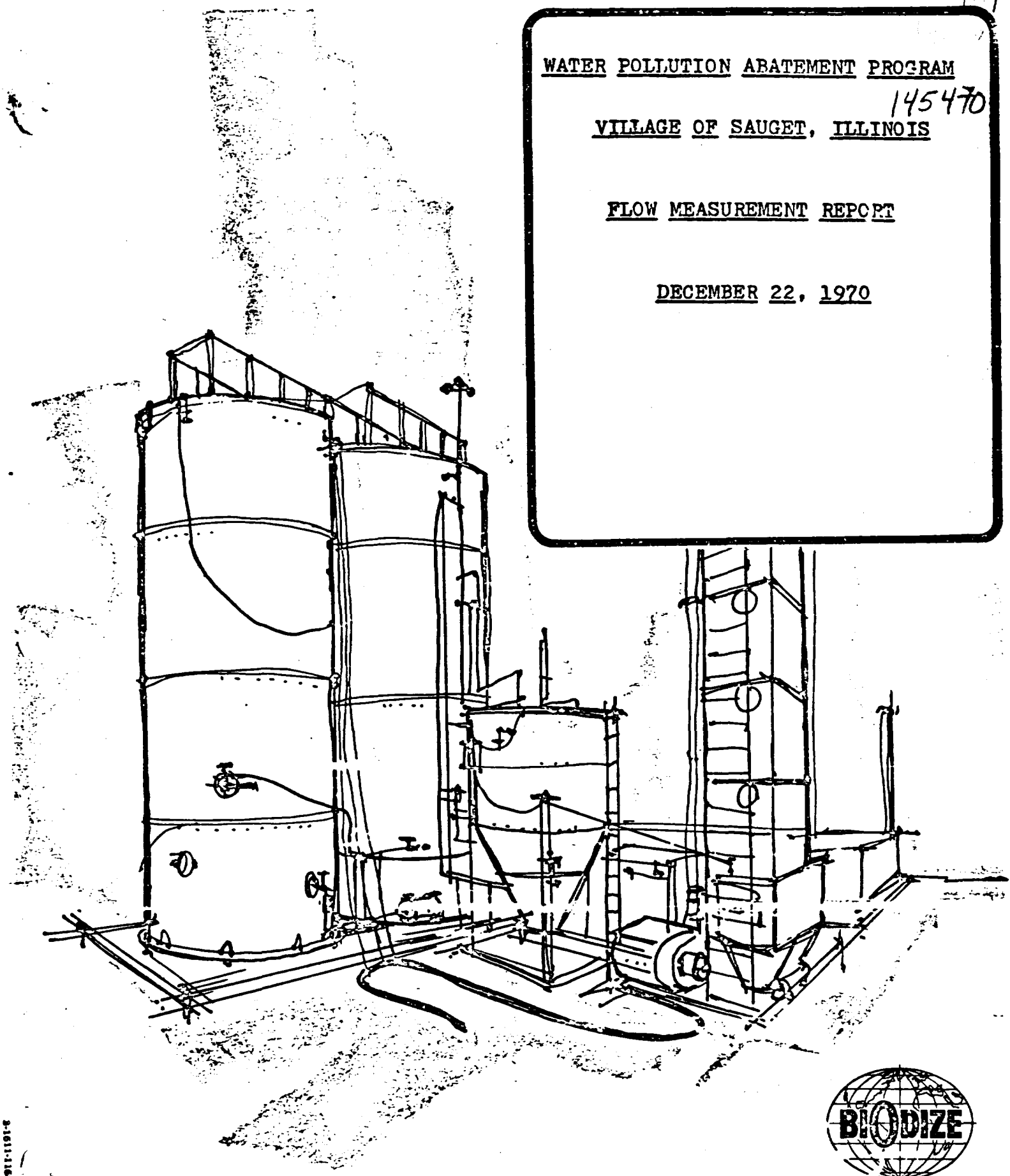
WATER POLLUTION ABATEMENT PROGRAM

145470

VILLAGE OF SAUGET, ILLINOIS

FLOW MEASUREMENT REPORT

DECEMBER 22, 1970



BIODIZE

Monsanto

BIODIZE SYSTEMS, INC.

VS0541

Monsanto

Monsanto Biodize Systems Inc.
510 Northern Boulevard
Great Neck, New York 11021
Phone: (516) 466-55[illegible]

December 22, 1970

Village of Sauget Board of Trustees
2897 Monsanto Avenue
Sauget, Illinois 62206

Attn: The Honorable Paul Sauget
President of Board of Trustees

Gentlemen:

In accordance with the agreement between the Village of Sauget and Monsanto Biodize Systems, Inc., we submit herewith a report of the results of our flow measurement work.

Very truly yours,

Jerry L. Jones

Jerry L. Jones
Prototype Plants Supervisor

JLJ:rs

BIODIZE
Monsanto
BIODIZE SYSTEMS INC.

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WATER POLLUTION ABATEMENT PROGRAM

VILLAGE OF SAUGET, ILLINOIS

DECEMBER 22, 1970

Prepared by: Jerry L. Jones

Jerry L. Jones
Prototype Plants Supervisor

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OBJECTIVES

The objectives of this study were to:

(1) measure the volume of water being discharged by the individual industries and the residential areas of the Village of Sauget, Illinois.

(2) measure the level of the suspended matter in the waste water discharges of the contributing industries and residential areas.

(3) present a revised rate schedule for distributing the operating costs for the Village of Sauget Treatment Plant among contributing industries and the Village of Sauget.

(4) gather proportionate to flow samples for general analytical characterization. The results of these tests are to be presented in reports of treatability work and overall waste characterization.

RESULTS AND CONCLUSIONS

The basis for the distribution of operating costs for the Village of Sauget Treatment Plant has been specified as the amount of the contribution of waste water and suspended matter to the facility. Mobil Oil Company's waste contribution has become very insignificant since their shutdown during the first part of October, 1970. Cerro Copper and Brass Company's waste flow contribution has increased significantly from 5.58% of the total to 10.48% of the total. All other flow proportions remained at nearly the same level.

The changes in the measured amounts of suspended matter being discharged were quite significant compared with those found in previous studies. Monsanto's discharges increased 55.4% over the previous level or from 12,000 lbs. per day to 18,657 lbs. per day. Midwest Rubber's discharges decreased from 10,000 lbs. per day to 2,250 lbs. per day or 77.5%. Cerro Copper and Brass's contribution increased from 1,600 lbs. per day to 5,280 lbs. per day or a 2.3 fold increase. The total lbs. per day of solids handled by the treatment plant, however, has increased by only 7%. A distribution of 68.5% of the operating cost to the flow contribution and 31.5% of the cost to the solids contribution has been used for proportioning the operating costs of the primary facility.

RESULTS AND CONCLUSIONS (Continued)

The following summary table shows the previous distributions and the revised distributions resulting from the Monsanto Biodize Systems' study.

SUMMARY

VILLAGE OF SAUGET PRIMARY TREATMENT PLANT

DISTRIBUTION OF OPERATION COSTS

Contributor	Revised Equalized Avg. Flow MGD	Revised Distrib. % of Flow	Previous Distrib. % of Flow	Revised Equal.Sus. Solids (lbs/day)	Revised Distrib. % of Sol.	Previous Distrib. % of Solids	Revised Distrib.of Treatment % Costs	Previous Distrib. % of Costs
American Zinc Company	4.33	18.154	21.23	2,160	7.660	9.50	14.848	15.60
Cerro Copper & Brass Co.	2.50	10.480	5.58	5,122	18.166	15.24	12.901	5.42
Mobil Oil Company	0.014	0.058	5.89	7	0.025	14.41	0.048	9.99
Monsanto Company	14.80	62.047	61.14	18,657	66.168	43.57	63.385	52.70
Midwest Rubber Reclaiming	2.08	8.720	5.87	1,845	6.543	27.19	8.034	16.10
Sterling Steel Casting Co.	0.072	0.303	0.29	75	0.268	0.09	0.292	0.19
Village of Sauget*	0.042	0.178	0	330	1.170	-	0.532	-
	23.836	100.000	100.000	28,196	100.000	100.000	100.000	100.000

*Includes Rogers Cartage Company Waste Discharges

PROCEDURE FOR FLOW DETERMINATION

The basic plan for the measurement of the flows from the individual industries and residential areas within the Village of Sauget was outlined in the Monsanto Biodize Systems Proposal dated July 31, 1970.

Preliminary work was done within each plant to determine the order of magnitude of the various water discharges. Fluorescein dye was used as a tracer to check sewer maps and observe distance required for adequate mixing. Good mixing is of the utmost importance for obtaining reliable results from salt dilution flow measuring techniques. Velocity measurements, pump operating times at lift stations, and in process inspections were used to determine the necessary salt injection rates for the various sewers.

The injection and sample stations have been shown in Figure 1. A tabulation of all the sample and injection stations as well as a description of the flow sources of these points has been included in Appendix IV, pages 65-67.

The program was planned so that all discharges along the North Trunk Sewer would be measured during the period from September 16, 1970, thru September 23, 1970, and those discharges to the South and West Trunk sewers during the period from September 25, 1970, thru October 1, 1970. A shut-down at the American Zinc Company during the flow determination study conducted on September 21, prevented

completion of the North Trunk work during the designated time period. A subsequent shutdown at the Midwest Rubber Company prevented the scheduled completion of the flow measurement work on the West Trunk sewer. This work was completed during the period from December 5, 1970, to December 11, 1970.

FLOW MEASUREMENT RESULTS

NORTH TRUNK SEWER

All data for the North Trunk Sewers has been shown in Appendix I. The flow from the Mobil Oil Refinery was determined from measurements at sample stations N-1 and N-7 before the refinery shutdown and was approximately 1.6 MGD. After the refinery shut-down a spot check indicated that the total waste flow will be less than 10 gpm. Mr. H. Kilabrew of Mobil informed us that none of their deep wells will be used and that the only waste water will come from the sanitary sewer system and steam blowdown. The Sanitary Development and Research Association should be informed of any changes in the water discharge rate due to changes in operation or plant equipment cleaning.

Sample stations N-2, 3, 4, and 5 provided flow data for the discharges from the North Area of the Monsanto Plant while the two discharges from the Main Plant area to the North Trunk Sewer were measured at sample stations N-7 and N-8. The results are shown in Appendix I, pages 17-38, and Appendix IV, pages 65-67.

The sum of the flows measured at sample stations N-1, 2, 3, 4, and 5 should equal the combined flow measured at station N-6 after the American Zinc Company shutdown during the afternoon of September 21, 1970. The flows, however, do not balance and this may either be attributed to continued use of some water by American

NORTH TRUNK SEWER (continued)

Zinc Company or unusually high discharges from the two sewers flowing into the North Trunk sewer from Monsanto's Main Plant area.

The results of the flow determination work for the American Zinc Company have been shown in Appendix I, pages 39-43, and Appendix IV, pages 65-67.

SOUTH TRUNK SEWER

All data for the South Trunk Sewer has been shown in Appendix II. Sterling Steel Casting Company's only use of well water is for air conditioning units. The marked drop in the water being discharged from their plant at sample station S-1 may be attributed to the shutdown of the air conditioning units during the evening of September 25, 1970. (Note Appendix II, Figure II-1, page 46.

The Village of Sauget residential area discharges plus Sterling Steel Casting Company and the Rogers Cartage Company discharges, were measured at sample station S-2.

The volume of water from Cerro Copper and Brass Company which flows into the outlet of Dead Creek was measured at sample station S-4. (Note Appendix II, Pages 50 - 52.

From the flows measured at sample stations S-2, 3, 4, and 5, a flow balance for the 24 inch South Trunk Sewer

SOUTH TRUNK SEWER (continued)

could be made and the flows distributed among the contributing sources. (Note Appendix II, pages 44-55 and Appendix IV, pages 65-67.

WEST TRUNK SEWER

Sample stations S-7 and S-8 for Cerro Copper and Brass are for discharges to the West Trunk Sewer. Flowsfrom Midwest Rubber were measured at sample stations W-1 and W-2. (Note Appendix III and Appendix IV, pages 58-64.

SUMMARY OF CONTRIBUTIONS

The calculations for the proportioning of flows between the Village of Sauget and the various industries has been shown in Appendix IV, pages 68-69.

If there are any consistent major flucuations during a normal working week, the waste water discharges from the various contributors must be equalized over a 7 day period.

No such flucuations occur for the following contributors:

(a) American Zinc Company

(b) Mobil Oil Company

(c) Monsanto Company

(d) Sterling Steel Casting Company

(e) Village of Sauget

Cerro Copper and Brass Company does not cast copper on approximately 50% of the Saturdays during the year and 100% of the Sundays. This would decrease the water discharge

by about 250 gpm which is normally used for makeup water to the quench tanks. This decrease in water usage is approximately 14% for 21% of the year.

$$\text{Equalized Flow} = (0.79)(\text{Avg Flow}) + (0.21)(0.86)(\text{Avg. Flow})$$

$$\text{Equalized Flow} = (0.79 + 0.18)(\text{Avg Flow})$$

$$\text{Equalized Flow} = (0.97)(\text{Avg Flow})$$

Midwest Rubber Company has partial production on Saturdays and no production on Sundays. The water discharges on Saturdays are approximately 75% of normal usage.

$$\text{Equalized Flow} = (0.75)(\text{Avg Flow})(1/7)+(5/7)(\text{AvgFlow})$$

$$\text{Equalized Flow} = \{(0.105) + (0.715)\}\ \text{Avg Flow}$$

$$\text{Equalized Flow} = (0.82)\ (\text{Avg Flow})$$

The flow distribution results are listed in Table #1.

TABLE #1

VILLAGE OF SAUGET

WASTE WATER DISTRIBUTION

Contributor	Avg. Flow (gpm)	Equalization Factor	Equalized Avg. Flow (gpm)	Equalized Avg. Flow (MGD)	New Distrib. % of Flow	Old Distrib. % of Flow
American Zinc Company	3,020	1	3,020	4.33	18.154	21.23
Cerro Copper & Brass Co.	1,800	0.97	1,745	2.50	10.480	5.58
Mobil Oil Co.	10	1	10	0.014	0.058	5.89
Monsanto Co.	10,315	1	10,315	14.80	62.047	61.14
Midwest Rubber Co.	1,765	0.82	1,450	2.08	8.720	5.87
Sterling Steel Casting Co.	50	1	50	0.072	0.303	0.29
Village of Sauget	30	1	30	0.042	0.238	0
TOTALS	16,900			23.836	100.000	100.00
	24.4 MGD					

SUSPENDED SOLIDS RESULTS

Flow proportioned samples were composited for the various sample points and the level of suspended matter was measured. Solids contributions were calculated directly or indirectly from material balances. All data and calculations have been shown in Appendix V, pages 70-73.

Results are tabulated in Table #2.

The changes in the measured amounts of suspended matter being discharged were quite significant from those found in previous studies. Monsanto increased 55.4% over the past measured level or from 12,000 lbs/day to 18,657 lbs/day. Midwest Rubber decreased from 10,000 lbs/day to 2,250 lbs/day or 77.5%. Cerro Copper and Brass's contribution increased from 1,600 lbs/day to 5,280 lbs/day or a 2.3 fold increase. American Zinc's solids contribution decreased approximately 20% from 2,600 to 2,160 lbs/day. The total lbs/day of solids handled by the treatment plant, however, has changed by only about 7%.

The 28,196 lbs/day of suspended matter would correspond to an influent concentration of approximately 130 to 140 mg/l. The average value for the concentration of suspended matter we have observed in the influent flow to the treatment plant for the months of November and December of this year has been 240 mg/l. The mean ($\bar{X}$), however, has been approximately 125 mg/l.

SUSPENDED SOLIDS RESULTS (continued)

During the testing period grab samples were taken at Midwest Rubber Company to determine if our automatic - continuous samplers were obtaining a true sample of the waste being discharged. Automatic samplers tend to take a sample which contains a lower amount of suspended matter than actually contained in the waste stream for certain particle size distributions. Grab samples, however, showed lower concentrations than those observed during the continuous sampling program. Midwest's lower solids level can probably be attributed to better control of dumping according to Mr. R. Rhinehart of Midwest Rubber. Special attention should be given to the West Area of the plant in the vicinity of the silos and shredding operations to prevent solid discharges from storm runoff.

Monsanto's increase in solids came from the high solids level in the 30" South Trunk Sewer. Perhaps more data over an extended period of time, which was beyond the scope of this project, will indicate that an abnormal period of operation occurred during this study.

TABLE # 2

SUSPENDED SOLIDS DISTRIBUTION

	Lbs. solids per day	Equalization Factor	Equalized lbs. solids per day	New Distrib. % of Solids	Old Distrib. % of Solids
American Zinc Co.	2,160	1	2,160	7.660	9.50
Cerro Copper & Brass	5,280	0.97	5,122	18.166	5.24
Mobil Oil Company	7	1	7	0.025	14.41
Monsanto Company	18,657	1	18,657	66.168	43.57
Midwest Rubber Co.	2,250	0.82	1,845	6.543	27.19
Sterling Steel Co.	75	1	75	0.268	0.09
Village of Fauget	330	1	330	1.170	-
			28,196	100.000	100.00

DISTRIBUTION OF PRIMARY TREATMENT PLANT OPERATING COSTS

The most equitable basis for distribution of operating costs for the primary treatment facility is by equating costs to the amount of suspended matter, floating scum and flow contributed by each user. Metcalf & Eddy neglected to include floating oil or scum in their estimate and this oil has involved many man hours of labor for skimming from the treatment plant, and caused problems in the drying of the sludge in the sludge lagoons. Now that Mobil Oil Company has ceased operations, however, floating oil is no longer a major problem at the treatment plant.

Metcalf & Eddy estimate the waste quantities and these have been shown in Appendix VI, page 74. The distribution of a given operating cost is all that we are concerned with for the purposes of this report. Metcalf & Eddy's distribution of 68.5% (61.65%) of the cost to flow and 31.5% (38.35%) to suspended matter has been taken as the basis for distributing the costs using the data we have presented. (Note Appendix VI, page 75).

Table 3 shows the new cost distribution for the treatment plant.

TABLE #3

VILLAGE OF SAUGET PRIMARY TREATMENT PLANT

OPERATING COSTS DISTRIBUTION

Contributor	% of Susp.Mtr. lbs/day	% of Trtmt.Costs (SM)	% of Flow	% of Trtmt.Costs (Flow)	Revised Total % of Trtmt.Costs	Previous Total % of Trtmt. Costs (May-Sept)	(Oct-Apr)
American Zinc Company	7.660	2.413	18.154	12.435	14.848	15.60	15.62
Cerro Copper & Brass Co.	18.166	5.722	10.480	7.179	12.901	5.42	5.42
Mobil Oil Co.	0.025	.008	0.058	.040	0.048	9.99	10.00
Monsanto Co.	66.163	20.843	62.047	42.502	63.345	52.70	52.78
Midwest Rubber Reclaiming Co.	6.543	2.061	8.720	5.973	8.034	16.10	16.12
Sterling Steel Casting Co.	0.268	0.084	00.303	0.208	0.292	0.19	0.06
Village of Sauget	1.170	0.369	0.238	0.163	0.532	-	-
					100.000	100.00	100.00

APPENDIX I

VILLAGE OF SAUGET
NORTH TRUNK SEWER
FLOW DATA AND DATA ANALYSIS

Table I-1

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background LiCl Concent.

JOB 225

INJECTION POINT N-A

ANALYZED BY WFS, Jr.

SAMPLER N-1

DATE 10/70

SEWER North Trunk - Mobil Oil
Outfall from Monsanto Dept. 254 is also included.

