

APRIL 26, 1983, INVESTIGATION OF
THE BROTHERTOWN CREEK FISH KILL AND MANURE RUNOFF

July, 1983

Author: Michael D. Reif

GENERAL INFORMATION

Drainage Basin: Upper Fox River - 111

Classification: Unclassified

Investigation Reach
Location: Tributary to Brothertown Creek from SW $\frac{1}{4}$
of the Section located east of South
Tower Road and north of Hwy H to the SW $\frac{1}{4}$
of the Section located east of Hwy 151 and
north of Hwy H in Brothertown Township
in Calumet County.

Investigation Date: April 26, 1983

Investigation Personnel: Michael D. Reif, Water Pollution
Biologist; and Dick Streng, Calumet
County Warden.

OBJECTIVE

The objectives of this investigation were: (1) to investigate a manure spill to a tributary of Brothertown Creek near Brothertown, Calumet County; and (2) to investigate a fish kill in Brothertown Creek.

INTRODUCTION AND STUDY AREA

On April 21, 1983, and April 23, 1983, Calumet County Deputy Warden Hank Gillig investigated a fish kill in Brothertown Creek called in by an anonymous caller on April 20, 1983, and a manure spill to a tributary to Brothertown Creek originating from the Jim Klien hans farm. I investigated this situation on Tuesday, April 26, 1983, with Richard Streng, Calumet County Warden.

The investigation reach stretched from the fence near the John Klien hans farm located on a tributary to Brothertown Creek located 100 feet above the point of a manure runoff from the John Klien hans farm downstream to Brothertown Creek 200 feet below its confluence with the above mentioned Tributary (Figure 1). This Tributary averaged approximately 6 inches in depth and 2 feet in width and the current was fast throughout most of the observed reach. Brothertown Creek averaged approximately 6 inches to 1 foot in depth and 6-8 feet in width and the current was fast throughout most of the observed reach.

INVESTIGATION PROCEDURE

The tributary to Brothertown Creek was walked from South Tower Road to 100 feet above the manure runoff discharge points (there were two manure runoff discharges located about 25 feet apart). Samples were collected from the Tributary from 30 feet above the manure discharge points, at the downstream most discharge point, in the Tributary at the mixed point, and immediately above South Tower Road.

Brothertown Creek was walked from Hwy 151 to the confluence with the above mentioned Tributary. Samples were collected from the Tributary 75 feet above Brothertown Creek, from Brothertown Creek 50 feet above the confluence with the Tributary, and from Brothertown Creek at the mixed point below the Tributary.

All samples were properly preserved and sent to the State Laboratory of Hygiene under chain of custody. All samples were analyzed for biochemical oxygen demand, 5-day (BOD₅), lab pH, suspended solids (SS), total phosphorus (T-P), dissolved ammonia nitrogen (NH₃-N), dissolved nitrite plus nitrate nitrogen (NO₂+NO₃-N), total alkalinity, chlorides (Cl⁻), conductivity, fecal coliform (FC), and fecal strep (FS), except sample 6 which was only analyzed for BOD₅, lab pH, and SS, and sample 7 which was analyzed for everything but FC and FS.

RESULTS AND DISCUSSION

On walking the Tributary from South Tower Road to the Klienhans farm, we observed an almost continuous very noticeable residue of manure throughout the reach of the Tributary. The Tributary had a brown color from South Tower Road to the manure runoff discharge point. Above the discharge point there was no manure residue in the Tributary and the Tributary water was noticeable clearer. A runoff was occurring from two discharge points (the runoff streams were approximately 25 feet apart and a few inches in width) at site 2 (Figure 1). A manure residue was noticeable in the field immediately above these 2 discharge points.

All parameters increased downstream from site 1 (Table 1 and Figures 2, 3 and 4). As can be seen from Figures 2, 3 and 4, the most dramatic increase in BOD₅, T-P and the nitrogen series, was at site 4 (located immediately above South Tower Road). The Tributary was noticeably brown at site 4 though the bottom could be seen. The increase in parameters at this site can be attributed directly to the manure runoff and the manure residue in the Tributary which was observed to have originated at the manure runoff discharge points. These values are high for a creek of this type and the nutrients are in excess of those that would cause nuisance algae and weed growth in streams or lakes (USEPA, 1976). Also based upon the manure residue in the Tributary during this investigation and the comments and observations in the report by Deputy Warden Hank Gillig (see Appendix A), the runoff was significantly greater during his investigation and all parameter values must have been much higher. Also, the BOD₅ (a measure of the amount of oxygen used up by bacteria in the decomposition of organic matter like manure) must have been much higher to the point where fish kills could easily occur.

