

COMPLIANCE MONITORING ENFORCEMENT
STUDY AT MARLBOROUGH WEST WWTP
MARLBOROUGH, MA



U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 1

JOHN F. KENNEDY FEDERAL BUILDING · BOSTON, MA. 02203

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region I

Surveillance & Analysis Division

60 Westview Street

Lexington, MA 02173

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INTRODUCTION

The Enforcement Division requested the Surveillance and Analysis Division to conduct an intensive study at the Marlborough West WWTP. The purpose of this study is twofold; to determine the causes of the periodic solid washouts at the WWTP and to evaluate the static bioassay technique as a screening tool.

The decision to proceed with sampling at the Marlborough West WWTP was based upon the following problems.

- failure of the plant to report upsets during the months of August 1978 and September 1978.
- the highly variable nature of plant organic loading and pH
- the occasional presence of substances which have impaired microbiological activity and cause non-filamentous bulking of the activated sludge system.
- the low nitrogen levels ($\text{NH}_3\text{-N}$) in the primary effluent.
- discover any operation and maintenance problems at the WWTP.

BACKGROUND

The Westerly plant is located on Boundary Street near the Northboro town line. It is a conventional activated sludge system designed by Metcalf & Eddy (Figure 1). The plant 1985 design flow is 2.0 MGD, however, it currently receives about 0.85-1.00 MGD. The discharge goes to the Assabet River which eventually joins the Sudbury River in Concord, MA (Figure 2).

The WWTP was originally designed for a sanitary waste but now receives mostly industrial wastes from a nearby industrial park. The industrial composition of the influent to the WWTP amounts to 30% of the flow and 72% of the organic load. The seven major contributing industries to the WWTP are listed below in alphabetical order.

1. Butchers Wax produces waxes and detergents. Their total flow to the treatment plant is minimal yet they discharge a number of toxic materials. They have no pretreatment with the exception of batch neutralization of certain organic wastes.
2. Dav-Tech, Inc. is a small job metal plating shop. They primarily plate nickel onto parts received by outside suppliers. Their pretreatment consists of metal precipitation prior to discharge.
3. H.B. Fuller Company compounds resins and adhesives. The wastes from the plant amount to 6% of the organic load and 1% of the flow to the treatment plant. Pretreatment consists of a screening basket used to filter particles larger than 1/16" diameter out of the discharge.
4. Koehler Manufacturing Co. manufactures electric miners lamps and the

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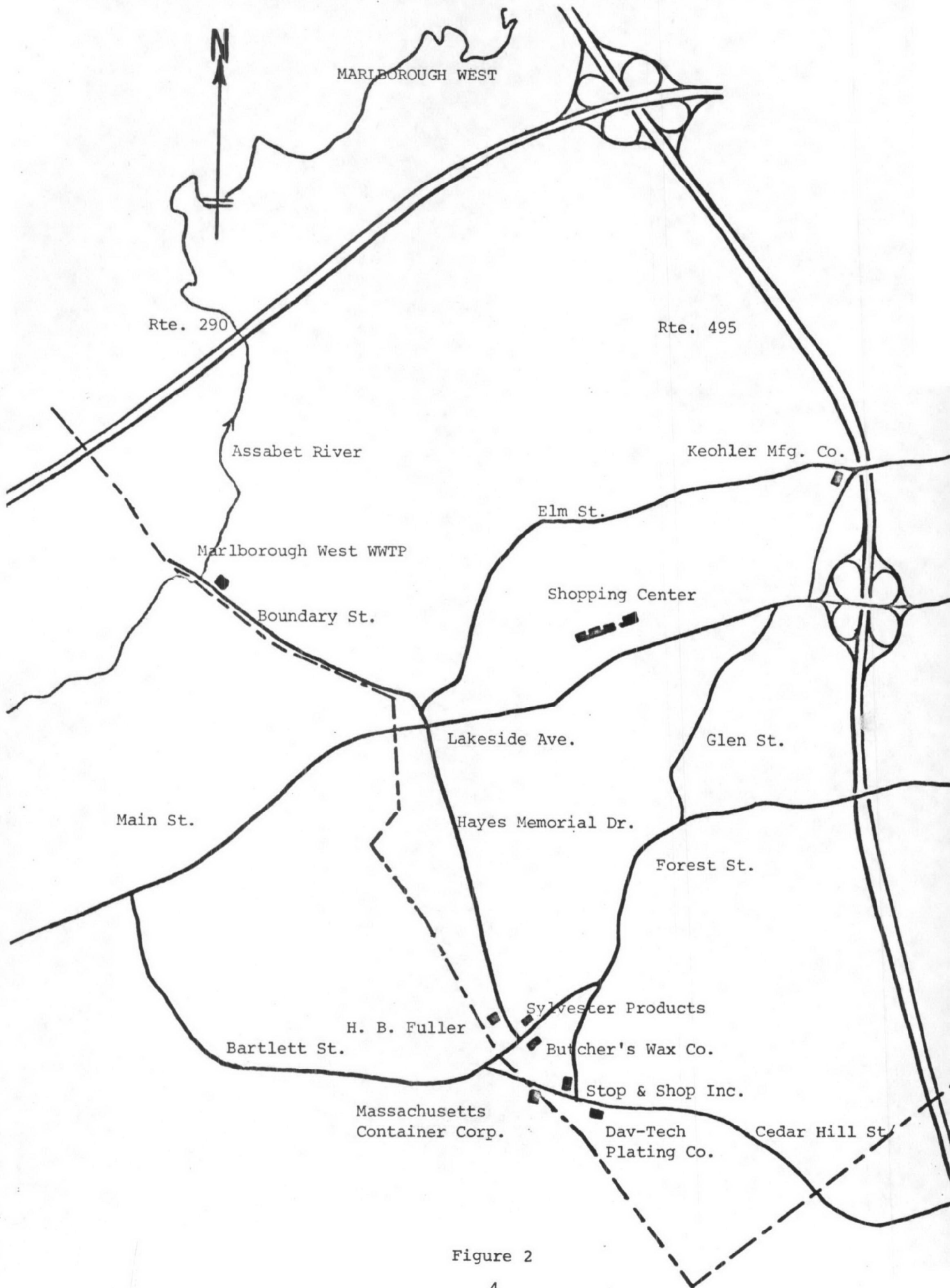


Figure 2

lead acid batteries used in the lamps. The company adds 5% of the flow to the treatment plant. Pretreatment consists of pH neutralization followed by settling prior to discharge. The discharge often violates the sewer use ordinance (Appendix VIII) for pH and lead.

5. Massachusetts Container Corporation manufactures corrugated boxes. Their flow to the WWTP is minimal. Presently, there is no pretreatment of their wastewater.

6. Stop & Shop Company, a meat processing plant contributes 17% of the total flow and a significant 66% of the BOD₅ load to the treatment plant. They presently pretreat for oil and grease and are in the process of installing flow measurement equipment. Their discharge frequently violates the sewer use ordinance for oil and grease.

7. Sylvester Products is a small metal plating operation. There is no pretreatment of their waste. They often violate the sewer use ordinance due to high metal concentrations.

Table 1 summarizes the loading rates from the seven contributing industries to the treatment plant.

TABLE 1
Estimated Loadings for Summer Study*

	<u>BOD₅</u>	<u>COD</u>	<u>TSS</u>	<u>TP</u>	<u>NH₃</u>	<u>O&G</u>	<u>Phenol</u>	<u>CN</u>
Butcher's	18	146	0.7	1.6	J0.4	J1.8	0.01	0.0001
Dav-Tech	5	6	4	--	--	--	--	0.001
H.B. Fuller	194	415	144	0.11	J0.5	4	0.08	K0.0007
Keohler	K4	17	8	--	--	--	K0.001	--
MA Cont.	7	38	J14	0.04	0.04	J9	0.0006	0.01
Scrap & Shop	2270	4536	1403	18	7	377	--	--
Sylvester	0.6	2	2	--	--	--	--	0.001
Total	2499	5160	1576	20	8	392	0.09	0.01
Influent	3473	7158	2217	59	J87	J1313	0.444	K0.06
Total % of Influent	72%	72%	71%	33%	9%	30%	21%	21%

*All values are in lbs/day

TABLE 1 (cont)

Estimated Loadings for Summer Study*

	<u>Pb</u>	<u>Cr</u>	<u>Cu</u>	<u>Fe</u>	<u>Hg</u>	<u>Ni</u>	<u>Mn</u>	<u>Zn</u>
Butcher's	--	--	--	--	--	--	--	--
Dav-Tech	K0.008	0.008	0.009	0.3	0.00002	0.5	J0.007	0.006
H.B. Fuller	K0.01	0.01	0.02	0.04	K0.0001	0.01	0.006	0.03
Keohler	5	0.09	0.09	1.3	K0.0001	0.06	K0.03	0.03
MA Cont.	1	0.2	0.02	0.05	0.00001	0.01	0.003	0.01
Stop & Shop	K0.2	K0.2	K0.4	2	K0.0004	K0.2	K0.1	0.6
Sylvester	0.03	1.1	0.3	0.2	0.00002	3	0.01	0.008
Total	6	1.6	0.8	3.9			0.16	0.68
Influent	K7	2	2	88	0.004	5	J2	2.4
Total % of Influent	85%	80%	42%	4%	10%	74%	8%	29%

*All values are in lbs/day

STUDY

The study was separated into the summer 1979 and winter 1979/80 surveys. The summer study (8/13/79-8/17/79) was an intensive sampling program of the WWTP and the seven contributing industries. Samples collected during the summer were analyzed for most of the conventional pollutants and for 100% static bioassays.

The second sampling effort (Dec. 1979-Jan. 1980) involved multi-dilution static bioassays and was initiated as a result of the summer survey. In addition, a one day survey for the 129 priority pollutants was performed during the winter survey. For the purpose of this report, the summer and winter sampling efforts will be addressed separately.

Summer Survey

The survey was designed to look at the effluent characteristics of the seven individual industries and the removal efficiency of each operation unit in the treatment plant. The results of this study are in Appendices I and II-A.

Flow was measured and recorded with a flow meter located at the influent to the WWTP. Based on the limited accessibility and resources available, an estimate was made of each industry's flow to the WWTP. The estimate was based on water use minus the water used in processing or manufacturing (Appendix III). This data was used to calculate loading rates to the WWTP (Table 1).

Winter Survey

This survey was conducted both to verify the reliability of the static bioassay technique and determine the toxicity of the effluent from each industry and the WWTP. The 100% static bioassays collected in our summer survey showed that all the fish died at the 100% concentrations. It was felt a series of static bioassay dilutions should be done to get more meaningful data. Therefore, a series of dilution static bioassays were conducted during the months of December 1979 and January 1980. The results of these tests are in Appendix II-C.

On January 7, 1980, both the final effluent and the dewatered sludge from the WWTP were sampled and analyzed for the 129 priority pollutants. The purpose of this study was to determine what toxic pollutants enter the Assabet River by the waste stream and what toxics enter sanitary landfill from the digested sludge. The parameters analyzed in this survey are shown in Appendix V-A.

Sampling Program

Sampling took place during the summer of 1979 (August 13-17) and the winter of 1979-1980 (December 1979-January 1980). The purpose of each sampling program was to determine the most critical parameters related to the solid's washouts. Each sampling location is described in Table 2 and shown on Figure 3.

1. The summer survey encompassed the conventional pollutant parameters specified below and the 100% static bioassay tests.

- a. BOD₅, COD, TSS, TP NH₃, NO₂, and NO₃, oil and grease, phenols, cyanide, lead, chrome, copper, iron, mercury, nickel, manganese, zinc
- b. total and fecal coliforms

The sampling program for the summer study involved three crews who were assigned to specific plants. Automatic samplers were used at Stop & Shop and the WWTP so that a 24 hour composite could be collected at these locations.

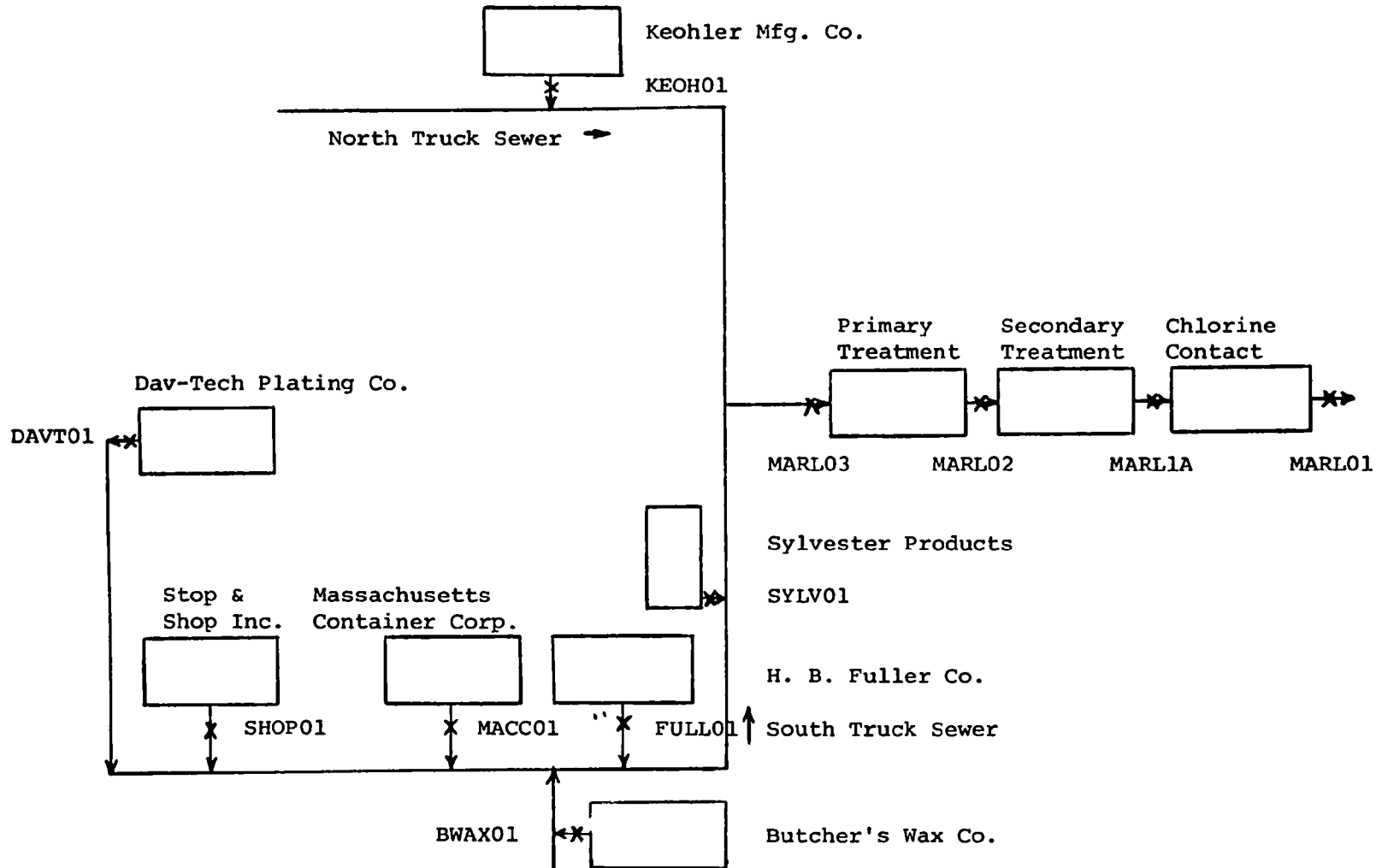
Crew 1: Sampled Stop & Shop, Inc.; Dav-Tech Plating Co.; Butcher's Wax Co.; and Sylvester Products. A 24 hour composite was collected at Stop & Shop, Inc. to obtain a representative sample for their work day. Manual eight hour composites were gathered at the other three industries.

Crew 2: Sampled the WWTP; Koehler Mfg. Co.; Massachusetts Container Corp.; and H. B. Fuller Co. The WWTP was sampled over a 24 hour period at four different locations. They were situated at the influent, primary effluent, secondary effluent, and the final effluent after chlorination. Manual composites were collected at the other industries. A 16 hour com-

TABLE 2

<u>Station Code</u>	<u>Description of Station Code</u>
MARL01	Final effluent from the Marlboro Westerly Plant. Sampled after chlorine contact chamber.
MARL1A (Summer study & bioassays testing)	Effluent from secondary clarifier prior to chlorination.
MARL02	Effluent from primary clarification prior to mixing with return sludge. Sample represents removal from primary treatment.
MARL03	Influent to the Marlboro Westerly Treatment Plant.
KEOH01	Effluent from the Keohler Mfg. Co., Felton St.
FULL01	Effluent from the H.B. Fuller Co., Hayes Memorial Drive.
BWAX01	Effluent from the Butcher's Wax Co., Bartlett Street.
MACC01	Effluent from Massachusetts Container Corp., Cedar Hill Street
SHOP01	Effluent from Stop & Shop, Inc., Crane Meadow Road.
DAVT01	Effluent from Dav-Tech Plating Co., Inc., Cedar Hill Street.
SYVL01	Effluent from Sylvester Products, Bartlett Street.
MARL1A (Toxic study only)	Waste activated sludge after dewatering.

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X indicates a sampling site

posite was collected at Mass. Container Corp. to obtain a representative sample over their two 8 hour shifts. The other two industries were sampled during their 8 hour work day.

Crew 3: Checked the automatic samplers at Stop & Shop and the WWTP and continued collecting the manual composite at Massachusetts Container Corporation.

In addition to the composite samples, grab samples were collected periodically throughout the survey at all the contributing industries and the WWTP (Appendix VII).

The standard chain of custody procedures were used in the collection and transportation of all samples. All samples taken during the survey were analyzed at the New England Regional Laboratory in Lexington, MA.

The winter sampling program consisted of both the static bioassays with various dilutions taken at the contributing industries and the WWTP and a toxic survey of all 129 priority pollutants at the WWTP. The bioassay survey extended over a two month period. The biology staff was able to perform two static bioassays each week. Stop & Shop and the WWTP were sampled with automatic samplers over a 24 hour period. Eight hour manual composites were taken at the remaining industries. A 90 liter sample was collected at each station so the biology staff could do its numerous dilution testing.

The toxic survey consisted of one 24 hour composite collected with an automatic sampler at the final discharge to the WWTP and one 4 hour manual composite of the dewatered sludge. Grab samples were collected periodically throughout the toxic survey (Appendix VII).

All sampling equipment was carefully cleaned using approved cleaning

techniques for toxic sampling. To avoid contamination special precaution was taken in collecting and preserving the samples. All samples were cooled at 4°C until delivery to the lab.

GENERAL PLANT CONDITIONS

Conditions at the WWTP were noted during both surveys. These conditions are based on visual observations and the treatment plants self-monitoring data.

The plant was operating without any problems or NPDES parameter violations during the summer survey. Polymers (sodium aluminate and ODOPHOS [ferrous sulfate]) were added to reduce sludge bulking by dosing the influent on a regular basis. These polymers were added as early as February 1979 to improve primary and secondary treatment according to Metcalf and Eddy, the town's consultant.

This situation changed during our winter survey when the plant experienced another solids washout problem which continued for several weeks (Appendix VI). Our laboratory results show the WWTP violated their NPDES permit for TSS but not for BOD. This verified our visual observations that the plant was experiencing a solids washout.

Several facts noted during this upset were:

- An alkaline slug entered the WWTP the first day of the upset and resulted in an elevated pH of 9.0.
- Polymers were not being added during the winter months due to freezing problems.

From visual observations, the solids washout at the WWTP produced a degrading white milky color in the Assabet River. The general quality of the effluent improved little over the duration of our winter survey.

Metcalf & Eddy decided to take corrective action at the WWTP after the December upset. The mean cell residence time (MCRT) was changed from 8 days to 15 days.

RESULTS

I. Field Analysis

Data was collected in the field for pH, temperature, total chlorine, and settleable solids. In addition, this section deals with visual observations made at the WWTP. The only parameter that violated permit conditions was pH. These violations occurred when alkaline slugs entered the plant. Chlorine remained at 1.5 ppm while temperature and settleable solids were within permit requirements. Visual observations showed grease was removed from the influent on a daily basis.

Six of the industrial discharges showed great variations in pH and temperature which inevitably affect the WWTP. Those industries were Koehler Mfg., Butchers Wax, H. B. Fuller, Dav-Tech, Sylvester Products, and Stop & Shop.

Based on treatment plant's self-monitoring data, some operation and maintenance problems were noted.

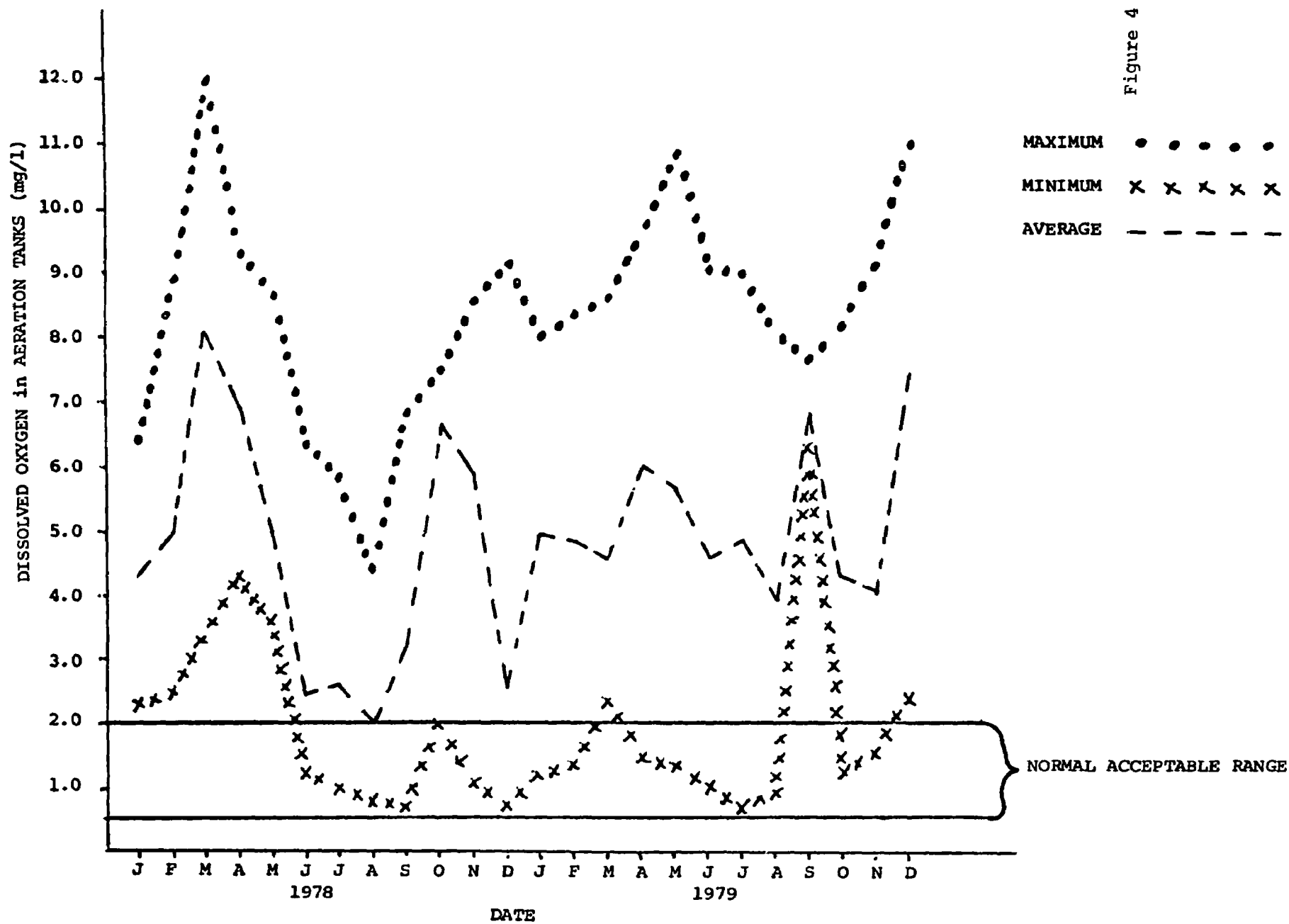
-The high dissolved oxygen data (Figure 4) in the aeration tanks may cause the bacteria to over oxidize resulting in poor settling. This may also prove to be an uneconomic operation.

-Between January 1978 through December 1979, the MCRT* (Figure 5) and the F/M** ratio (Figure 6) frequently changed (Appendix IV). A good F/M ratio varies between 0.2 to 0.4 for this type of plant, yet most of their data averaged below 0.2. This low F/M ratio indicated they were not wasting enough sludge. This contributed to excessive accumulation in the settling tanks which caused sludge collection over-loadings, septicity and final effluent deterioration.

* MCRT (mean cell residence time) The amount of time in days an average bug remains in the process. Also, termed "sludge age".

**F/M ratio: A ratio of the amount of food to the amount of organisms used to control the activated sludge process.

MARLBOROUGH WEST
TREATMENT PLANT DATA



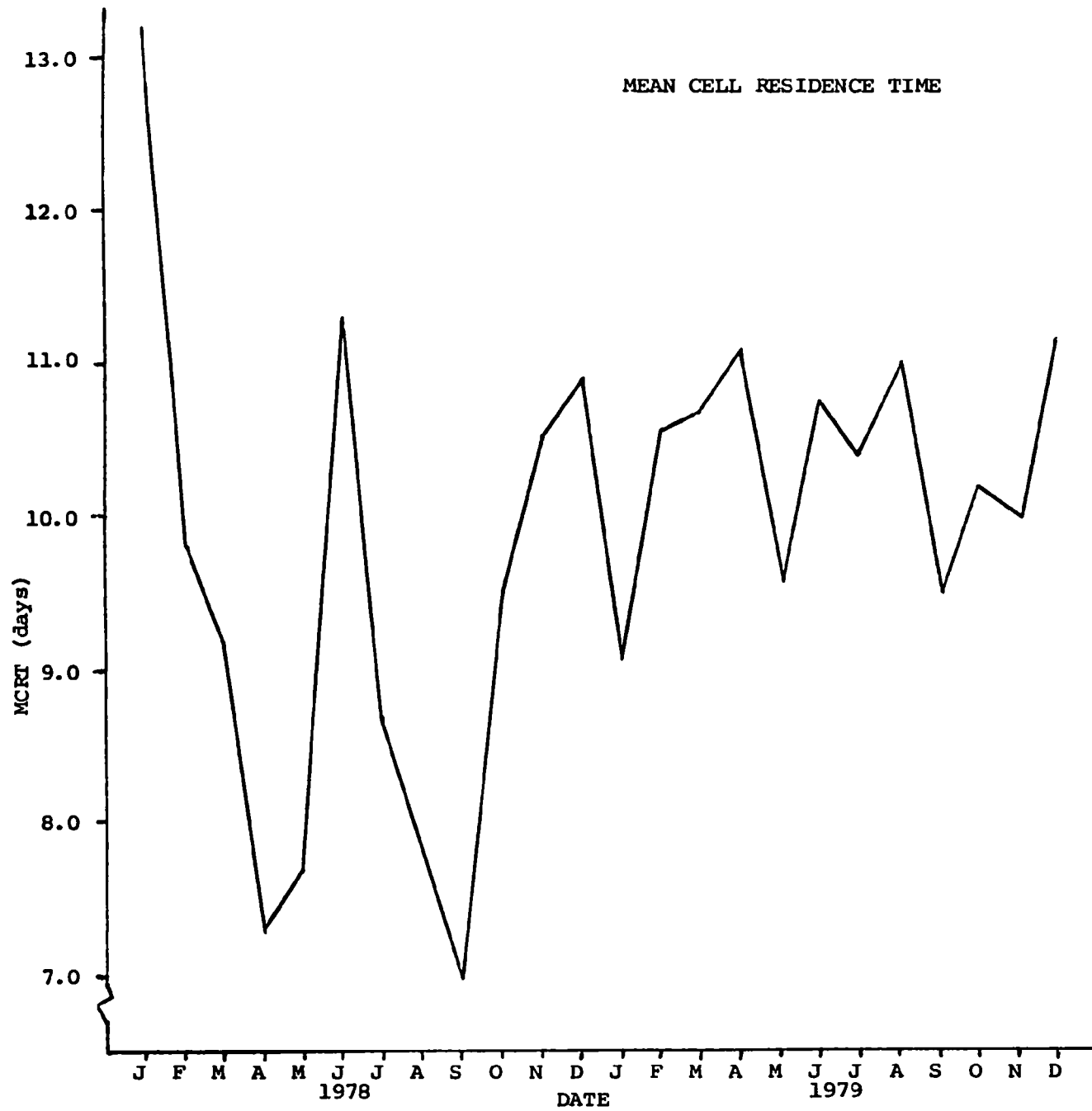


Figure 5
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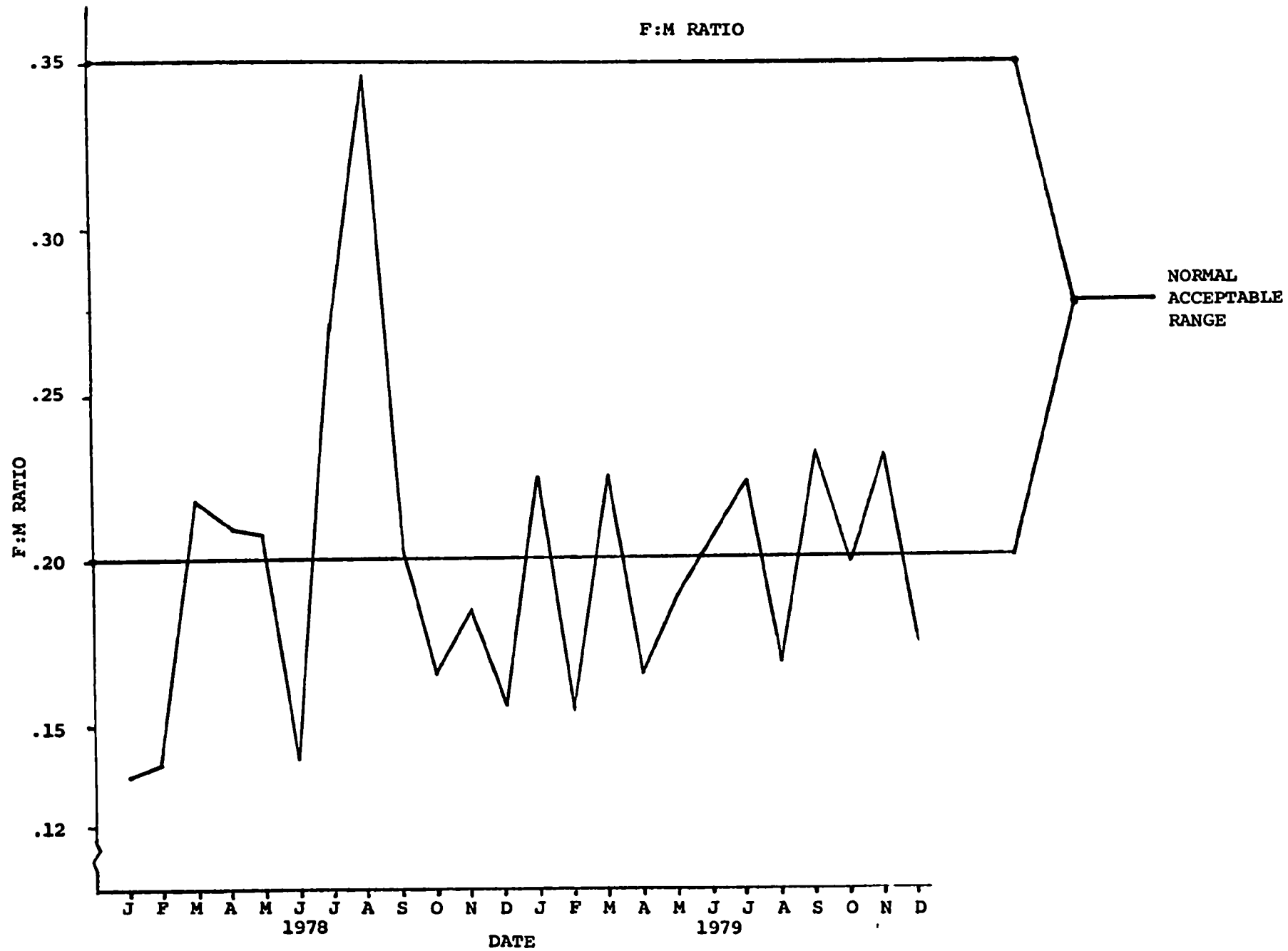


Figure 6
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II. Biological Analysis

This consisted of total and fecal coliform testing, microscopic examination of the activated sludge and static bioassays. The results of the microscopic examination and static bioassays can be found in Appendices II-B and II-C respectively. The total and fecal coliform tests showed no violations at the WWTP, however, the industries showed great variations. Butchers Wax, Koehler Mfg. Co., Sylvester Products, and Dav-Tech had low coliform counts. Stop & Shop, H. B Buller, and Mass. Container had high coliform counts (Appendix II-A).

III. Chemical Analysis

This section covers most of the conventional pollutants found in a permit.

A. The following industries violated the sewer use ordinance and often exceeded the threshold concentrations.*

Table 3

<u>Industry</u>	<u>Violations</u>	<u>Lab Analysis (mg/l)</u>	<u>Threshold Concentrations (mg/l)</u>
Stop & Shop	oil & grease	163	--
Sylvester Products	total chrome	12.5	50.0
	copper	2.8	1.0
	nickel	18.5	1.0-2.5
	lead	7.7	0.1
Koehler Mfg.	nickel	5.3	1.0-2.5
Mass Container	oil & grease	123	--
	total chrome	4.1	50.0
	lead	20.0	0.1

B. The normal ammonia level for domestic sewage varies between 12-50 mg/l, whereas our data indicates a low ammonia concentration of 6.6 to 11.6 mg/l in the influent.

*Maximum limits allowed before an inorganic pollutant will become inhibitory to the biological life of that system.

IV. Toxic Waste Analysis

This test consisted of all 129 priority pollutants. The results are shown in Appendix V and show a number of pollutants that can be traced to the industries included in our survey. Samples were collected for extractable organics and volatile organic analyses (VOA).

The following pollutants were found in both the final effluent and dewatered sludge (Appendices V-B and V-D). The permissible exposure limits indicate what toxic pollutants may be inhibitory to biological life.

Table 4

<u>Pollutant</u>	<u>Lab analysis (ppm)</u>	<u>Permissible Exposure Limits (ppm)</u>
A. Final Discharge		
1. 1,1,1 trichloroethane	0.045	350
2. methylene chloride	0.0065	500
B. Sludge		
1. 1,1,1 trichloroethane	12	350
2. 1,1 dichloroethane	12	100
3. tetra chloroethylene	4	100
4. toluene	74	200
5. acetone	--	250
6. methyl ethyl ketone	--	200
7. dimethyl disulfide	--	1

Due to laboratory constraints, no other stations were sampled for toxic pollutants. The levels reported by our lab analysis indicate possible violations in the permissible exposure limits. These chemicals can originate from a combination of industrial processes. The industrial processes most likely accountable for these toxic wastes entering the WWTP are Butcher's Wax, H.B. Fuller, and Koehler Mfg. Co.

V. Flow Measurement

Our flow measurement data from the influent to the WWTP was 16% lower than the plant's data. Flow was carefully monitored throughout our survey and the industries comprised 30% of the flow to the WWTP over a 24 hour period. Based on the industries normal hours of operation, the same flow over a 24 hour period can amount to 49% of the flow to the WWTP between 0800-1700. Table 5 shows the percentage of wastewater entering the treatment plant from each industry.

