

Summary Tables for Stream Classification Monitoring Conducted on an Unnamed Tributary to Hempton Lake  
(Receiving water for Whitelaw WWTP Outfalls 001 and 002)

July 17, 2000 – October 19, 2000

Table 1. Water chemistry measures from eleven locations on the unnamed tributary to Hempton Lake.

	Date	Station 1 (Braun site)	Station 2 (Village Park)	OFL 002 Site 1	OFL 002 Site 2	OFL 001 Site 3	OFL 001 Site 4	OFL 001 Site 5	Station 3 (Macroinvertebrate Site)	OFL 001 Site 6	OFL 001 Site 7	Station 4 (above outfall 001)
T°C	10-19	13.6							19.4			
	9-19	16.3	17.0									16.1
	7-17		23.48	24.57	24.57	23.26	22.16	22.16		23.27	18.21	21.47
D.O. mg/l	10-19	7.2							4.7			
	9-19	3.73	1.85									1.93
	7-17		2.94	2.09	3.14	2.67	3.59	3.82		2.53	5.26	4.25
pH su	10-19	7.3							7.3			
	9-19		7.47									7.65
	7-17		7.54	7.78	8.25	7.48	7.43	7.44		7.33	7.48	7.60
Conductivity μ/cm												
	7-17		1482	1510	1510	1481	1490	1500		1530	1700	1050

Shaded rows hold data from a preliminary field assessment conducted by Tim Rasman and Jeff Haack (Haack, Jeff. 2000. Lakeshore Basin Wastewater Engineer, Green Bay. Personal Communication.)

OFL 002 Site 1: Located approximately 100 m downstream from outfall 002 (polishing pond discharge)

OFL 002 Site 2: Outfall 002 (polishing pond discharge)

OFL 001 Site 3: Located approximately 15 m upstream from confluence of tributary from outfall 001 and tributary from outfall 002.

OFL 001 Site 4: Located approximately 250-300 m downstream from outfall 001.

OFL 001 Site 5: Located approximately 200 – 250 m downstream from outfall 001.

OFL 001 Site 6: Located approximately 100-150 m downstream from outfall 001.

OFL 001 Site 7: Located approximately 1 m downstream from outfall 001.

Table 2. Hilsenhoff Biotoc Index (HBI) values from two sites on the unnamed tributary to Hempton Lake.

Site	Date	HBI	Water Quality	% individuals w/ HBI of 8 or less	% individuals w/ HBI of 5 or less	Degree of Organic Pollution
Station 1 (Braun site)	10-19-2000	7.942	Poor	100	0	Very Significant Organic Pollution
Station 3	10-19-2000	9.297	Very Poor	99.6	0.3	Severe Organic Pollution

Table 3. Channel Characteristics of three fish survey sites on the unnamed tributary of Hempton Lake.

Station	Date	Mean Width	Mean Depth	Flow cms/cfs	Approximate Station Length
Station 1(Braun site)	09-19-2000	2.5 m	11.97 cm	0.007 / 0.26	150 m
Station 2 (Village Park site)	09-19-2000	1.3 m	10.4 cm	0.004 / 0.14	175 m
Station 4 (Above outfall 001)	09-19-2000	0.61 m		0	10.6 m

Table 4. Estimated substrate characteristics of ten sites on the unnamed tributary to Hempton Lake.

Site	%silt/muck	%sand	%gravel	% cobble / rubble	% detritus	% other	Comments
Station 1 (Braun site)	95		<5	<5			Filamentous algae covers 33% of bottom, overhanging grass is abundant
Macroinvertebrate Site #1	30		30	5	30	5	5% overhanging vegetation, 25 % canopy cover
Station 2 (Village Park site)	60		5	5		30	30% detritus and debris including clay pigeon debris, mostly shaded
OFL 001 Site 3	70	<15	<15		15		
OFL 001 Site 4	70				30		50% shaded
OFL 001 Site 5	85				15		85% shaded
Station 4 (Macroinvertebrate Site #2)	35	20	15	20	5	5	5% boulder, 10% canopy cover
OLF 001 Site 6	100						0% canopy other than overhanging grasses on edges.
OFL 001 Site 7	90			10			0% canopy cover (other than overhanging grasses on edges).
Station 4	70			10	10		

