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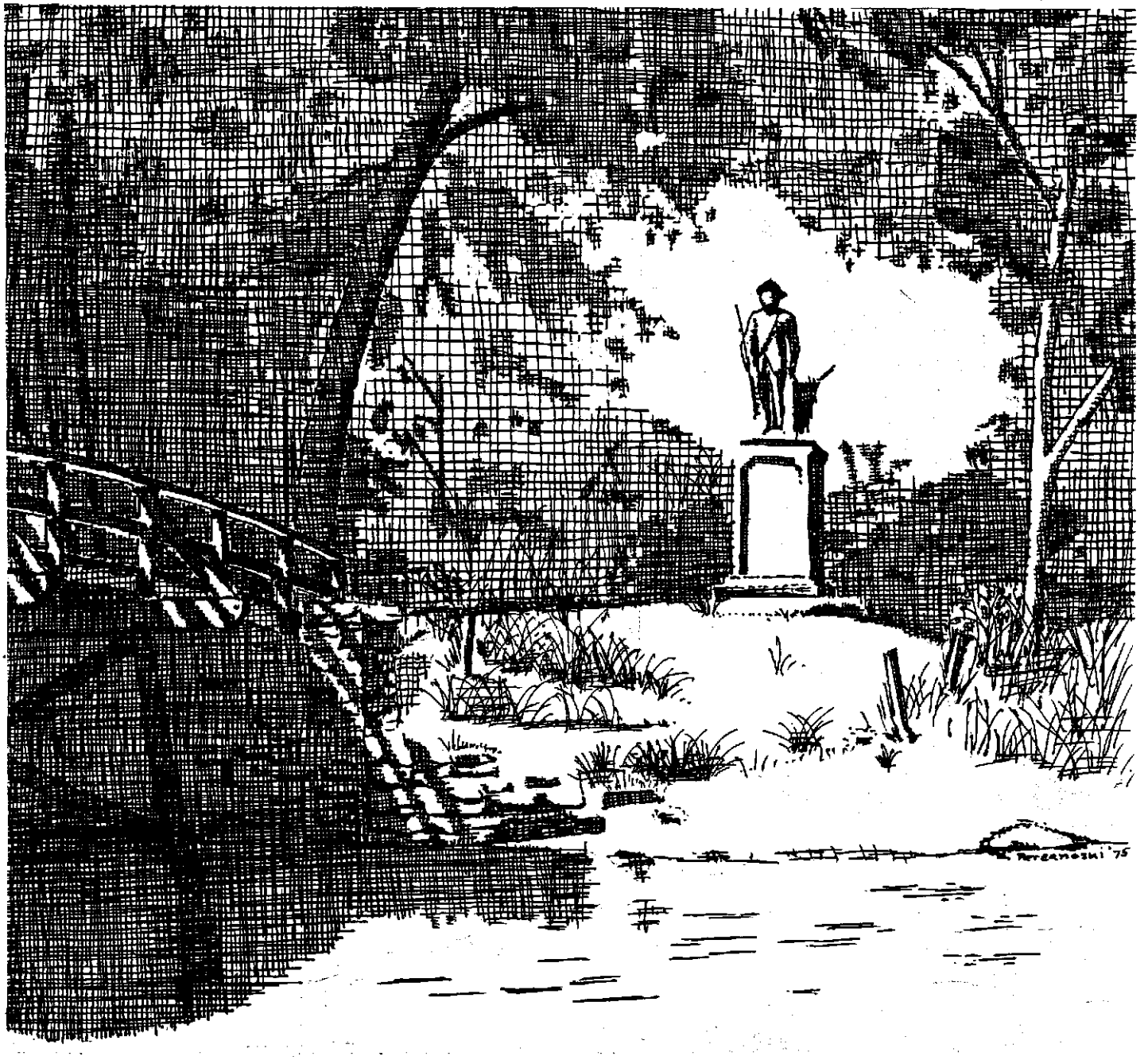
Concord (Suasco) River Basin

PART B - Wastewater Discharge Data 1981-1982



Massachusetts Department of Environmental Quality Engineering

DIVISION of WATER POLLUTION CONTROL

Thomas C. McMahon, Director

SUASCO RIVER BASIN

1981-1982

WASTEWATER DISCHARGE DATA

PREPARED BY

WATER QUALITY AND RESEARCH SECTION
MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL

WESTBOROUGH, MASSACHUSETTS
JULY 1983

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FOREWORD

This report contains sampling results from wastewater discharge surveys conducted in the SUASCO River Basin in 1981 and 1982. Most significant treated discharges in the SUASCO Basin were sampled at least once during 1981-1982. A few discharges were sampled for three consecutive days in order to better evaluate the performance of the treatment facilities. All samples except for a few minor discharges were 24-hour composites. The results of this sampling program, along with a brief description of the various discharges are contained in this report.

These surveys were carried out to determine if treatment facilities were meeting the limits imposed on them by their permits. Division personnel set up automatic samplers at some treatment plants and obtained coliform samples and chlorine residual analyses at all plants. Automatic samplers operated by plant personnel were used at most of the treatment facilities.

Chemical and coliform analyses were performed at the Lawrence Experiment Station in accordance with the APHA's Standard Methods for the Examination of Water and Wastewater (14th Edition, 1976, New York). Unless otherwise stated, all data are reported as milligrams per liter (mg/l).

WASTEWATER DISCHARGES

DISCHARGE		RIVER BASIN
1.	Marlborough East Wastewater Treatment Plant	Sudbury
2.	Raytheon Corporation (Wayland) Wastewater Treatment Plant	Sudbury
3.	Westborough Wastewater Treatment Plant	Assabet
4.	Shrewsbury Wastewater Treatment Plant	Assabet
5.	Marlborough West Wastewater Treatment Plant	Assabet
6.	Hudson Wastewater Treatment Plant	Assabet
7.	Digital Corporation (Maynard) Wastewater Treatment Plant	Assabet
8.	Maynard Wastewater Treatment Plant	Assabet
9.	Concord M.C.I. Wastewater Treatment Plant	Assabet
10.	Concord Wastewater Treatment Plant	Concord
11.	Billerica House of Correction Wastewater Treatment Plant	Concord
12.	Billerica Wastewater Treatment Plant	Concord
13.	Nyes Japenamelac Incorporated Wastewater Treatment Plant	Concord
14.	Silicon Transistor	Concord
15.	Raytheon Corp. Missile Division (Lowell) Wastewater Treatment Plant	Concord

GROUNDWATER DISCHARGES

1	Smith Valve Wastewater Treatment Plant	Assabet
2.	Cumberland Farms Wastewater Treatment Plant	Sudbury
3	Raytheon Corporation (Sudbury) Wastewater Treatment Plant	Sudbury
4.	Digital Corporation (Stow) Wastewater Treatment Plant	Assabet
5.	Nagog Woods Wastewater Treatment Plant	Assabet
6.	Frequency Sources Wastewater Treatment Plant	Concord

