A REPORT FROM

# *The State Hygienic Laboratory*

MEDICAL LABORATORIES BUILDING

THE UNIVERSITY OF IOWA

IOWA CITY, IOWA 52242

# WATER QUALITY EVALUATION
# of the
# LOWER CEDAR DURING LOW FLOW PERIODS

#77-25

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Prepared for the Iowa Department of Environmental Quality by the University of Iowa, State Hygienic Laboratory.

The publication of this report was financially acted through a contract between the Iowa Department of Environmental Quality and the University of Iowa, State Hygienic Laboratory utilizing funds made available to the Iowa Department of Environmental Quality by the United States Environmental Protection Agency.

23 March 1977

ABSTRACT

On 23 September 1976 and 11 January 1977, personnel of the State Hygienic Laboratory performed water quality investigations on the Cedar River from Vinton to Conesville to evaluate the impact of point source discharges from Cedar Rapids. In the summer at a river flow of 568 cfs (7Q10 is 310 cfs), the Cedar River violated Iowa Water Quality Standards for fecal coliform bacteria and dissolved oxygen. In January when the discharge rate (318 cfs) was nearly equal to the minimum protected flow, and the river was covered with ice, the data showed that violations of standards for fecal coliforms, dissolved oxygen, and ammonia nitrogen occurred throughout the reach below Cedar Rapids. It was concluded that under both low summer and winter flows, the Cedar River below Cedar Rapids cannot effectively assimilate the waste discharges from Cedar Rapids and maintain conditions adequate for aquatic life.

## INTRODUCTION

During Fiscal Year 1977, the water quality of the Cedar River from Vinton to Conesville was investigated on two separate occasions, 13 September 1976 and 11 January 1977. The purpose of both surveys was to evaluate the impact of the point source discharges from Cedar Rapids on the water quality of the Cedar River during low flow conditions. A similar study was conducted during the summer of 1970, and some of the data from the resulting report (SHL #71-7) will be utilized for comparative purposes in this report.

Discharge volumes on the Cedar River during both the winter and summer study periods were very low as can be seen in Table 1.

Table 1

Stream Flow Data* for the Lower Cedar River

| Location | 28 July 70 | 13 Sept 76 | 11 Jan 77 | Average | 7Q10 | Drainage Area |
|---|---|---|---|---|---|---|
| Cedar Rapids | 1350 | 568 | 318 | 3268 | 310 | 6510 sq mi |
| Vinton | | 700 | | 4058 | 390 | 7785 sq mi |

*in CFS from the U.S. Geological Survey

In 1970 the flow volume at Cedar Rapids was well below the 25-year average but it was two and one-half times larger than that found in September, 1976 (568 cfs). The extended period of low precipitation then allowed the river to drop even farther so that the discharge volume on 11 January 1977 (318 cfs) was nearly equal to the 7Q10. In fact, the river stage has declined even further, and at the time of this writing, the discharge was less than 300 cfs at Cedar Rapids.

The quality of the river water at such a low flow volume and heavy ice cover is extremely critical to aquatic life in the river. Such conditions are highly stressful to fish and other aquatic organisms and the presence of deoxygenating pollutants and toxins such as ammonia will only make them more so.

The entire reach of the Cedar River within the study area (Figure A) has been designated for aquatic life usage, and the resultant data will be evaluated according to the applicable Water Quality Standards. Within

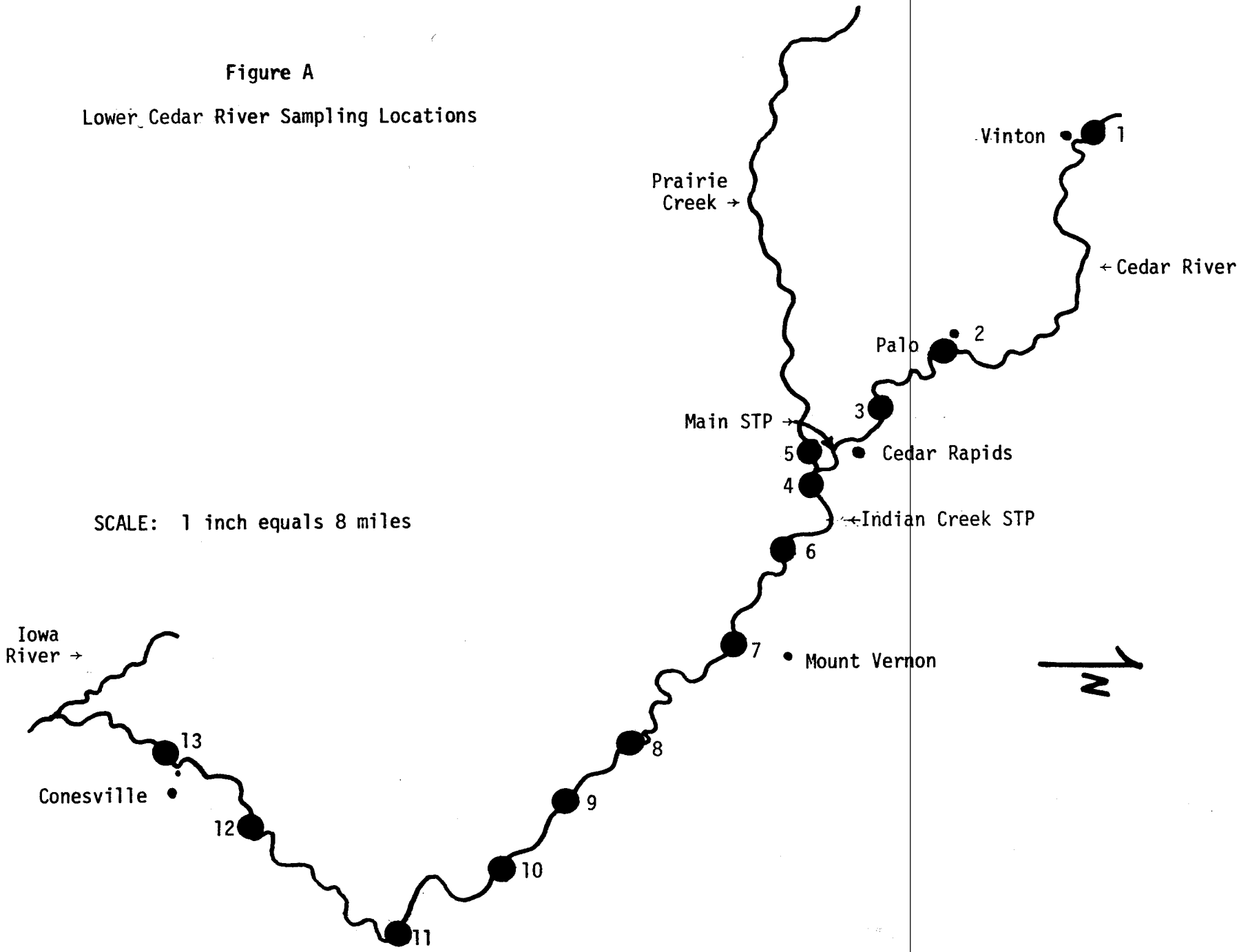
Figure A

Lower Cedar River Sampling Locations

| | |
|---|---|
| Station 1: | H'way 101 Bridge near Vinton |
| Station 2: | Linn Co. Rd. E-36 Bridge |
| Station 3: | Near Edgewood Road Bridge in Cedar Rapids |
| Station 4: | CNW RR Bridge on S Edge of Cedar Rapids |
| Station 5: | Prairie Creek Bridge on C Street in Cedar Rapids |
| Station 6: | H'way 30 Bridge W of Mt. Vernon |
| Station 7: | H'way 1 Bridge S of Mt Vernon |
| Station 8: | Cedar Co. Rd. F-28 Bridge; T-81N, R-4W, Sec. 33 |
| Station 9: | Cedar Co. Rd. F-36 Bridge; T-80N, R-3W, Sec. 18 |
| Station 10: | Cedar Co. Rd. F-44 Bridge; T-79N, R-3W, Sec. 11 |
| Station 11: | H'way 6 Bridge; T-78N, R-2W, Sec. 9 |
| Station 12: | H'way 22 Bridge W of Muscatine |
| Station 13: | Muscatine Co. Rd. G-28 Bridge; T-76N, R-4W, Sec. 2 |

Figure A

Lower Cedar River Sampling Locations



this reach, the Palisades Impoundment and the Ellis Park Impoundment have been further designated for primary contact recreation, and the reach above Cedar Rapids has also been classified as a raw water source for drinking water. Specific standards for these stream segments will be referred to as necessary.

