

Region NOR County Douglas Report Date 06/1990 Classification LFF  
 Water Body: Newton Creek / Hog Island Inlet  
 Discharger: Murphy Oil

If stream is classified as Limited Forage Fish (LFF) or Limited Aquatic Life (LAL), check any of the following Use Attainability Analysis factors that are identified in the classification report:

- Naturally occurring pollutant concentrations prevent the attainment of use
- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met
- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or operate such modification in a way that would result in the attainment of the use
- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses
- Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact

**Supporting Evidence in the report (include comments on how complete/thorough data is)**

- OK  Biological Data (fish/invert)
- Chemical Data (temp, D.O., etc.) good
- OK  Physical Data (flow, depth, etc.)
- Habitat Description good
- Site Description/Map good
- Other:

**Historical Reports in file:**

6/1990 - F. Kashere

**Additional Comments/How to improve report:**

- naturally low flow ID'd as limiting factor (p2, 4-5)  
- LFF classification appears to be appropriate considering naturally low flow  
- Good, thorough report.

**CORRESPONDENCE/MEMORANDUM**

Date: June 21, 1990 IN REPLY REFER TO: 3200

To: Duane Schuettpelz - WR/2

From: Frank J. Koshere

Subject: SURFACE WATER CLASSIFICATION FOR NEWTON CREEK AND HOG ISLAND INLET, SUPERIOR BAY, LAKE SUPERIOR

**Classification Recommendation**

Newton Creek, T49N, R14W, Section 25, to its mouth into Hog Island Inlet, T49N, R13W, Section 30, Douglas County, WI, shall be classed a non-continuous stream (NR 104.02(1)(e)) and be classed in the water quality variance category of limited forage fish communities (NR 104.02(3)(a)).

Hog Island Inlet and Superior Bay shall be classed for fish and other aquatic life uses in the subcategory of great lakes communities (NR 102.04(3)(a)).

**Description**

Newton Creek is a small warmwater stream located in the city limits of the City of Superior, Douglas County, WI. The stream has a calculated natural low flow of  $0 Q_{7,2}$  (Appendix B). The stream is 1.1 miles long with a gradient of 50 feet per mile (Appendix C).

The stream channel originates at the outfall of the Murphy Oil Refinery and flows northeast through the city into a small bay known as Hog Island Inlet which discharges into Superior Bay. Superior Bay is part of the St. Louis River freshwater estuary of Lake Superior. The entire stream corridor is surrounded by industrial or residential development. The stream bank ensopment is characteristic of the red clay soils of the area. The stream channel begins with low stream banks but rapidly cuts deep between steep, erodible, gully-like banks. The small valley-like stream course is an overgrown area between city streets and typifies an industrialized/urbanized stream.

The stream flows through a railroad yard before discharging into Hog Island Inlet. Hog Island Inlet is an embayment of Superior Bay which was created by constructing Hog Island from dredge spoils. The water depth in the inlet is shallow (estimated less than 5' maximum depth with an average of 2-3'). The inlet connects to Superior Bay via a narrow (approximately 50' wide) channel between Hog Island and a solid-fill pier which served as the now unused Lakehead Pipeline Company terminal.

Superior Bay is strongly affected by variable water currents induced by the natural flow of the St. Louis River, the frequent large shipping traffic, and a strong seiche effect from weather events over Lake Superior. Hog Island Inlet and the mouth of Newton Creek are also affected,

causing reverse directional flows in both. During one recent survey, the flow direction at the outlet of Hog Island Inlet was observed to reverse during one 15-minute interval. It is highly probable that current action and sandbar deposition can periodically close the inlet mouth to Superior Bay.

A surface water classification currently exists in NR 104.10(3)(b). Newton Creek is given a hydrologic classification of non-continuous stream only, and does not have a variance from fish and aquatic life standards. Hog Island Inlet is described as part of Superior Bay and is given specific criteria for ammonia concentrations. This report recommends revision of the classification of Newton Creek, Hog Island Inlet, and Superior Bay.

## Discussion

Without the Murphy Oil discharge, Newton Creek is an intermittent stream similar to other streams with small drainage areas in the red clay region near Superior. These streams are considered "flashy" in their abruptly changeable flow related to precipitation or runoff events. In addition, Newton Creek receives urban stormwater to further amplify extremes of flow conditions. The resulting stream channel is unstable and provides a poor aquatic environment for invertebrates and higher organisms.

A habitat evaluation was conducted on June 21, 1989, using the Ball Stream Classification System (Ball, 1982). Three sites were scored on the stream system habitat rating form. The sites were at 21st Street, 11th Street, and 4th Street (see Appendices D, E, F and G). Stream scores above 200 are placed in the "poor" category. The three sites scored 235, 237, and 220, respectively. All sites were extremely degraded. Petroleum odors, slime and algal growths, urban debris and trash, black anaerobic coloration of fine sediments, and foaming were present in varying degrees at each site. Only a few species of Chironomids were found at any of the sites. Benthic fauna was obviously deficient in the stream. Besides poor quality physical habitat, reasons for limited aquatic life probably include low dissolved oxygen levels, toxic levels of ammonia nitrogen, and acute or chronic toxicity from other contaminants in the stream. Table 1, Water Chemistry Observations, shows low dissolved oxygen, high ammonia, and high BOD concentrations in the stream. Chronic and acute toxicity from other contaminants is suspected.