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DATE: July 24, 2000

FILE REF: 3420

TO: Ron Fassbender - Lakeshore Basin Team Leader - Sturgeon Bay

FROM: Jeff Haack - Lakeshore Basin - NER-HQ *JHH*

SUBJECT: Village of Whitelaw WWTF

This memo is to request a formal stream classification for the unnamed tributary to the Branch River in Manitowoc County, to which the Village of Whitelaw WWTF discharges treated effluent. Specifically, I ask that staff time be allocated for this activity as work plans are developed so that this activity can be accomplished in a timely manner. This will necessitate some time for a water quality biologist (currently a vacant position in the Lakeshore Basin) and a fisheries biologist.

**Background:** This Village of Whitelaw Wastewater Treatment Facility (WWTF) is approximately 36 years old, and it is routinely receiving hydraulic and organic loading in excess of its original design loadings. The treatment facility has continued to maintain compliance with its current effluent limitations, though with very little margin. The Village has initiated Facilities Planning to meet future wastewater treatment needs, employing Robert E. Lee & Associates (REL) as consulting engineers. It is important to note that the Village has initiated this planning without being required to do so by this department. I have received a letter from Bryan Wedin of REL in which he requests a review of the applicable effluent limits for an ungraded WWTF. It is essential to use the correct stream classification for this review, so an evaluation of the receiving stream was felt appropriate.

The Village of Whitelaw WWTF discharges to an unnamed tributary to the Branch River. Attached is a USGS topographic map showing the area. According to the USGS Open-File report 83-933, entitled "Drainage Area Data for Wisconsin Streams"; this tributary drains 0.28 square miles upstream of the outfall, presumably outfall 002. At the first town road downstream, the drainage area is 1.31 square miles. This tributary flows in a westerly direction for about a mile (as the crow flies) before entering Hempton Lake. The drainage from Hempton Lake flows in a northerly direction about two miles before entering the main stem of the Branch River. Chapter NR 104, Wisconsin Administrative Code, lists this tributary from the outfall to Hempton Lake as "Limited Aquatic Life." Hempton Lake, and presumably downstream reaches, is classified as "Full Fish and Aquatic Life." Also attached is a copy of the narrative report from the original stream classification survey in 1976. A dye study conducted by department staff in 1980 concluded that the effluent limits for "Limited Aquatic Life" classification are adequately protective of the downstream uses. The Branch River is classified as an "Exceptional Resource Water" in NR 102 for its entire length in Manitowoc County.

Since the time of that original survey, the Village constructed a second, alternative outfall to that same tributary. The WWTF includes a "polishing pond" following an activated sludge treatment system. At times the quality of the effluent from the pond was actually worse than the mechanical plant effluent, prompting construction of this second outfall to bypass the pond, with department approval. The polishing pond is now used to store and treat primary clarifier effluent when the influent flow rates exceed about 70 gallons per minute, so that flow rates through the secondary treatment units do not "wash out" solids from the mixed liquor.

**Discussion:** On Monday, July 17, 2000, Tim Rasman and I evaluated the receiving stream for the discharge from the Whitelaw WWTF to assess whether the current classification was accurate. I used my Garmin, model GPS 12 XL, to locate the latitude and longitude of each outfall. Tim used his Hydrolab Quanta Water Quality Monitoring System to measure stream Temperature, Dissolved Oxygen, pH and Conductivity of the stream. He also took several photos with his SONY Digital Mavica MVC-FD95 electronic camera. Those photos are attached in a PowerPoint format. I recorded observations and notes. The weather conditions were very pleasant, with temperatures between 70 and 80 degrees F, mostly sunny skies and a light breeze. (The mosquitoes weren't too bad, but we had to walk through a lot of stinging nettles to access the stream.) The stream has obviously been altered (straightened and deepened) by ditching throughout the entire study area. It is also significant to note that the past two months had been unusually wet, with total annual precipitation going from a several inch deficit to a several inch surplus, compared to average.

