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STUDIES OF POLLUTION CONTROL IN A LAKEFRONT COMMUNITY 1964 - 1981

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ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION: STUDIES OF POLLUTION CONTROL IN A LAKEFRONT COMMUNITY, 1964-1981

PREFACE

By Elizabeth Y. Pixley, Chairman, Publications Committee
Rochester Academy of Science

The Rochester Academy of Science, which was organized in 1881 and celebrates its centennial this year, has had a long history of publication of scientific papers. Volume 1 of the Proceedings of the Rochester Academy of Science was published in 1891; it contained reports of all Academy meetings for 1889-1891 and a number of papers on a variety of scientific topics. The Academy has been publishing the Proceedings since that time. Many of the papers published have focused on the natural history of the Genesee region. The Proceedings are distributed through the University of Rochester Library on an exchange basis to more than 500 academic institutions and museums around the world.

This issue represents the culmination of a cooperative publications venture between the Rochester Academy of Science, Rochester Committee for Scientific Information and the Rochester Chapter Society of Sigma Xi. It is a new departure for the Academy and one which recognizes the significant role that Rochester Committee for Scientific Information has played in defining and resolving environmental issues within Monroe County. The Academy is pleased to be a partner in publication of this history.

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FOREWORD

HISTORICAL PERSPECTIVE

George G. Berg

The Rochester Committee for Scientific Information helped to start and carry out major advances in public health and environmental management in the Rochester area. William G. Bassett, President of the Rochester Chapter of Sigma Xi, said at the time this joint publication effort was undertaken: "The work of the RCSI is among the most important scientific accomplishments in the Rochester area during the last 15 years."

The organization began its work in 1962 as the Rochester Committee for Radiation Information (RCRI) with studies of protection of civilians from fallout from atomic weapons. The pattern of future activities was set when the Committee focused its attention and its resources on an objective cost-benefit analysis of local plans for construction of public and private fallout shelters. RCRI restricted itself to scientific objectivity and to local interests as a prudent strategy for a group of young scientists and friends. These restraints soon became cornerstones of RCSI policy and the key to effectiveness in its campaigns.

Instead of rejecting official wisdom, the Committee drew information from the technical and scientific sources used and often paid for by the policy makers. Instead of lobbying for a cause, RCSI bulletins offered to local residents scientifically validated information bearing on locally important controversies. When the shelter program was dropped and releases of radioactive fallout were banned by international treaty, the Committee was already involved in local problems of atomic power. It was the only public interest organization appearing at the licensing hearings for the Nuclear Fuel Services (NFS) reprocessing plant in West Valley in 1963. The Committee followed the technical reports of NFS operations, tested local waters, and put out bulletins which led to major improvements in cleanup of plant wastes released into local creeks. When an atomic power plant was proposed for Wayne County, neighbors of the site came to the Committee for advice. The resulting involvement with the R.E. Ginna nuclear power station led the Committee to assume a function quite unique in the history of the atomic power controversy. On one hand, under the presidency of Herman Forest, the organization established its scientific integrity with the management of the Rochester Gas and Electric Corporation and gained access to advice of RG&E engineers and health physicists. On the other hand, the Committee was recognized in 1968 by the AEC as an intervenor in the public interest in the licensing of RG&E's nuclear power plants. In this matter, an RCSI Bulletin showed faults in the state-operated system for coping with radiation emergencies and

predicted the resulting confusion and damage. The prediction was realized in the 1979 accident at the Three Mile Island plant in Pennsylvania. Locally, however, the Committee's intervention has been successful in protecting the public from confusion and panic: New York State emergency preparedness measures were upgraded in 1978, and shortly afterwards the neighbors of the Ginna Plant received from RG&E an illustrated pamphlet explaining radiation emergencies, the measures taken to protect the public, and the ways to get information as needed. Drafts of the pamphlet had been reviewed by the committee.

Hazards of exposure to radioactive materials were, by that time, only one of the concerns of the Committee. The success of the atomic test ban challenged the Committee to ask whether the organization should be continued. A visit by Barry Commoner proved seminal. In 1964 the Committee broadened its interest to all environmental hazards with special emphasis on water-related problems, adopted the new name of the Rochester Committee for Scientific Information, and eventually joined with similar groups across the nation as an affiliate of the Scientists' Institute for Public Information (SIPI). To the two established principles of providing scientifically sound information and dealing with locally controversial decisions, RCSI added the principle of dealing with the worst environmental damages first. Time has blurred the novelty of these policies, which Margaret Mead had called SIPI's new social invention. It should be remembered that the policy challenged established professional custom by putting scientific and technical controversies before the lay public, that it rejected politically fashionable topics to work on locally important problems, and that it stayed at arm's length from environmental lobbies by holding to a position as an objective consultant to the public.

As RCSI tackled the paradoxes of being scientifically accurate without boring its public and of taking sides in controversies without being partisan, the solutions evolved in time into a set of simple rules for editing RCSI Bulletins.

First and foremost, every draft Bulletin was put through the same kind of peer review by experts on its topic as would a manuscript for an archival scientific journal. By the same token, every Bulletin was signed by its authors, dated, and referenced. This harnessed the quality control method of science to the service of public information.

Second, the language of the Bulletins was laymen's language, edited to be brief, interesting and clear to people without scientific training after high school age. This was the "say it in English" policy pioneered nationally by Environment Magazine's Virginia Brodine. Professionals were served at the same time by putting the requisite technical information in an Appendix.

Third, each Bulletin started with a Summary written as a lead paragraph for a newspaper article. The lesson in journalism was the last to be learned by Bulletin editors, and perhaps the most important one, because it helped reporters for newspapers and broadcasting stations to transmit the information from the Bulletins to the public without garbling.

Finally, when a Bulletin was answered with criticism or outright denial, the editorial policy was not to indulge in polemic. Instead, the Bulletin's author was encouraged to get more evidence and publish it in a new Bulletin. This made RCSI immune to damage from political assault, and gradually gained it the respect of professionals.

How these skills grew and became an editorial routine can be seen in the series of bulletins on the problems of sewage pollution in the Genesee River Basin and estuaries. At its inception in 1964, RCSI rated sewage pollution as the worst local example of environmental degradation. RCSI Bulletins and testimony by RCSI members helped Monroe County to become a national leader in water pollution control; they also continued to warn the public of misuses and malfunctions of the new pollution control installations.

A set of Bulletins on sewage pollution has been chosen for this issue of the Proceedings of the Rochester Academy of Science to document the environmental research and science information activities of RCSI. The second set of bulletins covers the related work on chemical pollution of the Genesee River and Irondequoit Bay watersheds, which culminated in major curbs on the inflow of phosphates and chloride salts, and in a partial recovery of ecological health of the River and the Bay.

A complete bibliography of RCSI Bulletins is included as a guide to the scope of other RCSI studies. The work on radiation hazards has already been outlined above. Evidence that lead poisoning was endemic among inner city children presented in Bulletin was followed by neighborhood action, with technical training and guidance by Dr. David Wilson of RCSI; in time, the lead control project became a federally funded activity of the County Health Department. A Bulletin on rat control in the City led to continued support by RCSI scientists of Rochester's combined urban rodent control and the neighborhood revitalization program. RCSI presented supporting testimony in State legislative hearings on banning DDT and restricting pesticide applications, and provided speakers on ecological aspects of farming to local fruit growers and dairy farmers.

A potentially explosive controversy between the police and inner city residents was defused with the help of RCSI's Bulletin on the hazard of Mace spray guns. Land use planning and wetlands preservation issues took RCSI authors beyond the Genesee River

basin, as did studies of aquatic ecology and water pollution. These covered several Finger Lakes, where RCSI was instrumental in supporting the construction of peripheral sewers and advanced treatment plants to replace ecologically damaging household sewage disposal systems.

In an arena of powerful conflicting interests, RCSI was able to provide a significant public service as a trustworthy source of timely technical and scientific information. To gauge the gap between its means and its achievements it may be enough to say that the budget of the organization over the years had to cover only the services of one secretary on a time-as-reported basis and the costs of printing and mailing the Bulletins. Volunteer work by the Committee's investigators and members of the Board of Directors accomplished the rest. The committee also occasionally paid graduate students for research leading to bulletins, provided seed money for local environmental studies, and organized public meetings on issues raised in the bulletins.

Support for this work came from membership fees, from annual grants by two local foundations (Xerox and Eastman Kodak) and from grants for special RCSI projects. Donors for the latter included the National Science Foundation, the Gleason Foundation and Gannett Press Foundation. This publication was aided by grants from the Rochester Chapter of the Society of the Sigma Xi and from Gannett Press.

In the text that follows, the RCSI bibliography is complete as of April 1, 1981. The bulletins are quoted in excerpts, with deletions indicated when necessary by typographical marks (...) or editorial comments. Complete collections of RCSI Bulletins are on file at the Genesee Valley Collection, Milne Library, SUNY College at Geneseo, New York and at the Rundel Memorial Library, Rochester, New York. Individual copies and sets are available at cost from the secretary, Rochester Committee for Scientific Information, P.O. Box 5236, River Station, Rochester, NY 14627.

March 20, 1981

PART I

Bulletin #14 July 1966

STATEMENT BY
CHAIRMAN OF THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
Thomas A. Fink

The Rochester Committee for Scientific Information is composed of scientists and interested laymen dedicated to the principle that the public must know the facts surrounding the technological problems facing our community. In our highly complex society the danger to our democracy is well stated by Ambassador Arthur Goldberg:

> "The real enemy of a free society is not an opposition to essential reform but rather to general inertia and general unawareness or lack of concern, a general disengagement of the individual from social responsibility."

Before there can be concern, there must be understanding. Th scientists who started our Committee were convinced that scientists and other experts must not attempt to substitute their political opinions for the opinions of the public. Our effort has been to give the public objective scientific information on technological subjects and let the public decide what must be done.

We have found tremendous interest among members of the public in obtaining information on the subject of water pollution. The public is concerned with the consequences of pollution to our waters...

We cannot expect the public to authorize large expenditures for water pollution control while being denied relevant information and seeing municipal officials ignore existing state laws. We ask that in this area the Federal Government continue to do everything it can to obtain information concerning the pollution of our waters and to continue to distribute this information to the public.

Bulletin #135 March 1972

STATEMENT TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

George G. Berg

Summary

A plan that will guide environmental management in New York State is being prepared by the Department of Environmental Conservation (DEC). DEC held a public hearing on this topic on February 1. The statement which follows was submitted on behalf of the RCSI by Dr. George Berg. While the RCSI has supported a number of actions taken by the State of New York to help control pollution in the Genesee Region, Dr. Berg stressed that many environmental actions have been incomplete and poorly coordinated up to now, and named some ways of improving environmental planning and management.

On sewage treatment, we have gathered evidence since 1964 that backed the clean-up of Monroe County waters. We consider the proposed sewage treatment activities in this county as a sound model for activities state-wide, and note that this includes phosphate removal at the sewage treatment plant. We recognize the need for a new State bond issue, and the need to get Federal reimbursement for the State expenditures on sewers and sewage treatment plants. In the long run, however, we see sewage treatment, preservation of agricultural land and recycling of materials as three related aspects of the same problem, and we urge the DEC to explore ways for recycling sludge and nutrients from sewage to farmland. Ultimately, organic matter which comes from crops should be put back into crops.

On phosphate in detergents and in sewage, RCSI first raised this issue in New York State, originally in connection with polyphosphates in street salt and later on with detergents. We keep abreast of the publications of industrial spokesmen (Proctor and Gamble) and scientists, who claim that they have evidence in favor of continued use of phosphates and we find that their evidence is not generally valid for the Great Lakes or Finger Lakes basins. Curtailing of the phosphates in detergents used in the Great Lakes watershed is a high priority matter in our judgment; it is essential to the protection of water quality until suitable treatment plants are built and will in all probability be necessary afterwards as well.

On water pollution control, we supported as ecologically sound the New York State doctrine of non-degradation of water. We note with regret that the U. S. Government is tending now in the reverse direction, back to the old doctrine of "best use."

In summary, the Rochester Committee for Scientific Information has been investigating environmental problems in the Genesee Region. We offer our experience with the gains in environmental management in our region as a model of what needs to be done at the state and federal levels of government.

Bulletin #1 October 6, 1964

REPORT ON WATER POLLUTION
Thomas A. Fink and George G. Berg

1. What was found.

Dr. G. G. Berg and Dr. T. T. Bannister, acting for the committee, collected samples of Irondequoit Creek and counted the living coliform bacteria in the water.

Place		Date	Count of coliform bacteria per 100 ml of creek water
Site 1.	Public park, south of N.Y. Central RR right of way, upstream from sewer	Sunday 9/27/64	2 thousand to 5 thousand
Site 2	East Rochester sewage processing plant outlet	Sunday 9/20/64	3 million to 5 million
Site 3.	Under bridge to sewage disposal plant	Sunday 9/27/64	2 million
Site 4.	Oak Hills housing development, 1,500 feet downstream from sewer outlet	Sunday 9/27/64	200 thousand to 300 thousand

We counted the coliform bacteria because they live in intestines and are the best measure of the contamination of water with human fecal matter. This is how we interpreted the results:

1. The bacterial count at the sewer outlet was so high that there was no difference on that score between sewage coming out of the processing plant and sewage that would not be processed at all.

2. The bacterial count at the housing development downstream was as high as one would expect from mixing raw sewage with the water of the stream. This meant that the coliform bacteria were not killed or removed by the flow of the stream, and that the stream was too loaded with sewage to be self-cleaning...

3. A note on procedures and purposes.

The samples of water were obtained and handled according to the Standard Methods for the Examination of Water and Sewage of the American Public Health Association, as recommended by the New York State Department of Health. Counting was done on EMB agar plates (Hilleboe and Larrimore, page 101), and confirmed by the anaerobic gas fermentation test (as per Standard Methods of the A.P.H.A.). Tap water controls were negative. Supplies for the test were bought by the members of the Rochester Committee for Scientific Information.

The results of our tests of water are available as a public service to all parties with a legitimate interest in environmental pollution. For instance, the primary counts of Irondequoit Creek were made available to the Conservation Council of Monroe County in connection with public hearings held on September 23rd, 1964.

Bulletin #2 November 7, 1964

SECOND REPORT ON WATER POLLUTION
George G. Berg and Thomas A. Fink

A second series of tests was conducted by the Scientific Subcommittee on Water Pollution of the RCSI. Samples were collected by Dr. W. Newcomb, Dr. T.T. Bannister and Dr. G.G. Berg, and counts were made by Dr. J. R. Christensen, Dr. T.T. Bannister and Dr. G.G. Berg... The limit of detection was of the order of one thousand bacteria per 100 ml.

The results are shown proceeding downstream on the Genesee River from the area of the Barge Canal to the lakefront.

We concluded that the Irondequoit sewer was the major source of contamination of the Genesee River, and that it discharged a suspension of raw human fecal matter into the river.

...We feel that the following health officers should take action to correct this problem. Dr. W. Ames is the County Health Officer whose responsibility it was to test the water of the Genesee River and to examine sewage disposal systems that lead to the river for hazards to public health. In our opinion, such tests would have shown that Irondequoit sewage has been creating a hazard to the health of the public at Ontario Beach Park, Ontario Beach and Summerville Beach, and that Irondequoit sewage is currently polluting to a hazardous extent the neighborhood of the drinking water intake of the Monroe County Water Authority.

Mr. Andrew Fuller, District Engineer for the New York State Department of Health, is in charge of controlling water pollution

in Monroe County. If Mr. Fuller samples the waters as we did and traces the pollution to its source, it is our opinion that he will find the town of Irondequoit is violating the state laws and regulations which prescribe a modest B rating for the Genesee River.

Location	Date	Count per 100 ml.
Genesee River above Barge Canal, in Genesee Valley Park	11 October 1964	0.6 thousand
(Right Bank, opposite Bridge E-157)	25 October 1964	10 thousand to 20 thousand
Red Creek entering Genesee Valley Park	25 October 1964	3 thousand
Genesee River under Elmwood Avenue Bridge (left bank)	25 October 1964	10 thousand to 20 thousand
Genesee River under Erie R.R. bridge (right bank, at River Boulevard)	11 October 1964	1 thousand to 2 thousand
Genesee River at level of Eastman Avenue (left bank)	25 October 1964	40 thousand to 70 thousand
Outflow of Seneca Park Pond into Genesee River	25 October 1964	none detected
Genesee River at the dock of Rochester Yacht Club	11 October 1964	none detected
Genesee River, 100 feet downstream from Yacht Club dock	12 October 1964	80 thousand to 0.4 million
1 foot downstream from Irondequoit Sewer outlet	18 October 1964	5 million to 10 million
	1 November 1964	0.3 million to 0.9 million
Genesee River, 25 feet downstream from Irondequoit Sewer outlet	1 November 1964	Count of unstirred sample - 1.2 million to 2 million Count of stirred sample - 3.5 million to 4 million
Gillette Creek near outlet into Lake Ontario, under Oak Ridge Drive, Irondequoit	25 October 1964	none detected

The samples taken below the Irondequoit sewer outlet had a flocculent, grey precipitate and a strong, objectionable smell. The shaking test confirmed that the coarse suspended matter was a source of coliform bacteria.

Note to members #03 January 1965

WATER POLLUTION

Four letters were exchanged between RCSI president Thomas A. Fink and Dr. Wendell R. Ames, Director of the Monroe County Health Department. The correspondence was initiated by the RCSI to gather official information on local violations of water purity rules. This is a summary.

On November 2, 1964, Mr. Fink asked for a definition of standards by which the Health Department judges water purity, and for a list of recent violations of these standards. On November 5, Dr. Ames refused the request as neither reasonable nor possible. Among his stated reasons: standards are so variable that it would take a computer to list all standards for all creeks; standards are already listed in published New York State Department of Health reports; and laboratory tests to check for compliance with standards are not necessary in any case, if the stream pollution is so bad that it is obvious on visual inspection. On November 10, Mr. Fink transmitted the RCSI report which pinpointed the pollution of the Genesee River by the Town of Irondequoit, and noted that the RCSI called for action by the County Department of Health. On November 14 Dr. Ames replied, indicating that the RCSI may be justified "in a limited sense" in using a bacterial count method to test for water pollution. He devoted the rest of his letter to instructing us how the public could be misinformed if we misused our testing method: according to Dr. Ames, waters heavily contaminated with coliform bacteria may be harmless to nearby residents; water with no trace of such bacteria can be a hazard to public health; and a proper sanitary survey has to include tests for organic solids, biological oxygen demand, stream flow, dilution factors, location, and use of the water.

It is of interest to RCSI members that the information which Dr. Ames listed on November 14 as essential to the control of water pollution is also the information he felt unable to share with the RCSI on November 5. The RCSI will continue its efforts to bring into the open the record of violations of water purity in our county...

Bulletin #3* May 10, 1965

THIRD REPORT ON WATER POLLUTION

George G. Berg

1. Third series of tests of local waters.

The location and results of tests conducted on May 9, 1965, are shown in Table 1, below. Sampling and counting was done by a subcommittee consisting of Drs. T.T. Bannister, G.G. Berg, J.R. Christensen and I. Spar. The day was sunny, with moderate winds from the south. The water at all four locations was free of objectionable odors and had no visible gross pollution in it. Samples were taken between 1 and 3 p.m. Coliform bacteria were counted by serial dilution and the EMB Agar Plate method, in conformity with the Standard Methods of the A.P.H.A. recommended by the New York State Department of Health...

Table 1

Location	Coliform organisms per 100 ml**	Remarks
Irondequoit Bay, south end west shore, near Orchard Park Boulevard, Irondequoit	Detectable fewer than 1,000	water cloudy
Irondequoit Creek, main channel near outlet into Bay at Dayton Road	30,000 (range 10,000-60,000)	water silty, yellowish
Irondequoit Creek, 150 feet upstream from mouth of Allens Creek	50,000 (range 20,000-80,000)	water clear
Allens Creek, 500 feet upstream from outlet into Irondequoit Creek	70,000 (range 60,000-80,000)	water clear

**At all locations, we counted approximately ten times more lac + bacteria than there were coliform bacteria.

* This was the first time the designation "Bulletin" was used. Publications were renumbered later. HF(1980)

2. Comparison with previous tests.

Previous tests on these waters were done by the State of New York in October 1954 (Lake Ontario Drainage Basin Survey, Report No. 2, 1955) and by our Subcommittee in 1964 (First Report on Water Pollution, October, 1964. A comparison of the results is in Table 2.

Table 2

Location	Coliform organisms per 100 ml 1954	1964	1965
Irondequoit Creek above Allens Creek and below East Rochester Sewage Treatment Plant.	45,000	250,000	50,000
Irondequoit Creek, 2 miles above East Rochester Sewage Treatment Plant	up to 3,000	3,000	
Allens Creek, near outlet	45,000		70,000

3. Meaning of results

The following interpretation of the results is submitted to members of the RCSI and interested citizens.

a. Irondequoit Creek and Allens Creek are polluted. The presence of human wastes makes these waters a disease hazard, and specifically makes their shores unsuitable for free access and play by children. The mouth of Irondequoit Creek is rated B for recreational use. This rating is not being met.

b. The pollution is readily removable. The coliform counts seen in 1965 are low enough to show that the sewage effluent they came from would be made harmless by routine tertiary sewage processing. Such processing was recommended in Governor Rockefeller's Clean Waters Program.

c. Irondequoit Creek pollutes Irondequoit Bay. Some creeks are self-cleansing. Irondequoit Creek was clearly not self-cleansing under present conditions, since it had the same amount of fecal pollution near the sewage outfall as it had at the creek mouth. This pollution was discharged into the Bay, and in fact we picked up coliform bacteria in the Bay.

In the 1954 and 1964 surveys, Irondequoit Creek received unprocessed sewage which brought with it a heavy bacterial contamination (as seen in Table 2). In 1965, the creek was free of the bad odors and floating debris seen in previous years, and it is likely that all the contamination we measured came from sewage processing plants. In spite of this, the coliform counts in Allens Creek and in nearby Irondequoit Creek were higher in 1965 than they were eleven years before. It is reasonable to conclude that the construction of new sewage treatment facilities in the Irondequoit Creek Basin did not result in the improvement of the waters because it failed to get ahead of the growth of population.

BULLETIN #5 August 1965

REPORT OF THE SUBCOMMITTEE ON WATER POLLUTION
T. T. Bannister and J. R. Christensen

This summer Dr. T.T. Bannister and Dr. J. Roger Christensen, both of the University of Rochester, have been testing the coliform bacterial count at Lake Ontario Beaches and related water...

Methods. This year, we have used the Millipore Filter^{R} technique; this method is approved by the American Public Health Association, and is described in their Standard Methods (11th ed.).

Results.

July 10, early afternoon. Brisk N.W. breeze.

Location	Coliform index
Durand-Eastman Beach	50,000
Charlotte Beach	20,000
Genesee River-Triangle Marine (east bank)	1,500,000
Irondequoit Bay-Rochester Canoe Club Pier	100
July 13, morning. Calm	
Genesee River-foot of Petten St. (west bank)	approx. 500
July 20, morning. Moderate S.W. breeze	
Durand-Eastman Beach	2,000
Summerville Beach (200 ft. east of jetty at mouth of Genesee	1,000
Genesee River-Triangle Marine	450,000
Genesee River-foot of Petten St.	2,000

Note: This was the first data gathered toward understanding the condition of the bathing beaches. After two years of persistent work, analysis, and public information, the beaches were closed by the New York State Health Department. RCSI documented conditions but made no recommendations. HF(1980).

Interpretation. The results show a widely varying, and sometimes extremely high level of pollution along the Lake Ontario Beaches. The cause of this fluctuation is not known, but it seems reasonable to assume that such factors as wind direction, rate of flow in the river, etc., would have very large effects on the distribution of pollutional material.

As for the level of the pollution on the beaches, it may be noted that a number of authorities (1) and legally constituted interstate compacts (2) have set a standard of 100 as the maximum coliform index for water used for bathing or recreational purposes, although some of these standards permit an occasional sample to be as high as 1,000, so long as the average of samples from a given site does not exceed 100. No sample should exceed 1,000. We have three samples from Durand-Eastman Beach; two of these exceed 1,000, and the average is in excess of 15,000. Thus, even from the three observations, the coliform index of the water at this publicly operated bathing facility clearly exceeds by far the standards cited above. Similar conclusions seem warranted on the basis of the two samples from Charlotte Beach...

It seems obvious that the Genesee River is a major source of the pollution found at the beaches; whether or not it is the only significant source has not been determined. Furthermore, it is obvious that the pollution load is being added to the River below the level of Petten St. (about 2 blocks south of the Stutson St. bridge).

Conclusions. Public bathing beaches on Lake Ontario are seriously polluted. The Genesee River is a major source of the pollution. The water at the beaches will not come close to meeting the accepted standards for water used for bathing and recreational purposes until the pollution in the River is cleaned up.

BULLETIN #7 December, 1965

POLLUTION OF WATERS OF THE LOWER GENESEE RIVER
David J. Wilson

...a general survey of the quality of water in the lower Genesee has been made. The results of this brief survey indicate massive pollution of the Genesee River between the Elmwood Avenue bridge and the mouth of the river. This pollution consists of industrial wastes (chemicals and brewery wastes) and sewage. Some of the sewage is not chlorinated, and most of it contains solids (an infraction of the existing state law). The extent of this pollution is such that the river is unable to cleanse itself by bacterial oxidation before it empties into Lake Ontario.

It should be noted that the samples reported in the following table do not exhaust all the possible sources of pollution. As yet only four samples have been taken between Elmwood Avenue and the Beebee Power Station, and many of the outfalls south of the Hawkeye Works have not been sampled.

Still some conclusions can be drawn. The figures given for sample number 3 suggest that considerable pollution is entering the river south of the Beebee Power Station. At least a portion of this apparently comes from the Genesee Brewing Company (samples 2, 18). Samples 6, 7, and 8 indicate that the Kodak Park Works puts a significant load of pollution in the river. Samples 5, 13, 14, and 17 (sewage outfalls) indicate some probable sources of the extremely high coliform counts observed by Bannister and Christensen.

Samples were taken from the river on October 8, 10, 16, and 24, and on November 27, 1965. The sampling sites, chemical oxygen demands, some other analyses and tests, and qualitative observations are listed in the attached table starting at the Elmwood Avenue Bridge and proceeding downstream to the river's mouth. (Sample 18, out of order, was taken after the table had been prepared.)

The analyses were run by Dr. D.J. Wilson, and the samples were collected by Mr. Neal Dunkleberg and Dr. Wilson.

Note: Fifteen of the 22 entries are deleted. The original sample numbers of the remainder are retained. HF (1980)

Sample Number	Date	Site	COD[1]	Results and Observations
2	24 Oct	East bank, north of Platt St. bridge, immediate vicinity of Cataract St. sewer outfall.	1000 plus	COD in excess of 100 times the saturation concentration of oxygen. Very strong odor, large amounts of partly decomposed grain present. pH of 5-6, samples reduce $KMnO_4$ slowly. Rats were seen feeding on the brewery waste; seven were seen in a period of 2 minutes.
3	10 Oct	West bank of river just below Beebee Power Station.	48	COD almost 5 times greater than saturation concentration of oxygen. Some odor. Noticed that trash is being dumped in the river at this point, apparently by the City of Rochester.

Sample Number	Date	Site	COD[1]	Results and Observations
5	16 Oct	Sewage outfall, inlet off east bank just below Hawkeye	133	COD about 13 times the saturation concentration of oxygen. Solids seen-dung. No residual chlorine present, as indicated by several starch-iodide tests. pH about 6, does not reduce dilute $KMnO_4$.
6	16 Oct	West bank, outfall from grey tanks near Kodak Park	350	COD about 35 times saturation concentration of oxygen. Odor of H_2S, bluish color, foam reduces dilute $KMnO_4$ readily. Chlorine test negative. Slight positive test for sulfide.
13	10 Oct	East bank, Irondequoit sewage outfall at Genesee Yacht Club	389	COD 40 times saturation concentration of oxygen. No odor of chlorine but marked odor of sewage, sporadic appearance of solids (dung, toilet paper). People at the club stated that the smell was very bad and the volume of solids quite large at about 7:30 a.m. this date. A series of turbidity tests with silver nitrate indicated that this sewage contained about 20 ppm total chlorine (both free Cl and Cl ion), which suggests this sewage is being chlorinated.
18	27 Nov	South Genesee Brewery outfall, approx. 50 yd. north of Cataract St. sewer outfall	>1000	COD over 100 times saturation concentration. Heavy flow, paper, foam, extensive discoloration of the river. pH greater than 10 (hydrion paper), sample found on titration with acid to be about .04 N base. Strong odor.
19	27 Nov	See Sample No. 5		Dung seen, strong odor.

[1]Chemical oxygen demand expressed in mg of equivalent oxygen per liter of sample.

On December 2, samples were collected at three of the outfalls. The results were as follows:

Sample Number	Observations
19	Sewage outfall just north of Hawkeye Works. No free chlorine (2 tests performed), specimens of dung collected. Odor fairly strong. Several chunks of dung some roughly the size of a marble, were seen coming out of the outfall.
20	Sewage outfall, Genesee Yacht Club. Some discoloration and sediment, no coarse solids, no free chlorine (2 tests performed).
21	Sewage outfall at Triangle Marine. Lots of discoloration, some paper, lots of fine to medium solids, 4 condoms, no free chlorine.
22	Genesee Brewery outfall discharging profusely, discoloration of river extensive, much foam in the river for a distance of at least 200 yards downstream.

BULLETIN #9 May 18, 1966

FLOAT TESTS AND GREASE BALL DEPOSITS ON LAKE ONTARIO BEACHES
David J. Wilson and Neal G. Dunkleberg

...Some doubt was raised by local officials concerning the causal relationship between the discharge of septic sewage into the Genesee and the lake, and the occurrence of coliform counts on the beaches far in excess of the 2400 per 100 ml permitted by state law. It was suggested that these were soil coliforms, or that they were of bather origin.

To assist in clearing up these points, float tests were initiated at the mouth of the river and at the outfall of the Durand-Eastman plant in the lake. Also, careful examination of the beaches were made.

Grease balls identical in appearance to those found in large numbers at the sewage outfalls were found in excessive deposits on Ontario Beach, on the beach extending east of the river, along the entire length of Durand-Eastman Beach, and on the beach just west of the mouth of Irondequoit Bay. Condoms and what appeared to be fecal pellets were noted occasionally. Floats put into the river on three occasions were generally recoverd on the beach east of the river, although a few were found on Ontario Beach. On the one

occasion that floats were put into the lake at the Durand-Eastman outfall, they were recovered in large drifts of grease balls on the beach west of the mouth of Irondequoit Bay; this is a densely populated area.

These tests show that WNW to NW breezes bring floats, released at the mouth of the River or at the Durand-Eastman outfall, to shore at Rochester area beaches.

The following data come from a U. S. Weather Bureau bulletin summarizing hourly observations at the Rochester Airport from 1951 to 1960.

Percent frequency of wind direction

	WNW-NW	NNW-N	NNE-NE	ENE-E	Total "onshore"
June	14.0	6.2	4.9	5.7	30.8
July	14.4	7.1	6.0	4.4	31.9
August	10.4	7.9	7.7	7.1	33.1

Chlorine tests run at the Pattonwood plant outfall on May 13, 15, and 17 (since our last report was issued) were negative without exception; if this plant is chlorinating, the chlorine is gone by the time the sewage enters the river with its load of solids. (We have previously shown such sewage to be extremely septic. This plant discharged large amounts of black sludge on May 11 and 14; the Summerville plant discharged black sludge into the river on May 17, but has been chlorinating.

The results we have obtained indicate that sewage solids and septic sewage continue to be discharged into the river and the lake, and that the flow patterns produced by wind and water currents are such as to frequently bring floating sewage back onto essentially all of the beach north and northeast of the city.

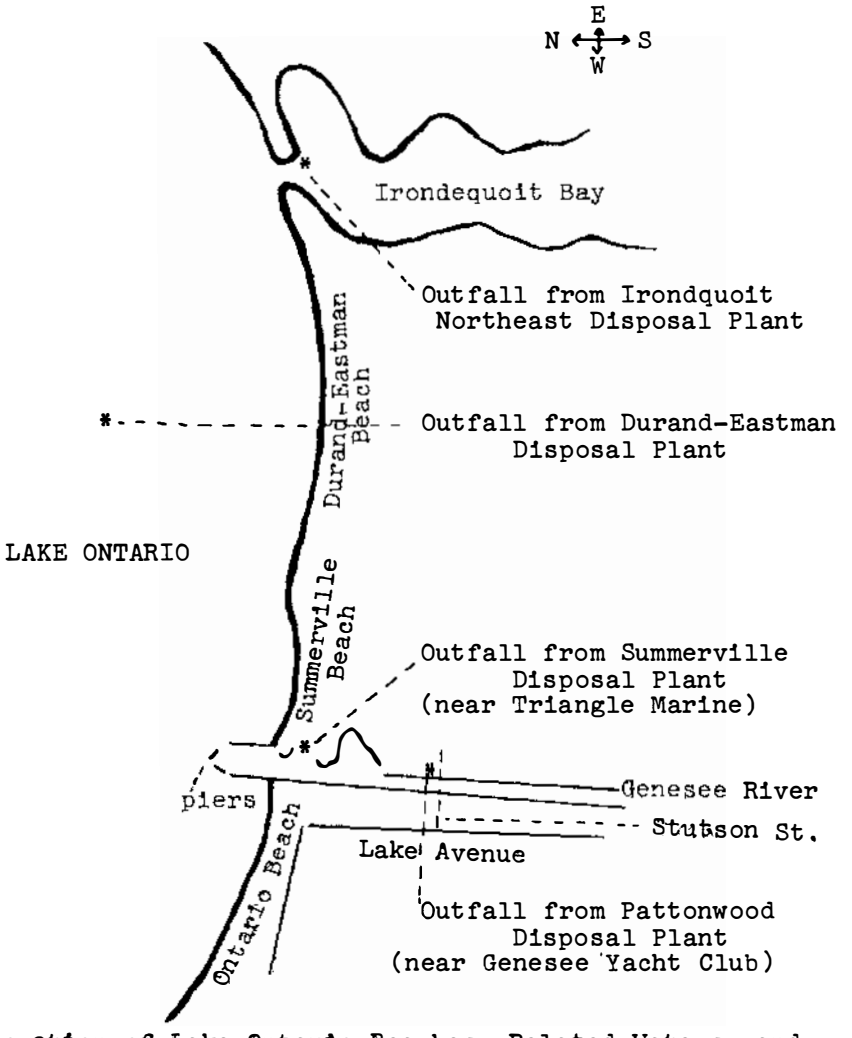
We are indebted to Dr. and Mrs. M. E. Missal for assistance in carrying out the float tests.

There follows a summary of the data and observations on which the above conclusions are based.

Float tests. (Only four of 14 entries have been retained as examples.)

May 11. 50 red floats put into river at north end of east jetty at 10:45 a.m. Wind from the WNW, moderate. 49 red floats recoverd on beach within half a mile east of the jetty at 6:15 p.m. the same day.

May 15. 70 blue floats put into lake at Durand-Eastman outfall at 10:55 a.m. On May 16, 19 floats were recovered between the mouth of Irondequoit Bay and Marge's Restaurant about 1/4 mile west. 19



Location of Lake Ontario Beaches, Related Waters, and Sewage Disposal Outfalls

1 mile
(approximate scale)

more floats were found between the restaurant and old Boardwalk Park. One float was found a short distance west of old Boardwalk Park. During this test the wind was generally from the NW.

May 16. Very extensive deposits of grease balls were seen on the beach between the outlet of Irondequoit Bay and the intersection of Scenic View Drive and Lake Bluff Road. Light NW breeze.

May 18. Durand-Eastman Beach, by Sunshine Camp. Grease balls in drift at water's edge, grease balls in drift back 20-30 ft. on the beach. Several pellets of what appeared to be fecal matter.

BULLETIN #12 July 22, 1966

WATER POLLUTION IN MONROE COUNTY
David J. Wilson

...This month we have begun a study of Oatka Creek, a tributary to the Genesee; we started in the vicinity of Scottsville. Coliform counts and residual free chlorine tests indicate that the Scottsville STP puts sewage solids and undisinfected sewage into Oatka Creek. This is a clear-cut violation of the stream's state classification of B, recreational. Counts in the stream below the sewage treatment plant were 46,000 and 120,000; the sewage effluent gave counts of 13.4 million and 13.8 million, among the highest counts we have ever obtained, and indicating that this effluent is essentially raw sewage. Sludge deposits were observed in the stream.

Last week we began a study of Slater Creek, which discharges into Lake Ontario a short distance west of Ontario Beach. The creek runs by a children's playground, at which point the coliform count was 3.3 million. At the mouth of the creek, with the flow greatly augmented by a large volume of cooling waste from a power plant, the count was 90,000. Slater Creek receives sewage effluent from the Town of Greece and is literally an open sewer - foul-smelling, grey, and ruined.

We have demonstrated extensive pollution of the creeks, which was not abated by public health authorities.