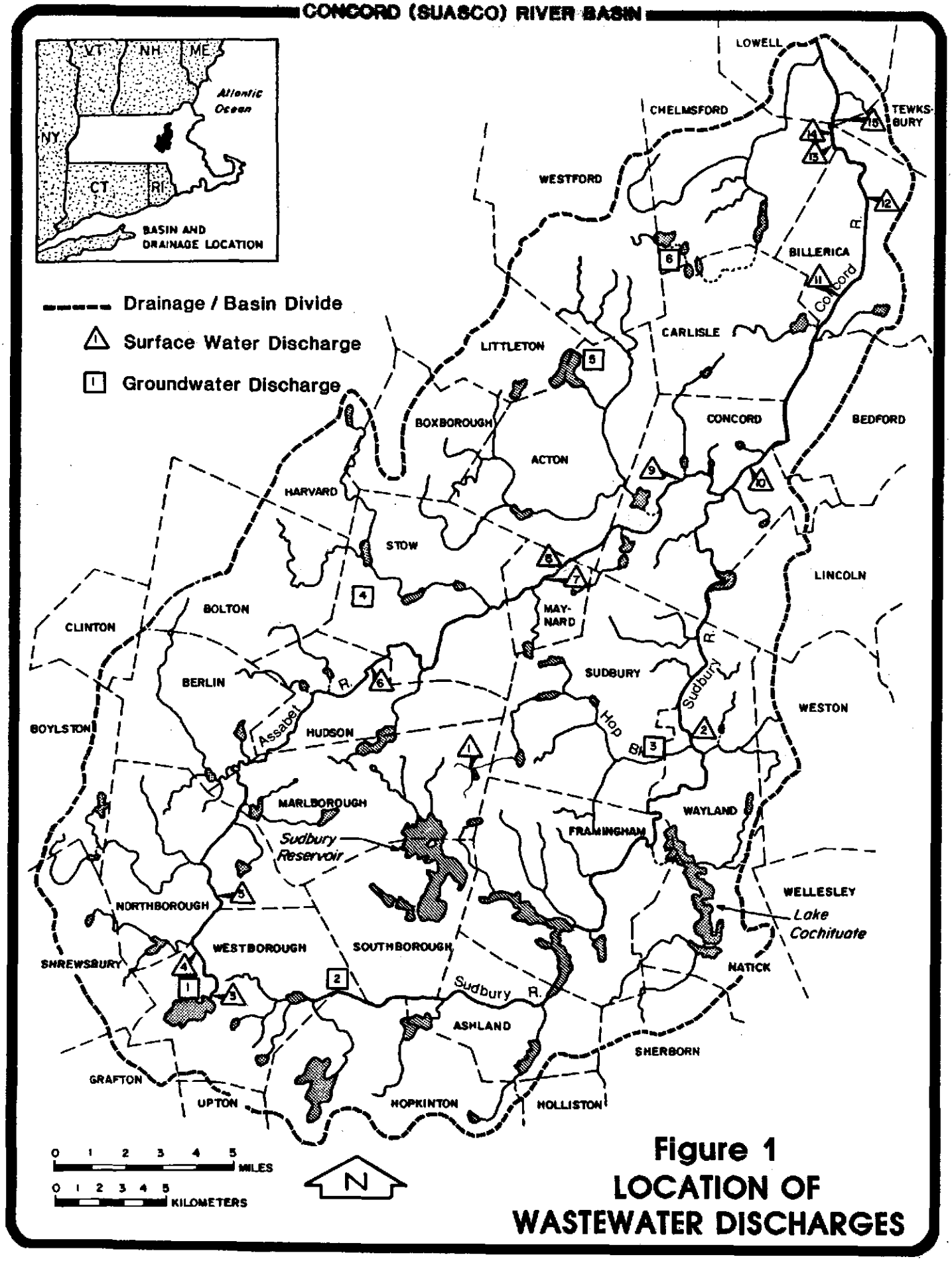

Figure 1
LOCATION OF WASTEWATER DISCHARGES

WESTBOROUGH WASTEWATER TREATMENT PLANT

LOCATION: Meadow Road, Westborough

RECEIVING WATER: Assabet River

NPDES No.: MA0100412

DESIGN CAPACITY: 1.1 MGD

SAMPLE DATES AND TYPES:

January 26-27, 1981	Influent and effluent - 24 hour chemical composites
January 27, 1981	Effluent - coliform grab
January 27-28, 1981	Influent and effluent - 24-hour chemical composites
February 23-24, 1981	Influent and effluent - 24-hour chemical composites
February 24, 1981	Effluent - coliform grab
February 24-25, 1981	Influent and effluent - 24-hour chemical composites
February 25-26, 1981	Influent and effluent - 24-hour chemical composites

This secondary plant has: Bar rack, comminutor, grit chamber, extended air tanks, clarifiers, and sand filter beds (May to October). The chlorinated effluent is discharged to the Assabet River. Sludge is aerobically digested, dried on drying beds and stockpiled on site. This plant experiences hydraulic overloads due to I/I problems. A new advanced waste-treatment plant is planned in Westborough, but is currently not funded. It is not known when construction of this plant will begin.

WESTBOROUGH WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	1/26-27/81		1/27-28/81	
PARAMETER	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
BOD_5	177	28	228	25
pH (Standard Units)	7.0	6.5	7.2	6.9
Suspended Solids	180	15	178	15
Total Solids	283	166	254	161
Total Kjeldahl-Nitrogen	24	1.8	23	1.5
Ammonia-Nitrogen	20	1.0	10	0.5
Nitrate-Nitrogen	2.0	10	0.3	12
Total Phosphorus	10	6.1	9.3	6.4
Chlorine Residual*	--	1.7	--	--
Total Coliform/100 ml*	--	91	--	--
Fecal Coliform/100 ml*	--	<36	--	--
Flow MGD	--	0.73	--	0.75

* Grab sample

WESTBOROUGH WASTEWATER TREATMENT PLANT (CONTINUED)

PARAMETER	2/23-24/81		2/24-25/81		2/25-26/81	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
BOD_5	174	460	142	47	120	21
pH (Standard Units)	7.3	6.7	6.8	6.5	6.9	6.6
Suspended Solids	160	2,500**	364	348	95	11
Settleable Solids (ml/l)	--	260**	--	0.7	--	0.0
Total Solids	478	2,744**	394	360	386	280
Total Kjeldahl-Nitrogen	22	133	17	5.6	17	5.1
Ammonia-Nitrogen	14	11	11	1.1	12	3.0
Nitrate-Nitrogen	0.6	3.3	1.0	9.3	2.0	10
Total Phosphorus	8.8	46	4.1	4.5	7.5	3.4
Chlorine Residual*	--	0.0	--	--	--	--
Total Coliform/100 ml*	--	240,000	--	--	--	--
Fecal Coliform/100 ml*	--	240,000	--	--	--	--
Flow (MGD)	--	1.06	--	1.58	--	1.67

* Grab sample
** Sludge pumps broken

SHREWSBURY WASTEWATER TREATMENT PLANT

LOCATION: Off Main Street, Shrewsbury

RECEIVING WATER: Channel to the Assabet River

NPDES PERMIT NO.; MA0101249

DESIGN CAPACITY: 1.75 MGD

SAMPLE DATES AND TYPES:

February 23-24, 1981	Influent and effluent - 24-hour chemical composites
February 24, 1981	Effluent - coliform grab
February 24-25, 1981	Influent and effluent - 24-hour chemical composites
February 25-26, 1981	Influent and effluent - 24-hour chemical composites
June 8-9, 1981	Influent and effluent - 24-hour chemical composites
June 9, 1981	Effluent - coliform grab
June 9-10, 1981	Influent and effluent - 24-hour chemical composites
June 10-11, 1981	Influent and effluent - 24-hour chemical composites

This secondary plant utilizes: Bar rack, aerated grit chamber, comminutor, primary settling, high rate trickling filter, secondary settling, and chlorination. Sludge is polymer-lime treated, vacuum filtered and land-filled. The final effluent is pumped over the watershed boundary where it flows by pipe and channel to the Assabet River on the Westborough/ Northborough town line. Plans are underway to tie this facility into a regional plant to be built sometime in the future in Westborough.

