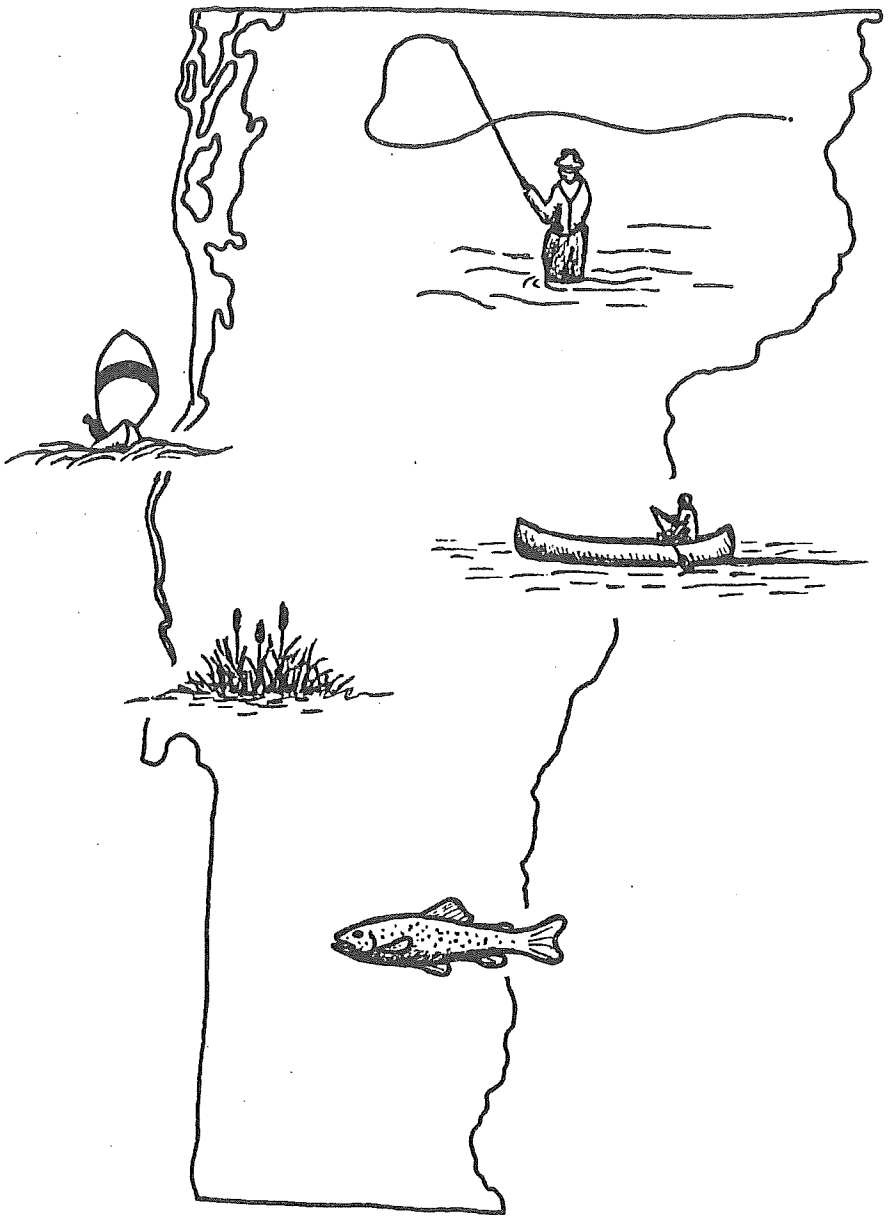
STATE OF VERMONT

1982 WATER QUALITY ASSESSMENT

(305(B) REPORT)



AGENCY OF ENVIRONMENTAL CONSERVATION

DEPARTMENT OF WATER RESOURCES

AND ENVIRONMENTAL ENGINEERING

WATER QUALITY DIVISION

MONTPELIER, VERMONT

TABLE OF CONTENTS

LIST OF TABLES..... iii
LIST OF FIGURES..... iv

INTRODUCTION..... v

FACILITIES PLANNING

Municipal..... 1

Industrial..... 4

PERMIT PROGRAM(NPDES)..... 6

PLANNING AND MANAGEMENT ACTIVITIES

Water Quality Standards..... 9

Combined Sewer Assessment..... 9

Discharge and Temporary Pollution Permit Review..... 10

201 Facility Planning Review..... 10

Program Planning Status..... 10

Water Resources Planning and Management Programs..... 13

Policies and Guidelines..... 14

MONITORING AND LABORATORY SERVICES

Core Monitoring..... 16

Compliance Monitoring..... 17

Acid Precipitation..... 20

Phosphorus Detergent Prohibition..... 23

Chlorine..... 26

Laboratory Services..... 29

Quality Assurance Program..... 30

LAKES AND PONDS MANAGEMENT PROGRAM..... 32

LAKE CHAMPLAIN AQUATIC NUISANCE CONTROL PROGRAM. 43

GROUNDWATER PROGRAM

Strategy..... 44

Aquifer Protection Areas Mapping..... 45

Groundwater Monitoring..... 45

Well Drilling..... 48

Water Level Monitoring..... 48

Underground Injection Control..... 48

TABLE OF CONTENTS

(cont.)

HYDROPOWER..... 50

ASSIMILATIVE CAPACITY/WASTELOAD ALLOCATION

Lower Winooski River..... 57

Otter Creek 58

Upper Connecticut River and Moore Reservoir. 58

Walloomsac River..... 58

Upper Winooski River(Stevens Branch)..... 58

WETLANDS..... 60

OIL AND HAZARDOUS MATERIALS..... 61

NONPOINT SOURCES..... 66

URBAN RUNOFF..... 70

ASSESSMENT OF STATE'S WATER QUALITY..... 72

APPENDICES

APPENDIX A. Status Inventory of Discharging Municipal Facilities..... 99

APPENDIX B. Status Inventory of Discharging Industrial Facilities..... 127

APPENDIX C. Water Resources Planning Needs.... 140

APPENDIX D. Streambank Management Policy..... 143

APPENDIX E. Interim Stormwater Policy..... 148

APPENDIX F. Otter Creek Wasteload Allocation.. 154

APPENDIX G. 1980 and 1981 Oil and Hazardous Materials Incidents..... 155

LIST OF TABLES

		Page
Table 1.	Summary of Municipal Wastewater Treatment Facilities as of January 1982	1
Table 2.	Vermont Stream and Lake Reclassifications January 1980-March 1982	11
Table 3.	208 Work Plan, Section I Projects	12
Table 4.	208 Work Plan, Section II Projects	12
Table 5	Cluster Analysis Grouping of 25 Vermont Lakes	22
Table 6.	Average Percent Reduction in Population Size Below Chlorinated Wastewater Effluent	28
Table 7.	Status of Major Laboratory Issues	31
Table 8.	Vermont Lakes and Ponds Management Program 1980-1981	33
Table 9.	Vermont Lakes and Ponds Management Program Phase I Core Program	34
Table 10.	High Priority Lakes for Diagnostic Studies or Management Action	35
Table 11.	Average Sampling Results of 75 Community Water Supply Sources	46
Table 12.	Proposed Hydropower Projects 1982	52
Table 13.	Status of Assimilative Capacity/ Wasteload Allocation Program	59
Table 14.	Water Quality Inventory Summary of Segmented River Miles	75
Table 15.	Summary of Water Quality for Segmented River Miles	97

LIST OF FIGURES

Figure 1. Municipal Discharge Inventory Map

Figure 2. Permitted Industrial and Nonmunicipal Discharge Inventory Map

Figure 3. Percent of WWTF's Producing Chronically Toxic Instream Chlorine Levels (greater than 0.005 mg/l TRC) at Mean Monthly Stream Flow

Figure 4. Regression Analysis Indicating Number of Truck Accidents Involving Oil and Hazardous Materials From 1972-1981

Figure 5. Regression Analysis Indicating Number of Underground Tank Leaks Involving Oil and Hazardous Materials From 1972-1981

Figure 6. Regression Analysis Indicating Total Number of Truck Accidents and Underground Tank Leaks Involving Oil and Hazardous Materials From 1972-1981

Figure 7. Water Segment Designations Map

Figure 8. Vermont Water Quality Summary 1976-1982

INTRODUCTION

The purpose of this document is to assess the status of the quality of Vermont's waters and to report on the progress made and problems encountered in the water quality programs charged with managing and protecting this resource. Delineated within are such program elements as water quality planning and management, monitoring and surveillance, construction and permits, groundwater, hazardous materials, lakes and ponds management and protection, and special studies.

Vermont continues to take positive steps towards achieving the desirable goal of fishable/swimmable waters where attainable. Insofar as the fishable portion of the goal is concerned, Vermont has for all practical purposes attained fishable waters. The swimmable goal is both meaningful and achievable in Vermont as long as one qualifies the goal with a "where attainable" modifier. Presently, waters classified as Class C waters in Vermont do not have a designated water use compatible with swimming even though it is the State's policy to manage and protect these waters at a level of quality in which swimming could occur. The distinguishing feature with regard to Class C water is that it is the only designated water classification which allows for a discharge of adequately treated sanitary waste. Class C waters because of the nature of the waste being discharged to them have a greater potential for containing pathogenic organisms. Though wastewater treatment facilities are designed to reduce "risk", treatment facilities are not 100 percent reliable. Hence, Vermont qualifies the swimmable goal with "where attainable".

The water quality of Vermont's streams and lakes has continued to show notable progress during the past two years. This progress is due primarily to continued wastewater treatment facility upgrading and construction and further implementation of identified best management practices for construction, silviculture, and agriculture. Realizing the importance of clean water to Vermont, implementation of these best management practices has been to a large degree voluntary. These voluntary efforts have been commendable but continued implementation will be necessary for further water quality progress.

Essentially, all Vermont communities desirous of achieving water pollution abatement by the municipal approach have been identified. Nearly 40 percent of these communities have completed pollution control facilities which do not require upgrading or improvement. An additional 52 percent of the communities have some level of treatment which will require upgrading or improvement. The remaining communities are in various stages of planning. It is absolutely imperative that the construction grants program be maintained to Vermont's

water quality progress. Significant facilities planning activities are presently underway for several identified water quality limited segments. These identified segments are:

1) Winooski River - below discharge from IBM to the river's confluence with Lake Champlain

2) Otter Creek - below Rutland City discharge, and the

3) Walloomsac River - below discharge from Bennington to New York State Line.

The ultimate resolution of water quality problems in these areas lies with future facilities construction activities. Priority for the construction and upgrading of facilities will place emphasis on those facilities that will bring the maximum amount of water into full compliance with water quality standards, with equal priority being given to those discharges affecting standing bodies of water.

Though substantial positive gains have been made with regard to Vermont's water quality, serious potential problems still remain which may offset the progress to date. The following listing is an attempt to identify those major potential problem areas that are having or could have a negative impact on Vermont's water quality. This listing is not complete. (See Appendix C for additional concerns.)

1) Hydropower Development - Interruption of stream flow and water quality conditions created in resulting impoundments.

2) Protection of Upland Streams - Increased developmental pressures by construction of new recreational facilities, condominiums, residences, and commercial establishments in areas with no municipal services and limited on-site waste disposal capabilities.

3) Water Withdrawals - The use of small streams, especially in the upland areas, for water supplies and/or snow making operations, which requires utilizing a stream's total hydrologic capacity.

4) Management of Waste Discharges and Municipal Growth Discharge wasteloads require monitoring so that proper facility planning, design and construction can occur prior to permit limits being exceeded and water quality violations result. Of obvious concern is the replacement or upgrading of wastewater treatment facilities with significantly reduced federal and state aid. Revision of the existing connection policy to municipal facilities will be necessary to assure avoidance of water quality problems.

5) Facilities Operation and Maintenance including Operator Training - The presence of wastewater treatment facilities can not by themselves assure compliance with permitted effluent levels. The operation and maintenance of these facilities is critical to proper operation. Operator training is essential.

6) Combined Sewer and Urban Stormwater Runoff - Though identified as a problem in a large number of Vermont's Water Quality Management plans, the issue remains to be resolved.

7) Wetlands - Continued identification of wetland areas; public informational seminars are necessary to stress value of wetland areas and to identify uses or abuses which result in loss of values.

8) Acid Precipitation - Continue to gather pertinent data on the damaging impact of acid precipitation in Vermont. Stress the need for legislation calling for the immediate reduction of sulfur and nitrogen oxidizers being emitted to the atmosphere through various sources. Acid precipitation is as potentially damaging to Vermont's aquatic ecosystem as is cultural eutrophication.

9) Erosion/Siltation Control - Implementation of best management practices for silviculture, agriculture and construction are necessary for future water quality progress. These activities are essential for reducing nonpoint source nutrients. Realizing that over fifty percent of the State's total drainage area drains to two lakes, Lake Champlain and Lake Memphremagog, control of nonpoint nutrients is vitally important.

10) Clean Lakes - Diagnostic/feasibility studies for lakes funded under Section 314 of the "Water Act" will be completed with the available federal funding. Restoration efforts on these lakes will not be possible, however, because it is anticipated that in the reauthorization of the Act, the Clean Lakes Program will be eliminated. In Vermont, this would mean that something in excess of $300,000 of federal money and nearly $39,000 of State funds had been expended to diagnose the water quality problems for three lakes and to develop a feasible means of restoring them. Since further funding for restoration is not likely, implementation of restoration activities is unlikely.

The Vermont Water Quality Standards are designed to set objectives regarding the quality of water to be maintained for certain water uses. The citizens of Vermont, through a public process, have set high objectives for water uses and high technical criteria for each calss of water. Vermont's standards are scheduled for review and revision during the coming year. Extreme pressure to modify restrictive no-discharge requirements is anticipated from developmental interests. The ultimate outcome of this particular standards revision will set the direction of Vermont's water quality programs for the next decade or more.

The future establishment of water resources planning and management priorities with specific goals and objectives will be necessary in the future in the face of limited anticipated federal and state fiscal resources. Vermont is, however, determined to maintain and protect its high quality waters.

FACILITIES PLANNING

(A) Municipal

The discharge of domestic sanitary waste by municipalities remains a major pollution problem in Vermont. All facilities constructed since 1965 have been secondary or off-stream disposal. There remain 12 municipalities which are discharging without treatment and which require a central collection and treatment/ disposal system and 24 municipalities which now operate primary or other treatment plants requiring upgrade to secondary or addition of phosphorus removal facilities. Facilities planning is under way or completed in all but two of these municipalities and Step II planning is under way in seven municipalities. Seventeen municipalities have projects under construction at this time. Table 1 is a summary of municipal wastewater treatment facilities in Vermont as of January 1982. Appendix A is a status inventory of all discharging municipal facilities. Location of each of these facilities is shown in Figure 1.

TABLE 1

SUMMARY OF MUNICIPAL WASTEWATER TREATMENT FACILITIES AS OF JANUARY 1982

a)	Number of municipalities requiring central sewage collection and treatment	102
b)	Number of municipalities served by primary treatment	17
c)	Number of municipalities served by secondary treatment	66
d)	Number of municipalities served by tertiary treatment	3
e)	Number of municipalities served by off-stream disposal	4
f)	Number of municipalities served by no treatment	12
g)	Number of major treatment facilities	21
h)	Number of minor treatment facilities	61
i)	Number of facilities requiring phosphorus removal	14
j)	Number of facilities with phosphorus removal capability on line or under construction	7

Major municipal facilities are those with a rated capacity of 1 mgd or more.
Minor municipal facilities have a capacity rated at less than 1 mgd.

Increased concerns for the protection of future groundwater supplies from shallow, unprotected acquifers has caused several small municipal projects which were anticipating using land application systems to reevaluate their projects and either delay implementation or seek other alternatives. Federal administration requirements associated with groundwater protection have caused most project reversals rather than technical or economic problems with the project. At present there are no projects in Step I or Step II proposing land treatment or disposal systems.

Considerable progress has been made during the past several years towards reducing the number of municipalities discharging raw sewage from municipal collection systems. Six municipalities currently discharging untreated waste have received construction funding and will be under construction during the summer of 1982. Only two municipalities remain with collection systems which discharge untreated sewage and eight communities with untreated discharges from scattered individual sources.

Progress in other areas of municipal pollution abatement continues with federal funding levels continuing to be the limiting factor. General public and legislative support is evident at the State level as shown by State funding appropriations sufficient to match expected federal receipts. The State has accepted full 205(g) delegation responsibility and is actively implementing that program.

The Vermont Legislature mandated the removal of phosphorus from domestic laundry detergents in 1977. This action was expected to reduce the phosphorus content of domestic sewage by nearly one-half, an expectation which has been generally verified by sampling municipal wastewater pollution control facilities throughout the State. The Legislature simultaneously mandated phosphorus removal from municipal discharges to Lake Champlain and other waters designated by the Secretary in drainage basin management plans. Twenty plants have been so designated and several are now fully operational and others are under construction; all others are actively engaged in Step I or Step II planning. This State objective is expected to be achieved by 1984.

On May 11, 1979, the State of Vermont executed a construction grant management agreement, 205(g), with the U.S. Environmental Protection Agency. The delegation functions contemplated in that agreement have been fully assumed by the State and all training is completed. Assumption of these functions by the State has contributed to more expeditious processing of grant related items and a faster turnaround on EPA payments to municipalities.

Vermont's continued exercise of construction grants management delegation authority in future years will require total committment of the authorized 205(g) set aside and in addition a contribution of State general fund monies. Recent ammendments to the Clean Water Act, and ongoing efforts by EPA to reduce the complexity of grants administration may enable the construction grants management activity to be totally supported within the 205(g) set aside.

The continued oversight of operations and maintenance of municipal wastewater pollution control facilities to maintain maximum pollutant removal efficiency and maximum effective useful life of treatment facilities has again been emphasized during the reporting period. This program of maximization is extremely important as the municipal facilities program goals shift from one of capital construction to one of maintenance and operations.

National emphasis continues on the oversight of major facilities and substantially reduced emphasis on minor facilities. Major facilities in Vermont generally exhibit the most stable and dependable achievement of required effluent limits because major facilities serve a large enough population base to afford a full-time operator of competency levels generally above that found in small towns utilizing only part-time operators. The great majority of Vermont treatment plants are of the minor category and it is in this area where future operations and maintenance surveillance will focus.

The future operations and maintenance emphasis must expand upon the scope and detail of technical assistance offered to municipal facility operators and local officials who are ultimately responsible for providing budget resources necessary to carry out a program of corrective measures. Operating costs continue to rise with energy costs and local officials will need assistance to operate treatment plants at optimum efficiency and minimum energy costs. Facilities constructed 10 and 15 years ago are or will shortly be reaching their design life expectancy with little likelihood of financial assistance for capacity enlargement. Assistance to local officials is needed here in terms of greater in-depth technical evaluations leading toward means of maintaining effluent limits under the stress of increasing flows. The latter should provide sewer system/connection/flow management advice in addition to in-plant technical changes, to assure compliance with effluent limits into the future.

Operator training remains centralized under the control of the Rutland Regional Vocational Training Center. A program of courses is currently available to new entry and practicing operators in three satellite training centers throughout Vermont.

Individual on-site training is also available on a limited basis. This program is funded under provisions of 109(b) of the Clean Water Act.

(B) Industrial

Substantial progress has been made by the State in cataloging industrial discharges and their impact on receiving water quality and municipal treatment facilities in the case of pretreatment industries. The majority of industrial discharges in Vermont presently employ Best Practicable Treatment Technology.

During the reporting period, all industrial discharges were surveyed in the field to verify actual processes and discharges in relationship to information on file with the Department of Water Resources and Environmental Engineering. The Department has attained a sound technical understanding of the manufacturing and treatment process of all but one industrial type in the State. Operational within the State are such industrial processes as metal working and finishing plants, cheese and dairy products manufacturers, specialty and paper product suppliers, electrical components, leather tanning and paper mills. This latter industry type is presently being researched by the Department.

In fiscal year 1981 the specialty and paper product suppliers were brought into compliance. In fiscal year 1982 a major effort has been made to bring the cheese and dairy product manufacturers into compliance. Actions have been initiated to correct two unsolved problems with two major cheese manufacturers discharging to two small municipal treatment facilities. One manufacturer has agreed to construct pretreatment facilities during the summer of 1982, the other manufacturer is currently engaged in litigation regarding the necessity of pretreatment. Preliminary contacts have been made with a third manufacturer, also discharging to a small town municipal treatment plant, in an effort to cause construction of requisite pretreatment facilities. All of these actions are undertaken and regulated pursuant to the pretreatment permit authority organic to Vermont's permit program.

The cheese whey drying plant in Georgia, Vermont became operational in the summer of 1980 and processes the cheese whey from 7 of the 14 cheese manufacturing plants in Vermont. The Georgia plant has substantially reduced the land application of cheese whey with its attendant odors and nuisance. Plans are currently being developed to expand operations at the Georgia plant to service other dairy oriented industries to be located at the Georgia Industrial Park.

A survey of the larger industries in the State for the discharge of toxic or hazardous wastes during 1979 failed to uncover any serious discharge problems. While spillage and

occasional accidents may introduce small amounts of these dangerous wastes into the sewer system there appears to be no cases where a waste of this type is discharged deliberately or in any volume.

Figure 2 lists and shows the location of the industrial facilities presently discharging to waters of the State. The facilities are identified as to whether they are considered major or minor discharges. Appendix B is a status inventory of all discharging industrial and nonmunicipal facilities.

PERMIT PROGRAM (NPDES)

Vermont executed a memorandum of agreement with the U.S. Environmental Protection Agency on March 11, 1974 in which the Vermont permit program was accepted as equivalent to the National Pollutant Discharge Elimination System (NPDES) program defined in Section 402 of Public Law 92-500. Under that program, permits were issued to all qualifying municipal and non-municipal dischargers, and during 1977, Enforcement Compliance Schedule Letters (ECSL) were issued to those qualifying permittees unable to achieve secondary treatment by the statutory objective of July 1, 1977. Passage of P.L. 95-217 authorized the selective extensions of permit schedules for qualifying permittees up to July 1, 1983 for achievement of secondary treatment under Section 301 (i) and the issuance of administrative orders under Section 505 to those permittees unable to achieve secondary treatment by that date. Vermont completed action on all permittees in these categories in the spring of 1979.

Subsequent passage of P.L. 97-117 extended the compliance deadline for achievement of secondary treatment from July 1, 1983 to July 1, 1988. Vermont officials are presently working in concert with EPA Region I to seek clarification of guidelines in light of P.L. 97-117 for the implementation of Section 301 (i) and Section 505 administrative orders.

Enactment of P.L. 95-217 required that the existing regulation and memorandum of agreement (MOA) be updated to reflect new requirements of the act, and that minor changes be made to Vermont statutes to gain conformity between State and Federal law. Those statutory changes, which specifically give Vermont permit issuing authority over Federal installations in the State, have received positive action from the Vermont Legislature. The regulation and MOA have been revised and are undergoing final review by the Vermont Attorney General, following which they will be respectively promulgated through Vermont's administrative procedures and signed by State and EPA officials.

Amendments to Vermont's permit enabling law V.S.A., Chapter 47, enacted April 34, 1973, provided for issuance of pretreatment permits to those discharges to publicly-owned treatment works (POTW's) whose waste would interfere with the treatment process, pass through without treatment, or otherwise be injurious to receiving water quality. The Clean Water Act of 1977 carried similar authority and provided that a State's pretreatment permit program consistent with P.L. 95-217 could be accepted in lieu of a federally-operated program. Vermont made intensive review of the memorandum of agreement by both parties the MOA was approved by the EPA administrator on March 16, 1982.

Pretreatment permits under Vermont's law have been issued to all known industrial discharges falling within the above-defined categories. The latter permits were based upon an industrial waste survey of the State conducted by the Permits Section staff in 1969-1970. That survey was, in part, updated in 1979 by a survey of all 135 Vermont industries employing greater than 50 individuals. Continued assessment of the need for pretreatment permits is being handled on a case by case basis with the establishment of new industries or as new information is gathered via the State's NPDES compliance monitoring program.

The control of toxic discharges is now limited by the ability of the State to analyze for a sufficiently broad spectrum of toxics. The Department Laboratory will have an expanded analytical capability in this area in the very near future. In addition, cooperative arrangements between other State Laboratories and EPA Region I have increased the State's capability to implement toxic control measures now available through NPDES and the pretreatment permit program.

The major water pollution control problems in the State are presently being caused by untreated municipal discharges and discharges from minor industries who, in discharging pollutants in excess of their pretreatment permit effluent limits to municipal treatment facilities, cause these municipalities to violate their permits.

Correcting the untreated municipal discharges is not a straight forward process as it is complicated by the availability of federal and State funds. Correcting the problems caused by pretreatment permit violations is direct however and primary assistance and enforcement emphasis is now being shifted toward these minor dischargers and away from the major industrial and municipal dischargers who are in compliance with their permits.

Beginning in January 1981, the Department increased its enforcment actions focusing on pretreatment permit violators who are causing violations at municipal treatment plants. Emphasis over the past year has been on indirect discharges from cheese manufacturing and direct discharges from the pulp and paper industries. The litigation process has been found to be time consuming, but the repercussions have been very beneficial in other industries in terms of improved voluntary compliance.

Other future activities will include amendment of pretreatment permits to reflect categorical industrial treatment standards as they are issued. Industrial permits issued to date have included a reopener clause allowing the State to amend on-going permits to incorporate newly issued categorical pretreatment standards and allow reasonable time for planning and construction to bring the permittee into compliance. This activity is expected to carry on for the next two to four years.

Administration of the permit program in dealing with those permittees, who for reasons beyond their control could not or cannot comply with the statutory deadlines of July 1, 1977, July 1, 1983 or July 1, 1988 has lead to issuance of documents which while legally correct in a technical sense, do not make sense to the general public or the permittees. Specifically at issue is the practice of carrying a reasonable attainment schedule up to the statutory compliance date and going silent on achievements beyond that date. Continued efforts will be directed toward identifying means of controlling permittees' compliance from now through attainment of secondary treatment even if that is to be attained after 1988 due to unavailability of supporting construction grant funding. Public support for the program can only be maintained by making meaningful achievements which deliver demonstrable environmental benefit, and by conducting regulatory activities in a simple, straightforward manner easily understandable by involved parties and the general public.

Permit issuing procedures are administratively cumbersome and time consuming, particulary for small permittees who have discharges of minor or negligible environmental impact, but which fall within the scope of the permit program. Currently all applications are processed the same and require about two months to issue a permit. Future efforts will be directed toward simplifying all permit issuing procedures and particularly those procedures for handling the small discharges. Vermont's permit program deals with all discharges to State waters which range from non polluting discharges from foundation drains and well over flows, urban runoff and stormwater, through major and minor municipal and industrial permits. Simplifying the permitting procedures is now a necessity with the cutback in both federal and State funds. We would like, in the future, to decrease the administrative time spent on issuing permits and focus on assistance to the permittees.

PLANNING AND MANAGEMENT ACTIVITIES

Water Quality Standards

The Vermont Water Quality Standards adopted by the Water Resources Board on March 1, 1978 are still in the process of review and revision. What started as a revision to assure the clarity and workability of the Standards has now become a major review of key provisions such as the Upland Streams Rule and restriction of treated sanitary discharges to Class B waters.

A draft proposal for revisions to the Standards was prepared by the Department of Water Resources in August of 1980 after numerous meetings with the Department of Fish and Game, the Permits Section and other Agency personnel. This draft proposal was not forwarded to the Water Resources Board and it appears at this time that another review of the Standards will be undertaken. This is appropriate in light of proposed changes in Federal regulations governing Water Quality Standards and recent Water Resources Board public meetings held to obtain public comments on the existing Standards. It is a top priority of the Board to review and revise the Standards.

Nine reclassifications to the Water Quality Standards were made by the Water Resources Board in the last two years. Table 2 summarizes the changes. Five reclassifications from Class B to Class C were made to accommodate existing or planned treated sanitary wastes. Three reclassifications from Class A to Class B were made where public water supplies were no longer so utilized. One reclassification from Class C to Class B was made where a planned sanitary discharge is no longer contemplated.

A summary list of all Class A and Class C waters in Vermont along with proposed changes in classification has been prepared by the Department of Water Resources and Environmental Engineering. Also, a state map showing this information has been prepared and is in draft form. Neither the list nor the map have been finalized. They will not be finalized until after the Water Quality Standards are reviewed, revised and adopted.

Combined Sewer Assessment

Some progress on the combined sewer overflow problem has been made. Sewer separation in Bellows Falls has been completed. In St. Albans a study has been done to define what extent of separation is necessary. In Burlington, a long range sewer separation program is being developed. No progress has been made in the other 11 communities identified in the previous 305(b) report.

Discharge and Temporary Pollution Permit Review

The Water Quality Division review of discharge and temporary pollution permits has been modified in the last two years. A Water Quality Division review is not conducted on routine permits. Rather, a Water Quality Division review is made of permits which involve the following issues or questions:

1. Discharges to lakes or water bodies where a review or modeling is necessary to determine effluent limits on nutrients to prevent accelerated eutrophication.

2. Discharges to water quality limited segments to assure that permits are in accordance with adopted wasteload allocations or assimilative capacity limits.

3. Discharges of exotic or odd chemicals where no standard effluent limits have been set.

4. Discharges where chlorine may be particularly critical with respect to fisheries and aquatic life.

5. Discharges where policy questions are involved and where effluent limits may not be generally established such as discharges to upland streams or to waters near public water supplies.

201 Facility Planning Review

The Water Quality Division continues to provide review of preliminary engineering reports for municipal wastewater treatment facilities (Step I planning).

The Division also provides support to the Engineering Division to assure that decisions as to the size, type and location of wastewater treatment facilities to assure protection of water quality. Examples of such support are the wasteload allocations of the Lower Winooski and Otter Creek and the eutrophication modeling of St. Albans Bay.

A review of 201 facilities plans for possible groundwater problems was recently instituted and will be done by the Groundwater Section of the Water Quality Division when necessary.

208 Program Planning Status

In April, 1981 when it became certain that the 208 Program would no longer be funded, Vermont developed a final work plan to close out the 208 Program by early 1983.

