16	.53	2.42	2.42	58	80	55	3.9	260	67
8	75 / 0037	916.25	.51	2.3	2.3	58	85	59	3.8	190	70
8	80 / 0042	920.365	.51	2.3	2.3	58	88	61	3.8	260	70
1B	5 / 0100	924.21	.42	1.9	1.9	58	77	64	3.5	280	56
1B	10 / 0105	927.83	.40	1.8	1.8	59	80	65	3.0	250	62
2	15 / 0110	931.96	.53	2.4	2.4	59	86	67	3.9	235	65
2	20 / 0115	936.07	.51	2.3	2.3	60	92	69	3.8	230	68
3	25 / 0120	940.30	.54	2.45	2.45	60	96	71	3.8	200	71
3	30 / 0125	944.67	.57	2.6	2.6	60	98	73		200	74
4	35 / 0130	949.00	.56	2.5	2.5	60	101	74	3.9	200	74

COMMENTS. — METER STOPPED PRODUCTION INTERRUPTION

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			
4B	40 0135	953.39	0.58	2.6	2.6	60	101	75	4.0	200	76
5B	45 0145	957.84	0.57	2.55	2.55	60	101	76	4.0	240	76
5	50 1521	962.05	0.57	2.55	2.55	60	96	75	4.0	190	71
6	55 1526	966.20	0.53	2.4	2.4	59	94	52	4.0	200	57
6	60 1531	970.34	0.52	2.4	2.4	58	93	54	4.0	170	68
7	65 1536	974.40	0.51	2.3	2.3	59	73	60	4.0	200	70
7	70 — 1608	978.51	0.51	2.3	2.3	58	70	60	3.8	200	68
8	75 1613	982.47	0.48	2.15	2.15	58	60	63	3.5	190	71
8	80 1618	986.40	0.46	2.10	2.10	52	85	65	2.5	200	72
					2.3						
	160	130.87			2.4	59 ave.		72 ave			
					.17 "H2O						

EPA (Dun) 236

— Shut off to wait for another car * Stopped until next day

elap time 68
cu ft. 80.53
dry gas T 532°R
P_M 30.25
P_{SN} 29.59
T_S 505°R

FIELD DATA

PLANT CARGILL
DATE 10-5-77
SAMPLING LOCATION INLET - S.C.
SAMPLE TYPE
RUN NUMBER 1
OPERATOR
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 29.95
STATIC PRESSURE, (P_s) -5
FILTER NUMBER (s) 79 330.2

PROBE LENGTH AND TYPE
NOZZLE I.D. 1/4 .000341
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER YELLOW
METER BOX NUMBER UNIT 1
METER $\Delta H_@$ 1.652
C FACTOR 0.95
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

30" = 4.909 ft²

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	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 / 10:08	181.81									
1A	1 / 10:12	186.60	1.1	4.3	4.3	45°F	55	51	8.5	150	55
2	8 / 10:16	191.43	1.0	4.0	4.0		56	51	8.5	155	55
3	12 / 10:20	196.23	1.0	4.0			61		8.5	165	55
4	16 / 10:24	201.96	1.5	6.0	4.0		70	52	9.5	170	55
5	20 / 10:28	207.81	1.25	5.0	6		82	54	10.5	175	60
6	24 / 10:32	212.65	1.5	5.9	4.6		86	56	10.5	180	60
7	28 / 10:36	212.17	1.5	5.9	4.5		88	57	10.5	185	66
8	32 / 10:40	220.51	1.5	5.9	4.5		90	58	10.7	185	68
	36 / 10:44	228.07	1.5	5.9	4.3		93	61	10.7	190	68
			1.5	5.9	4.3		94	63	10.7	190	66
			1.5		4.3		61.3				
	0	228.07									
1B	4	233.13	1.1	4.3	4.3		79	64	9.7	220	64
2	8	238.12	1.1	4.3	4.2		86	64	9.7	220	
3	12	243.49	1.2	4.6	4.1		90	65	11.0	225	
4	16	248.03	1.4	5.5	4.1		93	67	11.4	220	
5	20	253.13	1.4	5.5	4.0		94	67	11.2	215	
6	24	257.91	1.6	6.25	4.0		95	67	11.2	215	
7	28	262.76	1.4	5.5	3.8		98	68	11.4	215	
8	32	267.63	1.4	5.5	3.7		99	69	11.5	215	
			1.4		4		72.4				
	62	86.53	1.4		4.0	45	72 ave				
			1.4		4.0		72				

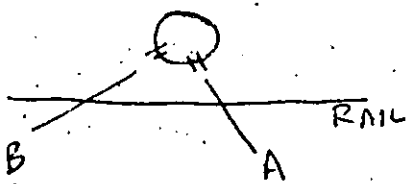
50 min
3 min intervals
30 min total

COMMENTS:

Elap Time
cu. ft. 67.07
DRY GAS T. 530°R
P_M 29.74
P_{SN} 29.10
T_S 507°R

FIELD DATA

PLANT Cargill
DATE 10-6-73
SAMPLING LOCATION Inlet-Skyload
SAMPLE TYPE Particulate
RUN NUMBER 2
OPERATOR Snowden
AMBIENT TEMPERATURE 50F
BAROMETRIC PRESSURE 29.76
STATIC PRESSURE, (P_s) -5
FILTER NUMBER (s) 80 330.0



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3' Pyrex
NOZZLE I.D. .25
ASSUMED MOISTURE, % 3
SAMPLE BOX NUMBER Blue
METER BOX NUMBER 3
METER $\Delta H_@$ 1.8162
C FACTOR 1.05
PROBE HEATER SETTING off
HEATER BOX SETTING 250
REFERENCE Δp .48

READ AND RECORD ALL DATA EVERY 4 MINUTES

4.5" H_2O ΔP Across S.H. @ 9:00AM
4" H_2O @ 10:00AM

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			
	0	8:49	274.77 EOD OF RUN 1 OUT									
*2A	4	8:54	279.27	1.1	4.3	4.3	45	50	47	5.2		
2A	8	8:58	283.80	1.1	4.3	4.3	45	60	47	5.2	200	
3A	12	8:62	288.80	1.2	4.6	4.6	45	71	48	5.6	210	
4A	16	9:08	292.95	1.2	4.6	4.6	45	75	50			
5	20	9:12	297.90	1.3	5.0	5.0	45	82	52	6.8	190	
6	24	9:16	302.05	0.9	3.5	~4.5	47	82	53			
7	28	9:28	307.50	0.92	3.7	3.7	48	83	55	5.5	200	
8	32	9:32	311.52	0.85	3.2	3.2	48	85	57	5.1	150	
2B	36	9:36	314.28	0.75	2.8	2.8	46	78	56	4.8	180	
2B	40	9:40	318.42	0.75	2.8	2.8	46	80	56	4.8	200	
3	44	9:52	321.86	0.57	2.1	2.1	46	70	55	4.0		
4	48	10:00	325.34	0.66	2.4	2.6	47	77	57	4.5	180	
5	52	10:04	329.29	0.85	3.2	3.2	47	82	58	5.0	190	
6	56	10:08	333.32	0.84	3.2	3.2	49	85	59	5.4	175	
7	60	10:12	337.57	.91	3.8	3.8	49	89	60	6.0	183	
8	64	10:16	341.84	.76	2.9	2.9	49	91	61	5.0		
	64		67.07	2.11		3.84	47	82.6	58			
						3.1	46.8	70.3 °F				
								(46.0)				

COMMENTS: * STARTED ** NOZZLE PLUGGED *** STOPPED

Elap. Time 160
cu. ft. 181.57
dry GAS T 536°R
P_M 30.26
P_{SN} 29.96
T_S 515°R

FIELD DATA

PLANT CARGILL - SEATTLE
DATE 10-5-73
SAMPLING LOCATION SHIPLOAD - OUTLET
SAMPLE TYPE PARTICULATE
RUN NUMBER 1
OPERATOR DOK
AMBIENT TEMPERATURE 50°
BAROMETRIC PRESSURE 29.95
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 78

PROBE LENGTH AND TYPE 3'-0" S TYPE
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, %
SAMPLE BOX NUMBER GREEN BOX
METER BOX NUMBER 3
METER $\Delta H_@$ 1.9162
C FACTOR
PROBE HEATER SETTING N/A
HEATER BOX SETTING 300
REFERENCE Δp 0.38