The stream classification process is intended to consider the highest potential use category the stream can achieve. Natural and cultural factors are considered in determining a use classification. The key natural limiting factor for Newton Creek is low, intermittent flow.

The discharge from Murphy Oil is the source of Newton Creek. There is little or no upstream flow; none during low flow conditions. A stream flow measurement done at the downstream end of Newton Creek on August 2, 1983, showed a flow of 0.25 cfs. A three-year summary of monthly discharge flows from Murphy Oil (Appendix A) shows a minimum monthly flow, a maximum monthly flow, and a three-year mean monthly flow of 0.185 mgd (0.12 cfs), 0.640 mgd (0.41 cfs), and 0.364 mgd (0.24 cfs).

Without the discharge from Murphy Oil considered as a stream base flow, flows in Newton Creek would frequently be too low or nonexistent to support a fish and aquatic life community. Even with the discharge as base flow, instream habitat conditions are extremely poor. Under existing flow conditions, aquatic animal life will be stressed under both summer and winter climatic extremes.

However, an unpolluted stream with the same fluctuating flow conditions but with a relatively stable minimal base flow, such as provided by the discharge, would be expected to support a limited number of aquatic invertebrates and a few minnow-like fish species. It is recommended that the classification of Newton Creek be revised and that it be placed in the non-continuous hydrologic category and in the water quality variance category of limited forage fish communities (intermediate surface waters). The stream does not have the capacity to support a higher use classification.

Hog Island Inlet is an inlet bay to Superior Bay of Lake Superior. There is no present justification for a variance from water quality standards for ammonia or other substances in Hog Island Inlet. As a bay connected to Lake Superior, Hog Island Inlet should be classified for fish and aquatic life uses in the Great Lakes communities subcategory. Superior Bay is also classed fish and aquatic life in the Great Lakes communities subcategory.

Based on the above recommendations, NR 104.10(3)(b) should be revised to reflect the current classification.

FJK:sn

Attached: Table 1: Newton Creek Water Chemistry Observations  
Table 2: Newton Creek Sediment Contaminant Analysis  
Appendix A: Murphy Oil Discharge Monitoring Data, 1987-1989  
Appendix B: USGS and Wis. DNR, 1974  
Appendix C: Wis. DNR, 1972  
Appendix D: USGS - Superior Quad, 7.5'  
Appendix E: Hand-drawn Map of Newton Creek  
Appendix F: Photos of Newton Creek  
Appendix G: Stream System Habitat Ratings

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Table 1 - Newton Creek water chemistry observations (reported in mg/l except as noted).

Location/ Date	Temp °C	DO	pH (su)	Hardness	Alkalinity	Cond. (umhos)	NH <sub>3</sub>	NO <sub>2</sub> - NO <sub>3</sub>	Kjel-N	Tot P	BOD <sub>5</sub>	COD	SS	Oil & Grease	Phenol	Tot Cr (ug/l)	Tot Ca	Tot M <sub>2</sub>	Chlor a (ug/l)
<b>#163006</b>																			
Newton Creek @ Murphy Oil Outfall/ 3/2/83	25	2.7	7.1				10				<10	100	6	7	24	27			
<b>#163008</b>																			
Newton Cr @ 21st St/ 3/16/78	6.5	12.1	8.4				4.7	0.2	6.3		27		21						
3/21/89	18.5	2.6	7.4	180	150	5920	11	ND	16	.20	17	110	6	6		32	52	12	24
<b>#163011</b>																			
Newton Cr @ 11 St 3/10/78	2.2	4.1	7.6				5.5	<0.1	5.0		17		13						
3/21/89	17.0	1.8	7.3	2.0	160	2560	11	ND	14	.27	9.8		3				59	15	
<b>#163017</b>																			
Newton Cr @ 4th St 3/16/78	1.3	5.6	7.6				5.2	<0.1	3.8		13		23						
20		3.3	7.2				10.0				<8	76	<2	4	15	11			
3/21/89	16.9	5.2	7.4	210	173	2400	10.0	0.25	14		14	81				22	58	15	
<b>#163092</b>																			
Hog Is Inlet 200' N of Creek/ 3/17/76	21	9.2	8.2				0.06		0.92		7.1*								
3/25/76	24.5	7.4	7.3				0.43		0.94		8.0								
3/26/77		9.1					0.09		1.90										
3/9/78	20.2	8.1	7.5				0.11	0.23	1.2		8.0								
3/2/83	25.0	9.8	8.0				0.13												
3/21/89	20.2	8.9	8.0				0.67	0.15	2.0		0.12								
<b>#163080</b>																			
Hog Is Inlet/ 3/17/76																			
3/26/76																			
3/26/77			9.6				0.80		2.9										
3/21/77			8.7				2.1		2.3										
3/9/78	20.0	8.4	7.4				0.08	0.23	1.1										
3/2/83	25.0	10.4	8.0				0.12												
3/21/89	19.2	8.9	7.9				0.05	0.06	1.1	0.07									
6-Day BOD																			
<b>#163093</b>																			
Hog Is Inlet 20' NE of Creek/ 3/17/76	24	10.8	8.5				0.49		1.3		9.8*								
3/26/76	25	7.8	7.5				0.40		1.0		8.0								
3/26/77			9.1				2.2		2.8										
3/9/78	21.4	7.9	7.5				0.22	0.23	1.6										
3/2/83																			
3/21/89	20.2	8.9	8.0	90	77	798	0.37	0.18	1.8	0.12	5.8	55	31			5	23	8	55