Table 5

<u>Industry</u>	<u>Hours of Operation</u>	<u>Percentages</u>	
		<u>Over 24 hour period</u>	<u>Over 8 hour period</u>
Stop & Shop	24	21	21
Koehler Mfg. Co.	8	5	18
H. B. Fuller	8	1	3
Sylvester Products	8	1	3
Dav-Tech	8	0.75	2
Mass Container	18	0.75	1
Butcher's Wax	8	0.50	1

Visual observations show the industrial flows from Butcher's Wax, H. B. Fuller, Mass. Container, Koehler Mfg. Dav-Tech and Sylvester Products to be highly variable.

The values in Table 5 are an estimate of the actual volume leaving each industry. There are many factors that can influence this estimate; however, the overall ratio in Table 5 gives us an illustration of the volume of wastewater entering the WWTP from each industry.

DISCUSSION

The purpose of this report was to identify the cause of the solids washouts. Our laboratory results indicate a number of parameters that could cause potential problems at the treatment plant.

The in situ tests showed the industries with great variations in pH and temperature. When a batch dump from one of the industries enters the WWTP, it raises the pH of the influent to over 9. Bacteria favor a pH of 7 for optimum growth and usually cannot withstand shock loadings. Although growth will occur at pH values of 6 to 9, it does so at a much reduced rate. This could result in undesirable forms of organisms forming at these outside ranges causing bulking problems. BOD removal efficiency also decreases as the pH moves outside the optimum range.

Therefore, bacteria are suppressed when an alkaline sludge enters the plant. This can be further compounded when an inorganic and organic slug enter the plant causing a shock load.

The presence of inorganic (Table 3) and organic (Table 4) pollutants at the WWTP indicates a problem could occur if the concentrates were above the threshold exposure limits. Our laboratory analysis shows at the time of our survey these pollutants are within an acceptable range for biological treatment to occur at the WWTP. This situation may change when the WWTP receives a peak flow at the influent due to varying volumes of wastewater leaving the industries. When these pollutants enter the plant in the form of a slug, the likelihood of it affecting biological treatment is increased. This may inevitably result in a solids washout.

The risk of a solids washout is increased by unsuitable operation and maintenance practices at the WWTP. The dissolved oxygen in the aeration

basins is higher than the normal operating range (Figure 4). This may cause bacteria to over-oxidize resulting in poor settling. Efforts should be made to bring the dissolved oxygen within an operable range.

As evidenced from their self-monitoring data, the WWTP had a low F/M ratio over the past two years. A low F/M ratio indicates they are not wasting enough sludge. Thus, when the solids level is increased the amount wasted is reduced which has the effect of lowering the F/M ratio and increasing the MCRT. Excessive accumulation of sludge will cause sludge collector overloading to final effluent deterioration. The reason for this problem is due to the limited amount of time the dewatering facility is in operation.

CONCLUSIONS

Based on the summer and winter surveys conducted at Marlborough West, I offer these following conclusions:

1. The chemical analysis from the summer survey showed the WWTP to be in compliance with their expired NPDES permit.
2. During the summer survey, the plant appeared in good operating condition.
3. Based on both surveys the major reasons for the solids washouts can be attributed to:

- Alkaline slugs entering the plant from Koehler Mfg., Butchers Wax, H. B. Fuller, Dav-Tech, Sylvester Products, and Stop & Shop.

- Inorganic pollutants above the threshold concentrations (Table 3) most likely come from Sylvester Products, Koehler Mfg., Dav-Tech, H. B. Fuller, and Stop & Shop.

- The toxic organic survey shows a number of pollutants present to create a problem. The industries responsible for discharges of organic pollutants most likely come from Butchers Wax, H. B. Fuller, and Koehler Mfg.

- The bioassay study shows most of the industries to have toxic discharges with some having greater toxicity than others.

4. Other problems that could have contributed to a solids washout are:

- The low ammonia concentrations in the influent to the WWTP are indicative of industrial wastewater.

- Industries discharge 72% of the BOD load into the WWTP and 91% of this amount is contributed by Stop & Shop. Based on our results,

Stop & Shop could most likely be responsible for the WWTP to experience a variable organic loading.

-Based on the self-monitoring data, several operation and maintenance practices at the WWTP may be questionable.

1. high levels of dissolved oxygen in the aeration tanks
2. backlog of solids to be dewatered

RECOMMENDATIONS

1. A comprehensive pre-treatment program should be initiated by all the industries sampled in this survey to minimize their specific pollutants entering the sewer system.
2. Batch dumps should be bleed into the sewer system so the WWTP could minimize problems created from organic and inorganic pollutants and alkaline pH loads.
3. The city should continue to monitor any new activities by the industries to insure compliance.
4. EPA personnel should schedule inspections at the WWTP and contributing industries to determine the status of compliance and provide technical support if necessary.
5. The city should continue to use polymers to help settling of the sludge in the clarifiers.
6. The city should continue to seek technical advice from Metcalf & Eddy on the proper operation of the aeration tanks and the wasting of their sludge.
7. A more accurate and comprehensive approach to flow measurement of the industries should be done to better quantify the loading rates of each industry's wastes to the WWTP.
8. More stations should be sampled for toxic wastes so the sources of these wastes could be specifically identified.

ABBREVIATIONS USED IN THE REPORT

<u>ABBREVIATION</u>	<u>DESCRIPTION</u>	<u>UNITS OF MEASURE</u>
Temp	temperature of sample	degrees centigrade (°C)
pH	field pH	standard units, (SU)
DO	dissolved oxygen	milligrams per liter, mg/l
9999	composite sample	----
MGD	million gallons per day	million gallons per day
BOD ₅	5 day biochemical oxygen demand incubated at 20°C	mg/l
TSS	total suspended solids	mg/l
VSS	loss on ignition at 600°C (organic)	mg/l
FSS	remining after ignition at 600°C (inorganic)	mg/l
O&G	oil & grease	mg/l
NH ₃	ammonia	mg/l
TKN	total kjeldahl nitrogen	mg/l
NO ₂	nitrite	mg/l
NO ₃	nitrate	mg/l
CN	cyanide	mg/l
COD	chemical oxygen demand	mg/l
Cr	chrome	micrograms per liter, ug/l
Cu	copper	ug/l
Fe	iron	ug/l
Hg	mercury	ug/l
Mn	manganese	ug/l
Ni	nickel	ug/l

ABBREVIATIONS (CONT)

<u>ABBREVIATION</u>	<u>DESCRIPTION</u>	<u>UNITS OF MEASURE</u>
Pb	lead	ug/l
Zn	zinc	ug/l
Plant loadings = concentration of BOD in mg/l times plant flow in mgd times weight of one gal. of water equals lbs. of BOD or $\text{mg/l} \times \text{mgd} \times 8.34 = \text{lbs/day}$		lbs/day

Symbols preceding a report value denote the following:

J = estimated, value not accurate

K = less than

L = greater than

R = results not reported

--- = no sample collected

S = not present in measureable amounts

APPENDIX I

APPENDIX I-A

KEOH01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	9.00	K5.00	K5.00	8.00	6.75
COD	--	12.0	--	44.0	28.0
TSS	13.0	11.0	1.0	29.0	13.5
TP	--	--	--	--	--
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
O&G	--	--	--	--	--
Phenol	--	--	--	K0.002	K0.002
(--	--	--	--	--
Cr	--	K0.100	--	K0.100	K0.100
Cu	--	0.200	--	0.100	0.15
Fe	--	0.800	--	2.800	1.80
Hg	--	--	--	K0.0002	K0.0002
Mn	--	K0.050	--	K0.050	K0.050
Ni	--	0.100	--	K0.100	K0.10
Pb	--	2.300	--	13.000	7.7
Zn	--	0.0300	--	0.0500	0.040

FULL01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	2200	1200	1400	1400	1550
COD	--	2750	--	6930	4840
TSS	3000	180	70	1100	1088
TP	--	1.28	--	0.25	0.77
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	3.40	4.44	6.70	11.30	3.96
O&G	20.0	--	53.4	--	36.7
Phenol	--	--	--	1.060	1.060
CN	--	0.005	--	K0.005	K0.005
Cr	--	K0.100	--	K0.100	K0.100
Cu	--	0.200	--	0.100	0.150
Fe	--	0.400	--	0.400	0.400
Hg	--	--	--	K0.0002	K0.0002
Mn	--	K0.05	--	K0.05	K0.05
Ni	--	0.100	--	K0.100	K0.10
Pb	--	K0.100	--	K0.100	K0.10
Zn	--	0.200	--	0.340	0.27

SYLV01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	6.0	6.0	6.0	K5.0	5.75
COD	--	12.0	--	16.0	14.0
TSS	18.0	8.0	5.0	49.0	20.0
TP	--	--	--	--	--
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
O&G	--	--	--	--	--
Phenol	--	--	--	--	--
CN	--	K0.005	--	K0.005	K0.005
Cr	--	0.900	--	24.000	12.5
Cu	--	20.000	--	17.000	18.5
Fe	--	0.700	--	2.600	1.650
Hg	--	--	--	0.0002	0.0002
Mn	--	J0.06	--	J0.09	J0.075
Ni	--	0.800	--	4.800	2.8
Pb	--	0.200	--	0.200	0.20
Zn	--	0.0400	--	0.0900	0.065

DAVT01

Parameter mg/l	08/13/79	08/14/79	08/15/79	08/16/79	Avg
BOD ₅	48.0	12.0	30.0	190.0	70.0
COD	--	52.0	--	76.0	64.0
TSS	60.0	21.0	80.0	46.0	51.8
TP	--	--	--	--	--
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
O&G	--	--	--	--	--
Phenol	--	--	--	--	--
CN	--	0.011	--	K0.005	F0.008
Cr	--	K0.100	--	K0.100	K0.100
Cu	--	0.100	--	0.100	0.100
Fe	--	3.400	--	3.400	3.40
Hg	--	--	--	K0.0002	K0.0002
Mn	--	J0.08	--	J0.090	J0.085
Ni	--	5.000	--	5.500	5.25
Pb	--	K0.100	--	K0.100	K0.10
Zn	--	0.0700	--	0.700	0.39

MACC01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	72.0	74.0	160	--	102
COD	--	470	--	684	577
TSS	160	220	230	J180	198
TP	--	0.580	--	--	0.58
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	0.40	0.45	1.00	--	0.62
O&G	J218	--	27.1	--	J123
Phenol	--	--	--	0.0110	0.011
CN	--	--	--	0.008	0.008
Cr	--	--	--	4.000	4.0
Cu	--	--	--	0.300	0.30
Fe	--	--	--	0.800	0.80
Hg	--	--	--	K0.0002	K0.0002
Mn	--	--	--	K0.05	K0.05
Ni	--	--	--	K0.100	K0.100
Pb	--	--	--	20.0	20
Zn	--	--	--	0.130	0.130

BWAX01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	1100	1200	190	1800	1073
COD	--	7070	--	10400	8735
TSS	65.0	38.0	35.0	32.0	42.5
TP	--	159	--	13.1	86.1
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	8.50	--	1.80	J76.2	J28
O&G	J164	--	38.2	--	J101
Phenol	--	--	--	0.350	0.350
CN	--	K0.005	--	0.010	K0.008
Cr	--	--	--	--	--
Cu	--	--	--	--	--
Fe	--	--	--	--	--
Hg	--	--	--	K0.0002	K0.0002
Mn	--	--	--	--	--
Ni	--	--	--	--	--
Pb	--	--	--	--	--
Zn	--	--	--	--	--

SHOP01

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>
BOD ₅	490	1400	1800	950	1160
COD	--	--	--	2150	2150
TSS	280	540	880	1100	700
TP	--	8.70	--	8.85	8.78
NO ₂₊₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	2.41	2.00	5.60	J3.40	J3.35
O&G	J130	--	--	196	J163
Phenol	--	--	--	--	--
CN	--	--	--	--	--
Cr	--	K0.100	--	K0.100	K0.100
Cu	--	0.200	--	0.200	0.200
Fe	--	0.700	--	1.300	1.000
Hg	--	--	--	K0.0002	K0.0002
Mn	--	K0.050	--	K0.050	K0.050
Ni	--	K0.100	--	0.100	K0.100
Pb	--	K0.100	--	K0.100	K0.100
Zn	--	0.340	--	0.290	0.32

MARL03

Parameter mg/l	08/13/79	08/14/79	08/15/79	08/16/79	Avg
BOD ₅	430	270	270	400	343
COD	--	550	--	932	741
TSS	360	370	35.0	68.0	208
TP	--	4.8	--	7.25	6.025
NO ₂₊₃	9.3	--	0.82	--	5.06
TKN	9.3	--	13.0	--	11.15
NH ₃	6.62	8.5	11.6	18.4	18.78
O&G	1118	--	138	--	1128
Phenol	--	--	--	0.048	0.048
CN	--	0.005	--	0.006	0.0055
Cr	--	0.1	--	0.2	0.15
Cu	--	0.2	--	0.2	0.2
Fe	--	9.0	--	9.0	9.0
Hg	--	--	--	0.0004	0.0004
Mn	--	0.14	--	0.15	0.145
Ni	--	0.5	--	0.5	0.5
Pb	--	0.8	--	0.6	0.7
Zn	--	0.21	--	0.03	0.12

MARL01

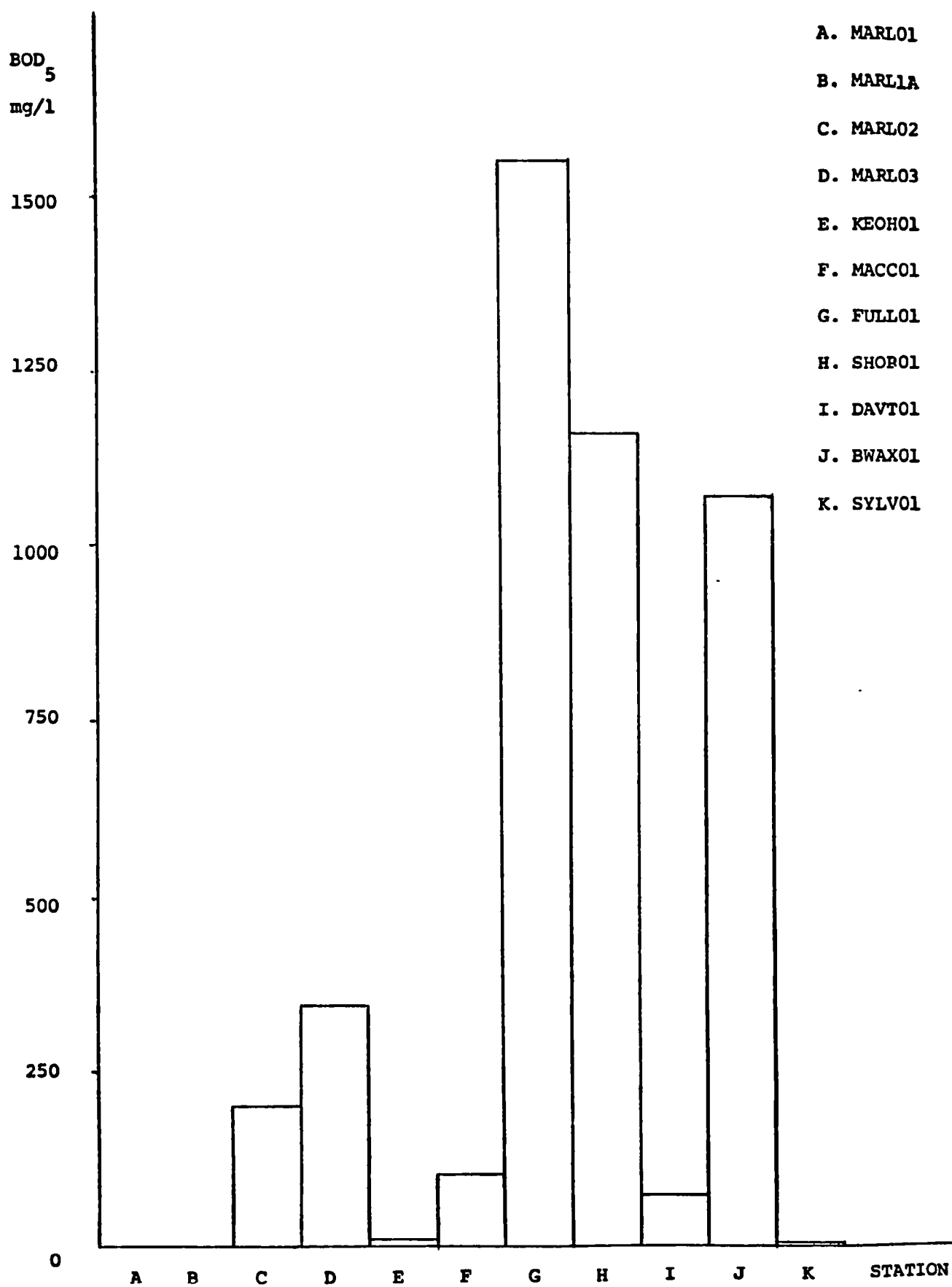
<u>Parameter mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg</u>	<u>Avg % Removal</u>
BOD ₅	5.00	K5.00	5.00	5.00	K5.00	98
COD	--	36.0	--	40.00	38.0	94
TSS	9.00	6.00	5.00	8.00	7.00	96
TP	--	1.17	--	0.970	1.07	82
NO ₂₊₃	2.30	--	7.12	--	4.71	0
TKN	2.30	--	2.50	--	2.40	78
NH ₃	1.09	0.47	1.07	J1.10	J0.93	J89
O&G	2.00	--	21.1	--	11.55	J91
Phenol	--	--	--	--	--	--
CN	--	--	--	--	--	--
Cr	--	K0.100	--	K0.100	K0.100	25
Cu	--	0.100	--	K0.100	K0.100	L50
Fe	--	0.300	--	0.200	0.250	97
Hg	--	--	--	--	--	--
Mn	--	K0.050	--	K0.050	K0.050	J65
Ni	--	0.400	--	0.400	0.400	20
Pb	--	K0.100	--	K0.100	K0.100	L85
Zn	--	0.300	--	0.230	0.130	0

MARL02

<u>Parameter</u> <u>mg/l</u>	<u>08/13/79</u>	<u>08/14/79</u>	<u>08/15/79</u>	<u>08/16/79</u>	<u>Avg.</u>
BOD ₅	210	200	180	210	200
TSS	130	100	110	110	113
FSS	26.0	21.0	20.0	20.0	21.8
VSS	110	81.0	90.0	90.0	93.0
COD	--	345	--	442	394
TP	--	4.04	--	3.70	3.87
NO ₂₊₃	0.03	--	0.82	--	0.43
TKN	13.70	--	15.90	--	14.80
NH ₃	9.94	12.50	15.30	10.20	11.99
O&G	51.20	--	57.70	--	54.45
Cr	--	0.100	--	0.200	0.150
Cu	--	0.100	--	0.100	0.100
Fe	--	5.5	--	7.0	6.3
Ni	--	0.50	--	0.30	0.40
Mn	--	0.20	--	0.20	0.20
Zn	--	0.10	--	0.08	0.09

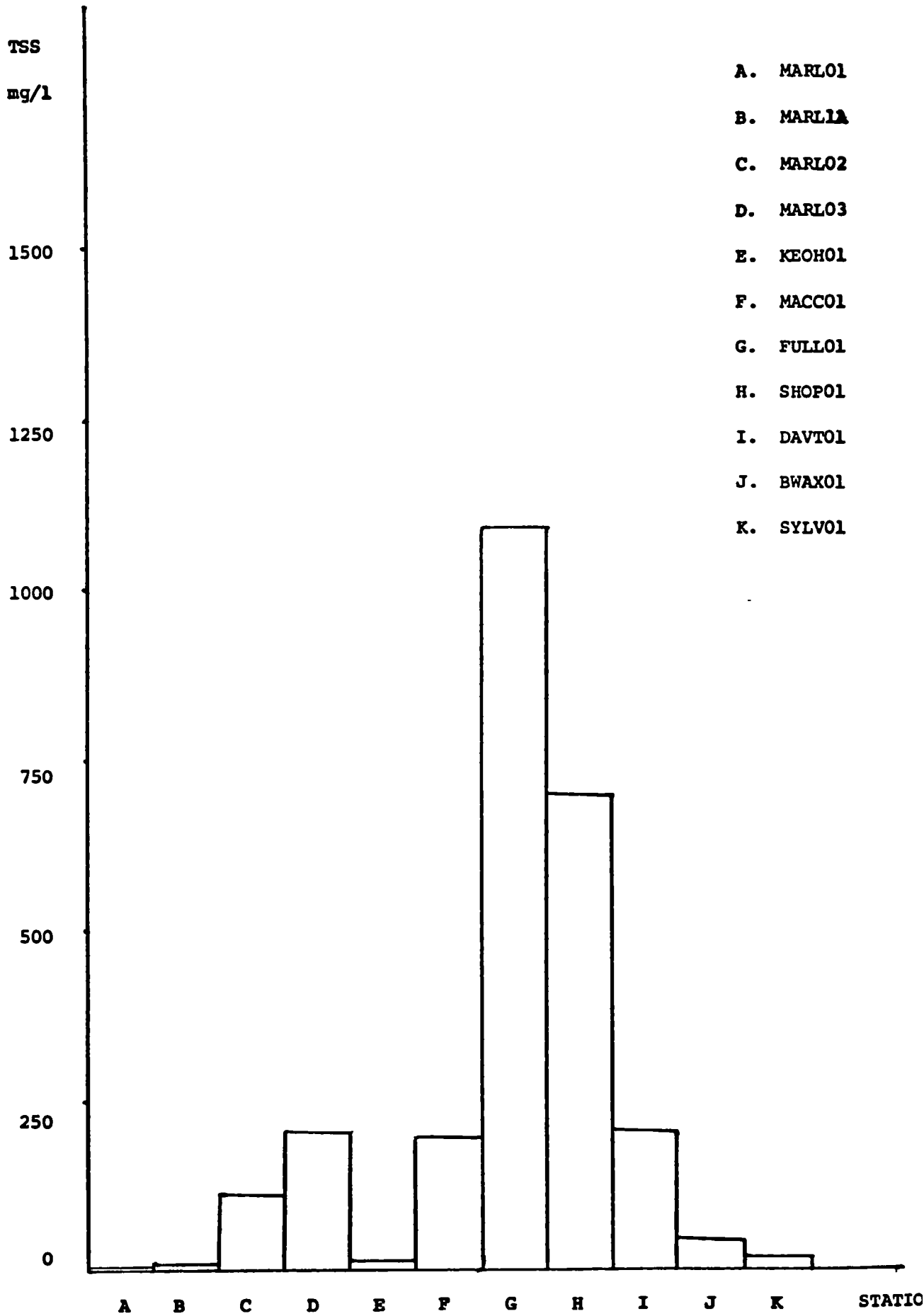
APPENDIX I-B

MARLBOROUGH WEST
FOUR DAY BOD₅ AVERAGES



MARLBOROUGH WEST
FOUR DAY TSS AVERAGES

2

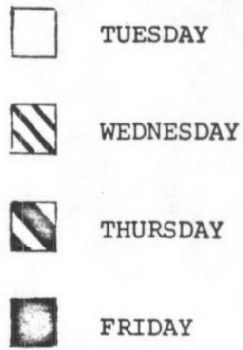


MARLBOROUGH WEST

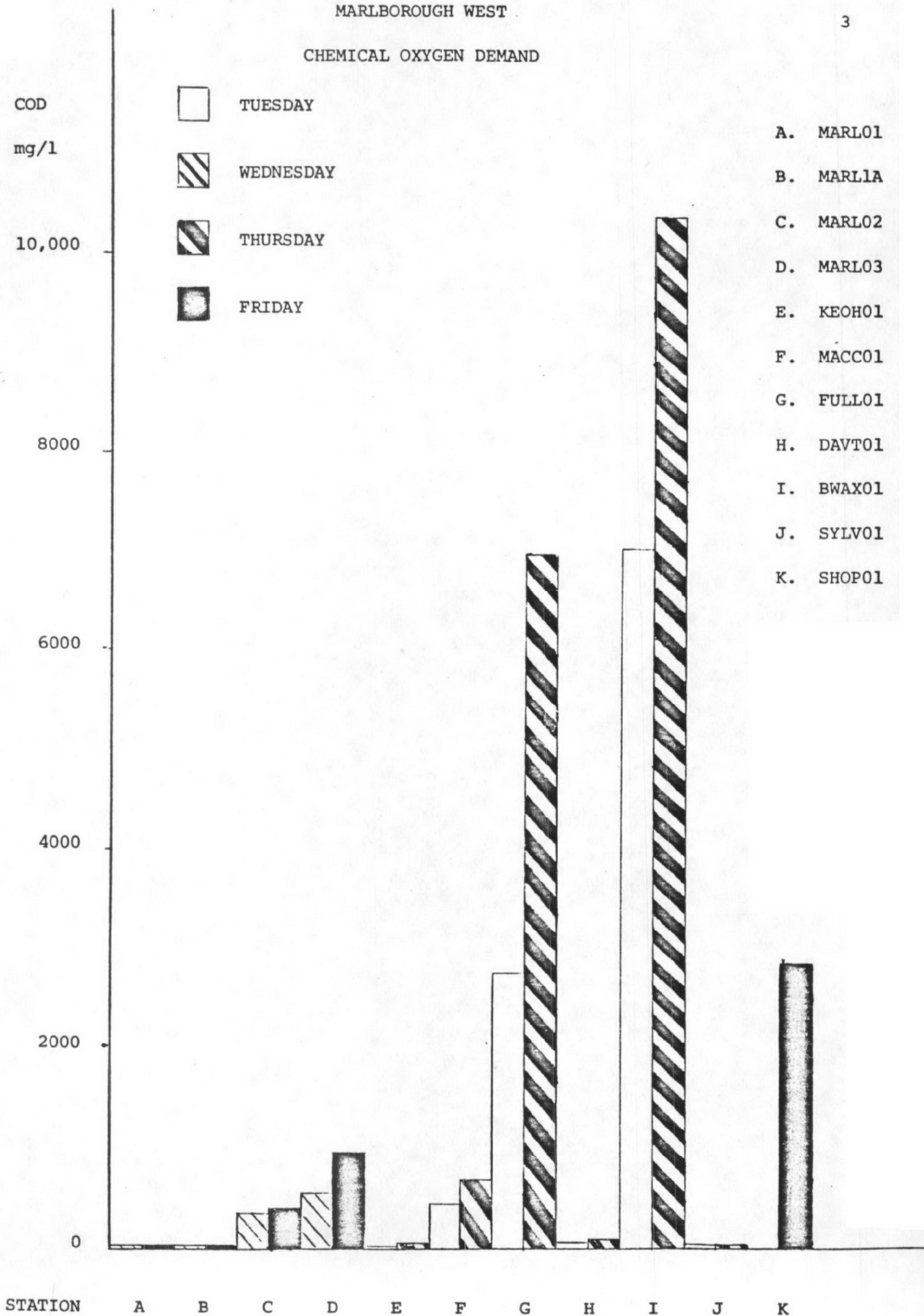
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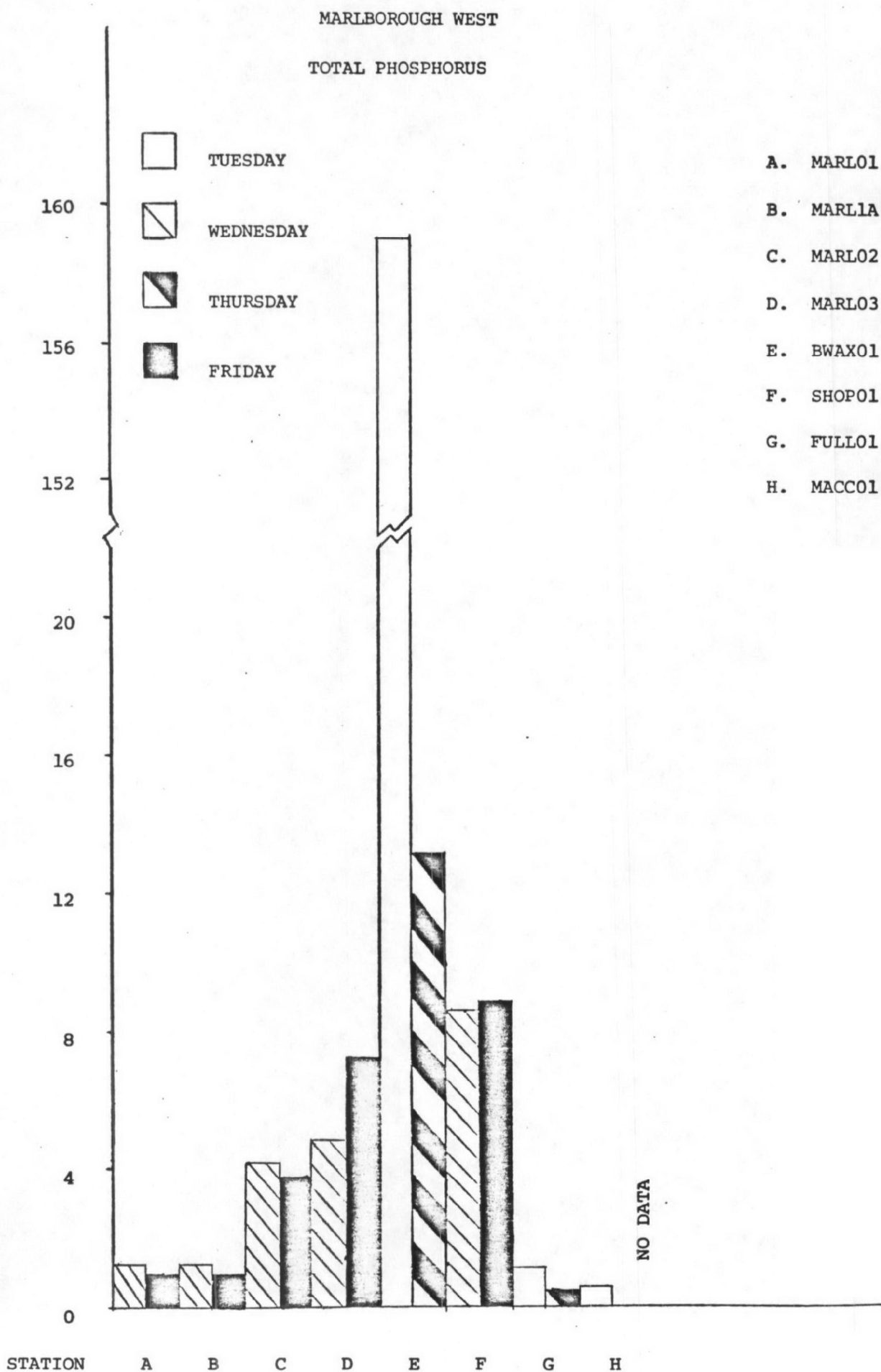
CHEMICAL OXYGEN DEMAND