The BOD₅ of 17 mg/l at site 4 was an increase of at least 5.7 times over the BOD₅ of 3 mg/l at site 1 and the large amount of manure residue in the Tributary between sites 2 and 4 exhibit a significant impact on the Tributary beyond a natural level (i.e. site 1).

One of the established methods used for determining BOD₅ discharge limits for sewage treatment plants is the 26 lb rule. One of the criteria used as a base for this rule is that a water with a BOD₅ of 4.8 mg/l at 24°C will have a drop in dissolved oxygen of 2 mg/l beyond the saturation level (i.e. the amount of oxygen the water can hold at any given temperature). This criteria then gives further emphasis to the fact that the BOD₅ of 17 mg/l at site 4 is a significant impact over natural levels especially in conjunction with the added oxygen demand of the manure residue.

Most parameters had decreased significantly by site 5 (75 feet above Brothertown Creek or approximately 7,100 feet below the discharge point). This was apparently due primarily to other streams entering this Tributary diluting the Tributary. Also, much of the nitrogen had been oxidized to the NO₂+NO₃-N form which resulted in a significant rise in the parameter (Figure 4). However, all parameters were still above the levels at site 1. Based upon observations by Hank Gillig (see Appendix A) the parameter levels at site 5 and site 7 in Brothertown Creek during his previous week's investigations were apparently much higher.

During this April 26 investigation, Dick Streng and I contacted John Klien hans at his farm. We walked the field where Mr. Klien hans sprayed approximately 500,000 gallons of manure waste from his pit the week before. We observed a runoff channel from his field across the corner of the property adjacent to his farm (west) and into the Tributary at site 2. A large amount of manure residue was still evident on both properties extending to the Tributary.

During the April 26 investigation, about a half dozen of what appeared to be freshly killed fish (mainly suckers) were observed below site 7 in Brothertown Creek.

SUMMARY AND CONCLUSIONS

1. This investigation, on its own, and in conjunction with that of Hank Gillig (see Appendix A) prove definitely that a large amount of manure had been spilled to a Tributary to Brothertown Creek located adjacent to the field of John Klien hans. This investigation and that of Hank Gillig also prove that the origin of the manure spill was the field of John Klien hans to which was applied approximately 500,000 gallons of manure from the Klien hans manure pit.
2. This manure spill caused a significant impact on the Tributary to Brothertown Creek, it spilled to and was the probable cause of a major fish kill in Brothertown Creek investigated by Hank Gillig (see Appendix A).
3. Manure from manure pits such as that of Mr. Klien hans exhibit a very high BOD₅ and contain large amounts of phosphorus and nitrogen. Spills of such manure wastes to surface waters can have large impacts on all aquatic life. It is the conclusion of this author, based upon all data and observations in this and Mr. Gillig's investigation, that a significant load of nutrients were discharged to Lake Winnebago (located about 3 miles below the discharge point). Large amounts of nutrients can cause nuisance weed and algae growths in lakes such as Lake Winnebago and can inhibit public use of such waters.

Table 1. April 26, 1983, Brothertown Creek fish kill investigation site description.

Site	Description
1	TTBC* at fence 30 feet above KMDP**
2	KMDP
3	TTBC - mixed point 200 feet below KMDP
4	TTBC - immediately above S. Tower Rd.
5	TTBC - 75 feet above Brothertown Creek
6	Brothertown Creek 50 feet above confluence with TTBC
7	Brothertown Creek mixed pt. 200 feet below confluence with TTBC