## RESULTS AND DISCUSSION

The raw data collected during both the winter and summer surveys are included in the Appendix to this report. Additionally selected items of data have been summarized in Table 2 for ease of discussion.

The presentation will begin with a consideration of the analytical results from 13 September 1976 and specifically with the parameters for which there are applicable water quality standards. The allowable maximum for fecal coliform organisms is 2000 per 100 ml, and Table 2 shows clearly that this level was violated at sampling locations 1-8. The 2000 per 100 ml count at Station 3 in the Ellis Park Impoundment furthermore exceeds the 200 per 100 ml limit for primary contact recreation waters. There is no obvious explanation for the 53,000 per 100 ml counts at Stations 1 and 2. Station 1 was sampled one month later as part of another study and only 10 fecal coliforms per 100 ml were found at that time. Station 2 is a quarterly monitoring location for which the fecal coliform level has seldom exceeded 2000 per 100 ml over a period of four years. The very high coliform counts (2600-510,000 per 100 ml) at Stations 4 and 6-8 are obviously the result of point source waste inputs from Cedar Rapids. The major sources would be the Cedar Rapids Main Sewage Treatment Plant which serves over 110,000 people and the Cedar Rapids Indian Creek Sewage Treatment Plant which serves 34,000 individuals.

Dissolved oxygen is another important water quality indicative parameter and the allowable minimum for Class B warm water is 4.0 mg/l. The D.O. concentrations shown in Table 2 were all determined during daylight hours, and they show that levels at Stations 1-3 were all at or near saturation. Station 5 near the mouth of Prairie Creek had a D.O. of only 6.6 which is rather low. At Station 4 below the Cedar Rapids Main STP, the D.O. was 3.6 which is below the Iowa Standard. At Station 6 below the Indian Creek STP, the D.O. had risen to 8.1 mg/l largely because of aeration at the old power plant dam. The dissolved oxygen continued to rise to supersaturated levels at downstream locations until it reached a maximum of 18.6 mg/l at Station 9. It is apparent that the combination of a warm, sunny day and an influx of available nutrients allowed a high rate of algal photosynthesis which produced the supersaturated oxygen concentrations. This supposition is supported by the increases in chlorophyll-a concentrations which were observed at the same downstream locations.

TABLE 2

Selected Analytical Data*
Cedar River

13 Sept 76 and 11 Jan 77

| Sampling Location | Fecal** Coliforms | | Dissolved Oxygen | | Ammonia Nitrogen | | TOC | | BOD | | COD | | Turbidity§ | | Filtrable Phosphate | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sept | Jan | Sept | Jan | Sept | Jan | Sept | Jan | Sept | Jan | Sept | Jan | Sept | Jan | Sept | Jan |
| 1 | 53,000† | 600 | 8.8 | 11.4 | 0.08 | 0.84 | 18 | 6.1 | 7 | 4 | 30 | 19 | 13 | 1.5 | 0.20 | 0.65 |
| 2 | 53,000† | 3,000† | 10.4 | 11.0 | 0.02 | 1.0 | 19.8 | 2.6 | 10 | 3 | 28 | 19 | 12 | 1.5 | 0.09 | 0.68 |
| 3 | 2,000† | 1,400 | 9.4 | 11.7 | 0.01 | 1.0 | 21 | 3.9 | 13 | 4 | 38 | 17 | 18 | 1.8 | 0.06 | 0.72 |
| 4 | 510,000† | 120,000† | 3.6† | 12.6 | 1.8 | 1.6 | 19.5 | 6.1 | 12 | 6 | 36 | 20 | 17 | 2.7 | 0.08 | 0.59 |
| 5 (Prairie Creek) | 3,800† | 35,000† | 6.6 | 4.5 | 0.46 | 2.8† | 13.7 | 20.8 | 2 | 40 | 8 | 60 | 30 | 8.8 | 0.07 | 0.14 |
| 6 | 160,000† | 230,000† | 8.1 | 6.5 | 1.3 | 8.1† | 21.3 | 12.5 | 10 | 12 | 44 | 44 | 17 | 3.2 | 0.24 | 0.94 |
| 7 | 8,000† | 5,700† | 11.6 | 13.5 | 1.2 | 7.0† | 26.5 | 9.5 | 10 | 9 | 40 | 27 | 16 | 2.9 | 0.19 | 0.93 |
| 8 | 2,600† | 1,400 | 14.7 | 3.7† | 0.19 | 7.5† | 21 | 14.7 | 10 | 8 | 38 | 27 | 16 | 3.1 | 0.17 | 0.95 |
| 9 | 890 | 1,200 | 18.6 | 3.3† | <0.01 | 7.5† | 26.9 | 8.3 | 10 | 7 | 47 | 29 | 16 | 3.2 | 0.17 | 0.96 |
| 10 | 650 | 120 | 17.9 | 2.9† | 0.02 | 6.7† | 24.7 | 8.6 | 10 | 6 | 44 | 26 | 18 | 3.3 | 0.13 | 0.94 |
| 11 | 60 | 100 | 16.6 | 2.3† | 0.20 | 5.8† | 23.9 | 10.0 | 12 | 6 | 42 | 35 | 18 | 3.2 | 0.12 | 0.96 |
| 12 | <100 | 50 | 16.2 | 3.4† | 0.01 | 5.7† | 26 | 7.7 | 13 | 5 | 51 | 54 | 22 | 3.2 | 0.06 | 0.83 |
| 13 | <100 | <10 | 16.1 | 3.3† | 0.02 | 5.8† | 26.2 | 6.5 | 14 | 5 | 61 | 23 | 28 | 3.3 | 0.04 | 0.84 |

* All units are mg/l unless otherwise designated.

** Organisms per 100 ml.

§ JTU

†Violations of Iowa Water Quality Standards.

In addition to the daytime D.O.'s, several measurements were taken before sunrise when minimum D.O.'s can be expected to occur. During the dark period, algal photosynthesis ceases and algal respiration is added to heterotrophic respiration, which can greatly reduce D.O. concentrations from daytime maxima. Figure B clearly shows the sag in oxygen concentrations below the Cedar Rapids STP as the D.O. dropped from 9.0 mg/l at Station 3 to 0.3 mg/l at Station 4. By Station 7 more than fifteen miles downstream, the D.O. had risen to 3.3 mg/l which is still below the allowable minimum.

Figure B also shows similar data for 1970 which were collected at a higher discharge volume (1300 cfs). It is readily apparent that at a higher flow volume, both the magnitude and duration of the oxygen depression were less than in 1976 when the discharge volume was 568 cfs. The minimum D.O. at Station 4 was 2.8 mg/l, and it had risen to 5.2 mg/l by Station 7.

