

BLUE RIVER

AT MONTFORT

TRIENNIAL STANDARDS REVIEW

MONTFORT WWTP

JUNE 1988

ROGER SCHLESSER, SOUTHERN DISTRICT

BUREAU OF WATER RESOURCES MANAGEMENT

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

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SUMMARY

The Montfort WWTP had previously discharged to a tributary of the Blue River. The tributary is listed in NR 104.05 (Appendix V) as being intermediate fish and aquatic life (D). The tributary had been upgraded to full fish and aquatic life in 1980. During facility planning it was decided to relocate the outfall to the Blue River. The Blue River is classified as continuous fish and aquatic life (A). Therefore, due to the upgrading of the tributary's classification and the relocation of the outfall to a fish and aquatic life stream, the tributary of the Blue River should be removed from NR 104.05.

GENERAL DESCRIPTION

The Montfort WWTP was revamped in the early 1980's and the outfall was extended 1.3 miles to discharge directly to the Blue River. Final effluent limits for the plant are located in Appendix IV. The treatment plant consists of a four cell stabilization pond.

The tributary to the Blue River had originally been classified as intermediate (D) in 1976 (Appendix III). The tributary was re-evaluated in 1980 with fish management and was upgraded to full fish and aquatic life.

RECEIVING WATER

The Blue River is a valuable trout resource to Iowa County. Deep pools and long riffles are a mainstay of the stream. Rubble - boulder and some gravel are the common substrate. The stream flows through a wooded valley with many bluffs and rock outcrops. Some of the valley floor is heavily pastured or cropped.

Table I and II contain macroinvertebrate data collected from CTH "I", which is approximately 1/2 mile above the outfall. According to this data the Blue River has "very good water quality".

CLASSIFICATION

The new receiving stream for the Montfort WWTP is the Blue River. The Blue River at the discharge site is classified as continuous fish and aquatic life (A).

Map #1
Montfort WWTP

Montfort WWTP

Montfort

NORTH WESTERN

BM 1164

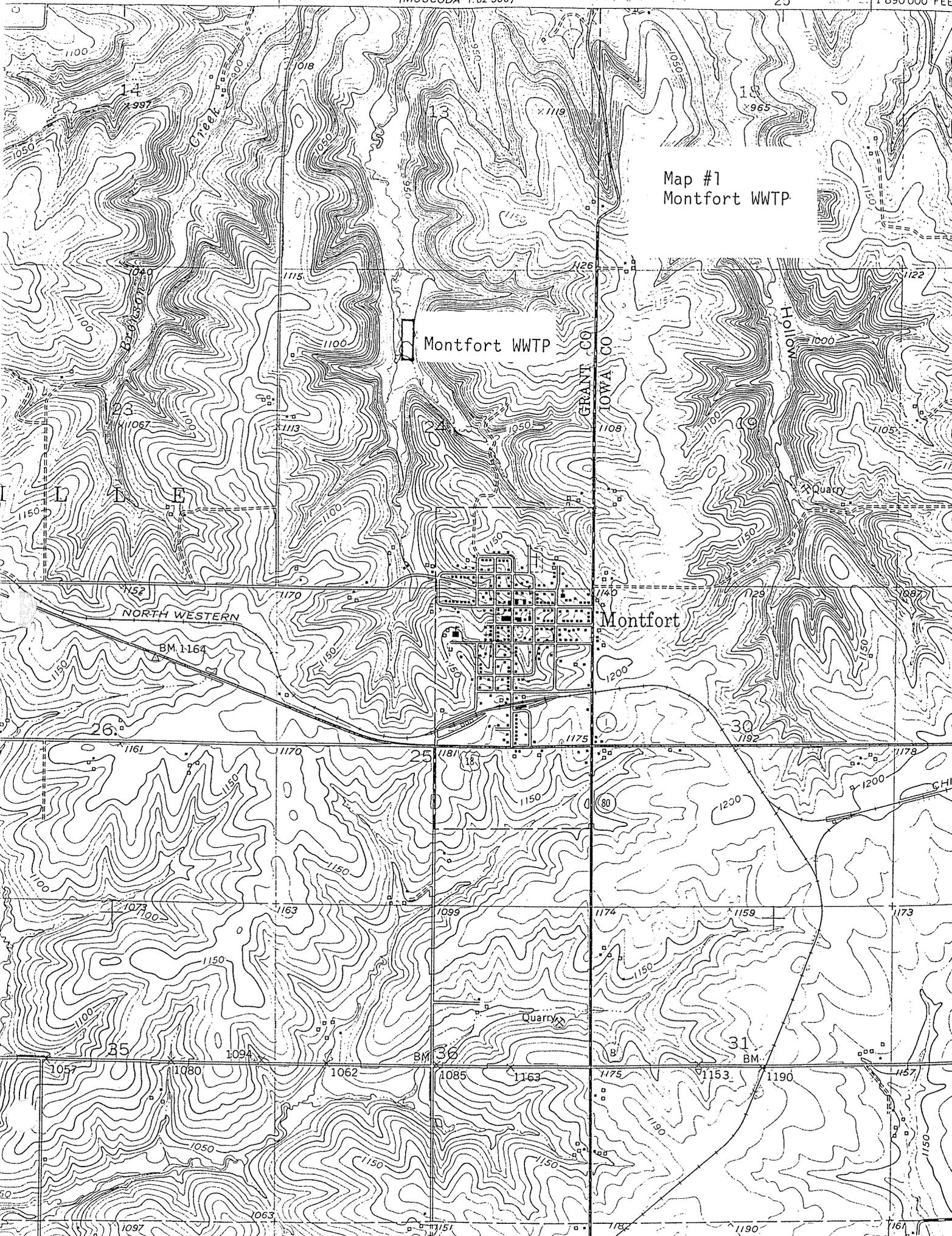
26

35

BM 36

31

BM





Macroinvertebrate
Sampling site.

(MONTFORT)
2969 IV NW

SCALE 1:64,000

Table I Taxonomic list of macroinvertebrates for CTH "I"

Date: 4/21/80 (Blue River)

ORDER	FAMILY	GENUS/SPECIES	NUMBER OF INSECTS (n)	BIOTIC INDEX VALUE (a)	a x n
COLEOPTERA	ELMIDAE	Optioservus spp. (larvae)	1	4	4
DIPTERA	CHIRONOMIDAE	Cricotopus spp.	2	7	14
DIPTERA	CHIRONOMIDAE	Diaamesa spp.	3	5	15
DIPTERA	CHIRONOMIDAE	Eukiefferiella spp.	12	8	96
DIPTERA	CHIRONOMIDAE	Orthocladus spp.	20	6	120
DIPTERA	CHIRONOMIDAE	Pagastia spp.	1	1	1
DIPTERA	CHIRONOMIDAE	Polypedilum spp.	1	6	6
DIPTERA	EMPIDIDAE	all genera	1	6	6
DIPTERA	TIPULIDAE	Antocha spp.	10	3	30
EPHEMEROPTERA	BAETIDAE	Baetis vagans	73	2	146
EPHEMEROPTERA	HEPTAGENIIDAE	Stenacron interpunctatum	5	7	35
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche alhedra	5	3	15
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche slossonae	29	4	116
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche spp.	2	5	10
AMPHIPODA	GAMMARIDAE	Gammarus pseudolimneus	1	4	4
Totals			166		618

Biotic Index = $618 / 166 = 3.72$ Very Good

Table II Taxonomic list of macroinvertebrates for CTH "I"

Date: 10/20/80 (Blue River)

ORDER	FAMILY	GENUS/SPECIES	NUMBER OF INSECTS (n)	BIOTIC INDEX VALUE (a)	a x n
COLEOPTERA	ELMIDAE	Dubiraphia spp. (larvae)	1	6	6
COLEOPTERA	ELMIDAE	Optioservus spp. (larvae)	61	4	244
DIPTERA	ATHERICIDAE	Atherix variegata	1	2	2
DIPTERA	CHIRONOMIDAE	Cricotopus spp.	3	7	21
DIPTERA	CHIRONOMIDAE	Orthocladus spp.	9	6	54
DIPTERA	EMPIDIDAE	all genera	1	6	6
DIPTERA	SIMULIIDAE	Simulium tuberosum	1	4	4
DIPTERA	TIPULIDAE	Tipula spp.	2	4	8
EPHEMEROPTERA	BAETIDAE	Baetis brunneicolor	10	4	40
EPHEMEROPTERA	BAETIDAE	Baetis flavistriga	1	4	4
EPHEMEROPTERA	HEPTAGENIIDAE	Stenacron interpunctatum	3	7	21
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche alhedra	3	3	9
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche bifida (group)	1	6	6
TRICHOPTERA	HYDROPSYCHIDAE	Ceratopsyche slossonae	12	4	48
TRICHOPTERA	HYDROPSYCHIDAE	Cheumatopsyche spp.	28	5	140
AMPHIPODA	GAMMARIDAE	Gammarus pseudolimneus	1	4	4
Totals			138		617

$$\text{Biotic Index} = 617 / 138 = 4.47 \text{ Very Good}$$



Blue River

Montfort WWTP;
upstream of
the outfall.