SCHEMATIC OF TRAVERSE POINT LAYOUT

34" = 6.305 ft²

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	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			
	0 / 1005	87.20									
1A	5 / 1010	91.68	.61	2.9	2.9	54	53	48	4.9	275	34
1	10 / 1015	96.39	.61	2.9	2.9	54	62	48	4.9	275	34
2	15 / 1020	101.67	.78	3.75	3.75	54	71	50	6.0	275	45
2	20 / 1025	107.11	.78	3.75	3.75	55	77	51	6.0	275	45
3	25 / 1030	112.82	.90	4.25	4.25	55	84	53	6.6	280	48
3	30 / 1035	118.64	.90	4.25	4.25	55	88	55	6.7	290	50
4	35 / 1040	124.58	.97	4.5	4.5	55	92	58	7.0	290	50
4	40 / 1045	130.58	.97	4.5	4.5	55	94	60	7.0	280	50
5	45 / 1050	136.74	.99	4.65	4.65	55	97	63	7.1	265	52
5	50 / 1055	142.91	.99	4.65	4.65	55	98	64	7.2	265	52
6	55 / 1100	148.85	.89	4.2	4.2	55	100	66	6.5	265	52
6	60 / 1105	154.75	.89	4.2	4.2	55	100	66	6.5	250	52
7	65 / 1110	160.50	.84	4.0	4.0	55	100	67	6.1	230	52
7	70 / 1115	166.26	.84	4.0	4.0	55	99	68	6.1	240	52
8	75 / 1120	171.95	.82	3.9	3.9	55	99	69	6.0	260	52
8	80 / 1125	177.62	.82	3.9	3.9	55	99	69	6.0	250	54
1B	85 / 1130	182.98	.70	3.4	3.4	55	83	68	5.3	275	52
1	90 / 1140	188.42	.70	3.4	3.4	55	96	69	5.3	265	54
2	95 / 1310	194.10	.89	4.25	4.25	54	98	69	6.5	265	54
2	100 / 1318	199.87	.90	4.3	4.3	54	60	54	7.0	260	48
3	105 / 1323	206.03	1.05	5.0	5.0	54	75	55	8.0	270	65
3	110 / 1328	212.30	1.05	5.0	5.0	54	80	55	8.0	280	68
4	115 / 1333	218.73	1.1	5.2	5.2	55	88	57	8.2	265	68

COMMENTS: - TRAIN STOPPED PROCESS INTERRUPTION

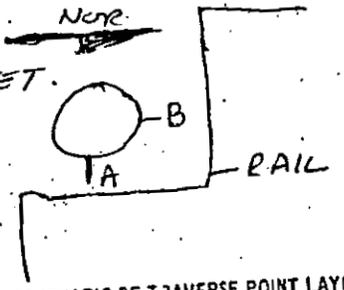
TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)		GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	115	1333	218.73									
4	120	1338	225.16	1.1	5.2	5.2	55	93	60	8.2	250	66
5	125	1343	231.60	1.1	5.2	5.2	55	96	62	8.2	270	66
5	130	1348	238.14	1.1	5.2	5.2	55	99	63	8.2	260	66
6	135	1353	245.68	1.0	4.8	4.8	55	100	65	7.4	250	66
6	140	1358	250.79	1.0	4.8	4.8	55	101	67	7.4	250	66
7	145	1403	256.90	.94	4.4	4.4	55	102	68	6.9	250	66
7	150	1408	262.96	.92	4.38	4.38	55	102	69	6.8	240	66
8	155	1413	268.77	.80	3.9	3.9	55	103	70	6.0	260	66
8	160	1418	274.58	.80	3.9	3.9	55	103	71	6.0	260	66
	160		187.35	21.41	4.26 / 13.6	4.3	55	76	76			

EPA (Dur) 236
4/72

elap Time 160
Qm ft. 173.78
Dry Gas T 536°R
PM 29.69
PsN 29.47
Ts 517

FIELD DATA

PLANT CARGILL - SEATTLE
DATE 10-5-73
SAMPLING LOCATION SHIPLOAD - OUTLET.
SAMPLE TYPE PARTICULATE
RUN NUMBER #2
OPERATOR DICK
AMBIENT TEMPERATURE 57
BAROMETRIC PRESSURE 29.76
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 81



SCHEMATIC OF TRAVERSE POINT LAYOUT

PROBE LENGTH AND TYPE 3'-0" P TYPE
NOZZLE I.D. 1/4"
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER RED BOX
METER BOX NUMBER 1
METER $\Delta H_@$ 1.652
C FACTOR .84
PROBE HEATER SETTING N/A
HEATER BOX SETTING 250
REFERENCE Δp ~~0.77~~ 0.48

READ AND RECORD ALL DATA EVERY 5 MINUTES

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			
	0 1525	268.03									
1B	5 1530	273.25	.64	3.1	3.1	55	57	52	3.5	50	43
1	10 1535	278.45	.62	3.0	3.0	55	68	52	3.4	140	43
2	15 1540	284.51	.90	4.3	4.3	55	78	54	4.2	200	50
2	20 1545	290.63	.90	4.3	4.3	55	83	55	4.7	210	54
3	25 1550	296.72	1.0	4.0	4.0	55	90	59	4.5	250	52
3	30 1555	303.01	1.03	4.2	4.2	55	93	60	4.7	250	52
4	35 1600	309.45	1.1	4.4	4.4	55	95	63	5.0	250	50
4	40 1605	315.87	1.1	4.4	4.4	55	99	65	4.9	290	54
5	45 1610	321.97	.94	3.8	3.8	55	101	67	4.2	290	55
5	50 1615	327.93	.92	3.7	3.7	55	103	69	4.1	290	55
6	55 1620	333.73	.85	3.45	3.45	55	104	70	4.0	270	56
6	60 1625	339.49	.84	3.45	3.45	55	105	72	4.0	280	56
7	65 1630	344.68	.65	2.7	2.7	55	105	73	3.1	300	56
7	70 1635	349.72	.64	2.6	2.6	55	105	74	3.0	280	56
8	75 1640	354.54	.59	2.4	2.4	60	106	75	2.8	280	57
8	80 ~~1645~~ 830	359.23	.61	2.55	2.55	50	55	46	3.0	190	45
1A	85 835	363.71	.54	2.2	2.2	56	58	47	2.8	200	40
1	90 840	368.61	.61	2.55	2.55	56	67	47	3.0	220	40
2	95 845	373.92	.87	3.50	3.50	56	76	49	4.0	240	42
2	100 850	379.68	.87	3.5	3.5	56	82	51	4.0	250	42
3	105 855	385.57	.92	3.75	3.75	56	88	54	4.2	250	44
3	110 900	391.28	.86	3.5	3.5	56	92	56	4.0	255	46
4	115 905	397.20	.92	3.75	3.75	57	94	59	4.1	260	46

COMMENTS:

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			
	115 / 905	397.20									
4	120 910	403.20	.93	3.8	3.8	58	97	62	4.2	270	48
5	125 915	409.13	.87	3.6	3.6	56	100	65	4.1	275	48
5	130 920	414.19	.60	2.5	2.5	59	101	67	3.0	280	48
6	135 925	419.00	.57	2.35	2.35	60	102	68	2.9	285	50
6	140 930	423.86	.59	2.4	2.4	60	102	69	2.8	285	50
7	145 935	428.59	.56	2.3	2.3	60	102	70	2.8	285	50
7	150 940	433.20	.57	2.15	2.15	60	101	71	2.5	260	50
8	155 957	437.72	.52	2.1	2.1	60	82	67	2.5	280	52
8	160 1002	441.81	.40	1.7	1.7	60	88	69	2.1	270	52
	160	173.78	11.75		3.18	57	76° avg				
				3.18 = / 13.6							

EPA (Dur) 236
4 72

Ti [redacted] 47 [redacted] 5
CU. FT. 49.47
DRY GAS T 535°R
PM 29.67
PSN 29.47
TS 518

FIELD DATA

PLANT CARGILL
DATE 10/6/93
SAMPLING LOCATION SHIPLOAD OUTLET
SAMPLE TYPE Particulate
RUN NUMBER 3
OPERATOR Dick
AMBIENT TEMPERATURE 45
BAROMETRIC PRESSURE 29.46
STATIC PRESSURE, (P_s) +.2
FILTER NUMBER (s)

PROBE LENGTH AND TYPE 3-0
NOZZLE I.D. .25
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER YELLOW
METER BOX NUMBER 1
METER $\Delta H_@$ 1.652
C FACTOR .84
PROBE HEATER SETTING UNHEATED
HEATER BOX SETTING
REFERENCE Δp .44

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	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			
	0 / 1100	441.975									
1A	5 / 1105	446.62	.54	2.25	2.25	57	65	60	3.5	150	47
1	10 / 1110	451.21	.55	2.3	2.3	57	73	60	3.9	200	48
2	15 / 1115	456.07	.69	2.9	2.9	58	80	60	4.6	230	52
2	20 / 1120	461.31	.69	2.9	2.9	59	85	61	4.8	240	59
3	25 / 1125	466.80	.77	3.2	3.2	59	90	62	5.1	245	58
3	30 / 1130	472.29	.77	3.2	3.2	59	95	63	5.1	255	58
4	35 / 1135	477.97	.84	3.45	3.45	59	97	65	5.5	258	58
4	40 / 1140	483.70	.84	3.45	3.45	59	100	67	5.6	260	59
5	45 / 1357	489.24	.82	3.2	3.2	59	100	67	5.6	260	59
5	~~55~~	491.445	.80	2.4	2.7						
6	55										
6	60										
7	65 / 42.125	49.47	(1)		2.96	58.5	87.2	62.8			
7	70						75 °F				
8	75										
8	80										
1B	85										
1	90										
2	95										
2	100										
3	105										
3	110										
4	115										