* TTBC means Tributary to Brothertown Creek

** KMDP means Klienmans Manure Discharge Point

FIGURE 1

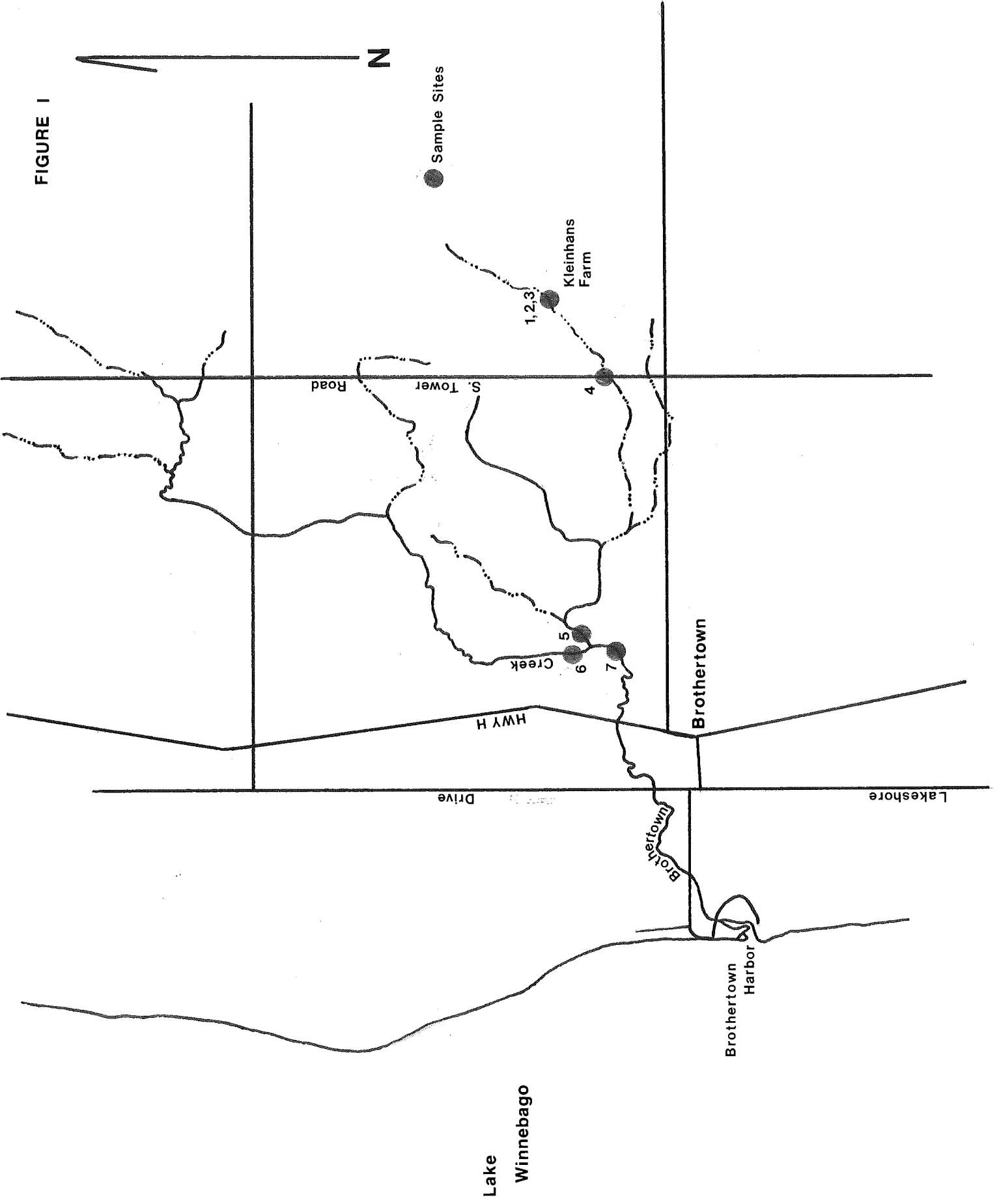


Table 2. Data from the April 26, 1983, Brothertown Creek fish kill investigation.

Parameter	Site						
	1	2	3	4	5	6	7
BOD ₅ (mg/l)	< 3	37	< 6	17	4.5	< 3	< 3
Lab pH (s.u.)	8.0	7.8	8.2	8.3	8.8	8.7	8.9
SS (mg/l)	2	20	7	11	38	9	8
T-P (mg/l)	0.14	1.55	0.46	1.70	0.58	-	0.11
TKN (mg/l)	1.1	14.0	2.6	9.2	2.2	-	0.8
Dis. NH ₃ -N (mg/l)	0.02	3.9	0.92	5.4	0.6	-	0.1
Dis NO ₂ +NO ₃ -N (mg/l)	< 0.02	< 0.02	0.03	0.1	6.7	-	6.3
T-ALK (mg/l Ca CO ₃)	112	298	124	256	320	-	286
Cl ⁻ (mg/l)	8.7	61	11	19	20	-	21
Cond. (umhos /cm) at 25°C	270	870	310	600	710	-	650
FC (M-FCAGAR/100 ml)	< 10	15,000	200	100	200	-	-
FS (MF M-ENT/100 ml)	< 10	35,000	480	600	300	-	-
FC/FS	1.00	0.43	0.42	0.17	0.67	-	-

