ASSABET RIVER BASIN

1989

Part A: Water Quality Data

Part B: Wastewater Discharge Data

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ASSABET RIVER BASIN

1989

WATER QUALITY DATA

WATER DISCHARGE DATA

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FOREWORD

The Massachusetts Division of Water Pollution Control was established by the Massachusetts Clean Water Act, Chapter 21 of the General Laws as amended by Chapter 685 of the Acts of 1966. Included in the duties and responsibilities of the Division is the periodic examination of the water quality of various coastal waters, rivers, streams and ponds of the Commonwealth, as stated in Section 27, Paragraph 5 of the Acts. This section further directs the Division to publish the results of such examination together with the standards of water quality established for the various waters. The Technical Services Branch of the Division of Water Pollution Control has, among its responsibilities, the execution of this directive. This report is published under the Authority of the Acts and is among a continuing series of reports issued by the Division presenting water quality data and analyses, water quality management plans, baseline and intensive limnological studies and various special studies.

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INTRODUCTION

This report is a compilation of the results of field and laboratory examinations of the Assabet River and its wastewater discharges during the summer of 1989 by the Technical Services Branch (TSB), Division of Water Pollution Control, Department of Environmental Protection (DEP).

Two studies, both concerned with nutrient loading effects on the Assabet River, are presented in this report. The first study involved the effect of the Maynard WWTP discharge on the Powdermill Impoundment and on the Assabet River downstream. The second study was a preliminary assessment of Assabet River wastewater treatment plant (WWTP) discharges and their worst-case effects on a nearby downstream station. Follow-up surveys of each of the study areas are planned for coming years.

Chemical and bacteriological samples were transported to the Lawrence Experiment Station (LES) of the DEP where they were analyzed according to procedures set forth in the most current edition of the American Public Health Association's Standard Methods for the Examination of Water and Wastewater. However, dissolved oxygen determinations were made by Technical Services Branch personnel using either the Winkler method, or the Hydrolab field instrument. In addition, water temperature and pH measurements were made at the time of sample collection.

River flow was not measured by TSB personnel during the surveys. Flow data collected by the United States Geological Survey (USGS) at the USGS gaging station on the Assabet River in Maynard is included in this report. The data are intended to give an indication of the flow regime of the river during the sampling.

Personnel from the four municipal discharges on the river, Westborough, Marlborough West, Hudson, and Maynard, collected 24-hour composite samples using WWTP equipment. The samples were then picked up by TSB personnel for delivery and analysis at LES. The 24-hour composite samples are indicated in this report by bracketing the days over which the sample was taken, e.g., 8/22-23/89.

PHYSICAL CHARACTERISTICS OF THE ASSABET RIVER

The Assabet River, originating in impounded swamplike land in southwestern Westborough, flows through several highly populated areas including Westborough, Northborough, Hudson, Maynard, and Concord, until it joins with the Sudbury River in Concord to form the Concord River. It currently receives major discharges from four municipal wastewater treatment plants and a state prison treatment plant.

The varying physical characteristics of the Assabet River play a critical role in the chemical and biological activities which occur in the river. The reoccurring presence of dams and the slow moving, swampy impoundments they create are vital factors in the water quality of the Assabet River. Table 1 lists the assigned water use classification of the Assabet River and its tributaries. Figure 1 shows the Assabet profile, with changes in elevation, and location of dams and wastewater treatment plant discharges. In the following description, the mile point from the confluence with the Sudbury River is shown in parenthesis.

The Assabet River begins at the outlet of the George H. Nichols Multiple Purpose Dam in the southwest section of Westborough. The dam creates a small impoundment of about 0.6 sq. mi. which collects water drainage from an area of about 7 sq. mi. much of which is swampland. The dam was intended to provide fish and wildlife habitat and low flow augmentation for pollution abatement. Decaying organic matter formed by the insufficient removal of trees and roots when the area was flooded produces inferior water quality within the impoundment. In addition, proper flow regulation is absent. Water which does flow through the dam, however, is aerated, and the resulting water quality in the newly emerging Assabet is good as far as dissolved oxygen and bacteriological parameters are concerned.

After a short, fast flowing stretch, the river begins its characteristic sluggish flow. "Hocomonco Stream" joins the river just above where the first of five wastewater treatment plants discharges into the Assabet - the town of Westborough Wastewater Treatment Plant (WWTP) (30.2). Shortly downstream the Shrewsbury WWTP discharged to the river until the spring of 1987, when its flows were tied into the Westborough WWTP. The Assabet meanders its way through swamplike lands and flows by a golf course before reaching the next impounded area and dam on Route 20 in Northborough (26.5). Soon, another relatively steep gradient causes the river to accelerate through a small industrial complex. Then, taking a 90° turn, the Assabet enters the "headwater" pool of the Allen Road dam impoundment (25.4). After flowing through pasture lands, the basic pattern of the river is repeated - the Marlborough West WWTP (24.1) coincides with the slowing of the river flow. The river flows through swamplands until the dam at Route 85 in Hudson (18.2). Through Hudson center the flow is constricted by industrial developments on both banks. Passing out of Hudson center the pattern is again repeated - the Hudson WWTP discharges into the Assabet just above the swampland impoundment created by the Gleasondale dam (14.4). Following a short rapid section, the river flows in its characteristic slow meandering style for 4.5 miles through the town of Stow.