Table 1 - Newton Creek water chemistry observations (continued)

<u>Location/ Date</u>	<u>Temp °C</u>	<u>DO</u>	<u>pH (su)</u>	<u>Hardness</u>	<u>Alkalinity</u>	<u>Cond. (umhos)</u>	<u>NH<sub>3</sub></u>	<u>NO<sub>2</sub>- NO<sub>3</sub></u>	<u>Kjel-N</u>	<u>Tot P</u>	<u>BOD<sub>5</sub></u>	<u>COD</u>	<u>SS</u>	<u>Oil &amp; Grease</u>	<u>Phenol</u>	<u>Tot Cr (ug/l)</u>	<u>Tot Ca</u>	<u>Tot Mg</u>	<u>Chlor a (ug/l)</u>
# 163094																			
Log Inlet																			
200' E of Creek/																			
5/1/76	25	10.6	8.7				0.23		1.6		9.6*								
3/26/76	25	7.8	7.5				0.40		1.1		8.0								
5/26/77			>9.6				0.42		2.8										
3/9/78	20.0	8.0	7.4				0.22	0.25	1.4										
3/2/83																			
3/21/89	20.4	8.9	8.0				0.37	0.15	1.8	0.12									

\* 6-Day BOD

Table 2 - Newton Creek sediment contaminant analysis, 6/21/89 (mg/kg or noted).

	<u>Newton Creek @ Impoundment at 21st Street</u>	<u>Hog Island Inlet 20' NE of Mouth of Newton Creek</u>
Arsenic	15	11
Barium	220	220
Cadmium	2	2
Chromium	260	72
Copper	85	140
Lead	94	93
Mercury	0.95	0.85
Nickel	59	37
Selenium	11	<2
Zinc	700	310
Oil & Grease	54000	9600
Residue Tot Vol	28%	14%
Moisture Content	84.9%	72%
PCB Total	<0.80 ug/g	
PCB 1254		0.07 ug/g







Appendix B - From "Low Flow Characteristics of Wisconsin Streams at Sewage Treatment Plants and Industrial Plants," USGS & Wis. DNR, 1979

Table 25. Lake Superior basin station location and low-flow characteristics—Continued.