We began with a short visit to the WWTF itself where we met Gerry Linsmeier, the WWTF Operator. I explained to him the purpose of our visit. The WWTF appeared to be operating fairly normally, which is to say that the mixed liquor was very thin (young) but the effluent was fairly clear with little turbidity or floc escaping over the weirs of the final clarifier. Because of all of the wet weather Gerry had been discharging a portion of the primary clarifier effluent to the polishing pond, and he advised that it had just recently begun overflowing, discharging via outfall 002. The mechanical plant can generally treat 100,000 gallons per day, but daily flows had reached as high as 200,000 gallons per day. I had advised Gerry of our impending visit the week before and requested that he inform the landowner(s) of our impending activity on their property.

We then proceeded to what is identified as **Outfall 001** in WPDES Permit No. WI-0022047-6. This is the direct discharge from the mechanical WWTF to the east of Hickory Street. The outfall location is: Latitude N 44° 8' 45.8"; Longitude W 87° 49' 44.7". The substrate in this area was roughly 85 - 90 % silt and 10 to 15 % rocks. There was a quite a bit of dying and decomposing algae with less than 10 % macrophyte growth. Though a few minnows were observed in the stream. In the mixing zone about a meter downstream from the outfall, the water temperature was 18.21° C, the Conductivity was 1700  $\mu$ S/cm, the Dissolved Oxygen (DO) was 5.26 mg/l and the pH was 7.48 SU, at approximately 10:30. Photo #1 was taken of me standing on the outfall pipe.

From the outfall we walked about 100 - 150 meters to the north to a point where the stream changes to a westerly direction. Photo #2 was taken from this point facing south, upstream toward the outfall and Photo #3 was taken facing downstream. The substrate in this area can best be described as a rich organic muck. We measured the stream temperature at 23.27° C, DO at 2.53 mg/l, Conductivity at 1530  $\mu$ S/cm and pH at 7.33 SU, at 11:05. The decline in the DO may be attributable to the oxygen demand of the sediments as much as the effluent from the WWTF.

From that point we traveled about another 100 meters downstream, to a point just downstream from a small riffle area. At this location we were in a forested area, provided roughly 85% shade. The substrate was about 85% silt and muck (mostly muck) and about 15% detritus. We measured the stream temperature at 22.16° C, the DO at 3.82 mg/l, the Conductivity at 1500  $\mu$ S/cm and the pH at 7.44 SU, at 11:15.

We traveled only about another 50 meters downstream in a generally westerly direction, through some very thick undercover with about 50% shade. At this location the substrate was about 30% debris, about 35% silt and about 35% muck. Some duckweed was observed at this location. We measured the stream temperature at 22.16° C, the DO at 3.59 mg/l, the Conductivity at 1490  $\mu$ S/cm and the pH at

7.43 SU, at 11:23.

Following a break to go visit the groundwater remediation facility at the Lemberger Landfill Remediation Site we proceeded to the outfall from the polishing pond. This is identified as **Outfall 002** in the above-referenced permit. This outfall location is: Latitude N 44° 8' 48.5"; Longitude W 87° 49' 56.4". There was a very small discharge from the polishing pond at the time, and we measured a temperature of 24.57° C, the DO at 3.14 mg/l, the Conductivity at 1510  $\mu$ S/cm and the pH at 8.25 SU, at 12:20. It should be noted that two individual discharge pipes are discernible. Many years ago the original, cement pipe had collapsed or become plugged and the Village replaced it with a PVC pipe. Most of the discharge was from that PVC pipe, but there was a small trickle from the cement pipe that looked somewhat foul with a lot of iron deposit and some rotting duckweed. Photo #4 was taken of me standing above the PVC outfall pipe, and Photo #5 shows the old cement outfall pipe.

From this point we traveled downstream, in a northerly direction, about 100 meters. We measured the stream temperature at 24.57° C, the DO at 2.09 mg/l, the Conductivity at 1510  $\mu$ S/cm and the pH at 7.78 SU, at 12:30. Photo #6 was taken facing upstream with the actual sampling point in the frame. The substrate was characterized as 90% muck with the remainder debris. Some duckweed was again observed.