TABLE 2

VERMONT STREAM AND LAKE RECLASSIFICATIONS
JANUARY 1980 THROUGH MARCH 1982

BASIN	STREAM/LAKE DESCRIPTION	RECLASSIFICATION	DATE	LENGTH (MILES)
1	Jewett Brook at Pownal School	B to C	11/12/81	1500 ft.
2	Indian River at N.Y. State Border	B to C	2/11/80	20 ft.
8	Airport Brook	A to B	1/18/80	2.25
8	Pond Brook	A to B	1/18/80	1.5
8	Ranch Brook**	B to C	2/8/82	(not specified)
8	Allen Brook	C to B	3/8/82	5.0
8	Saxon Hill Reservoirs and tributary	A to B	1/25/80	2.0
12	Harriman Reservoir and stream draining Sadawga Lake at Whitingham	B to C	3/9/81	0.41 acre (150 ft. diameter)
17	Mud Creek at Newport Center	B to C	9/10/81	3.0

**Under appeal to District Court

The final Work Plan was developed in two sections. The first section outlines several projects which had received prior 208 Water Quality Management Board approval, but still required detailed work plans for EPA approval. These projects, listed in Table 3, will provide specific information in the areas of on-site wastewater disposal, septage and lake eutrophication and educational materials on streambank management. The second section of the final work plan outlines high priority water quality planning and management objectives which would go unfunded without 208 Program funding. These projects, listed in Table 4, will provide necessary information for stormwater and hydropower management objectives and educational materials for lakeshore management and erosion control. Funding for these projects was accomplished through the reallocation of funds remaining from previous grant amendments.

The final Work Plan was approved by the Vermont 208 Water Quality Management Board in May, 1981 and by EPA in September, 1981. Other 208 funded activities include existing programs in Wetlands and Aquifer Protection discussed more completely in other sections of this report.

TABLE 3

208 Work Plan, Section I Projects

1. Detailed research on the Operation of Innovative On-Site Wastewater Disposal Systems
2. Septage Education
3. Sludge Analysis
4. Lake Eutrophication Analysis Procedure
5. Streambank Management Brochure

TABLE 4

208 Work Plan, Section II Projects

1. Hydropower Problem Mitigation Study
2. Interim Stormwater Policy Analysis
3. Lakeshore Management Brochure
4. Dissemination of the Construction Erosion Control Practices Handbook

Vermont Water Resources Planning and Management Program

In 1981, the State of Vermont Continuing Water Quality Management Planning Process was revised and adopted pursuant to the Federal Water Pollution Control Act, Amendments of 1972 and 1977 and EPA regulations. This document briefly outlines the components of Vermont's Water Quality Management Plan which are reiterated below:

1. River Basin Water Quality Management Plans completed and adopted for each of the major basins of the State.

2. Plans developed under the 208 Program:

   a. A State Water Quality Plan for Controlling Agricultural Pollution, August, 1978

   b. A State Water Quality Plan for Septage Management

   c. A State Water Quality Plan for Controlling Erosion from Back Roads, April, 1979

   d. A State Water Quality Plan for Controlling Silvicultural Non-Point Source Pollution, June, 1979

   e. State Water Quality Plan for On-Site Wastewater Disposal Management, May, 1980

The above plans were developed with 208 funds, approved by the 208 Board, adopted by the Governor and approved by EPA.

3. Vermont Water Quality Standards adopted by the Vermont Water Resources Board on March 7, 1978. The Standards are developed in cooperation with the Department of Water Resources and Environmental Engineering.

4. The comprehensive designation and status of all waters as effluent or water quality limited segments (contained in and adopted as a part of the Continuing Planning Process).

5. Regulatory programs including the Vermont discharge permit program, authorized by 10 V.S.A., Chapter 47 and accepted as equivalent to the National Pollutant Discharge Elimination System defined by Section 402 of the Act. Permits issued under this regulatory program mandate effluent limits and schedules for point source discharges consistent with Section 301(a), 301(b)(1)(B) and 301(b)(1)(C) of the Act and offer opportunity for public involvement and comments consistent with EPA regulations 40 CFR, Parts 25, 122, 123, 124 and 125.

6. State approved wastewater treatment facility plans developed by municipalities needing pollution abatement equipment and facilities. Facilities plans developed by Vermont municipalities under Section 201 are reviewed and approved by the Department for consistency with the applicable specific basin plans, NPDES permit requirements, Vermont Water Quality Standards and applicable 208 generated plans. Facilities plans are adopted and approved locally by public processes consistent with EPA public participation requirements of 40 CFR, Part 25.

7. State of Vermont, Non-Point Source Pollution Strategy 1980-1985

8. Agency of Environmental Conservation, Wasteload Allocation Process, November, 1978.

These components of the State of Vermont Water Quality Management Plan will be revised from time to time and any new components will be developed as necessary.

The list of planning needs referred to in the previous 305(b) report was an attempt to identify water quality problems and related planning needs and to match potential sources of funds to specific projects which addressed the needs and were eligible for funding. While funds were forthcoming from the Water Resources Council Title III Program, from the EPA 208 Program, from the New England River Basins Commission and from the funds available through the 205(g) delegation to Vermont, the array of planning needs served a useful purpose to match these sources of funds to priority planning projects. Many of the identified planning needs have been satisfied and many are in the process of being completed under the 208 Program.

Appendix C lists water resources planning needs which are still outstanding.

Policies and Guidelines

In this report period, an Agency policy was developed concerning river and streambank vegetation management. The policy is for educational guidance and to improve the understanding of streambank values. The policy was distributed in early 1982 and is included as Appendix D.

The Interim Stormwater Policy was revised in July of 1980 and is included as Appendix E. Some refinements to the old policy were made and a new section on the attenuation of peak runoff rates from impervious areas was added.

The definition of what constitutes a discharge to surface waters from on-site wastewater disposal systems is presently being developed and will be included in the current revision of the Agency's Environmental Protection Rules. Those on-site systems declared to be a discharge would be required to obtain a discharge permit and further, if they were of a sanitary nature, would require that a Class C zone be established before a discharge permit could be issued.

In final preparation at this time is the Fishery Flow Needs Assessment Methodology. The methodology has and is being used to determine the low flow necessary to preserve fisheries habitat below hydroelectric generation facilities or other facilities which divert or interrupt natural streamflow.

MONITORING AND LABORATORY SERVICES

Vermont's water quality monitoring programs continue to be an integral aspect of the State's water pollution control program.

Core Monitoring Network

The Department has continued with the Core Monitoring Network as required by the U.S. Environmental Protection Agency. The Vermont monitoring network consists of 11 stations:- nine in Lake Champlain, one in Lake Memphremagog and one in the Winooski River.

Station	Location	Sampling Frequency	Parameters
Lake Champlain	St. Albans Bay	Quarterly	Temp., Secchi, D.O., pH, Turb., Cond., Total P, NO_{2-3}, TKN, TSS, Fecal Coliform
	*Inner Malletts Bay	Quarterly	
	Outer Malletts Bay	Quarterly	
	*Shelburne Bay	Quarterly	
	Burlington Harbor	Quarterly	
So. Lake Champlain	Chipmans Point	Quarterly	
	Ticonderoga	Quarterly	
	International Paper Company Outlet	Quarterly	
	Crown Point	Quarterly	
Lake Memphremagog	Newport	Quarterly	
Winooski River	Colchester	Monthly	Same as above plus COD

*Paired Stations

The objectives of the Core Monitoring Program are incompatible with State water quality Monitoring objectives. The sampling frequency and parameter coverage provides no data output that can be used in ongoing State programs. Quarterly sampling on major lakes provides no useful data for any purpose and monthly sampling on major rivers is equally unproductive. The Core Monitoring Network consumes a considerable amount of sampling and analytical man-hours and provides no useful data output. For the sake of more efficient and productive use of available manpower, the Core Monitoring Network should be terminated.

Compliance Monitoring

The verification of effluent data reported by Vermont's municipal and industrial water pollution control facilities discharging under the permit program continues to be the prime focus of the Compliance Monitoring Program. In addition to the monitoring function, this program is engaged in enforcement action samplings, compatibility studies and technical assistance at various facilities.

Compliance monitoring activities divide discharges into major and minor facilities in municipal and nonmunicipal categories. Major municipal facilities, those with design flows of 1 mgd or over and major nonmunicipal facilities, those with design flows of 0.05 mgd and more, or those with potentially toxic discharges are sampled at least once per year. These facilities are listed below:

MAJOR MUNICIPAL FACILITIES

Barre City
Bennington
Brattleboro
Burlington(Main)
Burlington(North)
Burlington(East)
Essex Junction
Hartford(White River Jct.)
Middlebury
Montpelier
Newport
Northfield
Bellows Falls
Rutland City
St. Albans
St. Johnsbury
So. Burlington (Airport Pkwy)
Springfield
Swanton
Windsor
Winooski

MAJOR NONMUNICIPAL FACILITIES

American Optical, Brattleboro
Boise Cascade, Brattleboro
CPM, East Ryegate
EHV-Weidmann, St. Johnsbury
Fairbanks-Morse, St. Johnsbury
Georgia-Pacific, Gilman
IBM, Essex Junction
Pownal Tanning, Pownal
Putney Paper, Putney
Standard Packaging, Sheldon Springs
U.S. Samica, Rutland
Agrimark, Troy
Vermont Yankee, Guildford
Stanley Tools, South Shaftsbury
Goodyear Rubber, Windsor
Fairdale Farms, Bennington
Express Foods, Georgia

Minor municipal and nonmunicipal facilities are required to be sampled every 10 years but in actuality are sampled every three to five years.

Of the 20 major municipal plants which were sampled during the last compliance monitoring year (Oct. 1980-Oct. 1981), only seven were in compliance on all parameters. Thus, 65 percent of the major municipal facilities sampled were out of compliance for one or more parameters. Of the thirteen facilities out of compliance, one exceeded its permitted limit for BOD_5, while 12 others exceeded the allowable permitted value for total coliforms.

In addition, one of those 12 facilities exceeded its limit for total residual chlorine.

The performance of the minor municipal facilities was much the same. Of 33 facilities sampled, only 12 were in compliance with their permit limits. Of the 64 percent not meeting permit limits, 18 were over the permitted limit for total coliforms, seven were over on BOD_5 levels, four over on total suspended solids and three for total residual chlorine.

It is evident that a major problem in permit compliance for municipal wastewater treatment facilities is the adequate destruction of pathogens while maintaining a low total chlorine residual. There are a number of reasons for this: 1) failure due to mechanical problems, i.e., chlorinator unable to keep pace with increasing flows; 2) the chlorine contact chamber insufficiently sized for adequate contact between the wastewater and the chlorine; and 3) the level of chlorine dosage inadequate to properly disinfect.

The nonmunicipal facilities continue to perform somewhat better than the municipal facilities. Nine of the 14 major nonmunicipal facilities sampled met their permit limits for all parameters. This represents a 74 percent level of compliance. Of those facilities out of compliance, two exceeded BOD_5 limits and one each exceeded total coliform, zinc, and sulfide limits.

It is of concern to the Department that industrial wastes being discharged to municipal facilities be compatible with the type of treatment being employed and with other wastes being received by a given facility. Shock loadings due to toxic substances or very concentrated organic wastes can be destructive to biological treatment processes. In an effort to monitor this situation, industrial manufacturers discharging to a particular municipal treatment facility are sampled at the same time the municipal facility is sampled.

Pretreatment by industrial concerns is required if it is determined that the wastes are not compatible or pose a potential threat to the treatment process. Twenty-four pretreatment facilities were sampled during the reporting period, only 11 of which had permitted discharge limits associated with their respective permits (in the other cases, discharge limits are presently in the process of being established). Only four of the 11 facilities which had established permit limits, 36 percent, were in compliance on all parameters. Excessive BOD_5 was the reason for noncompliance in five of these samplings, all dairies. One of these facilities was also over its total suspended solids limits. One facility was over

its allowable total lead concentration and one slaughter house slightly exceeded its limit on oil and grease. Pretreatment facilities presently operational in Vermont are listed below.

PRETREATMENT FACILITIES

Agrimark, Middlebury
Kraft Foods, Middlebury
Catamount Dyers, Bennington
Globe Union, Bennington
Union Carbide, Bennington
Edlund Co., Burlington
General Electric, Burlington
Union Carbide, St. Albans
St. Albans Cooperative, St. Albans
Hood Dairy, St. Albans
Fonda Container, St. Albans
Richmond Cooperative, Richmond
New England Carpet, Winooski
Lucille Farm Products, Swanton
Vermont Meatpackers, Swanton
Swanton Packing, Swanton
Franklin County Cheese, Enosburg Falls
General Electric, Rutland
Vermont Plating, Rutland
Springfield Electroplating, Springfield
International Cheese, Hinesburg
Interstate Uniforms, Williamstown
Simmonds Precision, Vergennes
Mountain Paper Products, Bellows Falls

During the past year the compliance monitoring program was involved in several enforcement-type samplings. In one case, the Mountain Paper Company of Bellows Falls, Vermont was entered with a search warrant to determine the presence of an illegal discharge. International Cheese Company of Hinesburg, Vermont was sampled on several occasions to verify the fact of extreme organic overloading to the municipal treatment facility to which it discharges. Pownal Tannery of Pownal, Vermont was sampled to determine compliance with court-ordered effluents standards.

Additionally, program personnel were engaged in a three day intensive sampling program of the Magic Mountain Ski Area treatment facility and the Flood Brook Elementary School treatment facility discharge all located in Londonderry, Vermont. The Water Resources Board was considering the reclassification of an unnamed tributary from the Magic Mountain area to Thompsonburg Brook and a portion of Flood Brook which receives the treatment waste from the elementary school. The intensive sampling was carried out at the Board's request to determine treatment facility efficiency from the small, owner-operated treatment facilities in each of the respective areas. Likewise, impact on the receiving waters was also sought.

In some instances, examination of self-monitoring reports will turn up a possible problem in compatibility. Compliance monitoring personnel undertake intensive sampling programs in order to collect further data and to verify potential problems. Such was the three day intensive sampling program which was carried out in Swanton, Vermont. The treatment facility, twin facultative stabilization ponds, had long been evidencing organic overloading. It was speculated that the three pretreaters were contributing an excessive organic load and the study was conducted to determine if this was in fact the case. The sampling results showed that the municipal treatment plant was very definitely overloaded; the facility was receiving over twice its design loading of BOD_5 daily. It was found that a dairy products company alone was discharging an average of one and one-third times the BOD_5 design loading for the entire system. Planning is currently in progress to reduce this loading.

During compliance monitoring inspections the unit personnel very frequently assist facility operators with laboratory procedures and process control methods. The results in better quality effluent data and improved final effluent quality. On occasion special sessions are scheduled for more intensive training.

Acid Precipitation

Vermont, like many other areas in the northeastern United States and Canada, is experiencing the detrimental effects of acid precipitation on its aquatic ecosystems. The Department of Water Resources and Environmental Engineering, which is charged with the management of the State's water resources, is extremely concerned with the effects of acid precipitation on Vermont's aquatic ecosystems. Continued acid precipitation will result in reduced alkalinities in sensitive lakes and streams and in certain instances a complete loss of neutralizing capacity. Such alterations in lake chemistry will cause reduction or complete loss of viable fisheries and significant changes in aquatic biological communities. Vermont will continue to experience the detrimental effects of acid precipitation on its environment until such time when significant reductions are made at the sources primarily responsible for its occurrence.

The effects of acid precipitation on Vermont lakes were first studied in the spring of 1979. Data generated from this survey confirmed that some lakes in Vermont were sensitive to acid loadings and warranted an expanded survey of Vermont lakes. In February-March 1980, an extensive survey was undertaken on 121 Vermont lakes over 20 acres in size. Lakes were selected which encompassed a wide variety of geologic areas; emphasis was, however, placed on those lakes which were thought to be most sensitive. Other criteria considered in the selection of lakes included: (1) elevation, (2) ratio of drainage area to surface area, (3) soil types and (4) availability of historical water quality data.

Water quality data collected during this survey included, pH, alkalinity, calcium and magnesium. In order to further define the sensitivity of lakes surveyed, pH and alkalinity data were combined with calcium data to calculate a calcite saturation index (CSI). The CSI is based on the predominance of calcium carbonate in a lake buffering system and its subsequent influence on alkalinity and pH as expressed by the following relationship: (Kramer, James R., 1976, Geochemical and lithological factors in acid precipitation, U.S. Forest Service Tech. Report, NE-23, 611-618).

$$CSI = -\log_{10} \frac{(Ca\ mg/l)}{40{,}000} - \log_{10} \frac{(Alk\ mg/l)}{50{,}000} - pH + 2$$

For the purpose of selecting lakes for long-term monitoring, CSI values were divided into three categories, with increasing CSI values denoting increasing sensitivity to acid inputs. CSI values greater than 4 denoted lakes that are unstable, relative to acid loadings. CSI values between 3 and 4 indicated lakes with some unsuitability relative to acid loadings and lakes with CSI values in the range of 2-3 are generally stable relative to acid loadings. Lakes with CSI values less than 2 were not selected for long term monitoring. Monitoring on the 25 selected lakes continued with subsequent samples being collected and analyzed during June, July, August and October. Parameters examined during this time frame included pH, alkalinity, calcium, magnesium, conductivity, sulfate and chloride.

Similarities between selected long-term study lakes were statistically analyzed using cluster analysis to segregate lakes into similar groups based on eight chemical and physical parameters (Table 5). The groups vary progressively from the most highly sensitive and/or acidified (Group 1) to the least sensitive (Group 4). This trend is evident for all parameters except SO_4 and Cl. The lakes in Group 1 are located in the higher elevations of the Green Mountains (greater than 2000 ft.) and generally in the southern region of these mountains, with the exception of the Lake of the Clouds, the highest lake in Vermont (elevation approximately 3,950 ft.). It is evident from the mean pH for this group (4.86) that these high elevation lakes have undergone a reduction in pH over the past several decades since a hydrogen ion concentration of this magnitude in clear-water lakes can only be explained by the addition of strong acids. It is difficult, however, to determine the precise magnitude of this change due to the lack of valid historical data. Group 2 includes lakes that are generally less than 2000 ft. in elevation (exception, Grout Pond, elevation 2225 ft.)

During February-March 1981, surveillance of the selected twenty-five lakes continued. An additional thirty lakes less than 20 acres in size which had not been sampled previously for susceptibility were also examined. Likewise, in the 1981 program, an additional spring sampling date, April-May, was included in the overall program. Intensive biological monitoring was initiated for four lakes during the 1981 summer period.

Table 5. Cluster Analysis Grouping of 25 Vermont Lakes Using Statistically Standardized Variables

PARAMETERS	GROUP #1 Lake of the Clouds Haystack Pd. Somerset Res. Little Pd.	GROUP #2 Cole Pd. Osmore Pd. Grout Pd. Sunset Lake Howe Pd. Lake Ninevah South Pd. (Marlboro) Lily Pd.	GROUP #3 Beaver Pd. Little Averill Lake Holland Pd. Pigeon Pd. Kettle Pd. Wheeler Pd. South Pd. (Eden) Wolcott Pd.	GROUP #4 Chittenden Res. Doughty Pd. Sugar Hill Res. Miller Pd. Long Pd.
pH	4.86	6.13	6.61	6.89
Alk	0.3	3.1	5.6	15.2
Ca	1.37	2.30	3.74	6.29
Mg	0.35	0.56	0.74	1.22
$SO_4^{=}$	6.11	5.35	6.06	6.60
Cl-	0.82	0.84	0.54	0.72
Cond	21.0	22.0	29.0	46.0
CSI	6.93	4.45	3.39	2.45

In conjunction with the lakes program, an acid precipitation pH network was established. Eleven stations were located strategically around the state in an effort to obtain statewide coverage. Rainfall pH is measured on an event by event basis. The stations are operated by volunteers, the majority of which are cooperating in the collection of weather information for the National Oceanic and Atmospheric Administration.

Vermont is committed to a long-term monitoring program. It is our present intent to continue the long-term lake survey and pH data network. Likewise, we intend to continue with our susceptibility survey-sensitivity analysis for lakes and ponds presently not surveyed. Biological monitoring will be continued for chlorophyll-a along with an examination of phytoplankton, zooplankton, and benthic communities. Fisheries surveys are presently being planned in cooperation with the Vermont Department of Fish and Game. Additional future planned activities include: (1) extending the surveillance program into headwater streams and wetlands , (2) monitoring color and dissolved aluminum and (3) measuring field pH.

The ability to continue with Vermont's present program and to extend it into the identified areas is totally dependent upon funding availability. Present funding sources dedicated solely for the support of the acid precipitation program will be exhausted by June of 1982.

Phosphorus Detergent Prohibition

Vermont's Water Pollution Control Legislation (10 V.S.A. Chapter 47) was amended in April, 1977 to include 1) a prohibition, effective April 1, 1978, on the sale of household laundry detergents containing phosphorus in amounts greater than trace levels, the so-called Phosphorus Detergent Ban (10 V.S.A. § 1381-1384) and 2) the requirement that after June 30, 1981, no wastes which contain a phosphorus concentration in excess of 1.0 milligrams per liter (mg/l) be discharged to Lake Champlain or other waters designated in adopted river basin water quality management plans (10 V.S.A. § 1266a).

The purpose of the 1977 amendments is to reduce the amount of phosphorus entering waters of the State. Research has shown that in many Vermont lakes phosphorus is the key nutrient which must be reduced to limit the growth of algae and aquatic plants. Thus, limiting the quantity of phosphorus entering Vermont's lakes reaches to the source of the state's eutrophication problem.

To evaluate the effectiveness of the phosphorus detergent prohibition, two methods of analysis were undertaken. The first was an empirical analysis based on the results of an intensive sampling program conducted from 1977 to 1980. The second approach was the application of a recently developed mathematical water quality model to two lake areas. A complete assessment of Vermont's Phosphorus Detergent Prohibition is presented in a document entitled "Special Report to the Vermont General Assembly-Phosphorus Detergent Prohibition, March 1981".

Specific conclusions and recommendations from this report are as follows:

Conclusions

1. The Phosphorus Detergent Ban has substantially reduced the quantity of phosphorus discharged from Vermont's municipal wastewater treatment facilities to waters of the State.

   An analysis of selected municipal wastewater treatment facilities revealed that implementation of the Phosphorus Detergent Ban has resulted in a 40% reduction in the effluent phosphorus concentration.

2. Future operating costs to be paid solely by municipalities for the removal of phosphorus to a 1 mg/l effluent concentration may be reduced by as much as 50% as a direct result of the Phosphorus Detergent Ban.

3. A detailed statistical analysis of river sampling data indicates that the Phosphorus Detergent Ban has had a significant effect on those rivers receiving relatively large amounts of wastewater treatment facility effluent.

4. Lake sampling data collected during the 1977-1980 study period were analyzed using a statistical method which compared lake areas most affected by point source discharges to lake areas less affected. The results of the four year study showed that the Phosphorus Detergent Ban has had a significant impact on lake phosphorus concentrations at locations most affected by treatment facility effluents.

5. A mathematical water quality modeling analysis was undertaken to predict water quality trends in future years when wastewater treatment facilities reach their design capacity as a result of continued population growth. The lake areas modeled were Shelburne Bay in Lake Champlain and Newport Bay in Lake Memphremagog. The results show that:

a. If the Phosphorus Detergent Ban were discontinued, phosphorus concentrations are predicted to increase over present day levels by as much as 30% for Shelburne Bay and 80% for Newport Bay when wastewater treatment facilities discharging to these embayments reach their design capacity.

   With the Phosphorus Detergent Bay in effect, however, predicted increases in the phosphorus concentrations over present day levels are only 5-10% for Shelburne Bay and 25% for Newport Bay.

b. In Shelburne Bay, future phosphorus concentrations can, through the implementation of a 1 mg/l effluent requirement, be maintained at present day levels even with increased wastewater treatment facility discharges.

   Phosphorus removal to 1 mg/l at the City of Newport Wastewater Treatment Facility is predicted to result in phosphorus levels 40% below present day levels. This reduction should occur even at the design discharge capacity of the Newport Wastewater Treatment Facility.

6. Modeling analysis of the Main Lake region of Lake Champlain shows that phosphorus removal to a 1 mg/l level will be effective in protecting lake water quality. Without removal to a 1 mg/l effluent limit, phosphorus concentrations are projected to increase by 10% over present day levels within the next twenty years as a result of continued population growth. Implementation of the phosphorus removal requirement should offset this 10% projected increase, and, in addition, lower phosphorus concentrations by another 7%. Thus, phosphorus removal should result in lake phosphorus concentrations that are 17% lower than would otherwise occur.

7. It has been shown that algal abundance and water clarity in Lake Champlain and Memphremagog are closely linked to phosphorus concentrations. Therefore, projected increases in phosphorus levels will mean more algal growth and reduced water clarity. Conversely, reductions in phosphorus levels due to the Phosphorus Detergent Ban and/or phosphorus removal to a 1 mg/l level will lessen algal growth and increase water clarity.

Recommendations

1. The Phosphorus Detergent Ban should be continued as a means of protecting water quality in Vermont lakes. The water quality benefits of the Phosphorus Detergent Ban have been demonstrated by both an empirical data analysis and a mathematical water quality model. The cost of the Phosphorus Detergent Ban is minimal.

2. Continuation of the planning, design, and construction for phosphorus removal at selected Vermont waste treatment facilities should continue. Through such action it should be possible within the next decade or so to either maintain or improve upon existing water quality. Without phosphorus removal to the 1 mg/l level a degradation in water quality will occur. The severity of the degradation will depend on the particular lake area of interest. Projections for Shelburne Bay in Lake Champlain and Newport Bay in Lake Memphremagog show the potential exists for severe degradations in water quality due to accelerated eutrophication.

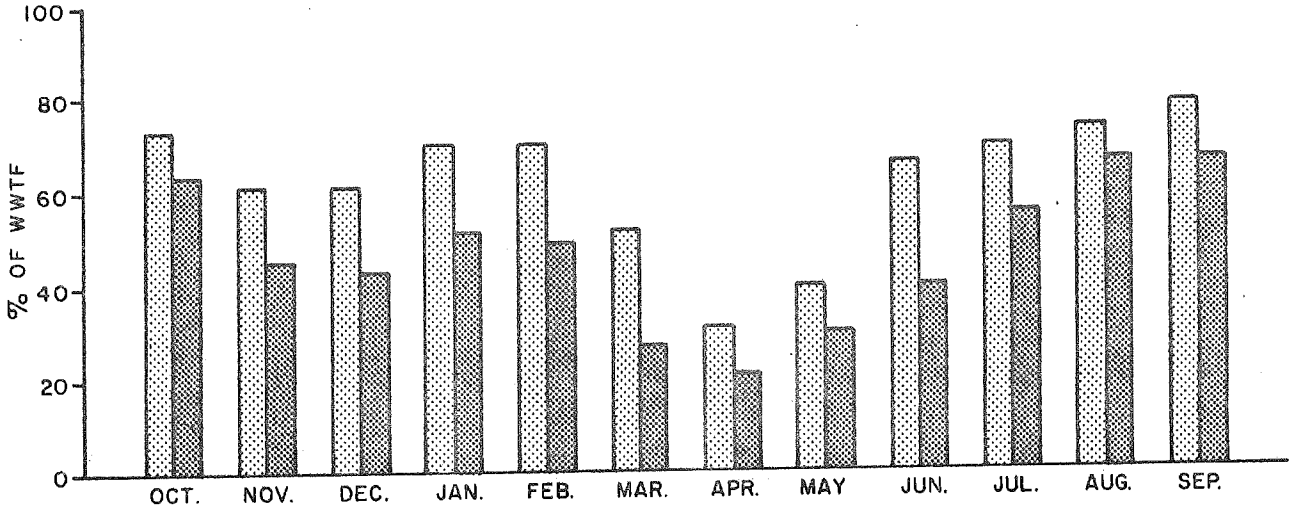
Chlorine

The negative impact of high levels of chlorine on aquatic biota has long been documented. Until recently, however, the extent of the chlorine problem in Vermont was unknown. Studies conducted by the Vermont Department of Water Resources and Environmental Engineering document severe impacts below selected wastewater treatment facilities (WWTF's) and the potential for chronic chlorine toxicity at a very large percentage of facilities.

At the present time, approximately 90 wastewater treatment facilities in Vermont are permitted to discharge chlorine at an effluent concentration of 4 mg/l (TRC) total residual chlorine. In a preliminary survey to determine the extent of the chlorine problem in Vermont, instream chlorine concentrations were estimated at 67 Vermont facilities. These values were calculated using average daily flow and design flow at the respective treatment facilities and calculated mean monthly stream flows of the receiving waters. Effluent concentrations of total residual chlorine were estimated at 4 milligrams per liter, the NPDES maximum allowable permitted limit. Figure 3 illustrates, on a month by month basis, the percentage of these plants that exceed, on a monthly average, an instream chlorine level of 0.005 mg/l, a level above which chronic toxicity to certain trout species has been demonstrated. This information clearly suggests a statewide problem.

FIGURE 3

PERCENT OF WWTFs PRODUCING CHRONICALLY TOXIC INSTREAM CHLORINE LEVELS (greater than 0.005 mg/l TRC) AT MEAN MONTHLY STREAM FLOW



EFFLUENT CONCENTRATION: 4 mg/l TRC
TOTAL NUMBER OF WWTFs: 67

AT DESIGN FLOW

AT AVERAGE DAILY FLOW

A report entitled A Preliminary Study of the Influence of Chlorinated Wastewater Effluent on the Biological Life of Selected Rivers and Streams in Vermont was published by the Vermont Department of Water Resources and Environmental Engineering in July 1981 (available upon request). The primary objective of this study was to determine the actual impact of chlorinated wastewater effluents on receiving water biota below selected wastewater treatment facilities in Vermont. Recommendations were presented, based on the results of the study, for a revised wastewater chlorination policy.

During a summer-long field sampling program, trout, macro-invertebrate and periphyton populations were sampled above and below the discharge outfall at eight WWTF's. Significant alterations in the populations of each group studied were associated with high total residual chlorine (TRC) levels in the effluent. These alterations were characterized by either reductions in population size or species number and/or changes in composition. See Table 6.