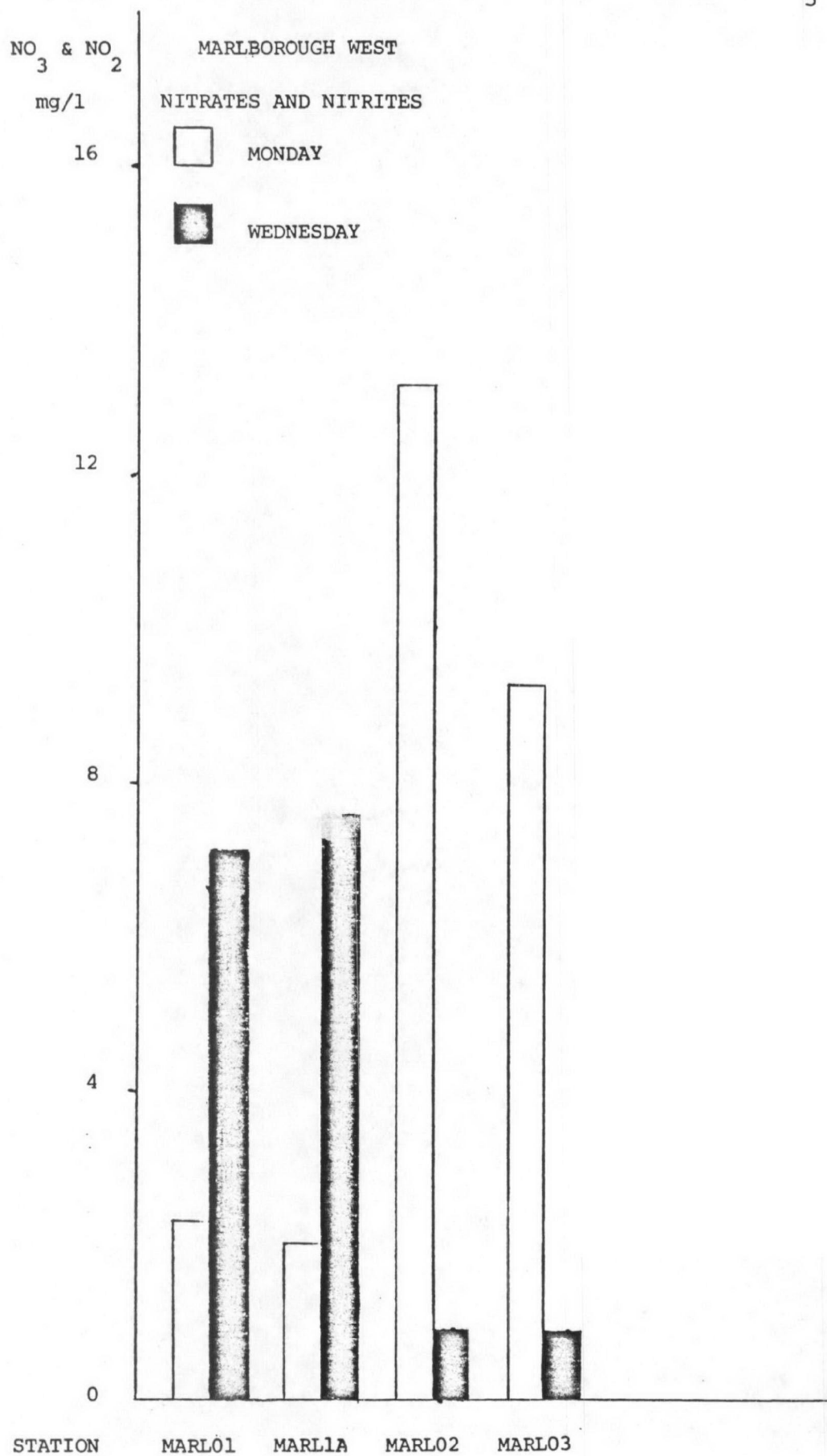
COD
mg/l

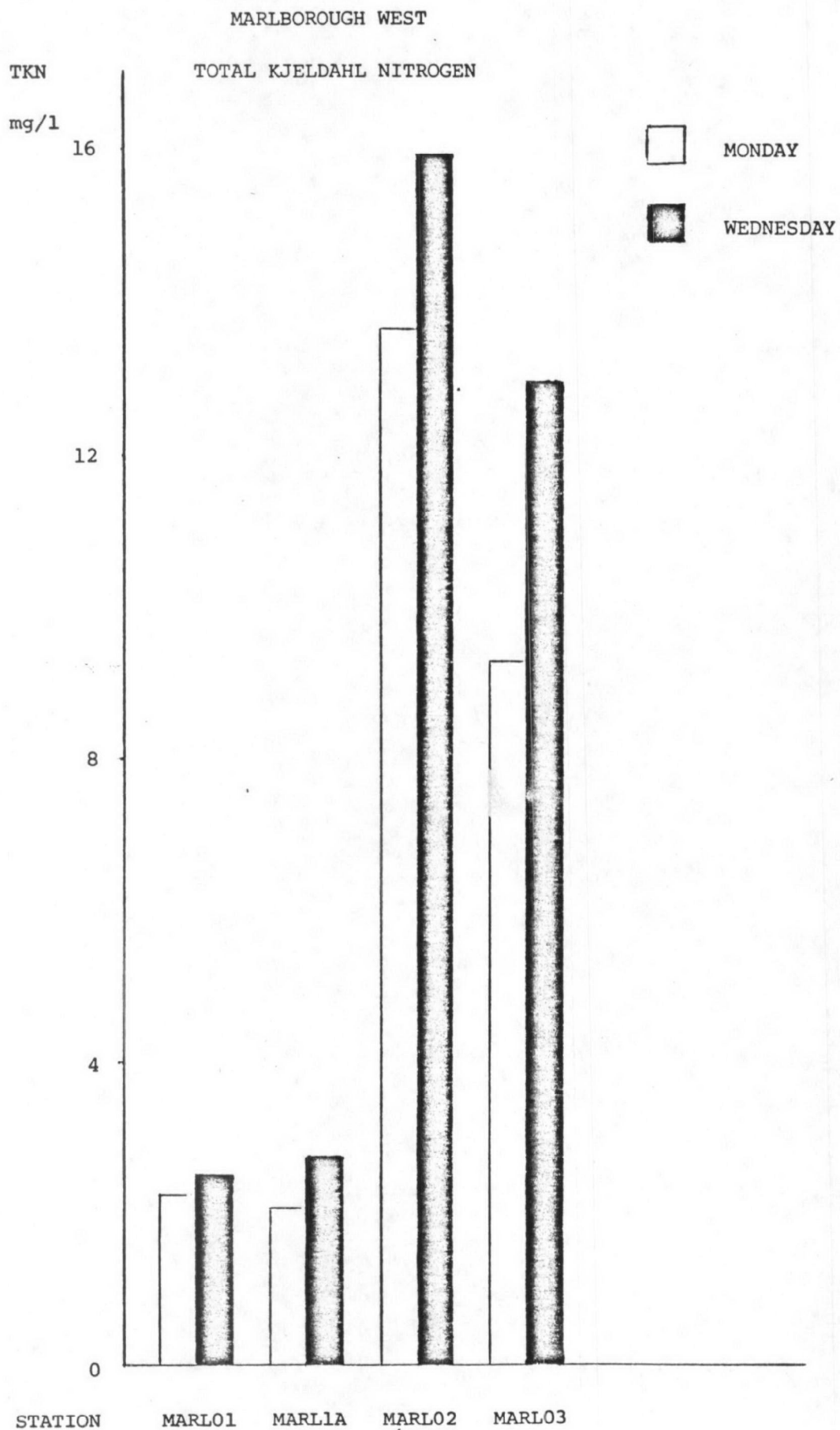


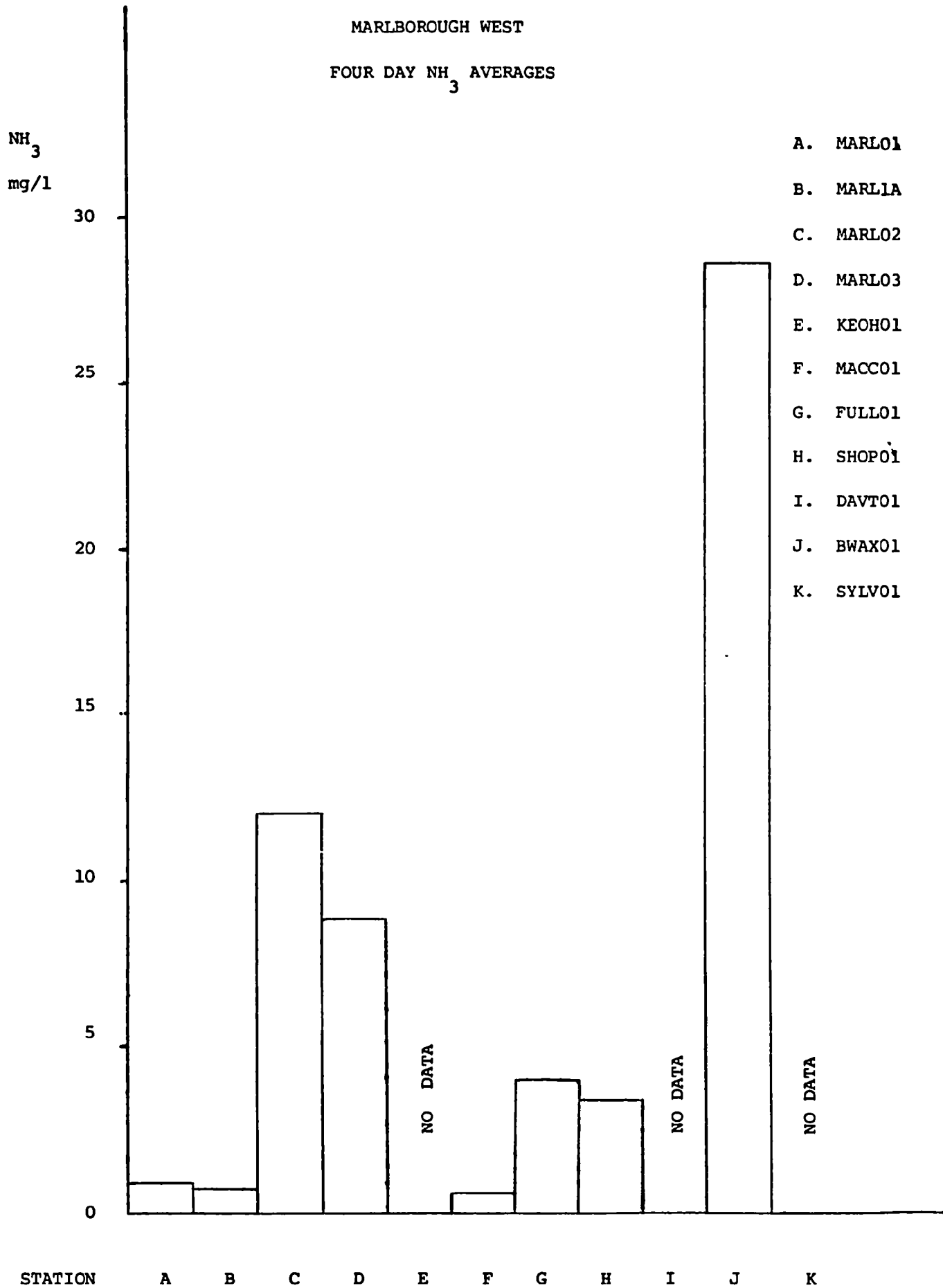
A. MARL01
B. MARL1A
C. MARL02
D. MARL03
E. KEOH01
F. MACC01
G. FULL01
H. DAVT01
I. BWAX01
J. SYLV01
K. SHOP01