BULLETIN #15 July, 1966

HOW NOT TO LIE WITH STATISTICS
David J. Wilson and George G. Berg

Past bulletins of the RCSI reported many counts of coliform bacteria in the waters of Monroe County. These counts were

arithmetic averages. They were computed to measure the amount of pollution in water. and this pollution was used to estimate the hazard that the water carries bacteria or viruses of human diseases. Technically speaking, we used the arithmetic average as an index of disease hazard.

Our reports are criticized by varous public officials, who objected to the use of arithemtic averages. We were told to use logarithmic averages or medians, because if we did this we could get much "lower" counts and the numbers would be safer looking. Unfortunately, these two ways of handling numbers were designed for completely different problems, and make no sense at all in connection with our counts.

Here is an example...

Why would anyone use the median or the logarithmic average? The median is used where we wish to get a picture of the most frequent event, as in finding the most usual summer temperature at the beach. It ignores the dangerous extremes.

The logarithmic average is used to measure the properties of growing populations, such as algae growing at the beach, but gives a completely false picture for polluting bacteria which do not grow more numerous in lake water.

Note: This bulletin (only the essentials reprinted) was one of the finest examples of RCSI's effective use of scientific skills to establish valid information in a technical field, and to present findings in layman's language without recourse to rhetoric. HF (1980).

BULLETIN #19 November 1966

SCOTTSVILLE REVISITED - SEWAGE POLLUTION OF OATKA CREEK
By David J. Wilson

On September 22, 1966, a follow-up study of Oatka Creek in the Scottsville area was made.

Location	Coliform Index
Oatka Creek at the Bowerman Road Bridge, upstream from STP	160
Sewage effluent, Scottsville STP	4.2 million
Oatka Creek near the Niagara Mohawk substation, approximately 50 yards downstream from STP	100,000
Oatka Creek at Highway 251 Bridge, at foot of Main Street, approximately ¼ mile downstream from STP	180,000

The sewage effluent of the STP was tested for the presence of free chlorine, and the tests were negative. The sewage contained grey sediment, and sludge banks were observed in the creek. The algae growth on the stream bottom downstream from the STP was markedly different in appearance from that upstream from the STP.

Our results indicate that no change has been made in the very poor quality of the effluent from the Scottsville STP since our earlier report was issued in July. On July 13, Mayor Seldon Brown was quoted as saying that the town has known that its STP was inadequate since 1961, that the County Health Department had not told them that they had to chlorinate their effluent, and that the plant was greatly overloaded. He blamed delay in beginning construction of a new plant on delays in handling of the town's application for aid by the state and federal governments. On September 23, the Committee wrote to Mayor Brown to inform him of the results of the recent tests and to inquire concerning progress in their plans for a new STP. He informed us that "We have been advised that the last forms requested by th State Health Department were forwarded to the appropriate federal agency September 30th. The consensus of the Board is to allow the State and Federal agencies until the November 15th meeting of the Village Board to give us the green light. Then we will go it alone with appropriate publicity."

BULLETIN #20 December 1966

SEWAGE BOOTLEGGING ONTO THE SHORE OF LAKE ONTARIO

J. Roger Christensen

On Sunday, October 23, a resident of Lake Bluff Road, Irondequoit, called to report a flow of bad-smelling liquid from a culvert which empties onto the beach of Lake Ontario, a few hundred yards west of Sea Breeze. Dry weather and the strong odor suggested sewage.

An hour later at the site, I found a small rivulet flowing from the culvert, across the beach, and into the lake. The rate of flow seemed to be about a few gallons per minute. No coarse solids were seen, but the liquid was cloudy from fine suspended solids, and it looked and smelled like the liquid portion of sewage.

A sample was assayed for coliform bacteria by a simple method; diluted aliquots were spread on MacConkey's agar plates, which were then incubated overnight at 37°. Even the plate receiving the smallest sample (equivalent to 0.001 ml.) developed so many typical coliform colonies that they could not be accurately counted. The plate was estimated to have at least 1000 colonies, which would correspond to a coliform index for the

original sample of 100 million coliforms/100 ml.!! Although the method used for this count is not an official one, there is no doubt that there was a very high concentration of coliform bacteria in the sample.

On Monday, I contacted Mr. Duane Tillotson, of the Irondequoit Sanitation Department. He explained that there had been occasional discharges from this culvert in the past. The culvert is the terminus of a system of storm drains, partly open and partly underground, built at different times by different builders. No complete plan of the system exists. He believes that there must be an illegal connection of a septic tank to the system, but has been unable to find it. The sporadic occurrence of the flow, and the lack of solids, suggests a septic tank which fills up and then empties or is emptied into a storm drain.

Conclusion

Undiluted sewage is flowing, albeit sporadically, across a beach where neighborhood children play. Furthermore, the location is only a few hundred yards from Durand-Eastman Beach. It is hoped that interested persons will help the Irondequoit Sanitation Department in tracking down this source, or any similar source, of potentially dangerous pollution.

BULLETIN #24 March 1967

TOWN OF IRONDEQUOIT: IMPROVEMENTS IN SEWAGE TREATMENT FACILITIES
J. Roger Christensen

Present Operations

In late 1966, treatment of sewage at the Summerville plant was discontinued, and the plant was converted to a pumping station, lifting the sewage to Pattonwood. This eliminates one of the sewage outfalls into the Genesee, and a major source of sewage solids and bacterial pollution.

In recent months, we have noted a marked improvement in the operation of the Pattonwood plant:

Tests on effluent at outfall of Pattonwood plant

April 2 - June 14, 1966	6 out of 18 chlorine tests positive (33%)
July 8, 1966 to present	5 out of 7 chlorine tests positive (71%)

Last negative chlorine test: November 18, 1966

January 8, 1967 settleable solids: 0.1 ml/l (quite good)

Construction at Pattonwood

Construction necessary to convert the Pattonwood plant to a secondary treatment facility, (i.e., one providing for biological treatment of the effluent from the primary stage of treatment), was about 80% complete.

The total design capacity is 1.2 million gallons per day (m.g.d.), with a present sewage load of about 0.6 mgd.

The completed plant should give about 80% removal of B.O.D., about twice the present extent of removal. Looked at in a more meaningful way, from the point of view of the river, the discharge will contain only about one-third as much B.O.D. as the present discharge. Disinfection of the effluent will be easier, cheaper, and more reliable.

The total cost of the capital improvements, according to Mr. Stoffel, will be approximately $700,000.

The Northeast Plant

This plant, located near Sea Breeze, is a secondary treatment plant with a capacity of 1.5 mgd, and current load of about 1.3 mgd. The present outfall is located in Irondequoit Bay, near the outlet into Lake Ontario.

Presently under construction is a new outfall line, which will carry the effluent approximatley 1 mile out into Lake Ontario.

BULLETIN #26 May 1967

SEWAGE POLLUTION OF DENSMORE AND THOMPSON CREEKS - A FOLLOW-UP REPORT

George G. Berg and David J. Wilson

In recent reports the Committee has described the pollution of Densmore and Thompson Creeks with sewage from the City of Rochester. These two streams are being kept under surveillance by the committee. We report here results obtained on 25 March, and present some material relevant to a press release on the subject of Densmore Creek made by Commissioner of Urban Works, Alfred S. Ancello.

I. Coliform Counts (taken on 25 March 1967)

Location and Remarks	Coliforms per 100 ml
Thompson Creek, at culvert under Sea Breeze Expwy. south of Tryon Park. Strong odor of gasoline, floating oil on water, water grey-black in appearance.	73,000

Location and Remarks	Coliforms per 100 ml
Densmore Creek about 50 yds. upstream from Norton St. chlorinator. No sludge or toilet paper visible in the stream.	45,000
Densmore Creek, just downstream from chlorinator. Toilet paper, sludge, 2 condoms seen in stream.	320,000
Densmore Creek at Densmore Rd., a few hundred yds. downstream from chlorinator. Toilet paper seen in stream.	280,000
Densmore Creek, downstream from Irondequoit's S.E. sewage treatment plant, Point Lookout.	78,000

These results, entirely consistent with our previous data, establish that (1) Thompson Creek is still polluted; and (2) the City of Rochester screening and chlorination facility at Norton Street is the main source of sewage pollution of Densmore Creek.

II. Note to Commissioner Ancello

A report by Commissioner Ancello, summarized in the 25 March Democrat and Chronicle under the heading "Sewage Unit Working Okay, City Retorts," shows some misconceptions concerning the pollution of Densmore Creek. In the text that follows we quote directly from the newspaper article and add our comments. We hope that these explanations will help Commissioner Ancello to recognize and correct the bad conditions originating at the city's Norton Street chlorinator...

According to the commissioner, Densmore Creek receives three kinds of water in passing through Rochester: surface runoff from the valley of the creek, ground water infiltrating into the creek and into the tunnel, and sewage. We found toilet paper, condoms, and high coliform counts just upstream from the station, and no sewage solids. It would be a remarkable coincidence if the extra bacteria did not come from the same place as the toilet paper. We suggest that these findings are definitive, since we have now repeated the tests on three occasions with the same results: the bacteria below the Norton Street station come from undisinfected sewage...

BULLETIN #30 June 1967

IMPROVED CONDITION OF THE IRONDEQUOIT CREEK WATERSHED

David J. Wilson

In previous years this committee has found Irondequoit Creek to be extensively polluted with undisinfected sewage. The picture

at present is greatly improved, although at least one source of undisinfected discharge into the creek continues. The RCSI tested the creek and its tributaries between December 1966 and March 1967, at locations which are shown in the attached sketch map...

Residual free chlorine tests and settleable solids analyses were run on sewage effluents from Penfield's main plant on Irondequoit Creek and from Fairport's plant on Thomas Creek... Coliform bacteria were counted in samples of water from Irondequoit Creek and from Thompson and Thomas Creeks, two of its tributaries.

Dissolved oxygen concentrations were measured in the waters of Thompson Creek with a galvanic cell dissolved oxygen meter, loaned by the Scientists' Institute for Public Information.

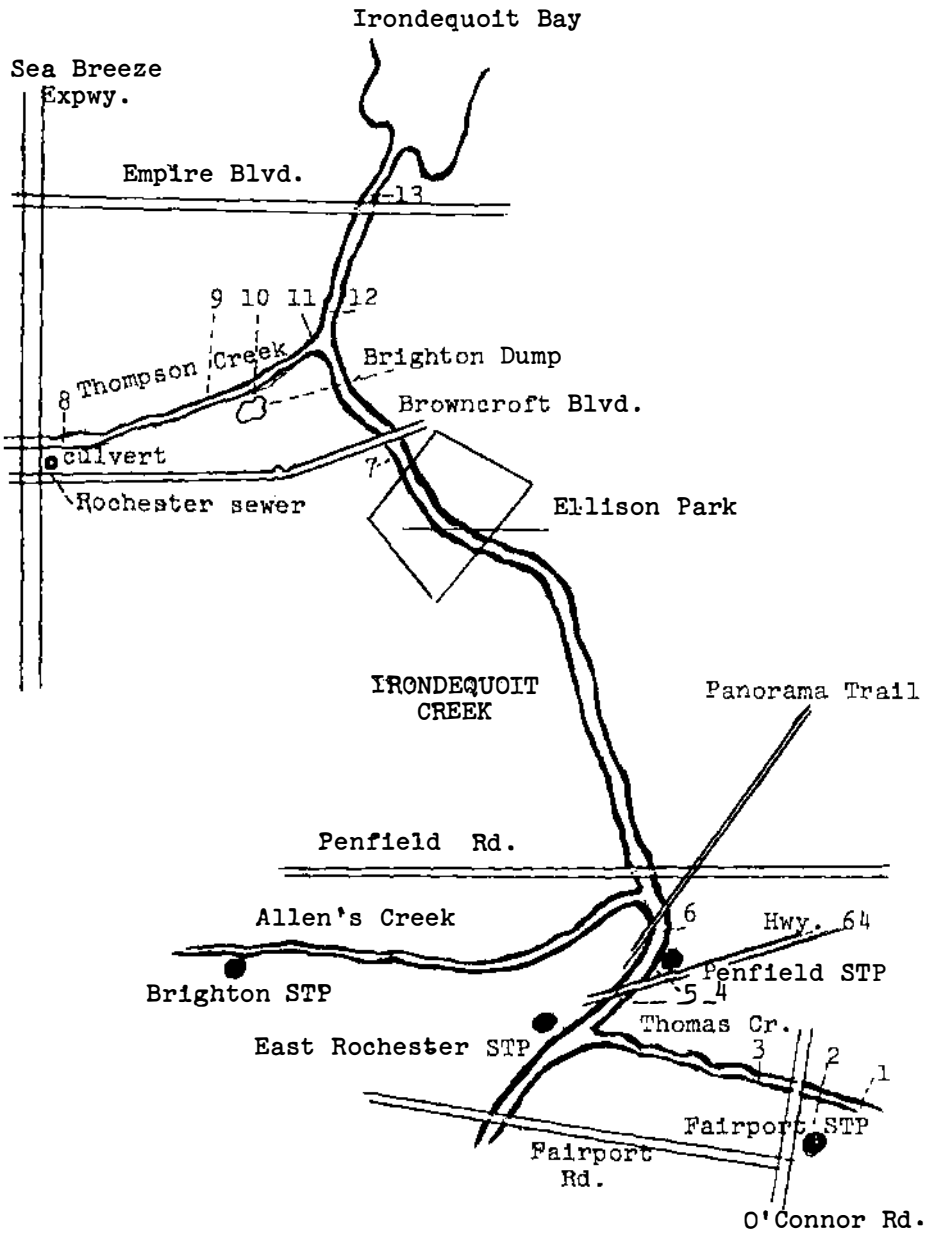
Intestinal Bacterial and Organic Matter in Irondequoit Creek and Tributaries

Location (a)		Coliforms per 100 ml	Dissolved Oxygen
1	Thomas Cr. upstream	1450 (c)	
3	Thomas Cr. downstream	0 (c), 0 (d)	
4	Irondequoit Cr., Hwy. 64	2400 (d)	
6	Irondequoit Cr. at Panorama Trail	560 (c), 600 (d)	
7	Irondequoit Cr. at Browncroft Blvd.	0 (d)	
8	Thompson Cr. culvert	48,000 (c), 200,000 (d)	9.2 (b)
9	Thompson Cr. upstream		8.8
10	Leachings, Brighton dump		6.5
11	Thompson Cr. outlet		8.4
12	Irondequoit Cr. downstream		10.5
13	Irondequoit Cr. outlet	0 (d)	

(a) Locations shown on map and described in Table 1.
(b) Dissolved oxygen in parts per million in water, measured on 17 December 1966
(c) Counts of coliform organisms per 100 ml of water,made by the Millipore® filter method 12 February 1967.
(d) Counts as above, made on 4 March 1967.

At the time these tests were made, the part of Irondequoit Creek extending from Fairport Road through Ellison Park to Browncroft Boulevard appeared to be clean enough for recreational use and fishing.

In our 1966 bulletins we reported that a sewer of the City of Rochester is discharging human fecal matter into Thompson (location 8 on the map). The creek was still badly polluted with undisinfected fecal matter on March 4. Locations 7 and 13 give us cause for concern. What killed all the bacteria in Irondequoit Creek downstream from Ellison Park? These zero counts raise the possibility of pollution of lower Irondequoit Creek with toxic chemicals. This points bears further investigation.



Map of Sampling Sites in Irondequoit Creek Basin

The effluents from the Fairport and Penfield sewage treatment plants (locaions 2 and 5) were tested for residual free chlorine and for settleable solids. Chlorine tests were positive on February 12 and March 4, 1967, indicating that these effluents were being disinfected; and the settleable solids analyses at both locations yielded less than 0.1 ml per liter of water on February 12, indicating that solid material is being effectively removed from these discharges. We owe to such procedures the clean condition of Irondequoit Creek at Panorama Trail (location 6).

The organic loading of the creeks is not so well controlled. At Fairport there were heavy deposits of black, fermenting sludge in the slough leading from the sewage treatment plant to Thomas Creek, and in the creek itself at the point where it receives this sewage. No such sludge was found in the creek above the mouth of the slough. Such deposits indicate that the water is locally overloaded with organic matter. The presence of these sludge beds raises some question as to the ability of this plant to handle the additional load of the meat packing plant now under construction in that area -- possibly considerable expansion will be necessary if much meat packing waste is to be handled without creating a nuisance.

The dissolved oxygen determinations made on Thompson Creek and on the leachings from the Brighton dump are lower than one would expect to find in normal stream waters in December.

BULLETIN #32 June 1967

COLIFORMS ON AREA BEACHES - SPRING 1967

J. Roger Christensen, Neal G. Dunkleberg
Regina Stewart and David J. Wilson

In view of the continuing controversy over the pollution of the water at the local beaches, the Water Pollution Subcommittee has continued to take coliform counts at various locations on Lake Ontario and tributary waters. Results for the first five months of the year are summarized in the two accompanying tables.

During the late winter and early spring, the counts were consistently low. We felt that this might be due to improvements at the Pattonwood plant, (conversion to complete secondary treatment), and at the Durand-Eastman plant, (added chlorinating machines), and we were cautiously optimistic about the counts which might be expected this summer. It turns out that the caution was more justified than the optimism, since a considerable number of high counts have turned up during April and May. Based on the counts during these two months, it seems questionable, at best, whether the water at the beaches will meet legal standards for coliform counts, even though the standards have been somewhat relaxed by the recent amendments to the law.

These counts, made when the beaches were closed, should lay to final rest the hypothesis, originating from the County Health Department, that the high counts at the beaches were of "bather origin."

With one exception, the counts at the mouth of the Genesee River have been low to moderate. The same is true of the mouth of Little Pond. It is unfortunate that sampling from the vicinity of the Durand-Eastman sewage outfall is so inconvenient. On the one day tested, however, it is clear that the counts, several hundred yards out from the shore and downwind from the outfall were of the same general magnitude as the counts at the shoreline. Again, the data agree with the idea that the coliforms at the beach come from the sewage outfall.

Conclusions and Comment. By now, it seems to us quite clear that the only credible source for the sporadic high coliform counts at the local beaches is the sewage that is discharged into the lake and tributary waters. By far the largest volume contributor in the vicinity is the Durand-Eastman plant. Furthermore, this plant provides only primary treatment, supplemented with chlorination.

Whether this level of sewage pollution constitutes a significant health hazard to swimmers is a question which, from a scientific standpoint, is still undecided. We continue to be concerned, however, about individuals swimming in water that gives coliform counts of the order of magnitude of 100,000, even though scientific evidence of disease resulting from this kind of exposure is lacking. (So far as we know, there are no studies that would give an estimate of any hazard that might be associated with swimming in water of this order of pollution.)

The New York State Department of Health has apparently decided that, scientific evidence or no, the beaches are likely to be unsuitable for swimming according to the legal standards, and that they therefore must not be opened. This represents a change in attitude on their part. Local authorities are reluctant to accept this decision, but seemingly have little choice in the matter.

We will continue to follow both the scientific and political developments on this matter, though we will continue to confine our announced judgments to the former.

Through March, the counts tended to run quite low, even in the places subject to more or less direct sewage pollution (mouth of Slater Creek, Genesee River, and Irondequoit Bay outlet). In April and May, however, the counts have been much higher, both for the waters entering Lake Ontario and on the beaches themselves. On the basis of two low counts on the same day, Hamlin Beach is an exception. Over the years, the Monroe County Health Department

records have quite consistently found low counts at Hamlin Beach. The sporadic high counts on Slater Creek, the Genesee River, and at the mouth of Irondequoit Bay would seem to indicate somewhat erratic disinfection of the sewage effluents discharged into these waters.

Acknowledgement. Financial assistance from the Scientist's Institute for Public Information has helped to make these studies possible.

BULLETIN #33 July 30, 1967

CONTINUED POLLUTION OF THOMPSON CREEK, DENSMORE CREEK, AND SLATER CREEK WITH UNDISINFECTED SEWAGE

Regina Stewart and David J. Wilson

Location of Tests.

During the past year this Committee has demonstrated that Slater Creek was massively polluted with undisinfected sewage from Greece's Latta Road Plant, and that Thompson and Densmore Creeks were similarly polluted with undisinfected sewage from the City of Rochester. Our disclosures brought some action: we are pleased to advise our members that the Norton Street Chlorination Station is apparently working properly at last, and that Densmore Creek now has low bacterial counts downstream from Norton Street. There is, however, no improvement to be seen at other trouble spots, which include the southern part of Densmore Creek, upstream from Norton Street. This report presents data obtained between 25 May and 24 July, 1967; the locations at which samples were taken are given in Table 1 (deleted), and the total coliform counts are given in Table 2.

Counts of total coliform organisms per 100 ml of water were made by the Millipore filter method. The streams and the vicinity of the Latta Road Plant outfall were examined for the presence of sewage solids and sludge. The results were as follows.

The effluent from the Latta Road plant was laden with grey sediment, condoms, toilet paper, etc., which covered the pieces of fencing and the two sets of bedsprings (!) placed in the channel from the plant to the creek in a futile effort to prevent massive quantities of foam from getting into the creek. A large bank of detergent foam, roughly 50 ft. in length, as much as 15 to 20 ft. wide, and 2 to 4 ft. high, was present in the channel from the plant to the creek. Slater Creek downstream from the Latta Rd. plant was found to be a grey stinking mess, choked with sludge banks and bubbling with fermenting sewage solids.

Densmore Creek upstream from the Norton Street Chlorination Station was examined in some detail in an attempt to account for rather high coliform counts which were observed earlier and mentioned in our previous reports. The sources of these high counts have now been located; Densmore Creek flows out of a large culvert at Master St. and Culver Rd.; our inquiry to the City of Rochester as to the ownership of this culvert has not been answered, but people living in the area inform us that this culvert is another of the City's combined storm-sanitary sewer overflows. It discharges even in dry weather, indicating that the weirs and floodgates are routinely letting sanitary sewage into the creek even when there is no storm water. The creek bed from Culver Rd. to Norton St. was plastered with toilet paper, condoms, and feces; and the smell in the vicinity of the creek is bad. In addition to this major discharge, the creek also receives a small but potent discharge from an outfall immediately behind houses at 2441, 2454, and 2457 Norton Street; we have informed the County Health Dept. of this outfall, and understand that their dye tests, which were being carried out when their reply was written, have already established that sewage from one home is being discharged through this pipe into the creek.

Thompson Creek, which receives effluent from another combined storm-sanitary sewage overflow from the City of Rochester, was found to be laden with grey sediment, paper, condoms, and feces. Evidently the City has not yet succeeded in abating the pollution of the creek with sewage during dry weather.

The following total coliform counts were obtained.

Table 2 - Coliform Counts

Location	Date	Coliforms/100 ml
1 Densmore, at Densmore Rd.	25 May	340,000
2 Densmore, downstream from chlorinator	25 May	710,000
	16 June	1.8 million
2 Densmore, downstream from chlorinator (cont.)	16 June	1.7 million
	1 July	0
	1 July	0
	19 July	0
3 Densmore, upstream from chlorinator	1 July	1.7 million
	19 July	220,000
4 Small sewer to Densmore	16 June	20 million
	1 July	10 million
5 Densmore, just upstream from small sewer	1July	470,00
6 Densmore, at Culver Rd. and Master St.	19 July	480,00
	19 July	420,00
	24 July	2 million
	24 July	2.2 million

Location	Date	Coliforms/100 ml
7 Effluent from Latta Rd. STP	19 July	260,000
	24 July	1.1 million
8 Slater Cr. at Ling and Kirkwood Rds.	25 May	0
	19 July	40,000
9 Mouth of Slater Cr.	19 July	170,000
10 Thompson Cr. at Sea Breeze Expwy.	1 July	400,000
Tryon Pk.	1 July	810,000
	24 July	approx. 5 ml.
	24 July	approx. 5 ml.

Conclusions

1. Three local streams constitute a public health hazard and are not suitable for free access and play by children. These are: Thompson Creek; Slater Creek downstream from the sewage disposal plant of the Town of Greece on Latta Road; and Densmore Creek between Culver Road and Norton Street in Rochester.

2. The polluter of Slater Creek is the Town of Greece. The outflow of Greece's Latta Road plant changes the creek into an open sewer foul with floating fecal matter and foaming with detergents.

3. The polluter of Thompson Creek is the City of Rochester, which discharges raw sewage into that creek. In dry weather, the sewage should be made to flow in the opposite direction, toward the City's sewage disposal plant.

4. The polluters of Densmore Creek are (a) the City of Rochester, which appears to have there another sewer conduit running in reverse; and (b) a private house owner, or owners, who simply use a public creek as a sewer.

5. The polluters break health laws and water quality standards and deprive local residents of the safe use and enjoyment of public waters.

6. The Norton Street Chlorination Station of the City of Rochester seems now to be operating effectively.

Acknowledgments

This work was supported by grants from the Scientists' Institute for Public Information and from the Gannett Foundation.

BULLETIN #34 July 5, 1967

DISSOLVED OXYGEN IN MONROE COUNTY WATERS: LOWER IRONDEQUOIT CREEK

David J. Wilson

Irondequoit Creek now bears a state classification of B, which requires that its water contain a minimum of 4.0 parts per million (ppm) of dissolved oxygen.

Irondequoit Creek receives a very heavy loading of sewage. Most of this sewage receives secondary treatment, but still introduces a large quantity of biologically oxygen demanding organic material into the creek. The creek also receives wastes from the rendering plant operated by William Stappenbeck, Inc., 2268 Browncroft Blvd. Rendering plant and slaughterhouse wastes are extremely high in biological oxygen demand, and therefore use up large amounts of dissolved oxygen in receiving waters unless the wastes are adequately treated.

On 23 April, the Committee carried out dissolved oxygen measurements on lower Irondequoit Creek, on Thompson Creek (a tributary to Irondequoit Creek at Tryon Park, consisting of "storm overflow" from the City of Rochester and routinely heavily polluted with coliform (intestinal) bacteria, and on the effluent from Stappenbeck's waste treatment lagoon. The following results were obtained:

Station	Results
Irondequoit Creek immediately north of Browncroft Blvd.	10 ppm dissolved oxygen
Thompson Creek, 50 yds. from Irondequoit Creek	6.4
Effluent from Stappenbeck's lagoon, discharged into Irondequoit Creek, at surface	0.9
Effluent from Stappenbeck's lagoon, 18 inches below the surface	0.1
Red Creek, Genesee Valley Park	9.8

On April 26 a letter was written by our committee to the rendering plant, inquiring if the results we had obtained on their effluent were typical, and asking for an estimate of the number of gallons of effluent discharged per day. As of 5 July we had no reply to this letter. The size of the plant, of the lagoon, and of the weir through which waste water is discharged to Irondequoit Creek all suggest that the volume of effluent is considerable.

The preliminary conclusion of the Committee is that the discharge from the rendering plant constitutes an appreciable fraction of the total load of organic pollution carried by the lower reaches of Irondequoit Creek. We note that the lower creek

frequently has a bad odor. The low dissolved oxygen figure for Thompson Creek for this time of year indicates that its amount of BOD (biologically oxygen-demanding materials) is high, and that this water can be expected to damage appreciably the quality of the water in Irondequoit Creek.

BULLETIN #35 July 5, 1967

DISSOLVED OXYGEN IN MONROE COUNTY WATERS: THE LOWER GENESEE RIVER

David J. Wilson and George G. Berg

1. Background Information

It was noted in earlier reports by the committee and in the detailed report presented by the Federal Water Pollution Control Administration at last summer's congressional hearing here on water pollution that the Eastman Kodak Park Works places a very heavy burden of biological oxygen demand (BOD) on the lower river; this loading corresponds to that from a population of 330,000 in terms of BOD. (This industrial waste does not constitute a source of pathogenic bacteria, however. It does, in fact, often sterilize the river for some distance, due to the presence of toxic chemicals.) The company has announced its intent to construct a large secondary waste treatment plant, which will result in the elimination of a large fraction of the present pollution load. The need for this additional processing is made only too obvious by the following data.

2. Test of River Water

Sampling Station (on Genesee River)	Date	Dissolved Oxygen
Off the docks of the Genesee Yacht Club	27 Dec.1966	14 ppm
Genesee River at Barge Canal	8 Jan.1967	14
Genesee Yacht Club docks at depth of 6 ft.	8 June	1.6
" " " " " " " 3 "	" "	1.2
" " " " " " " 6 ins.	" "	1.2
" " " " " " " " "	" "	1.2*
Between Triangle Marine and the Marine Corps Reserve Training Station. Quite a bit of breaking swell, and turbulence in sampling area	" "	4.9
Same as above		4.0*
Base of Summerville jetty, depth of 5 ft.	8 June	2.5
" " " " " " 6 ins.	" "	2.6
" " " " " " " " "	" "	2.2*

Sampling Station (on Genesee River)	Date	Dissolved Oxygen
Genesee River at River Blvd. approx. 50 yds. south of railroad bridge	"	9.6
Same as above	"	9.0*

The measurements marked with an asterisk were made by a chemical method called the alkaline iodide-azide test. Other measurements were made by an electrical method, with the use of a galvanic cell dissolved oxygen meter. The two methods give nearly the same readings, showing that our measurements of dissolved oxygen are reliable. All analyses were carried out in the field. The oxygen meter was made available for use by the Scientists' Institute for Public Information.

3. The Meaning of the Results

These measurements show that the Genesee River has enough oxygen for all kinds of fish when it enters the City of Rochester. Somewhere between the Clarissa Street Bridge and the Genesee Yacht Club the river becomes polluted with organic waste, and the pollution is so extensive that the water becomes nearly airless. Fish cannot survive in such water. We noted small fish gulping air at the surface of the river off the Genesee Yacht Club dock. This is a sign that the fish are not getting enough oxygen from the water, just as would be expected from our measurements of dissolved O_2.

Our previous measurements of oxygen in the lower Genesee were made in winter. These measurements did not show how bad the pollution was, because in winter the organic wastes are swept out into the lake faster than they decompose in the river, and the effects of pollution are distributed over the whole lakefront, diluted with lake water. In summer, the river bears the brunt of the damage for three reasons: (1) the flow of water in the river is reduced, so there is less dilution; (2) oxygen does not dissolve in warm water to the extent that it does in cold; and (3) bacterial decomposition of organic wastes takes place faster when the water is warmer.

The data taken in June indicate that we may expect septic conditions to be maintained in the lower Genesee for most of the summer and early fall, with associated odors and fish kills. Such conditions make it impossible for the river to assimilate any additional waste loading, such as the secondary effluent from Irondequoit's Pattonwood sewage treatment plant. We note that the measurements made at the Genesee Yacht Club docks were made well upstream from the outfall of the Pattonwood plant, hence do not reflect pollution from this source.

Under present waste loading it appears impossible for the lower reaches of the Genesee to achieve even a "D" classification during the summer months. We understand that Kodak has submitted the plans for its proposed new waste treatment facilities to the

New York State Health Department for approval. We hope that the state health authorities act promptly on the Kodak application, since our results show that such facilities are badly needed here.

BULLETIN #36 July 6, 1967

SEWAGE POLLUTION OF IRONDEQUOIT CREEK IN EAST ROCHESTER
David J. Wilson

On 23 May the committee received a phone call from Mrs. Nancy Meyers, 50 Oak Hill Terrace, Penfield; she asked us to investigate some discharges into Irondequoit Creek upstream from Linden Avenue in East Rochester. A study was carried out on 25 May. Two outfalls were found; one from a large buried tank on the creek just behind a large grey building belonging to the East Rochester Car Shops, and another just below a small, red brick pumping station opposite 107 Bluff Drive, East Rochester. Measurements were made the same day on Thomas Creek and Allens Creek. The following results were obtained:

Table 1

Location and Comments	Total Coliforms per 100 ml.
Outfall from buried tank just behind East Rochester Car Shops. Odor of petroleum, some shreds of what appeared to be toilet paper in effluent. Residual free chlorine tests negative.	58,000 34,000
Outfall just below small, red brick pumping station opposite 107 Bluff Drive. Extensive deposits of sludge and sewage solids noted on the bank, vary strong fetid odor. Residual free chlorine tests negative. Sewage fungus, toilet paper, condoms noted.	greater than 10 ml. greater than 10 ml.
Irondequoit Creek at Linden Avenue, downstream from the above outfalls.	15,000
Irondequoit Creek at Panorama Trail South.	5,000
Thomas Creek, just downstream from Fairport's STP.	0
Thomas Creek, just upstream from Fairport's STP.	greater than 100,000
Allens Creek, downstream from Brighton's Allens Creek STP. Water quite turbid, some fetid odor.	0

The outfall behind the East Rochester Car Shops appears to be industrial run-off which may contain some sanitary sewage. We were informed by people living in the area that this discharge varies greatly from day to day in appearance and character, frequently being quite black with sludge. The outfall behind the brick pumping station is obviously undisinfected sewage, which constitutes a health hazard and results in the violation of Irondequoit Creek's state classification of B, as indicated by our results on the creek downstream from this outfall.

The committee has written to the Town of East Rochester and to the Monroe County Health Department, inquiring as to the ownership of the two outfalls in East Rochester. No reply has been received from East Rochester. We received, however, a most helpful letter from Mr. G. Richard Sutherland, Associate Public Health Engineer with the Monroe County Health Department. The bulk of this letter is quoted on this page:

"The two outfalls discharging into Irondequoit Creek near Bluff Drive have been investigated, and work is in progress to abate one discharge and gather more information about the other.

The red brick building is a sewage lift station owned and operated by the Village of East Rochester. This discharge will be abated.

The large buried tank is the property of the East Rochester Car Shops, Inc. The discharge from this tank will be investigated further."

The RCSI commends the County Health Department for its prompt attention to this situation. We note that the water and bank of Irondequoit Creek in the vicinity of the East Rochester sewage lift station are not suitable for free access and play by children, and we advise parents in the neighborhood of Bluff Drive to warn children not to play near the creek. We hope that the Health Department will advise the parents in this neighborhood when their part of the creek is clean again.

The results on Thomas Creek and on Allens Creek indicate that Fairport's plant and Brighton's Allens Creek plant were effectively disinfecting the outflow of processed sewage on 25 May, as was the case when we ran tests earlier this year. We note that Thomas Creek upstream from Fairport's plant yielded a very high coliform count. This pollution should be a matter of concern to Fairport residents. We would like to know whether someone is discharging untreated sewage into upper Thomas Creek, and we hope that our neighbors living near the creek will help us answer this question.

Note: This bulletin records the establishment of a cooperative relationship between RCSI and the Monroe County Health Department, which has continued to the present. HF(1980).

BULLETIN #40 October 13, 1967

EVALUATION OF REPORTED IMPROVEMENT IN THE CONDITION OF ONTARIO BEACH

J. Roger Christensen and David J. Wilson

We have examined all the data that we have from official sources in an effort to answer two questions: (1) In 1967, did the water at Ontario Beach meet the state standards? (2) Was there an improvement in 1967, as compared with 1965 and 1966? We are also continuing our concern with possible sources of undisinfected sewage pollution of Ontario Beach.

Did Ontario Beach meet the standards in 1967? In Figure 1, we have plotted the percentage of samples that exceeded a count of 5000 for each of a series of overlapping 26 day periods (data from Monroe County Health Department). For three of the ten periods, the standards established by state law are violated. In the final columns of Table 1, the same data are tabulated by calendar month. During one of the three months, the standards are violated.

The standard is a double one; it specifies a median no greater than 2400 and in addition it specifies that no more than 20% of the counts during a month shall exceed 5000. The median count did not exceed the standard for any of the periods, but this is irrelevant, because the other criterion (no more than 20% greater than 5000) was violated, as shown in Figure 1.

Has there been an improvement in the bacteriological quality of the water? In Table 1, data from 1967 can be compared with that from 1965 and 1966. The median count has shown some improvement. However, for July and August of 1967, the number of counts over 5000 is remarkably similar to that for previous years. August 1967 was worse than August 1966. It is extremely unlikely that July 1967 would have met the standards of the 1965 law (we have no breakdown of the data on this point, but if 19.1% of the counts were over 5000, almost certainly more than 20% were over 2400).

Summaries of Data from Ontario Beach, 1965 to 1967

	New York State standards (maximum limits)				1967[3]		
	1965	1967	1965[1]	Aug 1966[2]	June	July	August
Median count	-	2400	1400-2100	1500-1600	490	790	790-1100
% of counts over 2400	20%	50%	*33.3%	*37.1%			
% of counts over 5000	-	20%	**22.2%	19.8%	8.3%	19.1%	**26.3%

*Violation of 1965 standards
**Violation of 1967 standards

[1]Data from Monroe County Health Department (10 counts) and from the lake Ontario Office of the Great Lakes Project, United States Public Health Service (8 counts). Period covered, June 17 to Sept. 7.

[2]Data from the New York State Department of Health, as published in the Democrat and Chronicle. We could find no published data for the period of Aug. 25 through 28. Otherwise, there are four counts for each day (106 counts).