The report recommends that the existing single criterion of a maximum 4 mg/l effluent TRC be replaced by an individually determined level for each facility. Due to widely varying effluent TRC levels between WWTF's in Vermont, each facility should be evaluated in terms of its bacterial killing efficiency and the potential for environmental harm downstream from the pipe. A single maximum level would be generated that would cause minimum impact in the receiving waters while still providing adequate bacterial kills.

TABLE 6

AVERAGE PERCENT REDUCTION IN POPULATION SIZE BELOW CHLORINATED WASTEWATER EFFLUENT

FACILITY LOCATION	PERIPHYTON	TROUT
Northfield	70	20
Barre/Berlin	79	63
Randolph	4	83
Chelsea	97	60
Newport	Increase	*
Rutland	36	*
Bennington	98	*
Swanton	Increase	*

* NOT SAMPLED

The Department of Water Resources and Environmental Engineering is presently involved in a plant by plant evaluation of chlorine application facilities. The variation in effluent TRC levels between WWTF's is largely due to the design of the chlorine contact chamber. Since contact times at some facilities are shorter than others, more chlorine is needed to provide the same disinfection capability. This effort will hopefully produce recommendations for easily implemented and inexpensive modifications that would increase contact time and/or mixing thus reducing the chlorine required to provide adequate disinfection.

Seasonal chlorination involves the curtailment of wastewater chlorination during the cold months of the year when downstream human contact would be minimal or nonexistent. This activity reduces the amount of chlorine discharged to streams resulting in decreased toxicity to aquatic biota and increased cost savings to the municipality. At the present time, however, the Vermont Water Quality Standards prohibit seasonal chlorination. The revision of these Standards to allow for seasonal chlorination, which is presently under consideration, is the single greatest step that could be taken at this time to reduce chlorine use and toxicity in Vermont rivers and streams.

Laboratory Services

The laboratory facility of the Department of Water Resources and Environmental Engineering serves a vital role of providing analytical services to the environmental programs of the Agency of Environmental Conservation. The request for analytical services by early 1980 were fast approaching both the personnel and analytical capacity of the facility. It became necessary for the first time to establish program priorities and to actually charge selected programs for services rendered.

As a result of continuing concerns, the State and the Environmental Protection Agency (EPA) in early October of 1981 identified the laboratory as a State/EPA Issue which would require closer attention in an attempt to resolve some of the difficulties being encountered in the laboratory. EPA in late October, 1980 conducted an on site evaluation of the Department's laboratory facilities and identified areas in which they thought the laboratory should concentrate its efforts to improve minor modifications and minimal expenditures of limited funds. Additional discussions with EPA officials lead to the identification of five areas which would require resolution to some degree to improve on the long term the overall efficiency of the laboratory operation. The areas identified were:

(1) analytical capabilities for organic analysis
(2) data management system
(3) improved analytical services for heavy metal analysis
(4) improved analytical services for automated inorganic systems
(5) bioassay technique training

In attempting to find solutions to each of these areas, the Department was aware that it would be unable to increase the size of its analytical staff. As a result, the Department began to seriously consider the acquisition of modern automated analytical instrumentation. It was envisioned that such instrumentation would increase the laboratory's overall operational efficiency utilizing the present staff size. EPA concurred with this approach and during 1981 the Department acquired or began the requisition for modern automated analytical equipment.

By 1981 years end, nearly all areas identified as requiring resolution for long term improvement of laboratory services had been addressed to some degree. Table 7 depicts the present status of each of the issues.

The Department plans to continue with its program of automating the laboratory facility to improve operational and analytical efficiency. Future activities to be considered by the Department will be the development of a procedure whereby major analytical instrumentation can be replaced on an established schedule. The Department has historically been confronted with funding difficulties to acquire major analytical equipment. Renovation of selected areas within the laboratory complex will also be required during the coming year.

Laboratory Quality Assurance Program

The Vermont Department of Water Resources and Environmental Engineering is in the process of developing a quality assurance project plan to assure the integrity of environmentally related data generated by the Departmental laboratories.

The Quality Assurance Project Plan, to be completed in 1982, will be a written document outlining the policies and objectives of, and organizational responsibilities for quality assurance activities. It shall also outline specific minimum quality control activities to be undertaken in the collection, handling, analysis, and data reporting of environmentally related data. This plan shall improve the quality of the data generated by the laboratory by providing a detailed review of existing procedures, outlining additional quality control procedures to be instituted, and providing for a means to document the quality of the data. To assume program development, a Quality Assurance Coordinator has been assigned to this task.

TABLE 7

Status of Major Laboratory Issues Requiring Resolution to Improve Laboratory Efficiency

1.	Improved Analytical Capabilities for Organic Analyses	Department has acquired modern gas chromatographic and staff personnel have attended EPA training sessions. EPA, Region I has indicated a willingness to continue with training programs and provide backup GC/MS support.
2.	Data Management System	Department has completed the first phase of a data management study in cooperation with the Vermont Information Systems. Currently examining existing computer hardware and software packages. Present intent is to have an operational system by late 1982.
3.	Improved Analytical Services for Metal Analysis	Recommendation to acquire modern analytical capabilities made by EPA. Departmental request for funding $30,000 disapproved in 1981. Alternative funds being sought.
4.	Improved Analytical Services for Automated Inorganic Systems	Department has acquired a microprocessor system to be used in conjunction with existing Technicon Autoanalyzer Systems.
5.	Bioassay Training	Two Department staff biologists attended an EPA sponsored bioassay training session. Future activities will include development of in-house bioassay capabilities.

LAKES AND PONDS MANAGEMENT PROGRAM

In 1979, the Vermont Department of Water Resources formed the Lakes and Ponds Management Program which is responsible for planning and management activities dealing with Vermont lakes. The basic format of the Program (Table 8) remains relatively unchanged from the description included in the 1980 Vermont Water Quality Assessment 305(b) Report. The Program provides a logical progression from lake monitoring and surveillance to diagnostic study and management action. Through these steps, water quality problems on lakes are identified, assessed and managed or corrected.

The first phase of the Lakes and Ponds Management Program is Surveillance. Through various programs, a large number of Vermont lakes are monitored for basic limnological data each year to keep abreast of existing water quality conditions and to detect any long term changes that may be occurring in the lakes. The three core programs of this phase are springtime phosphorus sampling, the Vermont Lay Monitoring Program, and a summer lakes sampling program. These programs are summarized in Table 9. Lakes which are found to be experiencing either water quality problems or trends toward deteriorating water quality are put on a priority list for phase II (Diagnostic Studies) consideration.

In addition to the three permanent core programs in the Surveillance phase, several short-term programs have been undertaken to aid in the detection of lakes with immediate or impending water quality problems. The Vermont Lake Classification Survey, funded through the Environmental Protection Agency's Clean Lakes Program, was completed in 1980. The results of this survey are contained in the document Vermont Lake Classification Survey, 1980, Water Quality Surveillance Series Report Number 8, by the Vermont Department of Water Resources and Environmental Engineering. Using springtime phosphorus as an indicator of trophic condition and land use in drainage basins as an indicator of cultural influence, 209 Vermont lakes greater than fifteen acres were ranked according to the likelihood of their experiencing water quality problems due to cultural eutrophication. The 44 priority lakes identified through this process were further ranked according to public use, resulting in fourteen high priority lakes as well as Lake Champlain and Lake Memphremagog (Table 10). At the present time, these lakes are the Department's top priority for phase II and phase III work under the Lakes and Ponds Management Program. This list may change as new information becomes available from short-term and core Surveillance programs.

TABLE 8

VERMONT LAKES AND PONDS MANAGEMENT PROGRAM
1980 - 1981

Phase I: Surveillance

Core Programs

Springtime phosphorus
Lay Monitoring Program
Summer lakes program

Short-Term Programs

Lake Classification Survey (completed)
Landsat assessment
Lake Eutrophication Analysis Procedure

Phase II: Diagnostic Studies

Harvey's Lake
Lake Morey
Lake Iroquois

Phase III: Management Action

Lake Bomoseen (completed)
Aquatic Nuisance Control Program grants
Soil Conservation Service work

TABLE 9

VERMONT LAKES AND PONDS MANAGEMENT PROGRAM
PHASE I
CORE PROGRAMS

SPRINGTIME PHOSPHORUS PROGRAM

Parameters sampled:	total phosphorus
Frequency:	once shortly after ice-out two to three stations per lake, in triplicate
Number of lakes:	1980 - 92 lakes 1981 - 66 lakes
Staff:	full-time employees

LAY MONITORING PROGRAM

Parameters sampled:	Secchi disk transparency chlorophyll-a(advanced programs only) total phosphorus(Lake Champlain advanced program only)
Frequency:	weekly,June-August one station per lake-chlorophyll-a, in duplicate two stations per lake-Secchi disk transparency
Number of lakes:	1980 - 27 advanced 10 basic 1981 - 32 advanced 4 basic
Number of Champlain stations:	1980 - 16 advanced 3 basic 1981 - 17 advanced 3 basic
Staff:	one full-time employee one temporary employee approximately 200 volunteer monitors

SUMMER LAKE PROGRAM

Parameters sampled	fecal coliform bacteria dissolved oxygen temperature Secchi disk transparency aquatic plants
Frequency:	three times during the summer 10-20 bacteria samples lakewide survey for aquatic plants one station per lake for remaining parameters
Number of lakes:	1980 - 30 lakes 6 Champlain areas 1981 - 28 lakes 3 Champlain areas
Staff:	two temporary employees

TABLE 10

High Priority Lakes for Diagnostic Studies or Management Action

°Lake Carmi
Cedar Lake
Curtis Pond
Lake Elmore
Fairfield Pond
*°Harvey's Lake
+Lake Hortonia
+*Lake Iroquois
*Lake Morey
+°Lake Parker
+Lake St. Catherine
°Shelburne Pond
Star Lake
Lake Winona
°Lake Champlain
°Lake Memphremagog

* - Diagnostic study in progress
+ - Aquatic Nuisance Control Program participant
o - Soil Conservation Service work in progress

During the course of the Department's work on the Lake Classification Survey, the use of Landsat satellite imagery was evaluated as a means of obtaining land use and lake water quality information on a statewide scale. This experiment met with success, and beginning with data from the spring of 1981, the Department is attempting to determine whether Landsat can be used operationally in Vermont to monitor the basic water quality of lakes and ponds. In order to effectively monitor water quality, Landsat information must be available immediately after the ice goes off the lake in the state in the spring (for springtime phosphorus determinations) and/or three times during the summer months (for Secchi disk transparency and chlorophyll-a determinations). Data collected through core Surveillance programs provide ground truth for the satellite imagery. The collection and analysis of Landsat data, funded through an Environmental Protection Agency Clean Lakes Grant, will extend from 1981-1983. At the end of that time, the value of Landsat as an integral part of the Lakes and Ponds Management Program will be assessed.

Another short-term program presently being conducted under the Lakes and Ponds Management Program involves the use of a computer model to predict water quality responses in lakes based on estimated phosphorus loadings. This model, the Lake Eutrophication Analysis Procedure (LEAP), was designed and calibrated to Vermont lakes by Dr. William W. Walker of Concord, Massachusetts. Through a Clean Water Act Section 208 Planning Grant, the Department plans to gather the necessary input data and run the model on all priority lakes (as determined by the Lake Classification Survey), and on as many additional lakes as possible. Information obtained from the model will be used to further rank Vermont's priority lakes according to their predicted sensitivity to any changes in their phosphorus loadings. In addition, the model will be used to provide information to planning and regulatory agencies regarding the response of a particular lake to expected or proposed changes in phosphorus loadings. It is anticipated that LEAP will soon become a valuable planning tool for the Lakes and Ponds Management Program.

The second phase of Vermont's Lakes and Ponds Management Program is Diagnostic Studies. Under this phase, lakes which have been identified through the Surveillance phase as experiencing either water quality problems or trends toward deteriorating water quality are studied in depth to diagnose the cause of the problems or trends. If a situation is found to be culturally induced, recommendations are made for feasible management or restorative action. At the present time, Vermont is conducting diagnostic studies on Harvey's Lake, Barnet, Vermont, Lake Morey, Fairlee, Vermont, and Lake Iroquois, Hinesburg, Vermont. All three studies are funded through Environmental Protection Agency Phase I grants under Section 314 of P.L. 92-500.

The Harvey's Lake Study is a three-year, $117,000 project which was initially designed to study methods for reducing the size of the large Oscillatoria rubescens population which exists in this deep, coldwater lake. During the course of the study, however, it has become apparent that the algae may actually be beneficial to the lake at this time. Since 1977, the springtime concentration of total phosphorus in Harvey's Lake has doubled. The Oscillatoria population in the lake strips the abundant nutrients from the water during the spring and traps them in the deeper, colder water of the lake during the crucial summer months. This allows the aesthetically important surface waters to remain clear and relatively algae-free from June to August. In light of these initial findings of the project, the focus of the study has now changed from reducing the size of the Oscillatoria population to determining the cause of the rapid increase in total phosphorus concentrations. Following a one-year nutrient budget study, recommendations will be made in 1983 regarding the control of phosphorus in the lake's drainage basin. It is believed that one large farm in the basin is having a significant impact on the water quality of Harvey's Lake.

The Lake Morey Study is a three-year, $143,000 project designed to determine the cause of the lake's severe algae blooms and widespread aquatic plant growth. A detailed nutrient budget study has been undertaken on Lake Morey with the aid of the U.S. Geological Survey and several consultants. The Department is attempting to monitor groundwater phosphorus inputs as well as internal loading, surface water and precipitation sources. An Environmental Protection Agency Section 208 Clean Water Grant is providing additional funds ($21,000) for nutrient budget and modelling work on Lake Morey in conjunction with the 314 study. The findings of the Lake Morey 208 and 314 studies concerning the importance of on-site lakeshore wastewater disposal systems in the overall nutrient budget of the lake will have a significant impact on the Section 201 Step I facilities planning project which is currently in progress in the Town of Fairlee.

The Lake Iroquois Study is the most recent Clean Lakes grant awarded to the Department of Water Resources and Environmental Engineering. This three-year, $143,000 project is designed to diagnose the cause of the abundant rooted plants and algae growth in Lake Iroquois. Initial study efforts are focusing on obtaining a complete nutrient budget for the lake. The Department's work with Landsat under the Surveillance phase of the Lakes and Ponds Management Program is also funded through the Lake Iroquois grant.

At this time the Department is not conducting any diagnostic studies supported solely by State funds. As the present federally-funded studies are completed, it is anticipated that new diagnostic studies will be initiated on other priority lakes. These new studies, however, will be greatly reduced in scope and nature from the studies described above, due to the scheduled loss of federal funding for such projects.

The third phase of the Lakes and Ponds Management Program is Management Action. The first Vermont lake to enter this phase of the program was Lake Bomoseen, which is the largest lake lying completely within Vermont's borders. The Town of Castleton was awarded a $150,000 three-year Clean Lakes restoration grant in 1977 to harvest aquatic plants on Lake Bomoseen. Financial obligations were shared by the Environmental Protection Agency (50%), the Town of Castleton (12.5%), the Lake Bomoseen Association (12.5%) and the Vermont Department of Water Resources (25%). The project was completed in 1979 and a final report entitled Lake Bomoseen Water Quality Improvement Project 1977-1979 is available from the Department of Water Resources and Environmental Engineering. The most significant findings of the project were:

1. Three years was an insufficient time period in which to evaluate aquatic plant harvesting as a lake restoration technique due to the significant influence or differing climatic factors on yearly plant growth.

2. Aquatic plant harvesting proved to be an excellent management technique for Lake Bomoseen. (Harvesting has therefore continued yearly on the lake since the completion of the Clean Lakes Project.)

3. No significant correlation was found between harvesting operations and total phosphorus and chlorophyll-a concentrations in surrounding waters.

4. Four years of aquatic plant harvesting had no noticeable effect in the species composition of the plant community in Lake Bomoseen.

5. The amount of plant regrowth in harvested areas in Lake Bomoseen appeared to correspond to the amount of phosphorus stress that was placed on the plants in each area. Future studies concerning the possible long-term restorative effects of aquatic plant harvesting should focus on establishing a relationship between repeated harvesting and increased phosphorus stress in plants.

6. The water quality of Lake Bomoseen improved significantly from 1977-1979, however the Department of Water Resources and Environmental Engineering does not attribute this improvement directly to the aquatic plant harvesting project. Earlier efforts to reduce the nutrient loading to the lake most likely resulted in the general water quality improvement.

In addition to conducting Departmental management or restoration programs, the Department awards grants to municipalities for the purpose of controlling aquatic nuisances, under the statutory authority of 10 V.S.A., §§921-923. Since the initiation of the Aquatic Nuisance Control Program in 1978, the Department has granted $66,650 to seven municipalities (six lakes). Projects have generally involved mechanical harvesting of aquatic plants, however one municipality plans to use the funds to install special screening on a lake's bottom sediments at a municipal beach to reduce aquatic plant growth. Legislation was recently passed in the 1982 adjourned Vermont legislative session to distinguish between new control projects and on-going maintenance projects under the Aquatic Nuisance Control Program. Under the new legislation, maximum possible State funding for maintenance projects will be reduced from 75 percent to 25 percent of the total project cost. This change was necessitated to ensure that the limited amount of funds available each year for the program are not depleted by the ever increasing number of on-going projects. The program is intended to aid municipalities with the high initial cost of control programs; municipalities should be capable of funding yearly operational costs themselves.

The Department of Water Resources and Environmental Engineering has been working closely with the U.S. Soil Conservation Service in the determination of priority watersheds for consideration for S.C.S. Best Management Practice plans and installations. The watersheds of lakes on the Department's high priority list (Table 10) which appear to include significant farming activity have been recommended for S.C.S. work. To date, work has been initiated in the Lake Parker watershed, work in the Lake Carmi watershed will begin upon notification of funding, and plans are in progress for the Harvey's Lake and Shelburne Pond watersheds as well as for various portions of the Lake Champlain and Lake Memphremagog basins. It is anticipated that the control of nonpoint runoff in these watersheds will greatly improve the water quality of the receiving waters; in the case of Lake Parker, Lake Carmi and Harvey's Lake, long-term water quality problems may finally be alleviated through the soil conservation work.

The direction taken by the Lakes and Ponds Management Program in the past two years has been largely influenced by the need to cut costs while still maintaining the integrity of the program. Programs such as springtime phosphorus sampling have been developed to enable the Department to gain as much information as possible about lake water quality with the least amount of sampling effort. The work with Landsat continues this process by expanding the information gathered from a few lakes to all the lakes in the state. Through the Lay Monitoring Program, 36 lakes and 20 stations on Lake Champlain are monitored weekly during the summer with the help of only one full-time employee and one summer temporary employee. This program has tremendously

increased the Department's ability to closely monitor lakes and meet the needs of Vermont citizens. In order to continue to expand the reach of the Lay Monitoring Program without increasing staff requirements, advanced program lakes which have been monitored for several years will now be moved to the less demanding basic program as new lakes begin the advanced program.

One unfortunate result of the Department's efforts to cut costs has been an increasing need for temporary employees to aid the very limited permanent staff during times of heavy sampling pressure (spring and summer). When State funds are cut, funding for temporary employees is often the first target. Without the aid of temporary employees, the Lakes and Ponds Management Program could not continue to function with its present efficiency. Major necessary changes in the program would result in a loss of many services. The importance of temporary employees in a program where seasonal staff requirements often double should not be underestimated.

The major problem facing the Lakes and Ponds Management Program at the present time is the scheduled loss of federal funding for the Clean Lakes Program. The loss of Section 314 Phase 1 Diagnostic-Feasibility grants will greatly reduce the scope and nature of future Vermont diagnostic lake studies. The Department is attempting to gather information from the three current diagnostic studies to aid in the design of small, inexpensive, yet comprehensive diagnostic studies. It is anticipated that future studies will have to be funded under the normal operating budget of the Department. It is recognized, however, that the federal loss may be combined with a reduction in State funding as changing fiscal situations change legislative priorities.

The loss of Section 314 Phase 2 Restoration grants is even more serious for the Lakes and Ponds Management Program. Programs to restore lakes are often extremely costly. Without federal aid, Vermont may be unable to implement the recommendations which will result from the Harvey's Lake, Lake Morey and Lake Iroquois diagnostic studies. An inability to implement management action would seriously jeopardize the purpose of the entire Lakes and Ponds Management Program, for of what value are surveillance and study if no action can be taken? At this time, there is no mechanism for State funding of lake management or restoration projects except on a case-by-case basis. There is a need for legislation, perhaps through the existing Aquatic Nuisance Control Program, to allow the Department of Water Resources and Environmental Engineering to receive funds to implement lake management and restoration programs.

In addition to the program needs which have resulted from the reduction of federal and state funding, there are several other areas which should be expanded upon or developed within the Lakes and Ponds Management Program. The most obvious deficiency in the present framework is the lack of a Lakes and Ponds Protection Program. The existing management program addresses itself to lakes with existing or impending water quality problems. Lakes that are not now endangered, yet have qualities that should be protected, have no place in the present program. An organized protection strategy should be established that will, one, identify lakes needing protection (for example, sensitive areas or lakes under development pressure) and determine priorities; two, develop plans for protective action on priority lakes; and three, implement recommended actions. Incorporated into this protection program would be a shoreland zoning program. Such a protection program would be very cost-effective over the long run since the funds required to protect a lake from degradation are far less than those needed to restore a degraded lake to some former water quality.

A need has developed over the past few years for lake modelling analyses, and more emphasis will be placed on such work in the future. Lake modelling is useful in the evaluation of permit requests (both for discharges and lake construction), in the assessment of proposed hydropower impoundments, for the justification of planning decisions (such as a phosphorus detergent ban and wastewater treatment facility upgrades), and in the priority ranking of lakes and watersheds for management work. As the Department's modelling techniques are refined, the use of lake models is expected to increase.

More emphasis will be placed upon obtaining good aquatic plant survey information on a large number of lakes in the coming years. An increasing number of complaints and requests for plant control has made it imperative that the Department have good background data upon which to base management decisions. Plant surveys will become a more important part of the Phase I summer lakes program (Table 9) in 1982 and surveys may be incorporated into the Lay Monitoring Program.

Due, in part, to the success of Vermont's Aquatic Nuisance Control Program, the need for the Department of Water Resources and Environmental Engineering (or the Water Resources Board) to have regulatory control over the harvesting of aquatic plants in lakes has grown tremendously. At the present time, any individual, organization or community may harvest any quantity of plants from a lake with little fear of State intervention. In fact, large scale harvesting projects are currently underway on at least five Vermont lakes and several other lakes are investigating such projects. Large-scale plant harvesting operations or the harvesting of plants in critical areas such as spawning grounds could have a significant impact on the water quality and fisheries of a lake. Such projects should

therefore be regulated, and permitted only when they are in the best public interest. It is anticipated that legislation to control aquatic plant harvesting operations in lakes will be introduced during the 1983 legislative session to remedy this situation.

In order that the Lakes and Ponds Management Program may better serve the needs of Vermont citizens, steps should be taken to improve the lines of communication between the Department and lakeshore residents. There are presently more than 50 lake associations in Vermont with 5 additional individuals serving as informal contact persons for their lakes. Lake associations in the Northeast Kingdom of Vermont have joined together to form a Federation of Lake Associations which represents 15 member associations. This Federation now acts as a single strong voice in matters relating to northeastern Vermont lakes, and the Department is able to distribute information quickly and efficiently to many associations through the Federation. It is hoped that lake associations in other areas of Vermont can be persuaded to form similar Federations based upon convenient geographic boundaries. In this manner, four or five Federations may represent the entire State on issues of importance to lakeshore residents. Maine and Massachusetts already have statewide organizations of lake associations (COLA and COLAP, respectively). Vermont should follow their lead. The Department of Water Resources and Environmental Engineering would endorse such a move by Vermont lake associations.

LAKE CHAMPLAIN AQUATIC NUISANCE CONTROL PROGRAM

Lake Champlain, located between the States of New York and Vermont, is an important recreational, natural and economic resource that, in recent years, has been experiencing increased nuisance aquatic plant problems.

Two species of aquatic plants have reached nuisance proportions in Lake Champlain. In southern Lake Champlain, water chestnut (Trapa natans L.) has rendered unnavigable several hundred acres. Originally carried by boats through the lock system, water chestnut is progressively spreading northward and threatens to infest additional shallow areas of Lake Champlain as well as other Vermont lakes. In northern Lake Champlain, Eurasian milfoil (Myriophyllum spicatum L.), another introduced species, has inundated several major bays and is found in virtually all shallow areas of Lake Champlain.

The Vermont Agency of Environmental Conservation has recently received financial assistance from the U.S. Army Corps of Engineers, as authorized under their Aquatic Nuisance Control Program. The approved program is a mechanical harvesting project, the goals of which are one, to prevent the spread of water chestnut into northern Lake Champlain by reducing the present infestations and confining them to south of 43°43'00"N, and two, to control Eurasian milfoil in St. Albans Bay, Vermont. The project is scheduled to commence in July of 1982.

Strategy

Vermont's efforts towards groundwater protection and management crystallized with the development and release of the Vermont Groundwater Protection Strategy for public discussion during May 1981.

The Protection Strategy proposes that Vermont's groundwater resources be divided into two classes. Class I groundwaters are defined as those groundwaters that recharge community water supplies. To protect Class I groundwaters, aquifers and aquifer recharge areas storing and transmitting the resource have been identified and mapped on topographical maps. These mapped areas have been designated as Aquifer Protection Areas (APA's). It has been proposed that activities known to contaminate groundwater be excluded from all APA's. The Agency of Environmental Conservation ultimately would be responsible for developing a list of unacceptable activities and modifying existing environmental program regulations to prohibit these activities in APA's. Groundwater quality in Class I zones would be managed at the highest degree of quality possible.

Class II groundwater includes all groundwater under all the land not designated as being within APA's. All land uses would be allowed in Class II groundwater areas and existing rules and regulations would govern development and waste disposal activities. While designated to prevent undue and adverse groundwater contamination, current practices cannot guarantee total groundwater protection.

The strategy has now progressed to a second draft stage to be released later in 1982. When the strategy has been finally implemented, groundwater quality will be protected appropriately for the designated classes.

A number of State programs govern development or pollution control activities which may have groundwater impacts. Continued communication among all State agencies, departments and programs with groundwater interests will be enhanced by the developing strategy.

Continued funding for strategy adjustment will be necessary as the analyses of increasing data indicates the effectiveness of the various protection programs.

Aquifer Protection Areas Mapping

One hundred and thirty-six major community water supplies were selected for the first phase of the APA mapping. APA's are identified utilizing existing, available data for geology, soils and hydrology.

The mapped areas are presently being evaluated for existing land use, projected future land use, and the degree of local protection afforded these areas by local ordinances.

Potential pollution sources will be evaluated in order to determine the level of protective measures necessary.

Land use planning and management is an integral part of any successful groundwater protection program. Local officials, town planning and zoning commissions and regional planning commissions will be encouraged to assume the lead in resolving land use conflicts that threaten groundwater quality and to incorporate aquifer protection areas and other groundwater protection considerations into their town planning and zoning efforts.

In the months and years ahead, support will be necessary to identify APA's around new community water supplies as well as around those rare, uncompromised high quality, high yield groundwater sources that will be essential to Vermont's growth and development in the years ahead. Consistent funding levels for the long term are necessary to assure the future protection of Vermont's groundwater resources.

Groundwater Monitoring

The evaluation of groundwater quality in Vermont has only recently begun with the tabulation and evaluation of water quality samples from some seventy-five community water supply sources. (See Table 11). Prior to this, the best available data came from analyses of scattered sampling from private and community wells. This data could not be considered as representative of background water quality conditions since many of the samples were taken in response to complaints of poor water quality. The seventy-five community wells were selected for sampling on the basis of geographical distribution throughout the State to represent the broadest possible range of varying geologic conditions. The analysis of this data indicates that most wells supply high quality water, but a few show some evidence of contamination. Further testing is needed to confirm the preliminary indicators of contamination.

As the water quality monitoring program matures, the emphasis will shift towards identifying those community supply sources (Aquifers) which are most vulnerable and hence need increased surveillance and protection. Concomitantly, we will

TABLE 11

Average Sampling Results of 75 Community Water Supply Sources

PARAMETER*	SAMPLE SIZE**	MEAN	MINIMUM	MAXIMUM	RANGE	MEDIAN	FEDERAL DRINKING WATER STANDARDS ***	
ALKALINITY	74	106.35	12.0	246.0	234.0	96.5		
BICARBONATE	74	128.76	15.0	300.0	285.0	117.5		
CALCIUM - Dissolved	75	34.60	2.54	102.0	99.46	32.5		
CHLORIDE	75	21.14	0.06	419.0	418.94	7.3	250.0	S
CONDUCTIVITY (umhos/cm.)	75	314.52	62.0	1,290.0	1,228.0	275.0		
HARDNESS	74	123.0	12.0	313.0	301.0	114.5		
IRON-DISSOLVED	75	0.099	0.0	1.63	1.63	0.02	0.30	S
MAGNESIUM - Dissolved	75	7.45	0.507	33.8	33.29	5.74		
MANGANESE - Dissolved	75	0.595	0.001	1.48	1.48	0.003	0.05	S
NITRATE-NITRITE-N	73	1.18	0.022	16.43	16.41	0.49	10.0	P
NON-CARBONATE HARDNESS	74	21.0	0.0	91.0	91.0	19.0		
pH (Units)	75	7.47	6.07	9.17	3.1	7.53	6.5 - 8.5	S

TABLE 11(continued)

PARAMETER*	SAMPLE SIZE**	MEAN	MINIMUM	MAXIMUM	RANGE	MEDIAN	FEDERAL DRINKING WATER STANDARD ***	
PHOSPHORUS - Total Dissolved	75	0.0076	0.003	0.044	0.04	0.005		
POTASSIUM - Total Dissolved	75	1.67	0.178	6.25	6.07	1.15		
SILICA-SiO_2	74	8.996	2.29	20.5	18.21	9.0		
SODIUM - Dissolved	75	11.82	0.89	95.0	94.11	5.9	20.0	P
SULFATE	75	15.31	0.077	36.76	36.68	14.01	250.0	S
TEMPERATURE ^{o}C	75	7.79	1.0	14.0	13.0	8.0		
TOTAL DISSOLVED SOLIDS	74	164.38	34.0	382.0	348.0	153.0	500.0	S

* Results expressed in mg/liter unless otherwise specified.
** Total sample size = 75 liters
*** Primary or Secondary Drinking Water Standard

study contaminated supplies to gather evidence as to the factors which are most prevalent in causing the degradation of groundwater. The goal is to refine the regulatory-management programs to provide the most cost-effective protection. As aquifers and protection areas for future community supplies are mapped, water quality sampling will be performed to assure the value of the supply for its future use and protection.