Figure 2

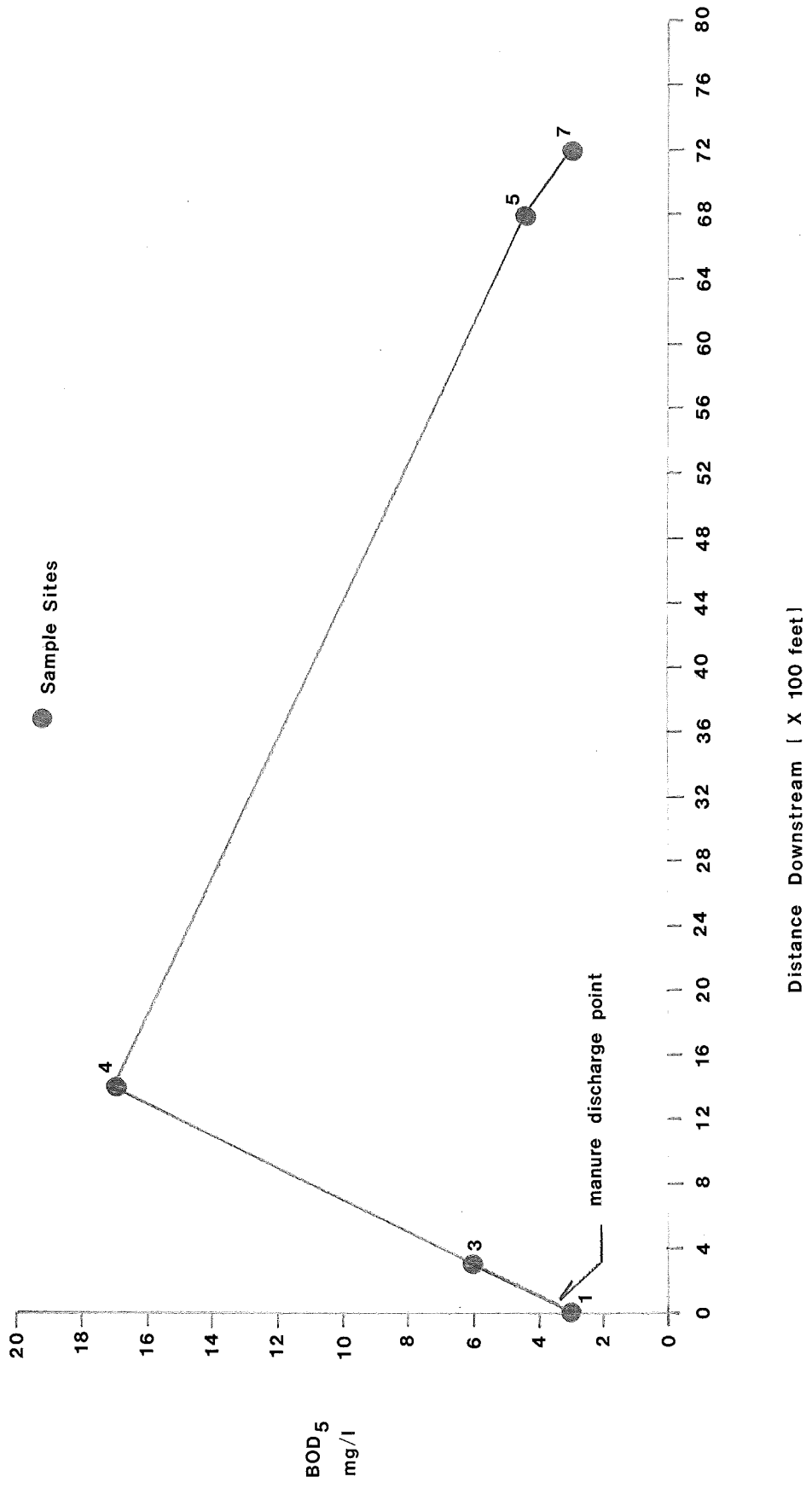