SHREWSBURY WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	2/23-24/81		2/24-25/81		2/25-26/81	
PARAMETER	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
BOD_5	90	33	84	51	60	34
pH (Standard Units)	6.9	6.8	6.5	6.6	6.7	7.2
Suspended solids	68	43	262	280	38	44
Settleable solids (ml/l)	--	0.4	2.5	1.5	0.8	0.9
Total Solids	396	362	362	302	298	328
Total Kjeldahl-Nitrogen	17	19	13	11	7.6	7.5
Ammonia-Nitrogen	9.4	12	5.9	5.2	5.0	6.9
Nitrate-Nitrogen	0.6	0.8	1.9	0.4	2.4	1.4
Total Phosphorus	5.4	5.9	3.5	3.6	2.8	2.5
Chlorine Residual*	--	0.2	--	--	--	--
Total Coliform/100 ml*	--	24,000	--	--	--	--
Fecal Coliform/100 ml*	--	2,400	--	--	--	--
Flow (MGD)	--	2.48	--	3.72	--	4.80

* Grab sample

SHREWSBURY WASTEWATER TREATMENT PLANT (CONTINUED)

PARAMETER	6/8-9/81		6/9-10/81		6/10-11/81	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	--	--	798	150	437	142
BOD_5	225	43	234	54	210	42
pH (Standard Units)	6.6	6.6	6.9	6.8	6.6	6.8
Suspended Solids	126	35	166	142	156	30
Settleable Solids (ml/l)	--	0.2	--	0.0	--	0.9
Total Solids	498	382	484	360	468	356
Total Kjeldahl-Nitrogen	22	19	22	18	35	17
Ammonia-Nitrogen	17	18	13	16	16	15
Nitrate-Nitrogen	0.0	0.0	0.0	0.0	0.0	0.0
Total Phosphorus	8.2	7.4	7.0	6.1	7.0	6.0
Chloride	--	52	--	50	--	51
Chlorine Residual*	--	0.8	--	--	--	--
Total Coliform/100 ml*	--	600	--	--	--	--
Fecal Coliform/100 ml*	--	20	--	--	--	--
Flow (MGD)	--	1.7	--	1.7	--	1.6

* Grab sample

MARLBOROUGH WEST WASTEWATER TREATMENT PLANT

LOCATION: Off Boundary Street, Marlborough

RECEIVING WATER: Assabet River

NPDES PERMIT NO.: MA0100480

DESIGN CAPACITY: 2.0 MGD

SAMPLE DATES AND TYPES:

December 8-9, 1980	Influent - 24-hour chemical composite
December 9, 1980	Effluent - chemical and coliform grab
December 9-10, 1980	Influent and effluent - 24-hour chemical composites
December 10, 1980	Effluent - coliform grab
December 10-11, 1980	Influent and effluent - 24-hour chemical composites
December 11, 1980	Effluent - coliform grab

This plant is an activated sludge plant with bar rack, aerated grit chamber, comminutor, primary and secondary clarifiers. The effluent is chlorinated prior to discharge to the Assabet River. Sludge is dewatered with vacuum filters and is stockpiled at the Marlborough East Facility. The plant seemed to be performing well with the exception of occasional solids problems. Three industries which discharge to the sewer were also sampled, these were: Fuller Adhesives, Butcher Wax, and Koehler Manufacturing. Twenty-four hour composites were taken for December 8-9, 9-10, and 10-11 at all plants with total volatile solids taken at Fuller, oil and grease at Butcher Wax, and metals and alkalinity at Koehler Mfg. All samples were 24-hour composites except where otherwise noted.

MARLBOROUGH WEST WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

PARAMETER	12/8-9/80 KOEHLER CORP.	FULLER** ADHESIVES	BUTCHERS WAX	MARLBOROUGH WEST INFLUENT	MARLBOROUGH WEST EFFLUENT
COD	64	17,292	410	562	60
BOD_5	19	--	120	210	12
pH (Standard Units)	9.5	7.9	6.3	6.7	7.5
Total Alkalinity	644	--	74	187	--
Alkalinity (phth)	162	--	--	--	--
Suspended Solids	18	--	79	236	16
Settleable Solids (ml/l)	1.0	0.5	3	15	0.0
Total Solids	1,450	25,756	378	630	396
Total Volatile Solids	--	15,606	--	--	--
Total Kjeldahl-Nitrogen	12	--	75	24	2.8
Ammonia-Nitrogen	0.10	--	13	15	0.4
Nitrate-Nitrogen	2.0	--	0.1	0.4	14
Total Phosphorus	0.90	--	5.4	6.4	4.8
Total Coliform/100 ml*	--	--	--	--	43,000
Fecal Coliform/100 ml*	--	--	--	--	4,300
Oil & Grease	--	--	7.4	--	--
Lead	4	--	--	--	--
Nickel	0.00	--	--	--	--
Zinc	0.07	--	--	--	--
Flow (MGD)	0.049	0.011	0.012	--	1.00

* Grab sample
** 9-hour composite

MARLBOROUGH WEST WASTEWATER TREATMENT PLANT (CONTINUED)

	12/9-10/80				
PARAMETER	KOEHLER CORP.	FULLER** ADHESIVES	BUTCHERS WAX	MARLBOROUGH WEST INFLUENT	EFFLUENT
COD	168	9,783	435	347	60
BOD_5	54	--	144	168	1
pH (Standard Units)	9.7	7.6	10.2	7.1	7.0
Total Alkalinity	1,660	--	160	155	90
Alkalinity (phth)	460	--	80	--	--
Suspended Solids	78	--	116	574	15
Settleable Solids (ml/l)	5.0	0.3	3.0	0.5	1.2
Total Solids	3,930	6,950	542	624	420
Total Volatile Solids	--	6,688	--	--	--
Total Kjeldahl-Nitrogen	14	--	62	23	3.6
Ammonia-Nitrogen	9.7	--	8.1	17	0.20
Nitrate-Nitrogen	0.3	--	0.9	2.5	16
Total Phosphorus	1.5	--	4.3	5.1	3.9
Total Coliform/100 ml*	--	--	--	--	93,000
Fecal Coliform/100 ml*	--	--	--	--	15,000
Oil & Grease	--	--	10	--	--
Lead	3.6	--	--	--	--
Nickel	0.00	--	--	--	--
Zinc	0.06	--	--	--	--
Flow (MGD)	0.033	0.010	0.018	--	1.01