Ammonia nitrogen is another important component of water quality for which the State of Iowa has a maximum allowable concentration of 2.0 mg/l for Class B warm waters. This standard was not exceeded at any Cedar River location during the summer survey. Maximum ammonia concentrations were observed below Cedar Rapids at Station 4 (1.6 mg/l) and Station 6 (1.3 mg/l). Sufficient dissolved oxygen together with warm water temperatures allowed rapid oxidation of the ammonia to nitrate so that ammonia concentrations at locations 8 and 9 were only 0.19 and <0.01 mg/l respectively.

Figure B again allows a comparison of present data with ammonia data from 1970. As with the D.O., the situation at a higher flow volume was less severe. The observed maximum for ammonia nitrogen was only 0.05 mg/l at Site 6.

Our analyses also included several other important water quality indicative parameters for which there are no specific water quality standards. The BOD (biochemical oxygen demand) was rather high throughout the study area. It ranged from 7-13 mg/l above Cedar Rapids and reached a maximum of 14 mg/l at Station 13.

The COD (chemical oxygen demand) which also indicates the organic load of the river exhibited a similar pattern. COD's were 28-38 mg/l upstream of Cedar Rapids and reached a peak of 61 mg/l well downstream at Station 13.

Filtrable phosphate phosphorus increased below Cedar Rapids from 0.06 mg/l at Station 3 to 0.24 mg/l at Station 6. The filtrable phosphate then exhibited a consistent reduction in concentration to a minimum of 0.04 at Station 13. Such a trend could be associated with the uptake of available ortho-phosphate by actively photosynthesizing phytoplankton.

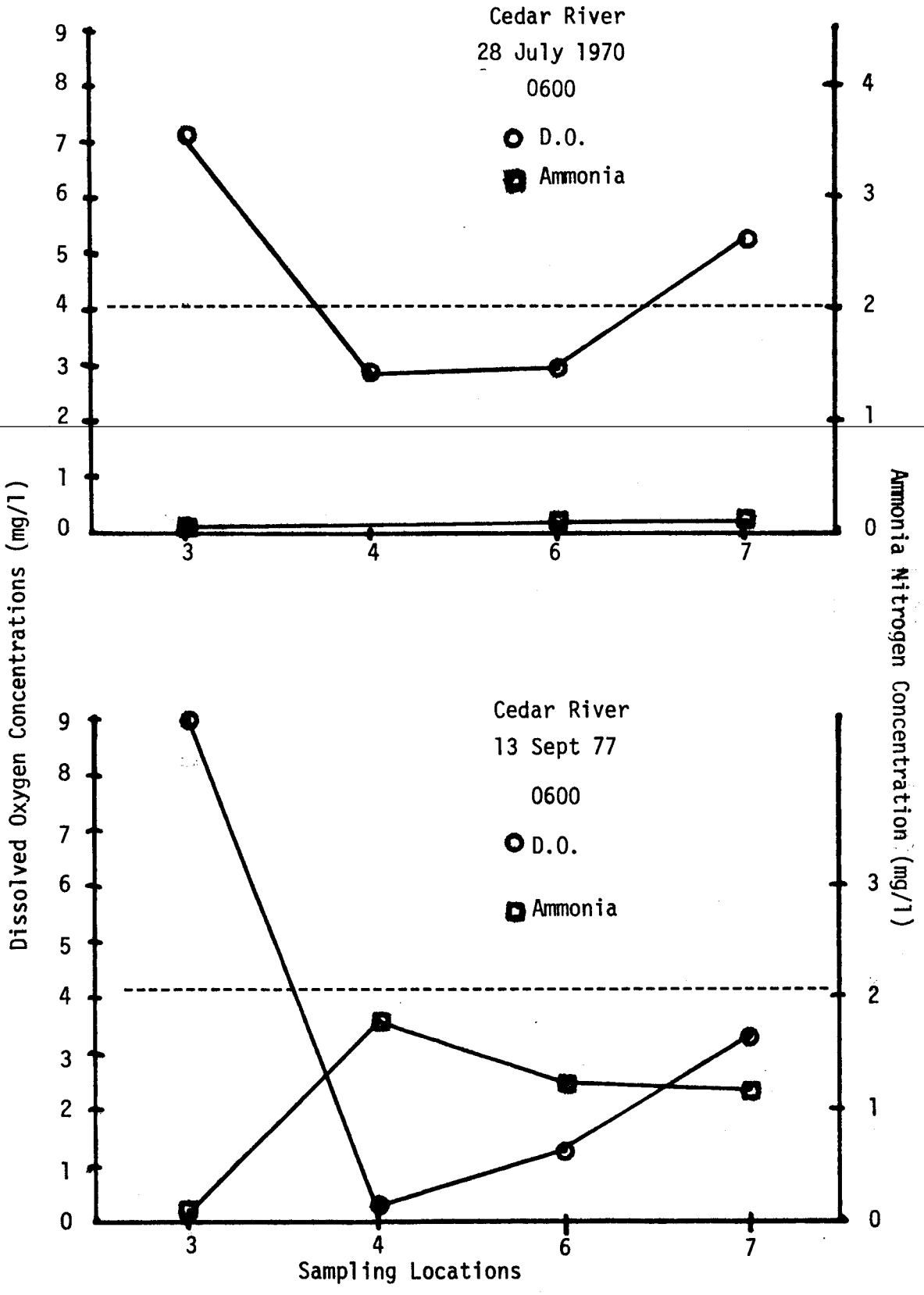



Fig. B Ammonia Nitrogen and Dissolved Oxygen Variation
28 July 70 and 13 Sept 76
Cedar River

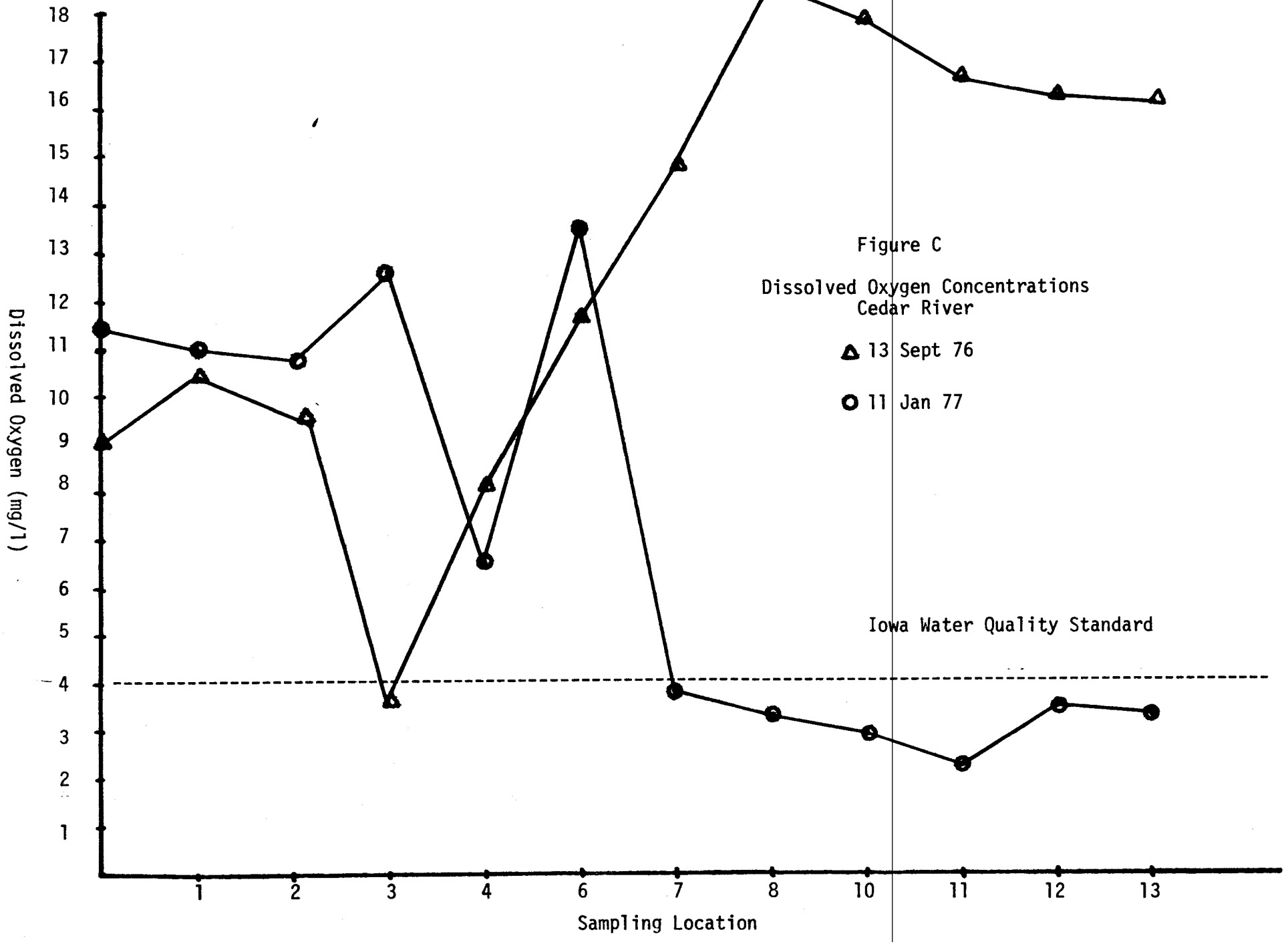
As mentioned above, conditions during the winter sampling period (11 January 1977) were significantly different than those of the summer. The volume of flow at Cedar Rapids (318 cfs) was almost equal to minimum protected flow for the Cedar River (7Q10) below which Water Quality Standards are not enforceable. Additionally, nearly all of the river was bridged by a thick layer of ice.