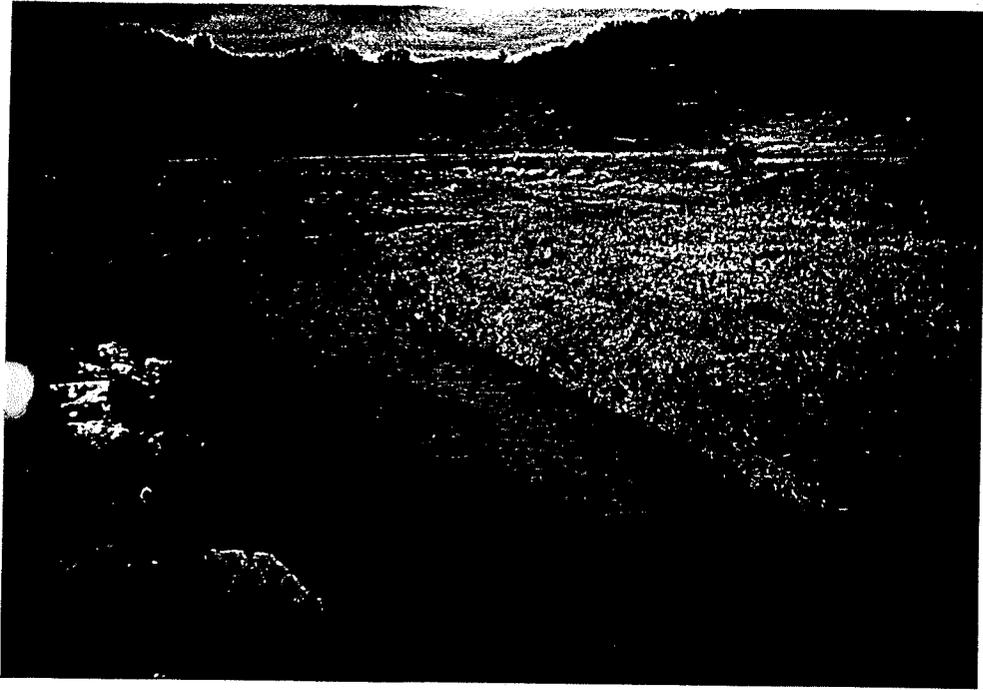
Blue River

Montfort WWTP;
outfall in
lower right-
hand corner.



Blue River

Montfort WWTP;
outfall in
lower left-
hand corner.



Blue River
Downstream of
Bluff Road and
the Montfort
WWTP outfall.

APPENDIX I

Stream Blue River Reach Location Downstream of the Montfort WWTP Reach Score/Rating 84/A

County Grant Date 6/16/88 Evaluator R. Schlessor Classification Full Fish and Aquatic

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. 10	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. 12	Heavy erosion evident. Probable erosion from any run off. 16
Watershed Nonpoint Source	No evidence of significant source. Little potential for future problem. 8	Some potential sources (roads, urban area, farm fields). 10	Moderate sources (small wetlands, tile fields, urban area, intense agriculture). 12	Obvious sources (major wetland drainage, high use urban or industrial area, feed lots, impoundment). 16
Bank Erosion, Failure	No evidence of significant erosion or bank failure. Little potential for future problem. 4	Infrequent, small areas, mostly healed over. Some potential in extreme floods. 8	Moderate frequency and size. Some "raw" spots. Erosion potential during high flow. 16	Many eroded areas. "Raw" areas frequent along straight sections and bends. 20
Bank Vegetative Protection	90% plant density. Diverse trees, shrubs, grass. Plants healthy with apparently good root system. 6	70-90% density. Fewer plant species. A few barren or thin areas. Vegetation appears generally healthy. 9	50-70% density. Dominated by grass, sparse trees and shrubs. Plant types and conditions suggest poorer soil binding. 15	<50% density. Many raw areas. Thin grass, few if any trees and shrubs. 18
Lower Bank Channel Capacity	Ample for present peak flow plus some increase. Peak flow contained. W/D ratio <7. 8	Adequate. Overbank flows rare. W/D ratio 8-15. 10	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. 14	Inadequate, overbank flow common. W/D ratio >25. 16
Lower Bank Deposition	Little or no enlargement of channel or point bars. 6	Some new increase in bar formation, mostly from coarse gravel. 9	Moderate deposition of new gravel and coarse sand on old and some new bars. 15	Heavy deposits of fine material, increased bar development. 18
Bottom Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition. 4	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. 8	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. 16	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. 20
Bottom Substrate/ Available Cover	Greater than 50% rubble, gravel or other stable habitat. 2	30-50% rubble, gravel or other stable habitat. Adequate habitat. 7	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. 17	Less than 10% rubble gravel or other stable habitat. Lack of habitat is obvious. 22
Avg. Depth Riffles and Runs	Cold >1' 0	6" to 1' 6	3" to 6" 18	<3" 24
	Warm >1.5' 0	10" to 1.5' 6	6" to 10" 18	<6" 24
Avg. Depth of Pools	Cold >4' 0	3' to 4' 6	2' to 3' 18	<2' 24
	Warm >5' 0	4' to 5' 6	3' to 4' 18	<3' 24
Flow, at Rep. Low Flow	Cold >2 cfs 0	1-2 cfs 6	.5-1 cfs 18	<.5 cfs 24
	Warm >5 cfs 0	2-5 cfs 6	1-2 cfs 18	<1 cfs 24
Pool/Riffle, Run/Bend Ratio (distance between riffles ÷ stream width)	5-7. Variety of habitat. Deep riffles and pools. 4	7-15. Adequate depth in pools and riffles. Bends provide habitat. 8	15-25. Occasional riffle or bend. Bottom contours provide some habitat. 16	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 20
Aesthetics	Wilderness characteristics, outstanding natural beauty. Usually wooded or un-pastured corridor. 8	High natural beauty. Trees, historic site. Some development may be visible. 10	Common setting, not offensive. Developed but uncluttered area. 14	Stream does not enhance aesthetics. Condition of stream is offensive. 16
Column Totals:	<u>6</u>	<u>54</u>	<u>24</u>	<u>0</u>