Flowing over the American Woolen Dam (9.0) and into the town of Maynard, the river's gradient sharply increases and the flow is channeled through the center of Maynard. The Assabet, for the fourth time, repeats its pattern - flowing into the Powdermill

impoundment and receiving the discharge from the Maynard WWTP (6.3). From the Powdermill dam to the confluence with the Sudbury River, the river's gradient is relatively uniform. The Assabet flows through West Concord receiving its final discharge from the Massachusetts Correctional Institution (MCI) at West Concord (2.4). The river slowly reaches the Sudbury River just north of the center of Concord. The confluence of the Assabet and Sudbury rivers produces one main stream - the Concord River.

TABLE 1

1990 ASSABET RIVER BASIN WATER QUALITY CLASSIFICATION*

BOUNDARY	MILE POINT	CLASS	OTHER RESTRICTIONS
Assabet River			
Source to Westborough STP	31.8 - 30.4	B	Warm Water High Quality Water
Westborough STP to outlet to Boones Pond	30.4 - 12.4	B	Warm Water
Outlet of Boones Pond to confluence with Sudbury River	12.4 - 0.0	B	Warm Water
Nagog Pond			
Source to outlet in Acton and those tributaries thereto	-	A	Public Water Supply
Westborough Reservoir			
Source to outlet in Westborough and those tributaries thereto	-	A	Public Water Supply
Gates Pond			
Source to outlet in Berlin and those tributaries thereto	-	A	Public Water Supply
White Pond			
Source to outlet in Hudson and those tributaries thereto	-	A	Public Water Supply

* Massachusetts Water Quality Standards, 1990

TABLE 1 (CONTINUED)

1990 ASSABET RIVER BASIN WATER QUALITY CLASSIFICATION*

BOUNDARY	MILE POINT	CLASS	OTHER RESTRICTIONS
Millham Reservoir			
Source to outlet in Marlborough and those tributaries thereto	-	A	Public Water Supply
Williams Lake			
Source to outlet in Marlborough and those tributaries thereto	-	A	Public Water Supply
Sudbury Reservoir			
In Westborough, Marlborough, Southborough, Framingham and those tributaries thereto	-	A	Public Water Supply

