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Dissolved Oxygen Levels in Irondequoit Bay*

*By: David J. Wilson & Ruth Levitt
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THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
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Water Pollution #45

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1. Conclusions.

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 or 90%. Progressive deterioration of recreational aspects of the Bay, increasing odor problems, and depreciating property values in the vicinity will occur. At a hearing in Penfield this summer the RCSI testified in favor of the County Pure Waters Agency's proposal for the large-scale diversion of sewage from this watershed to a good, big plant which will discharge directly through a long outfall pipe into Lake Ontario beyond the Rochester Embayment to a location where adequate assimilative capacity is available

2. The Law.

The New York Water Pollution Control Board, in accordance with the Declaration of Policy contained in Section 1200, Article 12 of the New York State Public Health Law, and by authority granted by Section 1210, Article 12 of this law, adopted water quality standards in October, 1950. Fresh surface waters in the state were divided into seven categories according to best usage, and minimum quality standards consistent with best usage were assigned to each class. We summarize the classes, best usages and minimum dissolved oxygen standards adopted in this law eighteen years ago.

<u>Class</u>	<u>Best Usage</u>	<u>Minimum allowed dissolved oxygen(ppm)</u>
AA, A	Drinking, food processing, culinary, other usages	5.0*, 4.0
B	Bathing and other usages; not drinking or culinary	5.0*, 4.0
C	Fishing and other usages; not drinking, culinary or bathing	5.0*, 4.0
D	Agricultural or source of industrial water; not fishing, bathing, drinking or culinary. Water shall be suitable for fish survival.	3.0
E**	Sewage and waste disposal, transportation.	Sufficient to prevent odor nuisances due to anaerobic decomposition unless other effective means are used to control odors.

<u>Class</u>	<u>Best Usage</u>	<u>Minimum allowed dissolved oxygen(ppm)</u>
F**	Sewage and waste disposal	Sufficient to prevent odor nuisances due to anaerobic decomposition unless other effective means are used to control odors.

*The 5.0 parts per million (ppm) figure applies to trout waters.

**It is now the policy of the Health Department and the Water Resources Commission to upgrade all state waters to a least a "D" classification.

3. Dissolved oxygen studies on the Irondequoit Bay watershed by others.

- a. On 22 July, 1966, the Federal Water Pollution Control Administration, testifying at the Congressional hearing in Rochester on water pollution, released a report stating that Irondequoit Bay, which receives sewage from a combined population of about 100,000 people, frequently shows dissolved oxygen concentrations of 0 ppm at depths of 20 feet and greater. The causes of this situation were ascribed to (1) massive algal growth, death, and decay; the massive growth being due to the large quantities of plant nutrients (nitrate and phosphate, particularly) discharged into the watershed in sewage, and (2) the biological oxygen demand present in the sewage effluent after treatment, despite the fact that practically all of this sewage has received good secondary treatment. The assimilative capacity of the Irondequoit Bay watershed is simply inadequate to cope with this load.
- b. Late this summer the County Health Department and Pure Waters Agency carried out a study on Irondequoit Creek which showed that dissolved oxygen levels in violation of the stream's state classification of B were occurring in the lower reaches (in the vicinity of Empire Blvd.).

4. Our results.

Fifty-eight dissolved oxygen and ortho-phosphate analyses were taken during the course of the summer on the Irondequoit Bay watershed; the results are tabulated below. Our findings are entirely consistent with the results of the earlier Federal Water Pollution Control Administration study and the work done by the county late this summer. Some dissolved oxygen results on Irondequoit Creek at Empire Blvd. indicated that the state standard was being violated. On 11 June, 247 dead fish were counted in Irondequoit Creek between Empire Blvd. and the Brighton Dump; these were mostly perch, sunfish and white bass, and we did not count alewives (which are commonly found dead here even in good water).

We observed that dissolved oxygen levels at depths much greater than 20 feet in the Bay dropped disastrously during the course of the summer, reaching 0.0 ppm. Some of these samples of water were found to contain quantities of highly poisonous hydrogen sulfide. (This does not constitute a hazard to swimmers, boaters and water skiers, but is deadly to much 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 that required to produce nuisance growths of algae were routinely observed.

5. Data.

Dissolved oxygen (D.O.) and ortho-phosphate (PO_4) are reported in parts per million (ppm).

<u>Date</u>	<u>Location</u>	<u>Depth (ft.)</u>	<u>D.O.</u>	<u>PO_4</u>
5 May	South end, Irondequoit Bay	3	14	1.7
	"	10	12	1.5
	"	24	12	1.7
	"	29	12	2.0
	"	0	16	2.0
	"	3	14	1.6
	Irondequoit Creek at Empire Blvd.	0	--	1.9
	" " at Browncroft Blvd.	0	--	2.1
	" " at Blossom Rd.	0	--	2.7
9 June	Irondequoit Creek at Empire Blvd.	0	5	2.8
	Irondequoit Creek between Brighton dump and Empire Blvd.	0	6	1.6
	Irondequoit Creek at Browncroft Blvd.	0	7.5	2.0
	" " at Blossom Rd.	0	8	2.5
	" " at Panorama Plaza	0	9	2.7
11 June	Irondequoit Creek at Empire Blvd.	4	3.8	--
	"	4	4.0	--
	"	4	3.8	--
	" " at Panorama Plaza	0	9	2.7
	Allen's Creek at Panorama Plaza	0	5	3.9
14 June	Irondequoit Creek at Empire Blvd.	8	4.2	3.2
	"	8	4.0	--
	"	8	4.2	--
	" " at Browncroft Blvd.	2	6.0	3.0
	South end, Irondequoit Bay	0	--	1.3
	"	0	--	1.0
15 June	South end, Irondequoit Bay	8	7	--
	"	8	9	--
	"	15	5.2	--
	"	20	5.2	--
	"	24	2.4	--
	"	25	1.6	--
	"	27	0.6	--
	Irondequoit Creek at Empire Blvd.	8	4	--
	24 Aug.	Irondequoit Bay, East of Rochester Canoe Club	15	6.0
"		20	5.6	--
"		23	3.4	--
"		25	1.0	--
"		30	0.6*	--
"		39	0.0*	--
"		39	0.0*	--
"		0	--	1.3
"		0	--	1.3
"	0	--	1.3	

*These samples smelled strongly of hydrogen sulfide and produced a positive test for H_2S with lead acetate paper.

6. Acknowledgments.

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