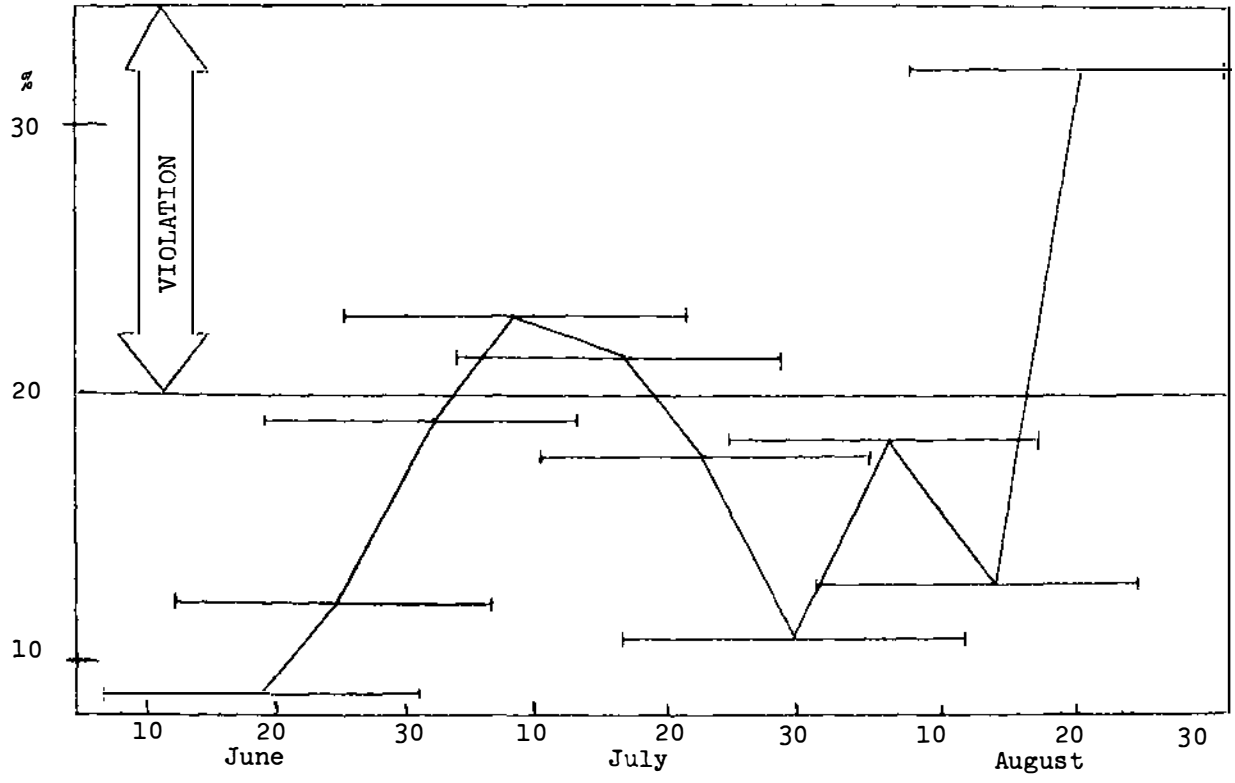
[3]Data from the Monroe County Health Department press release, Sept. 27, 1967. Number of counts not indicated.

Where does the pollution come from? Ontario Beach is located 1.2 miles east of the mouth of Slater Creek, which receives sewage effluent from Greece's Latta Road plant, and is about 3 miles from the outfall of Rochester's Durand-Eastman sewage treatment plant. The high counts at Ontario Beach this last summer (including one of 24,000) could be due to discharges of undisinfected sewage from these plants. That such discharges occur is demonstrated by the following coliform counts:

Data and Location		Coliforms per 100 ml.
16 July	Downwind (east) approximately ¼ mile from the Durand-Eastman STP outfall in the lake	60,000 63,000
19 July	Mouth of Slater Creek	170,000
24 July	Latta Road STP effluent	1.1 ml.

Conclusions

During the swimming season of 1967, the water at Ontario Beach violated state standards for coliform quality approximately one third of the time. Undisinfected sewage was observed in the vicinity of Rochester's Durand-Eastman and Greece's Latta Road sewage treatment plants and as indicated above. There is certainly no marked improvement in the coliform counts over the last three years, only a small decrease in the median counts. The very large spread in the data and the use of medians rather than averages obscure any trend. The recent statements by Mr. Howe and Dr. Scher implying that the condition of Ontario Beach is significantly improved and that this beach now meets state standards are incorrect. Contrary to the statements of Mr. Howe (Monroe County Manager) and Dr. Scher (Rochester City Manager), the RCSI finds no scientific basis for criticizing the judgment of the State Health Department in the matter of Ontario Beach. We also note that the state's position is consistent with those of the Federal Water Pollution Control Administration and the independent consultants hired by the city and the county at the beginning of the summer.



Percent of coliform counts over 5000 Ontario Beach 1967

Bulletin #44 September 1968

OUR BEACHES IN 1968

J. Roger Christensen, Ruth Levitt,
Regina Stewart and David J. Wilson

Since 1965, there has been controversy about the subject of coliform bacteria in the water of the Lake Ontario beaches in the vicinity of Rochester. Until this summer, however, there has been general agreement about one aspect of this subject: the range of numerical values of the actual coliform counts.

This summer, conflicting results on coliform counts from Ontario Beach have been reported in the local press. The Monroe County Health Department has stated that the counts are much lower this year than in previous summers. Their highest single value was said to be 9000. The Monroe County Conservation Council, on the other hand, has reported much higher counts, with counts running in the tens of thousands, and has demanded strict enforcement or the closing of the beaches.

We had not planned to do any beach monitoring this year. The beaches are officially closed, and we felt that the public was as well informed about the local pollution problems in the lake as could be expected. Late in the summer, however, because of the conflicting reports, we decided to make a series of observations. The results are presented in the accompanying table.

During the period of our observations, the coliforms were running strong at the beaches, especially during the later part of August. Grease balls were fairly common at Durand-Eastman. The Genesee River was found to be heavily contaminated on every occasion tested. Slater Creek, on the one date tested, was also heavily contaminated and we have doubts about the efficacy of chlorination at the Latta Road Sewage Disposal Plant (Town of Greece), which discharges into this creek. Slater Creek in turn discharges into the lake one mile west of Ontario Beach.

Clearly, our results continue to follow the pattern of previous years.

We do not know how many tests the county has made, nor the dates of their tests. On several occasions, we have asked Dr. Wendell Ames, Director of Health, and Mr. Van Buren, the public relations representative, for a full report on the County's results. Each time, we have been promised the reports. So far, we have received nothing from them.

COLIFORM COUNTS ON LAKE ONTARIO BEACHS AND TRIBUTARY WATERS - 1968

Date	Ontario Beach	Mouth of Genesee River	Durand-Eastman Beach
Apr. 21			extensive grease balls
Aug. 27	ca. 4,000	550,000	74,000
Aug. 9 calm	swimmers 1,500	70,000	190,000
Aug. 11 very windy	20,000	290,000	14,000
Aug. 13	2,200	12,000	1,200
Aug. 15	lots of algae 10,000	patches of foam 330,000	6,000
Aug. 16	33,000	350,000	grease balls 1,500
Aug. 24			swimmers East end: 25,000 28,000 West end: 37,000 50,000
Sept. 2	samples at 40 yard intervals 13,000 15,000 10,500 11,000	250,000 100,000	East end: grease balls ca. 1,400 31,000 West end: no grease 21,000 40,000

In addition:

Slater Creek Sept. 24 - "plates overgrown, much more than 100,000."

Shore west of Irondequoit Bay Mouth - "Aug. 24, 5400 and 6900; Sept. 2, grease balls (4) ca. 1000 (coliforms)."

North End of Irondequoit Bay - "Aug. 24 10 and 11,000 Sept. 2, 900 and 5600."

Bulletin #62 December 1969

CONTROVERSY ABOUT THE VALUE OF OUR PURE WATERS PROGRAM
Herman S. Forest, J. Roger Christensen and George G. Berg

Background

New York State's program for the abatement of water pollution was criticized recently by scientists, and the managers of the program met with their scientific advisory committee to ask whether the critics were right. The meeting took place on November 21, 1969 at the invitation of Health Commissioner Ingraham. Also present were Mr. Metzler, Assistant Commissioner for Environmental Health, other executives of the New York State Department of Health, and the scientific advisory committee, including Dr. Forest of the RCSI. The following questions were considered.

1. Is New York State's sewage control program a waste of money?

The advisory committee answered that:

a) No. The money now being spent is not wasted. On the contrary, it is buying much needed hardware in the form of sewer pipes and waste treatment plants.

b) But, yes. Facilities and above all, treatment methods, will have to be improved beyond present plans, or the investment will fail. Specifically, plant nutrients from sewage cannot be allowed to fertilize weeds in lakes, and this process can only be controlled by an unusually thorough tertiary treatment of wastes in lake watersheds.

> Dr. Commoner was interviewed on December 14 by Dr. George Berg of the RCSI. Dr. Commoner explained that he criticized the backward state of our technology for cleaning up pollution, and not the efforts we are making to build needed equipment. He said, in effect, that if we expect to control environmental pollution by using today's technology, then we are wasting our money.

The RCSI notes that the plans of Monroe County's Pure Waters Authority provide for improvements in technology. The proposed regional sewage treatment plants already include equipment for the removal of phosphate, and have a modular design which allows other tertiary treatment processes to be added as needed.

2. Is it useless to remove phosphate from sewage effluents?

> A Northwestern University scientist wrote to the Commissioner that phosphorus is not the element that

limits growth of aquatic plants, and that efforts to remove phosphate are useless. He found that carbonates (such as limestone) are the limiting factor.

The advisory committee replied that New York State made a good choice in deciding to remove phosphate as a first step in tertiary sewage treatment. The scientist at Northwestern set up his experiments under conditions that did not have much in common with the problems of lakes. For example, he used sewage ponds heavily loaded with all mineral nutrients. Carbonates would not be limiting in a freshwater lake.

3. Should moderate pollution be allowed in some public waters?

The advisory committee said no. Water pollution may be tolerated as a practical necessity, but it ought not be permitted as a policy. We need to return water to the environment as clean as it was when taken out. This policy of removal of pollution at the source is the only safe policy. Relying on the environment to clean up after us only promotes human laxness and invites an eventual breakdown of the environment's complicated cleaning machinery.

4. Should unwanted growth be removed by poison?

The Health Department gets suggestions to manage the environment with chemical poisons. For example, why not poison all the unwanted kinds of fish in Lake Erie, and restock with sporting varieties?

The Advisory committee answered that such programs are an invitation to further disasters. Today, people farm only small areas of the earth. At the present state of technology, farming has already disrupted and overloaded some aspects of the environment. We are certainly not able to "farm" whole lakes without harm. Natural communities are still the only reliable regulators of large environments. To spread poison on a lake is to simplify the natural community and destroy its regulating powers. Our task is rather to keep poisons and pollutants out, and to let natural populations rebuild a complicated and stable web of life; our course, to minimize man's effect on nature.

Bulletin #63 December 1969

LEGAL BULLETIN ON WATER POLLUTION
Thomas A. Fink and Herman S. Forest

Editorial Summary and Notes H. S. F. (1980)

The bulletin observed that there had been little change in state law during the year, and it was still too early to judge the effectiveness in using the 1966 Pure Waters Bond Issue. However, the Public Health Law had been amended to require an environmental feasibility report to be submitted to the Commissioner of Health by anyone intending to build or enlarge a power plant. Before this change, the only right the State had in the matter was control of discharge. (The amendment sealed the breach discovered in the Bell Nuclear Plant controversy at Cayuga Lake: the decision to build was under no regulation.) In addition, thermal standards were adopted by the Water Resources Commission, for discharges into streams. Some of the statements made at public hearings required for the standards were included. "Site selection, design approval, and both pre- and post- operational studies by public agencies with adequate technological resources" were advocated in testimony submitted by the Cornell University Water Resources and Marine Sciences Center.

Notes: Less than a decade later the procedures advocated are so commonplace that it is easy to forget how recently they evolved.

This was one of a series of bulletins summarizing the most significant legislative and administrative laws. They were initiated by Thomas A. Fink, and continued by Herman S. Forest. By 1977 such summaries had become available from other sources and the service was discontinued.

Bulletin #71 May 1970

COMBINED SEWERS - A MAJOR FLAW IN
LOCAL POLLUTION ABATEMENT PLANS
Graham Cox

Summary

Every time it rains on the city, nearly all of Rochester's raw sewage spills into the Genesee River and Irondequoit Bay because the present sewer system cannot handle the load.

In March the State Health Department approved an engineering plan to put an end to this problem.

But the State Health Department refuses to give Rochester money to help pay for improving the sewers on the mistaken excuse that the city is trying to rebuild its sewer system.

The State Health Department decision, coming at a time when the plans for the city's Durand-Eastman Sewage Treatment Plant are about to be put into operation, could jeopardize Rochester's entire program for cleaning up the Genesee River.

Background

About 80 percent of the city area is served by an antiquated sewage system. Combined storm and sanitary sewage flows along one set of pipes and tunnels.

In dry weather about 95 percent of the city sewage flows along the pipes to the Durand-Eastman Sewage Treatment Plant.

The other 5 percent overflows along some 40 overflow pipes into the Genesee River and Irondequoit Bay -- raw human and industrial sewage, cyanide, fecal matter, grease balls.

In wet weather -- rain storms, spring thaw -- the situation is reversed. Some 95 percent of the city sewage flows with the storm run-off water along the overflow pipes into the Genesee River and Irondequoit Bay.

Monroe County Pure Waters Agency has pointed to the city's storm sewer overflows as "the second most important contributor to the pollution of the lower river."

When Eastman Kodak Company completes its secondary sewage treatment plant in August, the city will be left as the biggest violator of pollution standards in this county.

Bulletin #113 February 1971

NEW YORK STATE'S AUTOMATIC WATER QUALITY SURVEILLANCE PROGRAM
Staff Report by Water Pollution Committee

Summary

In July, 1970 the N.Y.S. Department of Environmental Conservation installed two automatic water quality monitors on the Genesee River in the Rochester area. These monitors are part of a statewide system of automatic and manned water sampling stations. The automatic monitors continuously measure water characteristics and transmit data hourly to a central computer in Albany. Monthly reports are issued by the Department.

Bulletin #145 September 1972

THE ENVIRONMENTAL QUALITY BOND ACT OF 1972

Olga Berg

RCSI is one of the sponsors of the regional coalition to support the Environmental Quality Bond Act. In the past RCSI has documented the need for major investments in environmental cleanup in Monroe County. Currently, the money is needed to continue the Pure Waters program, to stop municipal and state heating plants from polluting the air, and to start an environmentally sound solid waste management program.

There are valid questions which can be raised in opposition to the Bond Act and we have considered a number of them before making a decision:

1) Is this the time to ask the voters to increase state indebtedness?

2) Is issuing bonds the best way to raise the money and is State money needed at all?

3) Is construction of capital facilities the best answer to environmental management?

4) Are the areas most in need assured of getting money first?

5) Will Monroe County get its fair share of the money?

6) Can we be sure that the money will be used as specified?

The Bond Act... is not perfect... but it will help this area to continue the environmental cleanup that we have been recommending for eight years.

Bulletin #161 July 1973

THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION NEW YORK STATE LEGISLATIVE REVIEW

Thomas A. Fink

Summary

In 1972 the New York State Legistlature passed two major environmental laws: the Environmental Conservation Law and the Environmental Quality Bond Act. The Environmental Conservation Law (ECL) collects the laws heretofore scattered on the books into one comprehensive body of law, which is to be administered by the

Department of Environmental Conservation (DEC). The Environmental Quality Bond Act shows the concern of the voters of the State of New York for the environment. They authorized one billion one hundred fifty million dollars for environmental purposes. In all, approximately twenty pieces of legislation dealt with the environment.

Bulletin #165 October 1973

IMPROVED CONDITION OF ROCHESTER BEACHES, STILL A LONG WAY FROM CLEAN WATER

Herman S. Forest and George G. Berg*

Summary

Ontario Beach on Lake Ontario was in an acceptable sanitary conditon on most days in the summer of 1973 judging by coliform tests performed by the County Health Department. Violation of standards could not be predicted for any given day in advance; therefore swimmers could not be protected or warned away from occasional exposures to excessively polluted water.

The beaches are still polluted, and this bulletin describes the prospects of having clean water for swimming by 1975.

* Contributions to this writing are gratefully acknowledged from Olga Berg (RCSI), Robert Hallenbeck of the Monroe County Pure Waters Agency, and G. Richard Sutherland and DeWayne Day of the Monroe County Health Department. Dr. Glenn Haughie, Director of the Health Department, and his staff members co-operated with RCSI on this bulletin.

Cleaner Beaches in 1973

Before 1973, the Health Department of Monroe County spot checked the sanitary condition of beaches by taking water samples two or three times a week for coliform tests. Many of the readings were high (in excess of several thousand coliforms per 100 ml.), and this was a reason for the State Health Department's decision to close the city's beaches to swimming. Monitoring was substantially improved in July, 1973, when the County Health Department put in a constant monitor at Ontario Beach west of the Genesee River. The system samples the water 200 ft. and 2,000 ft. out once every hour. The samples are checked for a number of variables including coliform bacteria. The number of coliform bacteria in a sample is known 18 to 24 hours after the sample is taken. The results are not published, but can be seen by permission of Dr. Glenn Haughie, Director. On most days during the summer of 1973 the coliform counts were low, less than a hundred organisms per 100 ml., so that the beach met the State's sanitary

standard for public bathing. RCSI observers also noted other signs of improvement. The edge of the water on Ontario Beach was not covered by a scum of grease balls, and was not cluttered with masses of filamentous algae during the summer. Some algae appeared in late season, however, to remind Rochester that abatement of nutrient pollution is not an immediate process. On the other hand, biological oxygen demand in the water, as reported by the Health Department, was still high in certain samples, although low in others. The high values may or may not be attributed to waste organic matter, and some certainly resulted from rotting algae. The sand was still dark and had a clinging texture associated with grease pollution, and the inshore water was murky with suspended particulate matter. There was, however, a marked improvement in cleanliness compared to the conditions of seven years ago. This has been a gradual, not a sudden, improvement. The first signs were reported by the RCSI in 1968.

At least six factors could have helped to make the beaches cleaner.

1) New sewage treatment facilities were built and put to work. In 1967 Irondequoit installed a plant with secondary sewage treatment which continues to discharge into the Genesee River. The nearby Summerville Plant was replaced by a station pumping to Pattonwood. Later the Eastman Kodak Co. installed a treatment plant for its industrial waste outflow into the Genesee River. That plant is very difficult to operate because it handles a wide variety of chemical wastes but it comes closer to 100% efficiency every year. These two new plants relieve the river of a heavy organic load. The river now carries more dissolved oxygen and can cleanse itself at least in part of the pollution that still comes in from the City's sewer overflows. Thus, less pollution comes to the beaches from the river mouth. The largest of the new plants, the Northwest Quadrant Plant of the County of Monroe, started operation in mid 1973.

2) Some old sewage treatment plants were closed. The Northwest Quadrant plant replaced several smaller and older sewage treatment plants, such as the Latta Road plant in the Town of Greece. These plants used to release inadequately treated effluents into Lake Ontario or its tributary streams, and the general nearshore drift may have carried this pollution eastward toward the Rochester beaches.

3) The operation of existing sewage treatment facilities in the city of Rochester was improved. In 1972 the County Pure Waters Division took over the operation of the city's sewage treatment plants. Old equipment in the Durand-Eastman plant was repaired and the level of disinfection with chlorine was stepped up. This meant that the outflow from the Durand-Eastman pipe into Lake Ontario could be kept relatively free of grease and could have a low bacterial count on most days. More recently, overflows

into the Genesee River have been curbed by a program of inspection and repairs to all the gates that direct the flow in the network of sewers under the City and keep sewage from overflowing. This means that the river was relieved of some of its pollution with raw sewage while the weather remained dry.

4) Unusual spring floods occurred in 1973. As a consequence, high levels of water in Lake Ontario this spring interfered with the usual growth pattern of Cladophora algae in the shallows. In the past years, these algae piled up near shore and rotted during much of the summer.

5) The following summer weather was unusually dry. This reduced considerably the storm overflows that usually flush raw sewage into the Genesee River and the lake.

6) New York State banned, by law, the use of phosphate additives in laundry detergents. This deprived the algae of a major source of phosphate fertilizer. In the long run, and in combination with other measures, the phosphate control strategy will reduce over-fertilization in the Great Lakes and many inland waters. Nevertheless, luxuriant growths of Cladophora have occurred from time to time for many decades and disappearance should not be expected.

It is not possible to say precisely to what extent the beaches were helped by each of these factors, but it is clear that the present improvement in water quality is neither sufficient nor reliable. Even when it operates at its best, the Durand-Eastman Sewage Treatment Plant is greatly overloaded, and discharges both organic pollution and suspended particulates into the Lake. Raw sewage still overflows into the Genesee. Shifts of wind and lake currents bring more or less of this pollution to the beaches; and bacterial counts may go up suddenly either with rain, or with some malfunction of equipment in the treatment plant.

The Van Lare Plant, now under construction, will replace the Durand-Eastman Plant, and will be able to give secondary treatment plus phosphate removal to 200 million gallons of waste a day when it opens. The Pure Waters Division hopes it will open in 1975. When completed the plant will be running at full capacity with no safety margin to compensate for breakdowns in equipment or for further growth of the City. If the storm overflows from Thomas and Densmore Creek as well as those from the Genesee are led into the plant, further enlargement will be necessary, and plans for an addition are being made.

In summary, Rochester will have clean and sanitary beaches when Monroe County (a) completes its Pure Waters program, and (b) builds the storm sewer interceptor system planned for the Genesee River.

Bulletin #188 July 1975

CONTROL OF POLLUTION DISCHARGES IN MONROE COUNTY

Peter J. Hetzel

Summary

Sixty industries and businesses in Monroe County are receiving or have received water discharge permits and 49 have dedicated themselves to clean up their discharges. Some have, in all probability, already started.

This bulletin presents an overall picture of the first stages of water pollution control in Monroe County under the Federal Water Pollution Control Act of 1972, by listing the 91 industries and municipalities that applied for or received federal discharge permits by May 1975. The permits are being issued under the National Pollutant Discharge Elimination System (NPDES) to sewage treatment plants and to commercial dischargers that do not discharge into larger municipal or industrial sewer systems.

The permit system carries out the purpose of the Federal Water Pollution Control Act Amendments of 1972 by regulating discharges to preserve the rated quality of streams, rivers, and lakes.

Eleven of the 91 permits have been challenged by the applicants. This is done by requesting an Adjudicatory Hearing. Three of the requests are described. (Cities Service, Rochester Gas and Electric Co., and Eastman Kodak). Some ask for changes because of special local conditions in the industrial process. Others are class actions challenging the strict standards for pollution control being imposed by the Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation. Most of the adjudicatory hearings have not yet been held. Local defenders of the FWPCA may be interested in speaking at the hearings. This bulletin encourages the newspapers to feature each coming hearing in local news and to present the issues to their readers in advance of the hearing.

(Included with the bulletin was a table listing names of applicants according to the receiving waters, the location by municipality, number of outlets, compliance date, amount of discharge, and whether an adjudicatory hearing had been requested. The waters receiving the most discharges were the Barge Canal (22), Irondequoit Creek (13) and its tributaries (10), and the Genesee River (11).) HF (1980)

Bulletin #191 November 1975

MONITORING THE LOWER GENESEE RIVER

Peter J. Hetzel

Summary

Several governmental agencies and private laboratories sample and test the water in a short stretch of the Genesee River near the outlet into Lake Ontario. There is more testing than required by various federal and state laws. No one is in charge of coordinating the work into a single testing program, but the RCSI found that the quality of water is adequately monitored at present in the lower Genesee River. This report describes all the monitoring programs, and shows the amount of work needed to check the cleanliness of a river. Some of the programs are designed to test for special, short range problems, such as the control of pollution from a single industrial outlet, or the control of sanitation at a beach. Some tests are done according to long range plans, and all the results can be analyzed to make a long-term record of the management of water quality in the River.

Introduction

Eleven years ago the RCSI ran its first series of tests of the Genesee River water, because little information was available to us on water quality and on sources of water pollution in the River. Today, several organizations are known to sample and test the River. This bulletin answers the following questions:

-- Who is testing the water?

-- Are resources wasted through duplication of tests?

-- Are testers working in coordination with each other?

-- How can citizens learn of the results of the tests and the state of the River?

-- Is the overall testing program complete, or does it still miss some important elements of water pollution?

Each testing program is described in turn.

Table 1. Schedule, Cost, and Location of Monitoring

	Schedule	Yearly Budget	Number of Stations	Location
Monroe County Health Dept.	weekly from late May until early Sept. 1966-	$2,500*	8	Stutson St., Genesee Docks, St. Bernard's, Veterans' Bridge, RG&E Headgates, Holiday Inn, Court St., Clarissa St.
Pure Waters Div.	1973-1975		8	Maplewood Park, Norton St., Lexington St., Cartlidge St., two on the Upper Falls, Court St., two on Brooks Ave.
U.S. Geological Survey	1973- Eight monthly samples (none in winter)	$2,000	1	Charlotte Docks
Kodak	biweekly	not available	4	A couple above the Kodak discharge and a couple below
RG & E	weekly	$10,000	1	below the Beebee Plant discharge
Delta Labs	1971 - once every summer			Take 6 to 8 core samples between Stutson St. and Driving Park bridges

* This is the estimated cost of operating the eight monitoring stations on the lower Genesee River. The Beach and Stream Monitoring Program operates at a cost of $32,000 a year.

Table 2. Water Quality Parameters Measured for by Monitoring Groups

	Monroe County Health Dept.	U.S. Geol. Survey	Kodak	RG & E	Delta	DEC (graph)
Silica		X				
Calcium		X				
Magnesium		X				
Heavy metals	X*	X	X		X**	
Chloride	X			X		
SO_4	X					
Total phosphorus	X	X	X			X
Ammonia						X
Nitrate nitrogen	X	X				X
Dissolved oxygen	X					X
Biochemical oxygen demand	X		X			X
Anions		X				
Cations		X				
Turbidity	X	X		X		X
Dissolved solids		X				X
Suspended solids		X	X			X
Organic carbon		X				
Hardness		X		X		
Color	X					
Temperature	X			X		X
pH	X		X			X
Alkalinity	X			X		
Phytoplankton		X				
Periphyton		X				
Total coliform	X		X			X
Fecal coliform	X	X	X			X
Fecal streptococci	X	X				
Flow	X		X			X
Phenols			X			X

* Assembled data include scattered tests by EPA (1969-1974) for cadmium, lead, mercury, and zinc. The Health Department's own testing (1973-1974) was a systematic profile of the Genesee River below Ballentyne Bridge for cadmium, lead, and zinc.

** Core samples are tested for lead, cadmium, nickel, copper, chrome, zinc, magnesium and iron.

BULLETIN #193 December 1975

CLEAN WATER AT ONTARIO BEACH: WATER POLLUTION STUDY IN SUMMER OF 1975

David B. Bauer and Dr. George G. Berg

Summary

The bathing area at Ontario Beach Park in Charlotte showed consistently low levels of bacterial contamination in tests conducted by the RCSI during the second half of the summer of 1975. It was the first summer RCSI has found this beach to be clean since the beginning of its water testing program in 1964. The results are an independent confirmation of similar tests made by the Monroe County Health Department.

The RCSI sampled water off the beach at nineteen equally placed sites, two evenings a week beginning July 15 and ending August 12. Water was tested for three kinds of bacteria which indicate water pollution by sewage.

In no sample did the total count of coliform bacteria reach 2400/100 ml, the figure set by the New York State Department of Health as the maximum median count for bathing areas. Of a total of 148 samples tested, 89% showed counts of less than 500/100 ml. These samples were considered free of pollution with bacteria associated with sewage.

Fecal coliform tests run on 132 samples showed that 95% of the samples had counts below 100/100 ml. The highest count was 310 colonies/100 ml. Fecal coliforms are found in fresh, untreated sewage. Low counts indicate very low levels of contamination by intestinal organisms which might cause diseases. Counts of 200/100 ml are considered low.

Fecal streptococcus tests provided further evidence that the water at the beach had low levels of fecal contamination during the test period.

It appears that the Pure Waters Program of mending sewers and upgrading sewage treatment plants in the County of Monroe is succeeding in controlling water pollution at Ontario Beach.

The highest counts for all 3 kinds of bacteria occurred after rainstorms. This contamination has in the past been traced to sewage spilled from the Rochester combined storm and sanitary sewer system into the Genesee River. Although the counts did not reach hazard levels in 1975, RCSI data suggest that the beach is not safe at all times from heavy pollution by spills of municipal sewage. The beach now appears to be safe for bathing except when storms or accidents cause municipal overflow.

Two actions are suggested:

1. That the County establish a Charlotte beach management system which permits swimming when the water is clean, keeps the sand clean, and provides for keeping bathers away when the water is polluted, and;

2. that the New York State Department of Health review the data on the condition of the beach along with the County beach management system and consider opening the beach to public swimming in 1976.

Table 1. Mean* Total Coliform, Fecal Coliform and Fecal Strep Counts for Sites 1-19 Over a Four-Week Period (July 15, 1975 to August 12, 1975); ranges of counts at right of each mean. The sites are numbered from west to east. (Five of 19 entries.)

Site #	Mean Total Coliform	Range	Mean Fecal Coliform	Range	Mean Fecal Strep	Range
1	277	0-530	30	0-60	98	20-380
2	456	30-2130	24	0-70	40	0-90
3	222	30-444	16	0-60	44	0-120
4	232	20-650	21	0-70	55	0-160
5	239	50-500	44	0-150	61	0-180

Table 2. Mean* Total Coliform, Fecal Coliform, Fecal Strep Counts for the Eight Test Days During the Four-Week Test Period (July 15, 1975 to August 12, 1975). Ranges of counts at right of respective mean. (Three of 8 entries.)

Date of Test	Mean Total Coliform	Range	Mean Fecal Coliform	Range	Mean Fecal Strep	Range
7/15/75	605	80-2180	45	0-170	86	0-610
7/17/75	128	0-260	--	--	54	10-210
7/22/75	397	0-900	49	10-110	76	10-280

*Arithmetic Mean

Table 3a. Distribution Chart of Total Coliform Counts of 19 Sites for Each Test Date. (Three of 8 entries in 3a and of 24 entries in 3a, b and c. 3b Fecal Coliform. 3c Fecal Strep.)

Test Date	0-99	100-199	200-299	300-399	400-499	500-599	600-699	700-799	800-899	900-999	1000-1999	2000-2199
7/15/75	2	4	3	3	2	0	0	0	0	2	1	2
7/17/75	4	13	2	0	0	0	0	0	0	0	0	0
7/22/75	1	1	3	2	6	4	1	0	0	1	0	0

Table 4. Peak Counts of the Three Tests Performed on Samples of the 19 Sites, with the Site number in Parenthesis. Peak counts arranged by test date. (Three of 8 entries.)

Date	Total Coliform Peak Count	Total Coliform Test Site	Fecal Coliform Peak Count	Fecal Coliform Test Site	Fecal Streptococcus Peak Count	Fecal Streptococcus Test Site
7/28/75	980	(19)	210	(17)	230	(19)
7/30/75	1390	(14)	310	(13)	390	(15)
8/5/75	670	(17)	90	(9,14)	310	(9)

BULLETIN #200 September 1976

BAD ODORS FROM PURE WATERS: THE CASE OF ROCHESTER'S NEW SEWAGE TREATMENT PLANT

A Report of the Water Pollution Subcommittee of RCSI
Edited by Dr. G. G. Berg

Summary

This report explains why parts of Irondequoit were polluted with noxious odors from the Van Lare Sewage Treatment Plant on approximately one day out of ten for half a year, and why this need not happen again. The odors were generated when the plant's incinerators were loaded with sewage sludge that was too wet to burn. The operators of the plant were ordered by the DEC to test the quality of sludge before burning it, and were given a chance to landfill sludge that could not be burned. There is, consequently, no technical reason for inflicting nuisance odors from the plant on Irondequoit residents from now on.

The plant's operation became defective when the secondary treatment system was turned on. It caused the difficulties with the sludge and had to be partly shut off late in June. The plant may not be in shape to handle increased sewage loads unless improvements are made in equipment as well as operations. The Administrative Board of the Pure Waters District accordingly voted on February 9 to delay the planned transfer of sewage from suburban treatment plants to the Van Lare Plant.

This report explains how the trouble started, what was done about it, and what can be done by various government agencies to support the Pure Waters Program.

BULLETIN #206 May 1977

IMPROVED PERFORMANCE AT THE VAN LARE SEWAGE TREATMENT PLANT

George G. Berg

Summary

The Administrative Board of the Rochester Pure Waters District may make a decision which would change the schedule for closing several suburban sewage treatment plants and transferring the load through the new Irondequoit interceptor sewer to the Van Lare Plant. We prepared this report to help the Board's deliberations and to inform the public of reasons to either hasten or delay the transfer.

Conclusions

1. The Van Lare Plant still holds an excessive backlog of sludge. The backlog accumulated between August and September 1976, when it rose from 280 to 800 tons of dry solids. It stood at 600 in the first week of May, 1977.

2. The Plant appears to have turned the corner in sludge disposal in March of 1977, and has a consistent record of getting rid of sludge faster than sludge came in from March to the present. Even so, the backlog dropped only by 1/4 in that period.

3. Backlog is defined as an excess of sludge over the amount needed to operate the Plant. Backlog contributes both to odor problems and to incineration costs. They should be routinely lower than some 200 tons dry equivalent (which is approximately four days' worth of sludge cake output), before the plant has a good margin of safety for handling added loads of sewage. The plant may reach this level of operation soon, but the timing is in question.

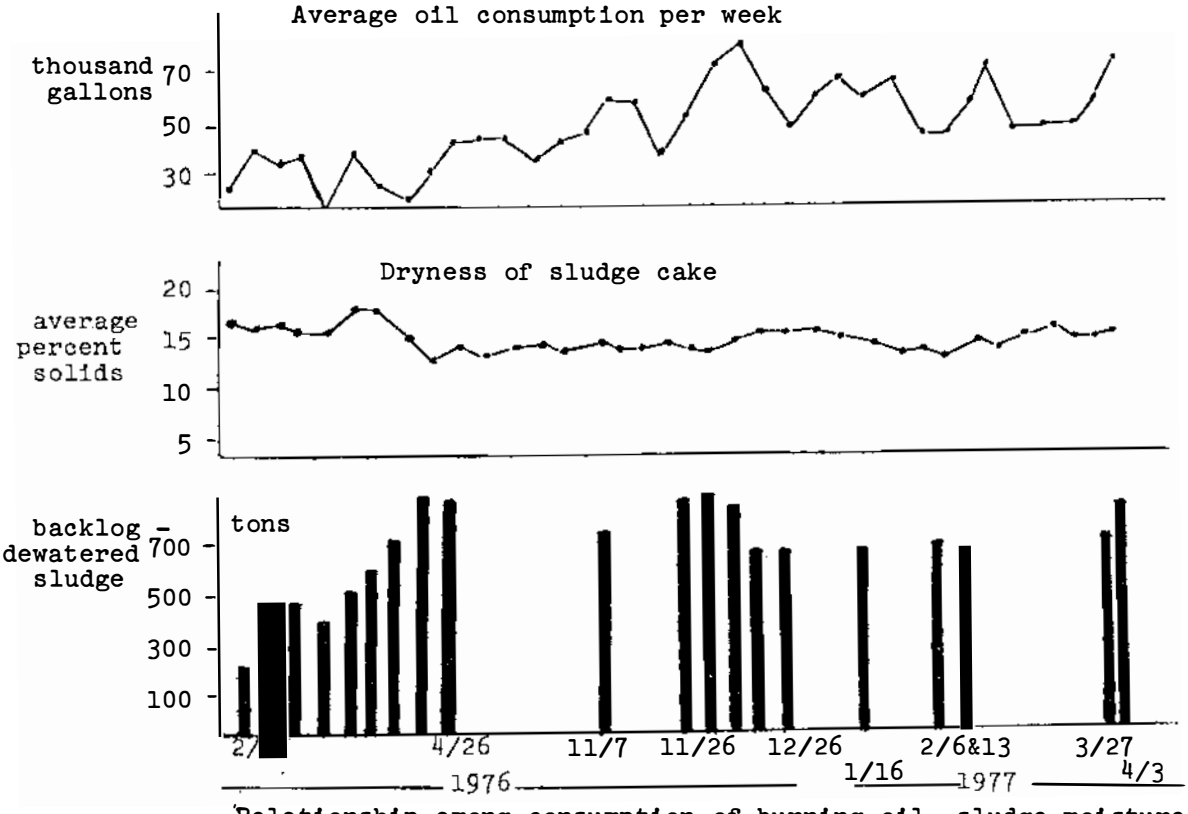
4. The plant is still incinerating a sludge cake not dry enough to burn efficiently. Excessive wetness is costly in fuel oil and increases the hazard of odor pollution. (Values of 12% of dry solids or less, recorded on many days of operation in the last two months, are excessively wet.) The plant averaged only between 15% and 16% solids for some time. It was designed for better than 20%. One way to check whether the plant is operating reliably is to look for a consistent daily record of adequately dry sludge cake.