FIGURE 1 ASSABET RIVER ELEVATION PROFILE

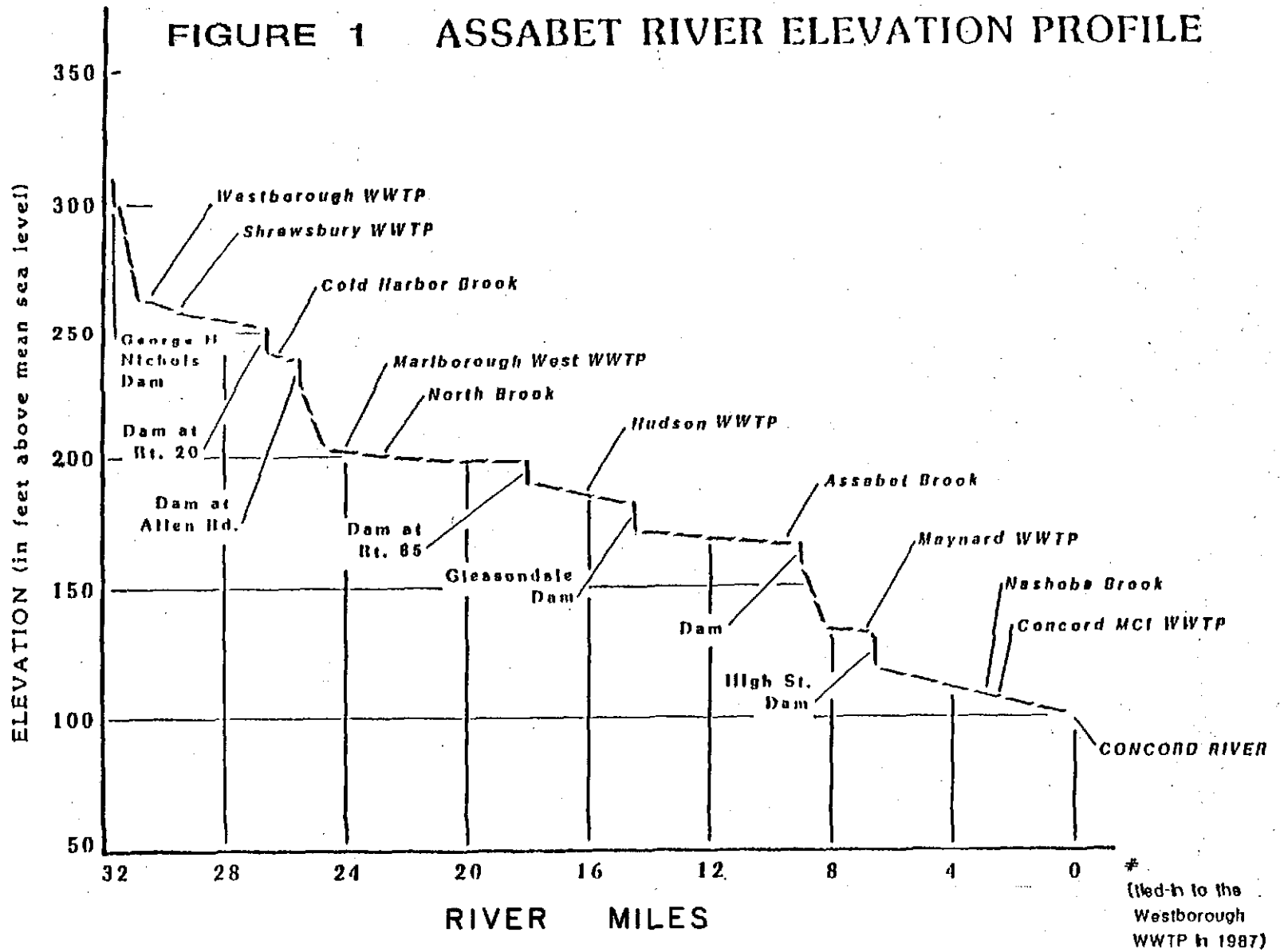


TABLE 2

1989 ASSABET RIVER AND POWDERMILL IMPOUNDMENT SURVEYS

LOCATION OF SAMPLING STATIONS

STATION NUMBER	LOCATION	RIVER MILE
Assabet River		
AS07	Above Dam, Route 20, Northborough	26.5
AS10	Robin Hill Road, Marlborough	23.8
AS18	Boon Road, Stow	12.1
AS21	Above Powdermill Dam, Acton	6.5
AS22	Route 62, first bridge, Concord	6.1
AS23	Route 62, second bridge, Concord	4.6
AS24	Route 62, third bridge, Concord	3.3
AS25	Routes 2/2A, Concord	2.6
Powdermill Impoundment		
PM01	30 ft. downstream of Maynard WWTP, 20 ft from shore	6.75
PM02	20 ft. directly downstream of PM01, 20 ft from shore	6.75
PM03	Deep hole of Impoundment, across from Perry Pkg.	6.8
PM04	Just upstream of High St. Dam	6.5
PM06	Upstream of Maynard WWTP, at impoundment inlet	6.95