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 AM			–	–	0.000264	–
1-2 9/21/70			22500	130	"	775
2-3			4230	180	"	200
3-4			36000	186	"	1770
4-5			34000	140	"	1260
5-6			9000	122	"	290
6-7			33000	118	"	1030
7-8			34000	117	"	1050
8-9			6800	119	"	215
9-10			36000	118	"	1120
10-11			34000	108	"	970
11-12			8000	122	"	260
					"	
12-1 PM			34000	141	"	1270
1-2			34000	147	"	1320
2-3			7400	164	"	320
3-4			34000	178	"	1600
4-5			36000	180	"	1710
5-6			33000	180	"	1570
6-7			10400	168	"	460
7-8			32000	143	"	1210
8-9			32000	130	"	1100
9-10			36000	149	"	1420
10-11			33000	190	"	1660
11-12			36000	166	"	1580
12-1 AM 9/22/70			37000	184	"	1800
					"	
					"	
10-11 AM			39000	203	"	1995
11-12			36000	167	"	1590
					"	
12-1 PM			32000	183	"	1410
1-2			32000	170	"	1440
2-3			37000	153	"	1500
3-4			46000	170	"	2075
4-5			–	185	"	–
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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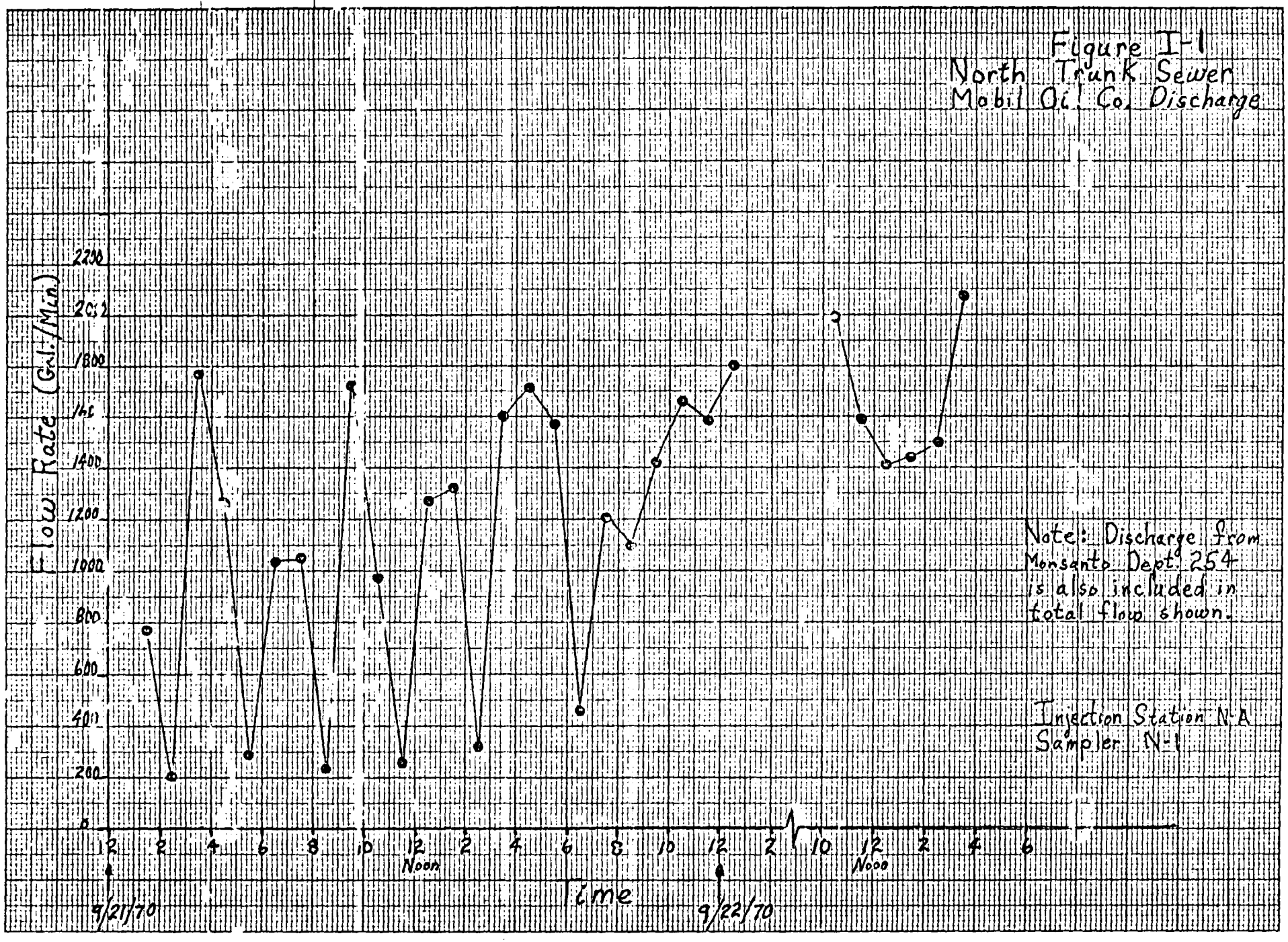

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-2

DEPT North Trunk	CODE	PRODUCT	TEST OF Waste Water Discharge	DATE 12/5/70
PLANT Mobil Oil	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT Sampler- N-1	PERIOD COVERED 9/21 — 9/22/70 Injection Station N-A	DATA ANALYZED BY JLJ
% UNDER SPEC	% OVER SPEC	DISTRIBUTION TYPE		

1	TALLY	2	5	5
X		f	Acc. 2	5 + 4 IN % OVER
2000-2200	I	1	1	[illegible].67
1800-2000	I	1	3	5
1600-1800	IIII	5	9	15
1400-1600	IIII III	8	22	[illegible]6.7
1200-1400	IIII	4	34	[illegible]6.7
1000-1200	III	3	41	[illegible]8.5
800-1000	I	1	45	75
600-800	I	1	47	78.4
400-600	I	1	49	81.7
200-400	IIII	4	54	90
0-200	I	1	59	98.4

UCL	UCL	3 TOTAL	30	UCL
LCL	LCL	4 DOUBLE TOTAL	60	LCL
PROC. CAPABILITY	σ			

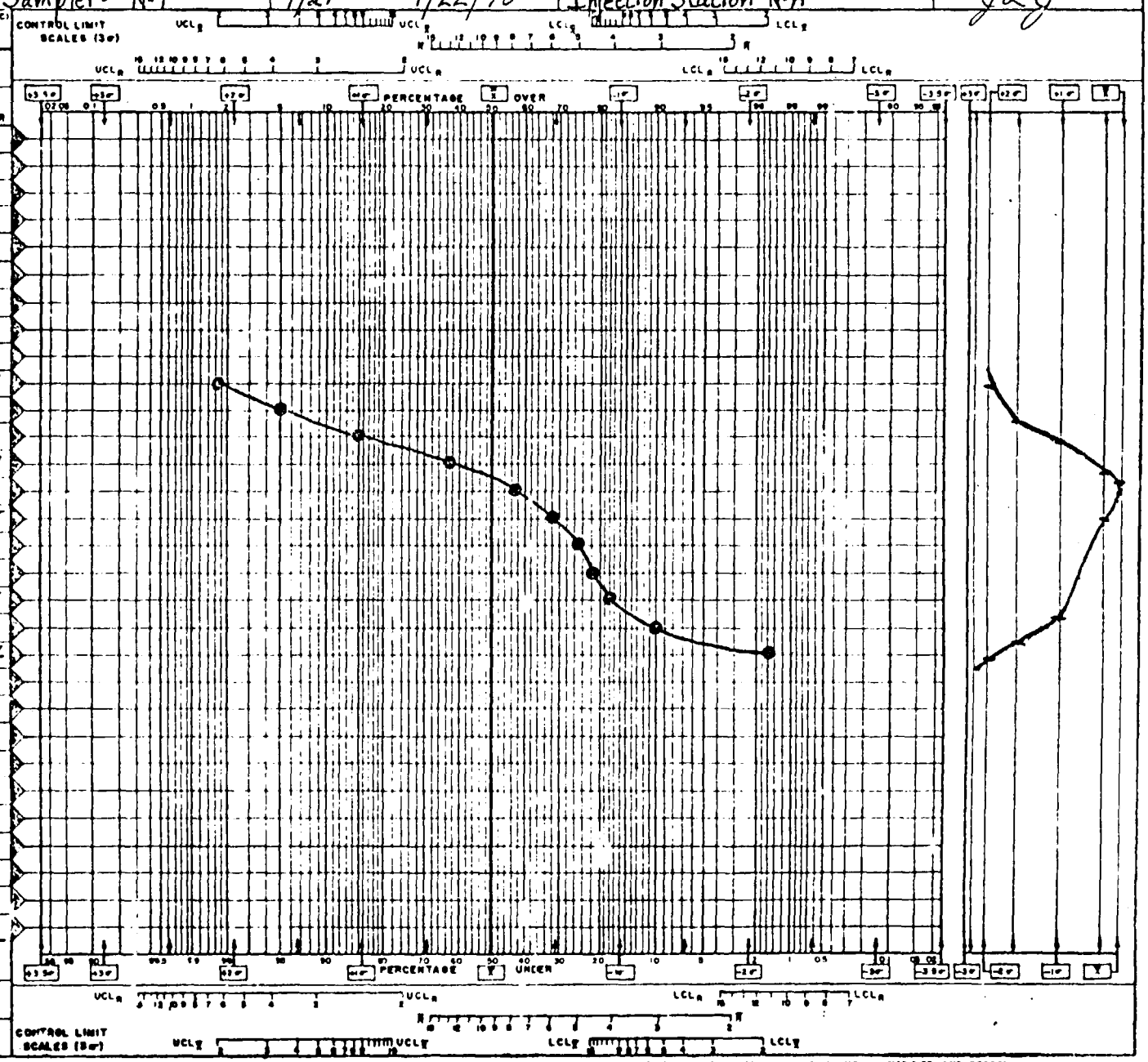

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Table I-2

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background [illegible] Concent

JOB 225

INJECTION POINT N-B

ANALYZED BY WFS, Jr.

SAMPLER N-2

DATE 10/70

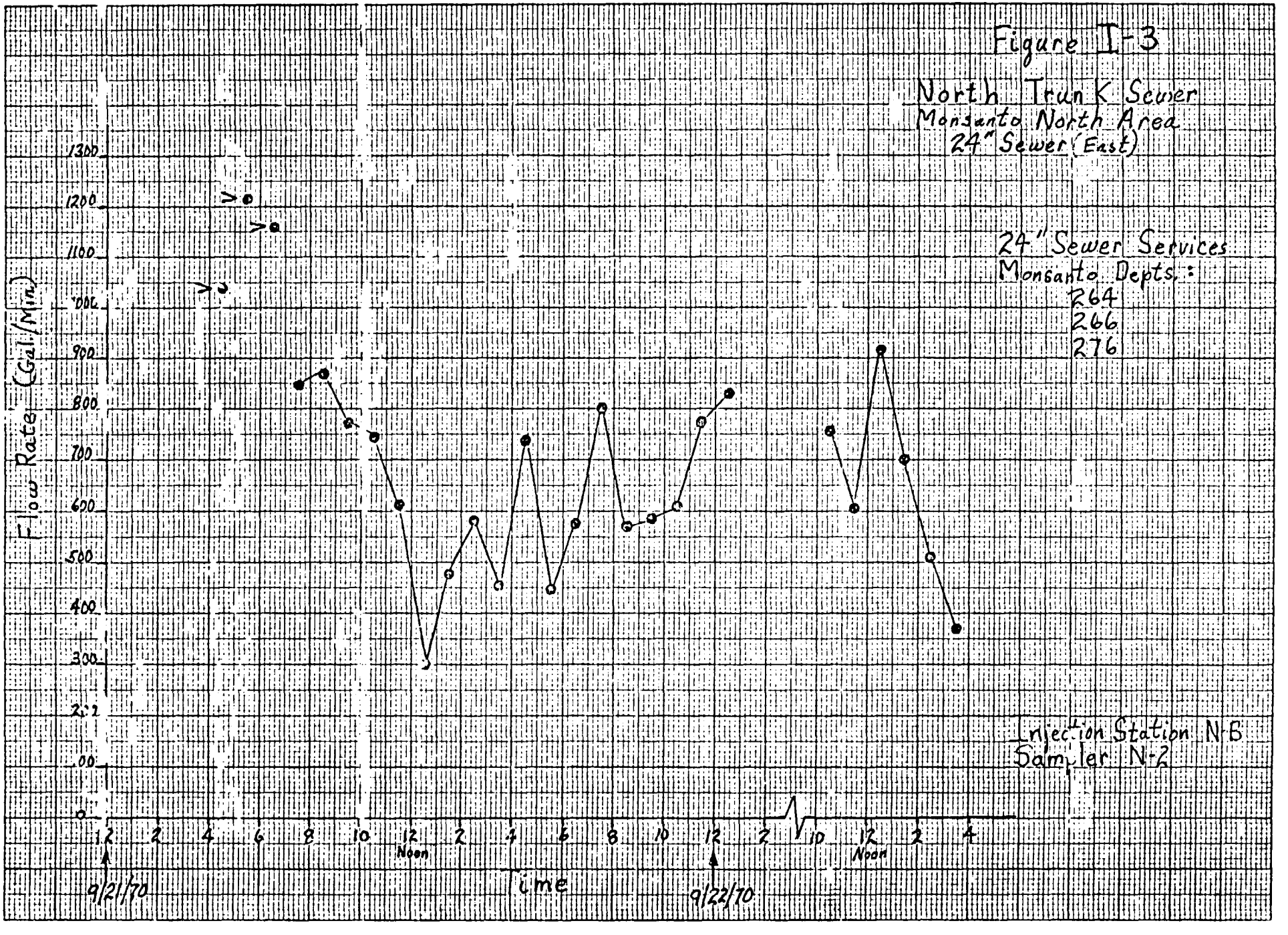
SEWER North Trunk - Monsanto North Area
24" Sewer (East)

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
4-5 AM	—		>100000	55	0.000264	>1040
5-6 9/21/70	—		>100000	46	"	>1215
6-7	—		>100000	44	"	>1160
7-8	—		86250	37	"	845
8-9	—		70000	47	"	870
9-10	—		62000	47	"	770
10-11	—		64000	44	"	745
11-12	—		70000	33	"	610
					"	
12-1 PM	—		49000	23	"	300
1-2	—		62500	29	"	480
2-3	—		58000	38	"	585
3-4	—		57000	30	"	455
4-5	—		67500	41	"	735
5-6	—		54000	31	"	445
6-7	—		53000	41	"	575
7-8	—		60500	50	"	800
8-9	—		45500	47	"	565
9-10	—		47000	47	"	58[illegible]
10-11	—		44500	52	"	610
11-12	—		46500	63	"	[illegible]
					"	
12-1 AM	—		49000	64	"	830
9/22/70	—				"	
10-1	—		52000	55	"	755
[illegible]	—		[illegible]	52		605
	—				"	
12-1	—		72000	48	"	915
1-2	—		78000	34	"	700
2-3	—		62000	31	"	510
3-4	—		78000	18	"	370
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302-9981



Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-4

DEPT: North Trunk	CODE:	PRODUCT: Depts. 264, 266, 276	TEST OF: Waste Water Discharge	DATE: 12/5/70
PLANT: Monsanto	UPPER SPECIFICATION LIMIT: Injection Station N-1	LOWER SPECIFICATION LIMIT: Sampler N-2	PERIOD COVERED: 9/21/70 - 9/22/70	DATA ANALYZED BY: North Area 24" Sewer (East)

% UNDER SPEC | % OVER SPEC | DISTRIBUTION TYPE

X	TALLY	f	Acc. f	% OVER
1200+	I	3	3	5.5
900-1000	I	1	7	13
800-900	III	3	11	20.4
700-800	~~IIII~~ I	6	20	37
600-700	IIII	4	30	55.5
500-600	~~IIII~~	5	39	72.4
400-500	III	3	47	87
300-400	I	1	51	94.5
200-300	I	1	53	98.2
100-200		0	54	100
0-100		0		

UCL$_R$	UCL$_{\bar{X}}$	3 TOTAL	27
LCL$_R$	LCL$_{\bar{X}}$	4 DOUBLE TOTAL	54
PROC. CAPABILITY	σ 225	$\bar{X}$ 700GPM	$\bar{X}$

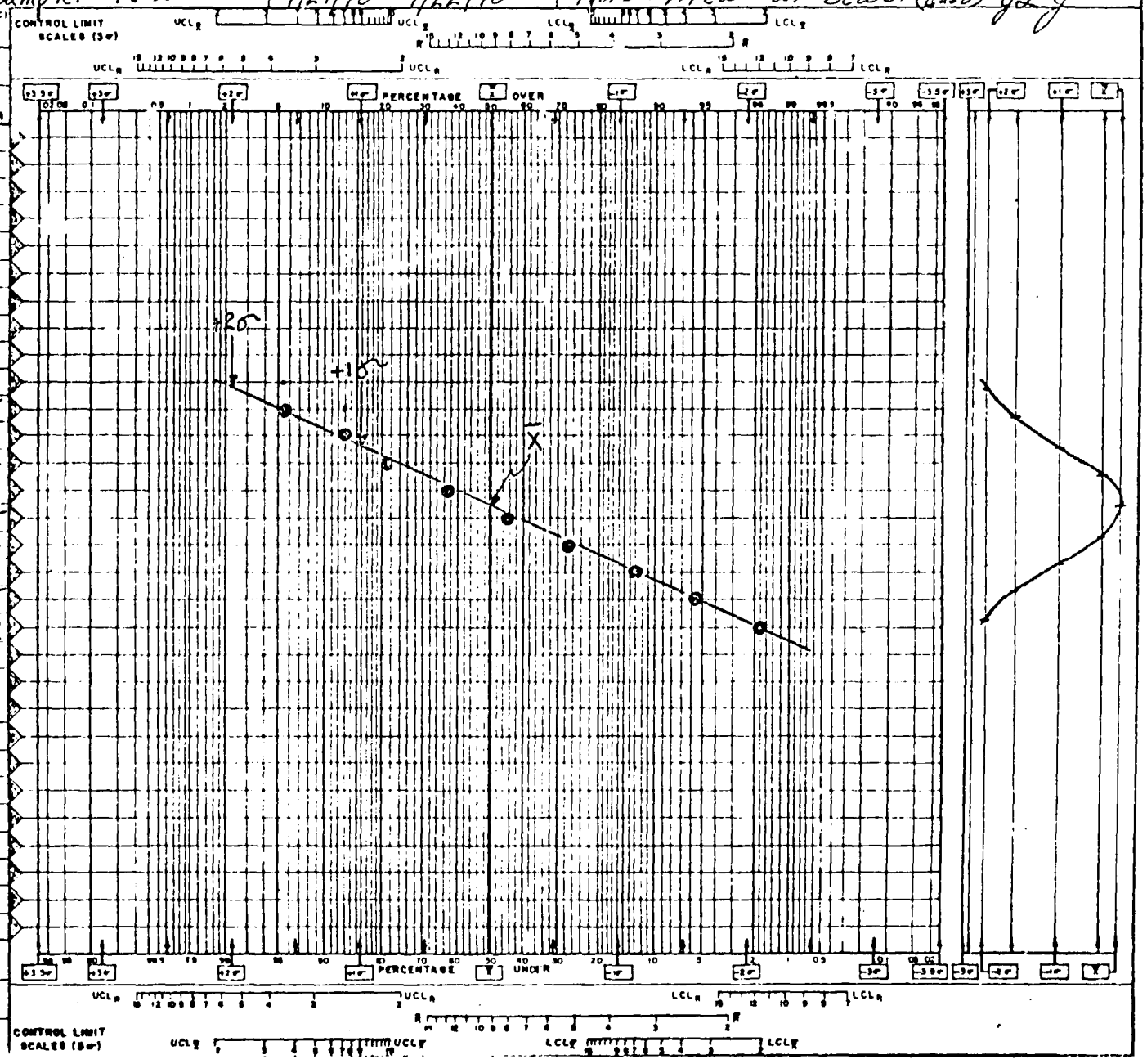


Table I-3

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background of Concent.

JOB 225 INJECTION POINT N-C

ANALYZED BY W.F.S. Jr. SAMPLER N-3

DATE 10/70 SEWER North Trunk, Monsanto North 18" Sew G St. Dept. 268

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 AM					0.000264	
1-2 9/21/70					"	
2-3			10750	35	"	100
3-4			8700	34	"	78
4-5			6100	40	"	65
5-6			5850	43	"	67
6-7			6175	42	"	69
7-8			6100	37	"	60
8-9			—	34	"	—
9-10			—	36	"	—
10-11			—	45	"	—
11-12			—	62	"	—
					"	
12-1 PM			—	44	"	—
1-2			6175	40	"	66
2-3			6600	36	"	63
3-4			6800	39	"	[illegible]
4-5			8800	40	"	94
5-6			7500	35	"	70
6-7	3/1		9500	42	"	26
7-8	3/1		9300	52	"	31
8-9	3/1		8400	49	"	[illegible]
9-10	3/1		6300	36	"	23
10-11	3/1		5850	66	"	24
11-12	3/1		9600	41	"	26
12-1 AM	3/1		9900	41	"	26
9/22/70					"	
10-11			9600	71	"	44
11-12			6600	68	"	29
12-1 PM			6000	64	"	25
1-2			5600	56	"	20
2-3			4900	47	"	15
3-4			[illegible]	38	"	14
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302-9961

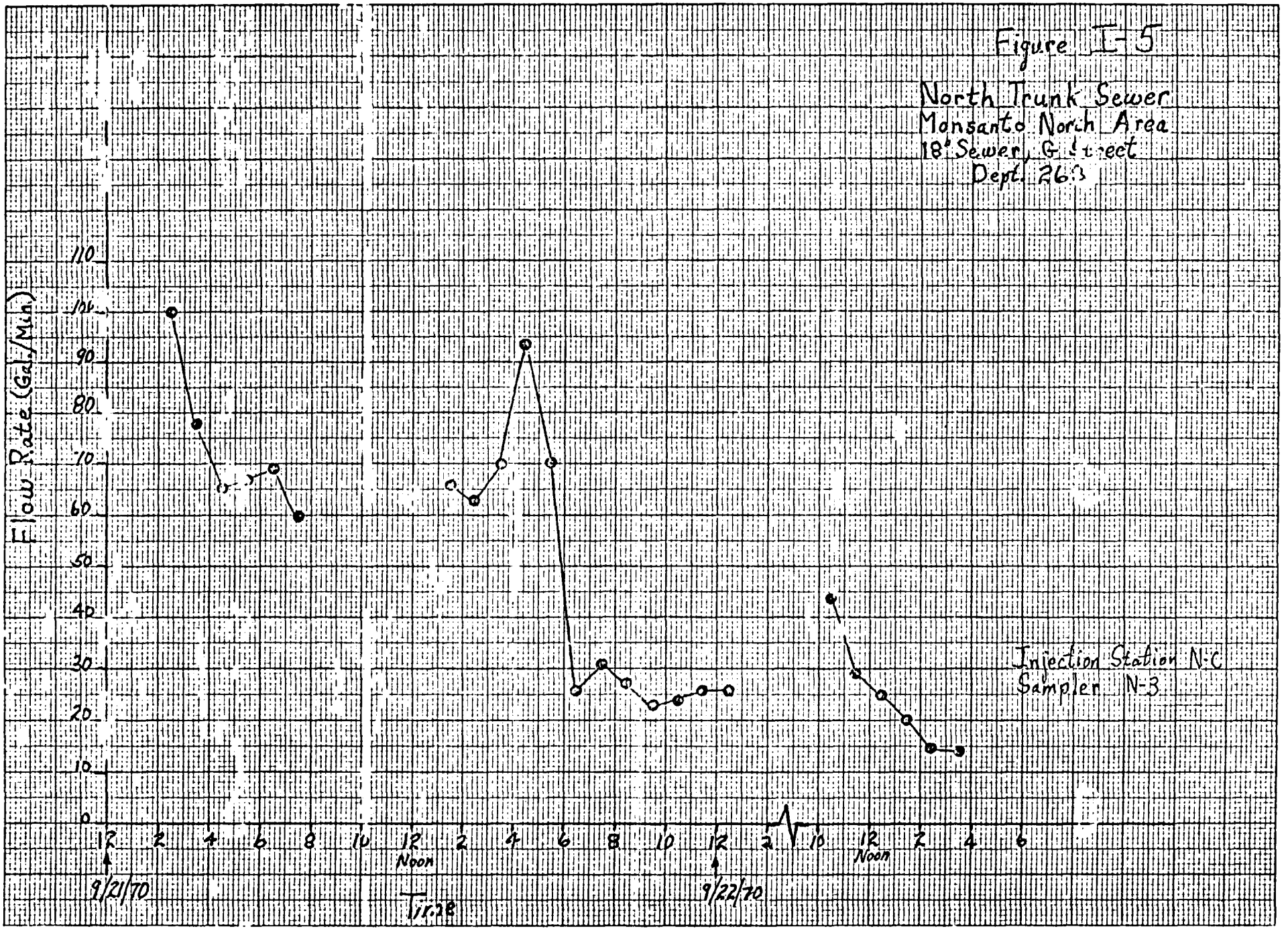


Table I-4

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.