5. The sludge accumulated last fall because incinerators were shut down to install afterburners. By December the afterburners were operating and the oil consumption at the plant rose from less than 40,000 gallons a week to peaks well over 70,000 gallons a week; but sludge backlogs did not go down until last March, when the plant started trucking raw sludge cake to landfills on a regular schedule. For the near future, the plant's capacity for handling sewage solids will be limited by its ability to get sludge out to landfills.

6. Odors from incineration have been greatly reduced with the help of afterburners beginning last December, though at a heavy cost in oil. In April, there was an episode of odors from sludge filtration, but improvements were made in venting to keep it from happening again. Odors from stale sludge in day tanks can be kept down by keeping backlogs of sludge down. These are the principal sources of bad odors. The plant's operators claim that they now have the means of protecting the neighborhood from air pollution, even under an increased load.

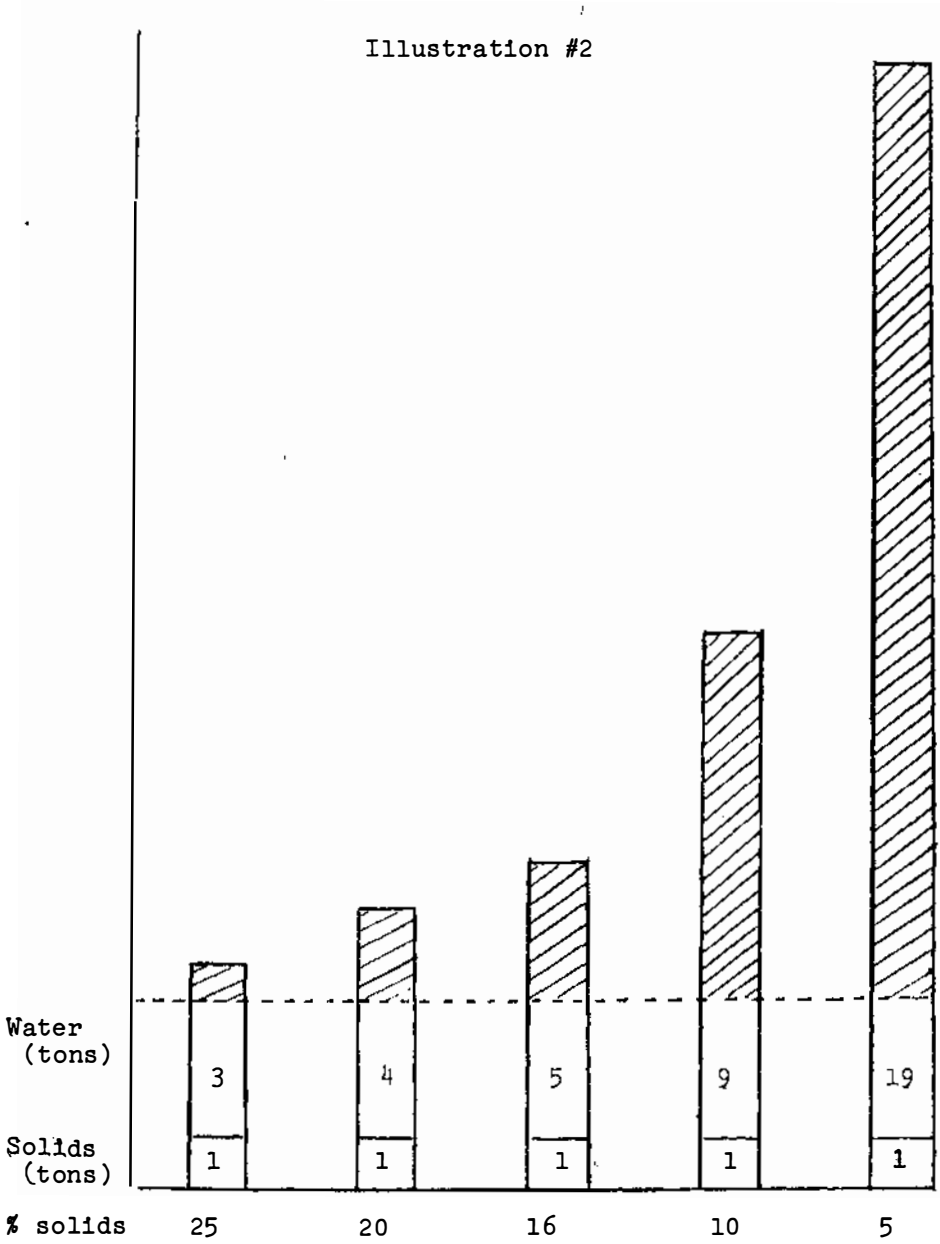
7. The plant's neighbors have been experiencing outbreaks of nuisance odors since the fall of 1975. The last few weeks were nuisance-free. In deciding on the timing of the transfer, the

Illustration #1



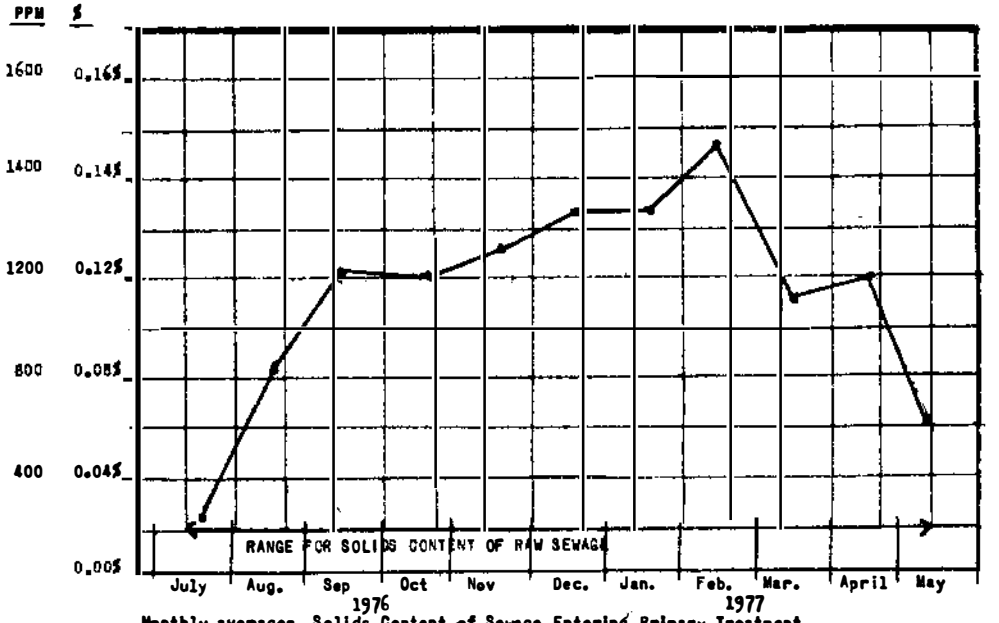
Relationship among consumption of burning oil, sludge moisture, and sludge backlog. Feb. 1976 - April 1977.

Illustration #2

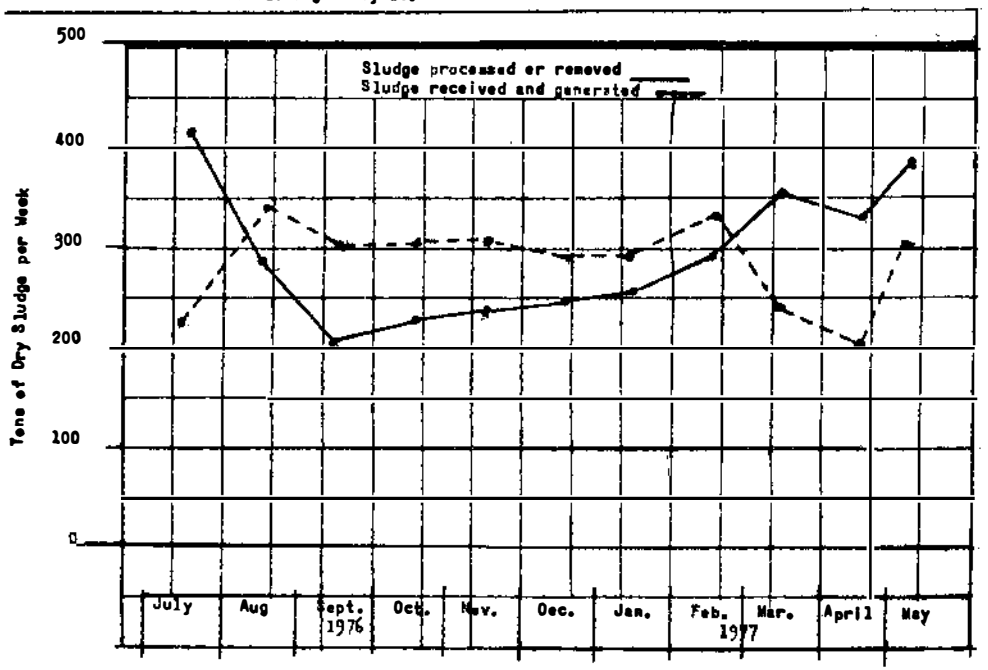


Tons of water processed with each ton of sludge solids
(fuel costs increase in proportion to height above the dotted line.)

Illustration #3



Monthly averages. Solids Content of Sewage Entering Primary Treatment, including re cycle.



Weekly Sludge Loads (averaged for each month)

Administrative Board will weigh the neighborhood's legitimate demands for a record of clean performance against the environmental urgency of relieving Irondequoit Creek and Irondequoit Bay of water pollution.

8. The discharge permits issued by the Department of Environmental Conservation to at least 6 plants in the Irondequoit Creek watershed expire June 30, 1977. This amounts to a deadline for closing the plants. The deadline was set so that we would be in compliance with the federal water pollution control law, but it was set on the assumption that the Van Lare Plant could handle the added load without polluting the air. The DEC has the power to extend the deadline for as long as necessary. The County can request such an extension, to complete and check out the improvements needed at the Van Lare Plant.

9. Current improvements in sludge disposal at the Van Lare Plant may work well in the short run, but they do not solve the long-range shortcomings of the plant. These include excessive wetness of sludge cake, excessive use of fuel oil for incineration, poor patterns of dispersal of smokestack fumes, and serious environmental drawbacks of landfilling raw sludge.

This Bulletin explains the basic problems and gives examples of workable solutions.

BULLETIN #211 December 1977

MAJOR NON-POINT WATER POLLUTION PROBLEMS
IN MONROE COUNTY, NEW YORK
Olga Berg, editor

NOTE:

In October, 1977 the County Manager of Monroe County needed a summary of the major water pollution problems still remaining in the County. Don Martin, Director of Planning, went to the Technical Committee which is helping the State Department of Environmental Conservation to prepare a local water quality management plan and together they developed the following list in order of importance:

1. Combined sewage overflows from the City of Rochester

2. Urban stormwater runoff from developed and developing areas

3. Urban erosion and stream sedimentation

4. Agricultural and farm runoff

5. Solid waste and sludge disposal

6. Septic tank effluent runoff

This Bulletin is the report prepared for the County Manager on very short notice, and RCSI would like to thank those involved from Pure Waters, the Monroe County Health Department and the Planning Department for permitting us to print it.

SUGGESTIONS FOR ACTION HAVE BEEN INDICATED
WITH A * BY RCSI.
Olga Berg

1. Combined Sewage Overflows from the City of Rochester

*EPA has indicated that they will not fund combined sewer projects at full 75% as they have other projects under PL 92-500. They have promulgated a complicated cost allocation formula to reduce the "fundable" amount by calling the urban stormwater portion ineligible. They ignore the fact that backups of combined sewage in streets and basements is a serious public health problem. They ignore the fact that PL 92-500 provides for funding such projects at the 75% level. They fail to recognize that funding at the 75% level is necessary for the project to proceed. The local taxpayer must be able to afford the cost and must see some tangible benefits.

John M. Davis, Deputy Director
Pure Waters

2. Urban and Suburban Stormwater Runoff

*Observations of large separate storm sewer discharges during rain storms suggest that some of these may have an impact of the same order of magnitude as combined sewer overflows. I note especially the Keeler and Merrill Street storm sewers to the Genesee River. The impact of these separate storm water discharges can be evaluated in the same manner, using the same equipment, as the combined sewer overflow monitoring program carried out in the mid-1970's by Monroe County Pure Waters personnel.

*Conclusion and Recommendations: With continued efforts to control dry weather discharges of pollutants from point sources, the percentage of total pollutant loading from diffuse sources especially during runoff periods will become higher. Further improvements in water quality will require diffuse source controls. In the case of urban and suburban runoff, the larger urban storm sewers may require some "first-flush" catchment with treatment, while the less organized suburban problems may be best solved with retention ponds and sewer flushing.

*In Monroe County, studies should be developed through Monroe County Pure Waters to evaluate large urban storm water discharge and its impact on receiving water. The studies of Irondequoit Bay and Irondequoit Creek currently being conducted by the Monroe County Health Department should be continued and consideration given to expanding the effort using 208 funds. This will provide needed information on a suburban watershed with a few point source discharges.

Richard S. Burton
Monroe County Health Department

3. Urban Erosion and Stream Sediment Runoff

The following are some of the major causes of stream sedimentation:

(1) Runoff from construction sites. Land development, highway improvements and the construction of stormwater retention ponds are principal sources of sediment runoff. These activities are common in many of our suburbanizing watersheds such as the Irondequoit Creek basin. These activities involve stripping off protective ground cover and disturbing topsoil, thereby increasing the potential for erosion. Good management practices such as building temporary sedimentation basins during construction will help contain the silt load associated with surface runoff.

(2) Erosion of streambanks. Sediment deposit due to erosion of streambanks can add significant loads to watercourses. One study indicates unusually severe erosion of streambanks of Red Creek, Oatka Creek and the Genesee River.

4. Agricultural and Farm Runoff

The major pollutants associated with farm runoff are: pesticides, fertilizers, sediments, nutrients and organic matter. They generally originate from one of the following sources:

(1) Water erosion
(2) Plant nutrients
(3) Pesticides
(4) Animal wastes

Richard Rising
Monroe County Planning Department

5. Solid Waste and Sludge Disposal

In the past, Monroe County has disposed of most of its sludge by incineration. Increasing costs for energy and the threat of future fuel shortages are forcing a new look at this disposal

method and a search for alternates such as land disposal and wastewater reuse. These are great ideas, but implementing them is another matter. The resolution to this represents a major, long range pollution problem which must be addressed.

John M. Davis
Pure Waters

6. Septic Tank Effluent Runoff

In unsewered areas of the New York portion of the Lake Ontario drainage basin, many on-site sewage disposal systems have been installed in the plant with little or no approval or inspection effort. This method of sewage disposal continues to be used and may actually increase in the future, due to the extremely high cost of collector sewer installations.

Solution of the problem requires that a sufficient staff in the regulatory agency initiate and carry through widespread community surveys to delineate the problem, identify the individuals in violation, and achieve correction of all of the violations so that corrective activities are equitable. Such staff is generally lacking in health departments and environmental conservation departments throughout New York State. Consequently, little survey effort is being made and these problems, where they exist, continue unabated.

Further study of this problem is needed. In some areas public collector sewer systems may be the best answer. Here increased availability of state and federal aid moneys is essential. At the present, virtually no money or interest in attacking the problem exists at either the state or federal level.

*In other locations collector sewers may not be the best answer. In some of these cases, the individual correction of the failing system may still be the method of choice. There is, however, an alternative to sewers or individual correction. This is the formation of local improvement districts which construct, repair and maintain individual on-site sewage disposal systems in areas that cannot be sewered. One such area in Monroe County would be the hamlet of Rush, and there are other smaller areas which could also benefit from this type of approach.

G. Richard Sutherland
Monroe County Health Department

BULLETIN #212 January 1978

IMPROVEMENTS IN SEWAGE TREATMENT IN THE FALL OF 1977*

Henry Hirschland and George G. Berg

Summary

In the period from May 15 through October 23, 1977, the Van Lare Sewage Treatment Plant reduced its backlog of sewage sludge and improved the control of nuisance odors. This was done at the costs of burning large amounts of fuel oil for sludge incineration and of disposing of surplus sludge at landfills.

The fuel savings gained by dewatering the sludge are computed in this report. The average level of dryness for this period was 13.6% solids in dewatered sludge. Our computations indicate saving of 32,000 gallons of fuel oil a week if the plant could produce sludge with an average 20% solids. Improvements in sewage treatment are expected beginning in November, 1977 when sawdust will be added to the sludge.

Background

Monroe County's new Van Lare Sewage Treatment Plant began full scale operation (with primary and secondary treatment) in the fall of 1975. From the start, it developed troubles in processing sewage sludge. These caused a spread of bad odors over the plant's Irondequoit neighborhood. RCSI investigated the problem, and RCSI Bulletins were used by neighborhood residents and the Town government in demanding better operation. The Monroe County Division of Pure Waters upgraded the treatment plant by installing afterburners in incinerators, and by installing equipment needed to send surplus sludge to landfills. This bulletin reports improved land operation, but it notes that the improvements in air quality were made in a way that proved costly in using two limited resources: fuel oil and landfill space. The information on plant operation comes from the Frank E. Van Lare Weekly Reports, May 15-Oct. 23.

Reduced Odors

Complaints about odors from the Van Lare Plant have decreased. We reviewed the list of complaints telephoned to the Irondequoit Odor Line at the Town of Irondequoit. The frequency of calls is shown in Table I.

*This Bulletin was accompanied by an eleven-page illustrated report on sludge handling by the Monroe County Pure Waters Division.

Table 1. Complaints to the Irondequoit Odor Line

Month	Total Calls	Dates with more than 10 calls: Date	Number of calls
August	95	August 7	17
		August 13	11
		August 26	10
		August 31	16
September	54	September 2	23
October	30	October 31	11

Quality of Sludge

The key to the plant's problems was that the sludge remained excessively wet even after it was treated with a flocculating agent and filtered to remove water. The amount of fuel required for incineration increases greatly with sludge wetness, as explained in RCSI Bulletin #200.

From May 15 to October 23, dewatered sludge at the plant averaged 13.6% dry solids and 86.4% water. The range of solids concentration was from 12% to 17%. There was a possible trend to drier sludge; if it holds, the average solids will be 15.2% in November.

Disposal in Landfills

The plant reported that sludge was trucked to landfills at a rate of approximately 81 to 105 tons of dry solids per week. If we consider that dry solids were only 13.6% of the shipped bulk, then the weekly truck shipments out of the plant were some 600 to 770 tons of sludge.

Consumption of Fuel Oil

Fuel oil consumption for the period varied from 60,000 gallons per week to 100,000 gallons per week. The average consumption was 80,000 gallons of oil per week.

To determine the relation of sludge dryness to oil consumption, we used the data for normal operation of the Van Lare Plant from May 15 to October 23. We excluded the period of abnormal operation during a strike, and the days when the plant experimented with adding sawdust to sludge. A multiple regression was run to correlate three variables:

F = fuel oil consumption, in gallons per week

S = sludge incinerated, in tons of dry solids per week

P = sludge dryness, as the average % of solids for that week.

We found the following equation:

$$F = 13{,}900 \times S^{0.9} \times P^{-1.3}$$

This meant that incineration became much more efficient when sludge dryness (P) increased. Under average conditions of dryness (P = 13.6), the plant burned 80,000 gallons of oil a week (F) to incinerate 303 tons of sludge dry solids (S).

If sludge dryness were improved to 20% solids, which was the level expected in the design of the plant, fuel consumption for the same measure of sludge would be cut to 48,000 gallons per week; if sludge could be dried to 25% solids, which is considered good, the equation predicted that oil use in incineration would be cut to less than half (F = 36,000 gallons per week).

Discussion

We have been unable to find, in the official reports of the Van Lare Plant, any indications of unusual operation on the days when the plant's neighbors complained of bad odors. On some days, bad odors are taken out to the Lake by southerly winds, but wind direction does not explain all the difference between odor-free days and bad days. Much of the difference must be in plant operation, but it does not appear in the official logs.

In general, odor problems have improved both from personal observation and from discussion with neighbors. This would support the idea that the Odor Line received fewer telephone complaints later in the season because there was actually less to complain about.

The Van Lare Plant is currently experimenting with sawdust as a cheap sludge additive and filter aid. A filter aid would increase the amount of solids on the filters thereby reducing the water content. In addition, sawdust has a fuel value. If the experiments in operation are successful, this should result in a dryer filter cake and a reduction in total costs since the decrease in the amount of fuel used on a dollar basis should be more than the added increase in cost of the sawdust. RCSI will report on the results of these tests.

In summary, Pure Waters management appears to have been doing a progressively better job of running the Van Lare Treatment Plant. They should be encouraged to continue their efforts to curb plant odors, improve the dryness of sludge, and save on fuel.

BULLETIN #224 October, 1978

A BAD SUMMER FOR THE VAN LARE PLANT AND ITS NEIGHBORS

Henry Hirschland and George G. Berg

Summary

From May 1978 through early September the Frank E. Van Lare Sewage Treatment Plant frequently polluted the air in Irondequoit with noxious odors. The odor problems were so bad that over 630 complaints were recorded on the telephone hotline in both June and July.

The plant is still more than meeting the water pollution standards for biological oxygen demand (BOD) and suspended solids, but during the summer it failed to meet phosphate standards. Phosphate discharges which were low in the winter rose to exceed the allowable limits by up to three times.

The sewage backlog increased for four reasons: 1) sewage load was increased; 2) sludge inventory was not reduced; 3) there was a mechanical failure; and 4) all through the spring and summer nobody made an emergency effort to remove the sludge overload. An official request could have been made to the Department of Environmental Conservation (DEC) to permit the effluent from primary sewage treatment to be diverted into the lake on an emergency basis. This was not done. Pure Waters tried to get excess sludge to a landfill. They were stopped by DEC because the landfill operation was not adequate. Other landfills were acceptable to the DEC. They would have presented political problems, but could have been used for sludge on an emergency basis. No one tried to do this.

This chain of events resulted in failure to meet the phosphate water pollution standard, and in extraordinary and unnecessary discomfort for Irondequoit residents.

This Bulletin explains what happened and what is being done to remedy the problem in the short term.

Since our last report on the Van Lare sewage treatment plant, January 1978, odors have increased and complaints have risen sharply - there were 655 in July (Table 1). This bulletin examines the operation of the plant and other actions in Monroe County, which together have contributed to air pollution with noxious odors from sewage processing.

Table 1. Odor and Sludge Backlog

Date	No. of Calls	Average Backlog of Sludge (TDS)*
Aug 77	95	not available
Sept 77	54	not available
Oct 77	30	not available

Date	No. of Calls	Average Backlog of Sludge (TDS)*
Nov 77	42	43
Dec 77	16	111
Jan 78	2	184
Feb 78	14	268
Mar 78	41	220
Apr 78	71	180
May 78	216 (150 after 5/15)	301
Jun 78	631	293
Jul 78	655	303**
Aug 78	348	159**

*Equivalent tons of dry sludge
**Calculated from weekly averages - July - weeks ending July 2 to July 30; August - weeks ending Aug 6 to Aug 27.

Table 2. Phosphate in the Effluent from the F. E. Van Lare Sewage Treatment Plant*

Week Ending	Phosphate, ppm (parts per million)**
3/5/78	0.93
3/12	1.96
3/19	1.40
3/26	1.02
4/2	0.96
4/9	0.80
4/16	0.99
4/23	1.26
4/30	1.24
5/7	2.30
5/14	1.93
5/21	1.55
5/28	1.51
6/4	2.38
6/11	2.35
6/18	1.37
6/25	2.23
7/2	3.35
7/9	2.37
7/16	2.48
7/23	2.23
7/30	1.63
8/6	1.61
8/13	2.37
8/20	2.98
8/27	1.31
9/3/78	1.42

*This plant was equipped for chemical phosphate removal in primary treatment, but the process is not in use **Current U.S. Standard for the Great Lakes is 1 ppm of phosphate. A standard of 0.5 ppm was requested by the International Joint Commission for the Great Lakes.

BULLETIN #27 May 1967

RUST INHIBITOR AND WATER POLLUTION

Herman S. Forest, David J. Wilson, and George G. Berg

A polyphosphate rust inhibitor has been added to the salt spread on snowy Rochester streets nearly every winter beginning in 1948-49. This year the city management questioned the advisability of using the rust inhibitor. One of the questions raised was the contribution of the rust inhibitor to the pollution of Lake Ontario. The R.C.S.I. Water Pollution Subcommittee has examined the available scientific evidence and summarizes it in this report.

(1) Does polyphosphate pollute the lake? Yes. It does so by acting as a fertilizer that increases the growth of algae. It is not a pollutant in any other way. Polyphosphate dissolves in water in the streets and passes with the water through the primary treatment of the sewage treatment plant. It then enters the lake. During treatment and later in the lake, the polyphosphate is gradually broken down to ordinary phosphate, which is a fertilizer for algae. Thus polyphosphate provides for a gradual release of fertilizer, in a way that will best promote algal growth in lake water.

(2) There is phosphate in city sewage. Does the use of rust inhibitor cause a significant increase in the amount of phosphate that Rochester releases into the lake? Yes. From the known annual volume of sewage released by the City's Durand-Eastman plant, and from the estimated phosphate content of this outflow (8 to 9 parts per million), we calculate an annual discharge of approximately 1200 tons of phosphate into Lake Ontario. Rochester uses 30,000 tons of rock salt in a typical winter, calling for 300 tons of rust inhibitor (at the 100:1 ratio recommended by the manufacturer). The polyphosphate inhibitor is converted to phosphate (PO_4) with a yield close to 90% by weight, which means an added 270 tons of phosphate, and an estimated increase in pollution by 20% to 25%. Even if the estimate is too high by a factor of two, we are left with minimum 10% annual increase in pollution, which is significant.

(3) Rust inhibitor is used in winter. Do algae grow in winter? Yes. Algal blooms, i.e. growths so dense that they resemble pea soup, are found in American lakes under ice. Winter blooms of the algae, Anabaena, Oscillatoria, and diatoms have been reported in lakes from Wisconsin to Pennsylvania.

(4) When inhibitor is discharged into the lake in winter, is it spent and gone by spring? No. Phosphate becomes a part of the ecological cycle of growth and decay in lake water. Some of it can cycle locally in the Rochester Embayment, where it will keep up the fertility of inshore waters for algae. Some will gradually

drift along the shore past Webster. Eventually, some will be deposited on the bottom of the lake. The bulk of the phosphate will be discharged from Lake Ontario to the St. Lawrence River, but the outflow is slow in proportion to the volume of the lake, so the "flushing" of Lake Ontario water down the river takes several years.

(5) Are there non-polluting commercial rust inhibitors that could be used in place of polyphosphate? No. While chromates can protect from corrosion as well as polyphosphates, they are poisonous and cannot be employed on city streets. As far as we know, all rust inhibitors available for city use contain polyphosphate.

(6) Is the use of polyphosphate rust inhibitor a bad practice from the standpoint of water pollution? This depends on the type of drainage basin, on the design of the sewage disposal plant and on the sewer system. We see no harm in releasing some phosphate in winter into a river that drains into the ocean. In lake drainage basins, the best practice would be not to release phosphate into the lake. This can be done by proper sewage processing. New techniques of treatment such as lime precipitation are now under development, and remove phosphate from sewage. As Rochester has combined storm and sanitary sewers, such treatment would keep most of the rust inhibitor out of the lake, even though the inhibitor was used in the streets. Under present conditions, however, the lake is overfertilized, as indicated by the wash-in of algae on beaches, and any fertilizer added to the lake makes a bad situation worse.

Note: This was a significant bulletin. It extended the pollution interest from microbial disease to over-fertilization, from human health to environmental quality. Although nothing is written to indicate the emergence of a new event, this bulletin also marked the emergence of a new relationship with local government. It is evident from previous bulletins that RCSI was considered an adversary. On this occasion, the City Engineer of Rochester asked its help, and the study undertaken in response led to the bulletin. The City administration was under attack by a councilman who apparently had been primed by a commercial interest to oppose the removal of rust inhibitor from salt. Nearly ten years later RCSI undertook to examine the environmental effects of the road salt itself. HF (1981)

BULLETIN #28 June 1967

SEWAGE PHOSPHATES AND ALGAE IN LAKE ONTARIO

J. Roger Christensen, Neal G. Dunkleberg,
Herman S. Forest and David J. Wilson

Summary

In recent years, massive growths of algae in Lakes Erie and Ontario have become more frequent; they now constitute one of the most serious problems arising from pollution. Not only do immense slimy deposits of rotting algae wash up on lake shores, where they foul beaches and lakefront property, but the algae also interfere with industrial and municipal water supplies by clogging water intakes, filters, and pipes. They may seriously taint drinking water.

It is well established that massive algal growths occur in waters over-fertilized with nitrates and phosphates. In clear lakes and streams phosphate concentrations are usually lower than about 0.04 parts per million (ppm PO_4^{-3})--too low for heavy growth to take place. Massive growth, or blooms, characterized by a "pea-soup" appearance of the water and by thick scums of algae, require about five to ten-fold larger phosphate concentrations, or 0.20 to 0.40 ppm. A common source of phosphate in lakes and streams is raw sewage and effluents from sewage treatment plants. It has been estimated that 80% of all phosphate discharged into Lakes Erie and Ontario enters in sewage.

Heavy algal deposits on the beaches of Monroe County (such as the one which was a major factor in the closing of Webster Beach last August) and in Irondequoit Bay led RCSI to determine phosphate concentrations in samples of some Monroe County waters during April and May. Altogether more than 70 samples from 23 locations have been assayed.

...The phosphate concentrations found in all of the locations except for Canadice Lake and Honeoye Creek are ample to produce algal blooms, and greatly exceed the concentrations commonly found in unpolluted freshwater lakes. The especially high values in Irondequoit Bay and the Barge Canal account for the very heavy algal growths seen in these locations. The values for Lake Ontario beaches are remarkably high considering the dilution of river and stream waters in the lake, and are unquestionably large enough to explain the algal deposits seen during the summer; these are in part responsible for the state's decision to close our beaches this coming summer.

We have estimated from the quantity of sewage discharged by Monroe County into Lake Ontario each year, that about 4 million tons of algal growth could be supported by the phosphate contained

Note: Later the phosphorus level was expressed in terms of the element itself (P) rather than phosphate (PO_4). HF (1981)

in the sewage. If only 1% of this growth washed up on shore there would be slightly less than one ton of algae for every 10 feet of shoreline extending for 100 miles.

Our analyses prove that Lake Ontario and Irondequoit Bay, as well as several creeks which discharge into them, contain high phosphate concentrations. It can be reasonably concluded that sewage effluents are the primary source of the phosphate, and furthermore, that the massive algal growths observed in the lake and the bay are a result of the phosphate discharged.

Up to now, state and county plans to fight pollution have been primarily concerned with eliminating disease-causing bacteria from sewage effluents. We believe that steps to eliminate phosphate must also be given immediate attention if the esthetic recreational and industrial values of the lake are to be restored.

...The report of the federal government's scientists at the congressional hearings on water pollution here last summer included a large amount of data taken locally by Mr. Lee Townsend and his co-workers here in the Federal Water Pollution Control Administration. This report stressed the importance of the pollution of Lake Ontario and Irondequoit Bay with phosphates and nitrates, and indicated that this pollution was responsible for the massive growths of algae which were occurring. In the hue and cry over bacterial pollution from undisinfected sewage, however, sight was lost of this aspect of the federal report.

The RCSI has begun an investigation of the problem of phosphate pollution; where does it come from, how much of it is there, where does it go, and what does it do? This report presents (1) background material; (2) data on phosphate levels in the river, at the mouth of the Bay, in the lake and in three area streams and (3) rough estimates on the phosphate burden discharged by the Durand-Eastman plant and by the county as a whole, together with approximate information on the total amount of algae this burden would produce in the lake when a steady state is reached.

The approximate concentrations of phosphate in various types of municipal sewage are as follows:

PO_4^{-3}	No treatment	Primary	Secondary	Tertiary (liming)
concentration (ppm)	35	32	25	1-2

The average phosphate loading per person per year is approximately 4.1 kilograms (9 lb.) per capita per year.

Phosphate levels in Some Waters of Monroe County.

Ortho-phosphate and total phosphate analyses were carried out by the molybdenum blue-stannous chloride method as described in a manual published by the Federal Water Pollution Administration, or by the procedure given in the Hach Company's Field Laboratory Kit Manual.

TABLE I - Phosphate levels in regional waters of Rochester
(representative data: 20 of 47 entries - HF, 1981)

Location	Date	PO_4^{-3} (ppm) (ortho unless otherwise marked)	
Red Creek, along the lower mile and a half	16 Apr.	.4	
Irondequoit Creek, just south of Highway 96	18 Apr.	.2	
Irondequoit Creek, at Empire Boulevard	15 Apr.	2.2	
	23 Apr.	2.4	
	1 May	3.5	
Mouth of Irondequoit Bay	22 Apr.	2.3	
	29 Apr.	3.5	
	4 May	0.4	
Allen's Creek at Nalge plant, below Brighton's Allen's Creek STP	15 Apr	5.8	
			6.2 (total)
	23 Apr.	5.1	
	1 May	10.5	
Slater Creek at Long Pond Road, below Greece's Latta Road STP	22 Apr.	6.0	
Ontario Beach	22 Apr.	0 2	
	29 Apr.	0.35	
	2 May	0.55	
	4 May	0.15	
Mouth of Genesee River	29 Apr.	0.24	
	4 May	0.30	
Canadice Lake	7 May	0.10	
Upper Honeoye Creek S. of U.S. 20 at Richmond Mill Road	29 Apr.	0.10	

The following data on Lake Ontario were obtained on lake cruises carried out by the Federal Water Pollution Control Administration, and reported at the Congressional hearing here last summer.

	Western Section	Central	Eastern
Total Phosphate	0.03 - .10	.03-.08	.02-.06
Average Total Phosphate	.05	.04	.04

This group found phosphate concentrations in Irondequoit Bay of 1 to 3 ppm.

Phosphate Burden from Rochester and Monroe County.

Monroe County receives approximately 2.5 billion tons of rainfall each year. If we use a figure of 0.1 ppm (The Honeoye Creek and Canadice Lake figures) as the concentration of phosphate due to natural sources, this leads us to a figure of about 250 tons of phosphate per year which would come from Monroe County in the absence of man. In fact, this figure should be somewhat lower, due to water losses from evaporation and transpiration. Even so, this maximum natural loading, as we shall see, is only about 5 to 10% of the phosphate loading which comes from the sewage plants of Monroe County.

Rochester discharges roughly 100 million gallons of primary-treated sewage per day into Lake Ontario. This corresponds to an annual phosphate load of 4,600 tons, if we assume that this is typical primary effluent.

$$10^8 \text{ gal/day} \times 365 \text{ days/year} \times 8 \text{ lb/gal} \times 32 \times 10^{-6} \text{ ppm } PO_4^{-3} \times \frac{1}{2000} \text{ ton/lb} = 4{,}600 \text{ tons phosphate}$$

An alternative method of doing the calculation, assuming a sewered population of 300,000 and an annual per capita phosphate load of 9 lbs., yields an annual total phosphate burden of about 1,400 tons.

If we assume an additional sewered population of 200,000 in the county, and assume (optimistically) that their sewage all receives secondary treatment, this gives an additional 2,400 tons as an upper limit, or 730 tons as a lower limit. We note that neither primary treatment nor secondary treatment remove very much phosphate from sewage. The total phosphate burden from the county's sewage plants lies somewhere between 2,100 and 7,000 tons/year. Let us more or less arbitrarily choose 3,500 tons as a figure for further calculation.

These data establish that by far the largest source of phosphate pollution of Lake Ontario in Monroe County is municipal sewage. The results obtained in our local lake waters, of the order of 0.4 ppm, are far in excess of the levels found for the lake as a whole (0.05 approximately), and are also much larger than the levels of 0.01 to 0.04 ppm commonly found in unpolluted freshwater lakes. The concentration of phosphate in the Rochester Embayment is double the average phosphate concentration in Lake Erie, which routinely suffers from massive algal growth.

...We are indebted to Ray Huther, of the Monroe County Conservation Council for assistance in sampling, and to Martha Wertlieb for the publication of the report.

BULLETIN #84 July 1968

LANDFILLS THREATEN IRONDEQUOIT BAY

Herman S. Forest

Summary

Landfills may be regarded as a kind of pollution of water, since part of the environment is destroyed, and the regulatory capacity of a wider area may be threatened. Landfills in New York also have the effect of transferring authority ownership from public to private hands. In the course of many years a considerable area of Irondequoit Bay has been filled, and the area south of Empire Boulevard clearly faces complete destruction within the next generation. Present landfills are being made both with and without application to the State Water Resources Commission, which is the permit granting agency.

