

Bub, Laura A

From: Bub, Laura A
Sent: Friday, February 06, 2004 1:56 PM
To: Searle, Greg S; Marshall, David W.
Cc: Schlessner, Roger A.; Masnado, Robert
Subject: RE: Rock Creek (Lake Mills) designated use

Greg:

From what I can tell by looking at the database, both of these dischargers have "recently" completed plant upgrades. So, in theory, I would assume that they could meet FAL limits. Neither file has a copy of the letter from the attorney asking for the change to occur in Phase 2--does this letter exist somewhere? I would think that if the plants can reasonably meet the limits for the FAL classification that is proposed, we should make the change in Phase 1, as originally planned. But, maybe there's more to this issue than I know about (which is usually the case).

BOB: Is there a reason that we can't move forward with these classifications in round one of the revisions?

-----Original Message-----

From: Searle, Greg S
Sent: Friday, February 06, 2004 1:13 PM
To: Bub, Laura A; Marshall, David W.
Cc: Schlessner, Roger A.; Masnado, Robert
Subject: Rock Creek (Lake Mills) designated use

Hi Laura and Dave,

A couple of questions for you on Rock Creek:

Nasrin is calculating limits for Lake Mills and Roger will be issuing a permit (hopefully this quarter, which means PN by 2/12).

In the Stream Classification Database, the two segments of Rock Creek that are listed (A. From the Lake Mills STP downstream to CTH "V", and; B. From CTH "V" to Harper's Mill Pond) are both listed for Phase 1 as old class LFF and new class LFF. As I think everyone knows, these segments were classified by Dave as FAL and had been included in a previous version of the NR 104 green sheet. The only reason FAL was not pursued in Phase 1 was political - the consultant (and, I believe, attorney) for Lake Mills (and Mt. Horeb) wrote letters to the NRB providing their reasons why they should not be included in the Phase 1 rule revision. In order to not derail the entire rule, they were not included in the Phase 1 revision. The use designations are to be changed to FAL in the Phase 2 revision.

Laura - is this still the course we are on for Rock Creek (and the West Branch of the Sugar River, too)? With all of the ground truthing and clean-up we are doing, based on environmental groups comments, shouldn't we also be including Rock Creek and the West Branch of the Sugar River as FAL in the Phase 1 rule revision?

Dave - did you recommend WWSF or WWFF?

Thanks,
Greg

Bub, Laura A

From: Marshall, David W.
Sent: Monday, February 09, 2004 8:59 AM
To: Searle, Greg S; Bub, Laura A
Cc: Schlessner, Roger A.; Masnado, Robert
Subject: RE: Rock Creek (Lake Mills) designated use

I believe the reclass was WWSF since we found largemouth bass, panfish and walleyes in the former LFF zone.

-----Original Message-----

From: Searle, Greg S
Sent: Friday, February 06, 2004 1:13 PM
To: Bub, Laura A; Marshall, David W.
Cc: Schlessner, Roger A.; Masnado, Robert
Subject: Rock Creek (Lake Mills) designated use

Hi Laura and Dave,

A couple of questions for you on Rock Creek:

Nasrin is calculating limits for Lake Mills and Roger will be issuing a permit (hopefully this quarter, which means PN by 2/12).

In the Stream Classification Database, the two segments of Rock Creek that are listed (A. From the Lake Mills STP downstream to CTH "V", and; B. From CTH "V" to Harper's Mill Pond) are both listed for Phase 1 as old class LFF and new class LFF. As I think everyone knows, these segments were classified by Dave as FAL and had been included in a previous version of the NR 104 green sheet. The only reason FAL was not pursued in Phase 1 was political - the consultant (and, I believe, attorney) for Lake Mills (and Mt. Horeb) wrote letters to the NRB providing their reasons why they should not be included in the Phase 1 rule revision. In order to not derail the entire rule, they were not included in the Phase 1 revision. The use designations are to be changed to FAL in the Phase 2 revision.

Laura - is this still the course we are on for Rock Creek (and the West Branch of the Sugar River, too)? With all of the ground truthing and clean-up we are doing, based on environmental groups comments, shouldn't we also be including Rock Creek and the West Branch of the Sugar River as FAL in the Phase 1 rule revision?

Dave - did you recommend WWSF or WWFF?

Thanks,
Greg

Bub, Laura A

From: Searle, Greg
Sent: Wednesday, September 10, 2003 7:12 AM
To: Bub, Laura A
Cc: Thiele, Doris K.; Heim, Dan
Subject: RE: Randolph & L. Mills

Laura - I've cc:ed Doris and Dan for their input to the question about Randolph. I put Doris' name first on the cc: line so she would not be "miffed" at me!

As far as Lake Mills is concerned, we had always intended that the classification be corrected in Phase 1, but their consultants lobbied the NRB and we made a political decision to not make the change until Phase 2. This is a question/decision for you, Bob, Al, and Todd. In my opinion, the political winds have changed, with MEA involved (as far as NR 104 is concerned), and I think Lake Mills should be included in Phase 1. It will probably be two to three years, at the best, before Phase two is promulgated. Lake Mills (and Mt. Horeb, also) have built WWTPs to meet limits for the changed classification - we're not putting them in a compromising situation.