JOB 225 INJECTION POINT N-D

ANALYZED BY WFS, Jr. SAMPLER N-4

DATE 10/70 SEWER North Trunk - Monsanto North 24" Sewer (West) Depts. 258,270

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.)	= Flow** GPM
12-1 AM	—		—	—	0.000264	—
1-2 9/21/70	—		—	—	"	—
2-3	—		34250	58	"	525
3-4	—		29000	60	"	460
4-5	—		31250	59	"	490
5-6	—		30000	57	"	450
6-7	—		30750	56	"	465
7-8	—		31000	54	"	445
8-9	—		32500	50	"	430
9-10	—		35000	52	"	480
10-11	—		33500	56	"	495
11-12	—		34000	58	"	520
					"	
12-1 PM	—		33500	65	"	575
1-2	—		31000	62	"	510
2-3	—		52500	39	"	540
3-4	—		50000	48	"	635
4-5	—		41000	50	"	540
5-6	—		43000	55	"	625
6-7	—		47000	55	"	685
7-8	—		60000	48	"	765
8-9	—		49000	51	"	660
9-10	—		56500	40	"	600
10-11	—		66750	38	"	670
11-12	—		49500	45	"	590
						—
12-1 AM	—		42750	46	"	510
1-2 9/22/70	—		48500	46	"	590
					"	
10-11	—		32500	81	"	695
11-12	—		49500	74	"	970
					"	
12-1 PM	—		37750	67	"	670
1-2	—		35000	84	"	800
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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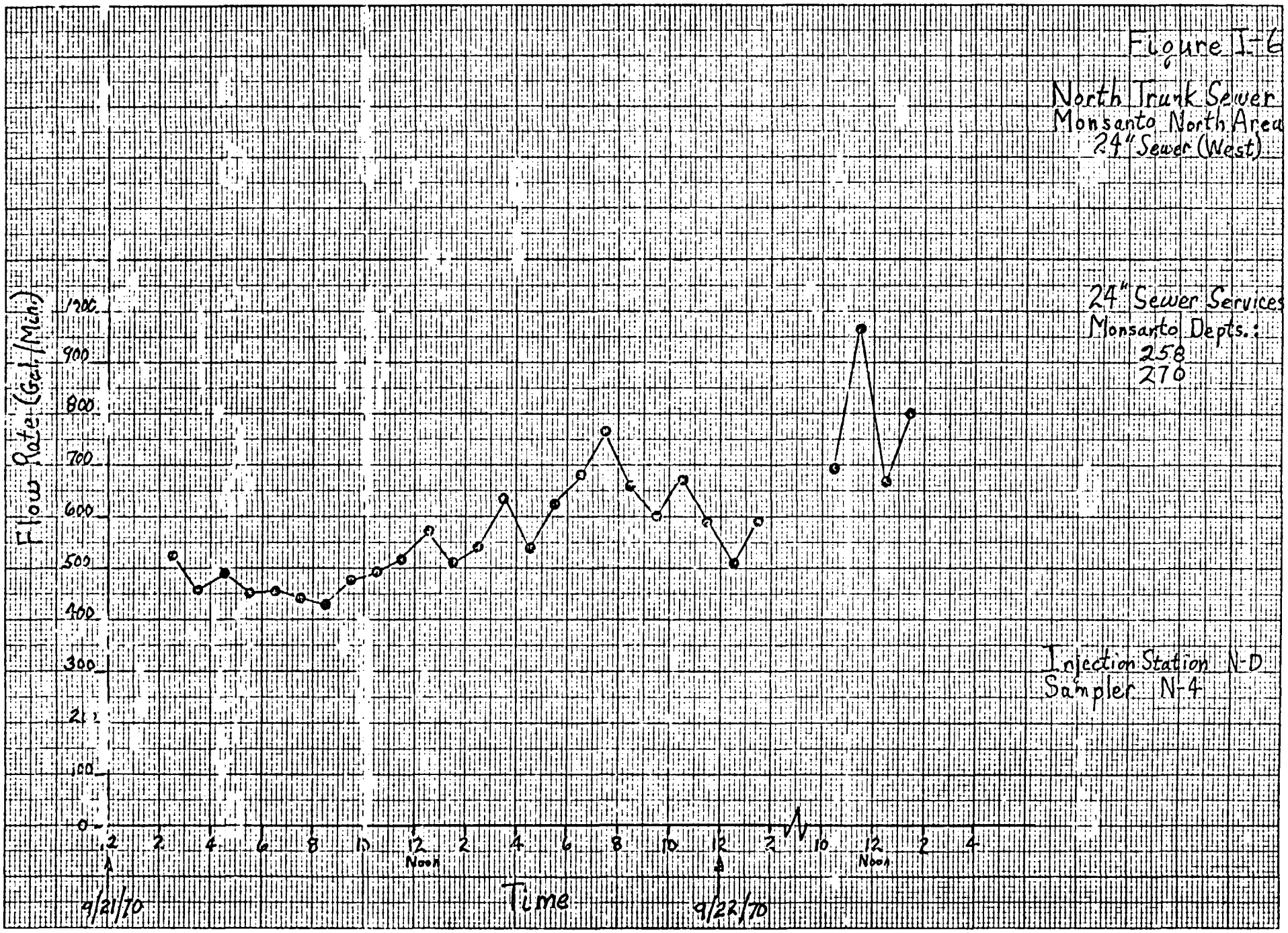


Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-7

DEPT: North Trunk	CODE	PRODUCT: Deots 258, 270	TEST OF: Waste Water Discharge - 24" Sewer (West)
PLANT: Monsanto	UPPER SPECIFICATION LIMIT: Injection Station N-E	LOWER SPECIFICATION LIMIT: Sampler N-4	PERIOD COVERED: 9/21/70 - 9/22/70

DATE: 12/5/70

DATA ANALYZED BY: J.L.J.

% UNDER SPEC | % OVER SPEC | DISTRIBUTION TYPE

1	TALLY	2	5	6
X		1	Acc. 2	5 4 % OVER
900-1000		1	1	1.8
800-900		0	2	3.6
700-800	II	2	4	7.2
600-700	~~IIII~~ II	7	13	23.2
500-600	~~IIII~~ ~~IIII~~	10	30	53.6
400-500	~~IIII~~ III	8	48	85.6
300-400		0	56	100
200-300		0		
100-200		0		
0-100		0		

UCL$_X$	UCL$_R$	3 TOTAL	28	UCL$_R$
LCL$_X$	LCL$_R$	4 DOUBLE TOTAL	56	LCL$_R$
PROC CAPABILITY	σ	X	R	

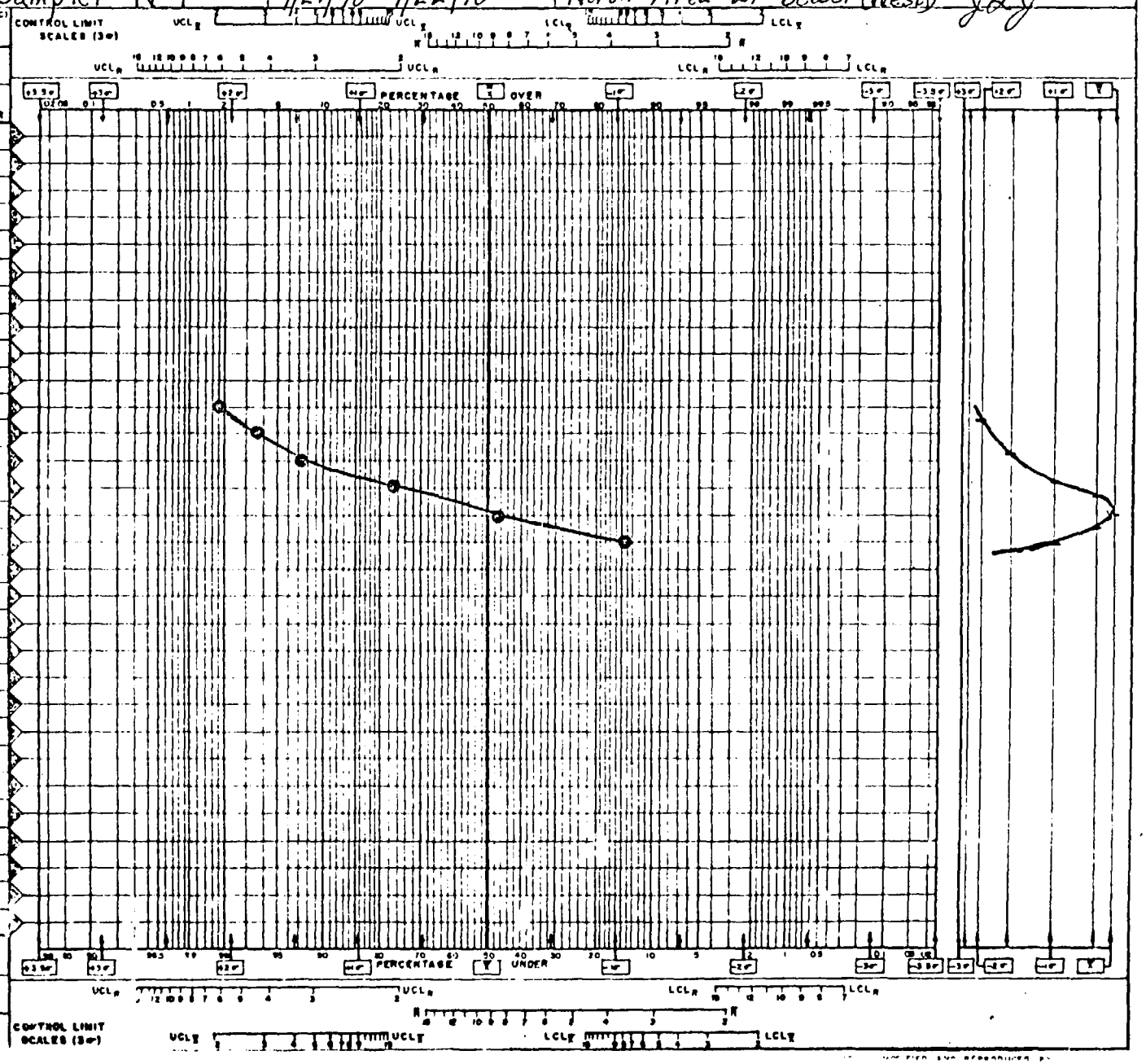


Table I-5

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.)

JOB 225 INJECTION POINT N-E

ANALYZED BY WFS, Jr. SAMPLER N-5

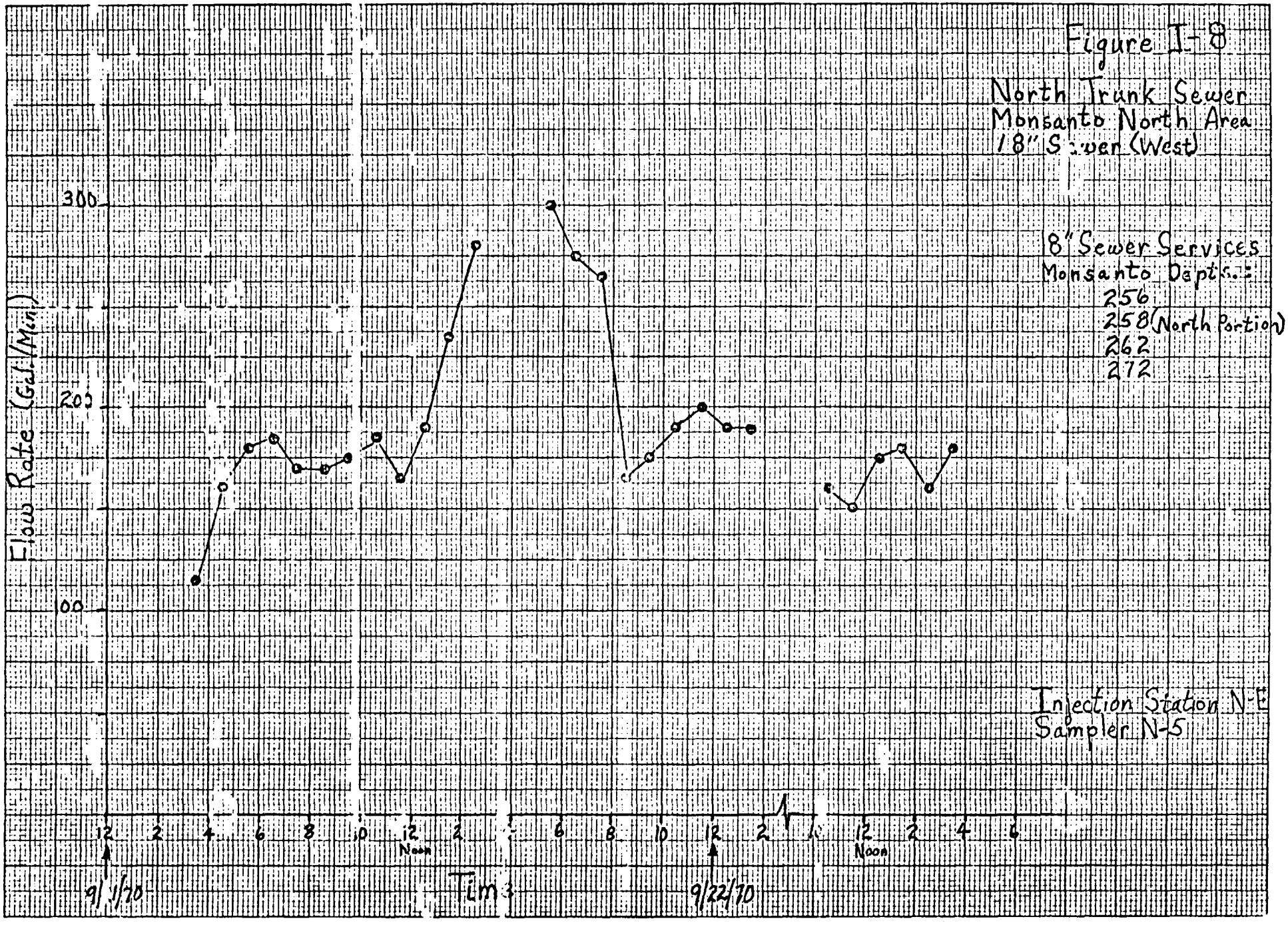
DATE 10/70 SEWER North Trunk - Monsanto North Area
18" Sewer (West) Depts 256, 258(N), 262, 272

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow* GPM
12-1 AM	—				0.000264	
1-2 9/21/70	—				"	
2-3	—	—	—	43	"	
3-4	—		9900	44	"	115
4-5	—		13250	46	"	160
5-6	—		14500	47	"	180
6-7	—		14750	47	"	185
7-8	—		13750	47	"	170
8-9	—		14500	45	"	170
9-10	—		15250	44	"	175
10-11	—		16500	42	"	185
11-12	—		17000	37	"	165
	—				"	
12-1 PM	—		17400	41	"	190
1-2	—		18250	49	"	235
2-3	—		20000	53	"	280
3-4	—		—	47	"	—
4-5	—		—	44	"	—
5-6	—		26000	44	"	300
6-7	—		27500	38	"	275
7-8	—		25000	40	"	265
8-9	—		17500	36	"	165
9-10	—		14400	46	"	175
10-11	—		15500	46	"	190
11-12	—		16500	46	"	200
	—					
12-1 9/22/70	—		17750	41	"	190
1-2 AM	—		17750	41	"	190
					"	
10-11	—		13750	44	"	160
11-12	—		12000	48	"	150
					"	
12-1 PM	—		12600	52	"	175
1-2	—		12500	54	"	180
2-3	—		12750	47	"	160
3-4	—		17500	39	"	180
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302-9961



Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-9

DEPT	CODE	PRODUCT	TEST OF	DATE
256, 258, 262, 272	North Trunk		Waste Water Discharge - 18" Sewer (West)	12/70

PLANT	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT	PERIOD COVERED	DATA ANALYZED BY
Monsanto	Injection Station N-5	Sampler N-5	9/21/70 - 9/22/70	[illegible]

% UNDER SPEC	% OVER SPEC	DISTRIBUTION TYPE	# OR CC

1 X	TALLY	2 f	5 Acc 2	6 5 + 4 % OVER
275-300	I	2	2	3.85
250-275	II	2	6	11.5
225-250	I	1	9	17.3
200-225		0	10	19.2
175-200	~~IIII~~ IIII	10	20	38.5
150-175	~~IIII~~ IIII	9	39	75
125-150	I	1	49	94.4
100-125	I	1	51	98.2

UCL	UCL	3 TOTAL	26	UCL
LCL	LCL	4 DOUBLE TOTAL	52	LCL
PROC CAPABILITY				

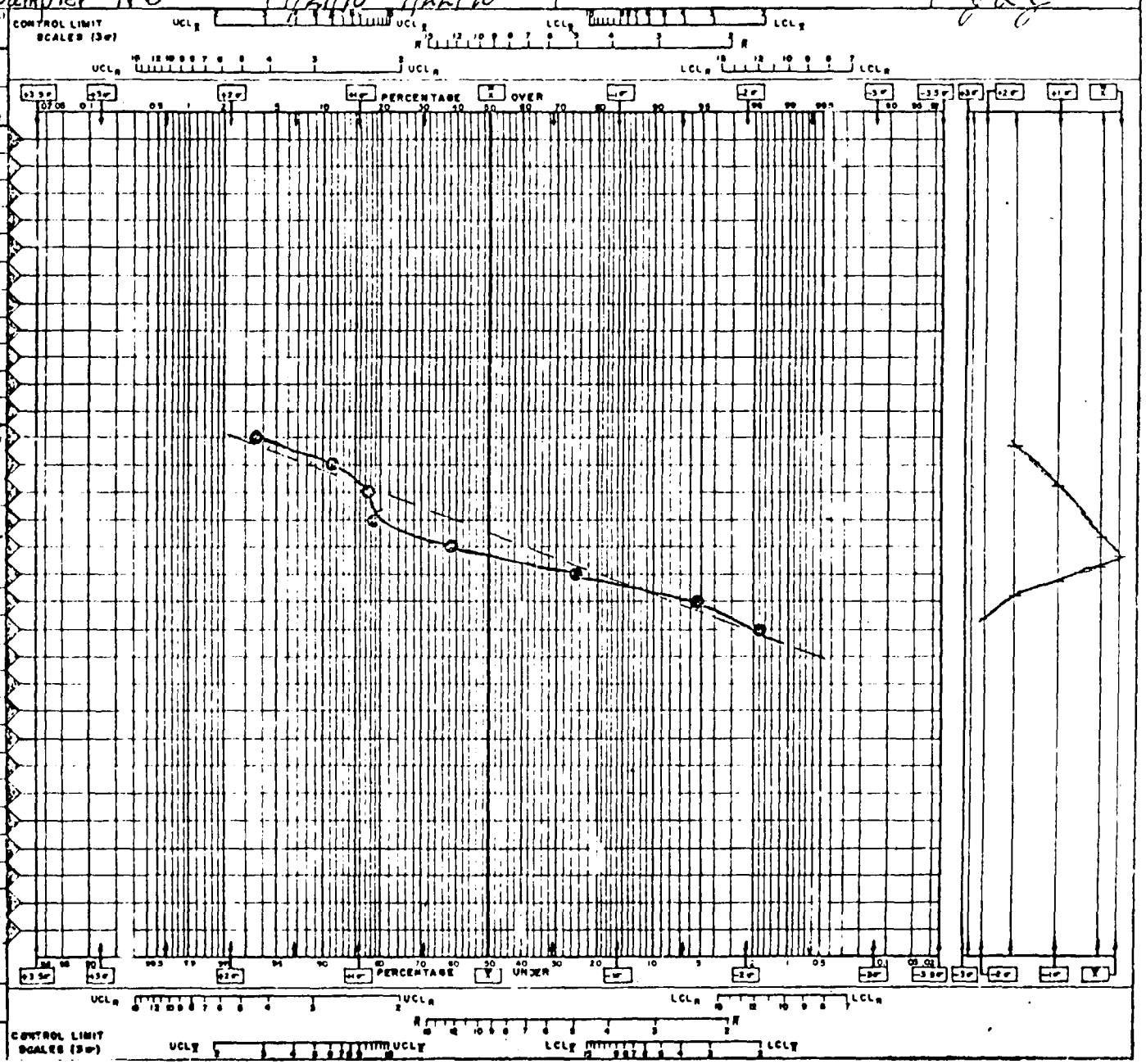


Table I-6

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background LiCl Content.

