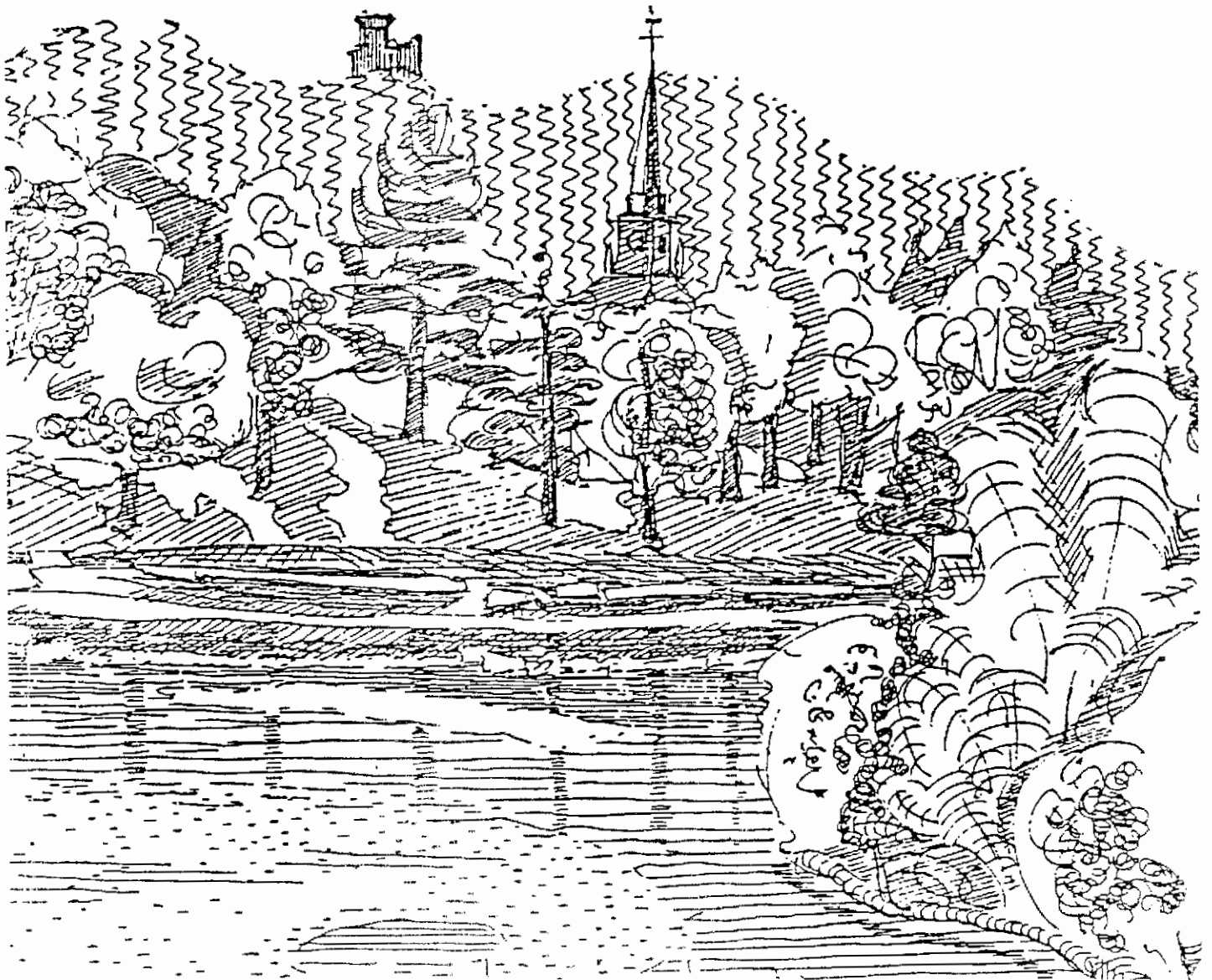


BLACKSTONE RIVER BASIN

1981-1982 Wastewater Discharge Data



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DIVISION of WATER POLLUTION CONTROL

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BLACKSTONE RIVER BASIN
1981 - 1982
WASTEWATER DISCHARGE SURVEY DATA

PREPARED BY
TECHNICAL SERVICES BRANCH
MASSACHUSETTS DIVISION OF WATER POLLUTION CONTROL

WESTBOROUGH, MASSACHUSETTS

DECEMBER 1984

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FOREWORD

The following report presents the results of the wastewater discharge surveys conducted on the Blackstone River by the Massachusetts Division of Water Pollution Control (MDWPC) during the years 1981-1982. These surveys were part of the state-wide discharge monitoring program which has been established in conjunction with the National Pollutant Discharge Elimination System (NPDES). These surveys are also a continuation of a previously established on-going program of water quality and discharge monitoring by the Division's Technical Services Branch.