Background

The State regulation of landfills took effect on January 1, 1966. Before that time virtually the only restraint might have been found in the State Sanitary Code (Ch. 9 Reg. 5) in which the Commissioner may direct local boards of health to take steps for the public good. In effect, no restraint was applied. In the Rochester area both Finger Lakes and Lake Ontario have been subjected to filling for almost a century. A major peninsula and at least one complete home site were constructed in Conesus Lake, and the area of Irondequoit bay which has been filled is several acres in extent. The Irondequoit encroachments were diagrammed in a study by John Bennett, the results of which were published in the Rochester Times-Union in June 1965 in two articles bylined by John Street. No documentary evidence has been assembled on the fills at Sodus Bay, but filling is still going on rapidly.

During 1967-68 there was for the first time State action against landfills. Applications must be made to a regional permit agent; for Region I the agent is Mr. Robert F. Perry, State Conservation Department, Scottsville, New York. At least one application for a small landfill was refused and not appealed. If the applicant appeals to the central permit agent, Mr. T. P. Curran, Conservation Department, Albany, then a public hearing may be held. In one case, the application of Parkvil for filling at the northern end of Conesus Lake, a hearing was held after the application was approved because of demands by objectors. At this hearing the State's counsel in fact defended the approval, that is, took the side of the applicant. The decision resulting from the hearing favored the applicant for the landfill, and it was contested in court (Albany, July 12, 1968) with the assistant solicitor of New York defending the State's decision. In all other cases which have come to a hearing in Region I, the decision has been against the applicant. Actual removal of fill which had been placed was enforced in both Canandaigua and Conesus Lakes. A

fine of $500.00 plus $100.00 a day until the fill was removed was levied in the Ames case, involving fill at the southern end of Lake Conesus.

A preliminary survey of action on landfills in other parts of the State (outside Region I)* indicates that applications are granted freely, and no restraint has been generally applied in cases of presumed illegal fills. Apparently Region I has done more to protect the public of New York than has been done by the State Conservation Department elsewhere.

Pollution

Increased urbanization of the area around Irondequoit Bay, and particularly of the watershed of Irondequoit Creek received little official attention until recently. Biological changes were obvious by 1939, when R. C. Clausen (State Biological Survey: The Lake Ontario Watershed) noted that several species of plants had disappeared. Clausen was a full generation ahead of official state action in deploring the pollution of the bay. Indeed, his documentary photograph of garbage in the bay might well have been taken in 1968.

During the spring and summer of 1967 eight different bulletins of the Rochester Committee for Scientific Information reported on the condition of Irondequoit Bay and its watershed. Conditions of pollution which were reported included coliform counts indicative of serious fecal pollution, petroleum product waste (poisonous to many kinds of aquatic organisms), and high phosphate content (condition for growth of nuisance algae). During the past year some new treatment facilities have begun to operate in the watershed, and plans have been announced for the removal of all waste water from the area. Improvement, however, is yet to come.

The Defense of Irondequoit Bay

The U. S. Geological Survey Quadrangle Map (7.5 min. ser.) states elevation of Lake Ontario as 249 feet. It should be noted that the International Great Lakes base is 1.22 feet below the USGS base, so that figures in elevation must be correlated with their corresponding base. The 249 foot level extends south of Empire Boulevard up the mouth of Irondequoit Creek.

Using the concept of high mean water level and invoking the marginal protection regulation, the State would defend the area under 246.88 ft. (USGS).

Up to this time there has been no official act on record to halt landfilling operations. Since the enforcement of the state landfill law (January 1, 1966) no permits have been sought or

*Note: The local area is now designated as part of Region 8 of the Environmental Conservation Department. HF (1981).

granted until the application submitted on behalf of Meli Bros. Construction Company which is scheduled for hearing on July 30, 1968. There has been filling in the inlet area since Jan. 2, 1966 which undoubtedly violates the defense line. The filling in the area of Frederico Inc., 1225 Empire Boulevard, was completed with a margin of rip-rap (rough blocks). Any role which the Conservation Department had in the matter is not on the public record.

The area south of Empire Boulevard has been examined a number of times during the spring and summer of 1968. The last visit was on July 21, 1968. The lake level for the day was 247.13. There are two inlets to the east of Float Bridge. No trespassing signs on both properties are over the name of F. A. Pecora. The western inlet has a building labeled Cameron Construction Co., the eastern area is the site of Meli Construction Co. Both areas contain recent fill of rubble such as comes from excavations and demolitions: mixed dirt, concrete, bricks, and miscellaneous materials. This fill extends into the water to the bottom, that is, well below 246 feet. There has been no establishment of pioneer land plants on the fill nor has there been the establishment of a thick layer of algae or bacteria on the submerged portion, thus the ecological evidence is unequivocal that the fill is recent - certainly less than 2 1/2 years old.

In addition to the rubble, the western inlet contains a large amount of tin cans and junk - bed springs, old refrigerators etc. The source of this material is the Town of Penfield. Ironically, the material seems to have been gathered in a clean-up campaign according to an unconfirmed, but probably reliabale reported.

BULLETIN #66 February 1970

PHOSPHATE IN WASHING PRODUCTS

Olga Berg and George G. Berg

Summary

Laundry detergents and presoaks tested for the RCSI contain a considerable amount of chained (poly-) phosphate. Other washday products and dishwashing detergents have less phosphate. The brand names are given with the amounts found. Since phosphates from laundering pollute fresh water lakes, some possible alternatives are suggested. It is also concluded that in many regions phosphates may be the most desirable water softeners since they are safe for both humans and other organisms.

Background

The RCSI was asked if there are low-phosphate laundering agents on the market. The questioner owns a home on a small, clear mountain lake, and he is eager to prevent the growth of

excess algae in "his" lake. Many such lakes receive the outflow of laundromats and home washing machines and have responded to the added fertilizer with increased plant growth, weeds and algae.

Samples of 22 cleaning compounds were supplied by the members of Mr. Collins 6th grade class in the Brighton School System. A set of directions was prepared and tested by George and Olga Berg of the RCSI. The class then performed the analyses under the direction of Olga Berg in the Spring of 1969.

The test material was weighed, dissolved in water, acidified and boiled to break the phosphate chains and produce phosphoric acid. After the acid was neutralized, addition of ammonium molybdate and stannous chloride caused the formation of molybdenum blue. The intensity of the blue color was measured in a Bausch and Lomb Spectronic 20 colorimeter at a wavelength of 650mu. The amount of phosphate was then calculated from the measurement. This technique was taken from "Standard Methods of the American Public Health Association," the manual used by public health and water resource agencies. Step-by-step instructions used by the class are available from the Secretary of the RCSI. Representative samples of soaps, detergents, detergents with enzymes (intended for both cold and hot water), presoaks, and fabric softeners were selected. Duplicate samples of Tide and All were analyzed, single samples of the others.

Results

The results of the tests are summarized in Table 1.

Table 1. TOTAL PHOSPHATE IN WASHING PRODUCTS
Analyses in Rochester and Milwaukee (NY Times)[1]

Washing product	grams of phosphate in a cup of product	grams of phosphate in a machine load	weight in grams of one cup of detergent	percent of weight as as phosphorus RCSI data	NY Times data
Water conditioner					
calgon					
Presoak	36	18	144	25%	
axion[2]					
biz	70	35	123	57%	43.7%
diaper pure					40.4%
Detergents					5.0%
ajax					
all - regular					28.2%
bold[2]	26	33	146	18%	
bonus	12	15	75	16%	30.2%
breeze					22.3%
cold power[2]					22.2%
cold water all	9	11	86	11%	19.9%
					9.8%

Washing product	grams of phosphate in a cup of product	grams of phosphate in a machine load	weight in grams of one cup of detergent	percent of weight as as phosphorus RCSI data	percent of weight as as phosphorus NY Times data
Detergents					
dreft					24.5%
drive[2]	18	23	83	22%	25.3%
duz					23.1%
fab					21.6%
gain[2]	17	21	74	23%	24.4%
ivory liquid	2		168	1%	
low suds	24	24	144	17%	
oxydol					30.7%
punch[2]	31	39	101	31%	25.8%
rinso	12	15	70	17%	
salvo cubes	15	10	157	10%	
salvo					35.5%
spic and span	22	11	217	10%	
surf	8	10	117	7%	
tide XK[2]	27	34	79	30%	30.6%
trend					1.4%
wisk	26	13	240	11%	7.6%
Soaps					
ivory flakes	3	5	43	7%	
ivory snow	0	0	58	--	
culligans[3]	15	3.7	137	11%	
instant fels	5	7.5	79	6%	
Fabric Softener					
downy	0	0	259	--	

[1]analyses done by Limnetics Inc. of Milwaukee, printed in NY Times, December 14, 1969.
[2]contains an enzyme (information only for those tested in Rochester)
[3]sold by Lan-o-sheen Inc.

Discussion

1. Detergents and suds. If wash is to be clean, the water and laundering material must be able to remove many kinds of soil. The detergents which have been used in recent years have been enormously successful as cleaning agents. The word detergent is used in two ways. It sometimes refers to just one of the active ingredients in the washday product (the detergent is distinguished from water softener, stabilizer, brightener, bleach, enzyme, etc.), and it sometimes refers to the whole mixture. This report uses the word both ways, but this paragraph refers to the chemical. Detergents can be classified according to whether microbes can break them into simpler units - i.e. whether they are biodegradable. Their chemical structure determines whether they can be called hard (hardly biodegradable) or soft (75-90% biodegradable under excellent conditions). Until recent years most detergents

were hard, they persisted in streams and lakes, directly damaged fish by a coating action on delicate parts, and were sometimes visible as suds. Now all detergents are soft. Unfortunately, even the soft detergents are polluters because they are only 90% degradable and time must pass before they are fragmented and removed. "Super-soft" detergents (rapidly 100% degradable) are being sought by manufacturers, and alternate solutions are being examined.

2. Phosphate as fertilizer. Water is classified as soft or hard according to its mineral content and particularly to its calcium content. According to the Monroe County Water Authority, water in this area is moderately hard. Any detergent is more effective in soft water. Since polyphosphates are the best water softeners known it is a common practice to add them to detergents. These chained phosphates are a logical choice because they are biodegradable, they are changed to simple phosphates by bacteria and algae and added to the small amounts of phosphate naturally present in nearby lakes and streams. However, in many lakes the natural scarcity of phosphate is a critical factor that limits plant growth. Thus, the added phosphate is a potential fertilizer and it may produce "blooms" of algae which make the water murky and affect its taste and odor. In addition, increased growth of attached algae and weeds (aquatic flowering plants) choke shallow water areas and fill the lake with debris.

These facts suggest that the public could ask manufacturers to market laundering materials in two forms - one with a greater and the other with a smaller amount of phosphate, then the consumer could match the product to the situation. At very least, the container should state how much phosphate it contains. A phosphate-free, biodegradable softener would be most desirable, but, in its absence, it should still be possible to use the minimum amount of polyphosphate required to obtain clean wash.

Although our results and those published in the Times are in general agreement, there are differences which may be compared in Table 1. Possible explanations include: (1) Different technique in analysis, (2) Incomplete breakdown of phosphate chains by boiling for the standard length of time, (3) Differences in the actual phosphate content of the product from one batch to another or in different regions of the country or at different times.

Wash water compared with sewage

The RCSI has also been asked to compare the amount of phosphate released in a week's washing with the amount of phosphate excreted in a week by an average family, using all available washing aids.

Each machine load:	87 grams
Week's Wash (5 loads):	435 grams

The same family also eats and excretes a certain amount of phosphorus each day. The following figures are from the Recommended Dietary Allowances, published by the National Academy of Sciences. We used maximum figures for adults, teen-agers and children, and assumed that all the phosphorus not specifically held in the body (e.g. as bone) is excreted...

This family excretes 3.9 grams of phosphorus each day, or 27.3 grams each week. Converted to phosphate for comparison it is equal to 82 grams each week. Thus, even under the best conditions a family puts 82 grams of phosphate into the water each week, and it may put in as much as 517 grams...

If your drain leads into a lake, the lake will become weed-grown. This was explained in RCSI Bulletins (#28 ∝ #29) and an FWPCA report. Neither septic tanks nor ordinary (primary or secondary) sewage treatment plants remove the phosphate. Tertiary treatment with special phosphate removal is necessary. Such treatment is available both for large sewage treatment plants and for small (package) plants (RCSI bulletins). Phosphate will be removed at the regional plants under construction in Monroe County, and the plant planned for Conesus Lake in Livingston County.

Even a septic tank might be supplied with such tertiary treatment. Phosphate compounds are precipitated by calcium, and it is possible in theory to hold back all the phosphate if the outflow of a septic tank trickles through a bed of lime on the way to the lake. We know of no tested, practical method to build such a lime bed, and we invite comments of chemists and engineers among our readers.

For individuals and groups concerned with pollution by laundry products, the RCSI suggests these actions:

(1) Launder with a soap or a washday product low in phosphate and eliminate extra presoaks and chemical water softeners.

(2) Write requests that ask that detergent manufacturers market their product low in phosphate and label the percentage on the container. This may stimulate them to look for other non-fertilizing water softeners.

(3) The community can be asked to give priority to building tertiary sewage treatment plants, which remove phosphate.

NOTE: This was the opening volley in a battle for public information which was to lead RCSI to testify at public hearings for national and international agencies. RCSI scientists also worked with state legislators and agency staffs in the bitter controversies which raged during the following three years. At the time of publication, this was the only available source of information on all aspects of the phosphate question, written in layman's language. HF (1981)

BULLETIN #67 February 1970

WATER TEMPERATURE AND DISSOLVED OXYGEN IN IRONDEQUOIT BAY

Robert C. Bubeck

Summary:

Irondequoit Bay, despite some pollution problems, behaves in many ways like a typical lake, and is not the stagnant, inactive body of water which many people believe it to be. The bay is characterized by at least one thermal mixing event in the fall. This occurrence, known as fall overturn, mixes the entire water mass in the bay and thoroughly distributes oxygen throughout the lake system. There is further evidence from observations made in early spring 1969 that the bay may also mix completely each spring after its ice cover thaws. If this latter observation is correct, then the bay can be said to resemble several upstate New York lakes in that it mixes twice a year. This encouraging behavior of Irondequoit Bay means that the deep oxygen deficient waters of the bay which develop in the summer are replenished with oxygen each fall and each spring. This redistribution of oxygen may last from periods of six to eight months. The statement often used in reports and conversation that the bay is devoid of oxygen below 20 feet (although it is an undesirable condition at any time) appears to be a summertime condition, occuring only during the period of summer thermal stratification of the bay.

NOTE: This was a summary report. The study was modestly supported by RCSI, but this "seed money" produced fruit. It led to Bubeck's interest in the effect of road salt on the Bay's seasonal mixing, which is pursued in Bulletin #125. Published in Science, the work is now a classic in the field. Dr. Bubeck is also co-author with T. T. Bannister of the monograph on Irondequoit Bay:

Bannister, T. T., and Bubeck, R. "The Limnology of Irondequoit Bay" in Jay A. Bloomfield (ed.) Lakes of New York State, Vol. II, Lakes of Western New York Academic Press, 1978. HF (1981)

BULLETIN #100 June 1970

SOURCES OF PHOSPHATES IN LAKE ONTARIO: THE SANDY CREEK WATERSHED

John E. Hubbard

Summary:

Sandy Creek enters Lake Ontario east of Hamlin Beach State Park and drains an area of 87 square miles in Orleans and western Monroe Counties (containing some villages). RCSI Bulletin #59, November, 1969, reported a survey of polluted portions of the Creek. Measurements of stream flow and phosphate concentration made in 1969 and 1970 were used to estimate the amount of phosphate contributed to Lake Ontario by this watershed.

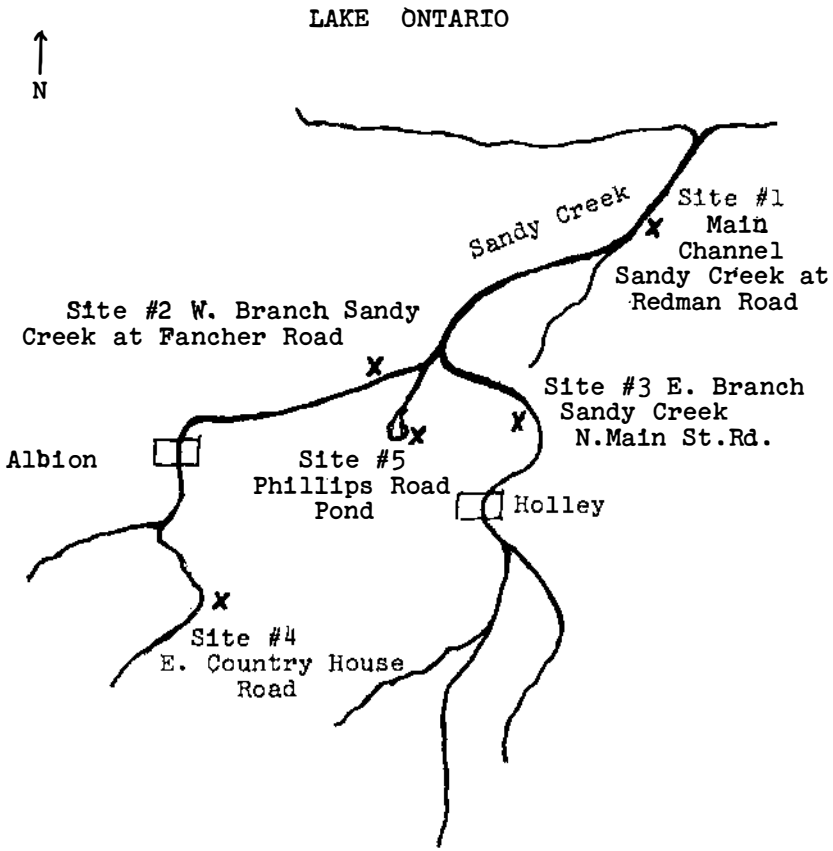
Results were as follows: 1. an estimated 65 tons of phosphate is contributed to Lake Ontario by this drainage, 2. phosphate concentrations in the main channel ranged from 0.9 to 1.7 parts per million (ppm) in the stream during the period of measurement, 3. phosphate concentrations were considerably higher in reaches downstream from municipalities than upstresm (ex. 0.1 ppm upstream from Albion and more than 2 ppm downstream), 4. dissolved oxygen at the sampling points was near saturation, indicating low excess organic matter. A table of data and a location map are included.

NOTE: Issue #100 marks the transformation of this series of reports into a serially numbered publication called "The Rochester Committee for Scientific Information Bulletin." Preceding issues were back-numbered at this time. HF (1981)

Commentary:

Sandy Creek drainage is probably typical of a large number of small watersheds in the Lake Ontario basin. Although mostly rural in nature, the impact of small communities discharging nutrients in the stream can be significant. The value of 0.1 ppm phosphate upstream and 2.1-2.8 ppm downstream from Albion is an example. The 0.1 ppm value is considered by some authorities as an upper level standard for lake river waters.

From the viewpoint of community responsibility, a paradox is evident from the evidence presented above. The people of Monroe County have voted to finance a Sewer-Interceptor-Treatment program which includes phosphate removal. Yet Sandy Creek discharges into Lake Ontario shortly after entering Monroe County.



Sampling sites for phosphate concentration in
Sandy Creek Basin, Monroe County
1969 - 1970

Bulletin #111 February 1971

PHOSPHATE-FREE DETERGENTS

Kenneth G. Harbison

Summary

Samples of seven brands of nominally phosphate-free laundry detergents were purchased during October, 1970. These were analysed for the ecologically undesirable ingredients: phosphate, borate, nitrilotriacetate (NTA), and anionic surfactant (cleaning agent). Sears, Lemon Low Suds No. 311, and Concern detergents were essentially free of these ingredients. Basic-L and Topco detergents contained small amounts of anionic surfactants but did not contain the other ingredients listed above. Ecolo-G contained both traces of phosphate (0.2-0.4%) and small amounts of anionic surfactants. Cold Water All (Liquid) contained NTA, which has been found by the National Institutes of Environmental Health Sciences to cause birth defects in rats and mice under special conditions.

In addition, the detergents were analysed for nitrogen, silicate, carbonate, pH, sodium chloride, water, brighteners, alcohol-soluble materials, and grams of detergent per wash. Every detergent contained sodium silicate, a corrosion inhibitor and water softener, and brighteners. Ecolo-G contained 42-48% sodium chloride, an inert filler. Concern contained 82% water, which is appreciably more than other liquid laundry detergents.

Granular detergents contained large amounts of carbonates and were quite alkaline. The pH at washing concentrations ranged from 10.7 (Basic-L) to 11.3 (Ecolo-G), which is substantially more alkaline than typical phosphate-based detergents. For Basic-L, Ecolo-G, and Topco detergents the pH increases appreciably as the concentration is increased. Avoidance of excessive contact of skin with concentrated solutions of detergents will prevent possible skin irritation from the silicates and high pH of these detergents. Adequate rinsing will minimize possible fabric deterioration from residues of these alkaline detergents.

R.C.S.I. feels that the ultimate benefit to the area's lakes and streams from a reduction in phosphate input is worth any minor changes in washday procedures necessary to use these phosphate-free detergents to their best advantage.

Bulletin #118 May 1971

WATER POLLUTION ABATEMENT THROUGH REGULATION OF CONTENT AND USE OF DETERGENTS

Herman S. Forest

This special bulletin was prepared in response to many requests for a completely non-technical explanation of the troubles facing both our lakes and the detergent industry. Three RCSI bulletins contributed parts of this report: #111, #119 and #120. Earlier RCSI bulletins documented the increasing pollution of our waters over the last seven years.

Summary and Conclusions

Phosphates from detergents are an important kind of pollutant in many lakes. Reduction of phosphate in waste water treatment is partial, therefore the content in detergents must be drastically reduced. Labelling of phosphate content on detergent containers has been ineffective as a control measure because useful information is difficult to obtain from complicated labels in fine print. The use of phosphate-free detergents or soap, either by law or voluntarily, is found to be a reasonable control measure. Phosphate-free detergents now marketed do not pollute. Some of these are highly alkaline and constitute a personal safety hazard, and some have not cleaned effectively. Nevertheless, the products are improving, and already both safe and acceptably effective phosphate-free detergents and soaps are available. It is further concluded that the use of phosphate in detergents is a resource waste and that the salvage and production of fats and oils for soap should be encouraged.

Guide to Content:

Detergent phosphates as a cause of pollution: Items 1-4
Water softeners, phosphate and nonphosphate: Items 5-9
Alkalinity, personal and environmental safety: Items 10-13
Effectiveness of detergents: Items 14-16
Cost: Item 17
Means of removing phosphates, treatment, prohibition, labeling: Items 18-20
Resources waste: Item 21

Note: This was indeed the only objective, thorough, and non-technical explanation then available in the nation. As matters developed, NTA, item 8, was not used as a substitute for phosphates, and, after the earlier phosphate-free products had been replaced, carbonates and silicates were no longer controversial ingredients. Only two years later, when New York's prohibition of phosphorus in washing products was enforced, manufacturers had safe, effective products ready for the market.

Bulletins #111 and #119 by Kenneth G. Harbison and his students provided the most comprehenisve chemical analysis of the new products available to the general public. One product was revealed as containing almost half common salt. Something of a scandal bubbled shortly afterward, although RCSI was not identified as source of the damning information. Major manufactures were distressed, but were prepared to market phosphate-free products when the law became effective HF (1981).

Bulletin #125 July 1971

RUN-OFF OF DEICING SALT:
EFFECT ON IRONDEQUOIT BAY, ROCHESTER, NEW YORK*

R. C. Bubeck, W. H. Diment, B. L. Deck, A. L. Baldwin, and S.D. Lipton

Summary

Salt used for deicing the streets near Rochester, New York, has increased the chloride concentration in Irondequoit Bay at least five fold during the past two decades. During the winter of 1969-1970, the quantity and salinity of the dense run-off that accumulated on the bottom of the Bay was sufficient to prevent complete vertical mixing of the Bay during the spring. Comparison with 1939 conditions indicates that the period of summer stratification has been prolonged a month by the density gradient imposed by the salt run-off.

History of Salt Use for Deicing

Use of salt for deicing has increased very sharply in recent years. Sodium chloride ("table salt") is by far the most common material but some calcium chloride is used. Before 1941 some salt was added to the sand spread at critical road locations such as hills, intersections, and curves. Pure salt was applied in a few localities before 1950, but in the next twenty years the amount grew very rapidly with the expansion of a "bare pavement" policy into most northern localities. The amount applied has doubled and redoubled every five years.

Application in Monroe County and the Irondequoit Creek Basin

The local use of salt exceeds national averages. In the winter of 1969-70, 2½ per cent of all salt used for deicing in the United States went on Monroe County. Irondequoit Basin, about one-quarter of the county, received 1 per cent of all the salt applied in the country. There is no obvious reason why the disproportionate amount should be applied, but part of the area is densely surburbanized, and the snowfall pattern may promote frequent applications.

Increased Salt in Water of Irondequoit Watershed

Since a few old records do exist, it is possible to calculate that the concentration of chloride (one of the two ions of common salt) has risen ten fold since 1910 in Irondequoit Creek and Bay.

*The full report with references cited appeared in Science (1). Reprints will be available from the author, Department of Geological Sciences, University of Rochester and from the RCSI. The senior author is indebted to RCSI for a grant with which this study was initiated. Subsequent support was received from the National Sea Grant Program, GH-106.

The rise has been particularly rapid since the mid-1950's, but the rate of increase has slackened somewhat after 1965, probably because the "bare pavement" policy had been fully implemented by then.

Salt enters the Bay not only from Irondequoit Creek, but from smaller creeks which enter the Bay directly. The concentration is striking because the Bay is relatively small in area and volume, and because it is essentially a sink, with only a small shallow opening at the lip as an overflow into Lake Ontario. Nevertheless, there was little net accumulation between November 1969 and November 1970.

About 77,000 metric tons of salt are applied to the watershed in a year. More than half is stored in the ground water and soil, but 32,000 metric tons enter the Bay, and in the course of a year flush into Lake Ontario. Two thirds of the total entering the Bay comes during the winter (December-March), but the contribution is continued from soil and goundwater all summer.

Interference by Salt of Lake Dynamics

Ordinarily, deeper lakes in the climate of northern United States mix once or twice a year when the surface water becomes denser than the deeper waters (spring and fall turnover). Mixing may be continuous during the winter in ice-free lakes such as Cayuga. Irondequoit Bay mixed completely in early October, 1939, when the surface temperature had reached 12°C (63°F). In 1970 mixing was delayed until November and a colder surface temperature (8.5°C or 46°F) was required to bring the density above that of the salty deeper water.

Significance of Changes

The aforementioned changes are not viewed with alarm. The point is that the salt run-off has significantly changed the physical characteristics of the Bay and that similar conditions might be expected elsewhere, particularly in heavily salted areas that provide natural traps. Very small and relatively deep lakes are particularly susceptible to such conditions. Indeed, one tiny lake in Michigan has been prevented from completely mixing in the

spring by salt run-off. More should be known about such lakes as it is likely that salt run-off will produce more of them.

The chloride levels are not presently critical. Although they exceed the U. S. Public Health Service recommended limit for human consumption (250 mg/l) chloride during parts of the year and are unsuitable for certain industrial processes, waters of much higher chloride content are utilized without processing in various regions. However, the fact that the chloride levels are rising suggests that they should be monitored carefully, and that serious attention should be given to the fraction of deicing salt that is being stored in the ground water. The need for more detailed statistics as to the local distribution of deicing salt is also evident.

Reference

(1) Bubeck, R. C., W. H. Diment, B. L. Deck, A. L. Baldwin, and S. D. Lipton, "Runoff of Deicing Salt: Effect on Irondequoit Bay, Rochester, New York", Science, 172(3988), 1128-1132, June 11, 1971.

Bulletin #130 December 1971

A SURVEY OF THE FISH OF IRONDEQUOIT BAY

Steven Gittelman and Claire Buchanan

Summary:

It is not true that "only the scavenger carp" exist in Irondequoit Bay. In 1969-1970, 23 species of fish were found in Irondequoit Bay, 14 of them collected in this study for the R.C.S.I., and the remainder identified by the New York State Conservation Department (recently renamed the Department of Environmental Conservation). Comparison with collections taken in 1939 shows that 9 species present then were not detected in 1969-1970 and 7 species have decreased in numbers; these were fish that favor clear, quiet, weedy waters. By contrast, 7 new species were recorded and 5 increased in numbers; these were fish that favor or tolerate silty or brackish water with much vegetation. The most prevalent fish today are emerald shiner, pumpkinseed sunfish and white perch, while the walleye is seemingly gone from the bay.

Realizing that seining, the primary sampling method used, only collected inshore species and therefore biased the findings, the authors obtained records of fish collections for July 1939 (1), May 1969 (2), and May 1970 (3) from the New York State Environmental Conservation Department in Avon, New York. The 1969 and 1970 fish collections were made with 4 ft. and 6 ft. trap nets in offshore locations in surface waters up to 6 ft. The 1939 fish collections were made with a gill net and 15 ft. and 50 ft. seines. The gill net was located 200 ft. offshore at a depth of 12 - 13 ft., and the seinings were done at distances of up to 100 ft. offshore at depths of 0 - 8 ft.

Results:

A map of the collection sites is shown in Fig. 1. Table 1 gives a listing of the fish collected. Fourteen species were represented in the 1538 fish collected by the authors at the 24 bay locations. Three species, emerald shiner (Notropis atherinoides), pumpkinseed sunfish (Lepomis gibbosus), and white perch (Roccus americana), constituted over 97% of the individuals collected.

The New York State Conservation Department records for 1969 and 1970, and the authors' data for 1970 show that at least twenty-four fish species presently inhabit Irondequoit Bay. Fish collection records show that at least twenty-five species inhabited the bay in 1939. However only sixteen of the twenty-five species found in the bay in 1939 were found in 1969-1970.

Since the data have been incorporated into the Irondequoit Bay Monograph, Bannister and Bubeck, 1978, they are not included here. HF (1981).

Discussion:

This report disproves the misconception of some that "only the scavenger carp" exist in Irondequoit Bay. It should be noted, though, that the quality of the bay waters is changing, and this is indicated by changing abundances of fish species. Since 1939, nine species of fish have seemingly disappeared (six species of minnows, bluegill, northern log perch, walleye and killifish). Eight new species have been recorded. There have been reported increases in the abundances of carp, emerald shiner, pumpkinseed, alewife and northern pike; and decreases in the abundances of shad and white sucker. The authors feel that not enough information is presently at hand to say precisely what changes have occurred in the bay since 1939 to cause these changes in the abundance of fish species. It is interesting to note, however, that of the 16 species that reportedly disappeared or decreased many favor clear weedy and often quiet waters (4). Of the 12 species reported to have moved in or increased in numbers two are anadromous (alewife, sea lamprey, one is very tolerant of low oxygen tensions and high temperatures (brown bullhead), and almost all of the others either favor or can tolerate silty, brackish waters with much vegetation (4). This suggests that the bay has become more eutrophic, or nutrient-rich, in character since 1939, but not to the extent of being uninhabitable to all fish species.

References:

(1) T. T. Odell, "Fish Collection", N.Y.S. Department of Environmental Conservation, #411.12, 411.13, 411.14, 1939.
(2) Riordan, King, "Fish Collection - Pond or Lake", N.Y.S. Department of Environmental Conservation, #411.30 411.31, 411.32, 1969.

(3) R. D. King, "Fish Removal or Transfer Stocking", N.Y.S. Department of Environmental Conservation, May 8, 1970.
(4) E. P. Slastenenko, The Freshwater Fishes of Canada, 1958.

Bulletin #150, January 1973

CONSUMER EVALUATION OF LAUNDRY DETERGENTS

Olga Berg and George G. Berg

Summary

Laundry detergents with no phosphate had the same record of safety to health as did high phosphate (8.7% P) detergents according to a November 1972 survey by the Rochester Committee for Scientific Information. Skin rashes or itching were reported by 4% of users of both high-phosphate detergents and non-phosphate detergents in Monroe County. In this County, as in all of New York State, high phosphate detergent formulations contain 8.7% phosphorus, which means that approximately 1/3 of the product (by weight) is a polyphosphate salt. The no-phosphate detergents use other water softeners.

The most popular high-phosphate brands as well as the most popular non-phosphate brands had some dissatisfied and some enthusiastic users among the 468 respondents. The two most used high-phosphate brands as well as the most used non-phosphate brands in our poll had some users complaining of health effects. The score for users who reported being completely satisfied with a product was 88% among users of all phosphate-containing detergents, 79% among users of non-phosphate detergents and 77% among users of soaps. Statistics on numbers using each kind of detergent are given in the test.

Bulletin #156 March 1973

LETTER FROM ROBERT A. SWEENEY
DIRECTOR, GREAT LAKES LABORATORY
STATE UNIVERSITY COLLEGE, BUFFALO, NEW YORK

Environmental Conservation Commissioner Henry Diamond, when he recommended the implementation of Phase II of the phosphate detergent legislation - namely, the elimination of phosphates from laundry detergents sold in New York State by 1 June 1973 - on 13 February 1973 warned that considerable efforts were afoot to derail this critical ban. As a native New Yorker and professional limnologist, who for more than a decade has studied the accelerated aging of our lakes and rivers, I strongly concur with the views of Mr. Diamond and his staff. On the other hand, as an educator, I am appalled by the tactics being employed by those opposing the ban. Specifically, they are disseminating half-truths and using scare tactics.

The opposition to the ban is being led by a consortium of phosphate manufacturers whose major spokesperson is Ms. Judith Smeltzer of FMC (Corporation). Another individual deeply involved is Dr. Mary Purchase of the College of Human Ecology (Home Economics) at the State University of New York at Cornell.

They have stated or inferred the following: (a) Reducing the phosphate content of detergents has not improved the quality of lakes and streams; (b) Non-phosphate detergents are less safe than phosphate detergents; (c) Non-phosphate detergents inhibit flame-retarding chemicals, particularly those used on children's sleepwear... Each of these generalizations is untrue.

An EPA-sponsored study has shown that stream quality in Erie County has improved more than 40% since the sale of phosphate detergents was banned on 1 January 1972. (During this period, there was no upgrading of sewage treatment plants or correction of combined storm-sanitary sewer problems.)

The Food and Drug Administration (FDA) rated more than fifty (50) phosphate and non-phosphate detergents on their degree of hazard to humans. They gave the most hazardous a rating of 5; the least 0.....The average and range for both the phosphate and phosphate-free products was the same..... Dr. Edwards, Head of the FDA, concluded that their degree of hazard was not related to phosphate content. In doing so, he strongly disagreed with Dr. Jessie Steinfeld, the former Surgeon General, who had recommended the use of phosphate detergents on 15 September 1971. Dr. Steinfeld has since stated that his remarks had been taken out of context. Non-phosphates have not resulted in any health problems or deaths, which have been implied by the pro-phosphate forces. The cause of death of a child in Connecticut, who swallowed a non-phosphate detergent, was due to asphyxiation, not related to the chemical formulation of the product involved. Unfortunately, four (4) to five (5) youngsters die each year in a similar fashion from swallowing talcum powder, an inert substance.....A careful monitoring of hospitals and dermatologists in Erie County by the FDA and Health Department has shown no increase in rashes, etc. since the phosphate ban was implemented. Similar observations have been made in other regions with phosphate bans, including Dade County, Florida and Chicago...

Bulletin #157a April 1973

The Rochester Prize:
Awarded for a Proposal on
THE INTRODUCTION OF THE WHITE AMUR INTO LAKE ONTARIO

George G. Berg

Summary

A proposal to introduce the white amur, a Malayan weed-eating fish, into Lake Ontario tied for first place in the competition

for the Rochester Prize. The $1000 prize was offered by the Rochester Committee for Scientific Information for ways of improving water quality at swimming beaches on the shores of Lake Ontario.

The white amur, a tasty fish which may grow to 11 pounds in weight before it is four years old, was the subject of the prize-winning article by Mr. William M. Bailey of the Arkansas Game and Fish Commission.

A View of the Amur

The species was brought to Arkansas in 1963 and has been under study there in hatcheries, ponds and lakes. A true vegetarian, it eats all the varieties of aquatic weeds that clutter the embayment of Lake Ontario. Young amurs show a special preference for the filamentous alga (Cladophora) which piles up in huge quantities on beaches. The amur does not root for food and so does not muddy the waters. Though misnamed the grass carp, it is not a carp. Its flesh is white and flaky, and it is an important source of food for many Asiatic countries. The risks of the fish spreading out of control are low, because amurs do not breed in lakes that are as cold as is Lake Ontario in the springtime, when they breed. Large numbers of amur fry would have to be bred at local fish hatcheries for the initial field tests. If the fish proves as beneficial as Mr. Bailey forecasts, the RCSI looks forward to further studies in New York State, aimed at using the hot water released from power plants along the lake to establish breeding grounds for the amur.