I will ask Margie today about her expectations of my involvement in the Horicon meeting on Monday, so I can let you know this afternoon. If she say I do not need to attend, I'll be in trouble with Doris!

Greg

-----Original Message-----

From: Bub, Laura A
Sent: Tuesday, September 09, 2003 3:34 PM
To: Searle, Greg
Subject: Randolph & L. Mills

Greg--

Some findings to the questions that you called me with yesterday...

- **Randolph WWTP in Dodge County:** you note that there is only the LFF segment listed, and the LAL that's currently in code has been omitted from the spreadsheet. The reason that it's not on the spreadsheet is because it wasn't included in the December 2001 Green Sheet, nor is that segment listed in the Access database. And, according to p4 of the August 1991 Triennial Standards Review document, the "Randolph Branch effluent channel no longer exists and should be deleted from NR 104." I'm guessing that's why the first segment classified as LAL was omitted--what do you think?
- **Lake Mills WWTP in Jefferson County:** you note that this site is not listed at all on the spreadsheet. Again, this is because it was not included in the December 2001 Green Sheet. However, it was listed on the Addendum that was presented at the NRB meeting. I will add it to the spreadsheet, as well as to the draft of a new Green Sheet (I've actually already done the last half of that). Both segments for this site are proposed as LFF for Phase 1, and FAL (D) for Phase 2. (But did you mention that maybe FAL could happen in P1?)

Let me know what you think about these two sites. And regarding the conference call that I'm trying to schedule--when will you know your availability for the 15th (Monday)? Right now, that is one day that is looking like it will work for everyone. Let me know when you can.

Laura

class. change

TRIENNIAL STANDARDS REVIEW AND RECLASSIFICATION
of ROCK CREEK, JEFFERSON COUNTY, WISCONSIN
UPPER ROCK DRAINAGE BASIN

WISCONSIN DEPARTMENT OF NATURAL REOSURCES

November, 1989

Prepared by David Marshall

FIGURE 1



Stream Description

Rock Creek is the outlet stream from a high quality lake in Jefferson County. A small dam at the outlet controls lake water levels and also affects downstream flow. Efforts to control lake water levels cause stream flows to fluctuate seasonally, but the City of Lake Mills is legally responsible to maintain a minimum flow equal to the U.S.G.S estimated Q7,10 of .13 CFS. A short distance below the dam, Q7,10 flows are unlikely because the stream discharge is augmented by industrial non-contact cooling water and the outlets from a Department of Natural Resources fish hatchery.

Rock Creek displays unnatural stream characteristics within the City of Lake Mills. Historically, the stream channel was straightened for drainage and the stream corridor was encroached by development. The resource potential of the stream appears to have been overshadowed by Rock Lake and development. Ultimately, the stream has been used as a wastewater conduit subject to public neglect. Small impoundments occur in the stream where litter and debris collect on discarded objects ranging from shopping carts to large automobile parts. Although Rock Creek lacks meanders, riffles, and aesthetics of natural streams, pools and snags provide adequate fish habitat.

Below Lake Mills, Rock Creek is impounded by another dam, approximately 1.5 miles upstream from the confluence with the Crawfish River. The dam forms a 12 acre impoundment, locally known as Hoopers Millpond. Prior to the wastewater treatment plant upgrade in 1981, the impoundment had a history of low dissolved oxygen levels and septic odors.

Classification

The former classification of Rock Creek from the Rock Lake outlet downstream to CTH V was Intermediate Fish and Aquatic Life (INT-D). Below CTH V, the stream use is Full Fish and Aquatic Life (FAL-B). The Intermediate classification reflected the unnatural stream conditions and anticipated low flows.

Several fish shocking surveys have demonstrated that the INT-D classification did not reflect the actual use potential of Rock Creek. Adequate stream flows coupled with snags and pools provide habitat for a surprising diversity of forage and sport fish. Yellow perch, Bluegills, Pumpkinseed sunfish, Largemouth bass, Smallmouth bass, Northern pike and Walleyes have been identified in the stream. To protect the use potential of Rock Creek, the classification has been changed to FAL-B from the outlet of Rock Lake downstream to the confluence with the Crawfish River. Figure 1 is a map of Rock Creek and Table 1 contains fish species identified during five backpack shocking surveys.

Table 1: Rock Creek Fish Monitoring Data

<u>Species</u>	<u>Date(s) Collected</u>	<u>Number</u>
Northern Pike <u>Esox lucius</u>	06-03-82	4
Goldfish <u>Carassius auratus</u>	09-74	3
	07-25-88	11
Carp <u>Cyprinus carpio</u>	09-74	1
	06-03-82	6
	07-25-88	15
Hornyhead chub <u>Nocomis biguttatus</u>	09-74	7
Golden shiner <u>Notemigonus crysoleucas</u>	09-74	21
Common shiner <u>Notropis cornutus</u>	09-74	2
	07-25-88	1
Blackchin shiner <u>Notropis heterodon</u>	09-74	3
Blacknose shiner <u>N. heterolepis</u>	09-74	10
Bluntnose minnow <u>Pimpephales notatus</u>	09-74	3
	07-25-88	abundant
Fathead minnow <u>P. promelas</u>	09-74	99
	07-25-88	26
Unidentified minnows	06-03-82	common
	07-25-88	4
White sucker <u>Catostomus commersoni</u>	09-74	1
	06-03-82	abundant
	10-30-83	abundant
	07-25-88	abundant
	11-08-88	abundant
Black bullhead <u>Ictalurus melas</u>	09-74	5
	07-25-88	1
Yellow bullhead <u>I. natalis</u>	07-25-88	1
Green Sunfish <u>Lepomis cyanellus</u>	09-74	81
	06-03-82	21
	10-30-83	abundant
	07-25-88	abundant
	11-08-88	abundant
Pumpkinseed sunfish <u>L. gibbosus</u>	09-74	4
	06-03-82	8
	10-30-83	1
	07-25-88	1
Rock bass <u>Ambloplites rupestris</u>	07-25-88	1
Bluegill <u>L. macrochirus</u>	09-74	15
	06-03-82	11
	10-30-83	1
	07-25-88	11
Hybrid sunfish	09-74	1