* Grab Sample
**9-hour composite

MARLBOROUGH WEST WASTEWATER TREATMENT PLANT (CONTINUED)

12/10-11/80

PARAMETER	KOEHLER CORP.	FULLER** ADHESIVES	BUTCHERS WAX	MARLBOROUGH WEST INFLUENT	MARLBOROUGH WEST EFFLUENT
COD	80	11,739	645	384	75
BOD_5	19	4,500	138	132	17
pH (Standard Units)	9.2	8.6	8.2	7.2	7.6
Total Alkalinity	216	--	70	136	80
Alkalinity (phth)	32	--	--	--	--
Suspended Solids	24	--	118	143	24
Settleable Solids (ml/l)	--	0.1	15	5.0	0.7
Total Solids	606	5,646	596	250	408
Total Volatile Solids	--	5,314	--	--	--
Total Kjeldahl-Nitrogen	5.7	--	57	18	4.3
Ammonia-Nitrogen	0.80	--	9.5	15	1.4
Nitrate-Nitrogen	0.4	--	0.6	4.0	17
Total Phosphorus	0.90	--	6.0	4.3	2.6
Total Coliform/100 ml*	--	--	--	--	93,000
Fecal Coliform/100 ml*	--	--	--	--	9,300
Oil & Grease	--	--	12	--	--
Lead	2.2	--	--	--	--
Nickel	0.00	--	--	--	--
Zinc	0.06	--	--	--	--
Flow (MGD)	0.029	0.016	0.014	--	1.03

* Grab sample
** 9-hour composite

HUDSON WASTEWATER TREATMENT PLANT

LOCATION: Municipal Drive, Hudson

RECEIVING WATER: Assabet River

NPDES PERMIT NO.: MA0101788

DESIGN CAPACITY: 2.0 MGD

SAMPLE DATES AND TYPES:

March 30-31, 1981	Influent and effluent - 24-hour chemical composites
March 31, 1981	Effluent - coliform grab
March 31-April 1, 1981	Influent and effluent - 24-hour chemical composites
April 1-2, 1981	Influent and effluent - 24-hour chemical composites
July 29-30, 1981	Influent and effluent - 24-hour chemical composites

This secondary plant utilizes: Bar rack, comminutor, primary clarifiers, trickling filters and final clarifiers. Sludge is vacuum filtered and stockpiled on site. The effluent is chlorinated and discharged directly to the Assabet River.

HUDSON WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	3/30-31/81		3/31-4/1/81		4/1-2/81	
PARAMETER	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	308	123	308	123	286	122
BOD_5	144	36	141	32	138	33
pH (Standard Units)	7.7	7.2	6.8	7.0	7.0	7.2
Suspended Solids	138	32	113	27	118	15
Total Solids	538	434	722	482	714	604
Turbidity (NTU)	--	--	--	3.8	--	--
Total Kjeldahl-Nitrogen	22	16	23	13	21	32
Ammonia-Nitrogen	16	11	15	13	12	14
Nitrate-Nitrogen	0.4	4.6	0.3	6.3	0.4	4.9
Total Phosphorus	6.8	6.4	8.4	6.2	7.5	16
Chloride	90	95	130	95	100	115
Chlorine Residual*	--	1.3	--	--	--	--
Total Coliform/100 ml*	--	9,300	--	--	--	--
Fecal Coliform/100 ml*	--	430	--	--	--	--
Flow (MGD)	--	1.54	--	1.55	--	1.65

* Grab sample

HUDSON WASTEWATER TREATMENT PLANT (CONTINUED)

	7/29-30/81	
PARAMETER	INFLUENT	EFFLUENT
COD	--	--
BOD_5	186	18
pH (Standard Units)	8.7	7.1
Total Alkalinity	134	37
Suspended Solids	76	7.0
Settleable Solids (ml/l)	7.5	0.0
Total Solids	688	582
Total Kjeldahl-Nitrogen	39	17
Ammonia-Nitrogen	16	11
Nitrate-Nitrogen	0.1	6.0
Total Phosphorus	8.3	4.9
Total Coliform/100 ml*	--	430,000
Fecal Coliform/100 ml*	--	240,000
Flow (MGD)	--	1.4

* Grab sample

DIGITAL CORPORATION (MAYNARD) WASTEWATER TREATMENT PLANT

LOCATION: 146 Main Street, Maynard

RECEIVING WATER: Assabet River

NPDES PERMIT NO.: MA0022144

INDUSTRIAL PROCESS: Plating

SAMPLE DATES AND TYPES:

March 30-31, 1981	Effluent - 24-hour chemical, metals, oil & grease composites
March 31-April 1, 1981	Effluent - 24-hour chemical, metals, oil & grease, cyanide composites
April 1-2, 1981	Effluent - 24-hour chemical, metals, oil & grease composites

This small plant removes metals and cyanide by chemical addition. The effluent pH is adjusted before discharge to the Assabet River.

DIGITAL CORPORATION (MAYNARD) WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	EFFLUENT		
PARAMETER	3/30-31/81	3/31-4/1/81	4/1-2/81
BOD_5	102	--	--
pH (Standard Units)	8.6	8.3	7.8
Suspended Solids	4	11	17
Total Solids	--	1,818	--
Total Phosphorus	0.75	0.80	1.1
Fluoride	0.1	18	13
Aluminum	0.88	0.50	0.22
Cadmium	0.01	0.00	--
Chromium	0.14	0.09	0.06
Hexavalent Chromium	0.00	0.00	0.00
Copper	0.94	0.72	0.42
Iron	0.42	0.35	0.21
Lead	0.20	0.28	0.20
Nickel	0.11	0.15	0.03
Silver	0.00	0.00	--
Tin	0.15	0.31	0.19
Oil & Grease	8.4	9.0	8.4
Total Cyanide	--	0.00	--
Flow (MGD)	0.11	0.11	0.13

MAYNARD WASTEWATER TREATMENT PLANT

LOCATION: Pine Hill Road, Maynard

RECEIVING WATER: Assabet River

NPDES PERMIT NO.: MA0101001

DESIGN CAPACITY: 1.29 MGD

SAMPLE DATES AND TYPES:

March 30-31, 1981	Influent and effluent - 24-hour chemical composites
March 30-31, 1981	Influent - 24-hour metals and cyanide composites
March 31, 1981	Effluent - coliform grab
March 31-April 1, 1981	Influent and effluent - 24-hour chemical composites
March 31-April 1, 1981	Influent - 24-hour chemical composite
April 1-2, 1981	Influent and effluent - 24-hour chemical composites
April 1-2, 1981	Influent - 24-hour metals composite
July 29-30, 1981	Influent and effluent - 24-hour chemical composites
July 30, 1981	Effluent - coliform grab

This activated sludge plant utilizes: Bar rack, comminutor, grit chamber with classifier, primary and secondary clarification. The sludge is gravity thickened and centrifuged. The solids are incinerated and landfilled. The effluent is chlorinated and discharged to the Assabet.

