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A REPORT FROM

*The State Hygienic  
Laboratory*




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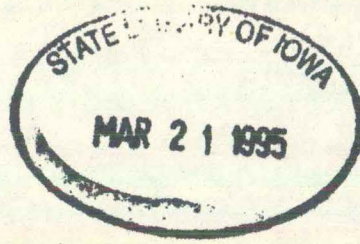
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/Des Moines River (east and west forks t



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DES MOINES RIVER  
(East and West Forks to Des Moines, Iowa)  
Winter Water Quality Study

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#75-1

Submitted to the Iowa Water Quality Commission by the  
State Hygienic Laboratory on  
25 July 1974

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DES MOINES

## INTRODUCTION

This report is a winter follow-up study of the East and West Forks of the Des Moines River and the Des Moines River from Fort Dodge to Des Moines, Iowa. An initial study was performed during the summer of 1973 and reported to the Water Quality Commission (State Hygienic Laboratory report #74 - 11 and #74 - 19). This report covered the same area as reports #74 - 11 and #74 - 19, collected during a period of low flow, low temperature and ice cover. Generally speaking, this time of year can be quite severe on the aquatic stream life. Under ice cover, water has less contact with the air so physical aeration is reduced. Biological processes and chemical reactions are retarded causing the effects of waste inputs to reach further downstream than at other times.

In winter, ammonia nitrogen levels are of concern. Ammonia directly may have a toxic effect on fish and aquatic life. Indirectly ammonia is oxidized to nitrite and nitrate (nitrification) by utilization of oxygen. This oxygen consumption where no reaeration may occur can cause oxygen levels to fall to zero.

A map of the sampling area is shown in figure 1 and a list of sampling stations with approximate locations is found on table 1. The East and West Forks are small streams with reduced flow. Joining at Humboldt, the two forks form a river of moderate size and volume. From Humboldt to Des Moines the river continues to grow, producing the largest interal stream in Iowa.

Samples were collected on January 7 and 8 for the East and West Forks and on January 15 for the segment from Fort Dodge to Des Moines. Provisional flow data from the United States Geological Survey for the West Fork and main