Table 1: Rock Creek Fish Monitoring Data (continued)

<u>Species</u>	<u>Date(s) Collected</u>	<u>Number</u>
Largemouth bass <u>Micropterus salmoides</u>	09-74	2
	06-03-82	2
	11-08-88	7
Smallmouth bass <u>M. dolomieu</u>	06-03-82	7
Yellow perch <u>Perca flauescens</u>	09-74	6
	11-08-88	1
Walleye <u>Stizostedion vitreum</u>	06-03-82	2
	10-30-83	1
	07-25-88	1

*Backpack shocking surveys were performed within the INT-D zone. Each survey covered approximately 100 to 200 yard reaches.

History of Municipal Wastewater Treatment and Water Quality Impacts

From 1966 until 1981, the City of Lake Mills operated a trickling filter secondary wastewater treatment plant. The treatment process included a communitor with bar screen, two primary clarifiers, trickling filter, final clarifiers, chlorination and anaerobic digestion. The system was in poor mechanical condition and hydraulically overloaded. Industrial influents occasionally had toxic affects on biological treatment.

Prior to 1980, wastewater impacts to the stream included dissolved oxygen levels below water quality standards, accumulation of sludge deposits below the treatment plant, and dominance of macroinvertebrates tolerant of severe pollution. A pre-operational report documented these wastewater impacts on Rock Creek (Appendix A).

The City of Lake Mills was awarded a Wisconsin Fund Grant in 1980. Construction was completed by 1982 and the treatment process included grit removal, primary clarifiers, secondary treatment and ammonia removal using rotating biological contactors (RBC), final clarifiers and chlorine contact disinfection. Efforts to measure water quality improvements included macroinvertebrate sampling and a waste load allocation survey in 1983. Results of post operation monitoring are contained in Table 2 and sample locations are identified in Figure 1. Self monitoring data and the results of the wasteload allocation survey demonstrated substantially improved effluent ammonia and BOD concentrations. Increased dissolved oxygen concentrations were measured in the stream. Macroinvertebrate communities did not respond to improved wastewater treatment because of unnatural stream conditions, urban nonpoint source pollution and residual sludge deposits below the WWTP.

Although effluent quality improved substantially after 1982, structural and mechanical problems associated with RBC technology were frequent and effluent quality was less than optimum. In 1988, the classification of Rock Creek was changed to FAL-B. The classification change, coupled with problems associated with the RBC treatment process, required a treatment plant upgrade to meet the new water quality standards and more stringent WPDES effluent limits. The new treatment facility will include a new influent screening unit, influent flow metering, influent pumping station, oxidation ditch, flocculating clarifiers, disinfection (chlorination-dechlorination), post aeration, sludge thickening, and sludge storage. The RBCs will be removed from service.

Additional monitoring included effluent bioassays at the Lake Mills wastewater treatment plant (April, 1989) and fish contaminant monitoring downstream in Hoopers Millpond (July, 1985). Significantly reduced fathead minnow weight was observed in 100% effluent. A largemouth bass and a carp were collected from Hoopers Millpond, and contained PCB concentrations of .78 and .52 ppm respectively.

Table 2: 1983 Waste Load Allocation Data and Macroinvertebrate Monitoring (Hilsenhoff Biotic Index)

Sta. No.	Location	Temp.	Do	pH	Bod ₅	Tot-P	Dis	Ortho P	TNK	NH ₃	NO ₂ + NO ₃	Chloride	HBI**	HBI**
		C	mg/l	su	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	(1983)	(1988)
1	below dam	23.1	6.4		2.4				0.8	.04	<.02	11		
2*	storm sewer	15.0	5.4		<4.0				0.4	.22	1.17	82		
3*	Fish hatchery	15.1	6.6	7.9	9.2				1.2	.49	.42	8.4		
4	Grove St.	19.3	8.9		2.4	.06	.017		0.6	.08	.36	15		
5*	Hamlin	24.0	7.8	7.9	0.9				<.02	<.02	.05	3.6		
6	R.R.	21.2	7.8		2.9				0.6	.08	.34	15		
7	Lake St.												7.16,7.12	7.59
8	Clark St.												6.75	7.23
9*	STP	20.8	6.7		5.3	9.2	8.9		2.0	0.6	9.4	35		
10	Mix												9.19	
11	CTH V												6.38	7.6
12	I-94	25.9	7.4	8.3	3.7	1.57	1.45		1.0	.16	1.85	74		
13	Hoopers Millpond	27.0	5.3		5.7				1.0	.03	.28	80		

*Point Source

**1988 HBI Revision

Impact of the Lake Mills Wastewater Treatment
Plant on the Water Quality of Rock Creek
A Pre Operational Study

GENERAL INFORMATION

Drainage Basin: Upper Rock - 011

Location: Rock Creek above and below the Lake Mills Wastewater Treatment facility (T7N - R13E, Sections 12 and 13 and T7N - R14E, Sections 5, 6 and 7), Jefferson County, Wisconsin.