MAYNARD WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	3/30-31/81		3/31-4/1/81		4/1-2/81	
PARAMETER	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	574	82	656	82	408	71
BOD_5	300	26	396	87	231	36
pH (Standard Units)	6.9	7.3	7.0	7.4	6.8	7.2
Suspended Solids	220	20	212	12	117	9
Total Solids	308	290	678	264	500	296
Total Kjeldahl-Nitrogen	36	14	28	13	25	13
Ammonia-Nitrogen	16	14	19	12	16	11
Nitrate-Nitrogen	4.0	1.1	0.3	1.2	0.3	0.9
Total Phosphorus	7.4	3.9	9.4	3.8	6.6	2.9
Chloride	55	55	50	55	50	55
Chlorine Residual*	--	0.2	--	--	--	--
Total Coliform/100 ml*	--	230	--	--	--	--
Fecal Coliform/100 ml*	--	36	--	--	--	--
Aluminum	0.50	--	0.56	--	0.44	--
Cadmium	0.00	--	--	--	--	
Chromium	0.00	--	0.00	--	0.01	--
Hexavalent Chromium	0.00	--	0.00	--	0.00	--
Copper	0.47	--	0.50	--	0.34	--
Iron	2.0	--	1.7	--	2.0	--
Lead	0.01	--	0.01	--	0.04	--
Nickel	0.00	--	0.00	--	0.00	--
Silver	0.01	--	0.01	--	--	--
Tin	0.02	--	0.02	--	0.02	--
Cyanide (Ammenable)	0.00	--	--	--	--	--
Cyanide (Total)	0.00	--	--	--	--	--
Flow (MGD)	--	1.13	--	1.22	--	1.16

* Grab sample

MAYNARD WASTEWATER TREATMENT PLANT (CONTINUED)

	7/29-30/81	
PARAMETER	INFLUENT	EFFLUENT
BOD_5	346	27
pH (Standard Units)	7.2	6.7
Total Alkalinity	98	27
Suspended Solids	100	8.0
Settleable Solids (ml/l)	6.5	0.0
Total Solids	438	264
Total Kjeldahl-Nitrogen	35	15
Ammonia-Nitrogen	24	9.2
Nitrate-Nitrogen	1.1	7.2
Total Phosphorus	6.8	4.8
Total Coliform/100 ml*	--	91
Fecal Coliform/100 ml*	--	36
Flow (MGD)	--	1.20

* Grab sample

BILLERICA WASTEWATER TREATMENT PLANT

LOCATION:	Off Lowell Street, North Billerica
RECEIVING WATER:	Concord River
NPDES PERMIT NO.:	MA0101711
DESIGN CAPACITY:	1.6 MGD

SAMPLE DATES AND TYPES:

April 5-6, 1982	Influent and effluent - 24-hour metals composites
April 6, 1982	Influent and effluent - chemical grabs
April 6-7, 1982	Influent and effluent - 24-hour chemical composites
April 7-8, 1982	Influent and effluent - 24-hour chemical composites
April 8, 1982	Effluent - coliform grab

This activated sludge plant is operated in the extended aeration mode utilizing: a comminutor, aeration tanks, settling tanks and chlorine contact chamber. Sludge is thickened in a high rate dissolved air flotation thickner. It is then conditioned vacuum filtered, and landfilled. Recent studies have determined that this plant needs to be upgraded. I/I is a major problem at this plant as evidenced by the flows on all days sampled.

BILLERICA WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	4/6/82		4/5-6/82		4/6-7/82	
PARAMETER	INFLUENT*	EFFLUENT*	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	432	75	--	--	236	171
BOD_5	138	11	--	--	102	9.3
pH (Standard Units)	6.5	7.2	--	--	7.3	7.3
Suspended Solids	85	16	--	--	106	50
Settleable Solids (ml/l)	--	0.0	--	--	--	--
Total Solids	774	380	--	--	508	430
Total Kjeldahl-Nitrogen	27	13	--	--	21	18
Ammonia-Nitrogen	23	12	--	--	21	10
Nitrate-Nitrogen	0.1	1.4	--	--	0.0	7.0
Total Phosphorus	7.0	4.8	--	--	4.8	6.0
Chloride	--	92	--	--	--	--
Aluminum	--	--	--	0.56	--	--
Cadmium	--	--	0.00	0.00	--	--
Chromium	--	--	0.02	0.02	--	--
Copper	--	--	0.05	0.19	--	--
Iron	--	--	0.39	1.1	--	--
Lead	--	--	--	0.06	--	--
Manganese	--	--	0.16	0.18	--	--
Mercury	--	--	0.0000	0.0005	--	--
Nickel	--	--	0.05	0.05	--	--
Silver	--	--	0.00	0.00	--	--
Tin	--	--	--	<0.10	--	--
Zinc	--	--	0.06	0.08	--	--
Flow (MGD)	--	--	--	4.35	--	4.49

* Grab sample

BILLERICA WASTEWATER TREATMENT PLANT (CONTINUED)

	4/7-8/82	
PARAMETER	INFLUENT	EFFLUENT
COD	226	236
BOD_5	99	87
pH (Standard Units)	7.4	7.2
Suspended Solids	67	154
Settleable Solids (ml/l)	--	5.0
Total Solids	448	478
Total Kjeldahl-Nitrogen	19	19
Ammonia-Nitrogen	15	13
Nitrate-Nitrogen	0.1	0.7
Total Phosphorus	5.9	5.3
Chloride	--	90
Chlorine Residual*	--	0.6
Total Coliform/100 ml*	--	15,000
Fecal Coliform/100 ml*	--	750
Flow (MGD)	--	4.52

* Grab sample

NYES JAPENAMELAC INC. WASTEWATER TREATMENT FACILITY

LOCATION: Katrina Road, Chelmsford

RECEIVING WATER: River Meadow Brook

NPDES PERMIT NO.: MA0003077

INDUSTRIAL PROCESS: Solvent/acid cleaning of metal, and finishing

SAMPLE DATES AND TYPES:

January 25-26, 1982 Effluent - 10-hour metals composite

January 26-27, 1982 Effluent - 9-hour metals composite

This small (less than .005 MGD) industrial treatment plant utilizes chemical addition and pH adjustment. During this round of sampling only metals samples were taken. Data showed moderate levels of aluminum and chromium.

	EFFLUENT	
PARAMETER*	1/25-26/82	1/26-27/82
Aluminum	0.44	0.44
Chromium	--	0.24
Hexavalent Chromium	--	0.00
Flow (GPD)	3,500	3,500

*All parameters in mg/l unless otherwise noted

SILICON TRANSISTOR

LOCATION: Katrina Road, Chelmsford

RECEIVING WATER: River Meadow Brook

NPDES PERMIT NO.: No permit

INDUSTRIAL PROCESS: Manufacture of Transistors

SAMPLE DATES AND TYPES:

January 26, 1982	Effluent - chemical grab
August 30, 1982	Effluent* - chemical and metals grab
August 30, 1982	Effluent* - chemical and metals grab
September 2, 1982	Effluent - chemical, metals, phenol, and volatile organics grabs

The permit for this discharge has been applied for but has not yet been issued. The manufacturing process includes the use of acids and solvents. The treatment process at present includes pH adjustment for the process wastewater plus flow equalization for wastes from regenerating the ion exchange unit. Plans are underway to upgrade this system to "Best Practicable Treatment."