Ecological Perspective

The prize was awarded by a jury of scientists who knew that the NYS Department of Environmental Conservation had asked New Yorkers not to buy and release white amurs privately. Agreeing that a new species must not be introduced into lakes in an uncontrolled fashion, the jury nevertheless found merit in Mr. Bailey's suggestion that the amur deserved large scale field tests in the Lake Ontario watershed. The ecosystem of the lake has previously been degraded by fish and plant species introduced carelessly over the past 150 years. These include the Hudson River alewife, which became a nuisance after it displaced the indigenous Lake Ontario herring, and the marine lamprey which displaced the indigenous lake lamprey and helped to destroy the trout fishery. In contrast to these intruders the amur would not compete with resident species but would fit into an empty ecological niche. The introduction of a primary consumer of submerged vegetation into the lake would help to restore some balance to the aquatic ecosystem. The amur's diet would include both the native water plants and others that were introduced by white settlers, such as some species of pondweed, watermilfoil and naiad.

The jury also considered long-range plans for the rehabilitation and management of Lake Ontario. The prize was split between

Mr. Bailey and Dr. Verduin. Dr. Verduin's plans included a way of converting the growth of water plants from a nuisance to a beneficial resource in restricted parts of the lake. The white amurs, while keeping the growth under control, would provide the final link in a food chain from weeds in the water to a delicacy on the table.

Biographical Note

Mr. William Bailey, Arkansas Game and Fish Commission, Little Rock, Arkansas 72201, is hatchery manager for the Joe Hogan State Fish Hatchery which is the hatchery for the Arkansas Game and Fish Commission. Born in 1948, Mr. Bailey received his higher education from the School of the Ozarks at Point Lookout, Missouri. He is married and has two children.

Reference

William M. Bailey, "Arkansas' Evaluation of the Desirability of Introducing the White Amur (Ctenopharyngodon idella, Val.) for Control of Aquatic Weeds." This report was presented at the 102nd Annual Meeting of the American Fisheries Society, Hot Springs, Arkansas, 1972. Copies may be requested from the Secretary of RCSI.

Bulletin #157b April 1973

The Rochester Prize:
Awarded for a Proposal on
COORDINATED APPROACHES TO RESTORE LAKE ONTARIO

Herman S. Forest

Summary

Dr. Jacob Verduin addressed the problem of managing Lakes Erie and Ontario from a long range view. He proposed that existing sewage treatments should be supplemented with a system of nutrient control by vegetation, starting with algae and other water plants grown in lagoons, and ultimately growing game animals and crops for human use. This proposal tied for first place in the competition for the Rochester Prize, in which the jury was instructed to "favor methods that would increase species diversity in the lake, increase the consumption of algae, and lower the standing crop of Cladophora". Dr. Verduin emphasized the utilization of biological systems, both in reducing the inflow of nutrients and in utilizing the crops grown from the nutrients.

View of the Problem

"The problems encountered in Lake Ontario are identical with those of Lake Erie, although they are presently less severe because Lake Ontario is deeper and contains a larger volume of

water. The largest contributor to the increased phytoplankton and Cladophora growth in the Great Lakes is the spectacular rise in phosphorus fertilization during the past 25 years. Every tributary flowing into these lakes represents a concentrated source of such nutrient injection."

It may be noted that tributary streams, even the Genesee River, seem to contribute only a minor portion of the total input water, compared with the flow from Lake Erie. The abatement of pollution on Lake Erie, which has been the primary concern of Dr. Verduin, is certainly part of the environmental management needed for Lake Ontario. Nevertheless, it is important to note that tributaries cause local pollution; the Rochester metropolitan area chiefly damages the Rochester embayment.

Reducing Nutrient Input

"We must recycle the sewage effluents from the cities on all shores and tributaries either by spreading the effluent on soil of croplands, on open areas, or parklands or through a system of lagoons and lakes like those in operation near San Diego, California (the Santee Lakes). It is imperative that we begin immediately to establish such systems around the North American Great Lakes. If we also divert the storm runoff from the cities to a lagoon-lake system then this valuable fresh water resource will be conserved, instead of being regarded as a 'waste disposal problem'. The cost of such recycling of our urban sewage effluents and storm runoff is small in comparison to our highway construction program."

Harvest

"As for promoting consumption of algae, especially Cladophora, the best candidate I know is the black mallard duck. If we include in our lagoon-lake systems, near the Great Lakes, some well-planned black mallard nesting areas we may be able to harvest significant amounts of Cladophora by their grazing.

"The white amur might also be worthy of consideration. It is an herbivorous fish and is also reported to be acceptable to sports fishermen. The species is Ctenopharyngodon idella...Some fisheries biologists, however, predict that its competition with other game-fish would be detrimental." Note the attached RCSI bulletin #157a, announcing the co-winner of the Rochester Prize, William M. Bailey, who submitted a proposal on introducing the amur to Lake Ontario.

Ecological Perspective

A natural environment is "clean" because of mutually supporting interaction among many species of organisms. Man has disrupted the self-regulation, or cleaning of the Great Lakes and reduced species diversity:

a) by filling in the marshlands that served as a purifier of runoff from land;

b) by overloading the water at various points with materials that killed off some consumer species and overfertilized some producer species; and

c) by introducing new, harmful populations that killed off native species.

In designing new management practices, Dr. Verduin used the model of the bound energy pyramid for the natural system. At the base of the pyramid are the green plants which produce food for the system. Their amount would be reduced by limiting the nutrients (particularly the fertilizer phosphorus) available to the plants. Without the high unput, much of the nutrient supply will be removed permanently to bottom sediments and through water outlet. Nevertheless, the heavy crop of plants will remain a problem because the diverse organisms which consume them in a natural ecosystem are not present. Conspicuously lacking in Lake Ontario are large direct consumers of plants. The suggested strategy is to guide the runoff into a system of lagoons, or some other area of confined vegetation. These lagoons would hold nutrients back from the lake. The reduced vegetation, in turn, would be eaten by a native game species - a duck - and by an introduced fish - the amur.

Biographical Note

Dr. Jacob Verduin, Botany Department, Southern Illinois University, Carbondale, Illinois, is a professional limnologist noted for his contributions to the measurement of primary productivity (photosynthesis) in lakes, and for his contributions to the explanation of the degradation of Lake Erie. Much of this work was accomplished at Ohio State University and the Franz Theodore Stone Laboratory on Lake Erie. Dr. Verduin was born in 1913 and received his higher education at Iowa State University.

Reference

Jacob Verduin, "Man's influence on Lake Erie," Ohio Journal of Science, 69(2). 65-70, 1969.

Bulletin #166 December 1973

ENVIRONMENTAL EFFECTS OF DEICING SALTS: INTRODUCTORY BULLETIN

Lindsay K. Holmes

Summary

The use of deicing salts on American highways has increased from a half million tons per year in 1949 to 9 million tons in the

winter of 1969-70. At temperatures above -9°C (15°F) rock salt which is primarily sodium chloride (NaCl) is the most effective chemical deicer available in its price range. Calcium chloride ($CaCl_2$) increases the speed of melting at lower temperatures and it is sometimes mixed with the rock salt. In the winters of 1969-70 and 1970-71 Monroe County bought almost 2.5% of the total salt sold for deicing in the U.S. Our high use of salt results from a combination of local weather conditions and New York State's policy that bare pavement is to be maintained on State roads. A recent cost-benefit analysis which did not include environmental considerations concluded that there was an economic loss in Monroe County from salt use.

Deicing salt washes off roads in water and enters soil, plants, surface waters and ground water. This salt is known to damage and kill some plant life and to change the nature of soil. Accumulation of salt in Irondequoit Bay has changed the physical characteristics of the Bay. Spring mixing is inhibited and fall mixing is delayed, which favors accumulation of nutrients in the Bay. In Penfield, N.Y., the mean chloride level in wells has more than doubled since 1935. Salt accumulation in other communities has led occasionally to the closing of private and public water supplies, and it has created a health problem for patients on low salt diets. Salinity has also limited industrial uses of water and greatly increased the rusting of cars, causing economic damage.

This bulletin documents the consequences of adding large amounts of salt to the ecosystem. Later bulletins will explain salt use practices in Monroe County and weigh the advantages and disadvantages of salt for deicing as used here.

Table 1* Range and average chloride concentration (mg/liter;ppm) of small streams flowing directly into Irondequoit Bay.

Location or name of stream*	5 July 70 22 Nov 70	5 Dec 70 28 Mar 71	24 May 71 7 Aug 71
Southwest	261-364 305	281-1668 1250	307-585 409
Snider Island	95-324 272	491-2122 967	223-360 291
Densmore Creek	159-380 224	431-2502 1328	251-445 373
Northeast Storm Drain	153-507 268	478-46,000 8937	92-699 467
Helds Cove 1	89-258 189	281-13,300 2508	234-555 432

Location or name of stream*	5 July 70 22 Nov 70	5 Dec 70 28 Mar 71	24 May 71 7 Aug 71
Helds Cove 2	218-276 244	245-400 304	not sampled
Glen Edith	193-411 342	248-6796 1327	323-546 438
Penfield STP	144-266 203	141-261 207	171-201 185
Bucaneer Restaurant	108-216 160	164-227 192	121-185 156
Rochester Canoe Club	144-198 176	not sampled	160-243 182

*Adapted from Diment et al. Table 4, p. 30. For specific locations of sampling sites see their Figure 6, p. 28.

Raymond Keefe of the Monroe County DPW in 1972 provided the figure of 250-300 miles of arterial streets in Rochester. Mr. Fitch, assistant director of the County DPW in 1973 estimated a total of 640 miles of all types of roads in the city of Rochester. According to Mr. Vicaretta, of the city DPW, a total of 43,318 tons of deicing salt were used in the city in the winter of 1971-72. If we assume that the salt was evenly spread over all city roads, the tonnage per mile for that year was about 67 tons salt/road mile/year. This estimate may be very low. Mr. Keefe stated in a discussion with the 1972 Salt Task Force that the city does not salt residential streets, except for danger spots. If all of this salt were spread on the 250-300 miles of arterial streets in Rochester, the amounts would be close to 144 tons salt/arterial road mile/year. The actual salt usage must lie somewhere between these two extremes, between 67 and 144 tons/road mile/year.

References*

Diment, W.H., R.C. Bubeck, and B.L. Deck, "Some Effects of Deicing Salt on Irondequoit Bay and Its Drainage Basin", in Environmental Degradation by Deicing Chemicals and Effective Countermeasures. Highway Research Record No. 425, pp 23-35, 1973

*The Bulletin cited 25 references.

Note: This was the first of a series of bulletins with data on the amount of deicing salt used on Monroe County roads. This series probably constitutes the best controlled and most accurate empirical evidence available on the subject. HF (1981).

Bulletin #171 June 1974

THE USE OF DEICING SALT IN MONROE COUNTY

Lindsay T. Holmes

Summary

The amount of salt spread per lane mile on state highways by Monroe County towns in 1972-73 ranged from less than 14 to over 140 tons. State crews used about 35 tons per lane mile on routes through urban areas. In spite of a mild winter, approximately 163,000 tons of deicing salt were used in the County.

Road salting practices in Monroe County were studied through questions directed to highway officials of villages, towns, the City of Rochester, New York State Department of Transportation and New York State Thruway Authority.

This report compares the diverse guidelines for spreading salt used by different crews, and the varieties and usage of plowing and salting equipment. Only one town, Chili, was found to have modern, salt-saving equipment.

The present procedures are inconsistent, wasteful, and result in unnecessary damage to property and the landscape. Eleven changes to improve salt use patterns in the County are discussed as a model for a uniform policy for rational management of snow on the roads.

Table 3.

Density of saltfall on state roads in Monroe County, 1972-73, salted by different municipalities. This table makes no effort to evaluate driving hazards of any of these roads.

Road Name	Tons/lane mile in:
Ridge Road	City, by State - 33.6; Greece - 125; Irondequoit - 149.6
East Avenue	Brighton - 59.4; Pittsford - 48.4
Clover Street	Mendon - 50; Pittsford - 48.4; Brighton - 59.4
47 west of City	State - 33.6
47 east of City	Brighton - 59.4; Irondequoit - 149.6
Monroe Avenue (& Pittsford-Palmyra Rd.)	Brighton - 59.4; Pittsford - 48.4; Perinton - 146.9
Penfield Road	Brighton - 59.4; Penfield - 139.2

Road Name	Tons/lane mile in:
Lake Road	Sweden - 92.3; Clarkson - 48.8
Mosley Road - Fairport	Perinton - 146.9; Penfield - 139.2;
9 Mile Point Road - Webster Road	Webster - 45.5

Bulletin #182 April 1975

"OPENING" OF IRONDEQUOIT BAY WILL NOT HELP TO CLEAN THE BAY

Herman S. Forest

Summary

One argument in favor of dredging a boat channel between Irondequoit Bay and Lake Ontario has been, that the larger "opening" will help to flush polluted waters out of the Bay. This report summarizes the scientific evidence which shows that making the connection between the Bay and the Lake deeper and wider by itself will not benefit the Bay either in terms of water purity or ecology. The arguments for and against a boat channel will have to be resolved in terms of the advantages and disadvantages of a fleet of large recreational boats to users of the Bay. It cannot be resolved by, and should not be further confused by, mistaken arguments about the effects of opening the Bay on water purity.

This report assumes that the land around the Bay will be managed, since permitting the opening of the Bay to destroy its shores is an obvious ecological degradation, whether or not it affects water quality.

Background

The water quality of Irondequoit Bay should be markedly improved by the Pure Waters sewer construction program, which will channel the sewage from neighboring towns and the City of Rochester away from the Bay. At present, however, the Bay is polluted with sewage effluents from three sewage treatment plants that discharge directly into the Bay, ten that discharge into Irondequoit Creek, and numerous private septic tanks.

The Bay is also polluted by pesticides, herbicides, fertilizers and salt carried in from the Irondequoit Creek watershed, an area of roughly 153 square miles in eastern Monroe and small parts of Wayne and Ontario Counties. The salt pollution is so heavy that it has interfered with seasonal circulation of bottom waters. These pollutants must be managed at the source - by decreasing salting and controlling the amount and location of fertilizer and

pesticide used. We are making some progress toward control; at present however salt pollution is still heavy. All pollution has of course been damaging to fishing and recreation in the Bay.

It has been well understood for over 40 years that the proper way to clean up the Bay is at the source of the trouble. The distinguished Cornell botanist, Robert T. Clausen, shook a 1939 Conference on the Bay by telling them that "Sludge Bay" would be cleaned only by pollution abatement and controlled land use, and that miracles should not be expected: the Bay would improve only slowly and only to a limited extent. Dr. Clausen's summation has been confirmed again and again by later scientific studies of Irondequoit Bay, and Dr. Clausen himself verified his own early judgement as recently as 1973 (personal interview).

The mistaken idea that the Bay waters could be cleaned by dilution with Lake Ontario water was first suggested in 1939, by people who thought that the pollution had increased when the shore line was extended to build the Hojack Railroad line. It was heard as recently as 1972, at a public meeting organized by the Monroe County Environmental Management Council.

Many people would like to use the Bay in various possibly conflicting ways. An enlarged boat channel would allow the fleet of recreational boats on Lake Ontario to use Irondequoit Bay as an all-weather harbor and water skiing area. If tall boats are to enter, in addition to dredging, two traffic arteries - a railroad and a road - would have to be cut or raised over the channel on expensive bridges. Some favor removing the railroad altogether because it is little used and interferes with the beauty and recreational use of the shoreline; others feel that it is of prime importance to some area farmers and they should be given all aid possible to maintain viable farms. There are local residents and fishermen who may prefer that the Bay remain "closed" and quiet. The resolution of these conflicts should not be confused further by mistaken arguments about ecology.

Scientific Evidence for Negligible Ecological Impact

Irondequoit Bay is a virtually self-regulated lake. It is not a bay in the sense that its behavior is determined by a large adjoining body of water. It acts somewhat like a Finger Lake - a long, narrow lake with a stream flowing in at one end and an outlet at the other. The one environmental factor which Lake Ontario largely determines is the fish population, since this is the most mobile segment. The following facts support the view the enlargement of the opening would have negligible effects.

A) Ecological Comparison. Bays with much wider openings such as Braddock's and Sodus are also largely self-regulating, not merely arms of Lake Ontario.

B) Topography. The Bay is long and narrow. Even a complete removal of its sandspit and the artificially filled lands near its mouth would provide little exchange surface between the Bay and Lake Ontario.

C) Basin Profile. The Bay acts like an overflowing "bathtub". Much of the water is rather deep, but there is a broad, shallow lip near the mouth. Consequently, projects of the magnitude proposed would affect only surface waters and in order to dilute significant amounts of pollutants, deep waters must be exchanged. A channel 50 feet deep and 200 yards wide would have to be dredged, to provide for exchange between the deeper waters. No one would propose dredging so big a ditch.

D) Current and Head. Much of the time water will flow out of Irondequoit Bay, not in, so that the Bay water will not be diluted by lake Ontario water. The flow will be outward as long as water is flowing into the Bay from Irondequoit Creek and other sources, or when winds blow from the south. Only when winds blow from the north long enough to pile up water near the mouth, is the direction reversed. When the level (pressure or "head") inside becomes higher than outside because of the water added from both directions, it will flow out again. Furthermore, water does not mix uniformly in the Bay itself. Some water may flow rather directly from Irondequoit Creek down the middle of the Bay to the opening, while other water remains for a much longer time in the deep basins and side coves. Biological and chemical evidence shows, for example, that the water quality may simultaneously be lower in Ides Cove and higher in Held's Cove.

E) Oscillatory or "Sloshing" Exchange. Photographs by K.G. Harbison dramatically illustrate the fallacy of trying to dilute Irondequoit Bay. When water enters it builds up to a level equal to the Lake, then flows out again. In effect, the same water simply sloshes in and out near the opening. The effect would not be altered by enlarging the opening.

F) Pollution of Lake Ontario Water. A study of shore currents and limited collection of chemical data by W.E. Diment's associates (communicated by R.C. Bubeck) indicates that polluted Genesee River water is well represented in Lake Ontario at Irondequoit Bay. The trade would not be pure benefit for the Bay.

G) Limited Benefits. The water and the biological community in Lake Ontario near the present opening can be used to determine the maximum benefit which might derive from enlargement of the mouth of the Bay. The rooted aquatic plants ("weeds" to the layman) can be used to reveal the story of environmental quality to the trained observer. Murky water filters out light, so rooted aquatic plants cannot grow. The clearer the water, the deeper plants will grow. The plants near the opening are of the same variety and general growth pattern as those growing near the other end of the Bay, farthest from the Lake. They are typical of murky and fertilizer-rich water. However, the plants near the

lake do grow a little deeper (about 6 inches) than those at the far end of the Bay, indicating that the clarity of the water is a bit better.

How much of an improvement is this? Very little, because the plants at Held's Cove, the best portion of the Bay, also grow 6 inches deeper than those at the south end. Plants in the Bay grow to a depth of 5 feet, whereas the range in the Finger Lakes is from 12 to 24 feet, and Sodus Bay is clear enough to allow growth at 14 feet.

The extent of improvement that one could theoretically expect from "opening" the Bay is a slight increase in the clarity of the water. Therefore the biological evidence agrees with the chemical evidence presented in Part F, above.

Sources of Information About Irondequoit Bay

The most substantial field studies on the Bay and its watershed are those of T.T. Bannister, R.C. Bubeck, K.G. Harbison, and H.S. Forest and his associates. W.H. Diment and his associates at the University of Rochester contributed significant studies of the adjacent area of Lake Ontario. An adequate record of these investigations may be found in RCSI Bulletin #137 and the more recent report, Environmental Studies of Irondequoit Bay, Monroe County, New York (Forest et al., 1973).

A recent bibliographic study supported by New York State Sea Grant Program reviewed the files and bibliographies of most of the original studies (Gehris, 1975). This independent review also found no environmental value in enlarging the opening.

Note: This report is based not only on written sources but on conversations with R.C. Bubeck, T.T. Bannister, K.G. Harbison, and Graham Bonham-Carter. I am highly indebted to all of them for their generous and open contributions.

Bulletin #196 February 1976

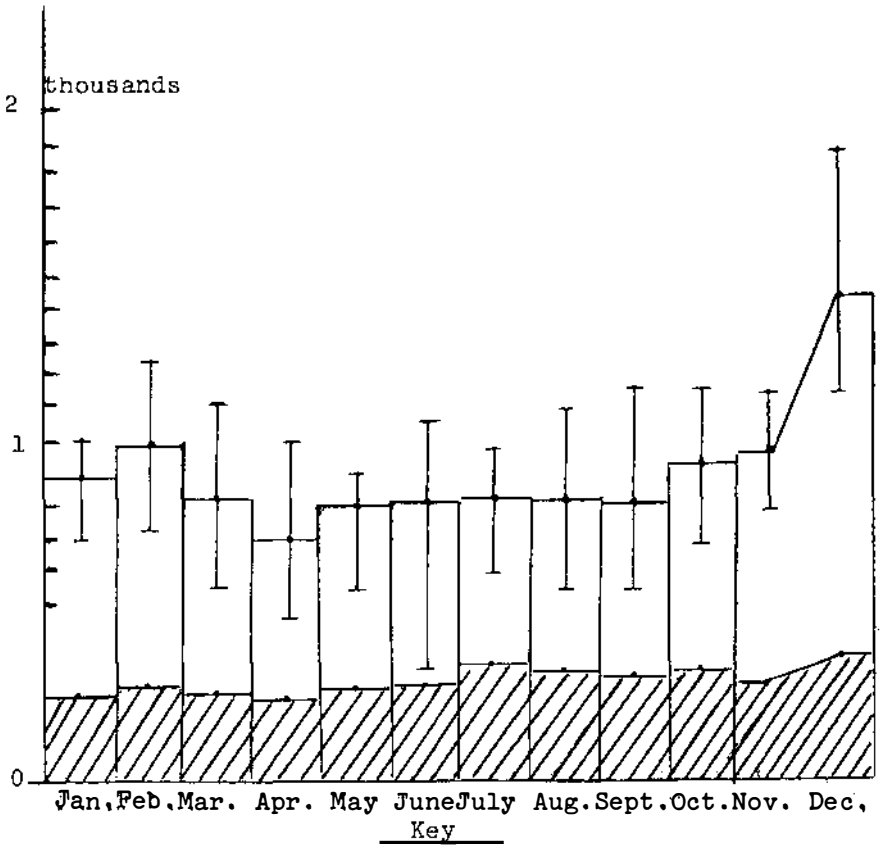
ACCIDENTS AND SALTING IN MONROE COUNTY

Lindsay K. Holmes

Summary

A study of accident reports, weather reports and records of salt use in all Monroe County Towns showed that the curb on the use of salt in Monroe County in 1974-75 did not result in a measurable increase in the total number of winter related accidents in the County.

Each year in five consecutive years the rate of accidents rose sharply in November and December, the first two snowy months,



Key

Six year average, total accidents for each month of the year, 1970-75.

Six year average, number of victims injured nonfatally for each month of the year, 1970=75.

Range of number of accidents for each month of the years, 1970-75.

Figure 1

Number of accidents and number of non-fatal injuries in Monroe County (outside the City of Rochester).

but there was no parallel increase in injuries or deaths, indicating that the rise in accidents caused by snow and ice consisted mostly of property damage collisions.

Comparisons by different towns which used salt at different rates failed to show any correlation between the curb on salt and rise in accidents.

There was a clear correlation between the winter accident rate and the severity of winter weather, with the lowest winter rise in accident rates found in the mild winter of 1972-73 and the highest in the harsh winter of 1970-71.

Note: This bulletin is included because the demonstration that waste of salt did not decrease accidents was responsible for action by authorities. Otherwise the subsequent reduction in salt use leading to improvement in water quality might not have occurred. HF (1981)

Bulletin #198 June 1976

IMPROVEMENT IN IRONDEQUOIT BAY FOLLOWING A DECREASE OF ROAD SALTING IN THE WATERSHED

Richard S. Burton*

Summary

Irondequoit Bay can now be added to the list of lakes that have started to recover from degradation due to pollution control measures.

Studies of Bay waters in the years 1969-1976 showed that the use of deicing salt in the watershed was so heavy that it interferred with the spring and fall overturns and was gradually turning the Bay into a body of dilute salt water. A voluntary reduction by towns from 76,000 tons in 1969-1970 to 43,000 tons by 1974-1975 reversed this trend. For the first time in at least 6 years the Bay overturned completely in the spring of 1975, and overturn occurred somewhat earlier in the fall of 1975. Complete spring mixing was also recorded in 1976.

Following a symposium on deicing salt co-sponsored by the Monroe County Department of Public Works, the Sierra Club and the Center for Environmental Information, the Monroe County Director of the Department of Public Works organized a committee to study the use of deicing salt. The Committee was not appointed by any county agency, but its members included representatives from four Towns (2 urban, 2 rural), the City, County Health, Public Works and Police Departments, State Department of Transportation, the Environmental Management Council and the Sierra Club. The Committee met throughout the summer of 1975 and drafted guidelines for

Table 3. Accidents and Use of Salt for Two Comparable Winter Seasons in Six Monroe County Towns.

Town	1971 - 1972 Total accidents in summer (Aug-Oct; May-July)	1971 - 1972 % increase in accidents in winter	1971 - 1972 Salt used (tons)	1974 - 1975 Total accidents in summer (Aug-Oct; May-July)	1974 - 1975 % increase in accidents in winter	1974 - 1975 Salt Used (tons)	% decrease in salt used
Henrietta	531	32%	10,115	609	13%	6,776	33%
Gates	492	25%	9,047*	558	27%	4,200	54%
Irondequoit	483	2%	21,272	595	8%	9,466	56%
Brighton	473	31%	11,875	673	18%	6,206	48%
Pittsford	338	2%	11,830	390	12%	5,741	51%
Webster	292	9%	7,668	299	5%	5,930	23%
Total for all Monroe County Towns	4,720	22%	136,366	5242	20%	78,026	43%

*Assumes as much salt was used on town roads that year as the following year.

salting in the winter of 1975-1976. They also organized a wide scale public relations program to publicize salt cut-back and encourage safe snow driving habits. Safety (number of accidents) correlates with the amount of snow, not the amount of salt used in Monroe County.

Overturn of a Lake

The opening of Irondequoit Bay into Lake Ontario is so small that the Bay behaves like a separate lake. Lakes of the shape and depth of Irondequoit Bay in this climate circulate vertically (thermally) twice a year. The bottom water mixes with the water on top. At other times of the year the lake is stratified. In the winter cold water is on top and warmer water is on the bottom. During the summer warmer water is above and cooler water below.

A number of factors influence overturn mixing. Among them...

> The difference between the salinity on top and on the bottom may determine the depth of mixing, as salt increases the density of water at all temperatures.

* Associate Chemist, Monroe County Health Department.

Overturn in Irondequoit Bay

The Bay is nutrient-rich. The bottom deposits are a sludge of organic matter that uses up oxygen so fast that water in the deeper zones is anaerobic much of the time.

Salt input into Irondequoit Bay increased rapidly from the mid-1950's through the 1960's. This resulted in a sharp increase in the chloride level that went unnoticed until it prevented complete mixing in the spring of 1970. The incomplete mixing can, therefore, be described as a measurable marker of a continually deteriorating condition. It is also the point at which the Bay can no longer function normally because of increased salinity. The rate of deterioration can be followed by the increase in the thickness of unmixed salt laden water remaining at the bottom after the spring mix. In Irondequoit Bay this layer increased in thickness from 5 feet in 1969-1970 to 11 feet in 1971-1972.

The County began to decrease its use of salt in the fall of 1972 with the largest percent decrease coming in 1974-1975. The decrease in salt level is reflected in the trend back to a normal mixing pattern in the Bay. The Bay still contains a great deal of salt; however, there is hope that with continued careful and minimal use of deicing salt and with sewage diversion, the load of salt in the Bay will continue to decrease. The salt level in the Bay is now such that it may or may not mix completely each year depending on how we treat it. Future good practice should stabilize the system in the proper direction, and insure normal annual mixing patterns.

Salt in the Irondequoit Bay Drainage Basin

In Table 1 the salt usage for 1969-1970 to 1972-1973 is taken from Diment et al. (1974). The next column records the salt usage for 1972-1973 to 1974-1975 from the County records for the seven Towns listed above. There was a 44% reduction in the amount of salt spread in the Irondequoit Bay Drainage Basin in 1974-1975 as compared to 1969-1970 (the year of the heaviest salt usage) and a 33% reduction as compared to 1972-1973. 1972-1973 was down 10% from 1971-1972 and 20% from 1969-1970.

Effects of Salt on the Bay

In 1974-1975, when the salt was decreased substantially, several favorable changes occurred. In the spring, the mixing was complete, allowing some of the bottom organic material to come to the top where aerobic bacteria could degrade it, and oxygen-rich warmer water to reach the bottom. By mid- to late spring, the organic deposits of decaying algae had once again depleted the oxygen on the bottom, but the anaerobic period was shorter, because by mid-November oxygen was brought to the bottom by the fall overturn, as shown in Table 2.

Table 1. Comparison of Salt in Watershed and Salt in Bay

Year	Estimated Salt Content of the Bay (Tons) November	March	Winter Saltfall in the Watershed (Tons) Diment et al.	County Data
1969-1970	8,500	18,300	76,600	
1970-71	9,300	18,000	73,500	
1971-72	12,500	19,800	68,900	
1972-73	12,000	14,800	64,000	65,400
1973-74				61,000
1974-75	9,300	12,600		43,000
1975-76	8,800	12,200		

Table 2. Overturn in Irondequoit Bay

Year	Depth in Meters of Water Unmixed After Spring Overturn	Bottom Temp. End of September °C	End of Spring Mix	Salt in Water Spring Overturn (Chloride mgm/L) 3meters/21meters		Salt in Water Fall Overturn	Month of Fall Mix	Temp at End of Fall Mix(°C)
1939-40	0	8	4/11-4/28				early Oct	12
1969-70	5	6.9	4/7-4/28	200	300	110	11/13	8-9
1970-71	8	5.6	4/13-4/15	200	380	170	11/25	7-8
1971-72	11	5.0		220	400	170	12/10	4-5
1972-73	3			180	270	160	12/1	4-5
1973-74	--	8.5		--	--	--	--	
1974-75	0	8.6	3/27[a]	--	--	123	11/25	6.9
1975-76	-		3/22[a]	158	318[b]	116	11/28	7.0

[a] mixing complete on or before this date

[b] at 22 meters

BULLETIN #199 September 1976

MIREX - A NEW PERSISTENT PESTICIDE IN LAKE ONTARIO*

Herman S. Forest

"What we must be concerned with is the chronic harm which may result from the total body burden of a multitude of these compounds, and the possibility that they may have a cumulative or synergistic (interacting) effect."

"While it is extremely unlikely that Mirex or other compounds are present in water to any significant degree, our study is being carried out to provide these communities with absolute assurance of the safety of their water supplies." Dr. Robert P. Whalen, New York State Commissioner of Health, in news release of September 14, 1976.

Summary

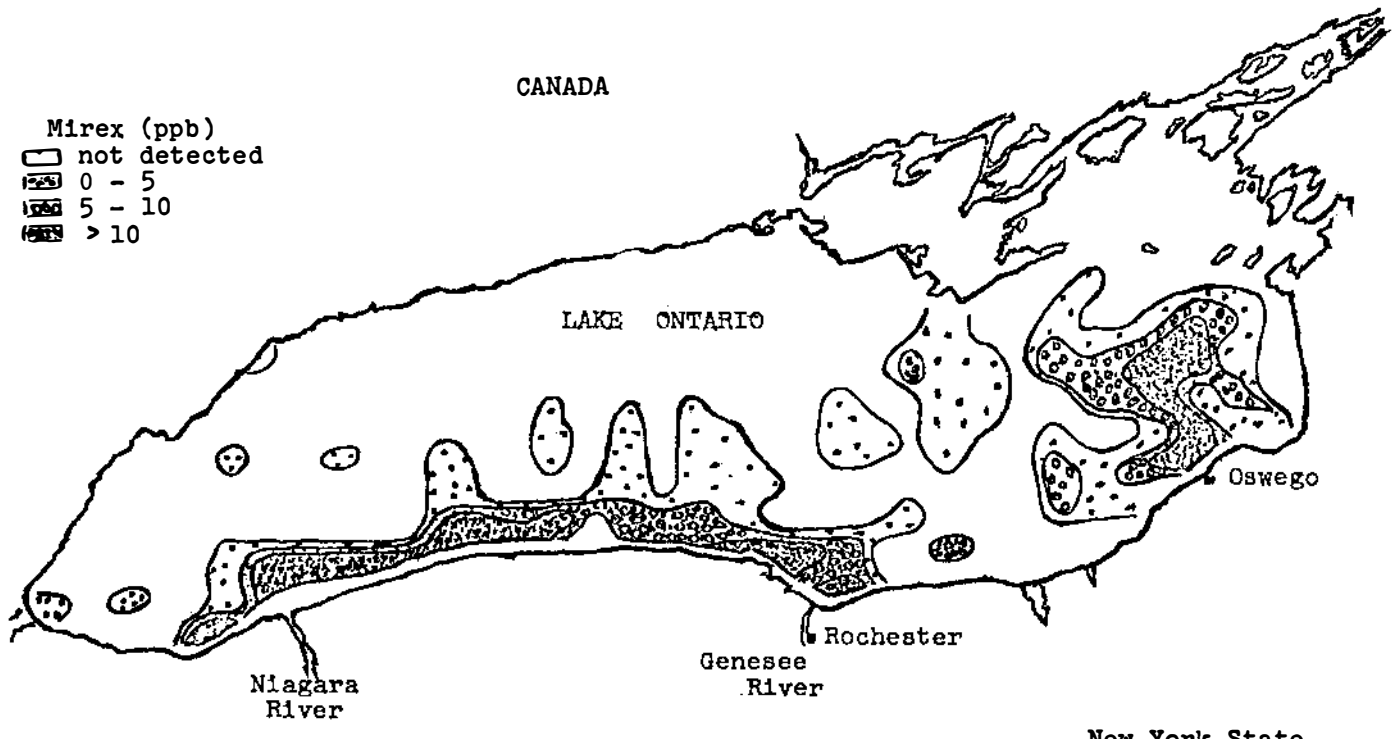
Unexpectedly high amounts of Mirex, a chlorinated hydrocarbon used as a pesticide and industrial chemical, have been found in Lake Ontario sediments, fish and herring gull eggs. Mirex was formerly manufactured by the Hooker Chemicals and Plastics Corp. of Niagara Falls under the trade name of Dechlorane. The plant, which discharged its wastes into the Niagara River, has been identified by State officials as one known source of the material in the lake sediments. However, the Mirex found at the eastern end of the lake may come from other sources, and the major discharges from the Hooker Corp. plant may have ended in 1968. That plant no longer manufactures Mirex at Niagara Falls but does buy it and grind it, and some is washed into the sewers. The material in the sewers gets into the lake because Niagara Falls does not yet have an adequate treatment plant.

On September 14, measures were announced by the New York State Commissioner of Environmental Conservation which approach the long-range aims of the permit system:

1. A computer analysis is being undertaken of all industries which discharge chlorinated hydrocarbons.

2. Requirements are imposed on the dischargers to identify the type as well as the amount of specific compounds by analysis of a 24-hour continuous sample.

In addition, Commissioner Berle of the DEC announced in a news release of September 14, 1976 that he asked 1,500 industrial dischargers in New York State to tell the DEC whether they have purchased or used chlorinated hydrocarbons in the past year. If they did, they must report the chemical identity and amount, so that the DEC may monitor their releases and if necessary adjust their discharge permits.


CANADA
Mirex (ppb)
not detected
0 - 5
5 - 10
> 10
LAKE ONTARIO
Oswego
Rochester
Genesee River
Niagara River
New York State

*RCSI thanks the Environmental Quality Research unit of the New York State Department of Environmental Conservation, Albany, and the Rochester Field Office of Region II, United States Environmental Protection Agency for their help in providing references, information and suggestions. Their aid was particularly appreciated at a time when there were few available sources, and access was difficult. As the Bulletin was being prepared, additional reports were released and public announcements began.

NOTE: The concentration adjacent to Oswego was subsequently traced to a single industrial disposal.

Because this Bulletin was virtually the only brief, and adequate writing on the subject in non-technical language, it was widely sought during the next few months; it was distributed by the State, among others. HF (1981)

Bulletin #207 June 1977

THE IMPORTANCE OF ROOTED AQUATIC PLANTS IN THE WESTERN FINGER LAKES REGION

Anne Kimber*

Summary

Rooted aquatic plants are important parts of the ecosystem in regional waters of western New York, and can be used as indicators of ecological damage. More importantly, they serve as critical stabilizers of the lakes and bays against increased fertilization due to man's activity. The record of collection of rooted aquatics from 1863 to 1976 for six lakes and two bays indicates that the lakes which started with more species changed less than those with a poorer community. Stability of the lakes is reflected in species diversity. All have a variety of species, some having lost more species than others. All remain relatively clear lakes, with heavy blooms of algae at times.

Phytoplankton reduces the clarity of the water. In extreme cases persistent phytoplankton shades out rooted aquatics. Reduction in clarity of water is a criterion of decline in water quality from the aesthetic viewpoint, and it is related rather directly to increase in available nutrients, particularly phosphorus, in the Finger Lakes region. Rooted aquatic plants require light and nutrient minerals, among other conditions. In any lake the given supply is shared with algae.