The wastewater discharges were sampled for various periods of time ranging from three 24-hour composite samples to a grab sample. The sampling period was determined according to regulations established by the NPDES permits. Composite samples were taken by automatic samplers and were composited according to flow where flow records were available. If no flow records were available, the composite was made of equal amounts for that time period.

The samples were analyzed at the Lawrence Experiment Station of the Department of Environmental Quality Engineering. All analyses were performed according to procedures of the current APHA's Standard Methods for the Examination of Water and Wastewater. Data were compiled and placed in tabular form by personnel of the Massachusetts Division of Water Pollution Control.

WASTEWATER DISCHARGES

1. Worcester Spinning and Finishing Company Wastewater Treatment Plant*
2. New England Plating Company Wastewater Treatment Plant*
3. Upper Blackstone Water Pollution Abatement District Wastewater Treatment Plant
4. Millbury Wastewater Treatment Plant*
5. Wyman Gordon Company Wastewater Treatment Facilities *
6. Grafton Wastewater Treatment Plant
7. Polyfoam Incorporated *
8. Northbridge Wastewater Treatment Plant*
9. Douglas Wastewater Treatment Plant
10. Hayward Schuster Woolen Mill Wastewater Treatment Plant
11. Whittin Machine, ATF Davidson*
12. Upton Wastewater Treatment Plant
13. Uxbridge Wastewater Treatment Plant
14. Hopedale Wastewater Treatment Plant*