We then continued traveling downstream to the point at which the tributary from outfall 001 meets the tributary from outfall 002. We went approximately 15 meters upstream of the confluence in an easterly direction, so that we were observing the discharge from outfall 001. We measured the temperature at 23.26° C, the DO at 2.67 mg/l, the Conductivity at 1481  $\mu$ S/cm and the pH at 7.48 SU, at 12:48. At this location the substrate consisted of about 15% sand and gravel, 15% detritus and 70% muck. Photo #7 was taken looking in a south-southwest direction at the confluence of the two tributaries. We also picked some rocks at this station to look for macroinvertebrates, where we observed only some snails and leeches.

From the confluence of the two tributaries we traveled downstream in a westerly direction another 50 to 100 meters. (At this location we were directly north of the bathrooms at the Village Park.) Here the substrate consisted of about 10% rocks and gravel, about 60% silt and muck and about 30% debris. Most of that debris was actually clay pigeons from a shooting range in the Village Park. Here we measured the stream temperature at 23.48° C, the DO at 2.94, the Conductivity at 1482  $\mu$ S/cm and the pH at 7.54 SU, at 13:25. Photo #8 was taken facing downstream from this site, clearly showing the fluorescent orange clay pigeons.

Prior to leaving the area, we returned to Outfall 001 to record background conditions, about 15 meters upstream from the outfall itself, because we had failed to do so earlier. At the culvert crossing the old railroad right-of-way we measured a stream temperature of 21.47° C, Do at 4.25 mg/l, Conductivity at 1050  $\mu$ S/cm and pH at 7.60 SU, at 13:40. Though there was ample standing water, the flow velocity was negligible. So the flow in both tributaries at this time consisted of almost all WWTF effluent.

**Conclusions:** Based upon our observations, it seems appropriate to conduct a more formal stream classification survey. Tim and I agreed that it was quite possible that this reach of stream might be more appropriately considered a "Limited Forage Fishery". Though we also agreed that it was unlikely to support a "Full Fish and Aquatic Life" (Warm Water Sport Fishery) designation, because of the habitat throughout the area we investigated.