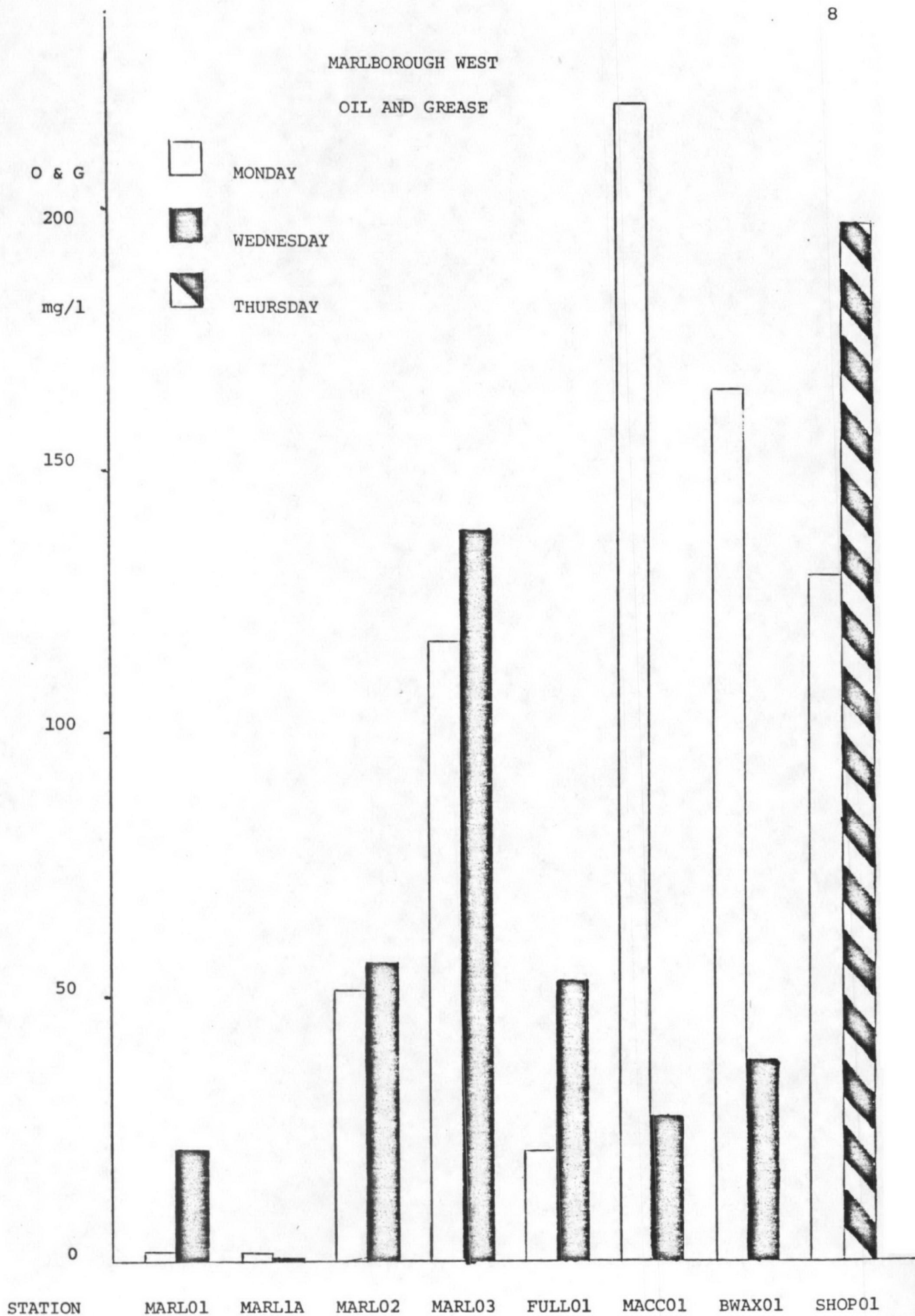


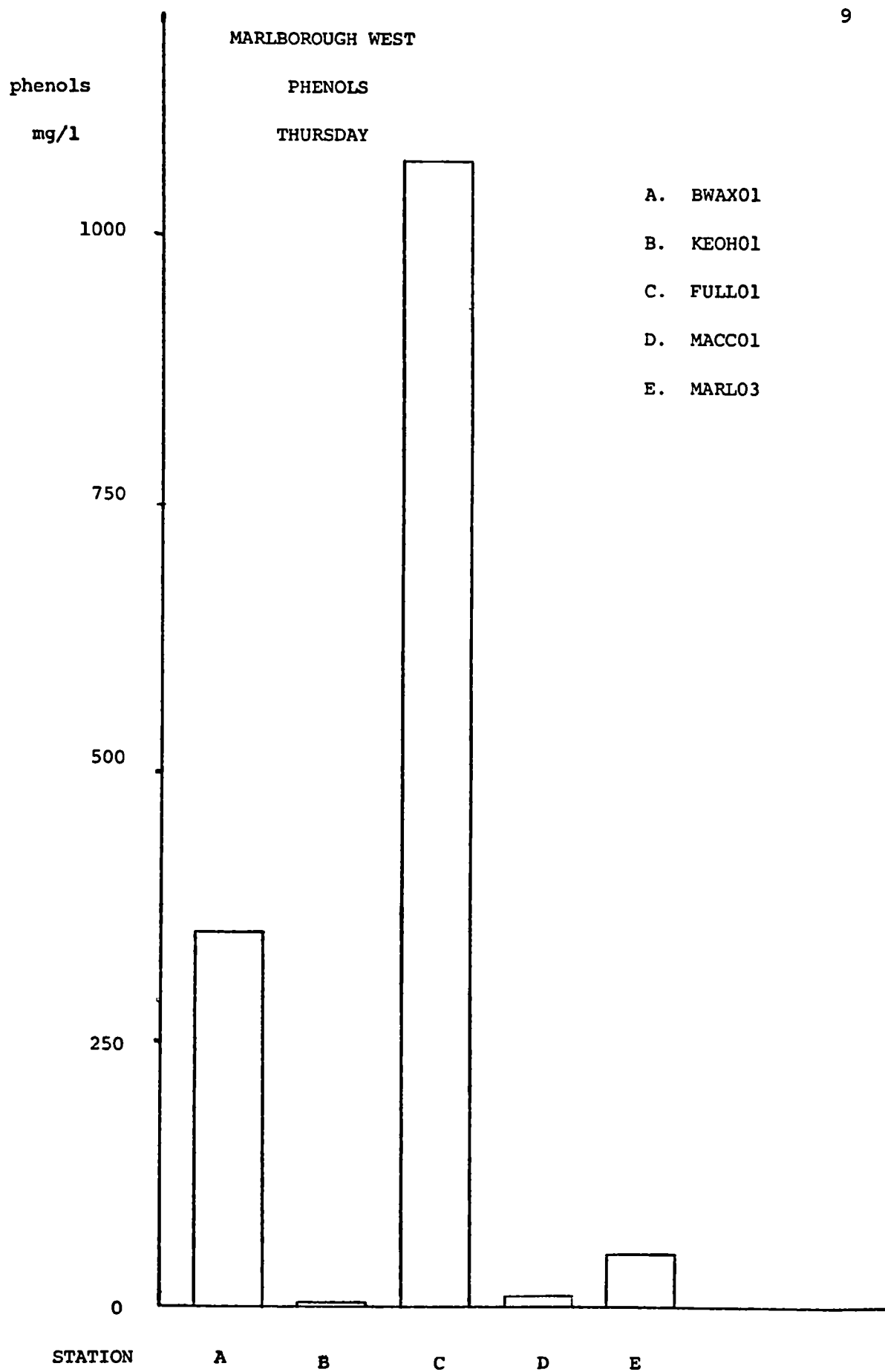


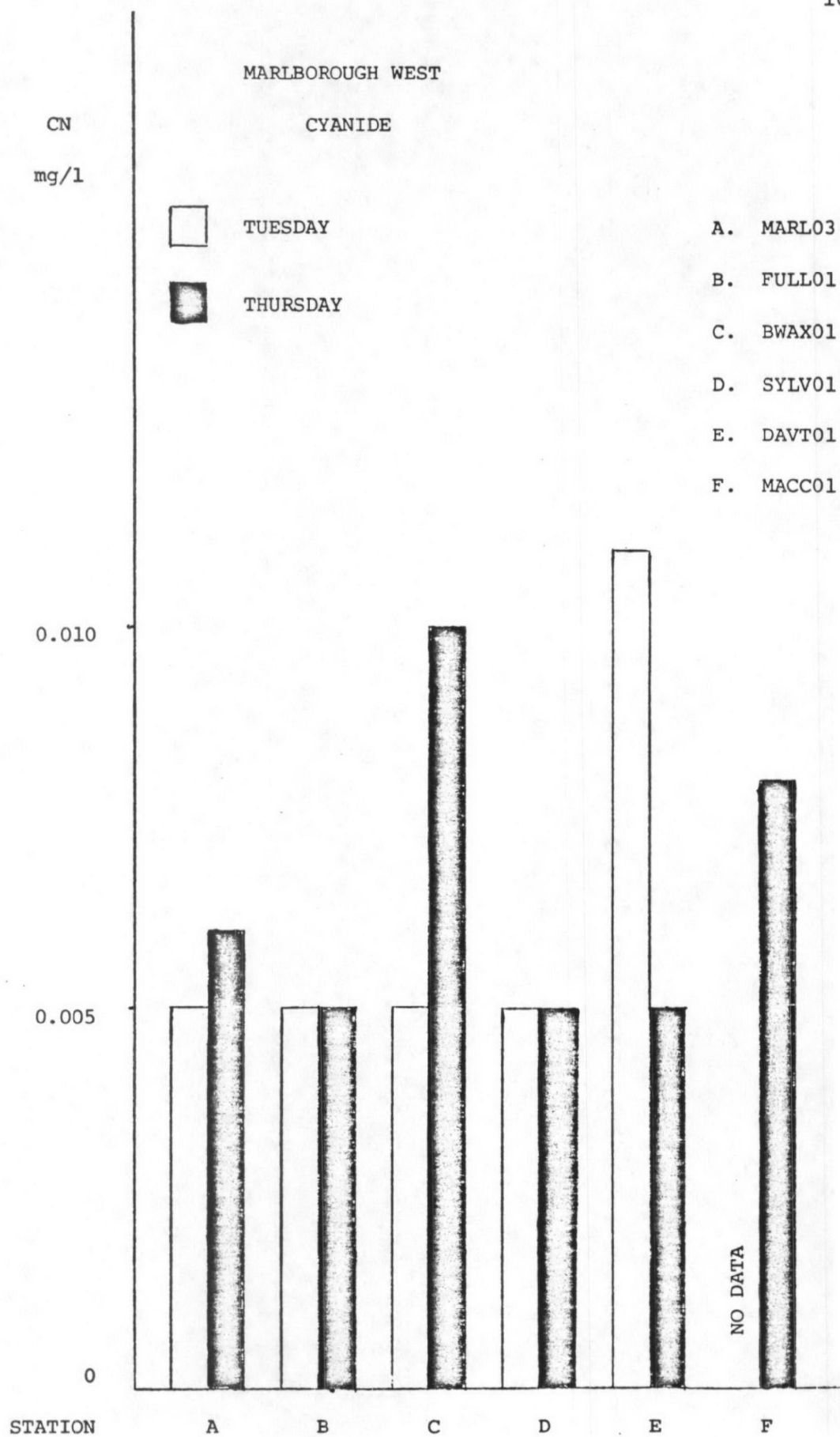


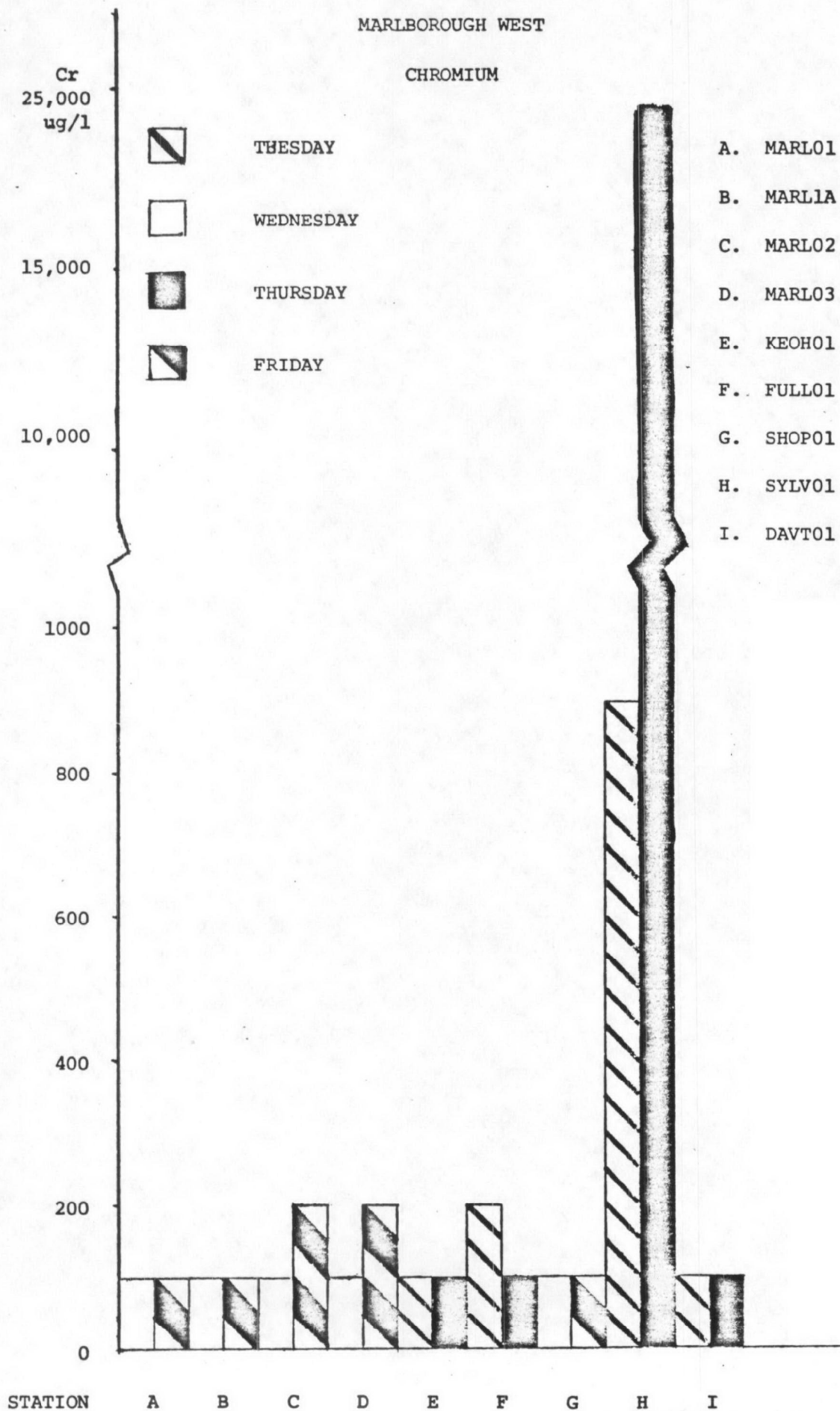


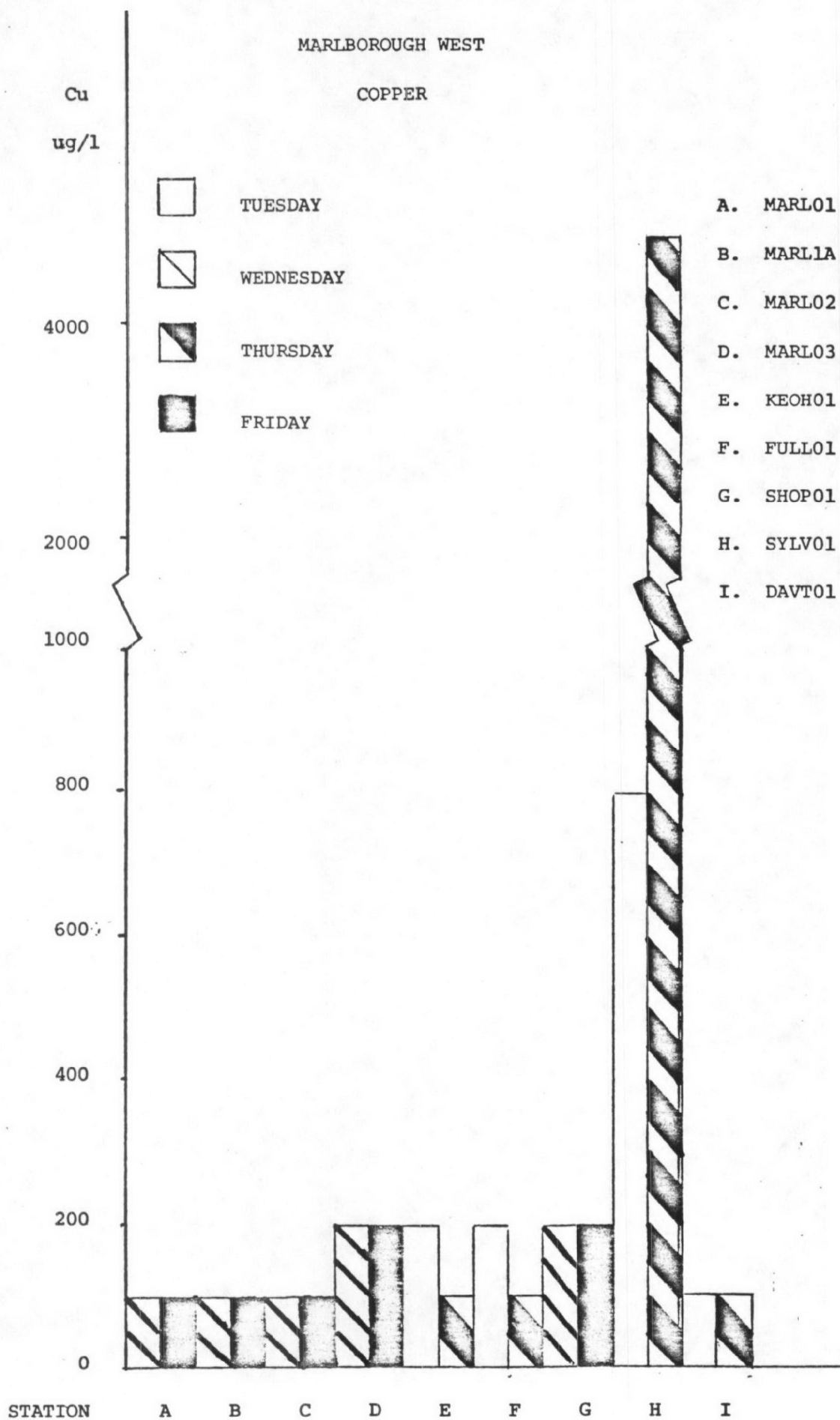


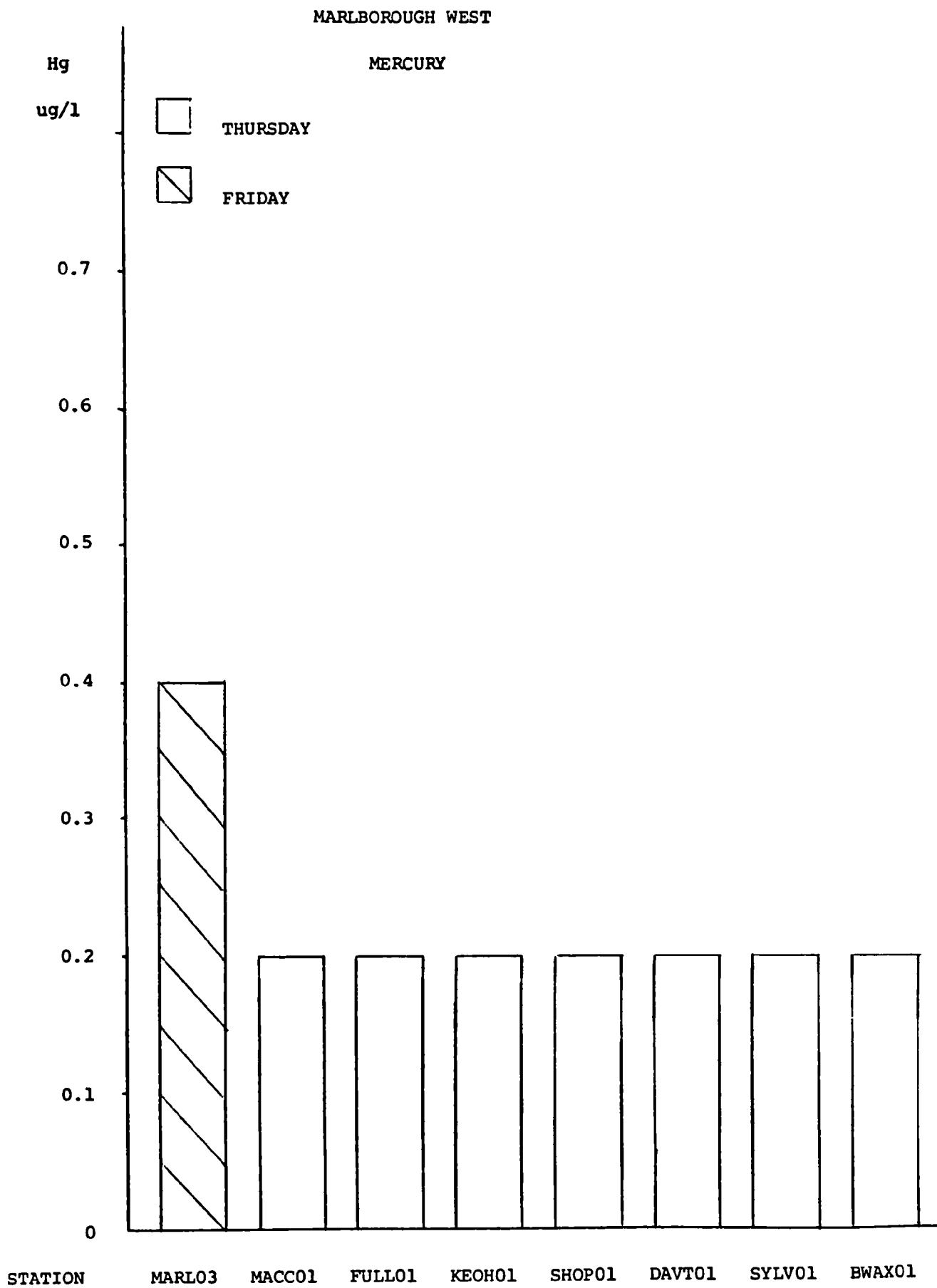








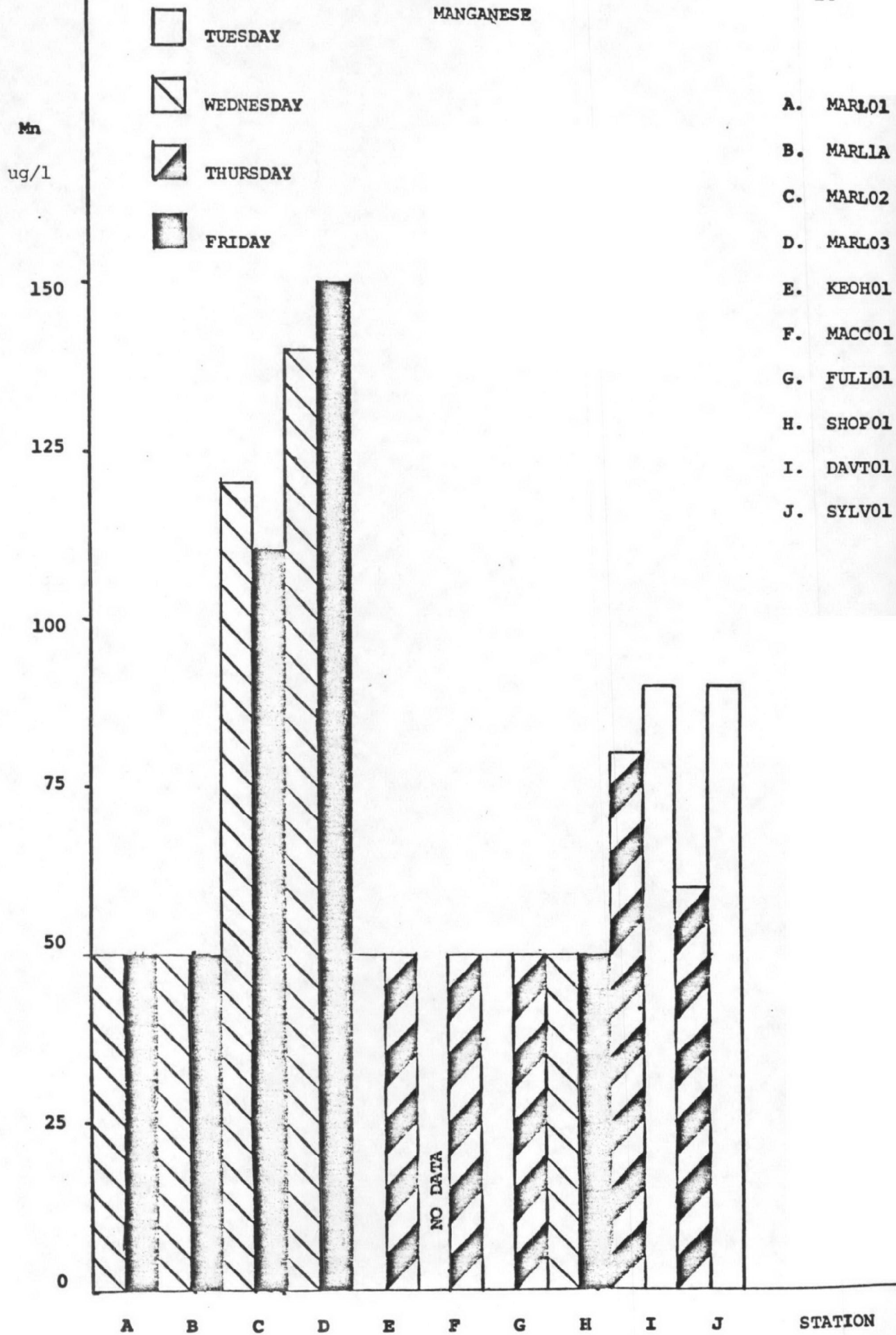


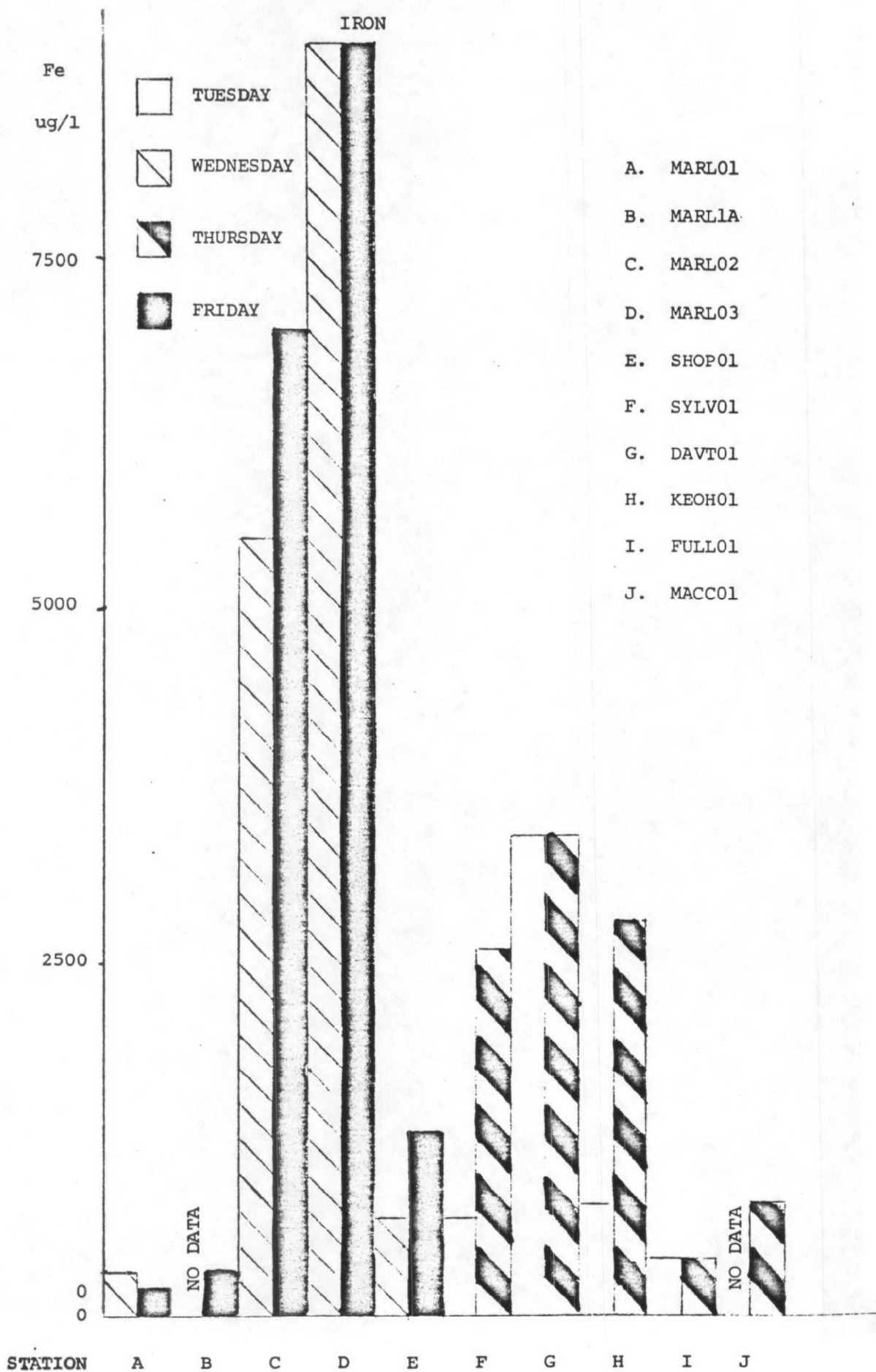


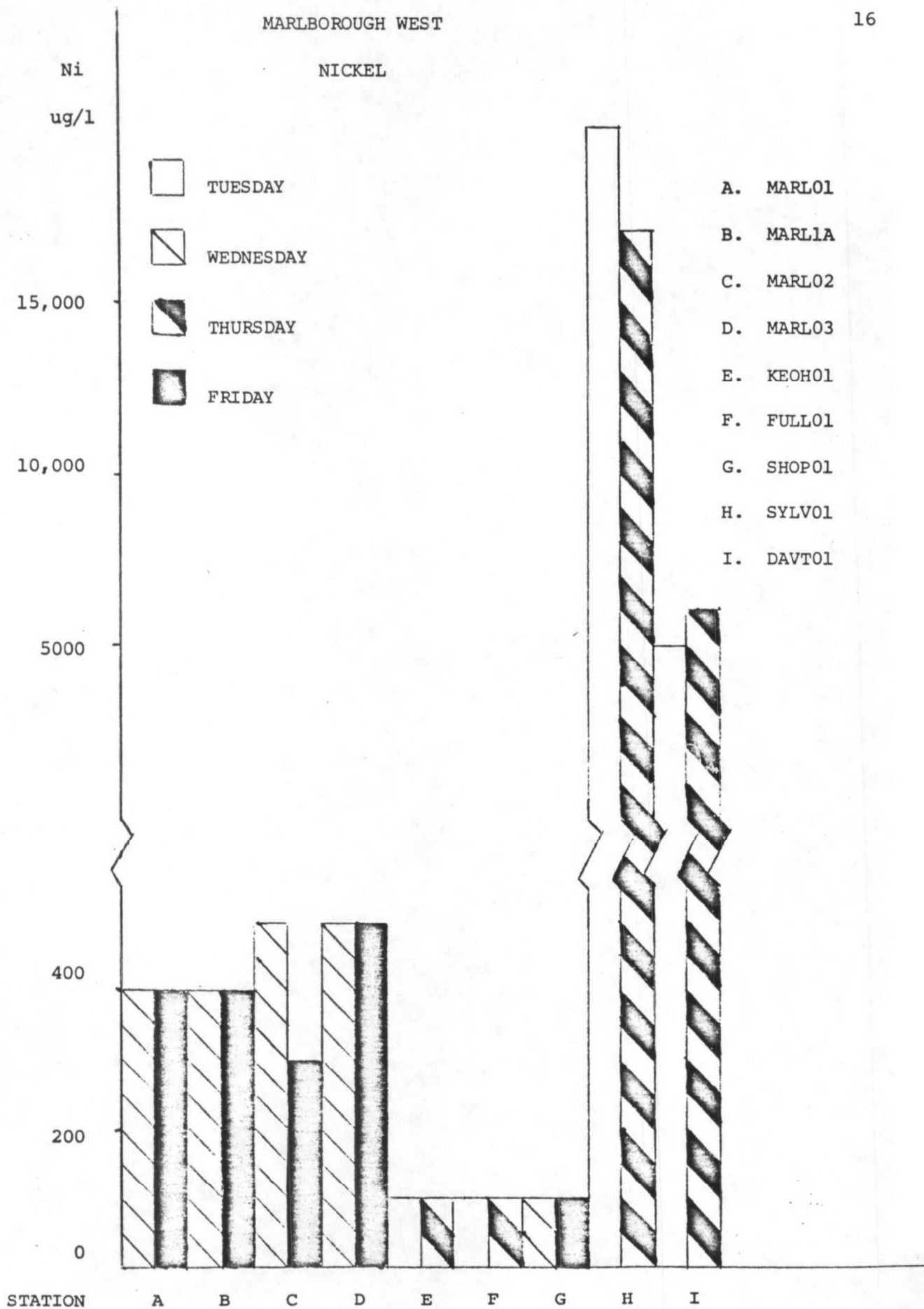
MARLBOROUGH WEST

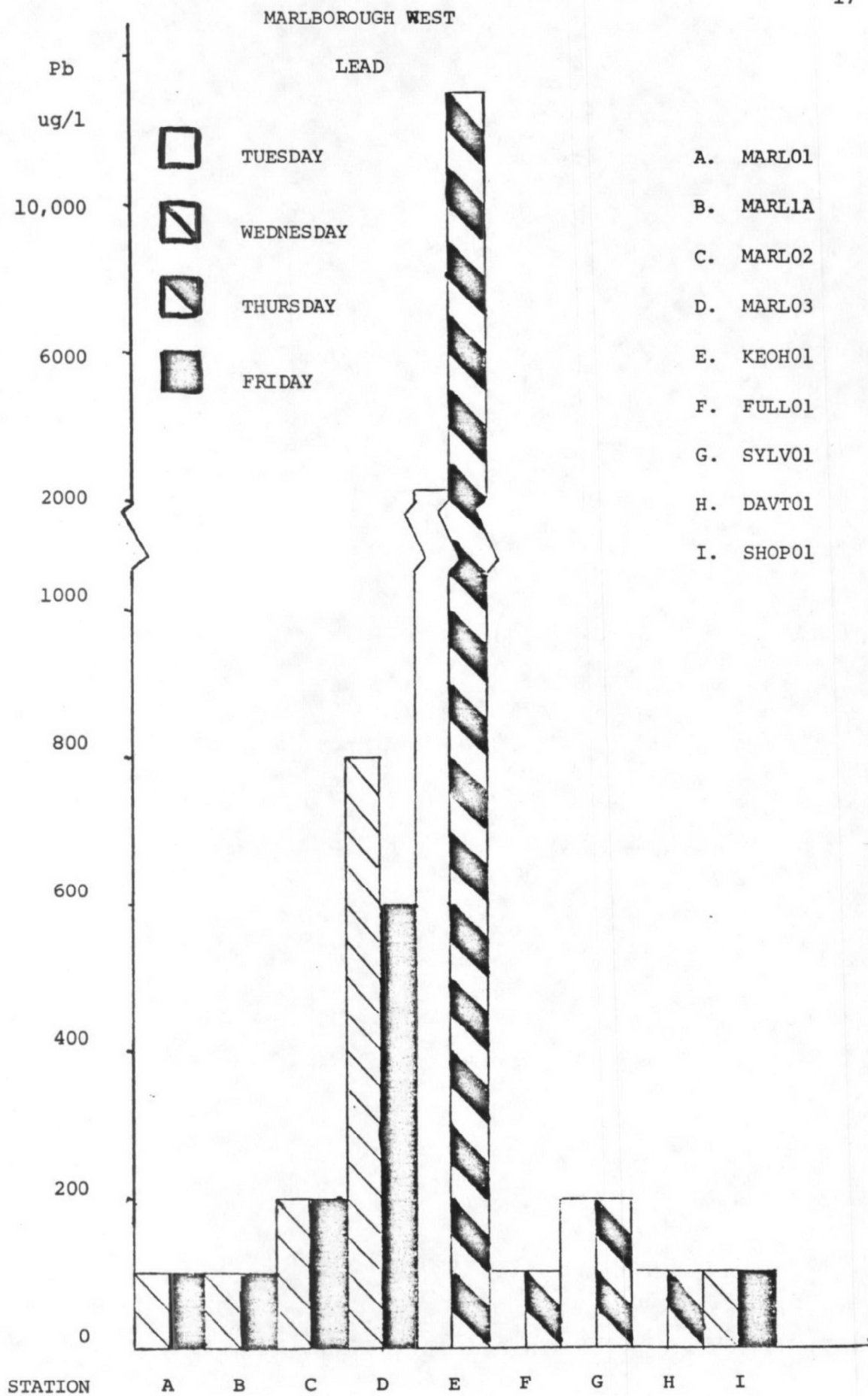
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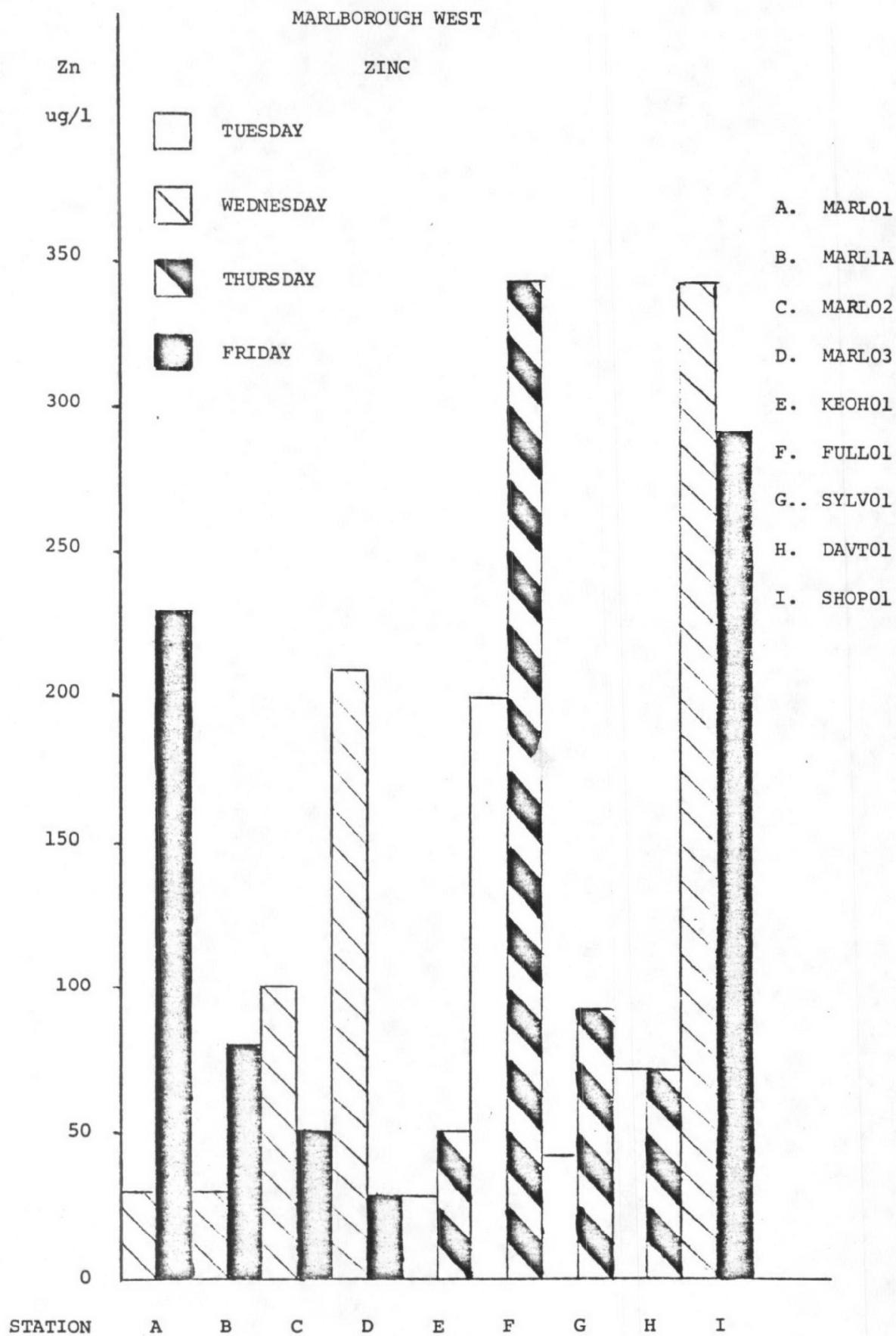
MANGANESE











Appendix I-C

MARLBORO WEST
August 13, 1979

<u>Station</u>	<u>pH</u>	<u>Temp °C</u>	<u>Total Cl</u>	<u>Time</u>
MARL01	6.8		1.5	9999
MARL1A	7.2			9999
MARL02	6.9			9999
MARL03	7.1			9999
KEOH01	3.3			9999
MACC01	6.1			9999
FULL01	6.7			9999
DAVT01	9.3			9999
BWAX01	7.4			9999
SHOP01	7.2			9999
SYLV01	5.4			9999
FULL01	6.7			9999
MARL01	6.5			1415
MARL1A	6.6			1425
MARL02	6.6			1428
MARL03	6.7			1420
FULL01	9.3			1510
MACC01	6.5			1520
BWAX01	8.9		0.1	1425
SHOP01	7.2	47	0.1	1520
SYLV01	3.3		1.5	1448
DAVT01	9.6		0.2	1502

MARLBORO WEST
August 14, 1979

<u>Station</u>	<u>pH</u>	<u>Temp °C</u>	<u>Total Cl</u>	<u>Time</u>
MARL01	7.4			9999
MARL1A	7.4		0.1	9999
MARL02	7.7		0.1	9999
MARL03	7.8		0.1	9999
KEOH01	10.7			9999
MACC01	6.4			9999
DAVT01	9.3			9999
BWAX01	7.4			9999
SHOP01	7.5			9999
SYLV01	5.4			9999
FULL01	9.6			9999
MARL01	---			----
MARL1A	---			----
MARL02	---			----
MARL03	7.1		0.1	1410
BWAX01	11.7		0.1	1309
SYLV01	6.0		0.2	1440
DAVT01	10.5		0.2	1404
FULL01	9.9		0.1	1450
MACC01	6.5		0.1	1510
KEOH01	10.7		0.1	1355

MARLBORO WEST
August 15, 1979

<u>Station</u>	<u>pH</u>	<u>Temp °C</u>	<u>Total Cl</u>	<u>Time</u>
MARL01	7.4			9999
MARL1A	7.4			9999
MARL02	7.7			9999
MARL03	7.8			9999
KEOH01	10.0		0.1	9999
MACC01	6.8			9999
DAVT01	8.9			9999
BWAX01	11.3		0.1	9999
SHOP01	7.5			9999
SYLV01	7.0		0.1	9999
FULL01	6.0		0.1	9999
MARL01	6.4		2.0	1636
MARL1A	6.8		0.1	1636
MARL02	8.6		0.1	1632
MARL03	7.8		0.1	1625
FULL01	5.4		0.1	1410
MACC01	6.0		0.1	1430
KEOH01	10.0		0.0	1355
BWAX01	9.2	19.0		1340
SHOP01	11.6	37.0	≤ 0.1	2125

MARLBORO WEST
August 16, 1979

<u>Station</u>	<u>pH</u>	<u>Temp °C</u>	<u>Total Cl</u>	<u>Time</u>
MARL01	7.3			9999
MARL1A	7.4			9999
MARL02	9.0			9999
MARL03	7.9			9999
KEOH01	10.0			9999
MACC01	6.1			9999
DAVT01	8.9			9999
BWAX01	11.3			9999
SHOP01	6.9			9999
SYLV01	7.0			9999
FULL01	7.2			9999
MARL01	6.8		> 0.1	----
MARL1A	6.8		> 0.1	----
MARL02	6.9		> 0.1	----
MARL03	8.3		> 0.1	1600
BWAX01	10.0	22.0	0.1	1337
SYLV01	2.6		2.0	1418
DAVT01	4.1		0.1	1502
SHOP01	7.2	44.0	0.1	1530
KEOH01	9.8		0.1	1420
FULL01	3.7	60.0	0.1	1500
MACC01	---		0.1	1530

Appendix I-D
(Plant Loadings)

MARLBOROUGH WEST
Marlborough West WWTP Influent
(MARL03)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>79/08/17</u>	<u>Average</u>
BOD ₅	--	4877	2792	2522	3703	3473
COD	--	--	5688	--	8628	7158
TSS	--	4083	3826	327	630	2217
TP	--	--	50	--	67	59
NO ₂ + NO ₃	--	26	--	8	--	17
TKN	--	105	--	121	--	113
NH ₃	--	75	88	108	J78	J87
Oil & Grease	J1338	--	1289	--	--	J1313
Phenol	--	--	--	0.444	--	0.444
CN	--	K0.052	--	0.06	--	K0.06
Cr	--	--	1	--	2	2
Cu	--	--	2	--	2	2
Fe	--	--	93	--	83	88
Hg	--	--	--	--	0.04	0.04
Mn	--	--	J1	--	J2	J2
Ni	--	--	5	--	5	5
Pb	--	--	8	--	K6	K7
Zn	--	--	2	--	2.8	2.4

MARLBOROUGH WEST
Marlborough West WWTP Effluent
(MARL 01)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>79/08/17</u>	<u>Average</u>
BOD ₅	--	57	K52	47	46	K50
COD	--	--	372	--	370	371
TSS	--	102	62	47	65	69
TP	--	--	12	--	9	11
NO ₂ + NO ₃	--	26	--	66	--	46
TKN	--	26	--	23	--	25
NH ₃	--	12	5	10	J10	J9
Oil & Grease	23	--	197	--	--	110
Phenol	--	--	--	--	--	--
CN	--	--	--	--	--	--
Cr	--	--	1	--	1	1
Cu	--	--	1	--	K1	K1
Fe	--	--	3	--	2	3
Hg	--	--	--	--	--	--
Mn	--	--	0.5	--	0.5	0.5
Ni	--	--	4	--	4	4
Pb	--	--	8	--	6	7
Zn	--	--	0.3	--	0.2	0.3

MARLBOROUGH WEST
 Keohler Mfg. Co.
 (KEOH01)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	5	K3	K3	5	K4
COD	--	7	--	26	17
TSS	7	7	0.6	17	8
TP	--	--	--	--	--
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
Oil & Grease	--	--	--	--	--
Phenol	--	--	--	K0.001	K0.001
CN	--	--	--	--	--
Cr	--	0.12	--	0.06	0.09
Cu	--	0.12	--	0.06	0.09
Fe	--	0.5	--	2	1.3
Hg	--	--	--	K0.0001	K0.0001
Mn	--	K0.03	--	K0.03	K0.03
Ni	--	0.06	--	0.06	0.06
Pb	--	1	--	8	5
Zn	--	0.02	--	0.03	0.03

MARLBOROUGH WEST
 Dav-Tech Plating Co
 (DAVT01)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	3	1	2	14	5
COD	--	5	--	6	6
TSS	4	2	6	3	4
TP	--	--	--	--	--
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
Oil & Grease	--	--	--	--	--
Phenol	--	--	--	--	--
CN	--	0.001	--	0.0004	0.001
Cr	--	K0.007	--	K0.008	K0.008
Cu	--	0.009	--	0.008	0.009
Fe	--	0.3	--	0.3	0.3
Hg	--	--	--	0.00002	0.00002
Mn	--	J0.007	--	J0.007	J0.007
Ni	--	0.5	--	0.4	0.5
Pb	--	K0.009	--	K0.007	K0.008
Zn	0.006	--	--	0.006	0.006

MARLBOROUGH WEST
Sylvester Products
(SYLV01)

<u>Parameter lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	0.4	0.9	0.7	K0.5	0.6
COD	--	2	--	2	2
TSS	1	1	0.6	6	2
TP	--	--	--	--	--
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	--	--	--	--	--
Oil & Grease	--	--	--	--	--
Phenol	--	--	--	--	--
CN	--	0.001	--	0.001	0.001
Cr	--	0.1	--	2	1.1
Cu	--	0.1	--	0.5	0.3
Fe	--	0.1	--	0.3	0.2
Hg	--	--	--	0.00002	0.00002
Mn	--	0.01	--	0.01	0.01
Ni	--	3	--	2	3
Pb	--	0.03	--	0.03	0.03
Zn	--	0.006	--	0.009	0.008

MARLBOROUGH WEST
Butcher's Wax Co
(BWAX01)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	18	20	3	30	18
COD	--	118	--	173	146
TSS	1	0.6	0.6	0.5	0.7
TP	--	3	--	0.2	1.6
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	0.1	--	0.03	J1	J0.4
Oil & Grease	J3	--	0.6	--	J1.8
Phenol	--	--	--	0.01	0.01
CN	--	K0.0001	--	0.0002	0.0001
Cr	--	--	--	--	--
Cu	--	--	--	--	--
Fe	--	--	--	--	--
Hg	--	--	--	--	--
Mn	--	--	--	--	--
Ni	--	--	--	--	--
Pb	--	--	--	--	--
Zn	--	--	--	--	--

MARLBOROUGH WEST
H. B. Fuller Co.
(FULL01)

<u>Parameter</u> <u>lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	349	160	175	93	194
COD	--	367	--	462	415
TSS	475	24	5	73	144
TP	--	0.2	--	0.02	0.11
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	0.5	0.6	0.8	J0.09	J0.5
Oil & Grease	3	--	7	--	4
Phenol	--	--	--	0.03	0.08
CN	--	0.0007	--	K0.0007	K0.0007
Cr	--	0.02	--	K0.01	0.01
Cu	--	0.03	--	0.01	0.02
Fe	--	0.05	--	0.03	0.04
Hg	--	--	--	K0.0001	K0.0001
Mn	--	K0.01	--	K0.003	0.006
Ni	--	0.01	--	0.01	0.01
Pb	--	K0.01	--	K0.01	K0.01
Zn	--	0.03	--	0.02	0.03

MARLBOROUGH WEST
Massachusetts Contaier Corp
(MACC01)

<u>Parameter lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	5	6	11	--	7
COD	--	35	--	40	38
TSS	12	17	15	J11	J14
TP	--	0.04	--	--	0.04
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	0.03	0.03	0.07	--	0.04
Oil & Grease	J16	--	2	--	J9
Phenol	--	--	--	0.0006	0.0006
CN	--	--	--	0.01	0.01
Cr	--	--	--	0.2	0.2
Cu	--	--	--	0.02	0.02
Fe	--	--	--	0.05	0.05
Hg	--	--	--	0.00001	0.00001
Mn	--	--	--	0.003	0.003
Ni	--	--	--	0.01	0.01
Pb	--	--	--	1	1
Zn	--	--	--	0.01	0.01

MARLBOROUGH WEST
 Stop & Shop Inc.
 (SHOP01)

<u>Parameter lbs/day</u>	<u>79/08/13</u>	<u>79/08/14</u>	<u>79/08/15</u>	<u>79/08/16</u>	<u>Average</u>
BOD ₅	1283	2639	3152	2004	2270
COD	--	--	--	4536	4536
TSS	733	1018	1541	2321	1403
TP	--	16	--	19	18
NO ₂ + NO ₃	--	--	--	--	--
TKN	--	--	--	--	--
NH ₃	6	4	12	7	7
Oil & Grease	340	--	--	413	377
Phenol	--	--	--	--	--
CN	--	--	--	--	--
Cr	--	K0.2	--	K0.2	K0.2
Cu	--	K0.4	--	K0.4	K0.4
Fe	--	1	--	3	2
Hg	--	--	--	K0.0004	K0.0004
Mn	--	K0.1	--	K0.1	K0.1
Ni	--	K0.2	--	K0.2	K0.2
Pb	--	K0.2	--	K0.2	K0.2
Zn	--	0.6	--	0.6	0.6

APPENDIX II

Appendix II-A

MARLBORO WEST

<u>Sample Number</u>	<u>Station Number</u>	<u>Date Collected</u>	<u>Coliform/100 ml (M-F) Total</u>	<u>Fecal</u>
49735	KEOH01	8/14/79	< 10	< 2
49736	FULL01	8/14/79	> 200,000	> 20,000
49737	MACC01	8/14/79	> 200,000	230
49738	MARL01	8/14/79	7,000	< 100
49739	MARL1A	8/14/79	> 2,000,000	130,000
49740	MARL02	8/14/79	67,000,000	3,800,000
49741	MARL03	8/14/79	15,000,000	560,000
49863	BWAX01	8/14/79	< 10	< 2
49864	SYLV01	8/14/79	160	10
49865	DAVT01	8/14/79	71,000	> 2,000
49866	SHOP01	8/14/79	> 200,000	> 2,000
49875	KEOH01	8/15/79	18,000	34
49876	FULL01	8/15/79	> 20,000,000	25,000
49879	MACC01	8/15/79	2,300,000	< 100
49755	MARL01	8/15/79	100	20
49754	MARL1A	8/15/79	700,000	44,000
49753	MARL02	8/15/79	25,000,000	1,000,000
49752	MARL03	8/15/79	20,000,000	740,000
49877	BWAX01	8/15/79	< 10	< 2
Missing	DAVT01	8/15/79	51,000	< 100
49874	SHOP01	8/15/79	> 2,000,000	40,000

MARLBORO WEST

<u>Sample Number</u>	<u>Station Number</u>	<u>Date Collected</u>	<u>Coliform/100 ml (M-F)</u>	
			<u>Total</u>	<u>Fecal</u>
48840	KEOH01	8/16/79	26,000	74
48841	FULL01	8/16/79	210,000	8,000
48842	MACC01	8/16/79	1,100,000	400
49770	MARL01	8/16/79	280	<10
49771	MARL1A	8/16/79	750,000	31,000
49772	MARL02	3/16/79	54,000,000	3,100,000
48839	MARL03	8/16/79	19,000,000	2,700,000
49889	BWAX01	8/16/79	20	12
49885	SYLV01	8/16/79	20	< 2
49886	DAVT01	8/16/79	94,000	1,000
49887	SHOP01	8/16/79	2,100,000	20,000

Appendix II-B

Microscopic Examination of Activated Sludge at
Marlborough, Massachusetts, Westerly STP

In an attempt to explain the cause of frequent upsets in the treatment process at the Westerly Plant, several selected inputs to the process including suspected industrial effluents discharged to the plant, were examined and tested for toxicity and various physical parameters. Included was a microscopical examination of the MLSS in the aeration tanks.

The presence or absence of various organisms in the sludge floc can indicate the stability and quality of the activated sludge process enabling the operator to change aeration and return activated sludge amounts to meet loading changes to the system.

A good quality activated sludge MLSS will have a predominance of rotifers, free swimming ciliates and stalked ciliates whereas a poor quality MLSS will contain a predominance of filamentous organisms and flagellates and few free swimming ciliates.

Microscopic Examination of Floc

On Wednesday, August 15, 1979, from 11:00 a.m. to 3:00 p.m. many samples from various points in the aeration tanks were examined to determine the predominant organisms. In almost every sample the most prevalent organisms were the free swimming ciliates which were very actively moving about feeding on bacteria and other organic matter. Next in numbers were the rotifers and stalked ciliates, all actively feeding. Occasionally, other organisms were observed such as a few flagellates,

amoebae and roundworms.

All samples examined appeared to indicate a good quality sludge floc and process stability. There was no evidence of any toxicity problems as far as the activated sludge process was concerned at that time.

Sludge Settled Volume (30 minutes)

Two determinations were made of the MLSS settled volume after 30 minutes to check on settleability:

<u>Input End of Aeration Tank</u>		<u>Output End of Tank</u>
11:30 a.m.	Start 1 Liter	
	20 min 300 ml sludge	300 ml
	30 min 220 ml	220 ml
1:23 p.m.		
	7 min	340 ml
	15 min	250 ml
	30 min	200 ml

These results indicate the sludge floc has a good settling rate and the process is under control.

Appendix II-C

MARLBOROUGH WEST STUDY
Effluent Toxicity Test Summaries
December 5, 1979 - January 30, 1980

Test Method

Static twenty-four hour acute bioassay.

Principal Investigators

Peter Nolan, Howard Davis, Jack Paar

Laboratory

New England Regional Laboratory, 60 Westview Street, Lexington,
Massachusetts, Mobile Toxicity Trailer.

Date of Tests

December 5, 1979 - January 30, 1980

Effluent Sources, Date and Method of Collection

Butcher's Wax, Sample No. 47689, 12/4/79, approximately 20 gallons
effluent collected between 0900 and 1600 and composited.

H. B. Fuller, Sample No. 47688, 12/4/79, approximately 20 gallons
effluent collected between 0900 and 1600 and composited.

Mass Container Co., Sample No. 48488, 12/17/79, approximately 20
gallons effluent collected between 0930 and 1520 and composited.

Koehler Manufacturing Co., Sample No. 48487, 12/17/79, approximately
20 gallons effluent collected between 0800 and 1505 and composited.

Marlborough West WWTP Influent (MARL03), Sample No. 58003, 1/15/80,
approximately 25 gallons from 24 hour composite.

Marlborough West WWTP Effluent from secondary clarifiers before
chlorination (MARL02), Sample No. 58004, 1/15/80, approximately 25 gallons
from 24 hour composite.

Sylvester Products, Sample No. 50010, 1/22/80, approximately 25 gallons effluent collected between 0915 and 1515 and composited.

Dav-Tech, Inc., Sample No. 50009, 1/22/80, approximately 25 gallons effluent collected between 0900 and 1500 and composited.

Stop & Shop, Inc., Sample No. 50011, 1/28-29/80, approximately 25 gallons of effluent collected for 24 hours and composited.

Marlborough West WWTP final effluent (MARL01), Sample No. 50012, 1/28-29/80, approximately 25 gallons of effluent collected between 1300 and 1250 and composited.

Waste Description

Butcher's Wax - milky, white, aromatic, congealed waxy substances.

H. B. Fuller - white, resinous liquid.

Mass Container - opaque, reddish-pink color.

Koehler Manufacturing Co. - relatively clear liquid, some solids.

Marlborough West Influent - typical domestic waste appearance.

Effluent - relatively clear with suspended solids.

Sylvester Products - yellow-green liquid, relatively clear.

Dav-Tech, Inc. - yellow-green liquid, relatively clear.

Stop & Shop, Inc. - greasy, milky, turbid liquid.

Treatment

See attached engineering report.

Collection Method

See attached sampling program.

Dilution Water Source

Aerated, dechlorinated, aged tap water.

Test Organisms - Fathead Minnow (*Pimephales promelas*)

Mean length - approximately 3.7 cm

Mean weight - approximately 0.4 gm

Age - young of year

Source - Newtown Fish Toxicology Station, Cincinnati, Ohio

History - hatched and reared at Newtown, all of same year, size, class with no apparent diseases or deformities. Upon arrival at the NERL, the fish were given a preventive treatment for disease and parasites according to the "ORSANCO" method (1974).

Acclimation - acclimated to dilution water for one week prior to test.

Test Procedure

Chambers: five gallon glass pickle jars with a calibrated maximum capacity of 16 liters. Test initiated by placing two fish in each randomly assigned test vessel for a total of 10 fish per tank. Each dilution is run in replicate.

Each treatment was gently aerated. Loading or weight of fish to volume = .25 gm/liter.

Criteria of Impact

Death defined by lack of gill movement and lack of response to prodding.

Results

Attached, see table 1 and 2 and Figures 1-6.

References

EPA, 1978, W. Pelletier, chairman, "Methods for Measuring the Acute Toxicity of Effluents to Aquatic Organisms". EMSL, Cincinnati, Ohio.

EPA, 1975, "Methods for acute toxicity tests with fish, macroinvertebrates and amphibians", National Environmental Research Center, National Water Quality Research Lab, Duluth, Minn., 61 pp.

EPA, 1974, "Methods for Chemical Analysis of Water and Wastes", NERC, Methods Development and Quality Assurance Research Laboratory, Cincinnati, Ohio, 298 pp.

Ohio River Water Sanitation Commission, 1974, "ORSANCO 24-hour Bioassay".

Table 1

LC₅₀ Determination
24 Hour Acute Bioassay
Marlborough West Study

Effluent Source	LC ₅₀	Date of Test	Reference Figure No.
Butcher's Wax	2.2%	12/05/79	1
H. B. Fuller Co.	8.7%	12/05/79	2
Mass Container Co.	8.5-19.5%*	12/10/79	3
Sylvester Products	65%	1/23/80	4
Stop & Shop, Inc.	81%	1/30/80	5
WWTP Influent	82%	1/17/80	6
WWTP Final Effluent	no LC ₅₀ 55% survival @ 100% concentration Total residual chlorine = .2 mg/l	1/30/80	
WWTP Effluent from 2 ^o clarifiers	no LC ₅₀ 95% survival @ 100% concentration	1/17/80	
Dav-Tech, Inc.	no LC ₅₀ 100% survival	1/23/80	
Koehler Manufacturing Co.	no LC ₅₀ 100% survival	12/18/79	

*Range based on 100% survivals at 0% effluent and 12.5 effluent (not performed during actual test).