Column Scores E 6 +G 54 +F 24 +P 0 = 84 = Score

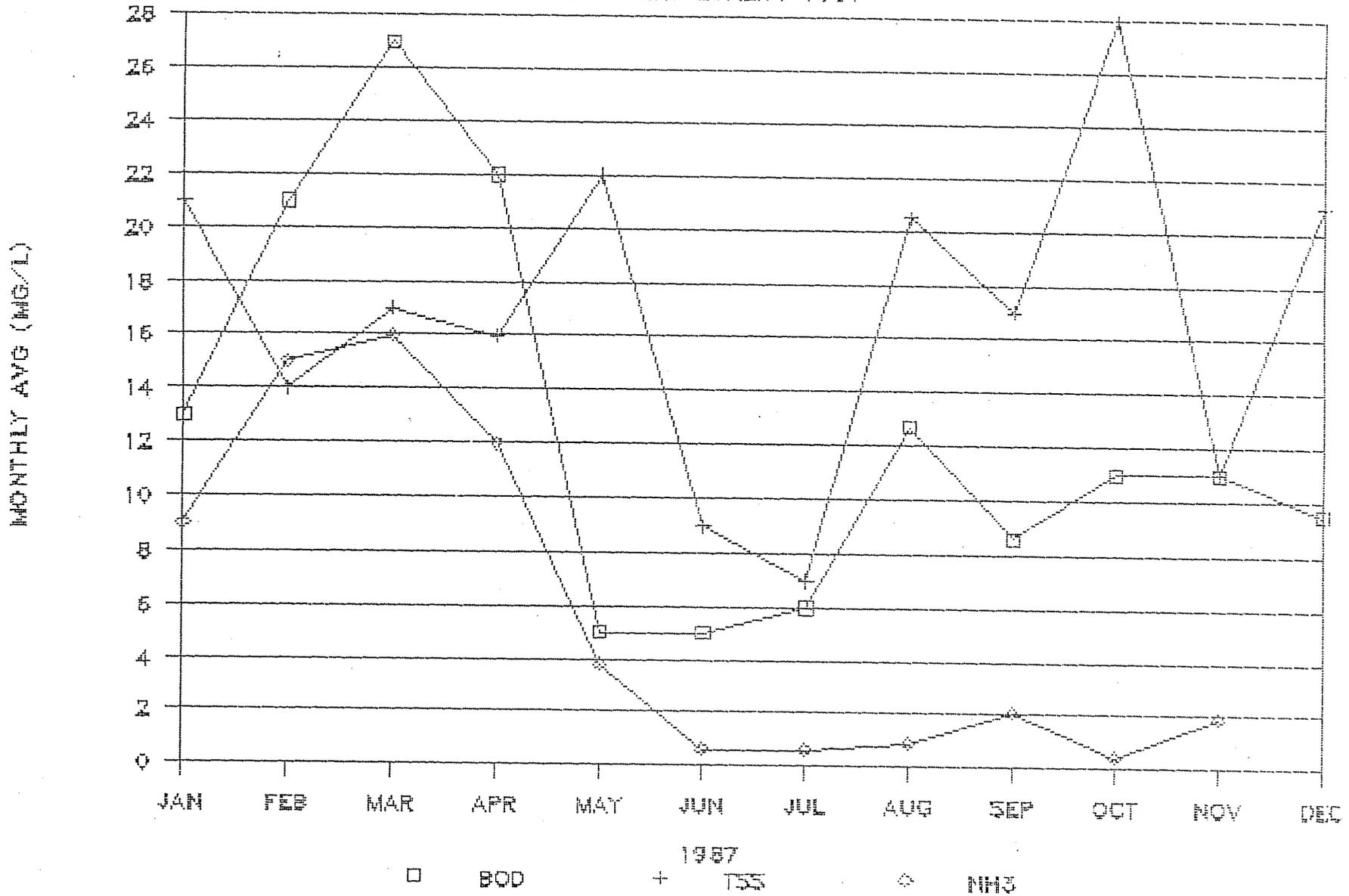
APPENDIX II

MONTFORT SEWAGE TREATMENT PLANT
EFFLUENT QUALITY 1987

	FLOW (MGD)	BOD (MG/L)	TSS (MG/L)	NH3-N (MG/L)	pH (MIN)	pH (MAX)
JAN	0.041	13.00	21.00	9.00		
FEB	0.043	21.00	14.00	15.00		
MAR	0.051	27.00	17.00	16.00		
APR	0.069	22.00	16.00	12.00		
MAY	0.071	5.00	22.00	3.80		
JUN	0.073	5.00	9.00	0.61		
JUL	0.070	6.00	7.00	0.60		
AUG	0.088	12.70	20.50	0.90		
SEP	0.079	8.60	17.00	2.06		
OCT	0.057	11.00	28.00	0.44		
NOV	0.072	11.00	11.00	1.90		
DEC	0.069	9.50	21.00	5.80		

MONTFORT WWTP

EFFLUENT QUALITY 1987



APPENDIX III

Montfort Sewer Department
Grant County

October 15, 1976
Blue River Tributary

Montfort discharges into the Blue River Tributary. Portions of it are pastured and heavily eroded. Its fishery consists mostly of forage fishes.

Blue River

Surface area = 30.31 acres, Length = 25.0 miles, Gradient = 8 ft./mile.

A spring and seepage-fed stream beginning in Iowa County as "Foreman Creek" and flowing southwest to empty into the Wisconsin River northeast of the Village of Blue River. The regional land form of this watershed is early maturity or late youth with narrow ridges, remnants of flat uplands, and steep, narrow valleys. The floodplain is one-fourth to one mile in width along the main section of the river. The terrain resembles the rimrock country in Montana and Wyoming with evergreen-capped outcrops overlooking much of the stream. The Blue River also has quality trout fishing as well as spectacular scenery. Numerous springs and spring-fed tributaries contribute to the stream assuring favorable temperatures and a stable water supply. Eight of these tributaries are classified as trout streams with Fennimore Fork rated as the best trout water in Grant County. The upper 3.5 miles of the Blue River is considered trout water. This could be extended downstream to include everything above the mouth of Big Rock Branch. Brown and rainbow trout dominate the fishery in this section of stream. Brook trout are also present. A good catfish and smallmouth bass fishery exists in the lower reaches near the Village of Blue River. Trout reproduction is low due to large rubble and rapid runoff. Fishing pressure is heavy during much of the season. A total 672 acres of shallow marsh, fresh meadow and timber swamp wetland adjoin the lower reaches.

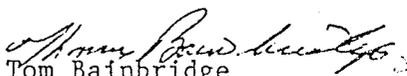
Recommendations

From the Montfort outfall downstream to the juncture with the Blue River the classification should be continuous surface waters not supporting a balanced aquatic community. From this point and for the remainder of the Blue 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:

Dennis Iverson, District Engineer
Gene Van Dyck, Area Fish Manager
Tom Bainbridge, District Biologist
Roger Schlessler, Natural Resources Technician

Respectfully submitted,


Tom Bainbridge
Stream Classification Coordinator

TB:cb

DHR - Dodgeville Area Hdqrs.

Date: December 19, 1980

File Ref:

To: Mark Tusler

From: Roger Schlessor A.S.

Subject: Reclassification of the Tributary to the Blue River (Montfort)

The Montfort sewage treatment plant consists of a four cell lagoon with a discharge to a tributary of the Blue River. At the present time only the first lagoon and the last lagoon contain waste water. The middle two lagoons contain only a minimal amount of water, with terrestrial plants covering most of the lagoon's bottom. The influent can travel to any of the first three lagoons with the fourth lagoon being the final treatment cell. Presently only the first and last cells are being used because of the small volume of influent flow. The stream flows along the west side of the lagoon and the stream channel appears to have been moved there when the lagoons were constructed.

A preliminary and primary WLA were conducted on the tributary 6/25/80 and 7/7/80 respectively. During the WLA's effluent discharge was 0.5-2 gpm. Consequently the impact upon the stream on these dates was minimal, due to the small effluent flow.

Stream flow during dry periods becomes somewhat small. The Q_{710} for the site is .26 cfs. Stream flow above the discharge on the 6/25/80 survey was 0.245 cfs and on the 7/7/80 survey it was 0.207 cfs.

The substrate is one of silt, sand and gravel. The percentage of each varies considerably throughout the stream reach.

Below the outfall the gradient becomes much less and the stream develops deeper pools, many of which are 1.5' to 2.0' deep. The tributary runs north from the lagoons for approximately 1.25 miles before the juncture with the Blue River. It runs through open pasture for the first 3/4 of a mile and for the last 1/2 mile it flows through wooded pasture. Some problems do exist with overgrazing and siltation of the stream from cattle. The mid-section of the stream has the deeper pools and is not overgrazed, so much of the stream at this point is totally shaded by vegetation. Not until the lower end of the tributary does cattle usage become a significant problem. Bank erosion is more serious, with very little stream bank vegetation being present. Also, heavy siltation of the riffles and pools is quite evident along with a high degree of turbidity.

According to the chemical data collected during the WLA's the water quality of the stream is good. (Surveys attached). Presently the fishery is limited to forage fish but fish management has said they will attempt to manage it as trout water sometime in the future.

This attempt would be dependent upon water temperatures and the maintenance of good stream bank cover. Due to the small size of the stream, water temperatures are a limiting factor. A continual discharge from the lagoons could lead to high stream water temperatures in the summer and low stream water temperatures in the winter. Consequently, consideration should be given to using the present system as a fill and draw. This would eliminate a discharge to the stream during the critical times of the year.

Because the stream has the potential for a trout fishery in the future it should be reclassified to fish and aquatic life.

RS:ho

NOTED:

Date

APPENDIX IV

B. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting until December 31, 1988, the permittee is authorized to discharge from outfall serial number 001.

Samples taken in compliance with the monitoring requirements specified below shall be taken at a representative location.

There shall be no discharge of visible or floating solids in other than trace amounts.

During any 30 consecutive days, the average effluent concentrations of BOD₅ and of total suspended solids shall not exceed 15% of the average influent concentrations, respectively.

