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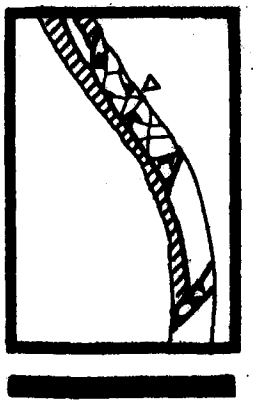
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Special Report 86-23
August 1986

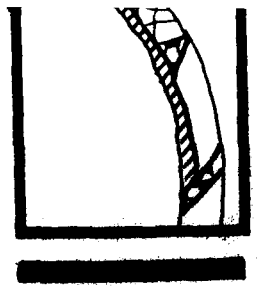
US Army Corps of Engineers
Cold Regions Research & Engineering Laboratory

ICE ATLAS 1984 – 1985

LAWRENCE GATTO
STEVEN F. DALY
KEVIN CAREY



KEVIN CAREY



OHIO RIVER
ALLEGHENY RIVER
MONONGAHELA RIVER

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Prepared for
OFFICE OF THE CHIEF OF ENGINEERS

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Ice conditions on inland rivers can change rapidly and adversely affect navigation. The ice maps in this atlas were prepared to document the 1984-85 ice conditions on those reaches of the Ohio, Allegheny and Monongahela Rivers that are included in study areas for the River Ice Management (RIM) Program, namely river mile 0 to 437 on the Ohio River, mile 0 to 7 on the Allegheny, and mile 0 to 66 on the Monongahela. The maps were prepared from interpretation of vertical aerial video imagery taken from a low-flying aircraft. The interpreted ice conditions were classified into five units and transferred to base maps by reference to navigation charts and topographic maps. *Fragmented Ice Cover* and *Ice Floes or Frazil Slush and Pans* were the most common ice units in the lower pools of the Monongahela River and lower Allegheny. *Solid Ice Cover* and *Fragmented Ice Cover* were the most common units in the upper pools of the Monongahela. *Fragmented Ice Cover* and *Open Water* were the most extensive units in the Emsworth to New Cumberland pools of the Ohio; *Open Water* and *Ice Floes or Frazil Slush and Pans* were the predominant units in the downstream pools. There were frequent cancellations of flights during the 1984-85 winter because of low cloud ceilings. To get more frequent video coverage of ice during the 1985-86 winter, a wider-angle lens on the video camera will be used. This will allow flights at a lower altitude, permitting video coverage even when the ceiling is low.

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PREFACE

This report was prepared by Lawrence W. Gatto, Geologist, Earth Sciences Branch, Research Division; Steven F. Daly, Research Hydraulic Engineer, and Kevin L. Carey, Research Hydraulic Engineer, both of the Ice Engineering Research Branch, Experimental Engineering Division, U.S. Army Cold Regions Research and Engineering Laboratory. The work was funded by the Office of the Chief of Engineers, under the River Ice Management (RIM) Program, Work Units 32228, *Remote Ice Monitoring System*, and 32227, *Forecasting Ice Conditions on Inland Rivers*.

Northland Video Associates, Inc., of Lebanon, New Hampshire, under contract to CRREL, acquired the aerial video tapes used for mapping ice conditions. Photographic Interpretation Corporation (PIC) of Lyme, New Hampshire, prepared the river ice maps under a contract to the New England Division of the Corps of Engineers. Vernon Anderson of PIC interpreted and mapped ice conditions from the video tapes, and Roger Arend of PIC measured the areal extent of the ice types and percentages of ice concentration. The authors thank Darryl Calkins and Michael Ferrick for technical reviews of the manuscript, Eleanor Huke for her assistance in planning and preparing the base maps, and Richard Sterling for compiling the data shown in Appendix A.

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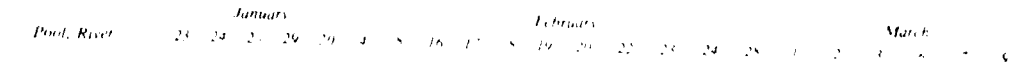
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Ice conditions as observed on video tapes 2

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Pool, River	January										February						March					
	23	24	28	29	30	4	8	16	17	18	19	20	22	23	24	28	1	2	3	6	7	9
Emsworth, Allegheny	3	5	7	13	19	27	33	—	—	—	83	—	109	111	117	123	131	139	147	155	163	171
Emsworth, Monongahela	3	5	7	13	19	27	33	—	—	—	83	—	109	111	117	123	131	139	147	155	163	171
L/D 2, Monongahela*	—	—	8	14	—	28	—	—	—	—	—	—	—	112	118	—	—	—	—	—	—	—
L/D 3, Monongahela	—	—	9	15	—	29	—	—	—	—	—	—	—	113	119	—	—	—	—	—	—	—
L/D 4, Monongahela	—	—	10	16	—	30	—	—	—	—	—	—	—	114	120	—	—	—	—	—	—	—
Maxwell, Monongahela	—	—	11	17	—	31	—	—	—	—	—	—	—	115	121	—	—	—	—	—	—	—
Emsworth, Ohio	—	—	—	—	20	—	34	47	—	—	84	97	—	—	—	—	—	—	—	156	—	—
Dashields, Ohio	—	—	—	—	20	—	34	47	—	—	84	97	—	—	—	—	—	—	—	156	—	—
Montgomery, Ohio	—	—	—	—	21	—	35	48	59	—	85	98	—	—	—	124	132	140	148	157	164	172
New Cumberland, Ohio	—	—	—	—	22	—	36	49	60	—	86	99	—	—	—	125	133	141	149	158	165	173
Pike Island, Ohio	—	—	—	—	23	—	37	50	61	—	87	100	—	—	—	126	134	142	150	159	166	174
Hannibal, Ohio	—	—	—	—	25	—	39	52	63	—	89	102	—	—	—	128	136	144	152	161	168	176
Willow Island, Ohio	—	—	—	—	—	—	41	54	—	65	91	104	—	—	—	—	—	—	—	—	—	—
Belleville, Ohio	—	—	—	—	—	—	43	56	—	67	93	106	—	—	—	—	—	—	—	—	—	—
Racine, Ohio	—	—	—	—	—	—	—	—	—	70	—	—	—	—	—	—	—	—	—	—		
Gallipolis, Ohio	—	—	—	—	—	—	—	—	—	72	—	—	—	—	—	—	—	—	—	—	—	—
Greenup, Ohio	—	—	—	—	—	—	—	—	—	74	—	—	—	—	—	—	—	—	—	—	—	—
Meldahl, Ohio	—	—	—	—	—	—	—	—	—	78	—	—	—	—	—	—	—	—	—	—	—	—

* L/D—lock and dam.

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Ice Atlas for the Ohio, Allegheny and Monongahela Rivers, 1984–85

L.W. GATTO, S.F. DALY and K.L. CAREY

INTRODUCTION

Background

The Corps of Engineers has broad responsibility for providing reliable avenues for waterborne commerce by operating and maintaining the Nation's navigable waterways. Across the northern United States, ice greatly impedes and occasionally stops winter navigation on some rivers and waterways. This creates a need to develop ice control techniques that will permit cost-effective, reliable and safe navigation throughout the year, without adverse economic or environmental effects.

The purpose of the Corps' River Ice Management (RIM) Program is to develop the structural and operational solutions to ice problems on navigable rivers that currently experience winter shipping delays and unexpected ice emergencies. Information on river ice conditions has not been previously collected on a large scale over long periods. This has impeded our understanding of river ice processes. This atlas will provide a permanent record of the ice conditions over these river reaches that should prove valuable to any future research. In addition, this information is required throughout the winter as input data and "ground truth" for developing river ice forecast models and for developing and evaluating various remote sensing devices for real time monitoring of ice conditions.

Repetitive coverage of ice conditions is required for documenting changes and for understanding the dynamics of river ice. Personnel at the Corps' lock-and-dam projects make daily observations of nearby ice conditions, but these data are not necessarily representative of ice conditions in the pools between the locks and dams. Consequently, their observations are of limited use for analyzing conditions over long stretches of the river. The Corps occasionally takes low-altitude oblique and vertical aerial photographs when ice conditions cause navigation problems, but there is usually no systematic collection of photographs every winter. Based on a sample video tape taken during the 1983–84 winter, videography was selected as a reliable and economical method to document ice conditions for the RIM Program.

The purpose of this ice atlas is to document the areal extent and variation through time of river ice and open water in the area of study during the 1984–85 winter. No detailed analyses of the ice conditions were done in preparing this atlas beyond placing the observed ice into general categories. The *Results* section provides very general descriptions of ice conditions, highlighting the ice categories and providing an introduction and guide to the ice information contained in the maps themselves.

Area of study

Ice conditions were to be documented on the Ohio River (Fig. 1) from Pittsburgh Point (river mile 0) to river mile 437, just downstream of Meldahl Locks and Dam, on the Monongahela from the Point (mile 0) to mile 66, just upstream of Maxwell Lock and Dam, and on the Allegheny from the Point (mile 0) to mile 7, just upstream of Lock and Dam 2. However, as discussed in the *Results* section, coverage of the entire study area was not always possible on each flight date.

There are 12 dams and associated locks in the study area of the Ohio River, four along the Monongahela and one on the Allegheny. Navigation channels at least 9 ft deep are maintained.

tions in the pools between the locks and dams. Consequently, their ob-

River, four locks on the Monongahela and one on the Allegheny. Naviga tion channels at least 9 ft deep are maintained.

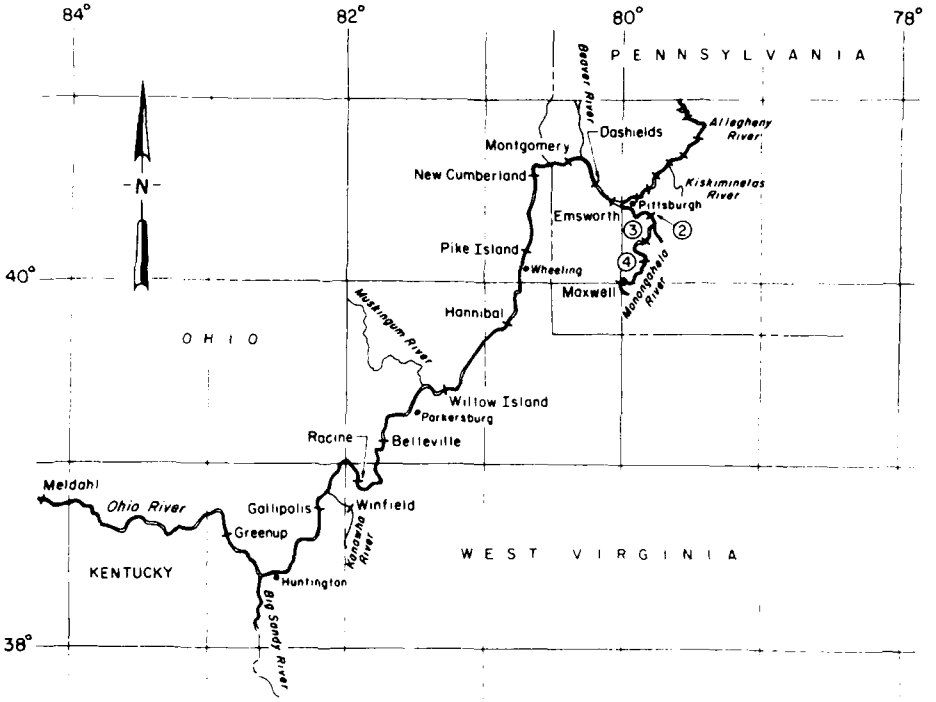


Figure 1. Location of the study area on the Allegheny, Monongahela and Ohio Rivers, showing locations of locks and dams.

APPROACH

Video tapes (½-in. VHS) were taken vertically with a Panasonic [illegible] video camera with a 12:1 zoom lens from a Cessna 172 fixed-wing aircraft, usually at an altitude between 2000 and 3500 ft above the ground. Aircraft altitude varied depending on cloud conditions. Occasionally, the aircraft was not cleared to enter the controlled air space around Pittsburgh International Airport, and thus tapes could not be acquired of the Ohio River from Pittsburgh Point to the vicinity of Ambridge, Pennsylvania (river mile 0 to 24).

The tapes were viewed on a TV monitor and the observed ice was visually interpreted and classified into five units (Table 1). The acquisition of "ground truth" was not required, since the image interpretation was limited to the classification of the ice conditions as seen on the video tapes by an experienced ice interpreter observer, and did not attempt to infer characteristics that could only be measured "on the ground" (e.g., porosity, strength or ice thickness). Boundaries between the units were transferred to 1:24,000 base maps by reference to Corps of Engineers navigation charts and U.S. Geological Survey topographic maps. The maps are organized according to the pools that exist between the dams. A pool is named for the dam at its downstream end, as listed in the index and subsequently in this report.

The ice maps show the areal extent of the five ice types and open water. These six units were selected because they are readily identifiable on video imagery and they satisfactorily describe the range of ice that can occur on inland waterways.

The area of each map unit in a pool was measured from the base maps with a Los Angeles Scientific Instruments Co. digital compensating polar-planimeter. For map units comprising both ice and open water, the surface concentration of ice was visually estimated with a probable accuracy of ± 5%. This included three ice types: *Solid Ice Cover with Open Areas*, *Fragmented Ice Cover with Open Areas*, and *Ice Floes or Frazil Slush and Pans*. The surface concentrations for the *Solid Ice Cover* and *Fragmented Ice Cover* are always 100% (Table 1). The measured areas and estimated concentrations are listed in Appendix A.

Table 1. Ice conditions as observed on video tapes.

Map unit	*Description*
Open Water	River is ice-free; no ice apparent.
Solid Ice Cover	River is completely covered (100%) with ice; no individual ice pans, blocks or chunks are visible; ice may be snow-covered.
Solid Ice Cover with Open-Water Areas	River is partially covered with solid ice (as described above) but has open (ice free) areas.
Fragmented Ice Cover	River is completely covered (100%) with ice that has distinct, variably sized, individual ice pans,

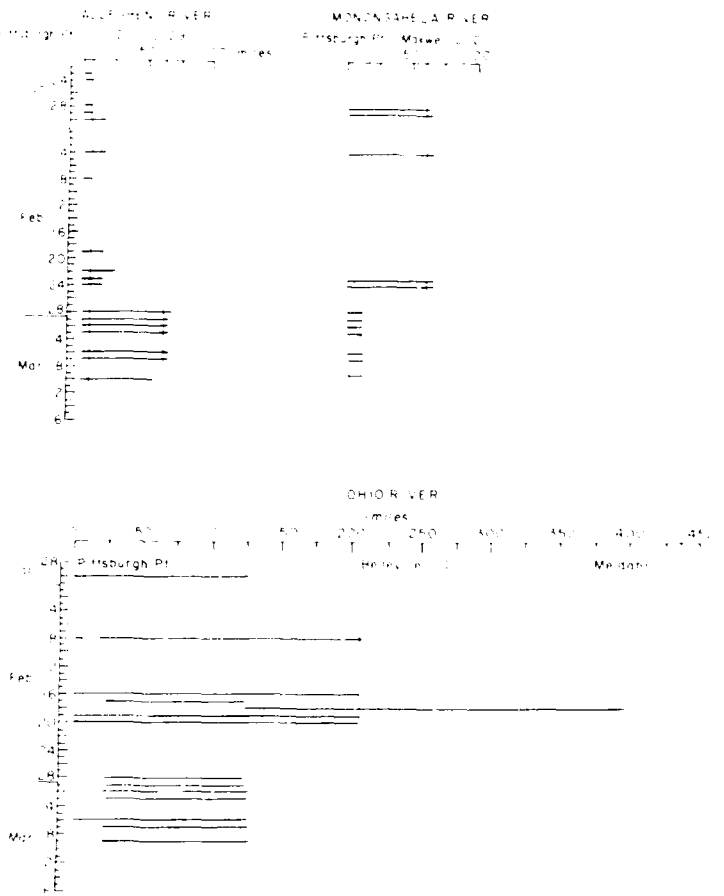


Figure 2. Dates of video tape acquisition (see also Appendix B). The vertical dashed lines indicate the extent of the aerial video contracts.

Allegheny River

Fragmented Ice Cover and *Fragmented Ice Cover with Open Areas* covered about 90% of the Emsworth pool on 23 January and remained the predominant ice types through 30 January. By 4 February about 60% of the pool was covered with *Solid Ice Cover* while *Fragmented Ice Cover with Open Areas* covered only 18%. From 8 through 24 February the coverage of these ice units decreased as *Ice Floes or Frazil Slush and Pans* and *Open Water* increased. After 28 February this reach was open.

	... may be snow-covered.
Solid Ice Cover with Open-Water Areas	River is partially covered with solid ice (as described above) but has open (ice-free) areas.
Fragmented Ice Cover	River is completely covered (100%) with ice that has distinct, variably sized, individual ice pans, blocks or chunks.
Fragmented Ice Cover *with Open-Water Areas*	River is partially covered with fragmented ice (as described above) but has open (ice-free) areas.
Ice Floes or Frazil Slush and Pans	River is primarily open (ice-free) with floating ice floes, slush or pans.

RESULTS

Ice conditions were documented on video tapes on 23 dates during the 1984–85 winter (Fig. 2). Note that tapes of the lower Ohio River from mile 210 to near Meldahl Dam were acquired on 18 February only. No additional tapes of these lower river pools were obtained because of frequent poor weather and low ceilings. In the latter portion of the winter, from 28 February to 10 March, documentation of the Allegheny River ice conditions was expanded to river mile 65. During this period, documentation of the Monongahela River ice conditions was reduced to only river mile 0 to 12. The reason for these changes was that more of the Allegheny had ice cover later in the winter than did the Monongahela. No maps of the Allegheny upstream of Lock and Dam 2 have been prepared, however, video documentation of the upstream sections was desired.

Ice conditions on the rivers change rapidly, often daily. In late January ice was extensive, but by late February most of it was gone. *Fragmented Ice Cover*, *Fragmented Ice Cover with Open Areas*, and *Ice Floes or Frazil Slush and Pans* were most common in the lower pools of the Monongahela and lower Allegheny. Solid and fragmented ice, both with and without open areas, were most common in the upper pools of the Monongahela. *Fragmented Ice Cover* and *Open Water* were most extensive in the Emsworth to New Cumberland pools of the Ohio; *Open Water* and *Ice Floes or Frazil Slush and Pans* were most common in the downstream pools.

... covered about 90% of the Emsworth pool on 23 January and remained the predominant ice types through 30 January. By 4 February about 60% of the pool was covered with *Solid Ice Cover* while *Fragmented Ice Cover with Open Areas* covered only 18%. From 8 through 24 February the coverage of these ice units decreased as *Ice Floes or Frazil Slush and Pans* and *Open Water* increased. After 28 February this reach was open.

Monongahela River

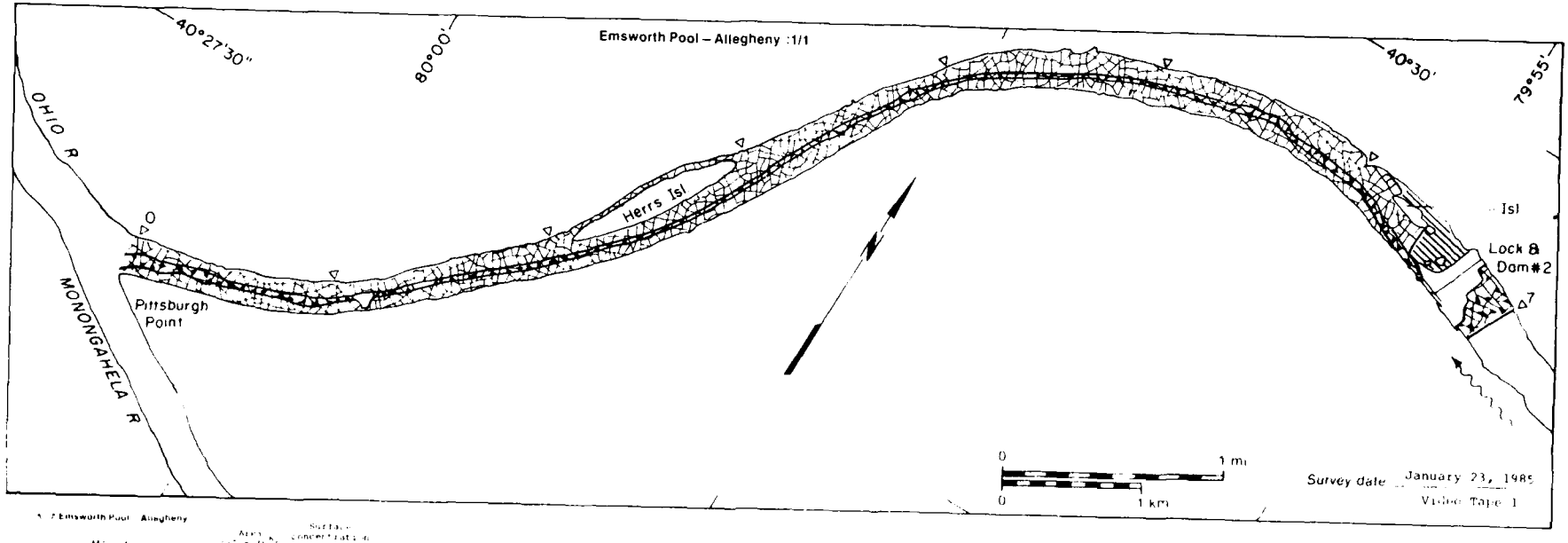
Fragmented Ice Cover and *Fragmented Ice Cover with Open Areas* were the most widespread types on the five pools of the Monongahela, and covered as much as 57% of the pools on 4 February. *Solid Ice Cover* covered 63% of the Lock and Dam 4 pool on 28 January and was more widespread on the upper three pools. Generally, *Ice Floes or Frazil Slush and Pans* was the more common ice type on the downstream pools. By 23 February most of the pools were ice-free, except for isolated patches of *Ice Floes or Frazil Slush and Pans*.

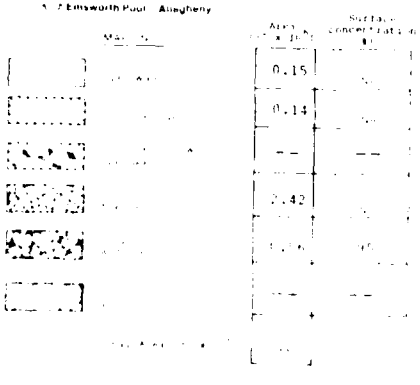
Ohio River

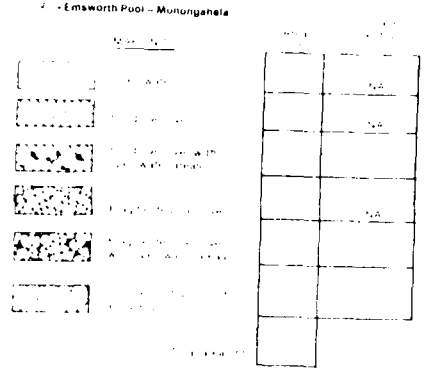
Fragmented Ice Cover and *Fragmented Ice Cover with Open Areas* were the most widespread; they covered nearly 80% of the Emsworth pool on 16 February. *Ice Floes or Frazil Slush and Pans* was second in area, although *Open Water* existed over large portions of the pools. *Solid Ice Cover* was more common on the upstream reaches, although it covered small areas downstream at this time. Ice was present in some form on all reaches from Emsworth to Belleville on 30 January; by 20 February most of the ice was gone.

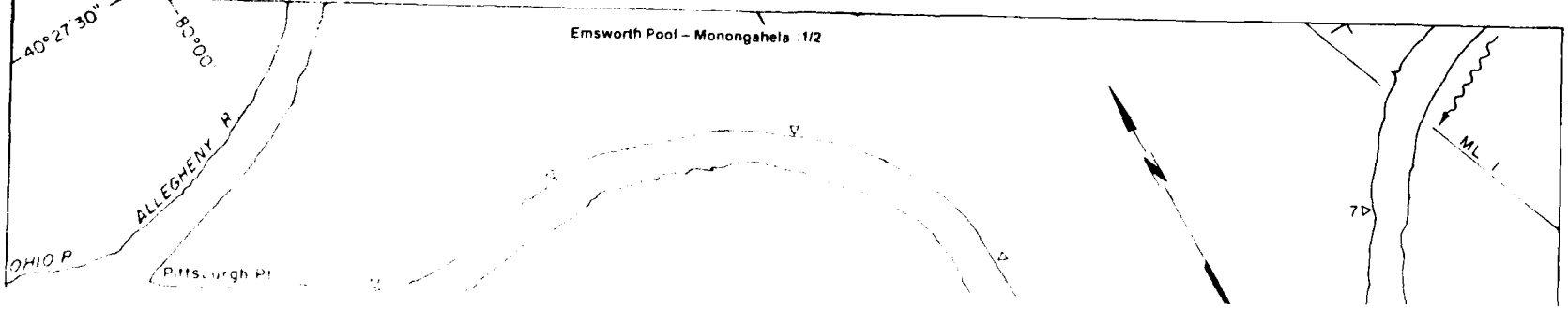
CONCLUSIONS

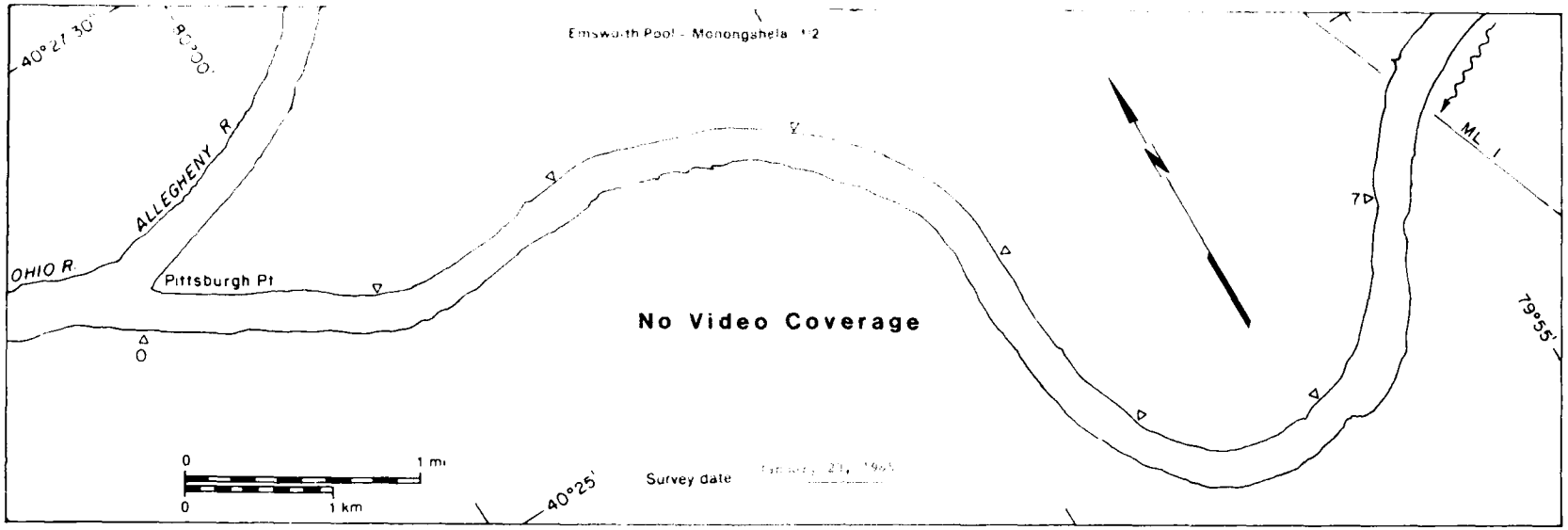
Videography proved to be an economical, effective and accurate way to document the rapidly changing ice conditions. However, cloud cover, inclement weather and low ceilings restricted the opportunities for getting more frequent video coverage and sometimes caused large gaps in the video record. It is critical to get more frequent coverage in the future. During the 1985–86 winter, a wider-angle will be used on the video camera, which will allow bank-to-bank video coverage while the airplane is flying at lower altitudes when the ceiling is low. Videographic techniques also provide near-real-time data during periods of extreme ice conditions.

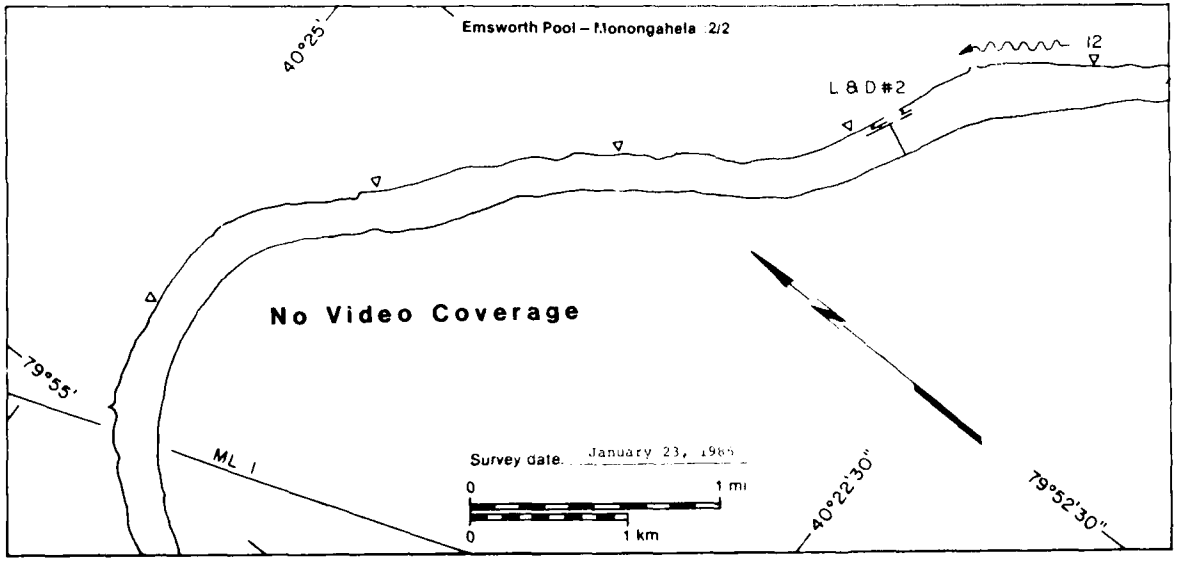

Emsworth Pool – Allegheny :1/1
40°27'30"
80°00'
40°30'
79°55'
OHIO R
MONONGAHELA R
Herrs Isl
Pittsburgh Point
Isl
Lock 8
Dam#2
0
1 mi
0
1 km
Survey date January 23, 1985
Video Tape 1

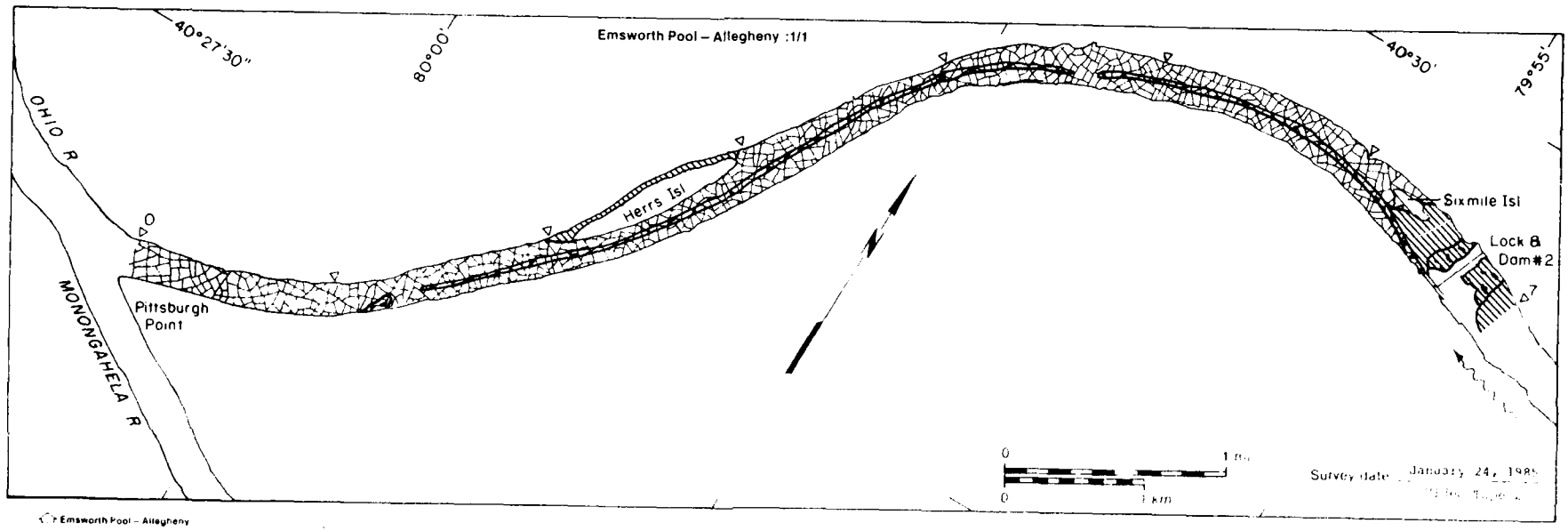


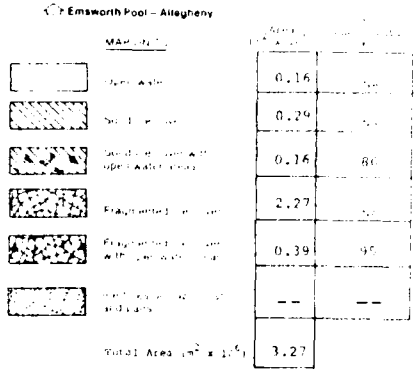


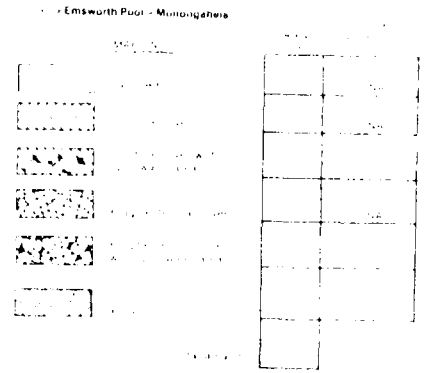

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R
OHIO R
Pittsburgh Pt
ML

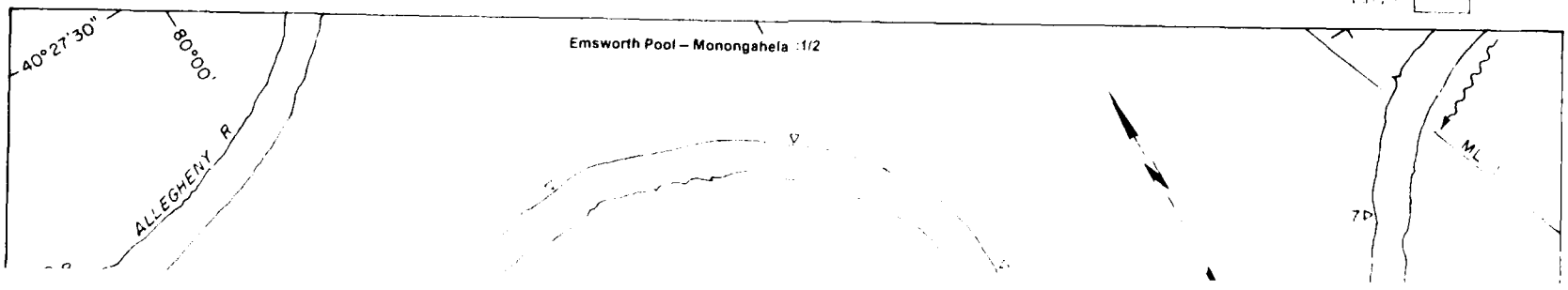

Emsworth Pool - Monongahela 1/2
40°27'30"
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
No Video Coverage
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date

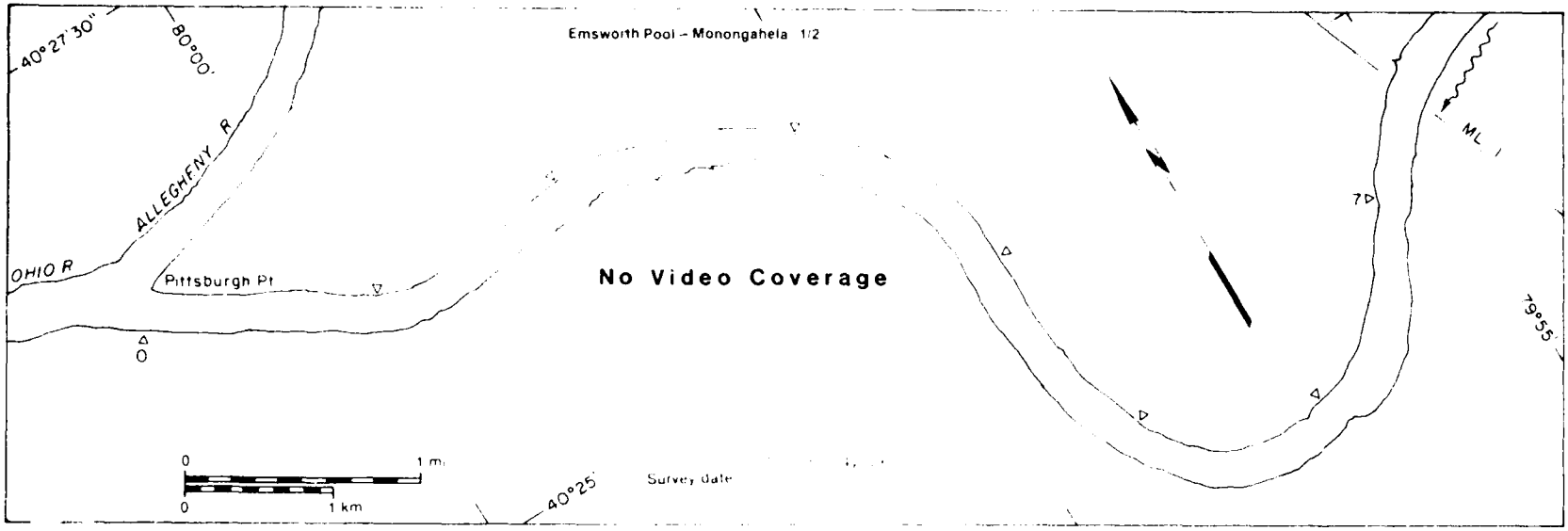

Emsworth Pool – Monongahela 2/2
40°25'
L & D #2
12
No Video Coverage
79°55'
ML 1
Survey date: January 23, 1985
0
1 mi
0
1 km
40°22'30"
79°52'30"

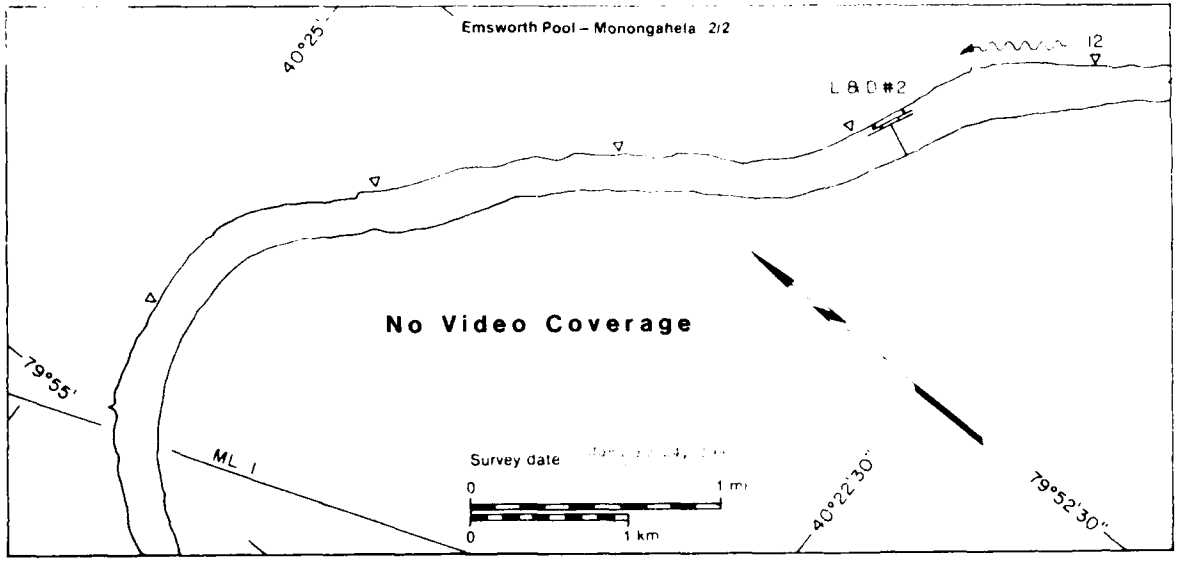

Emsworth Pool – Allegheny :1/1
40°27'30"
80°00'
40°30'
79°55'
OHIO R
MONONGAHELA R
Pittsburgh Point
Herrs Isl
Sixmile Isl
Lock & Dam #2
0
1 km
Survey date January 24, 1985

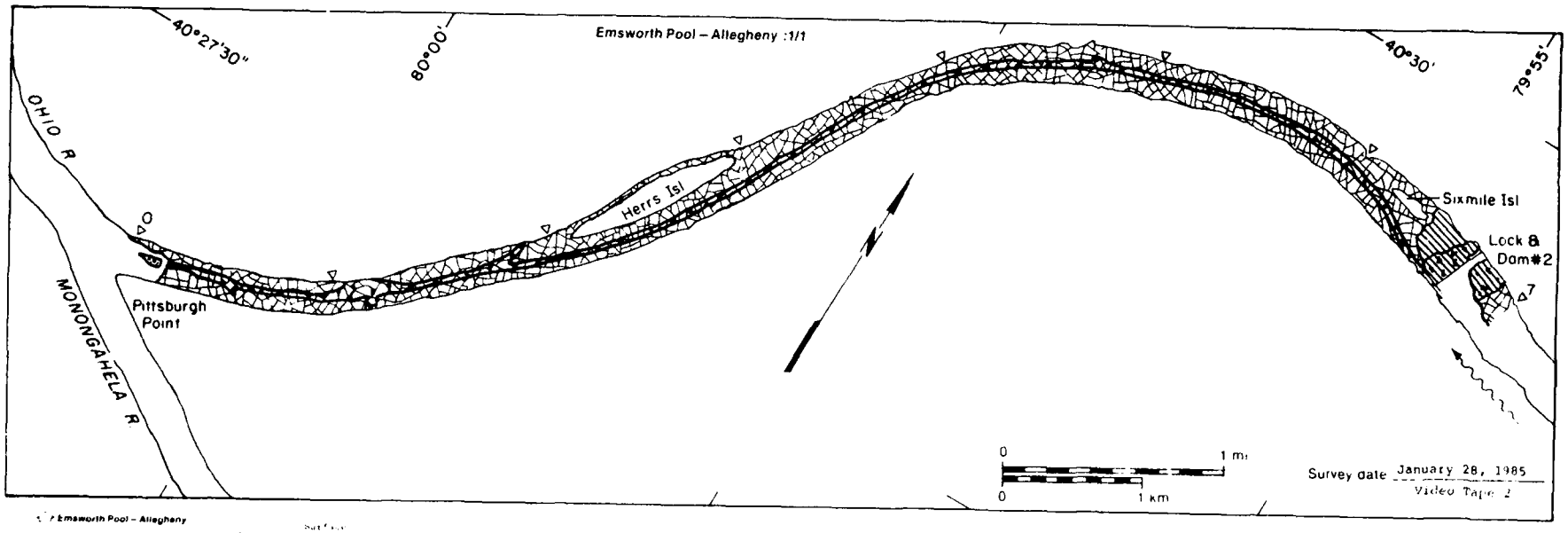

Emsworth Pool – Allegheny
0.16
0.29
0.16
2.27
0.39
--
--
3.27


Emsworth Pool – Monongahela


Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R


Emsworth Pool – Monongahela 1/2
40°27'30"
80°00'
ALLEGHENY R
OHIO R
Pittsburgh Pt
No Video Coverage
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date


Emsworth Pool – Monongahela 2/2
40°25'
12
L&D #2
No Video Coverage
79°55'
ML 1
Survey date
0
1 mi
0
1 km
40°22'30"
79°52'30"

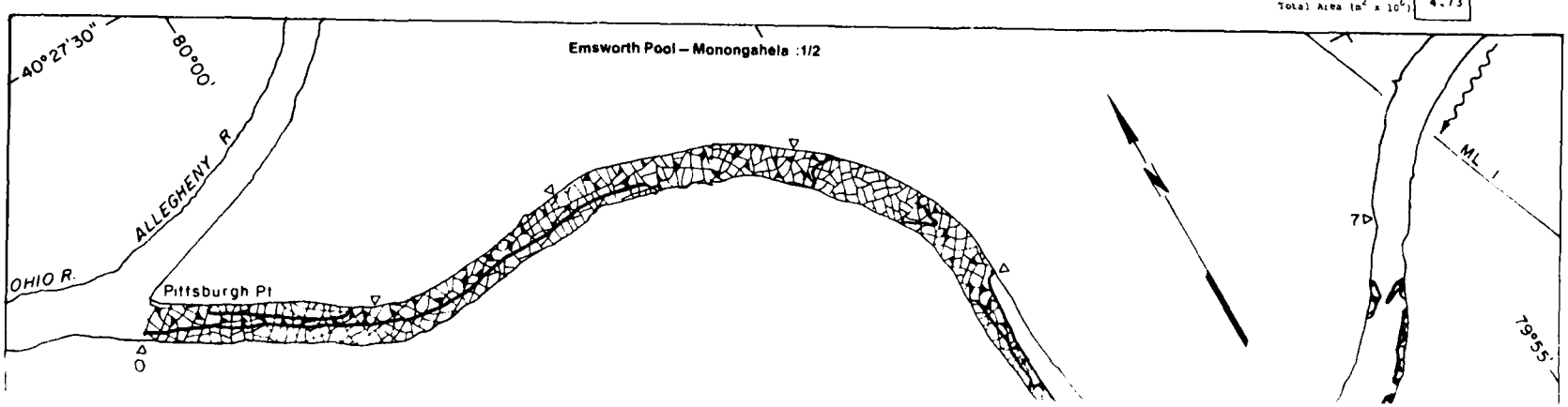


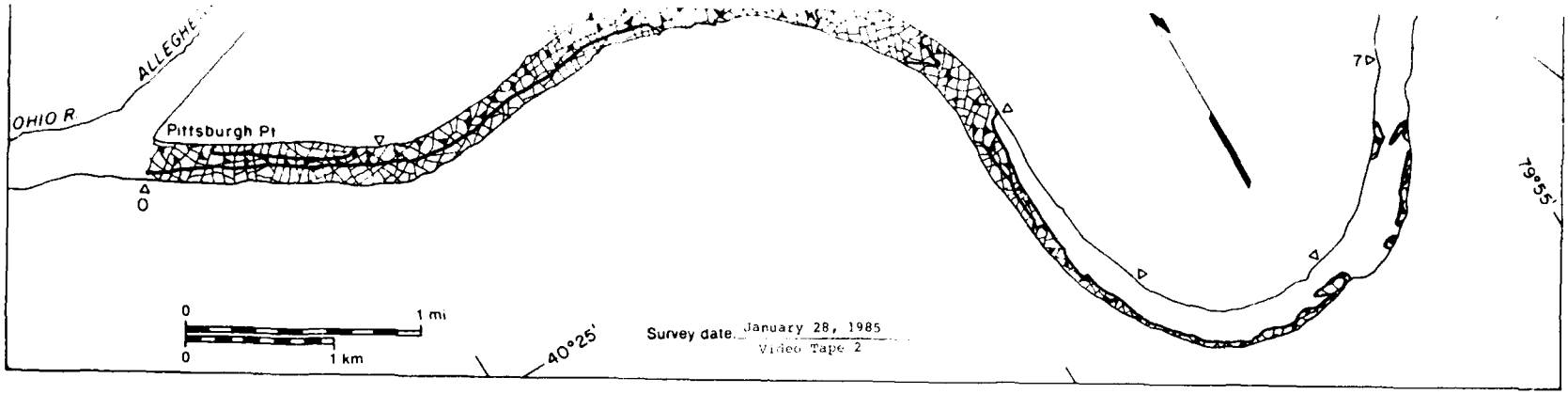
Emsworth Pool – Allegheny

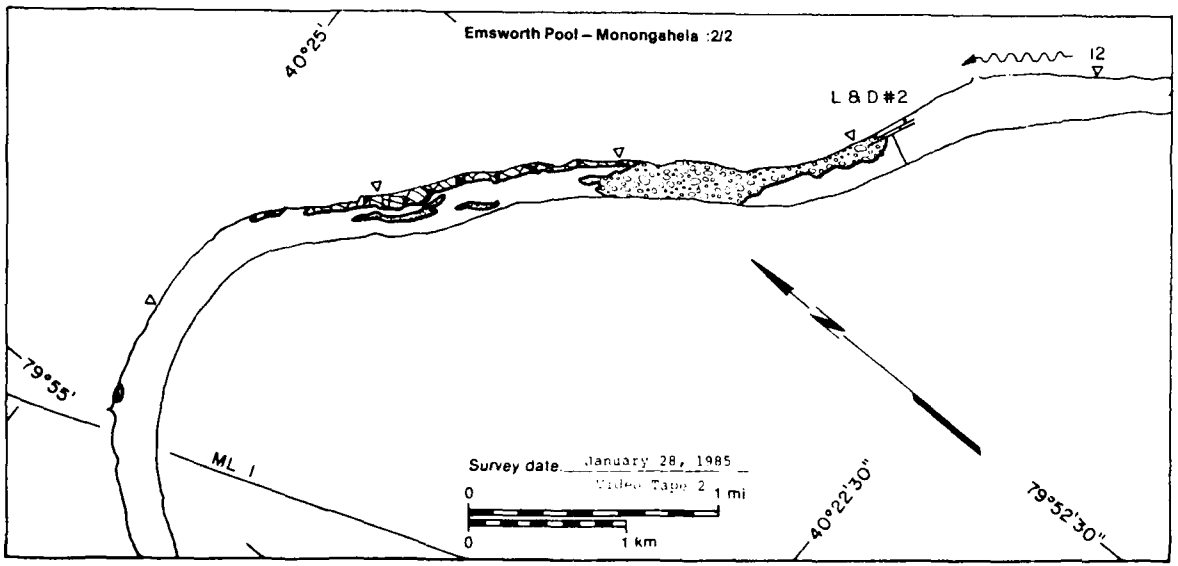
Material	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.18	NA
Sediment	0.07	NA
Sediment with open water areas	0.12	80
Fragmented ice cover	2.36	NA
Fragmented ice cover with open water areas	0.53	95
Ice accumulation on land and banks	0.01	2
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

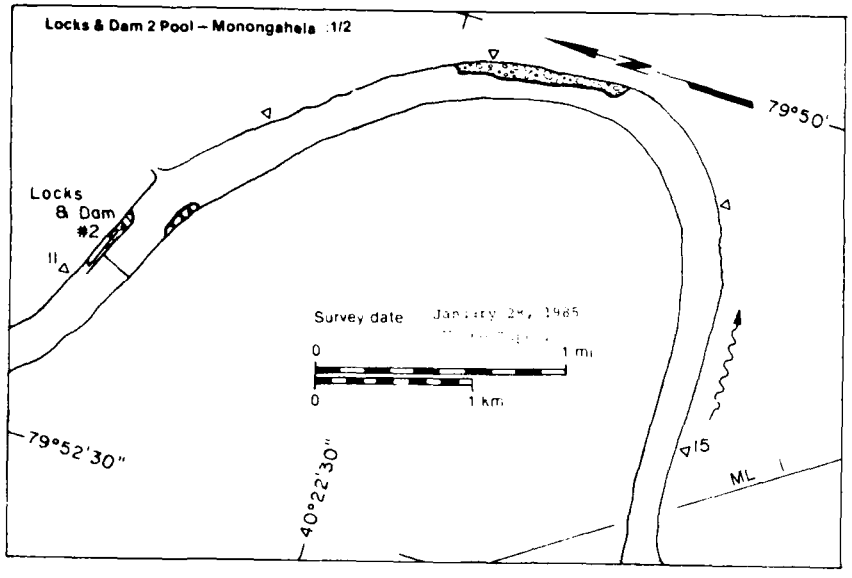
Material	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	2.23	NA
Sediment	--	NA
Sediment with open water areas	--	--
Fragmented ice cover	0.74	NA
Fragmented ice cover with open water areas	1.40	80
Ice accumulation on land and banks	0.36	10
Total Area ($m^2 \times 10^6$)	4.73	

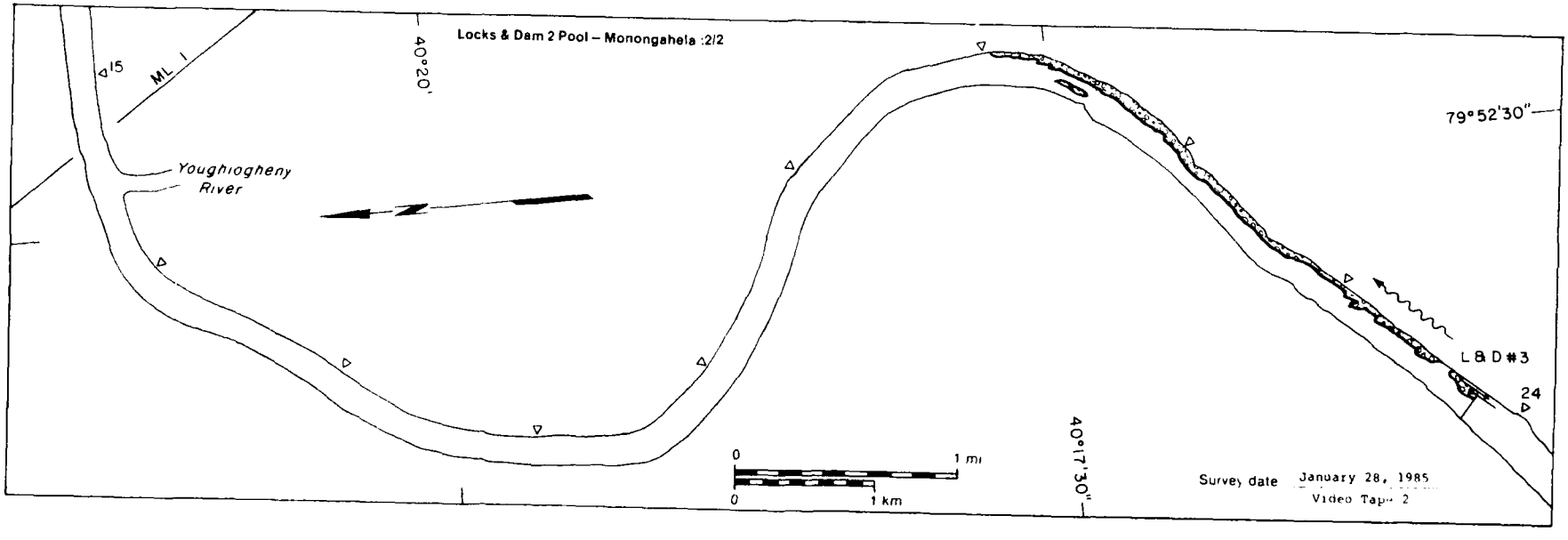



OHIO R
Pittsburgh Pt
0
7
79°55'
0
1 mi
0
1 km
40°25'
Survey date. January 28, 1985
Video Tape 2


Emsworth Pool – Monongahela :2/2
40°25'
12
L & D #2
79°55'
ML 1
Survey date. January 28, 1985
Video Tape 2
0
1 mi
0
1 km
40°22'30"
79°52'30"

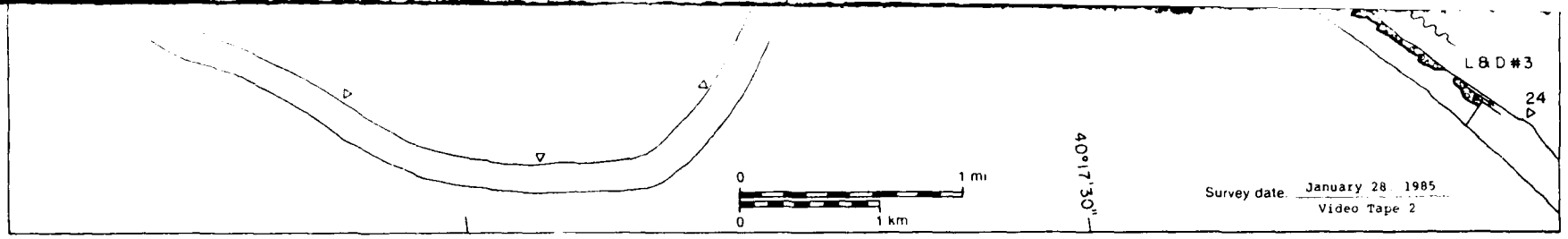
28 January 1985





Locks & Dam 2 Pool – Monongahela

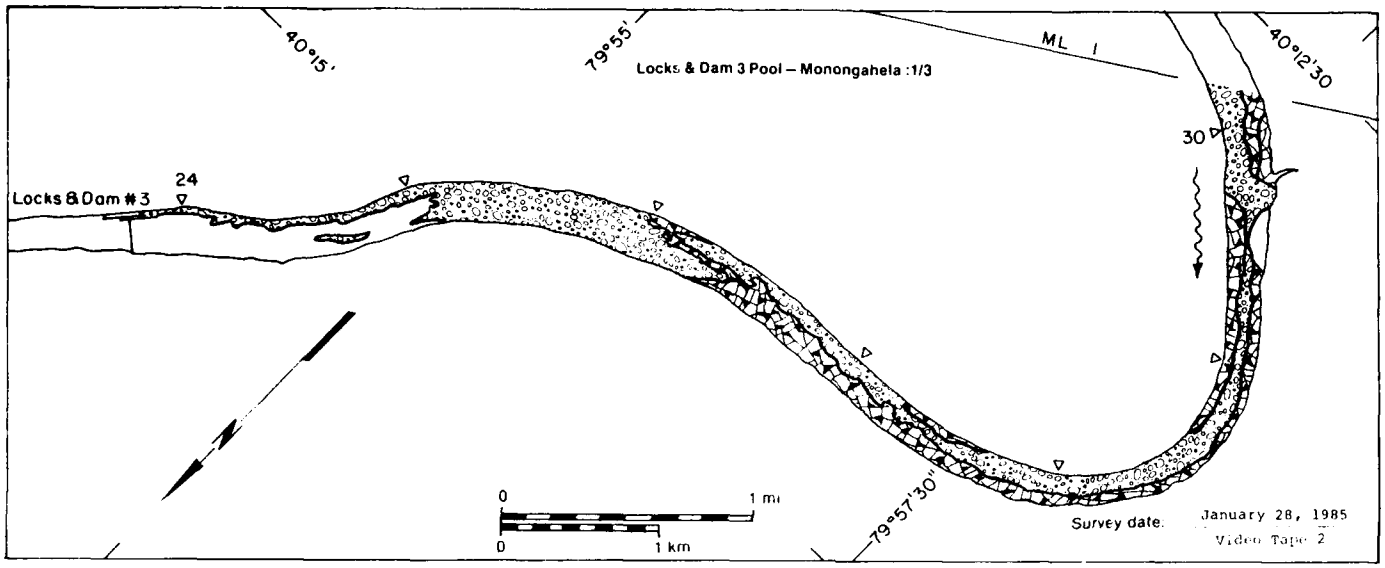
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.36	NA

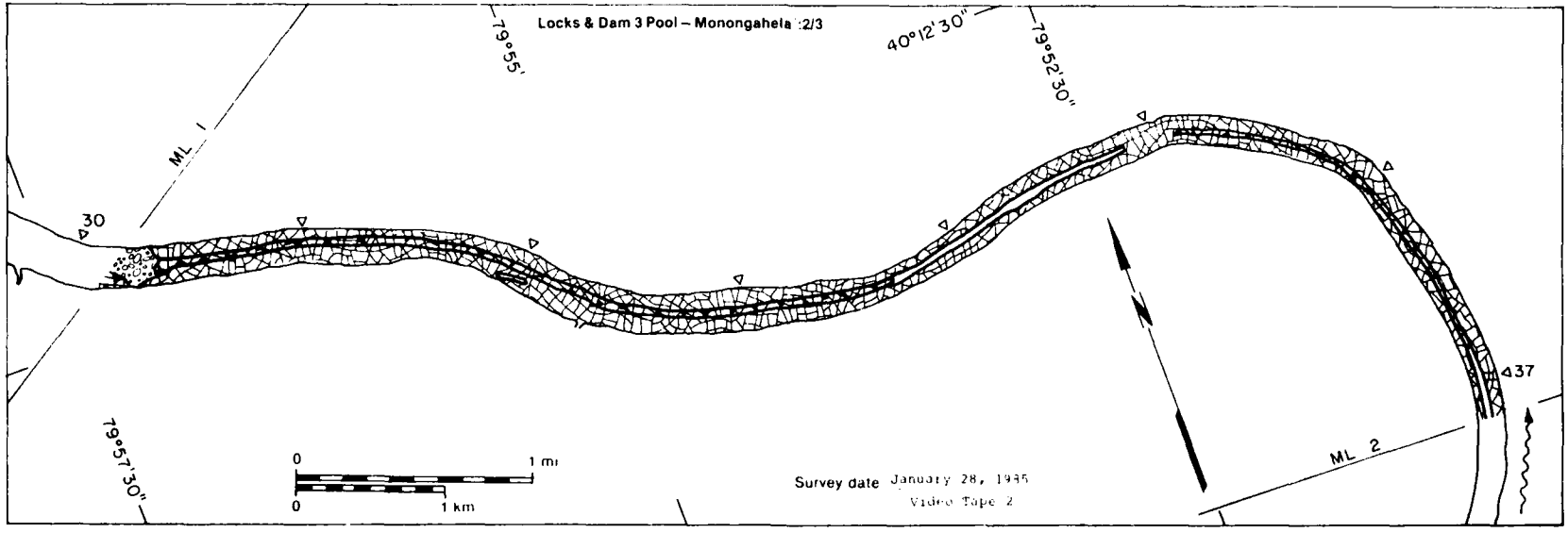


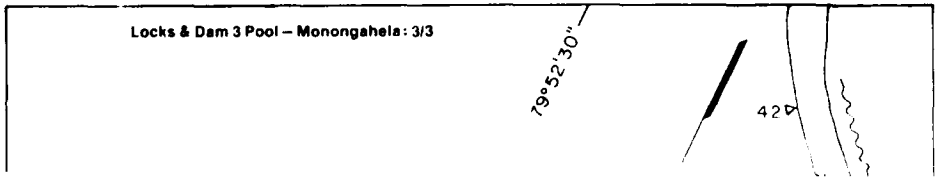
Locks & Dam 2 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.36	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.04	90
Ice floes or frazil slush and pans	0.37	10
Total Area ($m^2 \times 10^6$)	4.77	

28 January 1985



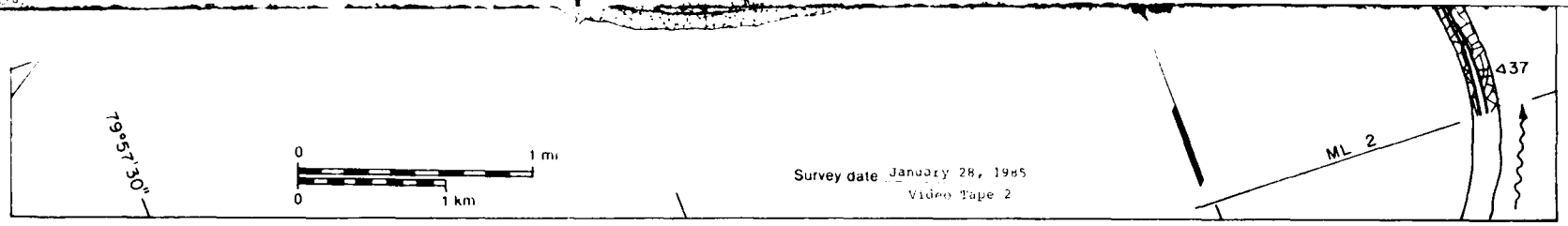


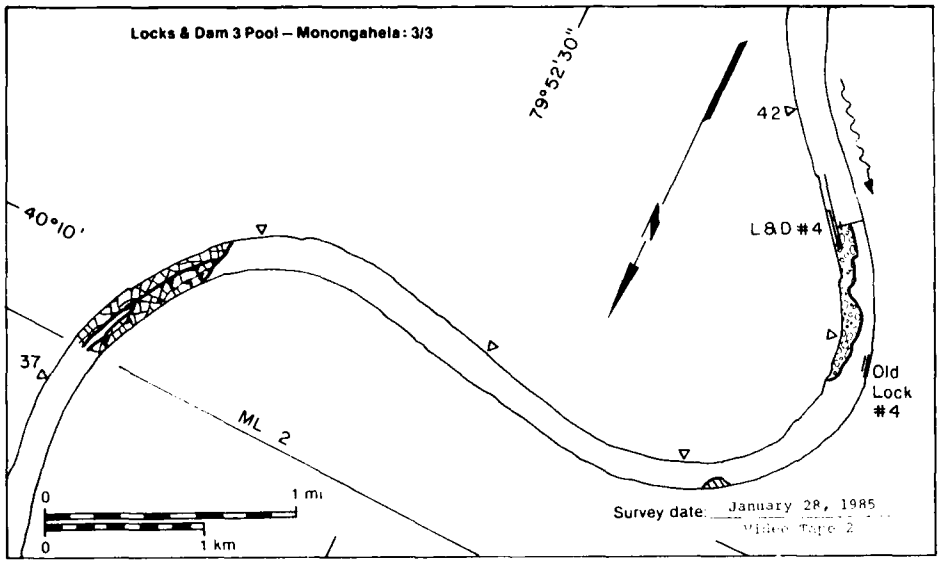


Locks & Dam 3 Pool – Monongahela

MAP UNITS

	Surface concentration (%)
	NA

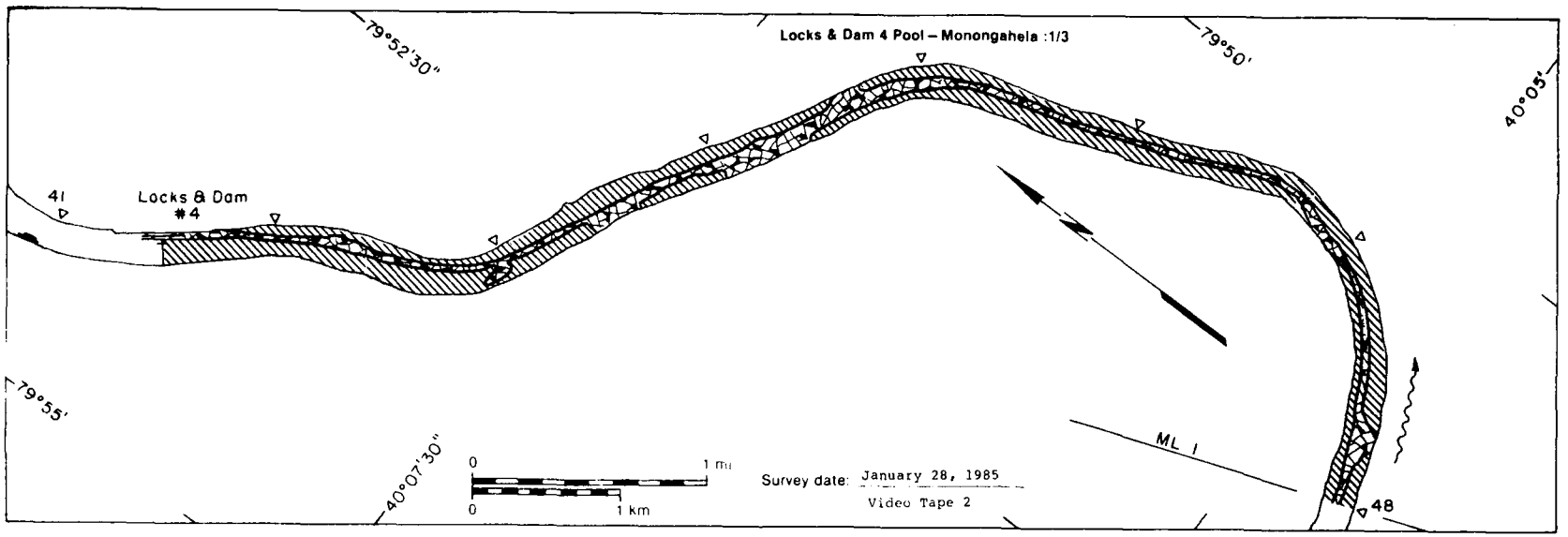


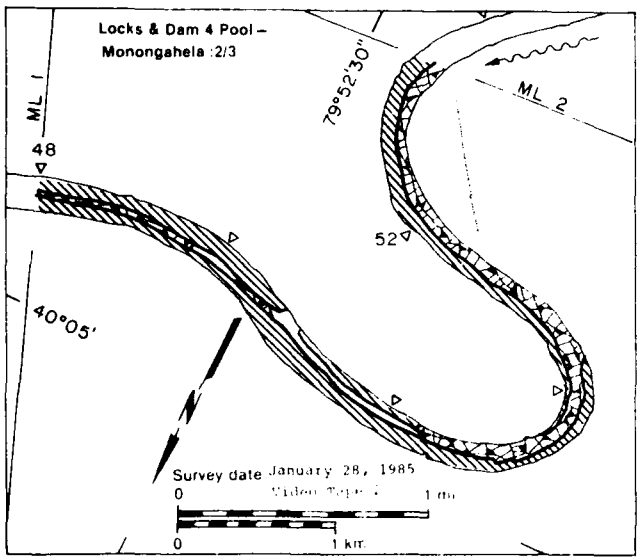


Locks & Dam 3 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	1.74	NA
Solid ice cover	0.01	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	2.15	NA
Fragmented ice cover with open-water areas	1.18	75
Ice floes or frazil slush and pans	1.56	20
Total Area ($m^2 \times 10^6$)	6.64	