FIGURE 2
Assabet River Powdermill Impoundment
Location of Sampling Stations

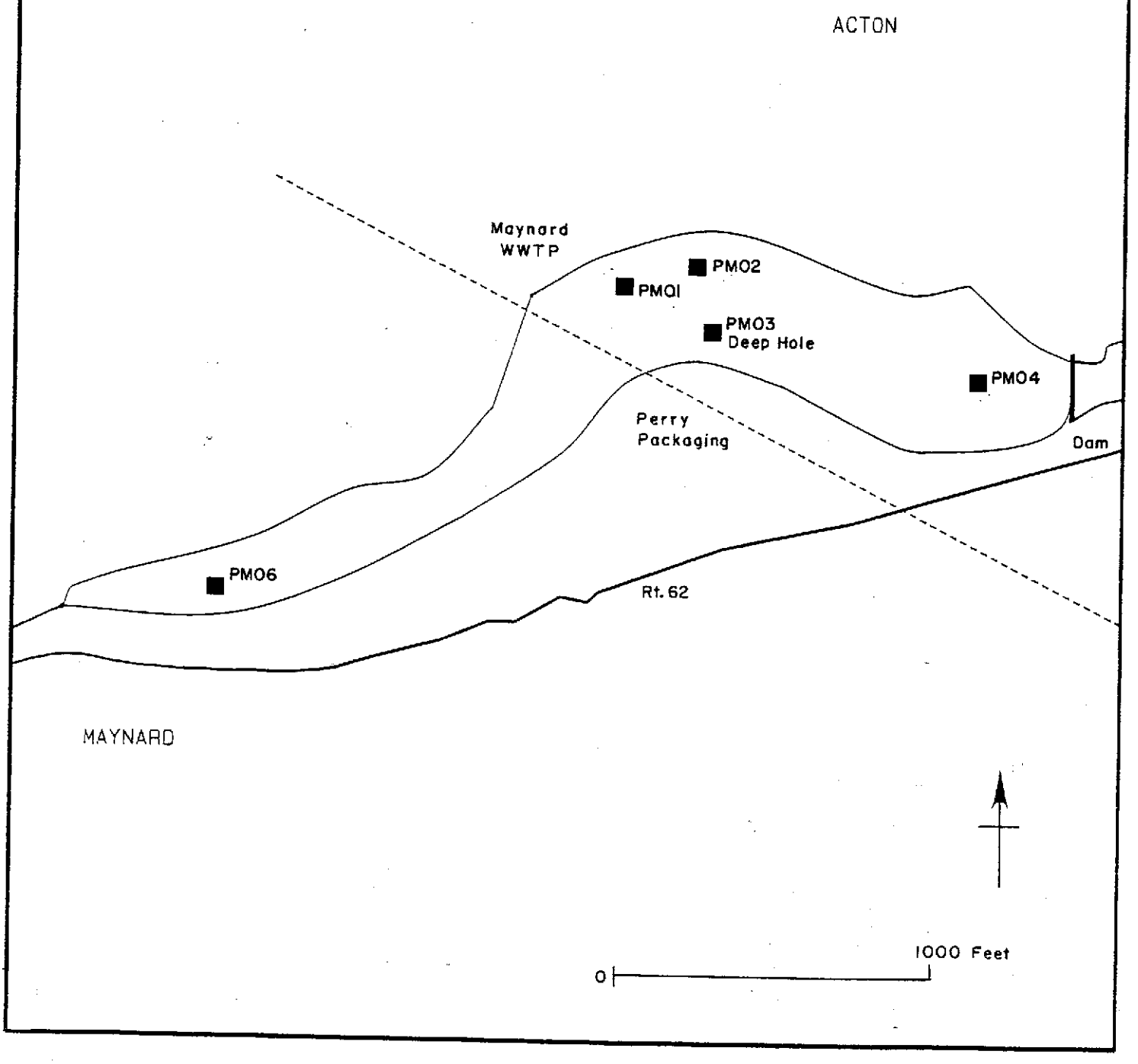
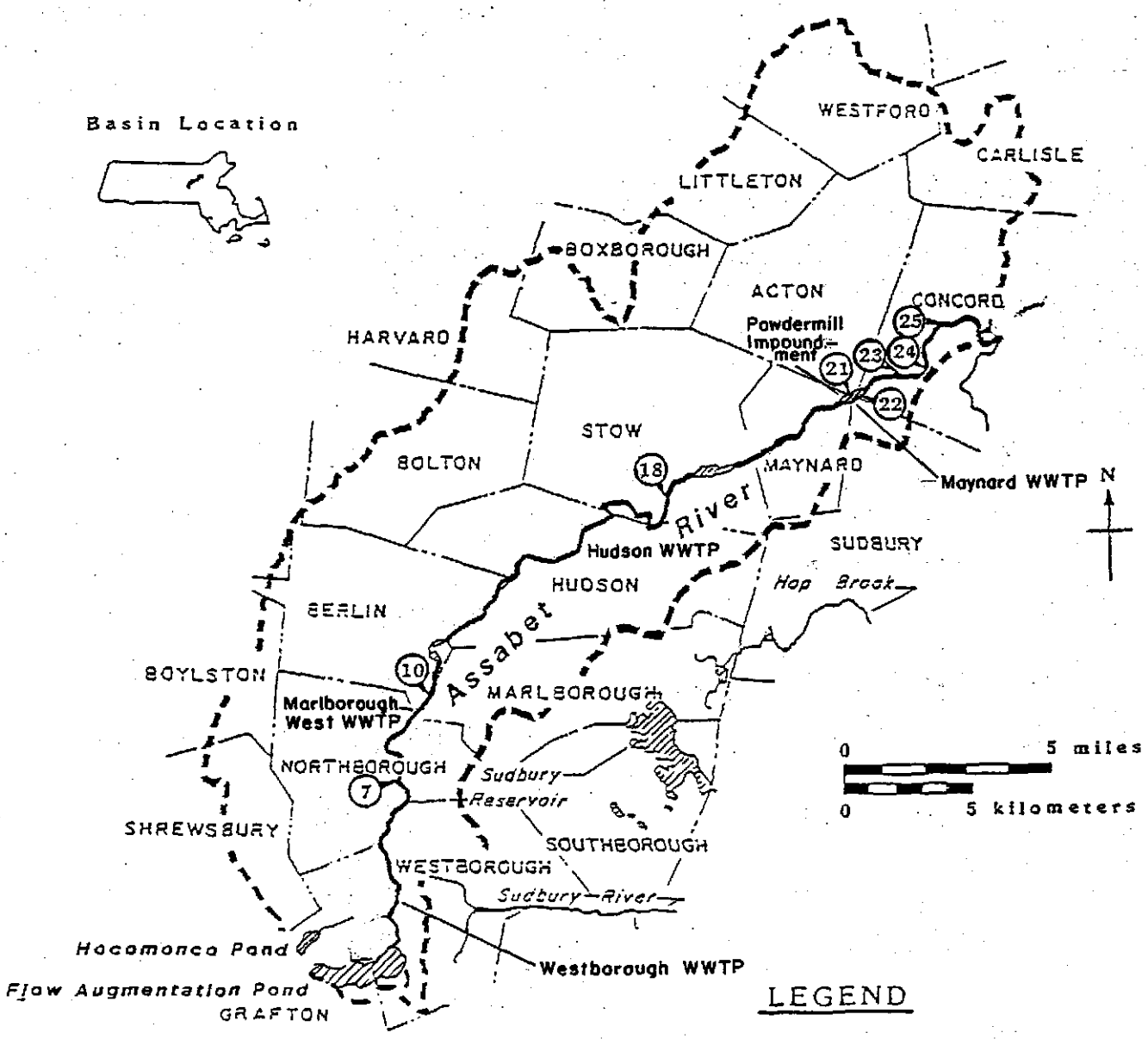