Table 2 shows that fecal coliform levels were much lower upstream (600 per 100 ml at Station 1) than during the summer. Large increases were again observed below the major waste inputs in Cedar Rapids. Fecal coliforms were 120,000 per 100 ml at Station 4 below the Cedar Rapids Main STP and 230,000 per 100 ml at Location 6 downstream from the Indian Creek STP. The extent of bacterial contamination was less however, in spite of the lower flow. Fecal coliforms had declined to 1400 per 100 ml at Station 8 and to <10 per 100 ml at Station 13. The duration of survival of these enteric organisms is much shorter at 0°C than at summer water temperatures. The low flow did result in a significantly higher level of fecal coliforms (35,000 per 100 ml) in Prairie Creek than in the summer (3800 per 100 ml).

Table 2 also shows that at Stations 1-4 concentrations of dissolved oxygen (11.0-12.6 mg/l) were adequate in spite of the low flow and thick ice cover. In fact, the maximum D.O. (12.6 mg/l) was at Station 4 below the Cedar Rapids Main STP. Such a high concentration was probably the result of reaeration from the passage over a midtown dam, and the fact that at 0°C the BOD from the treatment plant would be exerted very slowly.

At Station 6, the D.O. was down to 6.5 mg/l, but passage over the power dam had resulted in considerable open water which persisted to some degree down to Station 7 where the D.O. was 13.5. Below Station 7 the river was again completely bridged by ice. The lack of reaeration combined with the oxygen-demanding wastes from Cedar Rapids resulted in dissolved oxygen concentration below 4.0 mg/l at all downstream sampling locations.

Figure C presents the D.O. data for both the summer and winter surveys. During the summer, the oxygen sag occurred rapidly after the waste input but the impact was not extensive during the day due to atmospheric reaeration and algal photosynthesis. In fact, the 4.0 mg/l standard was not violated during the daylight hours. The graph also shows that under winter conditions, the impact of the waste input on D.O.'s was delayed due to a lower rate of bacterial metabolism and from physical reaeration at dams and open water areas. However, upon reestablishment of the ice cover below Station 7, which prevented both physical and photosynthetic reaeration, and the exertion of the BOD; the D.O. dropped severely and remained low throughout the lower reach of the river. At the minimum protected flow, D.O.'s in the Cedar River were below 4.0 mg/l for more than sixty river miles.


18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
Dissolved Oxygen (mg/l)
1
2
3
4
6
7
8
10
11
12
13
Sampling Location
Figure C
Dissolved Oxygen Concentrations
Cedar River
13 Sept 76
11 Jan 77
Iowa Water Quality Standard

Ammonia nitrogen concentrations upstream of Cedar Rapids were at acceptable levels (0.84-1.0 mg/l) in view of the severe winter conditions. The concentration in Prairie Creek (2.8 mg/l) however, was above the 2.0 mg/l standard. Below the Cedar Rapids Main Plant at Station 4, the ammonia had risen to only 1.6 mg/l. But by Station 6 the ammonia level was 8.1 mg/l, and it remained above 2.0 mg/l at each remaining downstream location. The 0°C water temperatures below the ice cover allowed little or no bacterial nitrification of ammonia.

Figure D shows the winter ammonias clearly as well as comparing them to summer concentrations. In the summer after a slight pulse below point source waste inputs, the ammonia concentrations steadily declined as ammonia was oxidized to nitrate or assimilated by algae. During the winter at a lower flow, the rise in ammonia below Cedar Rapids was even greater, but the elevated levels then persisted at downstream locations due to the lack of nitrification. The ammonia concentration was still 5.8 mg/l at Station 13 and more than eighty miles of the Cedar River violated the 2.0 mg/l Iowa Standard.

Other water quality parameters also showed significant differences from summer conditions. BOD which ranged from 3 to 12 mg/l and TOC (2.6-14.7 ppm) were much lower during the winter than during the summer survey. COD's were also consistently lower at low water flows. Turbidities were significantly lower in January (1.5-3.3 JTU) due to the lack of runoff and the low phytoplankton activity. Filtrable phosphate was appreciably higher than during the summer as it ranged from 0.59 mg/l to 0.96 mg/l. The reason is that soluble orthophosphates tend to accumulate during the winter months when little photosynthesis occurs.

The water quality of Prairie Creek was significantly reduced at the low winter flows from conditions found in September. Organic nitrogen (3.0 mg/l), total organic carbon (20.8 mg/l), BOD (40 mg/l), and COD (60 mg/l) were all well above summer concentrations. Such concentrations were apparently the result of very low stream flows combined with a series of small point source waste discharges which Prairie Creek receives along its length.

Samples for phenol analysis were collected at Stations 1 and 13 because there is a lack of information on phenol levels in Iowa streams. The present water quality standard for phenol is 1 µg/l and our results found 7 µg/l at Station 1 and 6 µg/l at Station 13. There are known sources of phenol upstream of Station 1 which could be the origin of what was found downstream. Some phenolic compounds are refractory to biological degredation and can be transported long distances in water.