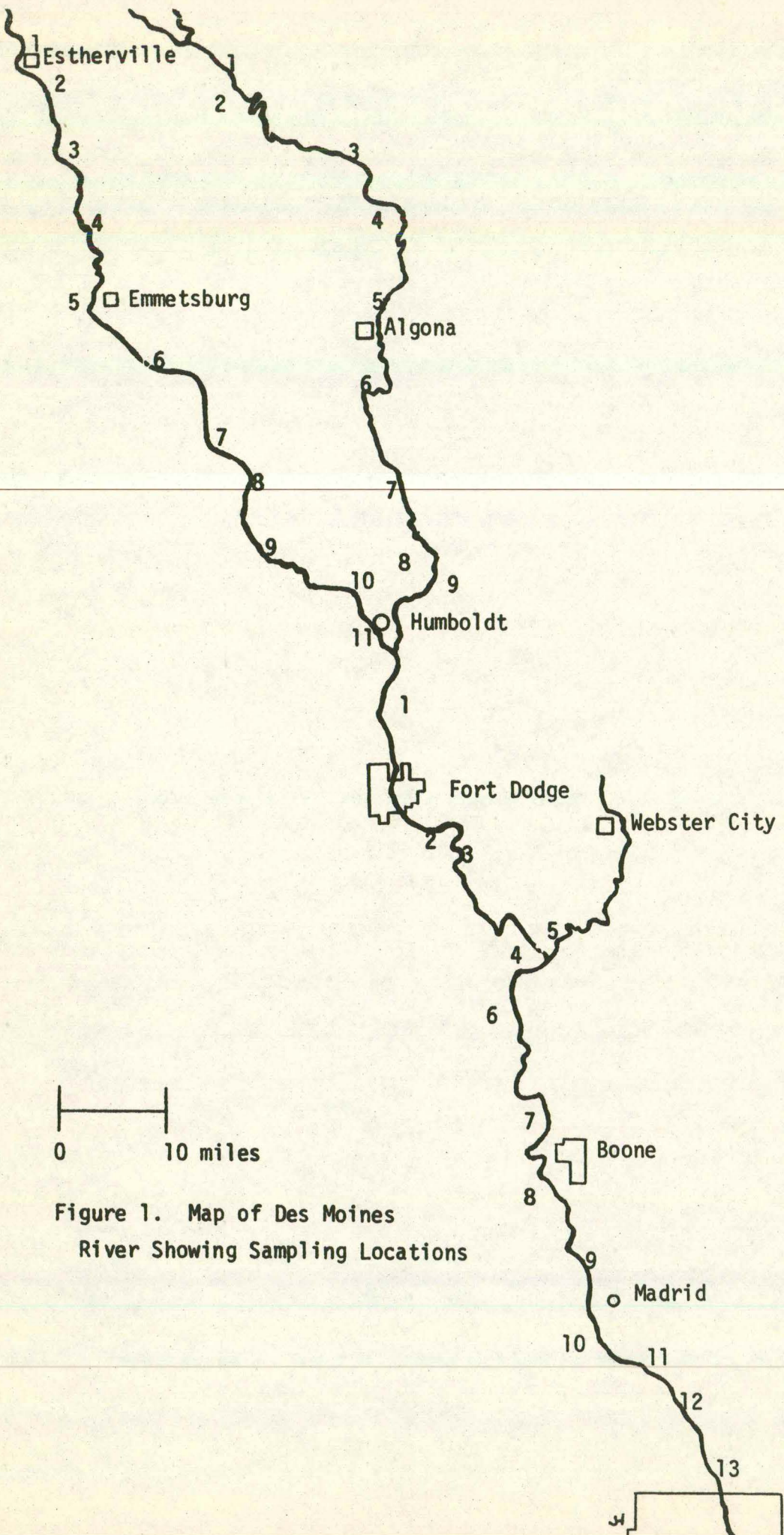


Figure 1. Map of Des Moines River Showing Sampling Locations

Table 1  
Station Numbers and Approximate Locations

East Fork

<u>Station</u>	<u>Location</u>
1	Emmet Co., Hwy 9, 2 miles west of Armstrong
2	Kossuth Co. Rd., R30W, T98N, Sec. 6
3	Kossuth Co. Rd., R29W, T98N, Sec. 22
4	Kossuth Co. Rd., R28W, T97N, Sec. 17 & 20
5	Kossuth Co. Rd., R29W, T96N, Sec. 25
6	Kossuth Co. Rd., B-55, R28W, T95N, Sec. 30
7	Kossuth Co. Rd., R29W, T94N, Sec. 25
8	Humboldt Co. Rd., C-20, R28W, T93N, Sec. 17
9	Humboldt Co. Rd., C-26, R28W, T92N, Sec. 10
10	Humboldt Co. Hwy 3 bridge, R28W, T91N, Sec. 6

West Fork

<u>Station</u>	<u>Location</u>
1	Emmet Co. Rd. N-26, 1 1/2 miles NW of Estherville
2	Emmet Co. Rd., R33W, T99N, Sec. 30 & 31
3	Emmet Co. Rd., R33W, T98N, Sec. 29
4	Palo Alto Co. Rd., R33W, T97N, Sec. 27
5	Palo Alto Co. Rd., R33W, T96N, Sec. 35
6	Palo Alto Co. Rd., R32W, T95N, Sec. 21
7	Palo Alto Co. Rd., R31W, T94N, Sec. 5 & 8
8	Pocahontas Co. Rd., R31W, T92N, Sec. 1
9	Humboldt Co. Rd., R30W, T92N, Sec. 23
10	Humboldt Co. Rd., R29W, T92N, Sec. 34
11	Humboldt Co. Rd., R29W, T91N, Sec. 24

Main Stream  
Fort Dodge - Des Moines

<u>Station</u>	<u>Location</u>
1	Co. Rd. bridge 3 miles west of Badger
2	Co. Rd. bridge 1/2 mile northeast of Otho
3	Boat Ramp in Dolliver State Park
4	Co. Rd. R27W, T87N, Sec. 25
5	Boone River, Co. Rd. bridge R27W, T87N, Sec. 25
6	Hwy 175 bridge 3 miles west of Stratford
7	Boone Co. Rd. E-26 northwest of Boone
8	Hwy 30 bridge southwest of Boone
9	Co. Rd. R26W, T82N, Sec. 9
10	Dallas Co. Rd. R26W, T81N, Sec. 14
11	Polk Co. Rd. 2 miles south of Polk City
12	Polk Co. Rd. R-6-F

stream are listed below. Data for the East Fork could not be obtained at this time.