COMMENTS: ~~47~~ 47 MIN. ~~7~~ 7½ SEC. LAST SHIP LOADED & HIGH WINDS & RAIN

FIELD DATA

PLANT CARGILL - SEATTLE
DATE 10-2-73
SAMPLING LOCATION OUTLET CAR DUMP
SAMPLE TYPE PARTICLE SIZE
RUN NUMBER 1
OPERATOR VIC - DICK
AMBIENT TEMPERATURE 55
BAROMETRIC PRESSURE 30.31
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) Set #1

PROBE LENGTH AND TYPE
NOZZLE I.D. 1/8
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER BLUE
METER BOX NUMBER 4
METER $\Delta H_@$
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	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			
	0	577.73									
	5	-			0.045						
	10	-									
	15 11:14	578.87				57	56	56	10.0*	250	46
	20	-				59	60	59	10.0	210	48
	25 1121	579.63				60	61	61	10.0	240	48
	30	580.0				60	63	63	10.0	260	50
	35	580.47				60	66	66	10.0	270	48
	40 2:36	580.77				61	60	61	10.0	200	50
	45	581.15				61	61	62	10.0	250	45
	50 3:10	581.65				61	65	65	10.0	280	40
	55 3:25	582.16				61	67	67	10.0	300	46
	60 3:35	582.53				61	68	68	10.0	310	47
	65	582.93				61	68	70	10.0	310	48
	70 3:47	583.37				61	69	70	10.0	275	50
	75	583.73				61	70	72	10.0	285	48
	80 4:00	584.20				61	72	74	10.0	310	50
	85 4:19	584.61				61	74	76	10.0	275	50
	90	585.05				61	75	77	10.0		
	95 4:27	585.38				61	76	79	10.0	310	50
	100 4:42	585.75				61	80	81	10.0*	270	52
	105 1:45	586.16					52	53	10.0	255	44
	110 1:51	586.72				62	54	54	10.0	270	46
	115 2:03	587.13				62	56	56	10.0	290	49

COMMENTS: * SHOULD BE 9.5 DUE TO INSTRUMENT ERROR

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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		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			
	120	587.60				G2	57	57	10.0	295	50
	125 2:13	588.16				G2	60	59	10.0	300	50
	130 2:18	588.52				G2	G2	G2	10.0	300	50
	135 2:23	588.88				G2	66	66	10.0	310	52
	140 2:28	589.45				G2	69	68	10.0	310	52
	145 2:33	589.91				G2	71	71	10.0	315	52
	150 2:38										
	155 2:43										
	160 2:48	591.69				G2	80	80	10.0		
	165 2:53	592.18				G2	82	82	10.0	310	52
	170 2:58	592.60				G2	84	85	10.0	310	52
	175 3:05	593.17				G2	86	87	10.0	305	52
	180 3:21	593.68				G2	86	88	10.0	305	52
	185 3:26	594.17				G2	86	88	10.0	310	52
	190 3:31	594.53				G2	87	89	10.0	250	52
	195 3:36	595.12				G2	88	90	10.0	250	52
	200 3:41	595.55				G2	88	90	10.0	280	52
	205 3:46	596.06				G2	88	90	10.0	250	52
	210 3:51	596.67				G2	88	90	10.0	240	52
	215 4:21	597.17				G2	80	80	10.0	270	52
	220 4:26	597.66				G2	80	80	10.0	290	52
	225 4:31	598.21				G2	79	80	10.0	270	52
	230 4:36	598.77				G1	78	80	10.0	260	52
	235 4:41	599.28				G1	78	80	10.0	250	52
	240 4:48	599.73				G0	G1	G1	10.0	215	42
	245 7:53	600.26				G0	G1	G1	10.0	240	45
	250 7:58	600.76				G0	G1	G1	10.0	255	44
	255 8:07	601.48				G0	G3	G3	10.0	290	43
	260 8:12	602.09				G0	65	65	10.0	295	42
	265 8:17	602.90				G0	69	68	10.0	300	42
	270 8:22	603.81				G0	72	70	10.0	310	42
	275 8:27	604.71				G0	74	72	10.0	310	42
	280 8:32	605.61				G0	76	75	10.0	315	42
	285 8:37	606.70				G0	80	78	10.0	320	42
	290 8:42	607.45				G0	82	80	10.0	255	44
	295 8:47	608.49				G0	84	82	10.0	265	44
	300 8:52	609.32				G0	86	84	10.0	260	44

[redacted] CARGILL-SEATTLE [redacted] RUN [redacted] OUTLET [redacted] PARTIC [redacted] 1 [redacted] 2-[redacted]

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			
	305 9:20	G1030				60	81	82	10.0	200	42
	310 9:25	G11.25				60	81	82	10.0	245	42
	315 9:30	G12.23				60	82	82	10.0	240	42
	320 9:35	G13.13				60	83	83	10.0	195	44
	325 9:40	G14.17				60	84	84	10.0	225	45
	330 9:45	G15.20				60	86	85	10.0	250	45
		37.47						75.2 °Avg			

EPA (Dur) 236
4/72

FIELD DATA

PLANT EPA @ CARGILL
DATE 16/6/73
SAMPLING LOCATION S.C. INLET
SAMPLE TYPE PARTICLE SIZE
RUN NUMBER 1
OPERATOR SNOWDEN
AMBIENT TEMPERATURE
BAROMETRIC PRESSURE 29.58
STATIC PRESSURE, (P_s)
FILTER NUMBER (s)

PROBE LENGTH AND TYPE SS, 1/4" OD PROBE W/ADAPT.
NOZZLE I.D.
ASSUMED MOISTURE, % 2
SAMPLE BOX NUMBER 3
METER BOX NUMBER
METER $\Delta H_@$ 1.8162
C FACTOR —
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 2.5 MINUTES

Set 3

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	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			
	10:42 0	341.94									
12	10:44.5 2.5	342.25			.045	46	60	57	10		
	10:47 5	342.52			.045	46	62	57	10		
	10:49.5 7.5	342.80			.045	46	62	59	10		
	10:52.0 10.0	343.04			.045	46	62	59	10		
	10:54.5 12.5	343.32			.045	46					
	10:57 15.0	343.57			.045	46	63	59			
							Avg 60°				

COMMENTS:

1-77 SHIPLOAD OU

PLANT EPA AT CARGILL
DATE 10 ~~9~~ | 73 | 10 | 5 | 73
SAMPLING LOCATION ~~INLET~~ ~~OUTLET~~ SHIP LOAD
SAMPLE TYPE IMPACTOR
RUN NUMBER 1-IMP-INLET
OPERATOR BROUSSEAU
AMBIENT TEMPERATURE 60°F
BAROMETRIC PRESSURE
STATIC PRESSURE, (P_s) 2.4" H_2O
FILTER NUMBER (s) N/A

PROBE LENGTH AND TYPE 21"
NOZZLE I.D. 3/16"
ASSUMED MOISTURE, % 2%
SAMPLE BOX NUMBER Yellow
METER BOX NUMBER #1
METER $\Delta H_@$ 1.652
C FACTOR N/A
PROBE HEATER SETTING N/A
HEATER BOX SETTING 250°F
REFERENCE Δp N/A

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES Set # 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		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			
	0 1:35 PM	621.570									
	5	622.050	—	—	—	52	51	52	10	—	—
	10	622.810	—	—	—	52	52	52	10	—	—
	15	623.410	—	—	—	52	52	52	10	—	—
	20	624.270	—	—	—	52	54	54	10	—	—
	25	625.010	—	—	—	53	56	56	10	—	—
	30	625.890	—	—	—	53	58	57	10	—	—
	35	626.480	—	—	—	53	59	58	10	—	—
	40	627.240	—	—	—	53	60	58	10	—	—
	45	628.170	—	—	—	53	60	60	10	—	—
	50	628.710	—	—	—	53	60	60	10	—	—
	55	629.460	—	—	—	53	65	64	10	—	—
	60	630.240	—	—	—	53	65	65	10	—	—
	1-5	631.060	—	—	—	53	66	65	10	—	—
	1-10	631.690	—	—	—	53	66	65	10	—	—
	1-15	632.440	—	—	—	53	68	66	10	—	—
	1-20	633.210	—	—	—	53	68	66	10	—	—
	1-25	633.930	—	—	—	53	68	67	10	—	—
	1-30	634.680	—	—	—	53	68	68	10	—	—
	1-35	635.420	—	—	—	53	68	68	10	—	—
	1-40	636.170	—	—	—	53	68	68	10	—	—
	1-45	636.920	—	—	—	53	68	68	10	—	—
	1-50	637.700	—	—	—	55	68	68	10	—	—
	1-55	638.410	—	—	—	55	68	68	10	—	—

COMMENTS:

EPA at CARGILL 10/5/73 SHIPLOAD OUTLET IMPACTOR

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	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		UNHEATED	
	55	638.410									
15	2-0	639.600	—	—	—	55	70	70	10	—	—
20	2-5	640.440	—	—	—	55	70	70	10	—	—
25	2-10	641.080	—	—	—	55	70	70	10	—	—
30	2-15	641.820	—	—	—	55	69	69	10	—	—
35	2-20	642.580	—	—	—	56	69	69	10	—	—
40	2-25	643.310	—	—	—	56	69	69	10	—	—
45	2-30	644.080	—	—	—	55	69	69	10	—	—
50	2-35	644.800	—	—	—	55	70	69	10	—	—
55	2-40	645.630	—	—	—	55	70	69	10	—	—
60	2-45	646.300	—	—	—	55	70	70	10	—	—
5	2-50	647.040	—	—	—	55	70	70	10	—	—
10	255	647.800	—	—	—	55	70	70	10	—	—
15	2-60	648.650	—	—	—	60	70	70	10	—	—
20	3-[illegible]50	649.22	—	—	—	60	70	70	10	—	—
25	3-[illegible]5	648 42	—	—	—	55	[illegible]	[illegible]	10	—	—
30	3-15 10	650.67	—	—	—	55	48	48	10	—	—
	3-20 15	651.400	—	—	—	55	49	49	10	—	—
	3-25 20	652.131	—	—	—	55	51	51	10	—	—
	3-30 25	652.840	—	—	—	55	52	51	10	—	—
	3-35 30	653.584	—	—	—	55	54	53	10	—	—
	3-40 35	654.300	—	—	—	55	56	55	10	—	—
	3-45 40	655.040	—	—	—	55	58	57	10	—	—
	3-50 45	655.790	—	—	—	55	59	59	10	—	—
	3-55 50	656.560	—	—	—	55	61	60	10	—	—
	4-0 55	657.240	—	—	—	55	63	62	10	—	—
	4-5 60	657.980	—	—	—	55	64	63	10	—	—
	4-10 5	658.736	—	—	—	55	65	64	10	—	—
	4-15 10		—	—	—	55	66	66	10	—	—
	4:20 15	660.230	—	—	—	55	63	63	10	—	—
	4-25 20	660.970	—	—	—	55	64	63	10	—	—
	4-30 25	661.700	—	—	—	55	63	64	10	—	—
	4-35 30	662.58	—	—	—	55	64	64	10	—	—
	4-40 35	663.200	—	—	—	55	65	66	10	—	—
	4-45 40	663.950	—	—	—	55	65	66	10	—	—
	4-50 45	664.710	—	—	—	55	66	67	10	—	—
	4-55 50	665.460	—	—	—	55	67	67	10	—	—
	5-0 55	666.200	—	—	—	55	68	68	10	—	—

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1 4 72

FIELD DATA

PLANT CARGILL
DATE 10-4-73
SAMPLING LOCATION INLET - CAR DUMP
SAMPLE TYPE PARTICLE SIZE
RUN NUMBER 1
OPERATOR VIK
AMBIENT TEMPERATURE 65
BAROMETRIC PRESSURE 30.15
STATIC PRESSURE, (P_s) _____
FILTER NUMBER (s) _____

PROBE LENGTH AND TYPE _____
NOZZLE I.D. _____
ASSUMED MOISTURE, % _____
SAMPLE BOX NUMBER BLUE
METER BOX NUMBER #4
METER $\Delta H_@$ _____
C FACTOR _____
PROBE HEATER SETTING _____
HEATER BOX SETTING _____
REFERENCE Δp _____

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES Nozzle # 4

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			
	0 8:57	618.79									
	5 9:02	619.54				52	75	75	10.0	150	
	to 8:57:30	620.01				52	75	75	10.0	180	

COMMENTS:

APPENDIX D

Laboratory Report

ACETONE = _____ mg/_____ ml = _____ µg/ml. TOTAL _____ µg

ETHER-CHLOROFORM = _____ mg/_____ ml = _____ µg/ml. TARE _____ µg

WATER = 0.2 mg/ 20 ml = 10 µg/ml.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMP INLET RUN NO. ONE

EVALUATION DATE 10|2|73 CLEAN-UP SET NO. 25

I. EVAPORATION OF 280 (ml) OF ACETONE

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

FINAL 80415.6 (mg) - TARE 77493.4 (mg)

-BLANK ((.001 mg/ml) (280 ml) = .28 mg) = 2721.92 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 3347.2 (mg) - TARE 337.6 (mg) = 3009.6 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 330 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 79060.5 (mg) - TARE 79059.2 (mg)

-BLANK ((.001 mg/ml) (330 ml initial

- 31 ml CONDENSED = 299 ml) = .30 mg) = .97|1.0 mg.

V. PARTICULATE FROM 120 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 78432.2 (mg) - TARE 78431.0 (mg)

-BLANK ((.001 mg/ml) (120 ml) = .12 mg) = 1.08 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 5933.60 mg.

BLANKS

ACETONE = 0.3 mg/300 ml = 0.001 mg/ml FINAL _____ mg. TARE _____ mg.

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

WATER = 0.2 mg/200 ml = 0.001 mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMP INLET RUN NO. TWO

EVALUATION DATE 10/3/73 CLEAN-UP SET NO. 27

I. EVAPORATION OF 325 (ml) OF ACETONE

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

FINAL 81442.4 (mg) - TARE 79011.2 (mg)

-BLANK ((.001 mg/ml) (325 ml) = .32 mg) = 2430.88 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 484.5 (mg) - TARE 301.2 (mg) = 183.3 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 260 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 79839.1 (mg) - TARE 79836.8 (mg)

-BLANK ((.001 mg/ml) (260 ml initial

- 013 ml CONDENSED = 260-247 ml) = .25 .26 mg) = 2.045 mg.

V. PARTICULATE FROM 140 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 79149.7 (mg) - TARE 79147.6 (mg)

-BLANK ((.001 mg/ml) (140 ml) = .14 mg) = 1.96 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 2618.18 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____mg. TARE _____mg.

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

WATER = _____ mg/_____ml = _____mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMP INLET RUN NO. THREE

EVALUATION DATE 10/4/73 CLEAN-UP SET NO. 22

I. EVAPORATION OF 320 (ml) OF ACETONE

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

FINAL 81006.4 (mg) - TARE 79052.1 (mg)

-BLANK ((.001 mg/ml) (320 ml) = .32 mg) = 1953.98 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 1877.4 (mg) - TARE 332.3 (mg) = 1545.1 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 290 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 78808.3 (mg) - TARE 78806.8 (mg)

-BLANK ((.001 mg/ml) (290 ml initial

- 013 ml CONDENSED = ~~290~~ 277 ml) = .28 mg) = 1.22 mg.

V. PARTICULATE FROM 120 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 79363.2 (mg) - TARE 79360.2 (mg)

-BLANK ((.001 mg/ml) (120 ml) = .12 mg) = 2.88 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 3503.18 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____mg. TARE _____mg.

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

WATER = _____mg/_____ml = _____mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMP OUTLET RUN NO. 1

EVALUATION DATE 10/2/73 CLEAN-UP SET NO. 26

I. EVAPORATION OF 240 (ml) OF ACETONE

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

FINAL 79128.7 (mg) - TARE 79122.5 (mg)

-BLANK ((.001 mg/ml) (240 ml) = .24 mg) = 5.96 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 339.2 (mg) - TARE 339.2 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 450 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 66411.0 (mg) - TARE 66407.0 (mg)

-BLANK ((.001 mg/ml) (450 ml initial

- 025 ml CONDENSED = ~~450~~ 425 ml) = .43 mg) = 3.57 mg.

V. PARTICULATE FROM 110 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 79824.5 (mg) - TARE 79823.8 (mg)

-BLANK ((.001 mg/ml) (110 ml) = .11 mg) = .59 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = ~~40~~ 10.12 mg.

BLANKS

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

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

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

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMP OUTLET RUN NO. 2

EVALUATION DATE 10/3/73 CLEAN-UP SET NO. 28

I. EVAPORATION OF 220 (ml) OF ACETONE

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

FINAL 78748.5 (mg) - TARE 78744.0 (mg)

-BLANK ((.001 mg/ml) (220 ml) = .22 mg) = 4.28 mg.

II. FILTER CATCH MSA 1106 EK (Media Type)

FINAL 328.2 (mg) - TARE 329.4 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 360 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 79426.7 (mg) - TARE 79422.7 (mg)

-BLANK ((.001 mg/ml) (360 ml initial

- 24 ml CONDENSED = ~~360~~ 336 ml) = ~~36~~ .134 mg) = ~~3.64~~ 3.66 mg.

V. PARTICULATE FROM 140 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 79077.9 (mg) - TARE 79077.0 (mg)

-BLANK ((.001 mg/ml) (140 ml) = .14 mg) = 0.76 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 8-68 5.72 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____mg. TARE _____ mg.

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

WATER = _____mg/_____ml = _____mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGIL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION CARDUMF- OUTLET RUN NO. 3

EVALUATION DATE 10/4/73 CLEAN-UP SET NO. 18

I. EVAPORATION OF 190 (ml) OF ACETONE

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

FINAL 78515.8 (mg) - TARE 78512.0 (mg)

-BLANK ((.001 mg/ml) (190 ml) = .19 mg) = 3.61 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 331.5 (mg) - TARE 332.0 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 290 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 64391.0 (mg) - TARE 64390.0 (mg)

-BLANK ((.001 mg/ml) (290 ml initial

- 025 ml CONDENSED = ~~290~~ 265 ml) = ~~.29~~ .27 mg) = 0.73 mg.