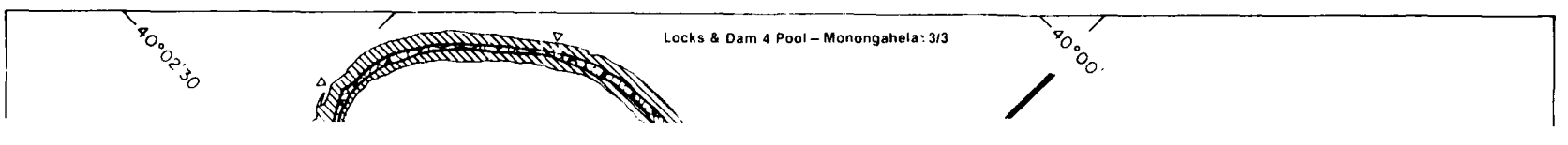
28 January 1985

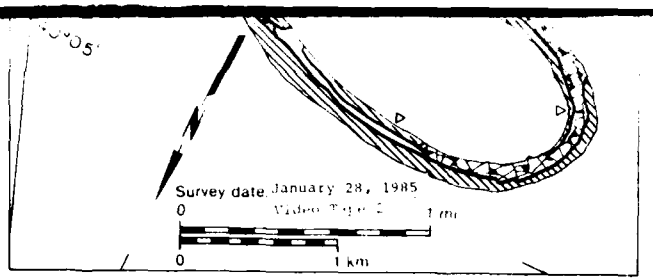




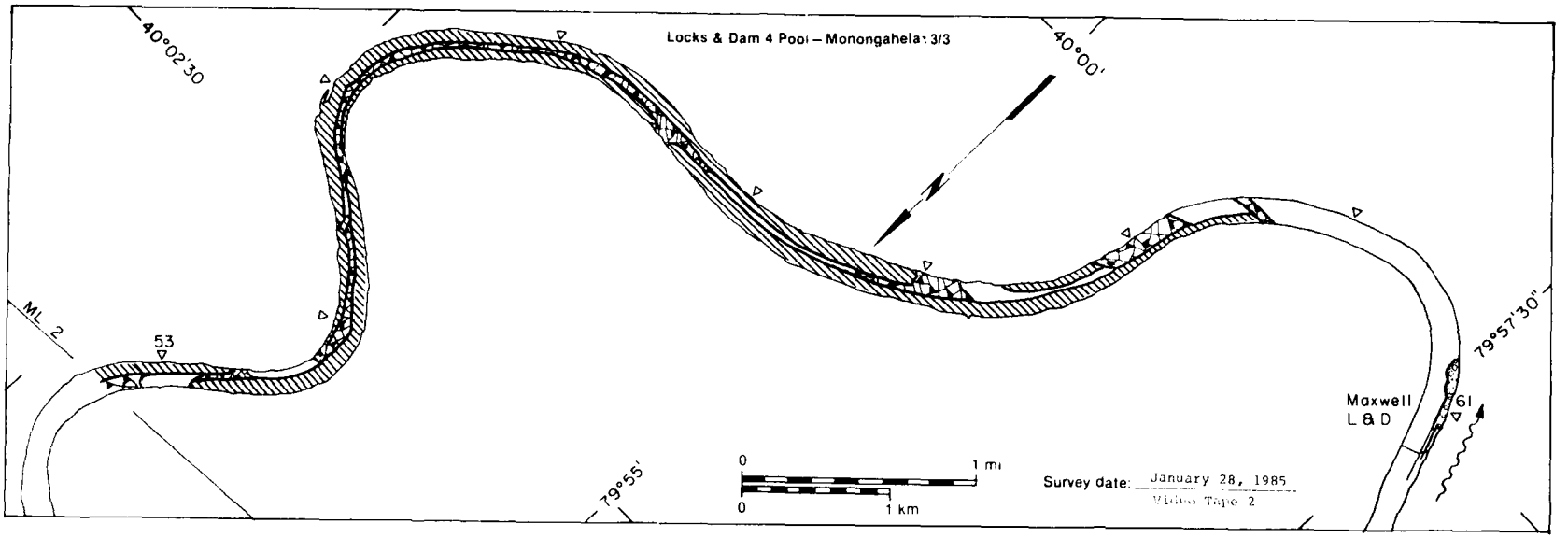
Locks & Dam 4 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.77	NA
Solid ice cover	4.19	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	1.61	80
Ice floes or frazil slush and pans	0.03	2
Total Area ($m^2 \times 10^6$)	6.60	

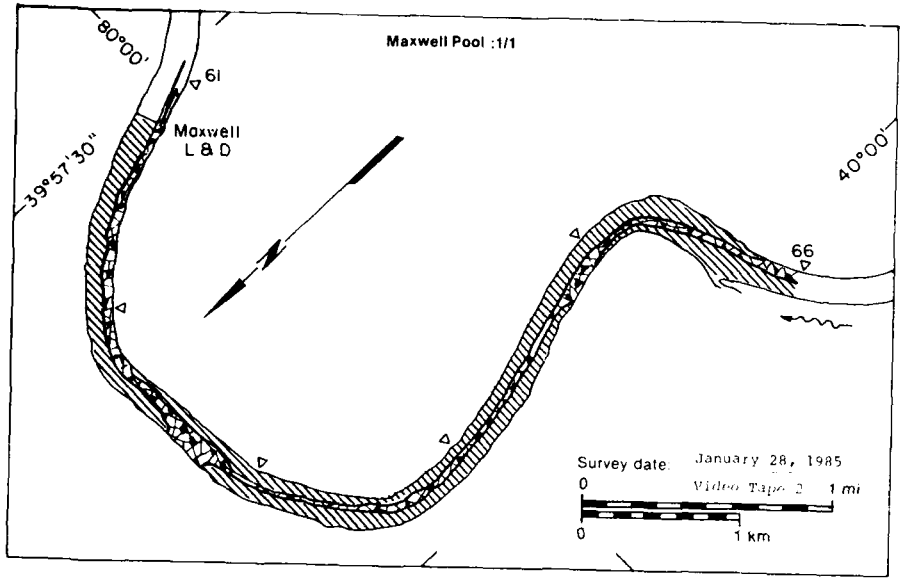




Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	1.61	80
Ice floes or frazil slush and pans	0.03	2
Total Area ($m^2 \times 10^6$)	6.60	

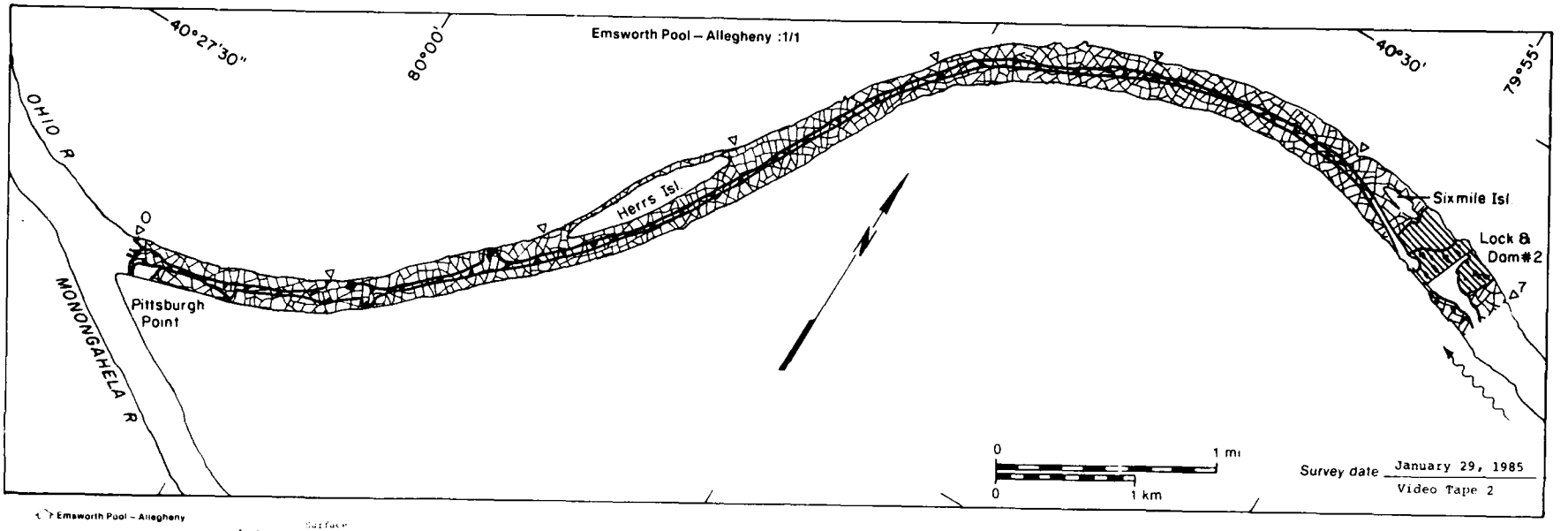


28 January 1985



Maxwell Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.05	NA
Solid ice cover	1.08	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.43	80
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	1.56	

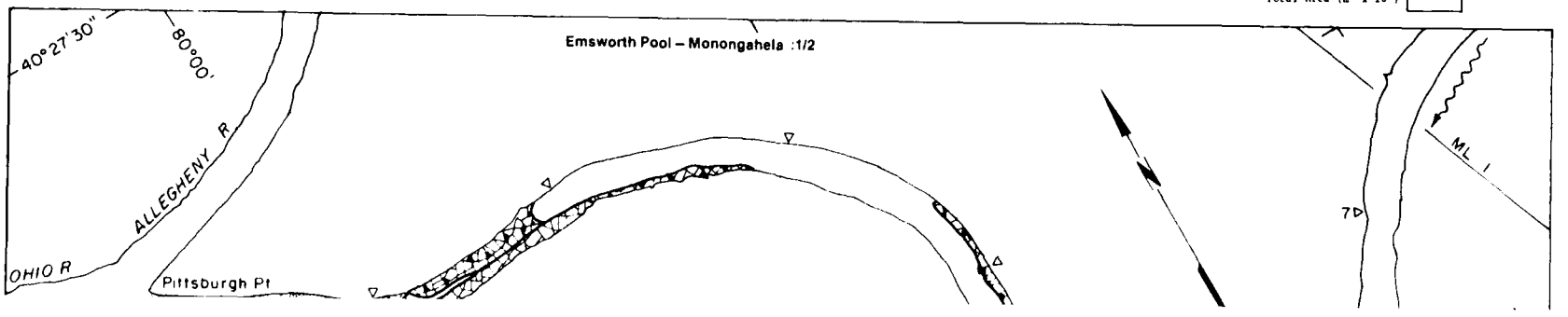


Emsworth Pool – Allegheny

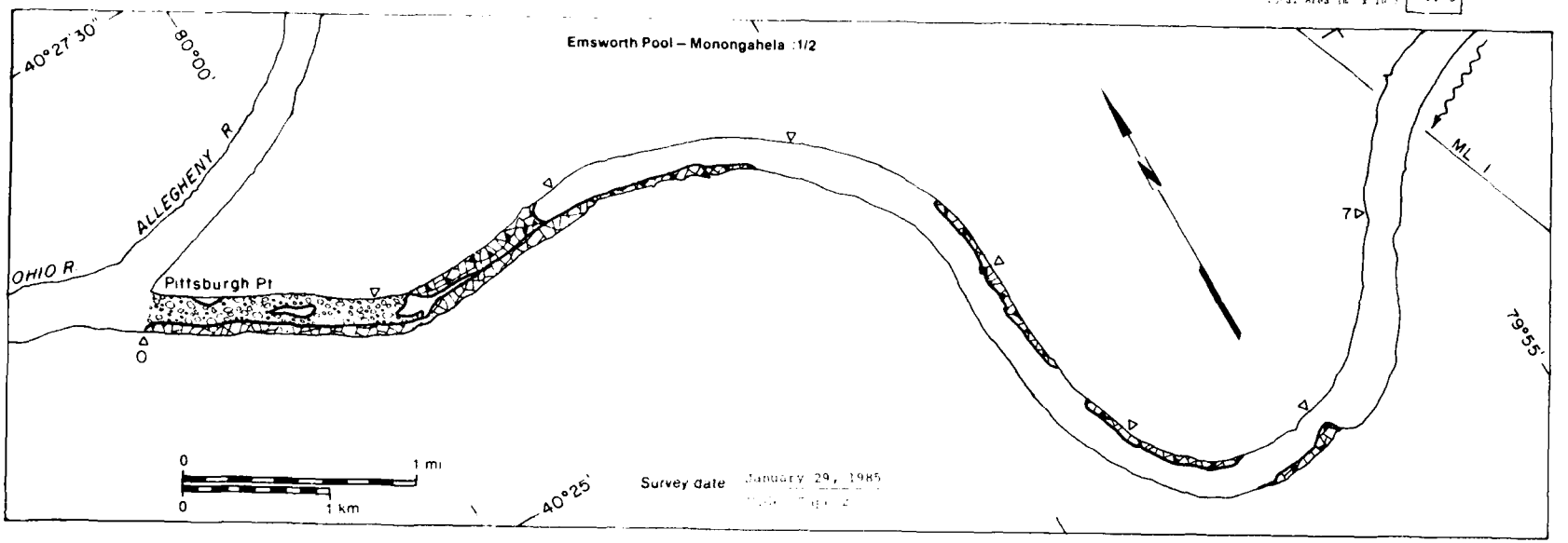
Map unit	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.15	NA
Solid ice cover	0.09	--
Solid ice cover with open water areas	0.14	80
Fragmented ice cover	2.25	40
Fragmented ice cover with open water areas	0.63	55
Ice floes of haz / slush and pans	--	--
Total Area ($m^2 \times 10^6$)	3.27	

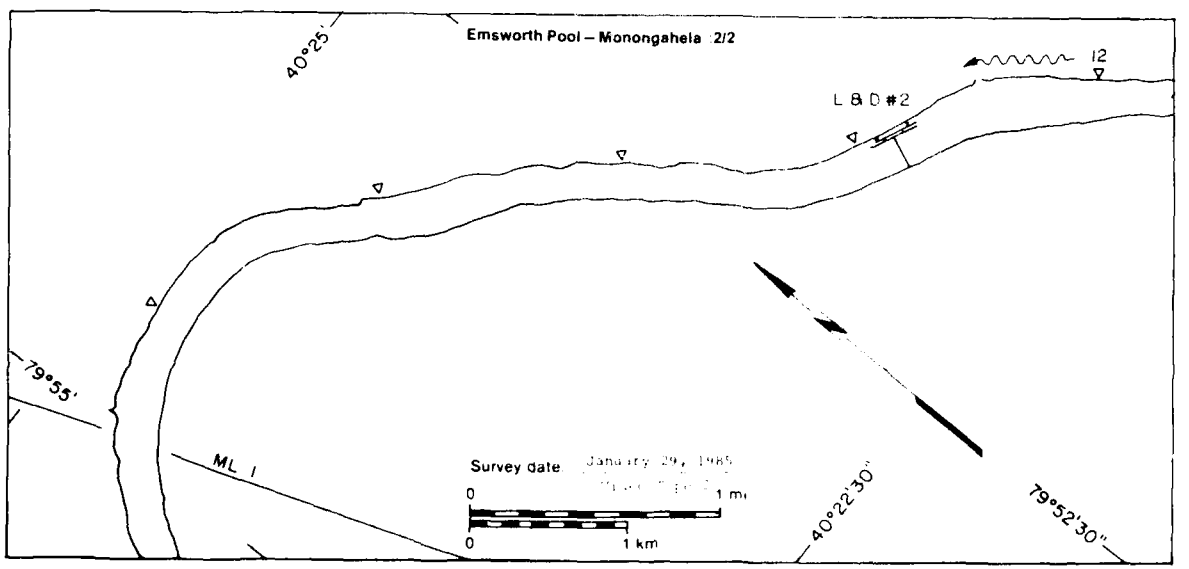
Emsworth Pool – Monongahela

Map unit	Area ($ft^2 \times 10^6$)	Surface concentration (%)
Open water	3.71	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	0.29	NA
Fragmented ice cover with open water areas	0.40	70
Ice floes of haz / slush and pans	0.33	45
Total Area ($m^2 \times 10^6$)	4.73	

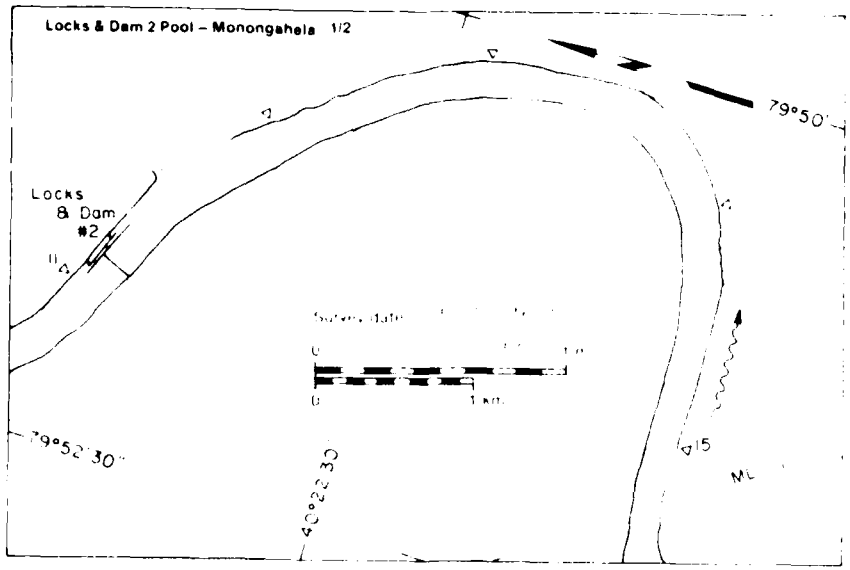


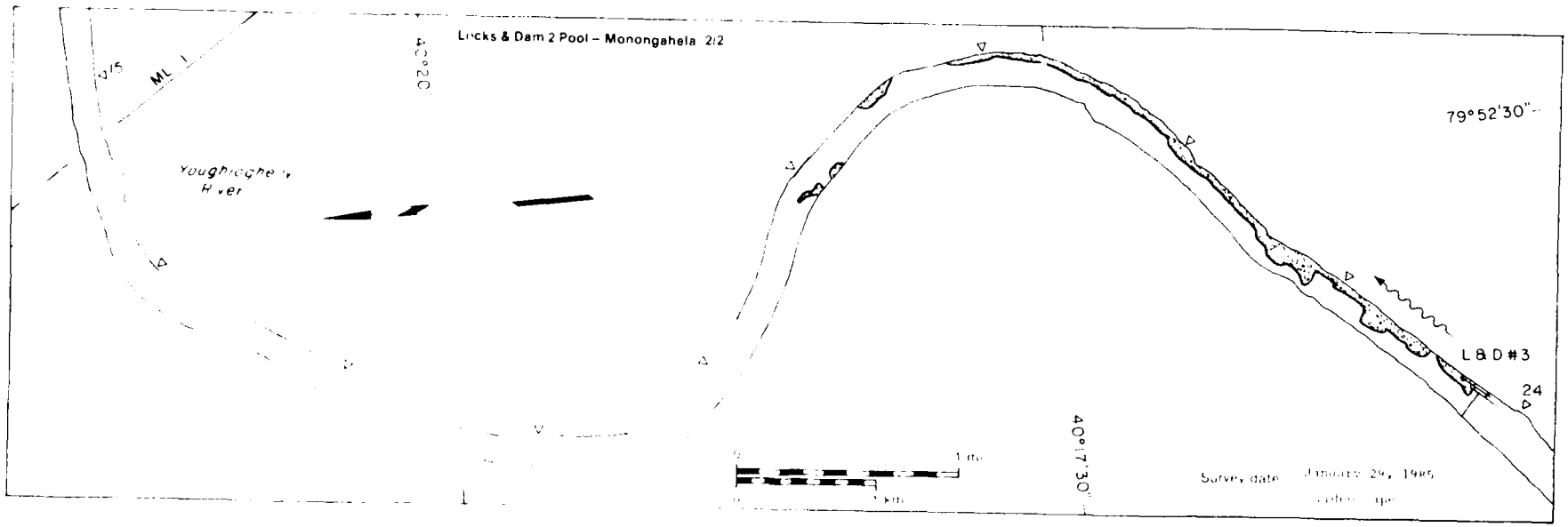
Total Area $ft^2 \times 10^6$ 4.73





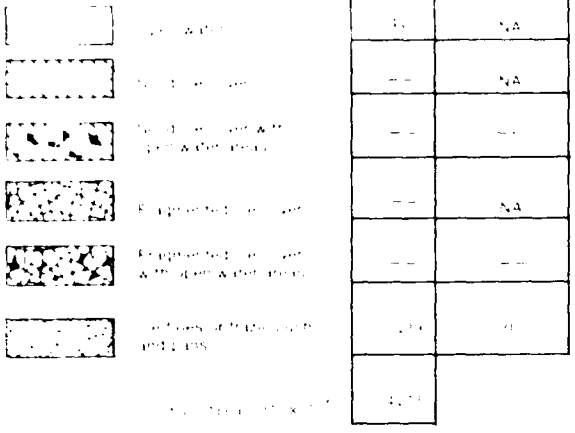
29 January 1985

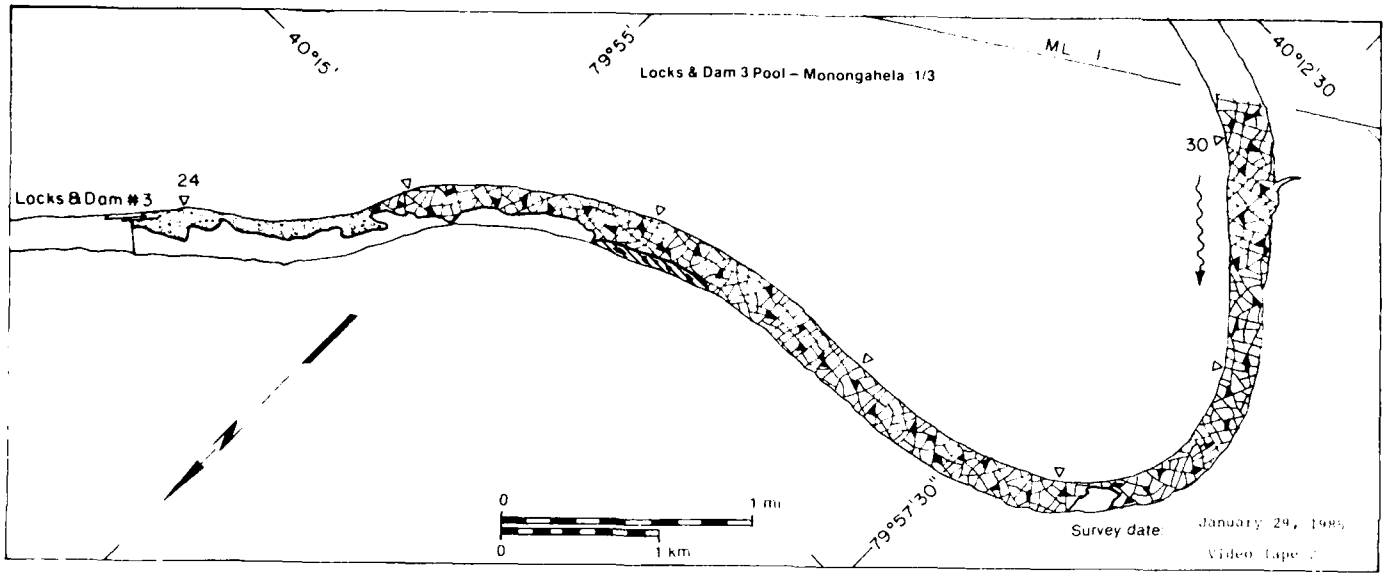


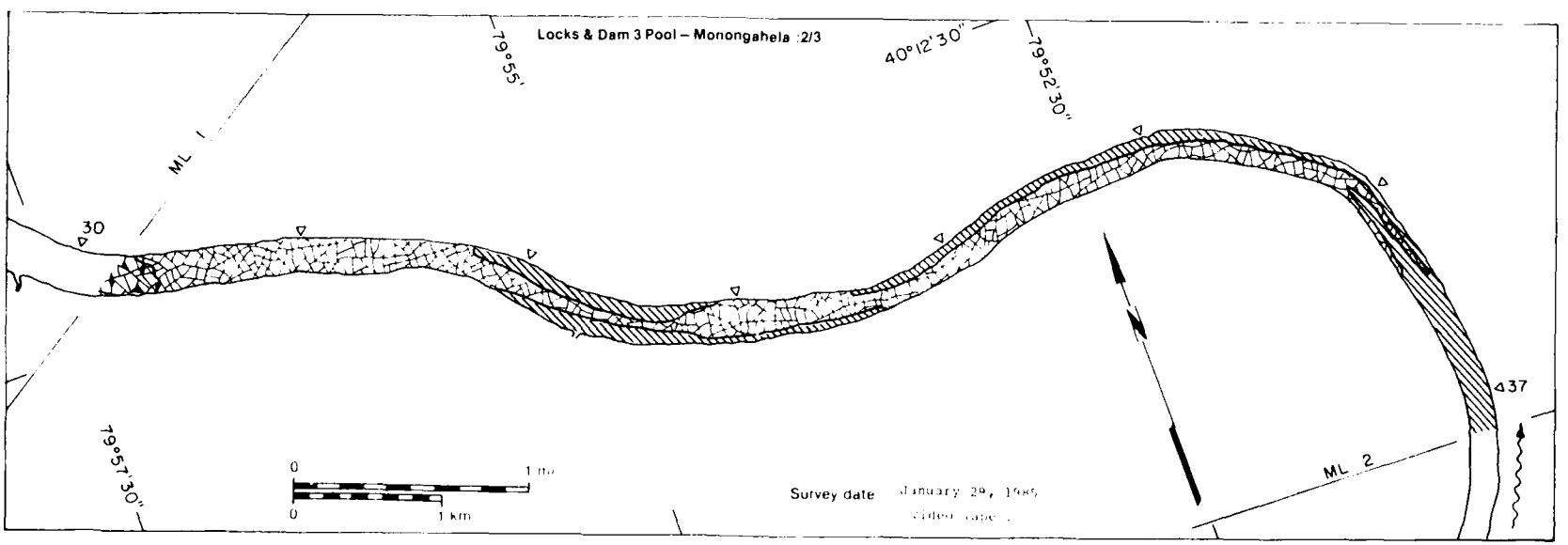


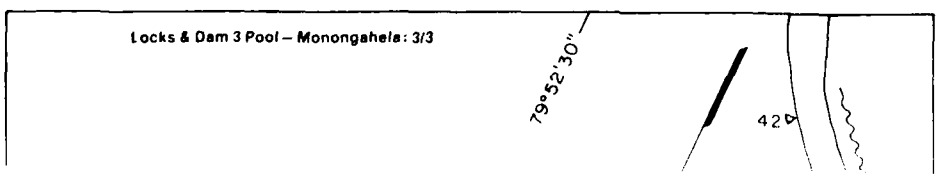
Locks & Dam 2 Pool – Monongahela

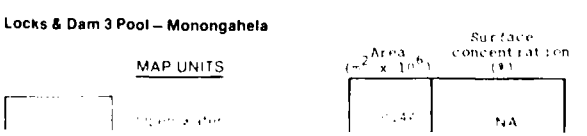
Locks & Dam 2 Pool – Monongahela

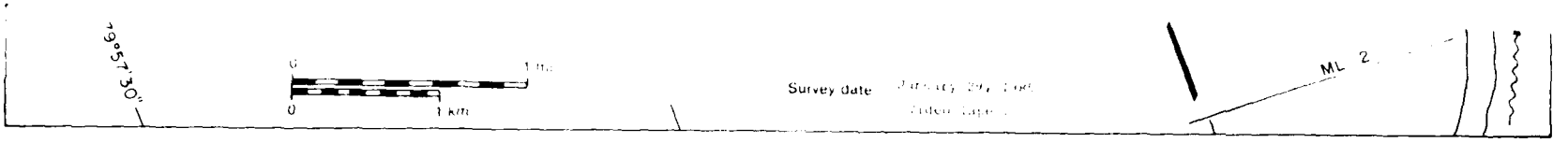


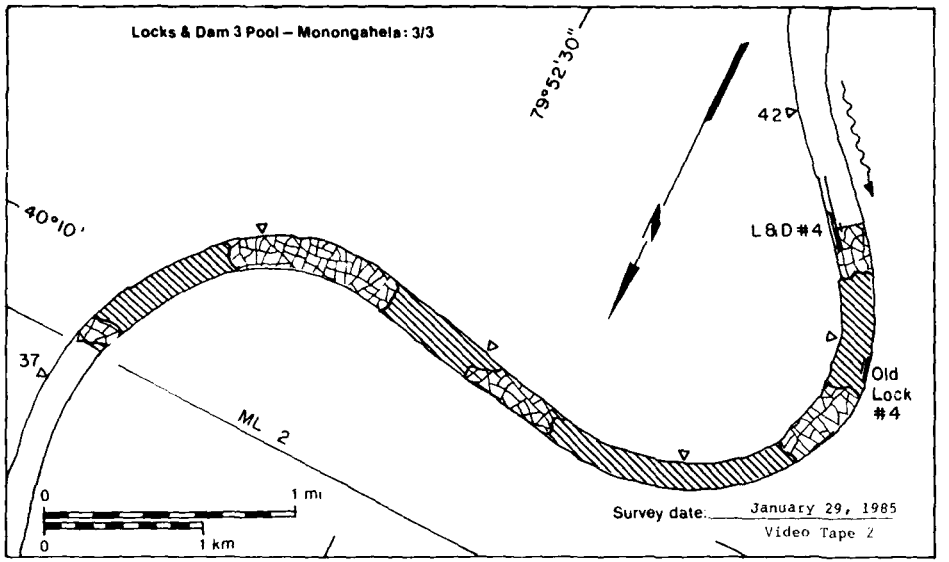

Locks & Dam 3 Pool – Monongahela 1/3
40°15'
79°55'
ML 1
40°12'30
30
24
Locks & Dam #3
0
1 mi
0
1 km
79°57'30"
Survey date: January 29, 1985
Video tape


Locks & Dam 3 Pool – Monongahela 2/3
79°55'
40°12'30"
79°52'30"
ML 1
30
37
ML 2
79°57'30"
0
1 mi
0
1 km
Survey date: January 29, 1985
Video tape


Locks & Dam 3 Pool – Monongahela: 3/3
79°52'30"
42


Locks & Dam 3 Pool – Monongahela
MAP UNITS
Area (m² x 10⁶)
Surface concentration (%)
NA

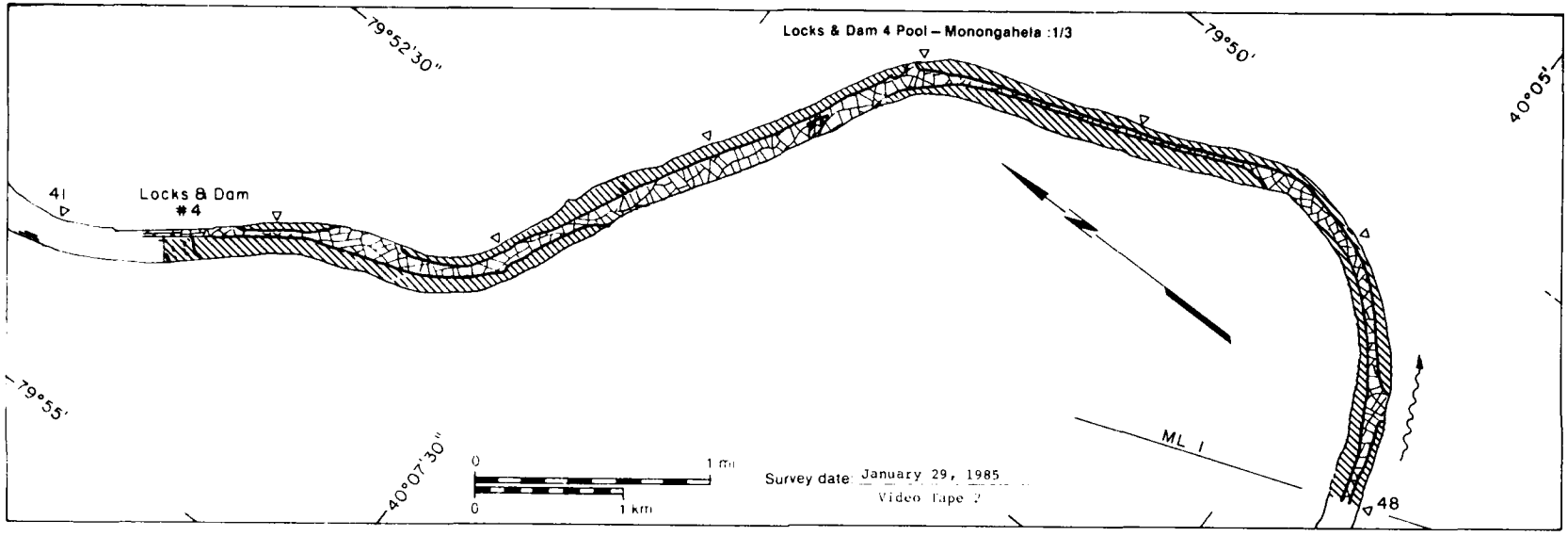


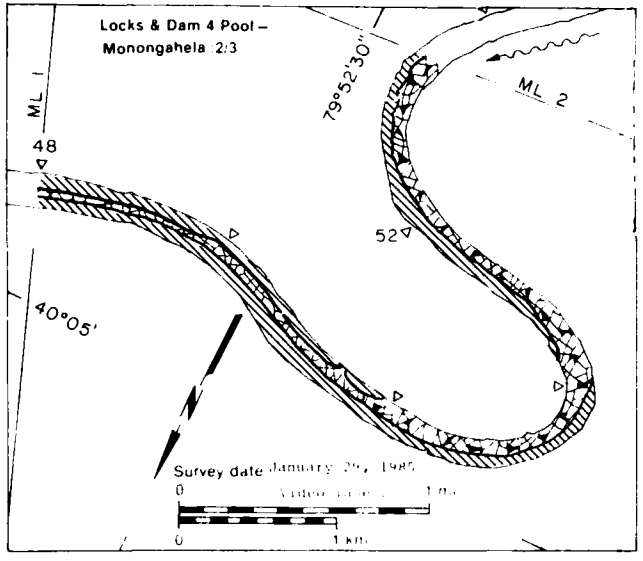


Locks & Dam 3 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.44	NA
Solid ice cover	1.76	NA
Solid ice cover with open-water areas	0.06	90
Fragmented ice cover	2.15	NA
Fragmented ice cover with open-water areas	2.04	90
Ice floes or frazil slush and pans	0.19	30
Total Area ($m^2 \times 10^6$)	6.64	

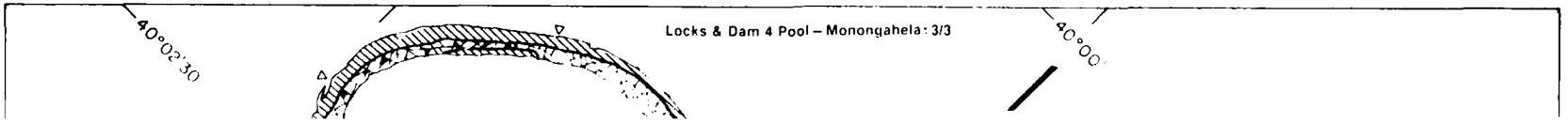
29 January 1985

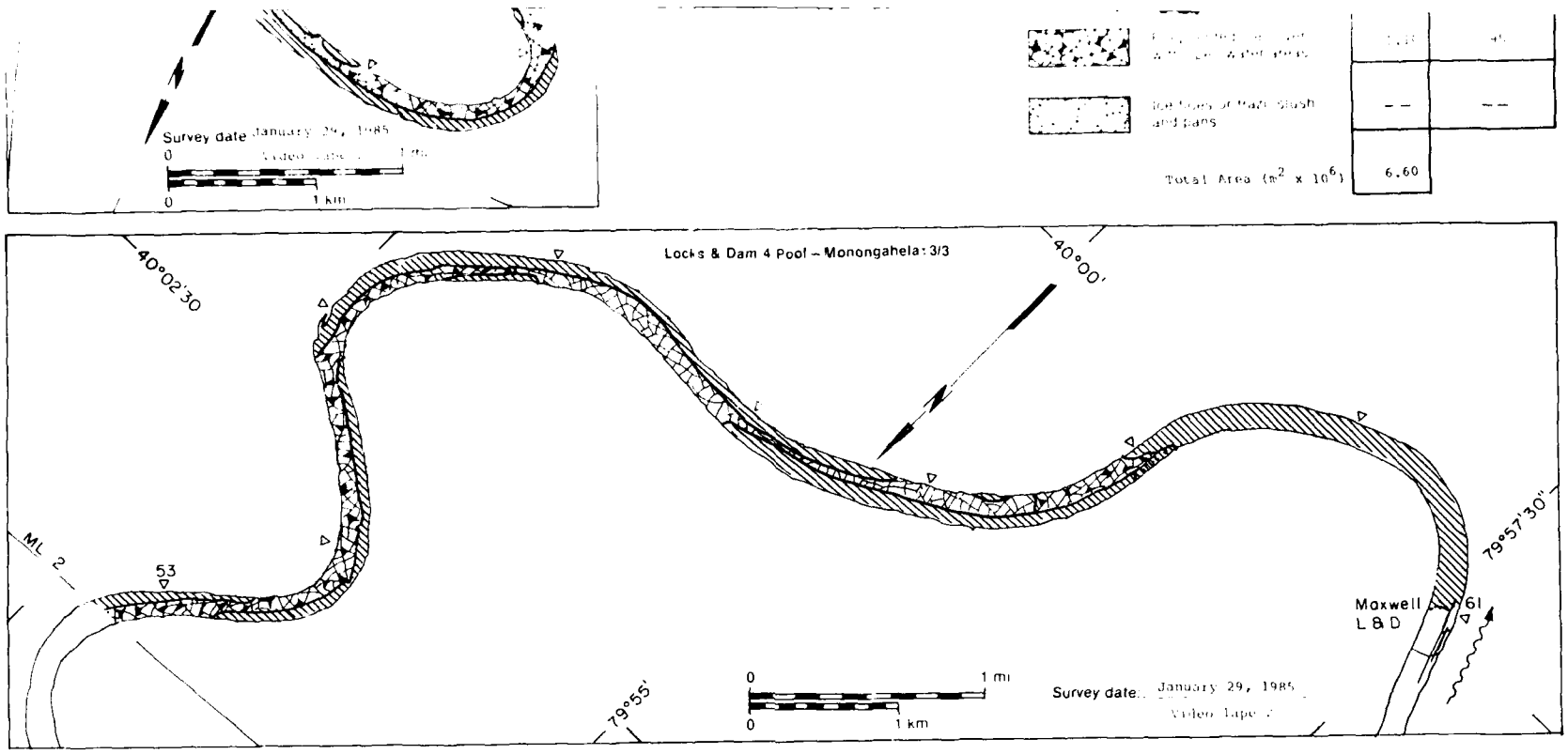


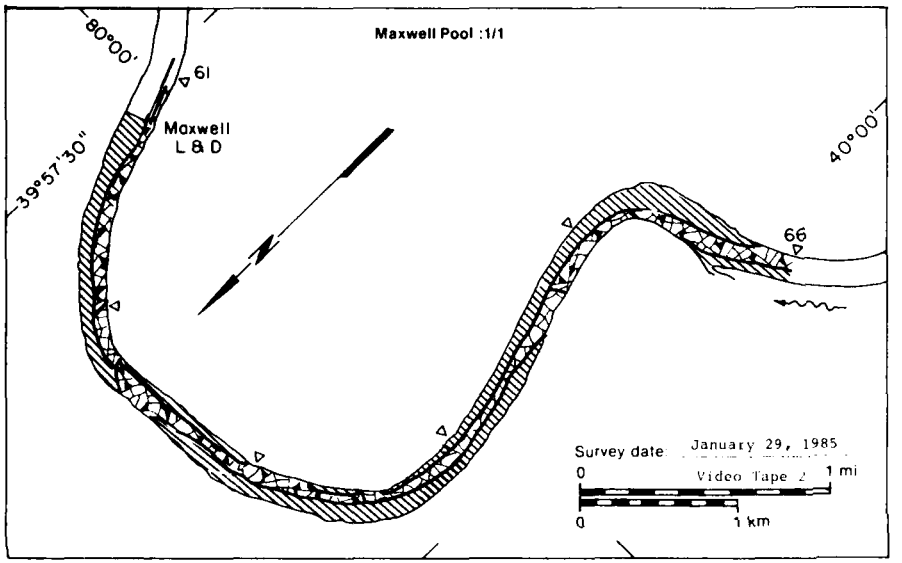


Locks & Dam 4 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.08	NA
Solid ice cover	3.71	NA
Solid ice cover with open water areas	0.08	60
Fragmented ice cover	1.63	NA
Fragmented ice cover with open water areas	1.10	95
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	6.60	



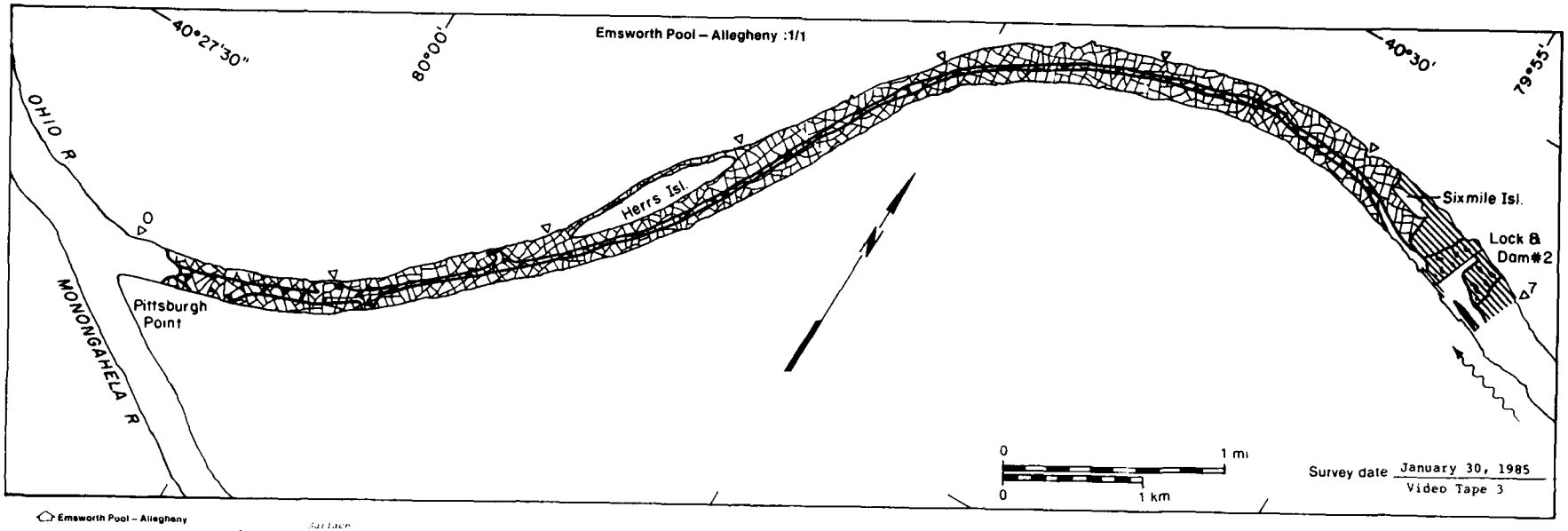

Survey date January 29, 1985
0
1 km
Total Area ($m^2 \times 10^6$)
6.60
Locks & Dam 4 Pool – Monongahela: 3/3
40°02'30
40°00'
79°57'30"
79°55'
ML 2
53
61
Maxwell L&D
0
1 mi
0
1 km
Survey date: January 29, 1985



Maxwell Pool

MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	--	NA
Solid ice cover	0.95	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	0.17	NA
Fragmented ice cover with open-water areas	0.44	95
Ice floes or frazil slush and pans	--	--
Total Area (m^2 x 10^6)	1.56	

30 January 1985

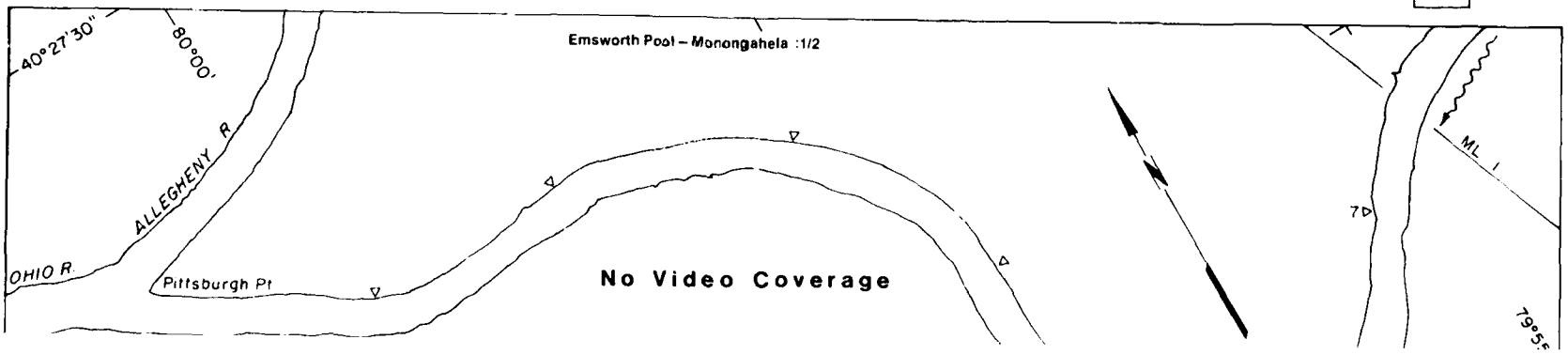


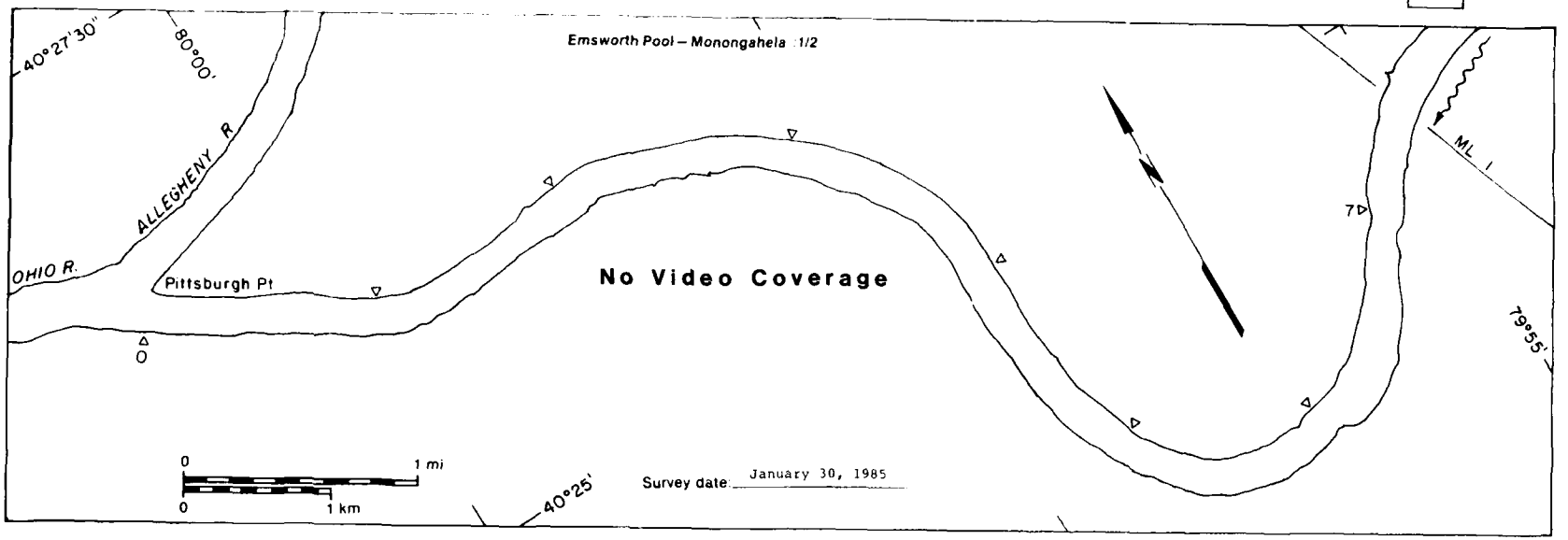
Emsworth Pool – Allegheny

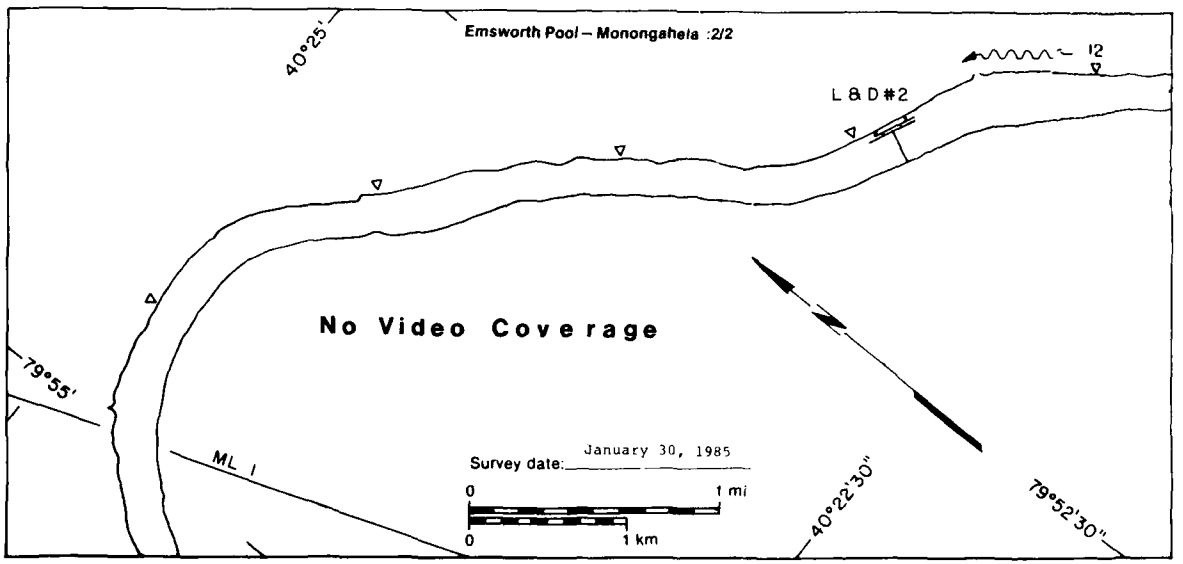
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.23	NA
Solid ice cover	0.18	NA
Solid ice cover with open water areas	0.14	85
Fragmented ice cover	2.13	NA
Fragmented ice cover with open water areas	0.58	95
Ice fibers or frazil slush and pans	0.01	20
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

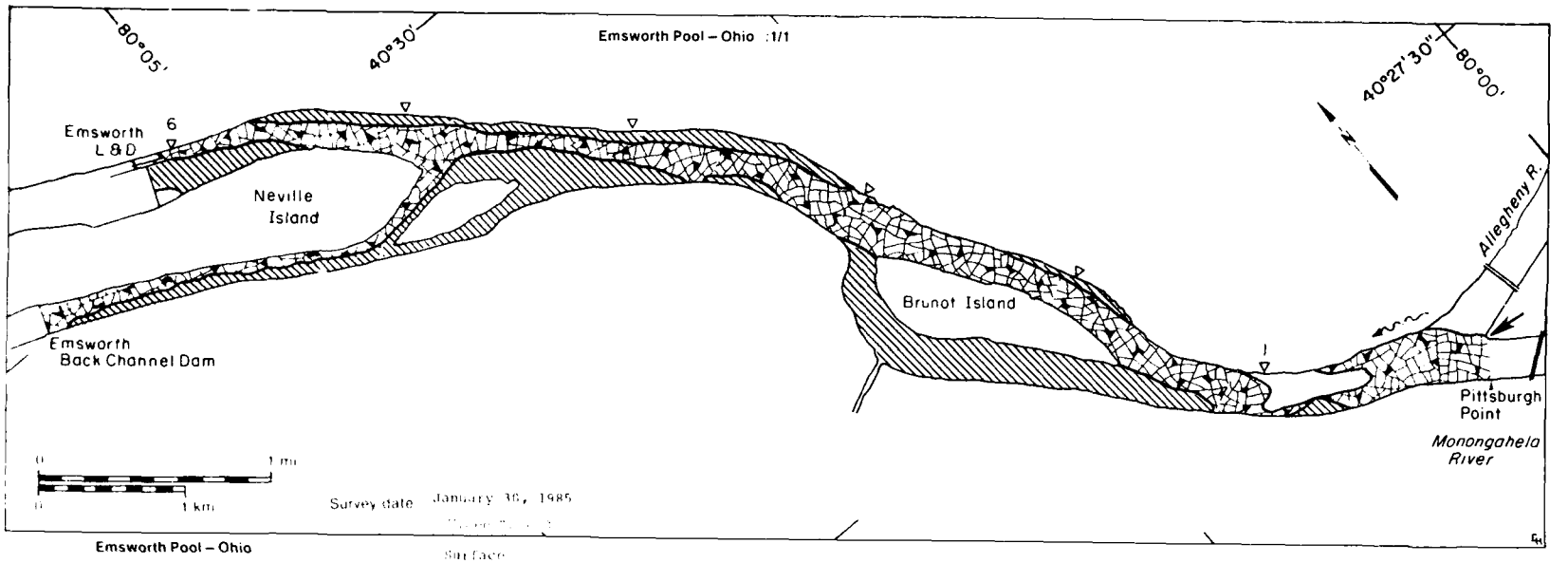
MAP UNITS	Area (mi²)	Surface concentration (%)
Open water		NA
Solid ice cover		NA
Solid ice cover with open water areas		
Fragmented ice cover		NA
Fragmented ice cover with open water areas		
Ice fibers or frazil slush and pans		
Total area (mi²)		




Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
No Video Coverage
ML 1
79°55'
40°25'
0
1 mi
1 km
Survey date: January 30, 1985

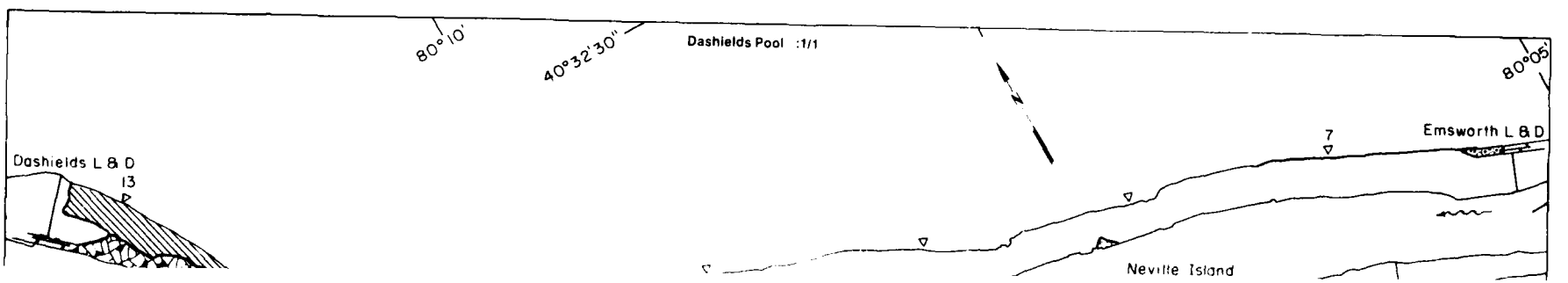

Emsworth Pool – Monongahela :2/2
40°25'
L & D #2
12
No Video Coverage
79°55'
ML 1
Survey date: January 30, 1985
0
1 mi
1 km
40°22'30"
79°52'30"

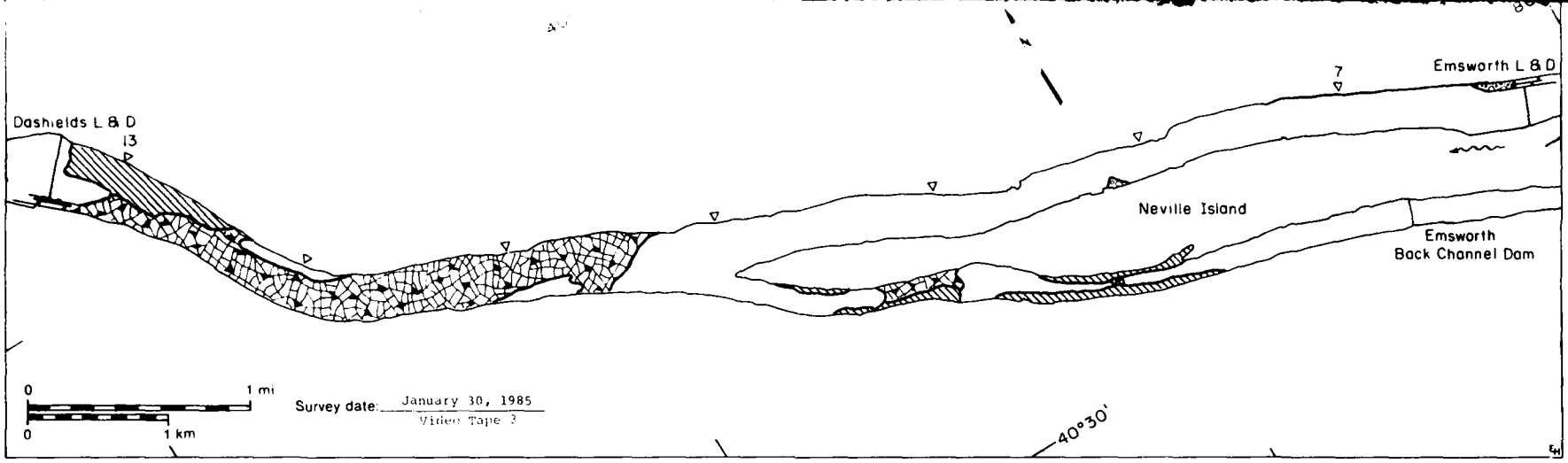
30 January 1985



Emsworth Pool – Ohio

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.28	NA
Solid ice cover	1.79	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	2.42	80
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.49	

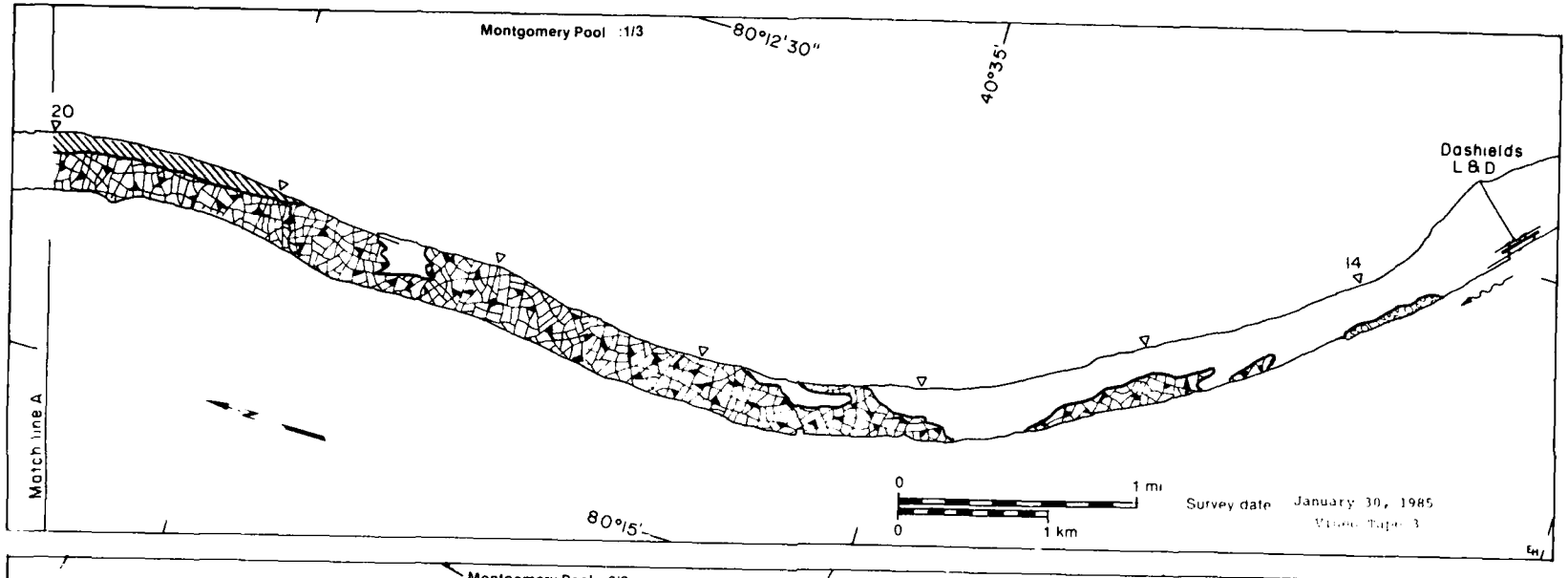


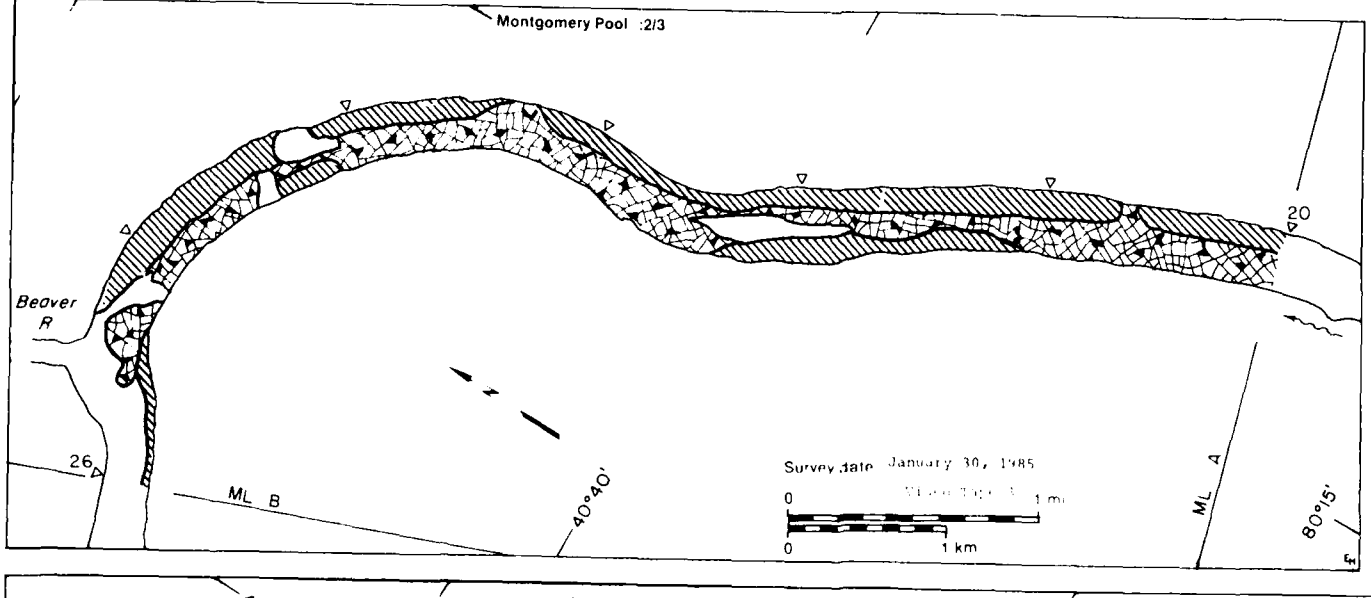


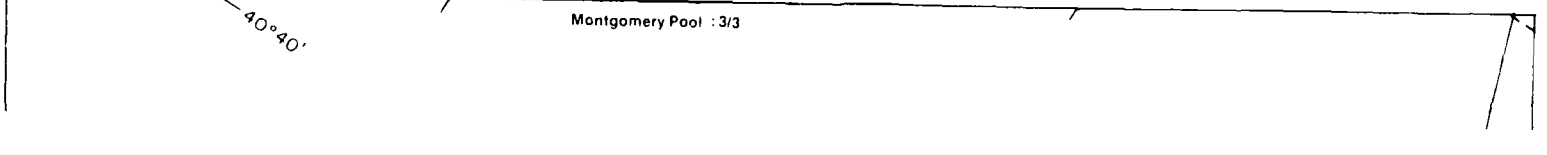
Dashields Pool

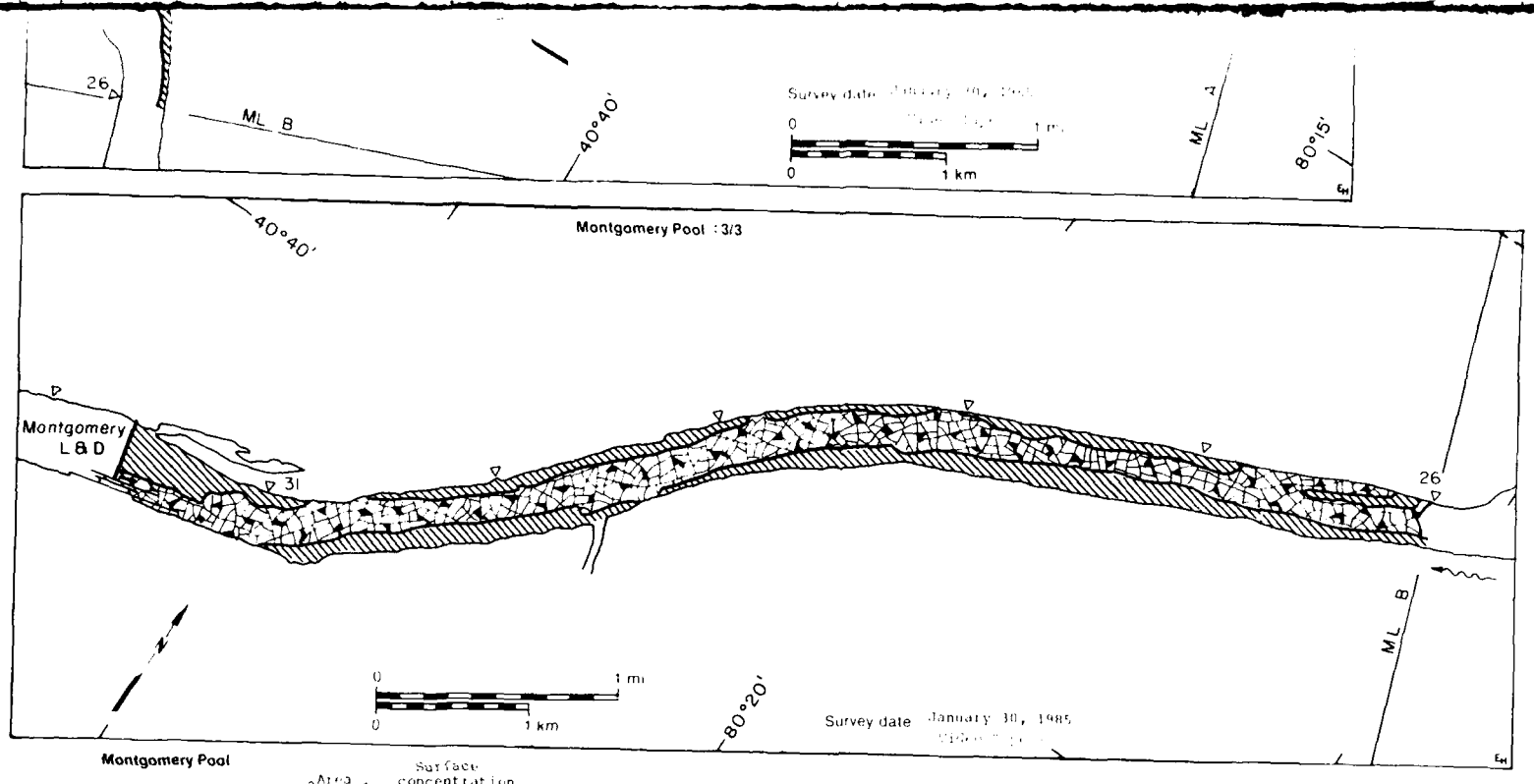
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.15	NA
Solid ice cover	0.47	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	1.34	70
Ice floes or frazil slush and pans	0.04	20
Total Area ($m^2 \times 10^6$)	5.00	