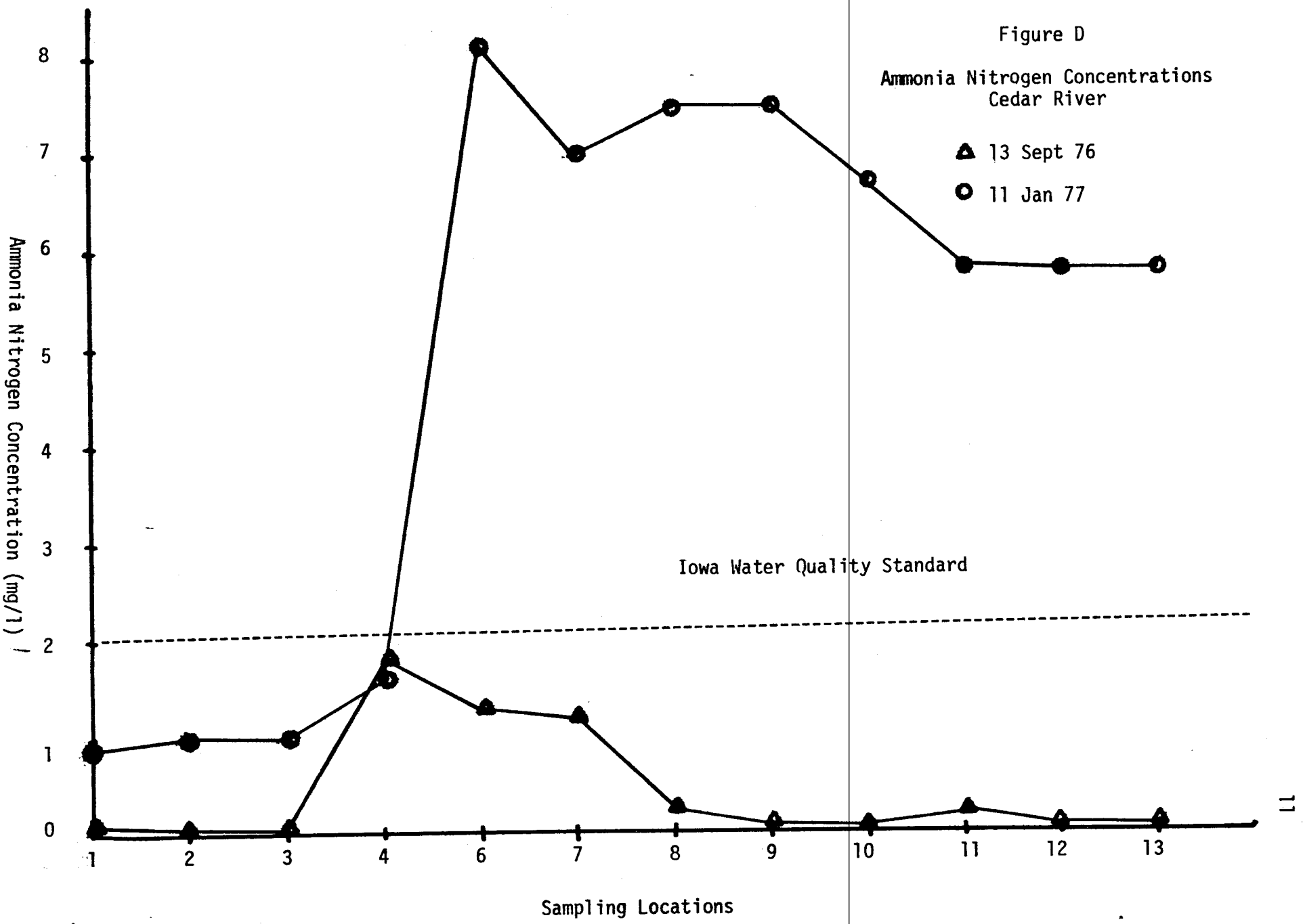


Figure D
Ammonia Nitrogen Concentrations
Cedar River
13 Sept 76
11 Jan 77
Iowa Water Quality Standard
Ammonia Nitrogen Concentration (mg/l)
0
1
2
3
4
5
6
7
8
1
2
3
4
6
7
8
9
10
11
12
13
Sampling Locations

SUMMARY AND CONCLUSIONS

On 23 September 1976 at a flow of 568 cfs, at least sixteen miles of the Cedar River downstream of Cedar Rapids were found to be below 4.0 mg/l of dissolved oxygen at 6:00 a.m. It can be concluded that at a discharge rate less than twice the 7Q10 and the absence of photosynthetically produced oxygen, the Cedar River was not able to assimilate the waste discharges from Cedar Rapids and maintain adequate dissolved oxygen concentrations.

Additionally, the river was shown to violate the water quality standards for fecal coliform organisms for at least thirty river miles below Cedar Rapids which included the Palisades impoundment, and the Ellis Park impoundment above the major waste inputs. The very high fecal coliform counts (53,000 per 100 ml) at Vinton and Palo were inconclusive in that they are much higher than any other measurements taken at either site, and no source was readily apparent.

On 11 January 1977 when the discharge rate at Cedar Rapids was nearly equal to the minimum protected flow and the river was completely bridged with ice at most locations, the situation was even more severe. The coliform contamination was somewhat less as it extended approximately 20 miles below Cedar Rapids, but this was due primarily to the reduced survival rate of enteric organisms at 0°C.

The entire length of river from sixteen miles below Cedar Rapids to near its confluence with the Iowa River was below the 4.0 mg/l of dissolved oxygen which is required by Iowa Standards. In addition the 2.0 mg/l ammonia nitrogen standard was violated from Cedar Rapids to near Conesville (Station 13).

It can be concluded that at the minimum protected flow and heavy ice cover, the Cedar River is not able to assimilate the point source waste discharges from Cedar Rapids and still maintain conditions adequate to support the aquatic life community.

Finally, samples taken near the mouth of Prairie Creek in both summer and winter exhibited degraded water quality. Conditions were worse during the very low flows in January, and in fact conditions were worse than in the Cedar River below Cedar Rapids. It is obvious that sufficient water was not present to allow the creek to accept the numerous small waste discharges it receives and still meet water quality standards.

Dennis M Geary

Dennis M Geary, M.S.
Limnologist

15 February 1977

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# APPENDIX

LIMNOLOGICAL SURVEY

## WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Vinton | Palo | Cedar Rapids |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Hwy 101 Bridge | Co.Rd. E-36 Bridge | Edgewood Road Bridge |
| Date Collected | 13 Sept.1976 | 13 Sept. 1976 | 13 Sept. 1976 |
| Date Received | 14 Sept.1976 | 14 Sept. 1976 | 14 Sept. 1976 |
| Lab Number | 1079 | 1080 | 1081 |
| | FIELD DATA | | |
| Collection Time | 10:20 | 11:10 | 11:30 |
| pH | | | |
| Temperature | 18.2°C | 19.6°C | 20°C |
| Dissolved Oxygen | | | |
| | BACTERIOLOGICAL EXAMINATION | | |
| Fecal Coliform/100 ml | 53,000 >24 hrs | 53,000 >24 hrs | 2000 >24 hrs |
| | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | | |
| Conductance (micromhos) | 470 | 430 | 410 |
| MBAS (as LAS) | | | |
| pH (units) | 8.2 | 8.95 | 8.9 |
| Alkalinity: P | none | 16.0 | 9.0 |
| T | 169 | 147 | 137 |
| NITROGEN: Organic N | 1.5 | 1.6 | 2.2 |
| Ammonia N | 0.08 | 0.02 | <0.01 |
| Nitrite N | | | |
| Nitrate N | 0.4 | <0.1 | <0.1 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 336 | 333 | 333 |
| Fixed | 218 | 211 | 205 |
| Volatile | 118 | 122 | 128 |
| Filtrable Residue T | 292 | 266 | 236 |
| F | 204 | 175 | 150 |
| V | 88 | 91 | 86 |
| Nonfiltrable Residue T | 15 | 43 | 62 |
| F | 4 | 12 | 28 |
| V | 11 | 31 | 34 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.20 | 0.09 | 0.06 |
| Total P | 0.44 | 0.37 | 0.39 |
| Dissolved Oxygen | 8.8 | 10.4 | 9.4 |
| BOD | 7 | 10 | 13 |
| COD | 30 | 28 | 38 |
| Grease or Oil | | | |
| Turbidity (JTU) | 13 | 12 | 18 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 24 | 27 | 27 |
| Sulfate ($SO_4^{--}$) | | | |
| Chlorophyll a | 62 µg/L | 136 µg/L | 135 µg/L |

REMARKS:

COLLECTOR REPORT TO: Geary
Limnology Division
State Hygienic Lab
Des Moines Branch

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

OCT 28 1976

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# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Cedar Rapids | Cedar Rapids | Mount Vernon |
| Source | Cedar River | Prairie Creek | Cedar River |
| Specific Location | CNW RR Bridge | C street Bridge | Hwy 30 Bridge W/Mt. Vernon |
| Date Collected | 13 Sept. 1976 | 13 Sept. 1976 | 13 Sept. 1976 |
| Date Received | 14 Sept. 1976 | 14 Sept. 1976 | 14 Sept. 1976 |
| Lab Number | 1082 | 1083 | 1084 |
| | FIELD DATA | | |
| Collection Time | 12:45 | 12:30 | 13:20 |
| pH | | | |
| Temperature | 21.6°C | 20.2°C | 22.6°C |
| Dissolved Oxygen | | | |
| | BACTERIOLOGICAL EXAMINATION | | |
| Fecal Coliform/100 ml | 510,000 >24 hrs | 3,800 >24 hrs | 160,000 >24 hrs |
| | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | | |
| Conductance (micromhos) | 520 | 600 | 500 |
| MBAS (as LAS) | | | |
| pH (units) | 7.7 | 7.85 | 7.75 |
| Alkalinity: P | none | none | none |
| T | 142 | 192 | 144 |
| NITROGEN: Organic N | 2.5 | 0.71 | 2.2 |
| Ammonia N | 1.8 | 0.46 | 1.3 |
| Nitrite N | | | |
| Nitrate N | 0.1 | 0.2 | 0.3 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 379 | 482 | 357 |
| Fixed | 245 | 361 | 231 |
| Volatile | 134 | 121 | 126 |
| Filtrable Residue T | 302 | 388 | 298 |
| F | 207 | 290 | 195 |
| V | 95 | 98 | 103 |
| Nonfiltrable Residue T | 42 | 69 | 52 |
| F | 19 | 52 | 22 |
| V | 23 | 17 | 30 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.08 | 0.07 | 0.24 |
| Total P | 0.50 | 0.26 | 0.62 |
| Dissolved Oxygen | 3.6 | 6.6 | 8.1 |
| BOD | 12 | 2 | 10 |
| COD | 36 | 8 | 44 |
| Grease or Oil | | | |
| Turbidity (JTU) | 17 | 30 | 17 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 49 | 26 | 46 |
| Sulfate ($SO_4^{--}$) | | | |
| Chlorophyll a | 103 µg/L | 10 µg/L | 111 µg/L |

REMARKS:

COLLECTOR REPORT TO: Geary
Limnology Division
State Hygienic Lab
Des Moines, Ia.

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

OCT 28 1976

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Mt Vernon | Cedar Bluff | Cedar Valley |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Hwy 1 Bridge | Co.Rd. F28 Bridge T81N R4W Sec. 33 | Co.Rd. F-36 Bridge T80N R3W Sec. 18 |
| Date Collected | 13 Sept.1976 | 13 Sept. 1976 | 13 Sept. 1976 |
| Date Received | 14 Sept. 1976 | 14 Sept. 1976 | 14 Sept. 1976 |
| Lab Number | 1085 | 1086 | 1087 |
| | | FIELD DATA | |
| Collection Time | 13:48 | 14:20 | 14:50 |
| pH | | | |
| Temperature | 24.8°C | 22.8°C | 24.2°C |
| Dissolved Oxygen | | | |
| | | BACTERIOLOGICAL EXAMINATION | |
| Fecal Coliform/100 ml | 8,000 >24 hrs | 2,600 >24 hrs | 890 <24 hrs |
| | | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | |
| Conductance (micromhos) | 530 | 540 | 520 |
| MBAS (as LAS) | | | |
| pH (units) | 8.0 | 8.4 | 8.8 |
| Alkalinity: P | none | 3.0 | 12.0 |
| T | 147 | 148 | 150 |
| NITROGEN: Organic N | 2.1 | 2.4 | 2.5 |
| Ammonia N | 1.2 | 0.19 | <0.01 |
| Nitrite N | | | |
| Nitrate N | 0.8 | 1.2 | 1.0 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 379 | 382 | 390 |
| Fixed | 262 | 261 | 275 |
| Volatile | 117 | 121 | 115 |
| Filtrable Residue T | 310 | 307 | 310 |
| F | 226 | 220 | 217 |
| V | 84 | 87 | 93 |
| Nonfiltrable Residue T | 49 | 52 | 61 |
| F | 23 | 24 | 26 |
| V | 26 | 28 | 35 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.19 | 0.17 | 0.17 |
| Total P | 0.52 | 0.51 | 0.51 |
| Dissolved Oxygen | 11.6 | 14.7 | 18.6 |
| BOD | 10 | 10 | 10 |
| COD | 40 | 38 | 47 |
| Grease or Oil | | | |
| Turbidity (JTU) | 16 | 16 | 16 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 48 | 51 | 50 |
| Sulfate ($SO_4^{--}$) | | | |
| Chlorophyll a | 150 µg/L | 276 µg/L | 319 µg/L |

REMARKS:

COLLECTOR
REPORT TO

Geary
Limnology Division
State Hygienic Lab
Des Moines Branch

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

OCT [illegible] 1976

# LIMNOLOGY SURVEY
## WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Rochester | Moscow | Muscatine |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Co.Rd. F44 Bridge T79N R3W Sec. 11 | T78N R2W Sec. 9 Hwy 6 Bridge | Hwy 22 Bridge W/Muscatine |
| Date Collected | 13 Sept. 1976 | 13 Sept. 1976 | 13 Sept. 1976 |
| Date Received | 14 Sept. 1976 | 14 Sept. 1976 | 14 Sept. 1976 |
| Lab Number | 1088 | 1089 | 1090 |
| **FIELD DATA** | | | |
| Collection Time | 15:10 | 15:40 | 16:05 |
| pH | | | |
| Temperature | 23°C | 23°C | 23°C |
| Dissolved Oxygen | | | |
| **BACTERIOLOGICAL EXAMINATION** | | | |
| Fecal Coliform/100 ml | 650 >24 hrs | 60 >24 hrs | <100 <24 hrs |
| **CHEMICAL ANALYSIS (as mg/l unless designated otherwise)** | | | |
| Conductance (micromhos) | 520 | 500 | 470 |
| MBAS (as LAS) | | | |
| pH (units) | 8.9 | 9.1 | 9.1 |
| Alkalinity: P | 10.0 | 18.0 | 19.0 |
| T | 149 | 152 | 136 |
| NITROGEN: Organic N | 2.5 | 2.5 | 2.3 |
| Ammonia N | 0.02 | 0.20 | 0.01 |
| Nitrite N | | | |
| Nitrate N | 0.8 | <0.1 | <0.1 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 398 | 379 | 370 |
| Fixed | 275 | 259 | 248 |
| Volatile | 123 | 120 | 122 |
| Filtrable Residue T | 314 | 290 | 273 |
| F | 214 | 229 | 199 |
| V | 100 | 61 | 74 |
| Nonfiltrable Residue T | 62 | 73 | 79 |
| F | 25 | 36 | 41 |
| V | 37 | 37 | 38 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.13 | 0.12 | 0.06 |
| Total P | 0.52 | 0.46 | 0.48 |
| Dissolved Oxygen | 17.9 | 16.6 | 16.2 |
| BOD | 10 | 12 | 13 |
| COD | 44 | 42 | 51 |
| Grease or Oil | | | |
| Turbidity (JTU) | 18 | 18 | 22 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 52 | 48 | 45 |
| Sulfate ($SO_4^{--}$) | | | |
| Chlorophyll a | 292 µg/L | 244 µg/L | 261 µg/L |