V. PARTICULATE FROM 110 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 77262.3 (mg) - TARE 77261.7 (mg)

-BLANK ((.001 mg/ml) (110 ml) = .11 mg) = 0.60 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = ~~4.92~~ 4.95 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____ mg. TARE _____ mg.

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

WATER = _____ mg/_____ml = _____mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION SHIPLOAD - INLET RUN NO. 1

EVALUATION DATE 10/5/73 CLEAN-UP SET NO. 23

I. EVAPORATION OF 210 (ml) OF ACETONE

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

FINAL 96255.0 (mg) - TARE 66328.8 (mg)

-BLANK ((.001 mg/ml) (210 ml) = .21 mg) = 29925.99 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 485.7 (mg) - TARE 330.2 (mg) = 155.5 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 250 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 63078.6 (mg) - TARE 63078.2 (mg)

-BLANK ((.001 mg/ml) (250 ml initial - 9/11 ml CONDENSED = ~~250~~ 239 ml) = .24 mg) = ~~0.15~~ 0.16 mg.

V. PARTICULATE FROM 120 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 67336.4 (mg) - TARE 67334.6 (mg)

-BLANK ((.001 mg/ml) (120 ml) = .12 mg) = 1.68 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 30063.32 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____mg. TARE _____mg.

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

WATER = _____mg/_____ml = _____mg/ml. FINAL _____ mg. TARE _____ mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION SHIPLOAD INLET RUN NO. 2

EVALUATION DATE 10/6/73 CLEAN-UP SET NO. 20

I. EVAPORATION OF 260 (ml) OF ACETONE

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

FINAL 100567.1 (mg) - TARE 79345.2 (mg)

-BLANK ((.001 mg/ml) (260 ml) = .26 mg) = 21221.64 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 660.6 (mg) - TARE 330.0 (mg) = 330.6 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 230 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 66711.3 (mg) - TARE 66708.6 (mg)

-BLANK ((.001 mg/ml) (230 ml initial

- 17 ml CONDENSED = ~~230~~ 213 ml) = ~~.23~~ .21 mg) = 2.47 mg.

V. PARTICULATE FROM 110 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 66920.5 (mg) - TARE 66918.5 (mg)

-BLANK ((.001 mg/ml) (110 ml) = .11 mg) = 1.89 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 21556.6 mg.

BLANKS

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

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

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

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION SHIPLOAD - OUTLET RUN NO. 1

EVALUATION DATE 10/5/73 CLEAN-UP SET NO. 19

I. EVAPORATION OF 380 (ml) OF ACETONE

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

FINAL 65160.6 (mg) - TARE 65150.3 (mg)

-BLANK ((.001 mg/ml) (380 ml) = .38 mg) = 9.92 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 327.4 (mg) - TARE 328.4 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 210 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 76724.7 (mg) - TARE 76722.9 (mg)

-BLANK ((.001 mg/ml) (210 ml initial - 021 ml CONDENSED = ~~210~~ 189 ml) = ~~21~~ .19 mg) = ~~1.59~~ 1.61 mg.

V. PARTICULATE FROM 110 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 64884.7 (mg) - TARE 64884.0 (mg)

-BLANK ((.001 mg/ml) (110 ml) = .11 mg) = 0.59 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 12.1 mg.

BLANKS

ACETONE = _____ mg/_____ml = _____mg/ml FINAL _____mg. TARE _____mg.

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

WATER = _____mg/_____ml = _____mg/ml. FINAL _____mg. TARE _____mg.

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION SHIPLOAD - OUTLET RUN NO. 2

EVALUATION DATE 10/5/73 CLEAN-UP SET NO. 24

I. EVAPORATION OF 270 (ml) OF ACETONE

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

FINAL 76922.0 (mg) - TARE 76912.7 (mg)

-BLANK ((.001 mg/ml) (270 ml) = .27 mg) = 9.03 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 358.0 (mg) - TARE 358.4 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 260 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 81635.0 (mg) - TARE 81633.4 (mg)

-BLANK ((.001 mg/ml) (260 ml initial

- 031 ml CONDENSED = ~~260~~ 229 ml) = ~~.26~~ .23 mg) = ~~1.34~~ 1.37 mg.

V. PARTICULATE FROM 140 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 78268.0 (mg) - TARE 78267.3 (mg)

-BLANK ((.001 mg/ml) (140 ml) = .14 mg) = 0.56 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = ~~10.93~~ 10.96 mg.

BLANKS

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

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

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

VFT/AP9 A

VALENTINE, FISHER & TOMLINSON
LABORATORY ANALYSIS AND TOTAL PARTICULATE SHEET

CLIENT EPA AT CARGILL DATE OF ANALYSIS 10/12-16/73

EVALUATION LOCATION SHIPLOAD OUTLET RUN NO. 3

EVALUATION DATE 10/6/73 CLEAN-UP SET NO. 12

I. EVAPORATION OF 150 (ml) OF ACETONE

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

FINAL 79548.9 (mg) - TARE 79545.5 (mg)

-BLANK ((.001 mg/ml) (150 ml) = .15 mg) = 3.25 mg.

II. FILTER CATCH MSA 1106 BH (Media Type)

FINAL 351.7 (mg) - TARE 352.3 (mg) = 0 mg.

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

FINAL _____ (mg) - TARE _____ (mg)

-BLANK (_____ mg) = N/A mg.

IV. PARTICULATE FROM EVAPORATION OF 320 (ml) WATER IN IMPINGER AND BUBBLERS FOLLOWING EXTRACTION -

FINAL 78543.6 (mg) - TARE 78540.0 (mg)

-BLANK ((.001 mg/ml) (320 ml initial

- 311 ml CONDENSED = ~~320~~ 309 ml) = ~~.32~~ .31 mg) = 3.28 mg.

V. PARTICULATE FROM 120 (ml) OF ACETONE RINSE OF IMPINGER, BUBBLERS, AND CONNECTORS AFTER FILTER:

FINAL 78815.3 (mg) - TARE 78813.2 (mg)

-BLANK ((.001 mg/ml) (120 ml) = .12 mg) = 1.98 mg.

VI. TOTAL PARTICULATE = I + II + III + IV + V = 8.51 mg.

BLANKS

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

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

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

VFT/AP9 A

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE 10/2/73

SAMPLING LOCATION INLET - Car Dump

SAMPLE TYPE PARTICULATE

RUN NUMBER 1

SAMPLE BOX NUMBER YELLOW

CLEAN-UP MAN BERI ; #25

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 25B — 2921.92 mg

FILTER NUMBER 69 — 337.6 mg — CONTAINER 25A — 3009.60 mg

FRONT HALF SUBTOTAL 5931.52 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 25C — 0.97 1.00 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 25D — 1.08 mg

BACK HALF SUBTOTAL 2.08 mg

TOTAL WEIGHT 5933.60 mg

MOISTURE

	FINAL, gm	TARE, gm
BUBBLER	430.5	445.7
IMPINGER	471.6	471.3
BUBBLER	336.8	329.7

IMPINGERS

FINAL VOLUME 1238.9 ml mg

INITIAL VOLUME 1246.7 ml mg

NET VOLUME −7.8 ml

SILICA GEL

FINAL WEIGHT	714.2 g	____ g	____ g
INITIAL WEIGHT	675.5 g	____ g	____ g
NET WEIGHT	38.7 g	____ g	____ g

TOTAL MOISTURE 30.9 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE 10/3/73

SAMPLING LOCATION INLET - Car Dump

SAMPLE TYPE PARTICULATE

RUN NUMBER 2

SAMPLE BOX NUMBER GREEN

CLEAN-UP MAN BERI #27

COMMENTS:

FRONT HALF

			LABORATORY RESULTS
ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER		CONTAINER 27B	2430.88 mg
FILTER NUMBER	18 — 301.2 mg	CONTAINER 27A	183.3 mg
		FRONT HALF SUBTOTAL	2674.18 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER	CONTAINER 27C	2.045 mg
	ETHER-CHLOROFORM EXTRACTION	N/A mg
ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER	CONTAINER 27D	1.96 mg
	BACK HALF SUBTOTAL	4.00 mg
	TOTAL WEIGHT	2618.18 mg

MOISTURE

IMPINGERS

			FINAL gm	TARE gm
FINAL VOLUME	1299 ml	BUBBLER	453.0	469.7
INITIAL VOLUME	1313 ml	IMPINGER	506.7	511.6
NET VOLUME	-14.0 ml	BUBBLER	339.3	331.7

SILICA GEL

FINAL WEIGHT	742.7 g	____ g	____ g
INITIAL WEIGHT	715.6 g	____ g	____ g
NET WEIGHT	27.1 g	____ g	____ g