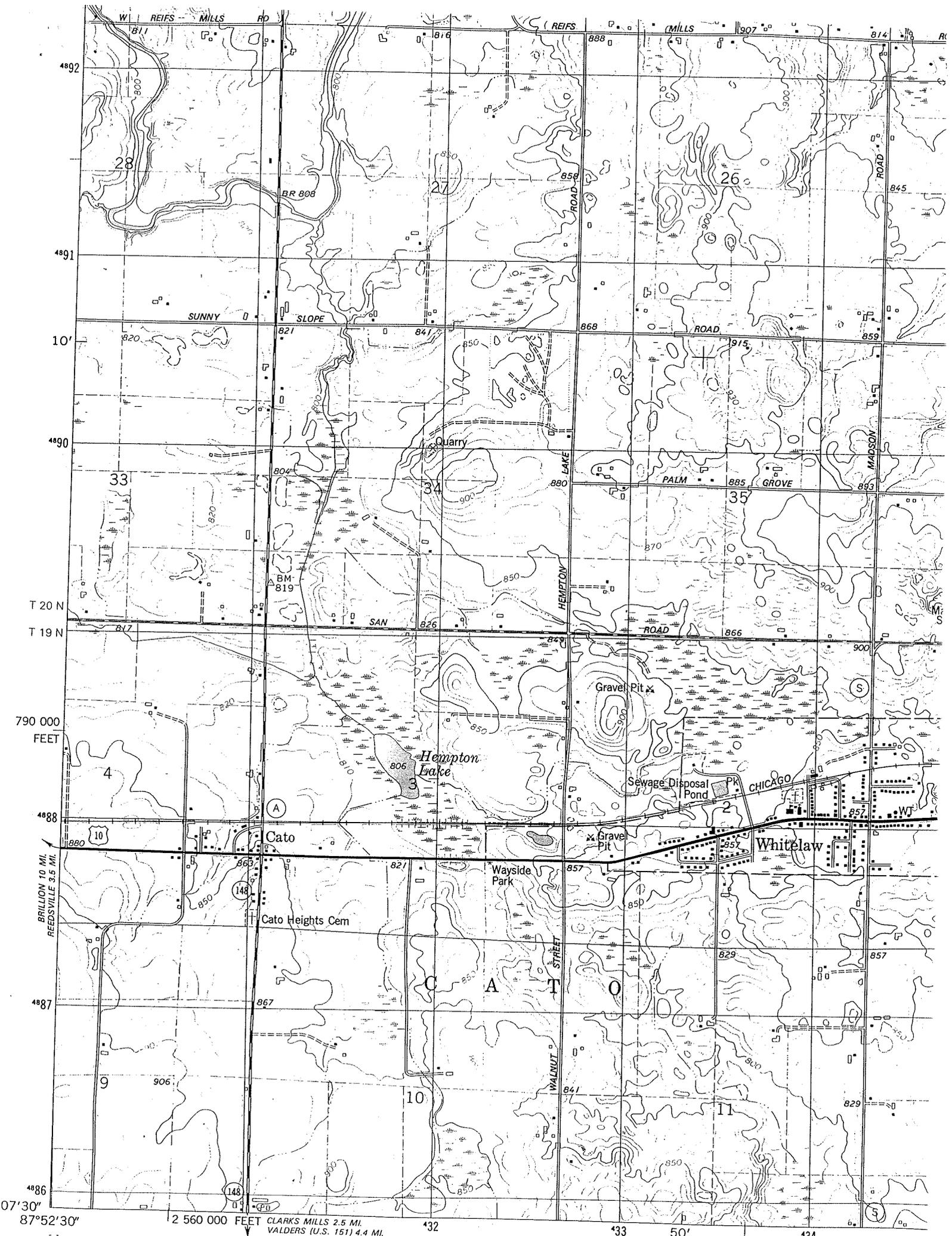
Consequently, I believe that we can advise the Village and their consulting engineers to plan for the

Limited Forage Fishery designation. The differences in effluent limits are significant at this time primarily with respect to Ammonia-Nitrogen limits. Currently, no limits for this substance are associated with the "Limited Aquatic Life" classification, while the "Limited Forage Fishery" classification involves limits of 3 mg/l in summer and 6 mg/l in winter for Ammonia-Nitrogen. Though this department is proposing revisions to water quality standards for Ammonia-Nitrogen, and current draft standards for "Limited Forage Fishery" and "Limited Aquatic Life" waters are identical. It is also my understanding that the Village is contemplating an Oxidation Ditch for a new WWTF. This type of treatment system should be capable of complying with limits associated with the "Limited Forage Fishery" designation, provided that the design is just a bit conservative.

But we should schedule a formal classification survey to substantiate this decision, and ultimately request modification of NR 104, as appropriate.

JJH

cc: Bob Masnado – Water Quality Standards Section Chief – WT/2  
NER Wastewater Files



T 20 N  
T 19 N

790 000  
FEET

BRILLION 10 MI.  
REDSVILLE 3.5 MI.

07'30"  
87°52'30"

2 560 000 FEET  
CLARKS MILLS 2.5 MI.  
VALDERS (U.S. 151) 4.4 MI.

432

433

50'

42A

August 31, 1976

Survey Date: May 6, 1976

Whitelaw, Manitowoc County

The Whitelaw STP discharges its effluent from a polishing pond to a small stream which flows into Hemptons Lake about 2 miles downstream of the outfall. No flow is present above the outfall. Most of the stream has been dredged in the past and the stream course appears to have been modified near the outfall.

Hemptons Lake is a small, hard water seepage lake with an area of 10.4 acres and a maximum depth of 18 feet. Winterkill is a use problem. The lake discharges to a small stream which flows approximately 3 miles to the Branch River.

Recommendation:

Non-continuous, marginal use from outfall to Hemptons Lake. Fish and aquatic life in Hemptons Lake.