EFFLUENT PARAMETERS	EFFLUENT LIMITATIONS					MONITORING REQUIREMENTS	
	Quantity-kg/day(lbs/day)		Other Limitations (Specify Units)			Sample	Sample
	Average	Maximum	Minimum	Average	Maximum	Frequency	Type
Flow ¹	-	-	-	-	-	Continuous	Total Daily
BOD ₅ (weekly) (April-Sept)	7.4(16.3) ¹	-	-	35 mg/l	-	Weekly	24 hr. Comp. ²
BOD ₅ (weekly) (Oct-March)	9.5(21.0) ¹	-	-	45 mg/l	-	Weekly	24 hr. Comp. ²
BOD ₅ (monthly) April-Sept	6.3(14.0) ¹	-	-	30 mg/l	-	Weekly	24 hr. Comp. ²
BOD ₅ (monthly) (Oct-March)	6.3(14.0) ¹	-	-	30 mg/l	-	Weekly	24 hr. Comp. ²
Suspended Solids (weekly)	6.3(14.0) ¹	-	-	30 mg/l	-	Weekly	24 hr. Comp. ²
Suspended Solids (monthly)	7.4(16.3) ¹	-	-	35 mg/l	-	Weekly	24 hr. Comp. ²
Ammonia Nitrogen (April-Sept)	0.8 (1.9) ¹	-	-	4 mg/l	-	Weekly	24 hr. Comp. ²
Ammonia Nitrogen (Oct-March)	3.8 (8.4) ¹	-	-	18 mg/l	-	Weekly	24 hr. Comp. ²
pH	-	-	6.0 s.u.	-	9.0 s.u.	Weekly	Grab

¹Based on a design flow of 0.056 MGD.

²Samples shall be composited on a flow proportional basis.

APPENDIX V

Chapter NR 104

INTRASTATE WATERS — USES AND
DESIGNATED STANDARDS

NR 104.01	General (p. 33)	NR 104.07	Variations and additions applicable in the Lake Michigan district (p. 44)
NR 104.02	Surface water classifications and effluent limitations (p. 34)	NR 104.08	Variations and additions applicable in the north central district (p. 48)
NR 104.03	Classification of surface waters and antidegradation (p. 37)	NR 104.09	Variations and additions applicable in the west central district (p. 49)
NR 104.04	Provision for changes (p. 38)	NR 104.10	Variations and additions applicable in the northwest district (p. 52)
NR 104.05	Variations and additions applicable in the southern district (p. 38)		
NR 104.06	Variations and additions applicable in the southeast district (p. 41)		

Note: Chapter NR 104 as it existed on September 30, 1976 was repealed and a new chapter NR 104 was created effective October 1, 1976.

NR 104.01 General. (1) "It is . . . the goal of the state of Wisconsin that, wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water be achieved by 1983. . . ." s. 147.01(1)(b), Stats. The long-range goal of Wisconsin water quality standards is, therefore, to permit the use of water resources for all lawful purposes. Surface waters which because of natural conditions are not conducive to the establishment and support of the complete hierarchy of aquatic organisms shall not be degraded below present levels, but shall be upgraded as necessary to support assigned uses. Most surface waters within the state of Wisconsin already meet or exceed the goals specified above. However, certain waters of the state may not meet these goals for the following reasons:

- (a) The presence of in-place pollutants,
- (b) Low natural streamflow,
- (c) Natural background conditions, and
- (d) Irretrievable cultural alterations.

(1m) Where it is determined that one or more of these factors may interfere with the attainment of the statutory objectives, a variance from the criteria necessary to achieve those objectives is provided.

(2) Surface waters within the boundaries of the state shall meet the standards for fish and aquatic life and recreational use with the variances and additions listed below in ss. NR 104.05 to 104.10. A system is provided within which small streams and other surface waters which cannot support high quality uses are granted a variance from the high quality criteria.

(3) Effluent limitations specified in this chapter shall be achieved by industrial, private and municipal dischargers by July 1, 1983 unless an earlier date is otherwise provided in a permit issued under s. 147.02, Stats. Municipal dischargers eligible for state or federal grant-in-aid

shall achieve the specified effluent limitations upon completion of construction or modification of facilities approved by the department of natural resources subsequent to adoption of this chapter unless otherwise provided in a permit issued under s. 147.02, Stats.

History: Cr. Register, September, 1976, No. 249, eff. 10-1-76; am. (1), Register, December, 1977, No. 264, eff. 1-1-78.

NR 104.02 Surface water classifications and effluent limitations. (1) HYDROLOGIC CLASSIFICATION. "Surface waters" as defined in s. NR 102.01(7), may be classified according to their hydraulic or hydrologic characteristics. For purposes of this chapter, surface waters will be classified by the department into one of the following categories:

(a) *Lakes or flowages*. This classification includes bodies of water whose current is more or less stagnant or which lacks a unidirectional current.

(b) *Diffused surface waters*. This classification includes any water from rains, intermittent springs or melting snow which flows on the land surface, through ravines, etc., which are usually dry except in times of runoff. This category does not include waters at the land surface in the vicinity of agricultural or wastewater irrigation disposal systems.

(c) *Wellands*. This classification includes areas where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic vegetation and which have soils indicative of wet conditions.

(d) *Wastewater effluent channels*. This classification includes discharge conveyances constructed primarily for the purpose of transporting wastes from a facility to a point of discharge. Drainage ditches (including those established under ch. 88, Stats.) constructed primarily for the purposes of relieving excess waters on agricultural lands shall not be construed as effluent channels. Modifications made to natural watercourses receiving wastewater effluents for the purpose of increasing or enhancing the natural flow characteristics of the stream shall not be classified as effluent channels.

(e) *Noncontinuous streams*. This classification includes watercourses which have a defined stream channel, but have a natural 7-day Q_{\cong} flow of less than 0.1 cfs and do not exhibit characteristics of being perpetually wet without wastewater discharges.

(f) *Continuous streams*. This classification includes watercourses which have a natural 7-day Q_{\cong} flow of greater than 0.1 cfs or which exhibit characteristics of a perpetually wet environment, are generally capable of supporting a diverse aquatic biota and flow in a defined stream channel.

Note: The application of this classification system is not dependent on the the navigability properties of the watercourse, but is dependent upon the quantity-quality relationships of the surface water.

(2) WATER QUALITY CLASSIFICATION. (a) Whenever the goals as specified in s. 147.01(1)(b), Stats., cannot be attained because of conditions enumerated in s. NR 104.01(1), a variance may be provided. Variances from a specific water quality criteria may be given in s. NR 104.05 et. seq. or a variance under one of the categories provided in this chapter may be specified.

Register, October, 1985, No. 358

(b) Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development, or other activities shall be controlled so that waters regardless of their hydrologic and water quality classifications meet the general aesthetic and acute toxicity conditions in s. NR 102.02(1).

(3) VARIANCE CATEGORIES. (a) Surface waters not supporting a balanced aquatic community (intermediate aquatic life):

1. Applicability. This category of variance may be applied to either the continuous or noncontinuous stream hydrologic classification.

2. Surface water criteria. The following water quality criteria shall be met in all surface waters included in this variance category:

a. Dissolved oxygen shall not be less than 3 mg/l.

b. Ammonia nitrogen (as N) at all points in the receiving water shall not be greater than 3 mg/l during warm temperature conditions nor greater than 6 mg/l during cold temperatures to minimize the zone of toxicity and to reduce dissolved oxygen depletion caused by oxidation of the ammonia.

c. The pH shall be within the range of 6.0 to 9.0.

d. Other substances may not exceed concentrations determined in accordance with s. NR 102.02(1).

3. Effluent criteria. a. The effluent limitations determined necessary to meet the surface water criteria listed above are enumerated in table 1.

Parameter	Monthly Average (mg/l)	Daily	Weekly Average (mg/l)	Other (mg/l)
		Maximum (mg/1)		
BOD ₅	15	30	-	-
Total Suspended Solids	20	30	-	-
NH ₃ -N (May-October)	-	-	3	-
NH ₃ -N (November-April)	-	-	6	-
Dissolved Oxygen	-	-	-	4 (minimum)

b. Unless otherwise specified in table 1 above, effluent limitations for sewage treatment works shall be as adopted in ch. NR 210.

c. In addition to the effluent limitations enumerated in table 1 above, effluent limitations for these and any other substance necessary to protect assigned uses shall be met.

(b) Marginal surface waters: 1. Applicability. This variance category may be applied to the continuous or noncontinuous stream hydrologic classification, except that it shall be applied to all surface waters classified as effluent channel, wetland or diffuse surface water.

2. Surface water criteria. The following surface water quality criteria shall be met in all surface waters included in this variance category:

a. Dissolved oxygen shall not be less than 1 mg/l.

b. The pH shall be within the range of 6.0 to 9.0.

c. Other substances may not exceed concentrations determined in accordance with s. NR 102.02(1).

3. Effluent criteria. a. The effluent limitations determined necessary to meet the surface water criteria listed above are enumerated in table 2.

Parameter	Table 2		Other (mg/l)
	Monthly Average (mg/l)	Weekly Average (mg/l)	
BOD ₅	20	30	-
Total Suspended Solids	20	30	-
Dissolved Oxygen	-	-	4 (minimum)

b. Unless otherwise specified in table 2 above, effluent limitations for sewage treatment works shall be as adopted in ch. NR 210.

c. In addition to the effluent limitations enumerated in table 2 above, effluent limitations for these and any other substance necessary to protect assigned uses shall be met.