Station number	Stream name	Station location	Drainage area (mi <sup>2</sup> )	Date	Discharge (ft <sup>3</sup> /s)	Q <sub>7,2</sub> (ft <sup>3</sup> /s)	Q <sub>7,10</sub> (ft <sup>3</sup> /s)	Accuracy level
LS12	Pokegama River	NE¼SW¼ sec. 10, T. 48 N., R. 14 W., Douglas County, at sewage-treatment plant, at Superior Village, Wis.	25.8					
	Pokegama River	NW¼NW¼ sec. 10, T. 48 N., R. 14 W., Douglas County, at bridge on town road, 0.25 mi south of State Highway 105, 0.75 mi west of State Highway 35, in South Superior, Wis.	26.3	Oct. 17, 1972 May 23, 1973 Sept. 18, 1973 Aug. 1, 1973 July 24, 1975 Aug. 21, 1975 Aug. 3, 1976	0.96 13.8 3.40 4.33 4.0 4.0 < .01	0.02	0	c
	*Newton Creek*							
LS16	Lake Superior tributary	SW¼SE¼ sec. 25, T. 49 N., R. 14 W., Douglas County, at culvert on Stinson Avenue, 2.5 mi southeast of post office, at Superior, Wis.	.50	July 25, 1975 Aug. 20, 1975 Aug. 3, 1976 Aug. 24, 1977	5.88 5.74 5.38 4.0	0	0	c
LS17	Crawford Creek	NE¼NE¼ sec. 14, T. 48 N., R. 13 W., Douglas County, at bridge on town road, 1.85 mi southeast of South Superior, Wis.	7.97	Aug. 26, 1970 July 25, 1975 Aug. 21, 1975 Aug. 3, 1976 Aug. 24, 1977	2.0 < .01 4.04 4.0 4.0	0	0	c
LS19	Bear Creek	SW¼SW¼ sec. 9, T. 48 N., R. 13 W., Douglas County, at bridge on County Trunk Z, 300 ft upstream from Douglas County Hospital and Sanatorium sewage-treatment plant, 4.3 mi southeast of South Superior, Wis.	3.56	Oct. 17, 1972 May 23, 1973 Sept. 18, 1973 Aug. 1, 1974 July 24, 1975 Aug. 21, 1975	.09 4.04 2.33 2.0 2.0 2.0	0	0	c
LS20	Middle River	SE¼NW¼ sec. 21, T. 47 N., R. 12 W., Douglas County, at Middle River Sanatorium sewage-treatment plant, 1.4 mi east of Hines, Wis.	31.6	Oct. 17, 1972 May 23, 1973 Sept. 18, 1973 Aug. 1, 1974 July 24, 1975 Aug. 21, 1975	12.6 20.9 5.09 6.24 4.39 1.07	1.4	.70	c
LS21	Iron River	NW¼NE¼ sec. 7, T. 47 N., R. 8 W., Bayfield County, at country bridge and sewage-treatment plant, at Iron River, Wis.	19.1	Oct. 17, 1972 May 23, 1973 Sept. 18, 1973 July 31, 1974 July 23, 1975 Aug. 20, 1975	16.8 19.3 10.8 13.8 13.5 12.2	7.4	5.7	c
LS25	Boyd Creek	NE¼SE¼ sec. 22, T. 48 N., R. 5 W., Bayfield County, at bridge on town road, 4.5 mi northwest of courthouse, at Ashland, Wis.	3.11	July 22, 1975 Aug. 20, 1975 Aug. 4, 1976 Aug. 25, 1977	≤ .10 est. 2.0 2.0 2.0	0	0	c
LS26	Whittlesey Creek tributary	SW¼NW¼ sec. 35, T. 48 N., R. 5 W., Bayfield County, just below confluence of two tributaries, at country road 0.3 mi south of Ondassagon School, 4.0 mi east of Ashland, Wis.	.94	Oct. 18, 1972 May 22, 1973 Sept. 18, 1973 July 31, 1974 July 22, 1975 Aug. 20, 1975 Aug. 4, 1976 Aug. 25, 1977	.51 .74 .56 .74 .64 .65 .67 .59	.58	.54	c
LS33	Bad River	NW¼NE¼ sec. 6, T. 44 N., R. 2 W., Ashland County, at State Highway 13, at Mellen, Wis.	105	Aug. 15, 1972 Oct. 19, 1972 May 22, 1973 Sept. 19, 1973 June 26, 1974 July 30, 1974 July 22, 1975 Aug. 19, 1975	<sup>3</sup> 59.6 77.4 96.1 16.2 51.7 16.2 11.7 6.56	12	5.4	b
LS36	Alder Creek tributary	NW¼NW¼ sec. 2, T. 45 N., R. 1 E., Iron County, on road past sewage lagoon, 1.0 mi northwest of Iron Belt, Wis.	1.24	Aug. 15, 1972 Oct. 18, 1972 May 21, 1973 Sept. 19, 1973 July 21, 1975 Aug. 19, 1975	.96 .79 1.78 .86 .42 .36	<sup>8</sup> .40	<sup>8</sup> .36	c

The stream supports strictly warmwater fish species, with muskellunge, northern pike, walleye, yellow perch, bluegill, black crappie, rock bass, carp, white sucker, sturgeon sucker, redbot and numerous minnow species making up the highly varied fish population. Even though the Nemadji River has numerous water tributaries along its course, only Balsam Creek is considered to be trout water. The major water tributaries are, in the order in which they enter the river, the South Fork of the Nemadji, Mud Creek, Clear Creek, Balsam Creek, Black River, Copper Creek, and Crawford Creek. Stream bottom types are unstable sand and clay overlain with an occasional boulder. Stream wildlife values are limited to light use by migratory waterfowl during spring and fall migrations. The Nemadji River derives its name from the Indian word "Nemadji", which means "left hand river". Stream access is available at seven public bridge crossings, and 9.37 miles of stream bank frontage are in Douglas County, Douglas County Forest, and City of Superior ownership. In addition, Superior Bay of the Duluth-Superior Harbor provides a water access to the mouth of the river.

Newton Creek, T49N, R14W, Section 25 to T49N, R13W, Section 30. Surface Acres = 0.5, Miles = 1.10, Gradient = 50 feet per mile, M.P.A. = 260 ppm.

A heavily polluted warmwater stream draining a large marsh wetland area located west of an oil refinery within the City of Superior. This stream flows north through a city park before emptying into Superior Bay of the St. Louis River. Even though the above mentioned wetlands do contribute a portion of the stream's normal base flow, most of the stream's water originates from refinery lagoons. An attempt to precipitate petroleum wastes from refinery cooling waters by the process of aeration is carried out in the lagoons; however, the separation process still allows a considerable amount of petroleum waste to reach the stream. Occasional spills of various refined petroleum products are also a problem. Recent surveys by an environmental protection biologist found only sludge worms inhabiting the stream. Newton Creek, as specified in the Wisconsin Statutes, Chapter N.R. 104.06, must meet minimum intrastate surface water standards for recreational use, and fish and other aquatic life. Fish and higher aquatic life forms are unable to survive in this stream. Because of the stream's heavily polluted condition and its location in an urban area, wildlife values are minimal. Stream access is available at eleven public road crossings and one city park. Public frontage amounts to 0.27 mile of City of Superior (city park) owned land.

O'Hara Creek, T43N, R10W, Section 27 to T43N, R10W, Section 33. Surface Acres = N.A., Miles = 1.30, Gradient = 20 feet per mile, M.P.A. = N.A.