Benthic Surveys: May 7, 1979, December 12, 1979 and April 27, 1981.

Chemical Surveys: July 7, 1979 and August 16, 1979.

Study Author: Dave Marshall, Madison Area Water Quality Management
Biologist

Study Investigators: Tom Bainbridge, Surveillance Unit Leader
Dave Marshall, Madison Area Water Quality Management
Biologist
Lynn Persson, Former Madison Area Biologist

SUMMARY AND CONCLUSIONS

The chemical surveys performed on Rock Creek indicated substantial water quality degradation from the Lake Mills Wastewater Treatment Plant. On August 16, 1979, the survey was conducted during high stream flows but still revealed significant organic enrichment from the treatment plant. If the survey would have been conducted during low flow conditions, more adverse impacts on the stream would be anticipated.

The results of the macroinvertebrate studies revealed poor to very poor water quality conditions below the treatment plant, documenting impacts of the wastewater discharge on Rock Creek. Representative macroinvertebrates upstream from the facility reflected only fair water quality conditions. Apparently, the upstream biotic index justifies the variance intermediate classification for the upper reaches of Rock Creek.

OBJECTIVE

The objective of this study is to document the impact of the Lake Mills Wastewater Treatment Plant on Rock Creek prior to construction of a new facility. Investigations performed in the spring and winter of 1979 and spring of 1981 evaluated the impact of the discharge on stream benthic macroinvertebrate communities. Detailed chemical and physical documentations evaluated the impact of the discharge during a waste load/stream response survey performed on August 16, 1979. A preliminary chemical survey was also performed on July 7, 1979.

DISCRIPTION OF WASTE SOURCE

The City of Lake Mills operates a trickling filter secondary wastewater treatment plant which was constructed in 1966. Approximately 4,000 people are served by the facility, along with some industry. Treatment unit processes includes a comminutor with bar screen, two primary clarifiers, trickling filter, final clarifiers, chlorination, and anaerobic digestion. Sludge is transported by truck to agricultural lands.

The current treatment system is in poor mechanical condition and suffers hydraulic overloading. The plant was originally designed for an average daily flow of .665 mgd but today receives an average daily flow of (1.42 cfs) .916 mgd. Also, the treatment plant operator has complained that local industries have discharged materials which have hindered biological treatment. If the situation continues, industrial pre-treatment may be necessary to efficiently operate the new treatment system.

The City of Lake Mills was awarded a Wisconsin Fund Grant in 1980. Construction is underway and the new facility is anticipated to be completed by June of 1982. By July 1, 1982, the existing WPDES permit will expire and the updated effluent limits will be in effect. Summarized in Figure I below, are the existing effluent limits and revised effluent limits effective July 1, 1982, under WPDES permit No. WI-0031194-2.

Table I

Effluent Parameters	Interim Effluent Limitations		Other Limitations		
	Quantity - Kg/day (lbs./day)	Average ¹	Minimum	Average	Maximum
BOD _s (monthly)	150.7	(332.8)		60 mg/l	
BOD _s (weekly)	226.1	(499.1)		90 mg/l	
Susp. Solids (monthly)	75.4	(166.4)		30 mg/l	
Susp. Solids (weekly)	113	(249.6)		45 mg/l	
pH (daily)	-----		6.0 s.u.		9.0 s.u.

¹ Based on a design flow of 0.665 MGD.

Effluent Parameters	Effluent Limitations Beginning July 1, 1982			Other Limitations		
	Quantity - Kg/day (lbs/day)	Average	Maximum	Minimum	Average	Maximum
BOD _s (monthly)	57.8	(127.6)			15 mg/l	
BOD _s (weekly)			115.6 (255.2)			30 mg/l
Susp. Solids (monthly)	77.1	(170.1)			20 mg/l	
Susp. Solids (weekly)			115.6 (255.2)			30 mg/l
pH (daily)				6.0 s.u.		9.0 s.u.
Residual Chlorine (daily)						
NH ₃ -N (weekly) (May-Oct.)					3.0 mg/l	
NH ₃ -N (weekly) (Nov.-Apr.)					6.0 mg/l	
Dissolved Oxygen (daily)				4.0 mg/l		