Well Drilling

The largest volume of groundwater data in Vermont is contained in the Well Completion Report files from Vermont licensed water well drillers. This file now contains records of over 27,000 wells. The file is accessed frequently by well drillers, engineers, geologists, developers, environmentalists, and private citizens seeking data on the nature of Vermont's subsurface. The Groundwater Management Section seeks to improve the value of this data by inserting it into an automated data storage and processing program. In addition to managing the well reports, the Section licenses the drillers. A bill pending in the Vermont legislature would extend the licensing period from one to three years thus reducing the administrative work load. Two major goals remain for this program element - the automation of the data and the development of regulations covering well construction criteria and requirements for licensing.

Water Level Monitoring

The Groundwater Management Section continues to cooperate with the U.S. Geological Survey in the regular measurement of groundwater levels in a statewide network of wells. Presently, monthly readings are taken in twenty-two wells of which fifteen are reported to the U.S.G.S. for inclusion in regional and national reports. When the period of record reaches a minimum of three years, some of the other seven may be added to the number reported. This program provides valuable data on the relative condition of the water levels in the State's aquifers. Persistent drought conditions can be effectively monitored to enable the State to develop timely drought remedial measures.

Underground Injection Control

Vermont is presently applying for primary responsibility under the Federal Safe Drinking Water Act to control the injection of fluids into the subsurface where those injections may impact upon underground sources of drinking water. Since almost all of the State's subsurface environment contains fresh groundwater which is providing or could provide drinking water

for community systems, the program is of vital interest to the State. Minor adjustments may be needed in the State regulatory authority to permit the Vermont program to meet the federal requirements. The control of underground injections will be considerably complicated for Vermont if exploration for oil and natural gas along the State's western portion lead to the need to inject brines and other fluids into the subsurface.

The implementation of the groundwater protection strategy will create the opportunity and necessity to evaluate the effectiveness of the State's protection programs. Crucial to this assessment will be the continuing accumulation and evaluation of data. The acquisition of automated data management capability together with the funding and trained manpower to utilize such a system is an important goal of the Groundwater Management Program.

HYDROPOWER

Hydropower development in Vermont has grown in significance as energy costs have increased in recent years. Economic incentives have encouraged the development of new sites as well as the modification of operations for existing sites. From the 1940's to about 5 years ago, virtually no new construction of hydroelectric facilities in Vermont was completed. On the contrary, many existing dam sites were removed to restore the rivers and streams to their natural condition.

From about 1980 to the present, a flood of applications for the development of hydroelectric facilities has resulted in approximately 70 major hydro developments presently under review. (Table 12). These 70 hydro proposals involve virtually all major rapids or waterfalls on Vermont's major rivers. The potential environmental impact on our rivers and streams is tremendous and the development of these sites present serious ecological, economic, and legal issues which have grown in significance with the increasing interest in hydropower development.

The Vermont Agency of Environmental Conservation is involved in the review and licensing of hydroelectric projects through the Federal Energy Regulatory Commission licensing process and through the issuance of a water quality certificate. General areas of Agency concern include recreation, aesthetics, fish and game, water quality, flooding, and dam safety issues. Expert testimony and technical reviews are conducted by the Department of Water Resources and Environmental Engineering in proceedings before the Federal Regulatory Commission and the Vermont Public Service Board in the areas listed above.

The general areas of Agency concern are quite clear but the statutory jurisdiction is not. While the State hydroelectric review process (30 V.S.A. §248) has proclaimed jurisdiction over the construction or reconstruction of hydroelectric facilities, the question of federal preemption still remains unsettled.

One area of State jurisdiction over the construction of hydroelectric facilities which has not been seriously challenged is the 401 Water Quality Certificate issued by the Department of Water Resources and Environmental Engineering. No federal license or permit may be granted until the State certifies that any discharge from a proposed hydroelectric project will comply with the applicable provisions of the Clean Water Act. The Department reviews each federally licensed project for compliance with the Vermont Water Quality Standards.

The effectiveness of the hydroelectric facility review process has been adequate although it has been hampered by a lack of clear jurisdiction and the sudden heavy workload. Other programs such as assimilative capacity/wasteload allocation, hydrology, permit reviews, and general water resources planning have suffered as resources were allocated to hydro reviews.

Future goals include increasing the efficiency of hydro review by clearing up jurisdictional problems where possible, development of clearer application guidelines and criteria, and increasing skills in negotiating compromises between the need for the generation of electricity and the need to protect the natural environment.

In summary, the development of hydroelectric facilities in Vermont is a serious environmental threat to our rivers and streams in the intermediate and long term. The review process is encumbered by unclear jurisdiction and a sudden and heavy workload. It is felt the review process has been adequate to date and will improve as jurisdictional problems are resolved and review experience is obtained.

TABLE 12

PROPOSED HYDROELECTPIC PROJECTS

PROJECT	APPLICANT	STREAM	TOWN	EST. CAPACITY (MINOR IF <1500 KW)	EXISTING OR NEW DAM
Bellows Falls (Fish Passage)	NEPC	Connecticut River	Bellows Falls	-	Existing
Green River Hydro and relicense Cadys Falls & Morrisville (3 sites)	Morrisville Water & Light Dept.	Green River	Hyde Park	1.7 MW	Existing- 2 operating
		Lamoille River	Morristown	3.1 MW	
Black River Hydro (6 sites)	Town of Springfield	Black River	Springfield Weathersfield Cavendish	30.1 MW Total	Existing & New
Chace Mill	City of Burlington & GMP	Winooski River	Winooski Burlington	13 MW	New
East Georgia	CVPSC	Lamoille River	Georgia Fairfax	14.0 MW	New
White Current Corp.	Roger Lamson	Ottauquechee River	Hartland	432 MW	Existing
North Hartland Dam	Vermont Electric Co-op	Ottauquechee River	Hartland	4 MW	Existing
Union Village Dam	Vermont Electric	Ompompanoosuc River	Thetford	-	Existing
West River Hydro (3 sites)	West River Basin Energy Committee	West River	Jamaica Townshend Dummerston	25 MW	New & Existing
Great Falls	Lyndonville Electric Dept.	Passumpsic River	Lyndon	1760 HP 1.2 MW	Operating
Hart Island	Town of Windsor	Connecticut River	Hartland	15.0 MW	New
No. Springfield Dam	Town of Springfield	Black River	Springfield	3.0 MW	Existing
Bolton Falls	GMPC	Winooski River	Duxbury	7.3 MW	Existing
Saxtons River Project	BSR Co., Inc. (David Buckley)	Saxtons River	Rockingham	1.5-2.0 MW	New

TABLE 12 (CONT.)

PROJECT	APPLICANT	STREAM	TOWN	EST. CAPACITY (MINOR IF <1500 KW)	EXISTING OR NEW DAM
Frog Hollow Hydro	CVPSC & Townscape, Inc.	Otter Creek	Middlebury	1.5 MW	New
Moretown #8	Pocantico Development Associates, Inc. (Hungerford-Dyrland)	Mad River	Moretown	0.8 MW	Existing
East Barnet Dam	CVPSC	Passumpsic River	Barnet	2.2 MW	Existing
Vail	Village of Lyndonville Electric Dept.	Passumpsic River	Lyndon	0.35 MW	Existing Operating
Ryegate Hydro (C.P.M. Dam-Dodge Falls)	Dodge Falls Hydro Associates	Connecticut River	Ryegate	5.0 MW	Existing
Brockway Mills	Williams River Electric Corp. (D. Buckley)	Williams River	Rockingham	1.16 MW	New
American Woolen Co.	City of Winooski	Winooski River	Winooski	1.2 MW	Existing
Batchelder Mill	Town of Plainfield	Winooski River	Plainfield	0.2 MW	New
Bridgewater Mill	-	Ottauquechee River	Bridgewater	-	-
Ladd's Mill	Vermont Power Consortium	North Branch Winooski River	Worcester	150 KW	Existing
Lane Shops	David De Brul	North Branch Winooski River	Montpelier	0.125 MW	Existing
Bradford Dam	CVPSC	Waits River	Bradford	0.93 MW	Existing
Murphy Dam (Lake Francis)	N.H. Water Resources Board & P.S.B. of NH	Connecticut River	Pittsburg, NH	2.0 MW	Existing
Pownal Tanning Co. Dam	Pownal Tanning Co.	Hoosic River	Pownal	500 KW	Existing

TABLE 12 (CONT.)

PROJECT	APPLICANT	STREAM	TOWN	EST. CAPACITY (MINOR IF <1500 KW)	EXISTING OR NEW DAM
Highgate Falls	Swanton Village	Missisquoi River	Highgate	9.4 MW	Existing
Ruhl Dam	Dr. Robert Ruhl	Cold Brook	Wilmington	7 KW	New
No. Montpelier Pond	Frank Clark	Kingsbury Branch	E. Montpelier	1.3 MW	Existing
Pioneer Dam	James Barrett	Winooski River	Montpelier	0.3 MW	Existing
Magnus	David Magnus	Peacham Hollow Bk.	Peacham	-	-
Proctor Station	Vt. Marble	Otter Creek	Proctor	7 MW	Existing
Downers Mill (Emery Mills)	Leggat McCall and Werner Ventures, Inc.	Ottauquechee River	Hartford	0.8 MW	Existing
Richford	Vt. Public Power Supply Authority	Missisquoi River	Richford	1.5 MW	New
Wells River	Wells River Hydro Associates	Wells River	Newbury (Boltonville)	1.04 MW	Existing
Comtu Falls	Comtu Falls Corp.	Black River	Springfield	-	Existing
Crossett Brook Hydro	Jack & Peter Tourin	Crossett Brook	Duxbury	30 KW	Existing
North Branch #3	Montpelier Hydroelectric Co.	North Branch	Montpelier	0.7 MW	Existing
Dewey Mills	Hydro Energies Corp. John Davidson	Ottauquechee River	Hartford	2.18 MW	Existing
Downers Mill (Emery Mills)	Simon Pearce (U.S.), Inc.	Ottauquechee River	Hartford	645 KW	Existing
Mays Mill F.H. Stone Mill	Town of Halifax	East Branch North Montpelier	Halifax	-	New
Vermont Tissue (Paper Mill Village)	Heller & Usdan, Inc.	Walloomsac River	Bennington	-	Existing
Swanson-Eames	L. Macrae Rood	Coaticook River	Norton	115 KW	Existing
Enosburg Falls	Vt. Public Power Supply Authority	Missisquoi River	Enosburg	2.75 MW	Existing

TABLE 12 (CONT.)

PROJECT	APPLICANT	STREAM	TOWN	EST. CAPACITY (MINOR IF <1500 KW)	EXISTING OR NEW DAM
Battell	Middlebury College	Otter Creek	Weybridge New Haven	1.5 MW	New
Moretown	L. Macrae Rood	Mad River	Moretown	350 KW	Existing
Corning Fibers Products Mill	Vt. Power Consortium	Wells River	Newbury	312 KW	Existing
Barnet	L. Macrae Rood	Stevens River	Barnet	370 KW	New
Newbury Hydro	Newbury Hydro Co. (Rood)	Wells River	Newbury	312 KW	Existing
North Troy	Vt. Public Power Supply Authority	Missisquoi River	Troy	600 KW	Existing
North Sheldon	Vt. Public Power Supply Authority	Missisquoi River	Sheldon	-	New
Sheldon Springs	Vt. Public Power Supply Authority	Missisquoi River	Sheldon	-	Existing
Garfield	Morrisville Water & Light Dept.	Green River	Hyde Park	1.8 MW	New
Baldin Brook Hydro	Bruce Taylor	Baldin Brook	Wolcott	-	New
Leveille	Leveille, Inc.	Little River	Stowe (Moscow)	93 KW	-
Big Branch	Fairview Orchards Associates	Big Branch/Otter Creek	Mt, Tabor	1 MW	New
Halls Brook	S.R. Thanhauser White Oak Water Power	Halls Brook	Newbury	20 KW	Existing
Northumberland Project	Groveton Papers Company	Connecticut River	Guildhall	2.5 MW	Existing
Warren	Mad River Hydro (L. Macrae Rood)	Mad River	Warren	40 KW	Existing
Chase Island	Seaward Development-Chase Island, Inc.	Connecticut River	Windsor	5-8 MW	New

TABLE 12 (CONT.)

PROJECT	APPLICANT	STREAM	TOWN	EST. CAPACITY (MINOR IF <1500 KW)	EXISTING OR NEW DAM
Pike Mill	Stephen E. & George S. Austin	Moose River	Concord	105 KW	New
Grist Mill Project	Stephen E. & George S. Austin	Moose River	Concord	80 KW	New
Bradley Vail Mill	Stephen E. & George S. Austin	Moose River	Concord	83 KW	New
Browns Mill	Stephen E. & George S. Austin	Paul Stream	Maidstone	47 KW	New
Mile One Rapids	Stephen E. & George S. Austin	Paul Stream	Brunswick	55 KW	New
College Town Industrial Plaza	E.F. Wall/R.P. Lord	Dog River	Northfield	150 KW	Existing

ASSIMILATIVE CAPACITY-WASTELOAD ALLOCATION

Vermont's assimilative capacity-wasteload allocation program for any river segment can be conceptualized as four distinct phases. The first is based on simplified modeling or screening techniques to identify which river segments in the state may be subject to water quality (specifically dissolved oxygen) violations. This phase was completed in the 1970's and the results are included in the River Basin Water Quality Management Plans.

For each of the potential problem segments identified under Phase 1, further studies have been undertaken. The three phases of these studies are: (A) data collection, (B) mathematical modeling and (C) wasteload allocations. The objective of Parts A and B of the allocation process is technical in nature; that is, to determine the assimilative capacity for each river segment based on the best technical determination possible. The objective of Part C, the wasteload allocation, is to distribute the allowable wasteload based on equity, social and political acceptability and cost-effectiveness criteria. To achieve this objective a Wasteload Allocation Process has been adopted under our rule-making authority and applies statewide.

For each water quality segment the Department of Water Resources and Environmental Engineering produces reports which describe each part of the allocation process.

During 1980 and 1981 assimilative capacity determinations and wasteload allocations continued on several river segments. These efforts are summarized below for several priority stream segments.

Lower Winooski River

Data collection and mathematical modeling of the Lower Winooski River is now complete. Results are available in two reports entitled Lower Winooski River Wasteload Allocation Study, Part A: Report of Data, 1980 and Lower Winooski River Wasteload Allocation Study, Part B: Mathematical Modeling, 1982.

Mathematical modeling required development of state-of-the-art formulations for nutrient/algal relationships as the impact of algae on dissolved oxygen has been identified as the most important component of observed dissolved oxygen deficits in the river. The basic model employed in this modeling effort was the Qual II River Model with the noted revisions for nutrient/algal relations.

Otter Creek

The Otter Creek allocation is complete and took effect October 14, 1981. The adopted allocation is presented in Appendix F. All three phases of the allocation process are available in the following reports:(1) Otter Creek Wasteload Allocation Study, Part A: Report of Data, 1979; (2) Otter Creek Wasteload Allocation Study, Part B: Mathematical Modeling Report, 1979a; and (3) Otter Creek Wasteload Allocation Study, Part C: Wasteload Allocation Report, 1981 written by the Vermont Agency of Environmental Conservation.

An equitable allocation of the allowable wasteload was achieved, in part, by active involvement by the Rutland Regional Planning Commission. Participation at the local level resulted in better understanding of the allocation process.

Implementation of the wasteload allocation will result in achieving a 6.0 mg/l dissolved oxygen standard for Otter Creek. With only a secondary treatment level, dissolved oxygen levels of about 4 mg/l are projected at design conditions.

Upper Connecticut River and Moore Reservoir

A water quality study of the Upper Connecticut River was conducted jointly by the Vermont Department of Water Resources and Environmental Engineering and the New Hampshire Water Supply and Pollution Control Commission from August 5-8, 1980. The State of New Hampshire has taken responsibility in report preparation.

Preliminary modeling analysis was undertaken by the U.S. Environmental Protection Agency. Model verification is not yet complete.

Walloomsac River

Two water quality sampling programs have been completed for the Walloomsac River. These studies were undertaken on July 8-11, 1980 and on July 28, 1981 and have served for model calibration and verification. An allowable loading of 1700 lbs. UOD/day has been determined. An allocation among competing dischargers is unnecessary because the Bennington WPCF is the only point source discharge responsible for dissolved oxygen violations. The Bennington WPCF is being designed to meet the allowable loading.

Data and modeling reports are in preparation.

Upper Winooski River (Stevens Branch)

Water quality sampling for the Stevens Branch is complete and results are available in two reports written by the Vermont Agency of Environmental Conservation entitled Upper Winooski River Wasteload Allocation Study, Part A: Report of Data, 1979b and Stevens Branch Periphyton Study, Report of Data, 1981b.

The Stevens Branch Study is a study of periphyton (attached algae) which proliferate in the Stevens Branch and account for large diel dissolved oxygen fluctuations. Study results will be used in further modeling analysis.

Table 13 summarizes the status of the assimilative capacity-wasteload allocation program for those stream segments in Vermont identified as water quality limited for dissolved oxygen.

TABLE 13

STATUS OF ASSIMILATIVE CAPACITY-WASTELOAD ALLOCATION PROGRAM

RIVER BASIN	SEGMENT	DESCRIPTION	STATUS
Winooski River	Main Stem (8-6)	Below discharge from IBM to confluence with Lake Champlain.	Data collection and modeling complete. Allocation process on-going.
	Stevens Branch (8-9)	Below discharge from Barre City to confluence with Winooski River	Data collection complete. Further modeling to be undertaken.
Otter Creek	Main Stem (3-3)	Below Rutland City discharge to confluence with Lake Champlain.	Complete.
Connecticut River	Main Stem	Upper Ammonoosuc to Comerford Dam.	Data collection complete. Preliminary modeling by EPA. Model verification needed.
Walloomsac	Main Stem (1-4)	Below discharge from Bennington to New York State Line.	Complete.
Poultney River	Main Stem	Poultney to the Castleton River.	Pending.
Hoosic River	Main Stem (1-2)	Below Pownal Tannery to New York State Line.	One monitoring program undertaken. Additional data collection necessary.
Lake Champlain	LaPlatte River	Below discharge from Hinesburg to Lake Champlain.	Data collection complete. Initial modeling undertaken.

WETLANDS

The Vermont Department of Water Resources and Environmental Engineering is concerned with the need for the protection of our valuable wetlands. In an attempt to preserve these unique areas, the Department of Water Resources and Environmental Engineering has begun to identify and photograph significant wetlands, evaluate the benefits of each wetland and determine future need for wetland protection.

During 1981, the Department of Water Resources and Environmental Engineering conducted an owner attitude survey of 305 owners of major wetlands. The survey revealed that 9 out of 10 persons surveyed favored protection of Vermont's critical wetlands and the majority favored resource protection over industrial expansion. Details of this survey are available in a booklet entitled Vermont Wetlands - Owner Attitude Survey.

The values, natural history, alteration and protection of Vermont's wetlands is described in a second report entitled Vermont Wetlands - Identifying Values and Determining Boundaries. Methods for identifying wetland boundaries and mapping are outlined in this document.

The regulatory laws of Vermont and techniques for wetland protection by individuals and towns are described in the booklet Vermont Wetlands - Laws and Voluntary Techniques for Conservation. A fourth report written during 1981, Vermont Wetlands - A Study of Impacts and Lost Values details findings of field visits to several wetlands throughout the State. All of the above reports are available upon request from the Department of Water Resources and Environmental Engineering, Water Quality Division, State Office Building, Montpelier, VT 05602.

Vermont will continue to develop wetland protection measures and is preparing to educate landowners, town officials and all interested groups through a series of radio and television programs, and public participation efforts.

OIL AND HAZARDOUS MATERIALS

During 1980, 144 oil and hazardous material spills were reported to the Agency of Environmental Conservation. Of those, 60 reached the surface waters and 10 reached the groundwaters of the State. During 1981, 199 oil and hazardous material spills were reported. Of these, 59 reached surface waters and 19 reached groundwaters of the State. These were investigated by the Agency's Hazardous Materials Management Section or the Regional Water Resources Investigator. Response activities included mitigating the spill, advising the responsible party on spill control, cleanup and disposal activities, advising local authorities on the properties of the spilled material, and on-site monitoring of the cleanup. Reports of spills are written and forwarded to the appropriate State's Attorney for prosecution under Section 1259 of the Vermont Water Pollution Control Statutes.

Slide presentations concerning oil and hazardous material emergency response activities will continue to be made to various State agencies, environmental organizations and the fire service. As a result of these contacts, standard operating procedures have been and continue to be developed for water quality accidents.

The Vermont Committee on Hazardous Materials, formed as a result of 3 V.S.A. §3116-3117, has established an executive order, which designates responsibilities of various State agencies involved in a spill incident. This committee provides for better overall coordination of environmental emergencies, especially in the area of chemical spills. The Hazardous Materials Management Chief represents the Agency of Environmental Conservation on this committee.

The Hazardous Materials Management Section, as part of the Air and Solid Waste Programs, is working with local officials to develop sites for the disposal of large amounts of oil-soaked debris in the event of a major oil spill on Lake Champlain. This section expects to use landfarming as the disposal method; this eliminates the need to permanently dedicate a portion of a landfill to oil-soaked debris. The Bristol Town Landfill has been designated as a landfarming site for this type of emergency.

The Hazardous Material Management Section and the Water Resources Investigators assist the Surveillance and Analysis Section of the Environmental Protection Agency in inspecting and evaluating spill implementation for Non-Transportation Related On-Shore and Off-Shore Facilities located in Vermont.

The Oil and Hazardous Materials Contingency Plan for the Waters of the State of Vermont has undergone redevelopment to reflect hazardous materials environmental emergency response and was published in 1980. Since July 1980, approximately 600 copies of the plan have been distributed to various agencies in Vermont. Technical assistance in the laboratory, office and on scene at environmental emergencies has been and will continue to be expanded.

The details concerning oil and hazardous materials incidents for 1980 and 1981 are summarized in Appendix G. Plots of the number of incidents each year from 1972 to 1981 for truck accidents, underground tank leaks, and the total are presented in Figures 4, 5 and 6. A regression analysis was performed on each set of data and resulted in a statistically significant trend in each case. The number of underground tank leaks and truck accidents has increased during the years 1972 to 1981. Overall there has been a significant increase in the total number of incidents. This analysis suggests that tank and truck spills will be most important in the future. In order to deal with the increasing problem of underground tank leaks, a cooperative effort involving the Vermont Petroleum Association, the Labor and Industry Fire Prevention Program and this Agency has resulted in the implementation of procedures to mitigate these leaks.

FIGURE 4. REGRESSION ANALYSIS INDICATING NUMBER OF TRUCK ACCIDENTS INVOLVING OIL AND HAZARDOUS MATERIALS FROM 1972 TO 1981

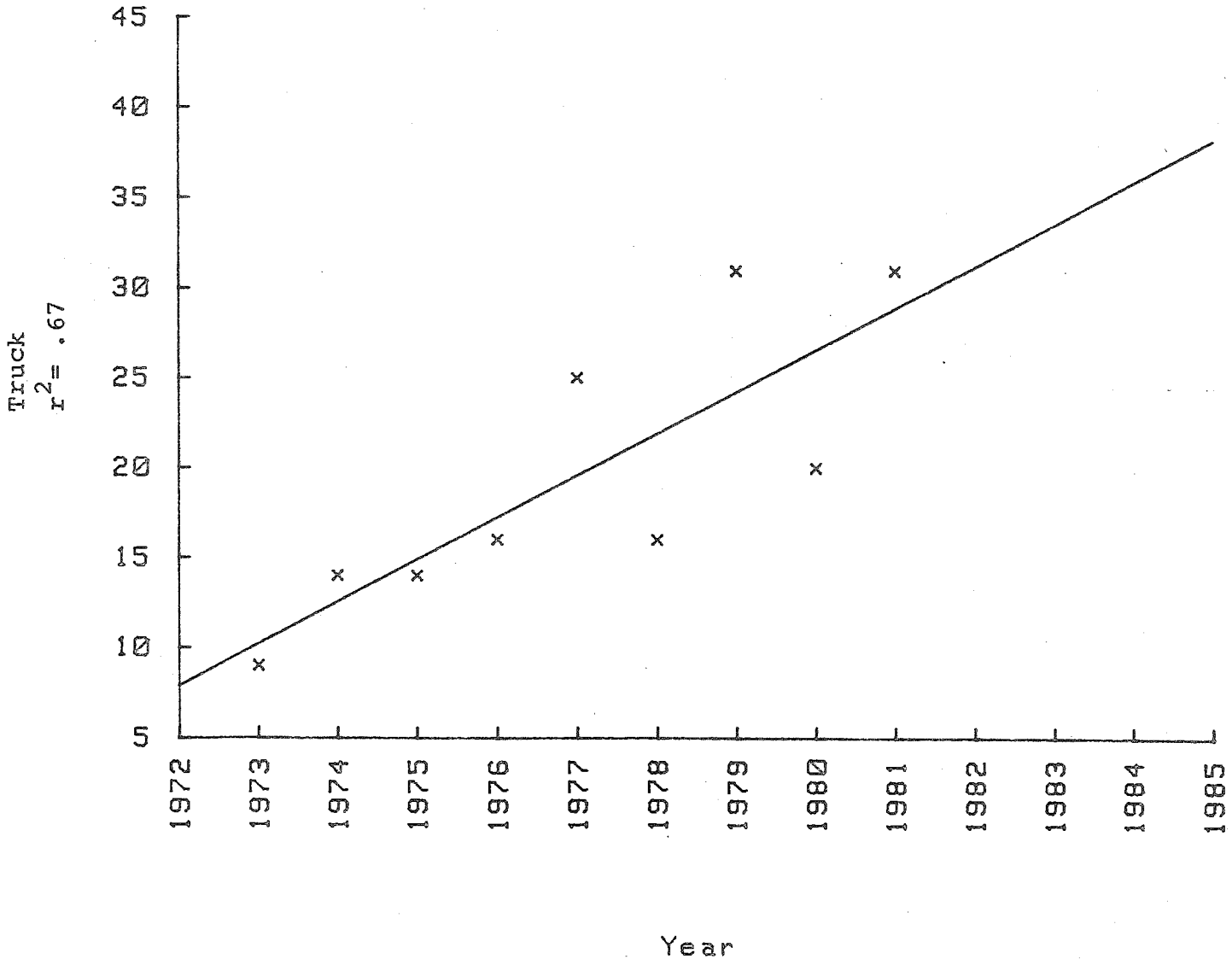


FIGURE 5. REGRESSION ANALYSIS INDICATING NUMBER OF UNDERGROUND TANK LEAKS INVOLVING OIL AND HAZARDOUS MATERIALS FROM 1972 TO 1981