REMARKS:

COLLECTOR
REPORT TO

Geary
Limnology Division S
State Hygienic Lab
Des Moines Branch

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

OCT 28 1976

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Conesville | | |
| Source | Cedar River | | |
| Specific Location | Co.Rd. G28 Bridge T76N R4W Sec. 2 | | |
| Date Collected | 13 Sept. 1976 | | |
| Date Received | 14 Sept. 1976 | | |
| Lab Number | 1091 | | |
| | | FIELD DATA | |
| Collection Time | 16:30 | | |
| pH | | | |
| Temperature | 23.6°C | | |
| Dissolved Oxygen | | | |
| | BACTERIOLOGICAL EXAMINATION | | |
| Fecal Coliform/100 ml | <100 <24 hrs | | |
| | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | | |
| Conductance (micromhos) | 450 | | |
| MBAS (as LAS) | | | |
| pH (units) | 9.1 | | |
| Alkalinity: P | 18.0 | | |
| T | 121 | | |
| NITROGEN: Organic N | 2.5 | | |
| Ammonia N | 0.02 | | |
| Nitrite N | | | |
| Nitrate N | <0.1 | | |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 382 | | |
| Fixed | 241 | | |
| Volatile | 141 | | |
| Filtrable Residue T | 256 | | |
| F | 182 | | |
| V | 74 | | |
| Nonfiltrable Residue T | 98 | | |
| F | 58 | | |
| V | 40 | | |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.04 | | |
| Total P | 0.48 | | |
| Dissolved Oxygen | 16.1 | | |
| BOD | 14 | | |
| COD | 61 | | |
| Grease or Oil | | | |
| Turbidity (JTU) | 28 | | |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 44 | | |
| Sulfate ($SO_4^{--}$) | | | |
| Chlorophyll a | 265 µg/L | | |

REMARKS:

COLLECTOR REPORT TO

Geary
Limnology Division
State Hygienic Lab
Des Moines Branch

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

OCT 23 1976

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Vinton | Palo | Cedar Rapids |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Hwy 101 bridge | Co.Rd. E-36 bridge | Edgewood Road bridge |
| Date Collected | 11 January 1977 | 11 January 1977 | 11 January 1977 |
| Date Received | 12 January 1977 | 12 Januray 1977 | 12 January 1977 |
| Lab Number | 2710 | 2711 | 2712 |
| **FIELD DATA** | | | |
| Collection Time | 0950 | 11:00 | 11:50 |
| pH | | | |
| Temperature | 0°C | 0°C | 0°C |
| Dissolved Oxygen | | | |
| **BACTERIOLOGICAL EXAMINATION** | | | |
| Fecal Coliform/100 ml | 600 (>24 hrs.) | 3,000 (<24 hrs.) | 1,400 (<24 hrs.) |
| **CHEMICAL ANALYSIS (as mg/l unless designated otherwise)** | | | |
| Conductance (micromhos) | 700 | 710 | 740 |
| MBAS (as LAS) | | | |
| pH (units) | 7.4 | 7.6 | 7.65 |
| Alkalinity: P | none | none | none |
| T | 260 | 270 | 268 |
| NITROGEN: Organic N | 0.81 | 0.72 | 0.65 |
| Ammonia N | 0.84 | 1.0 | 1.0 |
| Nitrite N | | | |
| Nitrate N | 3.9 | 3.7 | 3.9 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 422 | 429 | 457 |
| Fixed | 353 | 362 | 373 |
| Volatile | 69 | 67 | 84 |
| Filtrable Residue T | 398 | 403 | 431 |
| F | 346 | 353 | 367 |
| V | 52 | 50 | 64 |
| Nonfiltrable Residue T | 1 | 2 | 3 |
| F | 0 | 1 | 2 |
| V | 1 | 1 | 1 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.65 | 0.68 | 0.72 |
| Total P | 0.72 | 0.76 | 0.72 |
| Dissolved Oxygen | 11.4 | 11.0 | 10.7 |
| BOD | 4 | 3 | 4 |
| COD | 19 | 19 | 17 |
| Grease or Oil | | | |
| Turbidity (JTU) | 1.5 | 1.5 | 1.8 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 33 | 34 | 37 |
| Sulfate ($SO_4^{--}$) | | | |
| Total Organic Carbon | 6.1 | 2.6 | 3.9 |
| Chlorophyll a | 19 µg/L | 25 µg/L | 30 µg/L |
| Phenol | 7 µg/L | | |
| REMARKS: | Complete ice cover. | Complete ice cover. | Complete ice cover. |

COLLECTOR
REPORT TO

Geary
Limnology Division
State Hygienic Laboratory
Des Moines, Iowa

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Cedar Rapids | Cedar Rapids | Mount Vernon |
| Source | Cedar River | Prairie Creek | Cedar River |
| Specific Location | CNW RR bridge | C Street bridge | Hwy 30 bridge W of Mt. Vernon |
| Date Collected | 11 January 1977 | 11 January 1977 | 11 January 1977 |
| Date Received | 12 January 1977 | 12 January 1977 | 12January 1977 |
| Lab Number | 2713 | 2714 | 2715 |
| | | FIELD DATA | |
| Collection Time | 13:00 | 12:30 | 13:20 |
| pH | | | |
| Temperature | 0°C | 0°C | 0°C |
| Dissolved Oxygen | | | |
| | | BACTERIOLOGICAL EXAMINATION | |
| Fecal Coliform/100 ml | 120,000 (<24 hrs.) | 35,000 (<24 hrs.) | 230,000 (<24 hrs.) |
| | | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | |
| Conductance (micromhos) | 780 | 920 | 930 |
| MBAS (as LAS) | | | |
| pH (units) | 7.8 | 7.55 | 7.6 |
| Alkalinity: P | none | none | none |
| T | 275 | 231 | 294 |
| NITROGEN: Organic N | 0.93 | 3.0 | 1.8 |
| Ammonia N | 1.6 | 2.8 | 8.1 |
| Nitrite N | | | |
| Nitrate N | 3.7 | 1.6 | 2.8 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 479 | 662 | 537 |
| Fixed | 396 | 533 | 443 |
| Volatile | 83 | 129 | 94 |
| Filtrable Residue T | 447 | 593 | 485 |
| F | 389 | 521 | 435 |
| V | 58 | 72 | 50 |
| Nonfiltrable Residue T | 7 | 18 | 7 |
| F | 2 | 10 | 2 |
| V | 5 | 8 | 5 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.59 | 0.14 | 0.94 |
| Total P | 0.78 | 0.29 | 1.2 |
| Dissolved Oxygen | 12.6 | 4.5 | 6.5 |
| BOD | 6 | 40 | 12 |
| COD | 20 | 60 | 44 |
| Grease or Oil | | | |
| Turbidity (JTU) | 2.7 | 8.8 | 3.2 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 49 | 51 | 76 |
| Sulfate ($SO_4^{--}$) | | | |
| Total Organic Carbon | 6.1 | 20.8 | 12.5 |
| Chlorophyll a | 30 µg/L | 36 µg/L | 1 µg/L |
| REMARKS: | Complete ice cover. | Complete ice cover. | 50% ice cover. |

COLLECTOR REPORT TO: Geary
Limnology Division
State Hygienic Laboratory
Des Moines, Iowa