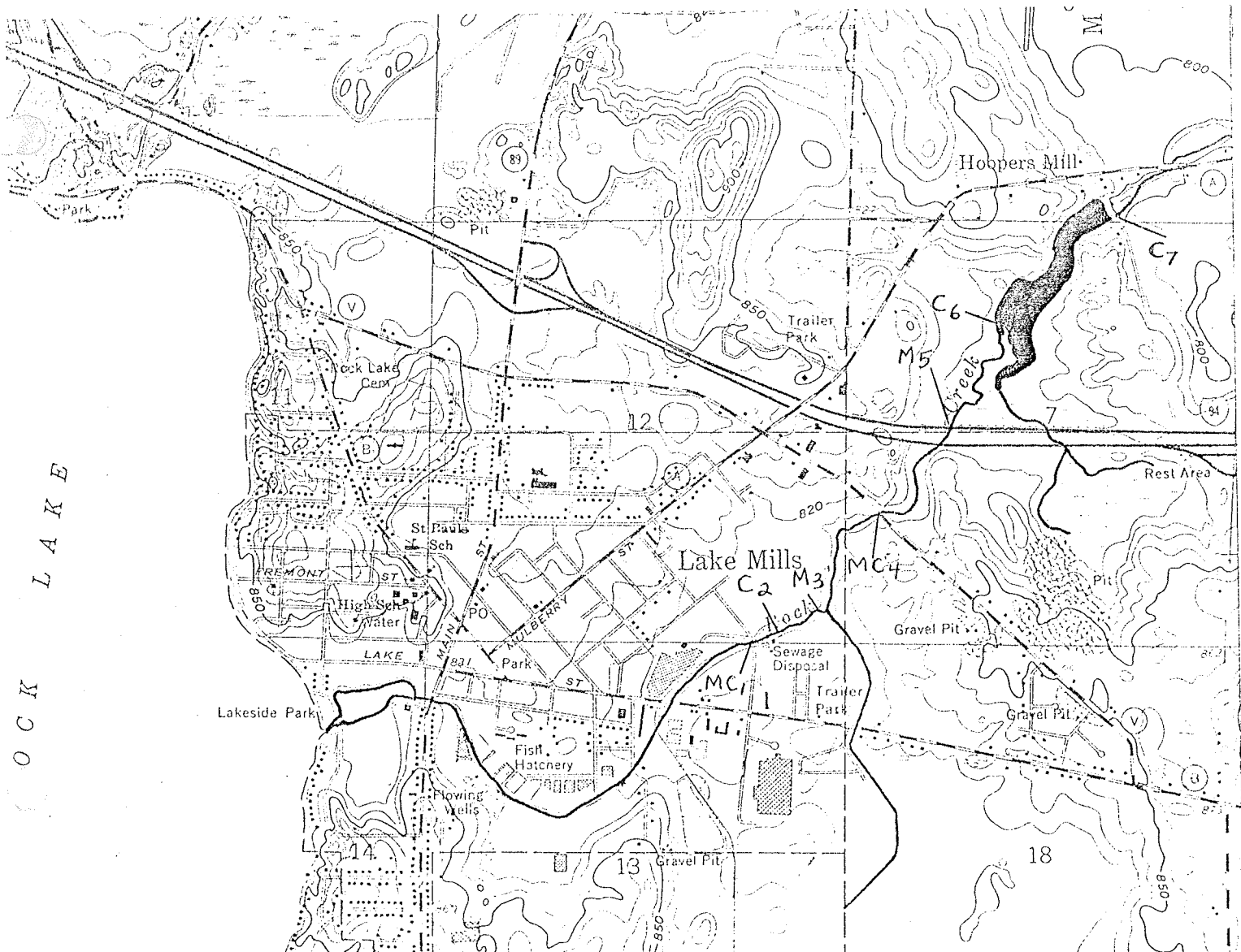
¹Based on a design flow of 1.02 MGD.

GENERAL STREAM CHARACTERISTICS

Rock Creek is the outlet stream of Rock Lake in Jefferson County. A dam at the outlet controls the lake water levels. Flow characteristics of Rock Creek are also affected by the dam. Flow rates frequently fluctuate in the stream, although the City of Lake Mills is legally responsible to maintain the estimated Q7,10 of .13 cfs.

Below the dam, Rock Creek flows through the City of Lake Mills and ultimately joins the Crawfish River. The reach of stream within the City limits has been ditched and straightened. In addition to the wastewater treatment plant discharge, Rock Creek receives cooling water discharges from Crepaco and a few other industries. Downstream of Lake Mills, Rock Creek is impounded by another dam, approximately 1.5 miles from its mouth. The dam forms a 12 acre impoundment, locally known as Hoopers Mill Pond. The impoundment has a history of low dissolved oxygen levels and nuisance septic odors. The raceway outlet is frequently covered with filamentous slime growths.

The Lake Mills Wastewater Treatment facility discharges to Rock Creek approximately 2.5 miles above the confluence with the Crawfish River. Within a short distance below the outfall, significant sludge deposits have been identified. Few organisms exist in the sludge deposits besides chironomids and oligochaete "sludge" worms. Generally speaking, the reach of stream within the Lake Mills City limits primarily supports forage fish and tolerant macroinvertebrates. From the outlet dam at Rock Lake to CTH "V" bridge, Rock Creek is classified intermediate fish and aquatic life. Below CTH "V", the classification changes to full fish and aquatic life.