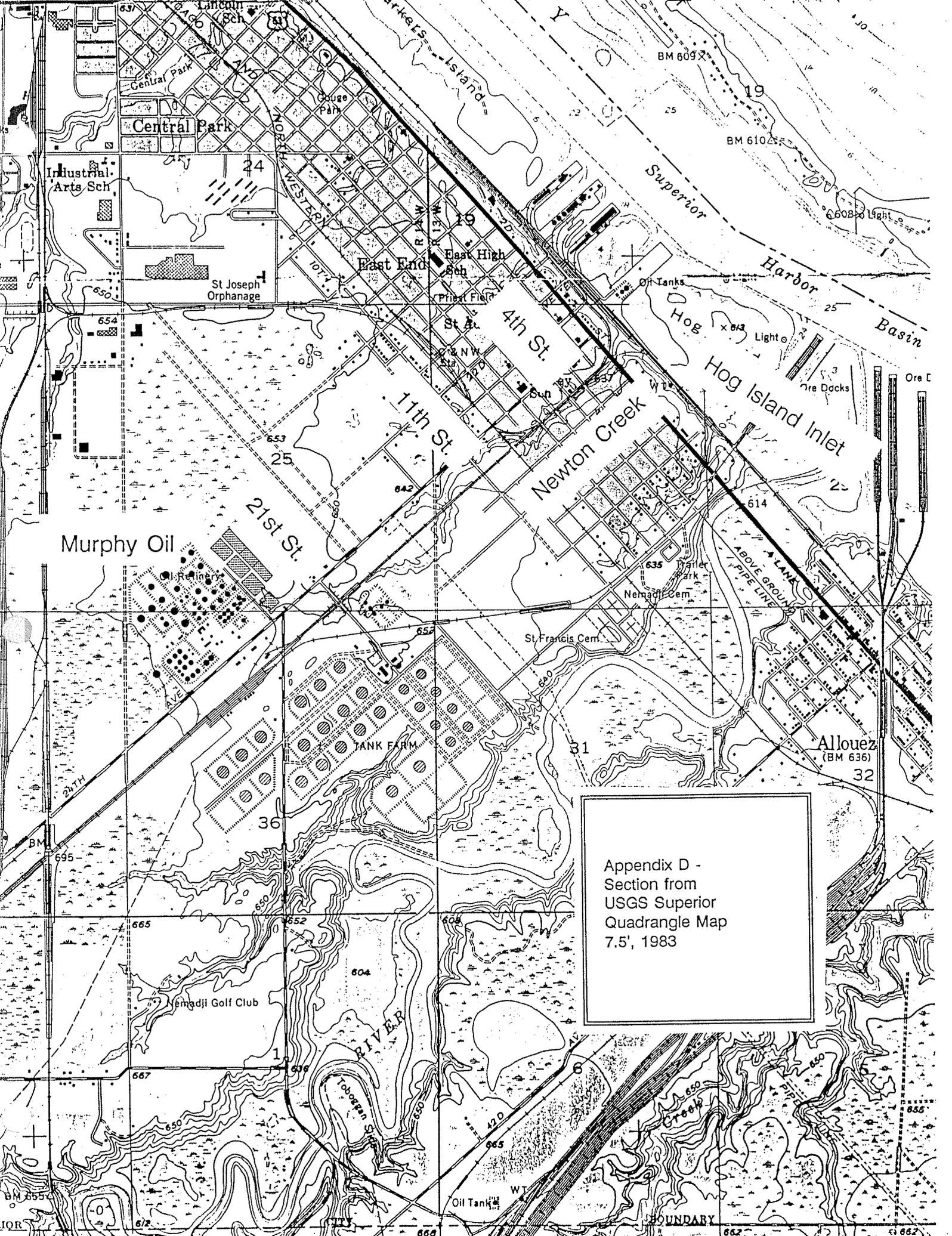
A small, intermittent drainage stream joining the Totagatic River at the Douglas-Washburn County line. Its entire watershed land cover remains in a wild state. Because of unpredictable seasonal flows of water, it has little fish or wildlife value. There is no public road crossing to provide access to O'Hara Creek; however, wilderness type access is available on 2.2 miles of stream bank frontage in the Douglas County Forest. In addition, a navigable water access down the Totagatic River also exists.

Ounce River, T43N, R10W, Section 1 to T43N, R11W, Section 36. Surface Acres = 22.9, Miles = 10.5, Gradient = 7 feet per mile, M.P.A. = 61 ppm.