(4) OTHER CLASSIFICATIONS AND EFFLUENT CRITERIA. (a) *Surface waters significant to the environmental integrity of the state or region.* Under all hydrologic categories, the department reserves the right to require other effluent limitations, including allocation of wasteloads for organic material, toxicants and chlorine residuals if it is determined that the specified surface water is important to the overall environmental integrity of the area. In waters identified as trout streams, located in scientific areas or wild and scenic areas, providing endangered species habitat or of high recreational potential, effluent criteria will be evaluated on a case-by-case basis.

(b) *Surface waters classified for fish and aquatic life.* 1. Streams. Where flowing streams or rivers are specified to achieve fish and aquatic life criteria, wasteload allocation for organic material, toxicants and chlorine residuals shall determine effluent criteria necessary to achieve that standard.

2. Lakes and flowages. Effluent characteristics for discharges to lakes or flowages shall be based upon an evaluation of water quality necessary to protect fish and aquatic life taking into account mixing zone and nutrient removal criteria.

3. Minimum effluent criteria. If it can be reasonably demonstrated that the quality of the surface water is independent of a wastewater discharge, effluent limitations established under ss. 147.04 and 147.06, Stats., shall apply.

(c) *Wastewater treatment lagoons.* Effluents from fill-and-draw wastewater treatment lagoons or domestic waste stabilization ponds discharging to waters receiving a variance in this chapter may be permitted to vary from the limitations specified in table 1 or 2 provided the following conditions are met:

1. The discharge occurs only during the spring and fall of the year when the flow in the receiving water is normally high, and the temperature is low. The rate of discharge shall not exceed that specified in a permit under s. 147.02, Stats., or where no rate is indicated, the allowable discharge quantities shall be determined by the department based upon current evaluation of the receiving water.

2. In lieu of the previous conditions, the discharge from a fill-and-draw lagoon may occur at any time provided the rate does not exceed the assimilative capacity of the receiving water as specified in a permit under s. 147.02, Stats.

3. The dissolved oxygen in the effluent is maintained at a level greater than or equal to 4 mg/l, and the permitted rate of discharge shall be such that the dissolved oxygen and ammonia nitrogen criteria necessary to sustain fish and aquatic life are maintained in the stream during the period of discharge.

4. The effluent limitations do not exceed those established under ss. 147.04 and 147.06, Stats.

(5) CHANGES IN CLASSIFICATION. Surface waters which exhibit changing hydrologic and quality characteristics shall be classified accordingly. Effluent criteria for upstream discharges shall be based upon the most critical downstream classification and shall be specified by the department either on the basis of justified inference or by the application of a wasteload allocation analysis. Any subsequent changes in a stream's morphology or potential may necessitate the reevaluation of the classification.

History: Cr. Register, September, 1976, No. 249, eff. 10-1-76; am. Tables 1 and 2, (2), (3) (a) 2a and d, (3) (b) 2a and c, (4) (c), Register, December, 1977, No. 264, eff. 1-1-78; am. (3) (a) 2a, Register, June, 1978, No. 270, eff. 7-1-78; am. (1) (c), Register, June, 1984, No. 342, eff. 2-1-84; r. (3) (a) 2. b. to d., (b) 2. b. and c., renum. (3) (a) 2. e. to g. and (3) (b) 2. d. and e. to be (3) (a) 2. b. to d. and (3) (b) 2. b. and c. and am (3) (a) 2. g. and (3) (b) 2. c., am. (3) (a) 3. a. and (3) (b) 3. a., Register, October, 1986, No. 370, eff. 11-1-86.

NR 104.03 Classification of surface waters and antidegradation. In no case shall the effluent criteria specified herein cause degradation of surface water quality below present levels. Surface waters which, be reason of their hydrologic classification, are permitted to receive a new effluent of a quality specified in NR 104.02 shall not receive such effluent unless it has been affirmatively demonstrated to the department that such degradation is necessary to protect the public health or to maintain or restore the environmental integrity of a higher value resource. In no case shall a new effluent interfere with or become injurious to any assigned uses made of or presently possible in any surface water.

History: Cr. Register, September, 1976, No. 249, eff. 10-1-76; am. Register, December, 1977, No. 264, eff. 1-1-78.

NR 104.04 Provision for changes. The surface waters specified in this chapter are not intended to be an exclusive listing nor do the specified effluent criteria purport to meet the 1983 water quality goals set forth in ch. 147, Stats. Additions to or deletions from these listings may be made based upon the accumulation of information necessary to make such determination and in accordance with the requirements of ch. 227, Stats.

History: Cr. Register, September, 1976, No. 249, eff. 10-1-76.

NR 104.05 Variances and additions applicable in the southern district. Subject to the provision of NR 104.04, intrastate surface waters in the southern district counties of Columbia, Dane, Dodge, Grant, Green, Iowa, Jefferson, Lafayette, Richland, Rock and Sauk shall meet the criteria for fish and aquatic life and recreational use with exceptions and additions as follows:

Register, October, 1986, No. 370

(1) ADDITION. The public water supply standard shall be met on the Wisconsin river in section 8, township 10 north, range 7 east.

(2) VARIANCE. Surface waters in the southern district subject to a variance under NR 104.02(3) are listed in table 3.

TABLE 3
SOUTHERN DISTRICT

Surface Water (Facility Affected)	Reach Description	Hydrologic Classification	Applicable Criteria (1)	Effluent Limitations (2) Effluent limitations to be determined
1. Goose Lake Tributary (Arlington)	Tributary upstream from Goose Lake	Noncontinuous	II	B
2. Tributary - East Branch Pecatonica River (Barneveld)	From the Barneveld STP downstream to the East Branch Pecatonica River	Noncontinuous	II	B
3. Williams Creek (Blue Mounds)	From the Blue Mounds STP downstream to the east line of Sec. 14, T6N, R5E	Noncontinuous	I	A
4. Sanders Creek (Boscobel)	From the Boscobel STP downstream to the Wisconsin River	Continuous	I	A
5. Allen Creek (Brooklyn)	Upstream from Butts Corner Road	Continuous	I	A
6. Kummel Creek (Brownsville)	From Brownsville STP downstream to CTH "HH"	Noncontinuous	I	A
7. Spring Brook and Tributary (Clinton)	Tributary from the Clinton STP to Spring Brook	Effluent ditch	II	B
8. Tributary - Dead Creek (Clyman)	Spring Brook in Clinton Township	Continuous	II	NA
9. West Branch Pecatonica River (Cobb)	Tributary from Clyman STP downstream to Dead Creek	Noncontinuous	II	B
	From the Cobb STP downstream to confluence with an unnamed tributary NE $\frac{1}{4}$, NW $\frac{1}{4}$, Sec. 2, T5N, R1E.	Continuous	I	A
10. Door Creek (Cottage Grove)	Door Creek upstream from STH 12 & 18	Noncontinuous	I	A
	From STH 12 & 18 downstream to Lake Kegonsa	Continuous	I	NA
11. Coon Branch (Cuba City)	Upstream from westerly tributary approximately 1 mile above STH "11"	Noncontinuous	II	B
	Downstream from above tributary to confluence with Galena River	Continuous	I	NA
12. Mud Creek and Tributary (Deerfield)	Tributary from Deerfield STP to confluence with Mud Creek	Effluent ditch	II	B
	Mud Creek from above tributary downstream to confluence with Koshkonong Creek	Continuous	I	