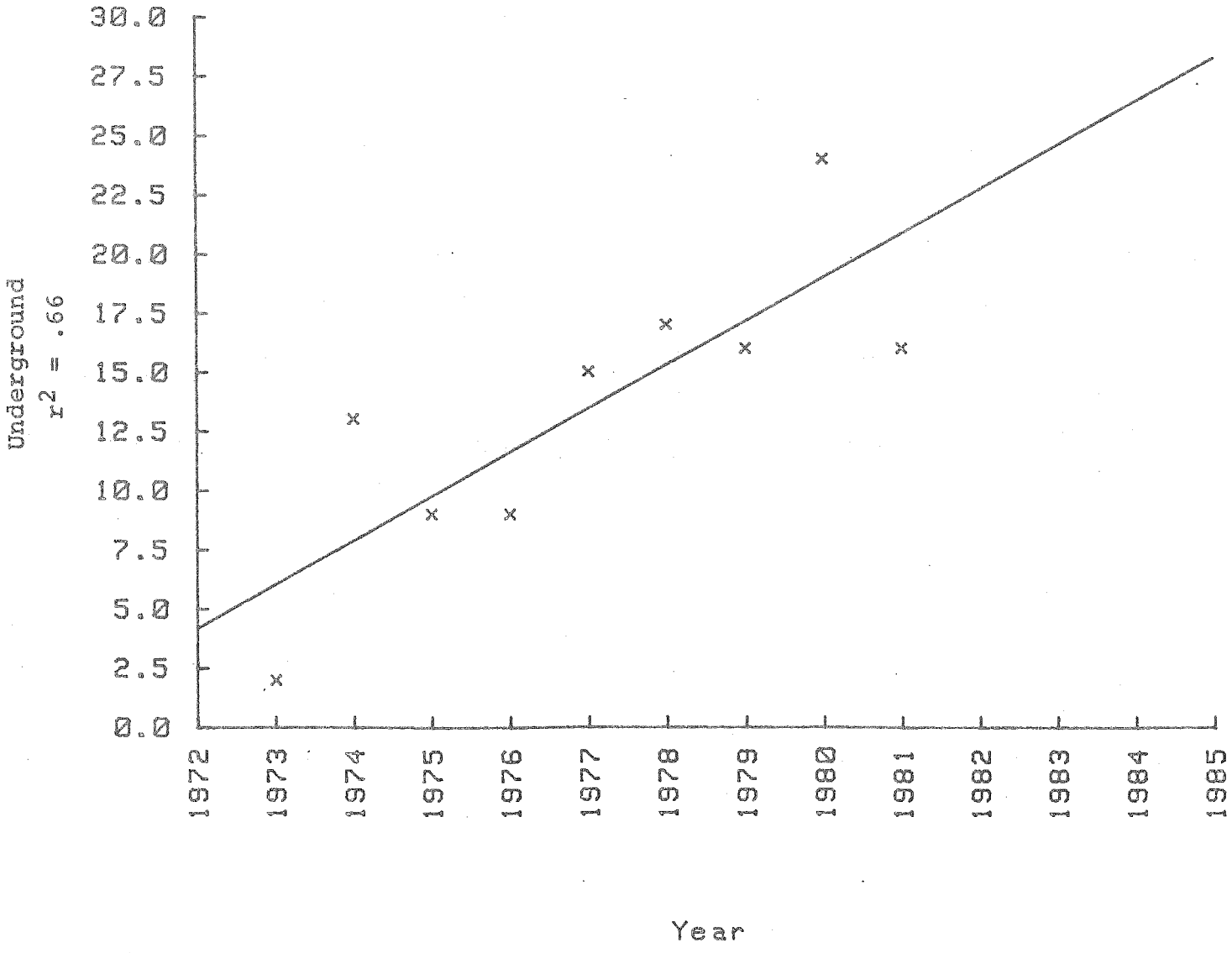
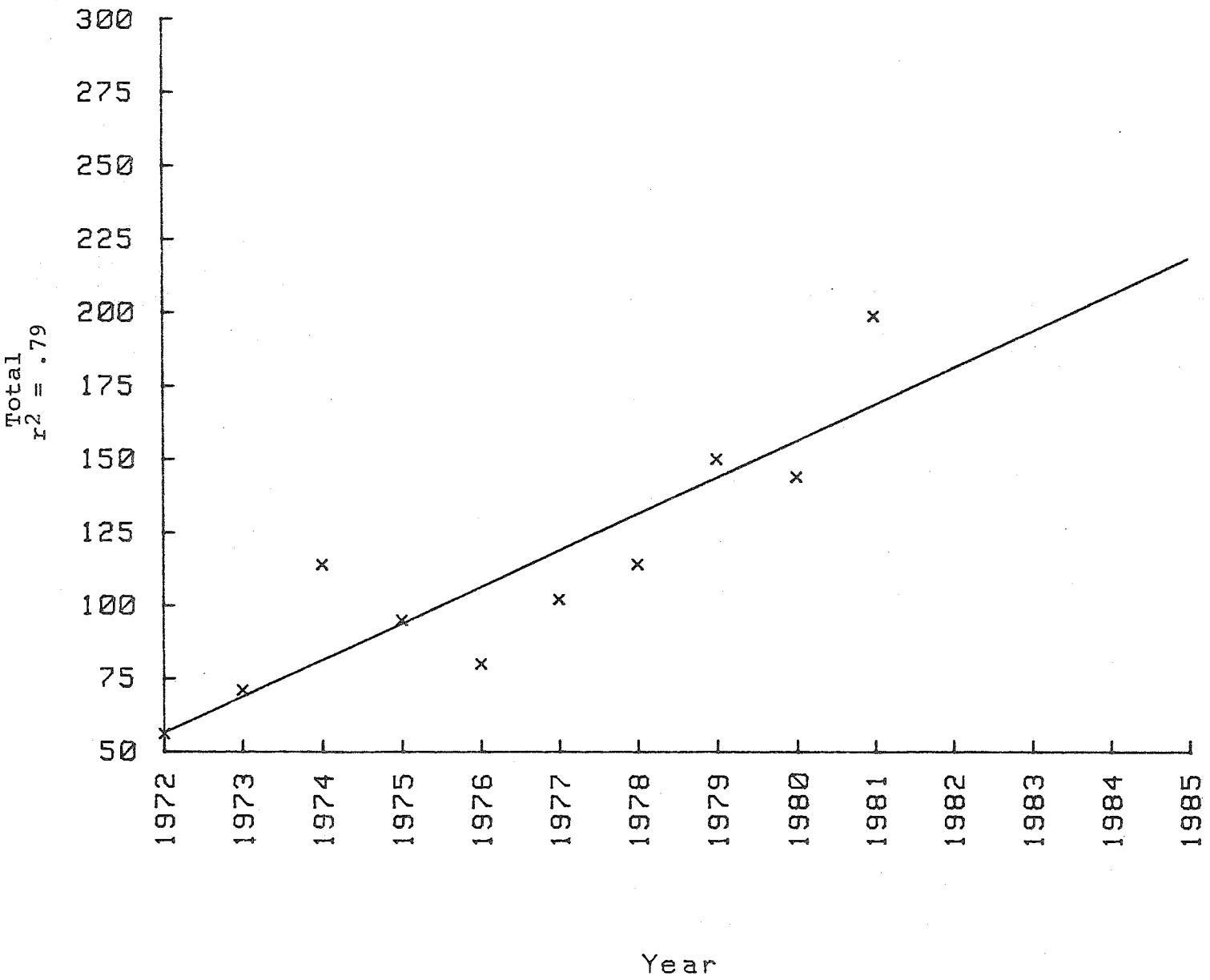


FIGURE 6. REGRESSION ANALYSIS INDICATING TOTAL NUMBER OF TRUCK ACCIDENTS AND UNDERGROUND TANK LEAKS INVOLVING OIL AND HAZARDOUS MATERIALS FROM 1972 TO 1981



NONPOINT SOURCES

The general term "nonpoint source pollution" pertains to all parameters originating from diffuse sources that could be considered to be pollutants at certain levels of concentration. Prior to 1974, little was known about the impact of nonpoint sources of pollution on the quality of Vermont's waters. It was known that spring runoff and rainfall/runoff events increased the nonpoint source loadings of rivers and streams, but the magnitude of the loadings was not known, and the nonpoint source parameters worthy of concern were not identified. Since it would have been impossible to assess the impact of all nonpoint source parameters throughout the State, a preliminary evaluation of the water quality of the State was made to locate problems attributable to nonpoint sources. The results of the evaluation indicated that the primary nonpoint source problem was the accelerated eutrophication of Lake Champlain, Lake Memphremagog, and other smaller lakes and ponds caused by influxes of phosphorus and other nutrients in runoff.

Intensive monitoring of the Black River, St. Albans Bay and Shelburne Bay drainage basins in past years proved to the general public that significant quantities of nonpoint sources of phosphorus from Vermont lands were entering Lake Champlain and Lake Memphremagog and hastening the trend toward eutrophication.

Lake Champlain and Lake Memphremagog drainage basins have been further broken down into major river and minor lake basins and are presented below in priority order for the implementation of Best Management Practices through cost sharing and other assistance programs.

1) St. Albans Bay/Lake Carmi Drainage Area
2) Black River/Lake Parker Drainage Area
3) Shelburne Bay Drainage Basin
4) Otter Creek Drainage Area
5) Winooski River Drainage Area
6) Barton River Drainage Area
7) Lamoille River Drainage Area
8) Missisquoi River Drainage Area
9) Clyde River Drainage Area

The priority list was based on existing water quality problems. Applications for Federal funding under the Rural Clean Water Program (RCWP) were made for the St. Albans/Lake Carmi drainage areas and for the Black River/Lake Parker drainage areas to financially aid farmers in the implementation of Best Management Practices. Alternate funding under P.L. 83-566 sought for the other priority basins through cooperation with the U.S.D.A. Soil Conservation Service. An intensive ten to twelve year monitoring program is being conducted on the LaPlatte River Basin

(the major tributary to Shelburne Bay) and is being funded by the U.S.D.A. Soil Conservation Service under P.L. 83-566. It is our opinion that the general relationships between land use and water quality revealed by the Black River study will be applicable throughout Vermont.

The monitoring study on the LaPlatte River will yield information on the water quality response to improved land management practices. The State prefers to see future nonpoint source monies spent on land and management improvements and not monitoring as a direct connection between nonpoint sources of nutrients and water quality has already been made in the several studies conducted in Vermont and in many studies throughout the nation.

The implementation of agricultural nonpoint source controls has shown substantial progress in recent years. Vermont received funding under the Rural Clean Water Program for nonpoint source control in the first ranked watershed tributary to St. Albans Bay. Of the 64 farms in the watershed scheduled for assistance, 32 have signed contracts to install nonpoint source control practices. In addition, a long term monitoring effort conducted by the Water Resources Research Center at the University of Vermont is underway in the St. Albans Bay watershed.

The Lake Carmi drainage basin also received attention. Under a joint 208 Board/SCS funded program the basin was studied and a nonpoint source control plan developed for 20 farms. It is anticipated that this area will receive Resource Conservation and Development funds in 1982 provided federal funds are available.

In addition, with planning assistance by the 208 Board a plan was prepared for the Lake Parker watersheds. Here Resource Conservation and Development funds were obtained quickly and all contracts have been implemented including the construction of 8 manure storage facilities on 8 farms.

The Black River Basin, which is number two in priority for nonpoint source control is now under active plan preparation by the Soil Conservation Service. It is projected that P.L. 83-566 funds will become available for cost sharing by the end of 1982. Construction will begin in fiscal year 1983. It is estimated that 65 farms will be involved including 45 manure storage facilities and 2,500 acres where erosion control practices will be installed.

The LaPlatte River watershed has received considerable nonpoint source control during the past two years. Since the beginning of the program in 1979 under P.L. 83-566, 26 contracts have been signed out of a total of 31 cooperating farms. The program to monitor water quality changes resulting from farm practices has been implemented as well.

With the completion of planning on the Lower Otter-Dead Creek watersheds (Rank 4 in priority) P.L. 83-566 funds have been authorized for nonpoint source control practices. Of the ninety farms in the project area, sixty will require manure storage facilities. At this writing four farms are under contract to begin installation of conservation practices.

The remainder of the watersheds (Rank 5-9) are less advanced toward implementation. Their current status is as follows:

5. Lower Winooski River - in planning, expect authorization in fiscal year 1983.

6. Barton River - no planning yet

7. Lamoille River - no planning yet, 208/SCS sponsored Soil Conservationist visiting farms to encourage voluntary agricultural nonpoint source control.

8. Missisquoi River - Special planning study proposed for Rock River and Pike watersheds. This watershed was cited as a high erosion loss site in the SCS Small Watersheds Study (see below)

9. Clyde River - no planning

The U.S. Soil Conservation Service in cooperation with the U.S.D.A. Forest Service and the Economics, Statistics, and Cooperative Service of the U.S.D.A. is completing a study of soil loss in small sub-basins of the watersheds 4-9 above. The Agency of Environmental Conservation has endorsed this project and cooperates in an advisory capacity.

The major objective of this project is to establish planning priorities so that State and Federal assistance can be allocated in accordance with the severity of the nonpoint problem in a subwatershed. The study involved collecting watershed information and quantifying erosion, sedimentation and animal waste problems. The study developed alternative management plans to reduce nonpoint source pollution from cropland and animal waste and on the evaluation of the economic and environmental impact of the alternative plans. Cost estimates were developed for implementing Best Management Practices in those watersheds where applications for funding from programs such as P.L. 83-556 and the Rural Clean Water Program might be made.

Preliminary results are under evaluation and a final list will be prepared by June 1982 which ranks watersheds in relation to the severity of phosphorus loss and erosion and considers where remedial practices will produce the best results for dollars spent.

The general trend in nonpoint source work in Vermont from 1982 to 1987 will be that of implementation of plans. This will be especially true in the area of agriculture and true to a lesser extent in the forestry area as large anticipated increases in timber harvesting will require some planning to control associated nonpoint source problems.

Finally, education efforts started under the 208 Program will continue although in a more limited fashion. A one year program was funded by the 208 Board under which the Extension Service promoted manure storage and timely spreading. The Board also funded the publication of a construction erosion control manual. This is now undergoing a final review by the Agency. Lastly, two 208 funded studies are in preparation on the subject of manure management. One deals with the properties of manure as a fertilizer, and methods for reducing nutrient runoff. The second deals with the layout of a barnyard to minimize nonpoint runoff. These educational effort combined with economic forces which favor less waste of nutrients are expected to favor the increased use of conservation practices which benefit the farmer and the State's water resources.

URBAN RUNOFF

The Vermont Urban Stormwater Runoff Program objectives remain almost the same as reported in the last 305(b) Report. These objectives and target dates for their attainment are given below:

Vermont Urban Stormwater Program

Target Dates		Objectives
1978	1.	Set forth Interim Stormwater Management Policy to slow the increase of stormwater pollution in Vermont. (The interim policy based treatment levels on the size of the paved parking area for the initial ease of administration under the Vermont permit program).
1979-1980	2.	Evaluate paved areas subjected to diverse uses, i.e., shopping centers, high volume streets, low volume streets, fast food restaurants, motels, and gas stations to determine if the policy should require treatment based on use rather than size, or a combination thereof. Begin broad spectrum analysis of suspected problem parameters and priority pollutants.
1980-1981	3.	Evaluate a portion of these treatment systems in place and determine treatment efficiency. Determine the relationship between the untreated pollutant concentration and the runoff hydrograph at various sites.
1982-1985	4.	Develop Stormwater Control Plan and revise Interim Stormwater Management Policy.

The Interim Stormwater Policy adopted in 1978 was revised in 1980 (see Appendix E). The second objective of the Urban Stormwater Program has been completed. The final report is being completed. Difference in runoff quality between various land uses were noted, however, it is unclear whether the differences are attributable to land use only.

In December, 1979 Vermont developed and submitted to EPA a grant proposal under the National Urban Runoff Program (NURP). The proposal was developed to accomplish both NURP program objectives and the third objective of Vermont's Urban Stormwater Program. The required State funding match was not approved by the Vermont Legislature and consequently the grant was not accepted.

Evaluation of treatment systems installed pursuant to the Interim Stormwater Management Policy is now being accomplished through Section 208. Vermont proposes to determine the treatment efficiency of both a catch basin and sand filter treatment system. These two treatment systems are the two most common systems installed in Vermont.

Objective number 4 has been revised to include development of a stormwater control plan as proposed in House Bill H-402 before the 1982 Vermont Legislature.

ASSESSMENT OF THE STATE'S WATER QUALITY

As previously stated in the introduction to this document, Vermont has continued to take positive steps towards achieving the desirable goal of total fishable/swimmable waters. Likewise, insofar as the fishable portion of the goal is concerned, Vermont has for all practical purposes attained total fishable waters. Also, all waters in the State having a designated water use compatible with swimming are capable of achieving this goal. Obviously, the swimmable goal requires a qualifier of "when and where attainable". The level of coliform bacteriological organisms in flowing waters has continued to occasionally present itself as a basic water quality problem. Historical and current data collected from Vermont waterways receiving virtually no point source discharges continue to show levels of elevated coliform organisms in excess of the criteria established for swimmable waters following storm events. Nonpoint runoff originating from agricultural, silvicultural, and urban areas (stormwater and combined sewer overflows) are believed to be essentially responsible for the elevated bacteriological levels. Being primarily nonpoint in nature, these sources are not currently economically controllable. The sanitary significance of these elevated levels is not known at this time.

Tables 14 and 15 have been prepared as an assessment of the current water quality conditions for the State's segmented river reaches. Table 14 is intended to be a specific segment by segment assessment whereas Table 15 serves as a summary of the State's water quality conditions on a river basin basis. Figure 7 has been prepared to accompany these tables by mapping the individual river basins and segmented river reaches. Also identified on Figure 7 is the present status of each designated reach with regard to limitedness. It has been assumed for the purposes of this report that all nonsegmented river reaches are meeting all applicable water quality standards since these waters are not receiving any pollutional discharges and nonpoint problems are minor or natural in origin.

The water quality problems indicated in Table 15 for the individual river segments are for the majority of instances based upon historical water quality data and best professional judgement. In all instances where current water data was available, the assessment was made utilizing that information. Caution is advised when utilizing data not based upon recent water quality surveys. It is highly unnecessary that an assessment of all streams and rivers in Vermont be accomplished biannually. An assessment schedule of once in five years would be more realistic and meaningful. Vermont will continue to survey its river and stream systems but only at a rate which is within our personnel and budgetary constraints.

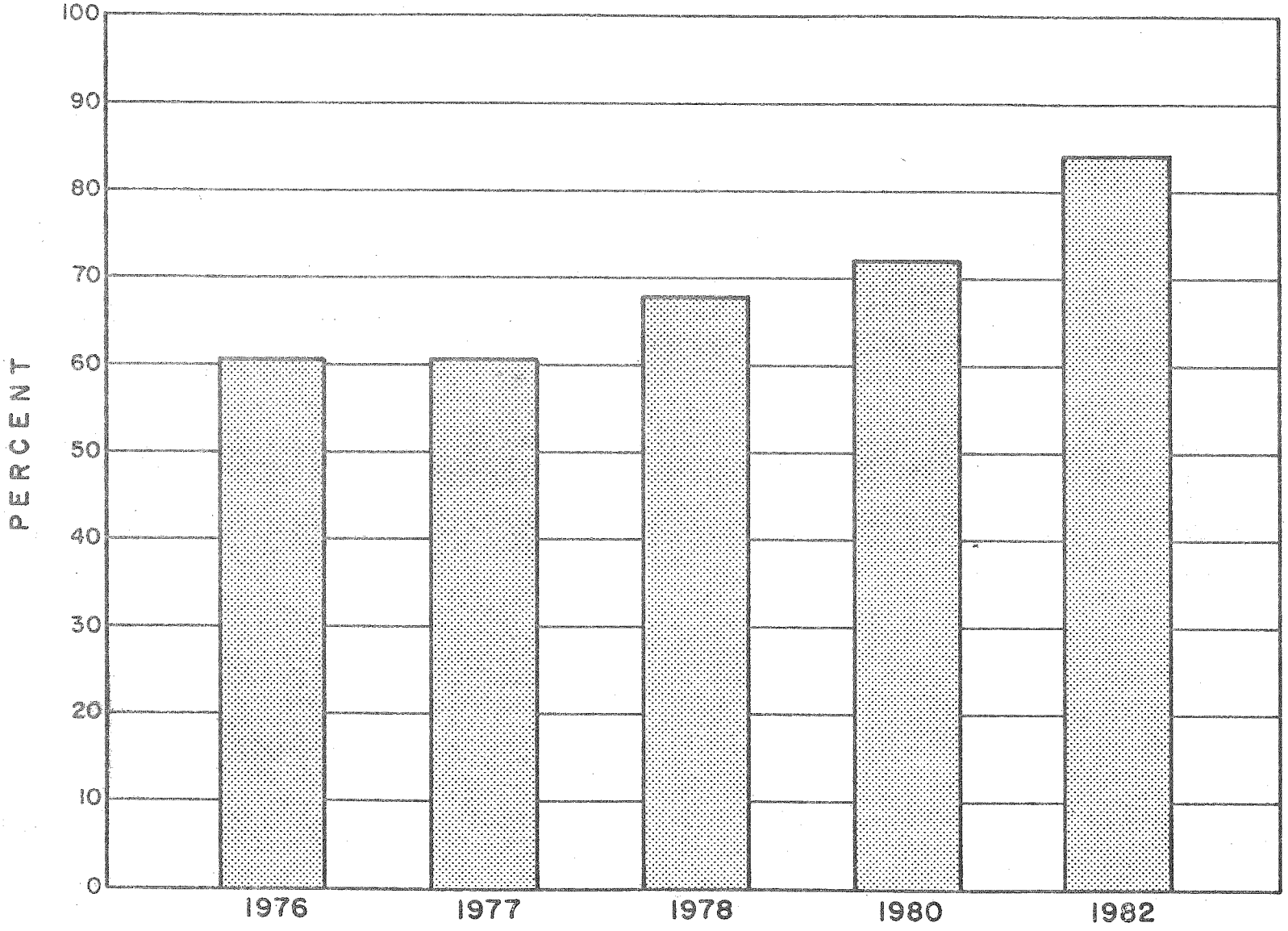
On the basis of our current water quality assessment, eighty-four percent of Vermont's segmented river miles are presently in compliance with all applicable water quality standards. Waters that have been brought into compliance have been done so mainly through the upgrading and new construction of municipal wastewater treatment facilities. The State's program to maintain maximum pollutant removal efficiency and maximum effective useful life of treatment facilities is a vital link in Vermont's overall water resource management activities.

Obviously, Vermont is quite proud of the positive steps it has been able to make towards achieving and maintaining its outstanding water resource. Figure 8 depicts the steady increase in improved water quality conditions that Vermont has been able to achieve. It is fully recognized that serious potential problems still remain and must be addressed if Vermont's high water quality is to be maintained for future generations. The majority of these problem areas, listed earlier in the document, do not have straight-forward solutions and will require new and innovative approaches to water quality management. In the face of increasingly limited financial resources, implementation of viable solutions to these complex problems will also be made more difficult. Vermont is determined to meet this challenge and to protect and maintain its high quality waters.

FIGURE 8

VERMONT WATER QUALITY SUMMARY 1976-1982

Percent of Major Stream Miles Meeting or Exceeding Class B Standards (Fishable/Swimable)



KEY TO WATER QUALITY INVENTORY
OF SEGMENTED RIVER MILES
(TABLE 14)

NOTE (1) CLASSIFICATION

STATUS:
- EL-1 - Effluent Limitation Segment(presently meeting water quality standards)
- EL-2 - Effluent Limitation Segment (presently not meeting water quality standards)
- WQ-1 - Water Quality Segment (for parameters or wastes noted)
- WQ-2 - Water Quality Segment (with existing polluting discharge to upland stream)
- Upland - Water Quality Segment (without a polluting discharge to an upland stream)

USE: Class B waters are suitable for bathing and recreation, irrigation and agricultural uses; good fish habitat; good aesthetic value, acceptable for public water supply with filtration and disinfection.

Class C waters are suitable for recreational boating, irrigation of crops not used for consumption without cooking, habitat for wildlife and for common food and game fishes indigenous to the region; and such industrial uses as are consistent with other class uses. Number in parentheses ( ) indicates number of Class C miles in each segment. An * indicates a proposed or recommended Class C zone different from what currently exists.

NOTE (2) WATER QUALITY STANDARDS VIOLATED

The majority of the segmented stream miles indicating elevated coliform levels as a water quality problem are listed because of temporary violations of the technical standards for swimmable waters as a result of nonpoint surface runoff and point source runoff resulting from stormwater and/or combined sewer overflows.

TABLE 14
1982
WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BATTENKILL-WALLOOMSAC-HOOSIC (BASIN #1)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
1-1	Hoosic R.-Mass. State Line to Pownal	C(2.2)	EL-2	2.2	2.2 ✓ 2.2	Coliform	Municipal & Industrial Wastes	Municipal wastes entering from Massachusetts. ✓
1-2	Hoosic R.-Pownal to N.Y. State Line	C(4.8)	WQ-1	4.8	4.8 4.8	D.O. Coliform	Tannery Wastes Municipal Wastes/D.O.	Water Quality Survey Pending-Assimilative Capacity.
1-3	Walloomsac R.-Bennington to Paran Creek	B	EL-2	5.5	0 ✓	Coliform	Combined Sewer Overflows & Stormwater	W.Q.S. met except during periods of high flow.
1-4	Walloomsac R.-Paran Creek to N.Y. Line	C(2.7) B	WQ-1	4.4	2.7 2.7	D.O. Coliform	Municipal & Industrial Wastes/D.O.	Water Quality Survey Completed for Assimilative Capacity; Wasteload Allocation Pending.
1-5	Paran Creek-S. Shaftsbury to Walloomsac R.	B	EL-1	5.0	0			
1-6	No Name Brook-Fairdale Farms to Walloomsac R.	B	EL-2	3.0	1.5 ✓	Coliform	Dairy Wastes	Process waste to be conveyed to upgraded municipal facility.
1-7	Batten Kill R.-Manchester Center Depot to Arlington	C(1.7)* B	EL-1	11.5	0			New secondary municipal facility operational segment upgraded to EL-1. Recommend Class C zone be shortened from 6.2 mi. to 1.7 mi. to reflect facility upgrade.
1-8	Batten Kill R.-Arlington to N.Y. State Line	B	EL-2	7.0	2.0 ✓	Coliform	Municipal Wastes Untreated	
1-9	Warm Brook & Roaring Brook-Fayville Branch to Batten Kill R.	C(3.6)	EL-2	3.6	3.6 ✓ 3.6	Coliform	Sanitary Wastes	

* indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982
WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: POULTNEY-METTAWEE (BASIN #2)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
2-1	Mettawee R.-Pawlet to N.Y. State Line	C(2.5)* B	EL-2	8.0	2.5 2.5	Coliform	Municipal Waste (Untreated) Nonpoint Runoff, Potential Thermal Problems	Recommend establishment of Class C zone of 2.5 mi. Waters presently classified Class B.
2-2	Poultney R.-Poultney to Castleton R.	C(3.0) B	EL-1	9.0	0	D.O.	Municipal Waste	Actual miles of W.Q.S. violated unknown pending assimilative capacity water quality study.
2-3	Poultney R.-Castleton R. to Hubbardton R.	B	EL-1	5.0	0			
2-4	Poultney R.-Hubbardton R. to Lake Champlain	B	EL-1	7.0	0			
2-5	Castleton R.-Castleton to Poultney R.	C(5.3) B	EL-1	7.0	0	D.O.	Municipal Waste	Actual miles of W.Q.S. violated unknown pending assimilative capacity water quality study.
2-6	Tributary to Hubbardton and Hubbardton R.-Benson STP to Hubbardton R.	C(3.0) B	EL-1	8.0	0			

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: OTTER CREEK (BASIN #3)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	CLASSIFICATION[1] STATUS	SEGMENTED STREAM MILES TOTAL	SEGMENTED STREAM MILES VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
3-1	Otter Creek-Danby to Wallingford	B*	EL-1	9	0			Recommend elimination of 3.2 miles Class C zone as not needed for municipal discharge.
3-2	Otter Creek-Wallingford to Rutland	C(1.8) B	EL-1	8	0			
3-3	Otter Creek-Rutland to Pittsford	C(11.7)	WQ-1	11.7	6	D.O. Coliform	Municipal Waste, Combined Sewer Overflows, Stormwater/D.O.	Water quality study completed for assimilative capacity. Wasteload allocation process completed.
3-4	Otter Creek-Pittsford to Neshobe R.	B	EL-1	8	0			
3-5	Otter Creek-Neshobe R. to Middlebury	B	EL-1	21	0	Coliform	Nonpoint Agricultural	
3-6	Otter Creek-Middlebury to Vergennes	C(2.0)* B	EL-1	16	0		Combined Sewer Overflows Stormwater, Nonpoint Agricultural	New secondary municipal facility operational. Recommend existing Class C zone be shortened to 2 miles to reflect facilities upgrade.
3-7	Otter Creek-Vergennes to Lake Champlain	C(2.0)* B	EL-1	8	0		Combined Sewer Overflows Stormwater, Nonpoint Agricultural	Recommend Class C zone be shortened from 4 miles to 2 miles to reflect facilities upgrade.

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BASIN #3 (continued)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION (1) USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S. (2) VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
3-8	Clarendon R.-W. Rutland to Otter Creek	C(1.7)*	EL-1	1.7	0		Municipal Wastes	Class C zone needed to accommodate existing discharge-1.7 miles recommended.
3-9	Neshobe R.-Brandon to Otter Creek	C(1.8) B	EL-1	2	0			

* indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: LOWER LAKE CHAMPLAIN-UPPER LAKE CHAMPLAIN-LAPLATTE MALLETTS BAY, ST. ALBANS BAY, ROCK, PIKE (BASIN #4-#5)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES TOTAL	VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
4-1	L. Champlain-South Bay to Crown Point	B	WQ-1	Lake	-		Natural Condition Phosphorus	Natural condition at times prevents attainment of Class B standards.
4-2	East Creek-Orwell to L. Champlain	C(2.3) B	WQ-1	4	0	D.O.	Natural Condition/D.O. Phosphorus	Natural condition causes dissolved oxygen problem.
4-3	L. Champlain-Crown Point to Addison-Chittenden County Line	B	WQ-1	Lake	-		Phosphorus	
5-1	Laplatte R.-Hinesburg to Shelburne	C(4.6) B	WQ-1	8.0	2 2	D.O.	Municipal Waste Dairy Waste, Phosphorus Nonpoint Agricultural	Municipal facility experiencing operational difficulties as a result of heavy loadings of dairy waste. Assimilative capacity study complete.
5-2	Laplatte R.-Shelburne to L. Champlain	C(0.75) B	WQ-1	2	0	D.O.	Municipal Waste Phosphorus	
5-3	Stevens Brook-St. Albans to L. Champlain	C(5.5) B	WQ-1	6	5.5 5.5	D.O. Coliform	Municipal Waste Industrial & Phosphorus Combined Sewer Stormwater Overflows Nonpoint Agricultural	Secondary facility with phosphorus removal required to achieve desired W.Q.S.

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BASIN #4-#5 (continued)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION (1) USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S. (2) VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
5-4	Lake Champlain-Shelburne Bay	B *	WQ-1	Lake	-		Phosphorus Nonpoint Agricultural	Class C zones need to be established for Shelburne FD #1 and S. Burlington Bartlett's Bay Treatment Facility.
5-5	Lake Champlain-Burlington Harbor	B *	WQ-1	Lake	-		Phosphorus Combined Sewer Overflows Stormwater	Class C zone needs to be established for Burlington Main Treatment Facility.
5-6	Lake Champlain-St. Albans Bay	B	WQ-1	Lake	-		Phosphorus Nonpoint Agricultural	Secondary facility requires upgrading to achieve desired W.Q.S.
5-7	Main Lake-Addison-Chittenden County Line to Canadian Border	C(0.18 acre) B	WQ-1	Lake	-		Phosphorus	Class C zone accommodates discharge from Alburg Treatment Facility.
5-8	Indian Brook-Colchester to Lake Champlain	C(1.0) B	WQ-2	2	2	Rule 12	Sanitary Waste	
5-9	Malletts Bay(Inner & Outer)	C(0.72 acre) C(0.72 acre)* B	WQ-1	Lake	-		Phosphorus Nonpoint Agricultural	Existing Class C zone of 0.72 acre accommodates discharge from Brown Ledge Camp. New C zone needed to accommodate discharge from Marble Island. Recommend 0.72 acre.

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BASIN #4-#5 (continued)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION (1) USE	CLASSIFICATION (1) STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	SEGMENTED STREAM MILES VIOLATED W.Q.S.	W.Q.S. (2) VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
5-10	Missisquoi Bay	B	WQ-1	Lake	-		Phosphorus Nonpoint Agricultural Municipal & Industrial Waste	Bay experiencing advanced signs of eutrophication as evidenced by dense algal blooms.
5-11	Lake Champlain-Northeast Malletts Bay to Hog Island	B	WQ-1	Lake	-		Phosphorus	
5-12	McCabes Brook-Shelburne STP to La Platte River	C(1.0) B	WQ-1	1	0.5	D.O.	Phosphorus	Natural condition causes dissolved oxygen problems. Secondary municipal facility operational.