	7 day, 10 year low flow	
West Fork at Estherville	0.1 CFS	62 CFS (Jan. 8)
Mainstream at Ft. Dodge	27.0 CFS	1160 CFS (Jan. 15)
Boone River at Webster City	3.6 CFS	270 CFS (Jan. 15)
Des Moines River at Stratford	41.0 CFS	1670 CFS (Jan. 15)

All flows were well above the 7 day, 10 year low flow.

## RESULTS

East Fork-selected data for the East Fork is tabulated below. Values are all in mg/l unless designated otherwise.

Station	Dissolved Oxygen	Fecal Coliform per 100 ml	NH <sub>4</sub> -N	Total Phosphate	BOD
1	11.9	220	0.52	0.10	2
2	10.7	100	0.41	0.11	2
3	10.2	120	0.35	0.12	2
4	9.9	2700	0.34	0.14	2
5	10.6	530	0.19	0.15	1
6	9.9	4900	0.28	0.18	2
7	9.7	1400	0.27	0.17	2
8	10.0	1800	0.21	0.20	1
9	9.8	1500	0.19	0.19	1
10	9.9	390	0.15	0.26	2

Main Stream - Fort Dodge to Des Moines

Selected data for this reach is tabulated below for ease of reviewing. Values in mg/l unless designated otherwise.

Station	D.O.	F-C 100 ml.	Ammonia-N	Total Phosphate	BOD
1	11.2	430	0.28	0.18	2
2	12.0	16,000	0.71	0.25	2
3	11.4	11,000	0.68	0.27	2
4	11.2	840	0.39	0.17	2
5	10.3	950	0.23	0.16	1
6	11.0	820	0.35	0.16	1
7	10.9	800	0.35	0.18	1
8	11.1	1,300	0.33	0.18	1
9	10.6	1,600	0.33	0.19	1
10	10.5	1,800	0.35	0.18	1
11	10.4	1,400	0.28	0.20	1
12	10.9	1,400	0.29	0.19	1

Station 2 and 3, located just downstream of Fort Dodge, had increases in fecal coliforms, Ammonia-N and Total Phosphate. By Station 4 the river had returned to pre Fort Dodge values and remained so for the subsequent stations.

Values for dissolved oxygen, phosphate, BOD and  $\text{NH}_4\text{-N}$  are relatively consistent throughout the river. Fecal Coliform values vary noticeably at stations 4 and 6. Station 4 is located about seven miles downstream of Bancroft and station 6 about four miles downstream of Algona. All data considered, winter water quality was generally good on the East Fork.

#### West Fork

A table of selected data for the West Fork of the Des Moines River is given below. Values are in mg/l unless designated otherwise.

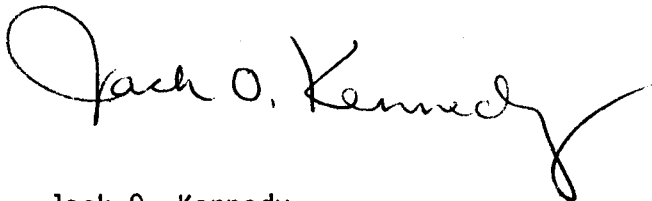
Station	D.O.	F-C 100 ml.	Ammonia-N	Total Phosphate	BOD	CL
1	7.5	40	0.57	0.19	1	57
2	7.5	26,000	1.3	0.42	6	90
3	7.6	3,900	1.0	0.41	2	61
4	7.0	270	0.59	0.28	2	52
5	7.4	340	0.39	0.21	2	49
6	Not Collected					
7	6.8	420	0.44	0.22	1	42
8	6.5	340	0.39	0.22	2	15
9	7.8	600	0.39	0.21	2	66
10	10.1	620	0.24	0.17	2	34
11	13.3	1,400	0.29	0.22	2	34

Station 2, located just downstream of Estherville demonstrates the effect Estherville's waste had on the river. Fecal coliforms, Ammonia-N, Phosphate, BOD and Chloride all increased at Station 2 and remained elevated through the next station. At Station 4 the values began returning to background levels found above Estherville. The remaining stations on this Fork indicate good water quality.




## Conclusions

A Winter water quality study on the East Fork, West Fork and Mainstream (Fort Dodge - Des Moines) of the Des Moines River indicates generally good water quality. Although no standards were violated, some deterioration in water quality was observed downstream of Estherville, Iowa and to a much lesser degree below Fort Dodge. Estherville's effect on water quality has been discussed previously and plans are underway for improvement of their treatment facilities. ~~Future studies of this area are suggested for~~ evaluation of the construction improvements.