DEPARTMENT OF NATURAL RESOURCES

NR 104

39

13. Indian Creek and Tributary (Dickeyville)	Tributary from Dickeyville STP to confluence with Indian Creek Indian Creek from above tributary downstream to confluence with Platte River	Noncontinuous Continuous	II I	NA A
14. Dodge Branch (Dodgeville)	Upstream from a point approximately 3,500 feet downstream from STH "191"	Noncontinuous	I	A
15. Tributary - North Branch Crawfish River (Fall River)	Tributary from the Fall River STP downstream to the North Branch Crawfish River	Noncontinuous	II	Effluent limitations to be determined
16. Gregory Branch (Fennimore)	Upstream from STH "61"	Continuous	I	A
17. Tributary - Rock River (Hidden Meadows Mobile Home Park)	Tributary from the Hidden Meadows Mobile Park STP discharge downstream to the Rock River	Noncontinuous	II	B
18. Big Spring Branch (Highland)	Upstream from the North line of Sec. 19, T7N, R1E	Noncontinuous	I	A
19. Pedler Creek (Iowa Co. Nursing Home)	From the Iowa Co. Nursing Home STP downstream to the confluence with an unnamed tributary, SE¼, SE¼, Sec. 34, T6N, R2E	Noncontinuous	I	A
20. Tributary - Wildcat Creek (Iron Ridge)	From the Iron Ridge STP downstream to Wildcat Creek	Noncontinuous	II	B
21. Tributary & Rock River Tributary (Ixonia San. Dist.)	From the Ixonia San. Dist. STP downstream to the juncture with the Rock River Tributary Rock River Tributary from above tributary to confluence with Rock River	Noncontinuous Continuous	II II	B NA
22. Tributary - Menominee River (Jamestown San. Dist. #2)	From Jamestown San. Dist. #2 STP to the Menominee River	Diffused surface water	II	B
23. Dead Creek (Juneau)	Upstream from CTH "M" From CHT "M" to St. Helena Rd.	Effluent ditch Continuous	II I	B NA
24. Sinipee Creek (Kieler San. Dist. #1)	From Kieler lagoon outfall to Bluff Road	Continuous	I	A
25. Rock Creek (Lake Mills)	From the Lake Mills STP downstream to CTH "V" From CTH "V" to Harper's Mill Pond	Noncontinuous Continuous	I I	A NA
26. Tributary - Pigeon Creek (Lancaster)	Tributary from Lancaster STP downstream to south line of section 10 Tributary from above point downstream to confluence with Pigeon Creek	Continuous Continuous	II I	Effluent limitations to be determined
27. Tributary - Baker Creek (Lebanon San. Dist.)	From Lebanon STP downstream to Baker Creek	Noncontinuous	II	B
28. Little Platte River (Livingston)	From Livingston STP downstream to New California Road	Noncontinuous	I	A
29. Tributary-East Branch Rock River (Lomira)	Tributary upstream from confluence with East Branch Rock River.	Noncontinuous	I	A
30. (Madison Metro Sewerage Commission)	From the STP outfall aerator to the Oregon Branch	Effluent ditch	II	Effluent limitations to be determined

31. Brewery (Furnance) Creek (Mineral Point)	Brewery Creek upstream from confluence with Mineral Point Branch	Continuous	II	B (Note: the above limitation shall remain in effect until significant nonpoint source problems can be corrected)
32. Tributary - Blue River (Montfort)	From the Montfort STP downstream to the Blue River	Continuous	I	A
33. Little Grant River (Mount Hope)	From the Mt. Hope STP downstream to the west boundary of Sec. 10, T5N, R4W	Noncontinuous	I	A
34. West Branch Sugar River (Mt. Horeb)	From Mt. Horeb STP downstream to CTH "JG".	Continuous	I	A
35. Tributary - Austin Branch (Orchard Manor)	Drainage from Orchard Manor outfall to Austin Branch	Diffused surface waters	II	Effluent limitations to be determined
36. Oregon Branch - Badfish Creek (Oregon)	From the Oregon outfall downstream juncture with the Madison Met effluent ditch	Noncontinuous	II	Effluent limitations to be determined
	From this point downstream to CTH "A"	Continuous	I	
37. Swan Creek and Tributary (Orfordville)	Tributary from Orfordville STP outfall to Swan Creek.	Effluent ditch	II	NA
	Swan Creek from confluence with above tributary to Dicky Road.	Noncontinuous	I	A
38. Tributary - Blake Fork (Patch Grove)	Tributary from the Patch Grove STP downstream to Blake Fork	Noncontinuous	I	A
39. Tributary - Honey Creek (Plain)	From the Plain STP downstream to Honey Creek	Continuous	I	Effluent limitations to be determined
40. Randolph Branch - Tributary Beaver Creek (Randolph)	From the Randolph STP downstream to Beaver Creek Tributary	Noncontinuous	II	Effluent limitations to be determined
	Tributary to Beaver Creek upstream from Beaver Creek	Noncontinuous	I	A
41. Tributary-Beaver Dam River (Reeseville)	Tributary from Reeseville STP to confluence with Beaver Dam River	Noncontinuous	I	A
42. Conley - Smith Creek (Ridgeway)	From the Ridgeway STP downstream to the south boundary of Sec. 14, T6N, R4E	Noncontinuous	I	Effluent limitations to be determined
43. Tributary - Rocky Run Creek (Rio)	From the Rio STP downstream to Rocky Run Creek	Noncontinuous	II	B
44. Tributary - Narrows Creek (Sauk Co. Health Care Center)	From the Sauk County Health Care Center STP downstream to Narrows Creek	Noncontinuous	I	A
45. Duck Creek and Tributary (Sullivan)	Tributary from the Sullivan STP to Duck Creek	Effluent channel	II	Effluent limitations to be determined
	Duck Creek from the effluent ditch downstream juncture with northerly drainage ditch in Sec. 5, T6N, R16E	Noncontinuous	I	
46. Koshkonong Creek (Sun Prairie)	Koshkonong Creek upstream from first bridge above Sun Prairie STP	Noncontinuous	II	Effluent limitations to be determined
	Koshkonong Creek from above location to CTH "J".	Continuous	II	
47. Badger Mill Creek (Verona)	Badger Mill Creek from road at Verona STP downstream to STH "69".	Continuous	I	A

9/30/81

Montfort
Grant-Iowa County
September 17, 1981
Stream Classification

The Village of Montfort operates a 4 cell lagoon approximately 0.5 miles northwest of the Village limits. The existing discharge site is located on a tributary to the Blue River. The tributary to the Blue River is classified as Fish and Aquatic Life. Because of the low Q₇₁₀, the 1983 effluent limits are relatively stringent. For this reason two alternate discharge sites were evaluated.

Platte River

The first site evaluated is designated as Site "A". (See attached map). This site is located approximately 800 feet east of the intersection of Hwy. 18 and 80 on the south side of the road. Site "A" is located in the headwaters of the Platte River but the only flow ever present at this site would be from surface water runoff. A discharge at this site would flow in a southwesterly direction. The first permanent water is located in the SW¹/₄, SE¹/₄, Sec. 25, T 6 N, R 1 W.

Site "A" is an undesirable discharge site for several reasons.

- 1) The effluent would flow through two separate agricultural fields which are presently used for hay. One is located directly below the discharge site and the other is located below Hwy. 80. Effluent in these two fields would make them continuously wet and render them useless for agricultural purposes.
- 2) Above Hwy. 80 is a pasture-barnyard also through which the effluent would have to travel.
- 3) The greatest effect a discharge at this site would have is on a large farm pond located in the SW¹/₄, SE¹/₄, Sec. 25, T 6 N, R 1 W. Farm ponds generally are noted for their nutrient rich nature. The flow of effluent into the pond would only increase the nutrient loading. Additional algae and macrophyte growth would make it less desirable for recreation. Also, the overall water quality could be affected along with the present fishery. Due to the size of the pond, it is valuable as a recreational source to its owners and could become useless as such with a flow of effluent into it.
- 4) A large section of the Platte River below the pond is considered trout water. Consequently additional flow into the pond would result in additional flow out of the pond. It would mean an increase in very warm water entering the stream during the summer months. Stream water at these temperature extremes are detrimental to trout populations.

The stream classification would remain the same with effluent in it. The grassy ravine and low wastewater treatment plant flow (0.11 cfs.) would provide little potential for aquatic life.

Classification Recommendation

Site A

From the discharge site downstream to the east boundary of the SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 25, T 6 N, R 1 W., the classification should be marginal, diffused surface waters. From this point downstream the classification should be Fish and Aquatic Life. Much of the stream in the SW $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 25, T. 6 N, R. 1 W, is actually a farm pond. Below the farm pond the Platte River is considered to be trout water.

Tributary to a Tributary of the Blue River

The second site evaluated is designated as Site F. (See attached map). This site is located in the SE $\frac{1}{4}$ SE $\frac{1}{4}$, Sec. 13, T. 6 N, R. 1 W. Flow would be in a northwesterly direction.

This tributary can be best described as a tree-lined dry run. Only during seasons of very heavy rainfall and high groundwater would water other than surface runoff be present in the tributary. The upper end of the tributary is a grassy ravine but the lower section has a silt, sand, gravel, rubble bottom. The banks are somewhat unstable in this area and can be eroded by heavy rainfall.

Some cropland is located in the headwaters of the tributary but, due to the slopes of the surrounding land, its entire length is buffered by pasture. Part of the area is heavily pastured which has resulted in some surface erosion.

The stream classification would remain the same with effluent in the tributary. The design effluent flow of 0.11 cfs. is very small. A combination of low flow and poor stream habitat would not be conducive to aquatic life.

Classification Recommendations

Site F

From the proposed discharge site downstream to the juncture with the tributary of the Blue River the classification should be marginal. The tributary to the Blue River is presently classified as Fish and Aquatic Life.