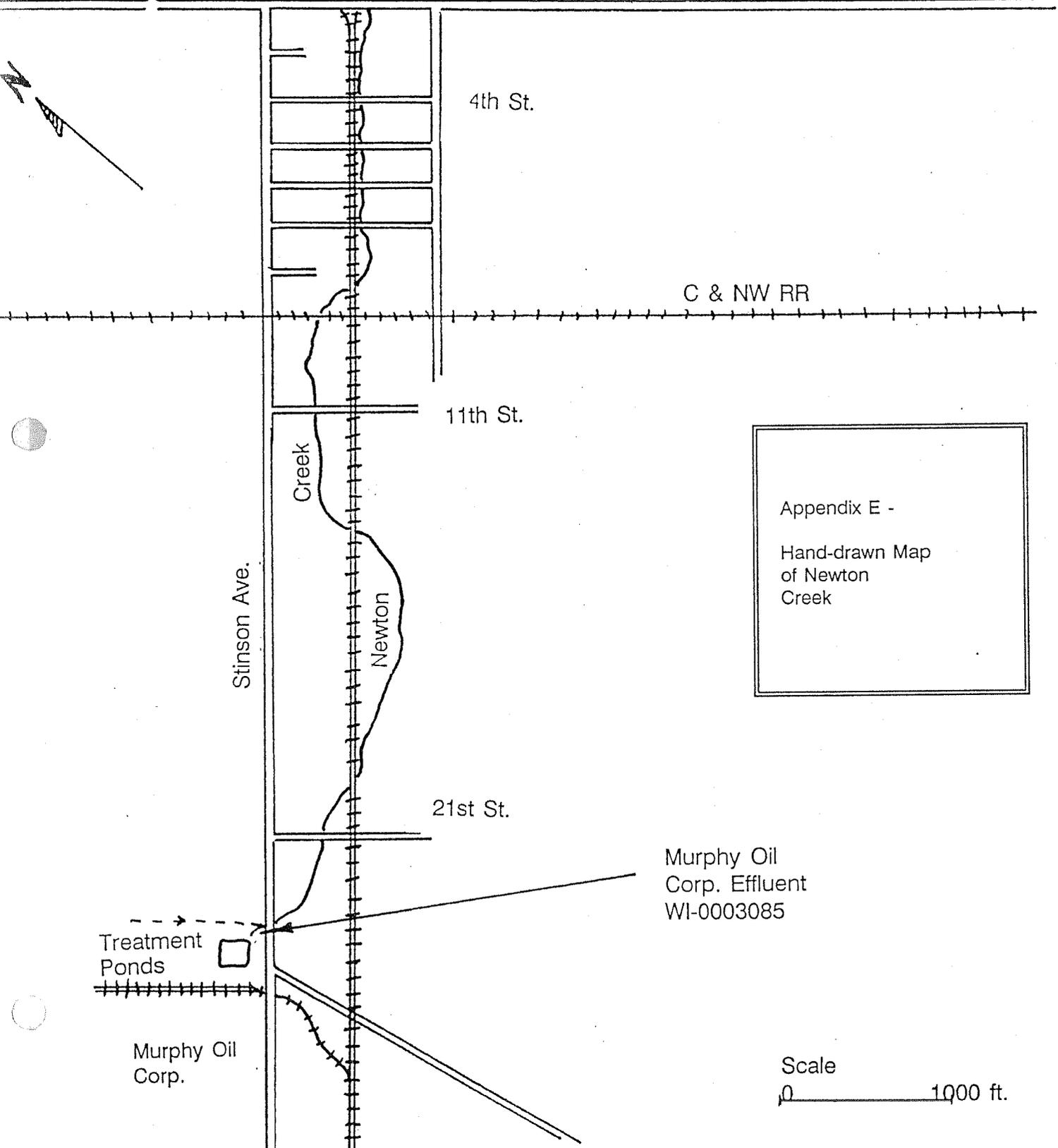
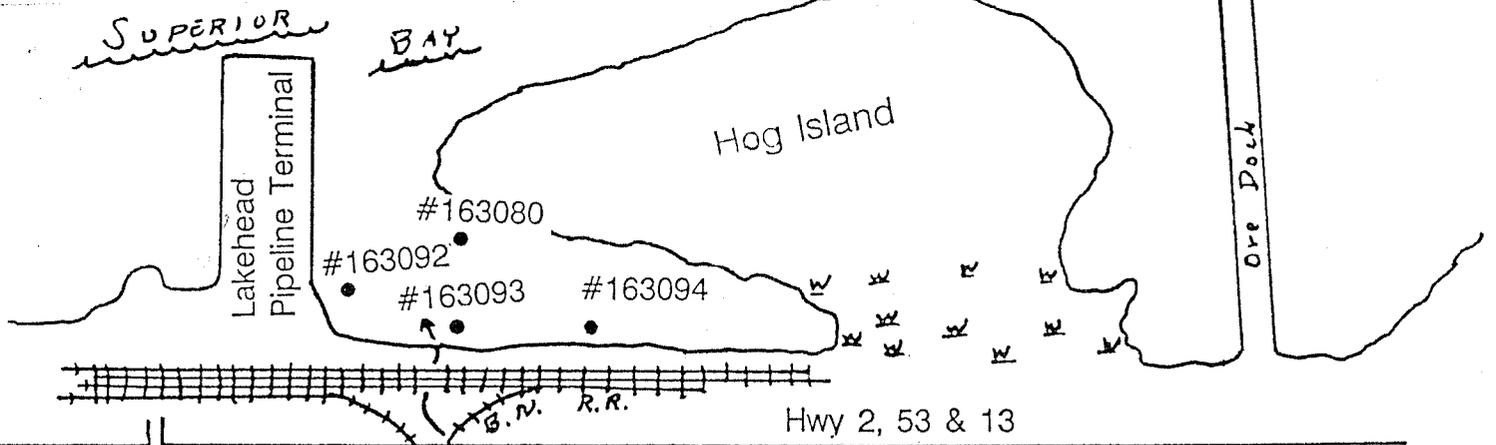
A Class III brook and brown trout stream originating in Bayfield County and flowing in a south-westerly direction across southeastern Douglas County into the Totagatic River. In addition to brook and brown trout, white sucker are common, with small northern pike, bluegill, burbot and a wide variety of minnows present in considerably fewer numbers. The Ounce River is bordered by dense tag alder along most of its length. This makes stream fishing very difficult, and in some areas next to impossible. The stream is fed by four poor quality feeders which are not considered to be trout water. Stream bottom types are mostly unstable sand and gravel. Sluggish to moderate stream flows normally average an estimated 12.1 cubic feet per second. Beaver are active at several locations along the stream. In addition to beaver, a few nesting ducks and migratory waterfowl also use the stream. Stream access is available at five public road crossings, and 14.14 miles of stream bank frontage are in the Douglas County Forest. In addition, the Totagatic River also provides water access to the Ounce River.