* Not sampled during 1981-82

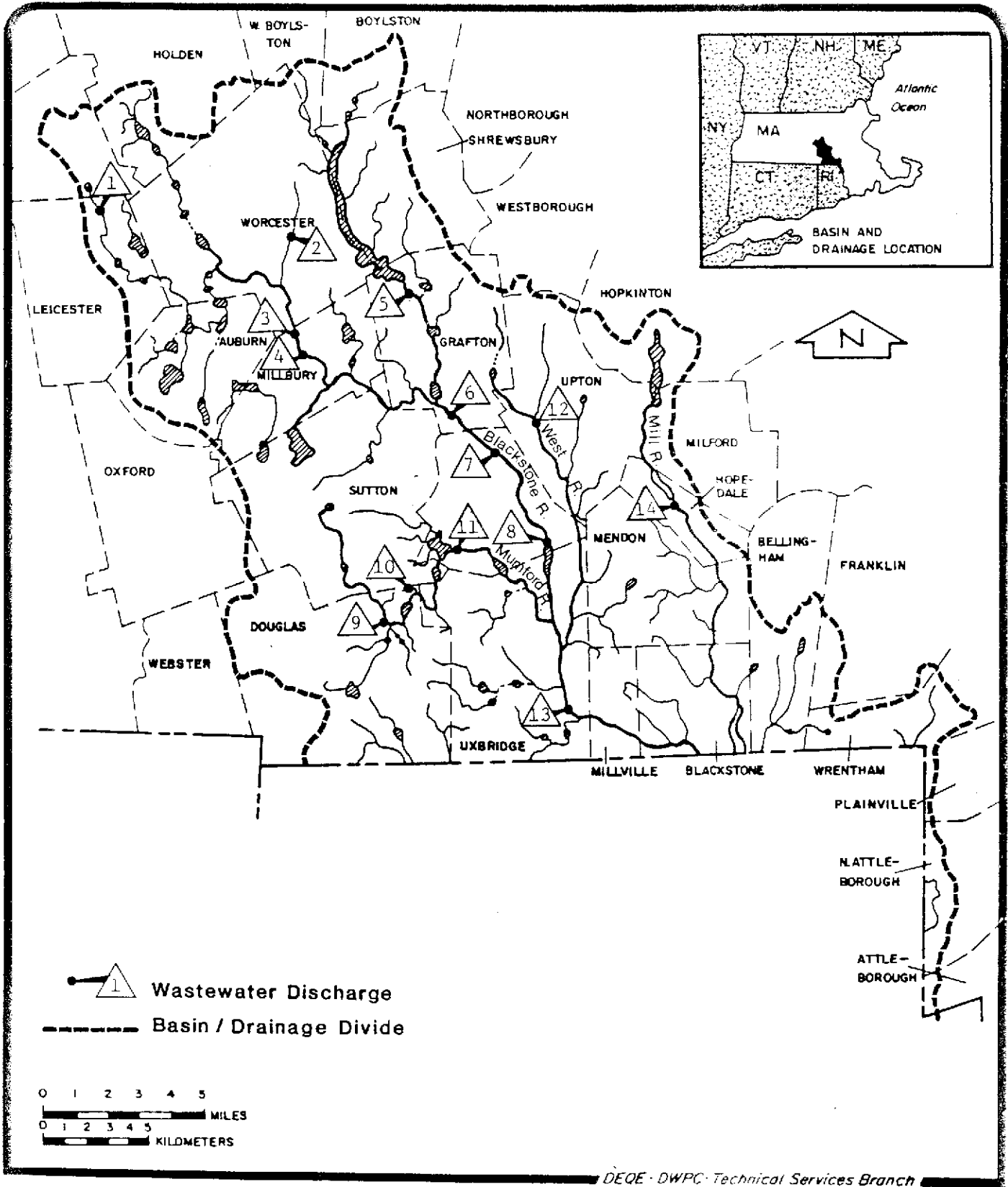


Figure 1

BLACKSTONE RIVER BASIN
LOCATION OF WASTEWATER DISCHARGES

UPPER BLACKSTONE WATER POLLUTION ABATEMENT DISTRICT
WASTEWATER TREATMENT PLANT

LOCATION: Route 20, Millbury

RECEIVING WATER: Blackstone River

NPDES PERMIT NO.: MA0102369

DESIGN FLOW: 56 MGD

TYPE OF TREATMENT: Activated Sludge
Aerated Grit Chamber
Primary Settling
Aeration Tanks
Secondary Settling
Chlorine Contact Tanks

SLUDGE HANDLING: Dissolved Air Flotation
Vacuum Filter
Incineration
Landfill

COMMENTS: This plant produces a good effluent. Because the facility is running well under design flow it has been able to handle upsets from illegal discharges to the system (i.e. acid wastes).

UPPER BLACKSTONE WATER POLLUTION ABATEMENT DISTRICT WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All results in mg/l unless otherwise noted)

PARAMETER	12/13-14/82		12/14-15/82		12/15-16/82	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	359	81	338	82	373	134
BOD ₅	170	32	160	13	170	28
pH (Standard Units)	7.1	7.3	7.3	7.3	7.1	7.7
Alkalinity	120	110	100	152	132	142
Suspended Solids	164	17	156	13	168	23
Settleable Solids (ml/l)	--	0.5	--	0.0	--	0.1
Total Solids	500	308	496	340	504	354
Total Kjeldahl Nitrogen	21	19	20	17	22	15
Ammonia Nitrogen	16	15	18	17	17	15
Nitrate Nitrogen	0.1	1.7	0.1	1.6	1.0	1.8
Total Phosphorus	6.3	3.6	6.5	3.8	6.0	5.0
Chloride	--	83	--	88	--	79
Aluminum	--	--	0.76	<0.10	--	--
Cadmium	--	--	0.00	0.00	--	--
Chromium	--	--	0.30	0.03	--	--
Copper	--	--	0.24	0.06	--	--
Iron	--	--	2.4	0.50	--	--
Lead	--	--	0.08	0.05	--	--
Manganese	--	--	0.18	0.14	--	--
Mercury	--	--	0.0003	0.0000	--	--
Nickel	--	--	0.52	0.25	--	--
Silver	--	--	0.00	0.00	--	--
Tin	--	--	<0.5	<0.5	--	--
Zinc	--	--	0.66	0.15	--	--
Flow (MGD)	--	26.1	--	24.9	--	25.3

GRAFTON WASTEWATER TREATMENT PLANT

LOCATION: Ferry Street, South Grafton

RECEIVING WATER: Blackstone River

NPDES PERMIT NO.: MA0101311

DESIGN FLOW: 1.67 MGD

TYPE OF TREATMENT: Activated Sludge
Aerated Grit Chamber
Primary Clarifiers
Aeration Tanks
Secondary Clarifiers
Chlorination

SLUDGE HANDLING: Diffused Air Flotation
Vacuum Filter
Landfill

COMMENTS: This facility has consistently put out a high quality effluent since it went on line in 1979.