STUDY PLAN

In addition to a preliminary dissolved oxygen survey, the pre-operational chemical survey was conducted on Rock Creek August 16, 1979. Water samples were collected; above the treatment plant outfall (MC₁); from the effluent (C₂); and at CTH "V" bridge (MC₄); at the upper end of Hooper's Mill Pond (C₆); at the mouth of Hooper's Mill Pond (C₇); and at Manske Road bridge (C₈). (See map) The samples were analyzed at the State Laboratory of Hygiene-Water Chemistry Laboratory. Parameters measured from water samples included: five day biochemical oxygen demands (BOD₅); total and soluble phosphorus; total organic nitrogen; ammonia nitrogen (NH₃-N); nitrites plus nitrates (NO₂-N + NO₃-N); fecal coliform (MFFCC); and suspended solids.

Temperature, dissolved oxygen and pH were measured in the field at the time of sample collection. Additional field measurements were taken earlier in the day to determine the photosynthetic effect on the dissolved oxygen levels in Rock Creek. Dissolved oxygen and temperature were measured with a Yellow Springs Instrument (Y.S.I.) dissolved oxygen meter, model number 54A. A Rascher and Betzold colorimetric kit was used to measure pH. Flow measurements were taken with a Marsh-McBurney flow meter, above and below the outfall.

Macroinvertebrate studies were conducted on May 7, 1979, December 12, 1979 and April 27, 1981. Sampling stations were established at MC₁, M₃, MC₄ and M₅. A D-frame net was used to collect macroinvertebrates. Samples were preserved in 95% ethanol before laboratory sorting and identification.

Macroinvertebrate samples were used to determine the biotic index at each station. Developed by Professor Hilsenhoff at the University of Wisconsin-Madison, the biotic index uses arthropods to evaluate the water quality of streams. The index is based on varying tolerances of different macroinvertebrate species to organic pollution. Biotic index values ranges from 0-5 with 0 indicating very intolerant arthropods and 5 indicating very tolerant arthropods. Table 2 lists water quality descriptions for respective biotic index values. For a complete discussion of Hilsenhoff's biotic index, consult DNR Technical Bulletin No. 100.

Figure 2: Water quality determination from biotic index values.

Biotic Index	Water Quality	Evaluation
0.00-1.75	Excellent	No organic pollution
1.76-2.25	Very Good	Possible slight pollution
2.26-2.75	Good	Some pollution
2.76-3.50	Fair	Significant pollution
3.51-4.25	Poor	Very significant pollution
4.26-5.00	Very Poor	Severe pollution

* = November 1980 revision.

CHEMICAL SURVEY RESULTS

The August 16 chemical survey was performed during high stream flows instead of optimal low flow conditions. The upstream flow was measured at 2.36 cfs; approximately 18 times the estimated Q_{7, 10} of .13 cfs. The STP was discharging at 1.52 cfs. Even though substantial dilution of wastewater was observed compared to low flow conditions, depressed dissolved oxygen levels reflected impacts of the wastewater treatment plant on the stream. During sample collection, D.O. levels were as low as 2.4 mg/l below the treatment plant compared to 6.6 mg/l above it. At four sampling stations in the full fish and aquatic life zone, dissolved oxygen levels dropped below water quality standards (NR 102.02) established at 5 mg/l. The lowest dissolved oxygen measurement was observed at MC₄ early in the morning. Respiration of aquatic plants and other organisms, coupled with waste assimilation, lowered the D.O. level to 1.2 mg/l at that location.

Low dissolved oxygen levels were also documented during a preliminary survey on July 7, 1979. Dissolved oxygen levels dropped as low as 0.2 mg/l at station C₇, which is located at the mouth of Hoopers Mill Pond. The results of this survey are summarized in Figure 3 along with the August 16 chemical survey results.

In addition to the studies documenting organic enrichment to the stream, a sludge deposit sample was analyzed for heavy metals in May, 1979. The sample was collected about 1/4 mile below the treatment plant in a sluggish ditched section of stream. The results indicated 1800 ug/l chromium, 2100 ug/l zinc and 1400 ug/l nickel. It is not known how much the city storm sewers contribute to these toxic concentrations compared to the wastewater treatment plant.

MACROINVERTEBRATE RESULTS

Representative macroinvertebrates above the wastewater treatment plant reflected only fair water quality conditions; a justification for the intermediate stream classification above CTH "V". At site M₃, located a short distance below the wastewater treatment plant, an ecologically unbalanced benthic community revealed very poor water quality or severe pollution. The heavy sludge deposits at this station contained only a few very tolerant species of arthropods. At selected downstream riffle sites (MC₄ and M₅), representative macroinvertebrates reflected poor water quality conditions. Since these two stations are located in the full fish and aquatic life zone, they cannot be directly compared to sites MC₁ and M₃ from the variance zone. However, the information does indicate organic enrichment from the wastewater treatment plant at these stations. The flow characteristics and substrates at MC₄ and M₅ provide better habitat than what is available at MC₁. Therefore, a more balanced community of arthropods is expected from the full fish and aquatic life stations than what is observed at MC₁. Considering the impacts from the wastewater treatment plant however, the opposite is observed: a lower biotic index was revealed at MC₁ than either MC₄ or M₅. The next five pages contain macroinvertebrate data from the four sampling stations.