Robert B. Lucas

Whitelaw WWTF Stream Evaluation  
July 17, 2000

Photo #1 Outfall 001



T-18.21 D.O.-5.26 Cond.- 1,700 pH-7.48  
10:30 AM

Photo #2



T-23.27 D.O.-2.53 Cond.-1,530 pH-7.33  
11:05 AM

Photo #4 Outfall 002



T-25.65 D.O.-3.14 Cond-1,510 pH-8.25  
12:20

T-centigrade  
D.O.-mg/l  
Cond.-uS/cm.  
pH-standard units

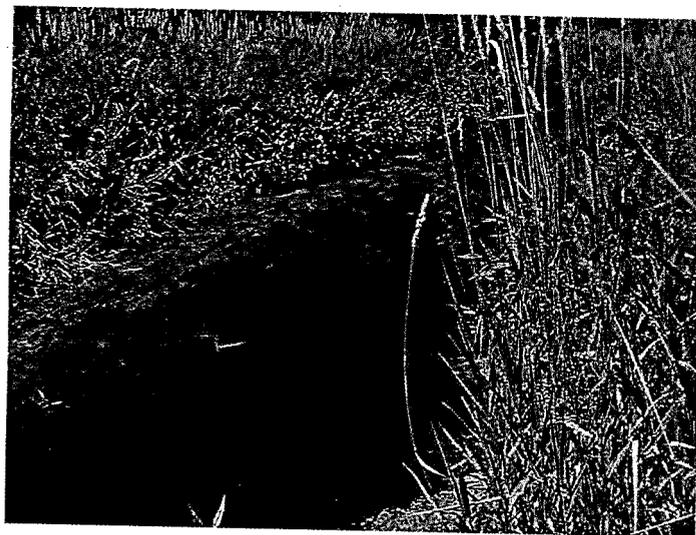


Photo #3 looking downstream

Photos: SONY MVC-FD95

tr-7/19/00

Phot #5 "Old" Outfall 002



T-24.57 D.O.-2.09 Cond-1,481 pH-7.78  
12:30 PM

Whitelaw WWTF  
Stream Evaluation  
July 17, 2000

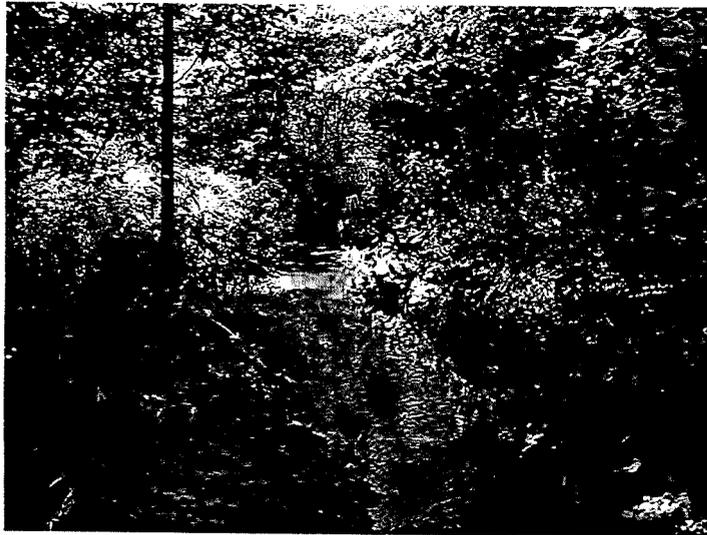
Photo #6 Downstream from outfall 002



Photo # 8 50 - 100 M below  
confluence (note clay pigeons)