Table 2
Toxicity Data
Marlborough West Study

Effluent Source Butchers Wax		Dissolved Oxygen		pH	No. Test Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
Effluent Concentra- tion Percent Volume		Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1		9.4	8.4	7.18	10	10	10	10	10	10	10	100
0 R2		9.2	8.6	7.31	10	10	10	10	10	10	10	100
.5 R1				8.92	10	10	10	10	10	10	10	100
.5 R2		8.8	8.9	7.02	10	10	10	10	10	10	10	100
1 R1		9.4	8.0	7.51	10	10	10	10	10	10	10	100
1 R2		9.5	7.6	7.6	10	10	10	10	10	10	10	100
5 R1				8.92	10	8	8	3	0	0	0	0
5 R2				8.97	10	9	9	3	0	0	0	0
12.5 R1		9.6			10	0	0	0	0	0	0	0
12.5 R1		9.6			10	0	0	0	0	0	0	0

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

[illegible]

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source H.B. Fuller Company

Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test , Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	9.2	8.6	7.21	10	10	10	10	10	10	10	100
0 R2	9.2		7.2	10	10	10	10	10	10	10	100
5 R1	9.5	8.3	8.19	10	10	10	10	10	10	10	100
5 R2	9.5	7.8	8.8	10	10	10	10	10	10	10	100
12.5 R1	9.7	5.6	8.8	10	10	10	10	10	10	8	80
12.5 R2	9.5	4.0	8.9	10	10	10	10	10	10	8	80
25 R1	10.0		9.12	10	10	8	8	3	0	0	0
25 R2	10.0		9.12	10	10	8	8	7	5	0	0
50 R1	10.0		9.18	10	9	6	1	0	0	0	0
50 R2	9.7		9.2	10	8	5	3	0	0	0	0

Table 2 (Cont'd)

Toxicity Data
...ilborough West Study

[illegible]

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source Mass. Container Company

Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	9.5		7.0	10	10	10	10	10	10	10	100
0 R2	8.6		7.0	10	10	10	10	10	10	10	100
25 R1	9.2		7.1	10	10	10	10	10	8	4	40
25 R2	8.7		7.3	10	10	10	10	9	8	1	10
50 R1	8.7		7.1	10	10	10	10	2	0	0	0
50 R2	9.6		7.1	10	10	10	10	0	3	0	0
75 R1			7.1	10	10	10	9	2	0	0	0
75 R2	9.5		7.1	10	10	10	9	2	0	0	0
100 R1	8.7		7.1	10	10	9	3	0	0	0	0
100 R2	8.7		7.1	10	10	9	2	0	0	0	0

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source <u>Koehler Manufacturing Co.</u>										
Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive					
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr
0 R1	8.7		6.98	10	10	10	10	10	10	100
0 R2	9.5		7.0	10	10	10	10	10	10	100
25 R1	8.2		9.22	10	10	10	10	10	10	100
25 R2	8.7		9.22	10	10	10	10	10	10	100
50 R1	8.6		9.33	10	10	10	10	10	10	100
50 R2	9.9		9.36	10	10	10	10	10	10	100
75 R1	9.0		9.38	10	10	10	10	10	10	100
75 R2	9.4		9.39	10	10	10	10	10	10	100
100 R1	9.4		9.40	10	10	10	10	10	10	100
100 R2	9.7		9.40	10	10	10	10	10	10	100

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source <u>Marlborough West WWTP Influent</u>											
Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	9.3	8.8	7.8	10	10	10	10	10	10	10	100
0 R2	9.0	7.9	7.8	10	10	10	10	10	10	10	100
25 R1	8.1	6.6	7.15	10	10	10	10	10	10	10	100
25 R2	7.9	7.0	7.8	10	10	10	10	10	10	10	100
50 R1	8.0	6.9	7.8	10	10	10	10	9	9	8	80
50 R2	8.1	6.8	7.8	10	10	10	10	10	10	10	100
75 R1	7.2	5.5	7.7	10	10	10	9	9	8	7	70
75 R2	8.0	7.0	7.8	10	10	10	10	10	9	6	60
100 R1	6.1	6.2	7.8	10	9	7	6	5	4	2	20
100 R2	7.5	8.0	7.9	10	8	8	8	8	5	2	20

Table 2 (Cont'd)

Toxicity Data

Marlborough West Study

Effluent Source	Marlborough West WTP 2 ^o Clarifier		pH	No. Test , Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Dissolved Oxygen ppm				2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	
Concentra- tion Percent Volume	Initial	Final									24 hr
0 R1	8.4	8.2	7.8	10	10	10	10	10	10	10	100
0 R1	8.5	8.3	7.7	10	10	10	10	10	10	10	100
25 R1	8.8	8.0	7.8	10	10	10	10	10	10	10	100
25 R2	8.9	8.8	7.7	10	10	10	10	10	10	10	100
50 R1	8.2	8.2	7.7	10	10	10	10	10	10	9	90
50 R2	9.2	8.9	7.7	10	10	10	10	10	10	10	100
75 R1	8.8	9.0	7.8	10	10	10	10	10	10	10	100
75 R2	7.6	7.0	7.7	10	10	10	10	10	10	10	100
100 R1	7.6	8.1	7.7	10	10	10	10	10	10	10	100
100 R2	9.0	7.5	7.8	10	10	10	9	9	9	9	90

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source <u>Sylvester Products</u>											
Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test , Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	9.9	9.6	6.9	10	10	10	10	10	10	10	100
0 R2	9.7	8.5	7.3	10	10	10	10	10	10	10	100
25 R1	9.4	9.9	9.82	10	10	10	10	10	10	10	100
25 R2	9.6	8.7	9.9	10	10	10	10	10	9	9	90
50 R1	8.8	10.0	9.96	10	10	10	10	10	10	8	80
50 R2	9.6	8.7	9.9	10	9	9	8	8	8	6	60
75 R1	9.6	9.6	9.9	10	10	10	10	8	6	5	50
75 R2	9.4	9.5	10.0	10	10	9	9	8	8	3	30
100 R1	8.4	8.3	10.0	10	10	10	10	8	4	0	0
100 R2	8.8	9.7	10	10	10	8	7	2	2	0	0

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source <u>Dav-Tech Inc.</u>											
Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test , Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	9.9	8.9	7.0	10	10	10	10	10	10	10	100
0 R2	9.6	9.4	7.0	10	10	10	10	10	10	10	100
25 R1	8.7	9.5	6.9	10	10	10	10	10	10	10	100
25 R2	10.1	9.9	6.8	10	10	10	10	10	10	10	100
50 R1	9.4	8.6	6.7	9	9	9	9	9	9	9	100
50 R2	9.8	8.7	7.7	10	10	10	10	10	10	10	100
75 R1	9.3	9.6	6.5	10	10	10	10	10	10	10	100
75 R2	9.4	8.7	6.5	10	10	10	10	10	10	10	100
100 R1	9.4	9.9	6.4	10	10	10	10	10	10	10	100
100 R2	8.8	8.5	6.6	10	10	10	10	10	10	10	100

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source Stop & Shop, Company											
Effluent Concentra- tion Percent Volume	Dissolved Oxygen ppm		pH	No. Test Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Initial	Final			2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	24 hr
0 R1	10.4	9.8	7.7	10	10	10	10	10	10	10	100
0 R2	10.3	9.9	7.5	10	10	10	10	10	10	10	100
25 R1	10.2	8.5	9.6	10	10	10	10	10	10	10	100
25 R2	10.3	2.5	9.6	10	10	10	10	10	10	10	100
50 R1	8.9	1.6	9.9	10	10	10	10	10	10	0	0
50 R2	10.0	5.3	10.1	10	10	10	10	10	10	0	0
75 R1	10.0	5.3	10.1	10	10	10	10	10	9	8	80
75 R2	10.0	1.5	10.1	10	10	9	8	7	6	0	0
100 R1	9.4	1.1	10.2	10	10	6	0	0	0	0	0
100 R2	10.0	1.1	10.2	10	9	3	0	0	0	0	0

Table 2 (Cont'd)

Toxicity Data
Marlborough West Study

Effluent Source	Marlborough West WTP Final Effluent		pH	No. Test , Organisms <u>Pimephales</u> <u>promelas</u>	No. <u>Pimephales promelas</u> Alive						Percent Survival
	Dissolved Oxygen ppm				2 hr	4 hr	6 hr	8 hr	12 hr	24 hr	
Concentra- tion Percent Volume	Initial	Final									24 hr
0 R1	10.4	10.0	7.2	10	10	10	10	10	10	10	100
0 R2	10.4	10.1	7.8	10	10	10 ¹	10	10	10	10	100
25 R1	10.0	8.7	7.8	10	10	10	10	10	10	10	100
25 R2	10.5	9.0	7.65	10	10	10	10	10	10	10	100
50 R1	10.3	10.0	7.9	10	10	10	10	10	10	8	80
50 R2	10.3	8.9	7.85	10	10	10	10	10	10	10	100
75 R1	10.4	8.0	8.0	10	10	10	10	10	10	9	90
75 R2	10.1	9.7	8.0	10	10	10	10	10	10	10	100
100 R1	10.3	10.2	7.9	10	10	10	10	10	9	5	50
100 R2	10.3	8.3	8.0	10	10	10	10	8	8	6	60

Figure 1

Plotted Data - Butchers Wax
Log-Concentration (% Effluent) vs.
% Survival

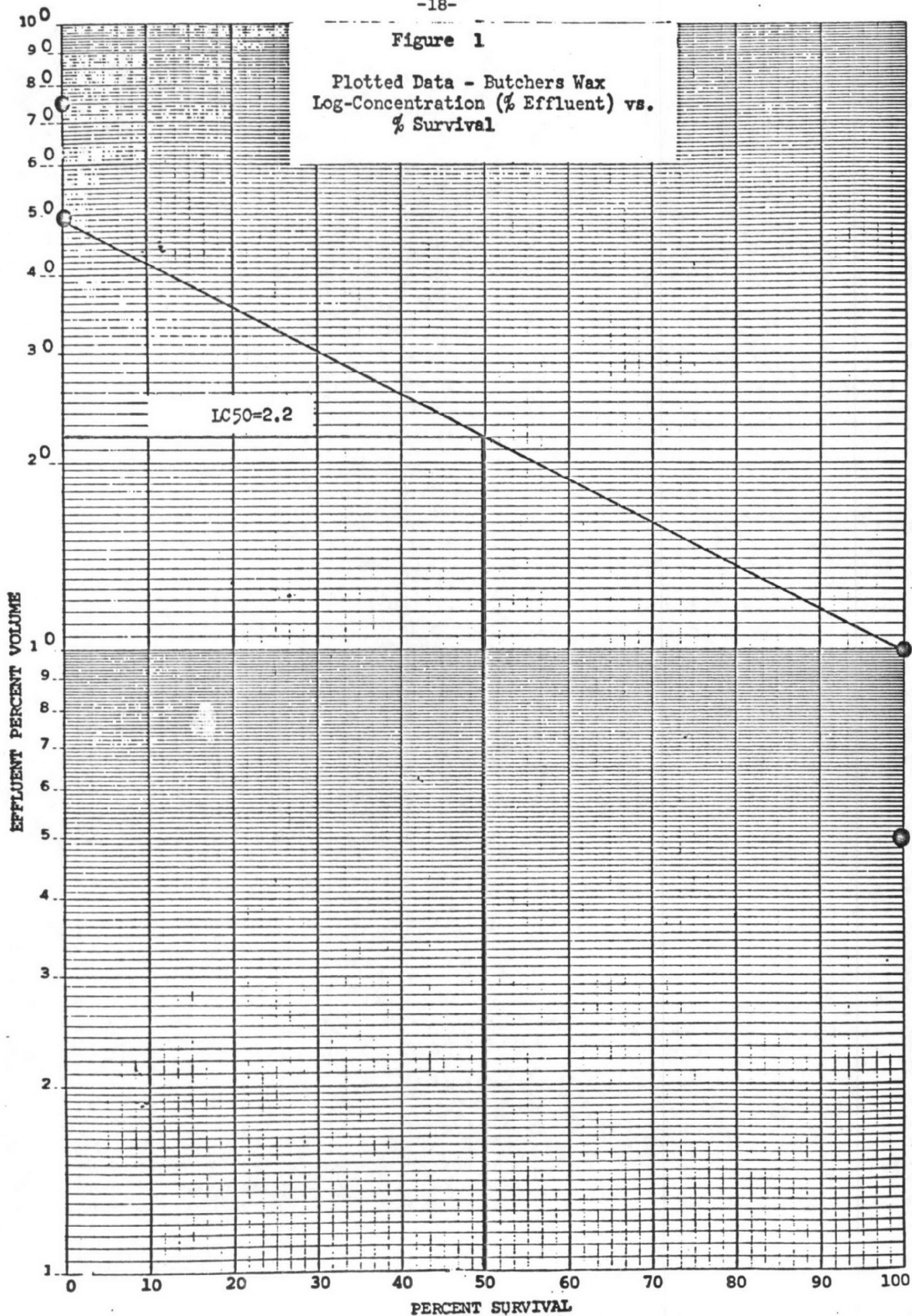


Figure 2
Plotted Data - H.B. Fuller Co.
Log-Concentration (% Effluent) vs.
% Survival

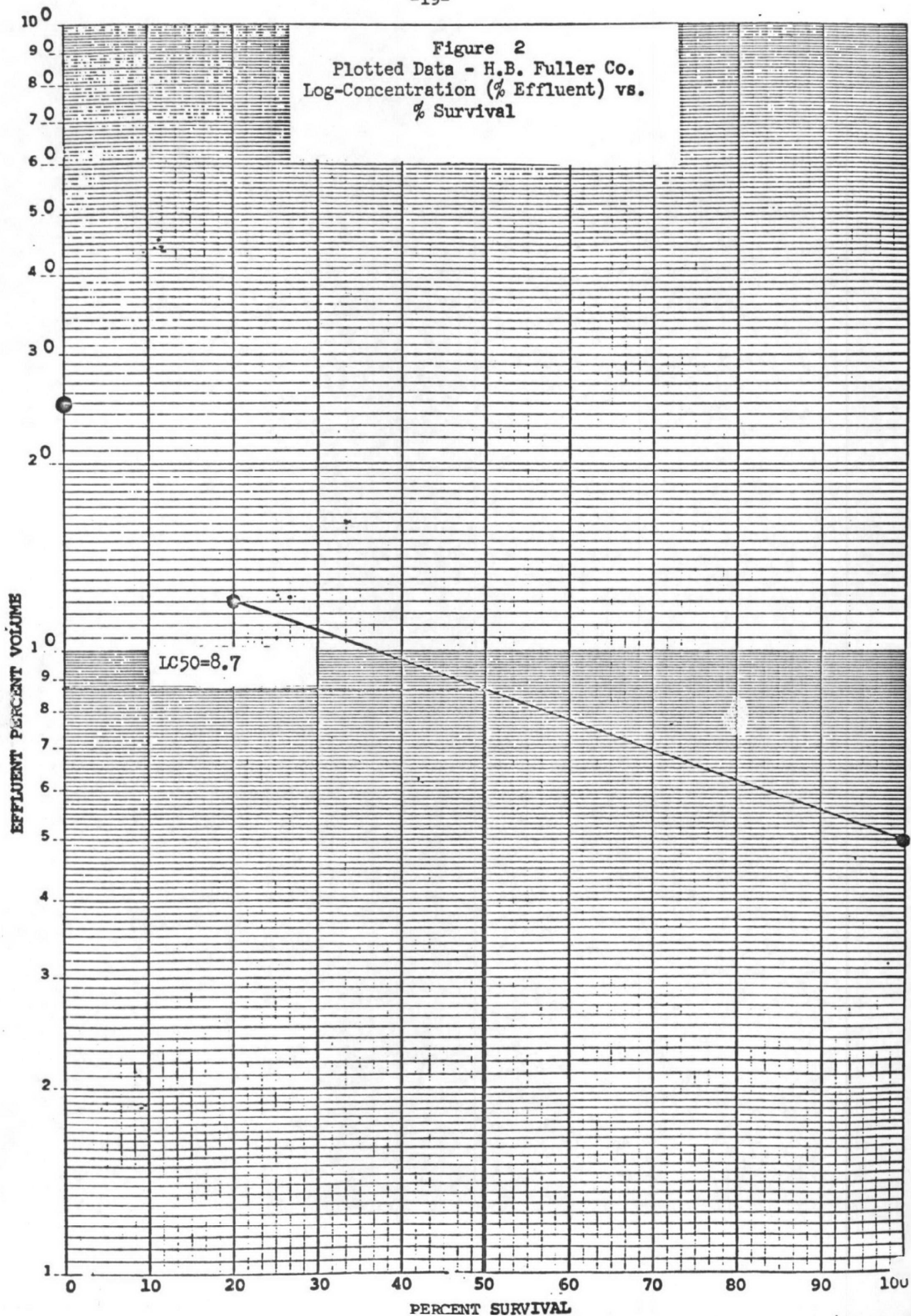


Figure 3
Plotted Data - Mass. Container Co.
Log-Concentration (% Effluent) vs.
% Survival

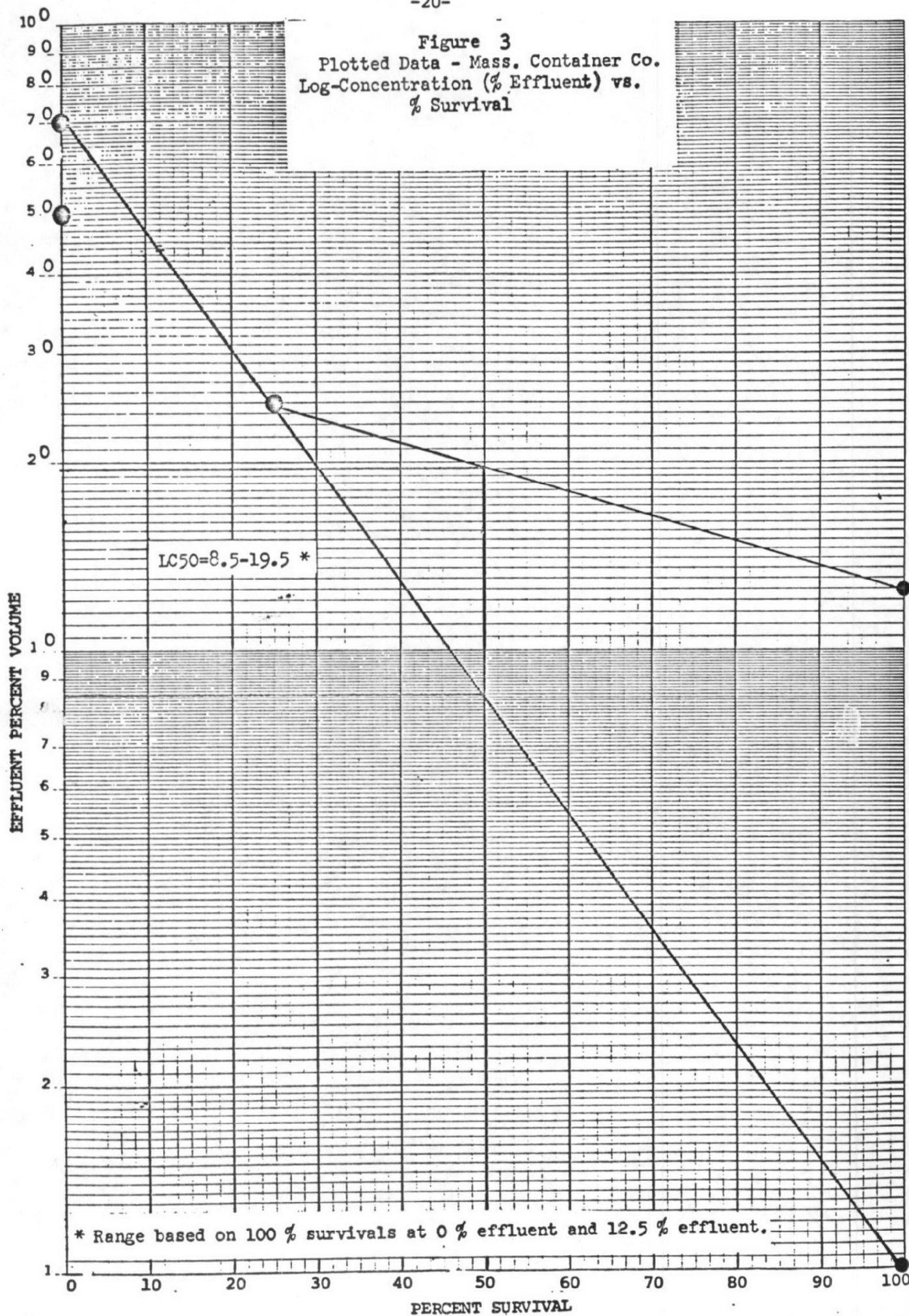
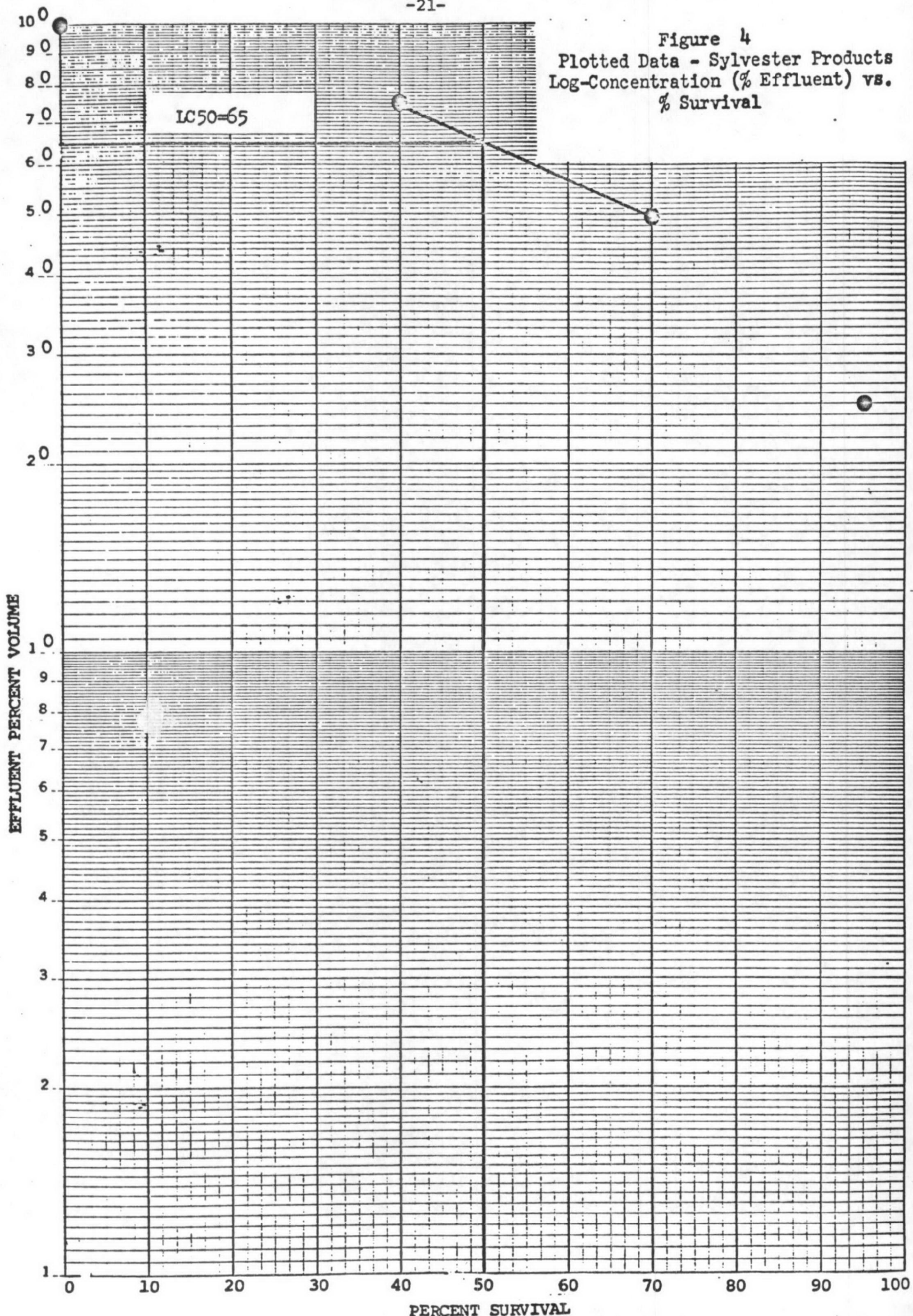
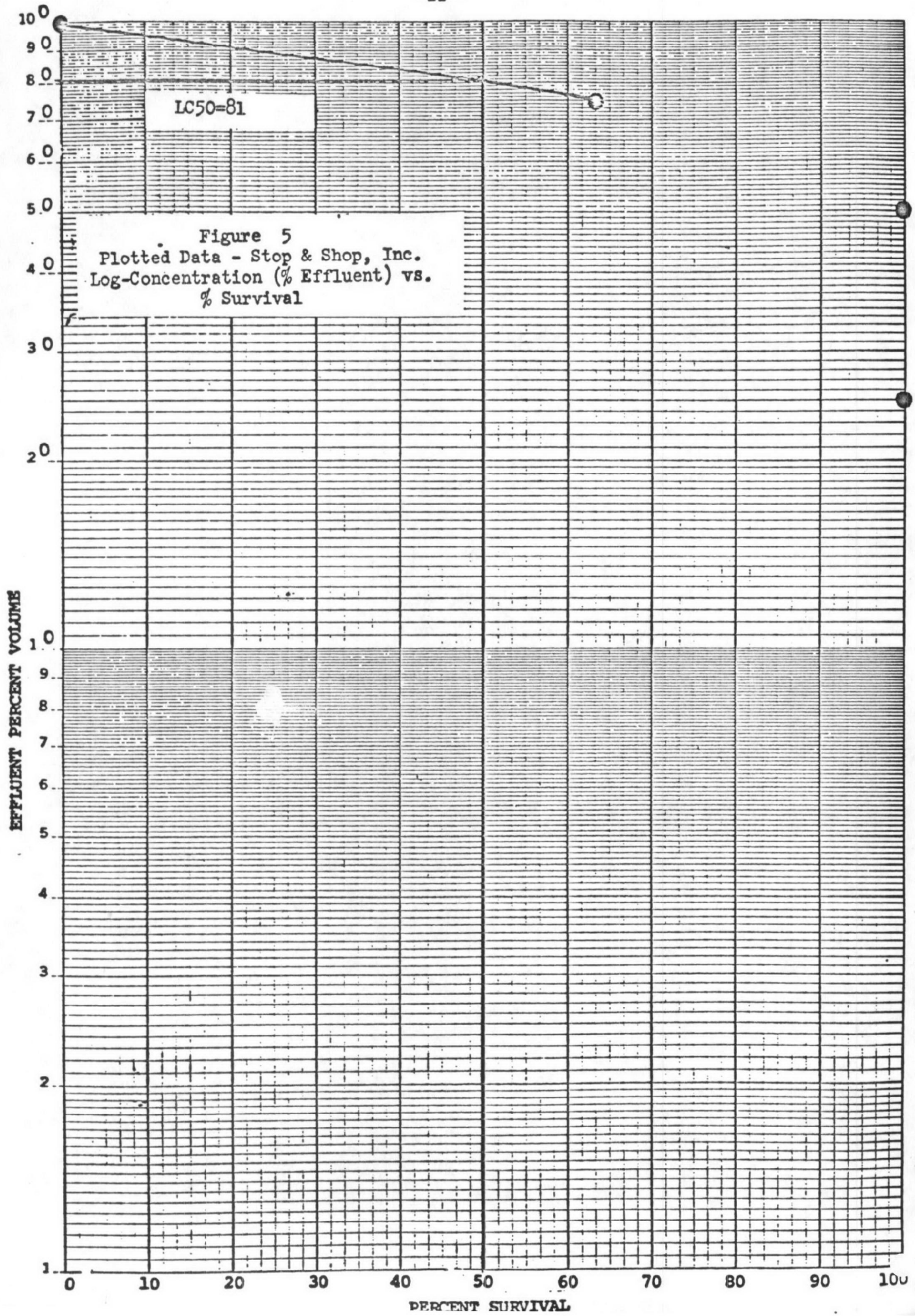
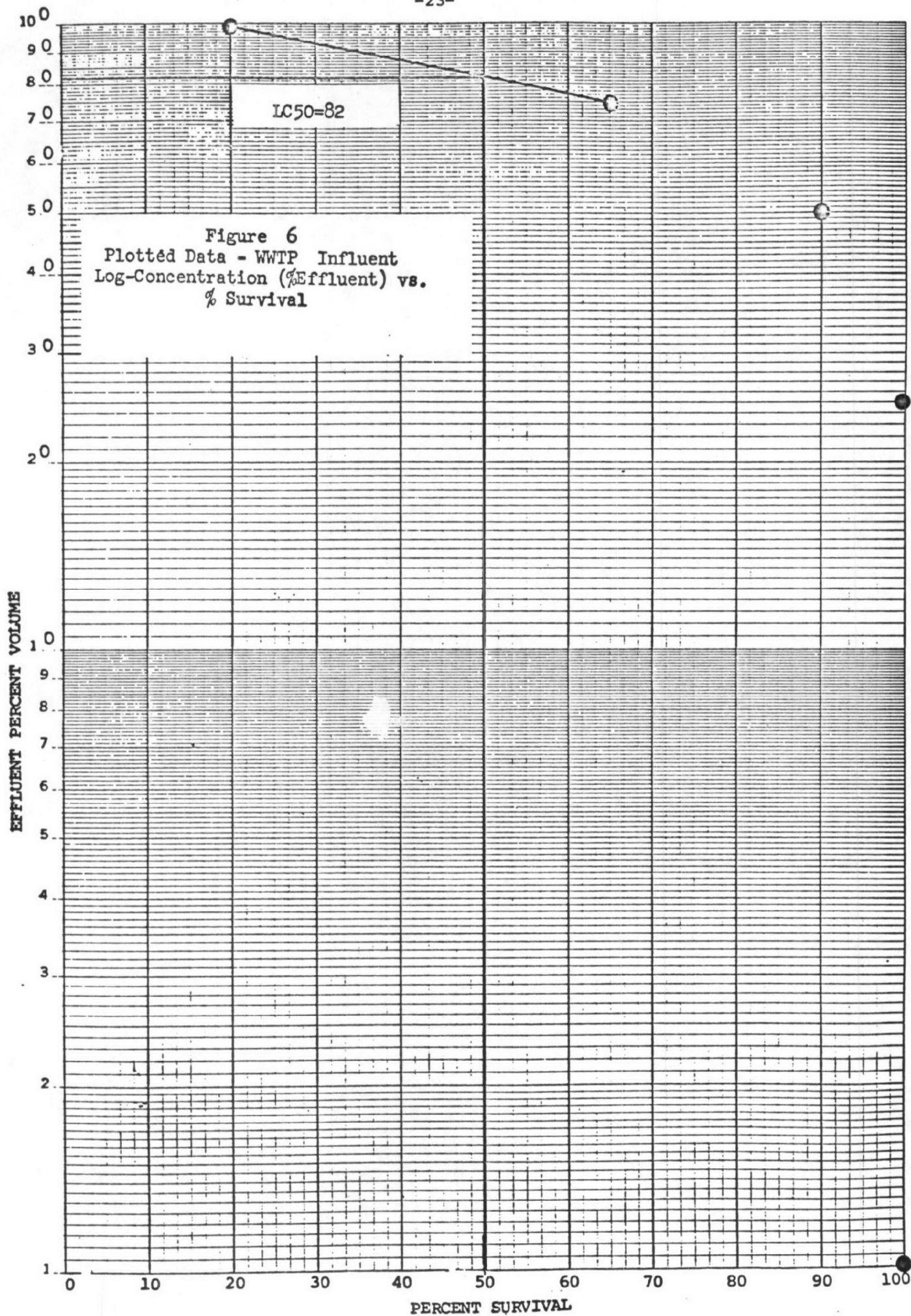


Figure 4
Plotted Data - Sylvester Products
Log-Concentration (% Effluent) vs.
% Survival



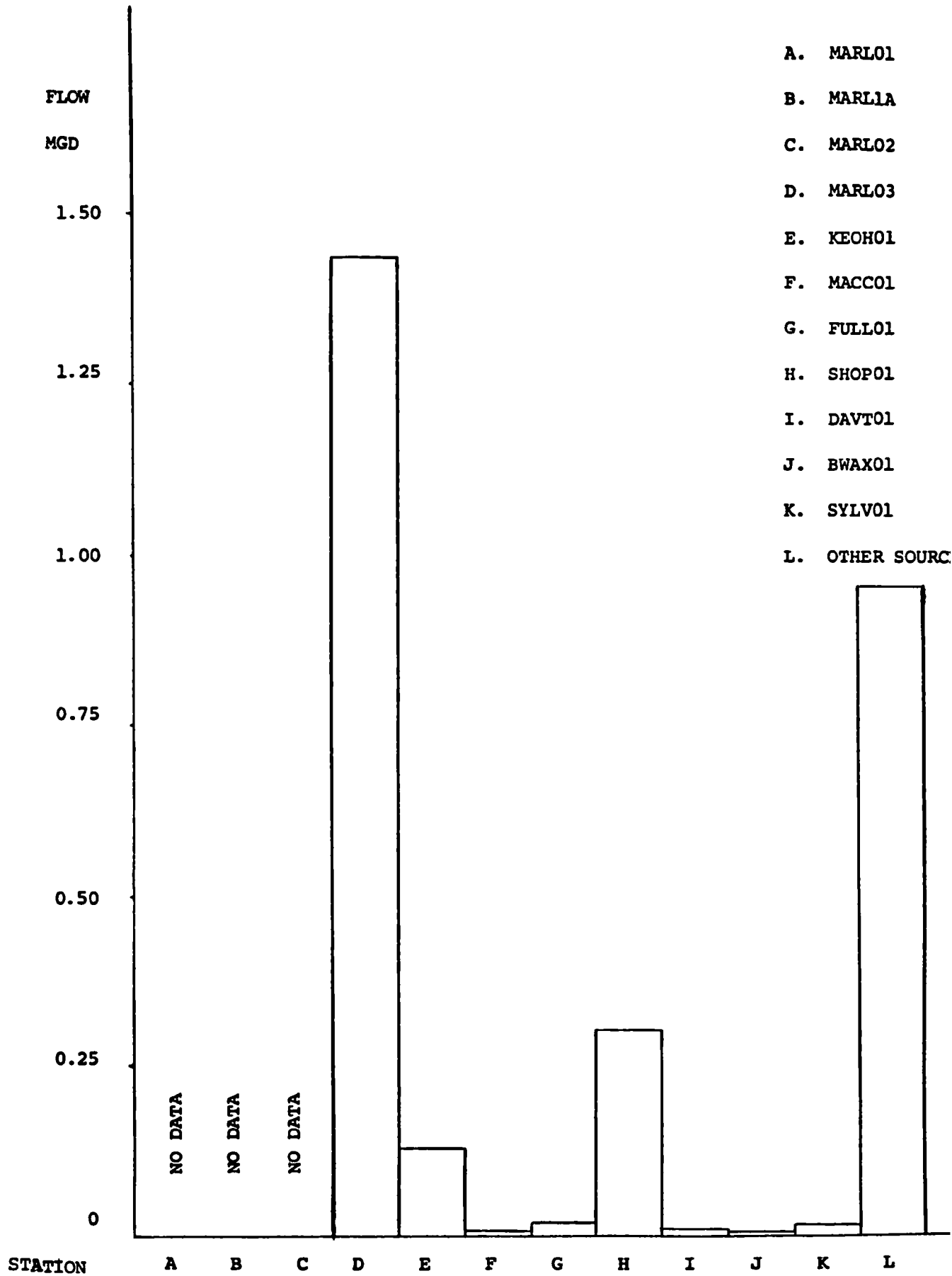




Appendix III

	FLOW (GPD)				
<u>Source</u>	<u>Day 1</u>	<u>Day 2</u>	<u>Day 3</u>	<u>Day 4</u>	<u>Avg</u>
WWTP Influent (Plant's recorder) 100% of tot. influent	1,610,000	1,440,000	1,360,000	1,350,000	1,440,000
WWTP Influent (Manning dipper - our data)	1,360,000	1,240,000	1,120,000	1,110,000	1,210,000
Butcher's Wax 20% of tot. influent	1,870	1,600	1,840	1,915	1,800
Stop & Shop 85% of tot. influent	314,000	226,000	210,000	253,000	251,000
H.B. Fuller 87% of tot. influent	17,800	14,800	13,900	9,100	13,900
Keohler Manufacturing 90% of tot. influent	62,700	72,700	71,800	71,500	69,700
Sylvester Products 90% of tot. influent	8,100	19,400	14,300	11,600	13,500
Dav-Tech 90% pf tot. influent	7,500	11,000	9,200	9,100	9,000
Mass Container 95% of tot. influent	9,000	9,000	8,000	7,500	8,600

FOUR DAY FLOW AVERAGES



Appendix IV

Appendix IV-A

Average Monthly Data

<u>Date</u>	<u>Influent Flow (MGD)</u>	<u>Recirculation Ratio* (%)</u>	<u>Return Sludge Suspended Solids (mg/l)</u>	<u>Mixed Liquor Suspended Solids (mg/l)</u>	<u>Sludge Volume Index*</u>	<u>F:M*</u>	<u>Mean Cell Residence Time* (days)</u>
Jan 78	1.46	64	6978	4036	216.8	0.135	13.2
Feb	1.20	65	5155	2861	148.5	0.138	9.8
Mar	1.61	54	4860	2283	190.5	0.218	9.2
Apr	1.61	53	4542	1824	98.7	0.211	7.3
May	1.06	77	3303	1371	72.9	0.209	7.7
June	0.97	79	4337	2331	53.6	0.141	11.3
July	0.73	86	2506	1174	489.8	0.271	8.7
Aug	0.85	85	1886	945	1058.2	0.345	--
Sep	0.77	88	3023	1661	571.9	0.205	7.0
Oct	0.85	87	4131	2241	419.5	0.166	9.5
Nov	0.80	98	3852	2388	410.4	0.184	10.5
Dec	0.93	100	4434	2514	373.9	0.156	10.9
Jan 79	1.64	62	4672	2017	344.6	0.226	9.1
Feb	1.31	95	4563	2506	347.2	0.154	10.6
Mar	1.71	80	4690	2376	250.4	0.226	10.7
Apr	1.64	63	6721	3347	104.6	0.164	11.1
May	1.50	62	5135	2352	164.5	0.189	9.6
June	--	--	3959	2460	273.2	---	10.8
July	0.98	80	4802	2179	97.3	0.224	10.4
Aug	1.17	53	5258	2499	80.0	0.169	11.0
Sep	1.10	50	5740	2785	93.4	0.233	9.5
Oct	1.31	42	6264	2747	120.1	0.198	10.2
Nov	1.43	41	6020	2583	116.2	0.232	10.0
Dec	1.16	45	4515	2725	51.4	0.174	11.2

*See next page for equations

Equations

$$\text{Recirculation Ratio} - \frac{Q_r}{Q} \frac{\text{Recirculated Flow}}{\text{Influent Flow}}$$

$$\text{Sludge Volume Index} - \frac{SV_{30} \times 1000}{\text{MLSS (mg/l)}}$$

$$\text{F:M} - \frac{\# \text{ BOD/day}}{\# \text{ MLSS}}$$

$$\text{Mean Cell Residence Time} - \frac{VX}{Q_w X_r}$$

V = Volume Aeration Tank (mg)

X = MLSS (mg/l)

Q_w = Waste Sludge Flow (MGD)

X_r = S.S. Waste Sludge

MARLBOROUGH WEST

FLOW (MGD)

DATE	MAXIMUM	MINIMUM	AVERAGE
January 1978	2.49	0.96	1.46
February 1978	1.68	0.84	1.20
March 1978	2.60	0.83	1.61
April 1978	2.18	0.68	1.61
May 1978	1.68	0.61	1.06
June 1978	1.25	0.61	0.97
July 1978	0.91	0.52	0.73
August 1978	1.20	0.54	0.85
September 1978	1.09	0.48	0.77
October 1978	1.04	0.54	0.85
November 1978	1.04	0.53	0.80
December 1978	1.22	0.56	0.93
January 1979	2.48	0.87	1.64
February 1979	1.75	0.91	1.31
March 1979	2.17	1.29	1.71
April 1979	1.96	1.27	1.64
May 1979	1.89	1.03	1.50
June 1979	--	--	--
July 1979	1.43	0.59	0.98
August 1979	1.62	0.73	1.17
September 1979	1.67	0.76	1.10
October 1979	1.54	0.96	1.31
November 1979	1.77	1.04	1.43
December 1979	1.37	0.89	1.16

MARLBOROUGH WEST
MARLBOROUGH WEST WWTP
BIOCHEMICAL OXYGEN DEMAND (mg/l)

<u>DATE</u>	<u>INFLUENT</u>			<u>EFFLUENT</u>		
(1978)	MAXIMUM	MINIMUM	AVERAGE	MAXIMUM	MINIMUM	AVERAGE
January	469.	202.	284.	35.	6.	16.
February	450.	87.	246.	29.	10.	20.
March	480.	107.	248.	28.	15.	20.
April	225.	148.	194.	27.	11.	16.
May	282.	105.	195.	72.	11.	29.
June	382.	277.	319.	60.	15.	30.
July	580.	144.	376.	76.	19.	43.
August	570.	28.	302.	438.	51.	178.
September	445.	255.	349.	61.	11.	22.
October	462.	258.	346.	45.	6.	22.
November	529.	200.	343.	37.	6.	19.
December	806.	195.	399.	92.	12.	34.