In this study, the rooted plant community was examined in relation to the supply of phosphorus entering from the watershed since phosphorus has been identified as the primary controllable nutrient fertilizer in these lakes. The general relationship is that a greater phosphorus input (from human activities) reduces the diversity of species of rooted plants. The best conserved

lakes have received the least phosphorus, and the most damaged community, Irondequoit Bay, received the most. Hemlock began with a limited community and was most altered of lakes in the middle range, where a typical lake has 11 to 15 submerged species. In typical lakes, a balance is maintained between rooted aquatic plants and phytoplankton algae. Algae have become dominant in Irondequoit and Hemlock, and rooted aquatics have been drastically reduced in amount and variety. Within the typical lakes, pollution abatement is likely to be most effective; preliminary evidence from Conesus Lake indicates the rooted plants promise a bonus effect from pollution abatement by dividing the reduced supply of nutrients between algae and rooted aquatics. Both algae and rooted aquatics are reduced in amount.

* This Bulletin was prepared under the Margaret Mead Undergraduate Internship awarded by the Scientists' Institute for Public Information and supervised for RCSI by Herman S. Forest, Principal Scientist, Environmental Resource Center at SUNY College at Geneseo, and Vice President for Scientific Activity, RCSI. Dr. Olga Berg and Dr. Thomas Bannister contributed valuable insight and criticism to the writing.

Note: Some of the data and conclusions which seemed correct at the time this bulletin was prepared have been modified since, but the fundamental idea stands as advanced: that the plants were not simply "weeds" but critical and informative elements in the lake ecosystem. The bulletin included brief but incisive assessments of the condition of the six lakes and two bays. HF (1981)

Bulletin #214 January 1978

EFFECT OF ROAD SALT ON GROUND WATER QUALITY IN PENFIELD, NEW YORK

R. Laurence Davis*

Summary and Conclusions

The Town of Penfield, New York was used as a test area for the effects of road salt on ground water. This study found a deleterious change in the quality of ground water since 1934, the first year for which water quality data are available. This change is an increase in chloride ion concentration - the water has become salty. Based on the data collected for this study, the following conclusions were reached.

* Department of Earth Sciences, Salem State College, Salem, Massachusetts Work on this report was generously supported by a grant from the Gleason Foundation.

1. The effect of increased chloride ion concentration is worst in areas that are highly developed or that have roads adjacent to them.

2. In rural areas, with the exception of areas with adjacent roads, the changes in chloride ion concentration have been negligible.

3. Average chloride levels for groundwater in urban watersheds were 650% higher than those for rural watersheds in winter. Average chloride levels in urban wells and wells less than 60 feet from the nearest road were 390% higher than those of rural wells farther than 60 feet from the nearest road. The highest chloride ion concentration was 4,240 mg of chloride per liter of water. It was measured in a well that had a chloride ion concentration of 18 mg per liter in 1934.

4. Much of the ground water in Penfield is now unpalatable and much is too salty for use as drinking water or for agricultural uses.

5. Most residents of the urbanized portion of the Town of Penfield, N.Y., get water from the Monroe County Water Authority or from the Town of Webster. They are not dependent on water from individual wells.

6. The rise of chloride ion concentration is almost certainly the result of high use of deicing salt.

7. In urbanized areas, the effects of deicing salt are not confined to areas near roads, but are much more pervasive, with water quality changes occurring over a wide area. These changes may be cumulative. Overall concentrations of chloride ion in the ground water may be increasing with time as deicing continues.

Table 1. Average Chloride Ion Concentration in Urban, Partially Urban and Rural Wells in 1935 and 1974. Penfield, New York.

Year	Urban Wells (7 used)	Partially Urban Wells (1 used)	Rural Wells (19 used)
1935	27.14 mg/l	57.00 mg/l	50.21 mg/l
1974	387.71 mg/l	121.00 mg/l	201.89 mg/l

Table 3. Average Chloride Ion Concentration in Urban, Rural and Close to Road Wells by Season, Penfield, New York.

Season	Urban Wells	Rural Wells	Wells within 60 ft of road
Spring	221.37 mg/l	119.60 mg/l	330.32 mg/l
Summer	356.39	191.45	530.18
Autumn	292.19	183.81	470.72
Winter	240.16	152.26	373.71

Chloride concentration peaks in the summer, rather than the winter. Lowest chloride ion concentrations coincide with highest ground water levels in the wells (in the spring) and the highest concentrations coincide with lowest water levels (in the late summer and early autumn).

Bulletin #234 December 1979

LESS DEICING SALT: A POLICY THAT IS PAYING OFF SOME IMPROVEMENT IN WELL WATER IN EASTERN PENFIELD*

E. Grant Pike, Olga Berg and Cynthia Pike**

Summary

The trend toward increased saltiness (measured as chloride) in the underground water in Penfield has stopped and in eastern Penfield a downward trend has started. Between 1935 and 1974 the salt concentration in many wells rose from low to very high levels. In 1974 Penfield made a major reduction in the amount of salt that it used to keep roads passable in winter and the underground water has started to benefit from the change.

The reduction in the amount of deicing salt spread on the roads was greater in eastern (rural) than in western (urbanized) Penfield. Although water stopped deteriorating in both sections, it has not improved in the west. The policy of decreasing salt use in a few places while continuing to salt others heavily did not benefit the wells. Alternately, when salt use was cut widely throughout an area, even wells near heavily salted roads benefited.

* This study was initiated by RCSI, but it would never have been completed without help from the Penfield Conservation Board and Delta Laboratory. Four members of the Conservation Board contacted well owners, made arrangements and collected water samples every two weeks from May through September. The water was analyzed by Delta Labs.

** The authors thank Laurence Davis for generously sharing raw data from his 1974 surveys with us, so that we could make comparisons.

The rise in salt concentration in the wells in the 38 years between 1935 and 1974 was sharp. The decrease between 1974 and 1979 while statistically significant was smaller. The water in many wells is still salty to taste. There is a long way to go before all the underground water in Penfield meets the standard and the water would benefit from further reductions in salt use.

Background

Salt in the well water in Penfield was last measured in 1974. At that time the average chloride level in urban wells and in wells less than 60 feet from the road was 400% higher than in rural wells and often far above the allowable standard. The increase was ascribed to the use of deicing salt to clear snow and ice from the roads in winter.

In 1974 Penfield changed the way in which it applied deicing salt to roads. Before 1974 all roads were salted. After 1974 less travelled roads and roads in developments were salted only at corners and hills. The precise amount of salt used varied with the severity of the winter but the changes in salting policy made a considerable difference. An average of approximately 7,000 tons of deicing salt per year was used between 1971 and 1974. That figure went down to 4,300 tons between 1974 and 1977. 4,265 tons of deicing salt were spread in the winter of 1978-1979.

In 1979 Chloride levels in the wells in Penfield were measured once again to see if the 39% average reduction in deicing salt use allowed the salinity of the underground water to decrease. The answer, reported here, is yes in eastern Penfield, no in western Penfield.

Improvement in Wells in Eastern Penfield, 1974 to 1979

The underground water in the easternmost part of Penfield has started to improve (Figure 2). Eleven wells were tested and the water was significantly less salty in seven and appeared much less salty in an eighth.* The water in the other three wells was unchanged or significantly higher in chloride. The information we have about these eleven wells is summarized in the Appendix. Interestingly enough, where the watershed as a whole is improving, as in eastern Penfield, even the water in a well next to a heavily salted road improved. This may be because it is receiving salt only from the road and no longer from areas further away.

* The water in the eighth well showed consistent improvement in 1979, but was so variable in the three samples available for 1974, that the improvement was not significant statistically.

The wells that have not improved are concentrated between Kennedy Drive and Sweets Corners east of Gloria Drive. There is a landfill in this area which may be related to the problem and may not. For example, there is a single reading from 1934 (2) which suggests that the well north of the landfill had a higher concentration of salt 45 years ago than it does today. There is also one road in the area that is still salted and one well in which the chloride has not dropped is right next to it.

No Improvement in the Watersheds in Western Penfield

The water in the urbanized western 3/4 of Penfield is still heavily salinated (Figure 2). Discontinuing the use of deicing salt on a few streches of road and in between corners in housing developments while continuing 100% salting on most roads has not decreased the chloride pollution in the wells. Fifteen wells were tested and only two showed improvement. Both of the healthier wells are near heavily salted roads and the water flows from the road toward the well. We do not know why these two wells showed a significant decrease in chloride. The chloride level in the remaining 13 wells was unchanged.

Wells With Extraordinarily High Amounts of Chloride

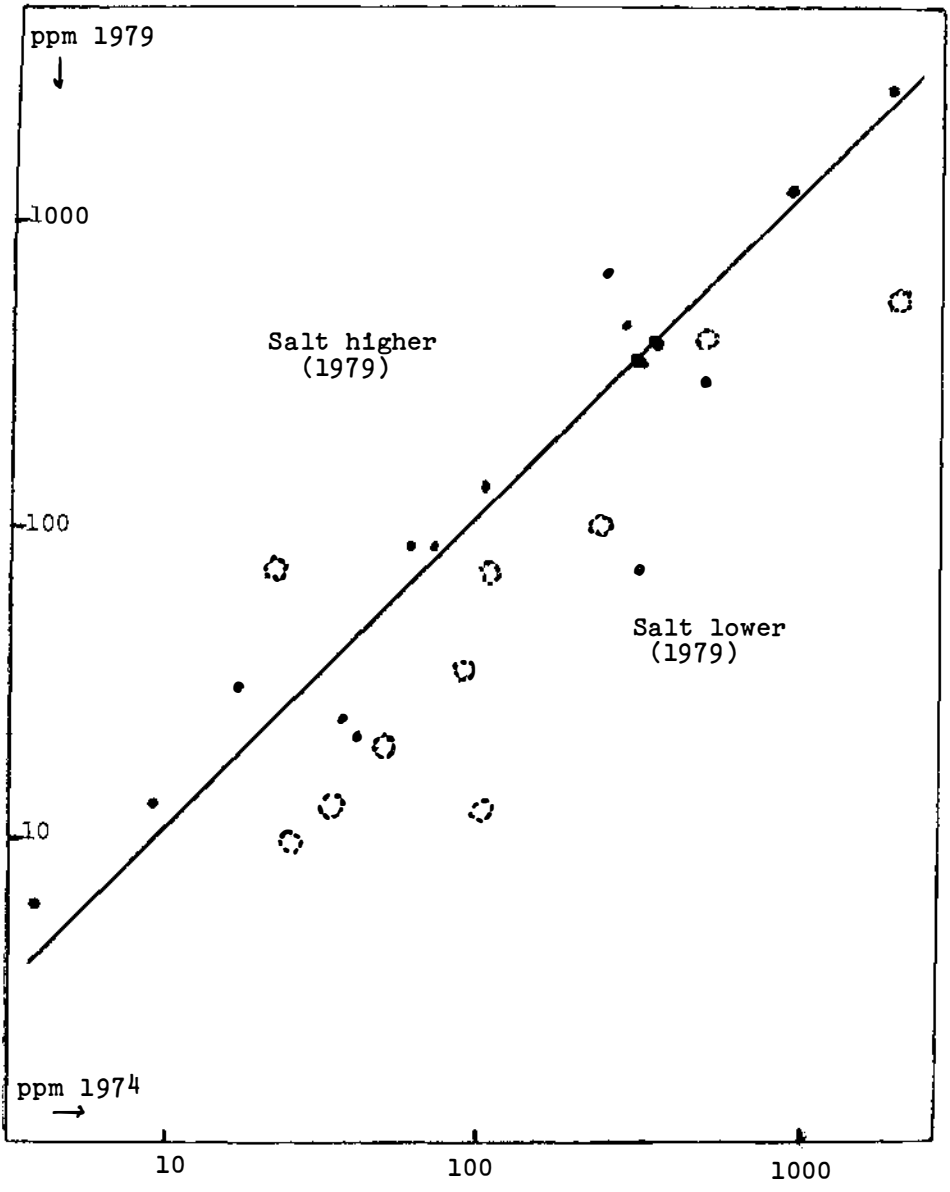
The most dramatic drop in salinity was in a grossly polluted well only 22 feet from a road that used to be salted and is no longer. It is in eastern Penfield. Chloride concentration dropped by 1827 ppm. By contrast, there were two other wells with extremely high concentrations of salt in 1974, both in western Penfield, less than 20 feet from a major road where both roads are still salted. The chloride concentration in those two wells was just as high in 1974 as in 1979: (extracted from Table 1, Appendix)

Chloride Concentration in Heavily Polluted Wells Near Roads

Well No.	1934	1974	1979	Road Salted in 1979
524	--	2394 ppm	568 ppm	no
594	41 ppm*	2228 ppm	2659 ppm	yes
2073	--	1105 ppm	1248 ppm	yes

*Single measurement, December 1934

It seems that extremely high concentrations of salt are not maintained in these Penfield wells unless nearby roads are salted each winter. Or stated the other way, extremely high concentrations of chloride will fall quickly if salting is discontinued locally. However, they will fall only part way. Even the well with dramatic improvement is still heavily polluted. Its salt content was only 41 ppm in 1934; it is now over 500.



Chloride Concentration in 26 Penfield Wells

Concentration values on or near the line are essentially unchanged in five years. Those below the line have decreased; above have increased. The open circles indicate that the change was statistically significant.

Note To Members, July 1979

WILL OPENING IRONDEQUOIT BAY HARM THE SHORES? ENVIRONMENTAL ANALYSIS IS NEEDED

Lawrence Lundgren*

Summary

There are two significant physical problems that may be caused by the opening of Irondequoit Bay and the use of the Bay by more than 1000 additional "medium-size" boats. These problems are: 1) The effects on stability of steep slopes caused by boat wakes, by the development of access roads to new marinas, and by construction on or above the marina areas; and 2) Dredging associated with marina development.

* Professor of Geology, University of Rochester; teaches course on "Geology and Public Policy."

Bulletin #228 May 1979

RESTORING IRONDEQUOIT BAY A PILOT STUDY ON THE TREATMENT OF BOTTOM MUDS IS NEEDED

Richard S. Burton*

Summary

Irondequoit Bay is on its way to recovery. It is now roughly a year since the sewage effluent that used to go into the creeks has been diverted to the Van Lare Sewage Treatment Plant. The improvement in water quality has been dramatic in the creek system, and is expected to be noticeable in the Bay soon.

While the diversion of municipal effluents and combined sewer overflows from the basin will undoubtedly improve bay water quality, the Bay is not expected to recover completely without further help in part because the bottom has a large anaerobic area.

When the water on the bottom of the Bay is airless, the phosphorus in the mud may be recirculated to the top, and once there it acts as a fertilizer.

The Bay may in effect be refertilizing itself.

Theoretically, the material on the bottom can be controlled by dredging, by blanketing the bottom so phosphorus cannot get out, or by aeration...

Improvement of Water Quality in Irondequoit Creek

Sewage diversion from 10 of 14 small treatment plants on the Creek in 1978 dropped phosphorus input by 80% in the summer time;

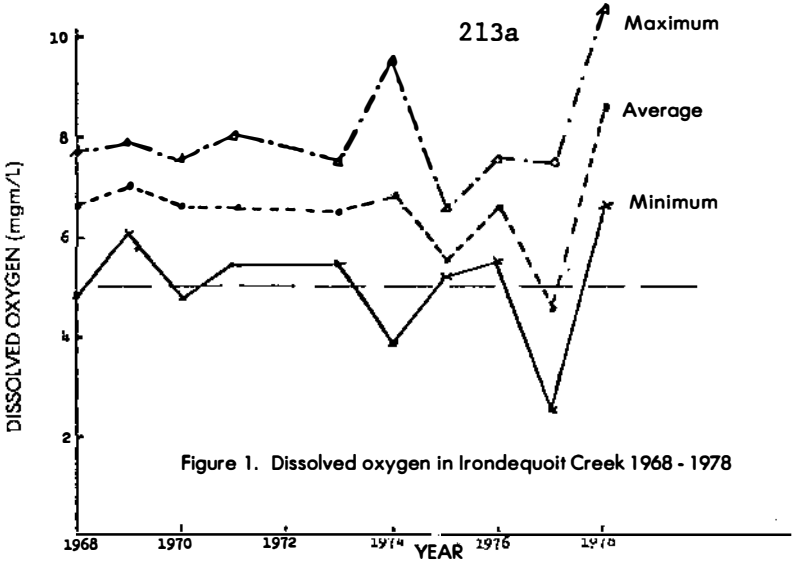
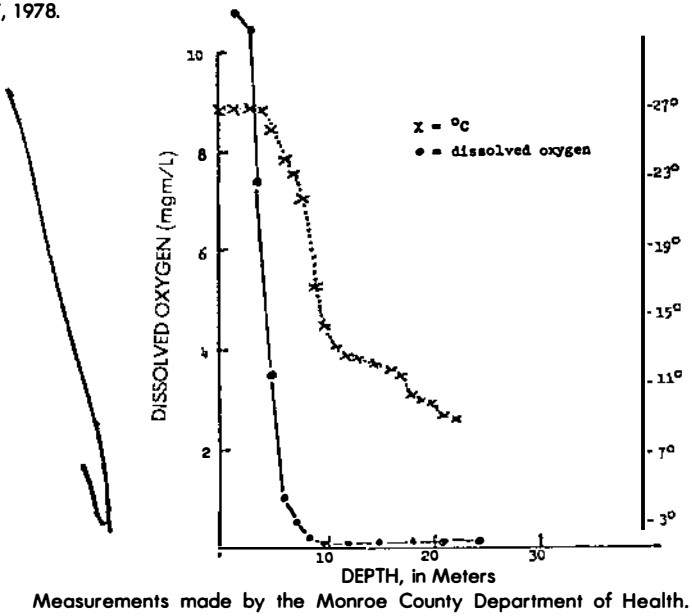


Figure 1. Dissolved oxygen in Irondequoit Creek 1968 - 1978

Measurements were taken near Linden Avenue by the Monroe County Department of Health. Most of the sewage treatment plants on the creek were closed during 1978. The high measurement for 1978 reflects the improvement in the waterafter less than one year of reduced nutrient input.

Figure 2. Dissolved oxygen in the water of the deep basin of Irondequoit Bay on Aug. 17, 1978.



Measurements made by the Monroe County Department of Health. Surface water is rich in dissolved oxygen but it decreases rapidly in the deeper waters. Most of it is gone below 6 meters, and below 10 meters the water was anserobic. The temperature is, of course, lower in the deeper water. No fish requiring cool water could have survived in the bay last August.

it also lowered organic loading. There was rapid improvement in the creek water. Figure 1 shows that 6 months after sewage diversion, dissolved oxygen in the creek at Linden Avenue is higher than it has been since 1968. Dissolved oxygen averaged 4.5 mg/liter in 1977; it was up to 8.5 mg/l in 1978, a truly dramatic difference.

The Problem

Irondequoit Bay is a highly fertile lake which has received heavy loadings of nutrients for many years. The result has been intense production of algae leading first to a loss of water clarity and then to a depletion of oxygen in the deeper waters (Figure 2). The oxygen problem resulted in huge accumulations of dead algae which have sunk to the bottom and are in the process of decomposition. The amount of organic material is considerable, with several feet of sludge-like mud on the bottom of most sections of the Bay.

The reduction in external inputs of nutrients has already reduced the algae crop and is expected to reduce it further and improve water clarity, but unfortunately the process of decomposition of the bottom muds is expected to keep the deeper waters devoid of oxygen for decades.

* The author is Associate Chemist, Environmental Health Lab., Monroe County Department of Health.

BULLETIN #236 December 1979

SAFE DRINKING WATER FOR ROCHESTER: CRITICAL DECISIONS FOR HEMLOCK LAKE

Herman S. Forest

Summary

Hemlock Lake has been a major municipal water supply source throughout the Twentieth Century. In recent years its quality has on occasion failed to meet federal standards, and the City of Rochester is required to undertake corrective action. The seriousness of the hazard may be questioned, but it appears certain that there will be a full effort to meet federal standards by filtering the water. This Bulletin provides an historical and ecological background for understanding the violated standard and the problem of altering water quality.

If the City considers only the building of a filtration plant as a solution to the problem, the cost may double the consumer's bill. A broader view would consider alternates. Four solutions are identified, which singly or together may lead to a cleaner and

healthier lake and meet the standards at much lower cost. The suggestions are:

1. Move the intake;

2. Build correctly placed settling basins on the main tributary and possibly other drainage channels;

3. Introduce a "therapeutic dose" of carniverous fish;

4. Replant the lake with a variety of rooted aquatic species.

While each of these is a valid idea, what is really needed is a water quality management plan for the lake and its watershed based on an understanding of the entire system.

Bulletin #251 March 1981

CONTINUED IMPROVEMENT IN IRONDEQUOIT CREEK: CLEAN ENOUGH?

Richard Burton and Olga Berg

Summary

Irondequoit Creek is getting cleaner and cleaner. Data gathered by the Monroe County Department of Health during the first year after most of the sewage treatment plants on the Creek were closed show a sharp drop in phosphorus. Closing of the final plants in January 1980 resulted in a still further drop. In the first half of 1980 there were many times when phosphorus was barely measurable, requiring adoption of more sensitive procedures, but phosphorus rose after storms - coming in from drainage ditches and runoff.

The monthly average in April 1980 was .006 milligrams of (filterable) phosphorus in each liter of water; in June it was .0295 mg/l. A stream with clear water has enough phosphorus to support plants for food and shelter and not so much that algae will become a nuisance. For Lake Ontario a realistic aim is .01 mg of total phosphorus per liter of water.* For the upper lakes we hope to do better, and they will be somewhat clearer. Irondequoit Creek is close to .01 mg/l and can reach it with some control of non-point sources.

*About 35-40% of total phosphorus is immediately available to plants.

Background

In 1965 there were 11 sewage treatment plants emptying into Irondequoit Creek and its tributaries. They had a combined outflow of 11 million gallons a day. Most of these plants were closed early in 1978 when the Cross-Irondequoit Tunnel was opened. The remaining plants closed between September 1979 and January 1980.

Conditions in the Creek improved dramatically. Dissolved oxygen rose from 4.5 mg/l in 1977 to 8.5 mg/l in 1978. In one year the Creek went from a body of water that had trouble supporting a sport fish to one which supports salmon. But Irondequoit Creek is still subject to abuse from "non-point" sources: storm sewers, septic tanks, farm runoff, surface drainage runoff, etc. Since it is possible to correct some or all of these problems at a cost, the question becomes: is it necessary, both for the stream and for the Bay into which it empties? Extensive measurements are being made under the National Urban Runoff Program, to decide.

There are, of course, all kinds of ways of gauging stream improvement, and all must be used together to understand what is happening. Some of the measurements used by the Health Department are listed in Table 1 (Appendix). For this Bulletin we have chosen to report on changes in phosphorus contamination between 1974 and 1980 because the Great Lakes International Joint Commission has tagged phosphorus as in immediate need of control in Lake Ontario.

How Do We Know If There Is Too Much Phosphorus?

Plants absorb water and nutrients dissolved in it; the form of phosphorus most available to them is soluble. In a low phosphorus (scant food) ecosystem there is restricted plant growth. A rapid rise in soluble phosphorus generally means an input by man and it is therefore a good measure of pollution.

The Monroe County Health Department measures phosphorus in two ways:

1. Total phosphorus: A combination of phosphorus which is dissolved in water, phosphorus which is inorganic and insoluble and phosphorus which is bound by plants and animals (organic).

2. Filterable phosphorus: Phosphorus which is dissolved in water of course comes through a filter; so do very fine particles.* Actually the Health Department measures filterable ortho (dissolved, reactive) phosphorus which is a further restriction. Most of the soluble phosphorus is in ortho form today; it was not true years ago when polyphosphate was put into detergents.

Good as things looked in 1979 (Figure 1), it can be seen in Figure 2 that in 1980 they were still better. In April the sol-

uble phosphorus was so low that it couldn't be measured by standard techniques on 13 days. The carat marks show the highest measurement in each month.

The second graph in Figure 2 measures the millions of cubic feet of water flowing past the monitor each day. Stream flow goes up when the snow melts, and during storms. During a rainy month water comes into the Creek directly from the rain, from storm overflow sewers, from drainage ditches and with soil that is washed away. Stream discharge rises with or after a storm. In 1979 the difference betweeen March and July was great; in 1980 it was not. If the runoff is relatively free of phosphorus there will be an increase in flow and a decrease in phosphorus per liter. If the runoff is phosphorus loaded the concentration of phosphorus will go up during storms.

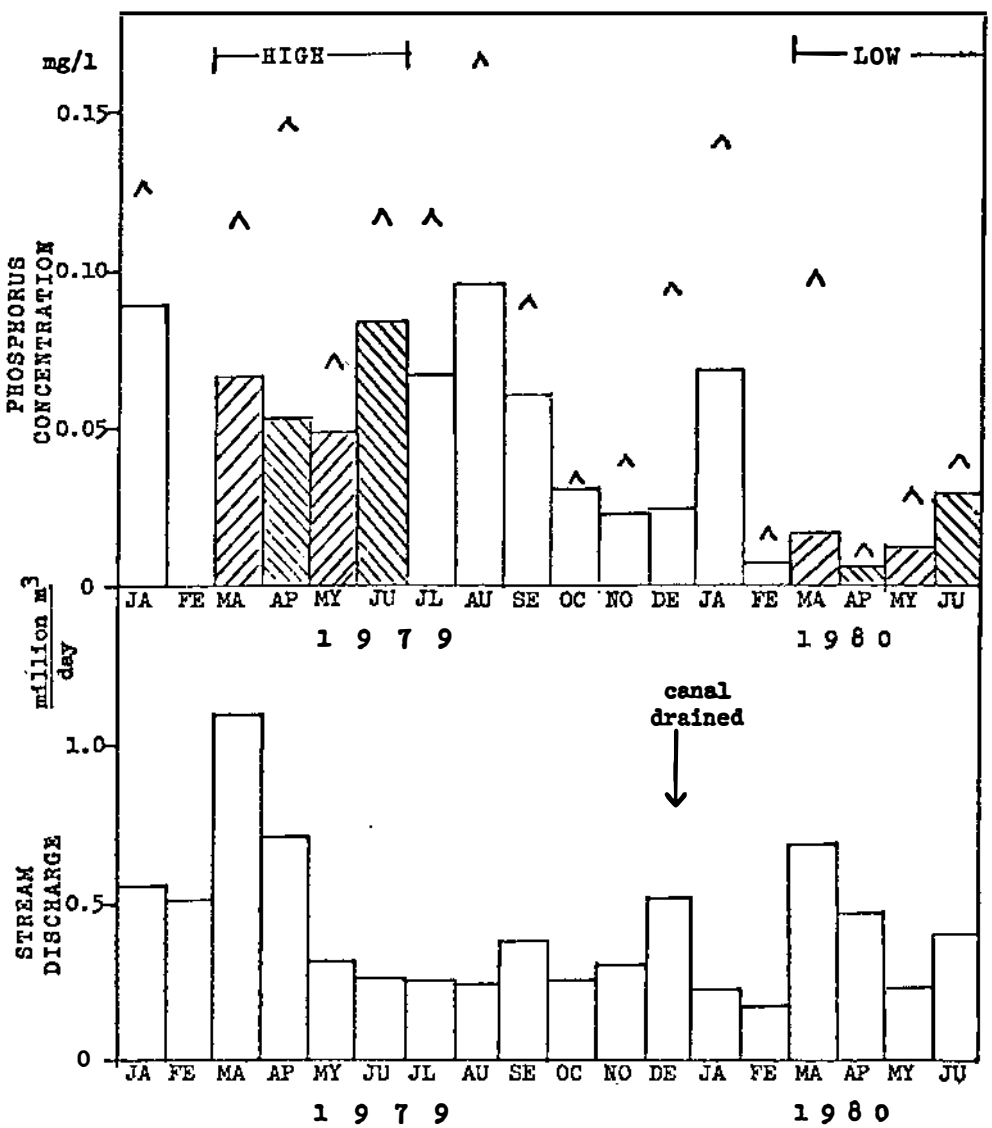
TABLE 1

	6/20/77	6/21/79
temperature, °C	19.0	18.2
dissolved oxygen, mg/l	6.6	8.4
dissolved oxygen, % saturation	70	88
BOD, mg/l	8.0	1.8
pH	7.5	8.1
conductance, μmhos/cm	1000	1059
alkalinity, mg $CaCO_3$/l	184	201
hardness as $CaCO_3$	366	403
chloride mg/l	121	106
nitrate, filtrable	2.4	0.95
phosphate (as P) total mg/l	0.72	0.194
phosphate, ortho-filtrable	0.55	0.09
fecal coliforms/100 ml	2900	410

Table 1. Sample measurements made two years apart. Oxygen in the water is up: organic pollutants measured as BOD (biological oxygen demand) are down. Both nitrate and phosphate have improved markedly. In 1977 fecal coliform bacteria came into the stream from sewage treatment plants. In 1979 they came presumably from septic tanks and animal wastes.

*0.45 micron filters are used.

Figure 2. Soluble phosphorous levels in Irondequoit Creek January 1979 - June 1980. The lined bars are comparable months.



In Continuation...

George G. Berg

By 1981 environmental degradation in Monroe County has been halted and some improvement can be seen. Current RCSI Bulletins are beginning to address rehabilitation. Once again our Bulletins are introducing new ideas to the public and challenging old ways. Bulletins numbers 248 and 249 discuss the controversy between expending total effort on extensive stocking of sports fish and spending some of that effort on rehabilitating streams for salmon and trout breeding grounds. Bulletins number 228 and 250 expose a controversy over measures to lock up pollutants on the bottom muds of Ides Cove as a model for a major project in Irondequoit Bay.

In another area, RCSI has brought the newly developing concepts of Risk Assessment before the public in everyday language, applying them to choices of fuel sources and other critical decisions. This newest phase of the work of RCSI is beyond the scope of this publication.

PART III

01 - Note to Members; October 1964 (the many subsequent
02 - Note to Members; November 1964 notes were not numbered
03 - Note to Members; January 1965 and will not be included
04 - Note to Members; March 1965 in this master list)
05 - Note to Members; March 1965

1 -	Report on Water Pollution. T.A. Fink, G.G. Berg	October 1964
2 -	Second Report on Water Pollution. G.G. Berg, T.A. Fink	November 1964
3 -	Third Report on Water Pollution. G.G. Berg	May 1965
4 -	Hearing on Irondequoit Creek. G.G. Berg	May 1965
5 -	Report of the Subcommittee on Water Pollution I. T.T. Bannister, J.R. Christensen	August 1965
6 -	Report of the Subcommittee on Water Pollution II. Note to Members	October 1965
7 -	Pollution of Waters of the Lower Genesee River. D.J. Wilson, N.G. Dukleberg	December 1965
8 -	Report on Honeoye Creek. T.T. Bannister, J.R. Christensen, D.J. Wilson	January 1966
9 -	Float Tests and Grease Ball Deposits on Lake Ontario Beaches. D.J. Wilson, N.G. Dunkleberg	May 1966
10 -	Sewage Pollution of the lower Genesee River and Lake Ontario. D.J. Wilson, J.R. Christensen	May 1966
11 -	Sewage Pollution of the Beaches of the Lake Ontario. D.J. Wilson, N.G. Dunkleberg	June 1966
12 -	Water Pollution in Monroe County. D.J. Wilson	July 1966
13 -	Coliform Counts on Lake Beaches, the Genesee River and Oatka Creek. D.J. Wilson	July 1966
14 -	Statement to be Presented by Thomas A. Fink, Chairman. T.A. Fink	July 1966
15 -	How Not to Lie With Statistics. D.J. Wilson, G.G. Berg	July 1966
16 -	Coliform Counts on Lake Ontario Beaches, June 1966. J.R. Christensen	July 1966
17 -	Coliform Counts on Slater Creek and Greece's Latta Road Sewage Treatment Plant. D.J. Wilson	August 1966
18 -	Legal Aspects of Water Pollution. T.A. Fink	October 1966
19 -	Scottsville Revisited - Sewage Pollution of Oatka Creek. D.J. Wilson	November 1966
20 -	Sewage Bootlegging Onto the Shore of Lake Ontario. J.R. Christensen	December 1966
21 -	Sewage Pollution of Area Streams. D.J. Wilson, J.R. Christensen	December 1966
22 -	Sewage Pollution of Oatka Creek and Lower Irondequoit. Creek, D.J. Wilson, J.R. Christensen	January 1967
23 -	Sewage Pollution of Northrop and Slater Creeks, The Lower Genesee, and Lake Ontario. D.J. Wilson	February 1967
24 -	Town of Irondequoit: Improvements in Sewage Treatment Facilities. J.R. Christensen	March 1967
25 -	Sewage Pollution of Densmore and Thompson Creeks - A Follow-up Report. G.G. Berg, D.J. Wilson	May 1967

26 - Pollution of Densmore Creek. D.J. Wilson — May 1967
27 - Rust Inhibitor and Water Pollution. H.S. Forest, D.J. Wilson, G.G. Berg — May 1967
28 - Sewage Phosphates and Algae in Lake Ontario I. J.R. Christensen, N.G. Dunkleberg, H.S. Forest, D.J. Wilson — June 1967
29 - Sewage Phosphates and Algae in Lake Ontario II. Report of the Lake Erie Enforcement Conference Technical Committee. D.J. Wilson — June 1967
30 - Improved Condition of the Irondequoit Creek Watershed. D.J. Wilson — June 1967
31- Control of Bacterial Pollution of Slater and Round Pond Creeks. D.J. Wilson — June 1967
32 - Coliforms on Area Beaches, Spring 1967. J.R. Christensen, N.G. Dunkelberg, R. Stewart, D.J. Wilson — June 1967
33 - Continued Pollution of Thompson Creek, Densmore Creek and Slater Creek with Undisinfected Sewage. R. Stewart, D.J. Wilson — July 1967
34 - Dissolved Oxygen in Monroe County Waters. Lower Irondequoit Creek. D.J. Wilson — July 1967
35 - Dissolved Oxygen in Monroe County Waters. The Lower Genesee. D.J. Wilson, G.G. Berg — July 1967
36 - Sewage Pollution of Irondequoit Creek in East Rochester. D.J. Wilson — July 1967
37 - Good Condition of Honeoye Creek. D.J. Wilson — September 1967
38 - Pollution of Irondequoit Bay with Diesel Fuel or Fuel Oil. T.T. Bannister, D. Martin, D.J. Wilson — September 1967
39 - Water Pollution in the Town of Victor. R. Stewart, D.J. Wilson — October 1967
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221 - Making It Pay to Use Less Salt: Monroe County, 1978 September 1978
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222 - Putting the Wetlands Act to Work: Monroe County, NY September 1978
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252 - Anatomy of a Landfill Permit: The Seneca Falls Sanitary Landfill. A. Lee Nesslage August 1981
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258 - Solar Projects in the Rochester Area: A Survey. C.A. Baybutt, B Weir January 1982
259 - Road Salt and Traffic Injuries in Rochester W. Brown, G. Berg, C.S. Brown, Jr. February 1982
260 - The Care of Public Well Water in Monroe County. O. Berg, R. Wilcove March 1982
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262 - Beverage Container Deposit Law or Litter Control Legislation: Can Experience in Other States Help New York Decide? J. Gutterman April 1982
263 - Managing the Irondequoit Creek Wetlands to Improve Water Quality in the Bay. I. Sediment Control R. Burton June 1982

PART IV

The Public Record: An Album of Press Reports Selected to Illustrate the Historical Impact of RCSI Bulletins.

A Place in History...

He an S. Forest

Four hundred years ago Francis Bacon wrote of his vision for a science-based society. In these pages we have had a glimpse of fulfillment. A unique social combination was present at this time and place. Capable scientists made their studies, and reported them not simply for scientists but for the public. An enlightened public weighed the studies in the marketplace, and responded with informed action. However, there was a critical info ation link between scientists and the public. This was the press. Without the special interest of the press in these scientific studies, and the wide reach of the press to make results available and useful, fulfillment would have been impossible. Thus, a few press reports have been selected as representative for inclusion in this special issue (Part IV). They help complete the perspective of science information in society.

Editorials

Salute These Environmental Paul Reveres

The critics who would change society merely by hollering from the rooftops might take a leaf—nay, a dozen leaves—from the book of the Rochester Committee for Scientific Information, that small but effective band of people-persuaders.

For the R.C.S.I. members don't wring their hands about problems. They wring their consciences and their competences and get down to work to prove their point with hard-driven facts.

We're moved to cite this example of public service by the current publication of a master list of the titles of bulletins published by the committee—no fewer than 130 bulletins since 1964.

They tell in capsule form the whole story of the rising tide of environmental concern. Here are some titles at random:

Report on Water Pollution, October, 1964.

Float Tests and Grease Ball Deposits on Lake Ontario Beaches, May 1966.

Dissolved Oxygen Levels in Irondequoit Bay, September 1969.

Amount of Cyclamate in Diet Foods, September 1969.

Recycling Day in New York, March 1971.

Measurement of Ambient Air Quality in Monroe County, August 1971.