Roger Schlessner
Water Quality Specialist



Site "A"

Proposed discharge area,
downstream of Hwy. "18".



Site "A"

Above Hwy. "80".



Site "A"

Below Hwy. "80". Effluent
would flow through hay
field. Culvert in lower
right hand corner.



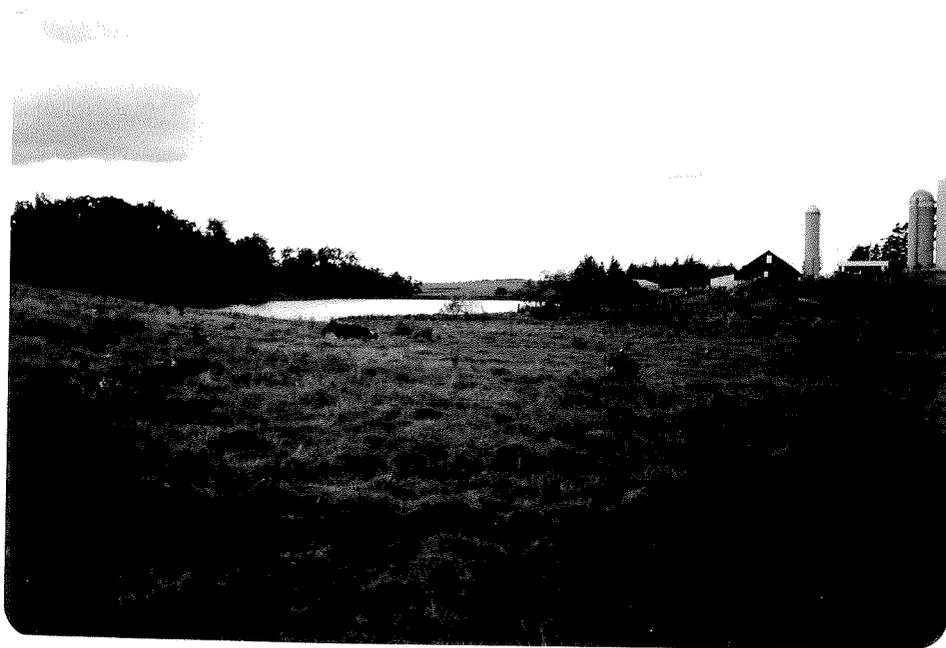
Site "A"

Grassy Ravine.



Site "A"

Grassy Ravine.



Site "A"
Farm Pond.



Site "A"
Farm Pond.



Site "F"

Grassy area near headwaters
of tributary



Site "F"

Grassy area near headwaters
of tributary



Site "F"

Midsection of tributary



Site "F"

Midsection of tributary



Site "F"

Midsection of tributary



Site "F"

Midsection of tributary



Site "F"

Just upstream of juncture
with the Tributary of the
Blue River.



Site "F"

Juncture of the two
tributaries.



Tributary of the Blue
River below juncture.

CORRESPONDENCE/MEMORANDUM

STATE OF WISCONSIN

DNR - Dodgeville Area Hdqrs.

Date: December 19, 1980

File Ref:

To: Mark Tusler

RECEIVED
DEC 23 1980
SD HDQRS

From: Robert Schlosser A.S.

Subject: Reclassification of the Tributary to the Blue River (Montfort)

The Montfort sewage treatment plant consists of a four cell lagoon with a discharge to a tributary of the Blue River. At the present time only the first lagoon and the last lagoon contain waste water. The middle two lagoons contain only a minimal amount of water, with terrestrial plants covering most of the lagoon's bottom. The influent can travel to any of the first three lagoons with the fourth lagoon being the final treatment cell. Presently only the first and last cells are being used because of the small volume of influent flow. The stream flows along the west side of the lagoon and the stream channel appears to have been moved there when the lagoons were constructed.

A preliminary and primary WLA were conducted on the tributary 6/25/80 and 7/7/80 respectively. During the WLA's effluent discharge was 0.5-2 gpm. Consequently the impact upon the stream on these dates was minimal, due to the small effluent flow.

Stream flow during dry periods becomes somewhat small. The $Q_{7,10}$ for the site is .26 cfs. Stream flow above the discharge on the 6/25/80 survey was 0.245 cfs and on the 7/7/80 survey it was 0.207 cfs.

The substrate is one of silt, sand and gravel. The percentage of each varies considerably throughout the stream reach.

Below the outfall the gradient becomes much less and the stream develops deeper pools, many of which are 1.5' to 2.0' deep. The tributary runs north from the lagoons for approximately 1.25 miles before the juncture with the Blue River. It runs through open pasture for the first 3/4 of a mile and for the last 1/2 mile it flows through wooded pasture. Some problems do exist with overgrazing and siltation of the stream from cattle. The mid-section of the stream has the deeper pools and is not overgrazed, so much of the stream at this point is totally shaded by vegetation. Not until the lower end of the tributary does cattle usage become a significant problem. Bank erosion is more serious, with very little stream bank vegetation being present. Also, heavy siltation of the riffles and pools is quite evident along with a high degree of turbidity.

According to the chemical data collected during the WLA's the water quality of the stream is good. (Surveys attached). Presently the fishery is limited to forage fish but fish management has said they will attempt to manage it as trout water sometime in the future.

This attempt would be dependent upon water temperatures and the maintenance of good stream bank cover. Due to the small size of the stream, water temperatures are a limiting factor. A continual discharge from the lagoons could lead to high stream water temperatures in the summer and low stream water temperatures in the winter. An attempt at purification should be made against the present system as a fill and draw. This would eliminate a discharge to the stream during the critical times of the year.

Because the stream has the potential for a trout fishery in the future it should be reclassified to fish and aquatic life.

RS:ho

NOTED:

Date

Montfort Sewer Department
Grant County

October 15, 1976
Blue River Tributary

Montfort discharges into the Blue River Tributary. Portions of it are pastured and heavily eroded. Its fishery consists mostly of forage fishes.

Blue River

Surface area = 30.31 acres, Length = 25.0 miles, Gradient = 8 ft./mile.

A spring and seepage-fed stream beginning in Iowa County as "Foreman Creek" and flowing southwest to empty into the Wisconsin River northeast of the Village of Blue River. The regional land form of this watershed is early maturity or late youth with narrow ridges, remnants of flat uplands, and steep, narrow valleys. The floodplain is one-fourth to one mile in width along the main section of the river. The terrain resembles the rimrock country in Montana and Wyoming with evergreen-capped outcrops overlooking much of the stream. The Blue River also has quality trout fishing as well as spectacular scenery. Numerous springs and spring-fed tributaries contribute to the stream assuring favorable temperatures and a stable water supply. Eight of these tributaries are classified as trout streams with Fennimore Fork rated as the best trout water in Grant County. The upper 3.5 miles of the Blue River is considered trout water. This could be extended downstream to include everything above the mouth of Big Rock Branch. Brown and rainbow trout dominate the fishery in this section of stream. Brook trout are also present. A good catfish and smallmouth bass fishery exists in the lower reaches near the Village of Blue River. Trout reproduction is low due to large rubble and rapid runoff. Fishing pressure is heavy during much of the season. A total 672 acres of shallow marsh, fresh meadow and timber swamp wetland adjoin the lower reaches.

Recommendations

From the Montfort outfall downstream to the juncture with the Blue River the classification should be continuous surface waters not supporting a balanced aquatic community. From this point and for the remainder of the Blue 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:

Dennis Iverson, District Engineer
Gene Van Dyck, Area Fish Manager
Tom Bainbridge, District Biologist
Roger Schlessler, Natural Resources Technician