Figure 3

LOCATION of SAMPLING STATIONS

ASSABET RIVER BASIN



POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY DATA

TABLE 3

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

FIELD DATA

8-9-89

Station	Total Depth (M)	Sample Depth (M)	Temp. (C)	pH (Std. Units)	Dissolved Oxygen (mg/l)	Spec. Cond. (μmhos/cm)	Time
PM01	1	0	24.5	6.7	5.0	298	<1225
		0.5	23.3	6.8	6.3	317	<1225
PM01A		0	25.1	7.2	7.2	298	>1225
PM02	1	0	24.1	6.9	5.3	285	<1225
		0.5	23.9	6.9	4.7	283	<1225
PM03	2.5	0	23.7	7.1	6.2	292	1225
		1	23.3	7.0	5.8	293	1225
		2	22.9	6.9	5.3	295	1225
PM04		0	24.8	7.0	6.5	283	>1225
		1	23.9	7.0	5.8	287	>1225
		2	23.5	6.9	5.5	291	>1225
		2.5	23.1	6.9	5.3	291	>1225
PM06	2	0	24.4	7.3	8.4	295	>1225
		1	24.0	7.2	7.9	295	>1225
		2	23.6	7.2	7.6	295	>1225
AS22	--	0	24.4	5.6	6.9	--	1137
AS23	--	0	25.0	6.6	8.8	--	1154
AS24		0	24.4	6.4	7.5	--	1205
AS25		0	24.4	6.0	7.9	--	1225

TABLE 4

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

TIME-TEMPERATURE (°F)-DISSOLVED OXYGEN (mg/l)

8-11-89

	Sample Depth	Time	Temp. (°F)	Dissolved Oxygen (mg/l)
PM01	*(S)urface	0630	73.5	6.5
	(B)ottom	0630	73.5	6.4
PM02	S	0635	73.5	8.3
	B	0635	73.5	8.5
PM03	S	0640	73.5	6.5
	B	0640	73.5	5.9
PM04	S	0650	73.5	8.2
	B	0650	73.5	6.9
PM06	S	0703	73.5	6.6
	B	0703	73.5	6.8
AS22	S	0510	75.0	8.7
AS23	S	0520	74.0	6.7
AS24	S	0540	74.0	6.5
AS25	S	0550	73.5	6.7

TABLE 5

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

RESULTS OF LABORATORY ANALYSES

8-9-89

	BOD_5 (mg/l)	pH (stand. units)	Chloride (mg/l)	Fecal Coliform Bacteria (#/100ml)
PM01	4.8	7.1	51	20
PM03(T)	1.5	7.1	54	320
PM03(B)	2.4	7.1	54	--
PM04	3.6	7.2	51	150
PM06	2.4	7.3	55	310
AS22	2.1	7.4	52	160
AS23	3.0	7.6	52	120
AS24	2.7	7.4	51	80
AS25	2.4	7.9	50	340

TABLE 6

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

NUTRIENT DATA (mg/l)

8-9-89

	Total Kjeldahl-N	Ammonia-Nitrogen	Nitrate-Nitrogen	Phosphorus
PM01	1.3	1.1	0.85	1.1
PM03(T)	0.55	0.03	0.47	0.39
PM03(B)	0.64	0.20	0.52	0.46
PM04	0.64	0.17	0.43	0.45
PM06	0.58	0.04	0.58	0.40
AS22	0.58	0.11	0.48	0.44
AS23	0.63	0.04	0.65	0.44
AS24	0.71	0.10	0.73	0.45
AS25	0.61	0.05	0.59	0.36