T-24.57 D.O.-2.09 Cond-1510  
pH-7.78 @ 12:52 PM

Photo #7 15M from confluence of outfall 002



T-21.47 D.O. 4.25 Cond-1,050 pH-7.60  
13:40 PM



T-21.47 D.O.-4.25 Cond-1,050 pH-7.6 @ 13:50

T-centigrade  
D.O.-mg/l  
Cond.-uS/cm  
pH-standard units

August 31, 1976

Survey Date: May 6, 1976

Whitelaw, Manitowoc County

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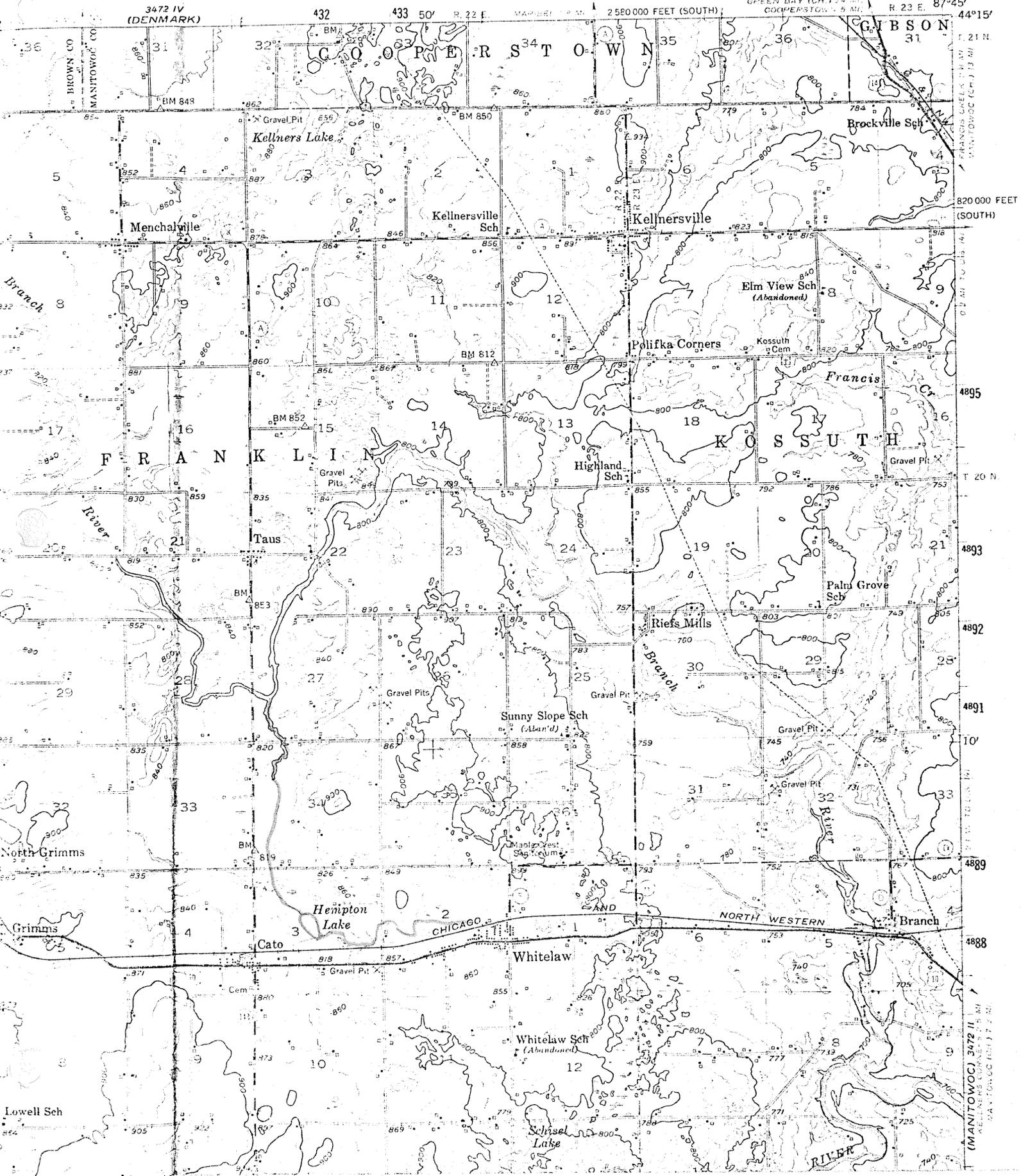