30 January 1985





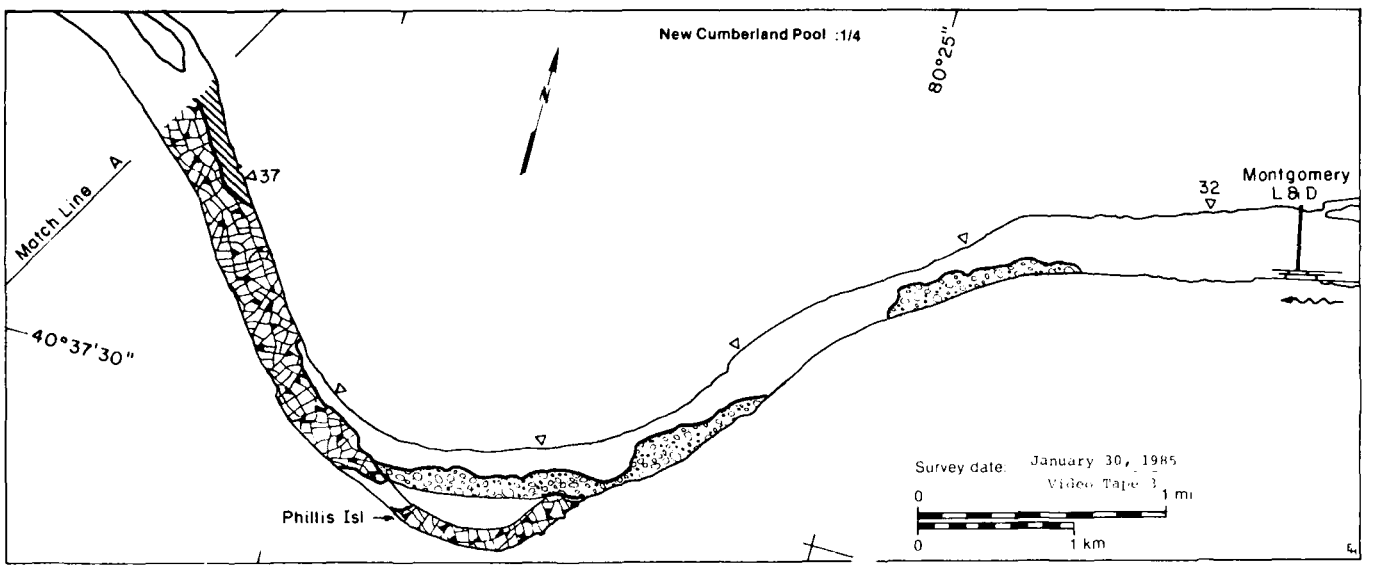


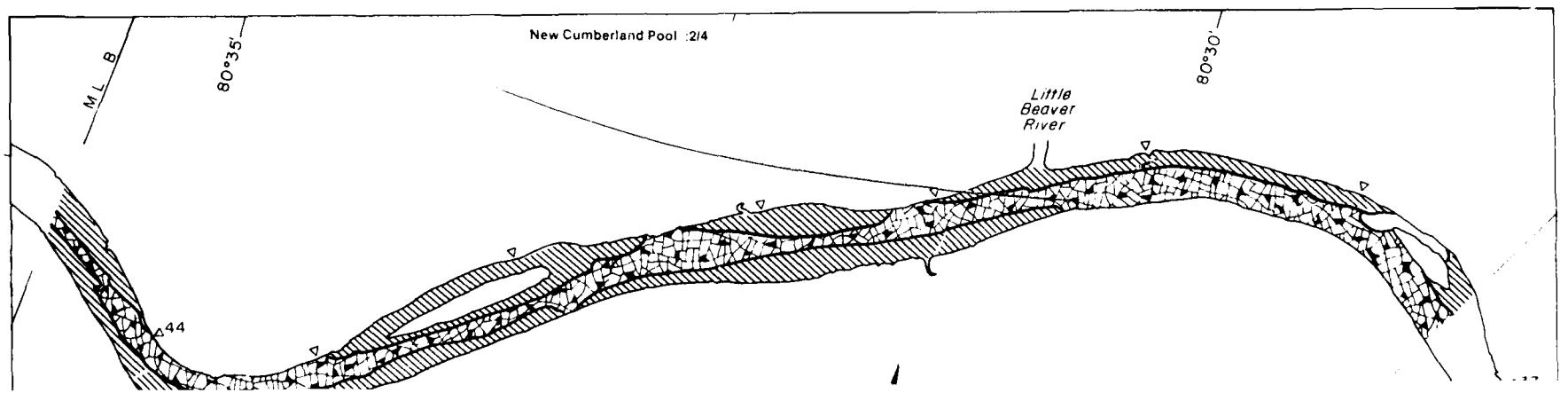


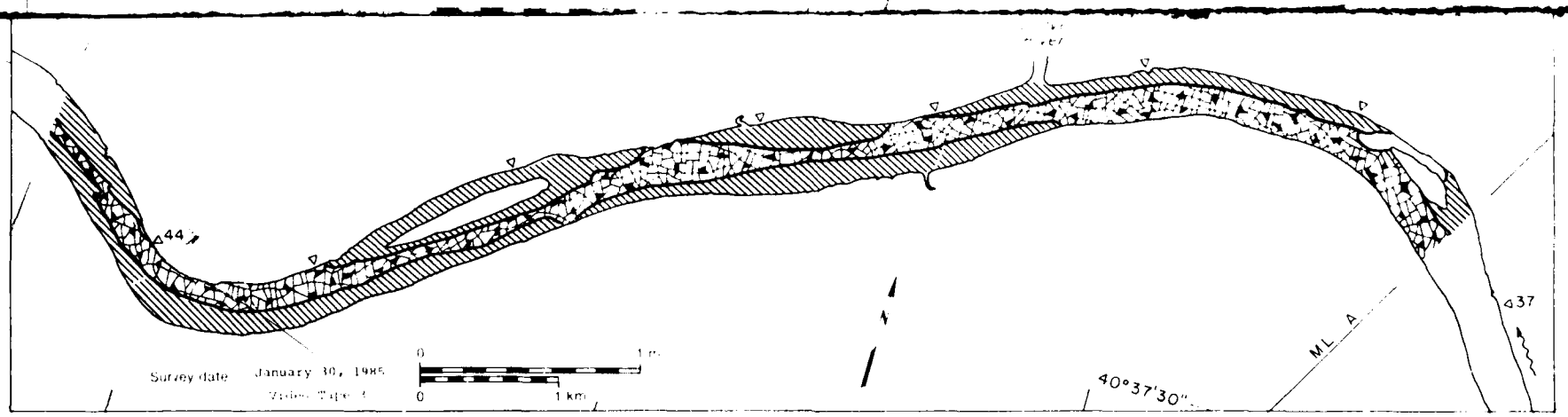
Montgomery Pool

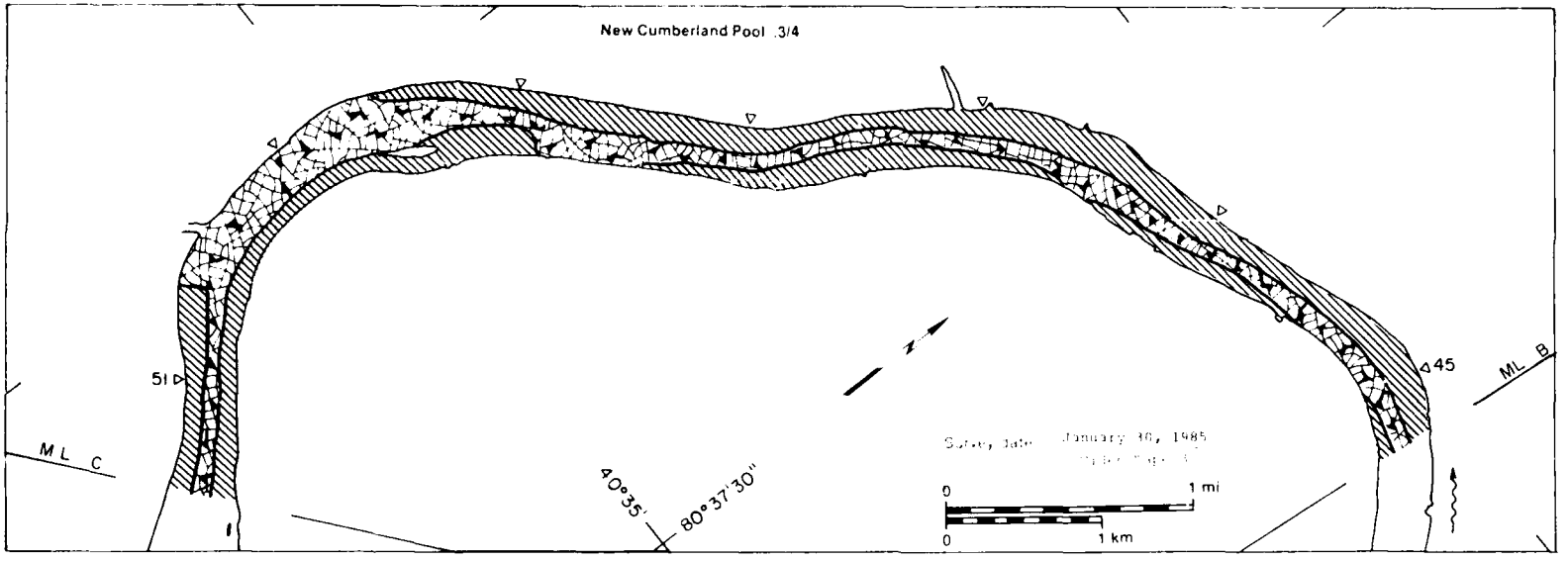
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	2.13	NA
Solid ice cover	3.39	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	5.71	75
Ice floes or frazil slush and pans	0.04	10
Total Area ($m^2 \times 10^6$)	11.27	

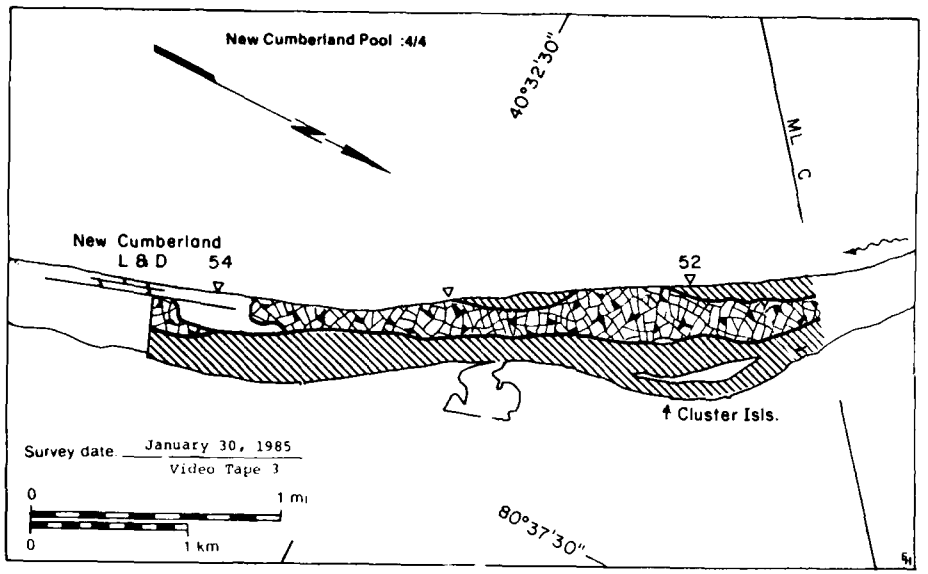
30 January 1985





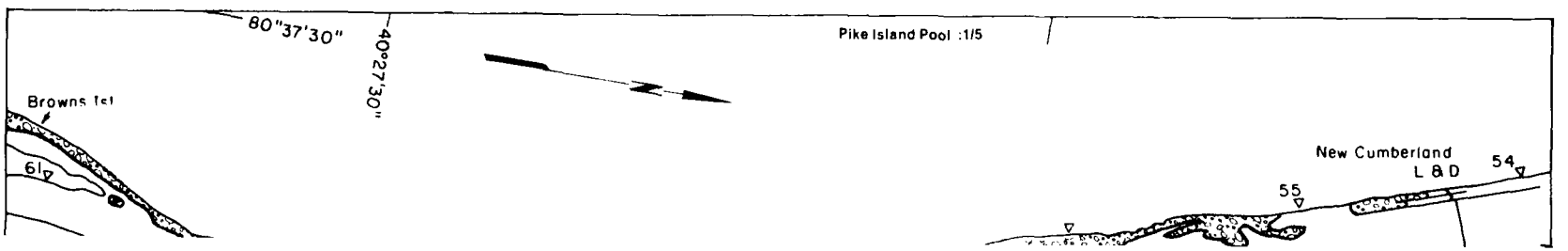

44
37
ML A
40°37'30"
Survey date January 30, 1985
0
1 mi
0
1 km

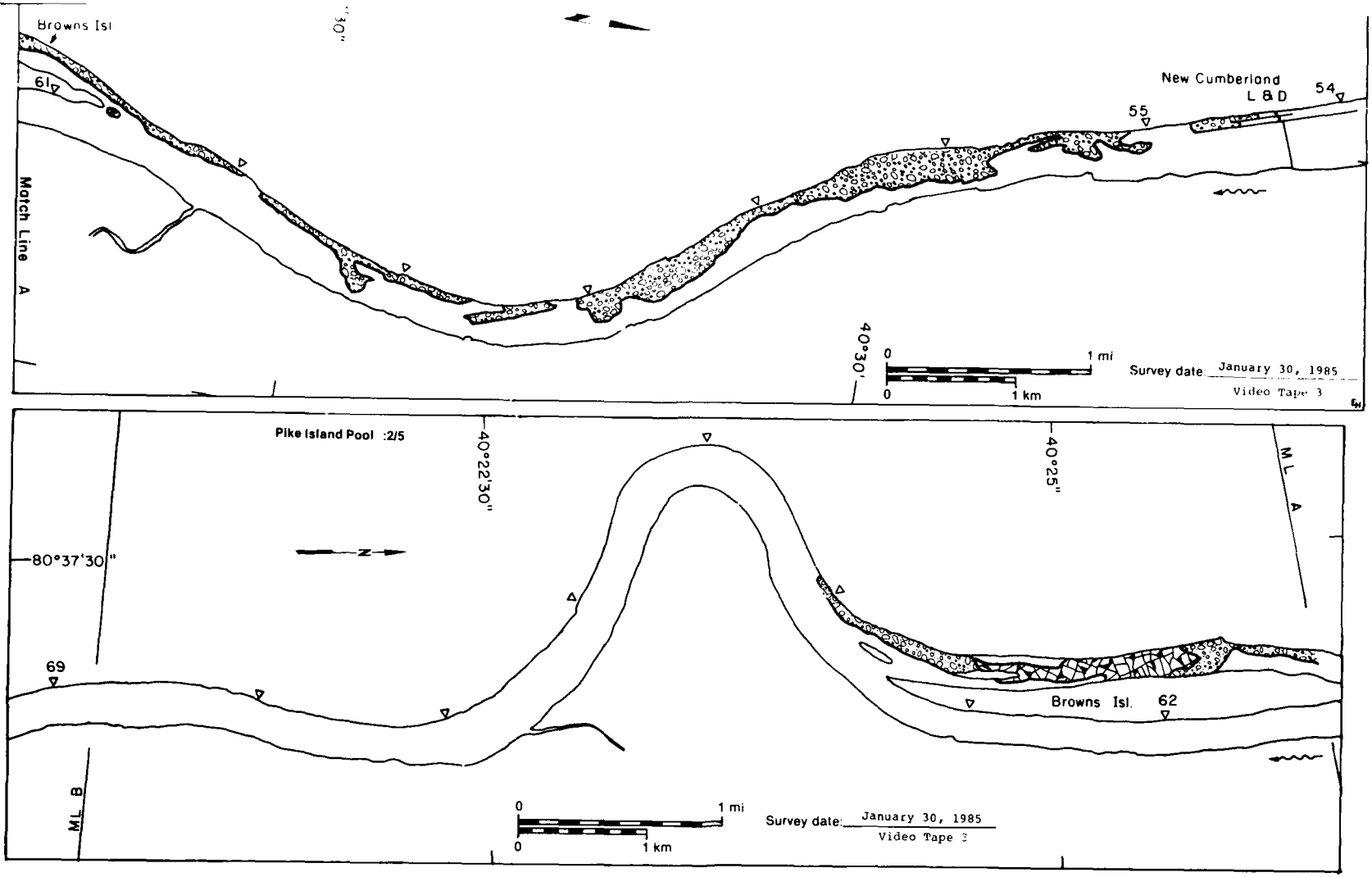

New Cumberland Pool 3/4
51
45
ML B
ML C
40°35'
80°37'30"
Survey date January 30, 1985
0
1 mi
0
1 km



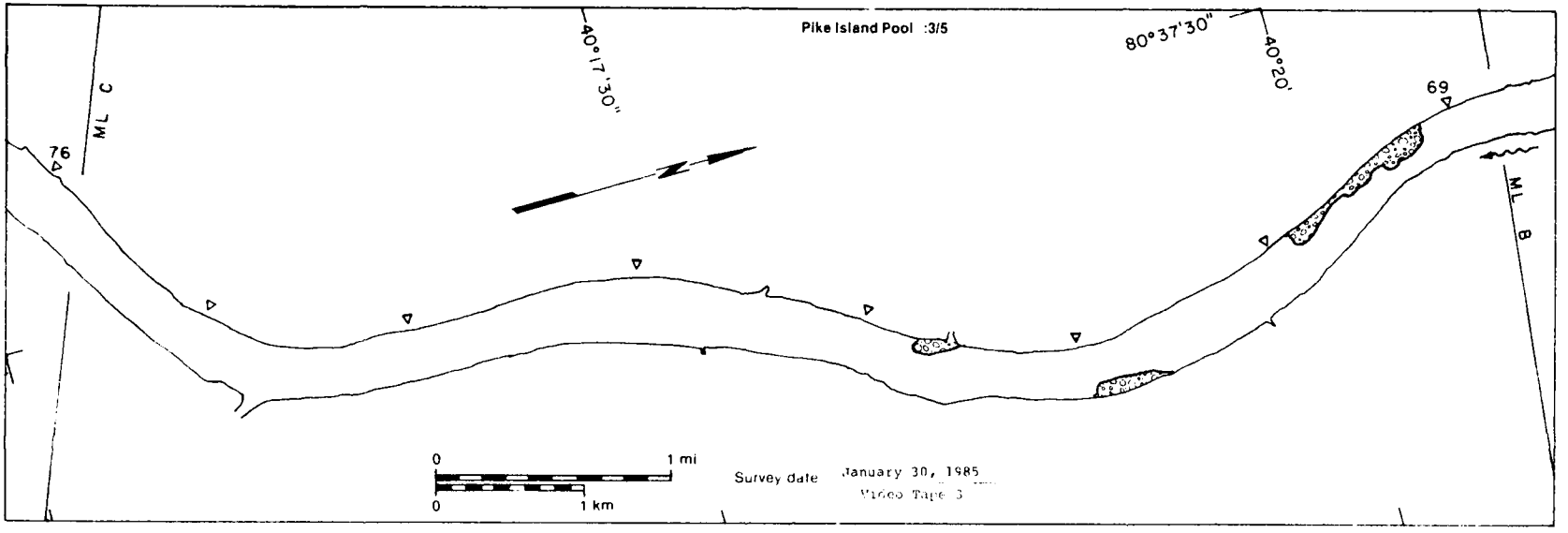
New Cumberland Pool

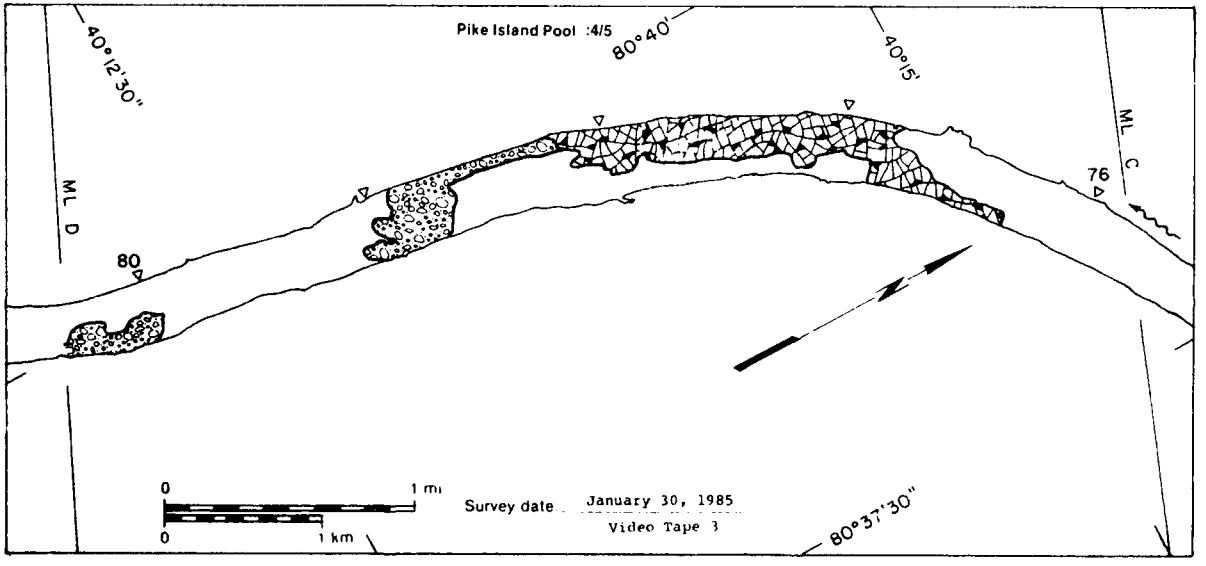
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	2.01	NA
Solid ice cover	6.55	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	5.82	70
Ice floes or frazil slush and pans	0.49	5
Total Area ($m^2 \times 10^6$)	14.87	

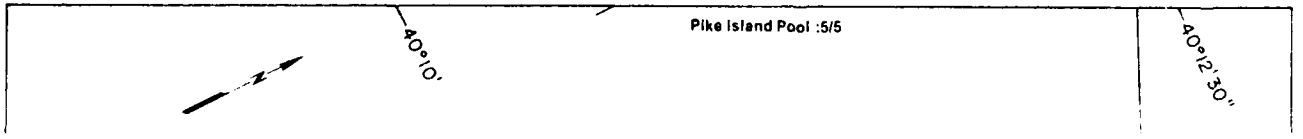


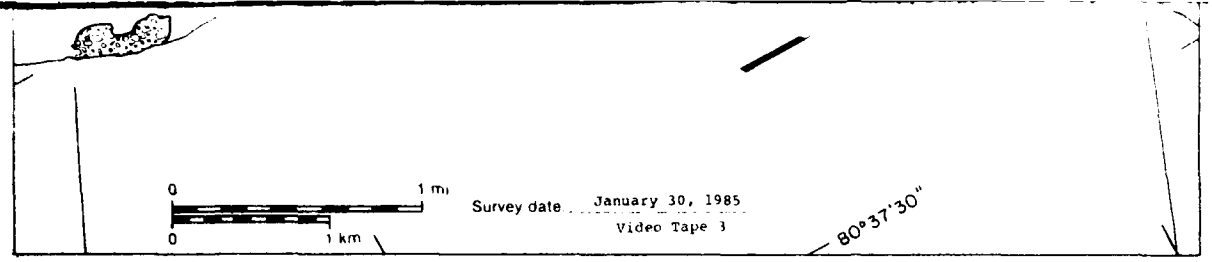

Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: January 30, 1985
Video Tape 3
Pike Island Pool :2/5
40°22'30"
40°25"
80°37'30"
ML A
69
Browns Isl.
62
ML B
0
1 mi
0
1 km
Survey date: January 30, 1985
Video Tape 3

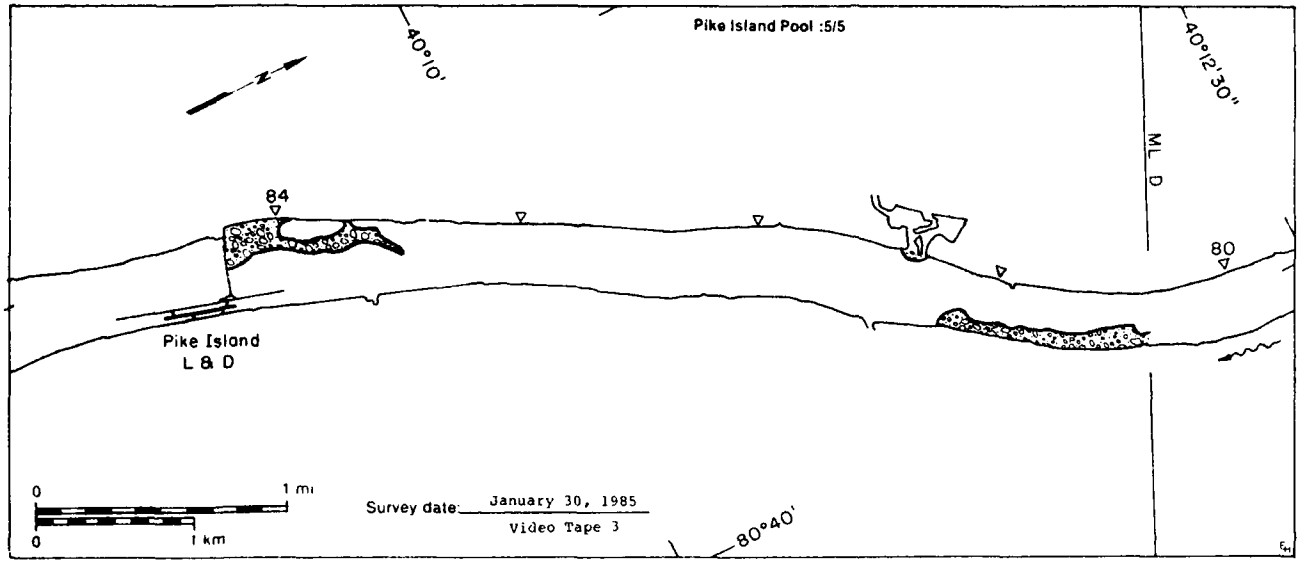
30 January 1985





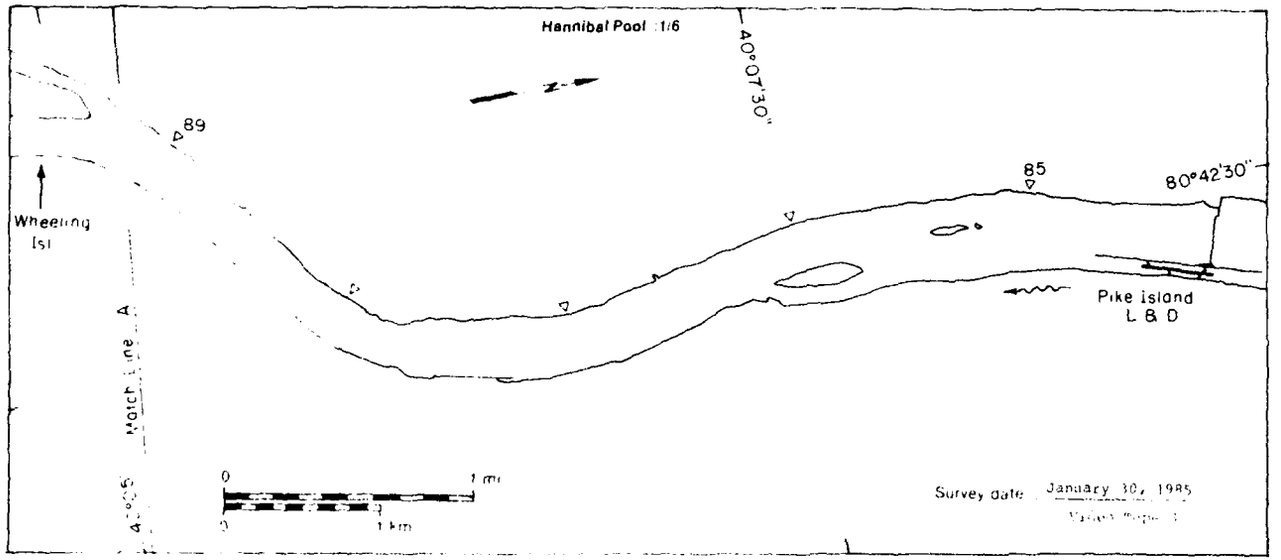


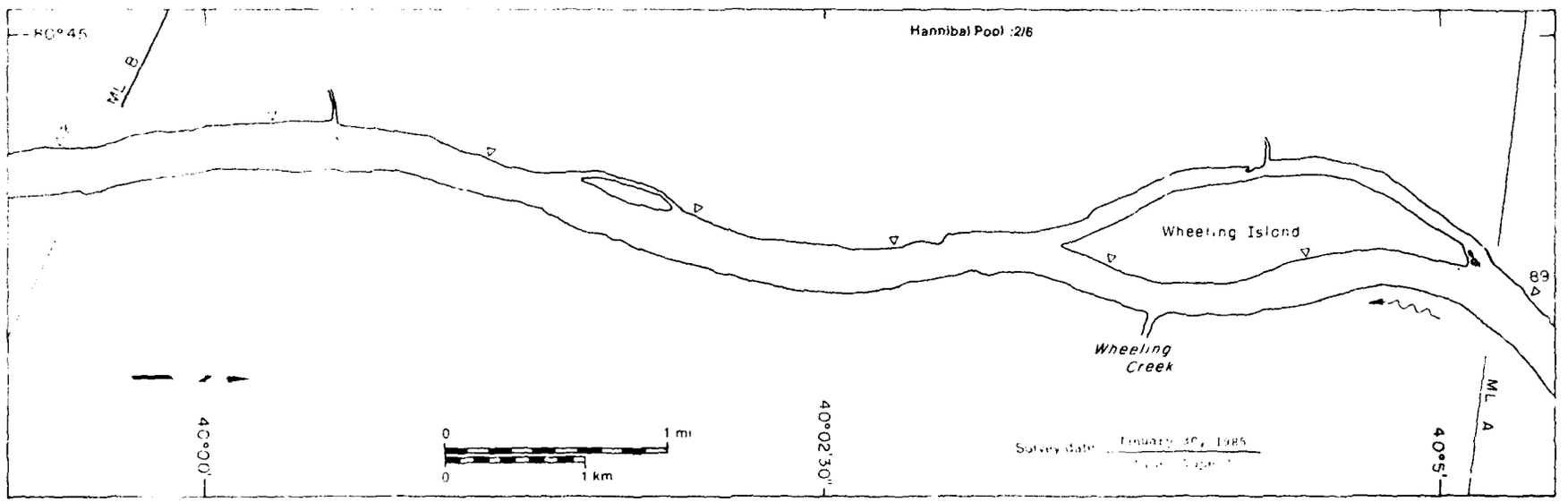


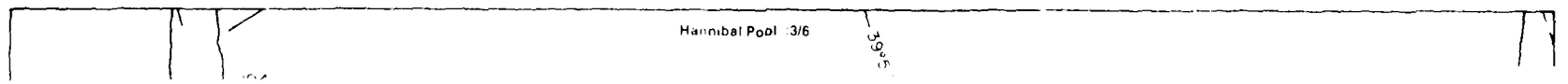


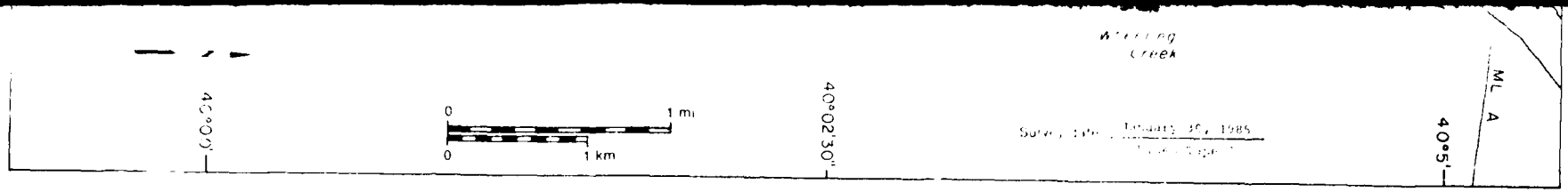
Pike Island Pool

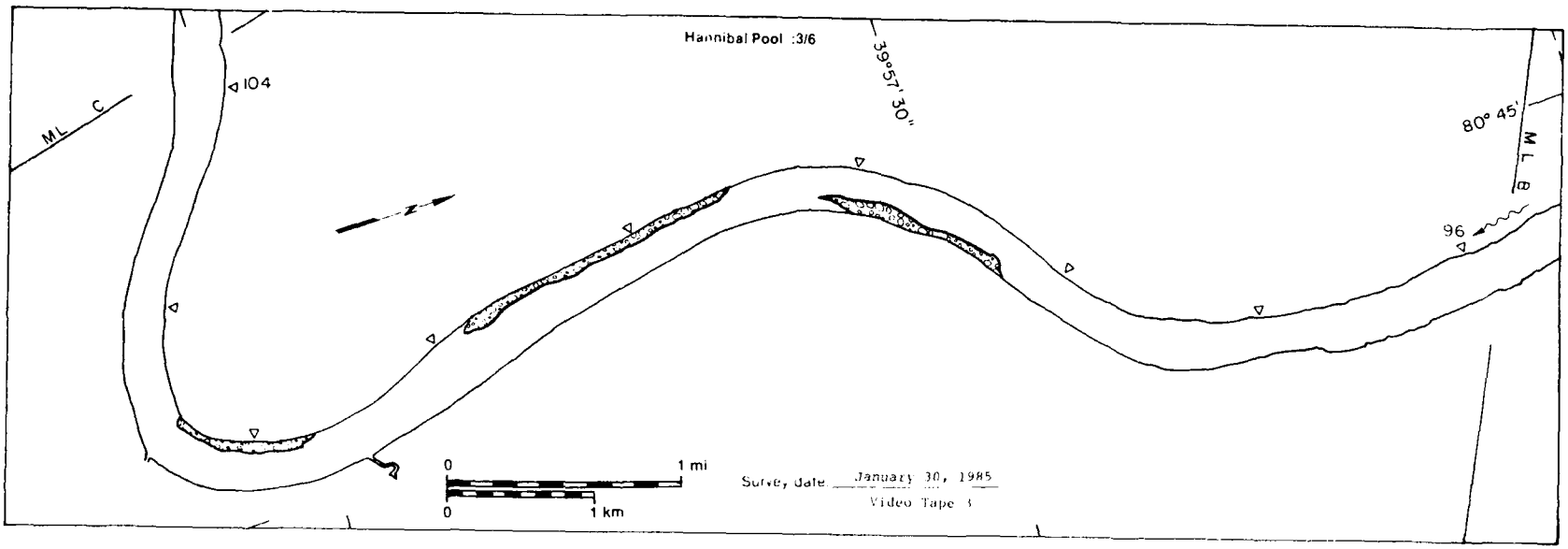
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	15.64	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	1.00	50
Ice floes or frazil slush and pans	2.28	5
Total Area ($m^2 \times 10^6$)	18.92	


Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Pike Island L & D
Mark Twain Lake
0
1 mi
0
1 km
Survey date : January 30, 1985

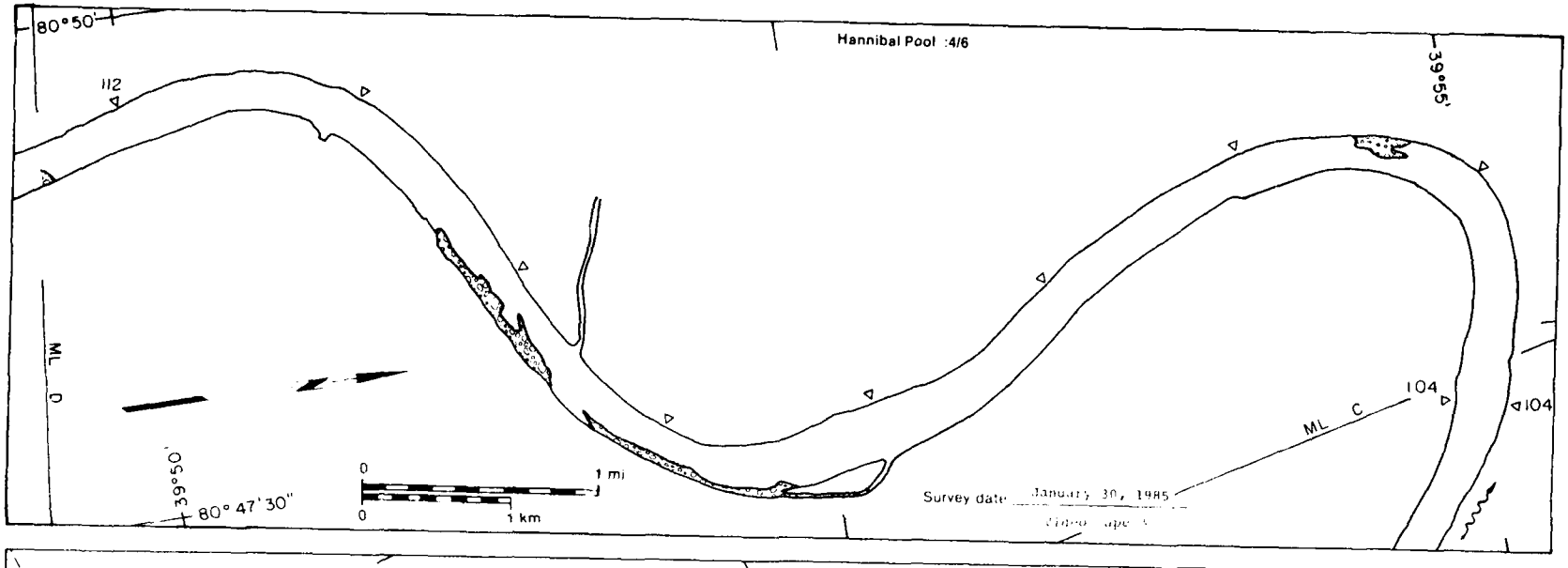

80°45
Hannibal Pool :2/6
ML B
Wheeling Island
89
Wheeling Creek
40°00'
40°02'30"
40°5'
ML A
0
1 mi
0
1 km
Survey date : January 30, 1985

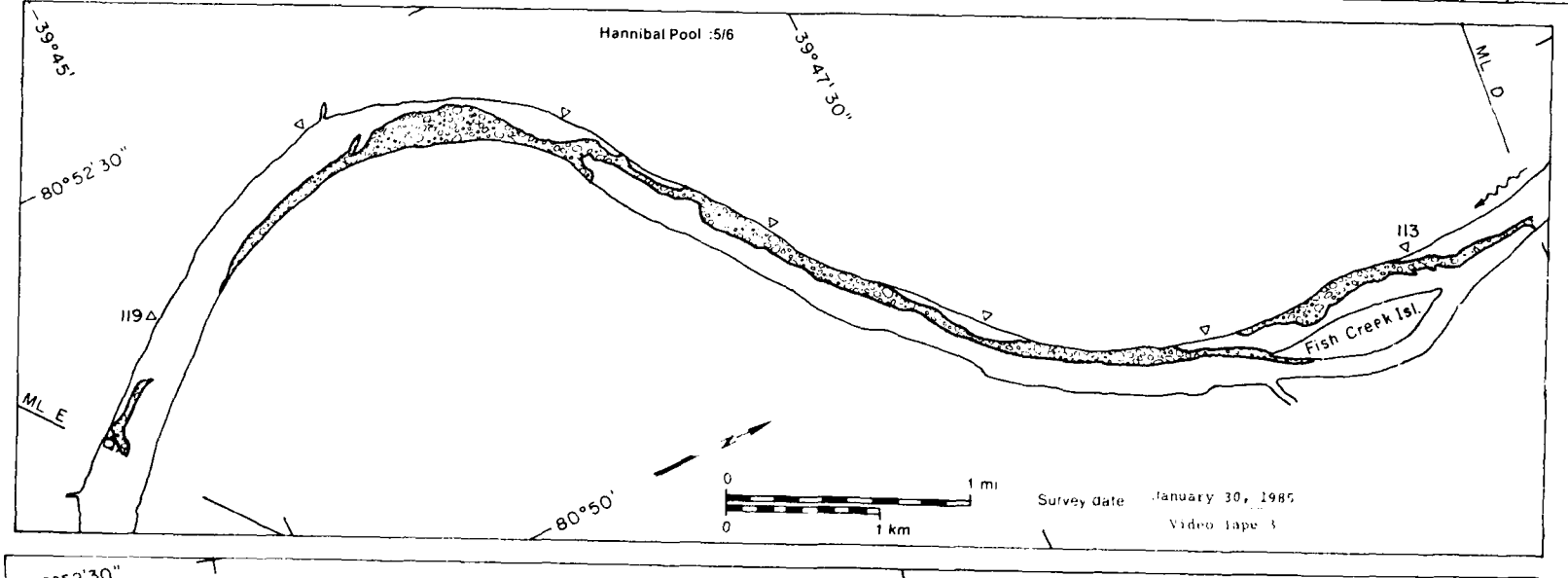

Hannibal Pool :3/6
39°5


40°05'
0
1 mi
0
1 km
40°02'30"
40°5'
ML A

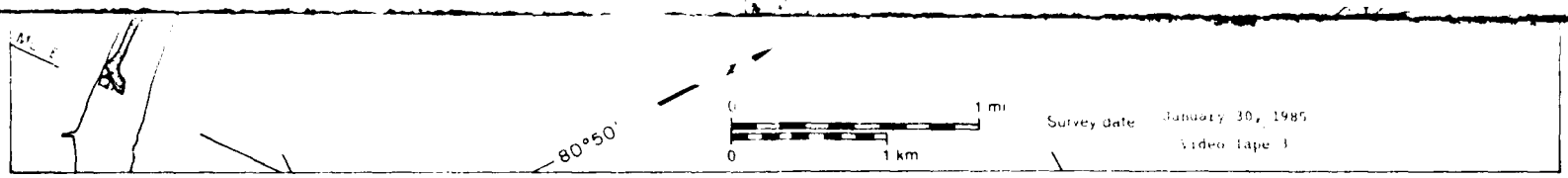

Hannibal Pool :3/6
39°57'30"
80° 45'
ML C
ML B
104
96
0
1 mi
0
1 km
Survey date January 30, 1985
Video Tape 3

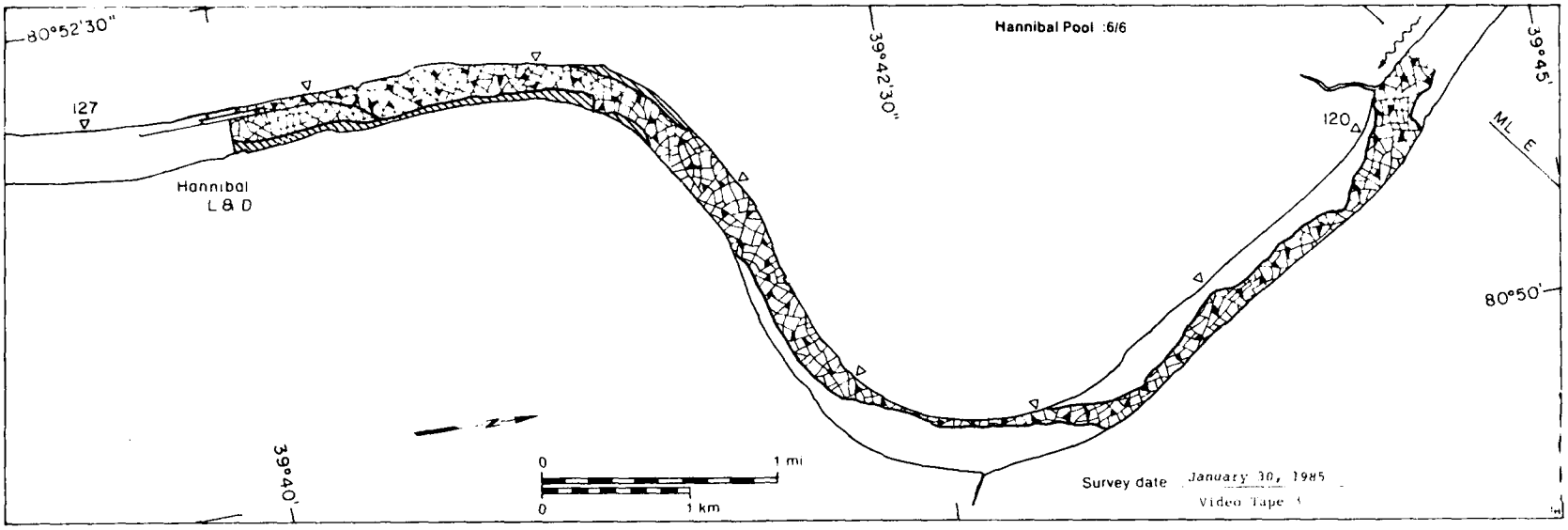
30 January 1985





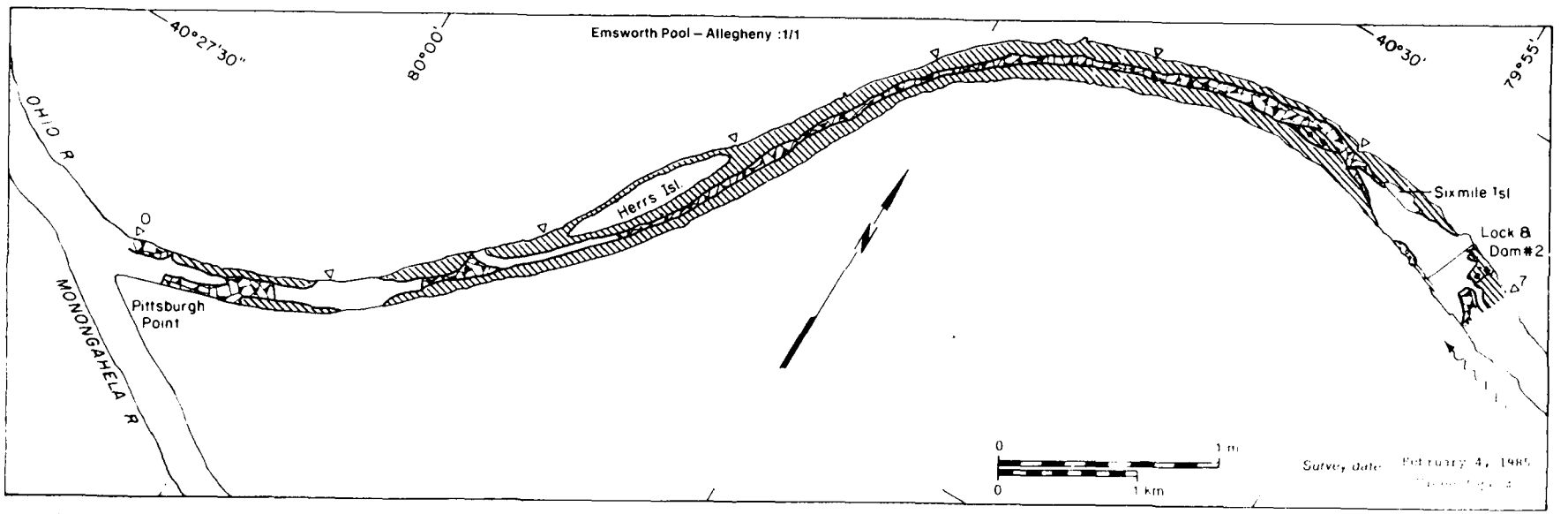






Hannibal Pool

Area (km² x 10⁻²)	Surface concentration (%)
18.49	NA
0.24	NA
--	--
0.17	NA
1.91	75
1.65	5
22.46	

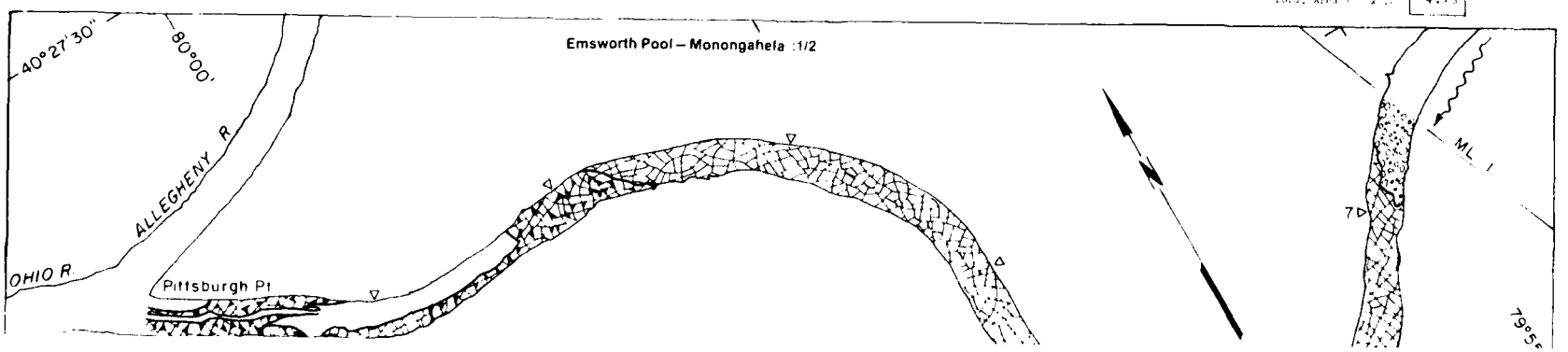


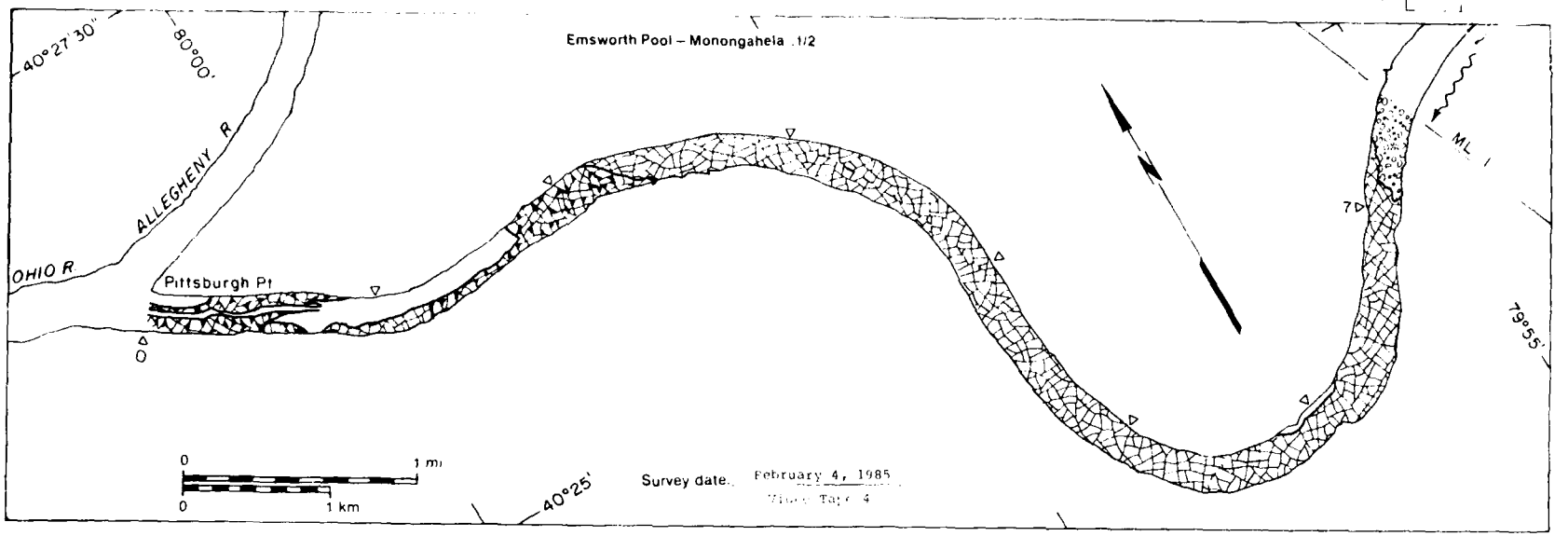
Emsworth Pool – Allegheny

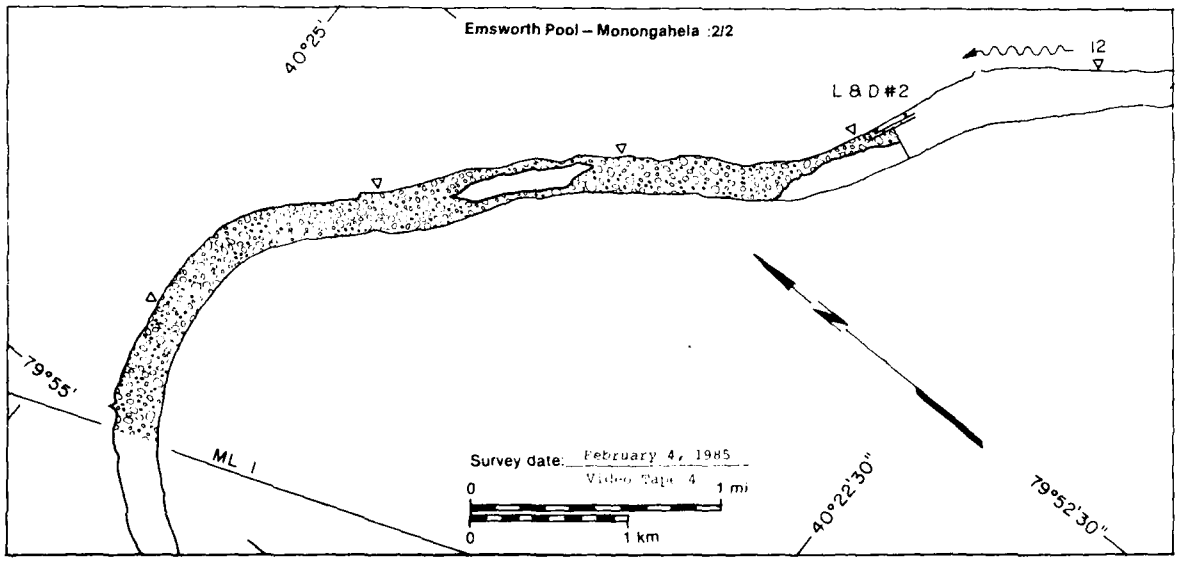
	0.65	
	1.95	
	0.07	95
	--	
	0.59	60
	0.01	5
	3.27	

Emsworth Pool – Monongahela

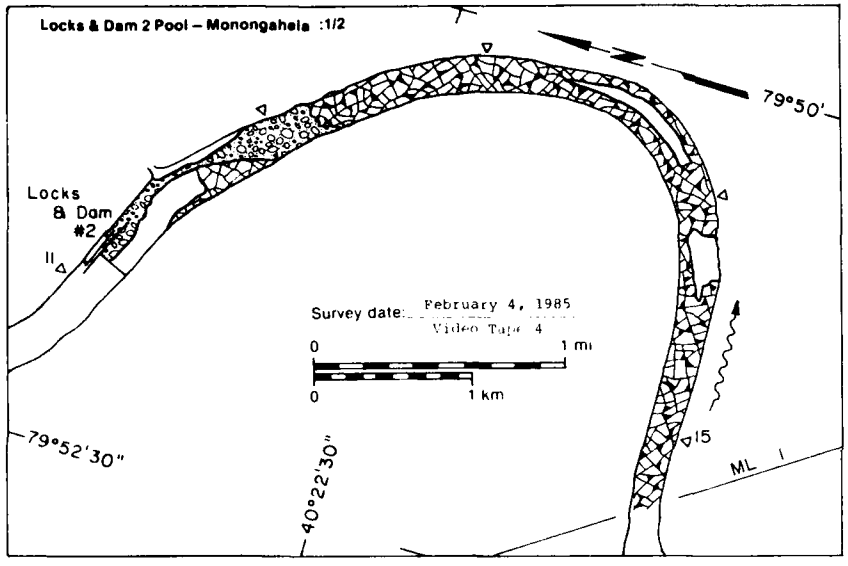
	0.61	
	--	
	--	--
	2.09	
	0.52	90
	1.51	50
	4.73	

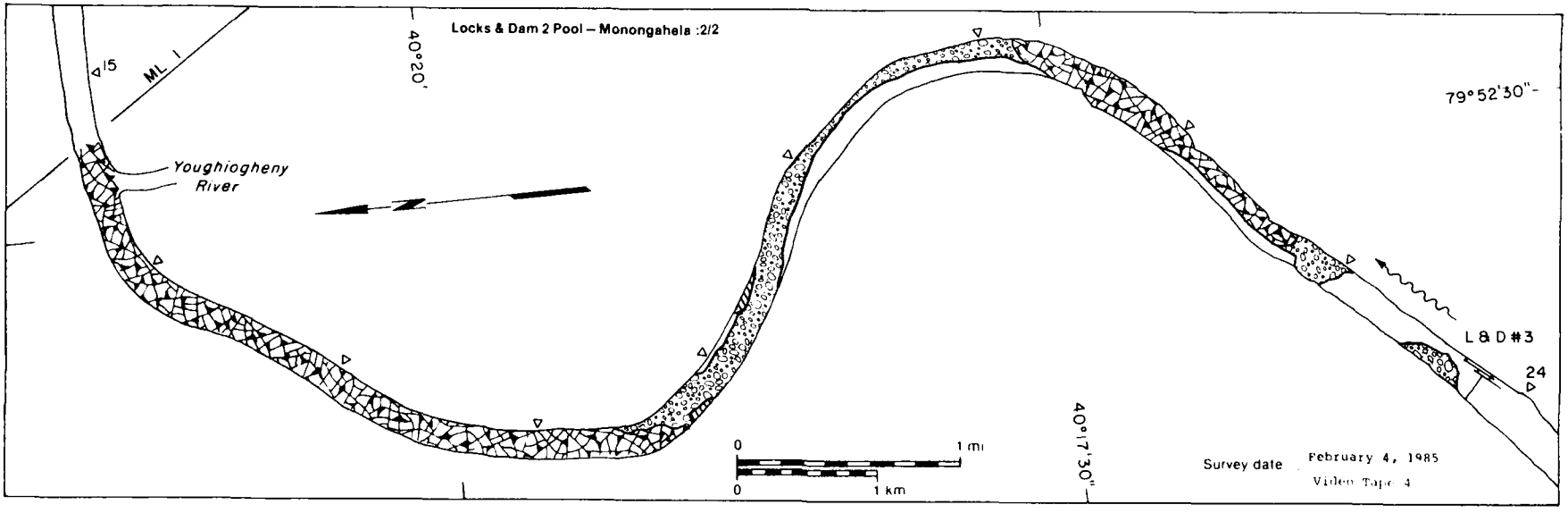


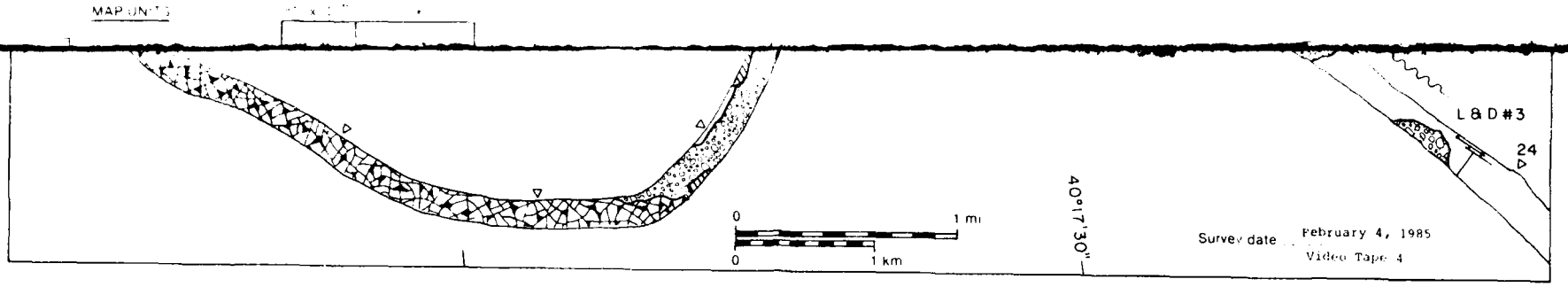

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R
OHIO R
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date: February 4, 1985
Video Tape 4


Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
79°55'
ML 1
Survey date: February 4, 1985
Video Tape 4
0
1 mi
0
1 km
40°22'30"
79°52'30"

4 February 1985



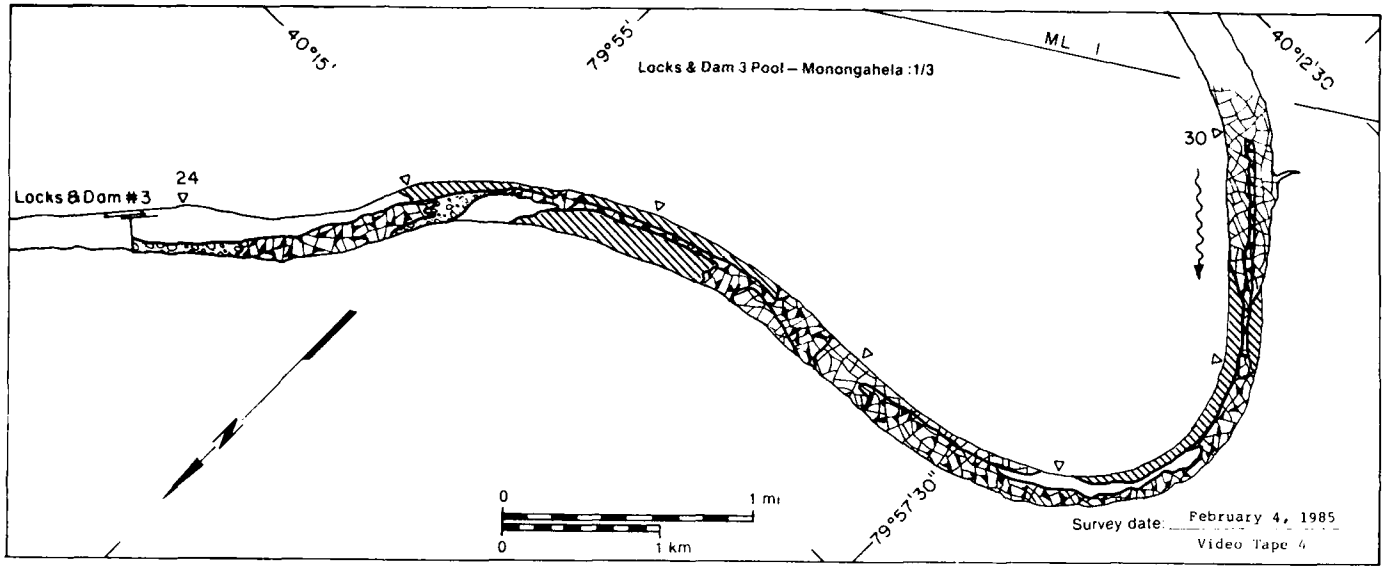


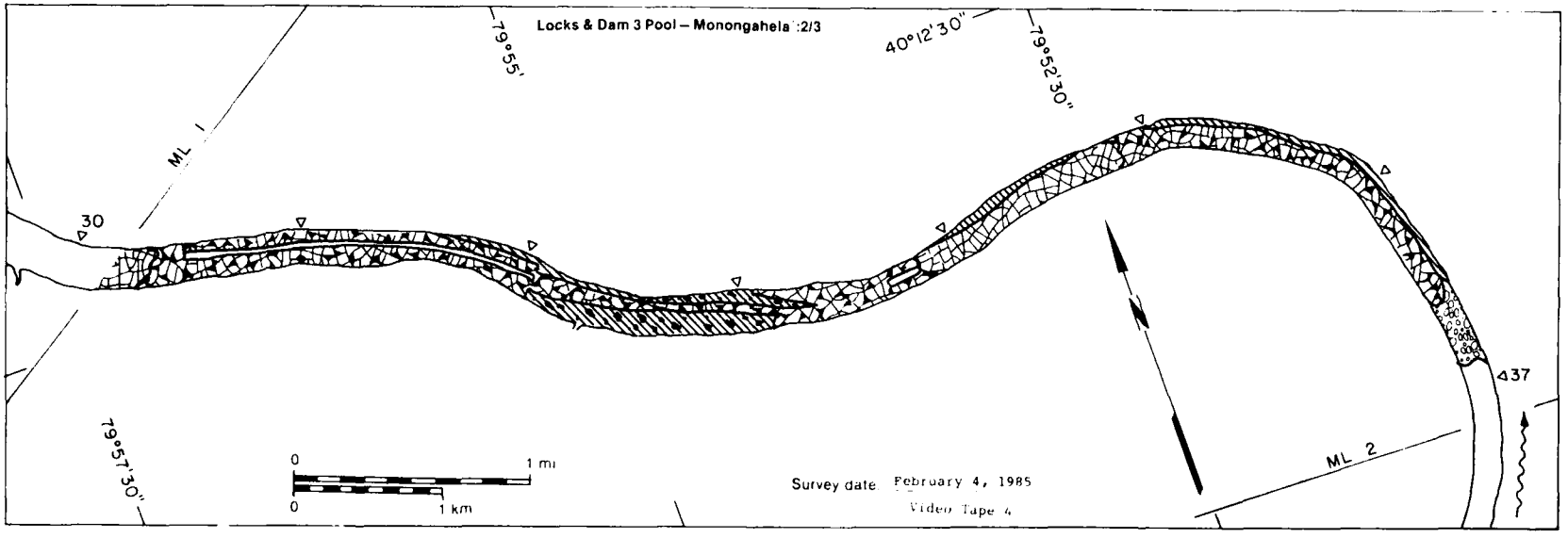


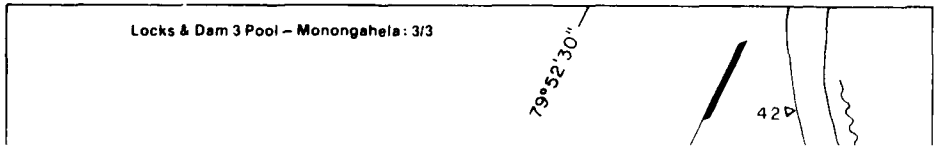
Locks & Dam 2 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (*)
Open water	0.97	NA
Solid ice cover	0.03	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	0.12	NA
Fragmented ice cover with open water areas	2.64	7P
Ice floes or frazil slush and pans	1.01	2P
Total Area ($m^2 \times 10^6$)	4.77	