TABLE 7

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

RESULTS OF LABORATORY ANALYSES

8-9-89

(All units in mg/l unless noted)

	Alkalinity	Hardness	Suspended Solids	Total Solids	Turbidity (NTU)
PM01	36	43	4.0	180	1.2
PM03(T)	31	41	<1.0	170	0.9
PM03(B)	32	43	2.0	180	1.1
PM04	31	43	<1.0	170	1.2
PM06	31	43	2.5	190	0.9
AS22	31	43	2.0	160	1.1
AS23	30	46	1.0	170	1.1
AS24	30	55	1.0	170	1.2
AS25	32	43	2.0	170	1.4

TABLE 8

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

POWDERMILL IMPOUNDMENT TROPHIC STATUS

Parameter	Value	Severity Points*
Hypolimnetic dissolved oxygen	5.3 mg/l	0
Transparency	2.6 m	2
Phytoplankton	439 cells/ml	1
$NH_3 + NO_3$	.72 mg/l	3
Total Phosphorus	0.45 mg/l	3
Aquatic macrophytes	very dense	3
	Total Severity Points	12**

* Each category ranges from 0 to 3 points, with 0 as least severe, and 3 as most severe.

** 12 points is considered eutrophic, particularly in as shallow an area as the Powdermill Impoundment.

TABLE 9

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

METALS DATA (mg/l)

8-9-89

	Al	Cd	Cr	Cu	Fe	Mn	Pb	Ni	Ag	Zn
PM01	<0.05	<0.02	<0.03	<0.02	0.24	0.04	<0.05	<0.03	<0.02	<0.02
PM03(T)	<0.05	<0.02	<0.03	<0.02	0.18	0.02	<0.05	<0.03	<0.02	<0.02
PM03(B)	0.07	<0.02	<0.03	<0.02	0.27	0.04	<0.05	<0.03	<0.02	0.08
PM04	<0.05	<0.02	<0.03	<0.02	0.26	0.04	<0.05	<0.03	<0.02	<0.02
PM06	0.15	<0.02	<0.03	<0.02	0.30	0.03	<0.05	<0.03	<0.02	0.16
AS22	0.18	<0.02	<0.03	<0.02	0.37	0.06	<0.05	<0.03	<0.02	0.35
AS23	<0.05	<0.02	<0.03	<0.02	0.20	0.08	<0.05	<0.03	<0.02	0.19
AS24	<0.05	<0.02	<0.03	<0.02	0.21	0.02	<0.05	<0.03	<0.02	0.02
AS25	<0.05	<0.02	<0.03	<0.02	0.30	0.09	<0.05	<0.03	<0.02	<0.02

TABLE 10

POWDERMILL IMPOUNDMENT/ASSABET RIVER SURVEY

SEDIMENT DATA

8-9-89

(All units in mg/kg dry weight unless noted)

	PM01	PM02	PM03	PM06
Total Volatile Solids (%)	15	44	15	7
Total Kjeldahl-Nitrogen	4,100	17,510	2,570	1,280
Total Phosphorus	1,640	4,390	1,640	840
Aluminum	5,400	10,400	7,500	6,500
Cadmium	2.5	10	2.5	2.0
Chromium	365	850	115	38
Copper	2,250	11,500	280	80
Iron	6,500	14,500	15,500	19,000
Lead	440	3,250	230	150
Manganese	75	240	600	550
Mercury	--	<0.0002	--	--
Nickel	13	55	90	65
Silver	15	240	2.5	<1.0
Zinc	35.0	2,000	285	235

WASTEWATER TREATMENT PLANT/ASSABET RIVER SURVEY DATA

TABLE 11

WASTEWATER TREATMENT PLANT/ASSABET RIVER SURVEY

FIELD DATA

8-23-89

Station	Time	Temp. (°F)	pH (stand. units)	Dissolved Oxygen (mg/l)
AS07	920	74	5.8	4.2
AS10	1016	74	6.3	4.9
AS18	1115	75.5	5.6	4.1
AS21	1221	79	6.2	5.7

TABLE 12

WASTEWATER TREATMENT PLANT/ASSABET RIVER SURVEY

RIVER STATIONS

RESULTS OF LABORATORY ANALYSES

8/23/89

(All units in mg/l unless noted)

