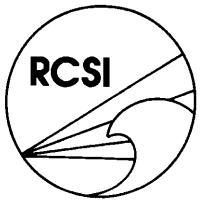

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Dissolved Oxygen in Monroe County Waters.
Lower Irondequoit Creek

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THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION

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#34(W)

DISSOLVED OXYGEN IN MONROE COUNTY WATERS. LOWER IRONDEQUOIT CREEK

Irondequoit Creek now bears a state classification of B, which requires that its waters contain a minimum of 4.0 parts per million (ppm) of dissolved oxygen. Dissolved oxygen is necessary to permit the self-purification of waters receiving organic wastes (such as sewage, dead algae, and many industrial and food-processing wastes). With adequate dissolved oxygen available, the organic waste materials are destroyed by bacteria, the end products being water, carbon dioxide, and harmless mineral salts. Oxygen is needed to prevent anaerobic ("airless") decay of such wastes; this type of decay results in the production of foul odors and toxic substances such as hydrogen sulfide and mercaptans. Dissolved oxygen is absolutely necessary for the respiration of fish and for the animals that fish eat. Dissolved oxygen levels in relatively unpolluted waters at this time of year are normally around 8 to 10 ppm during the day. Dissolved oxygen is used up principally by micro-organisms as they feed upon ("burn up") organic substances in the water; the more organic material in the water, the more dissolved oxygen is required by the bacteria and the less oxygen is left over for the other organisms in the water. Thus the term BOD (biological oxygen demand) is actually a measure of the oxygen consumption of the micro-organisms as they consume the organic chemicals which are their food. The activity of the micro-organisms is greatest during the warm summer months, at which time the solubility of oxygen in water is lowest and the volume of water available for diluting organic wastes is at its minimum. One therefore expects that the summer months will bring the greatest difficulties in maintaining dissolved oxygen concentrations at the levels required by state law and necessary to avoid odors and fish kills.

Two measurements are used by the committee to tell us whether water can remain a healthy "B" classification or if it will become foul. The first is a measurement of dissolved oxygen, in ppm (parts of oxygen by weight per million parts of water); this is done with an electrical device called a galvanic cell oxygen meter. The second is a chemical measurement of organic pollutants in the water; this is also calibrated in terms of oxygen, and is consequently called the chemical oxygen demand. It is the amount of oxygen (in ppm) that would be needed to convert all the organic pollutants into carbon dioxide and water. We use the acid dichromate oxidation procedure employed by the Federal Water Pollution Control Administration for this analysis.

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

These figures show a healthy oxygen content in Red Creek and in the upstream portion of Irondequoit Creek. Thompson Creek is not in the healthy condition it would be in if it really received only storm overflow from the city, and the outflow from the rendering plant lagoon is fouled to the point of being anaerobic (airless).

We also measured the concentration of organic waste coming out of the Stappenbeck lagoon into Irondequoit Creek by running a chemical oxygen demand analysis on the effluent. The chemical oxygen demand was 223 ppm, a quite high value, indicating that the effluent was highly concentrated in organic materials.

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.

We shall study Irondequoit Creek during the summer to determine whether or not these discharges and the secondary sewage load carried by the creek result in violation of the dissolved oxygen standard set by state law for this water.

We are indebted to John Wilson and Robert Lobliner for assistance in taking the samples, and to the Scientists' Institute for Public Information for use of their dissolved oxygen meter.

5 July, 1967

David J. Wilson
Water Pollution Subcommittee