



*Rochester Committee
for Scientific Information
Rochester, NY*

*RCSI Bulletin 102
The Components of Pollution in Slater Creek, Monroe County*

*By: Diane Chapman
July 1970*

THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
P. O. Box 5236, River Campus Station
Rochester, New York 14627

Bulletin #102 (W)

Water Pollution

July 1970

Summary-Bulletin:

The Components of Pollution in Slater Creek, Monroe County

by

Diane Chapman *

Summary:

The Latta Road Greece Town Sewage Treatment Plant affects Slater Creek in these specific ways. It 1. raises the phosphate content significantly, 2. increases the nitrates in the water, 3. adds a small amount of settleable solids and some coarse garbage to the water, 4. adds water warmer by two to six degrees centigrade to Slater Creek in winter, and 5. apparently disinfects the effluent sufficiently to kill all of the coliform bacteria (bacteria which grow in the intestines and feces of warm-blooded animals, and are therefore indicators of fecal pollution). Slater Creek already is bacterially polluted upstream from the treatment plant outfall, perhaps from leaky sewer lines, faulty septic tanks, or illegal connections to storm sewers by sanitary sewers. Under the Monroe County Pure Waters Program a new 15 million gallon per day (MGD) treatment plant will serve the Northwest Quadrant of Monroe County within 10 years. This plant will remove more than 80% of the total phosphates by lime precipitation of tertiary treatment stage, and through the activated sludge process it will remove over 90% of suspended solids and organic matter (measured as BOD or biological oxygen demand) (1). The condition of Slater Creek has been reported in R.C.S.I. Bulletins #17 (W), Aug. 1966; #31 (W), June 1967; #33 (W), July 1967.

Background:

Slater Creek is a small stream flowing northeast through the Town of Greece and emptying into Lake Ontario. On Latta Road near Dewey Avenue, the Greece Town Sewage Treatment Plant empties its effluent into a short channel joining Slater Creek. The R.C.S.I. Water Pollution Subcommittee studied pollution in Slater Creek during 1966 and 1967, concluding that Slater Creek was polluted with sludge, greaseballs, phosphates, and (sporadically) bacteria from the Latta Road STP (2,3,4).

* R.C.S.I. supported this study with equipment, supplies and technical assistance. This Bulletin is based on a report prepared for a course (Liberal Arts 240) at the University of Rochester. The Summary-Bulletin was edited by the Water Pollution Subcommittee. The complete report "Pollution of Slater Creek" is available in R.C.S.I. files. Mr. Terry Lempke, Manager of the Latta Road STP, was very helpful to Miss Chapman, providing her with a diagram of the plant, the manual for STP operators, and permission to collect water samples from the plant's outfall.

Methods and Procedures:

In order to determine what differences there might be in the stream water quality before, at and after the Latta Road STP, and if the polluted situation had changed since 1967, three locations on Slater Creek were sampled on each of two days in November 1969: #1 - Dewey Avenue and Latta Road upstream from the STP, #2 - the effluent channel of the STP, and #3 - the bridge at Ling Road and Kirkwood Road, downstream from the STP. Each sample was tested for phosphates by the stannous chloride Standard Method for orthophosphates and total phosphate (p. 234-238) and nitrates by the Brucien Method (p. 198-200) (5). Coliform bacteria were counted using the Membrane Filter method (p. 610-615 (5), by Mrs. Dudley Stewart. Also, pH (acidity and alkalinity), and air and water temperature (factors influencing which species inhabit an environment) were measured.

Discussion:

Lake biologists consider phosphate to be a limiting factor in algal growth, occurring in concentrations of the order of .07 parts per million (ppm) PO_4^{-3} in unpolluted rivers and 0.01 to 0.04 ppm in fresh-water lakes. The phosphate data (see appendix) showed five times this concentration at station #1, and 500-600 times as much at the STP and station #3. Obviously the Latta Road STP is loading Slater Creek with phosphate. Phosphate undoubtedly enters with the heavy detergent contribution (R.C.S.I. Bulletins #66 (W), Feb. 1970 and #70 (W), April 1970 (6,7)). A detergent foam bank was observed at the outfall. The land surrounding Slater Creek is not agricultural and would contribute little phosphate from fertilizers. Hence it appears obvious that human waste and water softeners in detergent mixes are the source of the phosphates. The Latta Road plant has no capacity for removing phosphates (e.g. a tertiary stage).