Jack O. Kennedy  
Limnologist



# WATER QUALITY REPORT

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

Town	Armstrong	Armstrong	Bancroft
Source	E.Fork D.M. River	E.Fork D.M. River	E.Fork D.M. River
Specific Location	Hwy 9 bridge 2 mi W. of Armstrong	Kossuth Co. Rd. R30W T98N Sec. 6	Kossuth Co. Rd. R29W T98N, Sec. 22
Date Collected	7 January 1974	7 January 1974	7 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	5995	5996	5997
Collection Time	4:45pm	<b>FIELD DATA</b> 4:15pm	3:15pm
pH			
Temperature	0°C	0°C	0°C
Dissolved Oxygen	11.9	10.7	10.2
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	220	100	120
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	890	900	900
MBAS (as LAS)			
pH (units)	7.8	7.8	7.75
Alkalinity: P	None	None	None
T	275	289	296
NITROGEN: Organic N	1.3	1.2	1.1
Ammonia N	0.52	0.41	0.35
Nitrite N	0.086	0.077	0.069
Nitrate N	4.8	5.6	6.4
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	618		
Fixed	370		
Volatile	248		
Filtrable Residue T	618		
F	370		
V	248		
Nonfiltrable Residue T	0		
F	0		
V	0		
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.06	0.06	0.08
Total P	0.10	0.11	0.12
Dissolved Oxygen			
BOD	2	2	2
COD	32	32	24
Grease or Oil			
Turbidity (JTU)	4	4	5
Total Hardness (as CaCO <sub>3</sub> )	460	472	476
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	42	42	38
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

**REMARKS:**

COLLECTOR Kennedy & Humeston  
 REPORT TO Limnology Division  
 State Hygienic Laboratory  
 Des Moines, Iowa

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

17 January 1974

jb

# WATER QUALITY REPORT

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

Town	Burt	Algona	E. Fork D.M. River
Source	E. Fork D.M. River	E. Fork D.M. River	E. Fork D.M. River
Specific Location	Kossuth Co. Rd. R28W, T97N, Sec. 17 & 20	Kossuth Co. Rd. R29W, T96N, Sec. 25	Kossuth Co. Rd. B-55, R28W, T95N, Sec. 30
Date Collected	7 January 1974	7 January 1974	7 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	5998	5999	6000
Collection Time	2:50 pm	FIELD DATA 2:30 pm	1:15 pm
pH			
Temperature	0° C	0° C	0° C
Dissolved Oxygen	9.9	10.6	9.9
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	2700	530	4900
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	930	900	920
MBAS (as LAS)			
pH (units)	7.75	7.7	7.7
Alkalinity: P	None	None	None
T	311	329	335
NITROGEN: Organic N	0.88	0.62	0.57
Ammonia N	0.34	0.19	0.28
Nitrite N	0.068	0.058	0.060
Nitrate N	5.9	6.4	6.5
Nitrate as NO <sub>3</sub>			
RESIDUE: Total		605	
Fixed		338	
Volatile		267	
Filtrable Residue T		584	
F		317	
V		267	
Nonfiltrable Residue T		21	
F		21	
V		0	
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.12	0.12	0.16
Total P	0.14	0.15	0.18
Dissolved Oxygen			
BOD	2	1	2
COD	24	12	14
Grease or Oil			
Turbidity (JTU)	4	4	3
Total Hardness (as CaCO <sub>3</sub> )	480	474	478
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	38	32	32
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

Ice cover

COLLECTOR  
REPORT TO

Kennedy & Humeston  
Limnology Division  
State Hygienic Laboratory  
Des Moines, Iowa