MARLBOROUGH WEST
MARLBOROUGH WEST WWTP
BIOCHEMICAL OXYGEN DEMAND (mg/l)

<u>DATE</u>	<u>INFLUENT</u>			<u>EFFLUENT</u>		
(1979)	MAXIMUM	MINIMUM	AVERAGE	MAXIMUM	MINIMUM	AVERAGE
January	362.	170.	244.	44.	19.	34.
February	298.	178.	244.	43.	8.	26.
March	326.	178.	242.	108.	14.	42.
April	412.	135.	276.	21.	5.	13.
May	365.	114.	251.	29.	7.	18.
June	520.	231.	410.	42.	11.	22.
July	850.	320.	549.	20.	7.	11.
August	665.	196.	390.	50.	6.	17.
September	790.	282.	536.	24.	7.	17.
October	560.	320.	429.	30.	15.	21.
November	474.	220.	351.	35.	13.	23.
December	500.	228.	378.	46.	16.	35.

MARLBOROUGH WEST

MARLBOROUGH WEST WWTP

TOTAL SUSPENDED SOLIDS (mg/l)

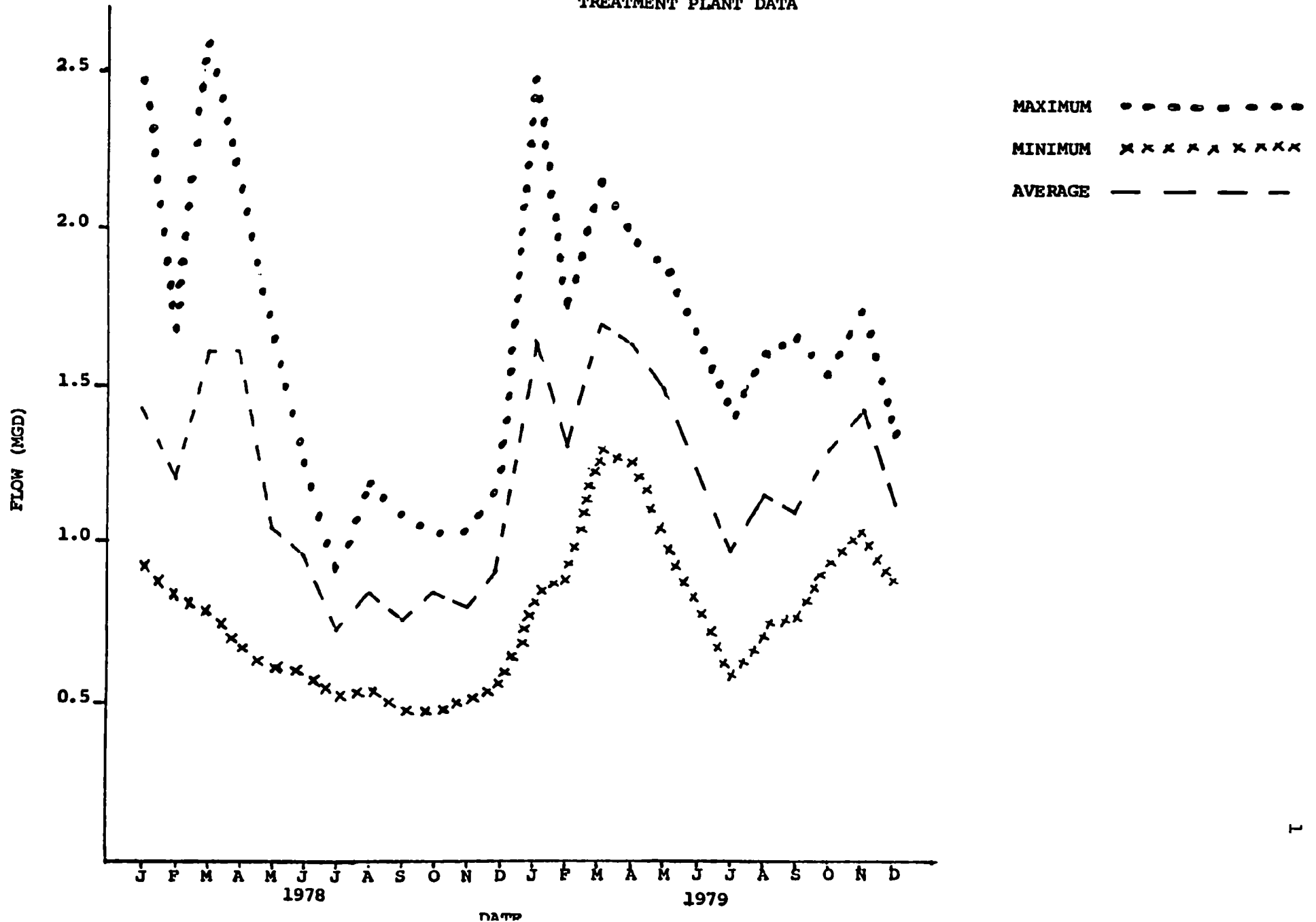
<u>DATE</u>	<u>INFLUENT</u>			<u>EFFLUENT</u>		
(1978)	MAXIMUM	MINIMUM	AVERAGE	MAXIMUM	MINIMUM	AVERAGE
January	386.	164.	242.	40.	5.	21.
February	309.	94.	193.	50.	8.	23.
March	440.	108.	242.	28.	5.	15.
April	252.	136.	188.	40.	10.	26.
May	265.	104.	185.	62.	20.	31.
June	404.	218.	274.	65.	17.	38.
July	624.	174.	368.	660.	11.	136.
August	391.	150.	291.	561.	63.	326.
September	433.	210.	298.	96.	7.	29.
October	432.	220.	306.	39.	9.	18.
November	340.	202.	276.	28.	7.	18.
December	516.	126.	391.	72.	9.	27.

MARLBOROUGH WEST
MARLBOROUGH WEST WWTP
TOTAL SUSPENDED SOLIDS (mg/l)

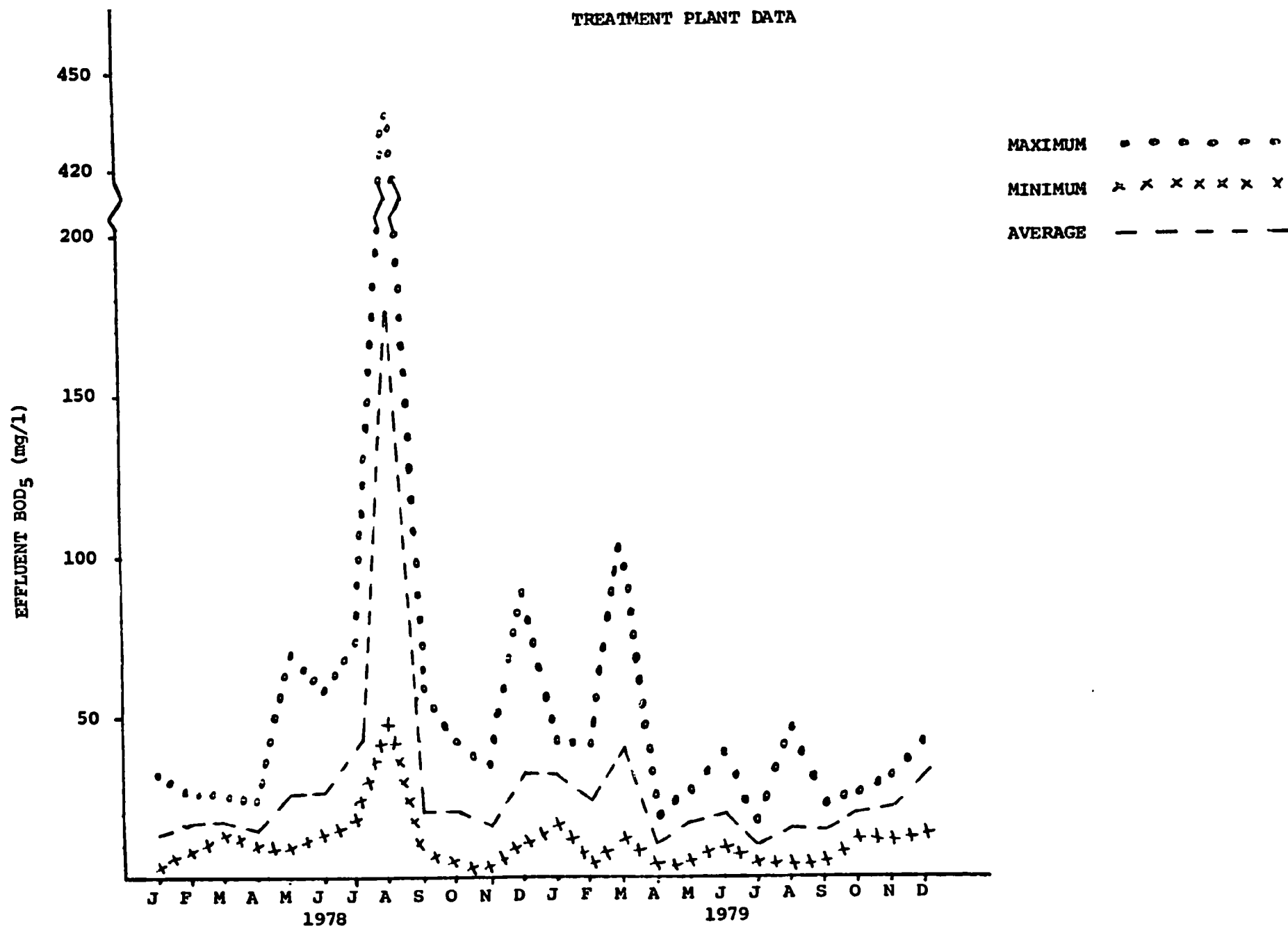
<u>DATE</u>	<u>INFLUENT</u>			<u>EFFLUENT</u>		
(1979)	MAXIMUM	MINIMUM	AVERAGE	MAXIMUM	MINIMUM	AVERAGE
January	364.	202.	282.	51.	21.	36.
February	353.	144.	236.	46.	10.	27.
March	288.	126.	210.	30.	15.	24.
April	386.	196.	293.	31.	1.	18.
May	444.	202.	302.	30.	4.	16.
June	728.	326.	458.	28.	4.	14.
July	928.	384.	571.	39.	1.	16.
August	790.	298.	501.	27.	5.	15.
September	748.	285.	467.	40.	1.	17.
October	605.	294.	474.	--	--	--
November	524.	40.	341.	50.	1.	24.
December	474.	213.	315.	50.	11.	31.

Appendix IV-B

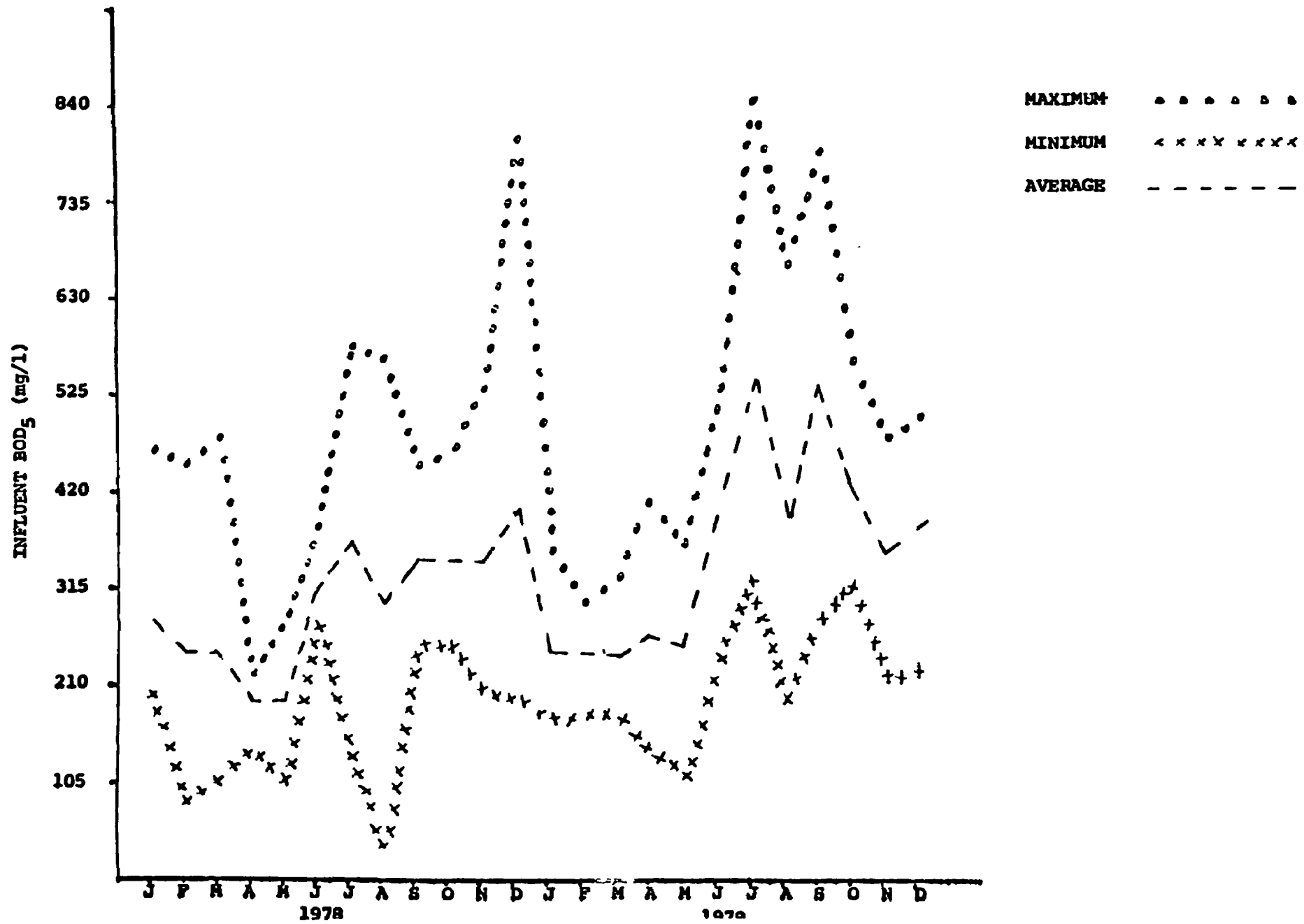
MARLBOROUGH WEST
TREATMENT PLANT DATA



MARLBOROUGH WEST
TREATMENT PLANT DATA

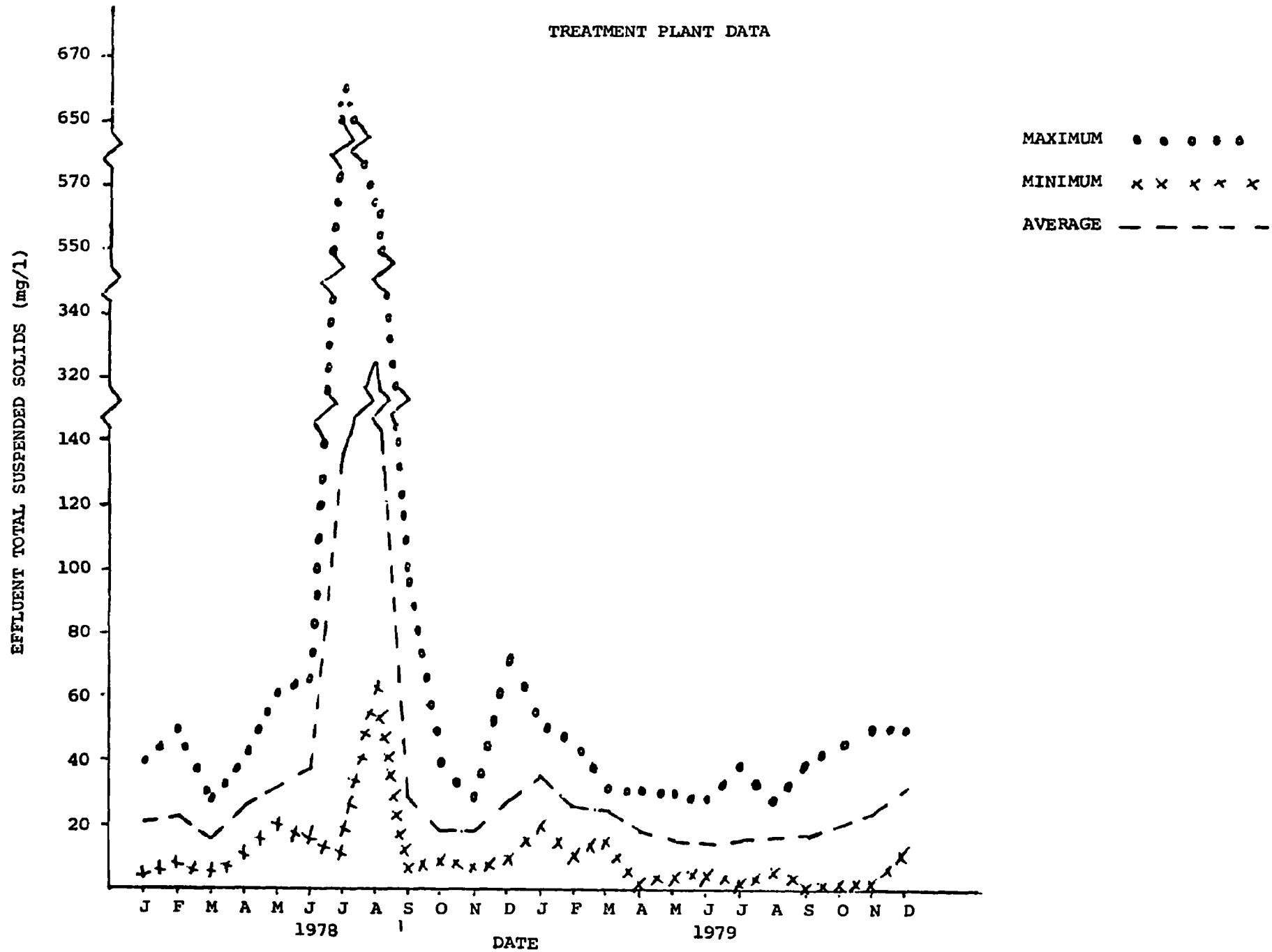


**MARLBOROUGH WEST
TREATMENT PLANT DATA**



MARLBOROUGH WEST

TREATMENT PLANT DATA



TREATMENT PLANT DATA



Appendix V

Appendix V-A

REVISEDRecommended List of Priority
PollutantsCompound Name

1. *acenaphthene
2. *acrolein
3. *acrylonitrile
4. *benzene
5. *benzidine
6. *carbon tetrachloride (tetrachloromethane)

*Chlorinated benzenes (other than
dichlorobenzenes)

7. chlorobenzene
8. 1,2,4-trichlorobenzene
9. hexachlorobenzene

*Chlorinated ethanes (including 1,2-
dichloroethane, 1,1,1-trichloro-
ethane and hexachloroethane)

10. 1,2-dichloroethane
11. 1,1,1-trichloroethane
12. hexachloroethane
13. 1,1-dichloroethane
14. 1,1,2-trichloroethane
15. 1,1,2,2-tetrachloroethane
16. chloroethane

*Chloroalkyl ethers (chloromethyl,
chloroethyl and mixed ethers)

17. bis(chloromethyl) ether

*Specific compounds and chemical classes as listed in the
consent degree.

18. bis(2-chloroethyl) ether
19. 2-chloroethyl vinyl ether (mixed)
- *Chlorinated naphthalene
20. 2-chloronaphthalene
- *Chlorinated phenols (other than those listed elsewhere;
includes trichlorophenols and chlorinated cresols)
21. 2,4,6-trichlorophenol
22. parachlorometa cresol
23. *chloroform (trichloromethane)
24. *2-chlorophenol
- *Dichlorobenzenes
25. 1,2-dichlorobenzene
26. 1,3-dichlorobenzene
27. 1,4-dichlorobenzene
- *Dichlorobenzidine
28. 3,3-dichlorobenzidine
- *Dichloroethylenes (1,1-dichloroethylene
and 1,2-dichloroethylene)
29. 1,1-dichloroethylene
30. 1,2-trans-dichloroethylene
31. *2,4-dichlorophenol
- *Dichloropropane and dichloropropene
32. 1,2-dichloropropane
33. 1,2-dichloropropylene (1,3-dichloropropene)
34. *2,4-dimethylphenol

*Dinitrotoluene

- 35. 2,4-dinitrotoluene
- 36. 2,6-dinitrotoluene
- 37. *1,2-diphenylhydrazine
- 38. *ethylbenzene
- 39. *flouranthene

*Haloethers (other than those listed elsewhere)

- 40. 4-chlorophenyl phenyl ether
- 41. 4-bromophenyl phenyl ether
- 42. bis(2-chloroisopropyl) ether
- 43. bis(2-chloroethoxy) methane

*Halomethanes (other than those listed elsewhere)

- 44. methylene chloride (dichloromethane)
- 45. methyl chloride (chloromethane)
- 46. meth' bromide (bromomethane)
- 47. bromoform (tribromomethane)
- 48. dichlorobromomethane
- 49. trichloroflouromethane
- 50. dichlorodiflouromethane
- 51. chlorodibromomethane
- 52. *hexachlorobutadiene
- 53. *hexachlorocyclopentadiene
- 54. *isophorone
- 55. *naphthalene
- 56. *nitrobenzene

*Nitrophenols (including 2,4-dinitrophenol
and dinitrocresol)

- 57. 2-nitrophenol
- 58. 4-nitrophenol
- 59. *2,4-dinitrophenol
- 60. 4,6-dinitro-o-cresol

*Nitrosamines

- 61. N-nitrosodimethylamine
- 62. N-nitrosodiphenylamine
- 63. N-nitrosodi-n-propylamine
- 64. *pentachlorophenol
- 65. *phenol

*Phthalate esters

- 66. bis(2-ethylhexyl) phthalate
- 67. butyl benzyl phthalate
- 68. di-n-butyl phthalate
- 69. di-n-octyl phthalate
- 70. diethyl phthalate
- 71. dimethyl phthalate

*Polynuclear aromatic hydrocarbons

- 72. benzo(a)anthracene (1,2-benzanthracene)
- 73. benzo(a)pyrene (3,4-benzopyrene)
- 74. 3,4-benzoflouranthene
- 75. benzo(k)flouranthene (11,12-benzoflouranthene)
- 76. chrysene
- 77. acenaphthalene

- 78. anthracene
- 79. benzo(ghi)perylene (1,12-benzoperylene)
- 80. flouroene
- 81. phenathrene
- 82. dibenzo(a,h)anthracene (1,2,5,6-dibenzanthracene)
- 83. indeno(1,2,3-cd)pyrene (2,3-o-phenylenepyrene)
- 84. pyrene
- 85. *tetrachloroethylene
- 86. *toluene
- 87. *trichloroethylene
- 88. *vinyl chloride (chloroethylene)

Pesticides and Metabolites

- 89. *aldrin
- 90. *dielddrin
- 91. *chlordan (technical mixtur_ & metabolites)

*DDT and Metabolites

- 92. 4,4'DDT
- 93. 4,4'DDE (p,p'DDX)
- 94. 4,4'DDD (p,p'TDE)

*Endosulfan and Metabolites

- 95. a-endosulfan-Alpha
- 96. b-endosulfan-Beta
- 97. endosulfan sulfate

*Endrin and Metabolites

- 98. endrin
- 99. endrin aldehyde

*Heptachlor and Metabolites

- 100. heptachlor
- 101. heptachlor epoxide

*Hexachlorocyclohexane (all isomers)

- 102. a-BHC-Alpha
- 103. b-BHC-Beta
- 104. r-BHC-Gamma
- 105. g-BHC-Delta

*Polychlorinated Biphenyls (PCB's)

- 106. PCB-1242 (Arochlor 1242)
- 107. PCB-1254 (Arochlor 1254)
- 108. PCB-1221 (Arochlor 1221)
- 109. PCB-1232 (Arochlor 1232)
- 110. PCB-1248 (Arochlor 1248)
- 111. PCB-1260 (Arochlor 1260)
- 112. PCB-1016 (Arochlor 1016)

- 113. *toxaphene
- 114. *antimony (total)
- 115. *arsenic (total)
- 116. *asbestos (fibrous)
- 117. *beryllium (total)
- 118. *cadmium (total)
- 119. *chromium (total)
- 120. *copper (total)

- 121. *cyanide (total)
- 122. *lead (total)
- 123. *mercury (total)
- 124. *nickel (total)
- 125. *selenium (total)
- 126. *silver (total)
- 127. *thallium (total)
- 128. *zinc (total)
- 129. **2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)

*Specific compounds and chemical classes as listed on the consent degree.

**This compound was specifically listed in the consent degree. Because of the extreme toxicity (TCDD). We are recommending that laboratories not acquire analytical standard for this compound.

OTHER HAZARDOUS MATERIALS

Butcher's Wax

1. Dibutyl Phthalate (insect repellant)
2. Methyl Carbitol
3. Morpholine (wax solvent)
4. Triethylene Glycol
5. Ethanolamine (waxes)
6. NTA (Nitrilotriacetic acid)
7. Germicide (O-phenylphenol)
8. Chloroethane (1,1,1-trichloroethane)
9. Methylene Chloride (anesthetic)
10. Dimethylbenzene
11. Formaldehyde (intensely irritating)
12. Volatile Hydrocarbons (mineral spirits)

H. B. Fuller

1. Ethylene Glycol
2. Polyvinyl Acetate
3. 1,1,1-Trichloroethane
4. Diethylene and Dipropylene Glycol Dibenzoate
5. Butyl Carbitol
6. Butyl Benzyl Phthalate

Appendix V-B

Walsh p. 1 of 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: February 8, 1980

SUBJECT: Volatile Organic Analysis on Marlboro Survey

FROM: Arthur Clark *ac*
Richard Siscanaw *RS*

TO: Edward Taylor
Chief, Chemistry Section

Four samples from Marlboro, MA were received on January 9, 1980. The field blank, 48496, and the preserved effluent, 48494-P were analyzed on January 16-17, 1980. The procedure followed was the EPA protocol, "Organics by Purge and Trap" method 624. The sludge sample, 48495, was qualitated and semi-quantitated on January 29, 1980 by headspace; therefore, the reported values have been given J values. There was 82.2% moisture in the sludge sample.

Quality control included laboratory blanks, a field blank, and an internal spike consisting of bromochloromethane, 2-bromo-1-chloropropane, and 1,4-dichlorobutane injected into the blanks and the effluent sample. The average recoveries were 87, 98, and 94%, respectively.

<u>Sample No.</u>	<u>Location</u>	<u>Compound</u>	<u>Concentrations (ppb)</u>	<u>ppm - dry weight</u>
48494-P	Effluent	Methylene Chloride	6.5	
		1,1,1-Trichloroethane	45.	
48495	Sludge	1,1-Dichloroethane		J12
		1,1,1-Trichloroethane		J12
		Tetrachloroethylene		J4
		Toluene		J74
		Acetone*		-
		Methyl Ethyl Ketone*		-
		Dimethyl Disulfide*		-
48496	Field Blank	N.D.**		

*These compounds were not quantitated since they were not on the list of requested compounds.

**None detected.

Appendix V-C

ANALYTICAL RESULTS

Source: _____

Address: _____

PARAMETER & UNITS	OUTFALL #	PERMIT LIMIT ¹	SAMPLE TYPE ²	COLLECT DATE	COLLECT TIME	ANALYTICAL RESULTS ³		
						EPA	SOURCE	STATE
Be - Sed ug/GM-DW	MARL1A	.		01/09/80	9999	K5.00		
Cd - Sed ug/GM- DW						5.00		
Cr - Sed ug/GM-DW						500		
Cu - Sed ug/GM-DW						670		
Ni - Sed ug/GM-DW						2000		
Pb - Sed ug/ GM-DW						1100		
Zn - Sed ug/GM-DW						470		
Sb - Sed ug/GM-DW						K50.0		
Tl - Sed ug/GM-DW						K10.0		
Ag - Sed ug/GM-DW						NO.00		
Hg - Sed ug/GM-DW						0.610		
Moist. %						82.1		
CN - Sed ug/GM-DW			G		1200	16.0		
Phen - Sed ug/GM-DW			G		1200	18.0		

1. D- daily 2. G- grab
 M- monthly 6TcVc- six hour composite sample, time constant, volume constant
 W- weekly 2TcVv- two " " " " " " variable
 4TvVc- four " " " " " " variable, " constant

3. J- approximate value

K- less than
 L- more than

Source: _____

Address: _____

1. D- daily
M- monthly
W- weekly

2. G- grab
6TcVc- six hour composite sample, time constant, volume constant
2TcVv- two " " " " " variable
4TvVc- four " " " " variable, " constant

3. J- approximate value

K- less than
L- more than

ANALYTICAL RESULTS

Source: _____

Address: _____

PARAMETER & UNITS	OUTFALL #	PERMIT LIMIT ¹	SAMPLE TYPE ²	COLLECT DATE	COLLECT TIME	ANALYTICAL RESULTS ³		
						EPA	SOURCE	STATE
BOD mg/l	MARLO1			01/09/80	9999	32.0		
TSS mg/l						56.0		
Be ug/l						K100		
Cd ug/l						K100		
Cr ug/l						K100		
Cu ug/l						100		
Ni ug/l						600		
Pb ug/l						K100		
Zn ug/l						100		
Sb ug/l						K1000		
As ug/l						KJ5.00		
Tl ug/l						K100		
Ag ug/l						K10.0		
Hg ug/l						J0.200		

 1. D- daily
 M- monthly
 W- weekly

 2. G- grab
 6TcVc- six hour composite sample, time constant, volume constant
 2TcVv- two " " " " " variable
 4TvVc- four " " " " " variable, " constant

3. J- approximate value

 K- less than
 L- more than

Source: _____

Address: _____

1. D- daily
M- monthly
W- weekly

2. G- grab
6TcVc- six hour composite sample, time constant, volume constant
2TcVv- two " " " " " variable
4TvVc- four " " " " " variable, " constant

K- less than
L- more than

Appendix V-D

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: April 28, 1980

SUBJECT: Marlboro Effluent and Sludge Samples for Priority Pollutants

FROM: Dr. William J. Andrade *WJA*
Chemist

TO: Steven Serian
Environmentalist

THRU: Edward L. Taylor *E. Taylor*
Chief, Chemistry Section

The effluent sample 48491 was extracted and analyzed according to the Environmental Protection Agency's procedure published in the Federal Register Vol. 44 #233 Monday, December 3, 1979 p. 69464. Analysis of the sludge sample #48489 followed procedures from the U.S.EPA Office of Research and Development, Environmental Monitoring and Support Lab., Cincinnati, Ohio, December 11, 1978.

The procedure for the effluent sample involves pH adjustment of the sample to 11 and methylene chloride extraction followed by pH adjustment to 2 and methylene chloride extraction. The extracts are then analyzed on a gas chromatograph/mass spectrometer for both qualitative identification and quantitation. An acid and base spiked effluent sample and a blank was also analyzed for quality assurance.

Results:

		<u>ppb</u>
48491	benzyl alcohol	1209
	butyl benzyl phthalate	369
	bis (2 ethyl Hexyl) phthalate	270
	phthalic acid	4200*
48490	bis (2 ethyl Hexyl) phthalate	15
blank	phenol	6.5
	trichlorophenol	9.5

*Phthalic acid and phthalic anhydride could not be distinguished and the value represents the concentration calculated as phthalic acid.

The recoveries for the acid and base spike were:

Base

% recovery

hexachloroethane	71
naphthalene	160
2,6 dinitrotoluene	120
aldrin	102
di-butyl phthalate	110
benzo (g,h,i) perylene	113

<u>Acid</u>	<u>% Recovery</u>
phenol	76
2,4,6 trichlorophenol	91
4-nitrophenol	29

Several unidentified peaks were also present in this sample.

The sludge procedure involved the extraction of three portions of sludge, one for phenols using methylene chloride, one for neutrals using methylene chloride and the final one extracted with chloroform for benzidine. The pH for the phenol and neutral extraction of the sludges was adjusted with KHSO_4 to be acidic. A neutral pH of 7 was used for the benzidine extraction. Several cleanup techniques were employed and the extracts analyzed on a gas chromatograph/mass spectrometer.

<u>Results:</u>	<u>ppm</u>
48478	
benzaldehyde	2.3
benzyl alcohol	1.2
naphthalene	0.04
1H Indole	2.7
di n-butyl phthalate	1.2
butyl benzyl phthalate	37
bis (2-ethyl hexyl) phthalate	3.5
cresol (isomers)	30

Numerous other alkanes were present, as well as some unidentified peaks.