	AS07	AS10	AS18	AS21
BOD_5	3.3	4.2	2.4	3.9
pH (stand.units)	6.9	7.0	6.7	7.0
Alkalinity	39	38	26	23
Hardness	52	44	39	35
Suspended Solids	1.0	6.0	3.0	3.5
Total Solids	230	190	180	150
Turbidity (NTU)	1.6	2.5	1.9	1.6
Total Kjeldahl-Nitrogen	2.0	1.1	0.82	0.76
Ammonia-Nitrogen	0.28	0.45	0.09	0.09
Nitrate-Nitrogen	1.5	0.60	0.86	0.45
Total Phosphorus	1.3	0.62	0.44	0.37
Chloride	67	54	51	43
Fecal Coliform (#/100ml)	60	100	120	360
Aluminum	<0.05	0.06	0.05	<0.05
Cadmium	<0.001	<0.001	0.004	<0.001
Chromium	0.001	0.001	0.001	<0.001
Copper	0.007	0.011	0.004	0.005
Iron	0.28	0.71	0.82	0.70
Manganese	0.04	0.18	0.13	0.13
Lead	<0.002	<0.002	<0.002	<0.002
Nickel	0.004	0.016	0.008	0.007
Silver	<0.001	<0.001	<0.001	<0.001
Zinc	0.012	0.070	0.043	0.017

TABLE 13

WASTEWATER TREATMENT PLANT/ASSABET RIVER SURVEY

WASTEWATER TREATMENT PLANT EFFLUENTS

RESULTS OF LABORATORY ANALYSES

(All units in mg/l unless noted)

	8/22-23/89				8/8-9/89
	Westboro WWTP	Marlboro W. WWTP	Hudson WWTP	Maynard WWTP	Maynard WWTP
BOD_5	7.8	38	15	50	13
pH (stand.units)	7.3	7.4	7.4	7.6	7.8
Alkalinity	65	130	43	93	110
Hardness	78	179	74	48	44
Suspended Solids	30	13	14	14	8.0
Total Solids	390	480	570	300	300
Turbidity (NTU)	1.4	4.0	2.7	3.6	5.3
Total Kjeldahl-Nitrogen	0.60	6.2	3.0	14	34
Ammonia-Nitrogen	0.07	5.2	0.03	4.3	18
Nitrate Nitrogen	3.0	0.45	14	14	3.4
Total Phosphorus	4.5	2.4	5.0	6.3	7.1
Chloride	120	120	170	59	62
Fecal Coliform (#/100ml)	20	<20	20	20	<20
Dissolved Oxygen	--	--	--	--	6.5
Aluminum	<0.05	0.09	0.18	<0.05	0.05
Cadmium	<0.001	<0.001	<0.001	<0.001	<0.02
Chromium	0.001	0.004	0.008	0.003	<0.03
Copper	0.026	0.011	0.13	0.04	0.11
Iron	--	0.14	0.24	0.17	0.26
Manganese	0.04	0.09	0.04	0.08	0.06
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	--
Lead	<0.002	0.006	0.002	<0.002	<0.05
Nickel	0.003	0.11	<0.03	<0.03	<0.03
Silver	<0.001	<0.001	<0.001	<0.001	<0.02
Zinc	0.076	0.073	0.071	0.046	0.08
Flow (MGD)	3.77	1.683	2.14	1.253	1.162

1989 ASSABET RIVER BASIN

U.S.G.S. GAGE AT MAYNARD

FLOW DATA (cfs)

Date	Flow
8-7	68
8-8	95
8-9	99
8-10	90
8-11	87
8-21	156
8-22	142
8-23	123

APPENDIX A

ANALYTICAL METHODS USED AT LAWRENCE EXPERIMENT STATION

PARAMETER (Water Column)	METHOD	REPORTED AS
Dissolved Oxygen	Azide modification of Winkler method. 0.0375 N sodium thiosulfate titrant, 300 ml sample EPA Method 360.2	mg/l D.O.
BOD	5-day oxygen depletion at 20°C EPA Method 405.1	mg/l BOD
pH	Electrometric, glass indicator, silver chloride reference EPA Method 150.1	pH Standard Units
Total Alkalinity	0.02 N sulfuric acid potentiometric titration to pH 4.5, Orion Model 701, digital pH meter EPA Method 310.1	mg/l $CaCO_3$
Phenolphthalein Alkalinity	0.02 N sulfuric acid potentiometric titration to pH 8.3 Orion Model 701, digital pH meter	mg/l $CaCO_3$
Acidity	0.02 N sodium hydroxide potentiometric titration. Orion Model 701, digital pH meter EPA Method 305.1	mg/l $CaCO_3$
Suspended Solids	Filtration through standard glass fiber filter paper. Residue dried at 103-105°C. Gravimetric EPA Method 160.2	mg/l S.S.
Total Solids	Evaporation to dryness at 103-105°C. Gravimetric EPA Method 160.3	mg/l T.S.