JOB 225 INJECTION POINT N(A,B,C,D,E)

ANALYZED BY WFS Jr. SAMPLER N-6

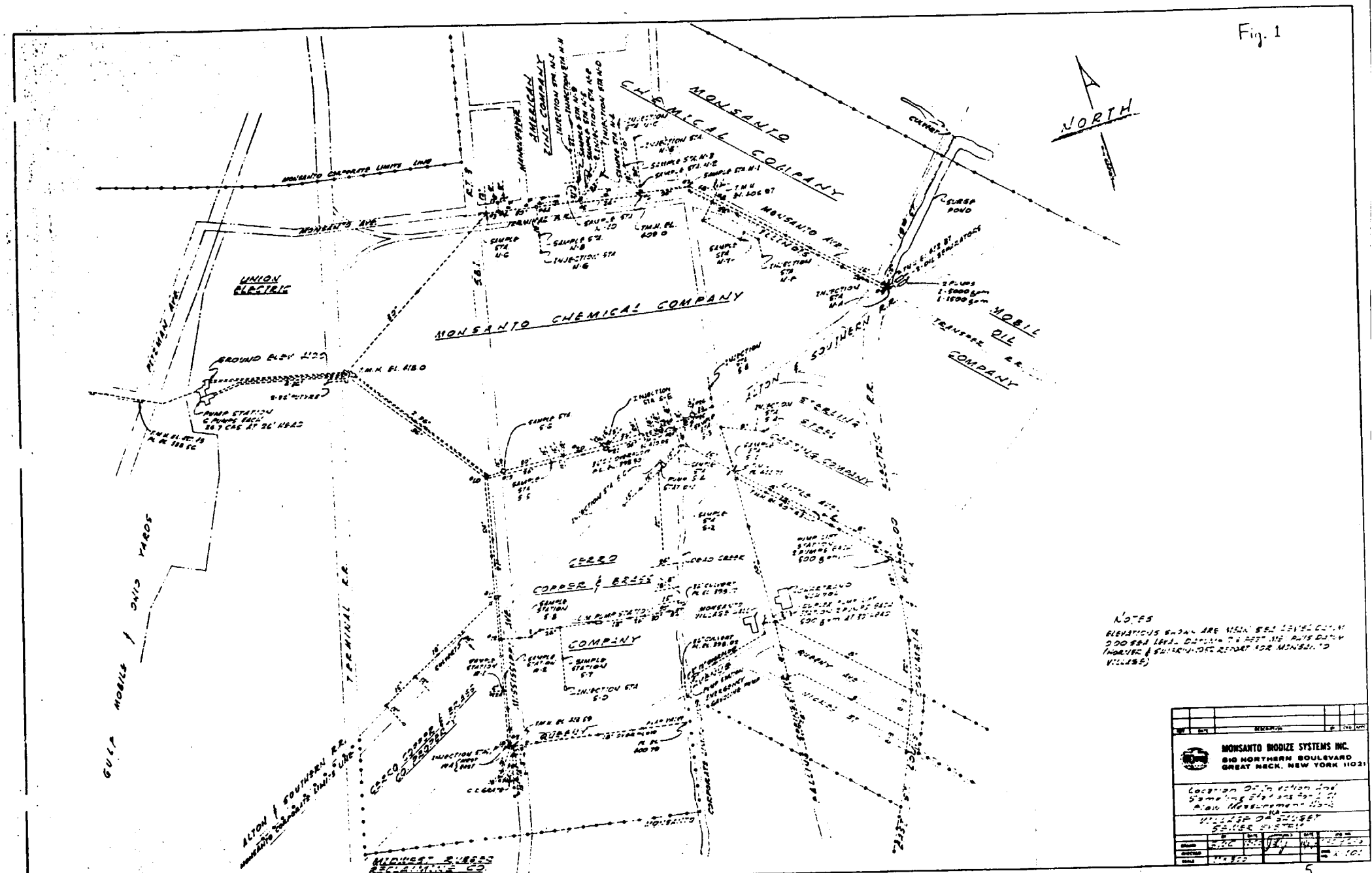
DATE 10/70 SEWER North Trunk- 30" Line to Treat. Ph

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 AM 9/21/70	—		—	—	0.000264	—
1-2	—		—	130	"	—
2-3	—		94,000	316	"	7850
3-4	—		77,000	324	"	6600
4-5	—		65,000	340	"	5850
5-6	—		65,000	315	"	5410
6-7	—		65,000	307	"	5270
7-8	—		43,500	292	"	5100
8-9	—		44,000	295	"	3400
9-10	—		46,500	297	"	3650
10-11	—		39,500	295	"	3080
11-12	—		37,750	312	"	3115
					"	
12-1 PM	—		40,000	314	"	3325
1-2	—		36,000	327	"	3285
2-3	—		45,000	330	"	3930
3-4	—		43,000	342	"	2900
4-5	—		41,500	355	"	3900
5-6	—		45,000	345	"	4110
6-7	—		43,000	344	"	3915
7-8	—		40,000	333	"	3520
8-9	—		40,000	313	"	3315
9-10	—		40,000	338	"	3580
10-11	—		—	392	"	
11-12	—		—	361	"	
10-11 AM	—		39,000	454	"	4685
11-12 9/22/70	—		42,000	404	"	4540
					"	
12-1 PM	—		39,000	414	"	4275
1-2	—		40,000	398	"	4210
2-3	—		44,000	278	"	3325
3-4	—		68,000	265	"	4770
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

Fig. 1


NORTH
MONSANTO CHEMICAL COMPANY
MONSANTO CHEMICAL COMPANY
MONSANTO CORPORATE LIMITS LINE
MONSANTO AVE.
UNION ELECTRIC
PITTMAN AVE.
GROUND ELEV. 410.0
PUMP STATION
6 PUMPS EACH
26.7 CFS AT 26' HEAD
T.M.H. EL. 418.0
AMERICAN ZINC COMPANY
MANCHESTER
INJECTION STA. N-1
INJECTION STA. N-2
INJECTION STA. N-3
INJECTION STA. N-4
INJECTION STA. N-5
INJECTION STA. N-6
INJECTION STA. N-7
INJECTION STA. N-8
INJECTION STA. N-9
INJECTION STA. N-10
SAMPLE STA. N-1
SAMPLE STA. N-2
SAMPLE STA. N-3
SAMPLE STA. N-4
SAMPLE STA. N-5
SAMPLE STA. N-6
SAMPLE STA. N-7
SAMPLE STA. N-8
SAMPLE STA. N-9
SAMPLE STA. N-10
T.M.H. EL. 409.0
T.M.H. EL. 406.97
TERMINAL R.R.
MONSANTO AVE.
ILLINOIS
SURGE POND
CULVERT
MOBIL OIL COMPANY
TRANSFER R.R.
ALTON & SOUTHERN R.R.
STERLING STEEL CASTING COMPANY
INJECTION STA. S-6
INJECTION STA. S-5
INJECTION STA. S-4
INJECTION STA. S-3
INJECTION STA. S-2
INJECTION STA. S-1
SAMPLE STA. S-6
SAMPLE STA. S-5
SAMPLE STA. S-4
SAMPLE STA. S-3
SAMPLE STA. S-2
SAMPLE STA. S-1
SAMPLE STA. S-8
SAMPLE STA. S-7
SAMPLE STA. S-0
SAMPLE STATION N-1
SAMPLE STATION N-2
SAMPLE STATION N-3
SAMPLE STATION N-4
SAMPLE STATION N-5
SAMPLE STATION N-6
SAMPLE STATION N-7
SAMPLE STATION N-8
SAMPLE STATION N-9
SAMPLE STATION N-10
INJECTION STA. S-0
INJECTION STA. S-1
INJECTION STA. S-2
INJECTION STA. S-3
INJECTION STA. S-4
INJECTION STA. S-5
INJECTION STA. S-6
INJECTION STA. S-7
INJECTION STA. S-8
CERRO COPPER & BRASS COMPANY
DEAD CREEK
MONSANTO VILLAGE HALL
CHARTRAND SCHOOL
PUMP LIFT STATION
2 PUMPS EACH
500 gpm
QUEENY AVE.
MICKEY ST.
COLUMBIA
EAST ST. LOUIS
CORPORATE LIMITS
MISSISSIPPI AVE.
TERMINAL R.R.
GULF MOBILE & OHIO YARDS
ALTON & SOUTHERN R.R.
MONSANTO CORPORATE LIMITS LINE
CERRO COPPER & BRASS CO. PROPERTY
MIDWEST RUBBER RECLAIMING CO.
NOTES
ELEVATIONS SHOWN ARE MEAN SEA LEVEL DATUM
MONSANTO BIODIZE SYSTEMS INC.
810 NORTHERN BOULEVARD
GREAT NECK, NEW YORK 11021
Location Of Injection And Sampling Stations For Flow Measurement Work
VILLAGE OF SAUGET SEWER SYSTEM

FREDERICK POST SQUARE 10 X 10 TO THE CENTIMETER 302-5961

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-11

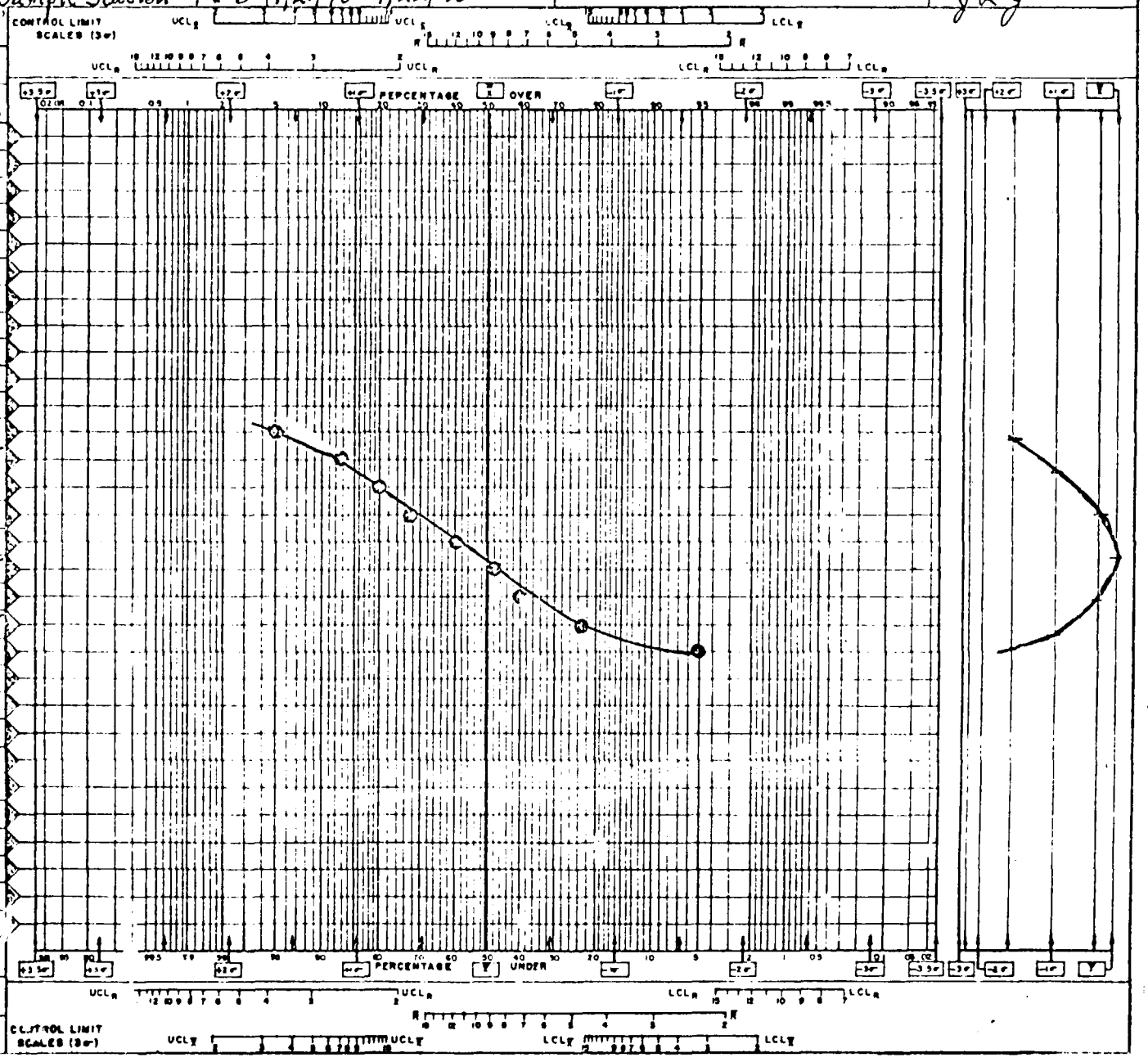
DEPT | CODE | PRODUCT: North Trunk Flows after Am. Zinc Shutdown | TEST OF: Waste Water Flow - North Trunk Sewer | DATE: 12/15/70

POINT: North Trunk Injection Stations (A, B, C, D, E) | UPPER SPECIFICATION LIMIT | LOWER SPECIFICATION LIMIT | PERIOD COVERED: Sample Station N-6 9/21/70 - 9/22/70 | DATA ANALYZED BY: JLY

% UNDER SPEC | % OVER SPEC | DISTRIBUTION TYPE

1	TALLY	2	5	5
X		f	Acc. 2	5 % OVER
4800-5000				
4600-4800		2	2	5
4400-4600		1	5	2.5
4200-4400		2	8	20
4000-4200		1	11	27.5
3800-4000	IIII	4	16	40
3600-3800	I	1	21	52.5
3400-3600	II	2	24	60
3200-3400	IIIII	5	31	77.5
3000-3200	II	2	38	95

UCL$_{\bar{X}}$	UCL$_{\bar{Y}}$	3 TOTAL	20	UCL$_R$
LCL$_{\bar{X}}$	LCL$_{\bar{Y}}$	4 DOUBLE TOTAL	40	LCL$_R$
PROC CAPABILITY				



3.0

Table I-7

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.

JOB 225 INJECTION POINT N-F

ANALYZED BY W.F.S. Jr. SAMPLER N-7

DATE 10/70 SEWER North Trunk 12" Line from Dept. 25

Sample	Sample* Dilution	Absorbance	(LiCl Dilution) x (Avg. Inject. Rate (ml/min.)) x (1 gal. / 3785 ml.) =			Flow** GPM
9-10 AM	—		21,500	10	0.000264	57
10-11 9/16/70	—		24,500	8	"	52
11-12	—		26,000	8	"	55
					"	
12-1 PM	—		78,000	8	"	165
1-2 9/16/70	—		30,500	8	"	65
2-3	—		31,000	8	"	66
3-4	—		39,500	8	"	84
4-5	—		52,500	8	"	110
5-6	—		75,000	8	"	160
6-7	—		—	8	"	—
7-8	—		81,000	8	"	170
8-9	—		94,000	8	"	200
					"	
9-10 AM	—		18,000	15	"	71
10-11 9/17/70	—		—	16	"	
11-12	—		—	17	"	
	—				"	
12-1	—		—	18	"	
1-2	—		—	19	"	
2-3	—		45,000	21	"	250
3-4	—		11,800	21	"	66
4-5	—		13,000	18	"	62
5-6	—		14,000	16	"	59
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302-9951

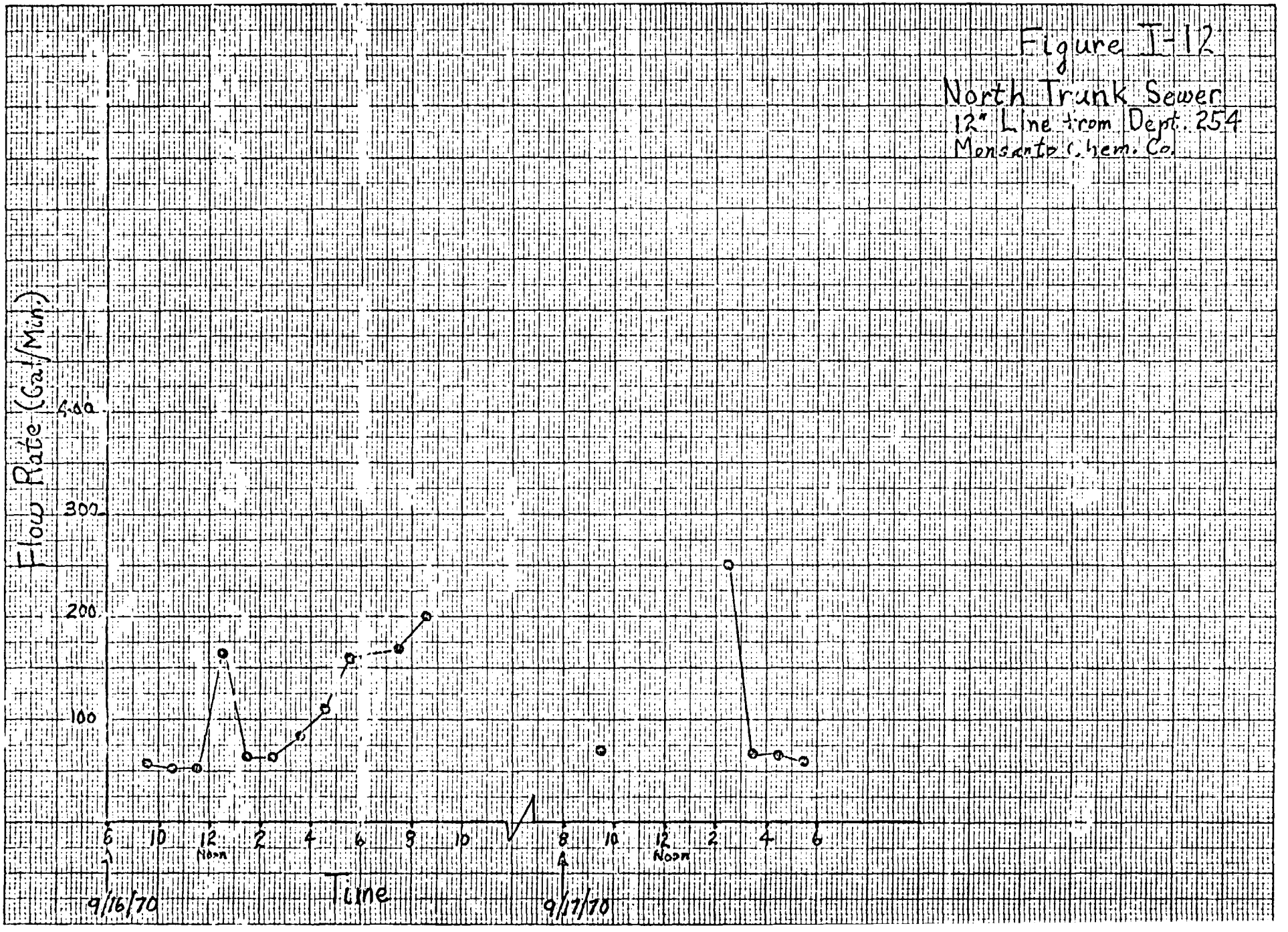


Table I-8.

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background of Concent

JOB 225

INJECTION POINT N-G

ANALYZED BY WFS, Jr.

SAMPLER N-8

DATE 10/70

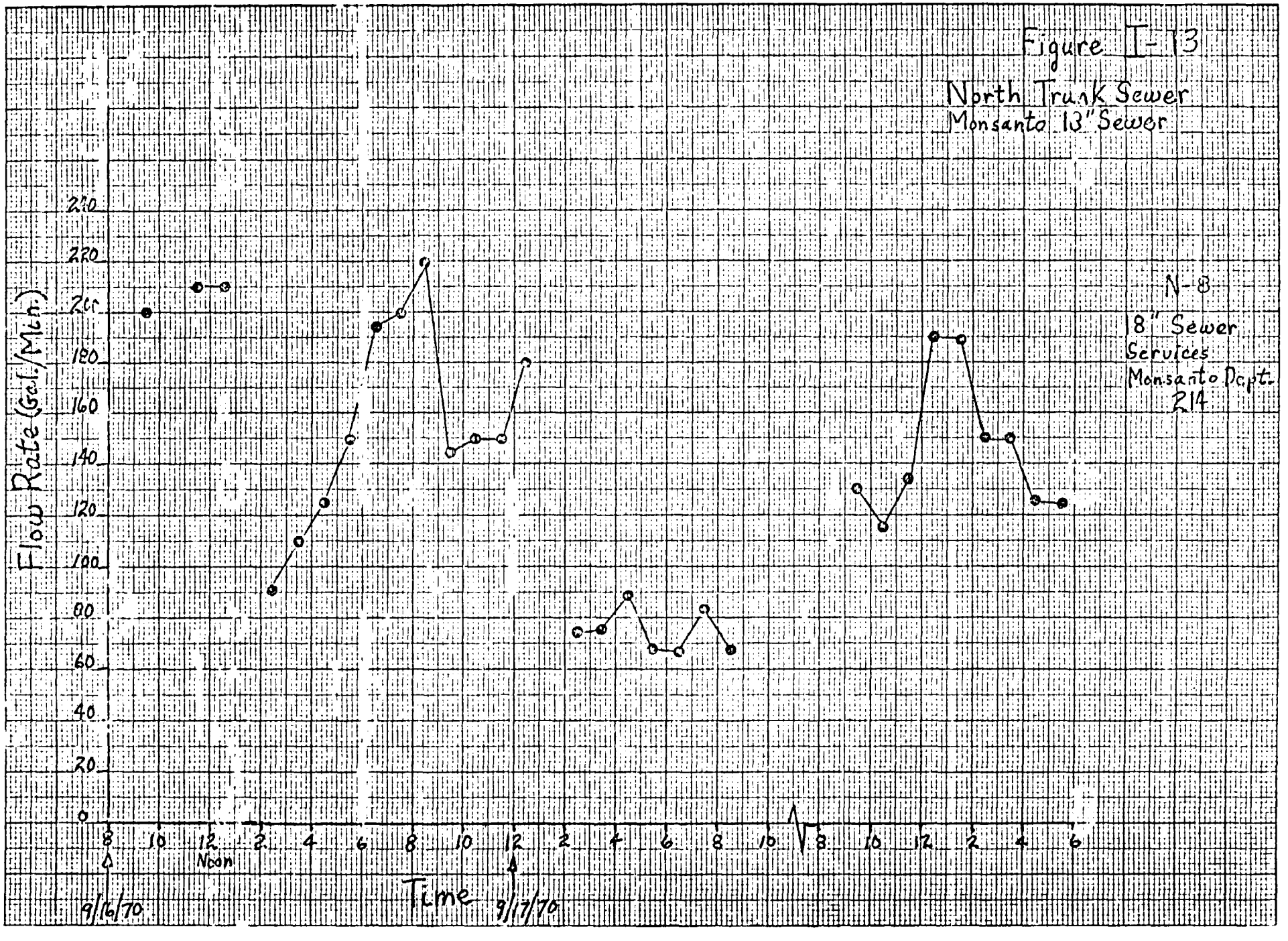
SEWER North Trunk - Monsanto 18" Sewer Dept. 214