Park Creek, T45N, R12W, Section 26 to T45N, R12W, Section 25. Surface Acres = 0.9, Miles = 1.4, Gradient = 73 feet per mile, M.P.A. = 40 ppm.

A Class IIa trout stream flowing east through Park Creek Pond and Lucius Woods State Park before emptying into Upper St. Croix Lake. Park Creek Pond is a seven-foot impoundment maintained by the Village of Solon Springs and managed as a children's fishing pond. Brook trout are stocked in the pond yearly to provide a fishery. The stream above Park Creek Pond is inhabited by brook trout, while below the pond brown trout make up the fishery. The brown trout inhabiting the stream below Park Creek Pond are probably lake-run fish which have survived from an early brown trout introduction into Upper St. Croix Lake. In 1971, Park Creek Pond and a portion of the creek above the pond was treated with rotenone to remove an undesirable population of small bluegills. Stream bottom types are mostly sand and gravel above Park Creek Pond, with sand and cobble-sized boulders below. Because of the stream's close proximity to the Village of Solon Springs and Lucius Woods State Park, wildlife values are limited. Stream access is available at two public road crossings, and 1.12 miles of stream bank frontage are in DNR (Lucius Woods State Park) and St. Croix School District ownership. Park Creek is ice free during the winter months in the SW, Section 26, T45N, R12W.



Appendix D -  
Section from  
USGS Superior  
Quadrangle Map  
7.5', 1983



Appendix E -  
 Hand-drawn Map  
 of Newton  
 Creek

Stream Newton Crk Reach Location Just below 21st Reach Score/Rating 235  
 County Douglas Date 6/3/59 Evaluator [Signature] Classification [Blank]

Reach of discharge in east water of Newton Crk

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. 14	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). 14	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. 12	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. <u>Very unstable</u> 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 Warm >1.5' 0	6" to 1' 6 10" to 1.5' 6	3" to 6" 18 6" to 10" 18	<3" 24 <6" 24
Avg. Depth of Pools	Cold >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' 18 3' to 4' 18	<2' 24 <3' 24
Flow, at Rep. Low Flow	Cold >2 cfs 0 Warm >5 cfs 0	1-2 cfs 6 2-5 cfs 6	.5-1 cfs 18 1-2 cfs 18	<.5 cfs 24 <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: 10 41 184

Column Scores E 0 +G 10 +F 41 +P 184 = (235) = Score

from skulls of petrolicum valves, Freming present.  
 with is turbid grey-green color.  
 <70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor

A few Listeria present, but these are only living organisms noted.  
 Stream channel covered with algae-covered fungal growth on banks where dead grass and other material.

bottom substrate mostly fines with some sand present.  
 Layer of black coloration in fines on bank slumps.

Stream Manitou Creek Reach Location upstream of 11th St Reach Score/Rating 237  
 County Logan Date 2/11/89 Evaluator F. J. ... Classification \_\_\_\_\_

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

Column Totals: 77 160  
 Column Scores E 0 +G 0 +F 77 +P 160 = 237 = Score  
 Strong petroleum odors, almost sickening heavy filamentous algal growth on grassy stream, some oil slicks water level has dropped 2' recently, bank grassed bank covered with matted dried algae. Stream bed 90% covered with plumes of filamentous algae. Benthic organisms almost non-existent.  
 <70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor  
 none captured.

Stream Neuse Reach Location upstream of 4th St. Siler Reach Score/Rating 200  
 County Waynes Date 4/21 Evaluator J. C. ... Classification \_\_\_\_\_