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

17 January 1974

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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 Source Specific Location	E.Fork D.M. River Kossuth Co. Rd. R29W, T94N, Sec.25	E.Fork D.M. River Humboldt Co. Rd. C-20 R28W, T93N Sec. 17	E. Fork D.M. River Humboldt Co. Rd. C-26 R28W, T92N Sec. 10
Date Collected	7 January 1974	7 January 1974	7 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	6001	6002	6003
Collection Time	12:50 pm	FIELD DATA 12:30 pm	12:00 noon
pH			
Temperature	0°C 9.7	0°C 10.0	0°C 9.8
Dissolved Oxygen			
Fecal Coliform/100 ml	1400	BACTERIOLOGICAL EXAMINATION 1800	1500
Conductance (micromhos)	890	CHEMICAL ANALYSIS (as mg/l unless designated otherwise) 910	890
MBAS (as LAS)			
pH (units)	7.7	7.7	7.7
Alkalinity: P	None	None	None
T	331	332	336
NITROGEN: Organic N	0.60	0.41	0.37
Ammonia N	0.27	0.21	0.19
Nitrite N	0.056	0.052	0.045
Nitrate N	6.6	6.4	6.6
Nitrate as NO <sub>3</sub>			
RESIDUE: Total			
Fixed			
Volatile			
Filtrable Residue T			
F			
V			
Nonfiltrable Residue T			
F			
V			
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.14	0.16	0.14
Total P	0.17	0.20	0.19
Dissolved Oxygen			
BOD	2	1	1
COD	10	12	8
Grease or Oil			
Turbidity (JTU)	2	2	3
Total Hardness (as CaCO <sub>3</sub> )	468	466	462
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	32	32	29
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS: Ice cover Ice cover 8" of ice

COLLECTOR Kennedy & Humeston  
 REPORT TO Limnology Division  
 State Hygienic Laboratory  
 Des Moines, Iowa

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

17 January 1974

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**WATER QUALITY REPORT**

**STATE HYGIENIC LABORATORY, Des Moines Branch**  
**The University of Iowa**  
**E 7th & Court, Rm 406, Des Moines, Iowa 50309**

Town	Dakota City		
Source	E.Fork D.M. River		
Specific Location	Hwy 3 bridge R28W, T91N, Sec.6		
Date Collected	7 January 1974		
Date Received	9 January 1974		
Lab Number	6004		
Collection Time	11:30 am	FIELD DATA	
pH			
Temperature	0°C		
Dissolved Oxygen	9.9		
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	390		
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	940		
MBAS (as LAS)			
pH (units)	7.75		
Alkalinity: P	None		
T	351		
NITROGEN: Organic N	0.55		
Ammonia N	0.15		
Nitrite N	0.048		
Nitrate N	6.7		
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	650		
Fixed	377		
Volatile	273		
Filtrable Residue T	615		
F	851		
V	264		
Nonfiltrable Residue T	35		
F	26		
V	9		
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.14		
Total P	0.26		
Dissolved Oxygen			
BOD	2		
COD	18		
Grease or Oil			
Turbidity (JTU)	9		
Total Hardness (as CaCO <sub>3</sub> )	490		
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	31		
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS: 8" of ice

COLLECTOR Kennedy & Humeston  
 REPORT TO Limnology Division  
 State Hygienic Laboratory  
 Des Moines, Iowa

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

17 January 1974

**WATER QUALITY REPORT**

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

Town	Estherville	Estherville	W fork DM River
Source	W fork DM River	W fork DM River	W fork DM River
Specific Location	Emmet Co. Rd. N-26 1½ mi. W of Estherville	Emmet Co. Rd. R33W, T99N, Sec. 30 and 31	Emmet Co. Rd. R33W T98N, Sec. 29
Date Collected	8 January 1974	8 January 1974	8 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	6005	6006	6007
Collection Time	8:45 am	FIELD DATA 9:45 am	10:05 am
pH			
Temperature	0° C	0° C	0° C
Dissolved Oxygen	7.5	7.5	7.6
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	40	26,000	3900
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	1400	1500	1400
MBAS (as LAS)			
pH (units)	7.75	7.7	7.65
Alkalinity: P	None	None	None
T	335	347	342
NITROGEN: Organic N	0.93	1.1	0.83
Ammonia N	0.57	1.3	1.0
Nitrite N	0.086	0.13	0.12
Nitrate N	4.6	3.2	5.2
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	1039	1074	972
Fixed	735	792	728
Volatile	304	282	244
Filtrable Residue T	1039	1034	972
F	735	752	728
V	304	282	244
Nonfiltrable Residue T	0	40	0
F	0	40	0
V	0	0	0
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.16	0.36	0.36
Total P	0.19	0.42	0.41
Dissolved Oxygen			
BOD	1	6	2
COD	36	36	24
Grease or Oil			
Turbidity (JTU)	3	4	3
Total Hardness (as CaCO <sub>3</sub> )	710	705	645
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	57	90	61
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS: Air Temp. -4° F