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
9-10 AM	–		54,500	14	0.000264	200
10-11 9/16/70	–		–	14	"	–
11-12	–		58000	14	"	210
					"	
12-1 PM	–		57000	14	"	210
1-2	–		–	14	"	–
2-3	–		24500	14	"	91
3-4	–		30000	14	"	110
4-5	–		34000	14	"	125
5-6	–		40000	14	"	150
6-7	–		52500	14	"	195
7-8	–		55000	14	"	200
8-9	–		92000	9	"	220
9-10	–		60000	9	"	145
10-11	–		63000	9	"	150
11-12	–		64000	9	"	150
					"	
12-1 AM	–		75000	9	"	180
1-2 9/17/70	–		–	4	"	–
2-3	–		70500	4	"	75
3-4	–		72000	4	"	76
4-5	–		84000	4	"	89
5-6	–		64000	4	"	68
6-7	–		63000	4	"	67
7-8	–		78000	4	"	83
8-9	–		64000	4	"	68
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Product of U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302 9961



Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. I-14

DEPT	CODE	PRODUCT	TEST OF	DATE
214		N-8	North Trunk Sewer - Waste H_2O	12/8/70

PLANT	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT	PERIOD COVERED		DATA ANALYZED BY
Monsanto			9/16/70 - 9/17/70	18" Sewer	JLJ

% UNDER SPEC	% OVER SPEC	DISTRIBUTION TYPE		% (OR CC)

1	TALLY	2	5	3
X		f	Acc. 2	5 - 4 IN % OVER
220-240				
200-220	///	3	3	2
180-200	///	5	11	18
160-180	/	1	17	28
140-160	////|	6	24	40
120-140	///	5	35	58
100-120	//	2	42	70
80-100	///	3	47	79
60-80	///	5	55	91.8
40-60		0	60	100
20-40				
0-20				

UCL$_X$	UCL$_{\bar{X}}$	3 TOTAL	30	UCL$_R$
LCL$_X$	LCL$_{\bar{X}}$	4 DOUBLE TOTAL	60	LCL$_R$
PROC. CAPABILITY	σ	$\bar{X}$		$\bar{R}$

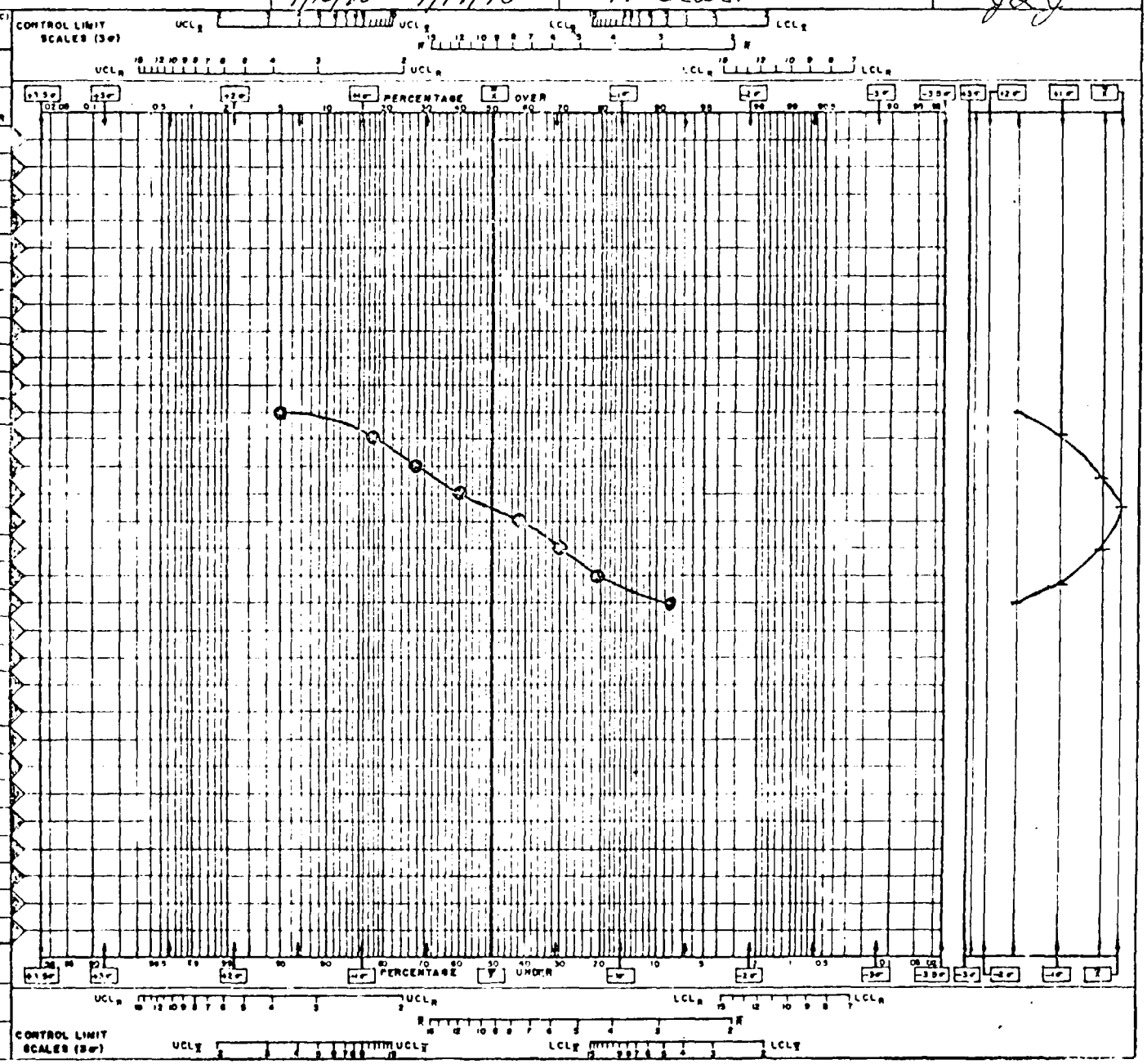


Table I-9

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background of Concent

JOB 253

INJECTION POINT N-H

ANALYZED BY CM

SAMPLER N-9

DATE 12/7 & 12/8/70

SEWER 27" Sewer (East) American Zin
Discharge to North Trunk

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPI
PM 1 9:30-10:30	-	0.040	60000	191	0.000264	2300
2 12/7/70	-	0.047	52000	189	"	2600
3	-	0.040	60000	188	"	2980
4	-	0.037	65000	189	"	3245
5	-	0.042	58000	191	"	2925
6	-	0.047	52000	192	"	2636
7	-	0.040	60000	191	"	3025
8	-	0.043	56000	189	"	2793
9	-	0.040	60000	189	"	2994
10	-	0.045	54000	187	"	2666
11	-	0.050	49000	179	"	2316
12	-	0.045	54000	169	"	2409
13	-	0.040	60000	163	"	2582
14	-	0.038	64000	175	"	2959
15	-	0.045	57000	186	"	2800
16	-	0.045	57000	179	"	2690
17	-	0.040	64000	162	"	[illegible]
18	-	0.023	113000	128	"	3020
19	-	0.043	59000	170	"	2650
20	-	0.043	59000	168	"	2620
21	-	0.042	61000	169	"	2720
22	-	0.041	62000	171	"	2800
23	-	0.040	64000	171	"	2810
24	-	0.056	45000	170	"	2020
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST SQUARE 10 X 10 TO THE CENTIMETER 202 9961

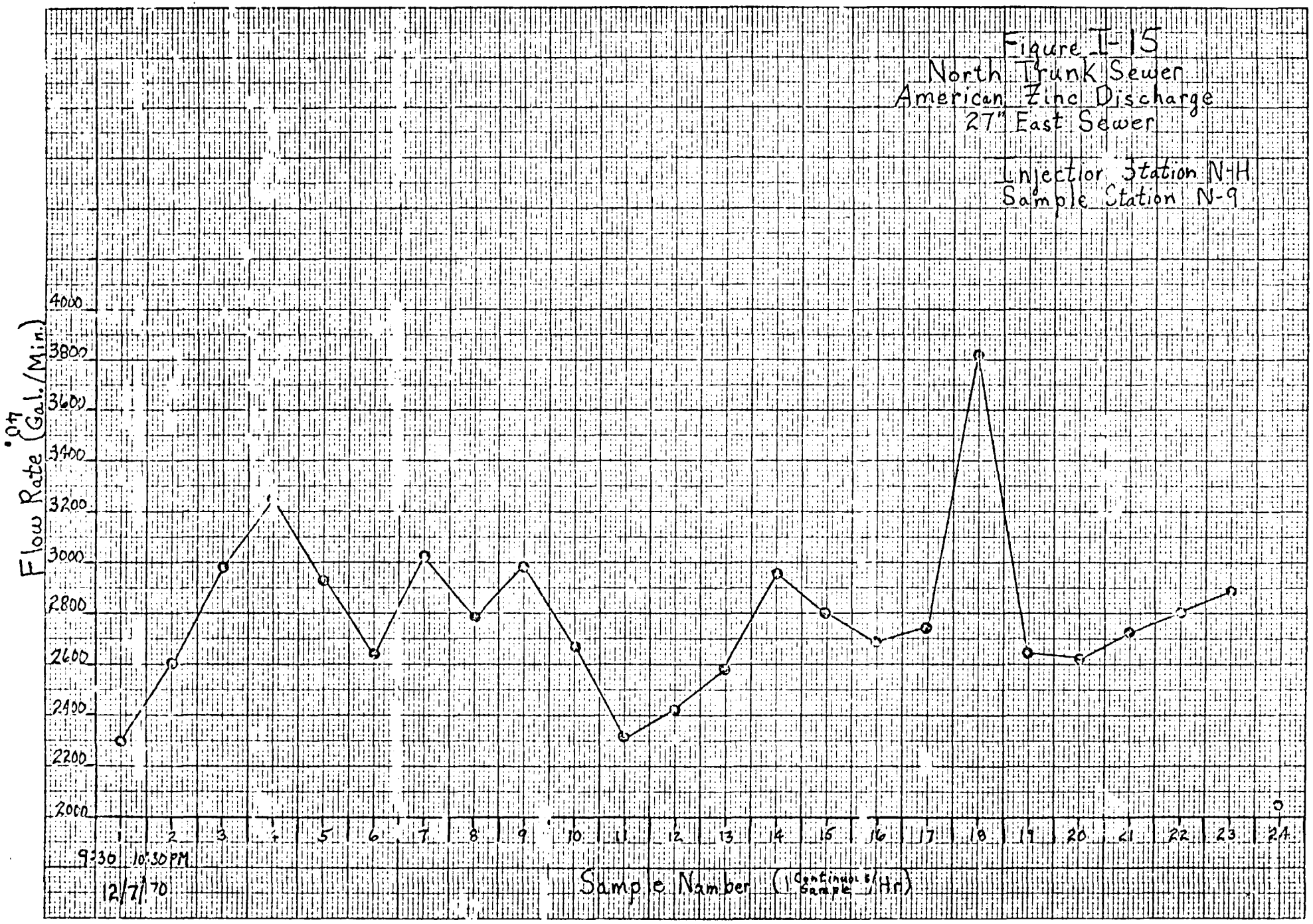


Table I-10

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent

JOB 253

INJECTION POINT N-I

ANALYZED BY JM

SAMPLER N-10

DATE 12/7 & 12/8/70

SEWER 21" West Sewer - American Zinc Discharge to North Trunk

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
PM 1 9:30-10:30	—	0.230	11250	19	0.000264	57
2 12/7/70	—	0.145	17500	19	"	88
3	—	0.055	44500	18	"	211
4	—	0.067	37000	18	"	176
5	—	0.064	38500	18	"	183
6	—	0.062	39500	18	"	188
7	—	0.085	29500	"	"	140
8	—	0.057	43000	"	"	204
9	—	0.076	32000	"	"	157
10	—	0.060	41000	"	"	195
11	—	0.060	41000	"	"	195
12	—	0.063	39000	"	"	185
13	—	0.063	39000	"	"	185
14	—	0.054	45000	"	"	214
15	—	0.072	31500	"	"	150
16	—	0.053	48000	"	"	228
17	—	0.040	62[illegible]	"	"	295
18	—	0.038	66000	"	"	314
19	—	0.042	60000	"	"	285
20	—	0.047	57000	"	"	271
21	—	0.042	60000	"	"	285
22	—	0.043	59000	"	"	280
23	—	0.043	59[illegible]	"	"	280
24	—	0.042	60[illegible]	"	"	285
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 302-9961

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

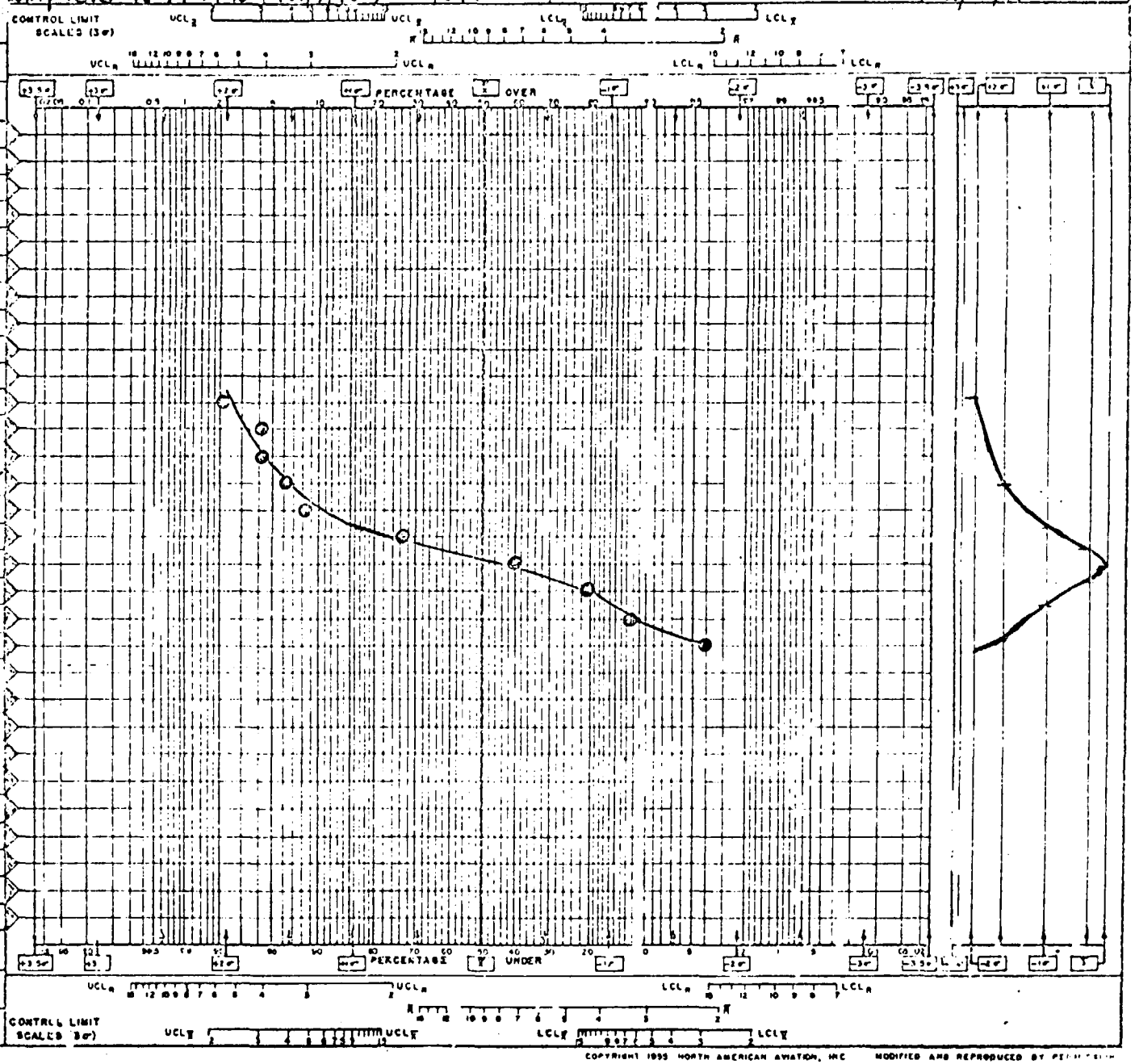
Fig. I-17

DEPT. North Trunk	CODE	PRODUCT	TEST OF Waste Water Flow-American Zinc (Total)
PLANT American Zi	UPPER SPECIFICATION LIMIT Injection Stations HGI	LOWER SPECIFICATION LIMIT Samplers N-9 & N-10	PERIOD COVERED 12/7/70 & 12/8/70

DATE 12/16/70

1	TALLY	2	5	6
X		f	Acc. 2	5 + 4
4000-4200	I	1	1	2.
3800-4000		0	2	4.
3600-3800		0	2	4.
3400-3600	I	1	3	6.
3200-3400		0	4	8.
3000-3200	~~IIII~~ IIII	9	13	2.
2800-3000	~~IIII~~ II	7	29	60.4
2600-2800	II	2	38	79.2
2400-2600	II	2	42	87.5
2200-2400	II	2	46	96
2000-2200				

3 TOTAL	24		
4 CUMULATIVE TOTAL	48		



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APPENDIX II

VILLAGE OF SAUGET
SOUTH TRUNK SEWER
FLOW DATA AND DATA ANALYSIS

Table II-1

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.

JOB 225 INJECTION POINT S-A

ANALYZED BY WFS, Jr. SAMPLER S-1

DATE 10/70 SEWER South Trunk- 8" Sterling Steel Discha

Sample	Sample* Dilution	Absorbance	(LiCl Dilution) x	(Avg. Inject. Rate (ml/min.)) x	(1 gal. / 3785 ml.) =	Flow* GPM
12-1 PM			5500	66	0.000264	96
1-2 9/25/70			9800	51	"	130
2-3			7600	40	"	80
3-4			8600	35	"	80
4-5			9600	50	"	125
5-6			8900	66	"	155
6-7			—	—	"	—
7-8			—	—	"	—
8-9			—	—	"	—
9-10					"	
					"	
					"	
12-1 AM	3/1		5500	42	"	15
8-9 9/26/70	1/1		8800	54	"	62
					"	
					"	
					"	
					"	
1-2 PM	9/1		7400	27	"	5
2-3 10/13/70	"		13000	64	"	22
3-4	"		12000	41	"	13
4-5	"		10000	45	"	12
5-6	"		6400	72	"	12
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

Table II-2

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.

JOB 225 INJECTION POINT S-A

ANALYZED BY WFS, Jr. SAMPLER S-2

DATE 10/70 SEWER South Trunk - Village Sewers

(a) 8" & 12" Sewers - Little Ave.
(b) 12" Sewer - Falling Springs Ave.
(c) Sterling Steel

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.)	= Flow** GPM
12-1 PM	=		8100	66	0.000264	140
1-2 9/25/70	=		8200	51	"	110
2-3	=		8500	40	"	90
3-4	=		9500	35	"	88
4-5	=		16000	30	"	210
8-9	=		14000	46	"	170
9-10	3/1		5500	42	"	15
10-11	7/1		10000	38	"	12
12-1 AM	15/1		4800	42	"	3
1-2 9/26/70	7/1		6200	34	"	7
2-3	3/1		5250	42	"	14
3-4	"		11400	53	"	39
4-5	"		13750	50	"	45
5-6	"		9600	56	"	35
6-7	"		10600	57	"	39
7-8	7/1		5400	54	"	10

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST SQUARE 10 X 10 TO THE CENTIMETER 3C2-99G1

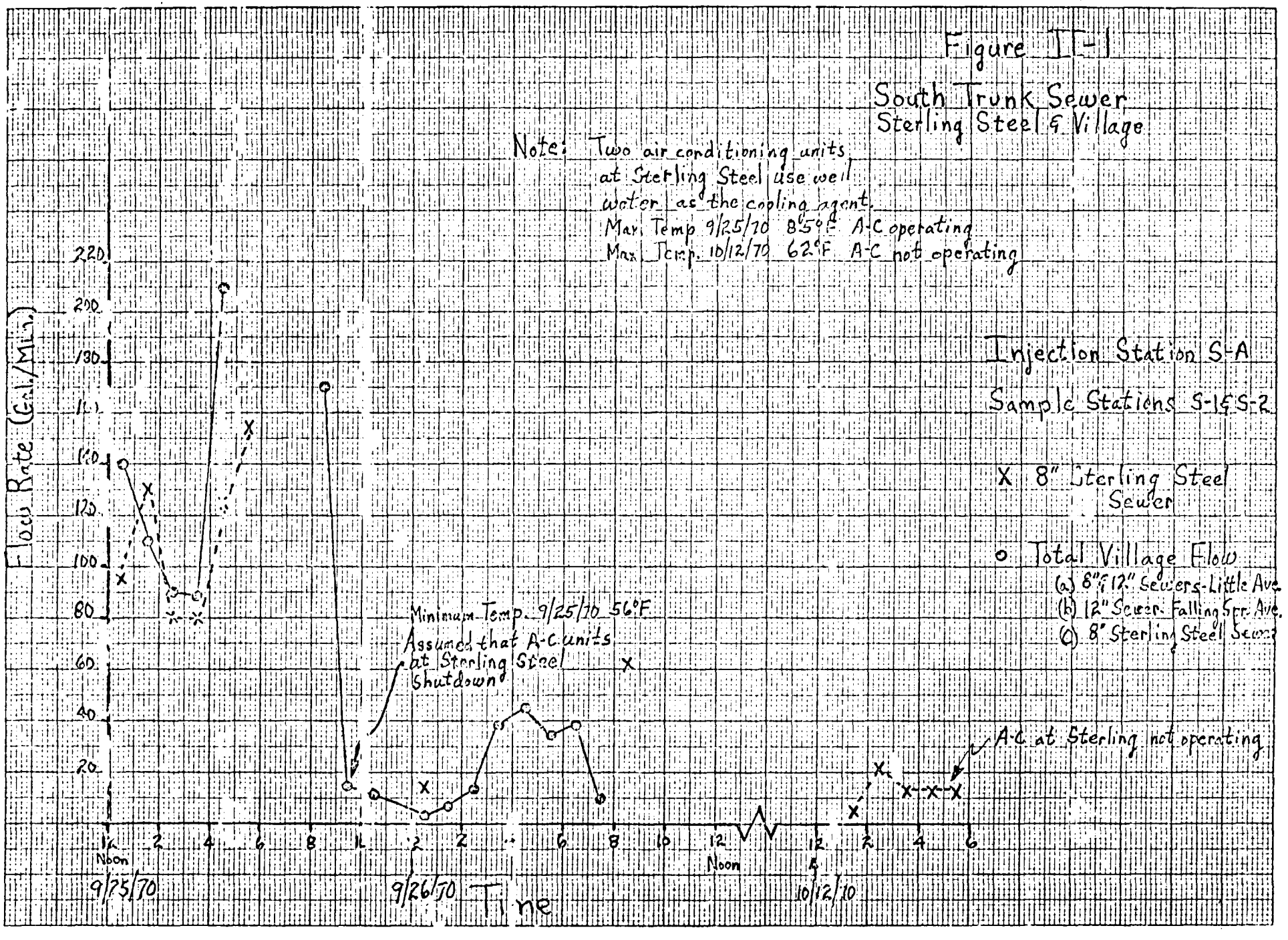

Table II-3

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent.