GRAFTON WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All results in mg/l unless otherwise noted)

PARAMETER	12/13 - 14/82		12/14 - 15/82		12/15 - 16/82	
	INFLUENT*	EFFLUENT	INFLUENT*	EFFLUENT	INFLUENT	EFFLUENT
COD	216	54	246	53	440	43
BOD ₅	120	7.6	111	7.6	390	6.4
pH (Standard Units)	7.3	6.9	7.4	6.9	7.2	7.0
Alkalinity	188	180	140	38	140	30
Suspended Solids	94	5	68	6	342	5
Settleable Solids (ml/l)	--	0.0	--	0.0	--	0.0
Total Solids	386	472	432	452	1660	492
Total Kjeldahl Nitrogen	24	1.7	26	1.7	32	1.8
Ammonia Nitrogen	21	0.17	24	0.59	32	0.12
Nitrate Nitrogen	0.0	17	0.0	20	0.0	22
Total Phosphorus	6.8	5.8	7.0	4.4	8.3	4.5
Chloride	--	87	--	85	--	91
Aluminum	--	--	0.43	0.10	--	--
Cadmium	--	--	0.00	0.00	--	--
Chromium	--	--	0.00	0.02	--	--
Copper	--	--	0.14	0.06	--	--
Iron	--	--	0.63	0.43	--	--
Lead	--	--	0.01	0.01	--	--
Manganese	--	--	0.06	0.02	--	--
Mercury	--	--	0.0000	0.0000	--	--
Nickel	--	--	0.00	0.00	--	--
Silver	--	--	0.00	0.00	--	--
Tin	--	--	<0.5	<0.5	--	--
Zinc	--	--	0.09	0.05	--	--
Flow (MGD)	--	0.54	--	0.66	--	0.68

*Grab Sample

DOUGLAS WASTEWATER TREATMENT PLANT

LOCATION: Charles and North Streets, Douglas

RECEIVING WATER: Mumford River

NPDES PERMIT NO.: MA0101095

DESIGN FLOW: 0.7 MGD

TYPE OF TREATMENT: Extended Aeration
Aeration
Secondary Clarifiers
Chlorine Contact Tank

SLUDGE HANDLING: Drying Beds
Landfill

COMMENTS: Samples were taken at this plant as part of water quality survey work conducted on the Mumford River.

DOUGLAS WASTEWATER TREATMENT PLANT
 RESULTS OF LABORATORY ANALYSES
 (All results in mg/l unless otherwise noted)

<u>PARAMETER</u>	<u>EFFLUENT</u>		
	<u>7/19 - 20/82</u>	<u>7/20 - 21/82</u>	<u>7/21 - 22/82</u>
COD	63	69	64
BOD ₅	36	32	34
pH (Standard Units)	7.3	7.8	7.7
Alkalinity	107	105	109
Suspended Solids	12	9.5	7.0
Total Solids	300	290	290
Total Kjeldahl Nitrogen	9.9	8.2	7.6
Ammonia Nitrogen	6.2	6.4	5.8
Nitrate Nitrogen	0.1	0.10	0.10
Total Phosphorus	1.4	5.1	5.4
Chloride	47	49	49
Flow (MGD)	0.048	0.058	0.053

HAYWARD SCHUSTER WOOLEN MILLS WASTEWATER TREATMENT PLANT

LOCATION: Gilboa Street, Douglas

RECEIVING WATER: Gilboa Brook

INDUSTRIAL PROCESS: Textile Manufacturing

TYPE OF TREATMENT: Chemical Addition
Vibrating Screen
Aeration
Settling

SLUDGE HANDLING: Drying Beds
Landfill

COMMENTS: This 1.25 MGD facility is prone to thermal shock during the winter months. Influent to the aeration tanks is quite hot, while after the weekend shutdown the aeration basin is near freezing. For the most part, this plant met secondary standards. This mill went out of business in the late summer of 1982. Another company has purchased the mill but it is still uncertain if the treatment facility will be utilized.