The sludge blank did not show any interfering peaks. An acid standard spike of phenol, 2,4,6 trichlorophenol and 4-nitrophenol did not show any recovery at the 1 ppm level.

Appendix VI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE: January 10, 1980

SUBJECT: Upset at Marlborough West WWTP, Marlboro, MA

FROM: Steven A. Serian *SAS*
Environmental Scientist

TO: Larry Brill
Water Compliance Section

An upset was discovered during a routine visit to the wastewater treatment plant. Upon closer inspection the two secondary clarifiers had large clumps of black sludge floating at the surface and the visual appearance of the water was murky brown. This problem was also found in the chlorine contact chamber and the final effluent.

We first noticed this problem at 1030 on December 4, 1979. At that time we failed to locate any plant personnel in the operations building or grounds. It should be noted three vehicles were parked in the lot outside the operations building.

I called John Hartley, Superintendent of the Treatment Systems, to notify him of the absence of plant personnel and the problems noted. At 1330, we returned to the treatment plant to notice any changes in the final effluent. The problem still existed however, two plant personnel were present when we arrived that afternoon. Samples were collected at the final effluent at 1030 and 1330 for BOD₅ and TSS for possible enforcement action. The results show low BOD but a high TSS. The visual appearance of floating solids in the secondary clarifiers is indicative of these results.

In addition, we took samples for the same parameters at the influent and the effluent of one of the primary clarifiers. It should be noted the influent pH was 8.5 and the effluent was 9.4.

An inspection was made of the discharge point into the Assabet River. We observed a milky colored plume which extended downstream from the point of discharge. This had a degrading affect on the visual quality of the river. However, subsequent visits have shown a noticeable improvement in the visual appearance of the effluent.

As part of our follow-up bioassay study in Marlborough, we noted a problem at H.B. Fuller Company, an adhesives manufacturer. Their empty drums are washed in the back lot allowing a white residue to accumulate on the ground after drying. We followed this substance in patches approximately 15 meters behind the facility where it entered a swamp. Whenever it rains, the residue is washed into the swamp. The water in the swamp had a thick orangy-brown scum of unknown composition.

We are planning to continue our survey of the industries and treatment plant this month. If I may be of further assistance concerning this matter, please do not hesitate to call me at 861-6700, ext. 238.

Attachment

cc: H. Armour

ANALYTICAL RESULTS

 Source: Marlborough West

 Address: Boundry Street
Marlboro, MA

PARAMETER & UNITS	OUTFALL #	PERMIT LIMIT ¹	SAMPLE TYPE ²	COLLECT DATE	COLLECT TIME	ANALYTICAL RESULTS ³		
						EPA	SOURCE	STATE
BOD	00F	50	G	12/04/79	1030	21		
TSS						74		
VSS						68		
FSS						6		
BOD					1330	28		
TSS						69		
VSS						63		
FSS	▼	▼			▼	6		
BOD	01A	---			1345	300		
TSS		---				420		
VSS		---				390		
FSS	▼	---				28		
BOD	01B	---				360		
TSS	▼	---	▼	▼	▼	510		

1. D- daily 2. G- grab
 M- monthly 6TcVc- six hour composite sample, time constant, volume constant
 W- weekly 2TcVv- two " " " " " " variable
 4TvVc- four " " " " " " variable, " constant
3. J- approximate value
 001 final discharge to Assabet River
 01A influent to the primary clarifier
 01B effluent from the primary clarifier
- K- less than
 L- more than

Appendix VII

Sampling Program

I. Summer Survey

<u>Sample Location</u>	<u>Sampling Frequency</u>	<u>Sample No</u>
A. Stop & Shop, Inc.	150 ml every 2 minutes	49888, 49862, 48854, 49756
B. Dav-Tech Plating Co.	100 ml every hour	49883, 49872, 49855, 49894
C. Butcher's Wax Co.	500 ml every hour	49884, 49870, 49856, 49890
D. Sylvester Products	500 ml every hour	49882, 49871, 49859, 49892
E. Keohler Mfg. Co.	500 ml every hour	49760, 49745, 49726, 48843
F. H.B. Fuller Co.	500 ml every hour	49761, 49746, 49728, 48844
G. Massachusetts Container	250 ml every hour	79775, 49773, 49727, 48845
H. Marlborough West WWTP		
1. influent	120 ml every 15 minutes	48853, 49769, 49751, 49725
2. primary effluent	120 ml every 15 minutes	48851, 49768, 49750, 49724
3. secondary effluent	125 ml every 20 minutes	48852, 49767, 49749, 49723
4. final effluent	220 ml every 30 minutes	48850, 49766, 49748, 49722

II. Bioassay Survey

A. Stop & Shop, Inc.	4 liters every hour	50011
B. Dav-Tech Plating Co.	12 liters every hour	50009
C. Butcher's Wax Co.	12 liters every hour	47689
D. Sylvester Products	12 liters every hour	50010
E. Keohler Mfg. Co.	12 liters every hour	48487
F. H.B. Fuller Co.	12 liters every hour	47688
G. Massachusetts Container	12 liters every hour	48488
H. Marlborough West WWTP		
1. influent	4 liters every hour	58003
2. primary effluent	4 liters every hour	58004
3. final effluent	4 liters every hour	50012

III. Toxic Survey

A. Marlborough West WWTP		
1. final effluent	150 ml every 20 minutes	48490, 48491
2. dewatered sludge	1 liter every hour	48489

Grab Samples

I. Summer Study

<u>Sample Location</u>	<u>Parameter</u>	<u>Time & Date</u>	
A. Stop & Shop, Inc.			
49858	oil & grease	8/13/79	1520
49866	bacti	8/14/79	1013
49874	bacti	8/15/79	0800
49887	bacti/oil & grease	8/16/79	0844
49896	Hg	8/16/79	1530
49774	Cr ⁺⁶	8/15/79	2125
49776	phenols	8/16/79	1945
B. Dav-Tech Plating Co.			
49861	pH, Cl ₂	8/13/79	1502
49865	bacti	8/14/79	1008
49869	CN (total)	8/14/79	1404
49873	bacti	8/15/79	0745
49886	bacti	8/16/79	0805
49895	CN, Hg	8/16/79	1502
C. Butcher's Wax Co.			
49857	oil & grease	8/13/79	1425
49863	bacti	8/14/79	0934
49867	CN (total)	8/14/79	1309
49877	bacti	8/15/79	0905
49880	oil & grease/Cr ⁺⁶	8/15/79	1340
49889	bacti	8/16/79	0928
49891	CN, phenol, Hg	8/16/79	1337
D. Sylvester Products			
49860	pH, Cl ₂	8/13/79	1448
49864	bacti	8/14/79	0950
49868	CN (total)	8/14/79	1440
49881	Cr ⁺⁶	8/15/79	1355
89885	bacti	8/16/79	0749
49893	CN, Hg	8/16/79	1418
E. Keohler Mfg. Co.			
49875	bacti	8/15/79	0820
49757	Cr ⁺⁶	8/15/79	1355
48840	bacti	8/16/79	0735
48846	phenols	8/16/79	1420

<u>Sample Location</u>	<u>Parameter</u>	<u>Time & Date</u>	
F. H.B. Fuller Co.			
49876	bacti	8/15/79	0850
49733	oil & grease	8/13/79	1510
49736	bacti	8/14/79	0840
49743	CN	8/14/79	1450
49758	CN ⁺⁶	8/15/79	1410
48841	bacti	8/16/79	0755
48847	CN, phenols	8/16/79	1500
G. Massachusetts Container			
49879	bacti	8/15/79	0945
49734	oil & grease	8/13/79	1520
49737	bacti	8/14/79	0955
49744	CN	8/14/79	1510
49759	CN ⁺⁶	8/15/79	1430
48842	bacti	8/16/79	0810
48848	Hg, CN, phenols	8/16/79	1530
H. Marlborough West WWTP			
1. MARLO3			
49732	oil & grease	8/13/79	1420
49741	bacti	8/14/79	0955
49742	CN	8/14/79	1410
49752	bacti	8/15/79	0825
49762	Cr ⁺⁶ /oil & grease	8/15/79	1625
48839	bacti	8/16/79	0825
48849	CN, phenols	8/16/79	1600
2. MARLO2			
49731	oil & grease	8/13/79	1428
49740	bacti	8/14/79	0955
49753	bacti	8/15/79	0825
49763	oil & grease	8/15/79	1632
49772	bacti	8/16/79	0825
3. MARL1A			
49730	oil & grease	8/13/79	1425
49739	bacti	8/14/79	0955
49754	bacti	8/15/79	0825
49764	oil & grease	8/15/79	1634
49771	bacti	8/16/79	0825
4. MARLO1			
49729	oil & grease	8/13/79	1415
49738	bacti	8/14/79	0955
49755	bacti	8/15/79	0825
49765	oil & grease	8/15/79	1636
49770	bacti	8/16/79	0825
II. Toxic Study			
A. MARLO1			
48494	VOA, CN, phenol	1/09/80	1035
B. MARL1A			
48495	VOA, CN, phenol	1/09/80	1200

III. December Upset

<u>Sample Location</u>	<u>Parameter</u>	<u>Time & Date</u>
A. MARL01		
47690	BOD, TSS	12/4/79 1030
47691	BOD, TSS	12/4/79 1330
B. MARL1A		
47692	BOD, TSS	12/4/79 1345
C. MARL1B		
47693	BOD, TSS	12/4/79 1345

APPENDIX VIII

Ordered

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF MARLBOROUGH
That the Code of the City of Marlborough, as amended, be further amended by striking in its entirety Chapter 19 – Water, and inserting in place thereof the following:

Chapter 19 – Water

ARTICLE I. IN GENERAL

- 19.1 Regulations for Introduction and Use of Water**
- 19.2 Determination of Water Rates.**
- 19.3 Abatement in Water Rates.**
- 19.4 Repairs, Extensions and Improvements, generally**
- 19.5 Powers and duties of Water Registrar.**
- 19.6 Annual Reports.**
- 19.7 Extension of Water Mains**
- 19.8 Entrance Fees.**
- 19.9 Payment of Entrance Fees.**
- 19.10 Water Rates.**
- 19.11 Service Pipes, Installation.**
- 19.12 Service Pipes, Maintenance.**
- 19.13 Meters.**
- 19.14 Licensing of persons authorized to make connection to the public water supply system.**
- 19.15 Construction methods and materials.**
- 19.16 Violations**
- 19.17 Matter tending to pollution of certain waters.**
- 19.18 Budding Fires.**
- 19.19 Camping, picnicking and fishing.**
- 19.20 Trespassing.**
- 19.21 Destroying or damaging property.**

CHAPTER 19 – WATER

Article I. In General

Sec. 19.1 Regulations For Introduction and Use Of Water.

The Department of Public Works shall have power to establish regulations for the introduction and use of water.

All persons taking the water supplied by the City shall prevent all waste of water.

The Commissioner of Public Works, or any of his agents or assistants, may enter the premises of any water taker to examine any water pipes and plumbing therein or thereon for the purpose of ascertaining whether there is any waste of water and for the purpose of determining the quantity of water used and the manner of use and for the further purpose of shutting off the water for non-payment of rates or fines or for any alleged violation of the provisions of this Chapter.

The Department of Public Works shall have the power to decide what is waste or improper use of water, and to restrict its use. If the water taker refuses or neglects to comply with any order of said Department after notice is given to him, the water shall be shut off, and not let on except by payment of reasonable charges.

Sec. 19.2 Determination Of Water Rates.

The Department of Public Works shall determine and assess the water rates.

Sec. 19.3 Abatement In Water Rates.

The Department of Public Works may make abatements in the water rates in all proper cases upon receipt, in writing, from the property owner of a request for abatement, stating reasons for such request, together with all information necessary to evaluate its merits. Excessive usage caused by pipe leaks or leaking fixtures on the owner's property, beyond the meter, shall not be considered cause for abatement. Should owner request meter be removed and checked, this shall be done in accordance with Sec. 19.13.

Any person aggrieved by the decision of the Department under this section, may, if the bill in question is in the amount of one hundred dollars or more, appeal said decision to the City Council. A two-thirds vote of the Council will be necessary to overturn said decision. Should this occur, the claim would then be settled under conditions put forth by the Council.

Sec. 19.4 Repairs, Extensions and Improvements, generally.

The Department of Public Works may make repairs, extensions or improvements on the waterworks, provide new main pipes and construct or repair hydrants established by the City.

The Department of Public Works does not guarantee constant pressure nor uninterrupted service, nor does it assure either a full volume of water or the required pressure per square inch necessary to effectively operate appliances of any kind, the same being subject to all the variable conditions which may occur in the use of water from the main pipe.

The City will not be responsible for damages caused by shutting off water for the purpose of doing repairs on pipes, gates, hydrants or other fixtures, or by any work on the main pipe system, or by breaks in the pipes, or by low pressure resulting from any cause. Reasonable notice shall be given if possible, to all customers before the water is shut off, except in cases of emergency.

Any work done on the public water supply system by a private contractor or agent shall only be performed after procurement from the Department of all necessary permits and licenses as hereinafter described.

No plumber or other person not in the employ of the Department of Public Works Water Division shall shut water off or turn on the water at any service pipe except at the cellar wall. Whenever by request of the owner or his representative, water is turned on or off at the curb stop for testing plumbing or other purposes, the charge for turning on or shutting off water shall be ten dollars. (\$10.00)

No person, not in the employ of the Department of Public Works, or a member of the Fire Department in the performance of his duties, shall turn on any hydrant, public or private, without first obtaining permission from the Water Department.

Sec. 19.5 Powers and Duties of Water Registrar.

The Water Registrar shall act as clerk of the Department of Public Works Water Division. This person shall perform such services as may be required, and shall annually, in July, present to such Department detailed statements of receipts and expenditures in the water division for the year ending the thirtieth day of June, of the number of water takers, the number of services in use, the number and amount of abatements and give such other information as the Department may require.

The Water Registrar, under direction of such water division, shall exercise a constant supervision of the use of the water. This person shall, under the direction of the Commissioner of Public Works, make and deliver to water takers, statements for metered water used. Such statements shall be delivered monthly, in the case of heavy users, or quarterly. Statements for charges for specific supplies or for fractional parts of a term shall be delivered when payable.

The Water Registrar shall keep, in suitable books, the names of all persons who take the water, the name and number of the street, the amount charged and amounts of abatements, which records shall be open to the inspection of the Department of Public Works, the Mayor or any committee of the City Council. The Water Registrar shall at the end of each fiscal year, report to such Department the amounts respectively, of bills delivered, abatements, uncollected bills and fees.

Sec. 19.6 Annual Reports.

The Commissioner of Public Works shall annually, in July, present to the City Council a report of the conditions of the waterworks, and other property connected

therewith, with an account of receipts and expenditures, and a schedule of property in hand, together with any information or suggestions which they deem important. The report of the Water Registrar shall accompany this report.

Sec. 19.7 Extension of Water Mains.

Extensions of water mains shall be subject to approval by the City Council and the Mayor and shall be made under the supervision of the Department of Public Works.

Sec. 19.8 Entrance Fees.

A. Service pipes connected to City main.

Entrance fees for any service pipe connected into the public water system shall be in accordance with the following schedule:

Residential:

Single family residence	\$400.00
Multiple family residence (including all structures containing more than one dwelling unit such as duplexes, apartment houses, apartment complexes, hotels, motels, trailer parks, etc)	\$400.00 plus \$ 25.00 per living unit.

Non-Residential:

Entrance fee shall be based on size of service pipe as follows

¾" - \$ 500.00	4" - \$1,500.00
1" - \$ 750.00	6" - \$1,750.00
1½" - \$1,000.00	8" - \$2,000.00
2" - \$1,250.00	10" - \$3,500.00
	12" - \$5,000.00

Entrance fee for any service larger than 12 inches shall be as determined by the Commissioner of Public Works with the approval of the Mayor.

B. Secondary or Branch mains connected to City main and service pipes connected thereto:

1. Single family residential subdivision or development:

The entrance fee shall be \$400.00 for each connection of the secondary or branch main, or mains, to City mains plus \$50.00 for each lot served by the secondary or branch main.

2. Multi-family residential subdivision or development:

The entrance fee shall be \$400.00 for each connection of the secondary or branch main, or mains, to City mains plus \$25.00 for each living unit served by the secondary or branch main.

3. Commercial or Industrial Subdivision or Development:

The entrance fee shall be \$500.00 for each connection of the secondary or branch main, or mains, to the City main plus the non-residential entrance fee listed in paragraph "A", for each service connected to the branch or secondary main.

C. Fire Protection:

Any service pipe to be used for fire protection purposes (i.e. feeding hydrants, sprinkler systems, etc.) shall be a separate service from the main and subject to an entrance fee of \$750.00 for any size 8" or smaller and \$1,500.00 for any size greater than 8".

Any residence now under extension contract will continue to benefit by additional connections into the extension until the life of that particular extension contract expires.

Sec. 19.9 Payment of Entrance Fees.

The entrance fee for a single family residence shall be payable at the time of the service connection except that, at the discretion of the Department of Public Works, this payment, plus a service charge of ten per cent, may be paid over a ten year period.

Entrance fees for all other connections shall be payable at the time of application for connection.

The unpaid balance of any entrance fee due the City under this section shall constitute a municipal lien on the property of the applicant.

Sec. 19.10 Water Rates.

The taker of water, in addition to such entrance fees as put forth in Sec. 19.8 shall pay for the water used at the established rates of the Department of Public Works, and shall also pay for all service work and materials on his property.

Water bills shall be issued monthly in the case of heavy users or quarterly and are due 30 days thereafter. Delinquent bills or accounts continually in arrears may, at the discretion of the Commissioner of Public Works, be assessed a penalty of ten per cent (10%) of the unpaid balance.

Should a taker of water desire, due to vacancy or prolonged non-use, to have a water service shut off, he shall notify the Department in writing of his request, and the Department will shut the service off at the curb-stop. No bills will be issued while a service is shut off at the curb-stop, however, a minimum bill, in accordance with the Department's water rate schedule will be issued in all other cases. When it is desired to have water turned back on, taker should notify the Department and service will be reactivated and a fee of ten dollars (\$10.00) assessed.

In all cases, bills will be sent to, and liability for payment will rest with the owner of the property.

Sec. 19.11 Service Pipes, Installation.

Any landowner desiring to connect to the public water supply system, should apply to the Water Registrar's Office and fill out the necessary forms. The prescribed form must be signed by the owner or his authorized agent. This request must be accompanied in all cases except a single family home, by a plot plan showing the location of the proposed connection and appurtenances unless this requirement is waived by the Department of Public Works.

All service pipes, valves, meters, etc. are the property of the landowner and shall be supplied and maintained in proper order by him.

In the case of the construction of an individual single family home, it will be the responsibility of the property owner to have the service pipe installed. The Department will, during the months of June, July and August only, agree to install services and bill the property owner for all materials, labor and equipment supplied. Only those that can be accomplished during this period will be performed. The Department reserves the right to accept or reject any application for service installation. Services not installed by the Department must be installed by contractors licensed by the Department as stated hereinafter. Work performed by the Department will be in accordance with Sec. 19.15.

All services excluding individual single family residences shall be installed by the developer or property owner, and he will furnish all materials, labor and whatever else is necessary to complete service. This includes the furnishing and installing of tapping sleeves and gates for larger services. This work shall be done in accordance with Sec. 19.15.

Sec. 19.12 Service Pipes, Maintenance.

Maintenance and repair of service pipes shall be the responsibility of the property owner. The Department will, at the request of the owner of a single family home, and at no cost to him, repair minor leaks in accordance with the conditions of Sec. 19.15.

Major repairs or relays, whether deemed necessary or requested, shall be the responsibility of the property owner.

Maintenance and repair of all service pipes, other than those serving single family homes as described above, shall be the responsibility of the property owner. The Department will only make emergency repairs that it deems necessary at the time and the property owner billed accordingly.

Sec. 19.13 Meters.

All individual services from the public water supply shall be metered in a manner approved by the Department of Public Works.

Meters, as stated in Sec. 19.11 are the property of the land owner and will be purchased and set by him. The Department will, in the case of an individual single family residence, furnish and set the meter for the property owner at the owner's cost. All other meters shall be purchased and set by property owner in conformance with Department requirements. All meters will be equipped with remote readers mounted on outside of building. The Department will, if it deems necessary, repair and/or replace damaged, faulty or old meters on single family residential homes at no cost to property owner. All other meters, if deemed by the Department to be in need of repair or replacement, shall be repaired or replaced by property owner within 30 days of notification in writing from

The property owner shall provide access to meter at all times. If the property owner requests Department to remove the meter and check its accuracy, there shall be, within each three year period, charge assessed to the owner, if meter is found to be running accurately (within 2%), as follows: first call - no charge, second call - \$5.00, third call and each additional call - \$10.00. Should meter prove to be faulty, no charge will be made.

No meter shall be disconnected from the pipe, moved or disturbed without permission from the Department of Public Works, who will send a properly authorized person to attend to any change needed. The Department shall have the right to change, replace, inspect, repair or remove any meter at any time it deems necessary.

Sec. 19.14 Licensing of Persons Authorized to Make Connection to the Public Water Supply System.

Contractors or individuals of established reputation and experience will be licensed by the Commissioner of Public Works to make connections to the public water supply.

No connections shall be made, or service pipes installed, by any contractor or individual not so licensed.

All licensees shall be subject to compliance with the following requirements:

- A. Applicants for licenses are required to pay a filing fee of \$10.00, payable to the City, all of which will be refunded to the applicant if his application is rejected.
- B. All licenses issued will expire on December 31st of each year after which they will be renewed upon payment to the City of a \$10.00 renewal fee.
- C. No licenses shall be transferable.
- D. If approved by the Commissioner, applicants for licenses shall file with the Commissioner, proper and acceptable performance and guarantee bond in the amount of \$1,000.00, which shall remain in full force and effect for at least one year from the date of original approval and each calendar year thereafter upon renewal.
- E. Applicants for licenses, after approval by the Commissioner, shall file with the Commissioner a Certificate of Insurance in the sums of \$50,000/\$100,000, to cover public liability and a Certificate of Insurance in the sum of \$10,000, covering property damage. In addition, a Certificate of Insurance covering Workmen's Compensation shall be filed, all of which shall remain in full force and effect for a period of at least one year from the date of original approval and each calendar year thereafter upon renewal. Said insurance shall indemnify the Commissioner and the City against any and all claims, liability or action for damages, incurred in or in any way connected with the performance of the work of the licensee, and for or by reason of any acts or omission of said licensee in the performance of his work.
- F. Applicants for licenses will be approved or disapproved within a period of fifteen (15) days after filing the application. After fifteen (15) days a license shall automatically be approved.
- G. The licensee shall abide by all the conditions of this Chapter with particular reference to Sec. 19.15 "Construction Methods and Materials".
- H. The licensee shall comply with all applicable City, State and Federal codes, rules and regulations.
- I. The Commissioner reserves the right to revoke or suspend any license if any provision of said license is violated.
- J. All licensees are required to give personal attention to all installations and shall employ only competent and courteous workers.
- K. All licensees shall be required, if, during the course of their work, they should encounter any previous violations of this Chapter, to give a full written report to the Commissioner within twenty-four (24) hours, of such violation.
- L. All licensees shall have all necessary equipment, tools and materials to perform this work.

Sec. 19.15 Construction Methods and Materials.

I. Work performed by the Department of Public Works:

In the event that the Department of Public Works, Water and Sewer Division, is involved either in the installation of a new service or relay to a single family residence, or

repairs to an existing service, the work shall be performed in accordance with the following rules and regulations.

- A. Trenches, or areas of excavation, after completion of the installation or repairs, shall be rough graded and hand raked. Permanent repairs, on the land owner's property (i.e. loaming, seeding, cold patching and hot topping of drives and walks, cement sidewalks, steps, etc.) shall be his or her responsibility.
- B. Fences or walls, of any kind, if not removed by the landowner, will, if within the Department's means and capabilities, be removed and stacked on the landowner's property. Upon completion of the Department's work, re-erection or rebuilding shall be the responsibility of the landowner.
- C. Trees, bushes, shrubs, hedges, flowers, lawn ornaments, etc., if not removed by the landowner, will, if within the Department's means and capabilities, be removed and stacked on the landowner's property. Upon completion of the Department's work, replanting or replacement of these items will be the responsibility of the landowner.
- D. In the event that the Department's work necessitates the cutting of roots of trees, bushes, shrubs, hedges, etc. the City will not be responsible for their continued life.
- E. The landowner shall be responsible for notifying the Department of any underground wiring, wells, septic system pipes, drainage pipes, etc. that may be in the line of construction. Unless the Department is notified in advance, the City will assume no liability for resulting damages.
- F. All decisions pertaining to A, B, C, D, and E above will be subject to appeal to the Public Works Committee of the City Council.

II. Work Performed by Developers and/or Private Contractors:

In the case of a water extension on or to a new development and on or to any private development, the owner of the property or the developer thereof shall construct and install the water mains and house connections in accordance with the following rules and regulations.

- A. There shall be submitted to the Commissioner of Public Works, in the case of a new development which has the approval of the Planning Board, a plotted plan which has been recorded in the Middlesex South District Registry of Deeds. Other private projects approved by appropriate City agencies shall also submit plan of proposed water system.
- B. Any and all plans for a water system in the City of Marlborough will show and/or specify the following: all mains will be a minimum of 8" Cement Asbestos, Class 150. All mains over 8" in diameter will be cast iron or ductile iron, including nipple pieces. All hydrant branches to be 6" C.I. All intersections of mains will be gated in their respective directions. No main will extend over 1000' in length without the use of a gate valve. All hydrants will be within 500 feet of each other, or so spaced at the discretion of the Department of Public Works or the Fire Chief. All hydrants will be gated. All taps to the existing public system will specify a tapping sleeve and gate valve.
- C. Any contractor involved in water works construction in the City of Marlborough will strictly adhere to the provisions as set forth in Sec. 19.14. No equipment, tools or material will be rented or loaned from the Department of Public Works. All materials used must be of the same make and quality as set forth hereinafter.
- D. COSTS - All labor and material costs to install a water system as specified herein will be borne by the owner, developer or contractor, whatever the case may be. Costs for taps into the public system and the restoration thereof of any public way will be borne by the owner, developer or contractor.
- E. INSPECTION - will be provided by the City of Marlborough only on a limited or part-time basis. Before any backfilling is done the Department of Public Works Water Division will be notified twenty four (24) hours in advance, and a man will inspect the completed work. This method of operation will be used for hydrant installation, main taps, service taps, etc. If the Department of Public Works feels that insufficient workmanship and care is being taken in the installation, a man will be assigned from the Department of Public Works on a full-time basis. The contractor or owner will bear the cost of this man at his hourly wage rate, Monday thru Friday from 7:30 a.m. to 4:30 p.m. or in the

case of summer hours, 7:00 a.m. to 3:30 p.m. Any time spent on the site not within these limits or Saturday, Sunday, Holidays, etc. will be at twice the man's rate.

- F. EXCAVATION - in any public way will require a road opening permit from the Department of Public Works. Necessary forms may be obtained and filed with the Department of Public Works Street Division. It will be the contractor's responsibility to notify utility companies such as gas, telephone, electric, etc. if there is any possibility of their equipment or their property being jeopardized by excavation. It shall also be the contractor's responsibility to notify the Fire Department and Police Department of said work to be performed and if necessary, to hire uniformed police for traffic control. In the event that the roadway cannot be restored to its normal surface immediately following the work, sufficient care will be taken to make the roadway smooth for traffic and if necessary to light with flashers as a warning to motor vehicles.
- G. Before any water mains, water services or hydrants are installed in a new subdivision or development, the contractor will bring the entire site where these utilities are located to subgrade, such grade will be verified by grade stakes provided and set by a registered land surveyor or engineer employed by the owner or contractor, so that the Engineering Division of the Department of Public Works may expedite their checking of such grades.
- H. WATER MAINS - All water mains over 8" in diameter will be Cast Iron, Class 150, cement lined, C.I. Class 22 or Ductile Iron, Class II, all in accordance with A.W.W.A. Standards. Excavation will be to a depth that provides a minimum of 5 feet of cover over the pipe. If excavation is in ledge, a minimum of 8" spacing around the pipe will be required to allow for selected backfill material. It will be at the discretion of the Department of Public Works as to the type of bedding used and will depend on field conditions. In any event, it will be either crushed bank gravel or ¾" stone. No stones larger than 3" in diameter may be used within the first foot of backfill over the pipe. Once the pipe has sufficient cover with a select material, normal backfilling may proceed with care. Jointing of push-on or tyton joint C.I. will be with the use of a come along or bar. If a bar is used a block of wood will be used between it and the pipe; the same applies for having a backhoe set larger diameter pipe, a block of wood will be inserted between the bucket and the pipe; in no event will there be a metal to metal driving force to set the pipe. If this is not strictly complied with, the length of pipe will be removed and a new one used in its place.
- I. HYDRANTS - will be Mueller, meeting the A.W.W.A. improved type standards; open right, 5½ ft. bury, 4½" valve opening with bell and inlet for a 6" pipe. All hydrants to be on and in the center of at least a 2 ft. diameter sump by 1 foot deep consisting of ¾" stone for drainage purposes. No hydrant shall be placed within 15 feet of a driveway or access road.
- J. THRUST BLOCKS - All plug, caps, tees, bends and hydrants shall be provided with a concrete thrust block to prevent movement.
- K. MAIN GATE VALVES - shall be open right, iron body, bronze mounted, double disc, non-rising stem as manufactured by MUELLER Co. or approved equal.
MAIN GATE BOXES - shall be cast iron, slide type with at least 6" of adjustment and at least 5 feet long. The covers shall be flush, close fitting with the letter "W" on the word "WATER" cast into the cover.
- L. MAIN LINE TAPS - will always be done with the use of a tapping sleeve and gate valve. The tapping sleeve to be Mueller or approved equal. If the contractor is to make the tap himself he must furnish evidence of his competence thru previous work and have the necessary tools to perform the work satisfactorily.
- M. SERVICE CONNECTIONS - shall all have as their minimum size ¾" diameter. All service pipe 2" or under will be either Type K copper tubing or plastic tubing. Any service pipe larger than 2" and less than 8" in diameter will be of material approved by the Department of Public Works. Plastic tubing will be copper tube size for use with standard stops and fittings with A.W.W.A. outlets or compression type outlets with a minimum of 160 p.s.i.

All connections to the main will be made by the use of a two strap corporation saddle by either Smith-Blair or Mueller. A curb stop and box shall be installed at the property line on the owner's side for each service. The curb stop shall be copper to copper "T" head, open right, with drain, as manufactured by Farnum

or Mueller. Any service 1" or greater shall employ an onseal curb with drip. Under no circumstances will any inverted key curbs be installed in any water system in the City or Marlborough. The curb box or service box shall be 4½ to 5½ feet, extension type, ¾" rod, and cover to be with counter sunk 1" brass plug tapped for 1" iron pipe. Minimum cover for services shall be 5'0". A sand backfill material will be carefully placed around the service pipe to protect it from normal backfill and compaction. On the inside of the building there shall be a meter as manufactured by Badger Meter or its approved equal with a Read-o-matic outdoor meter register or its approved equal. All meters are to be set by the owner or developer, or as stated in Sec 19.13. Each meter will have a gate valve, before and after, and each valve will be within 1'0" of the meter. Where pressures are in excess of 80 p.s.i. a pressure reducing valve will be employed in the line.

N. TESTING – The contractor shall furnish a water meter, pressure gage, testing plugs, pumps, pipe connections and other required apparatus. The section of pipe to be tested will be completely filled with water and air blown off thru a high point such as a hydrant. The section under test will be maintained full and under pressure for a period of 24 hours. The line shall be filled and tested within one to three days after filling.

Any failure of the various pipelines, structures, valves, hydrants and related accessories that occurs before final acceptance of the work shall be replaced at the expense of the owner. A successful water pressure test is *not* to be interpreted as final acceptance.

The pressure and leakage test shall consist of first raising the water pressures (based on the elevation of the lowest point of the section under test and corresponding to the gage location) to a pressure in pounds per square inch numerically equal to the pressure rating of the pipe. While maintaining this pressure, the contractor shall make a leakage test by metering the flow of water into the pipe. If the average leakage during a two-hour period exceeds a rate of 10 gallons per inch of diameter per 24 hours per mile of pipeline, the section shall be considered as having failed the test.

O. AFTER TESTING – The completed pipeline is to be disinfected with a chlorine concentration of approximately 50 ppm prior to being placed in service. The introduction of this chlorine shall be accomplished by pumping or syphoning a calcium hypochlorite solution into the main.

The chlorinated water is to remain in the new pipeline for a period of 24 hours. During this period, proper precautions are to be taken to prevent this chlorinated water from flowing back into the existing system.

P. AS BUILT PLANS – will be furnished to the Department in duplicate, by the contractor or owner at the completion of the project. The plans in particular will depict exact distances between gate valves, ties to gate valves both in the main and on hydrant branches. Curb box location referenced to the house or building that it serves by at least two ties from permanent points.

Sec. 19.16 Violations.

The provisions of this Chapter shall constitute a part of the contract with every person who takes the City water. Every person taking the City water shall be considered as having expressed his or her consent to be bound thereby.

Whenever any provision of this Chapter is violated, the water shall be shut off and shall not be let on again except on the payment of ten dollars (\$10.00) and all chargeable rates. The Commissioner of Public Works may declare any payment made for the water by the persons committing a violation to be forfeited and the same shall thereupon be forfeited.

Article II. City Reservoirs, etc.

Sec. 19.17 Matter Tending to Pollution of Certain Waters.

No fish, food or other matter tending to pollute the water shall be thrown into the waters of, or left upon the shores of Lake Williams or Millham Reservoir.

Sec. 19.18 Building Fires.

No person shall build any fire upon the shores or the ice of Lake Williams or

Sec. 19.19 Camping, picnicking and fishing.

No person shall camp, picnic or fish on any lands or premises taken or held by the City for the purposes of its water supply.

Sec 19 20 Trespassing.

No person shall trespass on any city lands or structures taken or held by the City for the purposes of its water supply without the express written consent of the Commissioner of Public Works

Sec 19 21 Destroying or damaging property.

No person shall destroy, deface or remove any structure or other property belonging to the City in or upon any lands or premises taken or held by the City for the purposes of its water supply.

CHAPTER 15 – SEWERS

- 15.1 Definitions
- 15.2 Use of public sewers – Required; rates.
- 15.3 Same – Exception.
- 15.4 Building sewers and connections
- 15.5 Licensing of persons authorized to make connection to the public sewerage, and/or drainage systems.
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- 15.7 Damage, etc., to structures, etc., prohibited, arrest of persons causing damage, etc.
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- 15.9 Violations.
- 15.10 Validity of chapter
- 15.11 Bills, books, etc., of Water Registrar.
- 15.12 Chapter in force and effect.
- 15.13 Service Pipes, Installation.
- 15.14 Service Pipes, Maintenance.
- 15.15 Trespassing.
- 15.16 Construction Methods and Materials.

Sec. 15.1 Definitions.

Unless the context specifically indicates otherwise, the meaning of terms used in this chapter shall be as follows

BOARD OF HEALTH. The Board of Health of the City of Marlborough.

BOD (denoting biochemical oxygen demand). The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five days at twenty degrees centigrade, expressed in milligrams per liter.

BUILDING DRAIN. That part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of the building and conveys it to the building sewer, beginning five feet outside the inner face of the building wall

BUILDING SEWER. The extension from the building drain to the public sewer or other place of disposal.

CITY. The City of Marlborough, Massachusetts.

COMBINED SEWER. A sewer receiving both surface runoff and sewage.

COMMISSIONER. The Commissioner of Public Works of the City or his authorized deputy, agent or representative.