JOB 225

INJECTION POINT S-B

ANALYZED BY W.F.S. Jr.

SAMPLER S-3

DATE 10/70

SEWER South Trunk - 36" Sewer
Corner 5th St. & Falling Springs Rd.

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow** GPM
1-2 PM	—		29500	278	0.000264	2165
2-3 9/25/70	—		26000	295	"	2030
3-4	—		28500	322	"	2425
4-5	—		31250	347	"	2870
5-6	—		35000	347	"	3215
6-7	—		34500	334	"	3050
7-8	—		34250	313	"	2840
8-9	—		37750	280	"	2760
9-10	—		42500	267	"	3070
10-11	—		41500	255	"	2800
11-12	—		39500	240	"	2510
12-1 AM	—		41000	230	"	2490
1-2 9/26/70	—		36500	230	"	2220
2-3	—		38250	230	"	2330
3-4	—		43500	230	"	2640
4-5	—		43500	229	"	2630
5-6	—		37000	225	"	2200
					"	
10-11 AM	—		45000	213	"	2540
11-12 9/26/70	—		45000	220	"	2620
12-1 PM	—		48000	220	"	2790
1-2	—		48000	220	"	2790

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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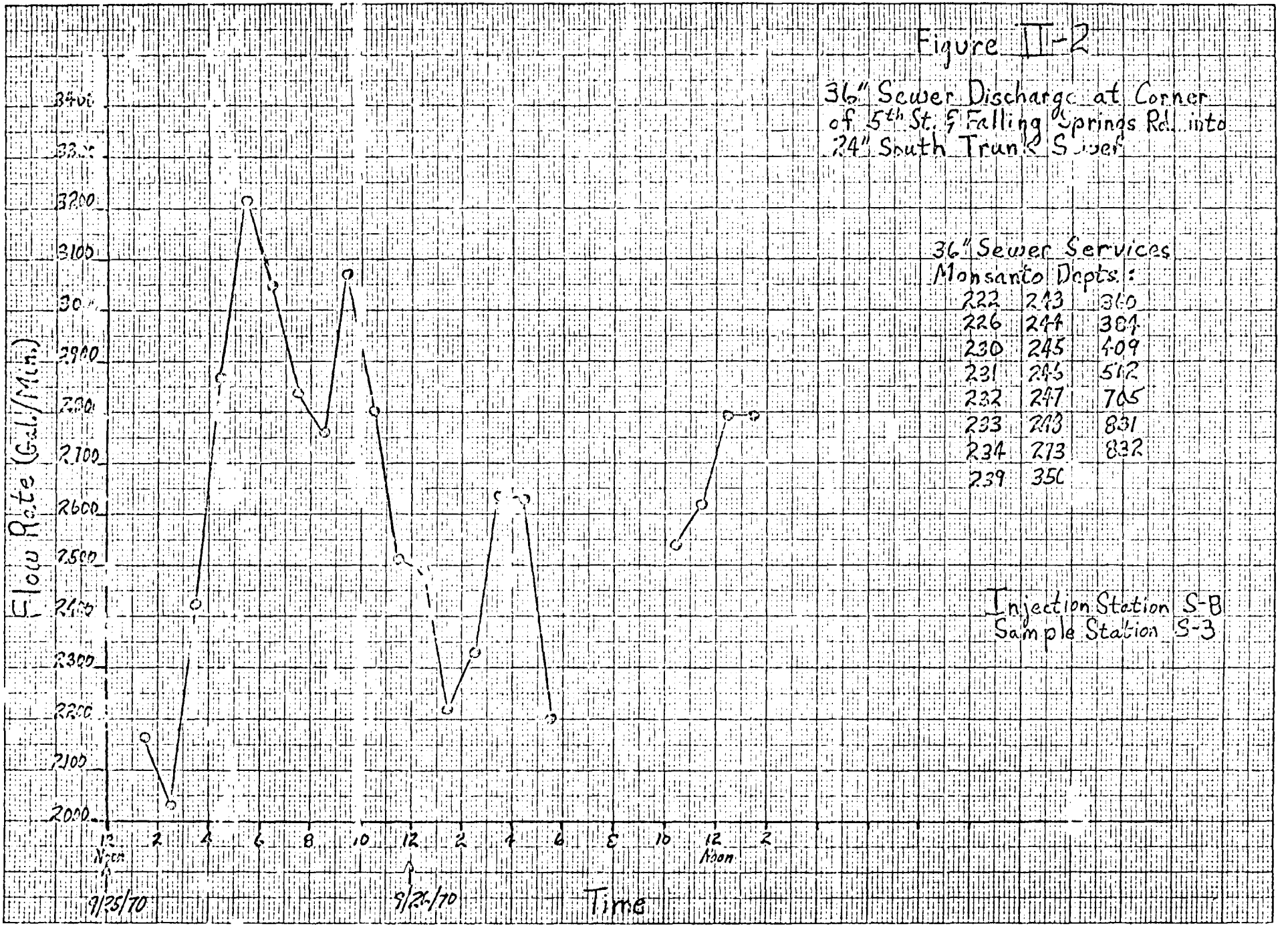

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. II-3

DEPT: Monsanto	CODE:	PRODUCT:	TEST OF: Waste Water Discharge - 36" Sewer into 24"	DATE: 12/13/70
PLANT: South Trunk	UPPER SPECIFICATION LIMIT: Injection Station S-B	LOWER SPECIFICATION LIMIT: Sample Station S-3	PERIOD COVERED: 9/25/70 - 9/26/70	5th St. & Falling Springs Rd.
UNDER SPEC:	OVER SPEC:	DISTRIBUTION TYPE:		

1 X	TALLY	2 f	5 Acc. 2	5 4
3200-3300	I	1	1	.4
3100-3200		0	2	.76
3000-3100	I	2	4	1.5
2900-3000		0	6	4.3
2800-2900	I	2	8	9
2700-2800	IIII	4	14	3.4
2600-2700	I	2	20	7.6
2500-2600	III	3	25	59.5
2400-2500	II	2	30	71.5
2300-2400	I	1	33	78.5
2200-2300	I	1	35	83.4
2100-2200	II	2	38	90.5
2000-2100	I	1	41	97.5

UCL	UCL	3 TOTAL	21	UCL
LCL	LCL	4 DOUBLE TOTAL	42	LCL
PROC. CAPABILITY	+ 300	2600		

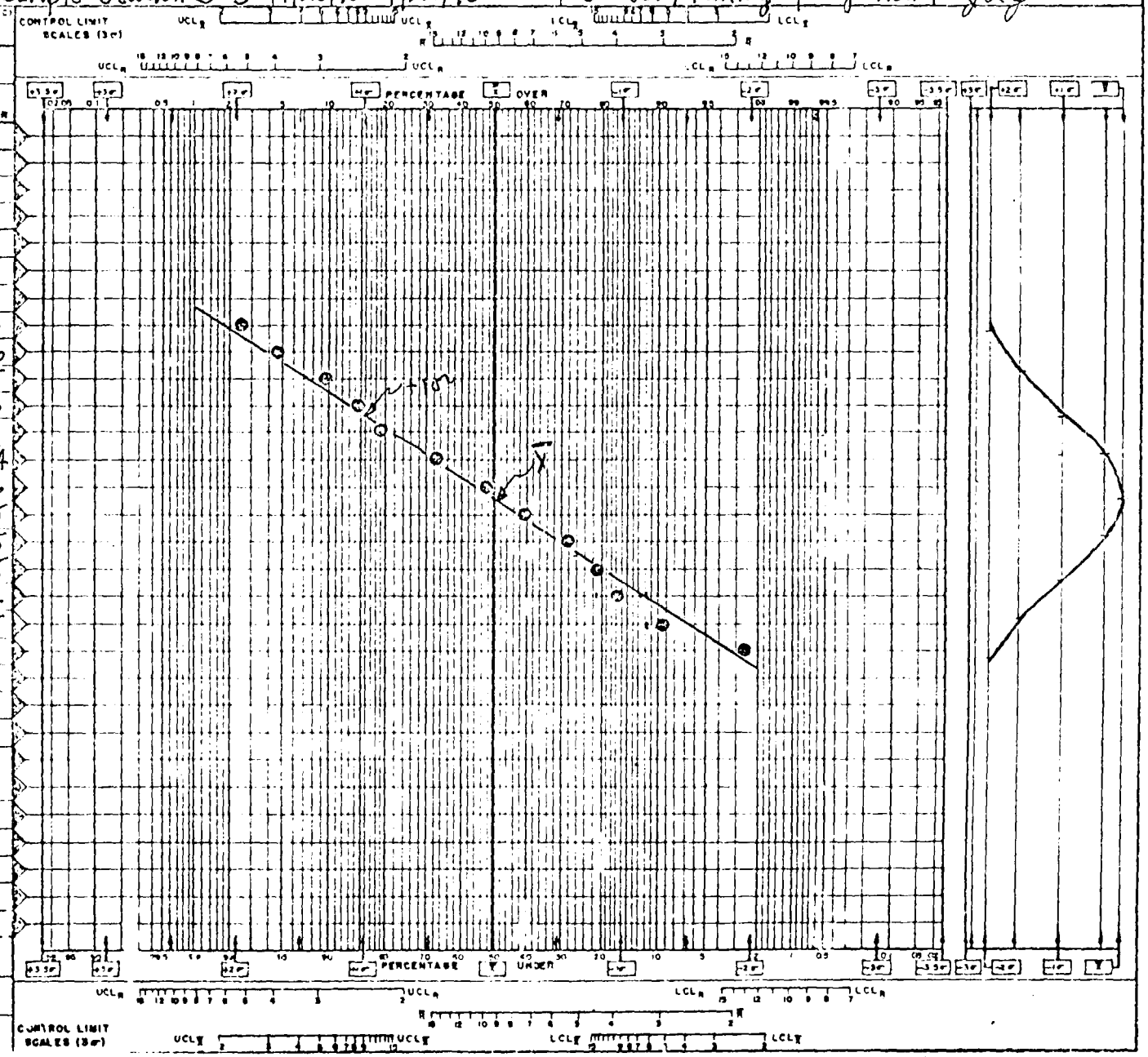

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Table II-4

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent

JOB 225 INJECTION POINT S-C

ANALYZED BY WFS, Jr. SAMPLER S-4

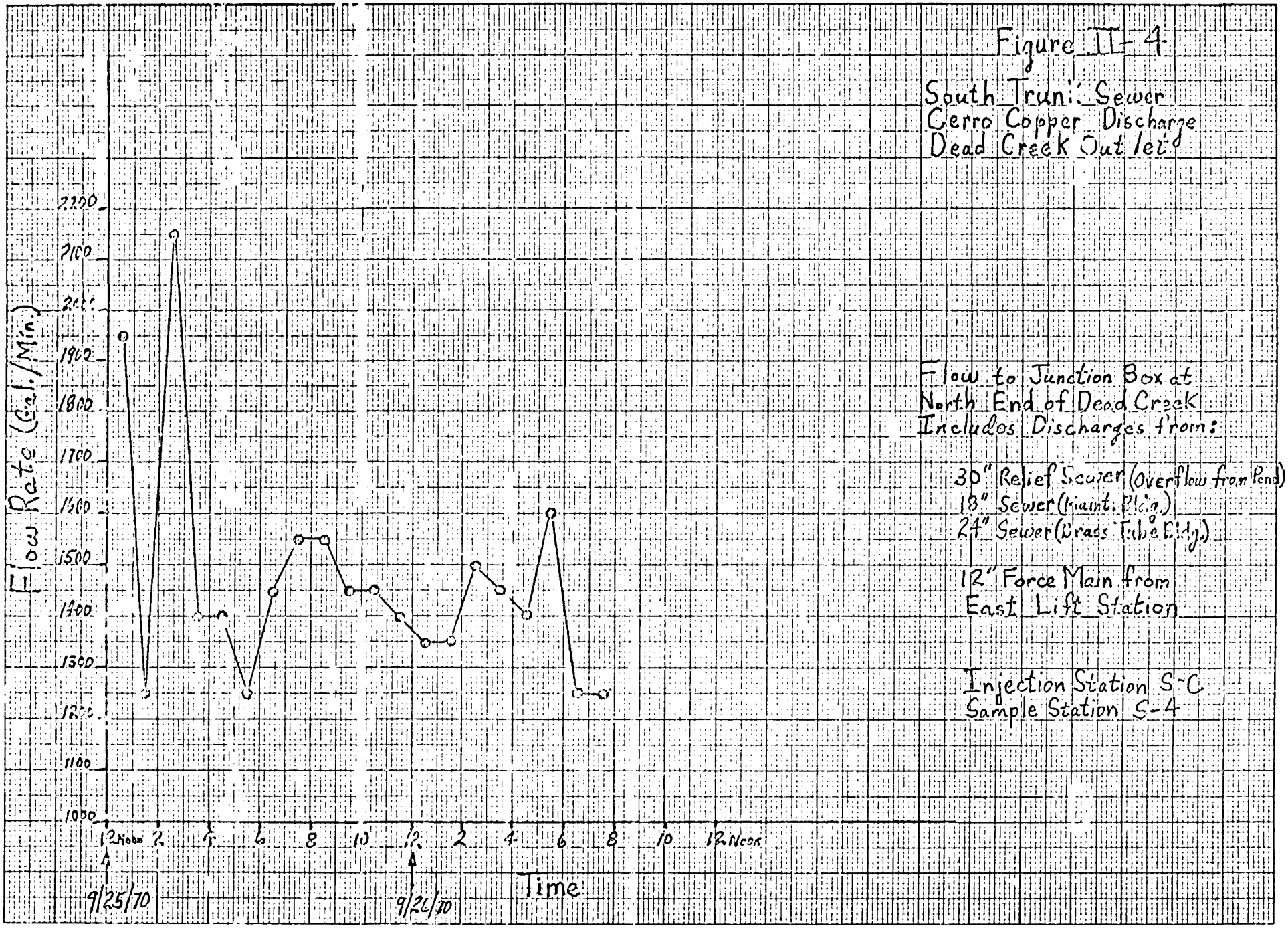
DATE 10/70 SEWER South Trunk - Cerro Dead Creek Outlet

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 PM	—		18000	230	0.000264	1950
1-2 9/25/70	—		18000	260	"	1250
2-3	—		36500	230	"	2150
3-4	—		34000	157	"	1400
4-5	—		34000	158	"	1400
5-6	—		30000	158	"	1250
6-7	—		35000	157	"	1450
7-8	—		37000	156	"	1550
8-9	—		37000	157	"	1550
9-10	—		35000	156	"	1450
10-11	—		34000	156	"	1450
11-12	—		35000	152	"	1400
					"	
12-1 AM	—		34000	148	"	1350
1-2 9/26/70	—		34000	147	"	1350
2-3	—		36500	153	"	1500
3-4	—		35000	155	"	1450
4-5	—		37000	143	"	1400
5-6	—		50000	120	"	1600
6-7	—		38000	122	"	1250
7-8	—		36500	127	"	1250

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

FREDERICK POST Printed in U.S.A. SQUARE 10 X 10 TO THE CENTIMETER 307 3951



Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. II-5

DEPT	CODE	PRODUCT	TEST OF	DATE
Cerro Copper			Waste Water Flow - Cerro-Dead Creek Outlet	12/13/70

PLANT	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT	PERIOD COVERED	DATA ANALYZED BY
South Trunk	Injection Station S-C	Sample Station S-4	9/25/70 - 9/26/70	JLJ

% UNDER SPEC	OVER SPEC	DISTRIBUTION TYPE	% FOR CCI

X	TALLY	2 f	5 Acc. 2	6 5 + 4 % OVER
>1600	I	2	2	5
1550-1600	I	1	5	2.5
1500-1550	II	2	8	20
1450-1500	I	1	11	27.5
>1400-1450	IIII	4	16	40
1350-1400	IIII	4	24	60
1300-1350	II	2	30	75
1250-1300		0	32	80
1200-1250	IIII	4	36	90
1150-1200		0	40	100

UCL$_X$	UCL$_{\bar{X}}$	3 TOTAL	20	UCL$_R$
LCL$_X$	LCL$_{\bar{X}}$	4 DOUBLE TOTAL	40	LCL$_R$
PROC CAPABILITY	σ ±150	$\bar{X}$ 1400		$\bar{R}$

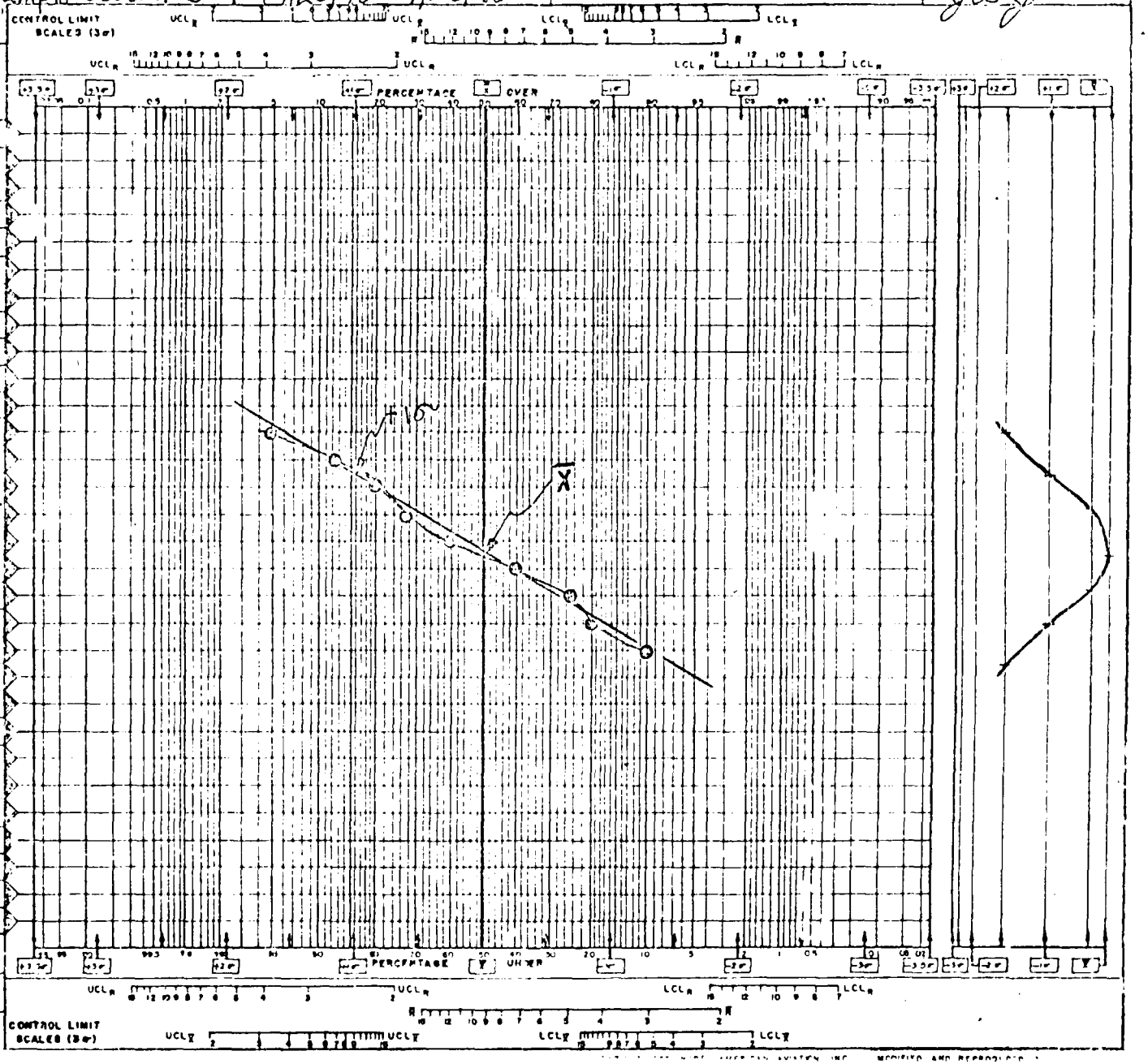


Table II-5

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background in Concent.