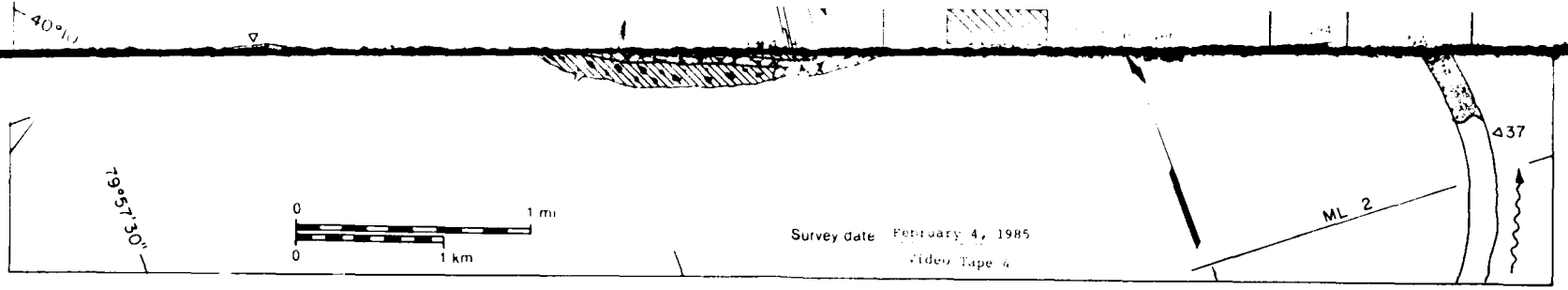
4 February 1985

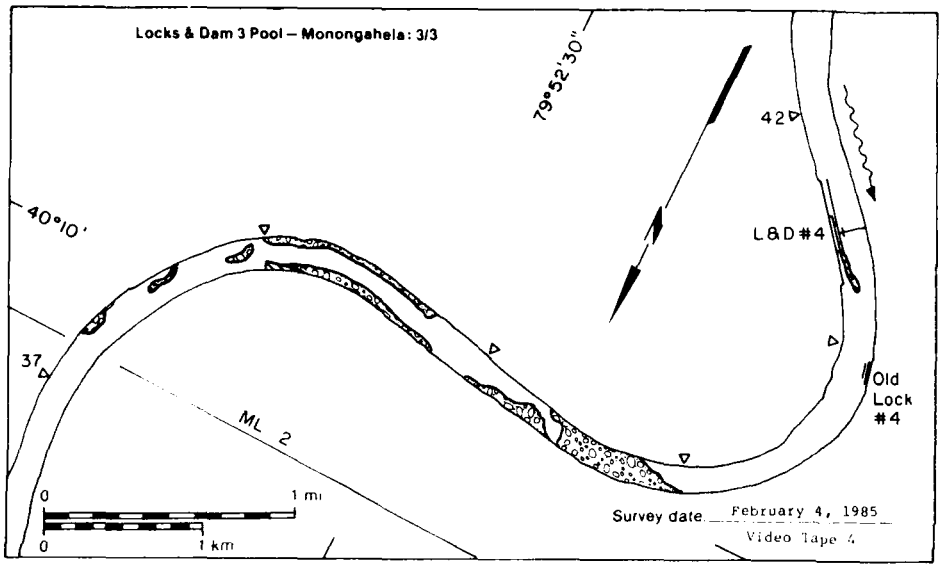








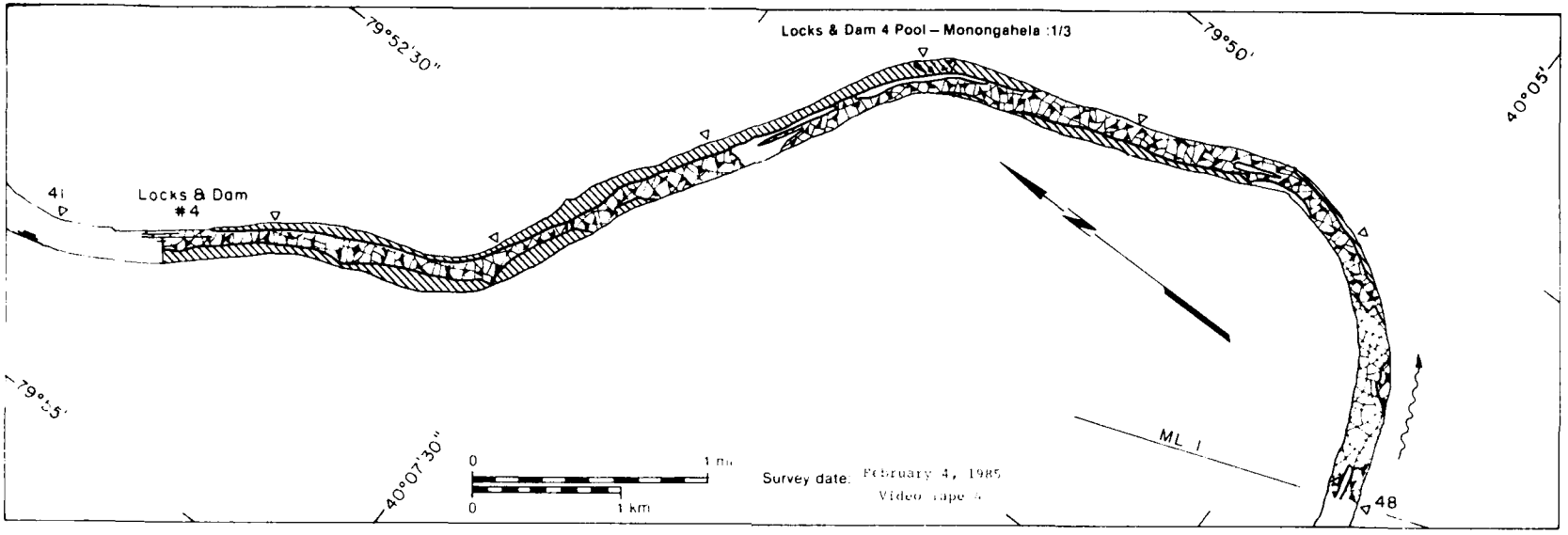


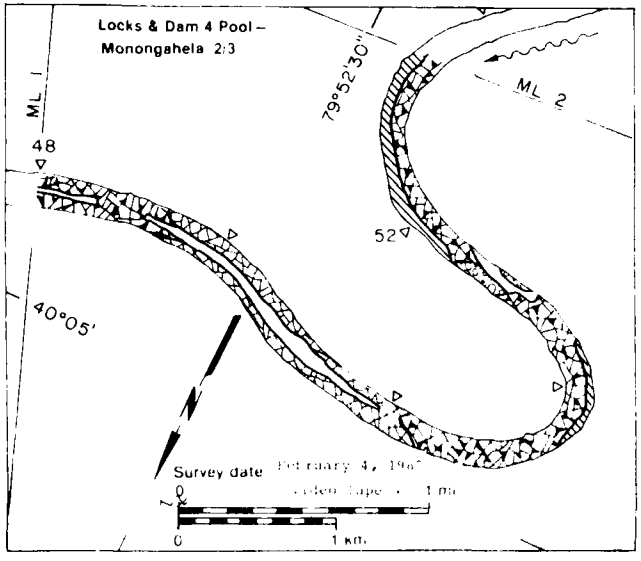


Locks & Dam 3 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	*Surface* concentration (%)
Open water	1.61	NA
Solid ice cover	0.94	NA
Solid ice cover with open-water areas	0.35	90
Fragmented ice cover	1.22	NA
Fragmented ice cover with open-water areas	1.93	75
Ice floes or frazil slush and pans	0.59	10
Total Area ($m^2 \times 10^6$)	6.64	

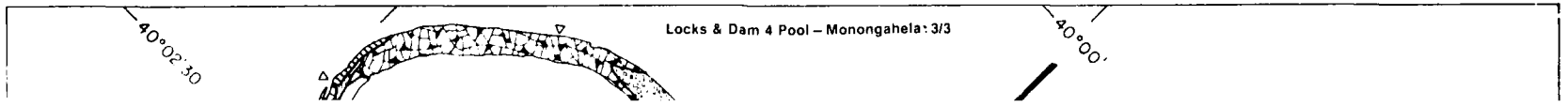
4 February 1985



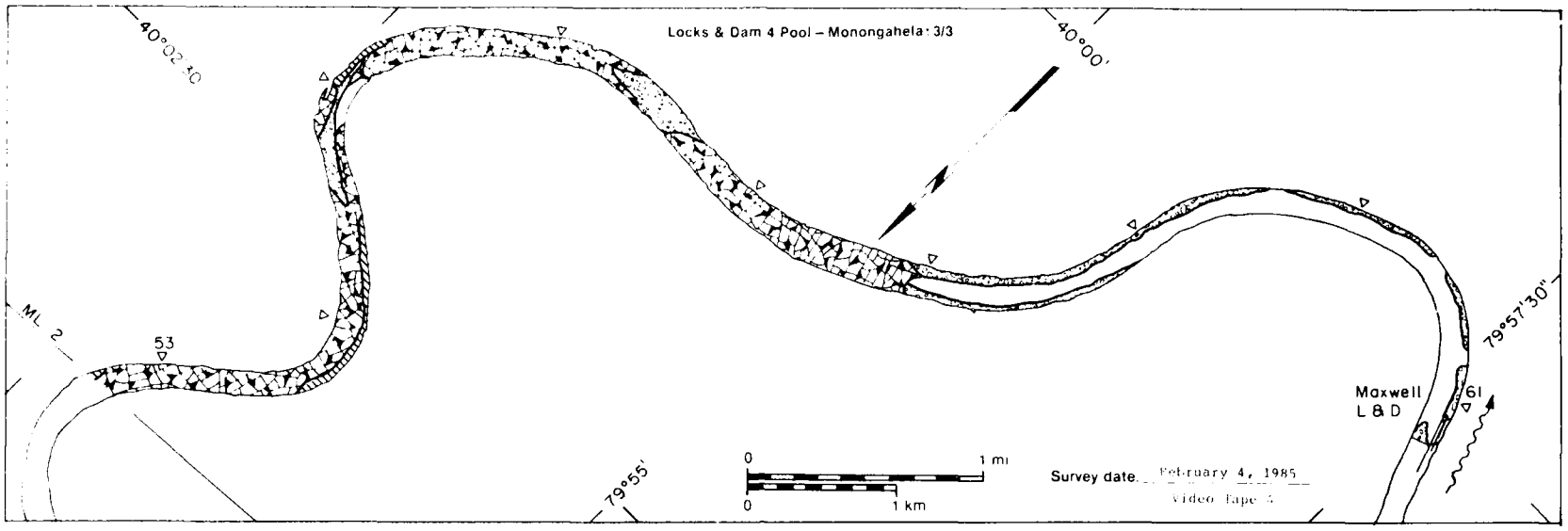


Locks & Dam 4 Pool – Monongahela

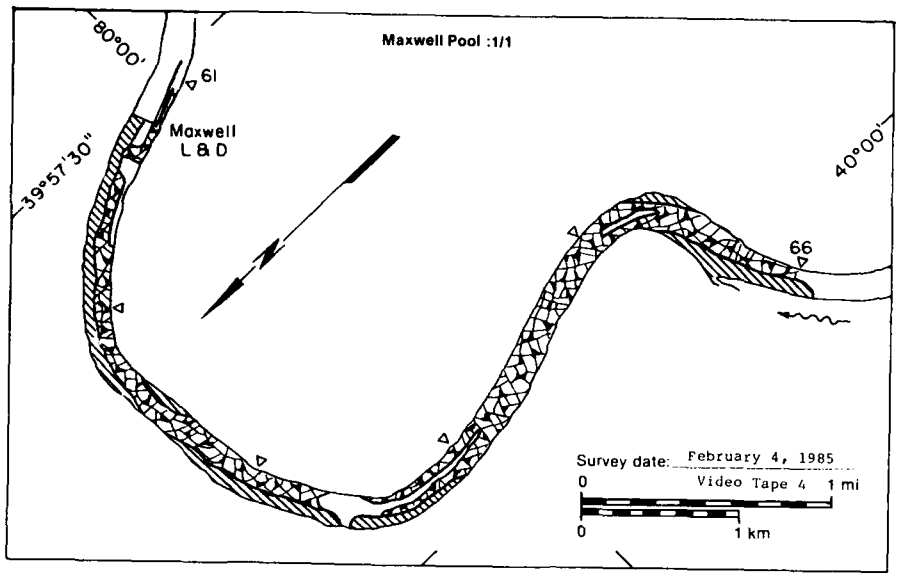
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	1.09	NA
Solid ice cover	1.11	NA
Solid ice cover with open-water areas	0.03	90
Fragmented ice cover	0.56	NA
Fragmented ice cover with open water areas	3.26	80
Ice floes or frazil slush and pans	0.55	30
Total Area ($m^2 \times 10^6$)	6.60	



Total Area ($m^2 \times 10^6$) 6.60



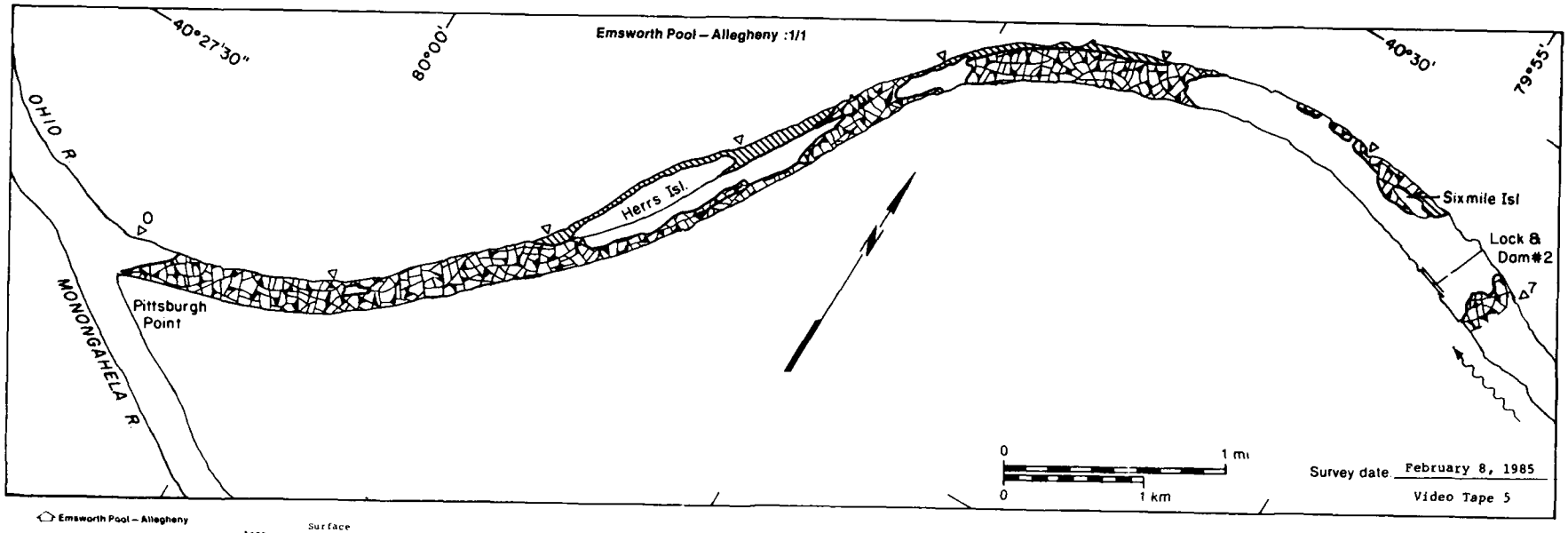
4 February 1985



Maxwell Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.17	NA
Solid ice cover	0.42	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.97	80
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	1.56	

8 February 1985

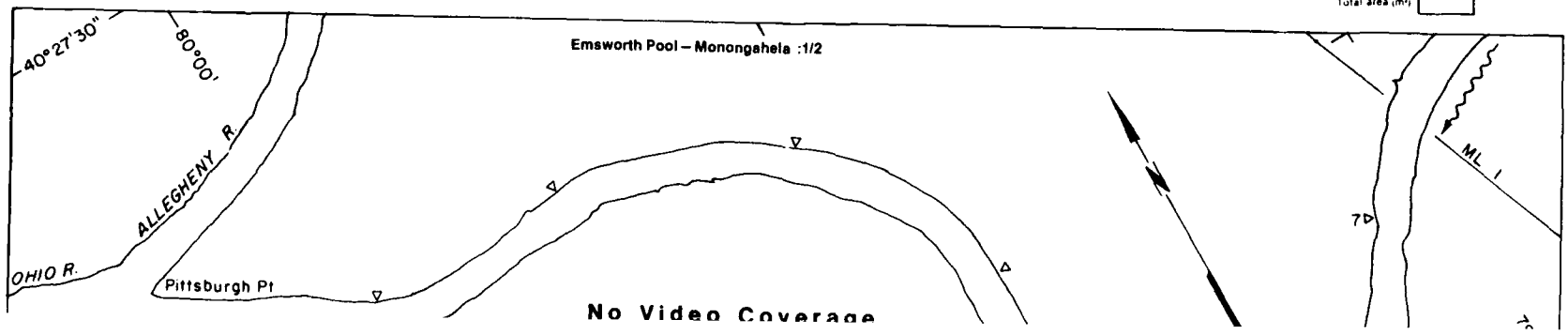


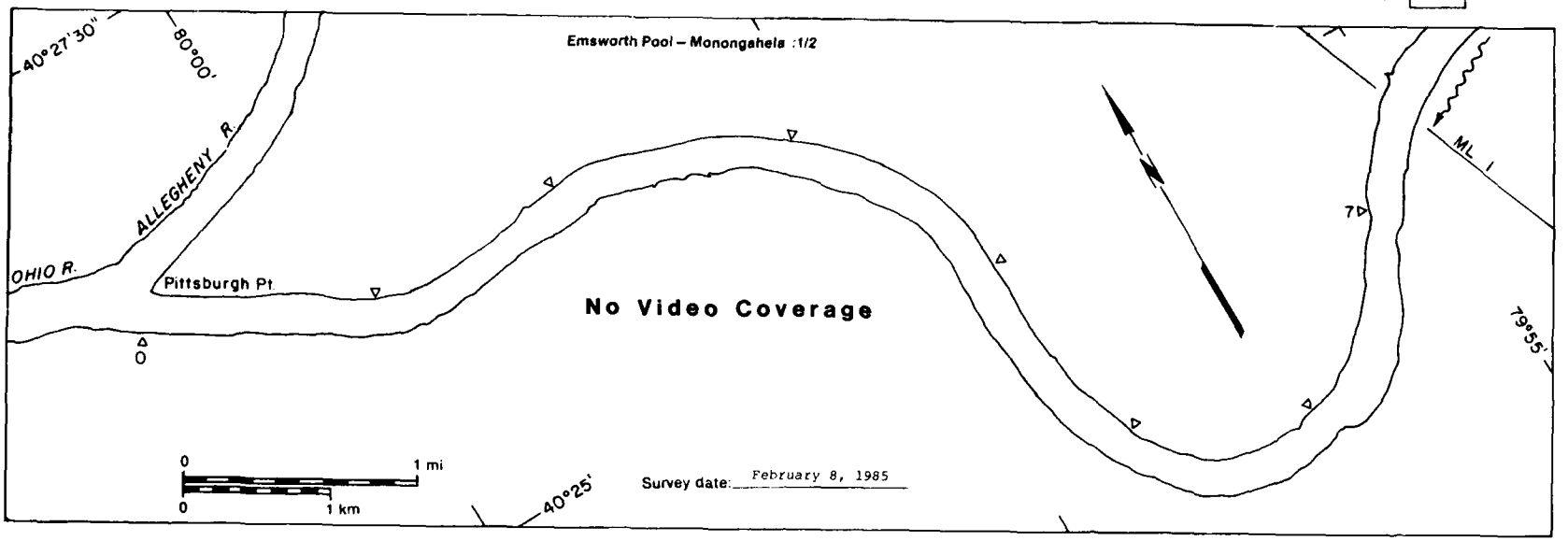
Emsworth Pool – Allegheny

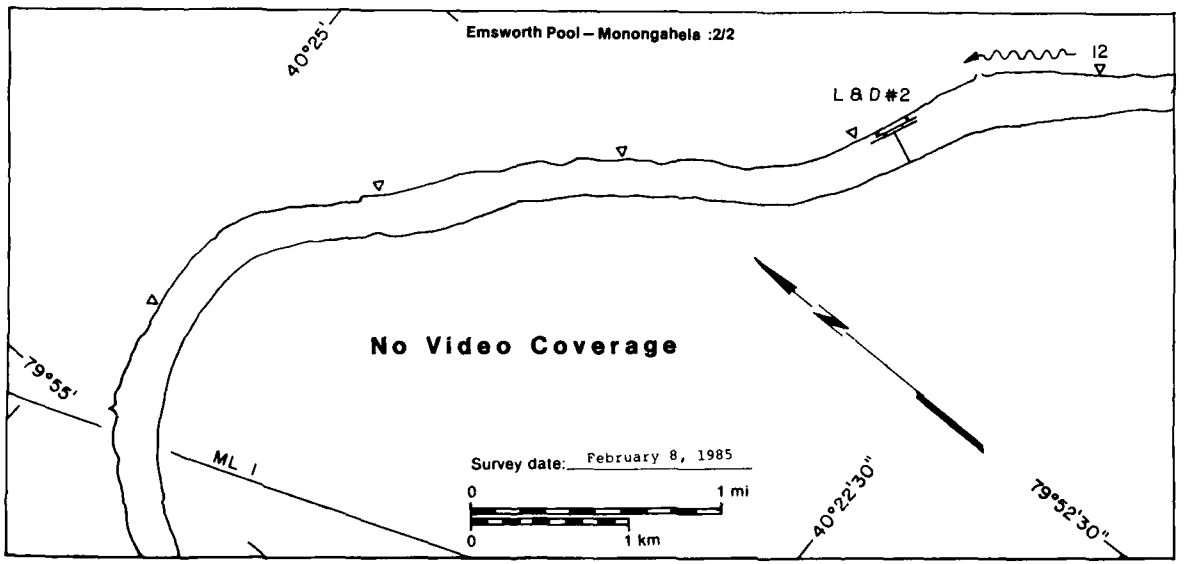
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	1.22	NA
Solid ice cover	0.28	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	0.05	NA
Fragmented ice cover with open water areas	1.72	80
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

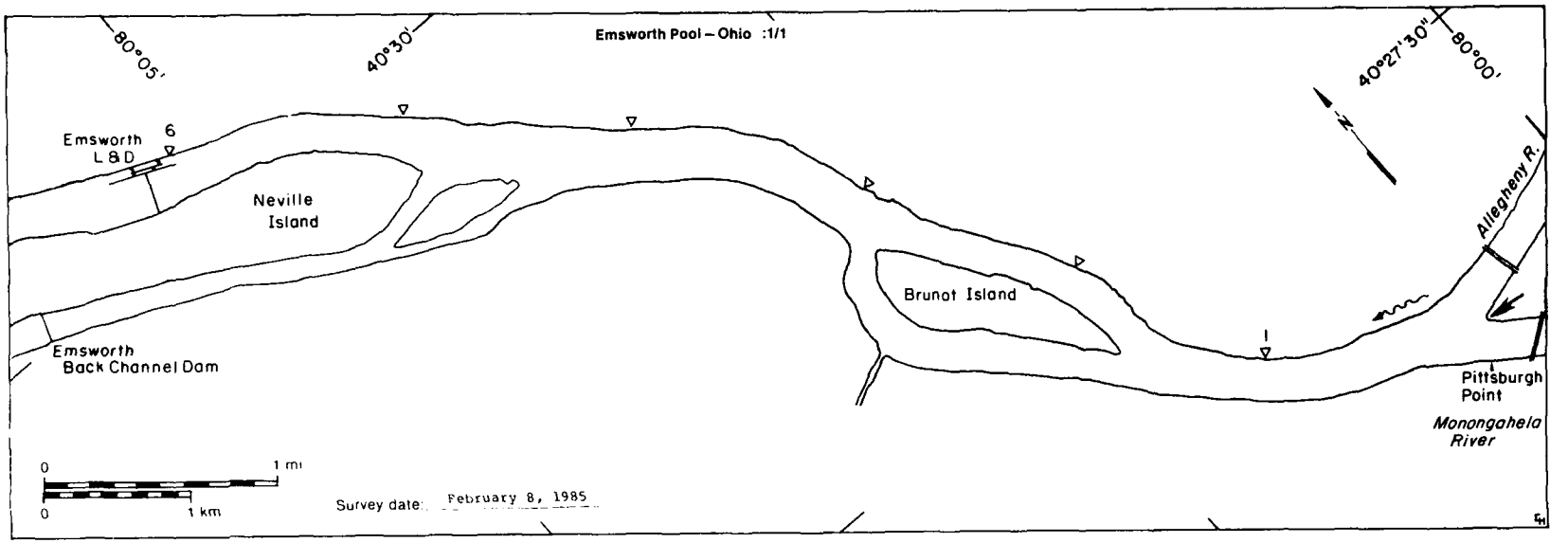
MAP UNITS	Area (mi²)	Surface concentration (%)
Open water		NA
Solid ice cover		NA
Solid ice cover with open water areas		
Fragmented ice cover		NA
Fragmented ice cover with open water areas		
Ice floes or frazil slush and pans		
Total area (mi²)		




Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
No Video Coverage
ML 1
79°55'
40°25'
0
7
0
1 mi
0
1 km
Survey date: February 8, 1985


Emsworth Pool – Monongahela :2/2
40°25'
L&D#2
12
No Video Coverage
79°55'
ML 1
Survey date: February 8, 1985
0
1 mi
0
1 km
40°22'30"
79°52'30"

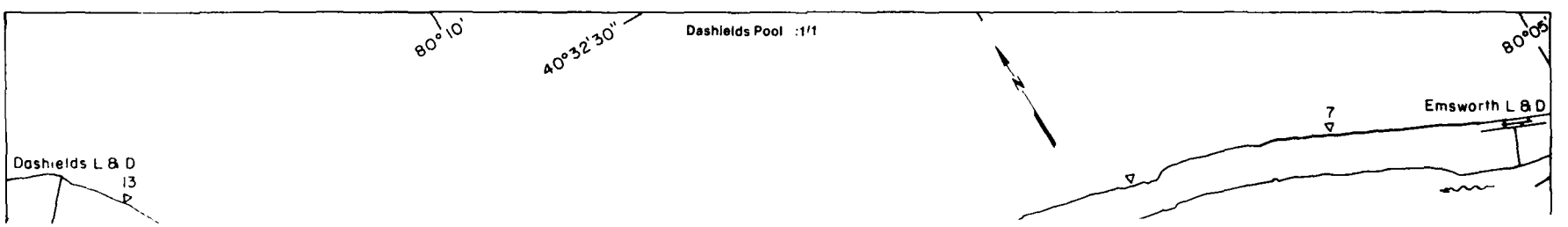
8 February 1985

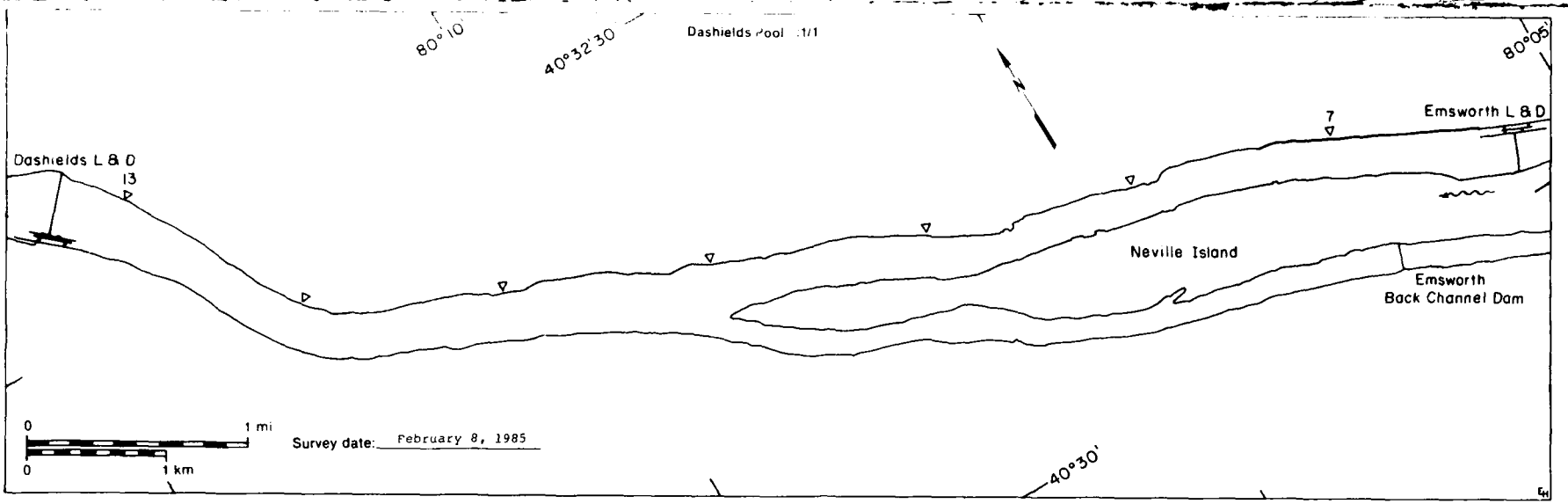


Emsworth Pool – Ohio

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	--	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.49	

No Video Coverage



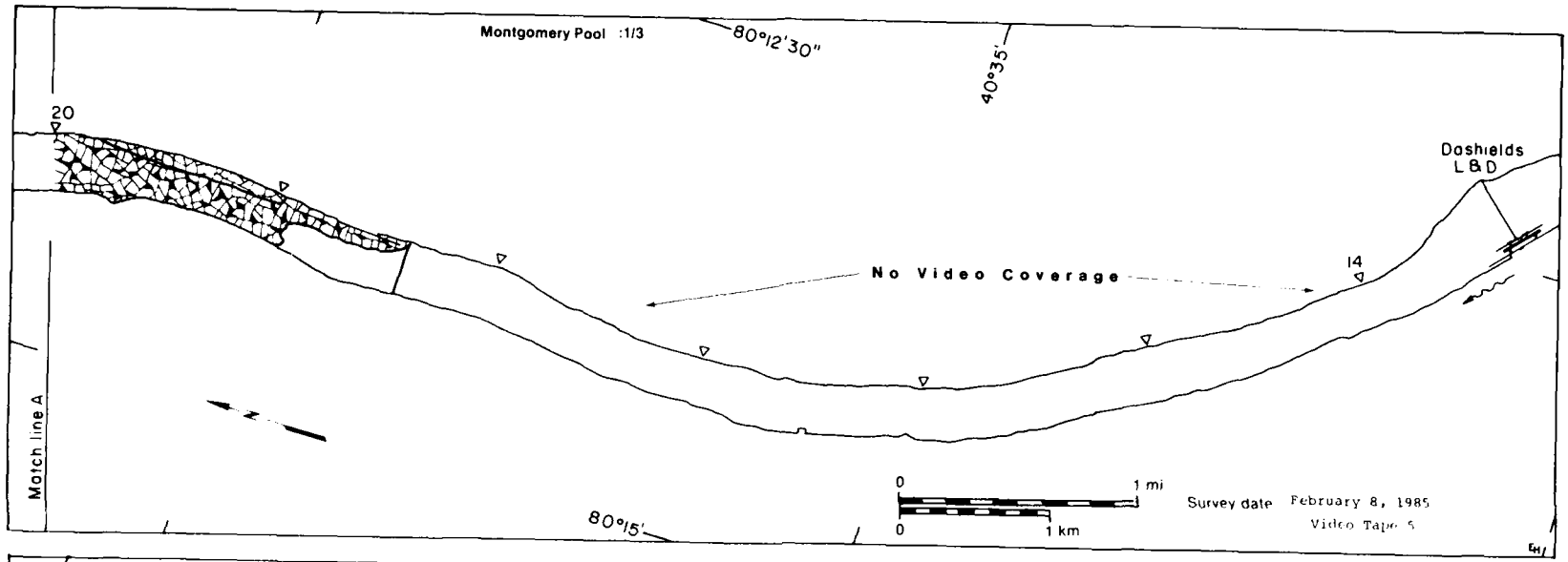


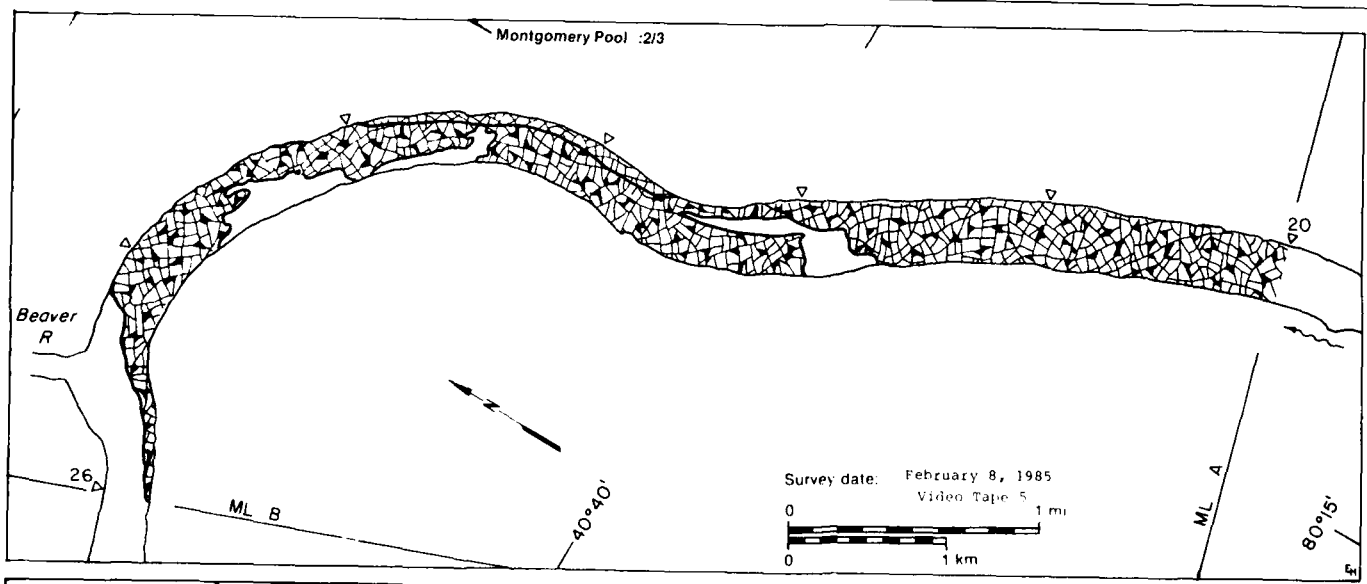
Dashields Pool

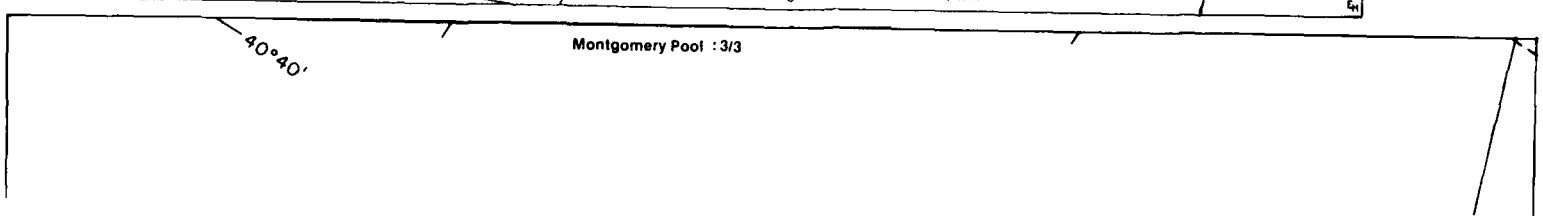
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	--	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	5.00	

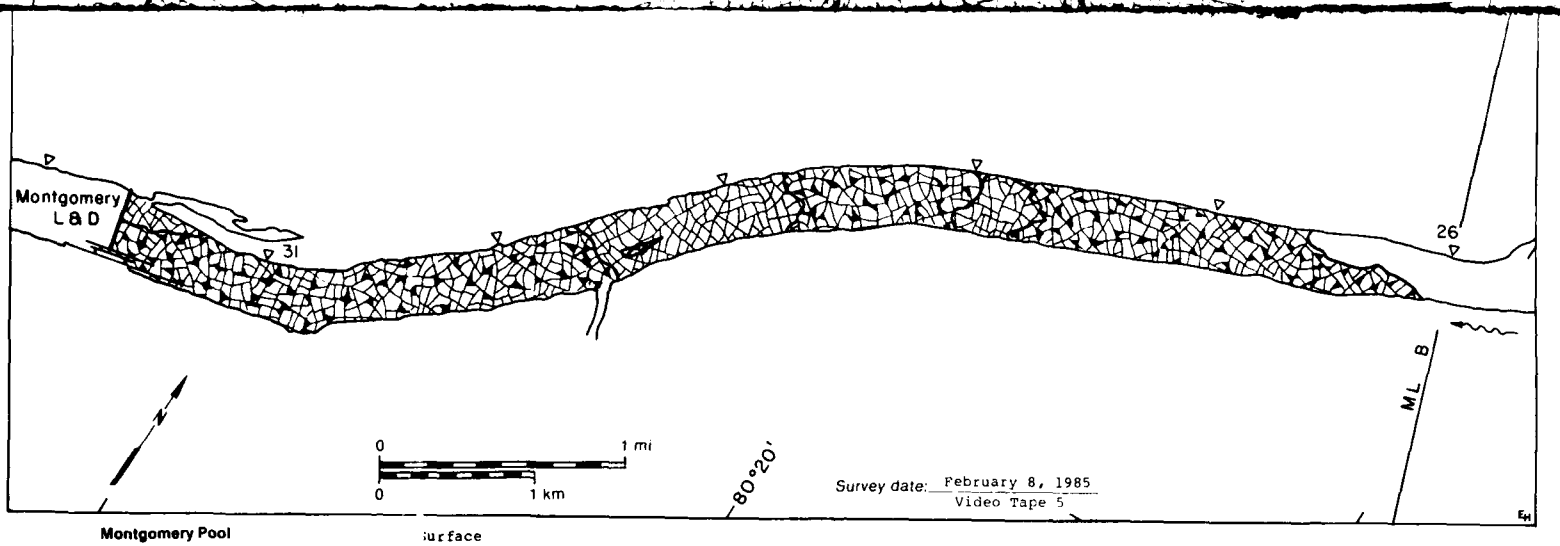
No Video Coverage

8 February 1985





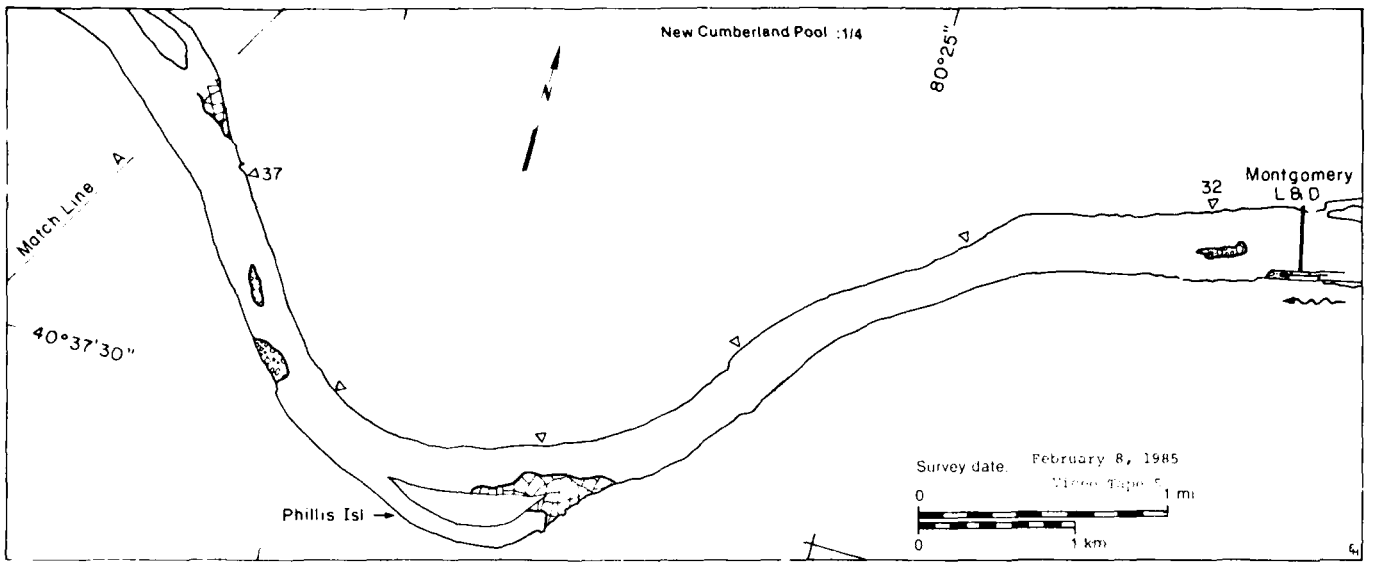


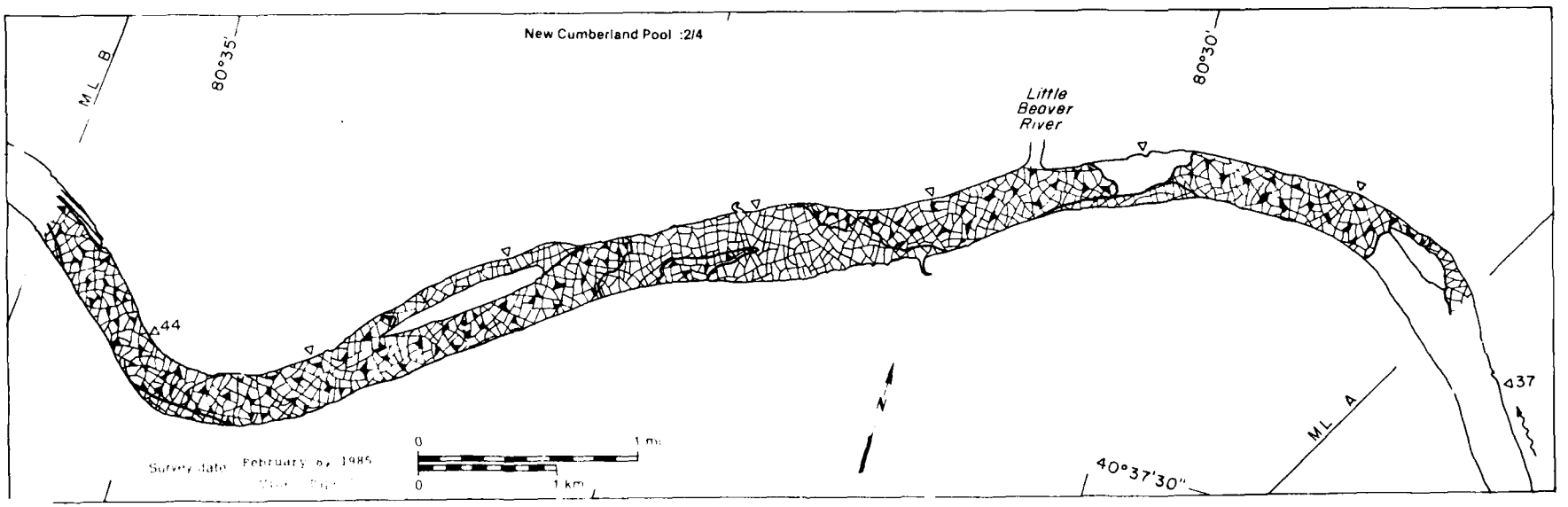


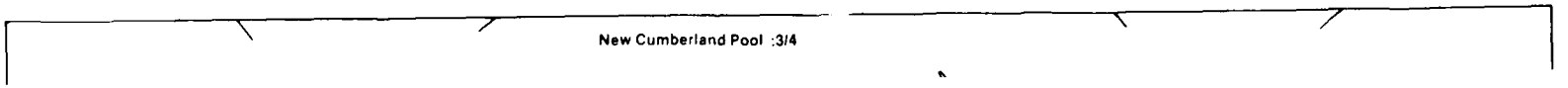
Montgomery Pool

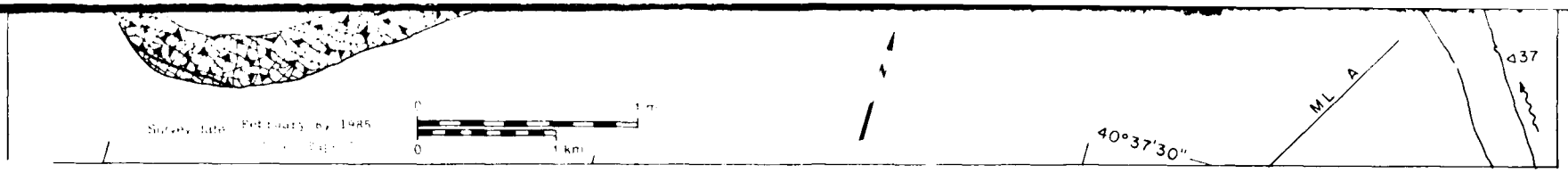
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	1.28	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	1.14	NA
Fragmented ice cover with open-water areas	5.93	90
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27*	

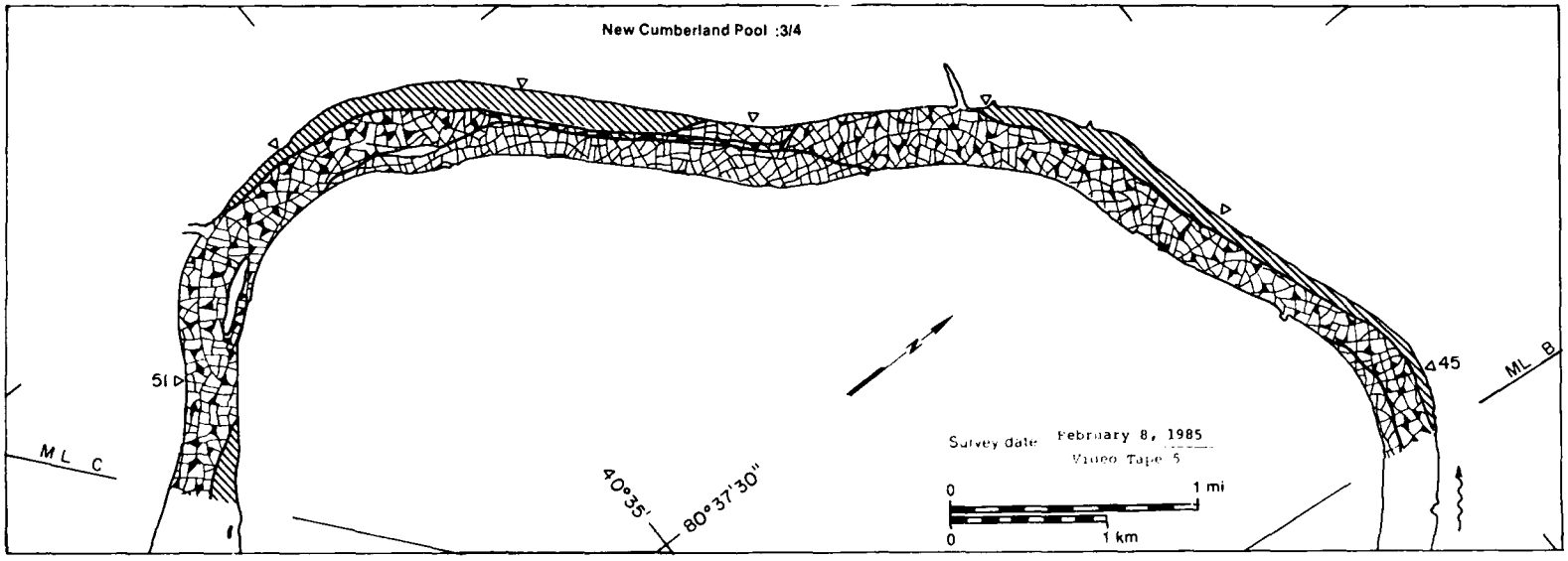
*Includes 2.92 of no video coverage

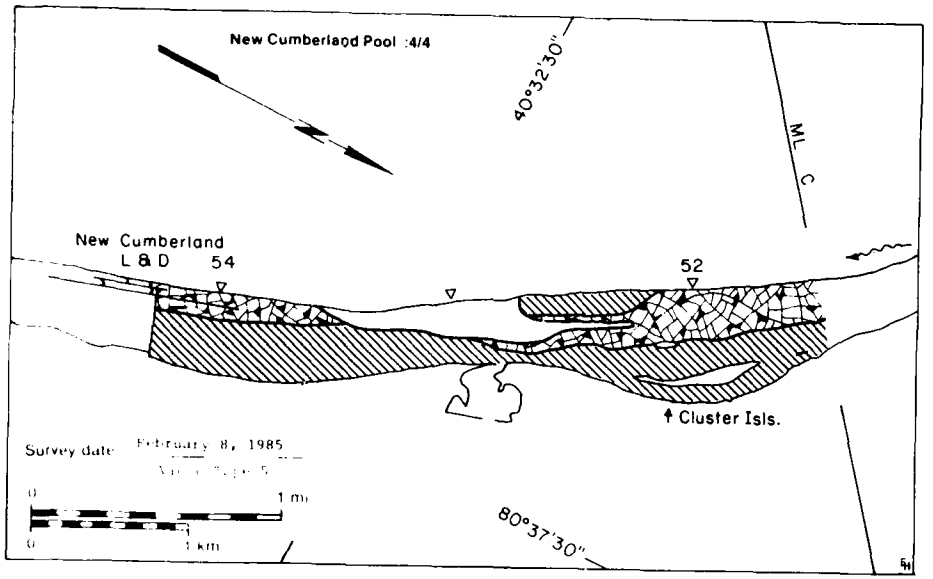

New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery
L&D
40°37'30"
Phillis Isl
Survey date: February 8, 1985
0
1 mi
0
1 km


New Cumberland Pool :2/4
M.L. B
80°35'
80°30'
Little
Beaver
River
44
37
M.L. A
40°37'30"
0
1 mi
0
1 km


New Cumberland Pool :3/4

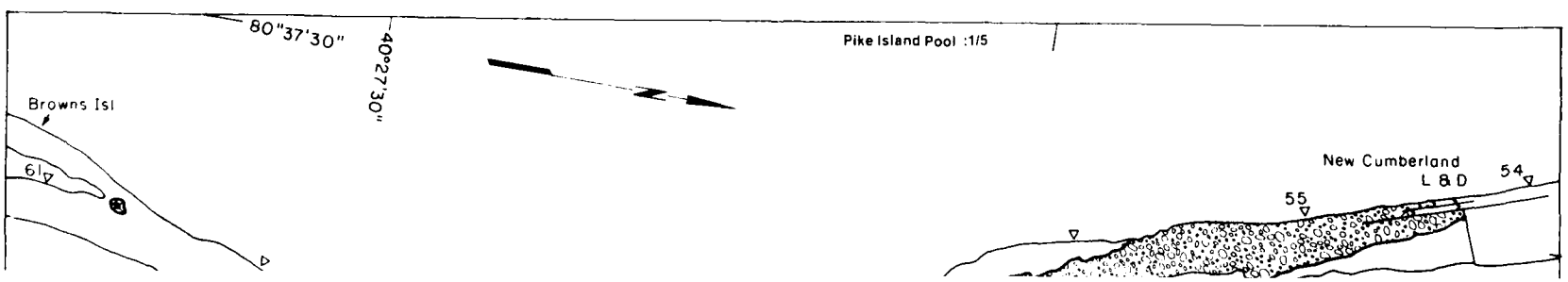

Survey date February 8, 1985
0
1 km
40°37'30"
ML A
37

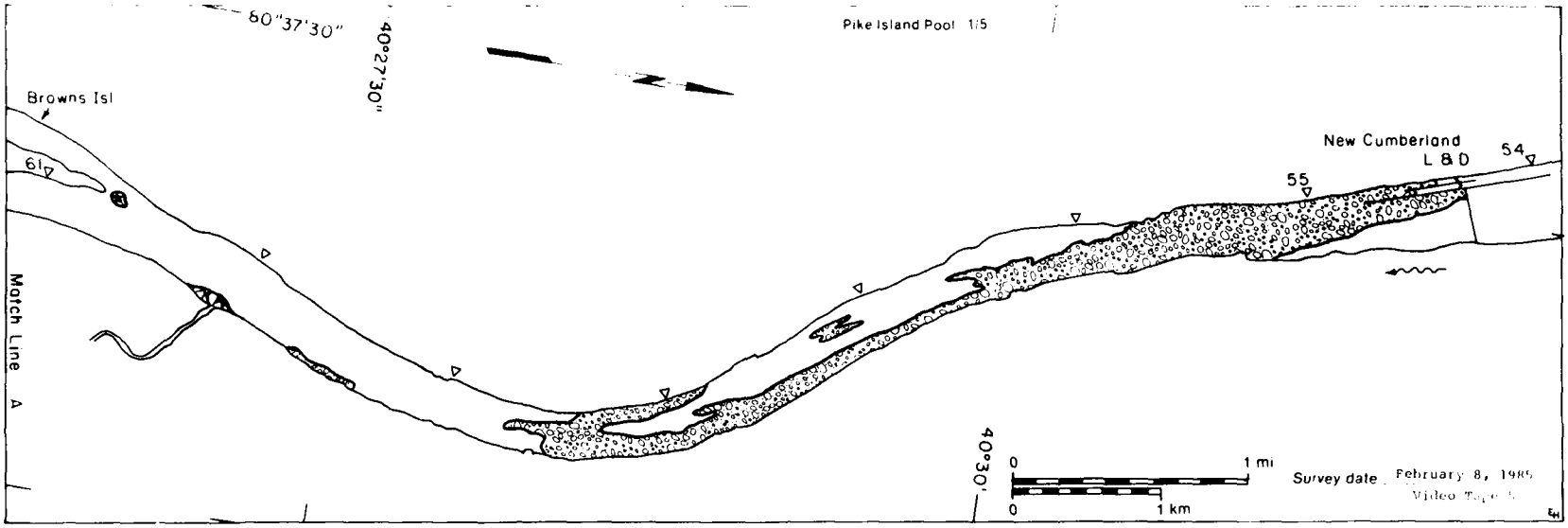

New Cumberland Pool :3/4
51
45
ML C
ML B
40°35'
80°37'30"
Survey date February 8, 1985
Video Tape 5
0
1 mi
0
1 km

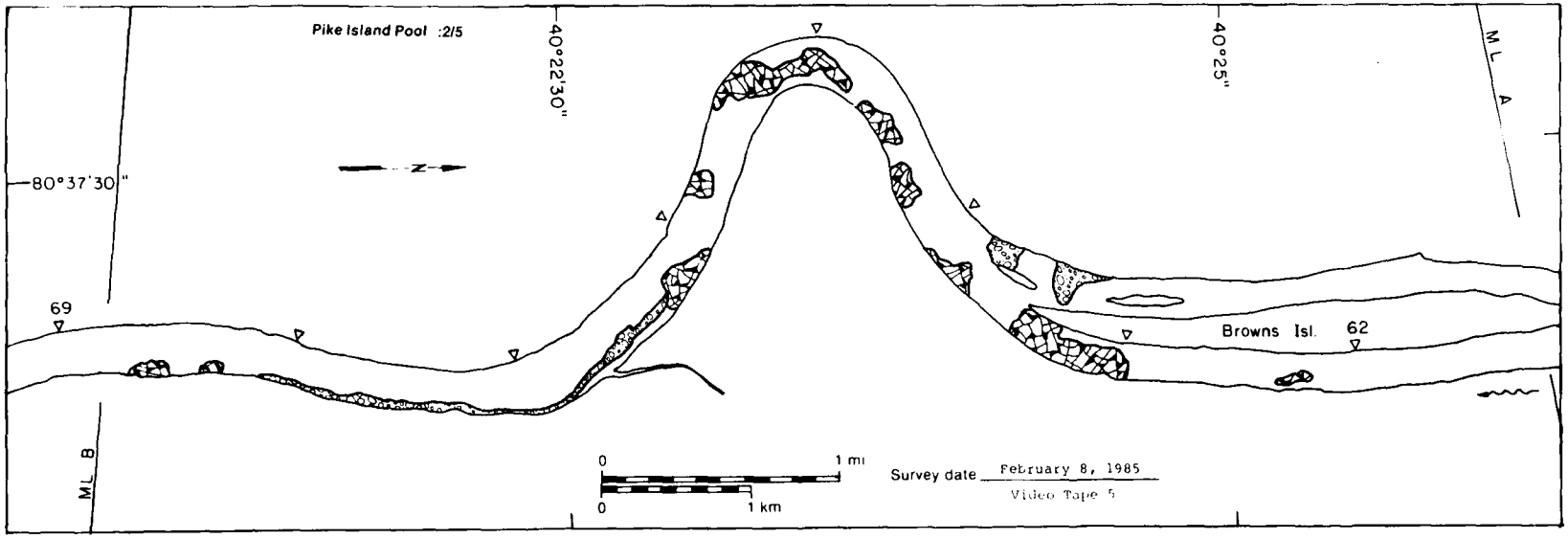


New Cumberland Pool

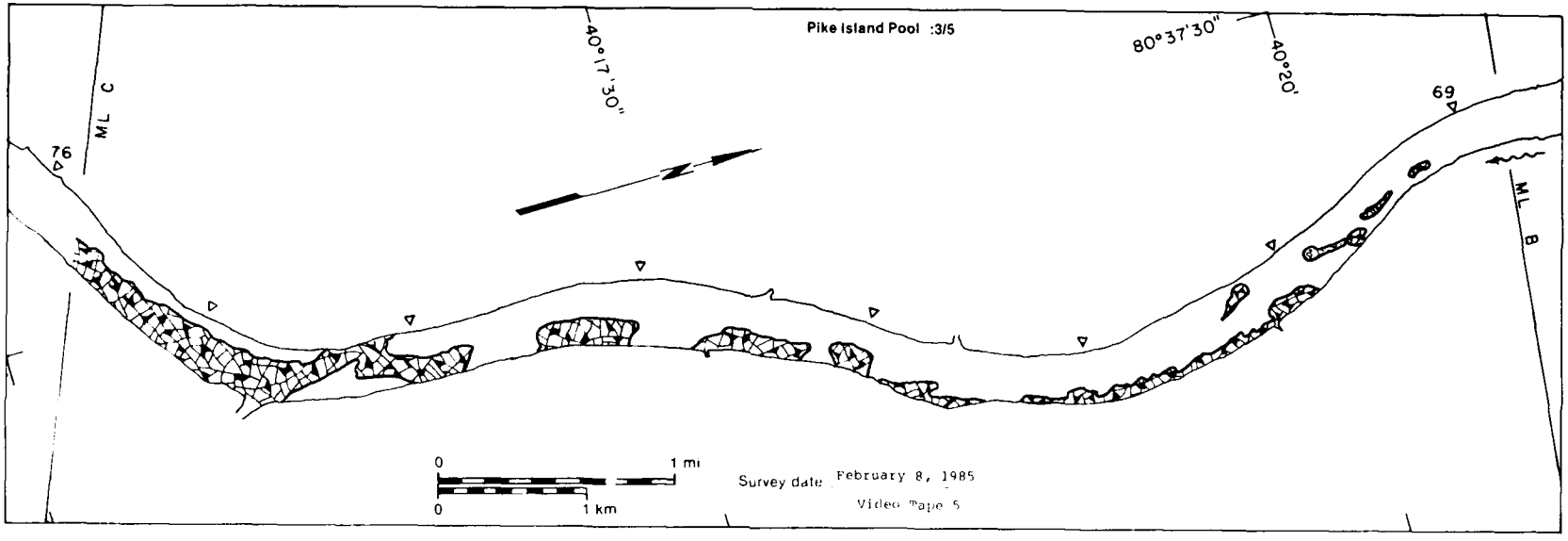
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.76	NA
Solid ice cover	2.37	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	2.10	NA
Fragmented ice cover with open-water areas	6.59	80
Ice floes or frazil slush and pans	0.05	30
Total Area ($m^2 \times 10^6$)	14.87	

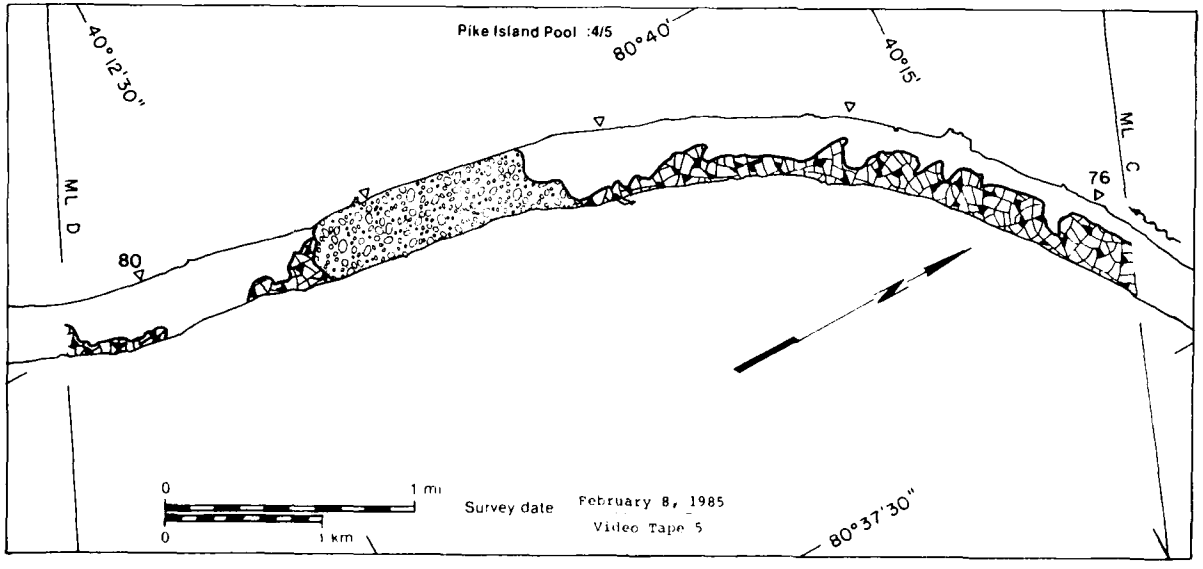


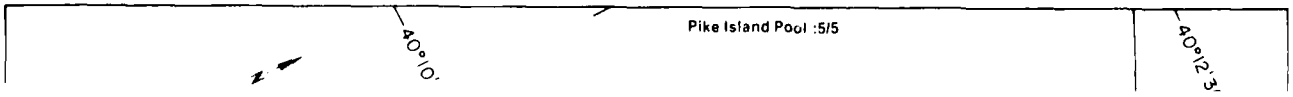

Pike Island Pool 1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L&D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date February 8, 1985
Video Tape 5

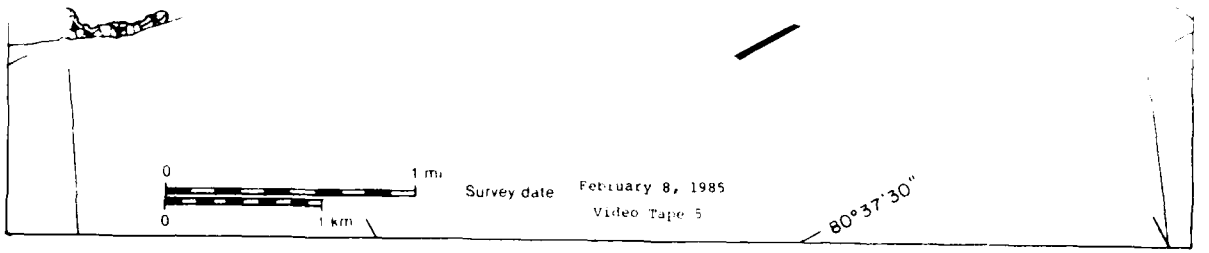

Pike Island Pool :2/5
40°22'30"
40°25"
ML A
80°37'30"
69
Browns Isl.
62
ML B
0
1 mi
0
1 km
Survey date February 8, 1985
Video Tape 5

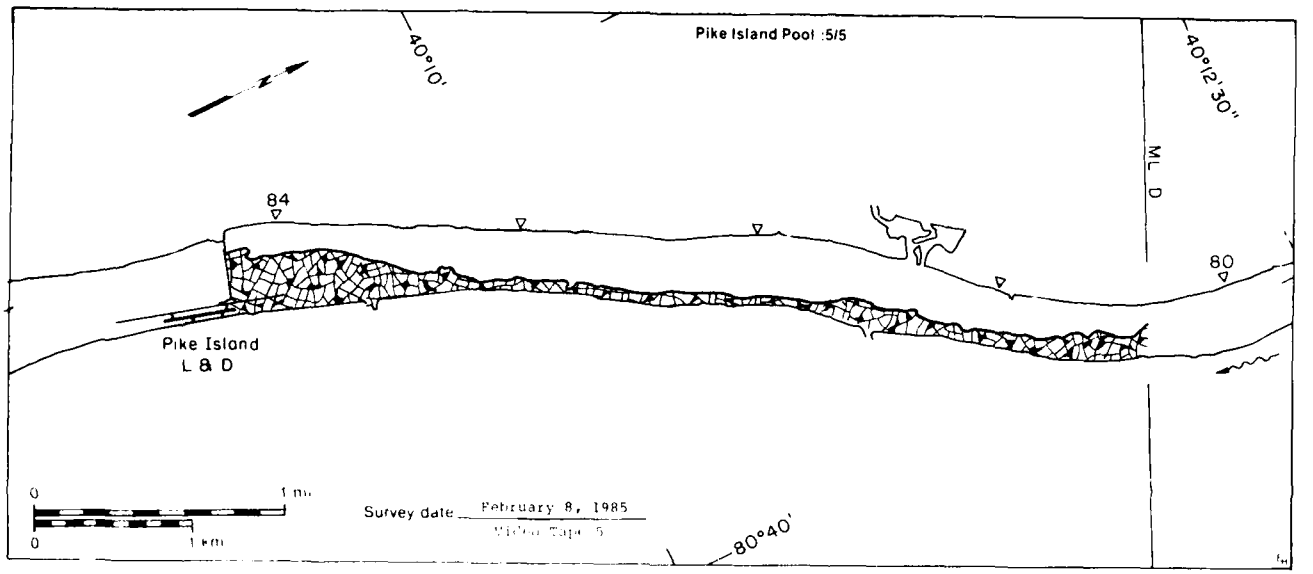
8 February 1985





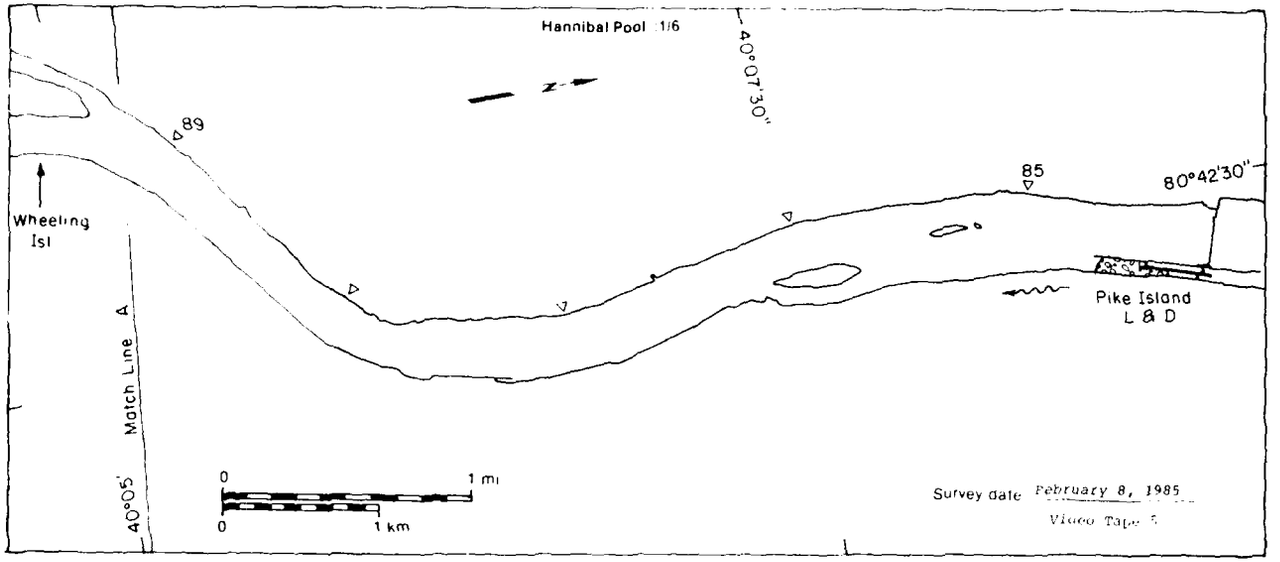


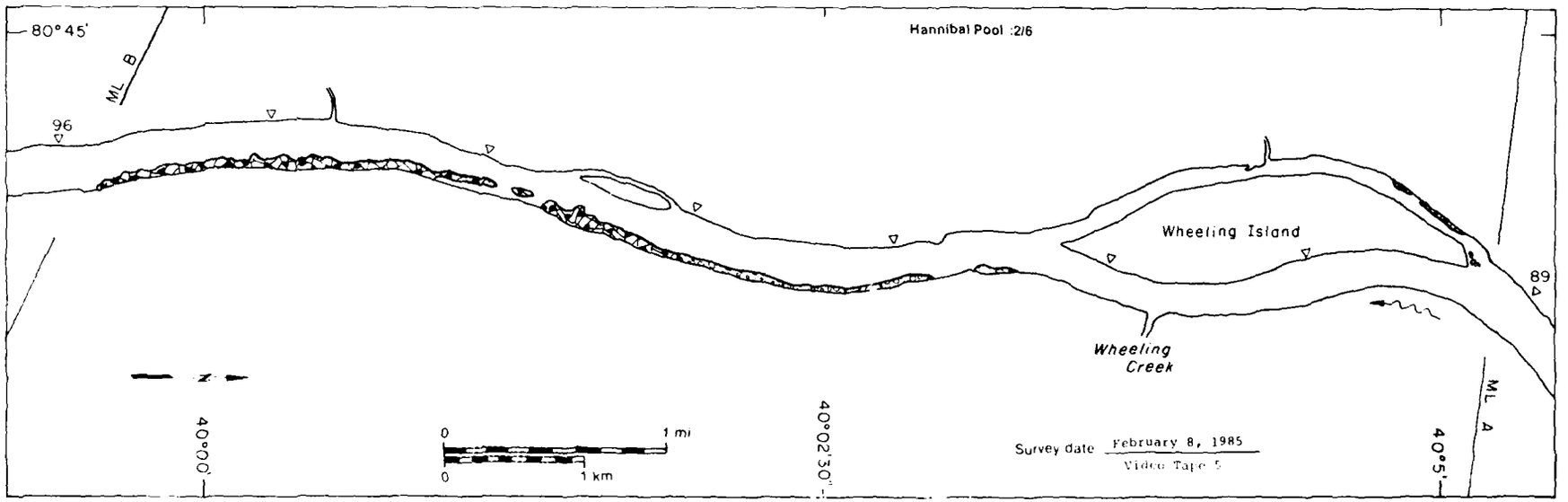


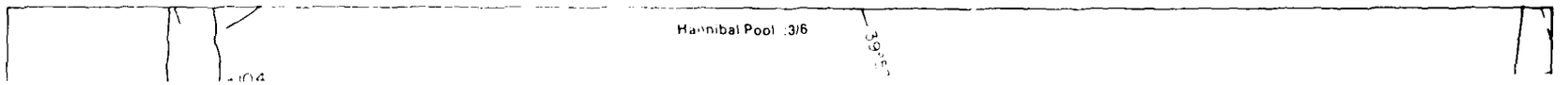


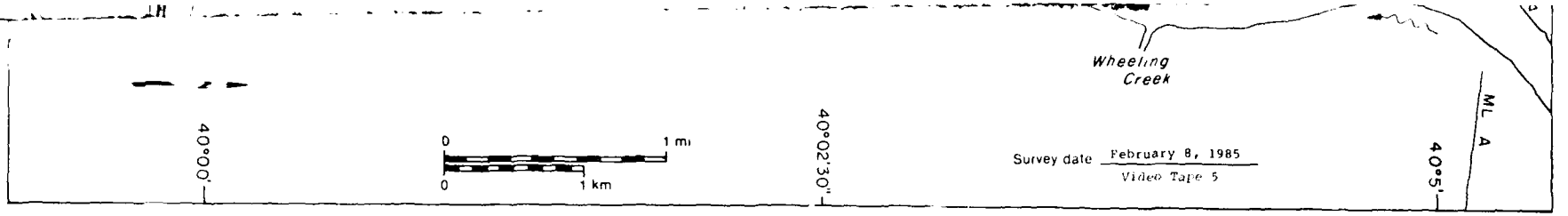
Pike Island Pool

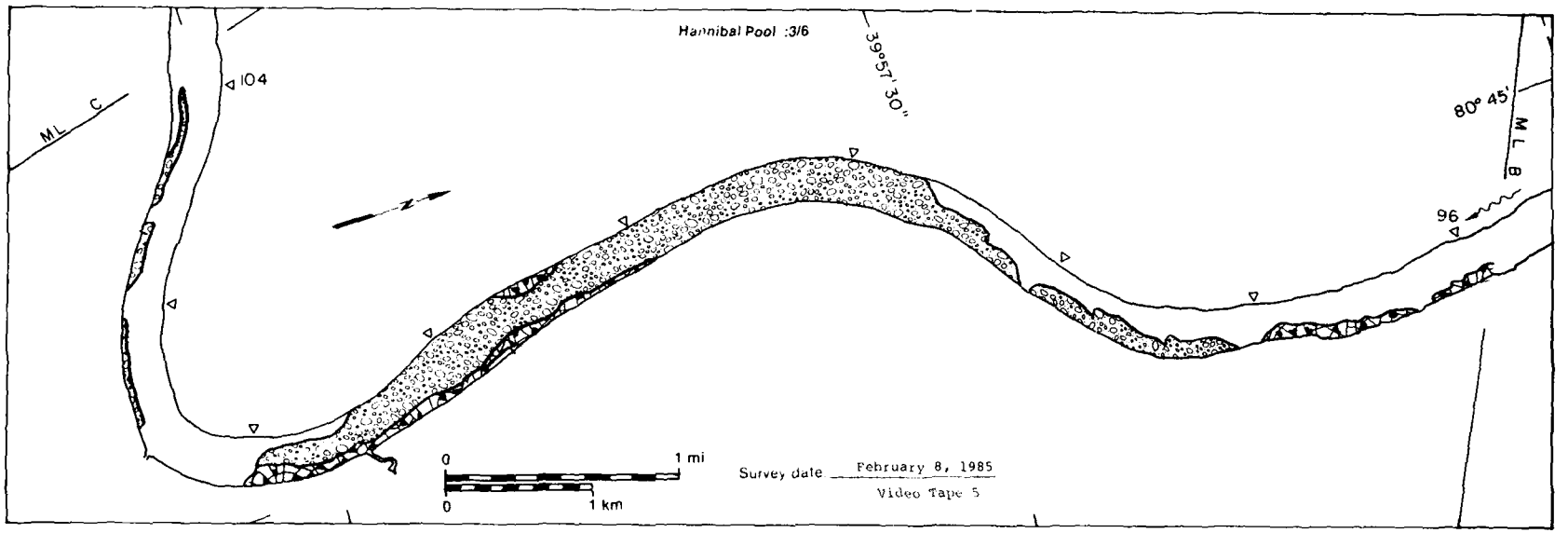
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	12.82	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	3.61	90
Ice floes or frazil slush and pans	2.49	40
Total Area ($m^2 \times 10^6$)	18.92	


Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Match Line A
40°05'
Pike Island L & D
0
1 mi
0
1 km
Survey date February 8, 1985
Video Tape 5

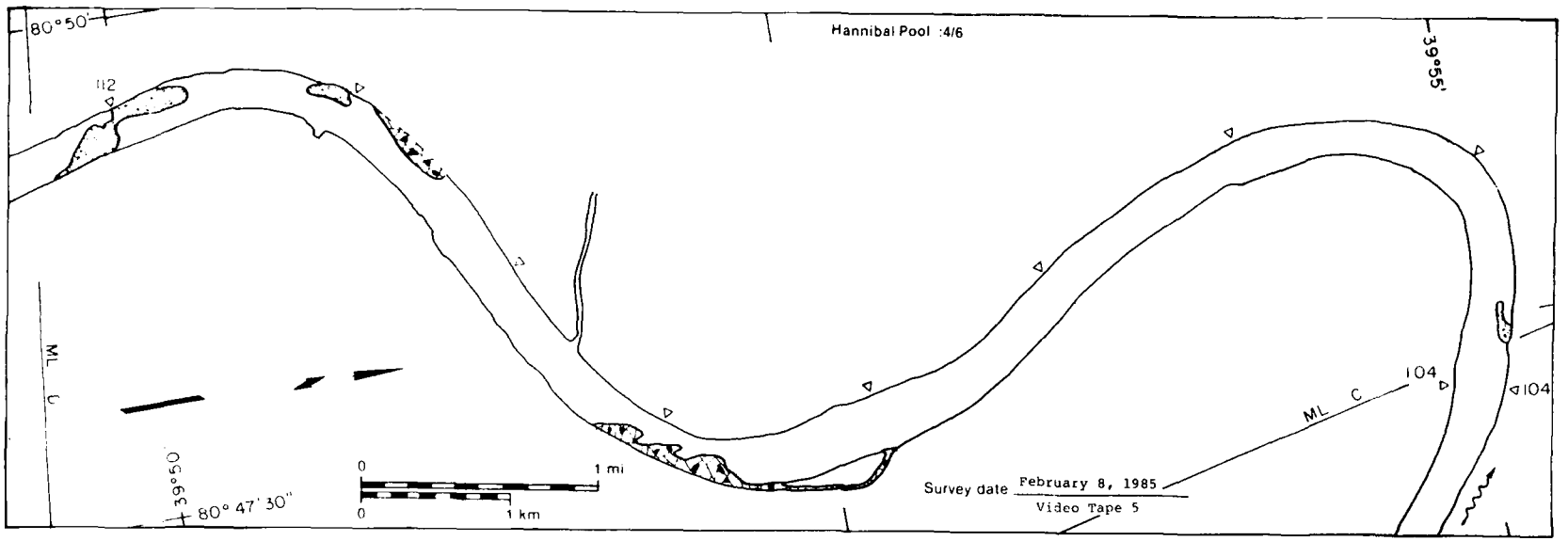

80°45'
Hannibal Pool :2/6
ML B
96
Wheeling Island
89
Wheeling Creek
ML A
40°00'
40°02'30"
40°05'
0
1 mi
0
1 km
Survey date February 8, 1985
Video Tape 5

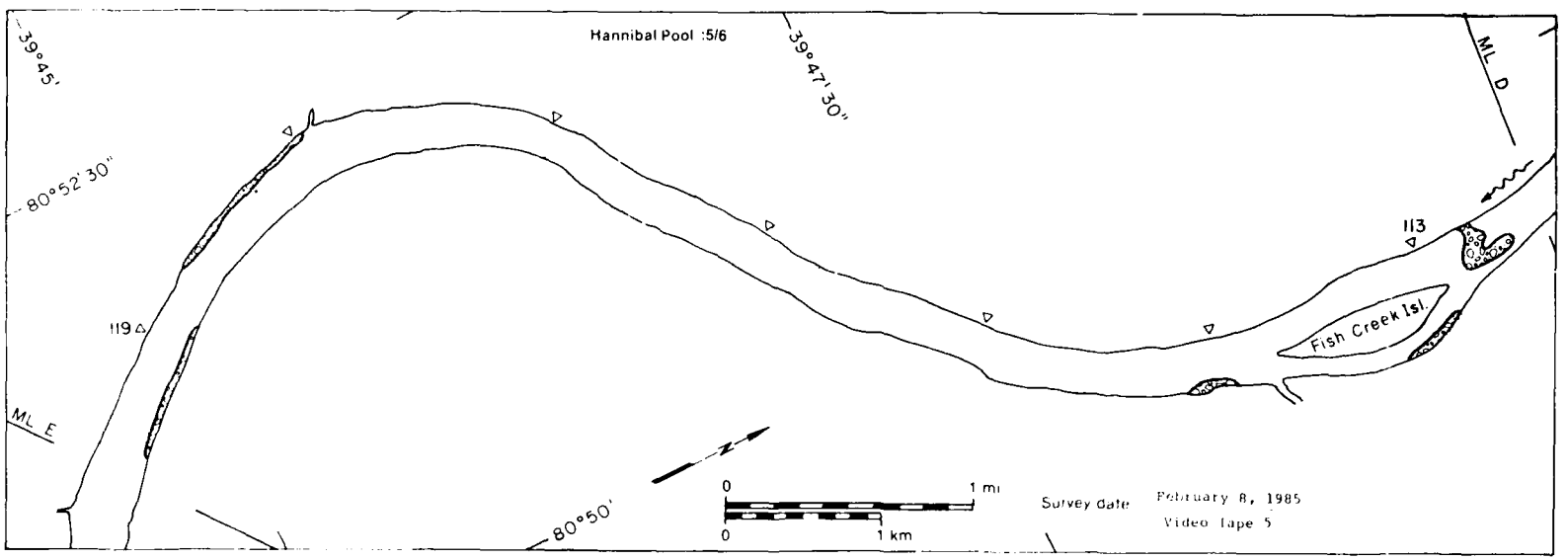

Hannibal Pool :3/6

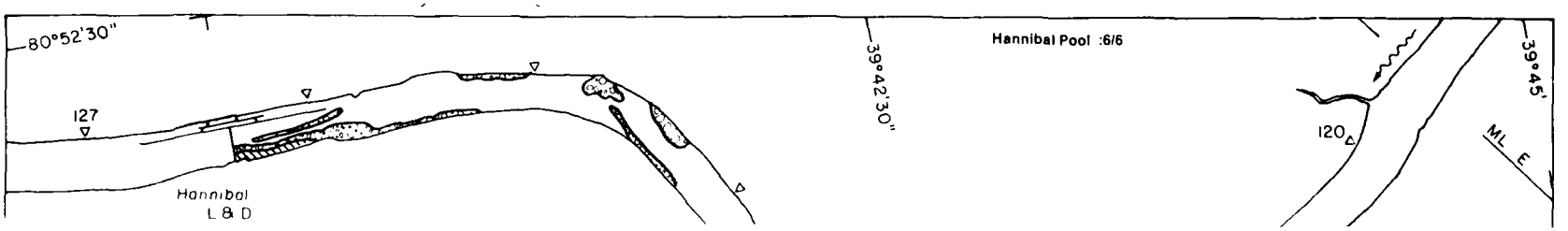

Wheeling Creek
40°00'
40°02'30"
40°5'
ML A
0 1 mi
0 1 km
Survey date February 8, 1985
Video Tape 5

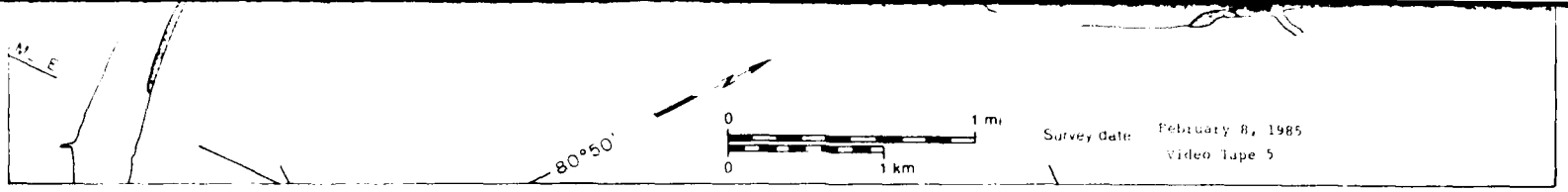

Hannibal Pool :3/6
39°57'30"
80° 45'
ML C
ML B
104
96
0 1 mi
0 1 km
Survey date February 8, 1985
Video Tape 5

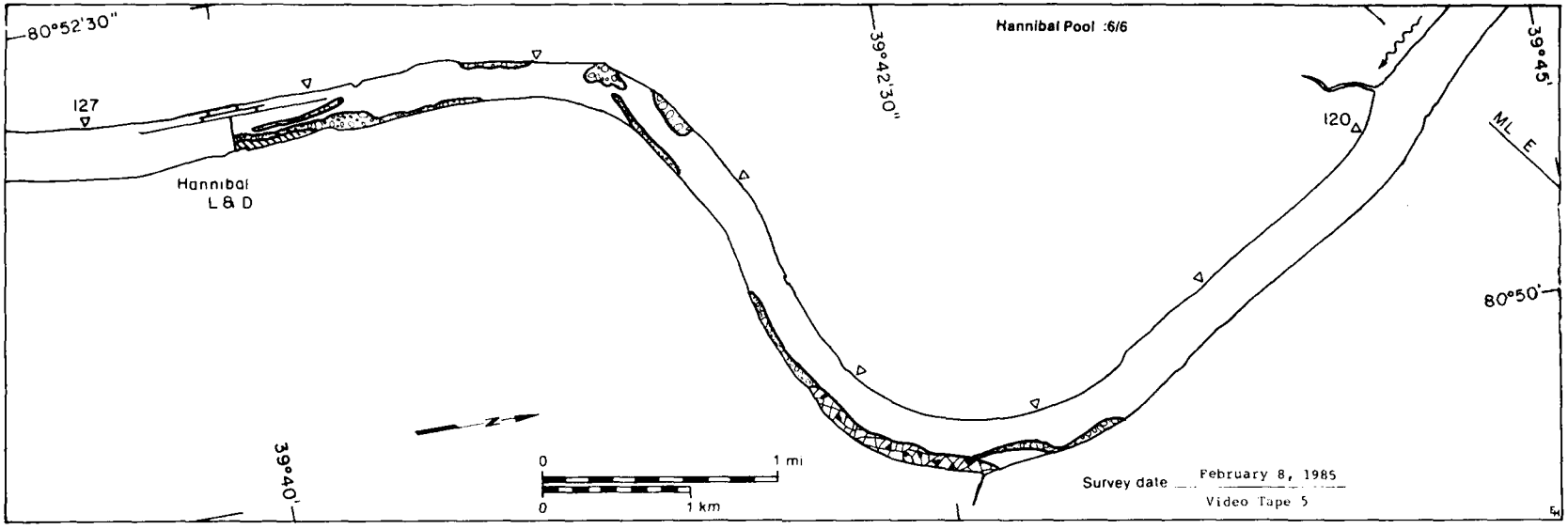
8 February 1985





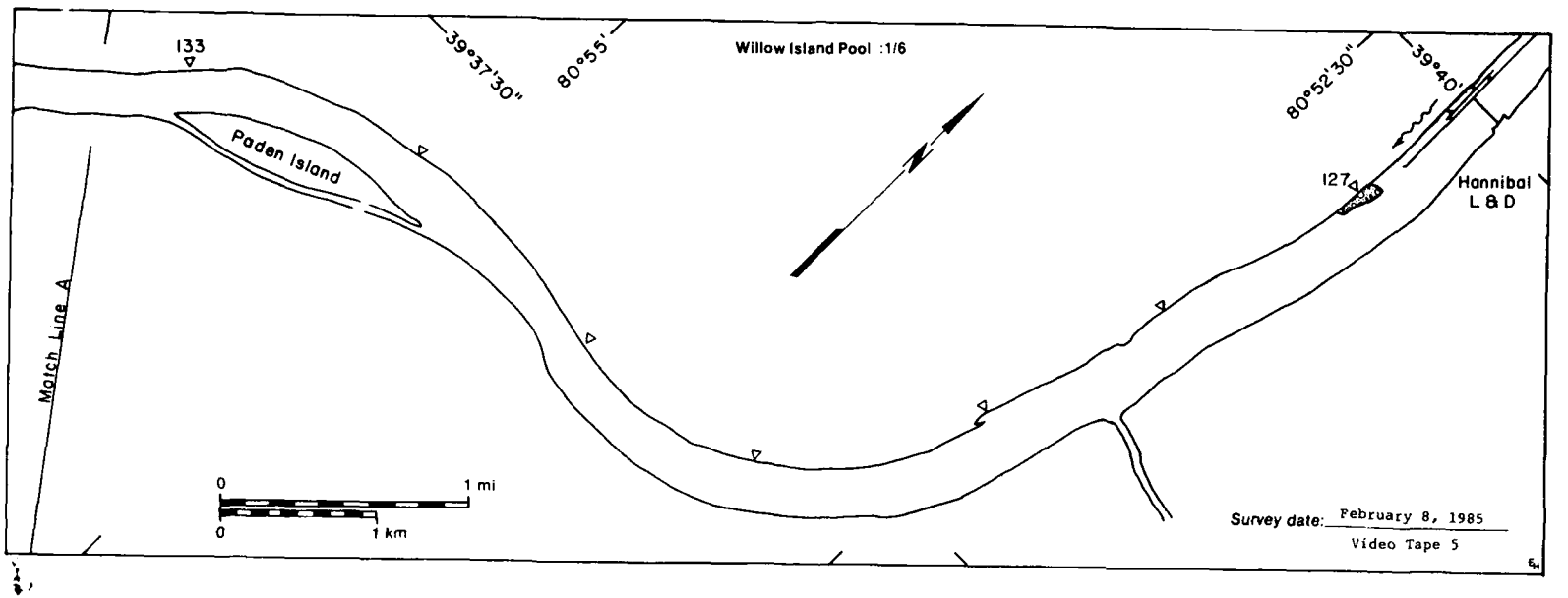


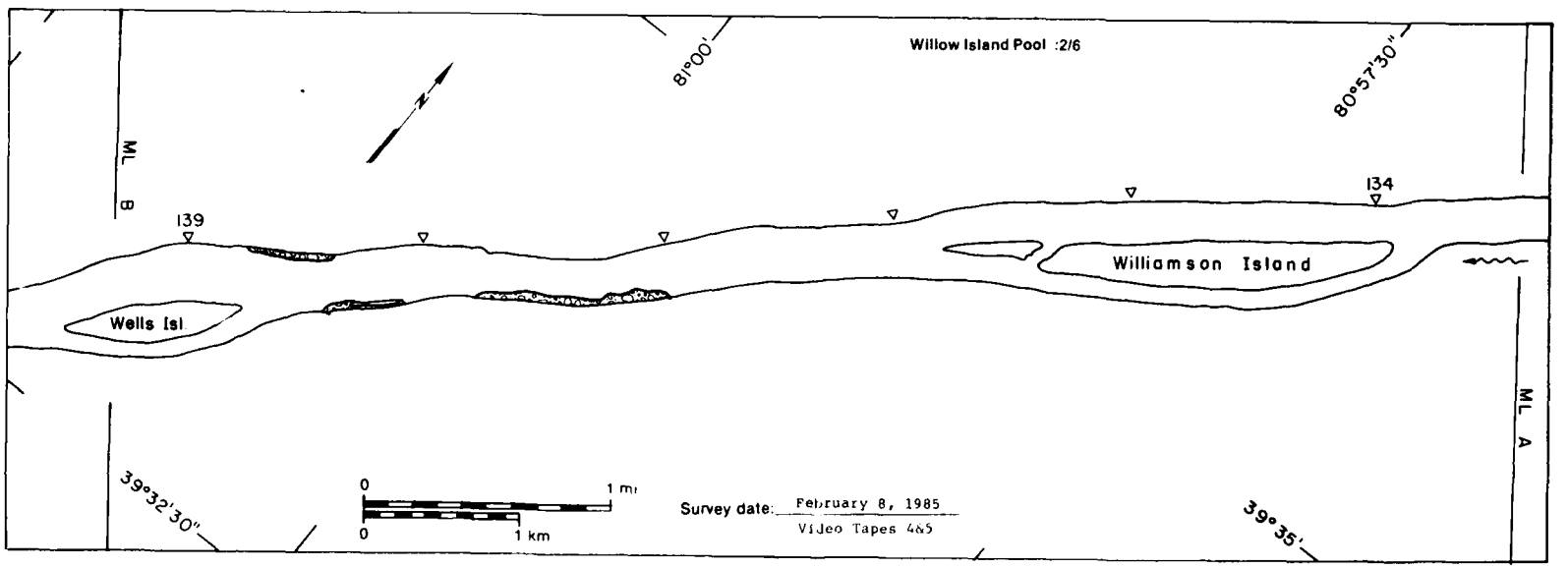


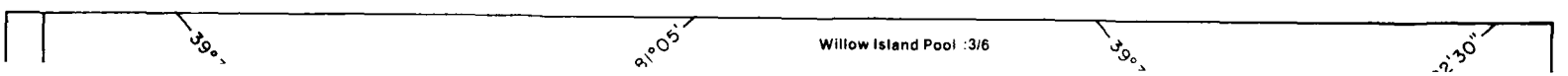


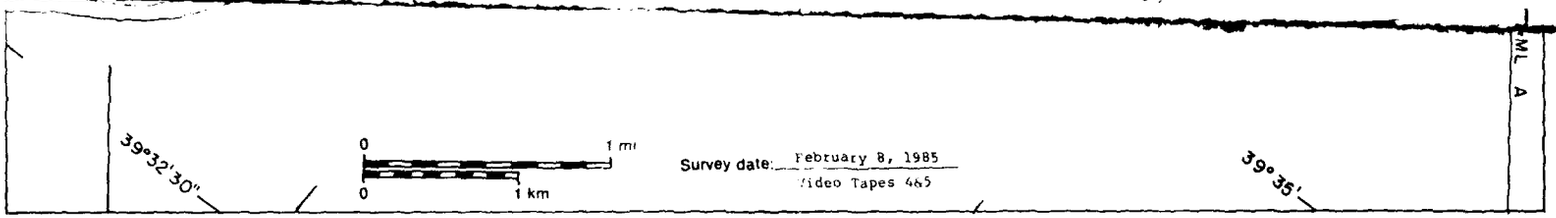
Hannibal Pool

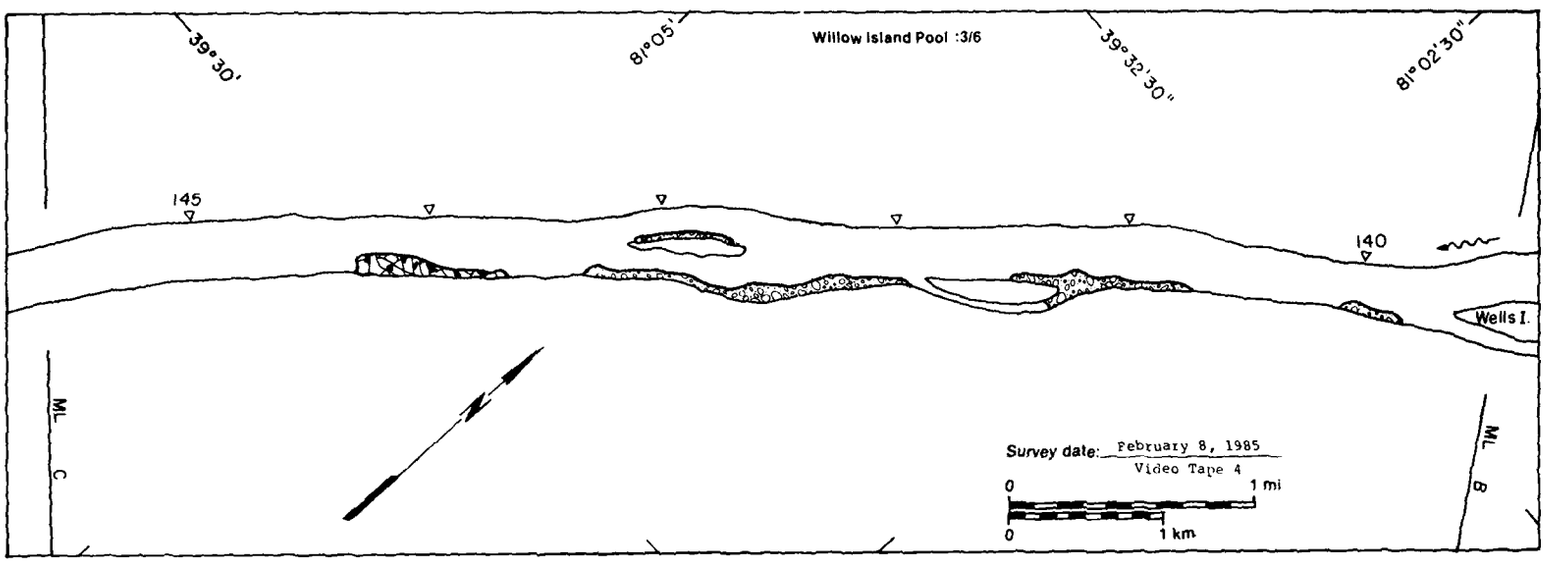
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.77	NA
Solid ice cover	0.03	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	1.01	90
Ice floes or frazil slush and pans	2.65	30
Total Area ($m^2 \times 10^6$)	22.46	


Willow Island Pool :1/6
133
39°37'30"
80°55'
Paden Island
Match Line A
80°52'30"
39°40'
127
Hannibal L&D
0
1 mi
0
1 km
Survey date: February 8, 1985
Video Tape 5

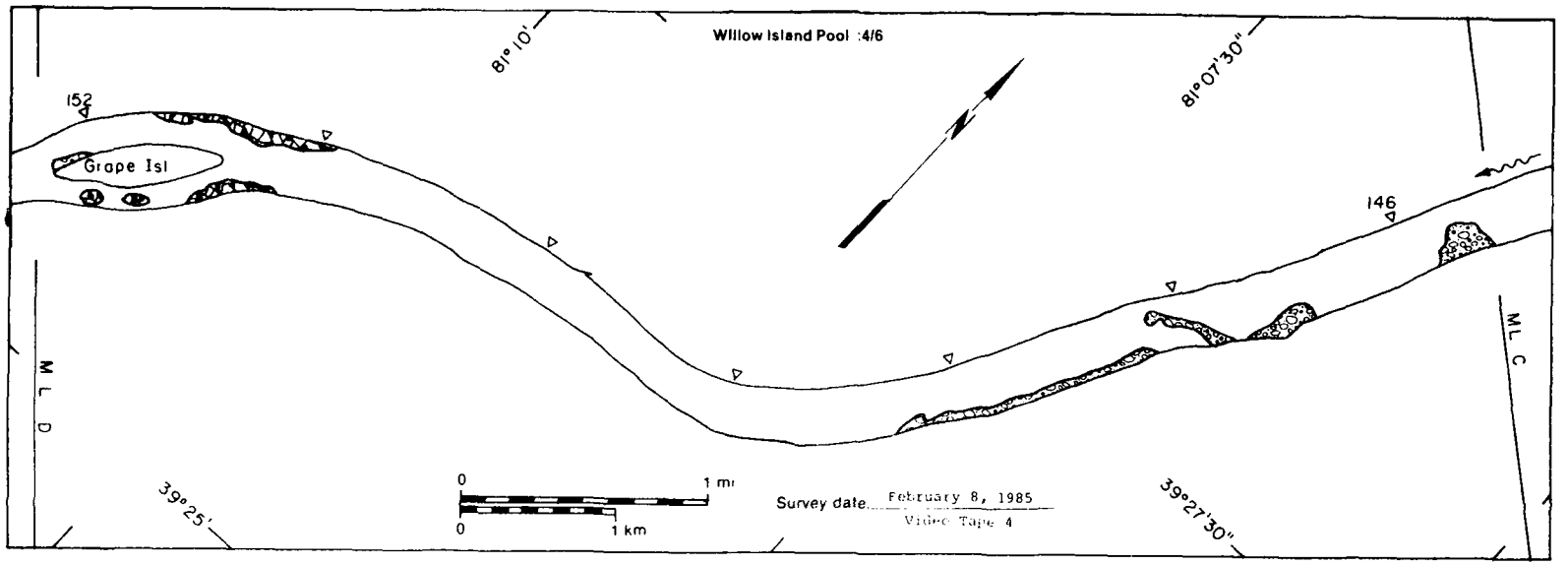

Willow Island Pool :2/6
81°00'
80°57'30"
ML B
139
134
Williamson Island
Wells Isl
ML A
39°32'30"
0
1 mi
0
1 km
Survey date: February 8, 1985
Video Tapes 485
39°35'

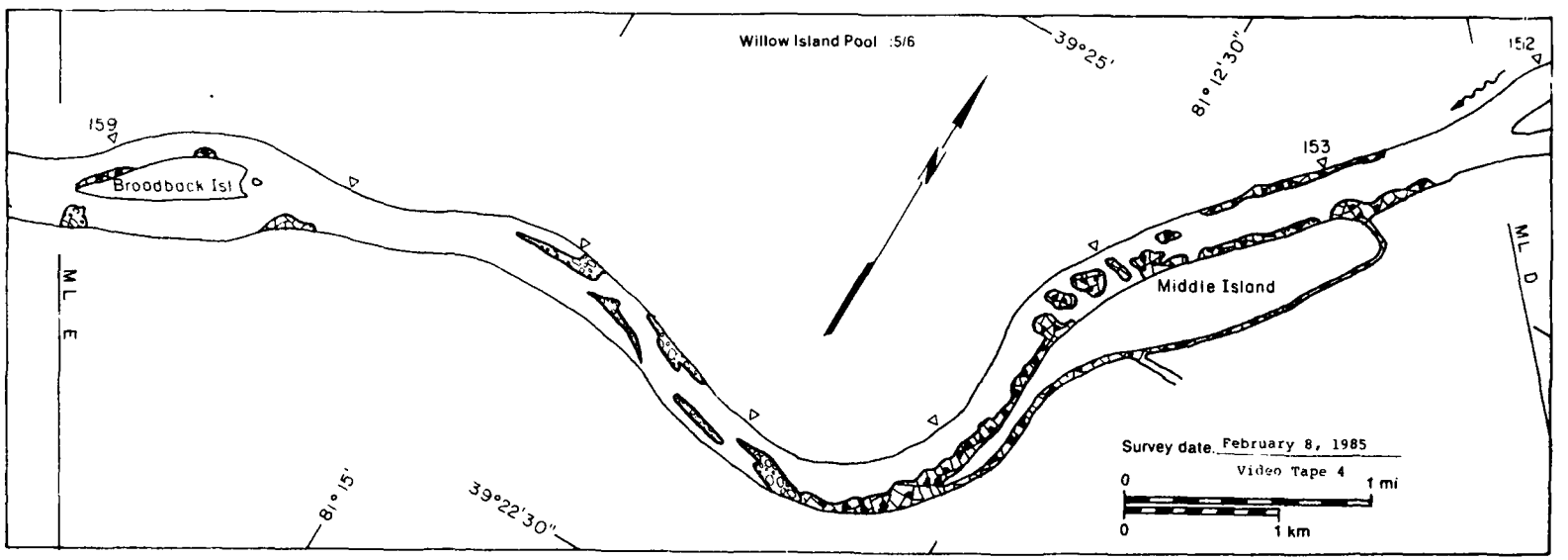

Willow Island Pool :3/6
81°05'

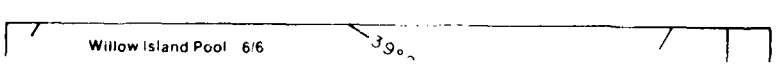

39°32'30"
0
1 mi
0
1 km
Survey date: February 8, 1985
Video Tapes 485
39°35'
ML A

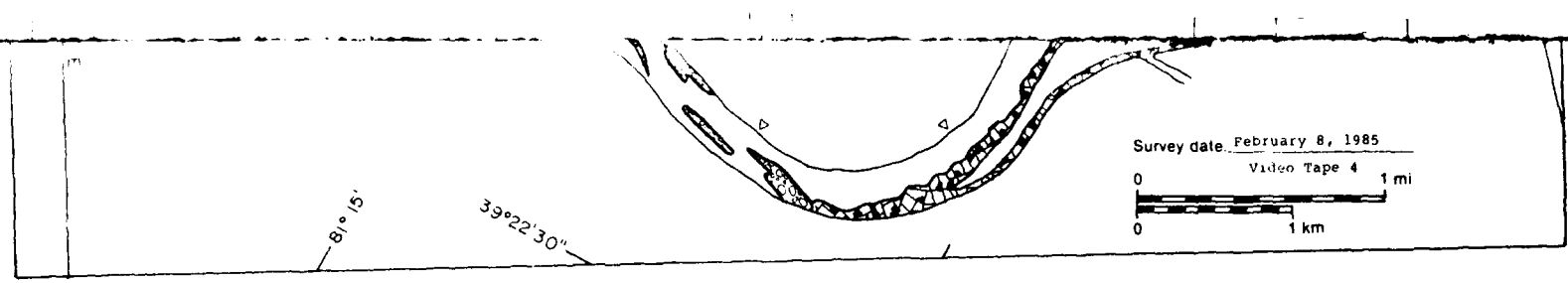

39°30'
81°05'
Willow Island Pool :3/6
39°32'30"
81°02'30"
145
140
Wells I.
ML C
ML B
Survey date: February 8, 1985
Video Tape 4
0
1 mi
0
1 km

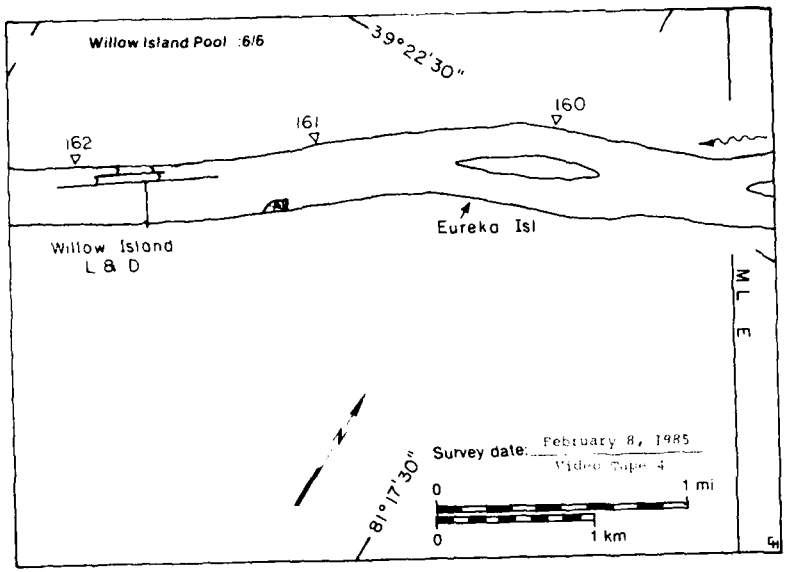
8 February 1985





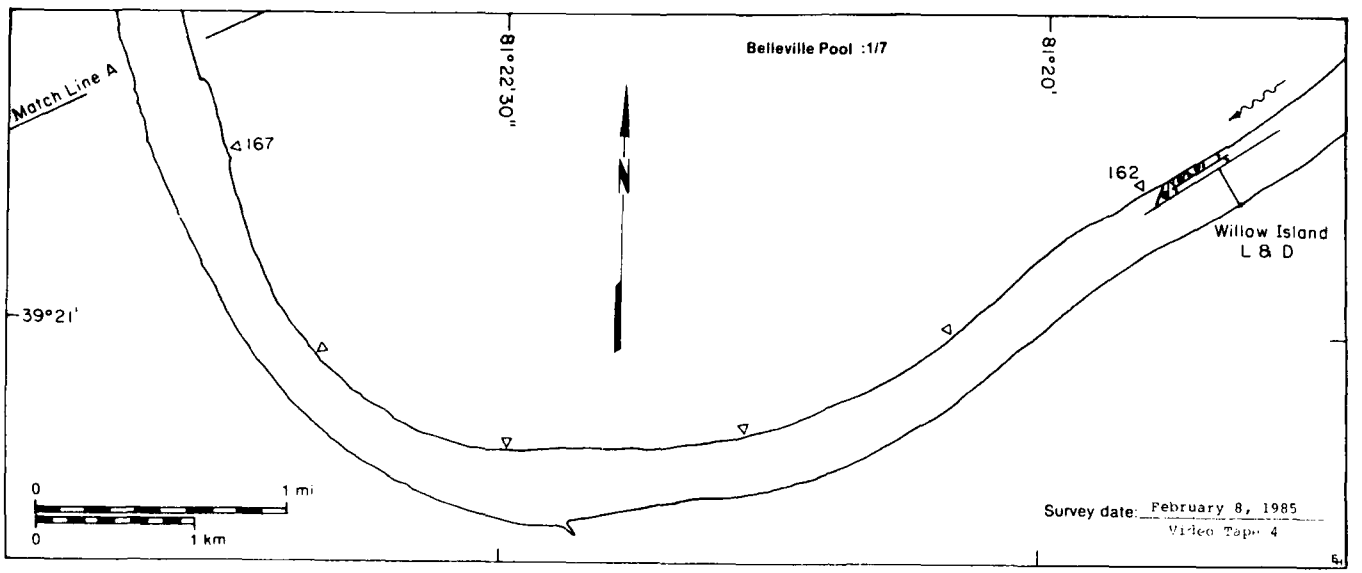


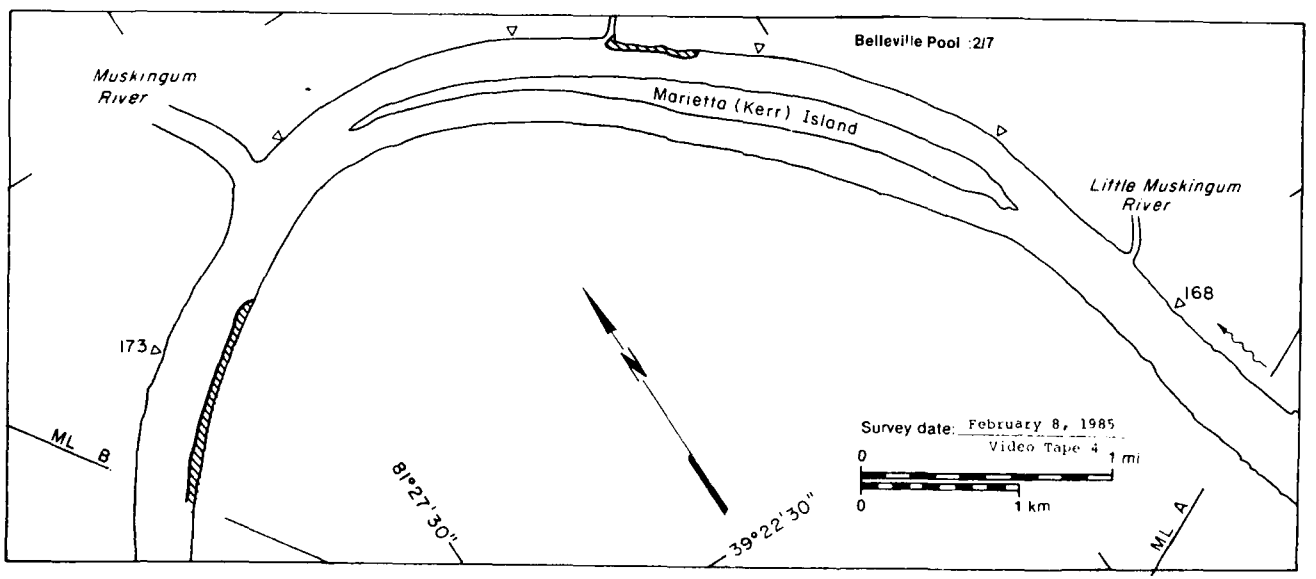


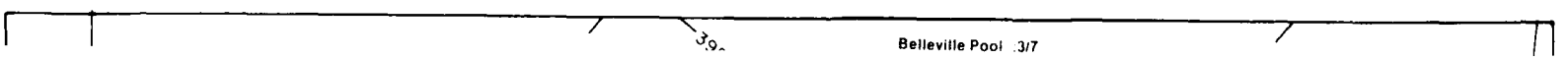


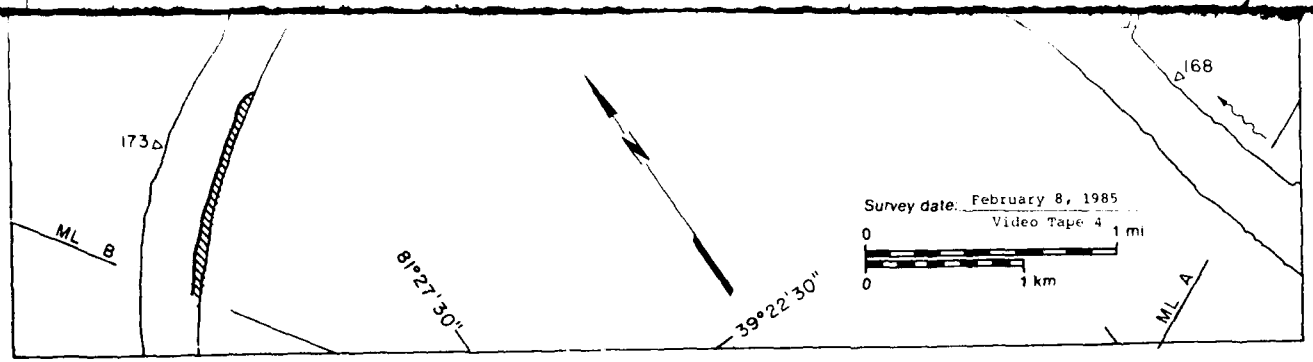
Willow Island Pool

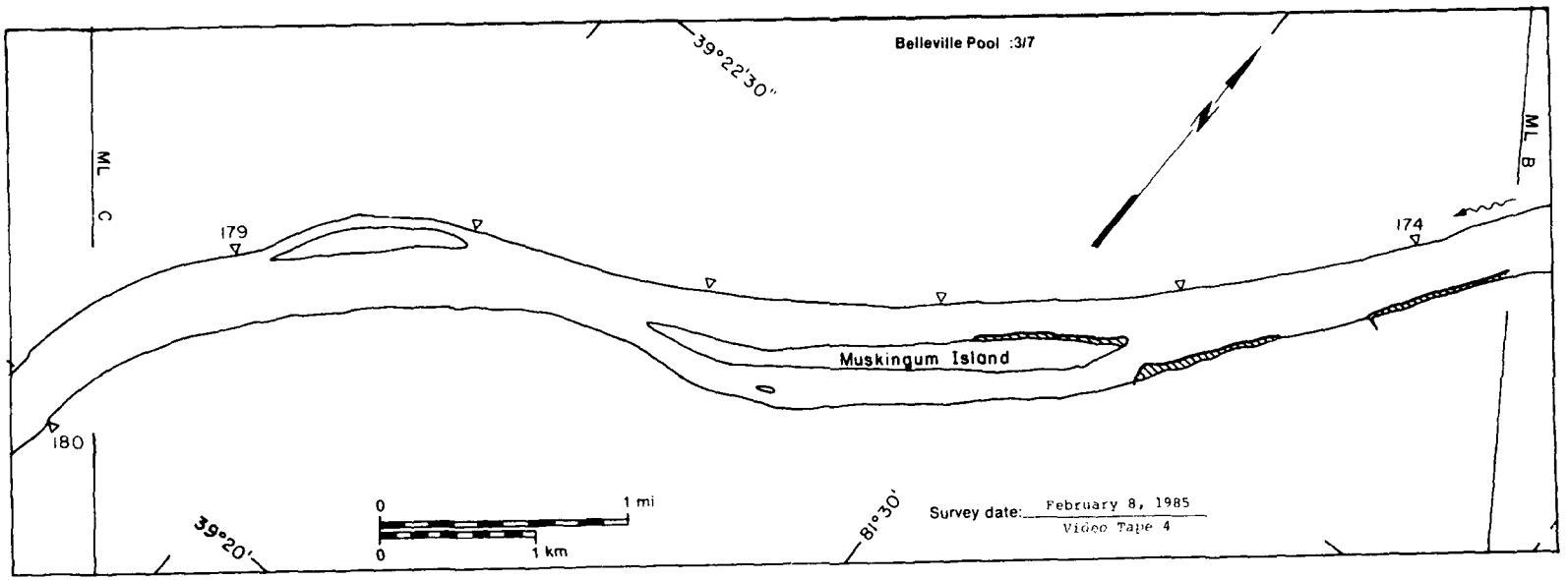
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	19.39	NA
Solid ice cover	--	NA
Solid ice cover with *open-water areas*	--	--
Fragmented ice cover	0.03	NA
Fragmented ice cover with open-water areas	0.95	90
Ice floes or frazil slush *and pans*	0.87	40
Total Area ($m^2 \times 10^6$)	21.24	


Belleville Pool :1/7
Match Line A
81°22'30"
81°20'
167
162
Willow Island
L & D
39°21'
0
1 mi
0
1 km
Survey date: February 8, 1985
Video Tape 4

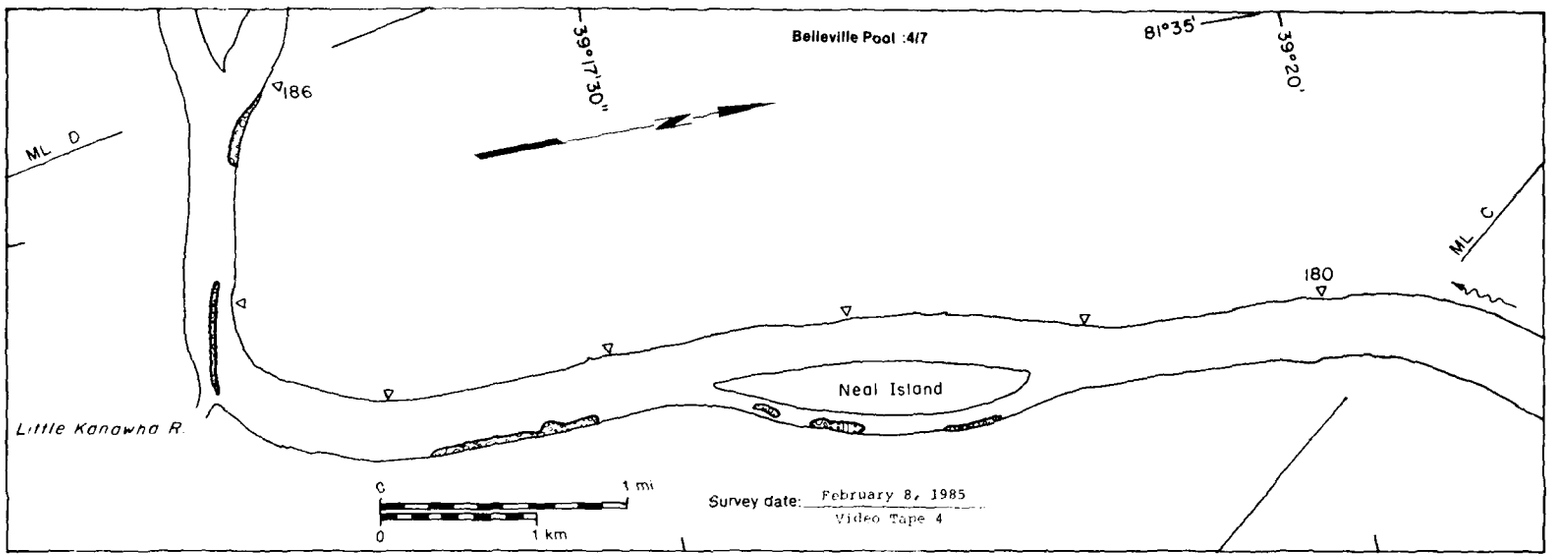

Belleville Pool :2/7
Muskingum
River
Marietta (Kerr) Island
Little Muskingum
River
168
173
ML B
81°27'30"
39°22'30"
ML A
Survey date: February 8, 1985
Video Tape 4
0
1 mi
0
1 km

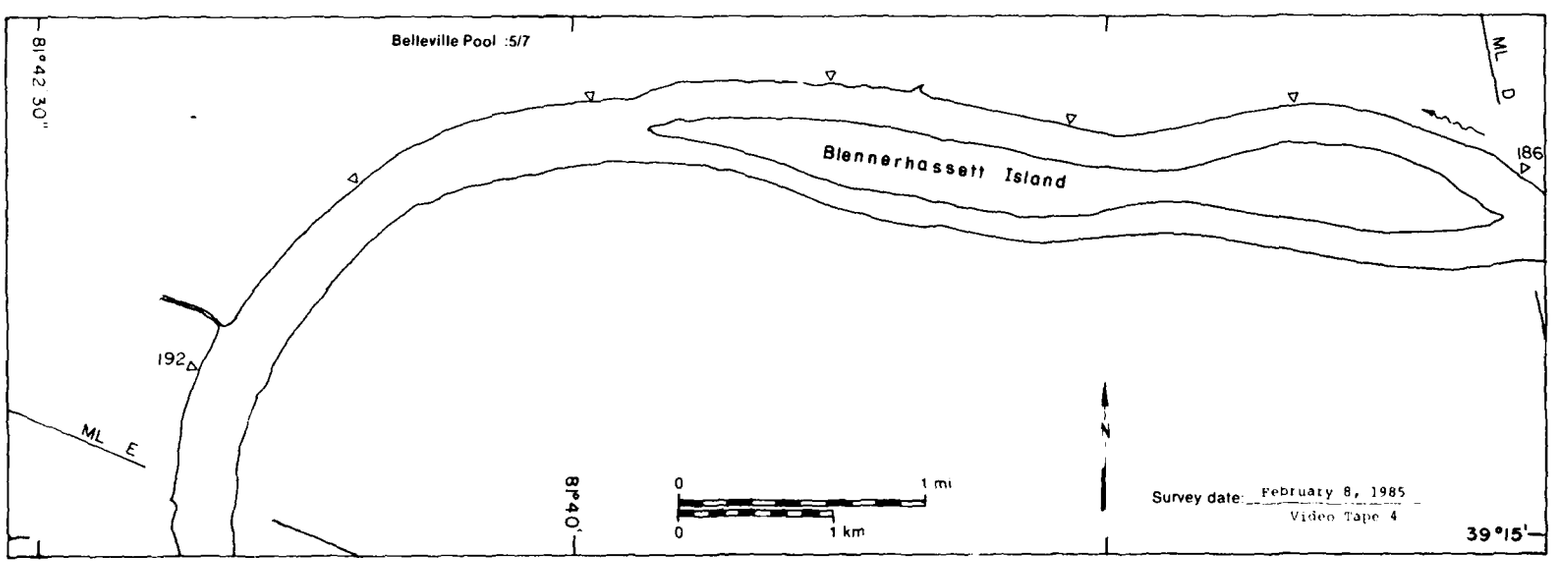

Belleville Pool :3/7


168
173
ML B
81°27'30"
39°22'30"
Survey date: February 8, 1985
Video Tape 4
0
1 mi
0
1 km
ML A

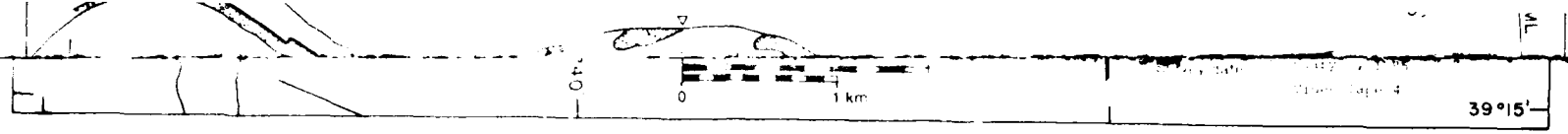

Belleville Pool :3/7
39°22'30"
ML C
ML B
179
174
Muskingum Island
180
39°20'
0
1 mi
0
1 km
81°30'
Survey date: February 8, 1985
Video Tape 4

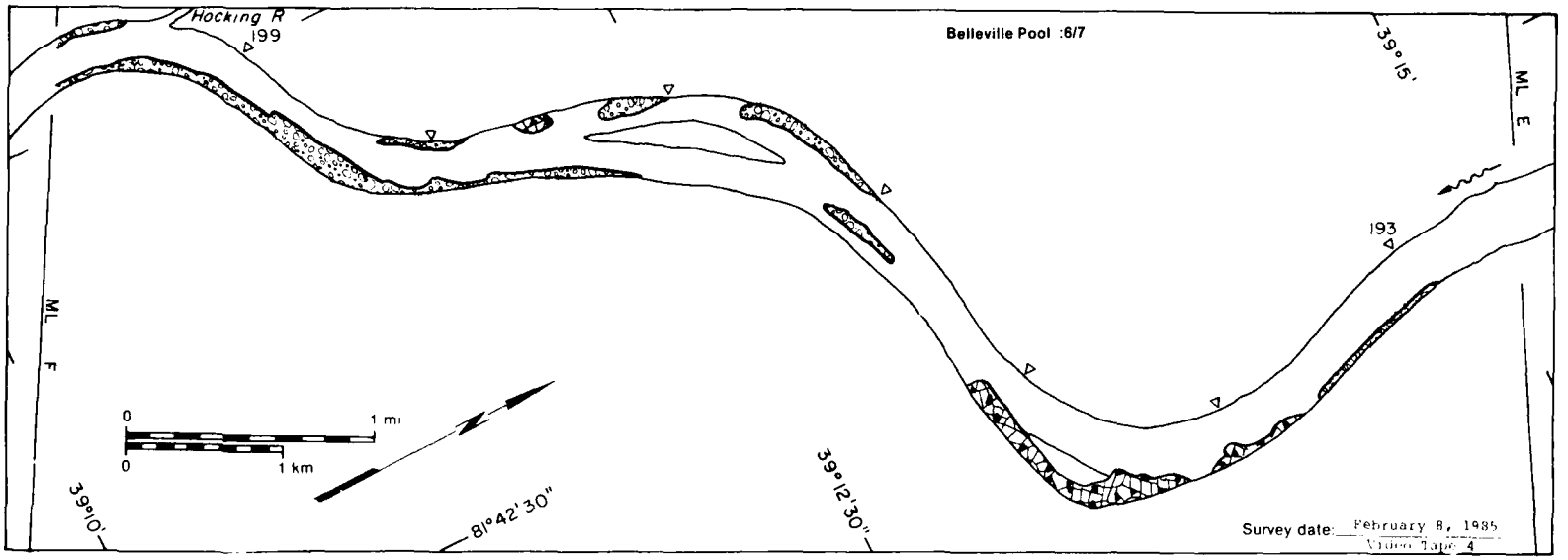
8 February 1985



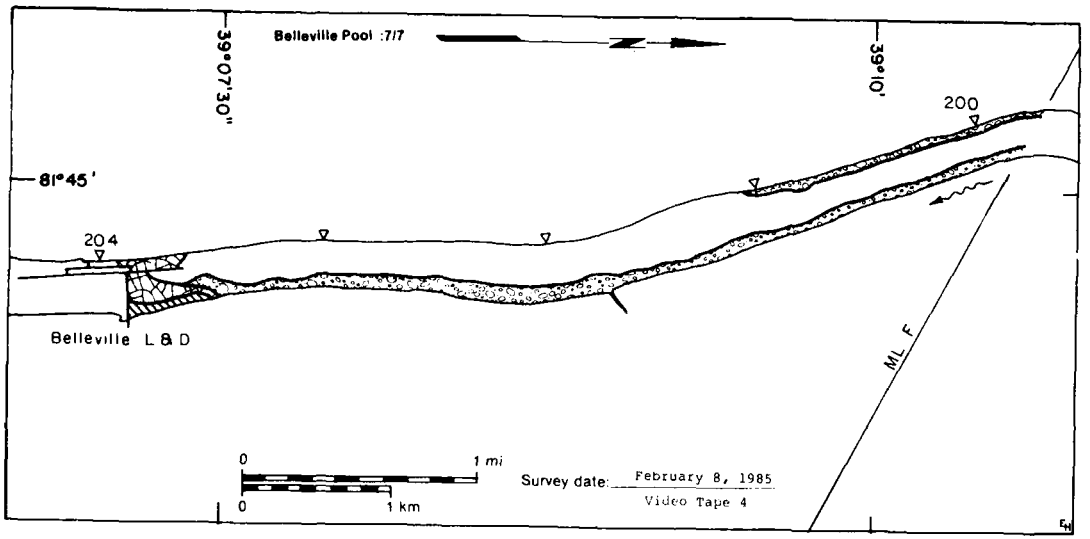


Hocking R


0
1 km
39°15'


Hocking R
199
Belleville Pool :6/7
39°15'
ML E
193
ML F
0
1 mi
0
1 km
39°10'
81°42'30"
39°12'30"
Survey date: February 8, 1985
Video Tape 4

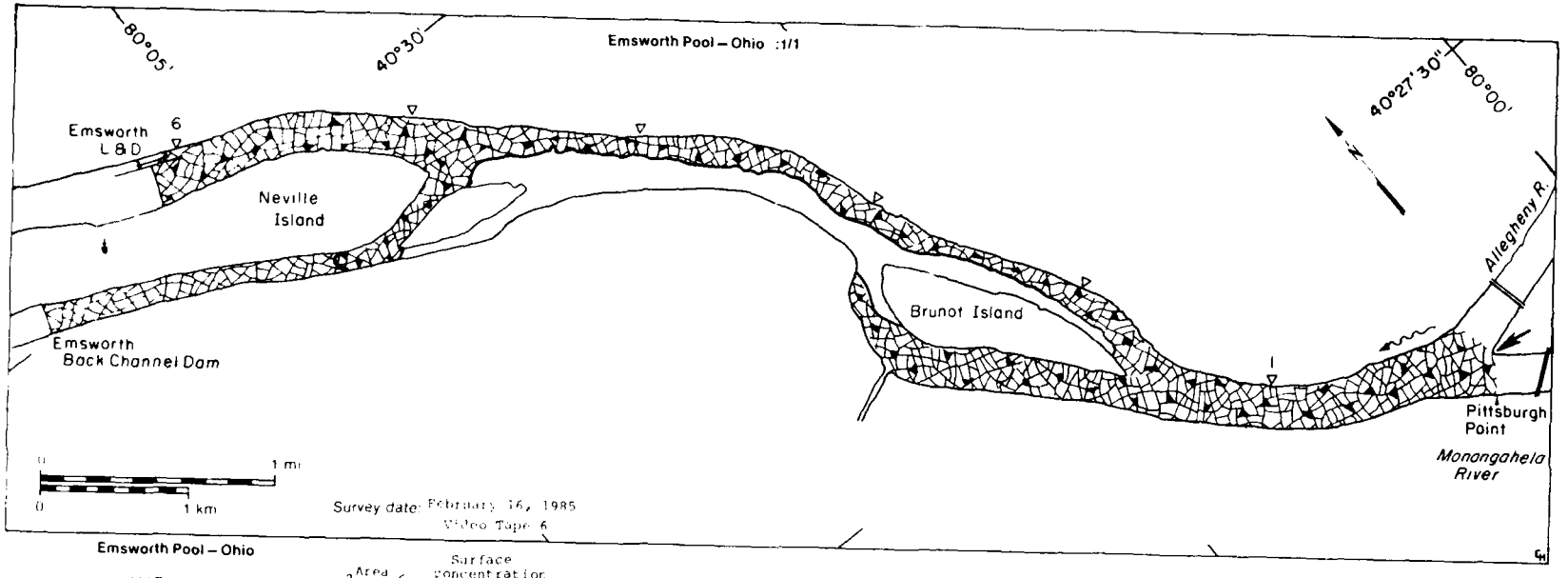
8 February 1985



Belleville Pool

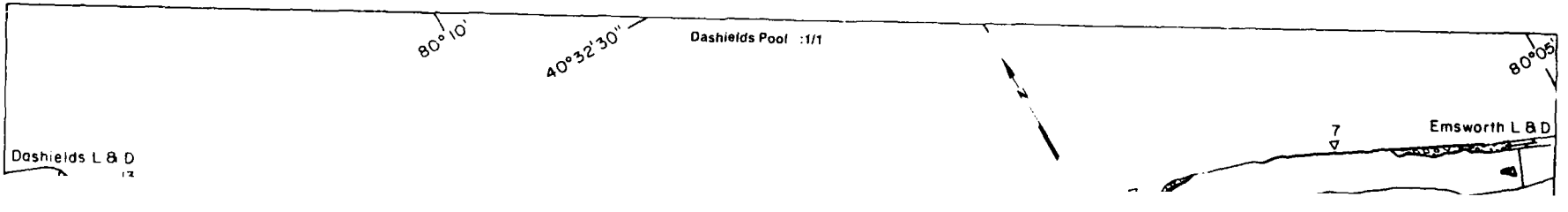
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	24.92	NA
Solid ice cover	0.31	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	0.11	NA
Fragmented ice cover with open-water areas	0.37	60
Ice floes or frazil slush and pans	1.57	30
Total Area ($m^2 \times 10^6$)	27.28	

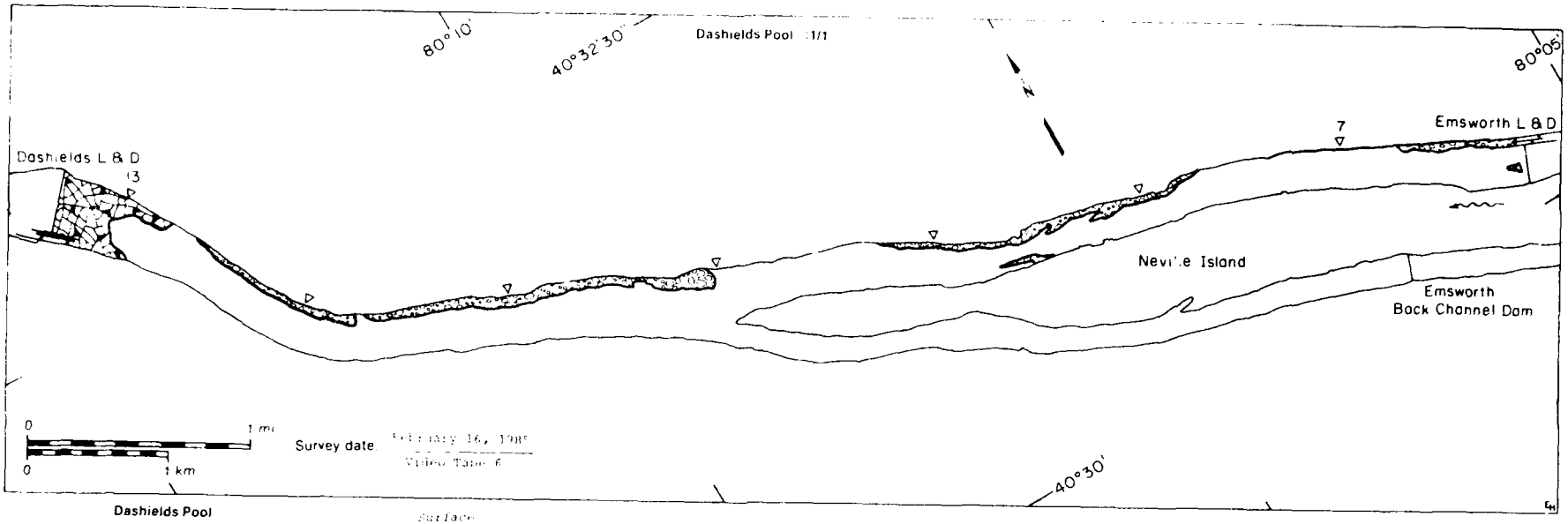
16 February 1985



Emsworth Pool – Ohio

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.98	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	0.32	NA
Fragmented ice cover with open-water areas	3.19	60
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.49	

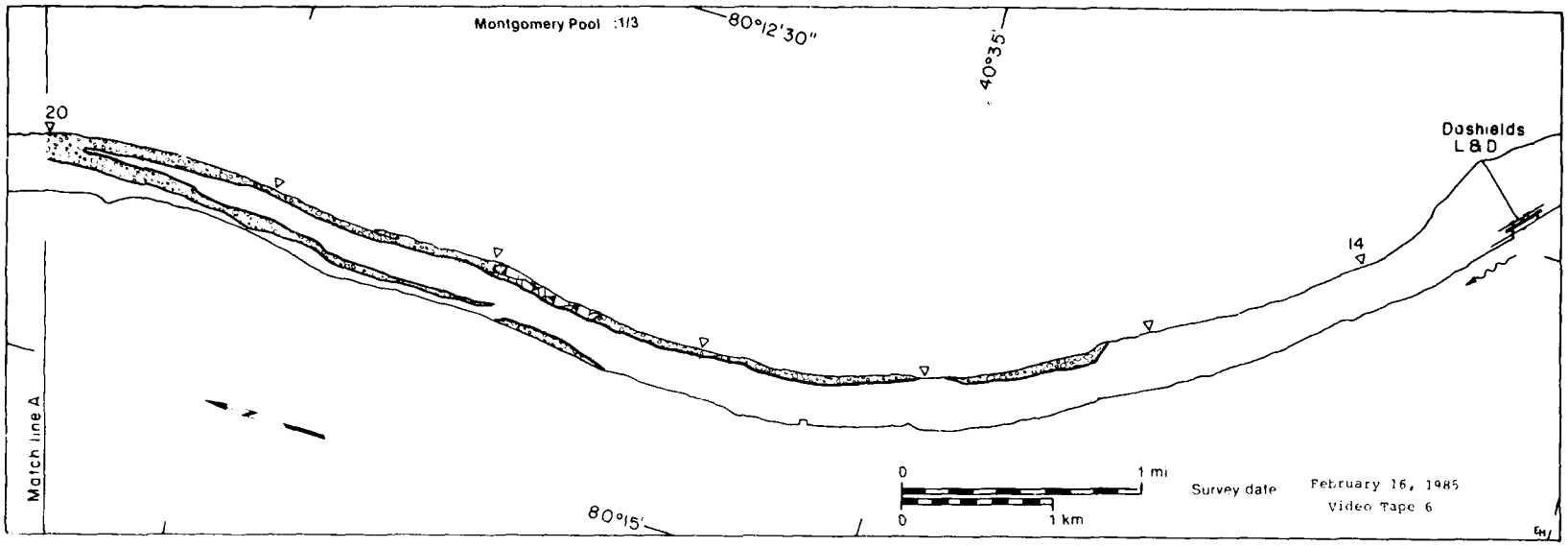


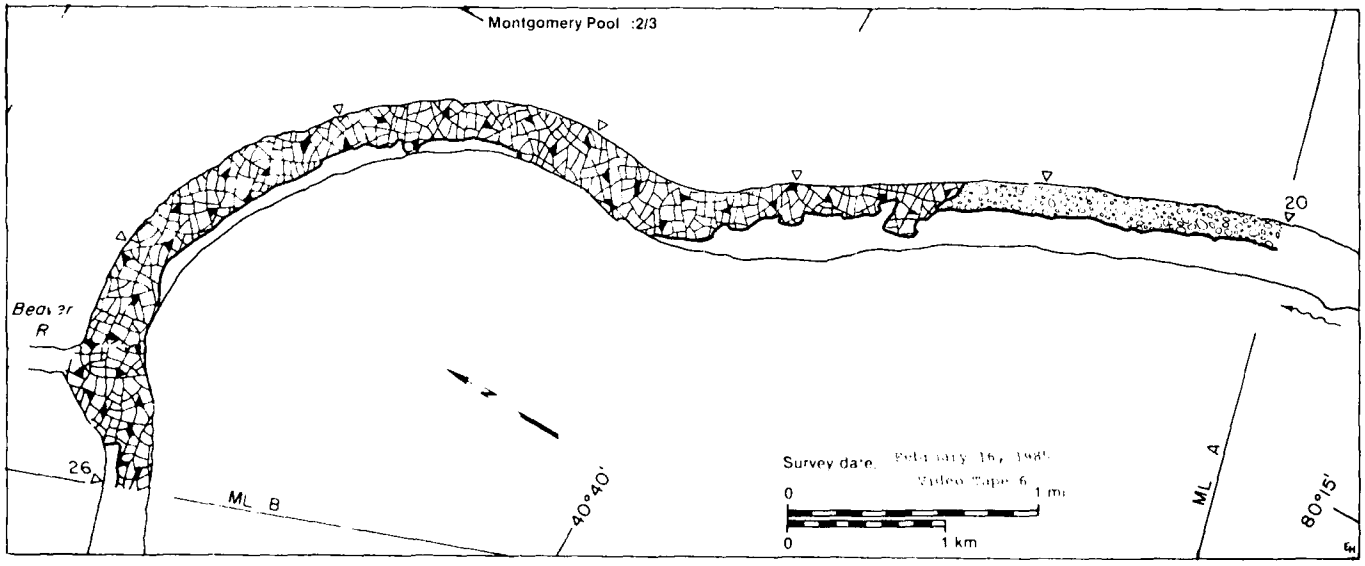


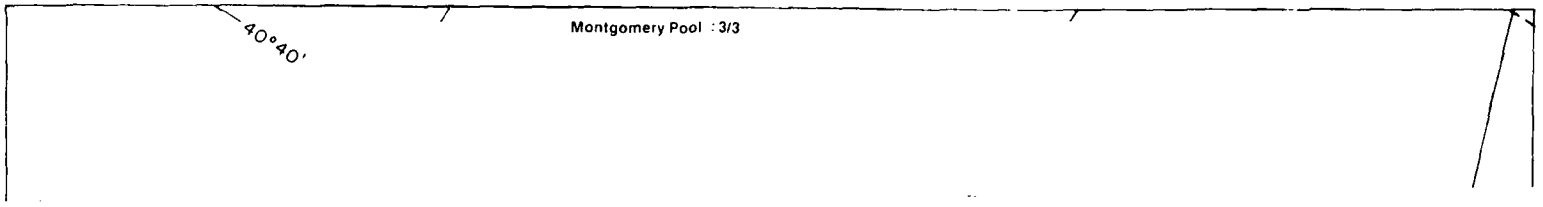
Dashields Pool

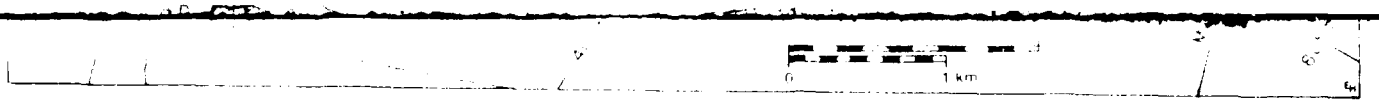
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.13	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	0.26	80
Ice floes or frazil slush and pans	0.61	5
Total Area ($m^2 \times 10^6$)	5.00	