COLLECTOR  
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 Kennedy & Humeston  
 Limnology Division  
 State Hygienic Laboratory  
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**The University of Iowa**  
**E 7th & Court, Rm 405, Des Moines, Iowa 50309**

Town	Emmetsburg	Emmetsburg	Emmetsburg
Source	W fork DM River	W fork DM River	STP effluent discharge
Specific Location	Palo Alto Co. Rd. R33W, T97N, Sec.27	Palo Alto Co. Rd. R33W, T96N, Sec.35	into W fork DM River Palo Alto Co. Rd. T96N R33W, Sec. 35
Date Collected	8 January 1974	8 January 1974	8 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	6008	6009	6010
Collection Time	10:30 am	FIELD DATA 11:00 am	11:00 am
pH			
Temperature	0° C	0° C	0° C
Dissolved Oxygen	7.0	7.4	
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	270	340	6900
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	1200	1100	
MBAS (as LAS)			
pH (units)	7.65	7.7	
Alkalinity: P	None	None	
T	333	125	
NITROGEN: Organic N	0.88	1.1	0.96
Ammonia N	0.59	0.39	3.8
Nitrite N	0.080	0.092	0.38
Nitrate N	4.8	5.2	2.7
Nitrate as NO <sub>3</sub>			
RESIDUE: Total			
Fixed			
Volatile			
Filtrable Residue T			
F			
V			
Nonfiltrable Residue T			
F			
V			
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.21	0.14	3.7
Total P	0.28	0.21	4.0
Dissolved Oxygen			
BOD	2	2	5
COD	24	20	
Grease or Oil			
Turbidity (JTU)	3	3	
Total Hardness (as CaCO <sub>3</sub> )	620	565	
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	52	49	
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

COLLECTOR  
REPORT TO

Kennedy & Humeston  
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 Source Specific Location	W fork DM River Palo Alto Co. Rd. R32W, T95N, Sec.21	W fork DM River Palo Alto Co. Rd. R31W, T94N, Sec. 5 and 8	W fork DM River Humboldt Co. Rd. R30W T92N, Sec. 23
Date Collected	8 January 1974	8 January 1974	8 January 1974
Date Received	9 January 1974	9 January 1974	9 January 1974
Lab Number	6011	6012	6013
Collection Time	11:10 am	FIELD DATA 11:45 am	12:20 am
pH			
Temperature	0°C	0°C	0°C
Dissolved Oxygen	6.8	6.5	7.8
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	420	340	600
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	1100	1100	1000
MBAS (as LAS)			
pH (units)	7.65	7.65	7.7
Alkalinity: P	None	None	None
T	324	316	320
NITROGEN: Organic N	0.82	0.69	1.3
Ammonia N	0.44	0.39	0.39
Nitrite N	0.099	0.085	0.079
Nitrate N	5.0	4.8	5.6
Nitrate as NO <sub>3</sub>			
RESIDUE: Total			
Fixed			
Volatile			
Filtrable Residue T			
F			
V			
Nonfiltrable Residue T			
F			
V			
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.17	0.17	0.15
Total P	0.22	0.22	0.21
Dissolved Oxygen			
BOD	< 1	2	2
COD	24	22	18
Grease or Oil			
Turbidity (JTU)	3	4	5
Total Hardness (as CaCO <sub>3</sub> )	550	545	510
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	42	15	66
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

COLLECTOR  
REPORT TO

Kennedy & Humeston  
Limnology Division  
State Hygienic Laboratory  
Des Moines, Iowa