GARBAGE. Solid wastes from the domestic and commercial preparation, cooking and dispensing of food, and from the handling, storage and sale of produce.

INDUSTRIAL WASTES. The liquid wastes from industrial manufacturing processes, trade or business as distinct from sanitary sewage.

NATURAL OUTLET. Any outlet into a watercourse, pond, ditch, lake or other body of surface or ground water.

PERSON. Any individual, firm, company, association, society, corporation or group

pH The logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

PROPERLY SHREDDED GARBAGE. The wastes from the preparation, cooking and dispensing of food that have been shredded to such a degree that all particles will be carried freely under the flow conditions normally prevailing in public sewers, with no particle greater than one-half inch in any dimension.

PUBLIC SEWER. A sewer in which all owners of abutting properties have equal rights, and is controlled by public authority.

SANITARY SEWER. A sewer which carries sewage and to which storm, surface and groundwaters are not intentionally admitted.

SEWAGE (sometimes termed wastewater or waste) A combination of the water-carried wastes from residences, business building, institutions and industrial establishments, together with such ground, surface and storm waters as may be present.

SEWAGE TREATMENT PLANT OR WATER POLLUTION CONTROL PLANT. Any arrangement of devices and structures used for treating sewage.

SEWAGE WORKS. All facilities for collecting, pumping, treating and disposing of sewage.

SEWER. A pipe or conduit for carrying sewage.

SHALL is mandatory; **MAY** is permissive.

SLUG. Any discharge of water, sewage or industrial waste which in concentration of any given constituent or in quantity of flow exceeds for any period of duration longer than fifteen minutes more than five times the average twenty-four hour concentration or flows during normal operation.

STORM DRAIN (sometimes termed storm sewer) A sewer which carries storm and surface waters and drainage, but sewage and industrial wastes, other than unpolluted process and cooling water, are intended to be excluded.

SUSPENDED SOLIDS. Solids that either float on the surface of, or are in suspension in water, sewage or other liquids, and which are removable by laboratory filtering.

WATERCOURSE. A channel in which a flow of water occurs, either continuously or intermittently. (Ord. 9496, 4-27-70.)

Sec. 15.2 Use of public sewers – Required; rates.

(a) It shall be unlawful for any person to place, deposit or permit to be deposited in any manner on public or private property within the City, or in any area under the jurisdiction of the City, any human or animal excrement, garbage or other objectionable waste, except where an approved method of disposal is provided.

(b) It shall be unlawful to discharge into any natural outlet within the City, or in any area under the jurisdiction of the City, any sewage or other polluted waters, except where suitable treatment has been provided in accordance with subsequent provisions of this chapter and the requirements of the commonwealth.

(c) Except as hereinafter provided, it shall be unlawful to construct or maintain in the City any privy, privy vault, septic tank, cesspool or other facility intended or used for the disposal of sewage.

(d) The owners of all houses, buildings or properties used for human occupancy, employment, recreation or other purposes, situated within the City and abutting on any street, alley or right-of-way in which there is located a public sanitary sewer of the City, is hereby required at his expense to install suitable toilet facilities therein, and to connect such facilities directly with the proper public sewer in accordance with the provisions of

that such public sewer is within one hundred feet of the property line, unless prevented by topographical or other reasons.

(e) The Commissioner shall annually establish equitable and just rental charges for the use of the sewerage facilities to be paid by every owner of an establishment whose building sewers connect directly or indirectly into public sewers. Such annual charges shall be in proportion to the quantity of water supplied to every such establishment, subject to any just equitable discounts and abatements in exceptional cases. The rental charges shall constitute a lien upon the real estate using such public sewers to be collected in the same manner as taxes upon real estate, or in an action of contract in the name of the City. (Ord. 9496, 4-27-70)

Sec. 15.3 Same – Exception.

Where a public sanitary sewer is not available under the provisions of section 15.2, the building sewer shall be connected to a private sewage disposal system complying with the requirements of the Board of Health. (Ord. 9496, 4-27-70.)

Sec. 15.4 Building sewers and connections.

(a) Extensions of sewers shall be subject to approval by the City Council and the Mayor, and such extensions shall be made under the supervision of the Commissioner, subject to the following provisions.

Entrance fees for any service pipe connected into the public sewerage system shall be in accordance with the following schedule:

Residential:

Single family residence	\$600.00
Multiple family residence (including all structures containing more than one dwelling unit such as duplexes, apartment houses, apartment complexes, hotels, motels, trailer parks, etc.)	\$600.00 plus \$ 50.00 per living unit

Non-Residential.

Entrance fee shall be based on size of water service pipe as follows:

¾" – \$1,000.00	4" – \$ 3,000.00
1" – \$1,500.00	6" – \$ 3,500.00
1½" – \$2,000.00	8" – \$ 4,000.00
2" – \$2,500.00	10" – \$ 7,000.00
	12" – \$10,000.00

Sewerage entrance fee for any water service larger than 12 inches shall be as determined by the Commissioner of Public Works with the approval of the Mayor

The service for the buildings under this section shall be paid entirely by the owner and shall include all labor, material, inspection and other charges related to the installation.

The entrance fee for a single family residence shall be payable at the time of the service connection except that, at the discretion of the Department of Public Works, this payment, plus a service charge of ten per cent, may be paid over a twenty year period.

Entrance fees for all other connections shall be payable at the time of application for connection

The unpaid balance of any entrance fee due the City shall constitute a municipal lien on the property of the applicant.

Secondary or Branch mains connected to City main and service pipes connected thereto:

Single family residential subdivision or development:

The entrance fee shall be \$600.00 for each connection of the secondary or branch main, or mains, to City mains plus \$100.00 for each lot served by the secondary or branch main.

Multi-family residential subdivision or development:

The entrance fee shall be \$600.00 for each connection of the secondary or branch main, or mains, to City mains plus \$50.00 for each living unit served by the secondary or branch main.

Commercial or Industrial Subdivision or Development:

The entrance fee shall be \$1,000.00 for each connection of the secondary or branch main, or mains, to the City main plus the non-residential entrance fee listed in paragraph "A", for each service connected to the branch or secondary main.

The service for the buildings under this section shall be paid entirely by the owner and shall include all labor, material, inspection and other charges related to the installation.

(b) All work related to the installation, repair, extension or modification of building drains, building sewers and connections to public sewers shall be performed by persons licensed by the Commissioner. Work related to the installation of building sewers, sewer extensions and connections to public sewers shall be performed only under permit issued by the Commissioner. No unauthorized person shall uncover, make any connection with or opening into, use, alter or disturb any public sewer or appurtenance thereto. Any person proposing a new discharge into the system or a substantial change in the volume or character of pollutants that are being discharged into the system shall notify the Commissioner at least forty-five (45) days prior to the proposed change or connection.

(c) There shall be two classes of building sewer connection permits (1) for residential and commercial service, and (2) for service to establishments producing industrial wastes. In either case, the owner or his agent shall make application on a special form furnished by the City. The permit application shall be supplemented by any plans, specifications or other information considered pertinent in the judgment of the Commissioner.

One copy of the permit shall be available for inspection at all times at the site of the work.

(d) All costs and expense incidental to the installation, testing and connection of the building sewer shall be borne by the owner. The owner shall indemnify the City from any loss or damage that may directly or indirectly be occasioned by the installation of the building sewer.

(e) The applicant for the building sewer permit shall notify the Commissioner at least twenty-four hours before beginning the work and also when the building sewer is ready for inspection, testing and connection to the public sewer. The testing and connection shall be made under the supervision of the Commissioner.

(f) Notification of the completion of the work with certification that all conditions of this chapter have been complied with shall be filed in writing with the Commissioner within twenty four hours after the completion of the work covered in each permit.

(g) A separate and independent building sewer shall be provided for every building, except where one building stands at the rear of another on an interior lot and no private sewer is available or can be constructed to the rear building through an adjoining alley, court, yard or driveway, the building sewer from the front building may be extended to the rear building under permit issued by the Commissioner.

(h) Old building sewers or portions thereof may be used in connection with new buildings only when they are found, on examination and test by the Commissioner to meet all requirements of this chapter.

(i) Where possible, the building sewer shall be brought to the building at an elevation below the basement floor. In all buildings in which any building drain is too low to permit gravity flow to the public sewer, sanitary sewage carried by such building drain shall be lifted by an approved means and discharged to the building sewer.

Ejector pumps, where necessary, are the property of the owner and shall be supplied, installed and maintained by the home owner.

(j) The building drain system shall be so vented that under no circumstances will the seal of any appliance be subjected to a pressure differential in excess of one inch of water. All appliances connected directly or indirectly to the building drain shall have traps with a liquid seal not less than two inches in depth.

Sec. 15.5 Licensing of persons authorized to make connection to the public sewerage, and/or drainage systems.

Contractors or individuals of established reputation and experience will be licensed by the Commissioner of Public Works to make connections to the public sewerage and/or drainage systems.

No connections shall be made, or service pipes installed, by any contractor or

All licensees shall be subject to compliance with the following requirements:

- A. Applicants for licenses are required to pay a filing fee of \$10.00, payable to the City, all of which will be refunded to the applicant if his application is rejected.
- B. All licenses issued will expire on December 31st of each year after which they will be renewed upon payment to the City of a \$10.00 renewal fee.
- C. No licenses shall be transferable.
- D. If approved by the Commissioner, applicants for licenses shall file with the Commissioner, proper and acceptable performance and guarantee bond in the amount of \$1,000.00, which shall remain in full force and effect for at least one year from the date of original approval and each Calendar year thereafter upon renewal.
- E. Applicants for licenses, after approval by the Commissioner, shall file with the Commissioner a Certificate of Insurance in the sums of \$50,000/\$100,000 to cover public liability and a Certificate of Insurance in the sum of \$10,000 covering property damage. In addition, a Certificate of Insurance covering Workmen's Compensation shall be filed, all of which shall remain in full force and effect for a period of at least one year from the date of original approval and each calendar year thereafter upon renewal. Said insurance shall indemnify the Commissioner and the City against any and all claims, liability or action for damages, incurred in or in any way connected with the performance of the work of the licensee, and for or by reason of any acts or omission of said licensee in the performance of his work.
- F. Applicants for licenses will be approved or disapproved within a period of thirty-one (31) days after filing the application.
- G. The licensee shall abide by all the conditions of this Chapter with particular reference to Sec. 15.4.
- H. The licensee shall comply with all applicable City, State and Federal codes, rules and regulations.
- I. The Commissioner reserves the right to revoke or suspend any license if any provision of said license is violated.
- J. All licensees are required to give personal attention to all installations and shall employ only competent and courteous workers.
- K. All licensees shall be required, if, during the course of their work, they should encounter any previous violations of this Chapter, to give a full written report to the Commissioner within twenty-four (24) hours, of such violation.
- L. All licensees shall have all necessary equipment, tools and material to perform this work.

Sec. 15.6 Regulations for use of public sewers.

(a) No storm water, surface water, groundwater, roof runoff, subsurface drainage, uncontaminated cooling water or unpolluted industrial process water shall be discharged or caused to be discharged to any sanitary sewer. No direct connection shall be made from a public water supply to a building drain discharging to any sanitary sewer.

(b) Storm water and all other unpolluted drainage shall be discharged to such sewers as are specifically designated as storm sewers, or to a natural outlet approved by the Commissioner. Industrial cooling water or unpolluted process waters may be discharged, on approval of the Commissioner, into a storm sewer or natural outlet.

(c) None of the following described waters or wastes shall be discharged or caused to be discharged into any public sewers:

1. Gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquid, solid or gas.
2. Waters or wastes containing toxic or poisonous solids, liquids or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any sewage treatment process, constitute a hazard to humans or animals, create a public nuisance or create any hazard in the receiving waters of the sewage treatment plant, including but not limited to cyanides in excess of two milligrams per liter as CN in the wastes as discharged to the public sewer.
3. Waters or wastes having a pH lower than 6.0, or having any other corrosive property capable of causing damage or hazard to structures, equipment and

removal of the sewage works.

4. Solid or viscous substances in quantities or of such size capable of causing obstruction to the flow in sewers, or other interference with the proper operation of the sewage works such as, but not limited to stone, gravel, ashes, cinders, sand, concrete, paving materials, mud, straw, sticks, plaster, cement, mortar, shavings, metal, glass, rags, feathers, tar, plastics, wood, unground garbage, whole blood, paunch manure, hair and fleshings, entrails and paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders

(d) No person shall discharge or cause to be discharged the following described substances, materials, waters or wastes if it appears likely in the opinion of the Commissioner that such wastes can harm either the sewers, waste treatment process or pumping equipment, have an adverse effect on the receiving stream or can otherwise endanger life, limb, public property or constitute a nuisance. In forming his opinion as to the acceptability of these wastes, the Commissioner will give consideration to such factors as the quantities of subject wastes in relation to flows and velocities in the sewers, materials of construction of the sewers, nature of the sewage treatment process, capacity of the waste treatment plant, degree of treatability of wastes in the sewage treatment plant and other pertinent factors. The substances prohibited are:

1. Any liquid or vapor having a temperature higher than one hundred fifty degrees Fahrenheit (sixty-five degrees centigrade).

2. Water or waste containing fats, wax, grease or oils, whether emulsified or not, in excess of one hundred milligrams per liter or containing substances which may solidify or become viscous at temperatures between thirty-two and one hundred fifty degrees Fahrenheit (zero and sixty-five degrees centigrade).

3. Garbage that has not been properly shredded. The installation and operation of any garbage grinder equipped with a motor of three-fourths horsepower or greater shall be subject to the review and approval of the Commissioner.

4. Waters or wastes containing strong acid iron pickling wastes, or concentrated plating solutions whether neutralized or not.

5. Waters or wastes containing iron, chromium, copper, zinc and similar objectionable, or toxic substances, or wastes exerting an excessive chlorine requirement, to such degree that any such material received in the composite sewage at the waste treatment works exceeds the limits established by the Commissioner for such materials.

6. Waters or wastes containing phenols or other taste-or-odor-producing substances, in such concentrations exceeding limits which may be established by the Commissioner as necessary, after treatment of the composite sewage, to meet the requirements of the state, federal or other public agencies of jurisdiction for such discharge to the receiving waters

7. Radioactive wastes or isotopes of such half-life or concentrations as may exceed limits established by the Commissioner in compliance with applicable state or federal regulations.

8. Waters or wastes having a pH lower than 6.0 or higher than 9.0, without prior written approval of the Commissioner of Public Works

9. Materials which exert or cause:

Unusual concentrations of inert suspended solids such as, but not limited to, Fullers earth, lime slimes and lime residues, or dissolved solids such as, but not limited to, sodium chloride and sodium sulfate.

Excessive discoloration such as, but not limited to, dye wastes and tanning solutions.

Unusual BOD, chemical oxygen demand, chlorine requirements or phosphorus in such quantities as to constitute a significant load on the waste treatment works.

Unusual volume of flow or concentration of wastes constituting "slugs" as defined herein.

10. Overflow by draining from cesspools or other receptacles storing organic wastes.

11. Steam exhausts, boiler blowoffs, sediment traps or pipes carrying hot circulating water.

12. Waters or wastes containing substances which are not amenable to

to treatment only to such degree that the sewage treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters

(e) If any waters or wastes are discharged, or are proposed to be discharged to the public sewers, which waters contain the substances or possess the characteristics enumerated in subsection (d) of this section, and which in the judgment of the Commissioner, may have a deleterious effect upon the sewerage facilities, processes, equipment or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the Commissioner may do any or all of the following

1. Reject the wastes and require separate treatment.

2. Require pretreatment to an acceptable condition for discharge to the public sewers

3. Require control over the quantities and rates of discharge.

4. Require payment under the provisions of subsection (j) of this section, to cover the added cost of handling and treating the wastes not covered by existing taxes or sewer charges.

If the Commissioner permits the pretreatment or equalization of waste flows, the design and installation of the plants and equipment shall be subject to the review and approval of the Commissioner, and subject to the requirements of all applicable codes, ordinances and laws.

(f) Grease, oil and sand interceptors shall be provided when, in the opinion of the Commissioner, they are necessary for the proper handling of liquid wastes containing grease in excessive amounts, or any flammable wastes, sand or other harmful ingredients; except, that such interceptors shall not be required for private living quarters or dwelling units. All interceptors shall be of a type and capacity approved by the Commissioner and shall be so located as to be readily and easily accessible for cleaning and inspection.

(g) Where preliminary treatment or flow-equalizing facilities are provided for any waters or wastes, they shall be maintained continuously in satisfactory and effective operation by the owner at his expense.

(h) The Owner of any property serviced by a building sewer carrying industrial wastes shall perform such monitoring of its discharges as may be required by the Commissioner, including the installation, use, and maintenance of monitoring equipment. Records of the results of such monitoring shall be kept and said results shall be reported to the Commissioner. The Commissioner shall make such records available upon request to State, Federal or any other public agencies having jurisdiction over such discharges.

In addition, the owner of any property serviced by a building sewer carrying industrial wastes shall install a suitable control manhole to facilitate monitoring of the wastes in the building sewer as may be required by the Commissioner. Such manhole shall be accessibly and safely located, and shall be constructed in accordance with plans approved by the Commissioner. The manhole shall be installed by the Owner at his expense, and shall be maintained by him so as to be safe and accessible to the Commissioner at all times.

(i) All measurements, tests and analyses of the characteristics of waters and wastes to which reference is made in this chapter shall be determined in accordance with the latest edition of "Standard Methods for the Examination of Water and Wastewater", published by the American Public Health Association, and shall be determined at the control manhole provided, or upon suitable samples taken at such control manhole. In the event that no special manhole has been required, the control manhole shall be considered to be the nearest downstream manhole in the public sewer to the point at which the building sewer is connected. Sampling shall be carried out by customarily accepted methods to reflect the effect of constituents upon the sewerage facilities and to determine the existence of hazards to life, limb and property. (The particular analyses involved will determine whether a twenty-four hour composite of all outfalls of a property is appropriate or whether a grab sample or samples should be taken. Normally, but not always, BOD and suspended solids analyses are obtained from twenty-four hour composites of all outfalls whereas pH's are determined from periodic grab samples.)

(j) No statement contained in this article shall be construed as preventing any special agreement or arrangement between the City and any industrial concern whereby an industrial waste of unusual strength or character may be accepted by the City for treatment provided that said agreements do not contravene any applicable State or Federal regulations.

(k) No person shall discharge industrial wastes to the public sewers except in accordance with the conditions set forth in an industrial waste discharge permit issued by the

(l) Within 30 days of being notified by the Commissioner, all persons discharging industrial wastes to the public sewers prior to the effective date of this revised ordinance, shall apply to the Commissioner for an industrial waste discharge permit. The application shall be made on the forms furnished by the Commissioner.

(m) All persons proposing to discharge industrial wastes to the public sewers shall apply to the Commissioner for an industrial waste discharge permit. The application shall be made on the forms furnished by the Commissioner.

Sec. 15.7 Damage, etc., to structures, etc., prohibited; arrest of persons causing damage, etc.

No person shall maliciously, willfully or negligently break, damage, destroy, uncover, deface or tamper with any structure, appurtenance or equipment which is a part of the sewerage facilities. Any person violating this provision shall be subject to immediate arrest under charge of disorderly conduct. (Ord. 9496, 4-27-70.)

Sec. 15.8 Right of entry, etc.

(a) The Commissioner and other duly authorized employees of the City bearing proper credentials and identification shall be permitted to enter into, upon or through all properties for the purpose of inspection, observation, measurement and testing, to have access to and copy any records, to inspect any monitoring equipment or method required in Section 15.6, subsection (h) and to sample any discharge to the sewers or waterways' facilities for waste treatment in accordance with the provisions of the ordinance. The Commissioner shall have no authority to inquire into the details of any industrial processes beyond that point having a direct bearing on the kind and source of discharge to the sewers or waterways or facilities for waste treatment.

(b) While performing the necessary work on private properties referred to in subsection (a) of this section, the Commissioner or duly authorized employees of the City shall observe all safety rules applicable to the premises established by the company and the company shall be held harmless for injury or death to the City employees and the City shall indemnify the company against loss or damage to its property by City employees and against liability claims and demands for personal injury or property damage asserted against the company and growing out of the gauging and sampling operation, except as such may be caused by negligence or failure of the company to maintain safe conditions as required in Section 15.4, subsection (h).

(c) The Commissioner and other duly authorized employees of the City bearing proper credentials and identification shall be permitted to enter all private properties through which the City holds a duly negotiated easement for the purpose of, but not limited to, inspection, observation, measurement, sampling, repair and maintenance of any portion of the sewerage facilities lying within such easement. All entry and subsequent work, if any, on such easement, shall be done in full accordance with the terms of the duly negotiated easement pertaining to the private property involved. (Ord. 9496, 4-27-70.)

Sec. 15.9 Violations.

The provisions of this chapter shall constitute a part of the contract with every person who connects to the City's Sewerage System. Every person making such connection shall be considered as having expressed his or her consent to be bound thereby.

Any person found to be violating any provision of this chapter, except Sec. 15.7, shall be served by the Commissioner with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory correction thereof. The offender shall, within the period of time stated in such notice, permanently cease all violations.

Any person who shall continue any violation beyond the time limit provided for in subsection (a) of this section shall be guilty of a misdemeanor, and on conviction thereof shall be fined in the amount not exceeding fifty dollars for each violation. Each day in which any such violation shall continue shall be deemed a separate offense.

Any person violating any of the provisions of this chapter shall become liable to the City for any expense, loss or damage occasioned the City by reason of such violation.

Sec. 15.10 Validity of chapter.

The invalidity of any section, clause, sentence or provision of this chapter shall not affect the validity of any other part of this chapter which can be given effect without such invalid part or parts. (Ord. 9496, 4-27-70.)

Sec. 15.11 Bills, Books, etc., of Water Registrar.

The Water Registrar shall distribute monthly, in the case of large users, or quarterly to the persons charged therewith, bills for sewer rental charges, conformable to the rates established by the Department of Public Works, and shall allow all discounts and abatements which the Department shall order.

The Water Registrar shall keep books and accounts in such form as the Department of Public Works shall direct.

The Water Registrar shall annually, in the month of July, furnish the City Council a report on the preceding fiscal year concerning this chapter.

Sec. 15.12 Chapter in force and effect.

This chapter shall be in full force and effect from and after its passage, approval, recording and publication as provided by law. (Ord. 9496, 4-27-70.)

Sec. 15.13 Service Pipes, Installation.

Any landowner desiring to connect to the public sewerage system, should apply to the Water Registrar's Office and fill out the necessary forms. The prescribed form must be signed by the owner or his authorized agent. This request must be accompanied in all cases except a single family home, by a plot plan showing the location of the proposed connection and appurtenances unless this requirement is waived by the Department of Public Works.

All service pipes and appurtenances are the property of the landowner and shall be supplied and maintained in proper order by him.

In the case of the construction of an individual single family home, it will be the responsibility of the property owner to have the service pipe installed. The Department will, during the months of June, July and August only, agree to install services and bill the property owner for all materials, labor and equipment supplied.

Only those that can be accomplished during this period will be performed. The Department reserves the right to accept or reject any application for service installation. Services not installed by the Department must be installed by contractors licensed by the Department as stated hereinafter. Work performed by the Department will be in accordance with Sec. 15.4.

All services excluding individual single family residences shall be installed by the developer or property owner, and he will furnish all materials, labor and whatever else is necessary to complete service. This work shall be done in accordance with Sec. 15.4.

Sec. 15.14 Service Pipes, Maintenance.

Maintenance and repair of service pipes shall be the responsibility of the property owner. The Department will, at the request of the owner of a single family home, and at no cost to him, make minor repairs in accordance with the conditions of Sec. 15.4.

Major repairs or relays, whether deemed necessary or requested, shall be the responsibility of the property owner.

Maintenance and repair of all service pipes, other than those serving single family homes as described above, shall be the responsibility of the property owner. The Department will only make emergency repairs that it deems necessary at the time and the property owner billed accordingly.

Sec. 15.15 Trespassing.

No person shall trespass on any City lands or structures taken or held by the City for the purposes of its municipal sewerage system without the express written consent of the Commissioner of Public Works.

Sec. 15.16 Construction Methods and Materials.

1. Work performed by the Department of Public Works:

In the event that the Department of Public Works, Water and Sewer Division, is involved either in the installation of a new service or relay to a single family residence, or repairs to an existing service, the work shall be performed in accordance with the following rules and regulations.

A. Trenches, or areas of excavation, after completion of the installation or repairs, shall be rough graded and hand raked. Permanent repairs, on the land owner's

property (i.e. loaming, seeding, cold patching and hot topping of drives and walks, cement sidewalks, steps, etc.) shall be his or her responsibility.

- B. Fences or walls, of any kind, if not removed by the landowner, will, if within the Department's means and capabilities, be removed and stacked on the landowner's property. Upon completion of the Department's work, re-erection or rebuilding shall be the responsibility of the landowner.
- C. Trees, bushes, shrubs, hedges, flowers, lawn ornaments, etc., if not removed by the landowner, will, if within the Department's means and capabilities, be removed and stacked on the landowner's property. Upon completion of the Department's work, replanting or replacement of these items shall be the responsibility of the landowner.
- D. In the event that the Department's work necessitates the cutting of roots of trees, bushes, shrubs, hedges, etc., the City will not be responsible for their continued life.
- E. The landowner shall be responsible for notifying the Department of any underground wiring, wells, septic system pipes, drainage pipes, etc. that may be in the line of construction. Unless the Department is notified in advance, the City will assume no liability for resulting damages.

II. Work performed by Developers and/or Private Contractors:

In the case of a sewer extension on or to a new development and on or to any private development, the owner of the property or the developer thereof shall construct and install the water mains and house connections in accordance with the following rules and regulations.

- A. There shall be submitted to the Commissioner of Public Works, in the case of a new development which has the approval of the Planning Board, a plotted plan which has been recorded in the Middlesex South District Registry of Deeds. Other private projects approved by appropriate City agencies shall also submit plan of proposed sewer system.
- B. Any and all plans for a sewer system in the City of Marlborough will show and/or specify the following: all gravity mains will be a minimum of 8" in diameter. All laterals, interceptors, trunklines, etc. will be either Asbestos Cement, Cast Iron or Reinforced Concrete. The Class of pipe will accommodate the field conditions i.e., all asbestos cement sewer pipe up to a 12 foot bury can be Class 2400; 12 to 18 feet will be Class 3300, 18 to 24 feet Class 4000 and anything over 24 feet Class 5000. No Class III concrete pipe shall be used for sewer construction. Class IV will be used up to 20 foot bury and anything over 20 feet will be Class V. When the cover is 5 feet or less under a roadway, the class and type of pipe will be specified by the Department of Public Works. The stationing and slopes of all pipes will be shown on a plan and profile view with an appropriate scale. The distance between any two manholes shall never exceed 300 l.f. Any two (2) sewer lines entering a manhole or a structure with a difference in elevation greater than 3' 0", the pipe with the higher elevation will enter via an outside drop connection, and will be shown as a drop manhole on the plans. All sizes of all pipe will have as their minimum slope, that slope which yields the scouring velocity for the particular diameter pipe. A benchmark shall be provided every 500' ±. Any and all existing utilities within 30 feet of the proposed main will be shown, and if available, their elevations noted.
- C. Any contractor involved in sewer construction in the City of Marlborough will strictly adhere to the provisions as set forth in Sec. 15.5. No equipment, tools or material will be rented or loaned from the Department of Public Works. All materials used must be of the same make and quality as set forth hereinafter.
- D. COSTS - All labor and material costs to install a sewer system as specified herein will be borne by the owner, developer or contractor, whatever the case may be. Costs for taps into the public system and the restoration thereof of any public way will be borne by the owner, developer or contractor.
- E. INSPECTION - will be provided by the City of Marlborough only on a limited or part-time basis. Before any backfilling is done, the Department of Public Works Water Division will be notified twenty four (24) hours in advance, and a man will inspect the completed work. If the Department of Public Works feels that insufficient workmanship and care is being taken in the installation, a man will be assigned from the Department of Public Works on a full-time basis. The contractor or owner will bear the cost of this man at his hourly wage rate,

7:00 a.m. to 3:30 p.m. Any time spent on the site not within these limits or Saturday, Sunday, Holidays, etc. will be at twice the man's rate.

- I. EXCAVATION - in any public way will require a road opening permit from the Department of Public Works. Necessary forms may be obtained and filed with the Department of Public Works Street Division. It will be the contractor's responsibility to notify utility companies such as gas, telephone, electric, etc., if there is any possibility of their equipment or their property being jeopardized by excavation. It shall also be the contractor's responsibility to notify the Fire Department and Police Department of said work to be performed and if necessary, to hire uniformed police for traffic control. In the event that the roadway cannot be restored to its normal surface immediately following the work, sufficient care will be taken to make the roadway smooth for traffic and if necessary to light with flashers as a warning to motor vehicles.
- G. Before any sewer mains, water mains or drain lines are installed in a new subdivision or development, the contractor will bring the entire site where these utilities are located to subgrade, such grade will be verified by grade stakes provided and set by a registered land surveyor or engineer employed by the owner or contractor, so that the Engineering Division of the Department of Public Works may expedite their checking of such grades.
- H. All materials used shall be as specified in Sec. 15.16. Work performed by Developers and/or Private Contractors, Item B. All sewer mains and sewer services will be set in a screened gravel bed, ½" to 1" stone, this stone bed will always be on firm undisturbed earth. In the event of peat or wet clay at grade, the contractor will excavate enough material so that when backfilled with stone, will provide a sound bed. The determination of how much unsuitable material is to be excavated will be at the immediate discretion of the inspector of the Department of Public Works. All concrete pipe shall be jointed by the use of a flat rubber gasket or the "O" ring type. All cast iron for sewer shall be the same class for gravity and force main systems, all force main systems will be Cast Iron. Under normal conditions, all pipe will have a 6" envelope of screened gravel around it. In ledge this envelope will go to 8". Select material will immediately follow the stone over the pipe; as to the amount will depend upon the depth and whatever the inspector deems necessary, at which time normal backfilling may start using already excavated material.
- I. MANHOLES - may be poured in place, precast, or at the discretion of the Department of Public Works, be Barrel Block, plastered both sides. All manholes will have aluminum steps on a 1' 0" spacing. All precast sections will be made watertight by "O" ring joints or an approved mastic. Connections to manholes may be "Mortar Joint", "Lock Joint Flexible Manhole Sleeve", "Press Wedge II", "Kor N Seal" and "Res Seal". The exterior of all manholes shall be completely covered with a Bituminous Waterproofing.
- J. MANHOLE RINGS/COVERS - shall be of the same type as used by the Department of Public Works.
- K. BRICK INVERTS - all sewer manholes will have a brick table constructed in their base to meet all incoming and outgoing pipes so that the flow is channeled smoothly from one point to another. All brick used for manhole inverts will be a hard burned sewer brick to meet ASTM C32-69 Grade SS.
Brickwork will also be used between the manhole structure and ring and cover to give the desired grade. However, the brickwork in this area will never exceed 8". This brickwork can be with a common brick.
- L. THRUST BLOCKS - will be used on any force main sections where called for by the Department of Public Works.
- M. CHIMNEYS - will be employed on the main wherever a service is needed when the depth of the main exceeds 8' 0". This will meet exception when the elevation of the connection at the building does not allow the use of a chimney. All chimneys will be encased in a concrete envelope 6 inches thick.
- N. WYE BRANCHES AND/OR TIES - will be employed in the main for depths of 8' 0" or less. All wye branches, tees, chimneys, etc., will be provided with proper end caps until the time that the completed tie in is made.
- O. TAP TO MAIN - Main to main connections will only be made by the use of a manhole as specified in Sec. 15.16, Item I, or in the case of a service by use of a tapping saddle approved by the Department of Public Works.

P. **BUILDING SEWERS** – All building sewers will be a minimum of 5" A.C. or C.I. The building sewer shall be Cast Iron ASTM Specification A74-66 or asbestos cement pipe ASTM Specification C428-67. Joints shall be tight and waterproof. Cast Iron shall be used when passing under or through any wall or footing of a building. If installed in filled or unstable ground, the building sewer shall be laid on a suitable concrete bed or cradle or shall be cast iron or as approved by the Department of Public Works.

The size and slope of the building sewer shall be subject to the approval of the Commissioner but in no event shall the diameter be less than five (5) inches. The slope of such pipe shall not be less than one-quarter (¼) inch per foot. The building sewer shall be laid at uniform grade and in straight alignment insofar as possible. Changes in direction shall be made only with benched manholes or curved pipe and fitting, as approved by the Commissioner. A clean out shall be located on the exterior side of the building service and shall be in a place that is accessible for maintenance by the Department of Public Works or others.

All parts of new building drains and sewers shall withstand under test without observable leakage a ten-foot head of water for a minimum period of fifteen minutes at a temperature above the freezing point of water.

The connection of the building sewer into the public sewer shall be made at the "Y" or "T" branch, or at bench level in a manhole if such branch tee or manhole is accessible.

If no branch, tee, or manhole is available, a connection may be made by tapping the existing sewer by an approved method.

No person shall make connections of roof drains, down-spouts, foundation drains, areaway drains, basement drains, sump pumps, or other sources of surface runoff or groundwater, to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer.

Q. **LEAKAGE TESTS FOR GRAVITY SEWERS** – the pipeline shall be made as nearly watertight as practicable and leakage tests and measurements shall be made on sections of approved length.

The Contractor shall furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the leakage tests on the pipeline.

Upon completion of a section of the sewer, the Contractor shall dewater it and conduct a satisfactory test to measure the infiltration for at least 24 hours. The amount of infiltration, including manholes, Y-branches, and connections shall not exceed 300 gallons per inch-diameter per mile of sewer per 24 hours. The Contractor shall be responsible for the satisfactory watertightness of the entire section of sewer and shall satisfactorily repair all joints or other locations that are not sufficiently watertight.

For making the infiltration tests, underdrains, if used, shall be plugged, and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable.

Where practicable, the leakage tests shall be made at a time when the groundwater is at least 1 foot above the top of the pipe of the highest section of work being tested.

Suitable bulkheads shall be installed, as required, to permit the test of the sewer.

Where the groundwater level is less than 1 foot above the top of the pipe at its upper end, the sewers shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 feet above the top of the sewer at its upper end. Where conditions between manholes may result in test pressures which would cause leakage at the stoppers in branches, provisions shall be made by suitable ties, braces, and wedges to secure the stoppers against leakage resulting from the test pressure.

The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level 2 feet above the top of the pipe.

Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified.

The sewers shall be tested before any connections are made to buildings.

The Contractor shall construct weirs or other means of measurement as may be required, shall furnish water and shall do all necessary pumping to enable the tests to be properly made.

Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation.

If in the judgment of the Inspector or the D.P.W., it is impracticable to follow the foregoing procedure exactly for any reason, modifications in the procedure shall be made as required and approved, but in any event, the Contractor shall be responsible for the ultimate tightness of the line within the above test requirements.

R. The Contractor shall furnish to the City of Marlborough, D.P.W. upon completion of the job, a set of "as built" plans which will indicate the following: Invert elevations of all pipes at any structure or manhole. Rim elevations of all structures or manholes. The correct slope on all pipe between structures or manholes in F/T/I/T. The exact location of chimneys and wye branches on the main and in the case of chimneys the vertical height over the top of the pipe. The exact location of where the building sewer enters onto private property from any City street or easement. This location will be pinned down by at least two ties from permanent or fixed objects. This same method will be used for locating clean-outs when the service connection is made to the building.

In City Council
Order No. 14648 – 14649

Adopted – April 28, 1975

Approved by Mayor – Edgar C. Gadbois
May 6, 1975

A TRUE COPY,

ATTEST: Rita T. Lapine, *City Clerk*