Figure 3

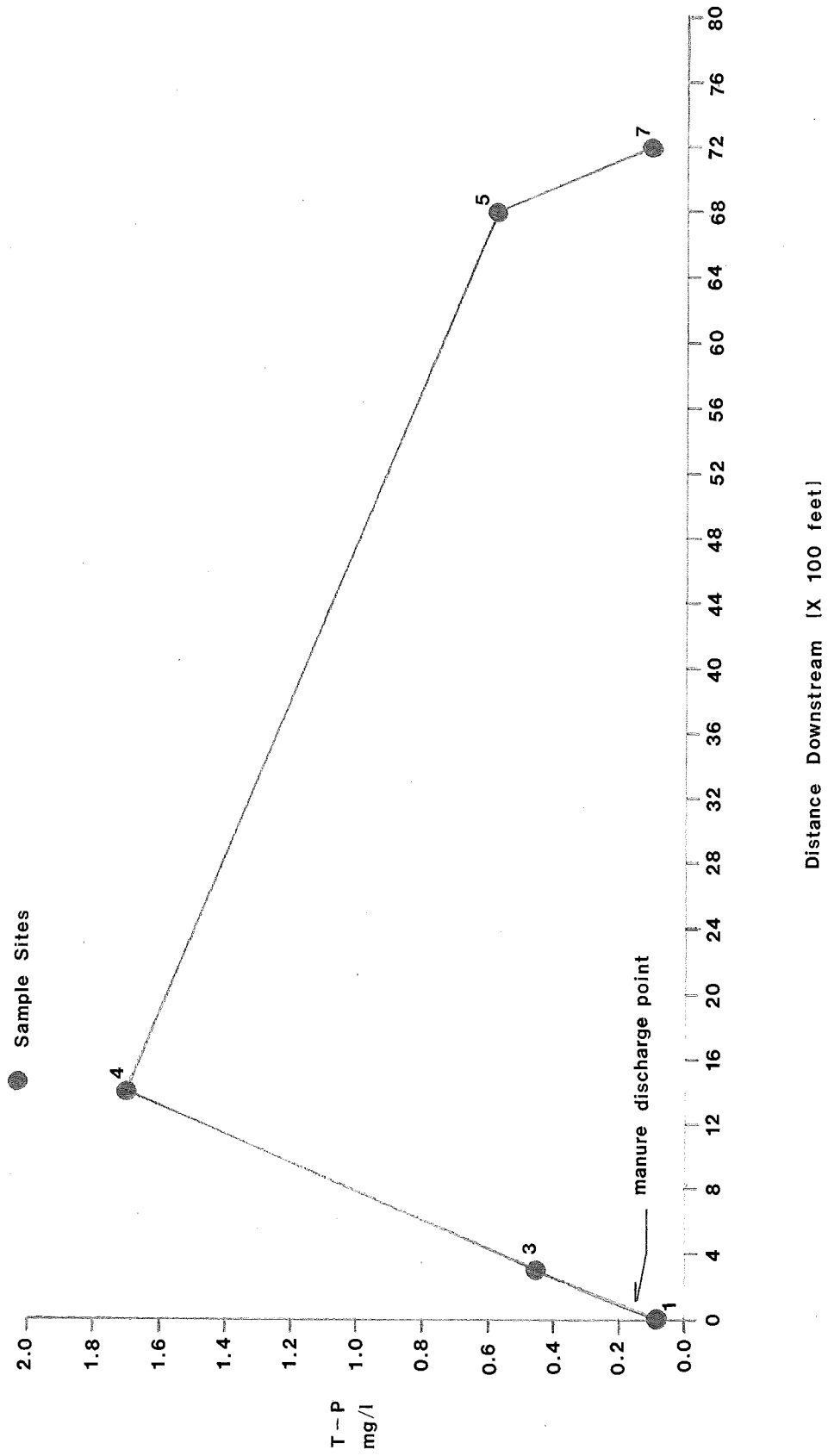