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

17 January 1974

dm



**WATER QUALITY REPORT**

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

Town	Humboldt	Humboldt
Source	W Fork DM River	W fork DM River
Specific Location	Humboldt Co. Rd. R29W, T92N, Sec. 34	Humboldt Co. Rd. R29W, T91N, Sec. 24
Date Collected	8 January 1974	8 January 1974
Date Received	9 January 1974	9 January 1974
Lab Number	6014	6015
Collection Time	12:45 pm	FIELD DATA 1:10 pm
pH		
Temperature	0 °C	0 °C
Dissolved Oxygen	10.1	13.3
<b>BACTERIOLOGICAL EXAMINATION</b>		
Fecal Coliform/100 ml	620	1400
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>		
Conductance (micromhos)	970	970
MBAS (as LAS)		
pH (units)	7.75	7.85
Alkalinity: P	None	None
T	318	315
NITROGEN: Organic N	0.96	0.73
Ammonia N	0.24	0.29
Nitrite N	0.072	0.068
Nitrate N	5.6	6.4
Nitrate as NO <sub>3</sub>		
RESIDUE: Total	673	667
Fixed	492	495
Volatile	181	172
Filtrable Residue T	673	667
F	492	495
V	181	172
Nonfiltrable Residue T	0	0
F	0	0
V	0	0
Settleable Matter (ml/l)		
PHOSPHATE: Filtrable P	0.15	0.17
Total P	0.17	0.22
Dissolved Oxygen		
BOD	2	2
COD	14	14
Grease or Oil		
Turbidity (JTU)	3	4
Total Hardness (as CaCO <sub>3</sub> )	500	490
Calcium (Ca <sup>++</sup> )		
Magnesium (Mg <sup>++</sup> )		
Chloride (Cl <sup>-</sup> )	34	34
Sulfate (SO <sub>4</sub> <sup>-</sup> )		

REMARKS:

Open Water

COLLECTOR  
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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	Badger	Otho	
Source	Des Moines River	Des Moines River	Des Moines River
Specific Location	Co. Rd. P56 Bridge, T90N, R29W, Sec. 12 & 13	Co. Rd. Bridge 1/2 mi NE of Otho, T88N, R28W, Sec. 17	Boat ramp in Dolliver State Park, T88N, R28W, Sec. 35
Date Collected	15 January 1974	15 January 1974	15 January 1974
Date Received	16 January 1974	16 January 1974	16 January 1974
Lab Number	6330	6331	6332
Collection Time	5:00 pm	FIELD DATA 4:30 pm	4:00 pm
pH			
Temperature	0°C	0°C	0°C
Dissolved Oxygen	11.2	12.0	11.4
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	430	16,000	11,000
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	910	940	960
MBAS (as LAS)			
pH (units)	7.7	7.7	7.75
Alkalinity: P	None	None	None
T	314	326	328
NITROGEN: Organic N	0.52	0.56	0.51
Ammonia N	0.28	0.71	0.68
Nitrite N	0.065	0.075	0.070
Nitrate N	6.0	6.5	7.0
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	620	622	639
Fixed	436	387	399
Volatile	184	235	240
Filtrable Residue T	601	622	636
F	417	387	399
V	184	235	237
Nonfiltrable Residue T	19	0	3
F	19	0	0
V	0	0	3
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.13	0.21	0.21
Total P	0.18	0.25	0.27
Dissolved Oxygen			
BOD	2	2	2
COD	10	6	4
Grease or Oil			
Turbidity (JTU)	10	3	3
Total Hardness (as CaCO <sub>3</sub> )	456	472	476
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	28	35	34
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

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

Town Source Specific Location	Des Moines River Co. Rd. R27W, T87N, Sec. 25	Boone River Co. Rd. Bridge R27W, T87N, Sec.25	Stratford Des Moines River Hwy 175 bridge 3 mi. W of Stratford, T86N, R27W, Sec. 21
Date Collected	15 January 1974	15 January 1974	15 January 1974
Date Received	16 January 1974	16 January 1974	16 January 1974
Lab Number	6333	6334	6335
Collection Time	3:15 pm	FIELD DATA 2:45 pm	2:20 pm
pH			
Temperature	0° C	0° C	0° C
Dissolved Oxygen	11.2	10.3	11.0
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	840	950	820
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	940	860	930
MBAS (as LAS)			
pH (units)	7.7	7.7	7.75
Alkalinity: P	None	None	None
T	350	322	337
NITROGEN: Organic N	0.48	0.33	0.45
Ammonia N	0.39	0.23	0.35
Nitrite N	0.080	0.065	0.070
Nitrate N	7.2	8.5	7.8
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	628	565	617
Fixed	384	336	457
Volatile	244	229	160
Filtrable Residue T	628	563	602
F	384	334	445
V	244	229	157
Nonfiltrable Residue T	0	2	15
F	0	2	12
V	0	0	3
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.17	0.15	0.15
Total P	0.17	0.16	0.16
Dissolved Oxygen			
BOD	2	1	2
COD	4	1	2
Grease or Oil			
Turbidity (JTU)	3	2	3
Total Hardness (as CaCO <sub>3</sub> )	478	454	476
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	21	33	18
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