JOB 225 INJECTION POINT S(A, B, C)

ANALYZED BY WFS, Jr. SAMPLER S-5

DATE 10/70 SEWER South Trunk - 24" Sewer

Sources (a) Junction Box Dead Creek
(b) Village + Sterling
(c) 36" Monsanto Sewer
(d) 18" Sewer - Dept. 260
(e) 15" Sewer Dept. 251

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow** GPM
12-1 PM	–		40000	296	0.000264	–
1-2 9/25/70	–		33000	589	"	5150
2-3	–		34800	558	"	5145
3-4	–		34500	514	"	4700
4-5	–		36500	555	"	5210
5-6	–		37500	571	"	5660
6-7	–		38000	550	"	5530
7-8	–		40000	520	"	5500
8-9	–		41500	489	"	5360
9-10	–		41500	465	"	5100
10-11	–		43500	449	"	5160
11-12	–		44000	429	"	4995
					"	
12-1 AM	–		43000	420	"	4775
1-2 9/26/70	–		42500	411	"	4620
2-3	–		41500	425	"	4770
3-4	–		44000	438	"	5100
4-5	–		49000	422	"	5460
5-6	–		48500	401	"	5145
6-7	–		40000	179	"	–
7-8	–		–	161	"	–
					"	
10-11	–		64000	213	"	–
11-12	–		87000	220	"	5060
					"	
12-1	–		90000	220	"	5120
1-2	–		90000	240	"	5245
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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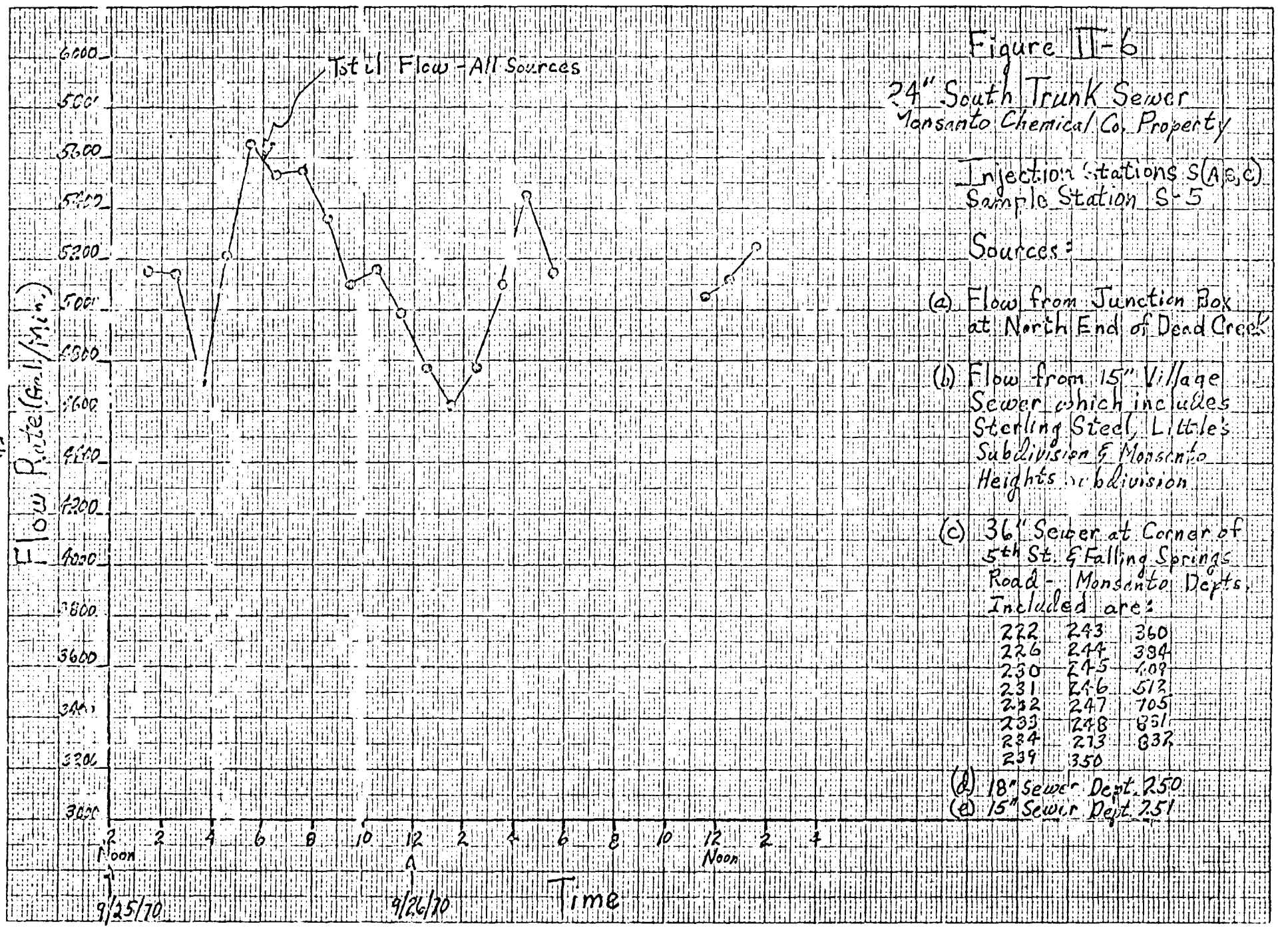

Figure II-6

24" South Trunk Sewer
Monsanto Chemical Co. Property

Injection Stations S(A,B,C)
Sample Station S-5

Sources:

(a) Flow from Junction Box at North End of Dead Creek

(b) Flow from 15" Village Sewer which includes Sterling Steel, Little's Subdivision & Monsanto Heights Subdivision

(c) 36" Sewer at Corner of 5th St. & Falling Springs Road - Monsanto Depts. Included are:

222	243	360
226	244	394
230	245	409
231	246	513
232	247	705
233	248	851
234	273	832
239	350	

(d) 18" Sewer Dept. 250

(e) 15" Sewer Dept. 251

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. II-7

DEPT	CODE	PRODUCT	TEST OF	DATE
		S-5	South Trunk 24" Sewer Flow	

PLANT	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT	PERIOD COVERED	DATA ANALYZED BY
South Trunk			9/25/70 - 9/26/70	

% UNDER SPEC	% OVER SPEC	DISTRIBUTION TYPE	* (FOR CC)

1	TALLY	2	5	6
X		f	Acc. 2	5 * 4 CM % OVER
5600-5700	|	1	1	2.5
5500-5600	|	1	3	7.5
5400-5500	||	2	6	15
5300-5400	||	1	9	22.5
5200-5300	||	2	12	30
5100-5200	|||||	5	19	47.5
5000-5100	|||	3	27	67.5
4900-5000	|	1	31	77.5
4800-4900		0	32	80
4700-4800	||	2	34	85
4600-4700	||	2	38	95

$UCL_{\bar{X}}$	$UCL_{\bar{Y}}$	3 TOTAL 20	UCL_R
$LCL_{\bar{X}}$	$LCL_{\bar{Y}}$	4 DOUBLE TOTAL 40	LCL_R
PROC. CAPABILITY	σ	$\bar{X}$	$\bar{R}$

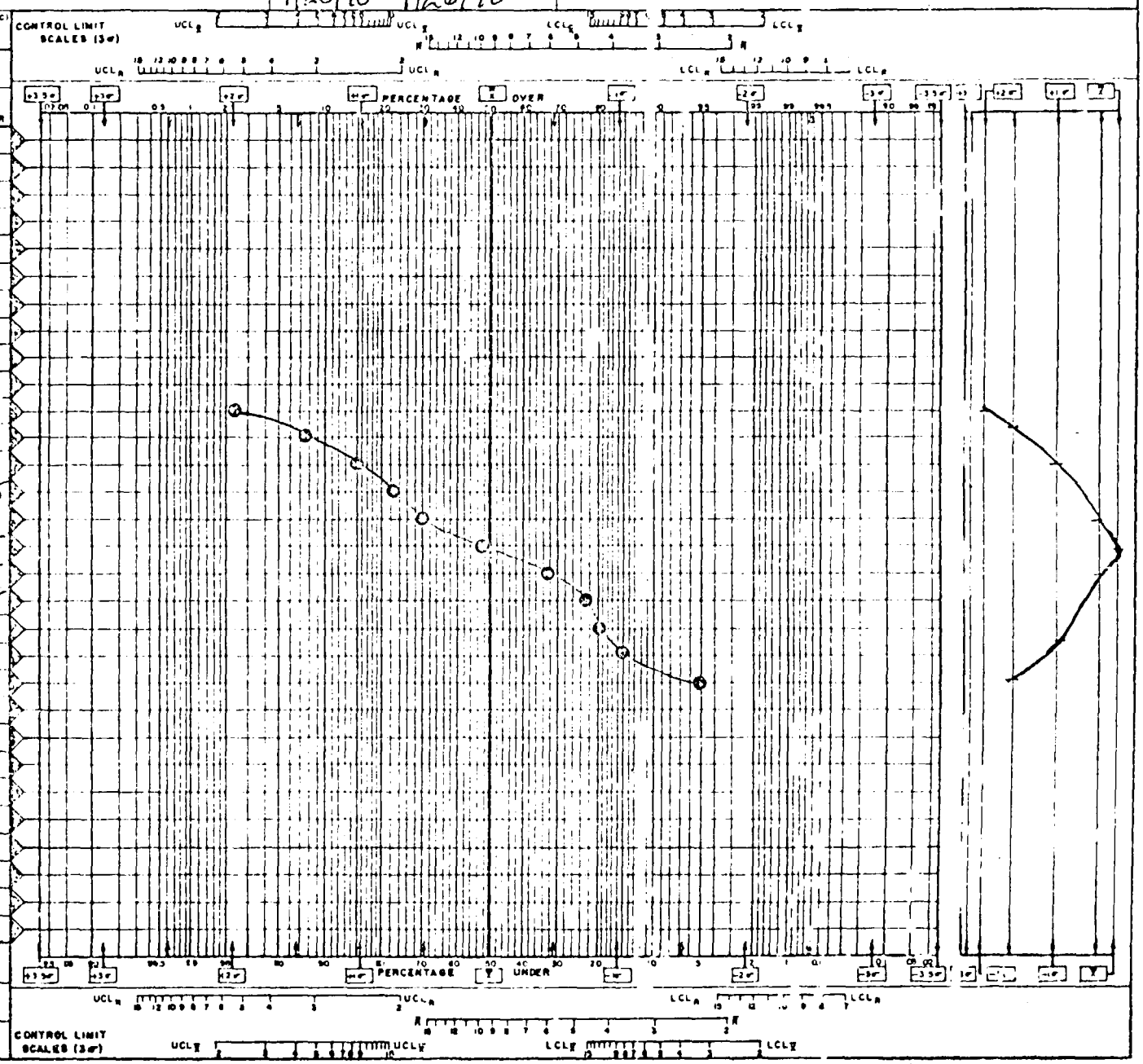

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Table II-6

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Li Concent

JOB 225 INJECTION POINT S-E

ANALYZED BY W.F.S Jr., J.S. SAMPLER S-6

DATE 10/70 SEWER South Trunk - 30" Sewer

Sample	Sample* Dilution	Absorbance	(LiCl Dilution) x	(Avg. Inject. Rate (ml/min.)) x	(1 gal. / 3785 ml.) =	Flow GPM
12-1 AM 9/25	—		—	—	0.000264	—
1-2	—		43,000	404	"	4595
2-3	—		41,500	414	"	4540
3-4	—		41,500	423	"	4650
4-5	—		37,750	428	"	4275
5-6	—		42,900	437	"	4625
					"	
					"	
10-11 AM 9/26/70	—		74,000	325	"	6350
11-12	—		56,500	329	"	4920
12-1 PM	—		54,500	327	"	4715
1-2	—		52,500	323	"	4490
					"	
					"	
10/12/70	—				"	
9:30-10:30 AM	—		80000	290	"	6120
10:30-11:30	—		60000	315	"	5000
11:30-12:30	—		60000	315	"	5000
12:30-1:30 PM	—		66000	310	"	5400
1:30-2:30	—		62000	308	"	5050
2:30-3:30	—		62000	275	"	4500
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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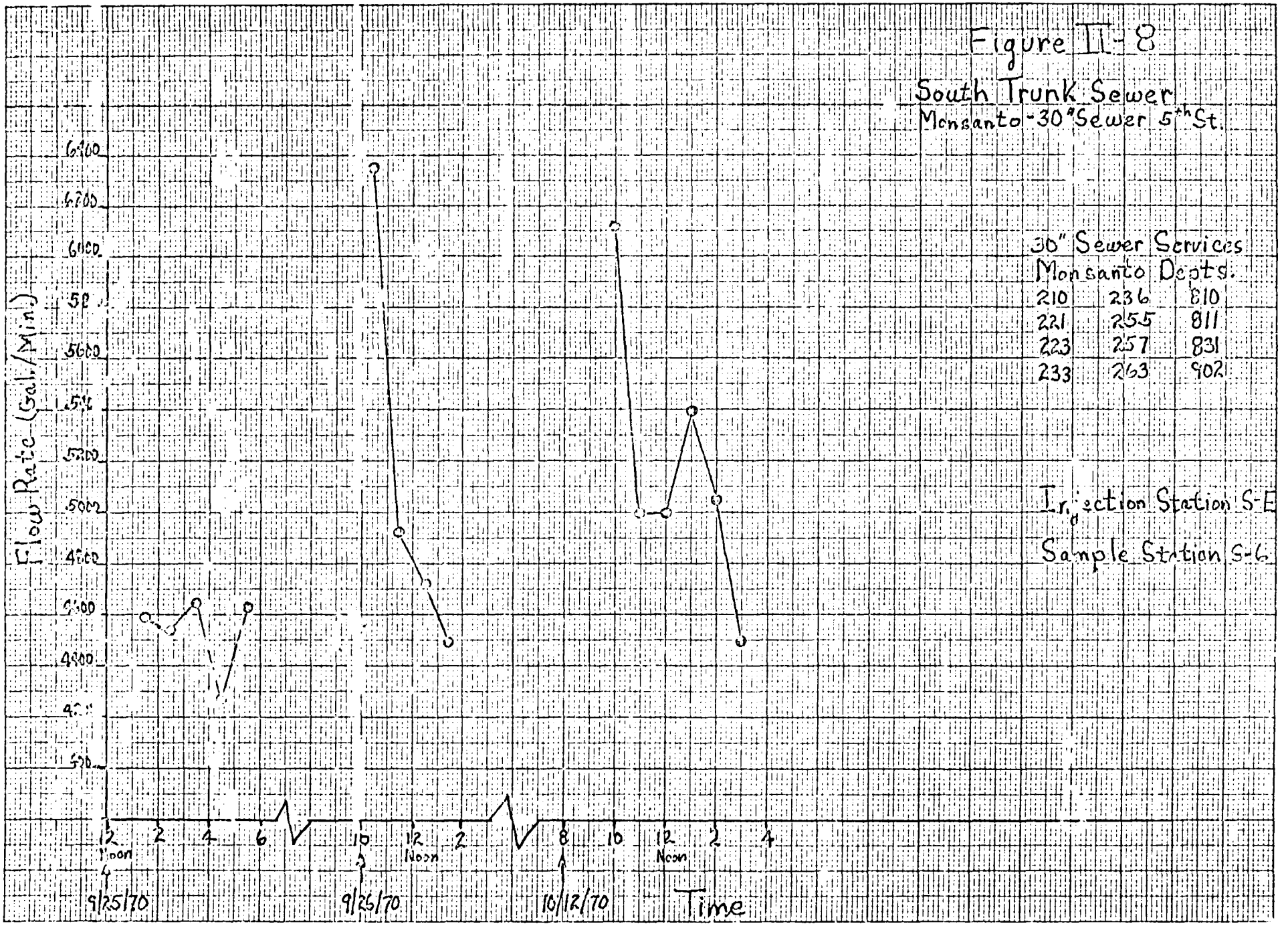

APPENDIX III

VILLAGE OF SAUGET

WEST TRUNK SEWER

FLOW DATA AND DATA ANALYSIS

Table III-1

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background Concent

JOB 225 INJECTION POINT S-D

ANALYZED BY WFS, Jr. SAMPLER S-7

DATE 10/70 SEWER West Trunk - Cerro from Furnace Bldg.

Connection to discharge to West Trunk

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 pm 9/25/70	1/1		7,800	151	0.000264	155
1-2	1/1		8,000	156	"	165
2-3	"		8,200	155	"	168
3-4	"		8000	145	"	158
4-5	"		7600	140	"	140
5-6	"		8200	140	"	153
6-7	"		9800	138	"	180
7-8	"		10,000	135	"	178
8-9	"		10,050	132	"	175
9-10	"		13,000	130	"	225
10-11	"		14,000	127	"	218
11-12	"		14,500	120	"	230
					"	
12-1 AM 9/26/70	3/1		9,800	113	"	144
1-2	1/1		16,500	105	"	230
2-3	"		16,500	102	"	223
3-4	"		16,000	97	"	230
4-5	"		—	94	"	—
5-6	"		14,500	92	"	178
6-7	"		17,500	88	"	205
7-8	"		16,000	86	"	183
					"	
					"	
10-11	"		5,800	95	"	73
11-12	"		5,800	98	"	75
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

Table III-2

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background of Concent.

JOB 225 INJECTION POINT S-(0)

ANALYZED BY WFS, Jr. SAMPLER S-8

DATE 10/70 SEWER West Trunk-Main Cerro Discharge

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min))	x (1 gal. / 3785 ml.) =	Flow GPM
12-1 9/25/70	3/1		9,600	151	0.000264	94
1-2	15/1		14,000	156	"	35
2-3	–		–	155	"	–
3-4	–		9,500	145	"	362
4-5	1/1		14,750	140	"	268
5-6	1/1		11,500	140	"	208
6-7	1/1		15,250	138	"	270
7-8	3/1		9,000	135	"	79
8-9	–		–	132	"	–
9-10	–		8,600	130	"	295
10-11	–		10,000	127	"	325
11-12	–		9,000	120	"	285
					"	
12-1 AM	3/1		11,000	113	"	80
1-2 9/26/70	–		12,500	105	"	350
2-3	–		12,600	102	"	340
3-4	–		13,000	97	"	[illegible]
4-5	–		14,250	94	"	355
5-6	–		14,000	92	"	340
6-7	–		12,500	88	"	340
7-8	–		–	–	"	
					"	
9-10 AM	–		13,500	96	"	340
10-11	–		13,000	95	"	325
11-12	–		8,400	98	"	220
					"	
12-1 PM	–		7,600	98	"	195
					"	
10/12/70					"	
12:30-1:30 PM	–		5400	98	"	140
1:30-2:30	–		5400	82	"	117
2:30-3:30	–		36000	68	"	646
3:30-4:30	–		30000	68	"	539
4:30-5:30	–		26000	68	"	467
5:30-6:30	–		25000	68	"	450
					"	
					"	
					"	
					"	
					"	
					"	
					"	
					"	

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

✓ Disregard- Data at S7 contradicts re

FREDERICK POST SQUARE 10 X 10 TO THE CENTIMETER 302-9961

Monsanto

QUALITY CONTROL

FREQUENCY DISTRIBUTION ANALYSIS SHEET

Fig. III-2

DEPT	CODE	PRODUCT	TEST OF	DATE
West Trunk			Waste Water Flow - Cerro Discharge to West Trunk	12/13/70

PLANT	UPPER SPECIFICATION LIMIT	LOWER SPECIFICATION LIMIT	PERIOD COVERED	DATA ANALYZED BY
Cerro	Injection Station S-11	Sample Station S-8	9/25/70-9/26/70; 10/12/70	JLJ

% UNDER SPEC	OVER SPEC	DISTRIBUTION TYPE		NO. OF CCI

1	TALLY	2	5	6
X		f	Acc. 2	5 4 OVER
>500	I	2	2	[illegible].35
450-500	II	1	5	[illegible].9
400-450	II	1	7	15.2
350-400	I	2	10	21.8
>300-350	~~IIII~~ III	8	20	43.5
250-300	IIII	4	32	69.5
200-250	II	2	38	82.7
150-200	I	1	41	89.1
100-150	II	2	44	95.6
50-100		0	46	

UCL$_X$	UCL$_{\bar{X}}$	3 TOTAL	23	UCL$_R$
LCL$_X$	LCL$_{\bar{X}}$	4 DOUBLE TOTAL	46	LCL$_R$
PROC. CAPABILITY				

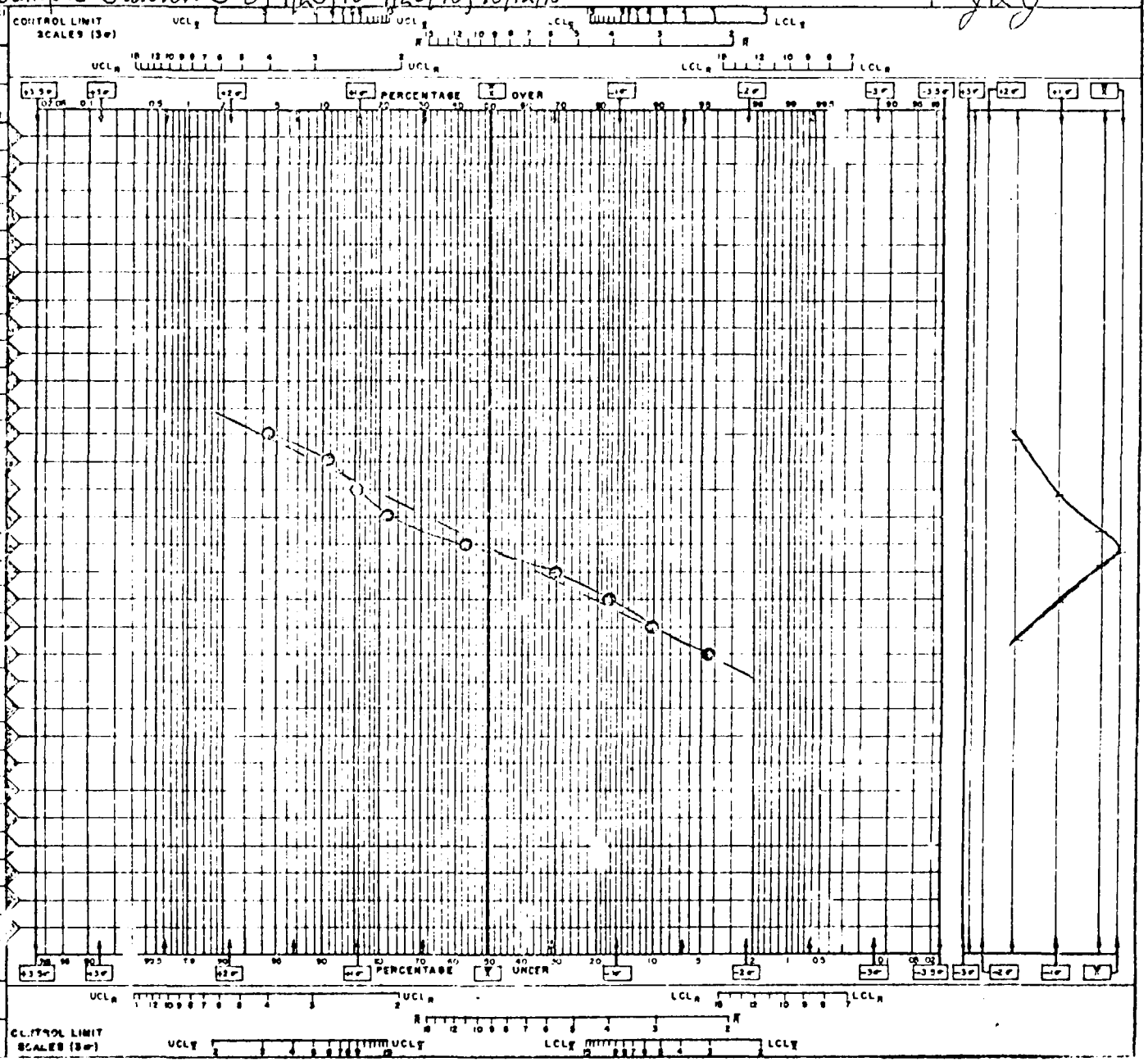

Table III-3

ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background ... Concent.