Figure 3: Lake Mills Chemical Survey
August 16, 1979

Sta. No.	Dis. From outfall miles	Time	Temp. (oc)	D.O. (mg/l)	pH (su)	BOD ₅ (mg/l)	Tot. Org-N (mg/l)	NH ₃ -N (mg/l)	NO ₂ -N NO ₃ -N (mg/l)	Tot.-P (mg/l)	Sol.-P (mg/l)	MFFCC #/100ml	Sus. Solids (mg/l)	Flow (cfs)	Landmarks
MC ₁	-.05	06:00	13.5	5.5											
		10:05	14.5	6.6	7.8	2.9	.7	.34	.44	.10	.03	L.A.		2.36	Above outfall, Rock Creek Rd.
C ₂	0	10:00	17.5	3.5	7.2	31	4.0	8.1	2.42	2.75	2.1	370	18		STP outfall
MC ₄	.45	06:05	15.0	1.2											
		10:15	15.0	2.4	7.4	2.9	.7	1.7	.94	.92	.77			5.7	CTH V
C ₆	1.1	06:15	17.8	2.8											
		11:30	18.0	2.6	7.4	3.7	.8	2.2	.09	1.06	.92				Upper end of Hooper's Mill Pond
C ₇	1.38	11:31	18.5	2.8	7.1	2.0	.7	1.9	.10	1.04	.87	L.A.		9.53	Mouth of Hooper's Mill Pond
C ₈	2.8	06:25	18.0	4.8											
		12:30	18.0	8.6	8.0	2.9	.9	.89	1.09	.90	.78				Manske Rd.

July 7, 1979

MC ₁	.05	15:00	24.0	10.5		4.1									
C ₂	0	13:00				49									
MC ₄	.45	13:30	24.0	2.3		7.4									
C ₇	1.38	14:30	25.0	0.2		8.6									

1988 Revised HBI values

	5-79	12-79	4-81
MC ₁	6.07	7.37	5.87
M ₃	9.32	9.95	9.71
MC ₄	6.97		6.57
M ₅			7.03

LAKE MILLS
JEFFERSON COUNTY

July 24, 1975

. 21

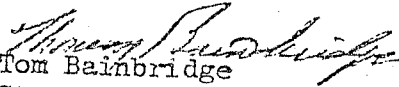
The effluent from the Lake Mills wastewater treatment plant is discharged to Rock Creek, which has a TQ10 of .03 cfs. Rock Creek flows out of Rock Lake about 1 mile above the plant outfall and then flows through the City of Lake Mills. Below the treatment plant, the stream flows through agricultural land with intermixed meadows and lowland areas. Approximately 1½ miles downstream from the plant outfall, a dam impoundment exists at Harper's Mill. This point downstream to the Crawfish River, roughly 1¼ stream miles, contains the higher quality fishery and also receives more recreational usage due to higher flows. Included in the stream's fisheries are Northern Pike, Largemouth Bass, Blue Gills and rough fish.

RECOMMENDATIONS

Rock Creek, from its head waters to County Trunk "V", should be classified as noncontinuous intermediate fish and aquatic life. From County Trunk "V" downstream to a point above the Harper's Mill Pond, the stream should be classified as continuous intermediate fish and aquatic life. From the Harper's Mill Pond and for the remaining length of Rock Creek to its confluence with the Crawfish River, the classification should be continuous fish and aquatic life.

The above recommendations represent a concurrence of opinion of the stream classification team who are as follows:

Roy Lembcke, District Engineer; Jim Congdon, Area Fish Manager; and Tom Bainbridge, Stream Classification Coordinator.


Tom Bainbridge
Stream Classification Coordinator

TB:lg

Lake Mills

Lake Mills STP discharges to Rock Creek, which is the outlet of Rock Lake and a tributary of the Crawfish River. The upstream flow in Rock Creek is solely dependent upon the flow over the Rock Lake dam. The dam which impounds Rock Lake is a top draw which contributes to higher water temperatures and fluctuating flows in Rock Creek. Rock Creek, below the treatment plant, flows through agricultural land with intermixed meadows and lowland. At Hooper's Mill, approximately one mile below the treatment plant, Rock Creek is impounded by a dam. The stream above this dam is subject to siltation and limited habitat. It is the area fish managers opinion that the most limiting factor of the stream is the quality of the habitat. The nature of the stream above Hooper's Mill dam is such that it will not support a game fish population and is limited to forage fish. The stream below this dam exhibits better quality and has a higher quality fishery.

LAKE MILLS
JEFFERSON COUNTY

July 24, 1975

The effluent from the Lake Mills wastewater treatment plant is discharged to Rock Creek, which has a 7Q10 of .03 cfs. Rock Creek flows out of Rock Lake about 1 mile above the plant outfall and then flows through the City of Lake Mills. Below the treatment plant, the stream flows through agricultural land with intermixed meadows and lowland areas. Approximately $1\frac{1}{2}$ miles downstream from the plant outfall, a dam impoundment exists at Harper's Mill. This point downstream to the Crawfish River, roughly $1\frac{1}{4}$ stream miles, contains the higher quality fishery and also receives more recreational usage due to higher flows. Included in the stream's fisheries are Northern Pike, Largemouth Bass, Blue Gills and rough fish.