R.C.S.I. must take a large share of the credit for alerting the public to the way in which our nests have become fouled over the years. It has done so both by calm scientific fact and by using language that the layman can understand.

One of its most recent bulletins by Neal G. Dunkleberg, deals with the problem of algae in Silver Lake. After noting that the ideal solution to the problem of residential liquid waste flow into the lake would be the installation of sewer lines around the lake, it goes on:

"The advent of sewer lines may be hastened by an early algal bloom in the next few years. Because these blooms tend to deposit along the heavily populated eastern shore, the economic consequences of falling property values, decreased tax revenue, and failure of tourist-dependent businesses may be felt more quickly in this situation than in some others. In the meantime, we remind residents of the lake area to use low phosphate laundry products to minimize lake water fertilization, and while the laundry is in the machine, consider how the community could provide for tough, working control of lake pollution . . ."

That puts it on the line in plain, thoroughly understandable terms. Like latter-day Paul Reveres, the R.C.S.I. members have been sounding the alarm in most effective fashion. We owe them more than we suppose.

'Massive Pollution' of Genesee Charged

Report Hits Industries, Governments

By JOHN VAN BUREN
Democrat and Chronicle Science Writer

FRIDAY, DEC. 24, 1965

A damning report of pollution in the lower Genesee River was released yesterday by the Rochester Committee for Scientific Information.

The report said results of recent committee surveys and water sampling tests indicate "massive pollution" of the river between the Elmwood Avenue Bridge and the mouth at Lake Ontario.

It implicates specific industries and municipalities; it says solid sewage—in some places "chunks of dung . . . roughly the size of marbles"—is entering the river in violation of state law; it contends that the river is virtually devoid of dissolved oxygen, which could support aquatic life and help the stream cleanse itself.

Informed of the report, public health and industrial officials said they felt the committee had painted an inaccurate picture. They said the river, while far from perfect, has improved vastly over the last 10 years with the expenditure of millions of dollars of public and private funds for pollution abatement programs, and that further improvements are underway, or planned.

An official of the Monroe County Conservation Council hailed the report, saying it supported findings of its committee on water pollution that "little" has been done to stem sources of pollution in the lower river.

"We are wholeheartedly in support of the scientific committee," the official said.

The Committee for Scientific Information is a private group composed largely of University of Rochester scientists. It is devoted to collecting scientific data for public enlightenment in such areas as radiation fallout and water pollution.

A committee report of bacterial analyses of Lake Ontario waters in July touched off the summer-long controversy over the safety of three public bathing beaches. Some members of the committee testified before the County Grand Jury that investigated water pollution; the jury last week handed up a lengthy presentment, which, if accepted by the court, will be made public in about two months.

Much of the committee's new report is a description of the results of visual observations and oxygen level water tests. The work, the report states, was carried out in October and November by Dr. David J. Wilson and Neal Dunkleberg. Though not identified in the report, Dr. Wilson is associate professor of chemistry at the UR, and Dunkleberg a graduate student.

Of the findings in general, the committee report says:

"This pollution (in the lower river) consists of industrial wastes—chemical and brewery wastes—and sewage. Some of the sewage is not chlorinated, and most of it contains solids . . . an infraction of state law. The extent of this pollution is such that the river is unable to cleanse itself by bacterial oxidation before it empties into Lake Ontario."

On specific findings, the report said at one point along the river "at least a portion of this (pollution) comes from the Genesee Brewing

Continued from Page 1B

Co." Three other sampling points, the report continues, "indicate that the Kodak Park Works puts a significant load of pollution in the river."

The report cites several sewage outfalls in the river—believed to be city storm water overflows—where specimens of "dung" were collected and where water tests indicated that the effluent was not chlorinated as required by state law.

At the outfall of the Town of Irondequoit sewage treatment plant, near the Genesee Yacht Club. the report said there was a "marked odor of sewage, sporadic appearance of solids—dung, toilet paper." It said tests indicated the sewage was chlorinated, but it stressed that chlorine is unable to penetrate solids and kill bacteria.

Four pages of the six-page report contain tables of highly technical findings relating to oxygen levels at 19 sampling points along the lower Genesee. The tables show that between 19 and 10,000 parts per million of oxygen would be needed by the stream to help purify itself of the entering wastes.

The report noted that if a stream, such as the Genesee, "becomes charged with a higher concentration of oxidizable material than can be oxidized . . . the oxygen content of the water drops to practically zero as oxidation of this material takes place, and normal plant and animal life in this water becomes impossible."

When pressed about whether state classifications for the lower Genesee require any specific dissolved oxygen content, Dr. Wilson conceded that "there is none."

However, Wayne M. Harris, who heads the conservation council's anti-pollution campaign, said the classification requires that oxygen in the river not be depleted to a point where fish kills occur. Harris cited a late summer report of the State Conservation Department, which said a fish kill had occurred at the river's mouth because of a total absence of any dissolved oxygen in the water.

Dr. Wendell R. Ames, county health director, said although the scientific committee had not sent him its report, he felt "the river may be pretty bad, but it's much better than it used to be, and it's going to be much better in the future.

Since the state originally found the lower river "grossly polluted" 10 years ago, he said, an extensive abatement program has been under way. He said the city has eliminated many outfalls into the river; that Eastman Kodak Co. has spent and is spending large funds on pollution control; that the Genesee Brewing Co. has eliminated about 80 per cent of its wastes entering the river by extensive re-piping into the city sewer system, and that the Town of Irondequoit is "ready to roll on its sewage plant expansion to provide secondary treatment for its North St. Paul Street plant."

"Much has been done, much remains to be done, but it takes time," the county health officer said.

A Kodak spokesman said the company has been engaged in water pollution control efforts since 1920. He said Kodak hired engineering consultants in 1929 to undertake special studies, and that in 1949 the company organized a full-time air and water pollution control engineering staff of its own.

He further noted that Kodak completed in 1957 a $1.5 million industrial water treatment plant designed to remove 95 per cent of settleable wastes and that the company has done experimental work in secondary treatment of industrial waste waters and the work is continuing. He emphasized that all sewage wastes from Kodak go into the city sewer system.

An official of the Genesee Brewing Co. said the problem cited in the committee's report, relative to his company, was due to an accidental stoppage of the brewery's sewer line to the city sewage main in Cataract Street. He said this stoppage has been cleared, that the company has requested that the city raise their outfall to prevent further backups, which the city has done.

Democrat and Chronicle

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METROPOLITAN EDITION

Without us with offense to friends we fare I cherish your world exactly as it goes—dipson

ROCHESTER, N. Y., SATURDAY MORNING, JULY 23, 1960 10 CENTS

AREA BEACHES 'HEALTH HAZARD'

U.S. Pollution Official Presses Charge

Massive Federal Study Details Industrial Pollution here, Page 1B

By BILL CLAIBORNE

The congressional subcommittee investigating Lake Ontario pollution raised penetrating questions about the safety of Monroe County beaches yesterday in a sharp exchange with the county's health director.

Following the debate, a Federal Water Pollution Control Administration director said flatly tha bacteria from discharged effluents constitute a "health hazard" at area bathing beaches.

H. W. Poston, Great Lakes regional director for the federal pollution agency, stuck by his statement under cross-questioning by the congressional panel.

Rep. Richard D. McCarthy, of Buffalo, (D-39th Dist.), meanwhile, questioned the validity of statements by Dr. Wendell R. Ames, county health director, that area beaches are safe for public swimming.

"I don't feel there is any health reason for closing the beaches," Dr. Ames maintained. He cited a lack of data on pollution-connected disease as the basis for his statement.

McCarthy pressed the health director on whether the county health department possessed coliform bacteria readings when it declared the beaches safe for opening last spring.

Dr. Ames replied, "We had none in our laboratory at that time," adding that beach permits are normally granted in January but this year were delayed to spring.

Coliform counts reveal the number of coliform bacteria per 100 milliters of water. The state's Van Lare law is supposed to prohibit approval of a beach at which readings over 2,400 coliforms per 100 milliters, although recent readings showed counts in excess of 50,000 at some area beaches.

McCarthy continued to press the issue, asking. "Do you feel it's safe to swim in areas where you actually can observe solid wastes?"

Dr. Ames said the condition was "occasional," adding, "I see no reason to take summary action." The health director contended that people become ill from consuming polluted water, not from swimming in it.

The beach safety issue arose toward the end of a marathon hearing held in the Hall of Justice by the House Subcommittee on Water Resources and Power. Twenty-two witnesses appeared during the all-day session.

Poston, while citing pollution effects in the area, declared, "Bacteria from the effluents constitute a health hazard at the bathing beaches in spite of the lack of epidemiological evidence of any illness suffered by persons swimming in these waters."

Rep. Frank J. Horton, Rochester Republican and the ranking minority member of the subcommittee, called the statement "gratuitous" and asked Poston if he wanted to withdraw it. The federal pollution control official declined.

McCarthy, however, said that it was "plain" that the bacteria resulting from discharged sewage constituted a health hazard. He added that from the evidence presented, he wouldn't swim in the lake.

Continued on Page 4A

Democrat and Chronicle Local
ROCHESTER, N.Y., MONDAY, OCTOBER 7, 1968

Dead Fish Tell Tale Of Bay

The Rochester Committee for Scientific Information (RCSI) announced yesterday that tests of Irondequoit Creek and Irondequoit Bay taken last summer "indicated the state standard was being violated."

RCSI said it found 247 dead fish between Empire Boulevard and the Brighton dump.

"These were mostly perch, sunfish and white bass," the group said. "We did not count alewives, which are commonly found dead here — even in good water."

The scientific group added that during parts of the summer there was no dissolved oxygen (needed for fish to breathe) below 20 feet in the bay.

"Some samples of water were found to contain quantities of highly poisonous hydrogen sulfide."

The group noted hydrogen sulfide does not constitute a hazard to swimmers, but is deadly to aquatic life.

"Odor problems were noted at the south end of the bay and in the vicinity of the Rochester Canoe Club on the west bank.

"Phosphate concentrations greater than tenfold of those required to provide nuisance growths of algae were routinely observed," RCSI added.

The County Health Department and the Pure Waters Agency made extensive tests of the creek late this summer and County Manager Gordon A. Howe called for a $1 million interim plan and a speedup of the $90 million Pure Waters District for the area so all sewage will be kept out of the watershed.

Editorials 8A Tuesday, October 8, 1968

Dead Fish Indicate Lying, Evasion

Dead fish do tell a tale!

The 247 dead perch, sunfish and white bass found in Irondequoit Bay and Creek by the Rochester Committee for Scientific Information testify mutely that state standards on pollution still are being disregarded. They can be interpreted as testimony of lying and evasion.

The lying looks suspiciously like the juggling of coliform counts that results in a better showing for health officcials charged with maintaining antipollution standards.

The evasion suggests an attitude of "don't look now at the lake pollution and it might go away" by city, county and and town governments.

RCSI, after lengthy tests taken last summer, reports: "Irondequoit Bay is in very serious trouble and will remain so until the load of sewage discharged into its watershed is decreased by roughly 80 to 90 per cent. Progressive deterioration of recreational aspects of the bay, increasing odor problems and depreciating property values in the vicinity will occur."

There can be no armistice in a war that, if lost, will be the end of life in Lake Ontario for years to come. Yet the generals directing the war certainly seem to be sitting quietly at their headquarters, disturbed only by the troops in the field that want to wage all-out battle and achieve a complete victor over pollution.

The generals do not, for example, seem disturbed by the growing infiltration of a cladophora, a sneaky aquatic weed that is strangling Lake Erie, already lost to receational use. And, in the domino theory, Lake Ontario will be next to fall since Erie dumps much of its pollution into Ontario through the Niagara River and Welland Canal.

One scientist estimates that within five to seven years, side materials produced by cladophora will create an unpleasant odor and taste to drinking water from the lake. No known filter can remove them.

Can we expect lying and evasion then?

Times-Union reporter Graham Cox inspects overflow pipe from city's eastside trunk sewer below Sea Breeze Expressway. Sewage flows into Irondequoit Bay.

Times-Union April 28, 1970

City Sewage Pollutes Bay, River, Lake

(This the second of a series spotlighting pollution problems in the Rochester area.)

PROBLEM — Overflow pipe from city's eastside trunk sewer discharging into Irondequoit Bay below Sea Breeze Expressway and near Browncroft Boulevard. Raw sewage overflows even in dry weather. In wet weather, says Monroe County Pure Waters Agency, about 95 per cent of the city's sewage pours out of this and about 40 other smaller pipes into Irondequoit Bay and the lower Genesee River. Thus, most city sewage is never treated when it rains. Some is not treated even in dry weather.

CURE — State Health Department has approved a plan that would stop almost all the sewage overflow. It involves collecting it in eight storage tanks below city streets, chlorinating it and pumping it out for proper treatment after a storm subsides.

COST — About $120 million if started this year, says G. Richard Sutherland, director of Pure Waters Agency.

Today's Water

WHERE IT STANDS — Money to pay for it. The state allocates nothing to stop sewage overflows, says Dwight Metzler, deputy state health commissioner in charge of the state Pure Waters Program. Federal government won't allocate funds for it, either, and the bill would be too big a burden for city taxpayers alone. Sutherland is asking area congressmen for help in finding money. City and Pure Water officials will visit Albany May 6 to plead for state funds.

Yesterday, The Times-Union spotlighted the rat-infested Emerson Street landfill. City DPW Commissioner Raymond Keefe last night said the dump will be closed when a truck transfer station is built on Colfax Street, replacing the westside incinerator. Bids for the station are out now and it could be operating by April or May, 1971; however, the contractor will have to find sites in or near county to dump city refuse.

Democrat and Chronicle Metro

ROCHESTER, N.Y., WEDNESDAY, DECEMBER 24, 1975

Group asks state to open Ontario Beach to swimmers

Ontario Beach is safe for swimmers most of the time, said the Rochester Committee for Scientific Information.

The committee has joined Monroe County officials in asking the state to reopen Ontario Beach officially next summer for swimming.

In 1967, the State Health Department closed the beach because the water was polluted and didn't meet swimming standards.

In a bulletin released yesterday, David B. Bauer and Dr. George G. Berg of the committee warned, however, that, "Ontario Beach shouldnot be considered safe for public swimming until the county has provided a workable pollution warning and emergency closing system for the beach."

The beach appears safe for swimming except when storm sewers overflow, they said.

Besides urging an emergency closing system, the scientists said the beach should be policed and cleaned and lifeguards should be posted near the water, not near the beach fence

The committee's independent monitoring of water at the beach showed the water was generally clean, confirming similar tests made by the Monroe County Health Department.

According to the bulletin, this was the first summer the committee found the beach to be clean since it began a water testing program there in 1964

"It appears that the Pure Waters program of mending sewers and upgrading sewage treatment plants in the County of Monroe is succeeding in controlling water pollution at Ontario Beach," the scientists said.

County officials, said earlier this month they would ask the state next month to reopen the beach.

Van Lare Sewage Plant Improperly Designed, Says Scientific Report

Local Front

Rochester, N.Y., Tuesday Evening, Oct. 5, 1976

THE TIMES-UNION

By MARSHA STANLEY

Odors from a county Pure Waters (sewage) treatment plant on Lake Ontario are symptoms of serious design problems which will be expensive to correct, says an independent scientific report.

The Van Lare sewage treatment plant's "troubles appear to be caused not by routine malfunctions, but rather by basic mistakes in design and management . . .." concludes a study by the Rochester Committee for Scientific Information.

And afterburners costing about $500,000 being installed at the plant will not solve its real problems, the report says.

"As sewage treatment plants go, the Van Lare plant proved to be a lemon, by producing a sludge mix that it could not handle," the report says.

"It will have to be fixed. This will not be done cheaply, and it cannot be done without additional help from state and federal agencies," the report says.

The afterburners will give the plant "a useful margin against normal errors of operation," but they will not cure the problem, the report said.

The problem is that the Van Lare plant produces a much wetter sludge than it was designed to produce, the report said. Sludge is the black sediment which settles out of sewer water in the cleaning process.

The sludge is burned in huge incinerators. Neighbors of the Van Lare plant have been complaining for months about foul odors from the plant. The odors were created because the sludge was too wet to burn completely.

The report accuses the county of keeping the public poorly informed of the plant's problems.

"During the odor crisis from December until June, the public could only get half-truths and public relations releases when it needed technical facts," the report says.

The report also charges that the federal Environmental Protection Agency, which funded the bulk of a $70 million expansion of the plant, "failed in providing quality control to match the money." Construction of such plants should be overseen much more rigorously to make sure they work as intended, the report recommends.

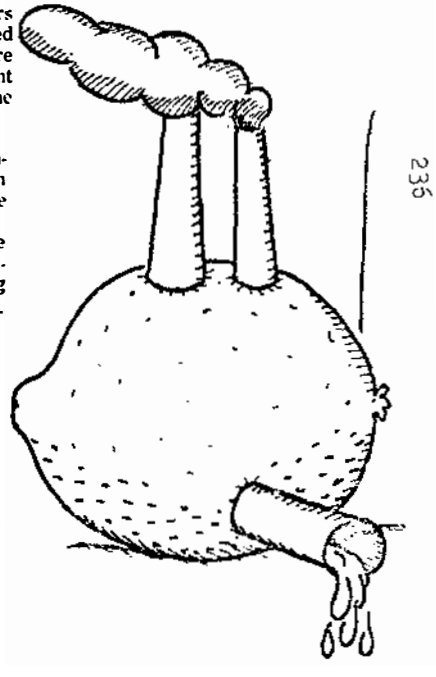
It also contends that Pure Waters Director Gerald C. McDonald did not make full use of consulting engineers on the problem. Engineers were asked to design a cure for the odor but were not asked to revise the faulty plant operations creating the problem, the report says.

Pure Waters officials and representatives of Black & Veatch, the design engineers, have said the wet sludge problem is not a design fault.

The plant was designed to handle sludge with large amounts of phosphates in it, they say. However, long after the plant was designed and construction began, the state banned use of phosphates in household detergents. The ban has reduced the amount of phosphates, creating the wetness problem, they say.

Albert Peterson, a project engineer for Black & Veatch in Kansas City, said today his firm is working on a modification design to cure the wetness problem. The plans will be ready in about two months, he said. He said he cannot estimate the cost at this time.

Is Van Lare sewage treatment plant a $70 million lemon? Some scientists say it is.



VanLareReport Inaccurate, Unfair, Pure Waters Says

The Times-Union
Wed., Nov. 17, 1976 7B

The Monroe County Pure Waters director charged yesterday that an October report critical of the design and management of the Van Lare sewage treatment plant is inaccurate and unfair.

The report, released Oct. 5, was prepared by the Rochester Committee for Scientific Information (RCSI), a local group of scientists who investigate matters of interest to the general public

The report was compiled following numerous complaints from residents living near the plant about bad odors coming from the smokestacks.

Gerald C. McDonald, in a staff analysis, listed 24 inaccuracies in the 15-page report

"It is our contention that the report is replete with inaccuracies and does not present fairly the situation existing at the facility nor the operations of the facility," his analysis said.

"In addition, if it is as it has been represented, a scientific report, it falls short of the standards required for such documents, particularly in the area of verification of facts and conclusions."

Dr. George Berg, who edited the RCSI report, said yesterday that he was unaware that McDonald was releasing an analysis of the report but he said "it is about time." He said that he knows of no inaccuracies in the RCSI report.

"I'm gratified that Pure Waters is finally telling their side of the story," he said. "Now that we have that, we can compare what they say with what we've said and the public will have the information to make a judgment on the matter."

Among the portions of the report criticized by McDonald are these:

RCSI WROTE in its bulletin that although the plant is complicated, it is "simple" to operate the facility cleanly. "The statement makes no sense," said McDonald's analysis. "If, in fact, the plant is complicated, the conditions for clean operation must also be complicated. In other words, there are no easy solutions to complex problems.'

The State Department of Environmental Conservation, according to RCSI, ordered Pure Waters to test the sludge before burning it and some of the sludge should have been buried in a landfill. McDonald claims he can find no correspondence from the DEC about testing it and that it is impossible to remove major portions of the sludge from the plant for landfilling.

McDonald denies that the county and plant officials claimed the odors were normal incidents at sewer plants or blamed them on accidents or equipment failures.

He also denied that the Van Lare plant was not releasing a cleaner effluent and working more efficiently than older existing sewage treatment plants.

Legislative Public Works Committee meeting. Berg said that RCSI is not trying to tell the legislators "that stinking up a neighborhood is wrong, but we are telling you it is unnecessary."

Democrat and Chronicle

Forum II

ROCHESTER, N.Y., SUNDAY, NOVEMBER 21, 1976

All's well that ends smell

The Rochester Committee for Scientific Information kicked up a dust storm when it published its September report calling the Frank E. Van Lare sewage treatment plant a "lemon." Whether or not that criticism was intended to be as harsh as it seemed, it was nevertheless overblown.

The problem of noxious odors, so irritating to nearby residents, ought to be correctable under normal operating conditions by installing afterburners on the plant's incinerators. Unfortunately for its neighbors, the plant's operating conditions haven't been "normal" since March.

During a two-week period in April, lime was added to the sewage to yield a drier sewage residue. The drier sludge was expected to burn more completely, reducing odors. But the lime addition was costly — $4,300 per day. It also produced a greater quantity of sludge, and the sludge accumulated when malfunctions later shut down part, or all, of the plant.

A major electrical failure in June due to faulty cable installation made the sludge pileup worse, and, at one point, forced the plant to cut the amount of treatment given the sewage before it was dumped into the lake.

Finally, the shutdown of each incinerator while its afterburner was installed added to the load of the working incinerators and continued the sludge backlog problems and the odors.

These were temporary problems, however, and the afterburner system deserves a chance to be tested under normal operating conditions — after the sludge accumulation is reduced. Plant officials say the final afterburner installation will be completed, and the sludge backlog incinerated, over the next few weeks.

The Times-Union
Fri., Feb. 20, 1970

Housewifes Advised To Cut Detergents

By GRAHAM COX

The Rochester Committee for Scientific Information today made three suggestions to the housewife and the community aimed at cutting the phosphate from household detergents polluting rivers and lakes.

To the housewife: Do the laundry with a soap or detergent that contains only a small amount of phosphate and use presoaks and water softeners sparingly and . . .

Write detergent manufacturers asking them to mark the phosphate content on the packet of each brand and to market detergents with low phosphate content.

To the community: Put a priority on building sewage treatment plants that will take phosphate out of the sewage effluent.

RCSI is an independent group of scientists from area colleges and schools. They are financed by donations from national foundations, industry and local subscriptions.

They issued a study of 22 soap and detergent brands after a hearing here earlier this month by an international commission which blamed phosphates in household detergents as the major source of pollution in the Great Lakes basin.

The international study recommended that detergent manufacturers stop putting phosphates in their products by 1972 and that communities build sewage treatment plants that will take phosphates from sewage effluent.

The RCSI made chemical tests of detergents, soaps, fabric softeners, presoaks and water conditioners.

Association, the manual used by public health and water resources agencies.

The study suggests: "Each housewife can try the various brands and find the one with the least phosphate that gets her clothes clean enough for her needs. If you live in the drainage basin of a small fresh water lake, it may be necessary to sacrifice some whiteness for low phosphate content."

The table shows the results of the RCSI tests compared with the results from two other tests, one by Limnetics Inc. of Milwaukee and one by a Toronto, Ont., citizens group.

The RCSI test results are compared with a study done by Limnetics Inc. of Milwaukee, printed in the New York Times, Dec. 14, 1969.

The test results were described by RCSI as "in general agreement" but added that there were significant differences which can be partly explained by different testing techniques and because of different phosphate content from one batch of detergent to another and in different regions at different times.

Washing Product	Water Conditioner Per Cent of Weight of Phosphate in Detergent		
	RCSI data	Lim. Inc.	Tor. data
Calgon	25	*	75.5
Pre-soak			
Axion	57	43.7	...
Detergents			
All-regular	18	...	39
Bold	16	30.2	32.5
Cheer	34	22	44.5
Cold Power	11	19.9	...
Drive	22	25.3	41.5
Gain	23	24.4	...
Ivory Liquid	1	...	less than 1
Low Suds	17	...	...
Punch	31	25.8	...
Rinso	17	...	...
Salvo Cubes	18	...	...
Solo and Spon	18	...	...
Surf	7	...	32.9
Tide XK	30	30.6	43.5
Wisk	11	7.6	18.5
Soaps			
Ivory Flakes	7	...	...
Ivory Snow	0	...	less than 1
Cuttlgans	11	...	...
Instant Fels	6	...	9
Fabric Softener			
Downy	0	...	less than 1

*—not tested

Editorials

February 25, 1970 DEMOCRAT AND CHRONICLE

Housewives Can Aid War On Pollution

How housewives react to appeals that they "cleanse" their laundering practices of detergents containing harmful pollutants could be a crucial factor in the battle against pollution.

The Rochester Committee for Scientific Information made this clear when it condemned phosphates in household detergents as the "major source of pollution of the Great Lakes basin." Phosphates contribute to imbalance of the natural environment of water by promoting excessive growth of algae and other aquatic plants.

ROCHESTER DEMOCRAT AND CHRONICLE
Monday, July 17, 1972 7B
Rochester, New York 14627

Get-Well Mail For the Lake

Proposals to "heal" Lake Ontario are regarded by the Rochester Committee for Scientific Information as their most important mail.

The proposals have had a priority since last December when the committee announced a contest awarding $1,000 to the person submitting the best proposal to clean up Lake Ontario.

The deadline for submitting proposals is in October, but, the mailman has only delivered eight such proposals since the start of the contest, says Dr. George Berg.

Dr. Berg, a radiation biologist, said he hopes to receive more proposals in the next month but said he thinks most people will send in their proposals at the last moment.

A major aim of the contest is to come up with a method of eliminating cladophora algae, which is taking over the lake.

The algae is thriving in Lake Ontario because of an excessive amount of nutrients, primarily from untreated sewage. It washes onto the beaches, producing an almost unbearable odor, and makes the water murky and unpleasant for swimming, Berg said.

Berg, a member of the committee's board of directors, proposed the contest last year. He is keeping track of all proposals received, and will present them to a jury of experts for consideration in October's final judging.

The jury will be composed of a geologist, an algae expert, an aquatic biologist, a systems analyst and a geochemist.

Berg said the contest was designed to produce proposals for improving the quality of the lake for human use while increasing its biological status.

"We want to heal it, not sterilize it," he said. "We want to restore it to the quality it used to have."

THE TIMES-UNION Suburb
Page 8B Rochester, N.Y., Tuesday Evening, June 11, 1974

Roads Oversalted?

Survey shows some towns use substantially more than others

By PAT WASHBURN

Irondequoit used almost 15 times more salt per lane mile on its state roads during the 1972-73 winter than Wheatland, according to a survey released today by the Rochester Committee for Scientific Information (RCSI).

The two towns represented the extremes in questionnaires mailed last summer to all Monroe County towns. All but Chili furnished salt-use figures. Surveys also were made of county villages, the state Department of Transportation and the New York State Thruway Authority.

"The present procedures are inconsistent, wasteful and result in unnecessary damage to property and landscape," said RCSI's Lindsay Holmes, who called for "uniform" salting practices in all county towns . . .

"Differences in local weather patterns and terrain may account for some of this variation, but the magnitude of the difference suggests that many state roads are receiving more salt than they need."

The RCSI survey showed that the towns spreading the most salt per lane mile on state roads were: Irondequoit, 149.6; Perinton, 146.9; Penfield, 139.2; and Greece, 125.

In contrast, Wheatland spread only 10 tons per lane mile. The next lowest figures, which were averages for state, county and town roads, were 10.4 tons in Parma and 14 in Hamlin.

RCSI also found some large differences when the same state roads were salted in different portions by several towns.

For example, the state only used 3.6 tons per lane mile on the portion it salted on Ridge Road in the city. However, Greece used 125 tons on West Ridge Road and Irondequoit used 149.6 on East Ridge Road.

The state also used only 33.6 tons on Route 47 (west of the city) while Irondequoit used 149.6 on Route 47 east of the city.

Other differences were: Penfield Road, Brighton, 59.4, and Penfield, 139.2; Lake Road, Clarkson, 48.8, and Sweden, 92.3 and Mosley Road in Fairport to Nine Mile Point Road to Webster Road, Webster, 45.5, Penfield, 139.2, and Perinton, 146.9.

In other results, salting on county roads by towns varied from 140.5 tons per lane mile in Irondequoit to 10 in Wheatland. In the villages, Hilton and Scottsvilel were the lowest at 4.1 tons and Webster was the highest at 21.1.

Holmes suggested that one way to reduce the salt use would be to require that towns not spread more per lane mile than the state if they want to be reimbursed for clearing state roads.

He also said he believed uniform policies would do away with complaints towns receive from drivers.

"The public tends to equate heavy salting with easy driving while there is no proof that salting increases safety," he said. "If public outcry . . . becomes loud enough, the highway officials are pressured to respond with more salt . . . .

"If countywide regulations for salt use . . . were adopted, the legal and psychological burden of justifying policies would be shifted from local highway departments to the county as a whole."

Holmes also suggested: The use of more sand in place of salt; the acceptance of snow-covered roads instead of bare pavement, when safe; and plowing only on residential streets unless unusually icy conditions prevail or there are dangerous curves, hills and intersections.

Democrat & Chronicle June 27, 1974

Ten times too much?

The amount of salt spread per lane mile of state highway in Monroe County last winter ranged from less than 14 tons in some towns to over 140 in others, according to the Rochester Committee for Scientific Information. Somebody's overdoing.

Irondequoit Bay on way to recovery: study

By MARK WERT

Irondequoit Bay is on its way to recovery, according to a recent Rochester Committee for Scientific Information bulletin.

But it suggests a study be made to see if the bay can be stopped from refertilizing algae that indirectly make it impossible for some fish, such as salmon, to live in the bay during the summer.

Sewage formerly discharged from 10 municipal treatment to creeks that feed the bay was diverted to Pure Waters' Van Lare Sewage Treatment Plant about a year ago.

"The improvement in water quality has been dramatic in the creek system and is expected to be noticeable in the bay soon," Richard S. Burton, associate chemist of the Monroe County Health Department's environmental health lab, wrote in the bulletin.

But he continued, "The bay is not expected to recover completely without further help in part because the bottom has a large anaerobic (airless) area. When the water on the bottom of the bay is airless, the phosphorus in the mud may be recirculated to the top and once there it acts as a fertilizer."

Research shows this recirculation occurs each spring and fall when the bay, which behaves like a lake, overturns — the warm water rising to the top in the spring and returning to the bottom in the fall.

Through this overturning, "the bay may in effect be refertilizing itself," Burton writes.

Of all the minerals in the environment, phosphorus is the most important to the growth of plants and animals.

It's an essential element in the normal production of algae in a lake, where a certain number of algae at the lake's surface die at the end of the growing season. They fall to the bottom, where they are broken down by bacteria.

But the overabundance of phosphorus has upset natural algae production in the Great Lakes and Irondequoit Bay.

Burton said the county applied last month for federal money to study Ide's Cove, an area on the bay's westside, to see if the whole bay could be improved by cleaning up the bay bottom.

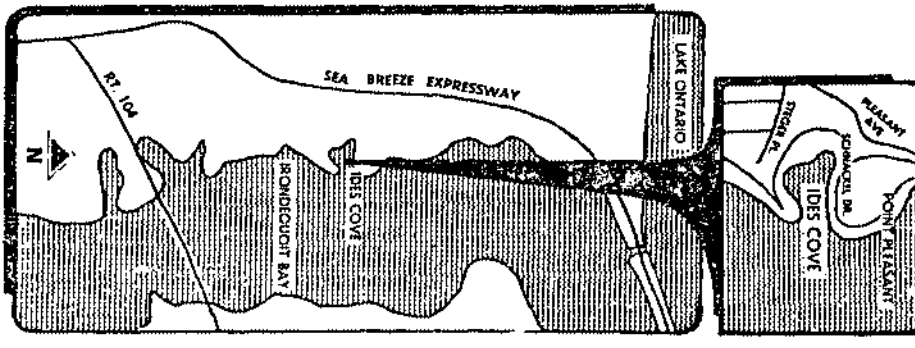
The cove was selected for study because "it's just like a small bay," Burton said.

He said the three ways being considered to clean up the bay bottom are:

- Dredging the bottom mud. The mud would replace original bay wetlands that have been largely eliminated because of development. "The phosphorus that is a liability on the bottom is of advantage in a wetland where it will induce the growth of wetland plants," Burton wrote.
- Stopping the phosphorus from reaching the bay's surface by sealing the bottom with lime or fly ash.

Fly ash has been used to seal and rehabilitate other lakes and is cheap and available. It may contain trace amounts of potentially hazardous metals and chemicals, however.

- Pumping air into the bay's deep water. Research shows bottom phosphorus can reach the top if the deep water has air.

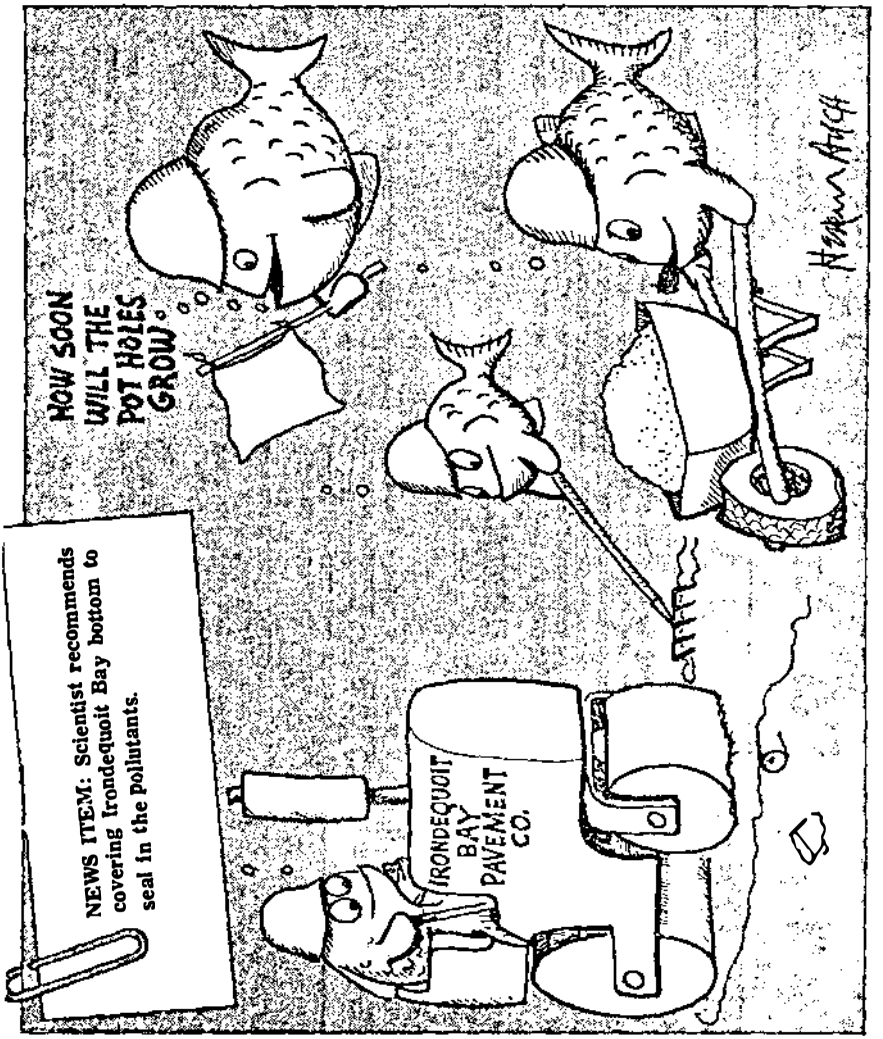


Irondequoit Bay
. . . Arrow shows study site

THE TIMES-UNION

Editorial Page

12A — Thursday, May 10, 1979



TIMES-UNION

Rochester, N.Y., Tuesday Evening, May 8, 1979

Irondequoit Creek 'Much Cleaner'

• *New committee to work for Irondequoit Bay opening* — 1B

By PAULA GODWIN

The quality of water in Irondequoit Creek has improved dramatically in the last year and the water in Irondequoit Bay modestly, says a scientist with the Monroe County Health Department.

Since 10 of 14 small sewage plants on the creek began diverting sewage to the Van Lare Sewage Treatment Plant in the spring of 1978, the water in the creek has become markedly cleaner and clearer, said Richard S. Burton, an associate chemist for the Health Department's environmental health laboratory.

He said there is some improvement in the clarity of Irondequoit Bay water, since the creek feeds into the bay. But the algae in the bay are still so heavy one can't see beyond 1 to 4 feet down, Burton said yesterday.

He said the bay is plagued by more complicated problems with phosphorus buildup that will make its recovery slower than the creek's.

After the sewage diversion began "there was rapid improvement in the creek water," he said in a report to the Rochester Committee for Scientific Information, which he serves as a member of the board of directors.

The amount of phosphorus being dumped into the creek dropped by 80 percent and the amount of dissolved oxygen in the water increased, he reported.

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