JOB 253

INJECTION POINT WA-(West)

ANALYZED BY JM

SAMPLER W-1

DATE 12/7 & 12/8/70

SEWER Midwest 24"
West Trunk-(West)

Sample	Sample* Dilution	Absorbance	(LiCl Dilution)	x (Avg. Inject. Rate (ml/min.))	x (1 gal. / 3785 ml.) =	Flow** GPM
1 11-12	–	0.133	20750	128	0.000264	703
2 12-1	–	0.135	20500	123	"	666
3 1-2	–	0.126	21750	120	"	691
4 2-3	–	0.128	21500	120	"	681
5 3-5:30	–	0.118	23000	125	"	759
6 5:30-6:30	–	0.120	22500	133	"	790
7 6:30-7:30	–	0.125	22000	134	"	778
8 2-3	–	0.091	29500	127	"	989
9 3-4	–	0.105	25500	133	"	895
10 4-5	–	0.102	26000	125	"	858
11 5-6	–	0.100	26500	123	"	791
12 6-7	–	0.100	25250	143	"	955
13 7-8	–	0.113	24000	144	"	912

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

Table III-4
ANALYTICAL DATA SHEET

FOR

SALT DILUTION FLOW MEASUREMENT METHOD

MONSANTO BIODIZE SYSTEMS, INC. (no background in Concent

JOB 253 INJECTION POINT W-A (East)

ANALYZED BY JM SAMPLER W-2

DATE 12/7 & 12/8/70 SEWER Midwest 21" West Trunk - (East)

Sample	Sample* Dilution	Absorbance	(LiCl Dilution) x (Avg. Inject. Rate (ml/min.)) x (1 gal. / 3785 ml.) =	Flow GPM
1 5-6 PM	–	0.055	43000 102 0.000264	1157
2 6-7 12/7/70	–	0.053	44500 90 "	1057
3 7-8	–	0.045	50500 61 "	813
4 11-12	–	0.024	85000 37 "	830
5 12-1 AM	–	0.020	99000 32 "	836
6 1-2. 12/8/70	–	0.022	92000 30 "	729
7 2-3	–	0.022	92000 28 "	680
8 3-5	–	0.025	82000 37 "	801
9 5-6	–	0.020	99000 44 "	1150
10 6-7	–	0.030	71000 45 "	843
11 1-3	–	0.018	144000 23 "	874
12 3-4	–	0.015	170000 23 "	1032
13 4-5	–	0.013	200000 24 "	1267
14 5-6	–	0.012	210000 23 "	1275
15 6-7	–	0.012	210000 23 "	1275

*Sample dilution necessary at times to get salt concentration to fall within bounds of the calibration curve.

**If a sample has been diluted, the calculated flow should be divided by the dilution factor.

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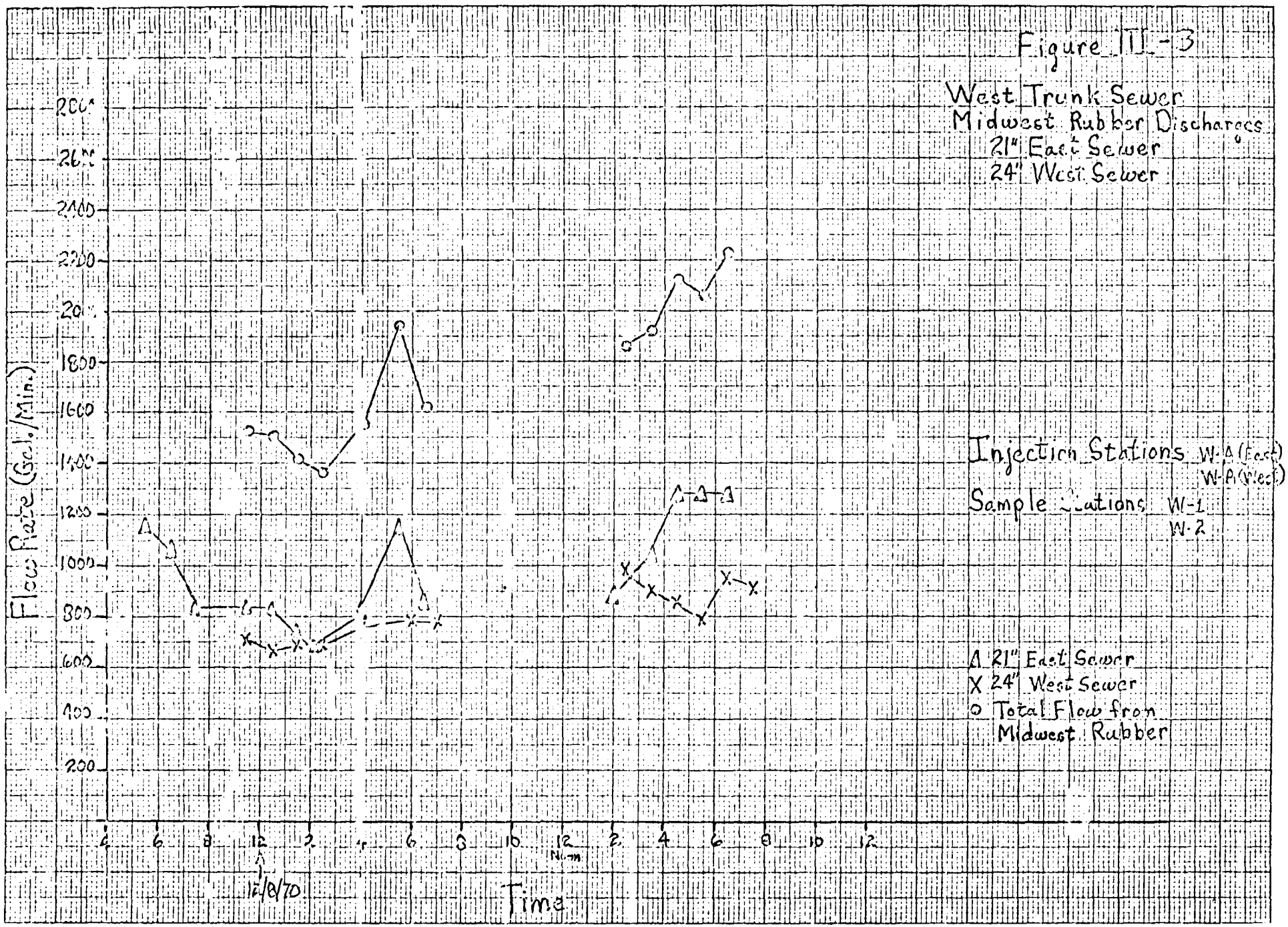

APPENDIX IV

AVERAGE WASTE WATER FLOWS
AT VILLAGE OF SAUGET SAMPLE STATIONS

FLOW CALCULATIONS FOR INDIVIDUAL CONTRIBUTORS

TABLE # IV-1

VILLAGE OF SAUGET SEWER SYSTEM

AVERAGE WASTE WATER FLOWS

Sample Station	Village Sewer	Avg. Flow (gpm)	Dates Measured	Sources
N-1	North Trunk	1,250	9/21 & 9/22/70	Mobil Oil + Monsanto 12" Sewer from Dept. 254
		10	12/70	Mobil Oil
N-2	North Trunk	700	9/21 & 9/22/70	Monsanto North Area - 24" East Sewer -Depts. 264, 266, 276
N-3	North Trunk	50	" "	Monsanto North Area - 18" Sewer G St. Dept. 268
N-4	North Trunk	590	" "	Monsanto North Area - 24" West Sewer - Depts. 258, 270
N-5	North Trunk	190	" "	Monsanto North Area - 18" West Sewer - Depts. 256, 258, 262, 272
N-6	North Trunk	3,800	" "	North Trunk - 30" Sewer to Treatment Plant - Average flow after American Zinc shut down during measurement run.
N-7	North Trunk	110	9/16 & 9/17/70	Monsanto Main Plant - 12" Sewer from Dept. 254
N-8	North Trunk	140	" "	Monsanto Main Plant - 18" Sewer from Dept. 214

TABLE #IV-1(continued)

VILLAGE OF SAUGET SEWER SYSTEM
AVERAGE WASTE WATER FLOWS

Sample Station	Village Sewer	Avg. Flow (gpm)	Dates Measured	Sources
N-9	North Trunk	2,760	12/7 & 12/8/70	American Zinc 27" East Sewer
N-10	North Trunk	210	" "	American Zinc 21" West Sewer
-	North Trunk	50	12/16/70	American Zinc Sanitary Sewer (Grab Sample)
S-1	South Trunk	110	9/25 & 9/26/70 10/12/70	Sterling Steel Casting Co. - 8" Sewer - Air Conditioning Units oper.
	South Trunk	20	9/25/& 9/26/70	Sterling Steel Casting Co.-A/C shutdown
S-2	South Trunk	140	9/25/70 & 9/26	Village Sewers + Sterling Steel Casting Co. -Sterling Steel Air Conditioning units operating
	South Trunk	50		Village Sewer + Sterling Steel Casting Co. - Sterling Steel Air Conditioning Units not operating
S-3	South Trunk	2,620	9/25 & 9/26/70	Monsanto Main Plant - 36" Sewer Monsanto Depts 222, 226, 230, 231, 232, 233, 234, 239, 243, 244, 245, 246, 247, 248, 273, 350, 360, 384, 409, 512, 705, 831, 832
S-4	South Trunk	1,470	9/25 & 9/26/70	Cerro Copper & Brass Co. discharge at North End of Dead Creek
S-5	South Trunk	5,150	" "	Monsanto Main Plant - 24" Sewer-5th St.

TABLE #IV-1(continued)

VILLAGE OF SAUGET SEWER SYSTEM
AVERAGE WASTE WATER FLOWS

Sample Station	Village Sewer	Avg. Flow (gpm)	Dates Measured	Sources
S-5(continued)				(a) Cerro Copper & Brass Co. Dead Creek Discharge(S-4) (b) Village Sewers + Sterling Steel Casting Co. (S-2) (c) Monsanto Main Plant - 36" Sewer (S-3) (d) Monsanto Sewers - 18" Sewer Dept. 251 - 18" Sewer Dept.250
S-6	South Trunk	4,950	9/25 & 9/26/70 10/12/70	Monsanto Main Plant - 30" Sewer 5th St., Monsanto Depts. 210, 221, 223, 233, 236, 255, 257, 263, 810, 811, 831, 902
S-7		175	9/25 & 9/26/70	Cerro Copper & Brass Co.-Bldg #19 Discharges into sewer outlet to West Trunk
S-8	West Trunk	330	9/25/ & 9/26/70	Cerro Copper & Brass Co. - Total Discharge to West Trunk Sewer
W-1	West Trunk	800	12/7 & 12/8/70	Midwest Rubber Company - Discharge to (24" West) Sewer
W-2	West Trunk	965	12/7 & 12/8/70	Midwest Rubber Company - Discharge to (21"East) Sewer

FLOW CALCULATIONS

American Zinc Company

$F_{AZ} = F_{N-9} + F_{N-10} + F_{Sanitary}$

$F_{AZ} = 2{,}760$ gpm + 210 gpm + 50 gpm

$F_{AZ} = 3{,}020$ gpm

Cerro Copper and Brass Company

$F_{CC\&B} = F_{S-4} + F_{S-8}$

$F_{CC\&B} = 1{,}470$ gpm + 330 gpm

$F_{CC\&B} = 1{,}800$ gpm

Mobil Oil Refinery

$F_{MO} = 10$ gpm

Monsanto Company

(North Area)
$F_{M-NA} = F_{N-2} + F_{N-3} + F_{N-4} + F_{N-5}$

$F_{M-NA} = 700$ gpm + 50 gpm + 590 gpm + 190 gpm

$F_{M-NA} = 1{,}530$ gpm

(Main Plant)
$F_{S-5} = F_{S-2} + F_{S-3} + F_{S-4} + F$(Monsanto 18" sewers Depts. 250 & 251)

$F_{M(250\ \&\ 251)} = F_{S-5} - F_{S-2} - F_{S-3} - F_{S-4}$

F_{M} (250 & 251)= 5,150 gpm - 65 gpm - 2,620 gpm - 1,470 gpm

F_{M} (250 & 251)= 965 gpm

(Main Plant)
$F_{M(M-P)} = F_{S-3} + F_{S-6} + F_{M(250\ \&251)} + F_{N-7} + F_{N-8}$

$F_{M(M-P)}$ = 2,620 gpm + 4,950 gpm + 965 pgm + 110 gpm + 140 pgm

$F_{M(M-P)}$ = 8,7[illegible] gpm

FLOW CALCULATIONS (continued)

Monsanto Company

(Total)

$F_{Monsanto} = F_{M(NA)} + F_{M(MP)}$

$F_{Monsanto} = 1{,}530 \text{ gpm} + 8{,}785 \text{ gpm}$

$F_{Monsanto} = 10{,}315 \text{ gpm}$

Midwest Rubber Company

$F_{MR} = F_{W-1} + F_{W-2}$

$F_{MR} = 800 \text{ gpm} + 965 \text{ gpm}$

$F_{MR} = 1{,}765 \text{ gpm}$

Sterling Steel Casting Company

$$F_{SSC} = F_{S-1}(\text{Air Conditioning Units Operating}) \frac{(4 \text{ months})}{(12 \text{ months})} + F_{S-1}(\text{Air Conditioning Units not operating}) \frac{(8 \text{ months})}{(12 \text{ months})}$$

$F_{SSC} = 110 \text{ gpm } (0.33) + 20 \text{ gpm } (0.67)$

$F_{SSC} = 36.4 \text{ gpm} + 13.4 \text{ gpm}$

$F_{SSC} = 50 \text{ gpm}$ *

Village of Sauget

$F_{VS} = F_{S-2} - F_{S-1}$

$F_{VS} = 50 \text{ gpm} - 20 \text{ gpm}$

$F_{VS} = 30 \text{ gpm}$

*Note: $F_{SSC} = 65$ gpm was used in calculation of Monsanto Company flow because of operation of air conditioning units during flow test.

APPENDIX V

AVERAGE SUSPENDED SOLIDS CONCENTRATIONS AT VILLAGE OF SAUGET SAMPLE STATIONS

SUSPENDED SOLIDS CALCULATIONS FOR INDIVIDUAL CONTRIBUTORS

TABLE # V-1

SUSPENDED SOLIDS DATA

Sample Station	Suspended Solids Concentrations (mg/l) 24 Hr. Composite	4 Hr. Composite
N-1	2,084	2,685
N-2	221	227
N-3	126	813
N-4	96	140
N-5	261	240
N-6	885	-
N-7	73	112
N-8	13	10
N-9	59	-
N-10	43	-
S-1	126	-
S-2	423	-
S-3	60	75
S-4	284	-
S-5	293	68
S-6	40	25
S-7	-	-
S-8	71	[illegible]
W-1	63	-
W-2	171	-
(W-1 & W-2)	25 41(Grab Samples)	-
American Zinc-Sanitary	163(Grab Sample)	-
Mobil Oil	54(Grab Sample)	-

TABLE # V-2

VILLAGE OF SAUGET SEWER SYSTEM

SUSPENDED SOLIDS

Sample Stations	Village Sewer	Avg. Flow (gpm)	Suspended Solids Conc. (mg/l)	Lbs. Solids per day
N-1	North Trunk	10	54	7
N-2	"	700	221	1,860
N-3	"	50	500	300
N-4	"	590	96	680
N-5	"	190	261	600
N-7	"	110	72	100
N-8	"	140	13	22
N-9	"	2,760	59	1,950
N-10	"	210	43	110
-	"	50	163	100
S-1	South Trunk	50	126	75
S-2	"	80	423	405
S-3	"	2,620	60	1,885
S-4	"	1,470	284	5,000
S-5	"	5,150	293	18,100
S-6	"	4,950	40	2,400
S-8	"	330	71	280
W-1	West Trunk	800	63	600
W-2	"	965	171	1,650

SOLIDS CALCULATIONS

American Zinc Company

$SS_{AZ} = SS_{N-9} + SS_{N-10} + SS_{Sanitary}$

$SS_{AZ} = 1{,}950$ lbs/day + 110 lbs/day = 100 lbs/day

$SS_{AZ} = 2{,}160$ lbs/day

Cerro Copper & Brass Company

$SS_{CC\&B} = SS_{S-4} + SS_{S-8}$

$SS_{CC\&B} = 5{,}000$ lbs/day + 280 lbs/day

$SS_{CC\&B} = 5{,}280$ lbs/day

Mobil Oil Refinery

$SS_{MO} = 7$ lbs/day

Monsanto Company

(North Area)

$SS_{M-NA} = SS_{N-2} + SS_{N-3} + SS_{N-4} + SS_{N-5}$

$SS_{M-NA} = (1{,}860 + 300 + 680 + 600)$ lbs/day

$SS_{M-NA} = 3{,}440$ lbs/day

(Main Plant)

$SS_{S-5} = SS_{S-2} + SS_{S-3} + SS_{S-4} + SS_{(Monsanto\ 18"Sewers\ Depts.\ 250\ \&\ 251)}$

$SS_{M(250\ \&\ 251)} = SS_{S-5} - SS_{S-2} - SS_{S-3} - SS_{S-4}$

$SS_{M(250\ \&\ 251)} = (18{,}100 - 405 - 1{,}885 - 5{,}000)$

$SS_{M(250\ \&\ 251)} = 10{,}810$

$SS_{(M-MP)} = SS_{S-3} + SS_{S-6} + SS_{M(250\ \&\ 251)} + SS_{N-7} + SS_{N-8}$

$SS_{(M-MP)} = (1{,}885 + 2{,}400 + 10{,}810 + 100 + 22)$ lbs/day

$SS_{(M-MP)} = 15{,}217$ lbs/day

SOLIDS CALCULATIONS (continued)
Monsanto Company (continued)

(Total)
$SS_{Monsanto} = SS_{M-NA} + SS_{M-MP}$

$SS_{Monsanto} = 3{,}440 \text{ lbs/day} + 15{,}217 \text{ lbs/day}$

$SS_{Monsanto} = 18{,}657 \text{ lbs/day}$

Midwest Rubber Company

$SS_{MR} = SS_{W-1} + SS_{W-2}$

$SS_{MR} = (600 + 1650) \text{ lbs/day}$

$SS_{MR} = 2250 \text{ lbs/day}$

Sterling Steel Casting Company

$SS_{SSC} = 75 \text{ lbs/day}$

Village of Sauget

$SS_{VS} = 330 \text{ lbs/day}$

APPENDIX VI

RESULTS OF METCALF & EDDY WASTE

CHARACTERIZATION AND OPERATING COST DISTRIBUTION

FOR VILLAGE OF SAUGET TREATMENT PLANT

Waste Quantities

The estimated quantities of flow and suspended solids as agreed upon at the August 17th meeting and which are to be used as a basis in determining annual charges are listed in Table 1.

Table 1. Estimated Quantities of Waste Materials to be Treated

Industry	Operation* days/year	Flow		Suspended Solids	
		Avg. Daily, mgd.	Total Annual, mil.gal.	Avg. Daily, tons/day	Total Annual Tons
Monsanto Chemical Co.	365	15.6	5,694	6.0	2,190
Mobil Oil Co.	365	1.5	548	2.0	730
American Zinc Co.	365	5.42	1,978	1.3	474
Cerro Copper & Brass Co.	325	1.6	520	0.8	260
Midwest Rubber Co.	273	2.0	546	5.0	1,365
Darling Fertilizer Co.	260	0.04	10	0.09	23
Others	365	0.15	55	0.06	22
TOTALS		26.31	9,351	15.25	5,064

*Based on operating schedule as indicated on Page 18 of Metcalf & Eddy Report dated March 16, 1965 to the Village of Monsanto, Illinois on "Costs for Waste Water Treatment".

Table 2. Estimated Annual Operating and Maintenance Costs

Annual Cost	Plan I: With Existing Pumping Station Costs					Plan II: Without Existing Pumping Station Costs				
	Total Amount	Flow %	Flow Amount	Susp. Solids %	Susp. Solids Amount	Total Amount	Flow %	Flow Amount	Susp. Solids %	Susp. Solids Amount
Salaries	$ 32,000	70.0	$22,400	30.0	$ 9,600	$32,000	70.0	$22,400	30.0	$ 9,600
Power and Fuel	35,000	90.0	31,500	10.0	3,500	5,000	30.0	1,500	70.0	3,500
Sludge Removal	10,000	0.0	0	100.0	10,000	10,000	0.0	0	100.0	10,000
Maintenance	18,000	60.0	10,800	40.0	7,200	13,000	50.0	6,500	50.0	6,500
Miscellaneous Supplies	3,000	80.0	2,400	20.0	600	3,000	80.0	2,400	20.0	600
Insurance	2,000	70.0	1,400	30.0	600	1,000	40.0	400	60.0	600
TOTALS	$100,000		$68,500		$31,500	$64,000		$33,200		$30,800

Incorrect!