* Same source 2 separate grabs

SILICON TRANSISTOR

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	1/26/82	8/30/82		9/2/82
TIME:	EFFLUENT GRAB 10:00	EFFLUENT GRABS 10:30	10:45	EFFLUENT GRAB 10:45
PARAMETER				
COD	--	12	35	70
pH (Standard Units)	1.7	5.6	6.7	6.4
Alkalinity	--	4.0	37	26
Acidity	1,900	--	--	--
Specific Conductance (μmhos)	11,000	--	--	--
Total Solids	--	410	310	330
Ammonia-Nitrogen	4.3	7.1	0.20	0.06
Nitrate-Nitrogen	17	1.7	12	1.9
Total Phosphorus	--	0.50	0.45	38
Fluoride	9.0	15	6.7	2.5
Sulfate	2,100	192	42	22
Phenol	--	--	--	6.5
Aluminum	--	0.1	<0.1	0.2
Cadmium	--	0.00	0.00	0.00
Chromium	--	0.00	0.00	0.00
Copper	--	0.03	0.04	0.05
Lead	--	0.00	0.14	0.00
Nickel	--	0.00	0.00	0.00
Silver	--	0.00	0.00	0.00
Tin	--	<0.5	<0.5	<0.5
Zinc	--	0.01	0.01	0.11
Trichloroethylene μg/l	--	--	--	220
Tetrachloroethylene μg/l	--	--	--	3,600
Dichlorobenzenes μg/l	--	--	--	*
Flow (MGD)	--	0.05 (est.)	--	--

1/26/82 Lab Note "Results indicate that H_2SO_4 is being discharged"

* Lab Note "No standard available for quantitation"

RAYTHEON CORPORATION, MISSILE DIVISION (LOWELL) WASTEWATER TREATMENT PLANT

LOCATION:	Woburn Street, Billerica, Tewksbury
RECEIVING WATER:	Concord River
NPDES PERMIT NO.:	MA0001414
INDUSTRIAL PROCESS:	Metal finishing

SAMPLE DATES AND TYPES:

April 6-7, 1981	Effluent - 24-hour chemical & metals composites
April 7, 1981	Effluent - Cyanide, oil & grease grabs
April 7-8, 1981	Effluent - 24-hour chemical & metals composites
April 8, 1981	Effluent - cyanide, oil & grease grabs
April 8-9, 1981	Effluent - 24-hour chemical & metals composites
April 9, 1981	Effluent - cyanide, oil & grease grabs
January 25-26, 1982	Effluent - 10-hour metals composite
January 26-27, 1982	Effluent - 8-hour metals composite

This 125 GPM facility utilizes: chemical addition, pH adjustment, and settling to treat metal finishing wastes. The effluent is chlorinated for cyanide treatment. The facility operates from 8-16 hours per day depending on the loadings. The effluent is discharged to the Concord River.

RAYTHEON CORPORATION, MISSILE DIVISION (LOWELL) WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	EFFLUENT			EFFLUENT	
PARAMETER	4/6-7/81	4/7-8/81	4/8-9/81	1/25-26/82	1/26-27/82
pH (Standard Units)	6.9	7.5	7.2	--	--
Suspended Solids	13	9	10	--	--
Total Phosphorus	2.2	2.3	2.0	--	--
Flouride	8.0	13	12	1.9	3.8
Oil & Grease*	1.2	1.4	1.4	--	--
Cyanide*	0.00	0.00	0.00	--	--
Cyanide Ammenable to Cl_2*	0.00	0.00	0.00	--	--
Aluminum	0.19	0.11	0.10	1.4	1.4
Cadmium	0.00	0.00	0.00	0.03	0.03
Chromium	0.00	0.02	0.02	0.06	0.04
Hexavalent Chromium	0.00	0.00	0.00	0.00	0.00
Copper	0.80	1.0	1.9	8.5	16
Lead	0.01	0.00	0.00	0.10	0.11
Nickel	0.13	0.17	0.28	0.84	0.90
Silver	0.00	0.00	0.00	0.08	0.19
Tin	0.00	0.14	0.60	0.05	0.05
Zinc	0.02	0.04	0.03	0.21	0.20
Chlorine Residual*	--	--	--	2.0	1.0
Flow (MGD)	0.018	0.028	0.023	--	0.0746

* Grab sample

SUASCO GROUNDWATER DISCHARGES

SMITH VALVE WASTEWATER TREATMENT PLANT

LOCATION: Fisher Street, Westborough

MASS. GROUNDWATER PERMIT NO.: 0-7

INDUSTRIAL PROCESS: Machining and Metal Finishing

SAMPLE DATES AND TYPES:

October 12-13, 1982	Effluent - 24-hour chemical and metals composite
October 13, 1982	Effluent - oil & grease grab
October 13, 1982	Monitoring Wells (2) - chemical and metals grabs
October 13-14, 1982	Effluent - 24-hour chemical and metals composite
October 14, 1982	Effluent - oil & grease grab

In addition to an oil separator, this facility utilizes precipitation and settling with pH adjustment. The effluent is discharged to the ground and monitored by means of two test wells. Flows are very small. The only problem noted was that the casings on the monitoring wells were deteriorated and some of the material was in the samples.

SMITH VALVE WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	10/12-13/82	10/13/82		10/13-14/82
		TEST WELLS		
PARAMETER	EFFLUENT	RIGHT*	LEFT*	EFFLUENT
pH (Standard Units)	7.2	6.0	6.0	7.2
Total Dissolved Solids	2,542	226	336	2,570
Ortho Phosphorus	41	--	--	28
Total Phosphorus	41	0.30	0.11	32
Sulfate	775	6.5	4.8	775
Chloride	40	24	62	46
Oil & Grease*	0.8	--	--	0.0
Chromium	0.01	0.00	0.01	0.00
Hexavalent Chromium	0.00	--	--	0.00
Iron	0.96	27	180	0.58
Nickel	0.19	0.00	0.00	0.19
Zinc	0.84	--	--	0.50
Flow (GPD)	946	--	--	2,405

* Grab sample

CUMBERLAND FARMS WASTEWATER TREATMENT PLANT

LOCATION: Flanders Road, Westborough

MASS. GROUNDWATER PERMIT NO.: 0-10

INDUSTRIAL PROCESS: Bakery

SAMPLE DATES AND TYPES:

October 12-13, 1982	Effluent - 24-hour chemical & metals composite
October 13, 1982	4 Monitoring Wells - chemical & metals grabs
October 13-14, 1982	Effluent - 24-hour chemical & metals composite

This company maintains an activated sludge plant with rotating biological contactors for on-site treatment of their wastes. The effluent is chlorinated and discharged to the ground. Four monitoring wells are utilized to test the effects of the discharge on the groundwater. A backflow of chlorine into the effluent sampling location caused interference with laboratory analysis resulting in no analysis for October 12-13, 1982, with the exception of pH.