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: MISSISQUOI (BASIN #6)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.		W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
6-1	Missisquoi R.-Troy to Canada Line	C(3.0) B	EL-2	11.0	1.6	1.6	Coliform	Dairy & Municipal Waste	
6-2	Missisquoi R.-Canada Line to Enosburg Falls	C(1.0) B	EL-2	17.0	0				Status of Canadian discharges unknown.
6-3	Missisquoi R.-Enosburg Falls to Sheldon Springs	C(1.9) B	EL-1	12.0	0			Nonpoint Agricultural	
6-4	Missisquoi R.-Sheldon Springs to Swanton	C(1.5) B	EL-1	15.0	0			Nonpoint Agricultural	
6-5	Missisquoi R.-Swanton to Lake Champlain	C(1.0) B	WQ-1	8.0	0			Phosphorus	
6-6	Trout R.-Montgomery to Missisquoi R.	B	Upland	6.0	0			Nonpoint Agricultural	Sanitary survey has been performed. Stream reclassification from C to B upland is recommended.
6-7	Black Creek-East Fairfield to Missisquoi R.	C(1.0) B	EL-2	12.0	3.0	1.0	Coliform	Domestic (Industrial) Waste	
6-8	Mud Creek-Newport Center to Canada Line	C(3.0) B	EL-2	7.0	3.0	3.0	D.O. Coliform	Municipal Waste (untreated) Nonpoint Agricultural	Facility to be constructed in Summer 1982.
6-9	Burgess Branch to confluence with Missisquoi R.	B	EL-1	5.0	0				

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: LAMOILLE (BASIN #7)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
7-1	Lamoille R.-Hardwick to Morrisville	C(0.9) B	EL-1	15	0			
7-2	Lamoille R.-Morrisville to Hyde Park	C(0.7) B	EL-1	6	0			
7-3	Lamoille R.-Hyde Park to Johnson	C(1.0) B	EL-1	9	0			
7-4	Lamoille R.-Johnson to Fairfax	C(1.9) B	EL-1	27	0			
7-5	Lamoille R.-Fairfax to Milton	C(0.6) B	EL-1	8	0			
7-6	Lamoille R.-Milton to Lake Champlain	C(3.0) B	WQ-1	9	0		Phosphorus	New secondary facility operational 1981.
7-7	Brewster R.-Madonna Mountain Corp. to Lamoille R.	B	Upland	7	0			
7-8	Browns R.-Jericho to Lamoille R.	B	Upland	16	0		Nonpoint Agricultural	

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: WINOOSKI (BASIN #8)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.		W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
8-1	Winooski R.-Marshfield to Plainfield	C(2.0)* B	EL-1	7	0				Recommend Class C for Marshfield STP of approximately 2 miles.
8-2	Winooski R.-Plainfield to Stevens Branch	C(4.0) B	EL-1	9	0				
8-3	Winooski R.-Stevens Branch to Dog River	C(4.0)	EL-1	4	0			Combined Sewers & Stormwater Overflow	
8-4	Winooski R.-Dog R. to Waterbury	C(2.0)* B	EL-1	9	0				Recommend Class C zone be shortened to 2 miles from 9 miles to reflect operational secondary facility.
8-5	Winooski R.-Waterbury to Alder Brook	C(2.7)* B	EL-1	22	0			Nonpoint Agricultural	Recommend Class C zone be shortened to 2.7 miles from 11 miles to reflect operational secondary facility.
8-6	Winooski R.-Alder Brook to Lake Champlain	C(14.8)* B	WQ-1	18.5	4	4	D.O. Coliform	Municipal & Industrial Waste, Combined Sewers & Stormwater Overflow	Water quality survey completed for assimilative capacity. Wasteload allocation in progress. Recommend Class C zone be shortened by 1.7 miles.
8-7	Jail Branch-East Barre to Stevens Branch	C(3.8)	EL-2	3.8	2	2	Coliform		

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BASIN #8(continued)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
8-8	Stevens Branch-Williamstown to Jail Branch(Barre)	C(2.0)* B	EL-1	6	0			Potential toxics problem-recommend Class C zone be shortened to approximately 2 miles from 5.2 miles to reflect operational secondary facility.
8-9	Stevens Branch-Jail Branch (Barre) to Winooski R.	C(6.0)	WQ-1	6	3	D.O. Coliform	Municipal Waste Combined Sewers & Stormwater Overflow	Water quality survey completed for assimilative capacity. Wasteload allocation underway.
8-10	Dog R.-Northfield to Winooski R.	C(1.0)* B	EL-1	10	0			Recommend Class C zone be shortened to 1 mile from 10 miles to reflect operational secondary facility.
8-11	Waterbury R.-Stowe to Winooski R.	C(1.3)* B	WQ-1	12	0		Phosphorus	AWT facility with phosphorus removal operational. Recommend Class C zone be shortened from 4.5 miles to 1.3 miles.
8-12	Alder Brook-Essex Center to Winooski R.	B	EL-2	3	2	Coliform	Municipal Waste	Existing treated discharge to be eliminated by connection to upgraded Essex Jct. facility.
8-13	Allen Brook-Williston to Winooski R.	C(5.0) B	EL-2	6	6	Coliform	Municipal Waste (Untreated)	Municipal waste to be treated at upgraded Essex Jct. facility.

* indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(Cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: WHITE (BASIN #9)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
9-1	White R.-Rochester to Third Branch	B	WQ-2	18	2	Coliform	Municipal Waste	Failed municipal subsurface system.
9-2	White R.-Third Branch (Bethel) to First Branch	C(3.0) B	EL-2	8	4	Coliform	Municipal Waste (untreated)	
9-3	White R.-First Branch (So. Royalton) to Connecticut R.	C(1.4) B	EL-1	19	0			
9-4	Third Branch-Randolph to White R.	C(1.2) B	EL-1	8	0			
9-5	First Branch-Chelsea to White R.	C(2.0) B	EL-1	16	0			

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: OTTAUQUECHEE-BLACK (BASIN #10)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.		W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
10-1	Ottauquechee R.-Killington Recreation Area to Bridgewater Corners	C(2.0) B	EL-2	10	5	2	Coliform	Domestic Waste	Seasonal Class C zone 11/1 to 5/31.
10-1A	Ottauquechee R.-Bridgewater Corners to Woodstock	C(2.0) B	EL-1	6	0				
10-2	Ottauquechee R.-Woodstock to Deweys Mills Pond	C(3.0) B	EL-2	10	4	3	Coliform	Municipal Waste	
10-3	Ottauquechee R.-Deweys Mills Pond to Conn. R.	C(0.9) B	EL-1	5	0				
10-4	Kedron Brook-S. Woodstock to Ottauquechee R.	C(2.0) B	EL-1	6	0				
10-5	Black R.-Ludlow to Cavendish	C(1.5)* B	EL-1	6	0				Recommend Class C zone be shortened to 1.5 miles from 6 mi. to reflect operational secondary facility.
10-6	Black R.-Cavendish to North Springfield Reservoir	C(2.0)* B	EL-1	12	0				Recommend Class C zone be shortened to approx. 2 miles from 9.5 miles to reflect operational secondary facility.
10-7	Black R.-North Springfield Reservoir to Springfield	C(4.5)*	EL-2	4.5	4	4	Coliform	Municipal Waste Dairy Waste	Present proposal is to convey waste from No. Springfield to Springfield. Recommend elimination of existing Class C zone for No. Springfield upon completion of Springfield/ No. Springfield project.

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: BASIN #10(continued)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES TOTAL	VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
10-8	Black R.-Springfield to Conn. R.	C(3.7)	WQ-1	3.7	0		Industrial Waste Possible Toxic Waste Combined Sewer & Stormwater Overflow	Classification status is tentative. Assimilative capacity study to be performed after construction of proposed hydro facility. Recommend shortening Class C zone to accommodate discharge from Springfield.

Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: WEST-WILLIAMS-SAXTONS (BASIN #11)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES TOTAL	VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
11-1	Williams R.-Middle Branch (Chester) to Conn. R.	C(2.0) B	EL-1	12	0			
11-2	Saxtons R.-Saxtons R. to North Westminster	C(2.0) B	EL-1	14	0			Proposed hydro project requires bonding for phosphorus removal at Saxtons River facility.
11-3	Saxtons R.-North Westminster to Conn. R.	B	EL-2	2	2	Coliform	Municipal & Wood Product Waste	
11-4	West R.-Londonderry to Ball Mountain Dam	B	Upland	10	0			
11-5	West R.-Ball Mountain Dam to Townshend Dam	B	Upland	8	0			
11-6	West R.-Townshend Dam to Conn. R.	B	Upland	18	0			
11-7	No Name Brook-Magic Mountain Inc. to South Londonderry	B	WQ-2	4	2	Coliform	Domestic Waste	
11-8	Mill Brook & Winhall R.-Bromley Ski Area to West R.	B	Upland	9	0			
11-9	No. Branch & Ball Mountain Brook-Stratton Corp. to West R.	B	Upland	9	0			

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: DEERFIELD (BASIN #12)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	CLASSIFICATION[1] STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	SEGMENTED STREAM MILES VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
12-1	No. Branch, Deerfield R.- Snow Lake to Wilmington	B	Upland	9	0			
12-2	No. Branch, Deerfield R.- Wilmington to Readsboro	C(1.0) B	EL-2	12	2		Municipal Waste (Primary treatment)	
12-3	Deerfield R.-Readsboro to Mass. State Line	C(1.0) B	EL-1	4	0			
12-4	East Branch, North R.- Jacksonville to Mass. State Line	C(1.4) B	EL-1	9	0			New secondary municipal facility made operational.

Refer to key for explanation (1),(2).

TABLE 14(cont.)
1982
WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: LOWER CONNECTICUT -MILL BROOK (BASIN #13)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION (1) USE	STATUS	SEGMENTED STREAM MILES TOTAL	VIOLATED W.Q.S.		W.Q.S. (2) VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
13-1	Conn. R.-Wilder Dam to Windsor	C(2.6) B	EL-2	15	5	2.6	D.O. Coliform	Municipal & Industrial Waste	
13-2	Conn. R.-Windsor to Bellows Falls	C(1.7) B	EL-2	27	1	1	Coliform	Municipal & Industrial Waste Combined Sewers & Stormwater Overflows in Bellows Falls	
13-3	Conn. R.-Bellows Falls to Brattleboro	C(1.6) B	EL-2	21	2	1.6	Coliform	Municipal & Industrial Waste	
13-4	Conn. R.-Brattleboro to Ashuelot R.	C(2.3) B	EL-2	10	5	2.3	D.O. Coliform	Municipal & Industrial Waste	
13-5	Conn. R.-Ashuelot R. to Mass. State Line	B	EL-2	6	1		D.O. Coliform	Municipal & Industrial Waste	
13-6	Sacketts Brook-Putney to Conn. R.	C(1.3) B	EL-1	2	0			Industrial Waste	

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: STEVENS-WELLS-WAITS-OMPOMPANOOSUC (BASIN #14)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION USE	CLASSIFICATION STATUS[1]	SEGMENTED STREAM MILES VIOLATED TOTAL	SEGMENTED STREAM MILES VIOLATED W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
14-1	Wells R.-South Ryegate to Conn. R.	C(1.0)* B	EL-1	7	3			Recommend shortening Class C zone to 1.0 mi. from 4.0 mi. Facility to become operational during 1982.
14-2	Stevens R.-Barnet to Conn. R.	B	EL-1	1	0			
14-3	Trib. to Ompompanoosuc R.-Ely Mine to Main Stem	B	WQ-1	2	1	Potential Heavy Metals, pH	Mine Drainage	No action contemplated at this time to correct mine drainage.
14-4	Copperas Brook & West Branch of Ompompanoosuc-Elizabeth Mine to Main Stem	B	WQ-1	5	5	Potential Heavy Metals, pH	Mine Drainage	No action contemplated at this time to correct mine drainage.
14-5	Waits R.-Bradford upstream municipal boundary to mouth	C(0.9) B	EL-1	2	0			

*indicates a proposed or recommended Class C zone different from what currently exists.
Refer to Key for explanation (1), (2).

TABLE 14(cont.)

1982
WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: PASSUMPSIC (BASIN #15)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.	W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
15-1	East Branch, Passumpsic R.-East Haven to West Branch	C(1.2) B	EL-1	12	0			
15-2	Passumpsic R.-West Branch to St. Johnsbury Center	C(5.3) B	EL-1	11	0			
15-3	Passumpsic R.-St. Johnsbury Center to Conn. R.	C(4.8) B	EL-2	12	8 4.8	Coliform	Municipal, Combined Sewer Overflow & Stormwater	Primary municipal facility requiring upgrade.
15-4	Moose R.-East St. Johnsbury to Passumpsic R.	C(1.1) B	EL-2	5	4 1.1	Coliform	Municipal Waste	
15-5	Water Andric Brook-Danville to Passumpsic R.	C(3.8) B	WQ-1	7	2 2.0	D.O.	Municipal Waste	

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982
WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: UPPER CONNECTICUT-NULHEGAN-WILLARD STREAM-PAUL STREAM (BASIN #16)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION[1] USE	STATUS	SEGMENTED STREAM MILES VIOLATED TOTAL	W.Q.S.		W.Q.S.[2] VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
16-1	Conn. R.-Canada Line to Upper Ammonoosuc	C(2.0) B	EL-1	48	0				
16-2	Conn. R.-Upper Ammonoosuc to Comerford Dam	C(0.9) B	WQ-1	44	44	.9	D.O. Coliform	Municipal & Industrial Waste, Benthic Demand	
16-3	Conn. R.-Comerford Dam to Wells R.	B	EL-2	15	2		D.O. Coliform	Municipal & Industrial Waste	
16-4	Conn. R.-Wells R. to Bradford	C(2.2) B	EL-2	18	2	2	Coliform	Municipal Waste	
16-5	Conn. R.-Bradford to Wilder Dam	C(0.9) B	EL-1	32	2	.9			

Refer to key for explanation (1),(2).

TABLE 14(cont.)

1982

WATER QUALITY INVENTORY SUMMARY OF SEGMENTED RIVER MILES

RIVER: LAKE MEMPHREMAGOG-BLACK-BARTON-CLYDE-COATICOOK (BASIN #17)

SEGMENT NUMBER	SEGMENT DESCRIPTION	CLASSIFICATION (1) USE	STATUS	SEGMENTED STREAM MILES TOTAL	VIOLATED W.Q.S.	W.Q.S. (2) VIOLATED	WATER QUALITY PROBLEM	CURRENT STATUS
17-1	Clyde R.-Island Pond to Derby Center	C(2.0) B	WQ-1	21	0		Phosphorus Nonpoint Agricultural	
17-2	Clyde R.-Derby Center to Lake Memphremagog	C(0.25) B	WQ-1	5	4 .25		Municipal Wastes Phosphorus	New secondary facility with phosphorus removal to begin construction Summer 1982.
17-3	Lake Memphremagog (Vt. Portion)	B	WQ-1	Lake	-		Phosphorus Combined Sewers & Stormwater Overflow	
17-4	Barton R.-Glover to Barton	B B	WQ-1	4	0		Phosphorus Nonpoint Agricultural	
17-5	Barton R.-Barton to Lake Memphremagog	C(4.7) B	WQ-1	15	0		Phosphorus Nonpoint Agricultural	Two new secondary facilities (Barton & Orleans) with phosphorus removal operational summer 1981. Recommend shortening Class C zone.
17-6	Tomifobia R.-Vt. Line to Canada Line	C (0.25)	EL-2	1	0	Coliform		Derby Line municipal waste being conveyed to Beebe Plains Quebec effective May 1982.
17-7	Black R.-Albany to Lake Memphremagog	B	Upland	21	0		Phosphorus Nonpoint Agricultural	

Refer to key for explanation (1),(2).

83.85

TABLE 15

STATE OF VERMONT
SUMMARY OF WATER QUALITY
FOR SEGMENTED RIVER MILES
1982

MAJOR WATER AREAS INCLUDING MAINSTEM AND MAJOR TRIBS.	TOTAL MILES ASSESSED	MILES NOW MEETING STATE WATER QUALITY STANDARDS	MILES NOT MEETING STATE WATER QUALITY STANDARDS	WATER QUALITY* PROBLEMS	SOURCE OF WATER QUALITY PROBLEM M = MUNICIPAL I = INDUSTRIAL CS = COMBINED SEWERS NPS = NONPOINT SOURCE
Basin 1-Battenkill, Walloomsac, Hoosic	47	30	17	5, 6	M, I, CS
Basin 2-Poultney, Mettawee	44	41	3	5, 6	M, NPS
Basin 3-Otter Creek	85	79	6	3, 5, 6	M, CS, NPS
Basin 4 and 5-Lake Champlain and Tributaries	23	13	10	2, 3, 5	M, I, CS, NPS
Basin 6-Missisquoi	93	85	8	3, 5, 6	I, CS, NPS
Basin 7-Lamoille	97	97	0	3	
Basin 8-Winooski	116	99	17	2, 3, 5, 6	M, I, CS, NPS
Basin 9-White	69	63	6	6	M, CS
Basin 10-Ottauquechee, Black	63	50	13	1, 6	M, I, CS
Basin 11-West, Williams, Saxtons	86	82	4	6	M
Basin 12-Deerfield	34	32	2	6	M

*WATER QUALITY PROBLEMS - 1 Harmful substances
2 Physical modification(suspended solids,temp.,etc)
3 Eutrophication potential
4 Salinity, acidity, alkalinity
5 Oxygen depletion
6 Health hazards -(coliform)

TABLE 15 (cont.)

STATE OF VERMONT
SUMMARY OF WATER QUALITY
FOR SEGMENTED RIVER MILES
1982

MAJOR WATER AREAS INCLUDING MAINSTEM AND MAJOR TRIBS.	TOTAL MILES ASSESSED	MILES NOW MEETING STATE WATER QUALITY STANDARDS	MILES NOT MEETING STATE WATER QUALITY STANDARDS	WATER QUALITY* PROBLEMS	SOURCE OF WATER QUALITY PROBLEM M = MUNICIPAL I = INDUSTRIAL CS = COMBINED SEWERS NPS = NONPOINT SOURCE
Basin 13 and 16-Upper and Lower Connecticut	238 ✓	174	64	2, 6	M, I, CS, NPS
Basin 14-Stevens, Wells, Waits, Ompompanoosuc	17 16 -1	8	9	1, 4, 6	NPS
Basin 15-Passumpsic	47 ✓	33	14	5, 6	M, CS
Basin 17-Lake Memphremagog, Black, Barton and Clyde	67 ✓	63	4	2, 3, 6	M, CS, NPS
TOTAL MILES	1126	949	177		
% OF MILES ASSESSED		84	16		

*WATER QUALITY PROBLEMS - 1 Harmful substances
2 Physical modification (suspended solids, temp., etc)
3 Eutrophication potential
4 Salinity, acidity, alkalinity
5 Oxygen depletion
6 Health hazards - (coliform)

APPENDIX A

MUNICIPAL DISCHARGE INVENTORY
April 1982

APPENDIX A

BASIN #	1	1	2
SEGMENT #	1-4	1-7	2-2
STREAM	Walloomsac River	Battenkill River	Poultney River
SEGMENT DESIGNATION	WQ-1	EL-1	EL-1
MUNICIPALITY	Bennington Town*	Manchester Town	Poultney Village
FLOW (DESIGN/ACTUAL) gpd	4.000/4.999	.600/.513	.300/.238
YEAR CONSTRUCTED	1961	1978	1971
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary dual digesters	Secondary aerated lagoon	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1048 7-1-77 Exp'd (A of D)	DP#3-1153 6-30-84 Exp'd	DP#3-1141 10-31-83
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Upgrading primary STP	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing)			
I. Prel. Planning & Design	Final design underway	Completed	Completed
II. Final Planning & Design			
III. Construction			
OPERATION & MAINTENANCE STATUS			
-date of last inspection	12-8-81	7-37-81	12-14-81
-significant problems	unacceptable high Coliform	acceptable	acceptable
PRETREATMENT FACILITIES			
Name	1) Catamount Dyers	Textile dying wastes	
Nature of Waste		Flow- none specified	will have flow limitation
Flow gpd		in new permit	
(repeat for each facility)	2) Johnson Controls Inc. (Globe Union)	Neutralized Industrial wastewater. Flow of effluent limits on	(Lead-acid Battery mfg 0.30 MGD daily max total lead only.
	3) Union Carbide Corp.	Lead plating discharge (Battery mfg) Flow of 0.22 MGD daily max Effluent limits on time.	total lead only at this
NOTES:			
*Major Municipal Facility			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	2	2	2
SEGMENT #	2-5	2-5	2-6
STREAM	Castleton River	Castleton River	Trib. to Hubbardton R.
SEGMENT DESIGNATION	EL-1	EL-1	EL-1
MUNICIPALITY	Fair Haven Town	Castleton Town	Benson Town
FLOW (DESIGN/ACTUAL) gpd	.200/.238	.360/.123	.0175/.003
YEAR CONSTRUCTED	1970	1971	1973
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary oxidation canal	Secondary extended aeration	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1008 Exp'd 7-1-77 (A of D)	DP#3-1160 4-30-84 Exp'd	DP#3-1166 5-1-84 Exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Upgrading STP	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Final design underway	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	12-14-81 acceptable	12-14-81 acceptable	5-20-80 high Coliform high BOD
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		1)Wilson Photo Finishing DP#3-0304 Photo Finishing process wastes 0.004 MGD daily avg.	
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN	3	3	3
SEGMENT #	3-2	3-3	3-3
STREAM	Otter Creek	Otter Creek	Otter Creek
SEGMENT DESIGNATION	EL-1	WQ-1	WQ-1
MUNICIPALITY	Wallingford Town	Rutland City *	Rutland Town
FLOW (DESIGN/ACTUAL) gpd	.090/.097	5.000/5.615	.0224/.027
YEAR CONSTRUCTED	1973	1963	1966
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary oxidation canal	Primary dual digesters	Primary clarigester
PERMIT STATUS Type - TPP or DP Expiration Date	Amended DP#3-0365 6-30-85 Exp'd	Amended TPP#1054 Exp'd 7-1-77 (A of D)	Amended TPP#4-1041 Exp'd 7-1-77 (A of D)
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Complete	Upgrade Primary STP	Upgrade Primary STP
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Final disign under-way	Preliminary planning underway
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	1-9-80 Conditional high Coliform	5-7-81 Conditional high Coliform	5-6-81 Conditional high BOD, high Coliform
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		1) General Electric Company Combined sanitary and industrial (plating rinsewater)- Flow of 0.500 MGD (daily avg.) permitted. 2) VT. Plating Inc. Combined sanitary and industrial (plating rinsewater) - monitoring only	
NOTES: *Major Municipal Facility			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	3	3	3
SEGMENT #	3-3	3-4	3-6
STREAM	Otter Creek	Furnace Brook	Otter Creek
SEGMENT DESIGNATION	WQ-1	EL-1	EL-2
MUNICIPALITY	Proctor Town	Pittsford Town	Middlebury Town*
FLOW (DESIGN/ACTUAL) gpd	.226/.254	.070/.047	1.003/.640
YEAR CONSTRUCTED	1962	1970	1975 1981
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary single digester	extended aeration	Primary rotating biological contactor (D.O-Chem.)
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1032 Exp'd 8-31-79 (no A of D)	DP#3-1189 9-30-85 exp'd	Amended TPP#4-1138 * * 12-26-81
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Upgrading primary STP	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning completed-final design not started	Completed	New Secondary facility recently completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	5-12-81 conditional high Coliform & setteable solids	5-12-81 conditional high BOD, Coliform, TSS	10-14-80 unacceptable high Bod operations-upgrade
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			1)Kraft Foods Cheesemaking wastes Flow of 0.20 MGD daily average
NOTES: *Major Municipal Facility **New Municipal DP on notice 3-31-87 expiration			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	3	3	3
SEGMENT #	3-7	3-8	3-9
STREAM	Otter Creek	Clarendon River	Neshobe River
SEGMENT DESIGNATION	EL-1	EL-1	EL-1
MUNICIPALITY	Vergennes Town	W. Rutland Town	Brandon Town
FLOW (DESIGN/ACTUAL) gpd	.500/.427	.250/.263	.700/.236
YEAR CONSTRUCTED	1980	1972	1975
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Tertiary aerated lagoon	Secondary extended aeration	Secondary oxidation canal
PERMIT STATUS Type - TPP or DP Expiration Date	Amended DP#3-0368 5-31-85 exp'd	DP#3-1159 3-31-84 exp'd	DP#3-1196 7-1-85 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	12-30-81 acceptable	5-20-81 conditional high Coliform	5-18-81 conditional potential washout
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1) Simmonds Precision Instrument Systems Division Combined plating rinse & sanitary wastewater Flow of 0.120 MGD daily max.		
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	4	5	5
SEGMENT #	4-2	5-1	5-2
STREAM	East Creek	Laplatte River	McCabes
SEGMENT DESIGNATION	WQ-1	WQ-1	WQ-1
MUNICIPALITY	Orwell Town	Hinesburg Town	Shelburne FD #2
FLOW (DESIGN/ACTUAL) gpd	.0325/.014	.250/.073	.450/.199
YEAR CONSTRUCTED	1977	1968	1975
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary aerated lagoon	Secondary aerated lagoon	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1120 11-30-82 exp'd	DP#3-1172 1-1-85 exp'd	TPP #4-1150 exp'd 3-31-81
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY (upgrading, P-removal, sewer separation, etc)	Complete	Complete	Phosphorus removal
STATUS OF PLANNING ACTIVITY (complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Preliminary planning underway
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	1-3-79 acceptable	8-8-79 unacceptable high BOD & TSS	9-10-81 conditional no TKN
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		1) International Cheese Co., Inc. 04-07-003 Cheesemaking process wastes Flow of 0.065 MGD daily max.	1) Shelburne Industries, Inc. 04-13-005 Plating process wastes Batch discharge-approx. 1200 gallons at about 200 gal/hr.
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	5	5	5
SEGMENT #	5-3	5-4	5-4
STREAM	Stevens Brook	Shelburne Bay	Shelburne Bay
SEGMENT DESIGNATION	WQ-1	WQ-1	WQ-1
MUNICIPALITY	St. Albans City *	Sehlburne FD #1	S. Burl.-Bartletts Bay
FLOW (DESIGN/ACTUAL) gpd	4.000/2.947	.250/.212	.700/.491
YEAR CONSTRUCTED	1961	1978	1972
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary trickling filter	Secondary extended aeration	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1132 5-31-83 exp'd	TPP#4-1154 exp'd 3-31-81	Amended TPP#4-1120 exp'd 6-30-81
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Upgrade STP, Phosphorus removal	Phosphorus removal	Phosphorus removal
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Preliminary planning underway	Preliminary planning underway
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-14-81 conditional bypass lagoon high Coliform	9-9-81 unacceptable operations	9-9-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1) Fonda Container Div. Printing roll wastewater No flow limit - avg. 400-400 gal/day. 2) St. Albans Co-op Creamery Combined processing & sanitary wastes 3) Union Carbide Corp. Metal plating process wastes Flow of 0.100 MGD daily max. 4) Agri-mark (H.P. Hood) Dairy processing & sanitary wastes Flow of 0.250 MGD daily max.		
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	5	5	6
SEGMENT # STREAM	5-5 Burlington Harbor	5-7 Main Lake	6-1 Missisquoi River
SEGMENT DESIGNATION	WQ-1	WQ-1	EL-2
MUNICIPALITY	Burlington-Main *	Alburg Village	N. Troy Village
FLOW (DESIGN/ACTUAL) gpd	4.000/2.987	.030/.05	.110/1.073
YEAR CONSTRUCTED	1973	1980	1977
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary conventional activated sludge	Tertiary aerated lagoon	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date			
CONNECTION POLICY Restrictions-Yes/No)			
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Phosphorus removal	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-27-80 acceptable sludge going over weirs	10-6-81 acceptable operational problem	1-12-79 condtional high Coliform
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1) The Edlund Co., Inc. Metal cleaning & plating (nickel) rinsewater monitoring only - no flow limit specified 2) General Electric Company Plating line rinsewater - 0.075 MGD daily avg. Aluminum process waste water - 0.050 MGD daily mas flow permitted.		
NOTES:			

* Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	6	6	6
SEGMENT #	6-2	6-3	6-4
STREAM	Missisquoi River	Missisquoi River	Missisquoi River
SEGMENT DESIGNATION	EL-2	EL-1	EL-1
MUNICIPALITY	Richford Village	Enosburg Falls	Sheldon Tn. (Sheldon Spr.)
FLOW (DESIGN/ACTUAL) gpd	.250/.260	.256/.304	.054/.0324
YEAR CONSTRUCTED	1971	1976	1976
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary aerated lagoon	Secondary extended aeration	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1147 exp'd 3-31-84	TPP#3-1142 exp'd 10-1-81	Amended DP#3-1108 12-1-86 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Sewer separation	Complete
PURPOSE OF PLANNING ACTIVITY (upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY (complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Final design underway	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-10-81 acceptable	10-10-81 unacceptable pump station bypass	10-20-81 unacceptable operational problems sludge in chlorine contact tank operation data missing
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		Franklin County Cheese DP#3-1055 expd. 5-1-80 Combined sanitary & industrial (cheese processing) wastes Flow of 0.065 MGD daily max. permitted Second (unmetered) discharge needs to be tied into monitoring pit.	
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	6	7	7
SEGMENT #	6-5	7-1	7-2
STREAM	Missisquoi River	Lamoille River	Lamoille River
SEGMENT DESIGNATION	WQ-1	EL-1	EL-1
MUNICIPALITY	Swanton Village*	Hardwick Village	Morrisville Village
FLOW (DESIGN/ACTUAL) gpd	.900/.700	.400/.221	.425/.300
YEAR CONSTRUCTED	1973	1980	1974
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary nonaerated facultative lagoon	Secondary aerated lagoon	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1121 exp'd 6-30-81	DP#3-1143 4-30-84 exp'd	DP#3-1155 6-30-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	Yes	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Phosphorus removal	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning complete-final design not started	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-6-81 unacceptable high BOD & Coliform	12-20-79 unacceptable monitoring data	6-30-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1) Lucille Farm Products Inc. Combined sanitary and cheese process clean-up Flow of 0.016 MGD to Swanton WWTF permitted. 2) Swanton Packing Inc. Meatpacking process wastewater Flow of 0.006 MGD (daily avg.) to Swanton WWTF permitted. 3) Vt. Meat Packers (no permit)		
NOTES: *Major Municipal Facility			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	7	7	7
SEGMENT #	7-4	7-5	7-6
STREAM	Gihon River	Lamoille River	Lamoille River
SEGMENT DESIGNATION	EL-1	EL-1	WQ-1
MUNICIPALITY	Johnson Village	Fairfax Town	Milton Town
FLOW (DESIGN/ACTUAL) gpd	.200/.128	.070/.0213	.225/.118
YEAR CONSTRUCTED	1973	1980	1980
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary aerated lagoon	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1149 4-30-84 exp'd	DP#3-1194 6-30-85 exp'd	DP# 9-1-86 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Complete	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	6-30-81 acceptable	11-14-80 acceptable	10-5-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	8	8	8
SEGMENT #	8-1	8-2	8-5
STREAM	Winooski River	Winooski River	Winooski River
SEGMENT DESIGNATION	EL-1	EL-1	EL-1
MUNICIPALITY	Marshfield	Plainfield	Waterbury Village
FLOW (DESIGN/ACTUAL) gpd	0.047/.0155	.100/.059	.250/.261
YEAR CONSTRUCTED	1980	1969	1979
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary aerated lagoon	Secondary extended aeration	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1195 6-30-85 exp'd	DP#3-0381 8-1-86 exp'd	DP#3-1160 7-31-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	6-24-81 unacceptable high BOD & Coliform	10-1-81 conditional high Coliform	8-27-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	8	8	8
SEGMENT #	8-5	8-6	8-6
STREAM	Winooski River	Winooski River	Winooski River
SEGMENT DESIGNATION	EL-1	WQ-1	WQ-1
MUNICIPALITY	Richmond Village	Essex Town	Essex Jct. Village
FLOW (DESIGN/ACTUAL) gpd	.222/.130	.100/.114	1.250/.958
YEAR CONSTRUCTED	1972	1960	1975
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Primary clarigester	Primary single digester
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1173 8-1-84 exp'd	Amended TPP#4-1140 6-30-02 exp'd	Amended TPP#4-1139 2-28-83 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	Yes	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Complete	Upgrade of primary STP Phosphorus removal	Upgrade of primary STP Phosphorus removal
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Final design complete-awaiting construction funds	Final design complete; awaiting construction
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	5-27-81 conditional high BOD, TSS, Coliform	9-1-81 unacceptable high Coliform operational problems	9-1-81 conditional high Coliform
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1) Richmond Co-op and Assoc. Inc. Combined dairy waste & sanitary waste Flow of 0.075 MGD (daily max) permitted.		
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	8	8	8
SEGMENT #	8-6	8-6	8-6
STREAM	Winooski River	Winooski River	Winooski River
SEGMENT DESIGNATION	WQ-1	WQ-1	WQ-1
MUNICIPALITY	Colchester FD#1	So. Burl. Airport Pky.*	Burl.-Riverside*
FLOW (DESIGN/ACTUAL) gpd	.310/.214	1.200/.923	1.000/.703
YEAR CONSTRUCTED	1969	1966	1972
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Primary dual digesters	Secondary conventional activated sludge
PERMIT STATUS Type - TPP or DP Expiration Date	TPP#4-1122 exp'd 6-30-81	Amended TPP #4-1145 7-1-83 exp'd	Amended TPP 4-1125 exp'd 6-30-81
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Phosphorus removal	Upgrade primary STP, Phosphorus removal	Phosphorus removal
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Preliminary planning underway	Preliminary planning underway
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	9-8-81 conditional operational problems	9-8-81 acceptable	10-27-80 acceptable high flow & filamentious problems
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY

April 1982

BASIN #	8	8	8
SEGMENT #	8-6	8-6	8-7
STREAM	Winooski River	Winooski River	Jail Branch
SEGMENT DESIGNATION	WQ-1	WQ-1	EL-2
MUNICIPALITY	Winooski Town*	Burl.-North End*	Barre Town (E. Barre)
FLOW (DESIGN/ACTUAL) gpd	1.200/.726	2.000/1.202	.200/.12
YEAR CONSTRUCTED	1971	1973	1965
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary conventional activated sludge	Primary Clarigester
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP #4-1129 9-30-82 exp'd	TPP#4-1124 exp'd 6-30-81	Amended TPP #4-1025 exp'd 7-1-77 (A of D)
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Phosphorus removal	Phosphorus removal	Upgrade primary STP
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Preliminary planning complete, final design not started	Preliminary planning complete, final disign not started
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	11-24-81 acceptable	12-28-80 acceptable	9-21-78 conditional high BOD, Coliform
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1)New England Carpet Co. Dyehouse & sanitary wastes Flow of 0.350 MGD daily max.		
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	8	8	8
SEGMENT #	8-7 Unnamed Trib.	8-8	8-9
STREAM	to Jail Branch	Fox Run Br.	Steven's Branch
SEGMENT DESIGNATION	EL-2	EL-1	WQ-1
MUNICIPALITY	Barre Tn(Websterville)	Williamstown	Barre City*
FLOW (DESIGN/ACTUAL) gpd	.010/NA	.150/.079	3.800/2.42
YEAR CONSTRUCTED	1965	1971	1973
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary imhoff cone	Secondary aerated lagoon	Secondary conventional activated sludge
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1057 7-1-77 (A of D)	DP#3-1176 3-31-84 exp'd	Amended DP#3-1145 3-31-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Upgrade primary STP	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning completed final design not started	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	no controls	9-30-80 high BOD, TSS & Coliform	8-26-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		1)Interstate Uniform Service Corp. Process waste (Industrial laundry) and sanitary wastes combined Flow of 0.100 MGD (daily max) permitted.	
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	8	8	8
SEGMENT #	8-9	8-10	8-10
STREAM	Stevens Br.	Dog River	Dog River
STATION LOCATION	WQ-1	EL-1	EL-1
MUNICIPALITY	Berlin Town	Northfield Village*	Montpelier*
FLOW (DESIGN/ACTUAL) gpd	.250/.154	1.630/.788	2.200/2.145
YEAR CONSTRUCTED	1966	1967	1981
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary trickling filter	Secondary conventional activated sludge
PERMIT STATUS Type - TPP or DP Expiration Date	TPP#4-1168 7-1-83 exp'd	DP#3-1158 5-31-84 exp'd	DP#3-1207 12-1-86 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)	Upgrade STP	Complete	Complete
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Final design underway	Complete	Complete
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	8-15-79 acceptable	1-5-82 acceptable	11-21-78 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			

NOTES:

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN	8	9	9
SEGMENT #	8-11	9-3	9-3
STREAM	Waterbury River	White River	White River
CLASSIFICATION	WQ-1	EL-1	EL-1
MUNICIPALITY	Stowe Town	Royalton Town	Hartford (White R. Jct)
FLOW (DESIGN/ACTUAL) gpd	.161/.147	.07/.019	.97/.462
YEAR CONSTRUCTED	1980	1978	1977
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Tertiary oxidation canal	Secondary aerated lagoon	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-0367 5-31-85 exp'd	DP#3-1165 11-30-84 exp'd	DP#3-1133 3-31-83 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	8-28-81 acceptable	8-28-81 acceptable	9-9-81 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			

NOTES:

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	9	9	10
SEGMENT # STREAM	9-4 Third Branch White River	9-5 First Branch White River	10-1 Ottauquechee River
CLASS DESIGNATION	EL-1	EL-1	EL-2
MUNICIPALITY	Randolph Village	Chelsea Town	Bridgewater Town
FLOW (DESIGN/ACTUAL) gpd	.320/.286	.055/.035	.043/.0076
YEAR CONSTRUCTED	1974	1975	1978
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary extended aeration	Septic Tank rotating biological contactor
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1198 9-30-85 exp'd	DP#3-1197 6-30-85 exp'd	DP#3-1156 6-30-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	Yes	No	No
FACILITIES PLANNING			
PURPOSE OF PLANNING ACTIVITY (upgrading, P-removal, sewer separation, etc)	Upgrade STP	Complete	Complete
STATUS OF PLANNING ACTIVITY (complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-16-81 unacceptable high flows & operational & maintenance problems	4-2-79 conditional	4-9-80 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	10	10	10
SEGMENT #	10-2	10-2	10-3
STREAM	Ottauquechee River	Ottauquechee River	Ottauquechee River
SEGMENT DESIGNATION	EL-2	EL-2	EL-1
MUNICIPALITY	Woodstock Town	Woodstock (Taftsville)	Hartford (Quechee)
FLOW (DESIGN/ACTUAL) gpd	.250/.185	.010/.008	
YEAR CONSTRUCTED	1963	1973	1974
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary extended aeration	Secondary Super Primary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1141 7-31-82 exp'd		DP33-1185 10-1-85 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No		No
FACILITIES PLANNING	Upgrade STP	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Construction under-way	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	4-4-81 operational & main-tenance problems high BOD & Coliform	4-4-81 operational & main-tenance problems high BOD	3-31-78 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	10	10	10
SEGMENT #	10-4	10-5	10-6
STREAM	Kedron Brook	Black River	Black River
SEGMENT [illegible]	EL-1	EL-1	EL-1
MUNICIPALITY	Woodstock (South)	Ludlow Village	Cavendish Town
FLOW (DESIGN/ACTUAL) gpd	.050/.016	.600/.368	.100/.077
YEAR CONSTRUCTED	1968	1971	1975
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary oxidation canal	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1178 12-31-84 exp'd	DP#3-1208 12-31-86 exp'd	DP#3-1205 6-1-86 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Upgrade STP	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Preliminary planning underway	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	4-4-81 high Coliform & BOD operational & maintenance problems	10-16-81 acceptable	4-1-80 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	10	10	11
SEGMENT #	10-7	10-8	11-1
STREAM	Black River	Black River	Williams River
SEGMENT DESIGNATION	EL-2	WQ-1	EL-1
MUNICIPALITY	Springfield (N.Spring)	Springfield Town*	Chester Town
FLOW (DESIGN/ACTUAL) gpd	.101/.111	1.900/1.111	.170/.083
YEAR CONSTRUCTED	1970	1961	1971
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary oxidation canal	Primary dual digesters	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1193 6-1-85 exp'd	DP#3-1154 12-31-83 exp'd	Amended DP#3-1177 6-1-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Completed	Completed	Completed
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	4-9-80 acceptable	4-15-81 acceptable	7-75-79 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1)Vt. Research Corp Final (plating) rinse tank discharge Flow of 0.00285 MGD monthly avg. allowed	1)Jones & Lamson Machine coolant 60 gallons/day daily avg. permitted.	
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	11	12	12
SEGMENT #	11-2	12-2 N. Branch &	12-3
STREAM	Saxtons River	Deerfield River	Deerfield River
SEGMENT DESIGNATION	EL-1	EL-2	EL-1
MUNICIPALITY	Saxtons R. Village	Wilmington Town	Readsboro
FLOW (DESIGN/ACTUAL) gpd	.105/.035	.070/.064	.075/.017
YEAR CONSTRUCTED	1972	1965	1980
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary oxidation canal	Primary clarigester	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1167 5-1-84 exp'd	Amended TPP#4-1056 exp'd 7-1-77 (A of D)	TPP#4-1167 exp'd 8-1-81
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Upgrade primary STP	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Complete	Final design under-way	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	5-8-79 conditional high Coliform	11-20-79 acceptable	5-29-80 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	13	13	13
SEGMENT #	13-1	13-2	13-2
STREAM	Conn. River	Conn. River	Conn. River
CLASSIFICATION	EL-2	EL-2	EL-2
MUNICIPALITY	Hartford (Wilder)	Windsor Town*	Windsor (Weston Hts.)
FLOW (DESIGN/ACTUAL) gpd	.400/.238	1.300/.413	.015/.0116
YEAR CONSTRUCTED	1965	1967	1972
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary single digester	Primary dual digesters	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1073 7-1-77 (A of D)	Amended TPP#4-1052 Exp'd 7-1-77 (ECSL)	DP#3-1168 8-1-84 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Upgrade primary STP	Upgrade primary STP	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Preliminary planning Underway	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	7-1-79 acceptable	4-14-81 Unacceptable high Coliform Cl_2 operational & maintenance problems	3-15-78 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1)Billings Dairy Inc., Dairy Waste (Monitoring only)		
NOTES: *Major Municipal Facility			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	13	13	13
SEGMENT #	13-3	13-4	13-6
STREAM	Conn. River	Conn. River	Sacketts Brook
SEGMENT CLASSIFICATION	EL-2	EL-2	EL-1
MUNICIPALITY	Bellows Falls Village*	Brattleboro Town*	Putney Town
FLOW (DESIGN/ACTUAL) gpd	1.500/.554	2.500/2.009	.08/.0191
YEAR CONSTRUCTED	1962	1974	1976
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary dual digesters	Primary dual digester -Chem.	Secondary extended aeration
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1028 Exp'd 7-1-77 (A of D	TPP#4-1163 11-1-83 exp'd	DP#3-1114 Exp'd 1-1-82
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING PURPOSE OF PLANNING ACTIVITY (upgrading, P-removal, sewer separation, etc)	Upgrade primary STP	Upgrade Primary STP	Complete
STATUS OF PLANNING ACTIVITY (complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Preliminary planning underway	Preliminary planning	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	9-23-81 operational problems	4-29-81 unacceptable high BOD, TSS, Coliform	4-16-80 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)	1)Mountain Paper Products Corp. Papermaking waste-water Flow of 0.100 MGD (daily avg.) permitted		
NOTES: *Major Municipal Facility			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	14	15	15
SEGMENT #	14-5	15-2	15-3
STREAM	Waits River	Passumpsic River	Passumpsic River
SEGMENT DESIGNATION	EL-1	EL-1	EL-2
MUNICIPALITY	Bradford Village	Lyndon Town Lyndonville	St. Johnsbury Town*
FLOW (DESIGN/ACTUAL) gpd	.150/.064	.750/.193	1.900/1.209
YEAR CONSTRUCTED	1980	1977	1964
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary extended aeration	Secondary extended aeration	Primary dual digesters
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1157 4-30-84 exp'd	DP#3-1111 3-1-87 exp'd	Amended TPP#4-1076 Exp'd 7-1-77 (A of D)
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Complete	Upgrade primary STP
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Completed	Completed	Preliminary planning underway
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	7-14-81 acceptable	6-4-81 acceptable	8-12-81 operational & maintenance problems
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)		1) VT Tap & Die Co. Combined domestic & industrial process waste discharges (Heat treat & nickel penetrant lines) Flow of 1000 gal/ day (daily max) permitted.	
NOTES:			

*Major Municipal Facility

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	16	16	17
SEGMENT #	16-1	16-2	17-1
STREAM	Conn. River	Conn. River	Pherrins River
SEGMENT DESIGNATION	EL-1	WQ-1	WQ-1
MUNICIPALITY	Canaan	Lunenburg FD #2	Brighton (Island Pd.)
FLOW (DESIGN/ACTUAL) gpd	.105/.068	.076/.059	.150/.083
YEAR CONSTRUCTED	1973	1977	1976
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Secondary aerated lagoon	Secondary aerated lagoon	Secondary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-0330 4-30-84 exp'd	DP#3-1140 2-28-83 exp'd	DP#3-1116 11-1-82 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Complete	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Complete	Complete	Complete
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	10-28-81 acceptable	10-2-81 unacceptable operational problems	1-10-79 acceptable
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

MUNICIPAL DISCHARGE INVENTORY
April 1982

BASIN #	17	17	17
SEGMENT #	17-3	17-5	17-5
STREAM	Clyde River	Barton River	Barton River
SEGMENT DESIGNATION	WQ-1	WQ-1	WQ-1
MUNICIPALITY	Newport City	Orleans Village	Barton
FLOW (DESIGN/ACTUAL) gpd	.975/.775	.170/NA	.170/NA
YEAR CONSTRUCTED	1966	1981	1981
TYPE OF FACILITY (extended aeration, aerated lagoon, etc)	Primary single digester	Tertiary aerated lagoon	Tertiary aerated lagoon
PERMIT STATUS Type - TPP or DP Expiration Date	Amended TPP#4-1080 6-30-83 exp'd	DP#3-1201 6-30-86 exp'd	DP#3-1202 6-30-86 exp'd
CONNECTION POLICY Restrictions-Yes/No)	No	No	No
FACILITIES PLANNING	Upgrade Primary STP	Complete	Complete
PURPOSE OF PLANNING ACTIVITY(upgrading, P-removal, sewer separation, etc)			
STATUS OF PLANNING ACTIVITY(complete/ ongoing) I. Prel. Planning & Design II. Final Planning & Design III. Construction	Construction under-way	Completed	Completed
OPERATION & MAINTENANCE STATUS -date of last inspection -significant problems	1-11-79	Under start-up	Under start-up
PRETREATMENT FACILITIES Name Nature of Waste Flow gpd (repeat for each facility)			
NOTES:			

APPENDIX B

INDUSTRIAL INVENTORY

APRIL 1982

APPENDIX B

BASIN	Battenkill, Walloomsac Hoosic R.	Battenkill, Walloomsac Hoosic R.
SEGMENT # STREAM	1-1 Hoosic R.	1-2 Hoosic R.
SEGMENT DESIGNATION	E1-1	WQ-1
INDUSTRIAL FACILITY Nature of Waste	General Cable Sanitary 02-07-002	Pounal Tannery * Tanning Waste 02-07-001
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1150 4-30-84 Cooling water, Temp. increase not over 1°F Daily max on Cyanide-.05 lbs/day Phenols-0.125 lb/day Sanitary limits flow-monitor only Daily max on BOD 50 mg/l TSS 50 mg/l Settleable solids-0.3 mg/l Chlorine residual-2.0 mg/l Fecal Coliform-400/100 ml	DP# 11-1-79 Discharge from final aerated lagoon, Daily max. limits lbs/day Summer-Winter BOD_5-145, 477 TSS-250, 596 Total Cr-11.0 Oil & grease - none visible Sulfur -2.5, 5.0 TKN-200, 500 pH-6.0 to 8.5
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	5-7-1980 Satisfactory	
NOTES:		

*Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Battenkill Walloomsac Hoosic R.	Battenkill Walloomsac Hoosic R.
SEGMENT # STREAM	1-5 Paran Creek	1-6 Trib. to Walloomsac R.
SEGMENT DESIGNATION	E1-1	E1-2
INDUSTRIAL FACILITY	Stanley Tools	Fairdale Farms, Inc.
Nature of Waste	Metal Plating- Process and cooling water	Dairy Processing
	02-12-001	02-02-001
PERMIT STATUS		
Type - TPP or DP	DP#3-0311	TPP#4-1082
Expiration Date	11-30-83	1-31-80
Effluent Limits	Flow-0.060 MGD daily max. TSS-6.4 lbs/day daily max. Total Iron 0.1 lb/ day daily avg. Total Phosphorus 0.50 lbs/day daily avg. 1.0 mg/l daily max. Total Zinc- 0.06 lbs/day daily avg. 0.2 mg/l daily max. Temperature increase of receiving water not over 1°F.	Flow-0.03 MGD daily avg. BOD & TSS 30 mg/l daily max. Settleable solids-0.3 mg/l daily max. Total Coliform 400/100 ml pH- 6.5 to 8.0
OPERATION & MAINTENANCE STATUS		
Date of last inspection	6-20-1979	
Significant problems	Satisfactory	
NOTES:		

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Otter Creek	Otter Creek
SEGMENT # STREAM	3-4 Otter Creek	Upland Trib. to Little Otter Creek
SEGMENT DESIGNATION	E1-1	
INDUSTRIAL FACILITY Nature of Waste	White Pigment Corp., Florence Limestone processing water 11-16-006	White Pigment Corp., Newfane Limestone processing water 01-13-001
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1124 2-28-83 Flow- 0.200 MGD daily max. TSS-10 lbs/day daily max. pH-6.5 to 8.0 Temperature- not over 1°F increase in temp. of receiving water 150' downstream	DP#3-1127 2-28-83 Flow-0.050 MGD daily max. TSS-8 lbs/day daily max. pH-6.5 to8.0 Temperature- not over 1°F increase in temp. of receiving water 150' downstream
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems		
NOTES:		

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Otter Creek	Otter Creek
SEGMENT # STREAM	Upland Cold River	Upland Furnace Br.
SEGMENT DESIGNATION		
INDUSTRIAL FACILITY Nature of Waste	US Samica Corp.*, Rutland Treated process waste 11-20-002	Pittsford National Fish Hatchery Pittsford 11-16-017
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-0017 12-31-83 Flow 1.0 MGD daily max. TSS-167 lbs/day daily max. pH - 6.5 to 8.0	DP#3-1188 5-1-85 Suspended solids-1.3 lbs/day daily max. Settleable solids-0.2 mg/l daily max. pH-6.5 to 8.0
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	5-6-1981 Acceptable	
NOTES:		

* Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Missisquoi	
SEGMENT # STREAM	6-4 Missisquoi R.	
SEGMENT DESIGNATION	E1-1	
INDUSTRIAL FACILITY Nature of Waste	Standard Packaging Corp. Missisquoi Speciality Board Div., Sheldon Springs Paper Processing Waste 06-15-001	
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	TPP#3-1118 11-30-82 Flow-5.5 MGD daily avg. BOD_5-1300 lbs/day daily max. TSS-3700 lbs/day daily max. Zinc-9 lbs/day, daily max. Total Phosphorus as P, 21 lbs/day daily avg. Turbidity-monitor only pH-6.0 to 8.5	
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	10-21-81 High BOD loads	
NOTES:		

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Lamoille	Lamoille
SEGMENT # STREAM	7-5 Lamoille R.	Upland Bell Brook
SEGMENT DESIGNATION	E1-1	
INDUSTRIAL FACILITY Nature of Waste	State of Vermont* Vermont Whey Authority Express Foods, Fairfax Dairy Processing Waste 06-09-004	Eastern Magnesia Talc Co. Johnson Mine Drainage 08-06-001
PERMIT STATUS Type - TPP or DP Expiration Date	DP#3-1183 4-1-85	DP#3-1138 11-30-83
Effluent Limits	Flow-0.360 MGD daily max. BOD_5-45 lbs/day daily max. TSS- 45 lbs/day daily max. Total Phosphorus 3 lbs/day daily max. Settleable solids 0.1 mg/l daily max. TKN - 2mg/l daily avg.	Flow-0.250 MGD daily avg. TSS-20 mg/l daily avg. Fe-0.3 mg/l daily max. Turbidity-10 JTU pH-6.5 to 8.0
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems		June 1981 Plant complies with permit
NOTES:		

*Major Industrial Discharger

INDUSTRIAL INVENTORY
APRIL 1982

BASIN	Winooski	White
SEGMENT # STREAM	8-6 Winooski R.	9-1 White R.
SEGMENT DESIGNATION	WQ-1	WQ-2
INDUSTRIAL FACILITY Nature of Waste	IBM * Sanitary & Industrial, Essex Jct. 04-06-007	White River National Fish Hatchery, Bethel Process Waste 14-04-005
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	TPP#4-1128 10-31-82 Flow - 2.5 MGD monthly avg. UOD - 1200 lbs/day daily max. TSS - 306 lb/day daily max. Fe-0.3 mg/l daily max. Pb-0.05 mg/l daily max. Cu-0.20 mg/l daily max. Ni-1.0 mg/l daily max. Zn-0.2 mg/l daily max. Total Phosphorus as P 1.0 mg/l daily max. Fecal coliform 200/100 ml pH - 6.0 to 8.5 Temperature- not over 1°F increase in receiving water Ammonia Nitrogen-monitor only	DP#3-1142 10-31-83 Flow-25 MGD, daily max. BOD_5*-208 lbs/day daily max. TSS*-250 lbs/day daily max. Ammonia*-83 lbs/day daily max. *increase over intake processing water
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	9-1-81 Compliance	
NOTES:		

*Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Ottauquechee-Black	Ottauquechee-Black
SEGMENT # STREAM	10-7 Black R.	10-8 Black R.
SEGMENT DESIGNATION	E1-2	WQ-1
INDUSTRIAL FACILITY Nature of Waste	Idlenot Farm Dairy, Inc. Springfield Dairy Processing 14-18-009	Springfield Electro-plating Co. Springfield Metal Plating 14-18-002
PERMIT STATUS Type - TPP or DP Expiration Date	TPP#4-0099 9-15-78	DP#3-1126 2-28-83
Effluent Limits	Flow-0.050 MGD Wastes permitted: "Dairy process wastes provided secondary treatment..."	Flow-1 gpm daily max. Cr(total): 50 mg/l Cu-0.50 mg/l Ni-1.00 mg/l Cd-0.30 mg/l Cn-0.03 mg/l Surfactants-0.07 mg/l
OPERATION & MAINTENANCE STATUS Date of last inspection	4-15-81	4-15-81
Significant problems	Noncompliance High BOD	Acceptable Flow rate
NOTES:		

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Connecticut	Connecticut
SEGMENT # STREAM	13-2 Connecticut R.	13-4 Connecticut R.
SEGMENT DESIGNATION	E1-2	E1-2
INDUSTRIAL FACILITY Nature of Waste	*Goodyear Tire & Rubber-Windsor Cooling & Process Water 14-23-001	Boise-Cascade Corp.-Brattleboro* 13-02-002
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1121 12-31-82 Flow-1.9 MGD daily max. TSS-432 lbs/day daily max. BOD_5, Oil & Grease-monitor only Temp.- not over 1°F increase in receiving water	DP#3-1136 9-30-80 Flow-1.50 MGD daily avg. BOD_5-800 lb/day daily max. TSS-1170 lb/day daily max. Turbidity-monitor only **Total Pb-0.4 lb/day **Total Ni-7.5 lb/day **Total Zn-1.5 lb/day Temperature -not over 1°F increase in recieving water pH-6.0 to 8.5
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	5-13-81 Acceptable	4-28-81 High Zn Acceptable
NOTES:		

*Major Industrial Discharger

**Daily avg.-excess over values present in intake water

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Connecticut	Connecticut
SEGMENT # STREAM	13-5 Connecticut R.	13-6 Sacketls Br.
SEGMENT DESIGNATION	E1-2	E1-1
INDUSTRIAL FACILITY Nature of Waste	Vermont Yankee Nuclear Power * Co.-Vernon 13-17-002	Putney Paper Co.-Putney * Papermaking process wastes 13-13-006
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1199 1-19-86 (Condenser C.W., circulating water discharge only) Flow-19.4 MGD daily max. on closed cycle Flow, open cycle 543 MGD daily avg. Temperature, closed cycle 93°F daily max. Cl_2, free residual 0.2 mg/l daily max. Cl_2, total residual 0.5 mg/l daily max. Sodium-0.2 mg/l daily max. Sulfate-0.5 mg/l daily max. pH-6.5 to 8.5	DP#3-1128 12-31-82 Process Wastes Flow-0.275 MGD daily max. BOD-450 lb/day daily max. TSS-300 lb/day daily max. Zinc-0.60 lb/day daily max. Total Phosphorus as P-mg/l-monitor only Settleable Solids-0.3 mg/l daily max Turbidity-25JTU Temperature-not over 1°F increase in receiving water pH-6.5-8.0
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	None carried out recently	5-20-81 Noncompliance High BOD Flow data
NOTES:		

* Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Passumpsic	Passumpsic
SEGMENT # STREAM	15-3	15-4
SEGMENT DESIGNATION	E1-2	E1-2
INDUSTRIAL FACILITY Nature of Waste	E.H.V. Weidmann, * St. Johnsbury 03-11-080	Colt Industries-Fairbanks Morse Weighting Systems St. Johnsbury 03-11-084
PERMIT STATUS		
Type - TPP or DP	DP#3-1184	DP#3-1125
Expiration Date	11-30-83	2-28-83
Effluent Limits	Flow-0.200 MGD daily avg. BOD_5-78 lbs/day daily avg. TSS - 78 lbs/day daily avg. Settleable Solids-0.1 mg/l Turbidity-monitor only Temperature-not over 1^oF increase in recieving water pH: 6.5 to 8.0	Flow-0.015 MGD daily avg. pH: 6.5 to 8.0 Cn-0.001 lb/day daily avg. Al-0.035 lb/day daily avg. Cr(total)-0.005 lb/day daily avg. Cu-0.05 lb/day daily avg. Hg-0.001 lb/day daily avg. Ni-0.05 lb/day daily avg. Fe-0.03 lb/day daily avg.
OPERATION & MAINTENANCE STATUS		
Date of last inspection	11-11-81	6-4-81
Significant problems	Acceptable	Cn mg/l - high Al mg/l - high Consultant working on problems-no rating
NOTES:		

*Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Connecticut	Connecticut
SEGMENT # STREAM	16-2 Connecticut R.	16-3 Connecticut R.
SEGMENT DESIGNATION	WQ-1	E1-2
INDUSTRIAL FACILITY Nature of Waste	Georgia Pacific Corp.-* Gilman Main sewer combined Paper Mill wastes 05-14-002	CPM-Ryegate Paper-East Ryegate* Paper wastes 03-10-003
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1182 3-31-81 Flow-3.5 MGD daily max. BOD-1650 lbs/day daily max. TSS-2800 lbs/day daily max. Monitor only: Lead, turbidity settleable solids, Total Phosphorus, Phenol, Iron Orthophosphate as P, Ammonia Nitrogen as N, Nitrite & Nitrate Nitrogen as N, TKN pH-6.0 to 8.5	DP#3-1117 12-31-82 Flow-2.0 MGD daily max. BOD-1200 lb/day daily max. TSS-590 lb/day daily max. Monitor only: Settleable solids, & Phosphorus Turbidity 25 JTU Temperature-not over 1°F increase in receiving water pH-6.0 to 8.5
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems	11-10-81 Acceptable	11-17-81 None-acceptable rating
NOTES:		

* Major Industrial Discharger

INDUSTRIAL INVENTORY

APRIL 1982

BASIN	Connecticut	
SEGMENT # STREAM	Upland Halls Stream	
SEGMENT DESIGNATION		
INDUSTRIAL FACILITY Nature of Waste	Ethan Allen, Inc. Beecher Falls Boiler Blowdown Furniture Mfg. 05-06-002	
PERMIT STATUS Type - TPP or DP Expiration Date Effluent Limits	DP#3-1123 2-28-83 Flow-0.007 MGD daily max. Zn-0.20 mg/1 daily max. Phosphate & Nitrate, monitor only pH: 6.5 to 8.0 Temperature- not over $1^{o}F$ increase in receiving water	
OPERATION & MAINTENANCE STATUS Date of last inspection Significant problems		
NOTES:		

APPENDIX C

APPENDIX C

WATER RESOURCES PLANNING NEEDS

1. Stream Flow Maintenance - evaluate the impact of regulation on stream aquatic life; reintroduce legislation as necessary to assure protection of streams. An assessment of the impact of regulation of stream flow in certain rivers is currently being done under the 208 Program.