Since 1965 in the United States "hard" detergents (incapable of being broken down by bacteria) have been replaced with "soft" biodegradable detergents (8). However, the speed of the biodegradation decreases as the temperature decreases and if the retention time of sewage in a treatment plant is insufficient (less than about eight hours in the activated sludge process) the bacteria do not have sufficient time to break the detergent molecules into smaller (and non-sudsing) molecules (9). Since the Latta Road STP was operating beyond designed capacity at the time of the study, it is probable that sewage retention time had been reduced to the point where detergents were not degraded.

Coliform bacteria are indicators of fecal pollution. Since none were recorded from cultures of water collected below the STP, the chlorination from the STP was disinfecting the water efficiently. Upstream from the plant, however, the 19000 coliforms/100 milliliters (ml) found in samples far exceeds the New York State's standard for "safe" swimming water: 2400/100 ml (10) and is in the "moderately" polluted range. Investigations upstream from the STP may explain this high coliform count.

References:

- (1) Monroe County Pure Waters Program, Sept. 1969. Frank E. Van Lare, Chairman, Pure Waters Agency.
- (2) R.C.S.I. Bulletin #17 (W), August 1966. "Coliform Counts on Slater Creek and Greece's Latta Road Sewage Treatment Plant".
- (3) R.C.S.I. Bulletin #31 (W), June 1967. "Control of Bacterial Pollution of Slater and Round Pond Creeks".
- (4) R.C.S.I. Bulletin #33 (W), July 1967. "Continued Pollution of Thompson Creek, Densmore Creek and Slater Creek with Undisinfected Sewage".
- (5) Standard Methods for the Examination of Water and Wastewater, ed. 12. Amer. Public Health Assoc., Amer. Water Works Assoc., Water Pollution Control Federation. New York: Amer. Public Health Assoc., Inc. 1965.
- (6) R.C.S.I. Bulletin #66 (W), February 1970. "Phosphate in Washing Products".
- (7) R.C.S.I. Bulletin #70 (W), April 1970. "Phosphates in Washing Products, II".
- (8) Wayman, Cooper, H. A Hard Look at Soft Detergents. Bulletin of the Atomic Scientists. April 1965, pp. 22-26.
- (9) Cleaning Our Environment The Chemical Basis for Action. A report by the Subcommittee on Environmental Improvement, Committee on Chemistry and Public Affairs, American Chemical Society. Washington D.C., 1969. p. 102, 129, 131, 141, 151.
- (10) Classifications and Standards of Quality and Purity for Waters of New York State. Prepared for Water Resources Commission: R. Stewart Kilborne, Chairman, by NY State Dept. of Health, Hollis Ingraham, Commissioner, Nov. 1968.

General Background References:

- (1) Bender, Michael E. "Nutrients in Water - the Problem". in Chemical Analyses for Water Quality - Training Course Manual. U.S. Dept. of Interior Federal Water Pollution Control Admin. Jan. 1967.
- (2) Cohen, J. M., "Determination of Phosphates in Water". in (same as above).
- (3) Punhorst, Betty Ann. "Ammonia, Nitrites and Nitrates". in (same as above).
- (4) Biology of Water Pollution - A Collection of Selected Papers on Stream Pollution, Waste Water, and Water Treatment. U.S. Dept. of Interior Federal Water Pollution Control Admin. 1967. compiled by Lowell E. Keup, W. M. Ingram, K. M. Mackenthun.
- (5) Hynes, H.B.N., The Biology of Polluted Waters. Liverpool: Liverpool University Press. 1966.
- (6) Manual of Instruction for Sewage Treatment Plant Operators. Prepared by NY State Dept. of Health, Office of Professional Education, Division of Environmental Health Services, Office of Public Health Education, Water Pollution Control Board.
- (7) NY State Dept. of Health - Herman Hilleboe, MD Commissioner. Water Pollution Control Board. Lake Ontario Drainage Basin Survey Series Report #4.