APPENDIX A (CONTINUED)

ANALYTICAL METHODS USED AT LAWRENCE EXPERIMENT STATION

PARAMETER	METHOD	REPORTED AS
Water Column)		
Chloride	Argentometric (titration with silver nitrate) EPA Method 325.3	mg/l Cl
Specific Conductance	Wheatstone Bridge type meter. Yellow Springs Instrument conductivity bridge, Model 31 EPA Method 120.1	umhos/cm
Total Kjeldahl-Nitrogen	Acid digestion using Technicon BD-40 Block Digester. Colorimetric analysis (reaction of ammonia, sodium salicylate, sodium nitroprusside, and sodium hypochlorite in buffered alkaline medium) using Technicon Auto Analyzer II EPA Method 351.3	mg/l TKN
Ammonia-Nitrogen	Phenate method, automated. Colorimetric analysis using Technicon Auto Analyzer II EPA Method 350.1	mg/l NH_3-N
Nitrate-Nitrogen	Hydrazine reduction method, automated. Colorimetric analysis using Technicon Auto Analyzer II EPA Method 351.3	mg/l NO_3-N
Total Phosphorus	Acid digestion using Technicon BD-40 Block Digester. Ascorbic acid reduction colorimetric method using Technicon Auto Analyzer II EPA Method 365.4	mg/l P
Fecal Coliform	Membrane filter technique	Fecal coliforms /100 ml

APPENDIX A (CONTINUED)

ANALYTICAL METHODS USED AT LAWRENCE EXPERIMENT STATION

PARAMETER (Water Column)	METHOD	REPORTED AS
Total Oil and Grease	Partition-Gravimetric Method EPA Method 413.1	mg/l
Aluminum	Inductively Coupled Argon Plasma technique (ICAP). Perkin Elmer EPA Method 200.7	mg/l
Arsenic	Atomic Absorption Spectrophotometry. Graphite furnace. Instrumentation Laboratory Model 951 EPA Method 206.2	mg/l
Cadmium, chromium, copper, iron, lead, nickel, silver, zinc, hardness (Ca+Mg)	Atomic Absorption Spectrophotometry. Air-acetylene flame. Perkin-Elmer Zeeman Model 5100 EPA Methods Cd - 213.2, Cr - 218.1, Cu - 220.1, Fe - 236.1, Pb - 239.1, Ni - 249.1, Ag - 272.1, Zn - 289.1	mg/l
Mercury	Cold Vapor Method EPA Method 245.1	mg/l
Volatile Organics	Purge and trap GC/MS EPA Method 624	ug/l
Acid and Base/Neutral Extractables	Extraction with methylene chloride followed by GC/MS EPA Method 625	ug/l
Polychlorinated biphenyls	Organochlorine Pesticides and PCBs. Extraction with methylene chloride followed by GC EPA Method 608	ug/l

APPENDIX A (CONTINUED)

ANALYTICAL METHODS USED AT LAWRENCE EXPERIMENT STATION

PARAMETER (Sediment)	METHOD	REPORTED AS
% Volatile Solids	Residue from Total Solids determination ignited at 550°C. Gravimetric EPA Method 160.4	% Volatile Solids
Total Kjeldahl-Nitrogen	Acid digestion using Technicon BD-40 Block Digester. Colorimetric analysis (reaction of ammonia, sodium salicylate, sodium nitroprusside, and sodium hypochlorite in buffered alkaline medium) using Technicon Auto Analyzer II EPA Method 351.3	mg/kg dry weight
Total Phosphorus	Acid digestion using Technicon BD-40 Block Digester. Ascorbic acid reduction colorimetric method using Technicon Auto Analyzer II EPA Method 365.4	mg/kg dry weight
Aluminum	Inductively Coupled Argon Plasma technique (ICAP). Perkin Elmer EPA Method 200.7	mg/kg dry weight
Arsenic, chromium, copper, lead, nickel, zinc	Atomic Absorption Spectrophotometry. Air-acetylene flame. Perkin-Elmer Zeeman Model 5100 EPA Methods As - 206.2, Cr - 218.1, Cu - 220.1, Ni - 249.1, Zn - 289.1	mg/kg dry weight
Mercury	Cold Vapor Method EPA Method 245.1	mg/kg dry weight
Polychlorinated biphenyls	Organaochlorine Pesticides and PCBs SW-846 EPA Method 8080	ug/g dry weight
Polycyclic aromatic hydrocarbons	EPA Method 8270	ug/g dry weight

APPENDIX B

CLASSIFICATION OF SLUDGE FOR LAND APPLICATION

310 CMR 32.00

PARAMETER	ALLOWABLE CONCENTRATIONS (mg/kg) CLASS I	CLASS II	CLASS III
Cadmium	2	2-25	>25
Lead	<300	300-1000	>1000
Nickel	<200	--	>200
Zinc	<2500	--	>2500
Copper	<1000	--	>1000
Chromium (Total)	<1000	--	>1000
Mercury	<10	--	>10
Molybdenum	<10	--	>10
Boron (water soluble)	<300	--	>300
PCBs in Class I sludge which is a commercial fertilizer	<2	2-10	>10
PCBs in Class I sludge which is a commercial soil conditioner	<1	1-10	>10