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

FEB 2 1977

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Mount Vernon | Cedar Bluff | Cedar Valley |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Hwy 1 bridge S of Mt. Vernon | Co.Rd. F-28 bridge; T81N, R4W, Sec. 33 | Co.Rd. F-36 bridge; T80N, R3W, Sec. 18 |
| Date Collected | 11 January 1977 | 11 January 1977 | 11 January 1977 |
| Date Received | 12 January 1977 | 12 January 1977 | 12 January 1977 |
| Lab Number | 2716 | 2717 | 2718 |
| | FIELD DATA | | |
| Collection Time | 13:45 | 14:30 | 15:00 |
| pH | | | |
| Temperature | 0°C | 0°C | 0°C |
| Dissolved Oxygen | | | |
| | BACTERIOLOGICAL EXAMINATION | | |
| Fecal Coliform/100 ml | 5,700 (<24 hrs.) | 1,400 (<24 hrs.) | 1,200 (<24 hrs.) |
| | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | | |
| Conductance (micromhos) | 910 | 920 | 960 |
| MBAS (as LAS) | | | |
| pH (units) | 7.5 | 7.3 | 7.5 |
| Alkalinity: P | none | none | none |
| T | 298 | 293 | 306 |
| NITROGEN: Organic N | 1.9 | 2.3 | 1.8 |
| Ammonia N | 7.0 | 7.5 | 7.5 |
| Nitrite N | | | |
| Nitrate N | 2.7 | 2.5 | 2.4 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 529 | 547 | 548 |
| Fixed | 438 | 441 | 455 |
| Volatile | 91 | 106 | 93 |
| Filtrable Residue T | 481 | 516 | 517 |
| F | 428 | 448 | 443 |
| V | 53 | 68 | 74 |
| Nonfiltrable Residue T | 6 | 8 | 6 |
| F | 3 | 5 | 2 |
| V | 3 | 3 | 4 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.93 | 0.95 | 0.96 |
| Total P | 1.1 | 1.2 | 1.2 |
| Dissolved Oxygen | 13.5 | 3.7 | 3.3 |
| BOD | 9 | 8 | 7 |
| COD | 27 | 27 | 29 |
| Grease or Oil | | | |
| Turbidity (JTU) | 2.9 | 3.1 | 3.2 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 74 | 79 | 80 |
| Sulfate ($SO_4^{--}$) | | | |
| Total Organic Carbon | 9.5 | 14.7 | 3.3 |
| Chlorophyll a | 26 µg/L | 35 µg/L | 43 µg/L |
| REMARKS: | 95% ice cover. | Complete ice cover. | Complete ice cover. |

COLLECTOR
REPORT TO

Geary
Limnology Division
State Hygienic Lab
Des Moines, Iowa

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

FEB 2 1977

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Rochester | Moscow | Muscatine |
| Source | Cedar River | Cedar River | Cedar River |
| Specific Location | Co.Rd. F-44 bridge; T79N, R3W, Sec. 11 | Hwy 6 bridge, T78N, R2W, Sec. 9 | Hwy 22 bridge W of Muscatine |
| Date Collected | 11 January 1977 | 11 January 1977 | 11 January 1977 |
| Date Received | 12 January 1977 | 12 January 1977 | 12 January 1977 |
| Lab Number | 2719 | 2720 | 2721 |
| **FIELD DATA** | | | |
| Collection Time | 15:40 | 16:15 | 16:55 |
| pH | | | |
| Temperature | 0°C | 0°C | 0°C |
| Dissolved Oxygen | | | |
| **BACTERIOLOGICAL EXAMINATION** | | | |
| Fecal Coliform/100 ml | 120 (<24 hrs.) | 100 (<24 hrs.) | 50 (<24 hrs.) |
| **CHEMICAL ANALYSIS (as mg/l unless designated otherwise)** | | | |
| Conductance (micromhos) | 940 | 910 | 870 |
| MBAS (as LAS) | | | |
| pH (units) | 7.5 | 7.45 | 7.5 |
| Alkalinity: P | none | none | none |
| T | 306 | 310 | 308 |
| NITROGEN: Organic N | 1.2 | 0.21 | 0.32 |
| Ammonia N | 6.7 | 5.8 | 5.7 |
| Nitrite N | | | |
| Nitrate N | 2.3 | 2.2 | 2.4 |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 539 | 543 | 524 |
| Fixed | 445 | 444 | 421 |
| Volatile | 94 | 99 | 103 |
| Filtrable Residue T | 504 | 504 | 495 |
| F | 443 | 450 | 441 |
| V | 61 | 54 | 54 |
| Nonfiltrable Residue T | 6 | 7 | 9 |
| F | 2 | 3 | 3 |
| V | 4 | 4 | 6 |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.94 | 0.96 | 0.83 |
| Total P | 1.1 | 1.1 | 1.1 |
| Dissolved Oxygen | 2.9 | 2.3 | 3.4 |
| BOD | 6 | 6 | 5 |
| COD | 26 | 35 | 54 |
| Grease or Oil | | | |
| Turbidity (JTU) | 3.3 | 3.2 | 3.2 |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 75 | 73 | 68 |
| Sulfate ($SO_4^{--}$) | | | |
| Total Organic Carbon | 8.6 | 10.0 | 7.7 |
| Chlorophyll a | 46 µg/L | 51 µg/L | 52 µg/L |
| REMARKS: | Complete ice cover. | Complete ice cover. | Complete ice cover. |

COLLECTOR
REPORT TO

Geary
Limnology Division
State Hygienic Lab
Des Moines, Iowa

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

FEB 2 1977

# WATER QUALITY REPORT

STATE HYGIENIC LABORATORY, Des Moines Branch
The University of Iowa
E 7th & Court, Rm 405, Des Moines, Iowa 50309

| | | | |
|---|---|---|---|
| Town | Conesville | | |
| Source | Cedar River | | |
| Specific Location | Co.Rd. G-28 bridge, T76N, R4W, Sec. 2 | | |
| Date Collected | 11 January 1977 | | |
| Date Received | 12 January 1977 | | |
| Lab Number | 2722 | | |
| | | FIELD DATA | |
| Collection Time | 17:40 | | |
| pH | | | |
| Temperature | 0°C | | |
| Dissolved Oxygen | | | |
| | BACTERIOLOGICAL EXAMINATION | | |
| Fecal Coliform/100 ml | <10 (<24 hrs.) | | |
| | CHEMICAL ANALYSIS (as mg/l unless designated otherwise) | | |
| Conductance (micromhos) | 890 | | |
| MBAS (as LAS) | | | |
| pH (units) | 7.5 | | |
| Alkalinity: P | none | | |
| T | 308 | | |
| NITROGEN: Organic N | 0.78 | | |
| Ammonia N | 5.8 | | |
| Nitrite N | | | |
| Nitrate N | 2.3 | | |
| Nitrate as $NO_3$ | | | |
| RESIDUE: Total | 534 | | |
| Fixed | 431 | | |
| Volatile | 103 | | |
| Filtrable Residue T | 491 | | |
| F | 433 | | |
| V | 58 | | |
| Nonfiltrable Residue T | 7 | | |
| F | 4 | | |
| V | 3 | | |
| Settleable Matter (ml/l) | | | |
| PHOSPHATE: Filtrable P | 0.84 | | |
| Total P | 1.0 | | |
| Dissolved Oxygen | 3.3 | | |
| BOD | 5 | | |
| COD | 23 | | |
| Grease or Oil | | | |
| Turbidity (JTU) | 3.3 | | |
| Total Hardness (as $CaCO_3$) | | | |
| Calcium ($Ca^{++}$) | | | |
| Magnesium ($Mg^{++}$) | | | |
| Chloride ($Cl^-$) | 67 | | |
| Sulfate ($SO_4^{--}$) | | | |
| Total Organic Carbon | 6.5 | | |
| Chlorophyll a | 48 µg/L | | |
| Phenol | 6 µg/L | | |

REMARKS: Complete ice cover.

COLLECTOR REPORT TO: Geary
Limnology Division
State Hygienic Lab
Des Moines, Iowa

R. L. Morris, Ph.D.
Associate Director & Principal Chemist

FEB 2 1977