RECOMMENDATIONS

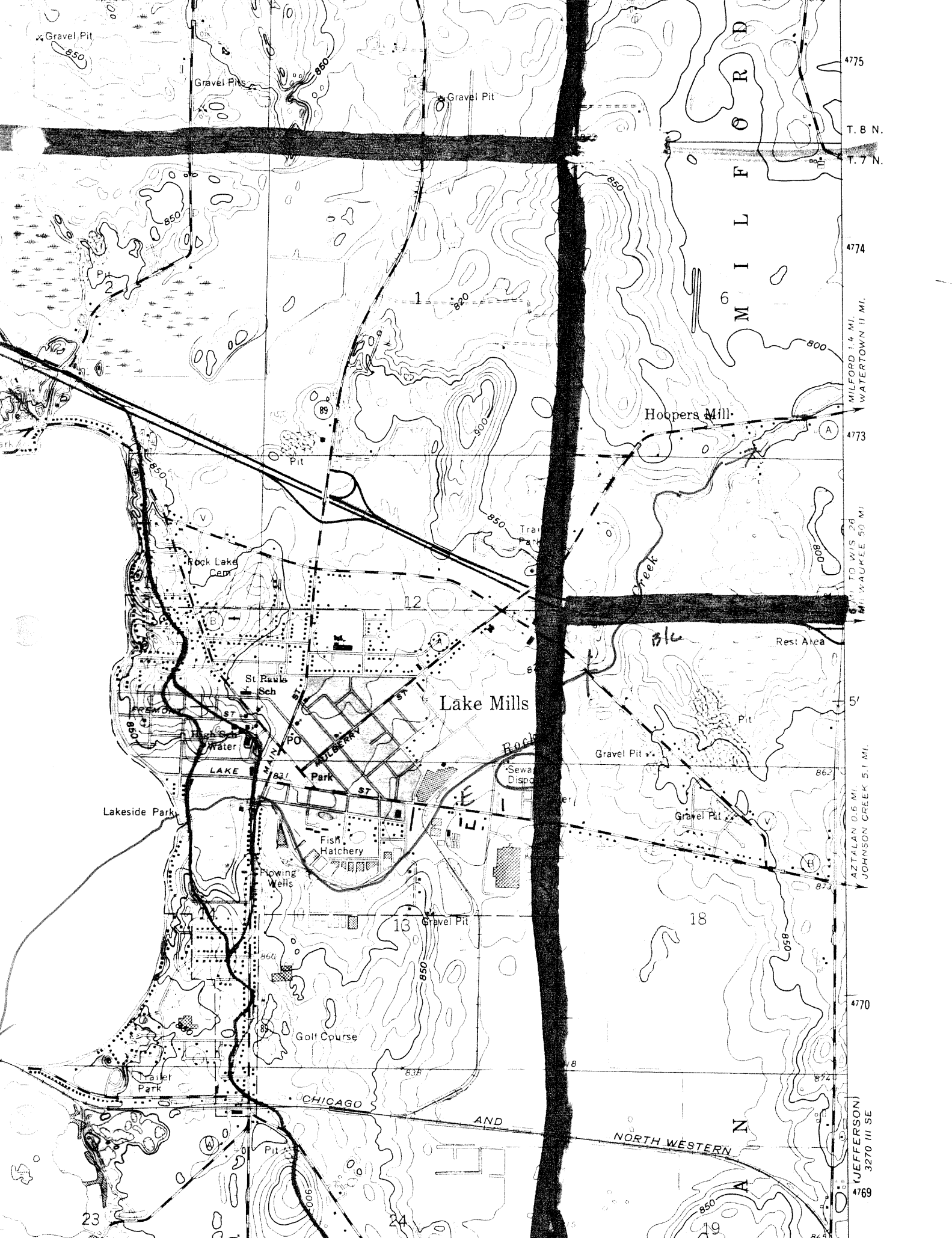
Rock Creek, from its head waters to County Trunk "V", should be classified as noncontinuous intermediate fish and aquatic life. From County Trunk "V" downstream to a point above the Harper's Mill Pond, the stream should be classified as continuous intermediate fish and aquatic life. From the Harper's Mill Pond and for the remaining length of Rock Creek to its confluence with the Crawfish River, the classification should be continuous fish and aquatic life.

The above recommendations represent a concurrence of opinion of the stream classification team who are as follows:

Roy Lembcke, District Engineer; Jim Congdon, Area Fish Manager; and Tom Bainbridge, Stream Classification Coordinator.


Tom Bainbridge
Stream Classification Coordinator

TB:lg



M I L L F O R D

Lake Mills

Hoopers Mill

Lakeside Park

Golf Course

Fish Hatchery

Rowing Wells

St Pauls Sch

Rock Lake Camp

Gravel Pit

Gravel Pits

Gravel Pit

4775

T. 8 N.

T. 7 N.

4774

MILFORD 1.4 MI.
WATERTOWN 11 MI.

4773

6 MI. TO WIS 24
MI. WAUKEE 50 MI.

5'

862

872

873

874

4770

872

873

874

4769

875

876

(JEFFERSON)
3270 III SE

CHICAGO AND NORTH WESTERN

23

24

18

12

1



← LAKE MILLS -
Above STP,
stream borders
St. Regis Co.

↗ Lake Mills - Directly
Above STP, view from
the outfall.



↖ LAKE MILLS - Above First Town
Road Bridge, below STP.

↘ LAKE MILLS - Harpers Mill Pond
Below STP.