TOTAL MOISTURE 13.1 g

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ANALYTICAL DATA

PLANT _____

DATE Oct 5th, 1973

SAMPLING LOCATION Cardump Inlet

SAMPLE TYPE _____

RUN NUMBER 3

SAMPLE BOX NUMBER RED BOX

CLEAN-UP MAN BERI ; #22

COMMENTS:

FRONT HALF

LABORATORY RESU

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 22B — 1953.98

FILTER NUMBER 77 — 332.3 mg — CONTAINER 22A — 1545.10

FRONT HALF SUBTOTAL 3499.08

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 22C — ~~121~~ 1.27

ETHER-CHLOROFORM EXTRACTION

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 22D — 2.88

BACK HALF SUBTOTAL ~~4.09~~ 4.10

TOTAL WEIGHT 3503.17

MOISTURE

IMPINGERS

FINAL VOLUME	1223.2	ml
INITIAL VOLUME	1240.1	ml
NET VOLUME	- 16.9	ml

	FINAL, mg	TARE, mg
BUBBLER	432.1	449.4
IMPINGER	461.4	462.1
BUBBLER	329.7	328.6

SILICA GEL

FINAL WEIGHT	747.7 g	_____ g	_____ g
INITIAL WEIGHT	717.5 g	_____ g	_____ g
NET WEIGHT	30.2 g	_____ g	_____ g

TOTAL MOISTURE 13.3

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE 10-2-73

SAMPLING LOCATION OUTLET CARDWP

SAMPLE TYPE PARTICULATE

RUN NUMBER 1

SAMPLE BOX NUMBER BLACK BOX

CLEAN-UP MAN BERI ; #26

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 26 B — 5.96 mg

FILTER NUMBER 71 339.2 mg — CONTAINER 26 A — 0 mg

FRONT HALF SUBTOTAL 5.96 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 26 C — 3.557 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 26 D — 0.59 mg

BACK HALF SUBTOTAL 4.146 mg

TOTAL WEIGHT 10.12 mg

MOISTURE

	FINAL GM	TARE GM
BUBBLER	412.1	436.3
IMPINGER	482.9	476.3
BUBBLER	494.9	493.7

IMPINGERS

FINAL VOLUME 1389.9 ml

INITIAL VOLUME 1406.3 ml

NET VOLUME -16.4 ml

SILICA GEL

FINAL WEIGHT	692.4 g	____ g	____ g
INITIAL WEIGHT	650.7 g	____ g	____ g
NET WEIGHT	41.7 g	____ g	____ g

TOTAL MOISTURE 25.3 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE 10/5/73

SAMPLING LOCATION CAR DUMP

SAMPLE TYPE PARTICULATE

RUN NUMBER #2 OUTLET

SAMPLE BOX NUMBER RED BOX

CLEAN-UP MAN GEPI & #28

COMMENTS:

FRONT HALF

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

FILTER NUMBER 75 — 329.4 mg

LABORATORY RESULTS

CONTAINER 28B — 4.28 mg

CONTAINER 28A — 0 mg

FRONT HALF SUBTOTAL 4.28 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 28C — 3.6 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

CONTAINER 28D — 0.76 mg

BACK HALF SUBTOTAL 4.40 mg

TOTAL WEIGHT 8.68 ~~8.68~~ 8.70 mg

MOISTURE

IMPINGERS

FINAL VOLUME	1214.5	ml
INITIAL VOLUME	1231.6	ml
NET VOLUME	17.1	ml

	FINAL, gm	TARE, gm
BUBBLER	438.8	461.4
IMPINGER	454.5	450.8
BUBBLER	321.2	319.4

SILICA GEL

FINAL WEIGHT	736.0 g	____ g	____ g	
INITIAL WEIGHT	695.0 g	____ g	____ g	
NET WEIGHT	41.0 g	____ g	____ g	

TOTAL MOISTURE 23.9

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4/72

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE 10-4-73

SAMPLING LOCATION CARDUMP - OUTLET

SAMPLE TYPE PARTICULATE

RUN NUMBER 3

SAMPLE BOX NUMBER BLACK

CLEAN-UP MAN BERI; #18

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 18B — 3.61 mg

FILTER NUMBER 76 — 332.0 mg — CONTAINER 18A — 0 mg

FRONT HALF SUBTOTAL 3.61 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 18C — 0.713 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 18D — 0.60 mg

BACK HALF SUBTOTAL 1.313 mg

TOTAL WEIGHT 4.925 mg

MOISTURE

	1ST	2ND	3RD
IMPINGERS FINAL VOLUME	396.7 ml	432.3	358.1
IMPINGERS INITIAL VOLUME	425.8 ml	430.4	356.1
IMPINGERS NET VOLUME	ml		
SILICA GEL FINAL WEIGHT	733.9 g	g	g
SILICA GEL INITIAL WEIGHT	683.7 g	g	g
SILICA GEL NET WEIGHT	g	g	g

TOTAL MOISTURE 25.0 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT _____

DATE _____

SAMPLING LOCATION Inlet-Shipload

SAMPLE TYPE _____

RUN NUMBER 1

SAMPLE BOX NUMBER Yellow

CLEAN-UP MAN BERI ; # 23

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 23B — 29925.99 mg

FILTER NUMBER 79 — 330.2 mg — CONTAINER 23A — 155.5 mg

FRONT HALF SUBTOTAL 30061.49 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 23C — ~~0.15~~ 0.16 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 23D — 1.68 mg

BACK HALF SUBTOTAL ~~183~~ 1.84 mg

TOTAL WEIGHT 30063.323 mg

MOISTURE

IMPINGERS

FINAL VOLUME 1181.8 ml

INITIAL VOLUME 1182.3 ml

NET VOLUME - 0.5 ml

	FINAL, GM	TARE, GM	
BUBBLER	423.2	427.8	4.6
IMPINGER	438.2	436.0	2.2
BUBBLER	320.4	318.5	1.9
			8.7

SILICA GEL

FINAL WEIGHT	726.1 g	_____ g	_____ g
INITIAL WEIGHT	714.7 g	_____ g	_____ g
NET WEIGHT	11.4 g	_____ g	_____ g

TOTAL MOISTURE 10.9 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL-SEATTLE

DATE 10/6/73

SAMPLING LOCATION INLET - SHIPLOAD

SAMPLE TYPE PARTICULATE

RUN NUMBER 2

SAMPLE BOX NUMBER BLUE

CLEAN-UP MAN BERI ; #20

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 20 B — 21221.64 mg

FILTER NUMBER 80 330.0 — CONTAINER 20 A — 330.60 mg

FRONT HALF SUBTOTAL 21552.24 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 20 C — 2.47 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 20 D — 1.89 mg

BACK HALF SUBTOTAL 4.36 mg

TOTAL WEIGHT 21556.60 mg

MOISTURE

IMPINGERS

		BUBBLER	FINAL, gm	TARE, gm
FINAL VOLUME	ml		458.8	465.3
INITIAL VOLUME	ml	IMPINGER	446.7	445.2
NET VOLUME	4.7 ml	BUBBLER	329.9	329.6
			1235.4	1240.1

SILICA GEL

FINAL WEIGHT	700.3 g	g	g
INITIAL WEIGHT	679.1 g	g	g
NET WEIGHT	21.2 g	g	g

TOTAL MOISTURE 16.5 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL - SEATTLE

DATE

SAMPLING LOCATION Shipload Outlet

SAMPLE TYPE PARTICULATE - ~~#3~~ Run 1

RUN NUMBER ~~#~~ 1

SAMPLE BOX NUMBER GREEN BOX

CLEAN-UP MAN BERI, #19

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 198 — 9.92 mg

FILTER NUMBER 78 — 328.4mg — CONTAINER 19A — 0 mg

FRONT HALF SUBTOTAL 9.92 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 19C — 1.61 + .59 mg

ETHER-CHLOROFORM EXTRACTION — ~~N/A~~ mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 19D — 0.59 mg

BACK HALF SUBTOTAL ~~2.18~~ 2.20 mg

TOTAL WEIGHT 12.102 mg

MOISTURE

IMPINGERS

FINAL VOLUME	1208.1 ml		
INITIAL VOLUME	1230.9 ml		
NET VOLUME	-22.8 ml		

	FINAL mg	TARE mg
BUB.	412.7	442.5
IMP.	457.9	456.0
BUB.	337.5	332.4

SILICA GEL

FINAL WEIGHT	786.6 g	g	g
INITIAL WEIGHT	742.7 g	g	g
NET WEIGHT	43.9 g	g	g

TOTAL MOISTURE 21.1 g

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4/72

ANALYTICAL DATA

PLANT _____

DATE _____

SAMPLING LOCATION Shipload Outlet

SAMPLE TYPE _____

RUN NUMBER 2

SAMPLE BOX NUMBER RED BOX

CLEAN-UP MAN BERI; #24

COMMENTS:

FRONT HALF

LABORATORY RESULTS

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

CONTAINER 24B 9.03 mg

FILTER NUMBER 81 358.4

CONTAINER 24A 0 mg

FRONT HALF SUBTOTAL 9.03 mg

BACK HALF

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

CONTAINER 24C 1.37 mg

ETHER-CHLOROFORM EXTRACTION N/A mg

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

CONTAINER 24D 0.56 mg

BACK HALF SUBTOTAL 1.93 mg

TOTAL WEIGHT 10.96 mg

MOISTURE

	FINAL, gm	TARE, gm
BUBBLER	437.2	453.3
IMPINGER	437.5	426.9
BUBBLER	330.0	327.1

IMPINGERS

FINAL VOLUME 1204.7 ml

INITIAL VOLUME 1207.3 ml

NET VOLUME -2.6 ml

SILICA GEL

FINAL WEIGHT	781.5 g	_____ g	_____ g
INITIAL WEIGHT	747.7 g	_____ g	_____ g
NET WEIGHT	33.8 g	_____ g	_____ g

TOTAL MOISTURE 31.2 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT CARGILL-SEATTLE

DATE 10/8/73

SAMPLING LOCATION SHIPLOAD OUTLET

SAMPLE TYPE PARTICULATE

RUN NUMBER 3

SAMPLE BOX NUMBER YELLOW

CLEAN-UP MAN BERI; #12

COMMENTS:

FRONT HALF

LABORATORY RESULTS

ACETONE WASH OF NOZZLE, PROBE, CYCLONE (BYPASS), FLASK, FRONT HALF OF FILTER HOLDER — CONTAINER 12B — 3.25 mg

FILTER NUMBER 82 — 352.3 mg — CONTAINER 12A — 0 mg

FRONT HALF SUBTOTAL 3.25 mg

BACK HALF

IMPINGER CONTENTS AND WATER WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 12C — 3.289 mg

ETHER-CHLOROFORM EXTRACTION — N/A mg

ACETONE WASH OF IMPINGERS, CONNECTORS, AND BACK HALF OF FILTER HOLDER — CONTAINER 12D — 1.98 mg

BACK HALF SUBTOTAL 5.267 mg

TOTAL WEIGHT 8.512 mg

MOISTURE

IMPINGERS

FINAL VOLUME	ml
INITIAL VOLUME	ml
NET VOLUME	-3.4 ml

	FINAL, gm	TARE, gm
BUBBLER	463.0	468.1
IMPINGER	450.7	449.5
BUBBLER	319.5	319.0
	1233.2	1236.6

SILICA GEL

FINAL WEIGHT	740.2 g	g	g
INITIAL WEIGHT	726.1 g	g	g
NET WEIGHT	14.1 g	g	g

TOTAL MOISTURE 10.7 g

EPA (Dur) 231
4/72

ANALYTICAL DATA

PLANT _____

DATE _____

SAMPLING LOCATION _____

SAMPLE TYPE _____

RUN NUMBER _____

SAMPLE BOX NUMBER _____

CLEAN-UP MAN _____

COMMENTS:

FRONT HALF

LABORATORY RESULTS

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

FILTER NUMBER _____ _____ — 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 _____ g

Impactor

MOISTURE

527.8 FINAL #1 — CLEAN-UP REP # 21

IMPINGERS

FINAL VOLUME	_____ ml	423.1	#2
INITIAL VOLUME	_____ ml	329.5	#3
NET VOLUME	_____ ml		

SILICA GEL

FINAL WEIGHT	679.1 g	_____ g	_____ g
INITIAL WEIGHT	_____ g	_____ g	_____ g
NET WEIGHT	_____ g	_____ g	_____ g

TOTAL MOISTURE _____

EPA (Dur) 231
4/72

APPENDIX E

Process Data

1	E/W			
Inlet	S/DNS	1.0	1,000,000	
			4,234,030	3,200,[illegible]
2	DNS	1.0	2,[illegible],000	
Inlet	DNS	1.0	755,000	
			2,905,[illegible]	2,210,[illegible]

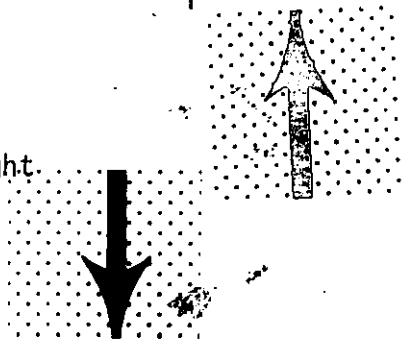
Process Data

Boxcar Receiving

Test Run No.	No. Car	Grain	Ave. Test Weight lb/bu	Ave. % Moisture	Ave. % Dockage	Weight Received lb	Process Weight Rate lb/hr
Outlet							
1	24	Wheat	60	11	1.0	3,007,020	1,120,000
2	22	Wheat	60	11	1.0	3,035,700	1,130,000
3	22	Wheat	60	11	1.0	2,657,540	1,000,000
Average							1,080,000
Inlet							
1	20	Wheat	60	11	1.0	2,496,300	1,250,000
2	10	Wheat	60	11	1.0	1,257,500	1,180,000
3	8	Wheat	60	11	1.0	957,960	900,000
Average							1,110,000

Ship Loading

Test Run No.	Grain and Grade	Percent Dockage	Weight Loaded lb	Process Weight Rate lb/hr
1	2 WW	0.5	2,434,000	
Outlet	2 DNS	1.0	3,200,000	
	2 DNS	1.0	2,430,000	
			8,064,000	3,000,000
2	2 WW	0.5	2,800,000	
Outlet	DNS	1.0	3,400,000	
	DNS	1.0	2,744,000	
			8,944,000	3,450,000
1	2 WW	0.5	2,434,000	
Inlet	2 DNS	1.0	1,830,000	
			4,264,000	3,200,000
2	DNS	1.0	2,200,000	
Inlet	DNS	1.0	745,000	
			2,945,000	2,210,000



Outlet Avg. = 3,225,000 lb/hr

Inlet Avg. = 2,705,000 lb/hr

APPENDIX F

Sampling and Analytical Procedures

PARTICLE SIZING PROCEDURE

The Brinks Cascade Impactor consists of five stages, each of which contains a collection cup and a nozzle jet. Particles suspended in the sample gas pass through the jet and are impacted on the disk. The amount of particles collected on each disk is a function of the gas velocity through the jet, the particle characteristics, and the amount of sample drawn.

Under operational vacuum of 4 to 8 inches of mercury, the impactor allows flow rates of 2700 to 3700 cc per minute. Normally, 40 to 80% of the particulate is collected in one stage. Sample time is limited by re-entrainment from this stage. A 25 to 50 mg. sample could be collected on one cup without re-entrainment. Maximum sample time should be determined by a trial run, and sample flow rates should be adjusted to allow maximum collection be the 3rd stage of the impactor. Sample times should allow for sufficient collection on other stages as well.

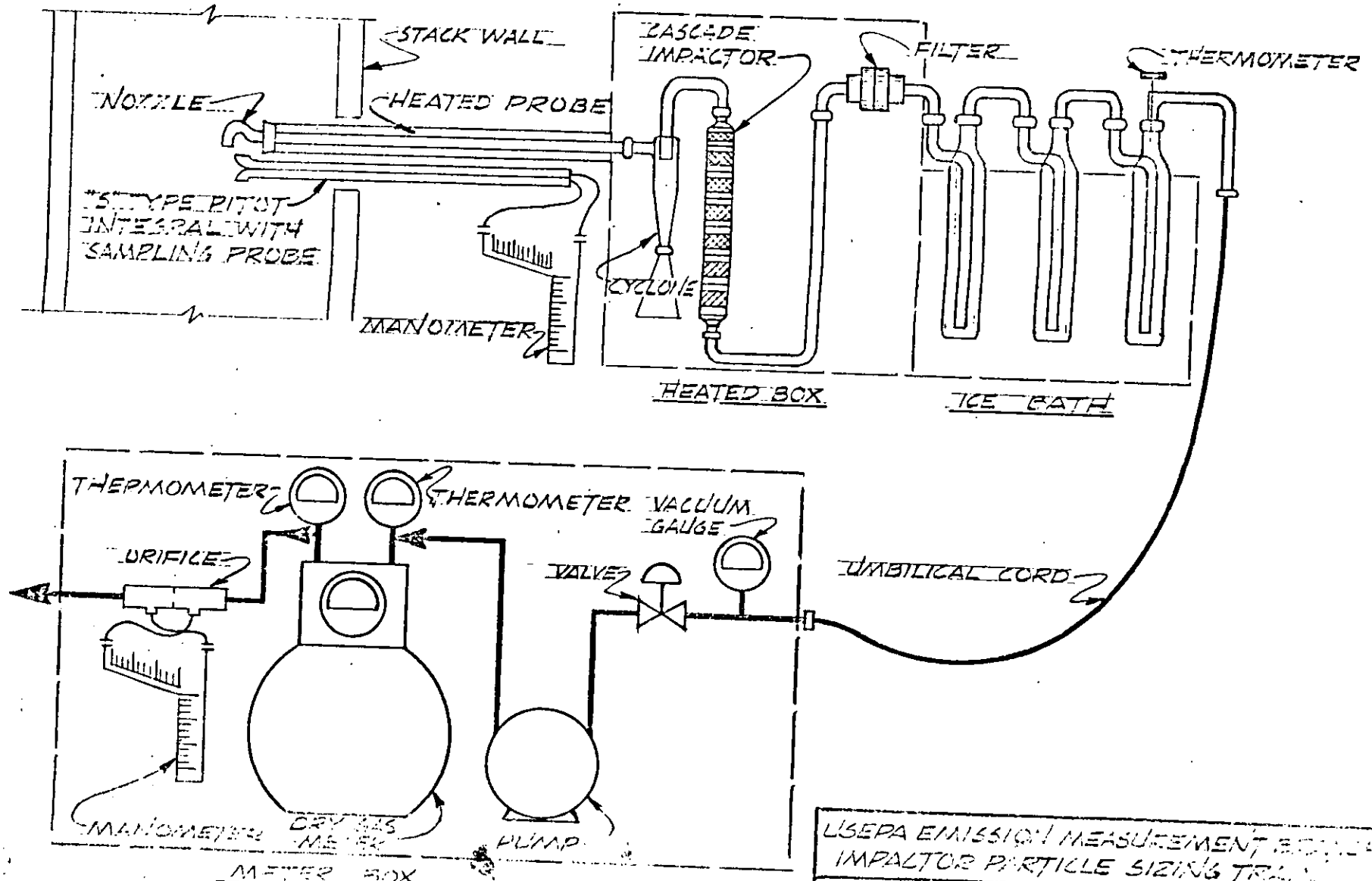
The sampling train is set up as in the drawing with the exception of the cyclone and receiver. Sample flow rates are such that the cyclone has little collection efficiency. If extremely dirty samples are taken, with an excess of a very large particles, the cyclone could be used to remove these particles.