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Des Moines, Iowa

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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	Boone	Boone	Madrid
Source	Des Moines River	Des Moines River	Des Moines River
Specific Location	Boone Co. Rd. E26 NW of Boone, R27W, T84N, Sec. 13	Hwy 30 bridge SW of Boone, R26W, T84N, Sec. 31	Co. Rd. bridge R26W, T82N, Sec. 9
Date Collected	15 January 1974	15 January 1974	15 January 1974
Date Received	16 January 1974	16 January 1974	16 January 1974
Lab Number	6336	6337	6338
Collection Time	1:30 pm	FIELD DATA 12:30 pm	11:50 am
pH			
Temperature	0°C	0°C	0°C
Dissolved Oxygen	10.9	11.1	10.6
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	800	1300	1600
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	910	910	920
MBAS (as LAS)			
pH (units)	7.75	7.75	7.75
Alkalinity: P	None	None	None
T	336	338	338
NITROGEN: Organic N	0.41	0.33	0.41
Ammonia N	0.35	0.33	0.33
Nitrite N	0.075	0.70	0.075
Nitrate N	7.5	7.2	7.2
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	614	626	620
Fixed	413	404	399
Volatile	201	222	221
Filtrable Residue T	610	604	616
F	413	382	395
V	197	222	221
Nonfiltrable Residue T	4	22	4
F	0	22	4
V	4	0	0
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.15	0.14	0.16
Total P	0.18	0.18	0.19
Dissolved Oxygen			
BOD	1	1	1
COD	1	12	1
Grease or Oil			
Turbidity (JTU)	3	5	5
Total Hardness (as CaCO <sub>3</sub> )	474	476	480
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	28	27	30
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

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REPORT TO

Kennedy & Humeston  
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Des Moines, Iowa

Historical Building  
DES MOINES, IOWA 50319  
R. J. Morris, Ph.D.  
Associate Director & Principal Chemist

29 January 1974

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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	Des Moines River	Polk City	Des Moines
Source	Des Moines River	Des Moines River	Des Moines River
Specific Location	Dallas Co. Rd. bridge, R26W, T81N Sec. 14	Polk Co. Rd. bridge 2 mi. S of Polk City R25W, T80N, Sec. 12&13	Polk Co. Rd. R6F bridge T79N, R24W, Sec. 5
Date Collected	15 January 1974	15 January 1974	15 January 1974
Date Received	16 January 1974	16 January 1974	16 January 1974
Lab Number	6339	6340	6341
Collection Time	10:30 am	FIELD DATA 10:05 am	9:35 am
pH			
Temperature	0°C	0°C	0°C
Dissolved Oxygen	10.5	10.4	10.9
<b>BACTERIOLOGICAL EXAMINATION</b>			
Fecal Coliform/100 ml	1800	1400	1400
<b>CHEMICAL ANALYSIS (as mg/l unless designated otherwise)</b>			
Conductance (micromhos)	910	910	900
MBAS (as LAS)			
pH (units)	7.8	7.7	7.7
Alkalinity: P	None	None	None
T	338	336	339
NITROGEN: Organic N	0.40	0.65	0.45
Ammonia N	0.35	0.28	0.29
Nitrite N	0.070	0.075	0.070
Nitrate N	7.8	7.8	7.2
Nitrate as NO <sub>3</sub>			
RESIDUE: Total	618	600	617
Fixed	428	395	360
Volatile	190	205	257
Filtrable Residue T	618	600	600
F	428	395	350
V	190	205	250
Nonfiltrable Residue T	0	0	17
F	0	0	10
V	0	0	7
Settleable Matter (ml/l)			
PHOSPHATE: Filtrable P	0.16	0.15	0.14
Total P	0.18	0.20	0.19
Dissolved Oxygen			
BOD	1	1	1
COD	1	1	2
Grease or Oil			
Turbidity (JTU)	5	6	9
Total Hardness (as CaCO <sub>3</sub> )	484	470	470
Calcium (Ca <sup>++</sup> )			
Magnesium (Mg <sup>++</sup> )			
Chloride (Cl <sup>-</sup> )	28	28	28
Sulfate (SO <sub>4</sub> <sup>-</sup> )			

REMARKS:

COLLECTOR Kennedy & Humeston  
REPORT TO Limnology Division  
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Des Moines, Iowa

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