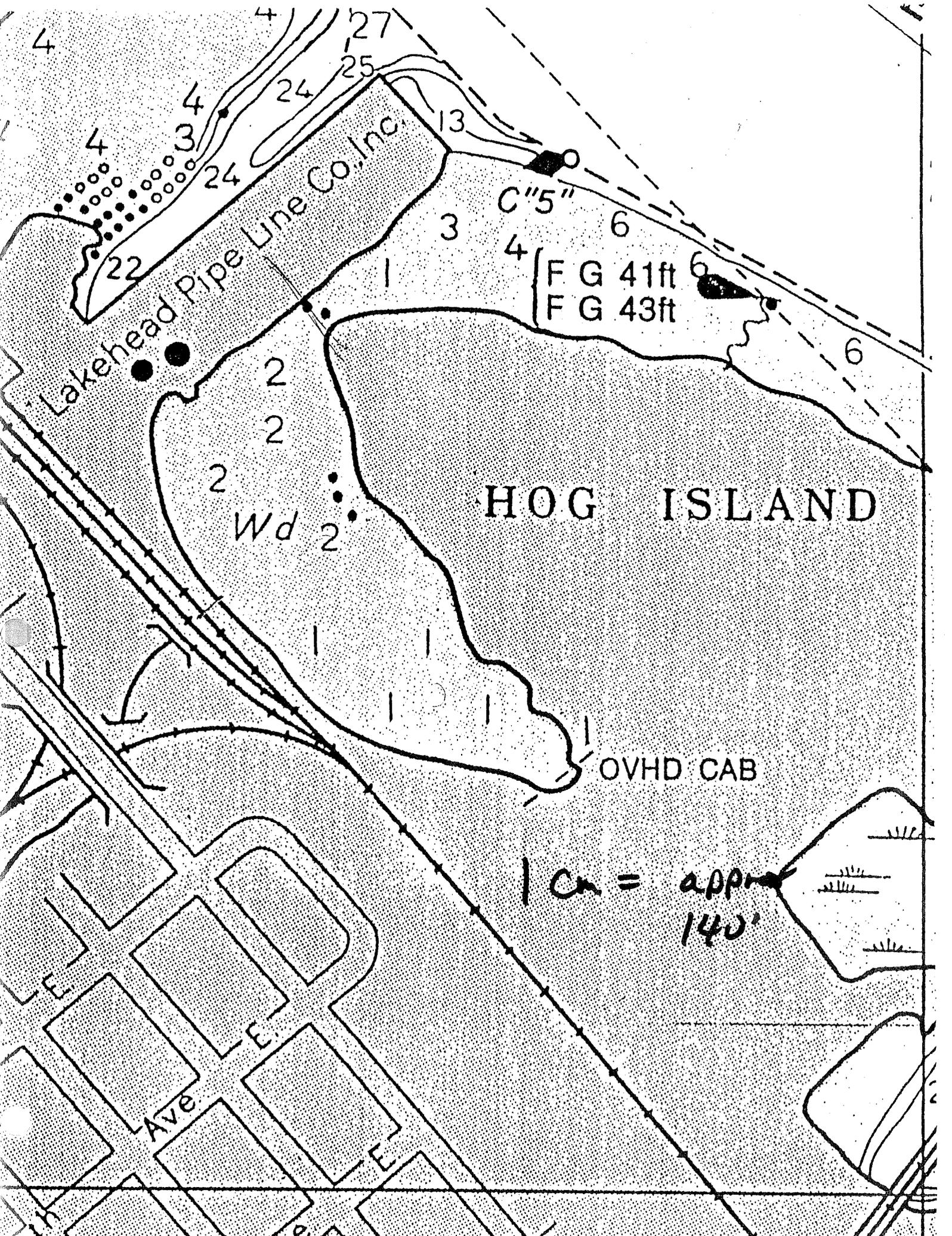
Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. 10	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. 14	Heavy erosion evident. Probable erosion from any run off. 16
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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. <sup>And less silt from stream, but not visible</sup> 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
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Column Totals: 0 0 108 122

Chironomids present - several different species, moderately abundant. Still has fairly strong petroleum odor. In situ debris common. Silt of moderate amounts of filamentous algae present. Only one sp. of macrophyte noted - unknown sp. Markedly improved over upstream sites, but still in poor shape.

Column Scores E \_\_\_\_\_ +G \_\_\_\_\_ +F 98 +P 122 = 220 = Score 220

<70 = Excellent, 71-129 = Good, 130-200 = Fair >200 = Poor



Lakehead Pipe Line Co. Inc.

C"5"  
FG 41ft  
FG 43ft

HOG ISLAND

Wd

OVHD CAB

1 Ch = approx  
140'

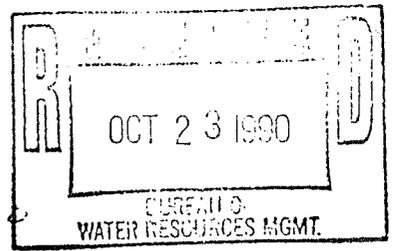
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Sent to Tom Benwitz 10/22/90



- Orig Stream Class for Newton Ck with photos
- slides of Newton Ck & Hog Is. Sediment sampling  
slide #s - 26, 23, 27, 28, 25, 22, 30, 32, 33, 29, 34, 35, 37, 38, 36, 31.

Please return originals as soon as possible.  
J.J. Kosbar 10/22/90

Sent to Tom Benwitz <sup>with</sup> 10/22/90

- Orig Stream Class for Newton Ck with photos

- slides of Newton Ck & Hog Is. Sediment sampling

slide #s - 26, 23, 27, 28, 25, 22, 30, 32, 33, 29, 34, 35, 37, 38, 36, 31.

Please return originals as soon as possible.  
J.J. Kosburn 10/22/90