Robert B. Lucas

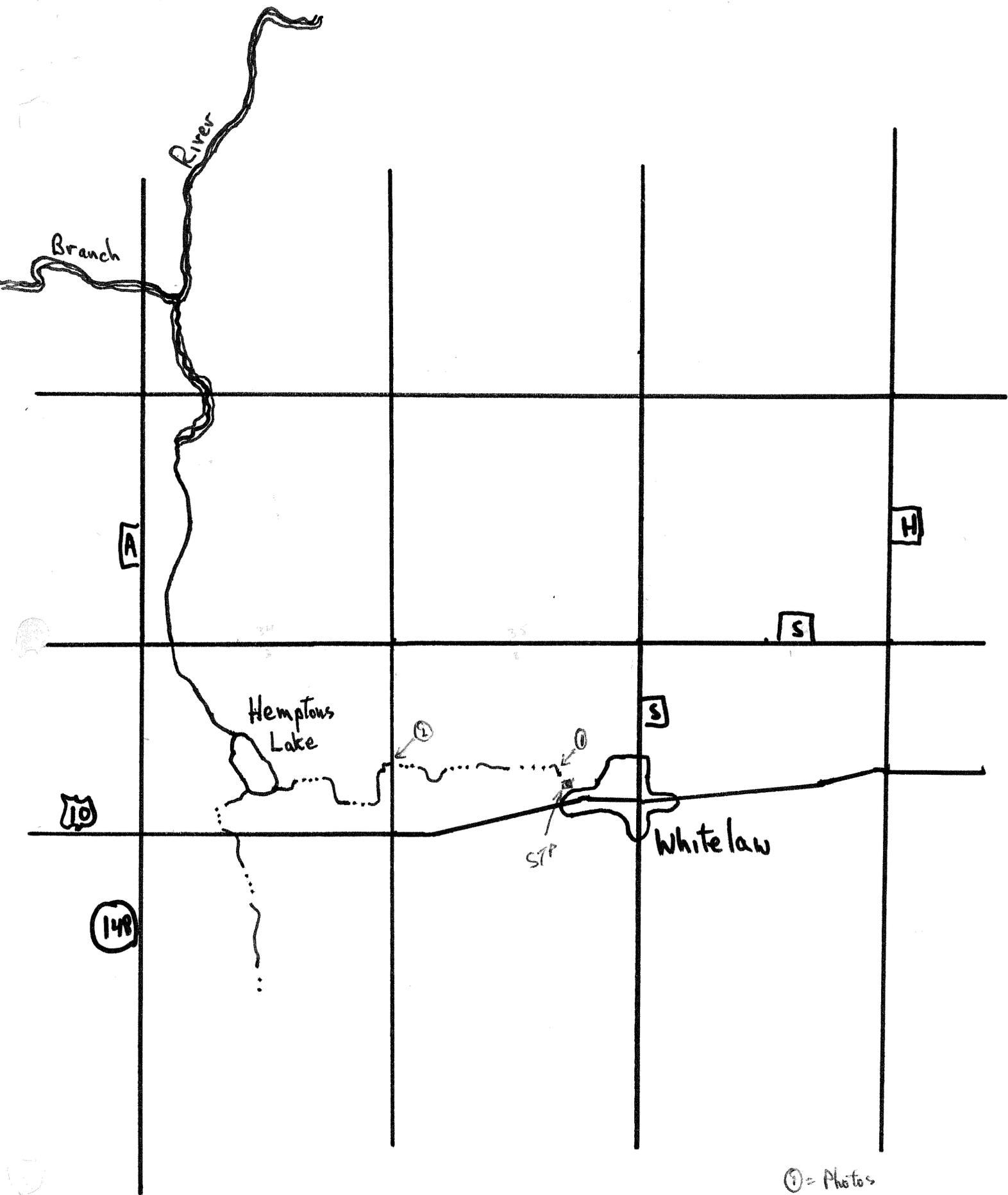


REEDSVILLE QUADRANGLE  
WISCONSIN  
15 MINUTE SERIES (TOPOGRAPHIC)

3472 I  
(KEWAUNEE)



3472 II  
(MANTOWOC)  
KELLNERSVILLE QUADRANGLE  
REEDSVILLE QUADRANGLE  
MANTOWOC (M. 17.2 N.)



① = Photos

White Clay



#1

Downstream from  
outfall pipe



#2

Downstream from  
Hempton Road