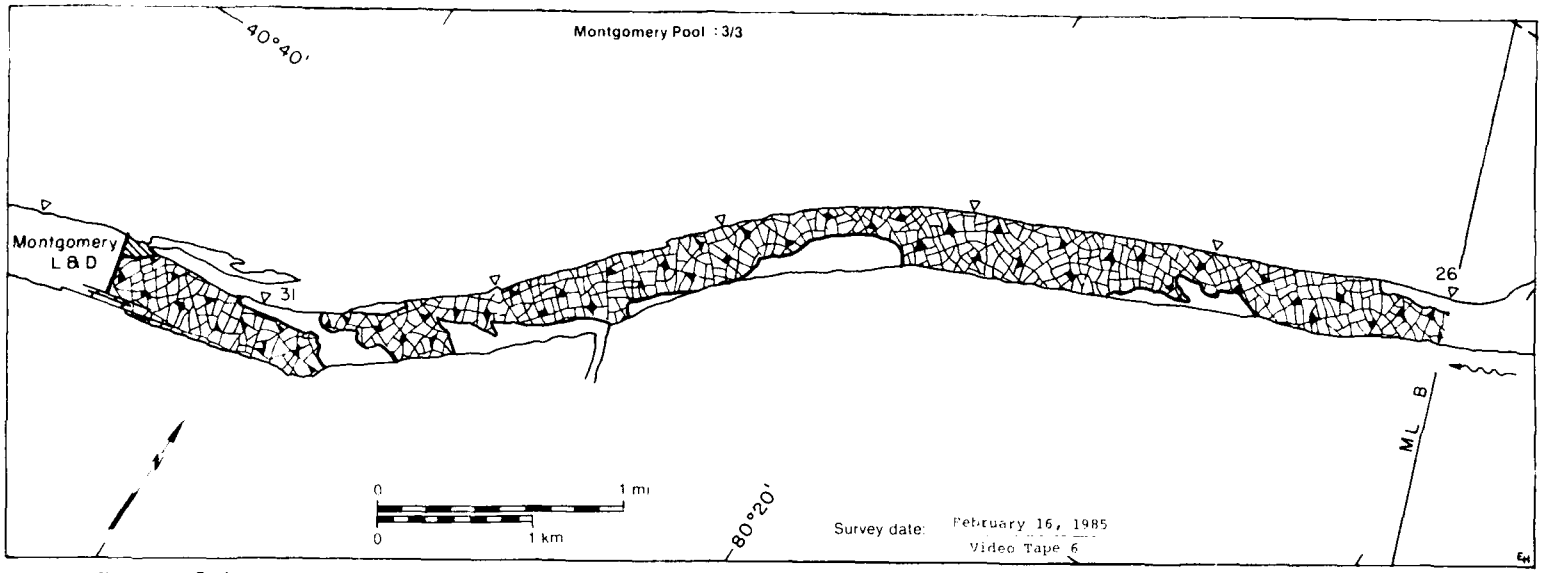
16 February 1985





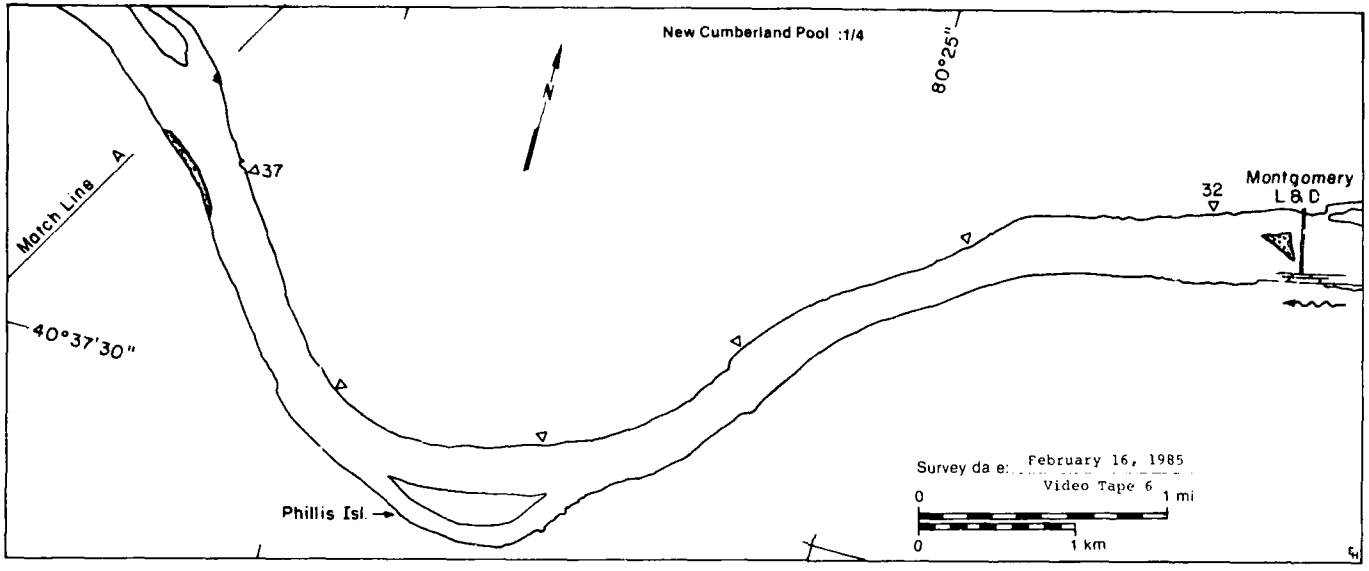


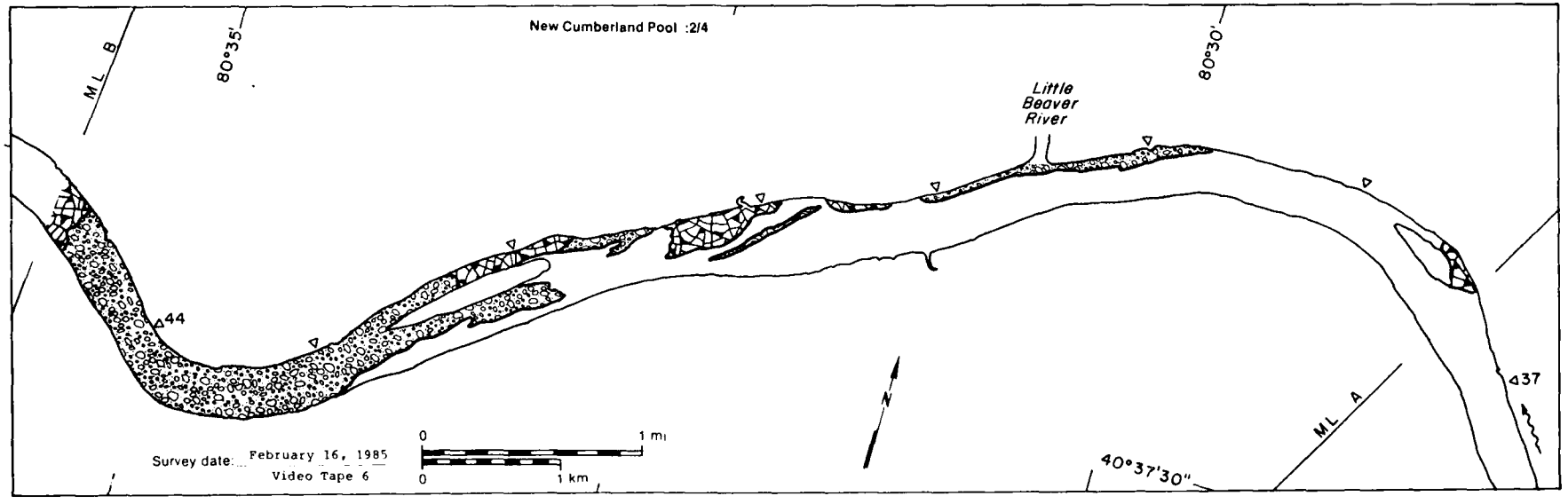


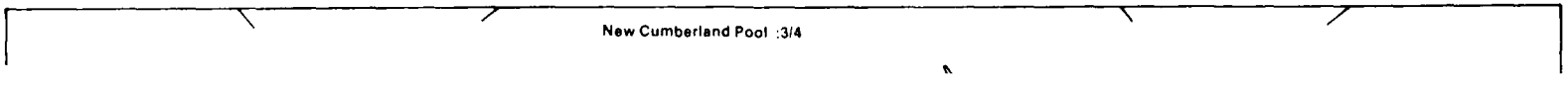


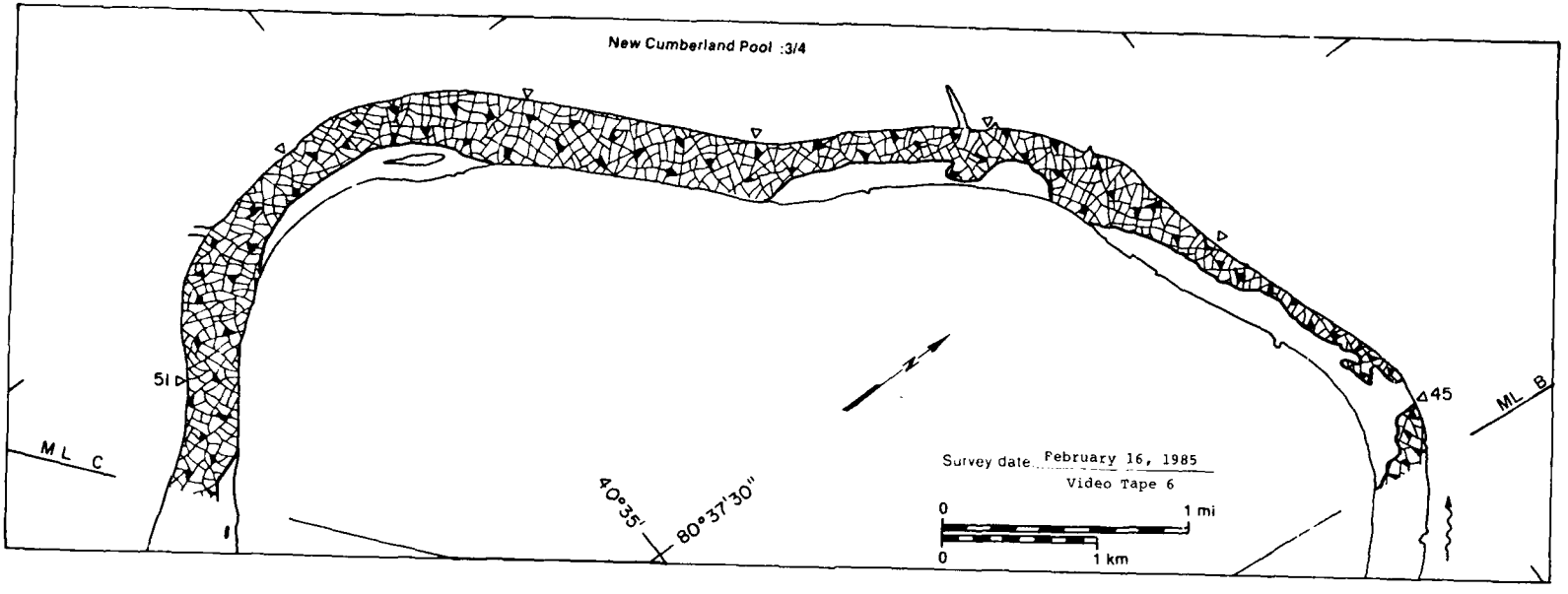
Montgomery Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.90	NA
Solid ice cover	0.09	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	5.18	70
Ice floes or frazil slush and pans	1.10	5
Total Area ($m^2 \times 10^6$)	11.27	

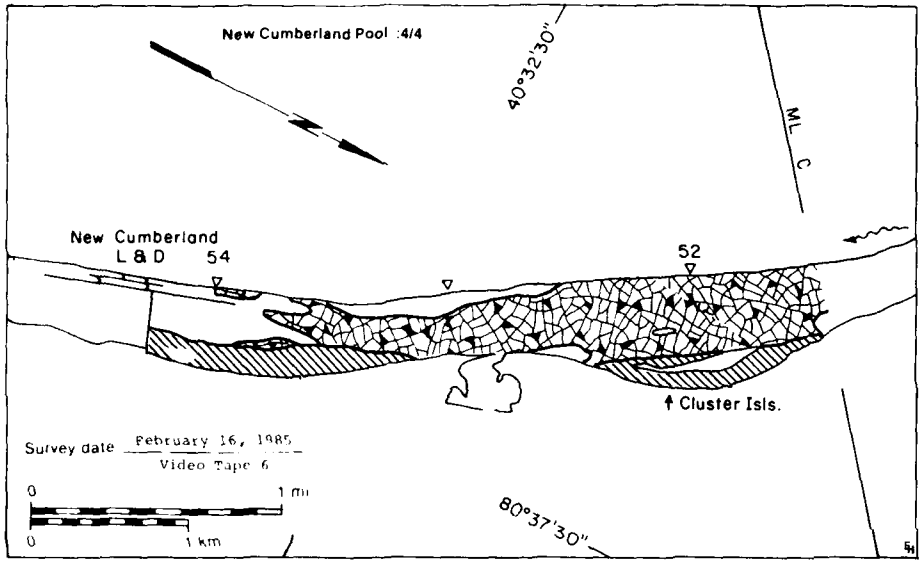

New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery L&D
40°37'30"
Phillis Isl.
Survey da e: February 16, 1985
Video Tape 6
0
1 mi
0
1 km


New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little Beaver River
44
37
ML A
40°37'30"
Survey date: February 16, 1985
Video Tape 6
0
1 mi
0
1 km


New Cumberland Pool :3/4

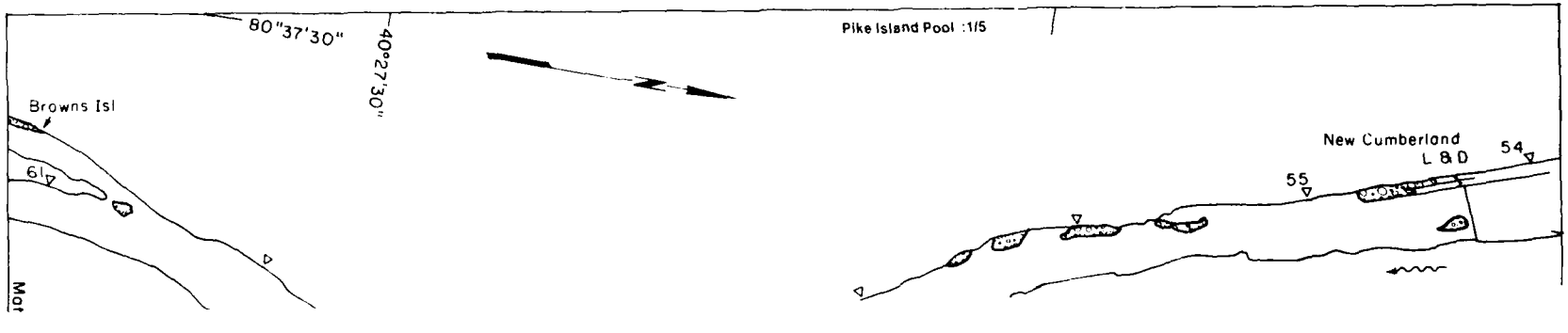

New Cumberland Pool :3/4
51
45
ML C
ML B
Survey date February 16, 1985
Video Tape 6
0
1 mi
0
1 km
40°35'
80°37'30"

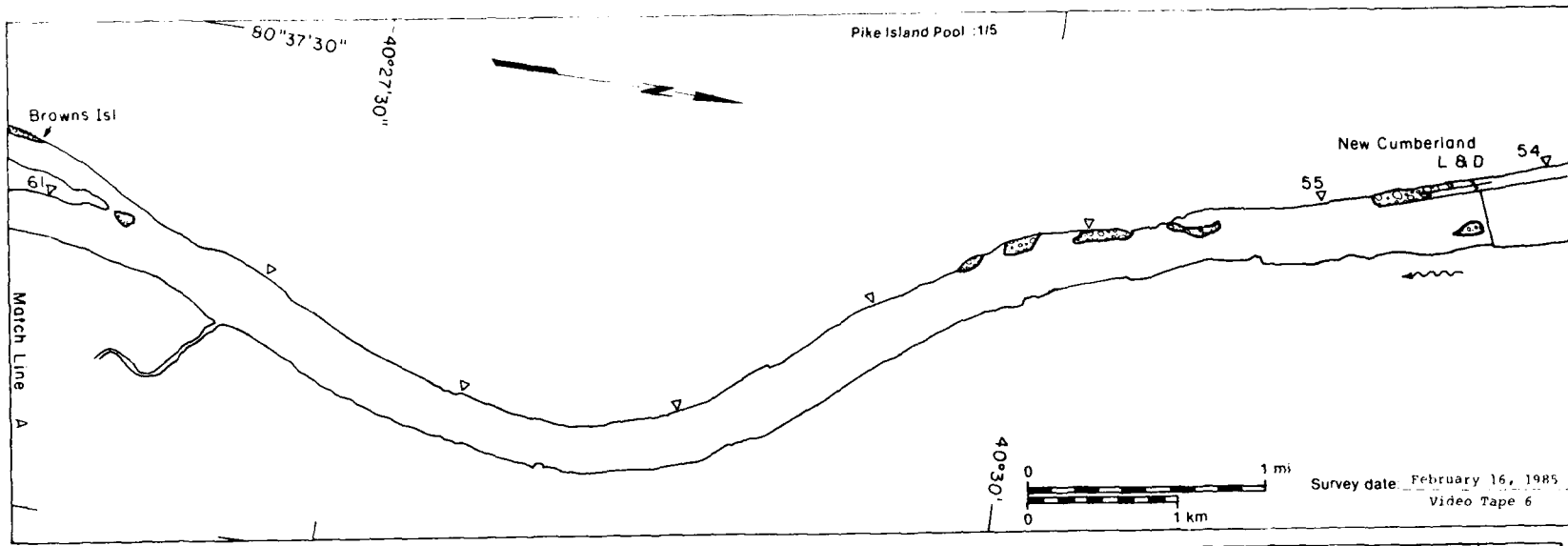
16 February 1985

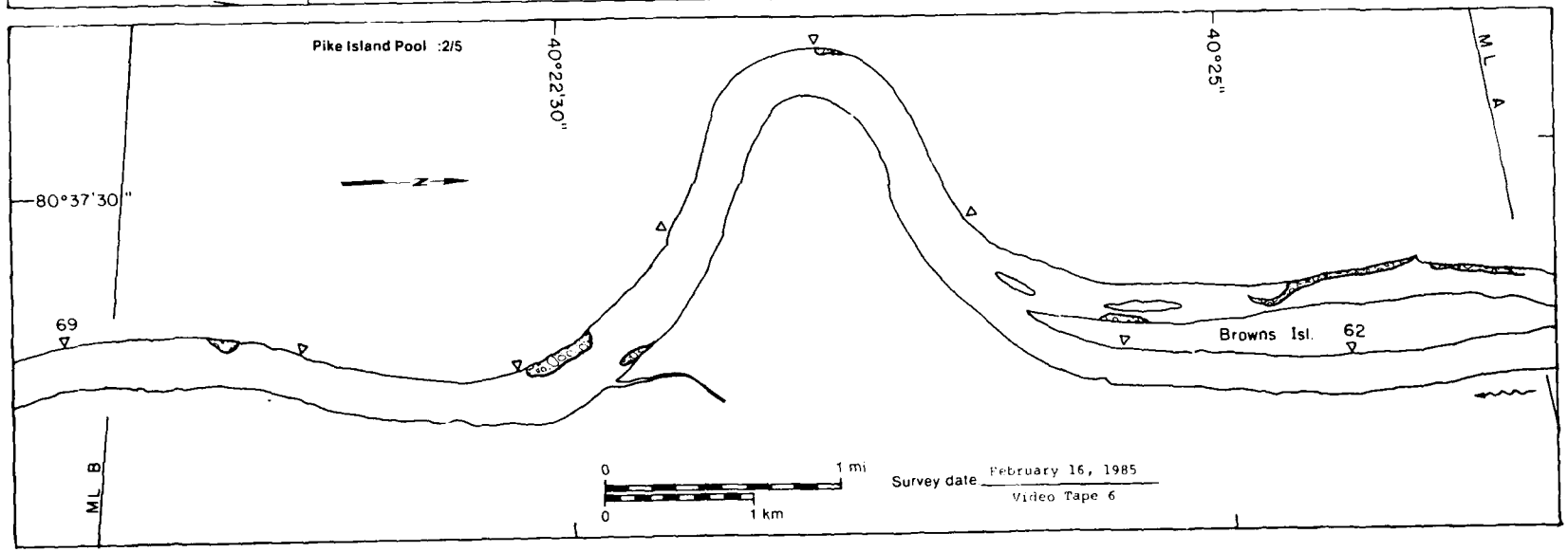


New Cumberland Pool

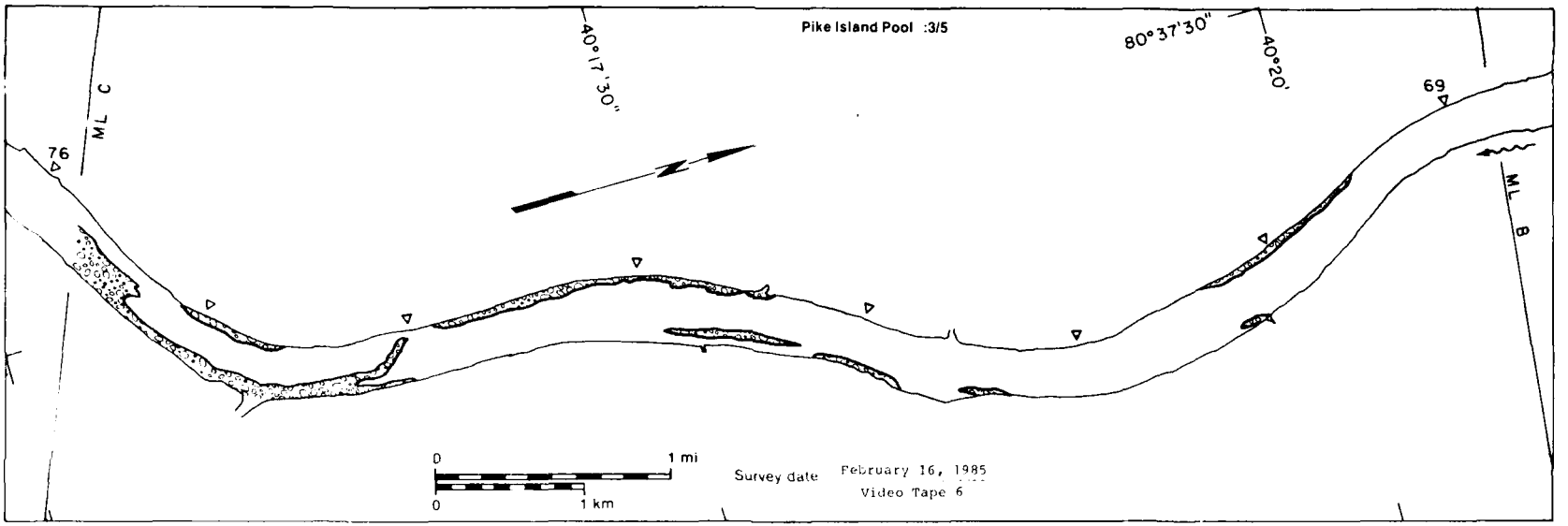
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	7.63	NA
Solid ice cover	0.45	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	5.15	70
Ice floes or frazil slush and pans	1.64	10
Total Area ($m^2 \times 10^6$)	14.87	

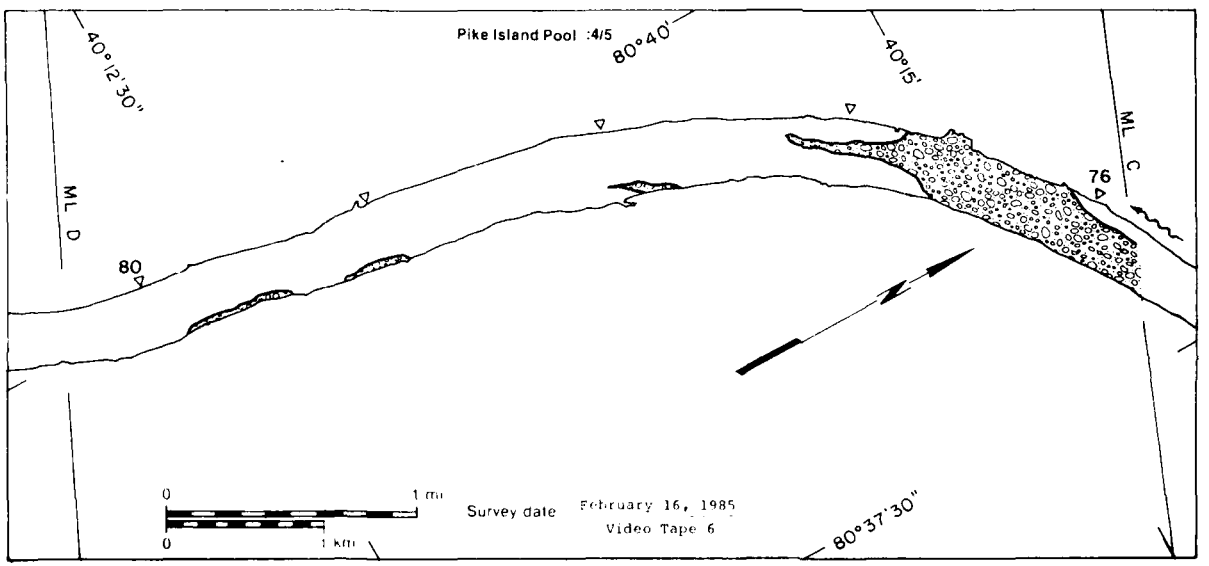


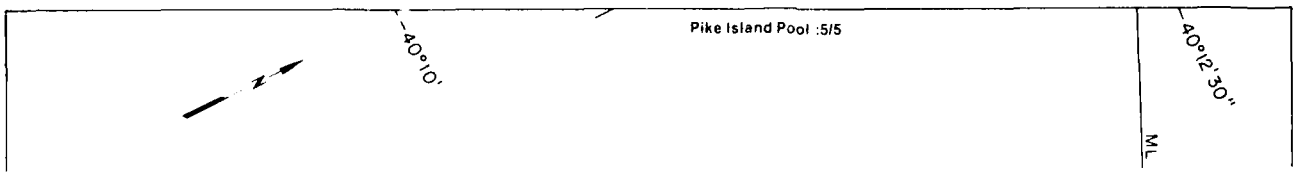

Pike Island Pool :1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date February 16, 1985
Video Tape 6

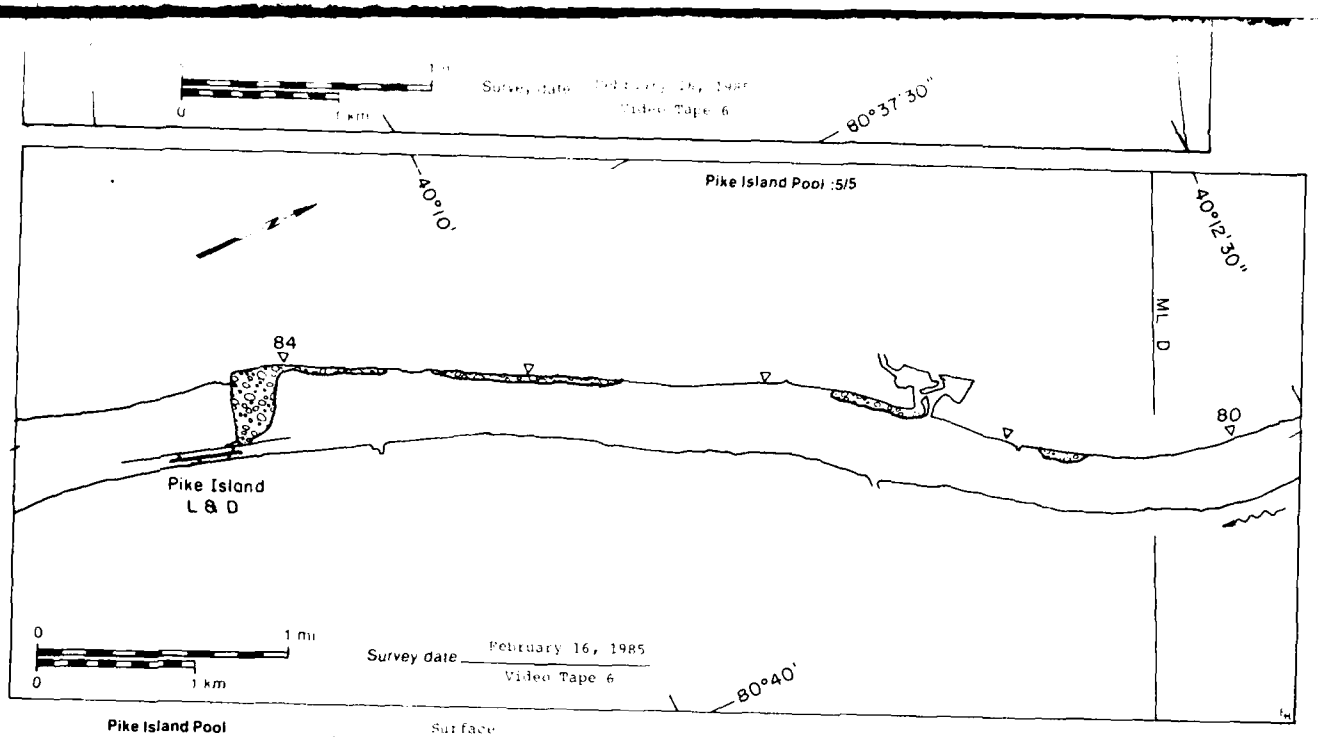

Pike Island Pool :2/5
40°22'30"
40°25'
M L A
80°37'30"
69
Browns Isl.
62
M L B
0
1 mi
0
1 km
Survey date February 16, 1985
Video Tape 6

16 February 1985





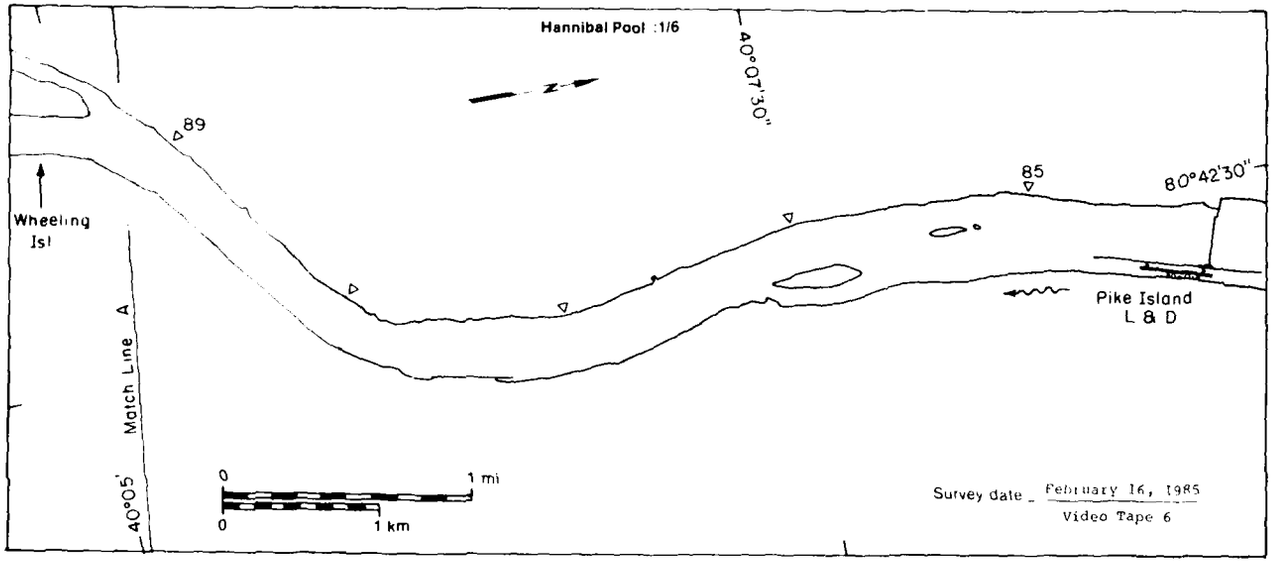


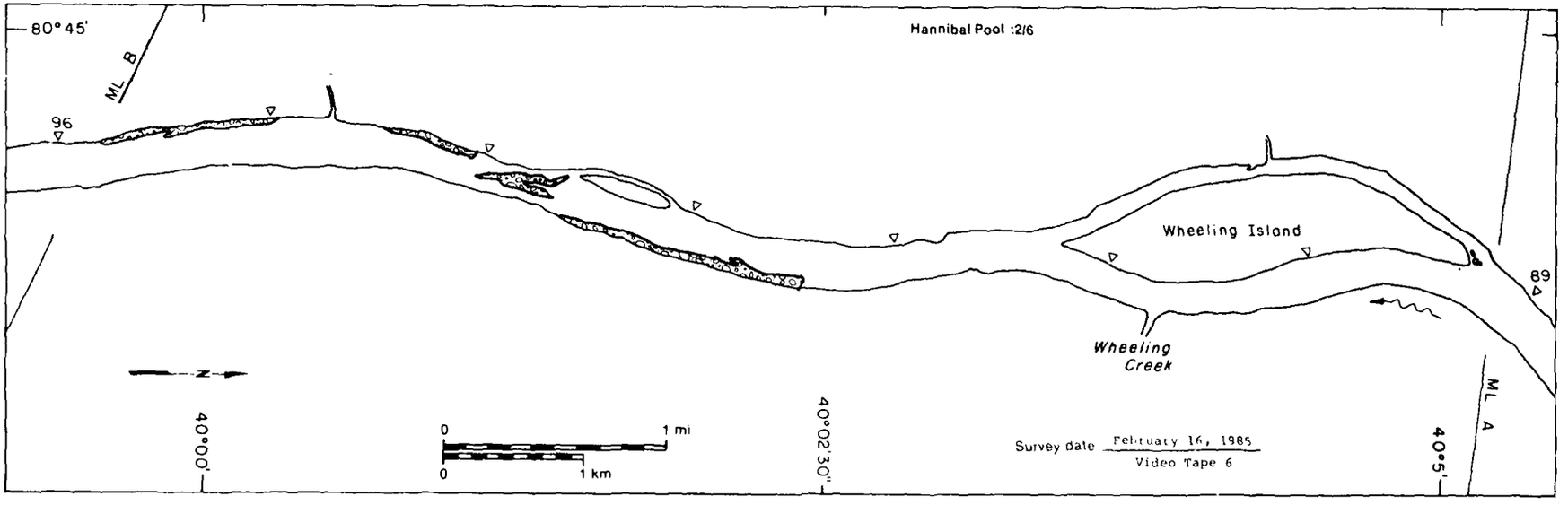


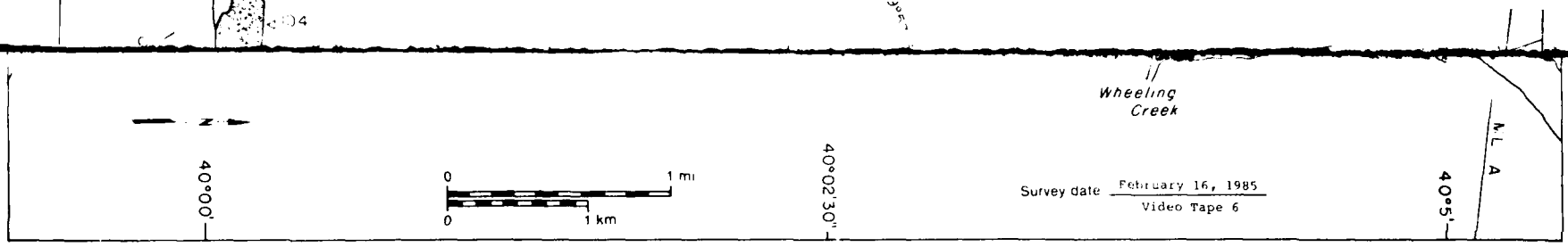
Pike Island Pool

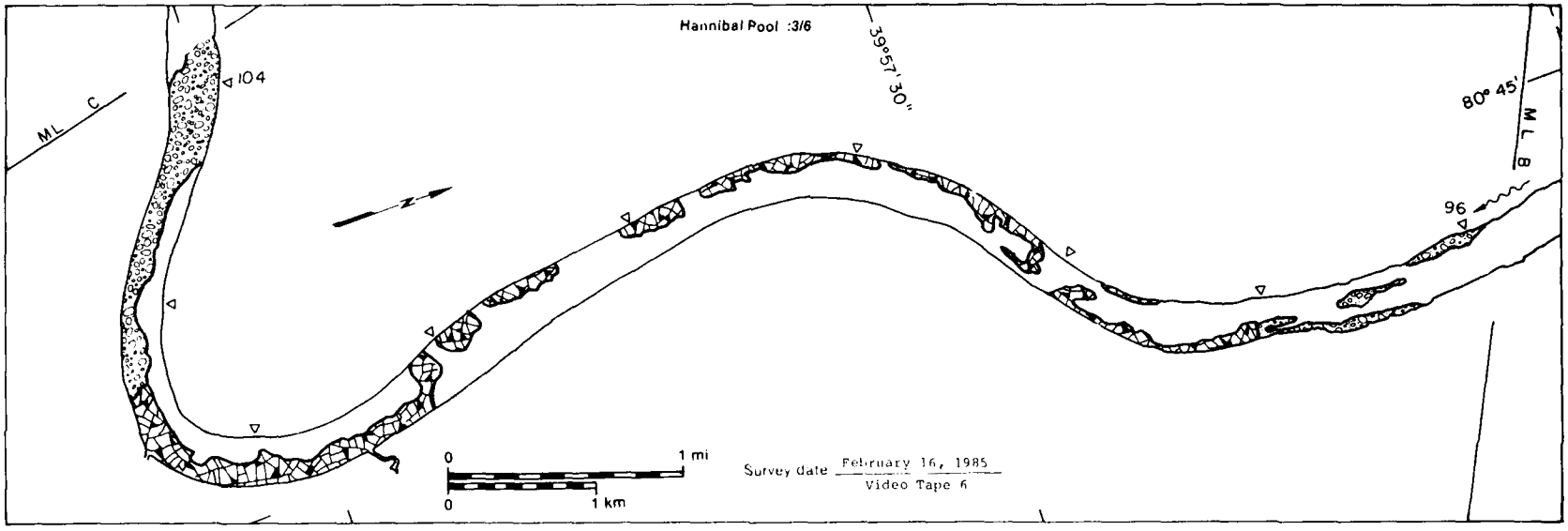
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	16.93	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	1.99	5
Total Area ($m^2 \times 10^6$)	18.92	

16 February 1985

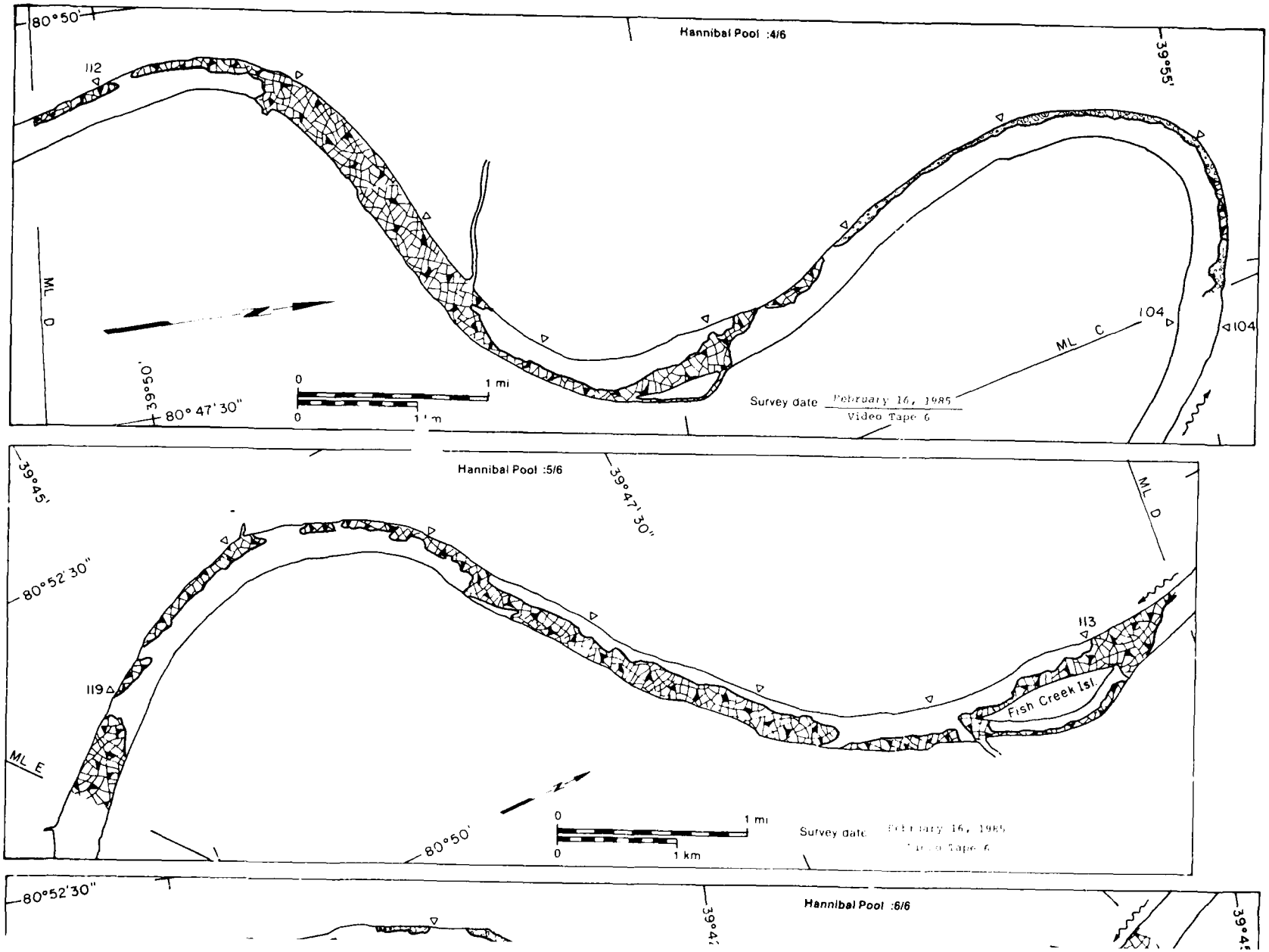


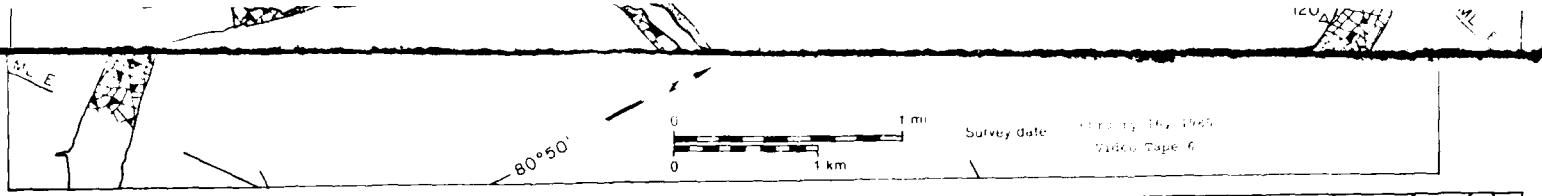


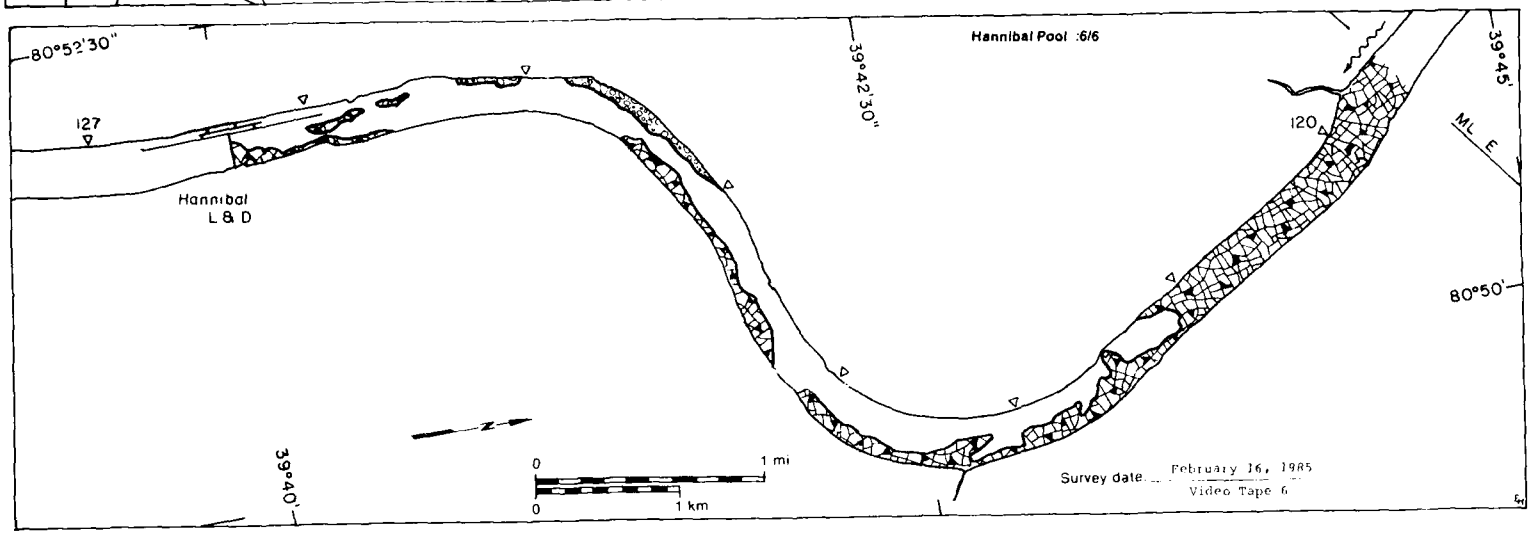

104
Wheeling
Creek
40°00'
40°02'30"
40°5'
M L A
0
1 mi
0
1 km
Survey date February 16, 1985
Video Tape 6


Hannibal Pool :3/6
39°57'30"
80° 45'
M L B
M L C
104
96
0
1 mi
0
1 km
Survey date February 16, 1985
Video Tape 6

16 February 1985



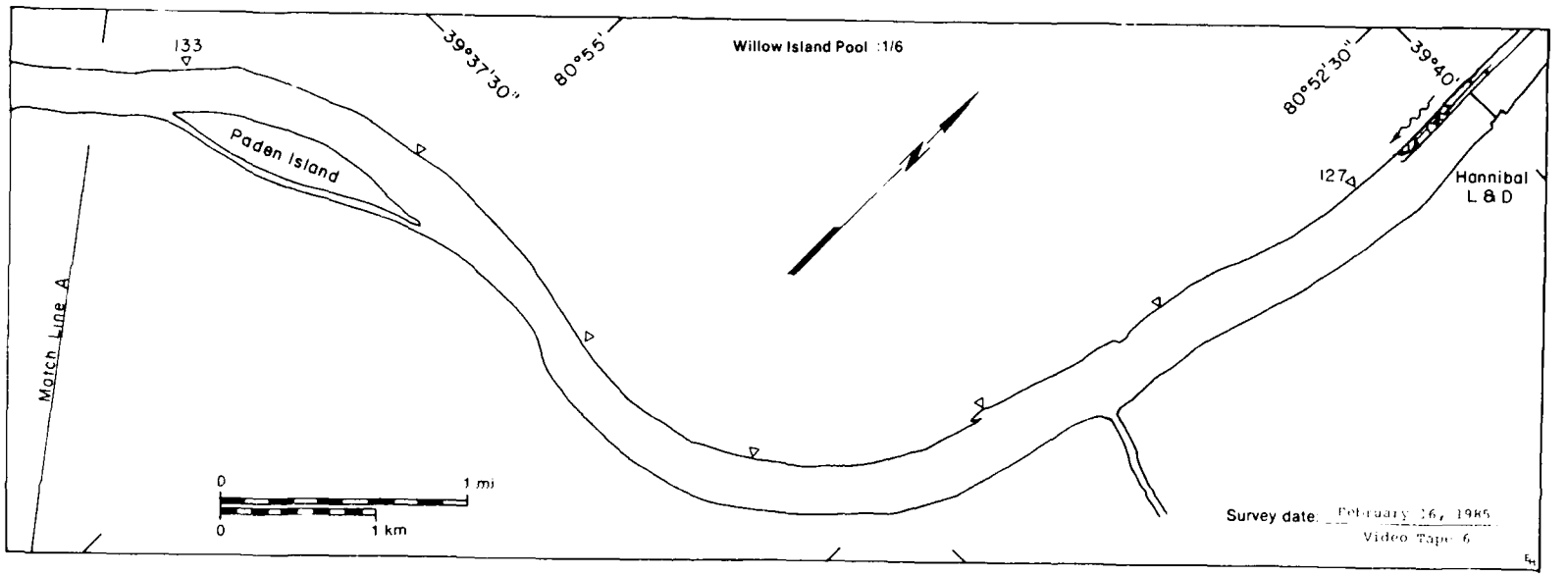


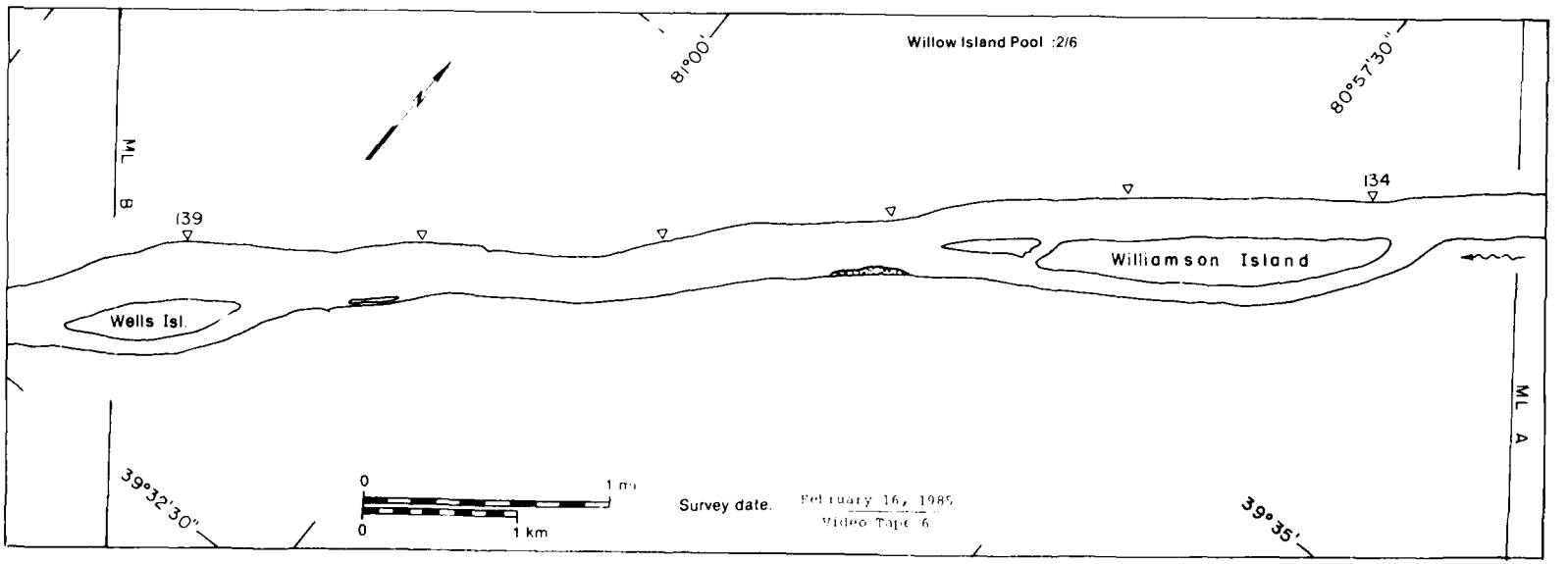


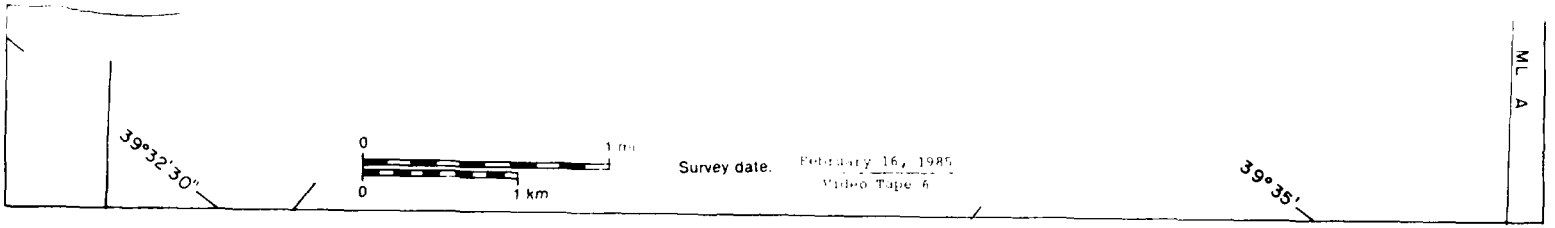
Hannibal Pool

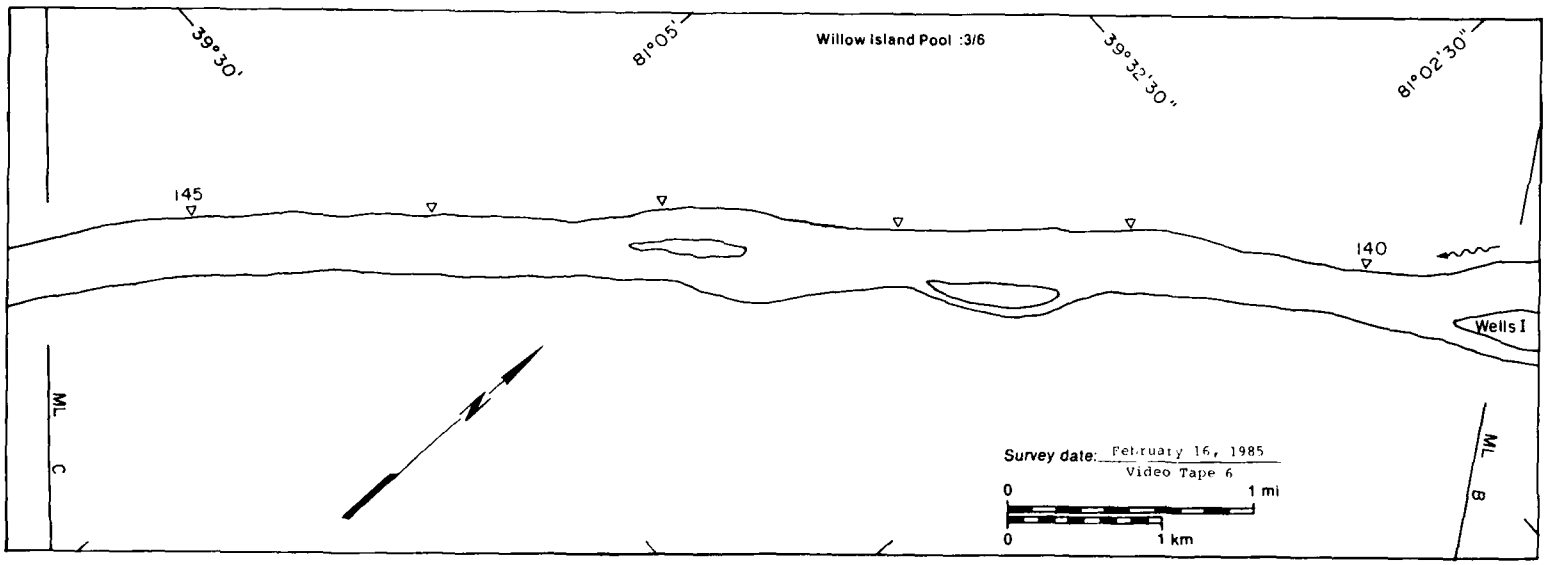
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	15.33	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	5.84	50
Ice lanes or frazil slush and pans	1.29	10
Total Area ($m^2 \times 10^6$)	22.46	

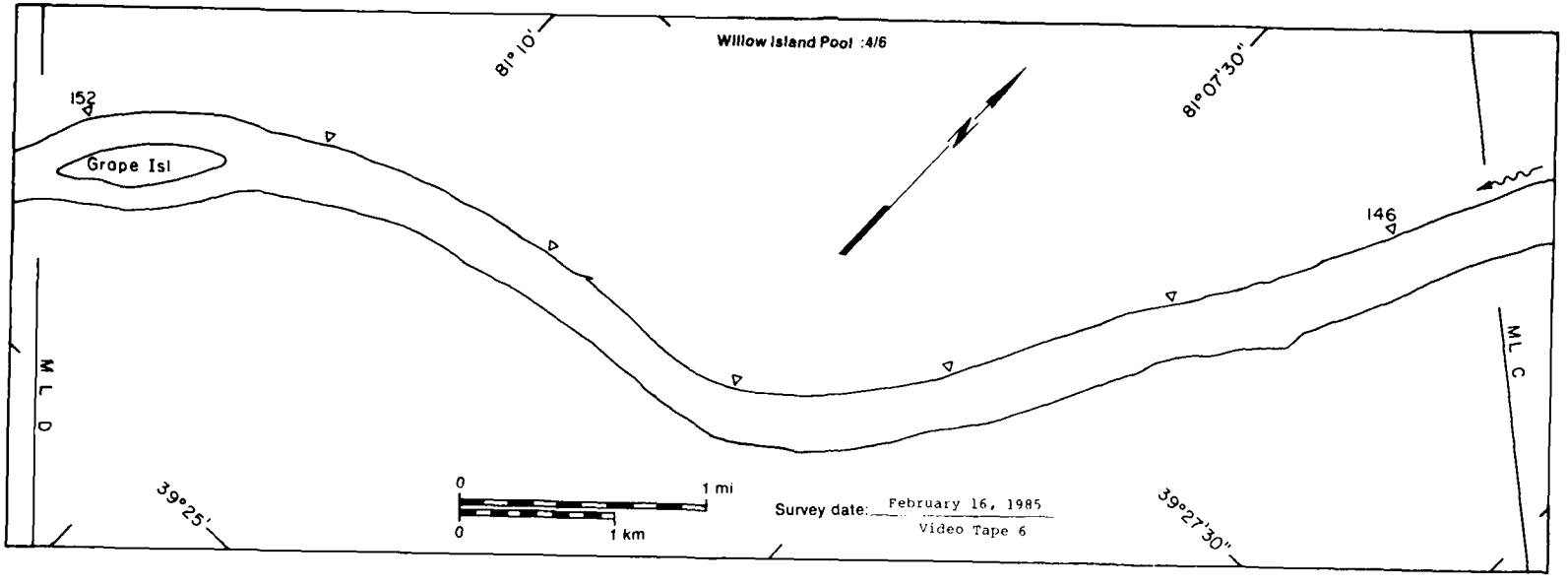
16 February 1985

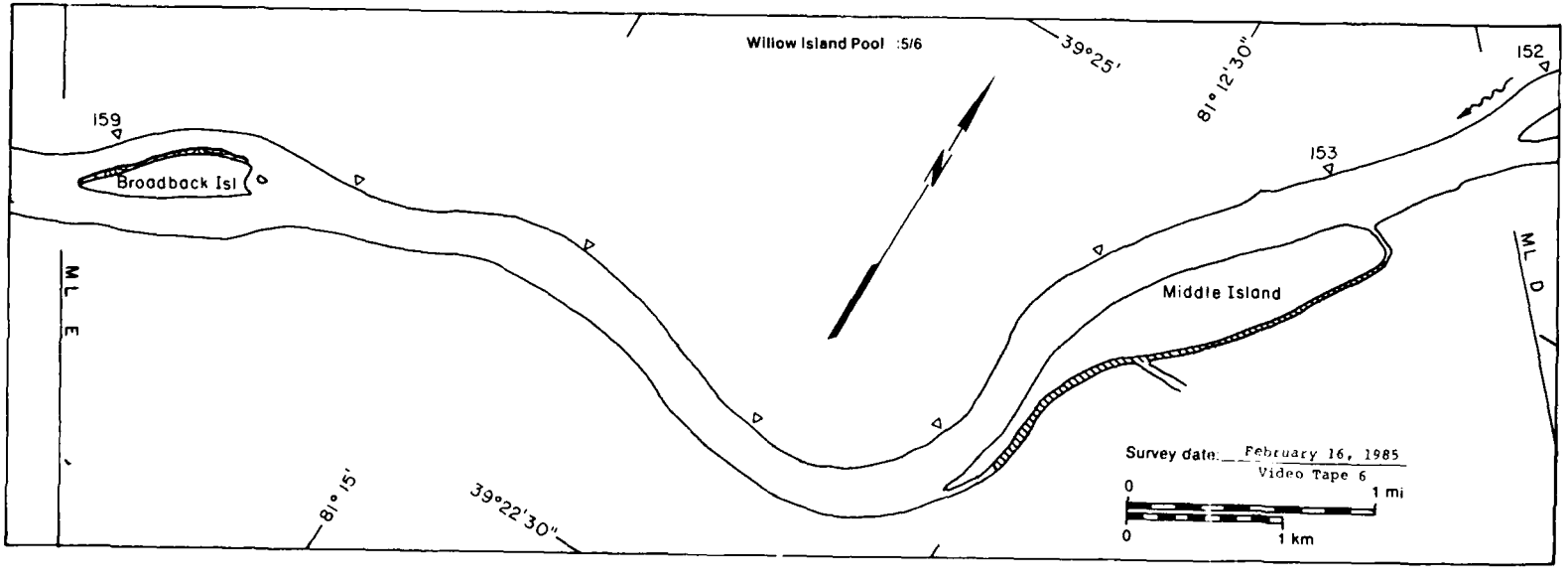


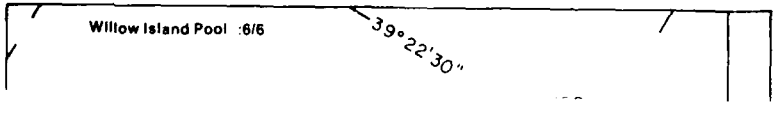



39°32'30"
0
1 mi
0
1 km
Survey date. February 16, 1985
Video Tape 6
39°35'
ML A


39°30'
81°05'
Willow Island Pool :3/6
39°32'30"
81°02'30"
145
140
Wells I
ML C
ML B
Survey date: February 16, 1985
Video Tape 6
0
1 mi
0
1 km

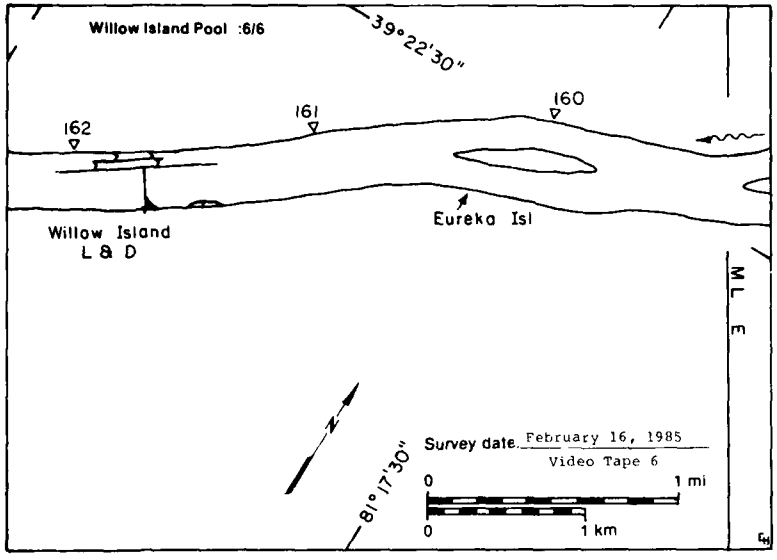






Willow Island Pool

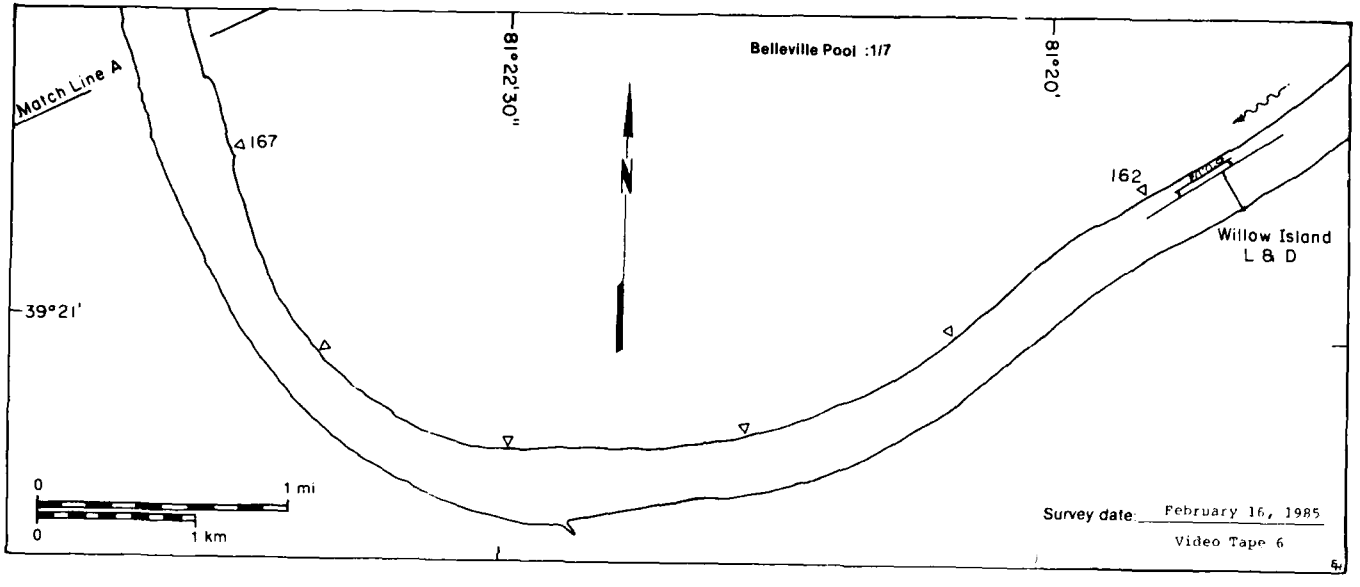
MAP UNITS

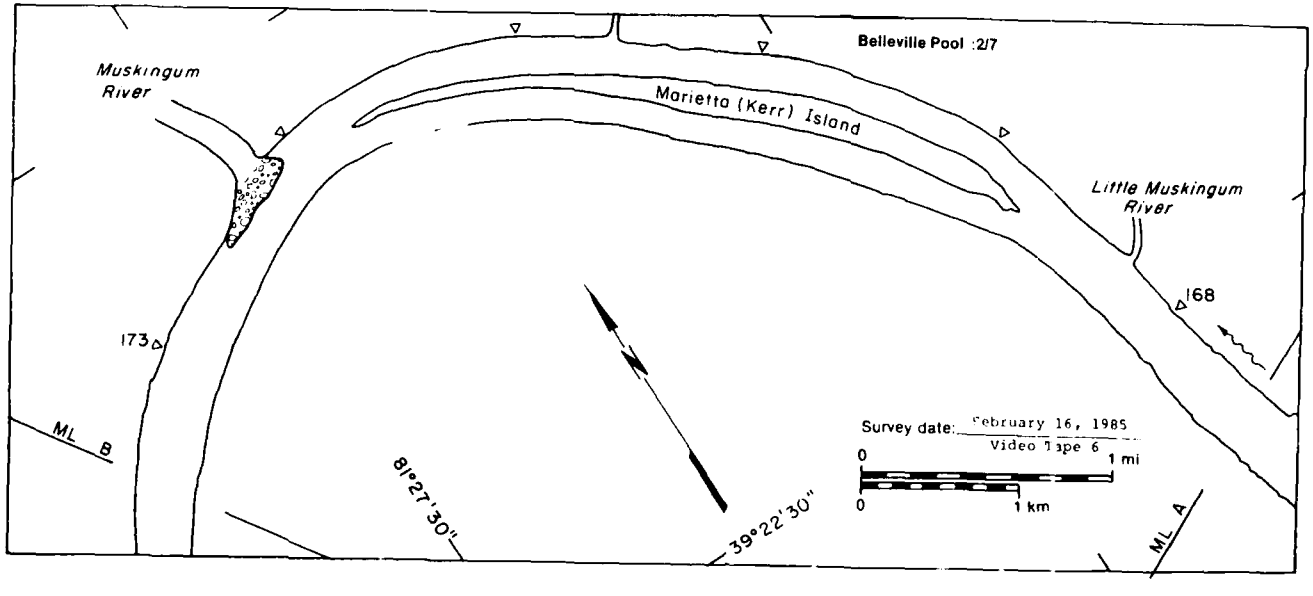


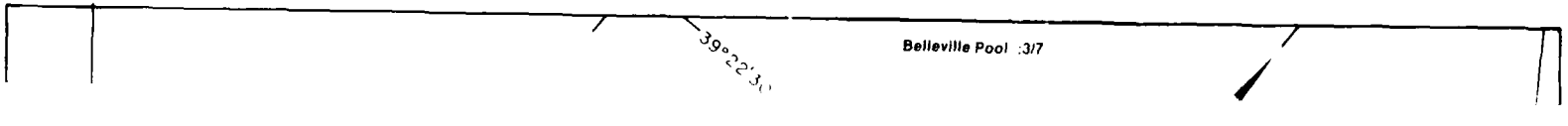
Willow Island Pool

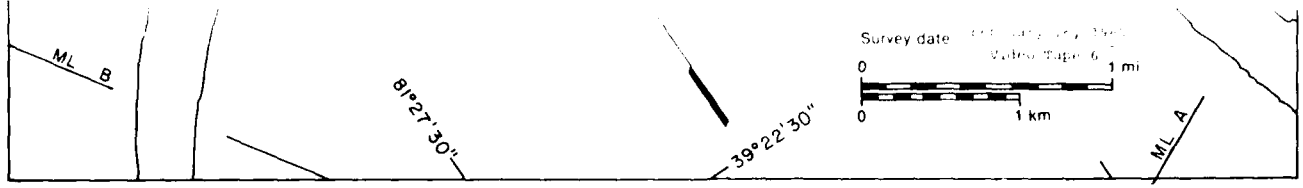
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	20.99	NA
Solid ice cover	0.16	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	0.04	NA
Fragmented ice cover with open-water areas	0.03	30
Ice floes or frazil slush and pans	0.02	10
Total Area ($m^2 \times 10^6$)	21.24	