CUMBERLAND FARMS WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

	10/12-13/82	10/13/82				10/13-14/82
		MONITORING WELLS				
PARAMETER	EFFLUENT	NORTH*	EAST*	SOUTH*	WEST*	EFFLUENT
BOD_5	--	--	--	--	--	110
pH (Standard Units)	10.5	7.3	7.4	7.2	7.3	7.8
Suspended Solids	--	--	--	--	--	36
Settleable Solids (ml/l)	--	--	--	--	--	0.0
Total Solids	--	--	--	--	--	1,160
Ammonia-Nitrogen	--	1.9	--	--	0.86	0.04
Nitrate-Nitrogen	--	0.00	0.00	0.00	0.01	0.4
Total Phosphorus	--	--	--	--	--	13
Sulfate	--	1.8	1.3	1.5	1.5	5.5
Chloride	--	178	156	264	148	185
Chlorine Residual	6,500	--	--	--	--	--
Copper	--	0.68	3.6	0.38	0.95	0.02
Iron	--	35	18	8.2	37	0.56
Manganese	--	2.2	0.95	2.1	5.2	0.06
Sodium	--	190	180	260	240	390
Flow (GPD)	14,200	--	--	--	--	13,300

* Grab sample

RAYTHEON CORPORATION (SUDBURY) WASTEWATER TREATMENT PLANT

LOCATION: Boston Post Road, Sudbury

MASS. GROUNDWATER PERMIT NO.: 0-23

INDUSTRIAL PROCESS: Sanitary wastes only

SAMPLE DATES AND TYPES:

October 19-20, 1982	Effluent - 24-hour chemical & metals composite
October 20-21, 1982	Effluent - 24-hour chemical & metals composite

The company operates an extended aeration plant to treat the sanitary waste from its Sudbury operation. Wastewater from air conditioning units and parking lots discharges to the storm sewers. Process water is either stored for removal by waste haulers or treated separately. This plant discharges to the ground.

RAYTHEON CORPORATION (SUDBURY) WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All results in mg/l unless otherwise noted)

PARAMETER	10/19-20/82 EFFLUENT	10/20-21/82 EFFLUENT
BOD_5	33	53
pH (Standard Units)	7.6	7.6
Suspended Solids	3	18
Settleable Solids (ml/l)	0.4	1.0
Total Solids	376	370
Ammonia-Nitrogen	35	38
Nitrate-Nitrogen	1.7	5.5
Total Phosphorus	6.4	7.6
Chloride	92	76
Sodium	60	53
Sulfate	45	44
Copper	0.07	0.10
Iron	0.11	0.12
Manganese	0.01	0.02
Flow (GPD)	19,100	16,200

DIGITAL EQUIPMENT CORPORATION (STOW) WASTEWATER TREATMENT PLANT

LOCATION: Old Bolton Road, Stow

MASS. GROUNDWATER PERMIT NO.: 0-31

INDUSTRIAL PROCESS: Sanitary wastes only

SAMPLE DATES AND TYPES:

October 19-20, 1982	Effluent - 24-hour chemical & metals composite
October 20-21, 1982	Effluent - 24-hour chemical & metals composite

The company operates an extended aeration plant to treat sanitary wastes from its Stow offices. In addition to secondary treatment the effluent is passed through a sand filter before being discharged to the ground.

DIGITAL EQUIPMENT CORPORATION (STOW) WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

PARAMETER	10/19-20/82 EFFLUENT	10/20-21/82 EFFLUENT
BOD_5	9.6	8.8
pH (Standard Units)	6.6	6.5
Suspended Solids	40	15
Settleable Solids (ml/l)	0.1	0.0
Total Solids	506	432
Ammonia-Nitrogen	22	23
Nitrate-Nitrogen	40	42
Total Phosphorus	8.2	6.6
Chloride	80	74
Sodium	43	75
Sulfate	28	25
Copper	0.59	0.45
Iron	0.40	0.31
Manganese	0.15	0.01
Flow (GPD)	15,120	18,000

NAGOG WOODS WASTEWATER TREATMENT PLANT

LOCATION: Route 2A, Acton

MASS. GROUNDWATER PERMIT NO.: 0-18

WASTE TYPE: Sanitary wastes only

SAMPLE DATES AND TYPES:

October 19-20, 1982	Effluent - 24-hour chemical & metals composite
October 20-21, 1982	Effluent - 24-hour chemical & metals composite

This treatment facility receives sanitary wastes from the condominiums and shopping center nearby. The facility is an extended aeration plant which also utilizes dual media filtration. Discharge is to the ground after chlorination.

NAGOG WOODS, WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/1 unless otherwise noted)

PARAMETER	10/19-20/82 EFFLUENT	10/20-21/82 EFFLUENT
BOD_5	11	9.2
pH (Standard Units)	7.5	7.4
Suspended Solids	1	1
Settleable Solids (ml/l)	0.0	0.0
Total Solids	358	384
Ammonia-Nitrogen	0.09	0.02
Nitrate-Nitrogen	14	15
Total Phosphorus	7.4	8.5
Chloride	62	58
Sodium	100	65
Sulfate	35	38
Copper	0.05	0.05
Iron	0.06	0.05
Manganese	0.01	0.01
Flow (GPD)	98,000	35,000

FREQUENCY SOURCES, WASTEWATER TREATMENT PLANT

LOCATION: Maple Road, South Chelmsford

MASS. GROUNDWATER PERMIT NO.: 0-51

INDUSTRIAL PROCESS: Metal finishing

SAMPLE DATES AND TYPES:

August 11, 1982	Effluent - 8-hour chemical & metals composite
August 11, 1982	Effluent - cyanide grab

The treatment facility utilizes chemical addition/precipitation and pH adjustment. Treatment is carried out in a small indoor plant. The discharge is to the ground.

FREQUENCY SOURCES WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless otherwise noted)

PARAMETER	8/11/82 EFFLUENT
pH (Standard Units)	7.4
Suspended Solids	15
Total Solids	630
Fluoride	50
Aluminum	0.5
Barium	0.8
Cadmium	0.00
Chromium	0.10
Iron	0.43
Lead	0.00
Manganese	0.04
Nickel	0.50
Total Cyanide*	0.00
Cyanide Ammenable to Cl_2 *	0.00
Flow (GPD)	2,520

* Grab sample

GLOSSARY OF TERMS

Acidity - The quantitative capacity of aqueous solutions to react with hydroxyl ions. It is measured by titration with a standard solution of a base to a specified end point. Usually expressed as milligrams per liter of calcium carbonate.

Alkalinity- The capacity of water to neutralize acids, a property imparted by the water's content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates. It is expressed in milligrams per liter of equivalent calcium carbonate.

Anaerobic Waste Treatment - Waste stabilization brought about through the action of microorganisms in the absence of air or elemental oxygen. Usually refers to waste treatment by methane fermentation.

Biochemical Oxygen Demand (BOD) - The quantity of oxygen used in the biochemical oxidation of organic matter in a specified time, at a specified temperature, and under specified conditions.

Biological Wastewater Treatment - Forms of wastewater treatment in which bacterial or biochemical action is intensified to stabilize, oxidize, and nitrify the unstable organic matter present. Intermittent sand filters, contact beds, trickling filters, and activated sludge processes are examples.

Chemical Oxygen Demand (COD) - A measure of the oxygen-consuming capacity of inorganic and organic matter present in water or wastewater. It is expressed as the amount of oxygen consumed from a chemical oxidant in a specific test. It does not differentiate between stable and unstable organic matter and thus does not necessarily correlate with biochemical oxygen demand.