The samples were taken to determine the efficiency of the treatment facility and as part of the July, 1982 water quality survey on the Mumford River.

HAYWARD SCHUSTER WOOLEN MILL WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All results in mg/l unless otherwise noted)

PARAMETER	EFFLUENT				
	1/5 - 6/81**	2/23 - 24/81	2/24/81*	2/24 - 25/81	2/5 - 2/6/81
COD	991	385	195	230	150
BOD ₅	144	20	14	17	74
pH (Standard Units)	7.2	7.4	7.0	7.5	7.6
Alkalinity	86	--	--	--	--
Suspended Solids	184	56	37	--	33
Settleable Solids (ml/l)	--	2.0	0.5	0.6	1.0
Total Solids	1,132	798	768	808	810
Turbidity (NTU)	247	--	--	--	--
Total Kjeldahl Nitrogen	29	22	24	20	15
Ammonia Nitrogen	15	14	17	18	1.3
Nitrite Nitrogen	0.049	--	--	--	--
Nitrate Nitrogen	11	0.7	0.6	0.4	1.2
Ortho Phosphorus	2.1	--	--	--	--
Total Phosphorus	3.5	1.4	1.6	3.6	0.75
Chloride	22	--	--	--	--
Total Coliform/100ml*	--	--	46,000	--	--
Fecal Coliform/100ml*	--	--	36	--	--
Phenol*	0.000	--	0.006	0.003	0.000
Cadmium	--	--	--	--	0.00
Chromium	0.50	--	--	0.28	0.32
Copper	--	--	--	--	0.04
Iron	--	--	--	--	0.33
Lead	--	--	--	--	0.02
Zinc	--	--	--	--	0.35
Flow (MGD)	0.510	0.513	0.634	0.634	0.579

* Grab Sample

** Plant Experiencing operational problems

HAYWARD SCHUSTER WOOLEN MILL WASTEWATER TREATMENT PLANT

RESULTS OF LABORATORY ANALYSES

(All results in mg/l unless otherwise noted)

PARAMETER	7/19 - 20/82		7/20 - 21/82		7/21 - 22/82	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	300	130	390	230	350	160
BOD ₅	120	21	140	21	120	23
pH(Standard Units)	7.2	7.1	8.6	7.7	7.3	7.7
Alkalinity	140	50	186	74	71	76
Suspended Solids	13	46	30	30	30	84
Total Solids	700	680	800	620	630	600
Total Kjeldahl Nitrogen	6.9	5.9	8.6	3.8	9.6	4.3
Ammonia Nitrogen	0.02	0.21	1.2	0.22	2.0	0.10
Nitrate Nitrogen	0.0	16	0.3	11	0.40	11
Total Phosphorus	0.62	2.5	0.50	2.0	1.0	1.9
Chloride	43	34	23	37	24	19
Phenol*	0.05	0.14	--	--	--	--
Oil and Grease	1.4	0.4	14	1.4	11	3.0
Hexavalent Chromium	0.00	0.00	--	0.00	0.00	--
Total Chromium	0.14	0.23	--	0.18	0.08	--
Flow (MGD)	--	0.24	--	0.314	--	0.396

*Grab Sample

UPTON WASTEWATER TREATMENT PLANT

LOCATION: Maple Avenue, Upton

RECEIVING WATER: West River

NPDES PERMIT NO.: MA0100196

DESIGN FLOW: 0.15 MGD

TYPE OF TREATMENT: Extended Aeration - Seasonal Sand Filtration
Aeration Tanks
Clarifiers
Sand Filters (Seasonal)
Chlorination

SLUDGE HANDLING: Aerobic Digestion
Drying Beds
Landfill

COMMENTS: This plant usually functions well. This survey in December found the plant grossly out of compliance. Part of this problem can be accounted for because the sand filters were off line for the winter. Solids problems seem to be the cause for the high BOD₅ values. Grab samples on the last two days may not have given a true representation of conditions at the plant.