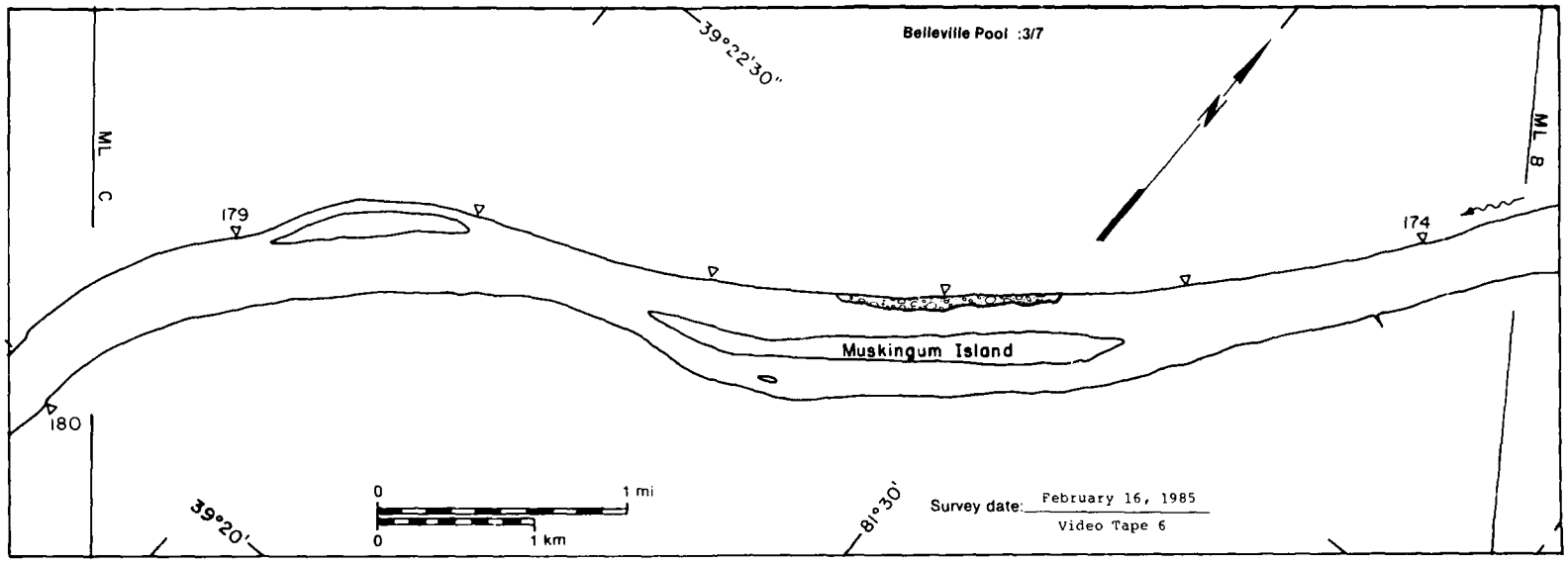
16 February 1985

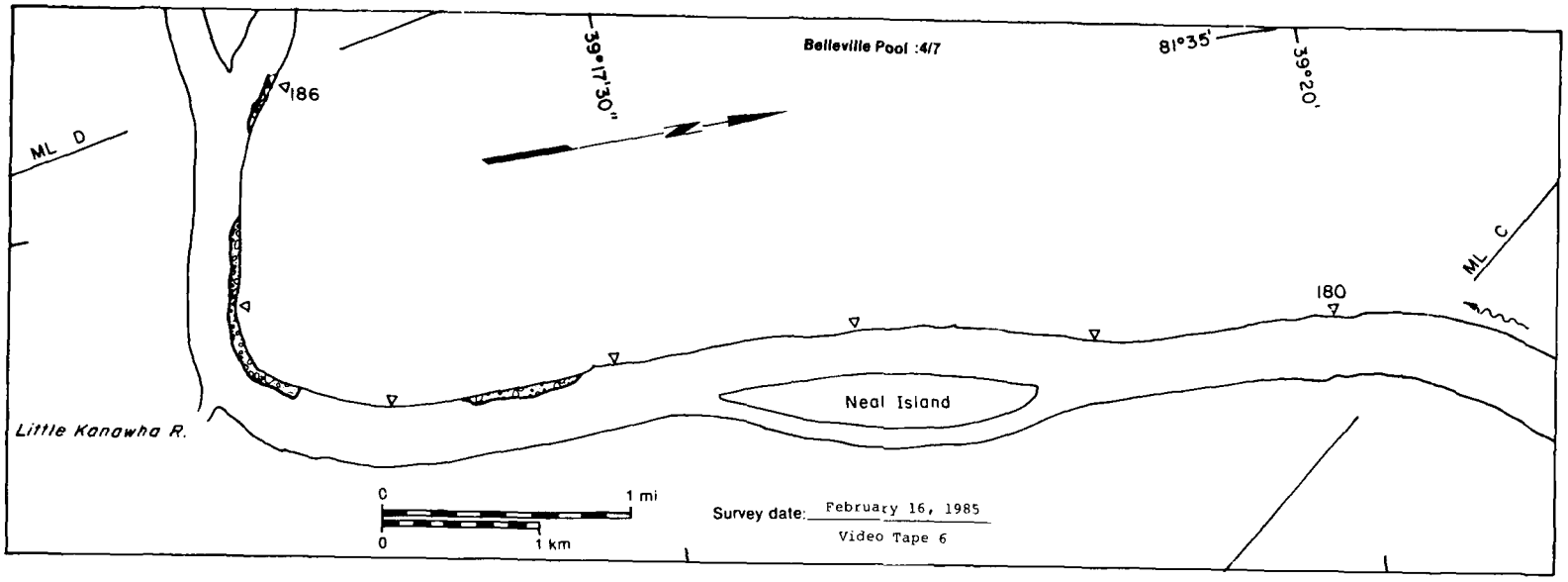


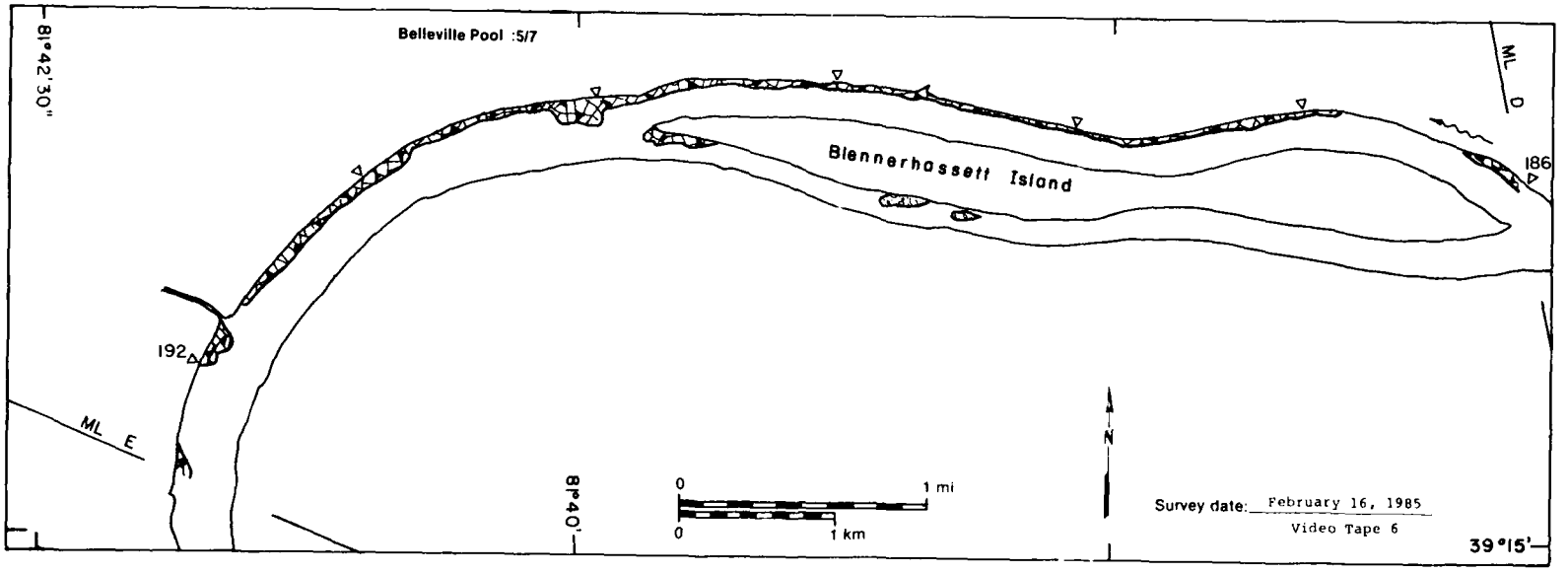


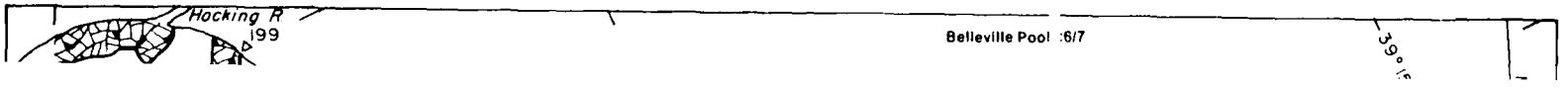


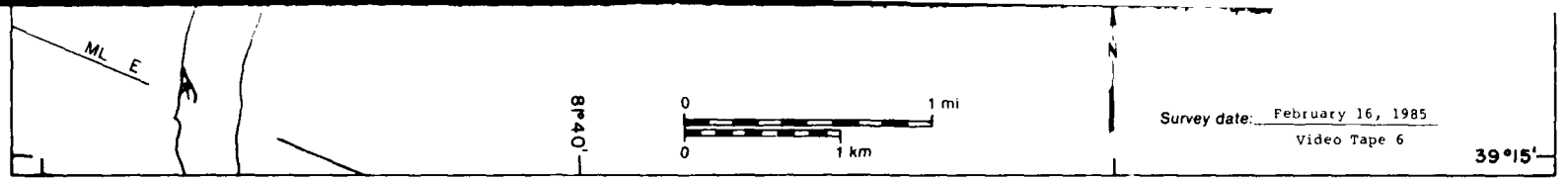

ML B
81°27'30"
39°22'30"
ML A
Survey date
Video Tape 6
0
1 mi
0
1 km

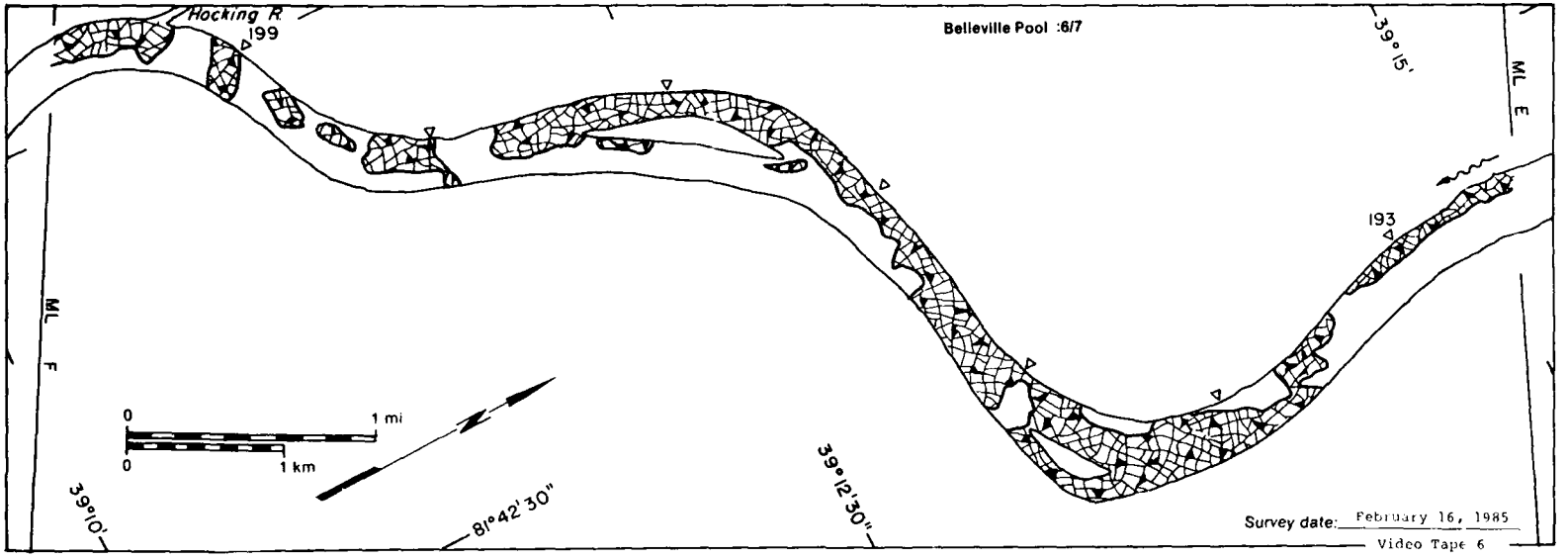

Belleville Pool :3/7
39°22'30"
ML C
ML B
179
174
Muskingum Island
180
39°20'
81°30'
0
1 mi
0
1 km
Survey date: February 16, 1985
Video Tape 6


Belleville Pool :4/7
39°17'30"
81°35'
39°20'
186
ML D
ML C
180
Neal Island
Little Kanawha R.
0
1 mi
0
1 km
Survey date: February 16, 1985
Video Tape 6

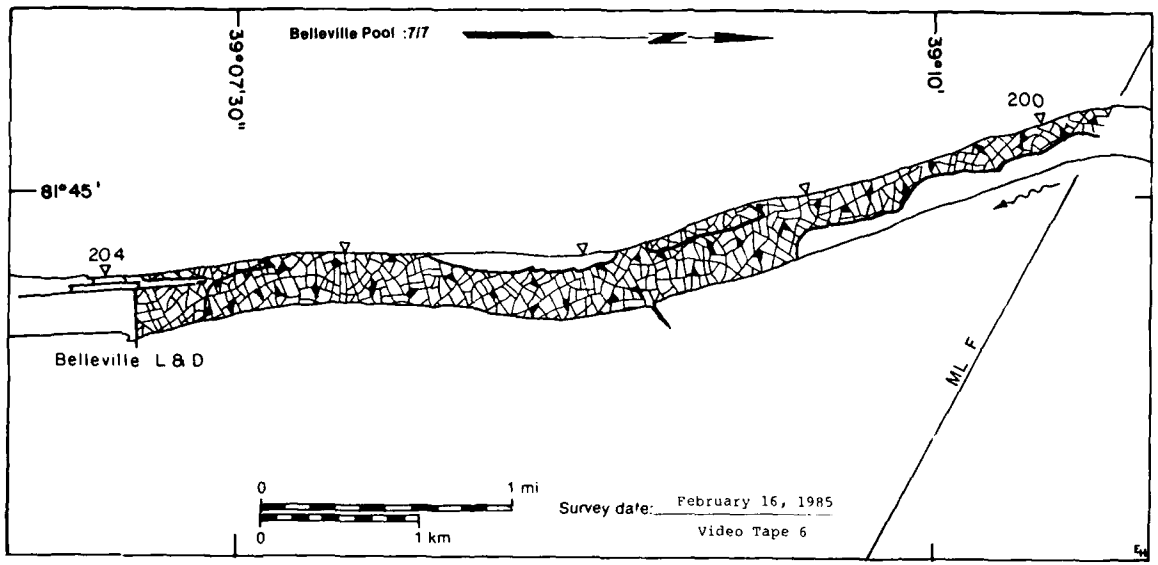

Belleville Pool :5/7
81°42'30"
ML D
186
Blennerhassett Island
192
ML E
81°40'
0
1 mi
0
1 km
N
Survey date: February 16, 1985
Video Tape 6
39°15'


Hocking R
199
Belleville Pool :6/7


ML E
81°40'
0
1 mi
0
1 km
Survey date: February 16, 1985
Video Tape 6
39°15'


Hocking R.
199
Belleville Pool :6/7
39°15'
ML E
193
ML F
0
1 mi
0
1 km
39°10'
81°42'30"
39°12'30"
Survey date: February 16, 1985
Video Tape 6

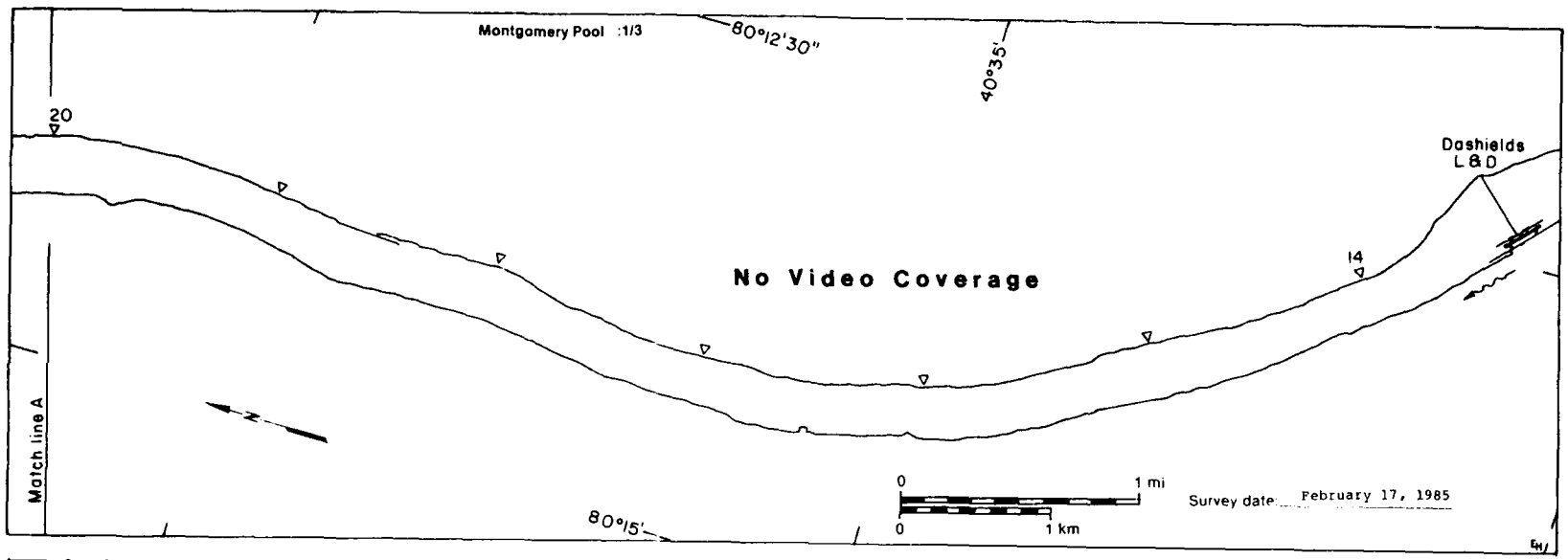
16 February 1985

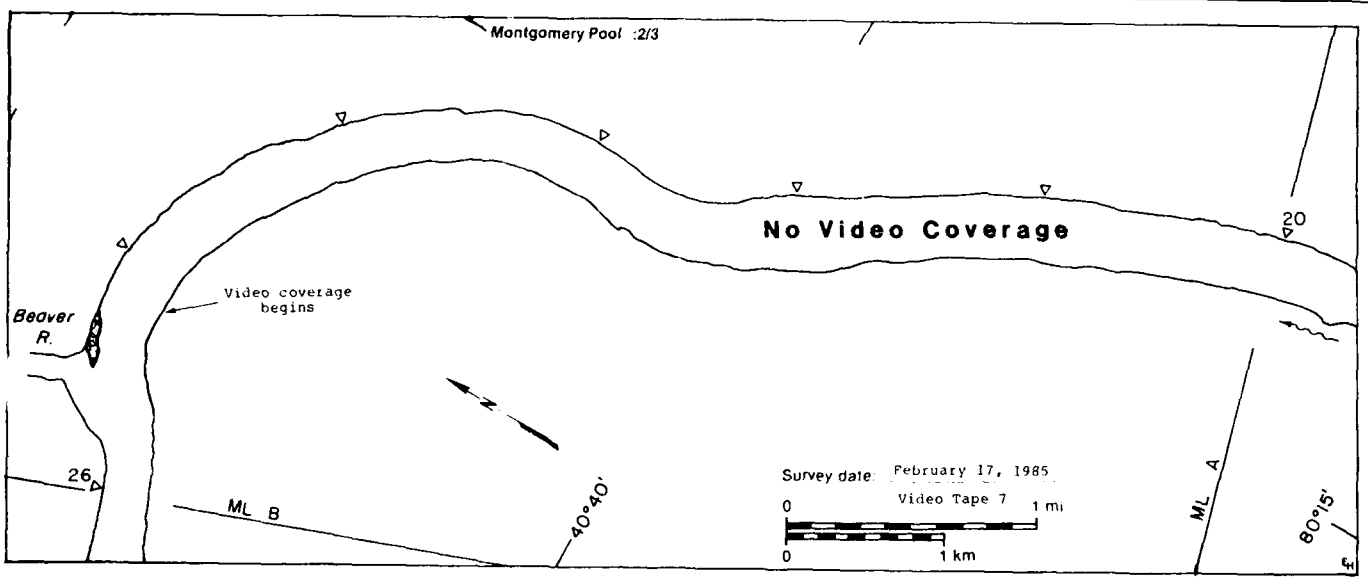


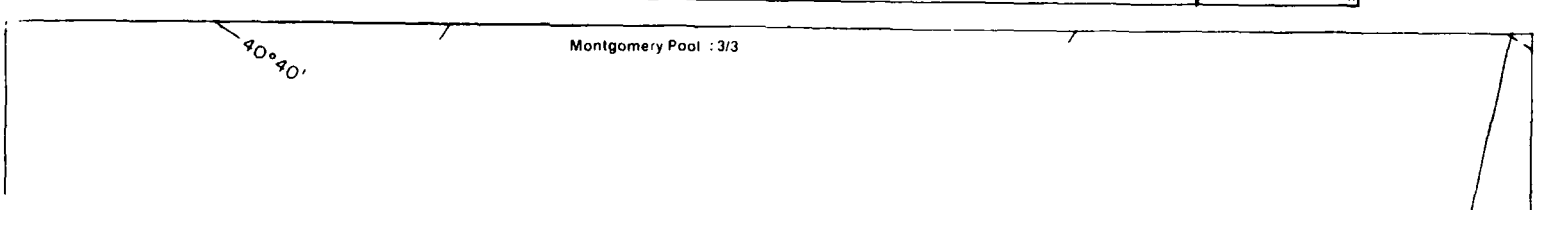
Belleville Pool

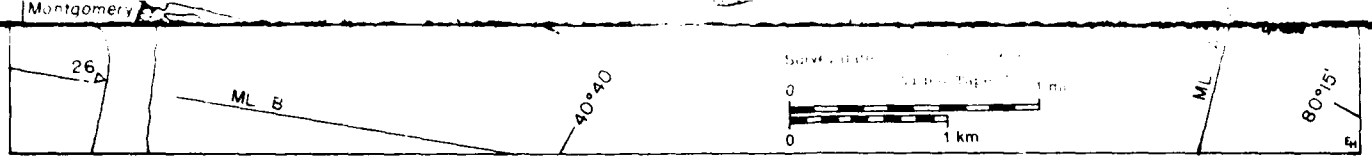
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	22.02	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	0.26	NA
Fragmented ice cover with open-water areas	4.65	50
Ice floes or frazil slush and pans	0.35	5
Total Area ($m^2 \times 10^6$)	27.28	

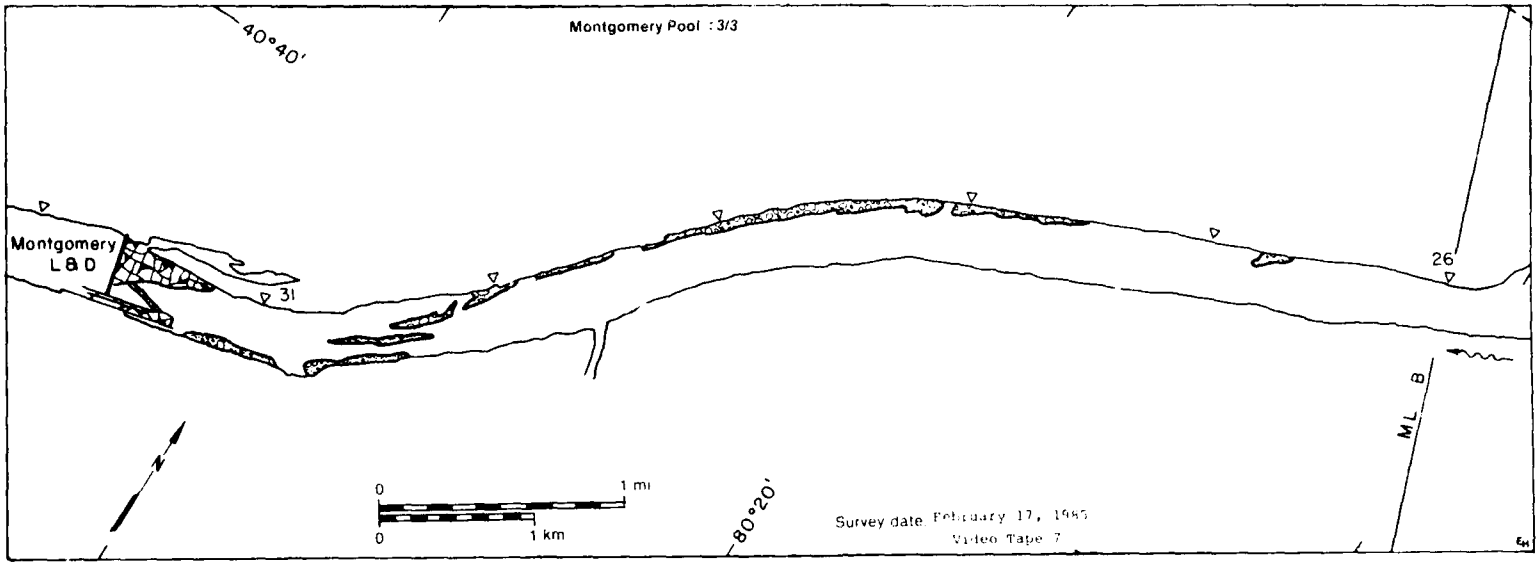
17 February 1985









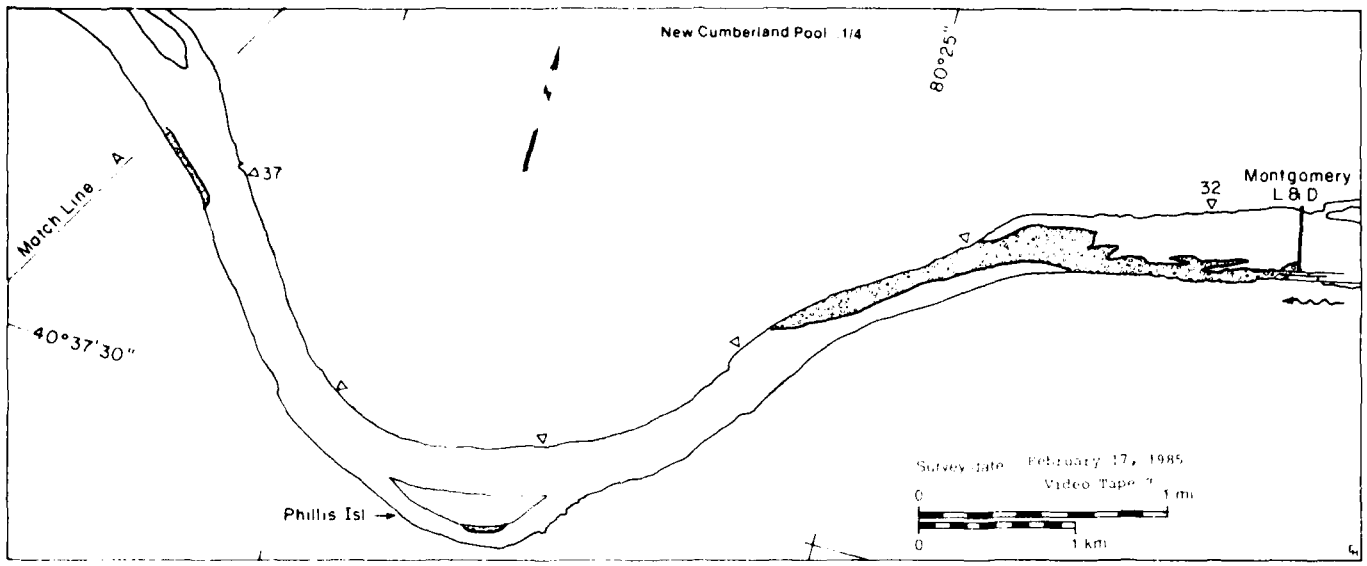


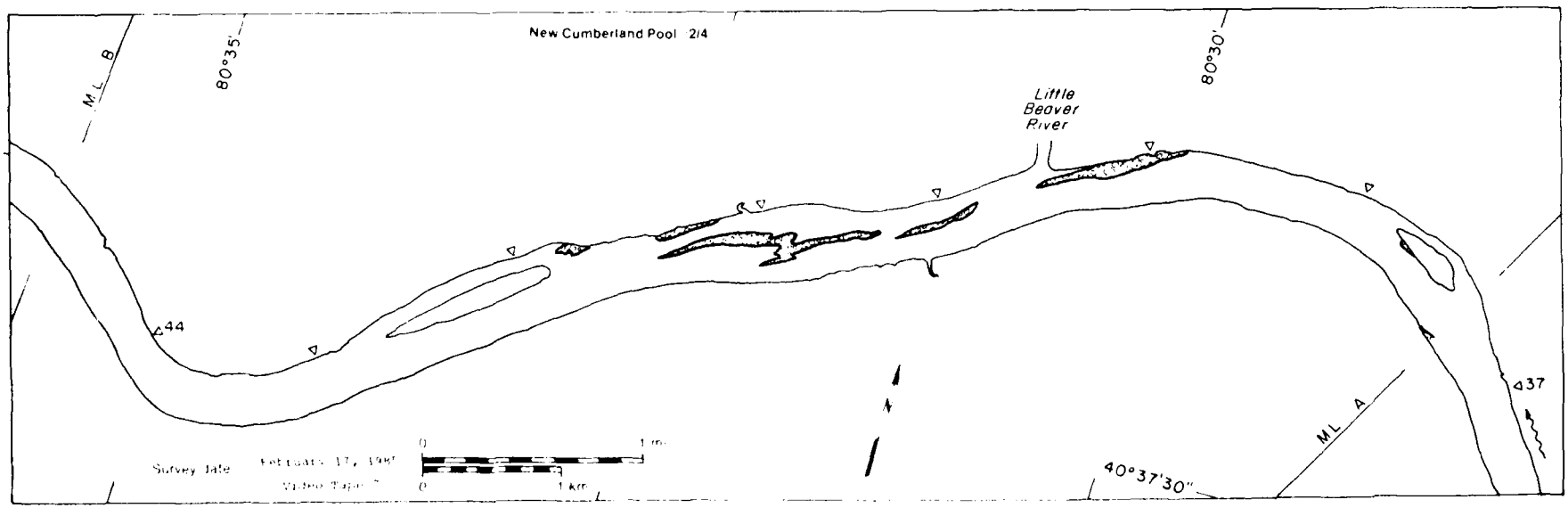
Montgomery Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.42	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.28	90
Ice floes or frazil slush and pans	0.39	10
Total Area ($m^2 \times 10^6$)	11.27*	

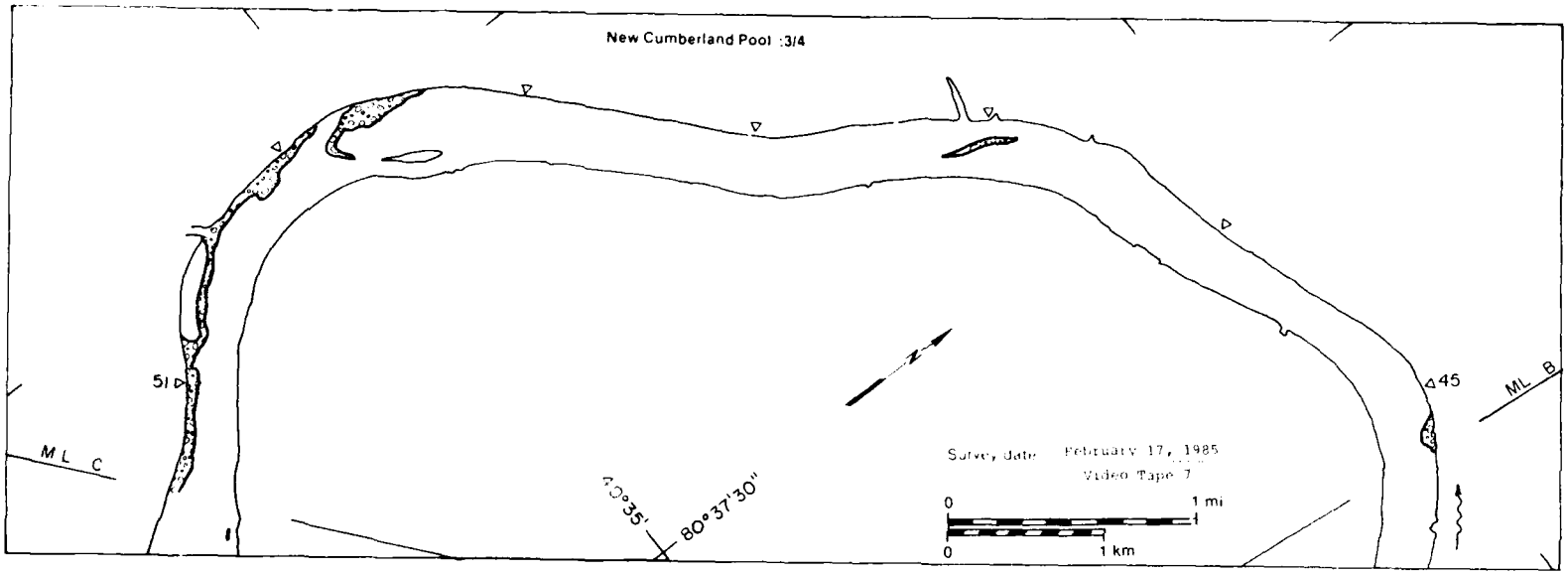
*includes 7.18 no video coverage

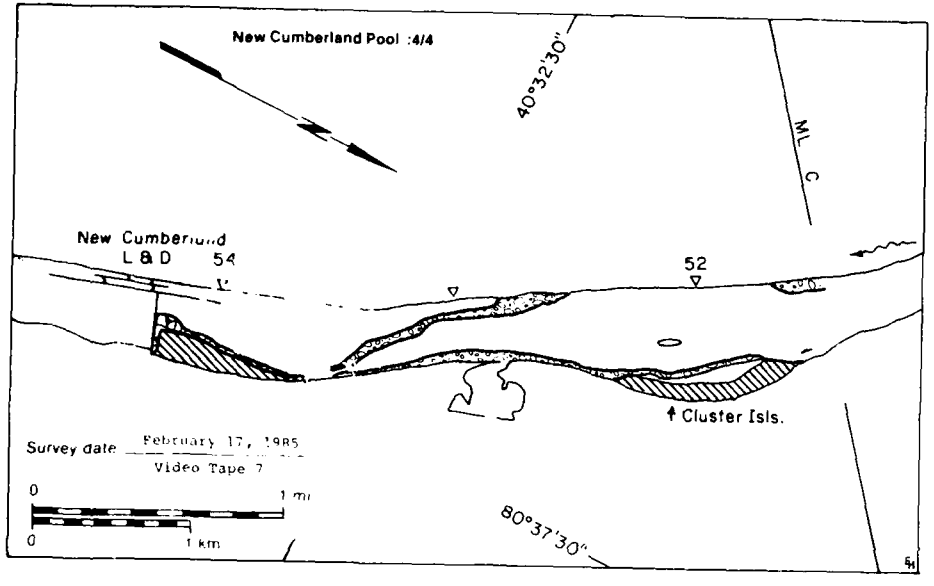
17 February 1985





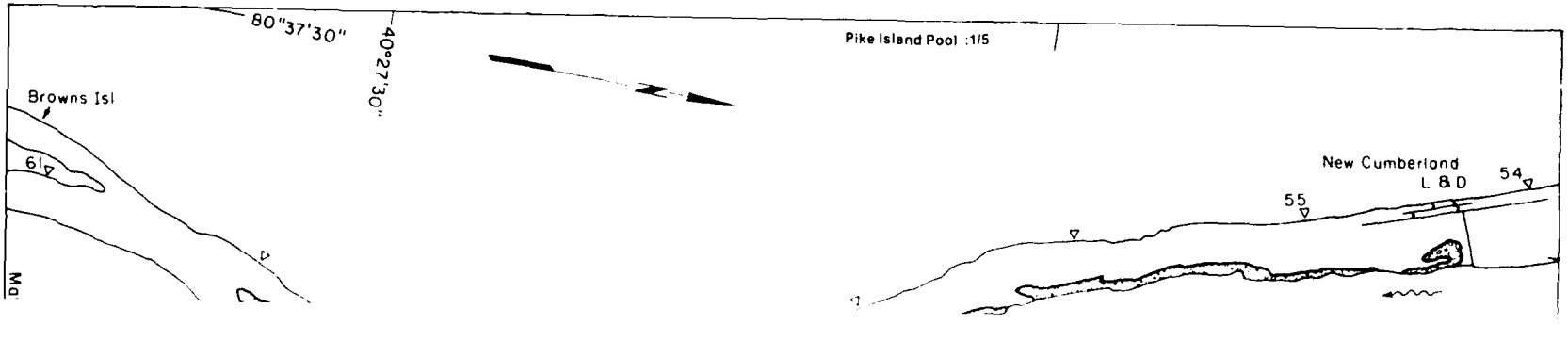

Survey date
0
1 km
40°37'30"
ML A
437

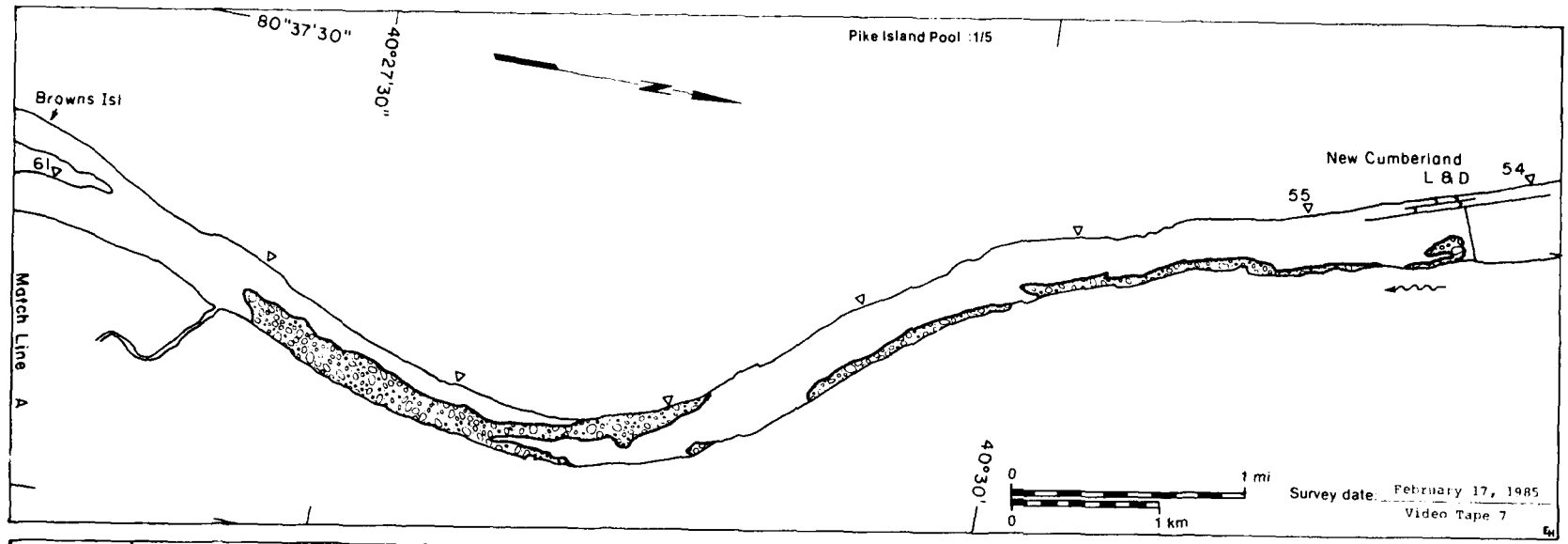

New Cumberland Pool :3/4
51
ML C
80°37'30"
Survey date February 17, 1985
Video Tape 7
0
1 mi
0
1 km
445
ML B

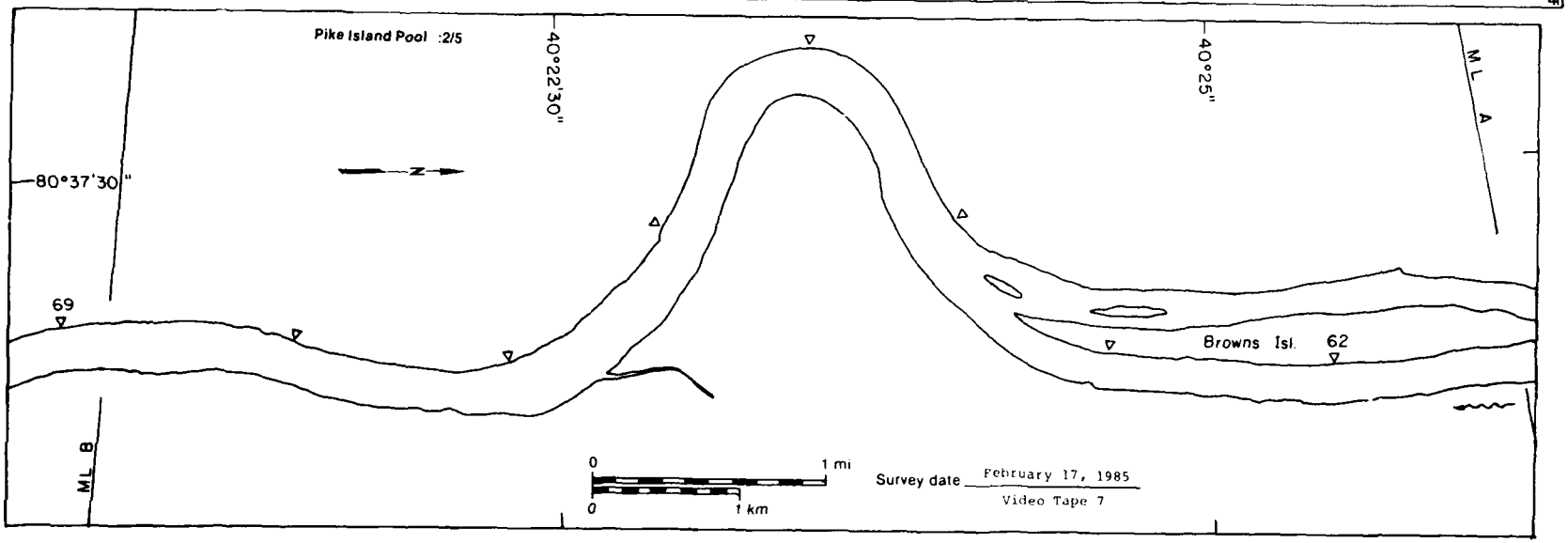


New Cumberland Pool

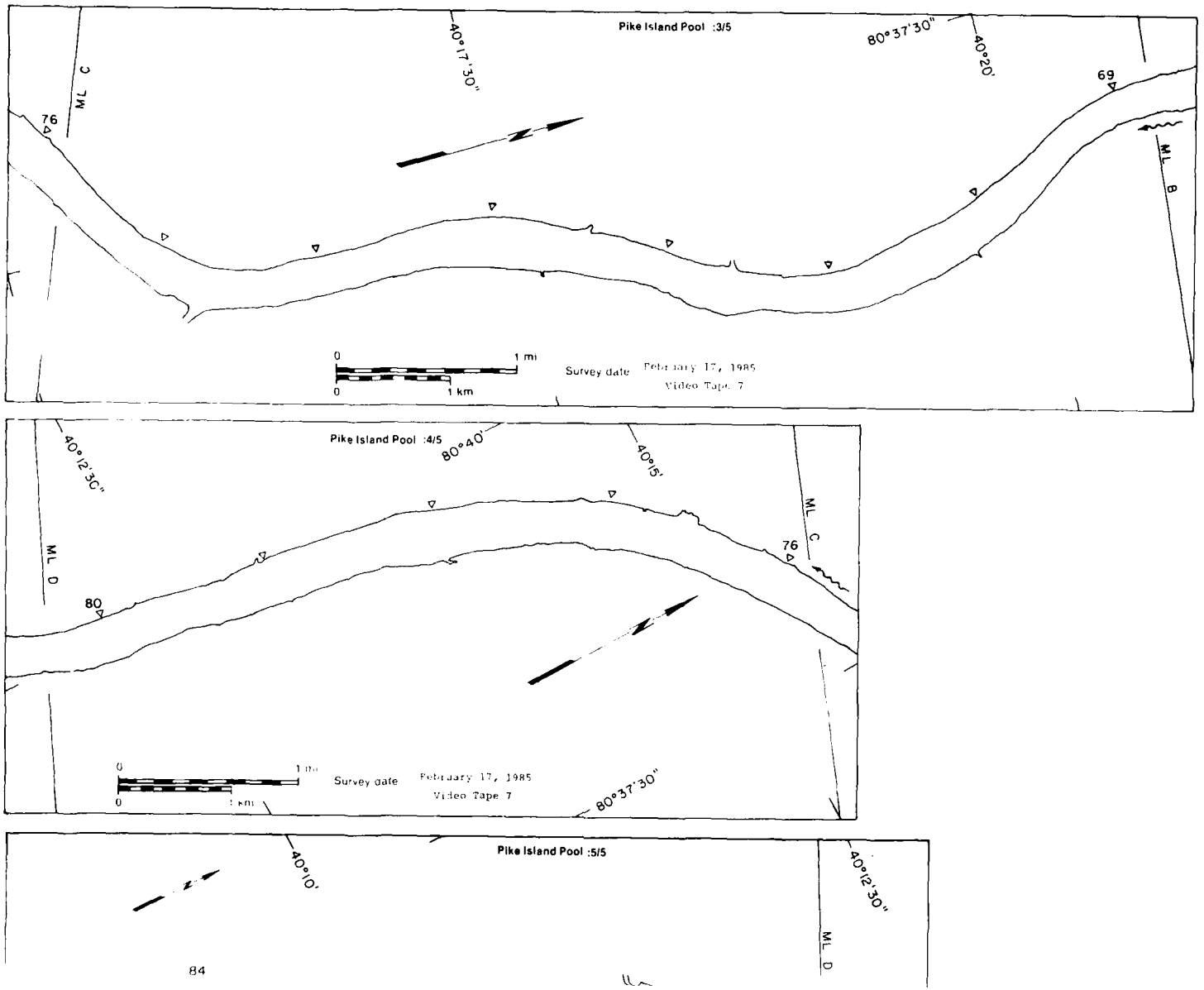
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	13.19	NA
Solid ice cover	0.23	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.06	80
Ice floes or frazil slush and pans	1.39	5
Total Area ($m^2 \times 10^6$)	14.87	

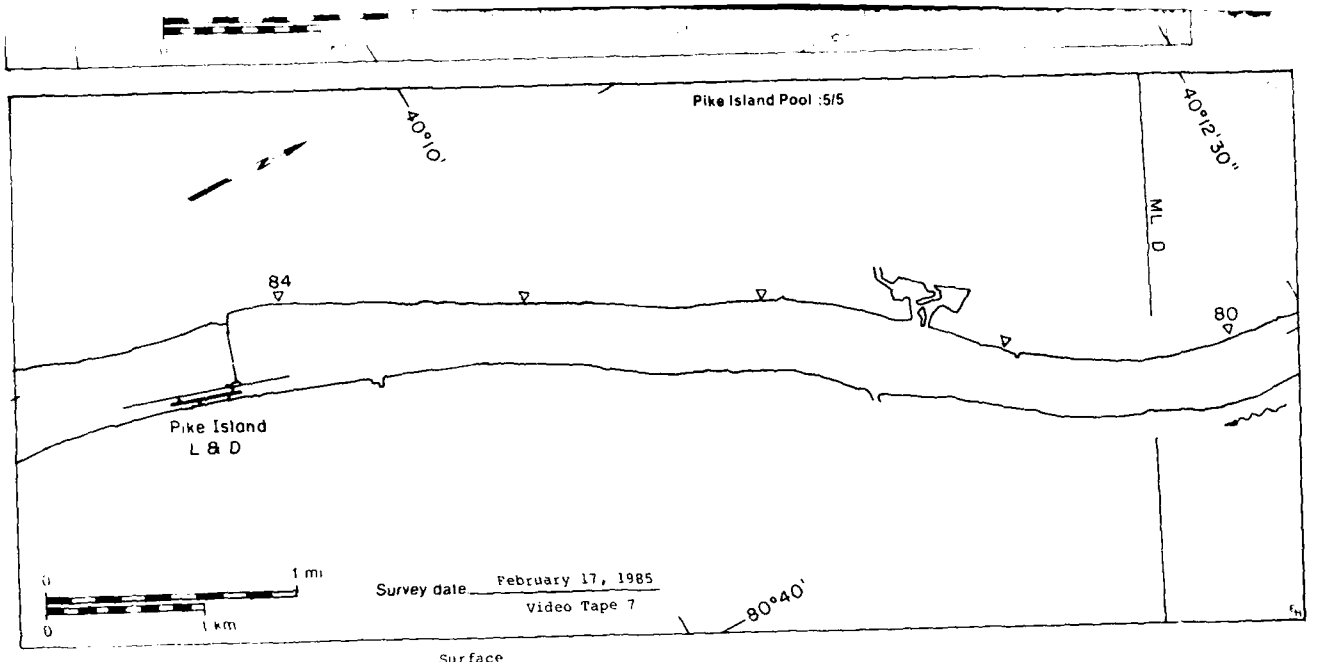



80°37'30"
40°27'30"
Pike Island Pool :1/5
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: February 17, 1985
Video Tape 7


Pike Island Pool :2/5
40°22'30"
40°25"
M L A
80°37'30"
N
69
Browns Isl.
62
M L B
0
1 mi
0
1 km
Survey date February 17, 1985
Video Tape 7

17 February 1985

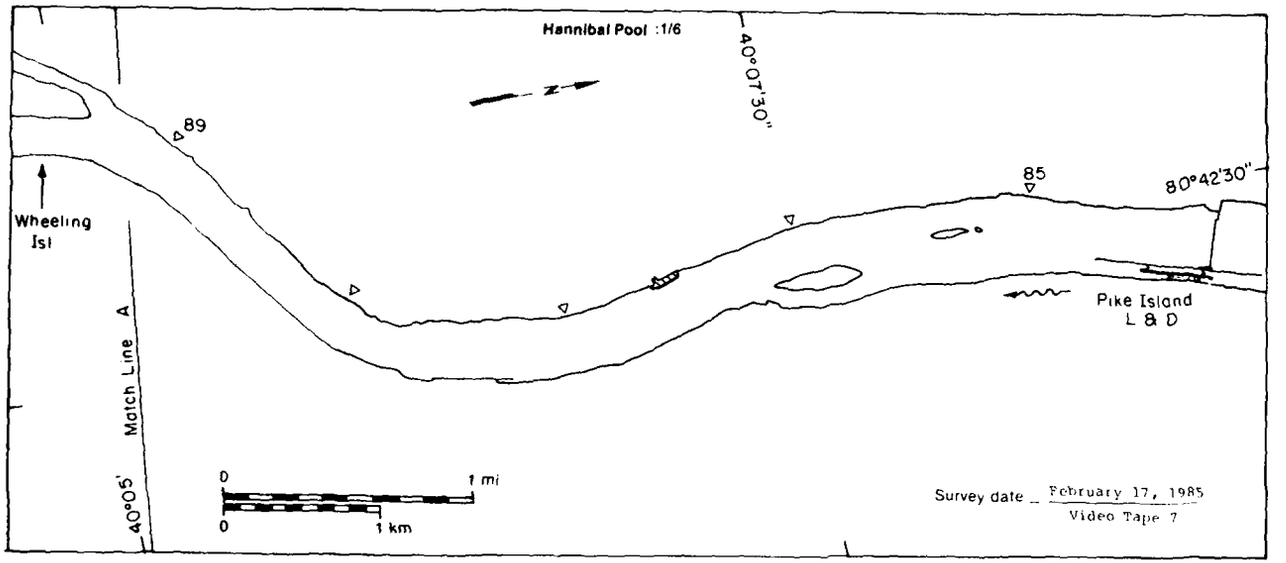


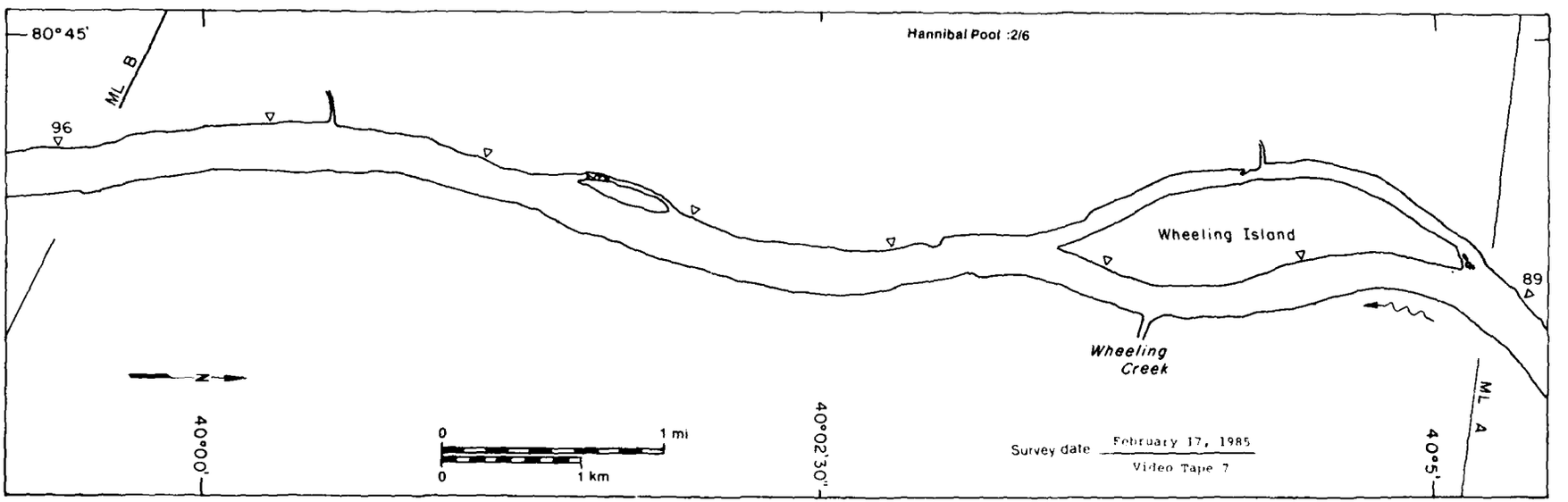


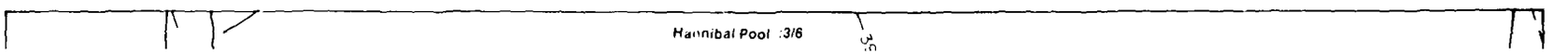
Pike Island Pool

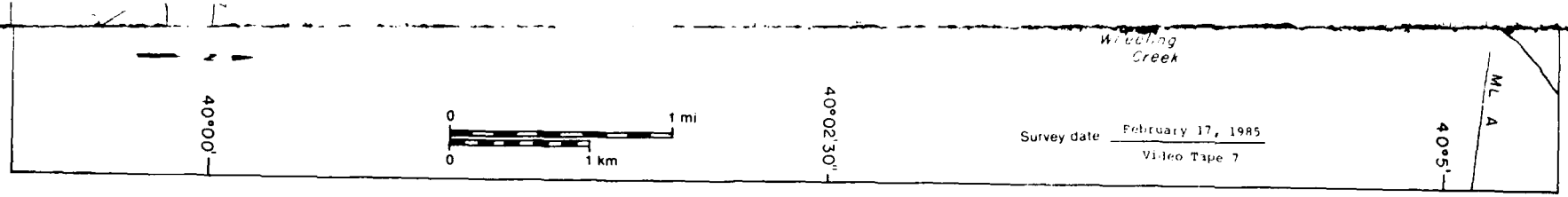
MAP UNITS

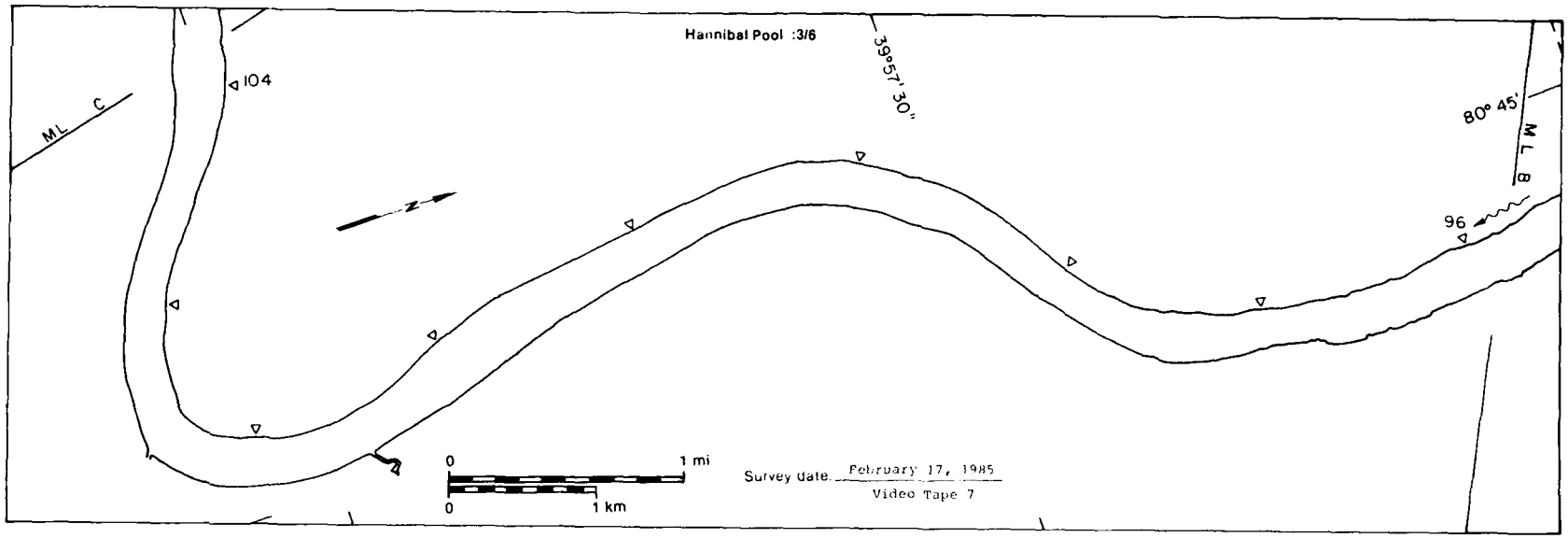
	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	17.95	NA
Snow ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	0.97	2
Total Area ($m^2 \times 10^6$)	18.92	


Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Match Line A
40°05'
Pike Island L & D
0
1 mi
0
1 km
Survey date February 17, 1985
Video Tape 7

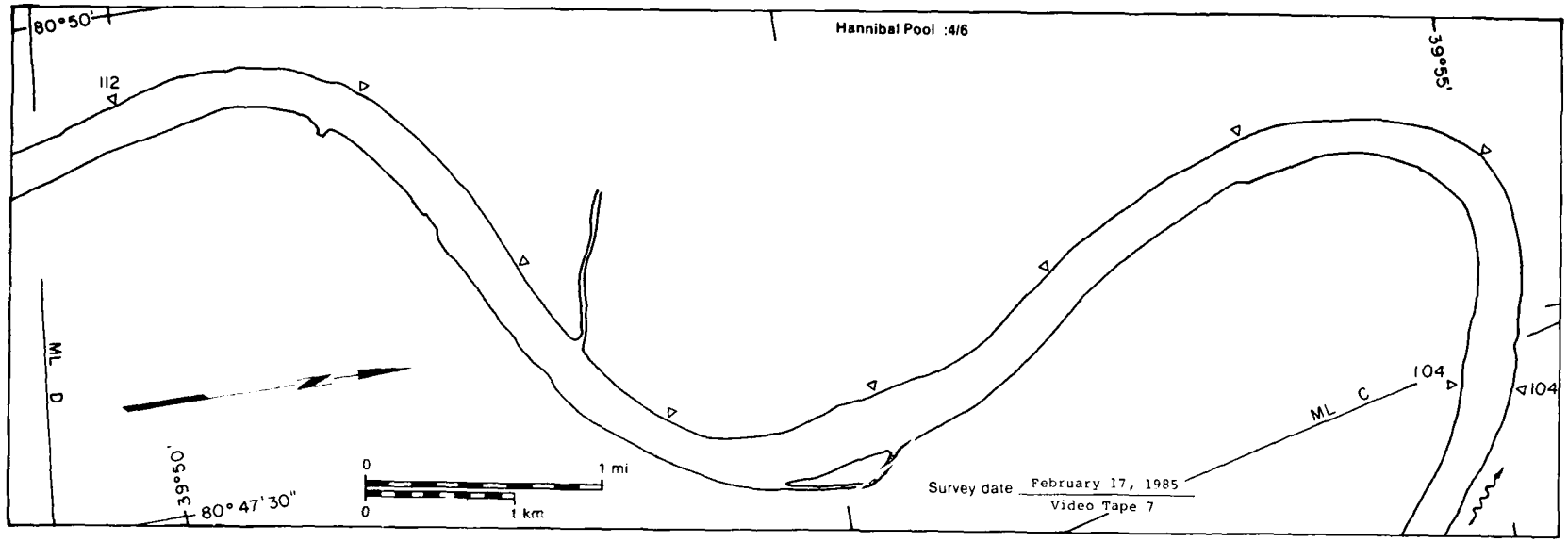

80°45'
Hannibal Pool :2/6
ML B
96
Wheeling Island
89
Wheeling Creek
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date February 17, 1985
Video Tape 7
40°05'
ML A

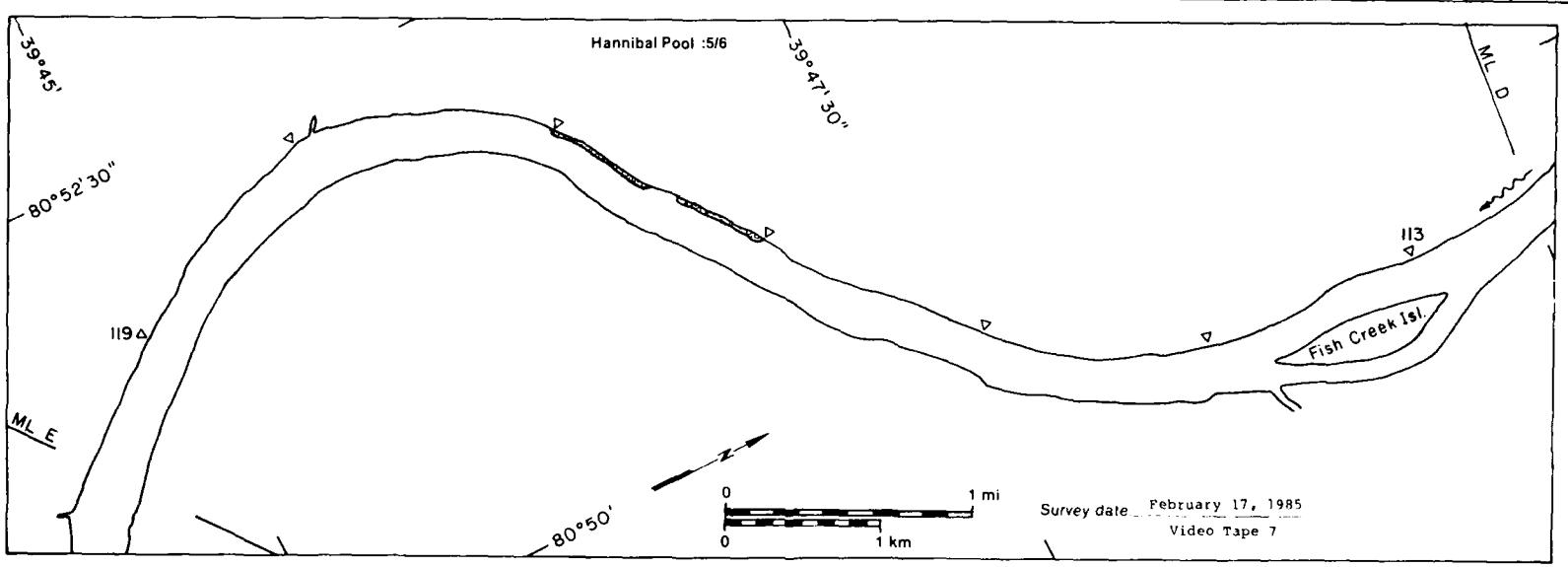

Hannibal Pool :3/6

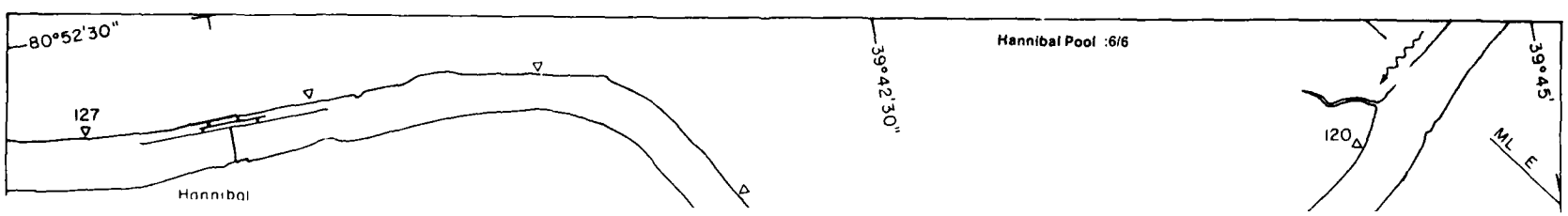

Wheeling Creek
40°00'
40°02'30"
40°5'
ML A
0
1 mi
0
1 km
Survey date February 17, 1985
Video Tape 7