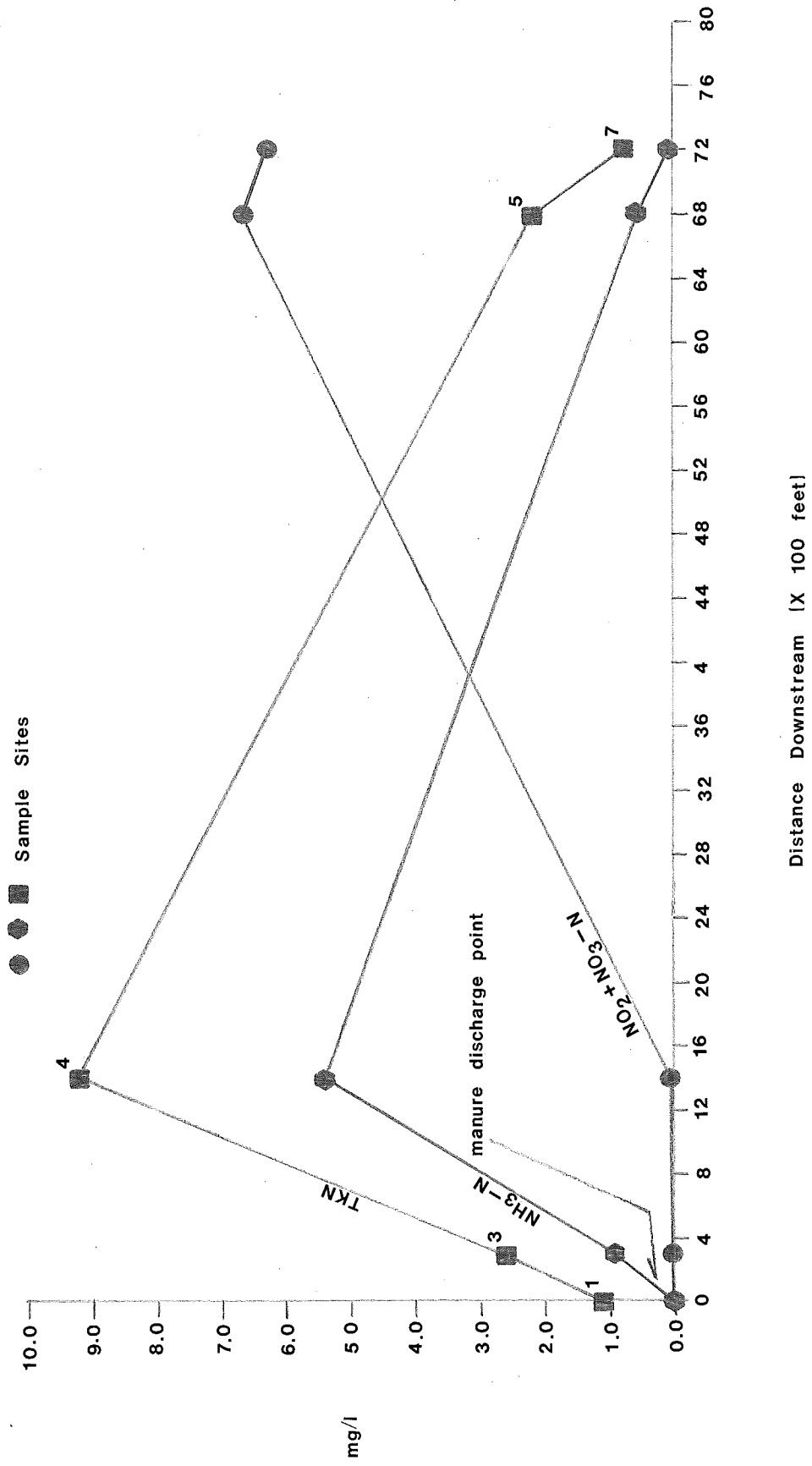