UPTON WASTEWATER TREATMENT PLANT
 RESULTS OF LABORATORY ANALYSES
 (All results in mg/l unless otherwise noted)

PARAMETER	12/13 - 14/82		12/15/82		12/16/82	
	INFLUENT	EFFLUENT	INFLUENT*	EFFLUENT*	INFLUENT*	EFFLUENT*
COD	549	230	565	198	545	67
BOD ₅	280	160	330	150	380	54
pH (Standard Units)	7.0	7.3	7.3	7.2	7.4	7.4
Alkalinity	188	143	150	135	201	136
Suspended Solids	286	198	176	134	188	58
Settleable Solids (ml/l)	--	15	--	18	--	1
Total Solids	584	438	616	342	660	362
Total Kjeldahl Nitrogen	38	18	33	17	42	14
Ammonia Nitrogen	33	8.5	32	11	31	14
Nitrate Nitrogen	0.0	1.2	0.1	1.1	0.2	0.5
Total Phosphorus	8.8	7.8	15	8.5	9.5	6.8
Chloride	--	68	--	61	--	60
Chlorine Residual*	--	--	--	1.7	--	--
Total Coliform/100ml*	--	--	--	430	--	--
Fecal Coliform/100ml*	--	--	--	<36	--	--
Aluminum	--	--	0.44	0.63	--	--
Cadmium	--	--	0.00	0.00	--	--
Chromium	--	--	0.00	0.02	--	--
Copper	--	--	0.55	0.38	--	--
Iron	--	--	1.0	1.0	--	--
Lead	--	--	0.08	0.06	--	--
Manganese	--	--	0.06	0.07	--	--
Mercury	--	--	0.0000	0.0001	--	--
Nickel	--	--	0.00	0.00	--	--
Silver	--	--	0.00	0.00	--	--
Tin	--	--	<0.5	<0.5	--	--
Zinc	--	--	0.18	0.14	--	--
Flow (MGD)	--	0.132	--	0.135	--	0.135

*Grab Sample

UXBRIDGE WASTEWATER TREATMENT PLANT

LOCATION: River Road, Uxbridge

RECEIVING WATER: Blackstone River

NPDES PERMIT NO.: MA0102440

DESIGN FLOW: 2.5 MGD

TYPE OF TREATMENT: Activated Sludge
Primary Clarifiers
Aeration Tanks
Secondary Clarifiers
Chlorine Contact Tanks

SLUDGE HANDLING: Thickener
Vacuum Filter
Landfill

COMMENTS: This plant produces a high quality effluent. Part of the reason for this is that the plant is operating well under design flow.

UXBRIDGE WASTEWATER TREATMENT PLANT
 RESULTS OF LABORATORY ANALYSES
 (All results in mg/l unless otherwise noted)

PARAMETER	12/13 - 14/82		12/14 - 15/82		12/15 - 16/82	
	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT	INFLUENT	EFFLUENT
COD	372	44	400	82	432	86
BOD ₅	190	14	180	13	260	17
pH (Standard Units)	7.2	6.9	7.2	7.0	7.6	7.2
Alkalinity	140	60	137	37	180	42
Suspended Solids	538	11	164	20	234	19
Settleable Solids (ml/l)	--	0.0	--	0.0	--	0.1
Total Solids	1,268	408	584	448	726	462
Total Kjeldahl Nitrogen	26	8.5	25	6.4	38	7.1
Ammonia Nitrogen	20	7.8	24	5.6	37	5.4
Nitrate Nitrogen	0.1	14	0.1	16	0.1	16
Total Phosphorus	7.5	6.8	7.8	6.6	10	6.3
Chloride	--	47	--	46	--	45
Aluminum	--	--	0.35	<0.10	--	--
Cadmium	--	--	0.00	0.00	--	--
Chromium	--	--	0.04	0.01	--	--
Copper	--	--	0.33	0.09	--	--
Iron	--	--	0.61	0.29	--	--
Lead	--	--	0.09	0.01	--	--
Manganese	--	--	0.11	0.11	--	--
Mercury	--	--	0.0004	0.0000	--	--
Nickel	--	--	0.00	0.00	--	--
Silver	--	--	0.01	0.00	--	--
Tin	--	--	<0.5	<0.5	--	--
Zinc	--	--	0.12	0.09	--	--
Flow (MGD)	--	0.403	--	0.407	--	0.501

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 combination 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 synonymous 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 constituents 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.