Nozzle tip dia. is essentially the only means of providing for iso-kinetic sampling. The sample flow rate is fixed by the pressure drop across the impactor (pressure drop is determined by the 3rd impactor stage, and its requirements for maximum collection). With the normally small flow rates, a small nozzle tip is necessary to prevent under iso-kinetic sampling (unrepresentative large particle capture).

The sample train is leak tested under 8 inch mercury vacuum. Again, it should be noted that the sample flow rate is low, and that any leak at all will have significant effect upon the accuracy of the results.

Prior to the test the particle sizing train is vacuum tested for leaks. Then the probe and the sample box are heated to above 250 degrees F. The sample probe is inserted in the process stream and gas flow through the impactor is started and held constant until the end of the test.

After each test, the sample cups are removed from the impactor with tweezers. The quantity collected on each cup is determined by weighing to the nearest 0.1 mg. Similarly, the quantity of material collected on the filter is determined. The nozzle, probe and pre-filter connections are rinsed with reagent grade acetone. The acetone rinse is evaporated to dryness and the weight of residue determined to the nearest 0.1 mg.



USEPA EMISSION MEASUREMENT SECTION
IMPACTOR PARTICLE SIZING TRAIN

DRAWN	VALENTINE, FISHER & TOMLINSON	DWG NO.
CHECKED	CONSULTING ENGINEERS	ES-1
DATE 1-73	520 LLOYD BLDG., SEATTLE	

APPENDIX G

TEST LOG

Monday, October 1, 1973

Set up equipment at car dump in afternoon.

Tuesday, October 2, 1973

8:00 a.m.	Arrived at plant.
10:21 a.m.	Started Run 1 at inlet and outlet of car dump, and particle size at outlet.
10:29 a.m.	Stopped to change cars.
10:54 a.m.	Restarted.
10:59 a.m.	Stopped.
11:13 a.m.	Started outlet and outlet particle size. Power failure at inlet.
11:30 a.m.	Train engine derailed. Stopped test and ate lunch.
2:32 p.m.	Restarted inlet and outlet.
2:41 p.m.	Stopped.
2:46 p.m.	Started.
2:51 p.m.	Stopped.
3:05 p.m.	Started.
3:10 p.m.	Stopped.
3:20 p.m.	Started.
3:24 p.m.	Stopped.
3:34 p.m.	Started.
3:52-3:54 p.m.	Stopped outlet to change ports.
3:59 p.m.	Stopped.
4:14 p.m.	Started.
5:30 p.m.	left plant. Sample pair [illegible]

Tuesday, October 2, 1973 (Con't.)

4:16-4:18 p.m.	Stopped inlet to change ports.
4:31 p.m.	Stopped.
4:41 p.m.	Started.
4:48 p.m.	Stopped. No more car dumping today.
5:00 p.m.	Left plant.

Wednesday, October 3, 1973

7:30 a.m.	Arrived at plant. Car dumping will not begin for several hours.
8:30 a.m.	VFT test crew returned to office.
11:00 a.m.	Left plant. Dumping scheduled for 1:30 p.m.
1:15 p.m.	Setting up to restart.
1:44 p.m.	Restarted.
1:50 p.m.	Stopped.
1:55 p.m.	Started.
2:31 p.m.	Finished Run 1 inlet.
2:43 p.m.	Finished Run 1 outlet.
3:00 p.m.	Started Run 2 inlet and outlet.
3:05 p.m.	Stopped.
3:17 p.m.	Restarted.
3:44-3:46 p.m.	Changed ports at inlet.
3:52 p.m.	Stopped.
4:17 p.m.	Restarted.
4:43 p.m.	Stopped. Run 2 inlet completed.
5:00 p.m.	Left plant. Samples being cleaned up at VFT office.

Wednesday, October 3, 1973 (Con't.)

7:46 p.m.	Restarted Run 2 outlet and particle size.
7:58-8:01 p.m.	Changed ports.
8:58 p.m.	Stopped.
9:19 p.m.	Started.
9:44 p.m.	Finished Run 2 outlet and outlet particle size.
10:00 p.m.	Left plant.

Thursday, October 4, 1973

8:00 a.m.	Arrived at plant. Set up to run Run 3 and inlet particle size.
10:19 a.m.	Started Run 3 inlet and outlet.
10:21 a.m.	Stopped.
10:30 a.m.	Restarted.
10:52 a.m.	Stopped.
11:05 a.m.	Restarted.
11:11 a.m.	Stopped. Ate lunch.
1:55 p.m.	Set up some equipment at shiploading. No dumping taking place yet.
2:53 p.m.	Restarted cardump tests and started inlet particle size.
3:05 p.m.	Stopped. Particle size complete.
4:45 p.m.	Setting up at shipload.
5:15 p.m.	Left plant.
11:30 p.m.	Returned to plant to finish car dump.

Friday, October 5, 1973

12:12 a.m.	Restarted Run 3 at inlet and outlet of car dump.
12:25 a.m.	Run 3 inlet complete.
12:43-12:45 a.m.	Changed ports at outlet.
12:47 a.m.	Stopped.
12:58 a.m.	Restarted.
1:35 a.m.	Stopped.
1:40 a.m.	Started.
1:46 a.m.	Stopped. Left plant.
8:00 a.m.	Arrived at plant. Setting up at shipload.
10:05 a.m.	Started Run 1 inlet and outlet at shipload.
10:42 a.m.	Started inlet particle size.
10:57 a.m.	Finished inlet particle size.
11:25 a.m.	Run 1 inlet complete. Stopped for lunch.
1:10 p.m.	Loading restarted. Restarted outlet.
1:12 p.m.	Stopped.
1:14 p.m.	Restarted.
1:35 p.m.	Started particle size at outlet.
2:18 p.m.	Finished Run 1 outlet. Switched meter boxes at inlet and outlet to get better pump at inlet. Stack velocity is too high to use 1/4" nozzle with other pump.
3:15 p.m.	Started Run 2 outlet at shipload. Could not start Run 2 inlet because two men left to finish Run 3 outlet at car dump on short notice.
3:21 p.m.	Restarted Run 3 outlet at car dump.

Friday, October 5, 1973 (Con't.)

4:18 p.m.	Finished Run 3 outlet at car dump.
4:39 p.m.	Stopped Run 2 outlet and particle size at outlet. Ship loading stopped.
5:05 p.m.	Left plant.

Saturday, October 6, 1973

8:00 a.m.	Arrived at plant.
8:30 a.m.	Restarted outlet and outlet particle size.
8:50 a.m.	Started Run 2 inlet.
9:16 a.m.	Stopped inlet. Pitot plugged.
9:23 a.m.	Restarted inlet.
9:40 a.m.	Stopped tests.
9:52 a.m.	Restarted.
10:02 a.m.	Run 2 outlet and outlet particle size complete. Started Run 3 outlet.
10:16 a.m.	Run 2 inlet complete.
11:41 a.m.	Loading stopped. Ate lunch.
1:57 p.m.	Restarted Run 3 outlet and started Run 3 inlet.
2:00 p.m.	Loading stopped for day. Also, inlet probe plugged. Remainder of testing cancelled.

APPENDIX H

TEST PARTICIPANTS

Valentine, Fisher, and Tomlinson

Wes Snowden - Test Team Leader
Mike Dick - Technician
Pete Brousseau - Technician
Jens Vic - Technician
Pete Beri, Ph.D. - Chemist

Environmental Protection Agency

Roger Pfaff - Project Test Officer
Ken Woodard - Project Engineer