Chlorination - The application of chlorine to water or wastewater, generally for the purpose of disinfection, but frequently for accomplishing other biological or chemical results.

Clarification - Any process or combinatin of processes, the primary purpose of which is to reduce the concentration of suspended matter in a liquid.

Coliform - Bacteria found in abundance in the intestinal tract of warm-blooded animals. They are not harmful in themselves, but their presence indicates that pathogenic bacteria may be present. Since they can be detected by relatively simple test procedures, coliforms are used to indicate the extent of bacterial pollution from sewage. Bacterial tests usually measure the fecal and total coliforms. Fecal coliform make up about 90 percent of the coliforms discharged in fecal matter. Non-fecal coliforms may originate in soil, grain, or decaying vegetation.

Comminution - The process of cutting and screening solids contained in the wastewater flow before it enters the flow pumps or other units in the treatment plant.

Composite Wastewater Sample - A combination of individual samples of water or wastewater taken at selected intervals, generally hourly, for some specified period, to minimize the effect of the variability of the individual sample. Individual samples may have equal volume or be proportioned to the flow at the time of sampling.

Data - Records of observations and measurements of physical facts, occurrences, and conditions, reduced to written, graphical, or tabular form.

Fats (wastes) - Triglyceride esters of fatty acids; erroneously used as synonomous with grease.

Flocculation - In water and wastewater treatment, the agglomeration of colloidal and finely divided suspended matter after coagulation by gentle stirring by either mechanical or hydraulic means. In biological wastewater treatment where coagulation is not used, agglomeration may be accomplished biologically.

Grab Sample - A single sample of wastewater taken at neither set time nor flow.

Grease - In wastewater, a group of substances including fats, waxes, free fatty acids, calcium and magnesium soaps, mineral oils, and certain other non-fatty materials. The type of solvent and method used for extraction should be stated for quantification.

Grit Chamber - A detention chamber or enlargement of a sewer designed to reduce the velocity of flow of the liquid to permit the separation of mineral from organic solids by differential sedimentation.

Hardness - A characteristic of water imparted by salts of calcium, magnesium, and iron such as bicarbonates, carbonates, sulfates, chlorides, and nitrates, that cause curdling of soap, deposition of scale in boilers, damage in some industrial processes, and sometimes objectionable taste. It is expressed as equivalent calcium carbonate.

Heavy Metals - These elements are toxic when present in sufficient quantities and can be fatal. They can adversely affect sewage treatment systems and the biological systems of waterbodies. They include cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc.

Industrial Wastes - The liquid wastes from industrial processes, as distinct from domestic or sanitary wastes.

Inorganic Matter - Chemical substances of mineral origin, or, more correctly, not of basically carbon structure.

Lagoon - A pond containing raw or partially treated wastewater in which aerobic or anaerobic stabilization occurs.

Most Probable Number (MPN) - That number of organisms per unit volume that, in accordance with statistical theory, would be more likely than any other number to yield the observed test result with the greatest frequency. Expressed as density of organisms per 100 ml. Results are computed from the number of positive findings of coliform-group organisms resulting from multiple-portion decimal-dilution plantings.

Nitrogen - A common non-metallic element that in free form is normally a colorless, odorless, tasteless, insoluble, inert, diatomic gas. In the combined form, it has a wide range of valences and is a constituent of biologically important compounds (as proteins) and hence of all living cells as well as industrially important substances (as cyanides, fertilizers, dyes).

Nitrogen, Ammonia - A compound of nitrogen and hydrogen, NH_3, which is part of the nitrogen cycle. Its presence in sufficient amounts in a stream can indicate a wastewater discharge. The oxidation of ammonia depletes a stream of dissolved oxygen. It is toxic in sufficient amounts, especially to fish.

Nitrogen, Kjeldahl - This represents the total organic nitrogen content of a sample.

Nitrogen, Nitrate - Nitrate represents the most highly oxidized phase in the nitrogen cycle and normally reaches important concentrations in the final stages of biological oxidation. Nitrogen in this form is readily available to plants.

Organic Matter - Chemical substances of animal or vegetable origin, or more correctly, of basically carbon structure, comprising compounds consisting of hydrocarbons and their derivatives.

Oxidation - The addition of oxygen to a compound. More generally, any reaction which involves the loss of electrons from an atom.

Oxidation Pond - A basin used for the retention of wastewater before final disposal, in which biological oxidation of organic matter is affected by natural or artificially accelerated transfer of oxygen to the water from air.

Parshall Flume - A calibrated device developed by Parshall for measuring the flow of a liquid in an open conduit.

Pathogenic Bacteria - Bacteria that may cause disease in the host organism by their parasitic growth.

pH - The reciprocal of the logarithm of the hydrogen ion concentration. The concentration is the weight of hydrogen ions in grams per liter of solution. Neutral water, for example, has a pH value of 7 and hydrogen ion concentration of 10^{-7}.

Phenol - An aromatic compound which is a monohydroxy derivative of benzene. In concentrated solution, it is quite toxic to bacteria. Widely used as a germicide. Commonly known as carbolic acid.

Phosphorus - A nonmetallic multivalent element of the nitrogen family that occurs widely in combined form, especially as inorganic phosphates in minerals, soils, and natural waters, and as organic phosphates in all living cells; it exists in several allotropic forms. The majority of the phosphorus contained in domestic sewage and industrial wastes comes from detergents.

Primary Settling Tank - The first settling tank for the removal of settleable solids through which wastewater is passed in a treatment works.

Primary Treatment - The first major (sometimes the only) treatment in a wastewater treatment works, usually sedimentation. The removal of a substantial amount of suspended matter but little or no colloidal and dissolved matter.

Residual Chlorine - Chlorine remaining in water or wastewater as combined or free chlorine at the end of a specified contact time.

Sampler - A device used with or without flow measurement to obtain an aliquot portion of water or waste for analytical purposes. May be designed for taking a single sample (grab), composite sample, continuous sample, or periodic sample.

Secondary Settling Tank - A tank through which effluent from some prior treatment process flows for the purpose of removing settleable solids.

Secondary Wastewater Treatment - The treatment of wastewater by biological methods after primary treatment by sedimentation.

Sludge Digestion - The process by which organic or volatile matter in sludge is gasified, liquified, mineralized, or converted into more stable organic matter through the activities of either anaerobic or aerobic organisms.

Sludge Thickening - The increase in solids concentration of sludge in a sedimentation or digestion tank.

Solids, Settleable - That matter in wastewater which will not stay in suspension during a pre-selected settling period, such as an hour, but which either settles to the bottom or to the top. In the Imhoff cone test, the volume of matter that settles to the bottom in one hour.

Solids, Suspended - Solids that either float on the surface of, or are in suspension in, water, wastewater, or other liquids and which are largely removable by laboratory filtering. The quantity of material removed from wastewater in a laboratory test, as prescribed in Standard Methods for the Examination of Water and Wastewater, and referred to as non-filterable residue.

Solids, Total - The sum of dissolved and undissolved constitutents in water or wastewater, usually stated in milligrams per liter.

Wastewater Survey - An investigation of the quantity and characteristics of each waste stream, as in a municipality or an industrial plant.