Respectfully submitted,


Tom Bainbridge
Stream Classification Coordinator

TB:cb

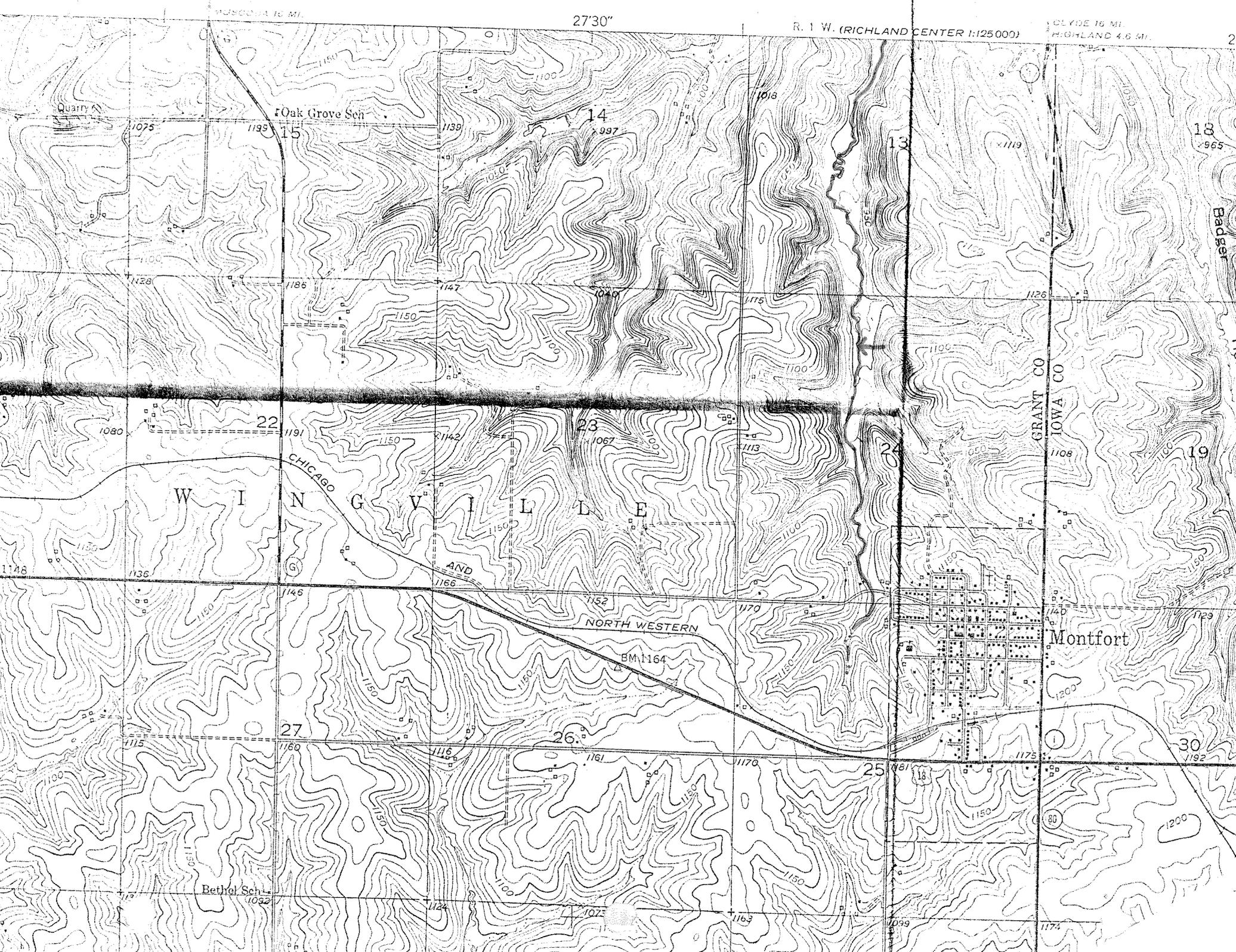
Montfort

The Village of Montfort has a lagoon system which discharges to a tributary of the Blue River. The tributary runs along the west side of the lagoon and it appears the course of the stream was changed when the lagoons were built. The tributary above and below the lagoons has a definite meander where as along the lagoons the stream is a straight water course. A spring located on the east side of the lagoons has to run below the lower lagoon before it enters the stream. If the streams water course has been changed, the water from the spring has to travel farther causing higher water temperatures before it reaches the main tributary. At the time of the survey minnows and a few white suckers were present in the tributary. It is questionable if the stream can maintain enough flow and low enough water temperatures later in the summer to support a trout fishery. With the warmer water coming from the spring and the warm water from the lagoon, temperature is a very limiting factor.

27°30'

R. 1 W. (RICHLAND CENTER 1:125,000)

CLYDE 16 MI.
HIGHLAND 4.6 MI.



Oak Grove Sch.

14

13

18

22

23

24

19

W I N O N A

AND

NORTH WESTERN

Montfort

27

26

25

30

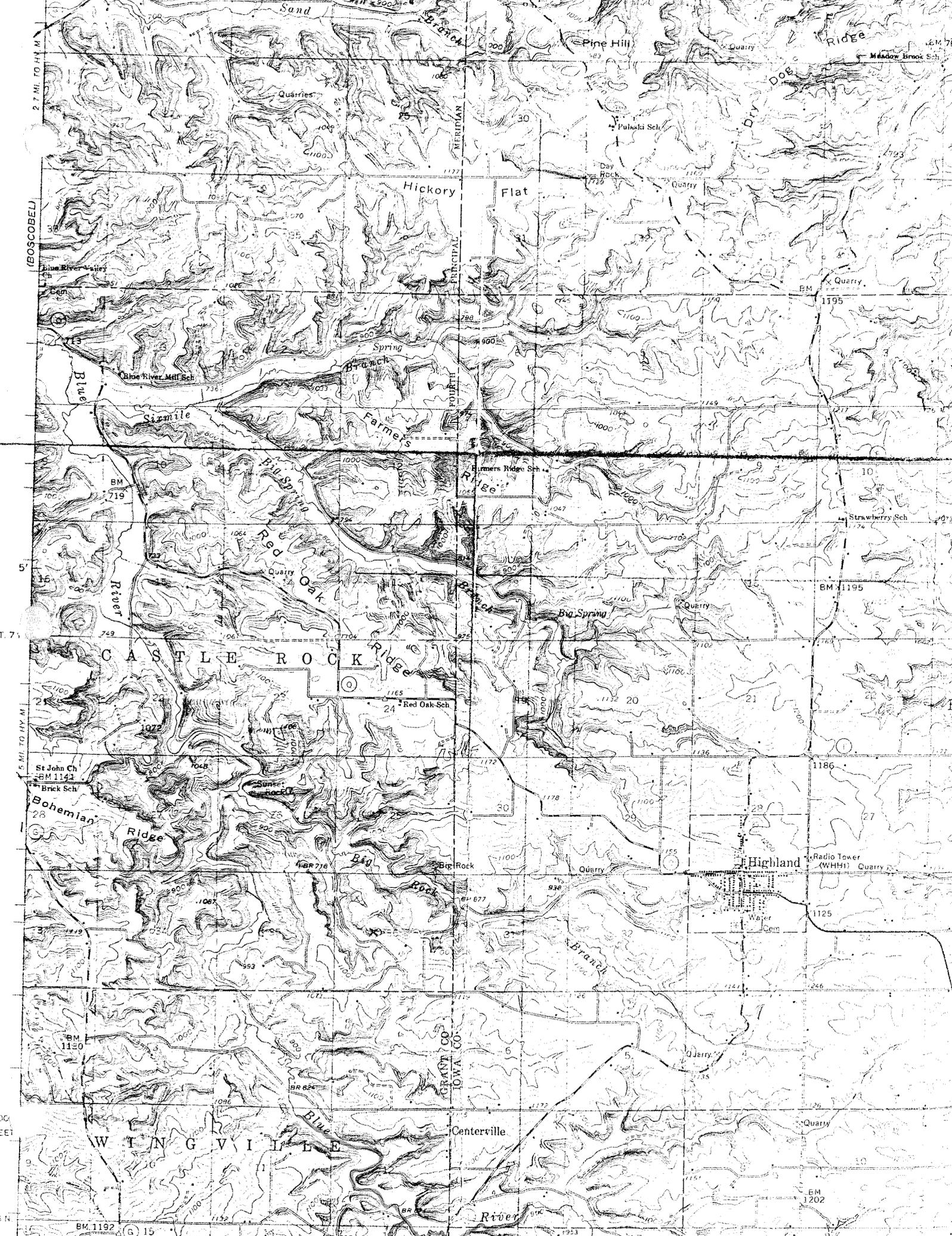
Bethel Sch.

1075

1099

1174

Badger



2.7 MI. TO HWY. M.

(BOSCOBEL)

5'

7'

5 MI. TO HWY. M.

OC
EET

N

Sand

500

1000

1500

2000

2500

3000

3500

Blue River

Blue River

Blue River

Blue River

Blue River

Blue River

Hickory

Hickory

Hickory

Hickory

Hickory

Hickory

Flat

Flat

Flat

Flat

Flat

Flat

Pine Hill

Quarry

Quarry

Quarry

Quarry

Quarry

Quarry

Quarry

Dry

Dry

Dry

Dry

Dry

Dry

Dry

Ridge

Ridge

Ridge

Ridge

Ridge

Ridge

Ridge

Blue River Mill Sch.

Quarries

Spring

Branch

Farmers

Red Oak

Big Spring

Big Rock

Highland

Water Cent.

Radio Tower

Quarry

Strawberry Sch.

Quarry

BM 1192

(G) 15

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

1192

EM 1202

EM 1150

EM 1141

EM 719

EM 677

EM 677

EM 677

EM 677

EM 677