Figure 4



LITERATURE CITED

United States Environmental Protection Agency. 1976. Quality
Criteria For Water. Washington, D. C. 256 p.

APPENDIX A

Brothertown Creek

MANURE SPILL

- 4-20-83 at 20:45 hours: I, Henry R. Gillig, recieved an anonymous telephone call stating that there were many dead fish floating in the Brothertown Creek. I asked the party if he could identify what killed the fish. His answer was manure. I then asked him how he knew it was manure. He then describe the creek as being brown and foaming; he thought he could see manure floating down the creek and there was a very strong odor, which smelt like manure. I then told him I would investigate.
- 4-21-83 at approx. 16:15 hours: I and Warden Walter Pendl proceded to Brothertown to collect water samples and fish samples if we could find any.
- At 16:39 hours: First water sample was taken north of the harbor in Brothertown. Marked this spot on the map. We see nothing and do not smell anything. Then moving on down the river toward calmer water-no signs of run-off or polution. We then walk down to the harbor to take the second sample. In the harbor we noticed large amounts of dead minnows. Collected 3 minnows from the bottom of harbor and placed in sample bottle #2. These minnows were later bagged and frozen. We then noticed some larger fish probably suckers or carp. One small sucker was also collected, bagged, and frozen. We noticed several small sized suckers laying on the bottom, which probably died at the same time. There was no sign of life- minnows, or other fish in the harbor.
- At 17:00 hours: Third sample was taken where the creek runs under Harbor Rd. Marked this spot on the map. We also noticed several other suckers dead in the water. One sucker was collected, bagged, and frozen. The location of this fish was 50 yards down stream, where the creek runs under Harbor Rd. We collected water sample #4 70 yards upstream where the creek runs under Harbor Rd. After taking sample #4, one of the residence of the area approached me. I identified myself as a Conservation Warden for Calumet County. I asked him if he knew anything about the manure spill in the river. At this time he asked to remain anonymous-so name would not appear in the paper. I asked him what it (the creek) looked like last night. He said, "Last night it was all foam, you couldn't even see the goddam stones and everything was all brown. Someone's pit let go or something, or someone was hauling pretty heavy." He also said that he checked the stream this morning and it was half the clarity. He said he first noticed the spill at 9:00 o'clock yesterday morning. I asked him if he noticed anything living in the stream before the spill. He said it was full of minnows.
- At 17:17 hours: Fifth sample was taken. This was also marked on the map. Sample #6 was taken where the creek crosses HWY 151 at 17:23 hours. Sample #7 was taken upstream approx. 150-200 yards from sample #6. Sample #8 was taken off of Jefferson Rd. Sample #9 was taken by the Hanson dairy farm just off Tower Rd. Sample #10 was taken from a drain running out of the field by the Hanson dairy farm.
- 4-23-83: I checked out a small tributary, which runs off of Tower Rd out of some farm fields. There was evidence of a large amount of manure in the stream. I took several pictures of the manure laying along the banks of the stream. Picture #1 shows a rock with large amounts of manure laying around it. Picture #2 shows what looks like a manure dump site-this dump site is 10 or 15 yards from the edge of the tributary.

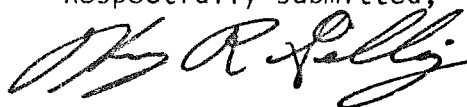
cont:

Picture #3 shows more manure in the stream, walking upstream. Picture #4 more manure upstream. Picture #5 shows the place where the spill enters the creek. At this point the manure laid in the field at least 3 inches deep in some places 6 inches. The other pictures that follow show how the manure ran through the field from the Kleinhans farm. There are many places in the field, where the manure stands 6 inches deep.

At 10:37 hours: Water sample #11 was taken where the spill entered the tributary.

All water samples and evidence will be turned over to the DNR from Green Bay to be tested.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "H. R. Gillig".

Henry R. Gillig
Conservation Warden Calumet County

PHOTOGRAPHS TAKEN BY HANK GILLIG,
DEPUTY WARDEN, OF THE SPRING 1983
BROTHERTOWN CREEK FISH KILL

By Michael D. Reif

October, 1983

Numbers in the explanations correspond to Mr. Gillig's report (Appendix A of my report entitled "April 26, 1983, Investigation of The Brothertown Creek Fish Kill and Manure Runoff").



Number 1. Tributary to Brothertown Creek above S. Tower Rd. and below the Kleinhan's farm. Note the large amount of manure around the rock. (April 23, 1983).



Number 2. A manure disposal site located directly next to the bank of the Tributary to Brothertown Creek located about 300 feet above S. Tower Rd. (April 23, 1983).





Number 5. Site of manure spill discharge to the Tributary of Brothertown Creek. Note the heavy accumulation of manure in the foreground (April 23, 1983).



Number 6. Kleinhan's field - the manure was pumped on (looking south toward the Kleinhan's farm from the fence, the runoff crossed under prior to discharge to the tributary). Note the runoff (April 23, 1983).



Number 7. Kleinhan's field
the manure was sprayed on
(looking south toward the
Kleinhan's farm) (April
23, 1983).



Number 8. More manure
runoff (April 23, 1983).