2. Water Withdrawal - perform an assessment of impact of withdrawal on streams, particularly small upland streams. Develop criteria or limits to protect the stream resource.

3. Mettawee River Thermal Pollution Study - assess the impact of lack of vegetative cover and develop restorative measures (New York Department of Environmental Conservation has approched Vermont in cooperating on this problem).

4. Definition of Discharge - The definition of what constitutes a discharge to surface waters from on-site wastewater disposal systems has been set forth in the Protection Division's Environmental Protection Rules. As experience is gained with this definition, an assessment will need to be made as to its effectiveness for administration as well as protection of surface waters.

5. Upland Stream Study - assess the impact on water quality of discharges to upland streams (planned for 1982).

6. Lake Champlain Program - coordinate data gathering, research, and modeling efforts on Lake Champlain.

7. Assimilative Capacity and Wasteload Allocation - continue efforts on rivers still not completed.

8. Phosphorus Wasteload Allocation - Develop a phosphorus wasteload allocation method which would determine phosphorus limits at specific lakes and stream areas to prevent accelerated eutrophication.

9. Spring Phosphorus Runoff Study - compile data gathered into report form.

10. Combined Sewer Assessment - assess the water quality impact of combined sewer overflows with respect to other point and nonpoint source discharges and set priorities for problem resolution.

11. Water Quality Division Publications - develop an annotated bibliography of publications for reference.

12. Water Resources Policies and Guidelines - very often, personnel struggling with a problem later find that the problem has been addressed before and a policy exists on the matter. A looseleaf notebook containing all issues and current policies would be of significant value in guiding actions and setting an overall emphasis and direction.

13. Water Resources Department-University of Vermont Coordination- with the Water Resources Council funding cutoff and elimination of the Water Resources Research Center, some method of coordination between the Department of Water Resources and the University of Vermont needs to be established to maintain an effective dialogue between management and research efforts.

14. Winter K Rates - determine the extent of nitrification at winter temperatures and changes in carbonaceous decay rates to determine impact of dissolved oxygen, particularly in small streams with large BOD loads.

15. Phosphorus Attenuation and Transport - continue research efforts and apply results to policies and management actions concerning phosphorus removal from discharges.

16. Stormwater Sand Filters - determine effectiveness and apply the results in revising the Interim Stormwater Policy (being done under the 208 Program).

17. On-Site Wastewater Disposal - Evaluate the short and long-term effectiveness and reliability of on-site wastewater disposal systems in protecting ground and surface water (partially being done under 208 Program).

18. Septic Tank Installation - develop a voluntary septic tank installers certification program to improve septic system installation.

19. Sludge and Septage Disposal - continue research and monitoring to determine effects on soils and capacity of the land for disposal.

20. Municipal Wastewater Treatment Facility Growth - monitor reserve capacity and planning for expansion to assure overloading does not occur and to prevent future water quality problems. Revise and update 1975 Connection Policy.

21. Phosphorus Recycling from Sediments - perform study on Malletts Bay to determine the exchange rate and eutrophication potential from sediments in a relatively closed embayment.

22. Operation and Maintenance of Wastewater Treatment Facilities - as more and more communities construct facilities emphasis needs to change from construction to operation and maintenance to assure the greatest effectiveness of treatment facilities in protecting water quality. Evaluate the effectiveness of the monitoring of facilities and technical assistance to communities.

23. Non-Point Source Control Strategy - review and revise the Non-Point Source Control Strategy as appropriate as the 208 Program comes to its conclusion.

24. Shoreland Zoning - survey towns, cities and villages for the existence of and adequacy of their shoreland protection measures. Develop a program which would provide technical assistance to communities in bylaw development, protection criteria, and methods of protection.

25. Public Assistance and Information - evaluate how the Department can be more effective in informing individuals, the general public, and organizations on key water resources issues and concerns and to illicit support in resolving them.

APPENDIX D

State of Vermont

AGENCY OF ENVIRONMENTAL CONSERVATION

Montpelier, Vermont 05602

OFFICE OF THE SECRETARY

Department of Fish and Game
Department of Forests, Parks, and Recreation
Department of Water Resources and Environmental Engineering
Division of Protection
Natural Resources Conservation Council

M E M O R A N D U M

TO: Agency Personnel

FROM: Brendan J. Whittaker, Secretary
Agency of Environmental Conservation

DATE: March 26, 1982

SUBJECT: Streambank Management Policy

The attached policy on river and streambank vegetation management is for educational guidance regarding the Agency attitude toward streambank protection and to improve understanding of streambank values. Wherever possible and practical this policy should be used as guidance in developing or reviewing projects which involve streambank alteration.

The attached policy is not a rule or regulation and is not to be cited or used as the regulatory basis to approve or deny permits.

Brendan J. Whittaker 3-26-82
Brendan J. Whittaker
SECRETARY

BJW:DLC:psp
Attachment

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION
POLICY
ON RIVER AND STREAM BANK VEGETATION MANAGEMENT

The Agency of Environmental Conservation hereby adopts a policy to protect and restore stream bank vegetation as a part of the state's long-term water pollution control, stream, fisheries and wildlife management programs. This policy addresses concerns caused by the removal of stream bank vegetation, which can raise stream temperatures, and in turn lead to a deterioration of cold-water fisheries and increased costs for wastewater treatment facilities through impairment of a stream's natural assimilative capacity. Poor stream bank management can also cause stream sedimentation, which eliminates fish spawning and nursery areas and stresses adult fish. In addition, the removal of stream bank vegetation can destroy habitat which is important for waterfowl reproduction and winter deer movements.

POLICY

Whenever appropriate, the Agency of Environmental Conservation, in its advisory, educational, state land management or permitting capacities, shall employ or encourage activities on stream banks which preserve or restore the following environmental values:

A. Shading which helps keep summer water at temperatures suitable for fisheries

Cool water contains more oxygen than warm water. The more abundant oxygen in cooler water is essential to healthy stocks of fish such as trout, salmon, bass and walleyes.

B. Preserving a stream's waste assimilative capacity

The higher oxygen concentration in cool water increases a stream's assimilative capacity and lowers the cost of wastewater treatment plant construction.

C. Binding of the soil by root system

Well-developed root systems stabilize stream banks and help resist erosion and stream meander. A vegetated corridor can help filter overland run off to the stream, thereby helping to reduce sediment in the stream.

D. Food supply for fish and aquatic insects

Leaves provide an important food source for aquatic insects which are in turn eaten by fish. Insects falling from overhanging vegetation can provide fish with their principal summer food source.

E. Cover and food for ducks, partridge, woodcock and non-game species

F. Protected corridor for wildlife movement

Stream bank vegetation corridors can be vital for passage within and between deer yarding areas in parts of the state dominated by coniferous trees.

G. Aesthetically pleasing aspect to waterways

Especially in urban areas, naturally diverse stream bank vegetation provides visual contrast and relief.

H. A potential source of firewood when good management and selective cutting are applied

I. Enhancing or preserving recreational experience

Stream bank vegetation enhances or preserves the stream environment for recreational uses such as hiking and camping.

J. Reduction of hazards from natural stream channel movement and high flood flow velocities

A corridor of stream bank vegetation separates structures from the stream and thereby reduces the risk to the structures from undercutting through the natural process of stream bank erosion and lateral movement of the stream through meandering. Dense, woody vegetation helps protect nearby structures in close proximity to the stream from damage by high flood flow velocities.

These stream bank values can be preserved or restored by encouraging activities which include, but are not limited to, the

following guidelines:

1. Fencing livestock out of stream and river bank areas where necessary to sustain natural woody plant reproduction and to minimize physical damage to the river and stream bank.

2. Revegetating soil stream banks and riprap (old and new) with compatible shrubs and/or trees (as appropriate to stream width and adjacent land use) to provide adequate shading where woody vegetation is sparse or absent.

3. Clearing stream channels and stream banks of "high hazard" dead or under-cut trees where the potential of their falling into the river and blocking flood waters appears imminent (after waterflow nesting and fish spawning season) if at all possible.

4. Limiting the cutting of trees and other vegetation on the banks of permanent streams. Selective cutting of mature trees on the bank shall be encouraged as long as the shading of the stream is not significantly reduced.

5. Protecting vegetation by excluding from the vegetated corridor soil plowing, herbicide application, dumping or filling, operation of construction machinery and other damaging activities.

The width of the vegetated stream bank corridor may vary but, at a minimum, it should include the stream bank and such additional land beyond the bank necessary to sustain a healthy growth of vegetation on the river's edge. The corridor width should be evaluated in each case to assure that environmental values (A-J above) are adequately protected.

It is impossible to generalize on recommended widths because of the great disparity in conditions from place to place along streams. Variables which should be examined in a particular instance would include such matters as the width and the gradient of the stream, the slope of the banks, adjacent land uses and preservation of wildlife or fisheries habitat.

The Agency shall follow this policy in the management of State lands, and it shall encourage others (private, state and federal) to use their best judgement in incorporating as many of the principles set forth in this policy as are reasonable to preserve, restore and manage Vermont's stream bank resources.

AGENCY OF ENVIRONMENTAL CONSERVATION

12-28-81
Date

By Brendan J. Whittaker, Secretary

APPENDIX E

STATE OF VERMONT
AGENCY OF ENVIRONMENTAL CONSERVATION

INTERIM STORMWATER MANAGEMENT POLICY

Stormwater runoff that is collected and discharged to waters of the State constitutes a discharge of "wastes" requiring a permit under Chapter 47 of the Title 10 V.S.A. The Agency of Environmental Conservation has historically issued Discharge Permits in such cases and has required a minimum level of treatment of the stormwater prior to discharge. This treatment usually required the removal of readily settleable solids and floatable material in trap type catch basins or by means of settling ponds in the case of runoff from large paved areas.

The Water Resources Board ruled in June 1978, that these practices were not in detailed technical conformance with the State Water Quality Standards and therefore did not qualify for Discharge Permits. The Board recognized that material changes would have to be made in law, regulations and administrative procedures to rectify this disparity and suggested that Temporary Pollution Permit might be issued in the interim. The Agency in administering a permit program must accept this guidance from the Water Resources Board and actions have been initiated to issue Temporary Pollution Permits to all pending and new applications for the discharge of stormwater.

Implicit in this action was the adoption of a treatment policy which would be utilized until a revised regulatory framework can be implemented. An initial policy was adopted with an expiration date of July 1, 1980. As full revision of the statutory and regulatory framework was not accomplished by that date this extension and revision of the policy is necessary.

The policy below summarizes treatment standards. Permits will be issued with the provision that additional treatment may be required as a result of the program changes being developed. These interim actions are necessary to insure continuance of orderly governmental actions in the administration of the permit program under 10 V.S.A., Chapter 47, its interrelationship with other state permit programs and the industrial, commercial and domestic growth of Vermont.

I. New Stormwater Discharges

A. All stormwater runoff that is collected and piped, channeled or otherwise conveyed directly or indirectly or by connection to an existing storm drainage system (including existing Municipal, State, or Federal systems), to waters of the State, including discharges to "wells," requires a Temporary Pollution Permit pursuant to 10 V.S.A. § 1265, prior to discharge. Stormwater permits will be reviewed whenever

possible in conjunction with Act 250 permits so that a smooth transition from the temporary erosion control measures can be made once the site is stabilized. This is also necessary to ensure agreement between the Temporary Pollution Permit and the Act 250 Permit.

B. All stormwater runoff discharges identified in (A) above from paved or substantially impervious areas require the following treatment:

(1) Paved Roads

(a) With curb, gutters or collection facilities:

Treatment to remove readily settleable solids and floatable material including oil and grease, by means of the following treatment devised;

(i) Catch basins, or equivalent structures, with minimum of 18" sump depth below outlet pipe invert and a submerged outlet, or

(ii) Settling pond with submerged hooded outlet.

(b) Without curbing, gutters or collection facilities:

Treatment and control of runoff velocity may be required on a case by case basis.

(2) Paved Parking Areas

(a) Total surface area less than 0.5 acres

Treatment of stormwater runoff in parking lots of less than 0.5 acres should, in most instances, be accomplished by the following methods (in order of preference):

(i) Perimeter drain (French drain) surrounding parking lot. Perimeter drain involves the placement of perforated pipe in the base of a trench and covering it with graded material. Coarse gravel is usually overlayed with finer layers until the top layer is one of sand. Perimeter drains probably require the most frequent maintenance as no structure exists to act as a pre-screening device to remove readily settleable materials that tend to plug the filtering media (see attached drawing).

(ii) Grassed buffer strips or buffer strips of undisturbed vegetative material designed to transmit sheet overland flow. This type of treatment is most preferred as it does not require routine maintenance if designed correctly. In order to function properly, buffer strips require gradual slopes, established vegetation, no channelization and shallow water depth (less than 1/4 inch). The minimum length for a buffer strip is 50 feet, but length requirements will vary depending upon terrain and application.

(iii) Settling ponds as in I (B)(1)(a)(ii)

(iv) Catch basins as in I (B)(a)(i) above.

Greater degrees of treatment may be required in areas of special water quality concern.

(b) Total surface area greater than or equal to 0.5 acres

Provide storage and subsequent subsurface disposal or slow discharge of sand filtered effluent from the first 0.5 inches of runoff from the paved area. Sand filters should be designed with a head works that admits the first half inch of runoff to the sand filter and bypasses the remainder of the flow to a receiving water, or a retention structure if required.

Monitoring and reporting may be required based on the use of the paved areas and the classification and quality of the receiving waters.

(3) Paved Road Continguous to Condominium and Apartment Complexes and Commercial and Industrial Parks

In the cases of condominium and apartment complexes and commercial and industrial parks, filtration of the first 0.5 inches of runoff is required when the total paved project area (including parking lots and roads) exceeds one-half acre. Runoff is excess of 0.5 inches may be diverted and discharged either directly to the receiving waters or to a retention structure.

The industrial park developer shall provide stormwater collection and discharge facilities for all of the proposed development and may or may not provide treatment facilities. Either the developer or subsequent lot owner may provide requisite stormwater treatment

facilities for a particular lot where the nature, sizing, pavement area, etc. of subsequent building on that particular lot are unknown.

Monitoring and reporting may be required based on use of the paved areas and the classification and quality of the receiving waters.

(4) Other Paved Areas

Some degree of treatment may be required; to be evaluated on a case by case basis.

(5) Substantially Impervious Un-Paved Areas (other than undisturbed natural terrain) and Un-Paved Roads

Some degree of treatment and/or velocity (erosion) control may be required. To be evaluated on a case by case basis.

C. All other stormwater runoff discharges identified will be reviewed on a case by case basis including velocity (erosion) control if needed.

B. All Temporary Pollution Permits utilizing catch basins, settling basins, and storage lagoon requirements will have mandatory cleaning, maintenance and reporting requirements to ensure efficiency of treatment. Parking lot and street cleaning operations will be encouraged.

E. Stormwater management requirements in (a) through (d) above will be unchanged until, at least, July 1, 1985, unless Federal or State laws or regulations governing stormwater management dictate otherwise.

II. Existing Stormwater Discharges

The priority activity of the Agency related to stormwater management during the next two years will be to develop a legal/regulatory framework upon which a sound management program can be undertaken and the issuance of Temporary Pollution Permits to new discharges of stormwater. Low priority will be devoted to short term activities such as conversion of existing stormwater discharge permits to temporary pollution permits and the issuance of new temporary pollution permits to existing stormwater discharges which have not yet received an original permit. However, new discharges to an existing stormwater system will require a temporary pollution permit and treatment as specified above Part I.

III. Attenuation of Peak Runoff Rates from Impervious Areas

Stream bank erosion, water quality, fish and wildlife habitat are affected by the cumulative runoff from developed areas in some local sites of the State. It shall be the policy of the Agency to prevent this, where special cases are identified, by requiring that peak flows from a proposed development be attenuated so as not to exceed the peak flows from the undeveloped site. A 50 year 3 hour duration storm (3 inches in 3 hours) shall be used to compute peak flows.

Regional Engineers shall identify problem and potential problem streams where attenuation measures may be necessary. The Department of Water Resources and Environmental Engineering shall make a final determination as to the need for such measures.

Development projects of large scale in particularly sensitive water quality areas may be required to conduct a more detailed hydrologic analysis to insure that stormwater discharges will not increase naturally occurring peak flows the applicant of specific requirements in this regard after initial review of the permit application.

IV. Effective Date

This policy shall become effective for all applications received after September 1, 1980, and shall remain in effect until July 1, 1985, unless Federal or State laws or regulations governing stormwater management dictate otherwise.

July 24, 1980
Date

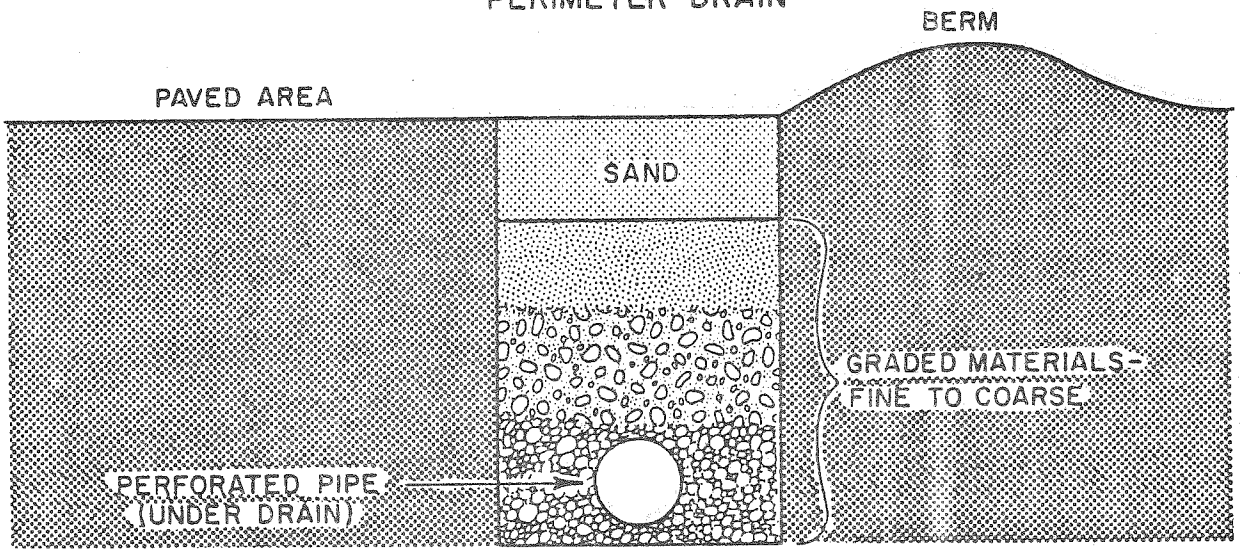
Reginald A. LaRosa, Acting Commissioner
Department of Water Resources

July 31, 1980
Date

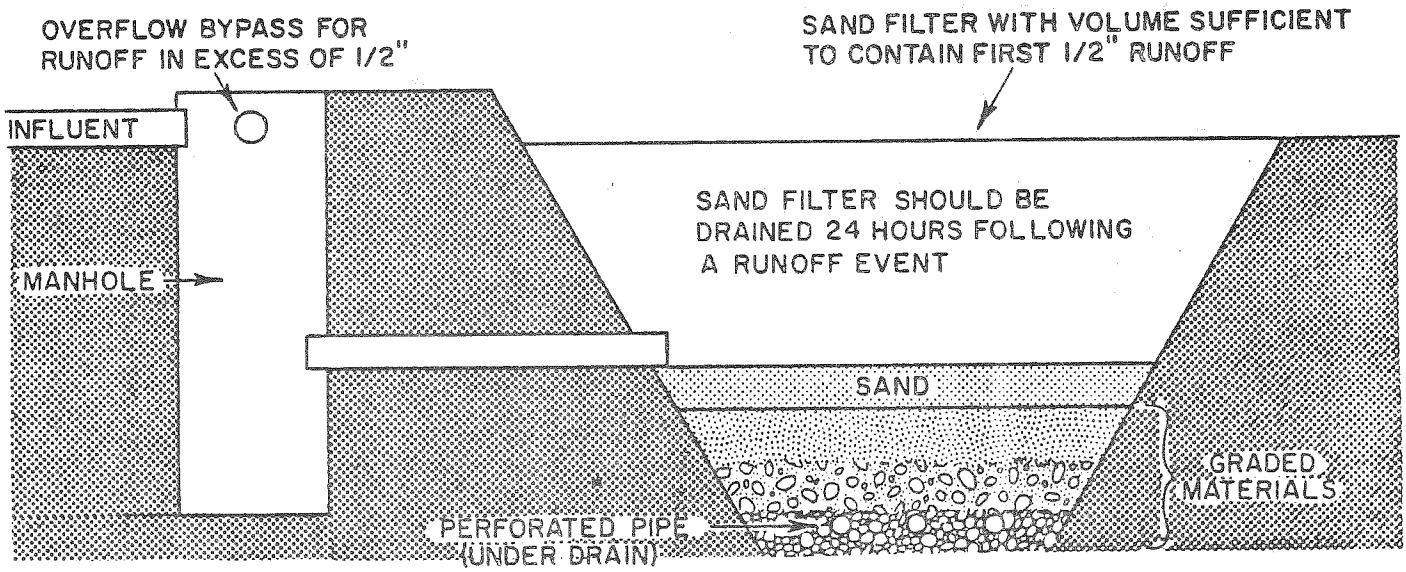
Brendan J. Whittaker, Secretary
Agency of Environmental Conservation

TYPICAL DRAWINGS OF STORM WATER STRUCTURES

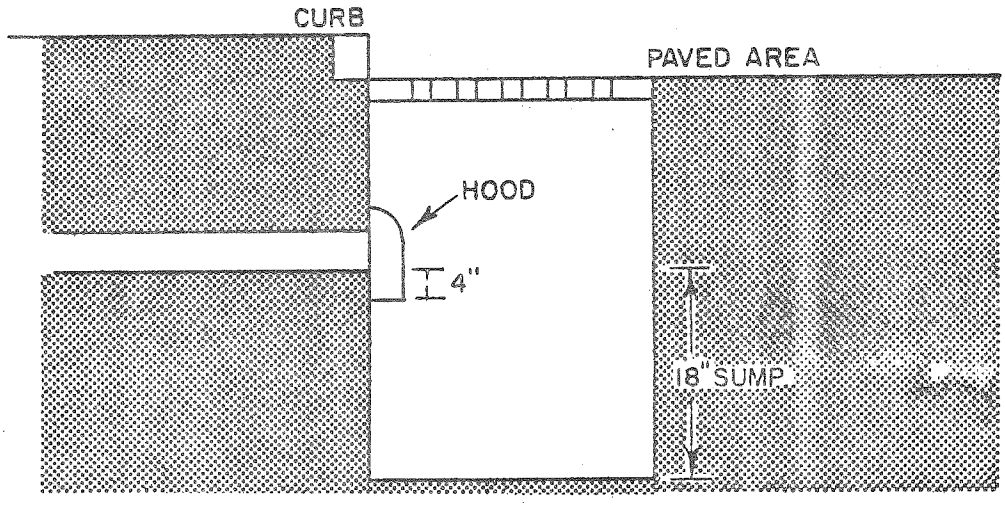
PERIMETER DRAIN



SAND FILTER



TRAP CATCH BASIN



APPENDIX F

OTTER CREEK WASTELOAD ALLOCATION

This rule establishes the permissible wasteloads that may be discharged to the Otter Creek between Moon Brook in Rutland and the Sutherland Falls Dam in Proctor. The wasteload allocation defined herein was developed in conformance with the Agency of Environmental Conservation's Wasteload Allocation Process. The Wasteload Allocation Process (adopted December, 1978 per the requirements of 3 V.S.A., Chapter 25) sets forth the procedural steps that must be followed in adopting a wasteload allocation.

The allocation, defined in terms of a maximum daily load of ultimate oxygen demanding wastes, is as follows:

Municipality	Allocation (lbs UOD/day)
Rutland City	1073
Rutland Town	136
West Rutland	177
Mendon	41
Sherburne	22

The adopted wasteload allocation will be implemented through the National Pollutant Discharge Elimination System (NPDES) administered by the Vermont Agency of Environmental Conservation (10 V.S.A., Chapter 47).

The allocation will be effective annually for the period June 15-September 15.

APPENDIX G

SUMMARY OF 1980 OIL AND HAZARDOUS MATERIALS INCIDENTS

Summary

Total number reported incidents	144
Number that reached surface waters	60
Number that reached groundwater	10
Number of oil spills	107
Number of hazardous materials spills	28
Number of fish kills	6
Miscellaneous	5
Algae blooms	4

Quantity Spilled

≤100 gallons	53
>100 - ≤500	20
>500 - ≤1,000	5
>1,000 - ≤5,000	4
>5,000 - ≤10,000	-
>10,000	-
Miscellaneous	11
1 yard^3	1
5 tons	1
40 tons	1
Unknown (minor, sheen)	48

Month / # of Spills

Month	# of Spills
Jan	11
Feb	10
Mar	16
Apr	10
May	13
June	12
July	14
Aug	17
Sept	16
Oct	11
Nov	7
Dec	7

Cause of Spills

Underground tanks, pipelines, etc.	24
Truck accidents	20
Improper disposal	21
Mystery spills	14
Above ground tank, piping & valve failures	13
Overfills	12
Other truck spills	8
No spill	7
Deliberate dumping	5
Construction accidents	4
Seepages (saturated ground)	4
Barge/vessel spills	2
Railroad accidents	2
Service station problems	2
Acts of God	1
Car/bus accidents	1
Fire	1
Airplane accidents	1
Spraying	1
Vandalism	1

Products Spilled

Diesel & #2 F.O.	43
Gasoline	26
Waste Oil	15
#6 F.O.	5
Unknown	5
Algae	4
Asphalt	3
Lube Oil	3
Crankcase	2
Gas-Oil Comb.	2
Liquid Fertilizer	2
Transformer Oil	2
Ammonia	1
Antifreeze	1
Asbestos	1
Caustic	1
Cement	1
Chicken Manure	1
Chlorinated H_2O	1
CO_2	1
Concrete	1
Coolant Oil	1
Creosote	1
Cutting Oil	1
Cyanide	1
Epoxy Resin	1
Foundry Refuse	1
Grinding Oil	1
Kerosene	1
Lead Oxide	1
Lime	1
Molasses	1
Paint	1
Paint Thinner	1
Paper Products	1
Perchloroethylene	1
Resin	1
Sand/Salt	1
Sheen	1
Styrene	1
Sulfuric Acid	1
Tar Emulsion	1
Unknown Hazardous Waste	1

SUMMARY OF 1981 OIL AND HAZARDOUS MATERIALS INCIDENTS

Summary

Total number reported incidents	199
Number that reached surface waters	59
Number that reached groundwater	19
Number of oil spills	136
Number of hazardous materials spills	46
Number of fish kills	3
Miscellaneous	9
Algae Blooms	2

Quantity Spilled

≤100 gallons	117
>100 - ≤500	29
>500 - ≤1,000	6
>1,000 - ≤5,000	9
>5,000 -≤10,000	4
>10,000	1
Miscellaneous	16
No spill	6
Overchlorinated	1
Unknown(minor,sheen)	8
1 cylinder	1
4 cylinders	4

Month	# of Spills
Jan	13
Feb	21
Mar	15
Apr	12
May	19
June	29
July	12
Aug	15
Sept	19
Oct	14
Nov	20
Dec	10

Cause of Spills

Above ground tank, piping, valve, capacitor & transformer failures	47
Truck accidents	31
Underground tanks, piping, etc.	16
Improper disposal	15
Overfills	14
Construction accidents	13
Other truck spills	10
Car/bus accidents	10
Vandalism	6
Deliberate dumping	6
No Spill	6
Barge/vessel spills	5
Poor housekeeping	4
Fire	4
Acts of God(floods,lightning,etc)	3
Mystery spills	3
Seepage	2
Railroad accidents	2
Service station problems	1
Spraying	1

Products Spilled

Diesel & #2 F.O.	54
Gasoline	29
Transformer Oil	21
Dilute Industrial Wastewater	9
Waste Oil	8
#6 F.O.	
LPG	5
Coolant Oil	4
PCB Oil	3
Mineral Oil	3
Kerosene	3
Bilge Oil	3
Hydraulic Oil	3
#4 F.O.	3
Gas & Oil	2
Milk	2
CO_2	2
Motor Oil	2
Chlorine	2
Whey	2
Butyl Acetate (Waste Solvent)	2
Sulfuric Acid	2
Urea Fertilizer	2
Algae Bloom	2
Cleaning Compound	1
Low Water	1
Hydrochloric Acid	1
Surfactant	1
Unknown	1
Cresylic Acid	1
Lead Contaminated H_2O	1
Roundup(Pesticide)	1
SO_2	1
Unidentified haz. waste	1
Metal hydroxide sludge	1
N Methyl Pyrroline	1
Xylene	1
Sodium Hypochlorite	1
Plasticizer	1
Concrete Curing Agent	1
Road Salt	1
Paint Thinner	1
MEK	1
Latex	1
Asphalt	1
Mixed Pesticides	1
Concentrated Industrial Wastewater	1
Acid Waste	1
Neoprene	1
Swamp Debris	1
Axle Oil	1
Tin Tetrachloride	1