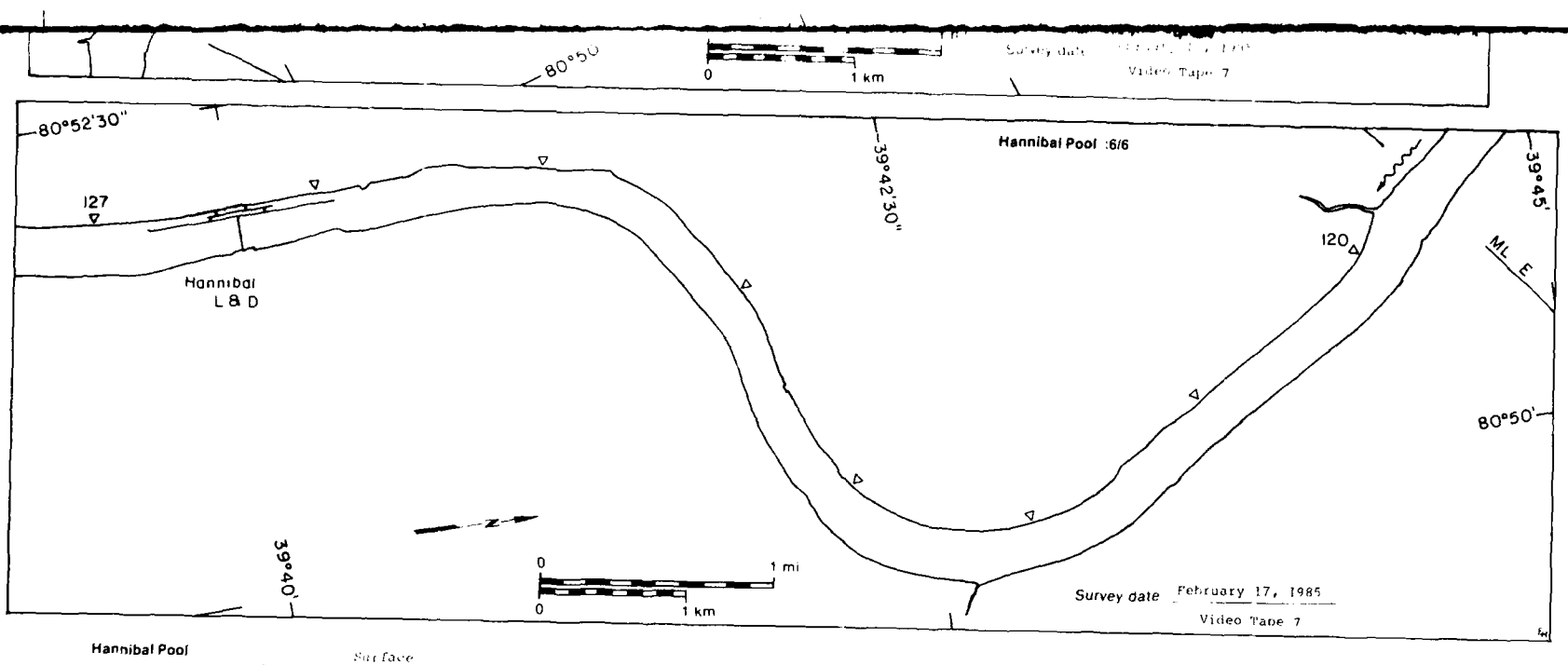

Hannibal Pool :3/6
39°57'30"
80° 45'
ML C
ML B
104
96
0
1 mi
0
1 km
Survey date February 17, 1985
Video Tape 7

17 February 1985



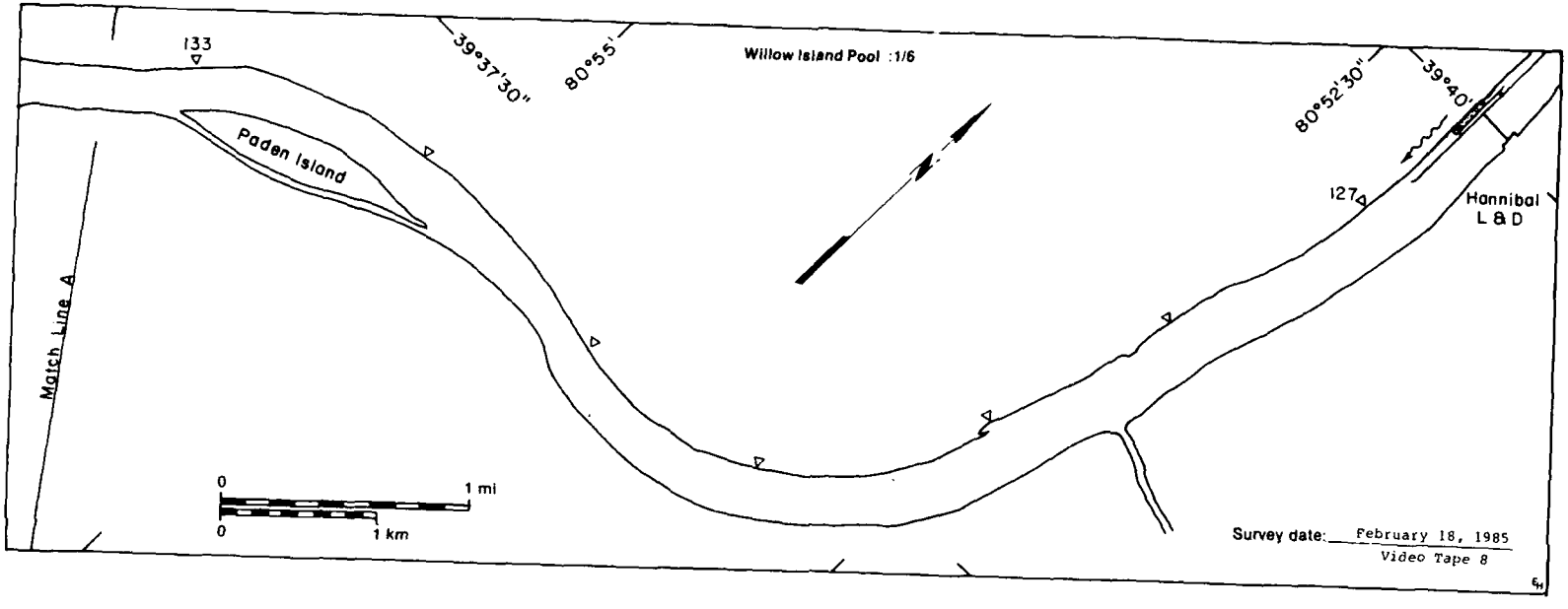


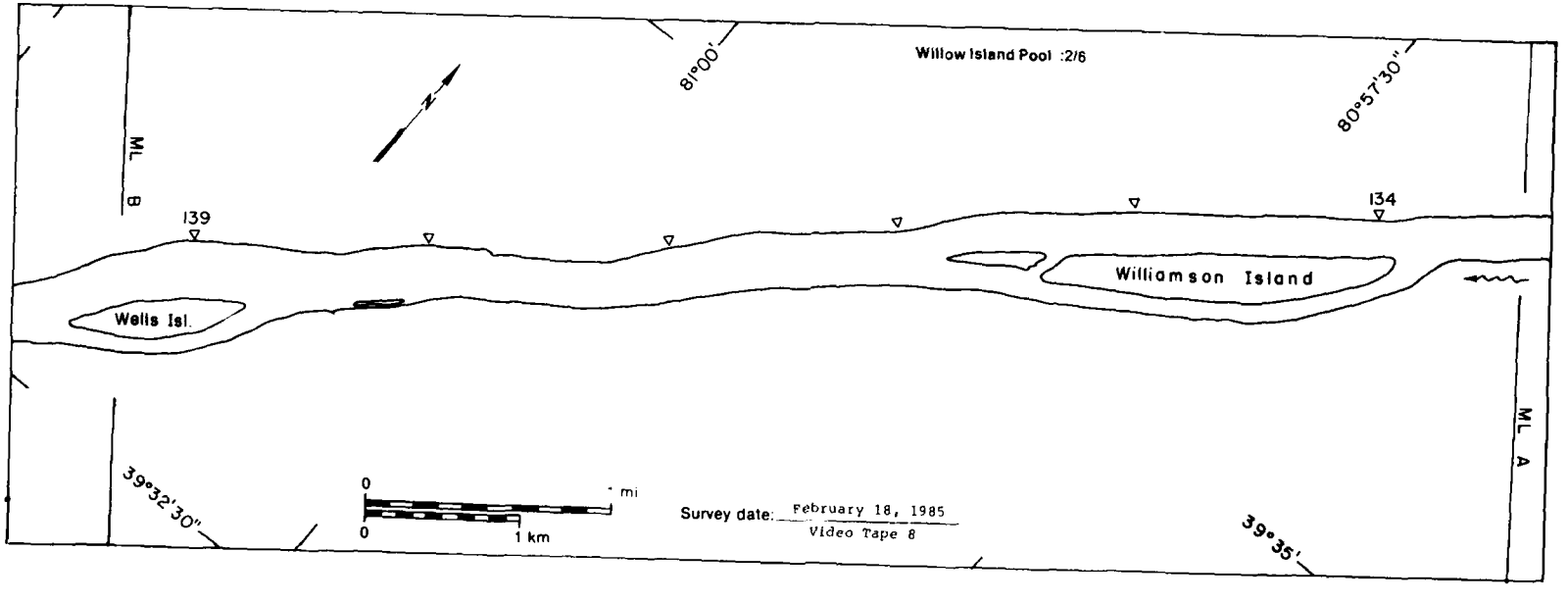


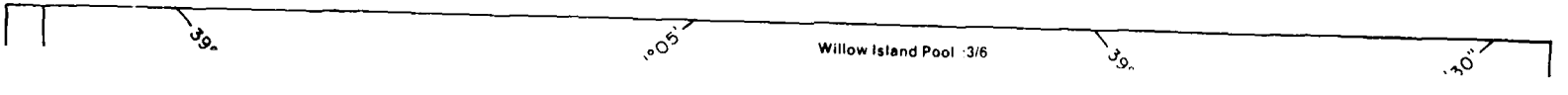


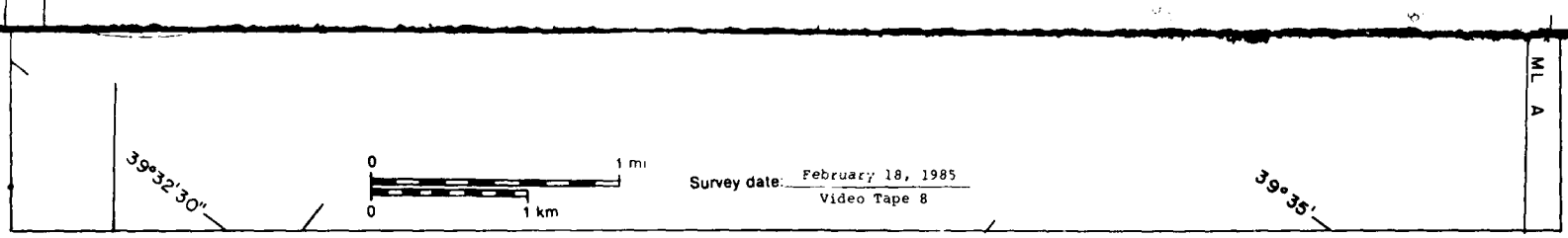
Hannibal Pool

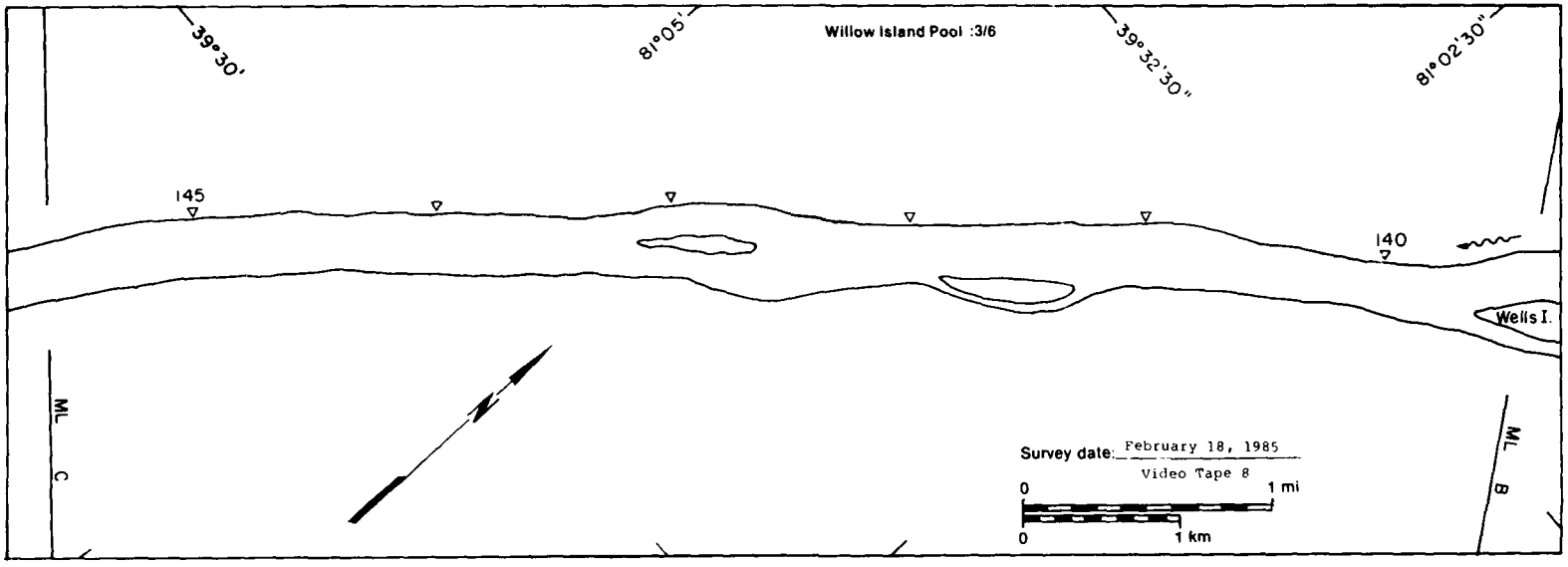
MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	22.38	NA
Solid ice cover	0.01	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	0.01	90
Ice lines or frazil slush and pans	0.06	20
Total Area (m^2 x 10^6)	22.46	


133
39°37'30"
80°55'
Willow Island Pool :1/6
80°52'30"
39°40'
Paden Island
127
Hannibal
L&D
Marsh Line A
0
1 mi
0
1 km
Survey date: February 18, 1985
Video Tape 8

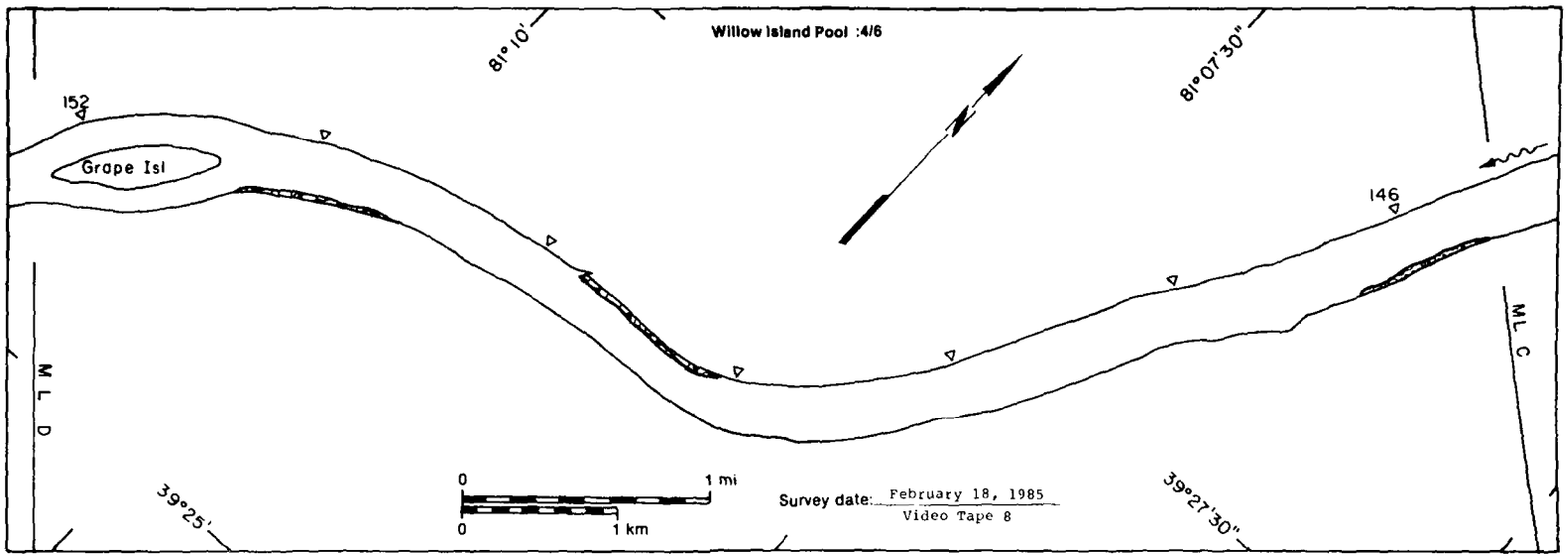

81°00'
Willow Island Pool :2/6
80°57'30"
ML B
139
134
Williamson Island
Wells Isl.
ML A
39°32'30"
0
mi
0
1 km
Survey date: February 18, 1985
Video Tape 8
39°35'

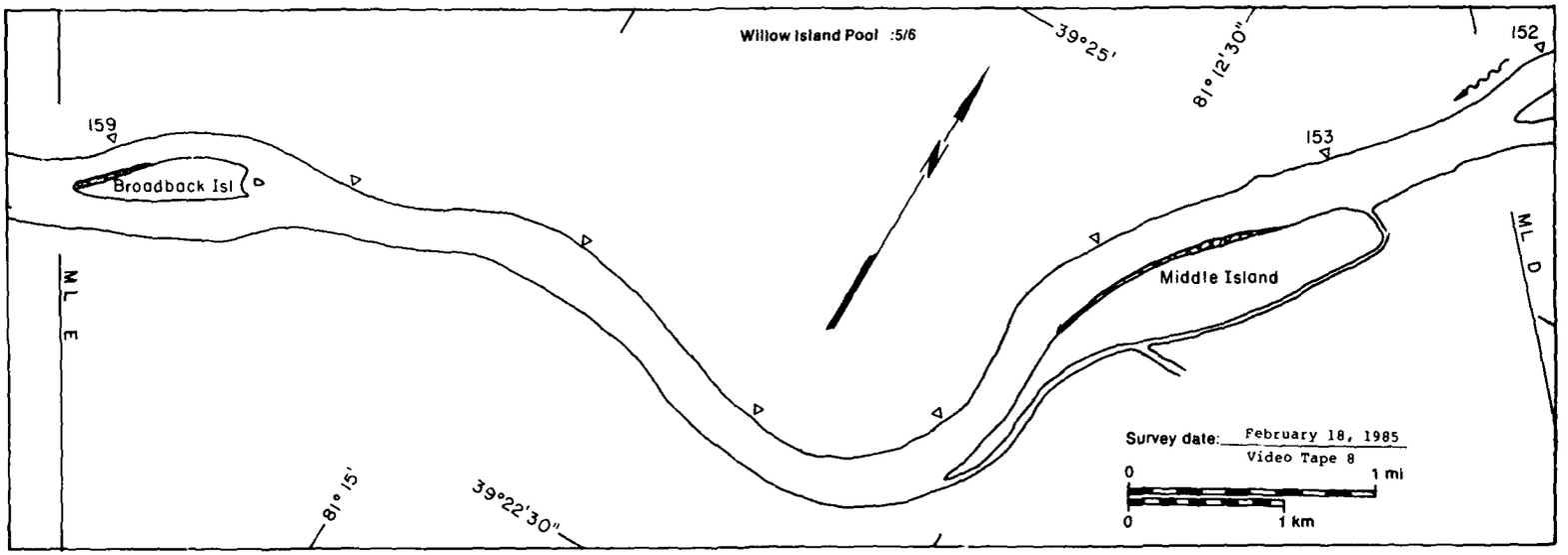

39°
Willow Island Pool :3/6

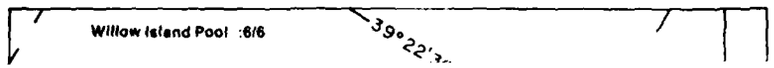

ML A
39°32'30"
0
1 mi
0
1 km
Survey date: February 18, 1985
Video Tape 8
39°35'


39°30'
81°05'
Willow Island Pool :3/6
39°32'30"
81°02'30"
145
140
Wells I.
ML C
ML B
Survey date: February 18, 1985
Video Tape 8
0
1 mi
0
1 km

18 February 1985

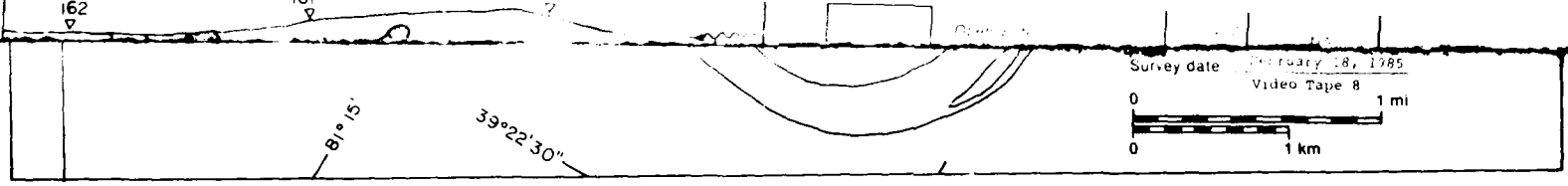


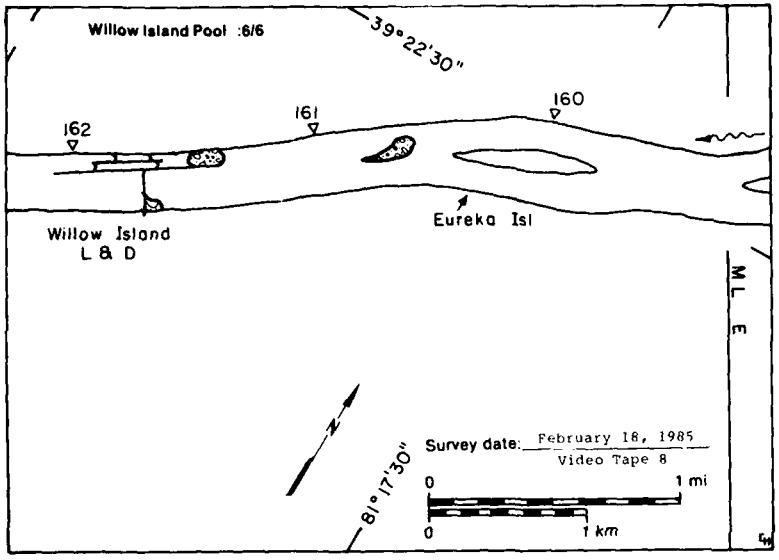




Willow Island Pool

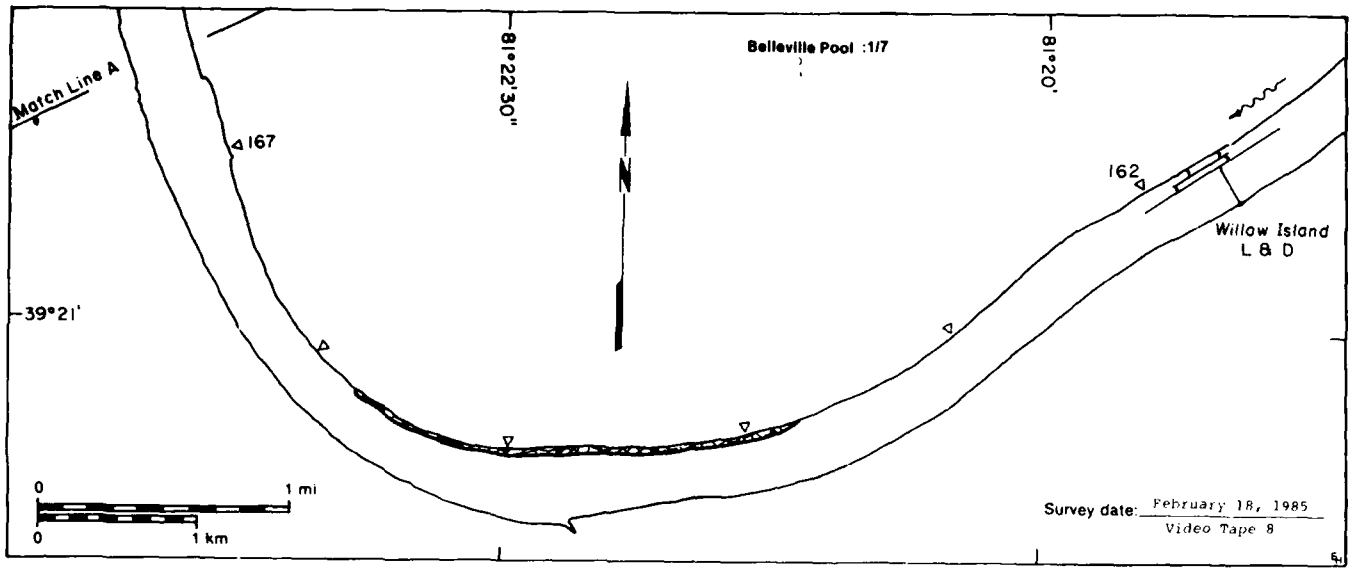
Surface

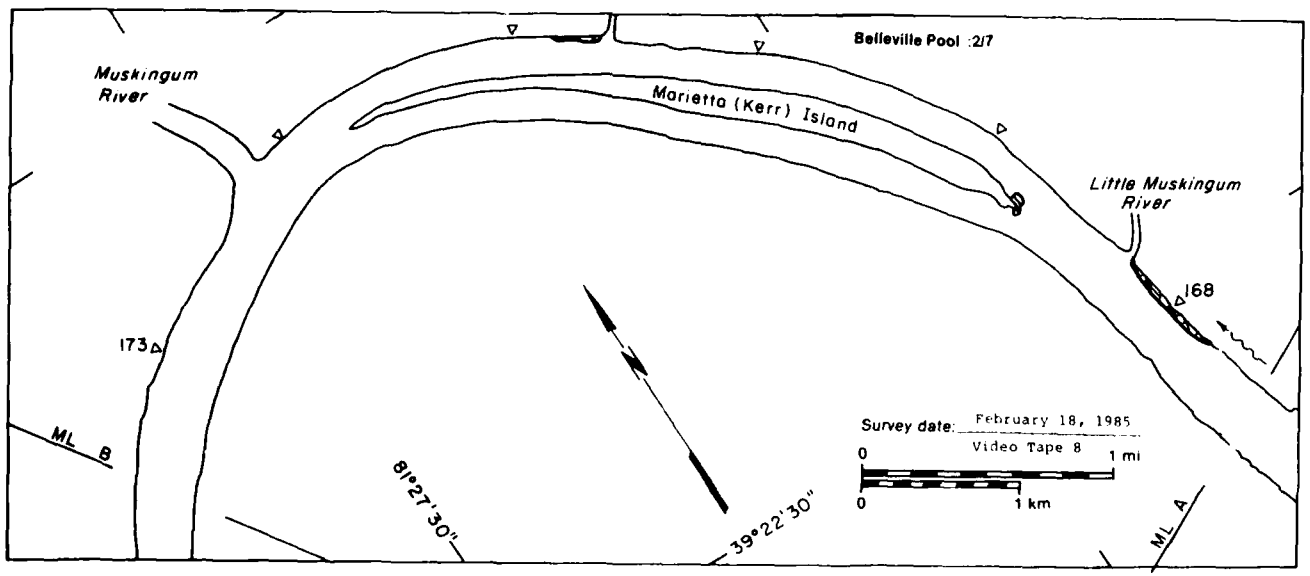


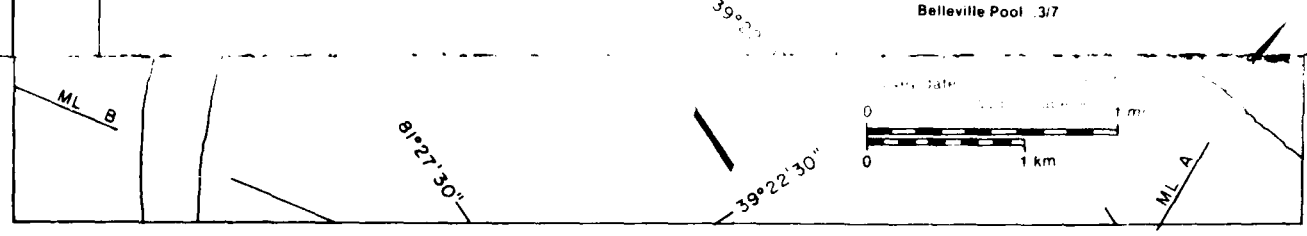


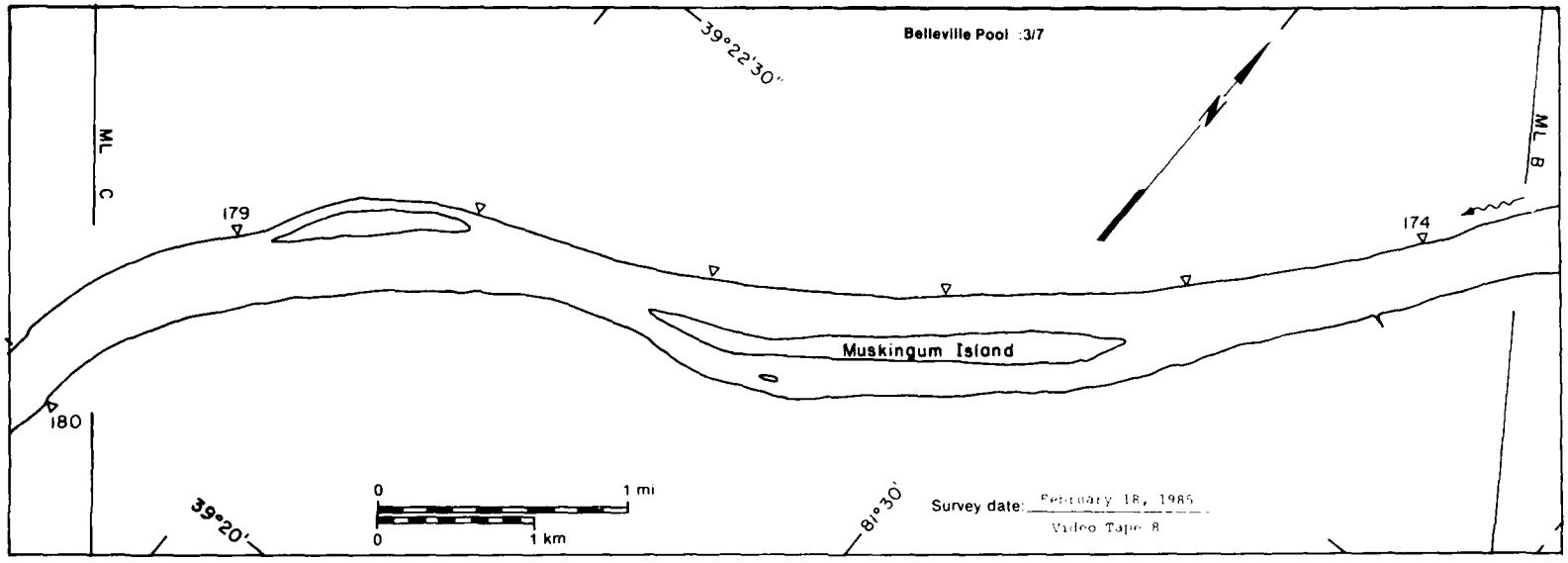
Willow Island Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	20.82	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.18	90
Ice floes or frazil slush and pans	0.24	1
Total Area ($m^2 \times 10^6$)	21.24	

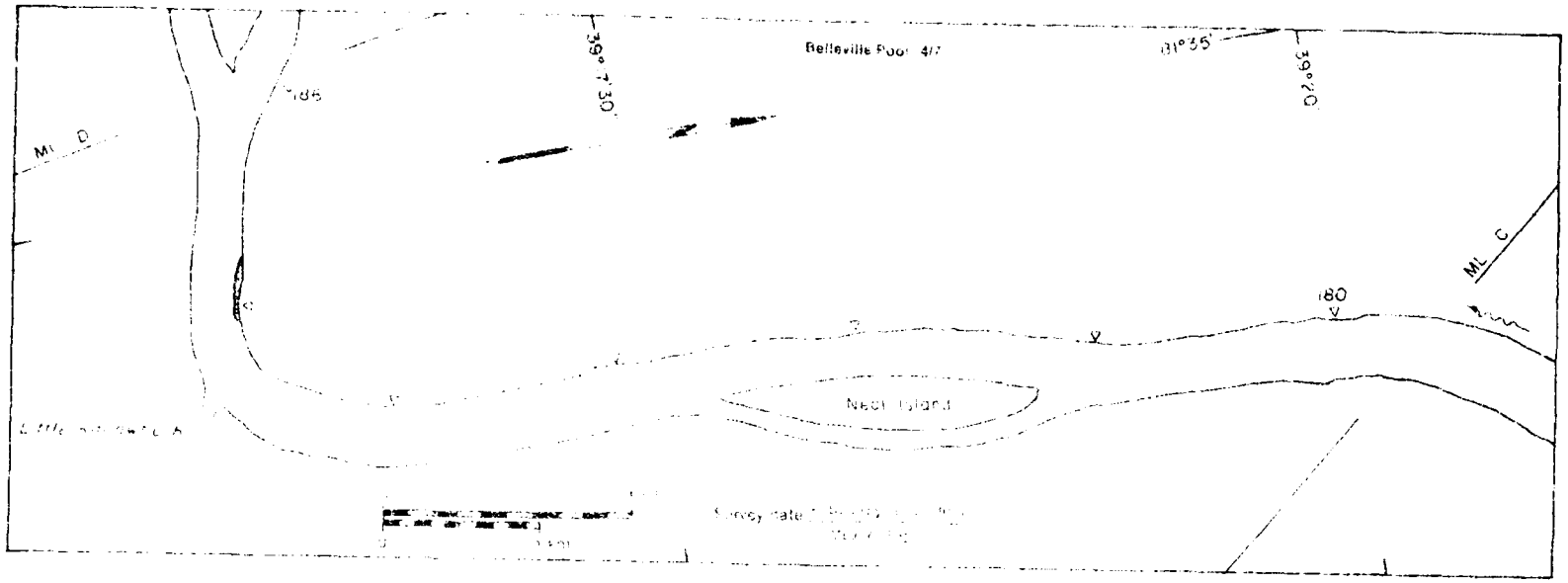

Belleville Pool :1/7
Match Line A
81°22'30"
81°20'
167
162
Willow Island
L & D
39°21'
0
1 mi
0
1 km
Survey date: February 18, 1985
Video Tape 8

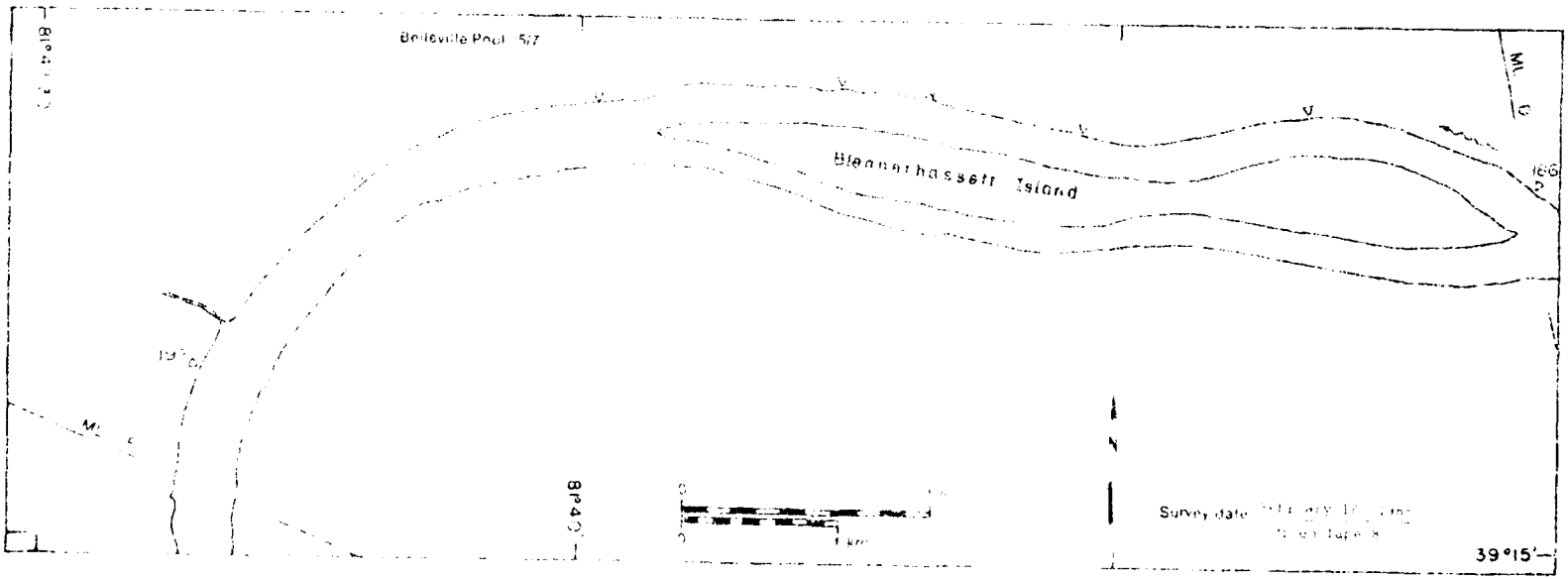

Belleville Pool :2/7
Muskingum
River
Marietta (Kerr) Island
Little Muskingum
River
168
173
ML B
81°27'30"
39°22'30"
Survey date: February 18, 1985
Video Tape 8
0
1 mi
0
1 km
ML A

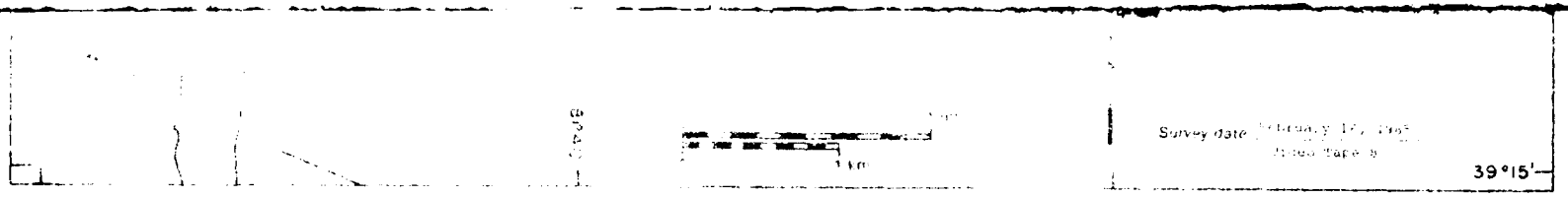

Belleville Pool :3/7
ML B
81°27'30"
39°22'30"
ML A
0
1 mi
0
1 km

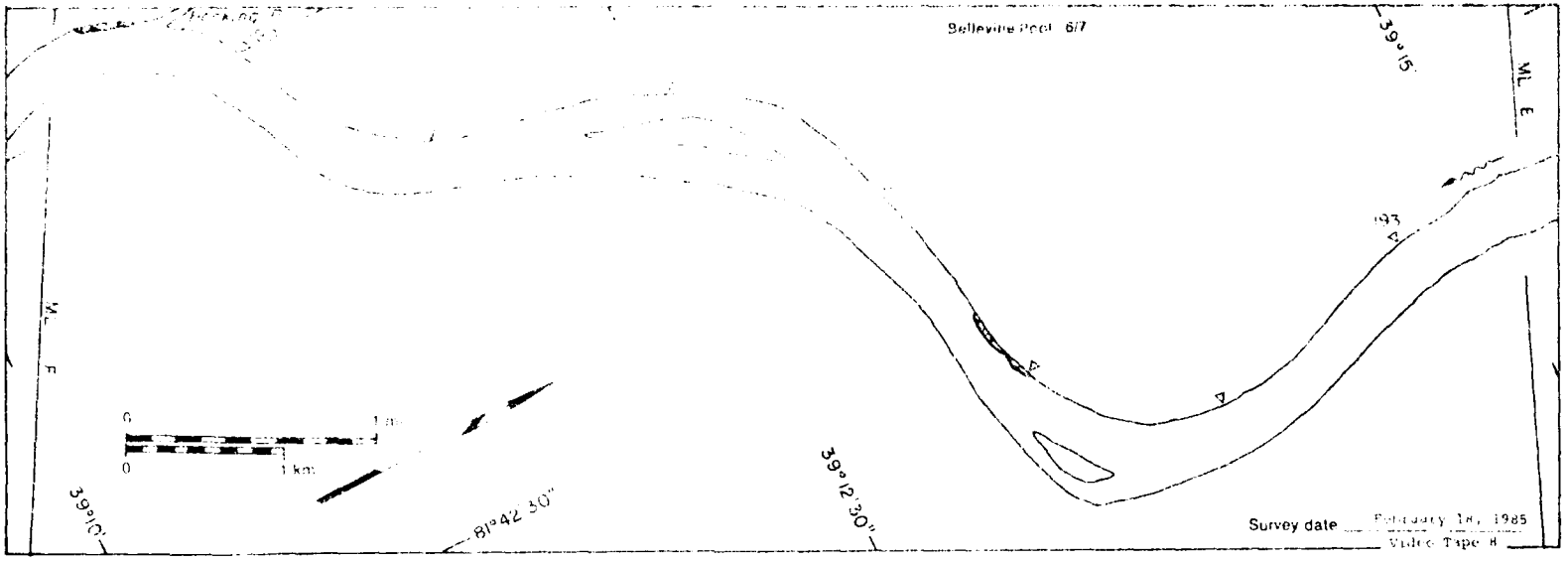

Belleville Pool :3/7
39°22'30"
ML C
ML B
179
174
Muskingum Island
180
39°20'
0
1 mi
0
1 km
81°30'
Survey date: February 18, 1985
Video Tape 8

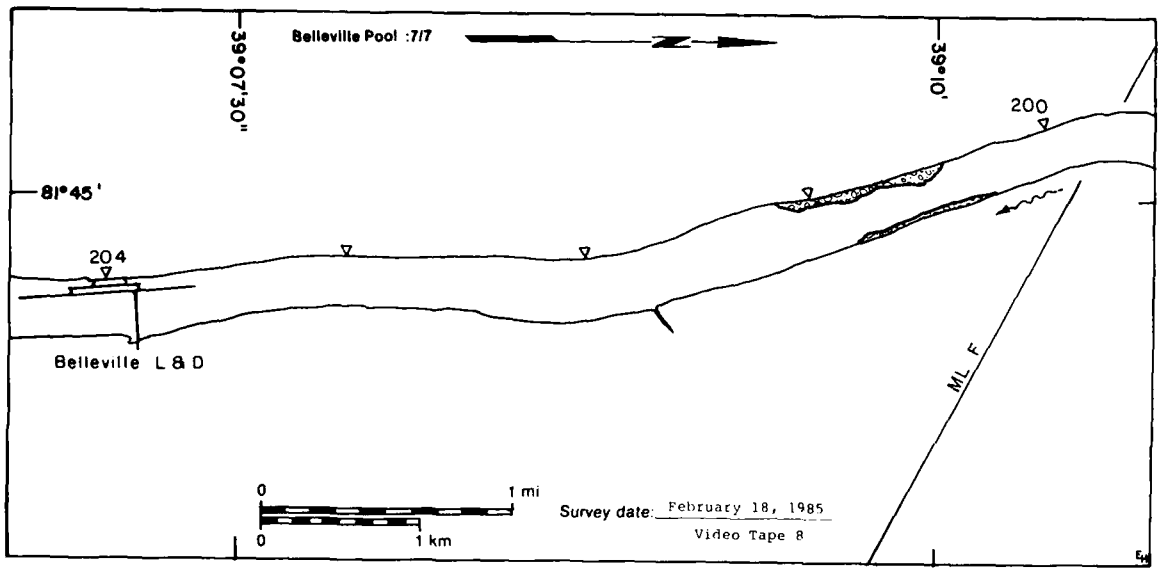
18 February 1985






Survey date
39°15'

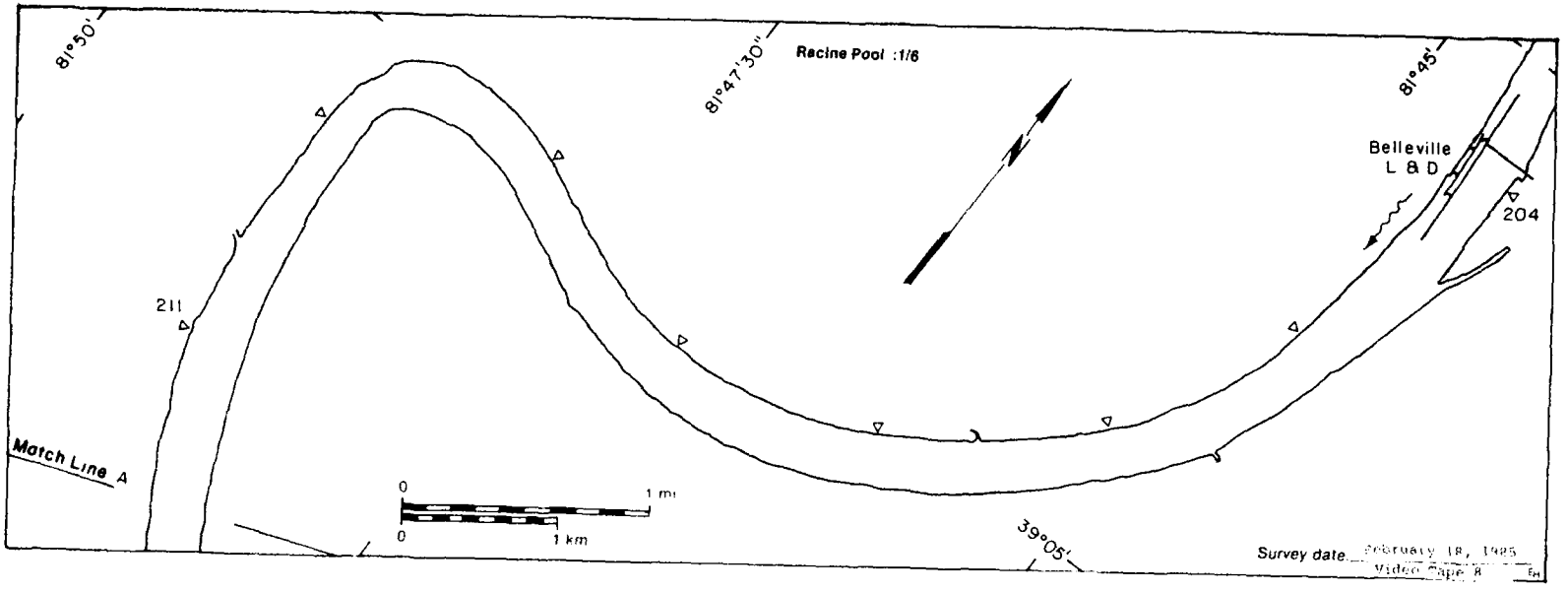

Bellevine Pool 6/7
39°15'
ML E
193
ML F
0
1 km
39°10'
81°42'30"
39°12'30"
Survey date
Video Tape #

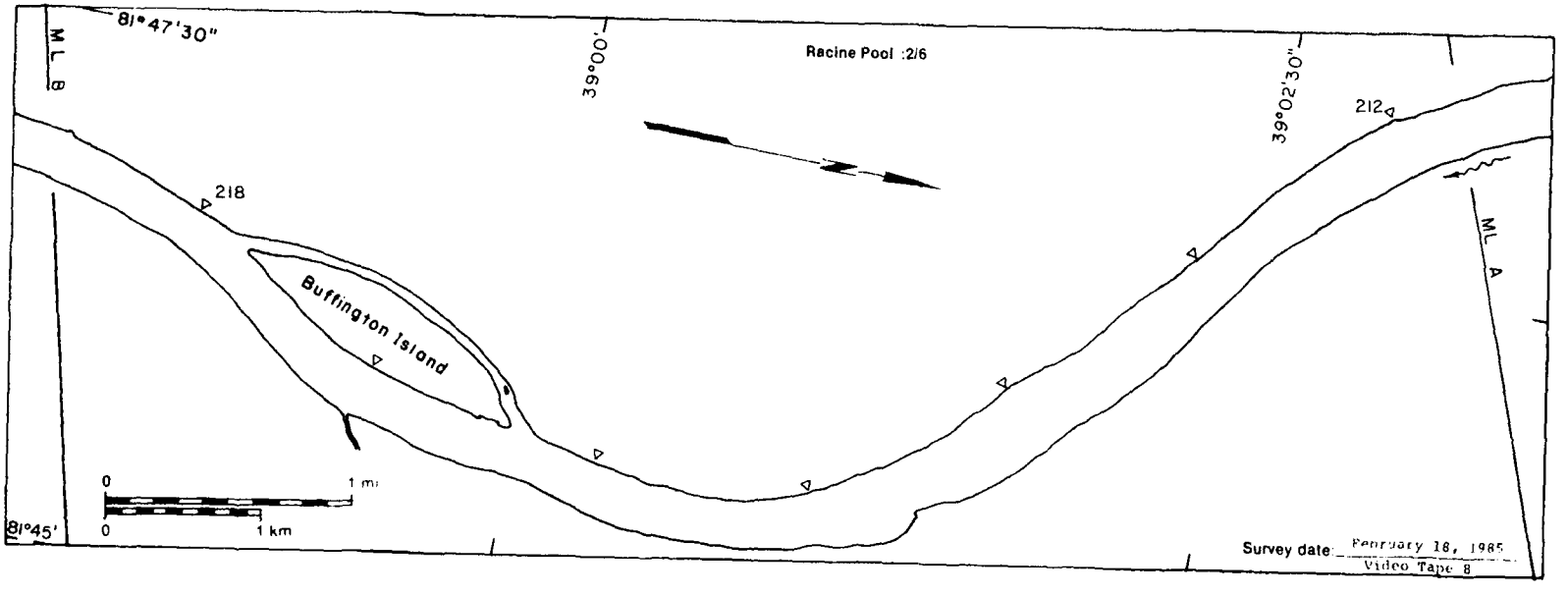


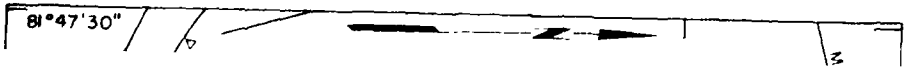
Belleville Pool

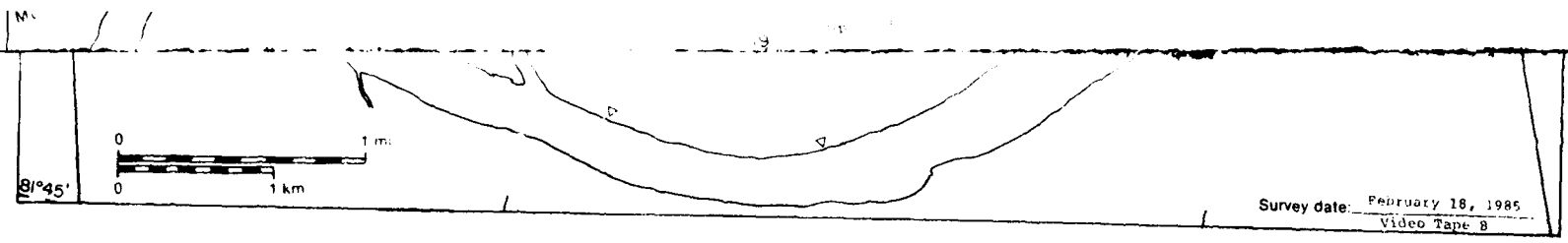
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	26.76	NA
Solid ice cover	0.02	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.35	80
Ice floes or frazil slush and pans	0.15	2
Total Area ($m^2 \times 10^6$)	27.28	

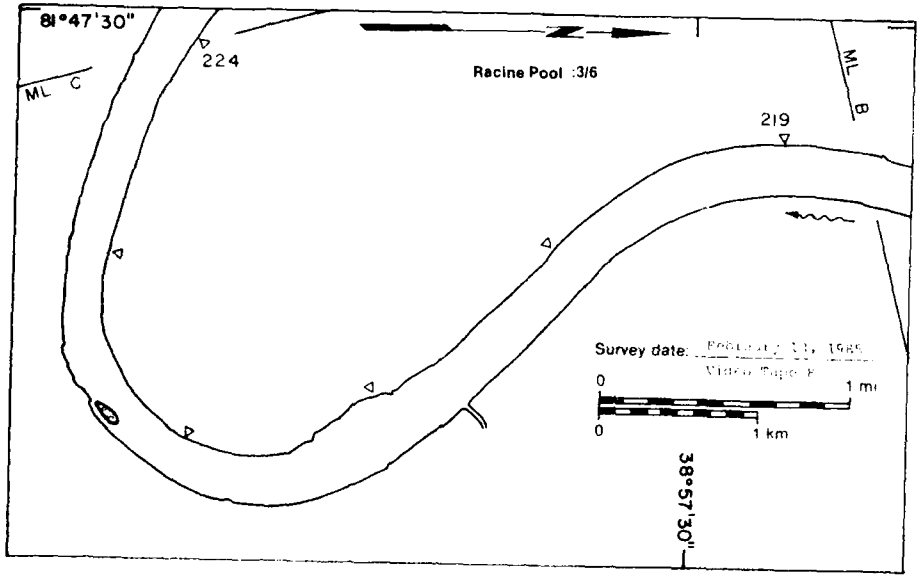
18 February 1985



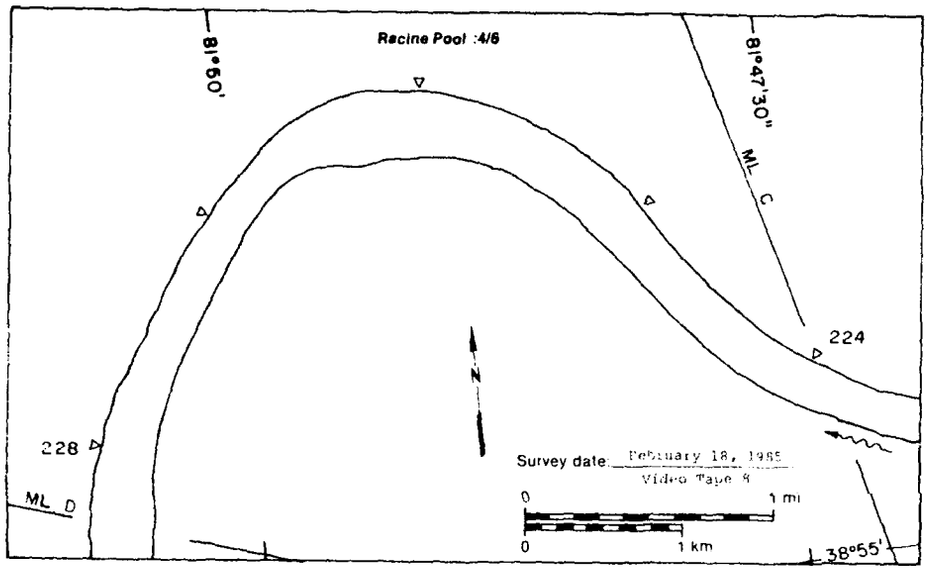


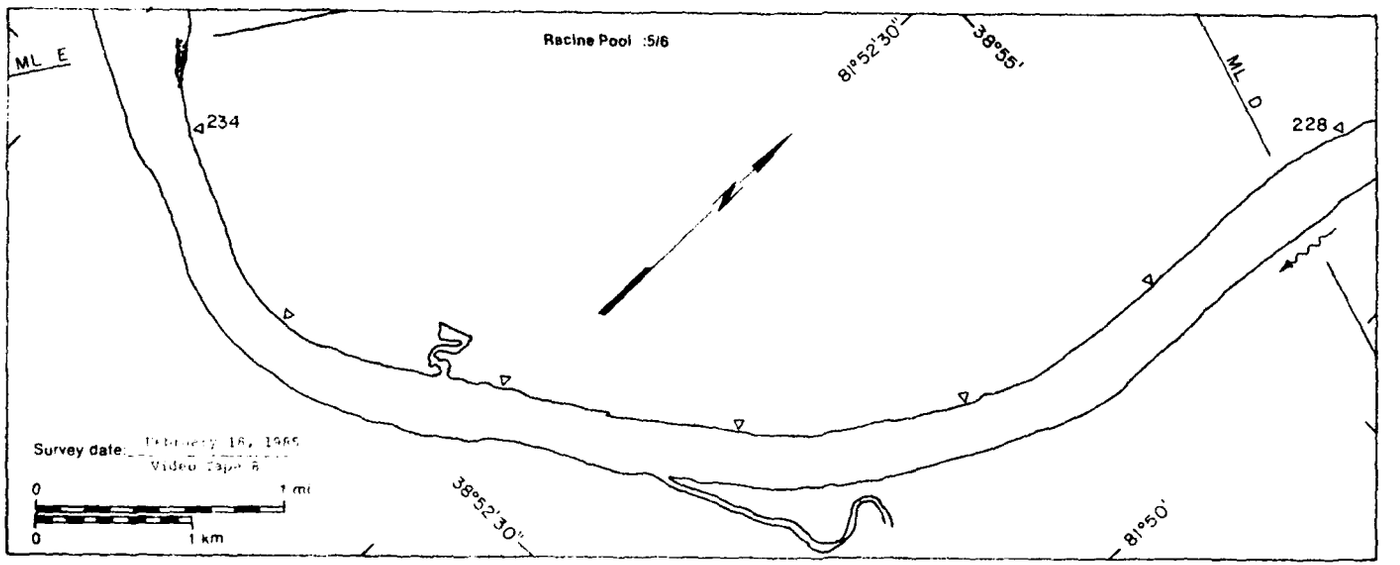


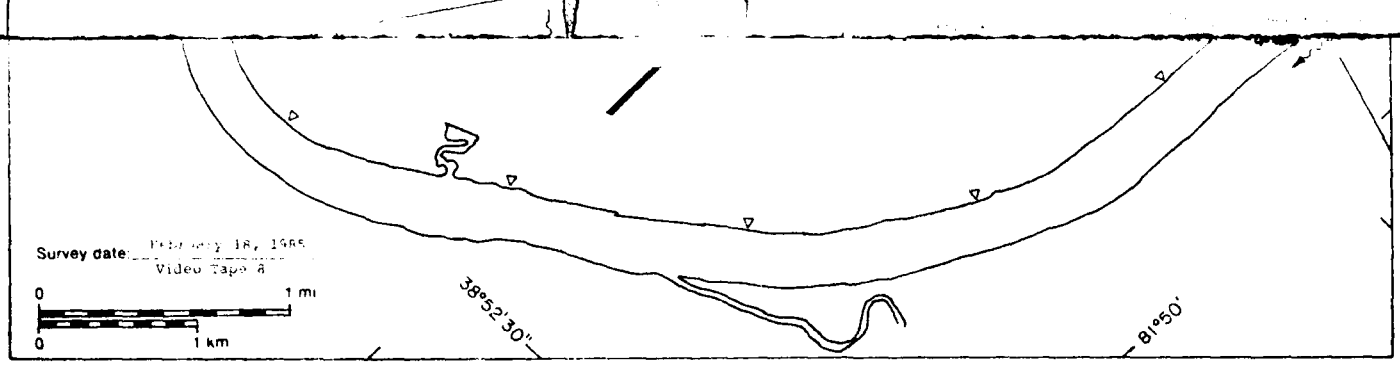

0
1 mi
0
1 km
81°45'
Survey date: February 18, 1985
Video Tape 8

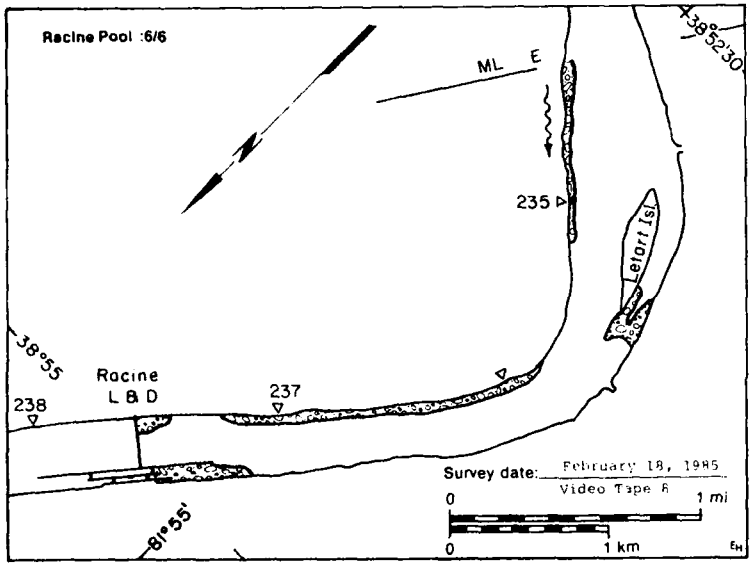

81°47'30"
224
Racine Pool :3/6
ML C
ML B
219
Survey date:
0
1 mi
0
1 km
38°57'30"

18 February 1985







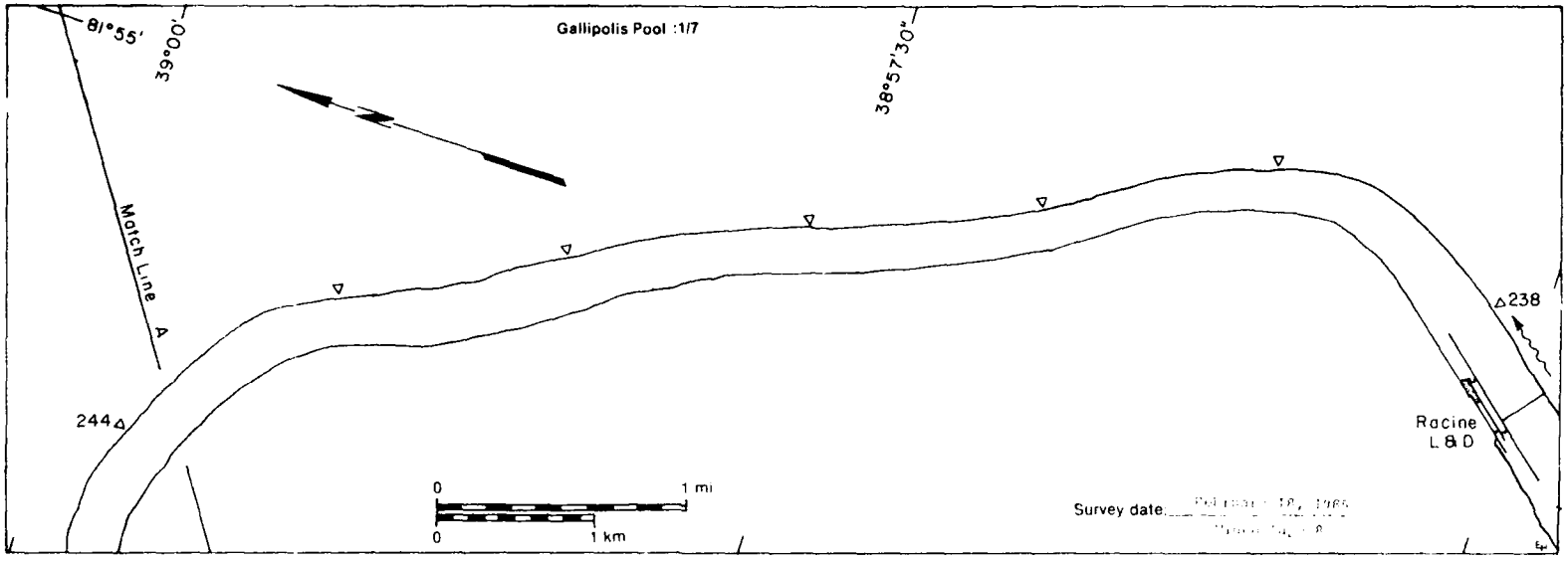


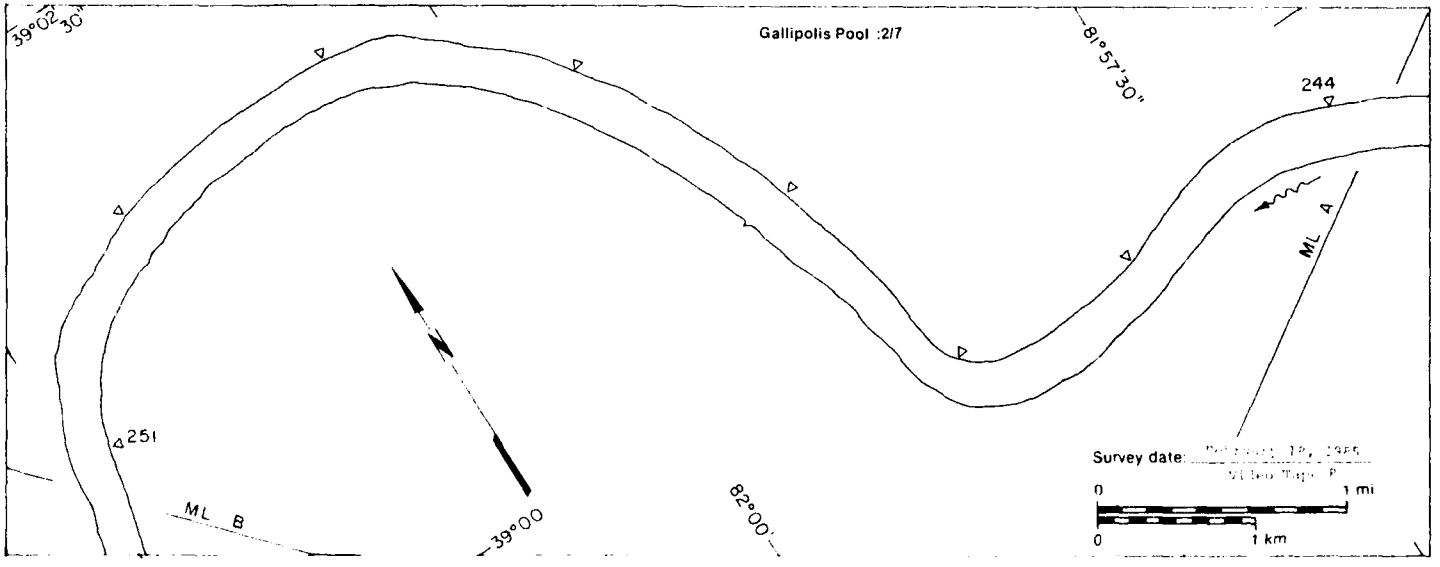
Racine Pool

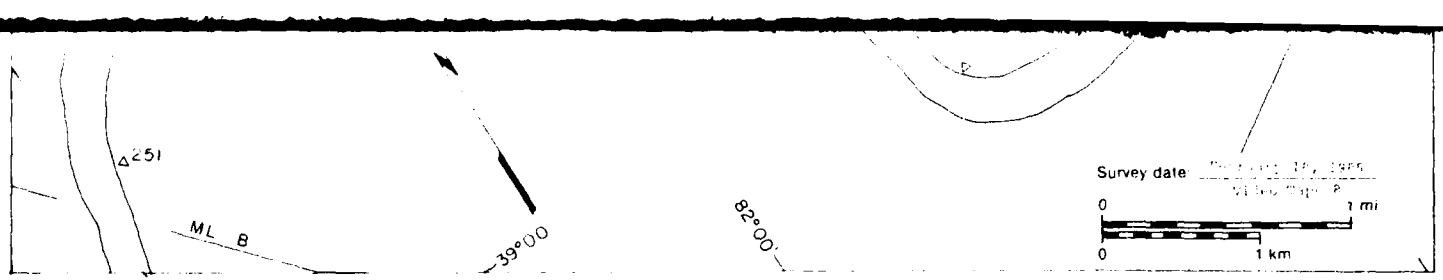
MAP UNITS

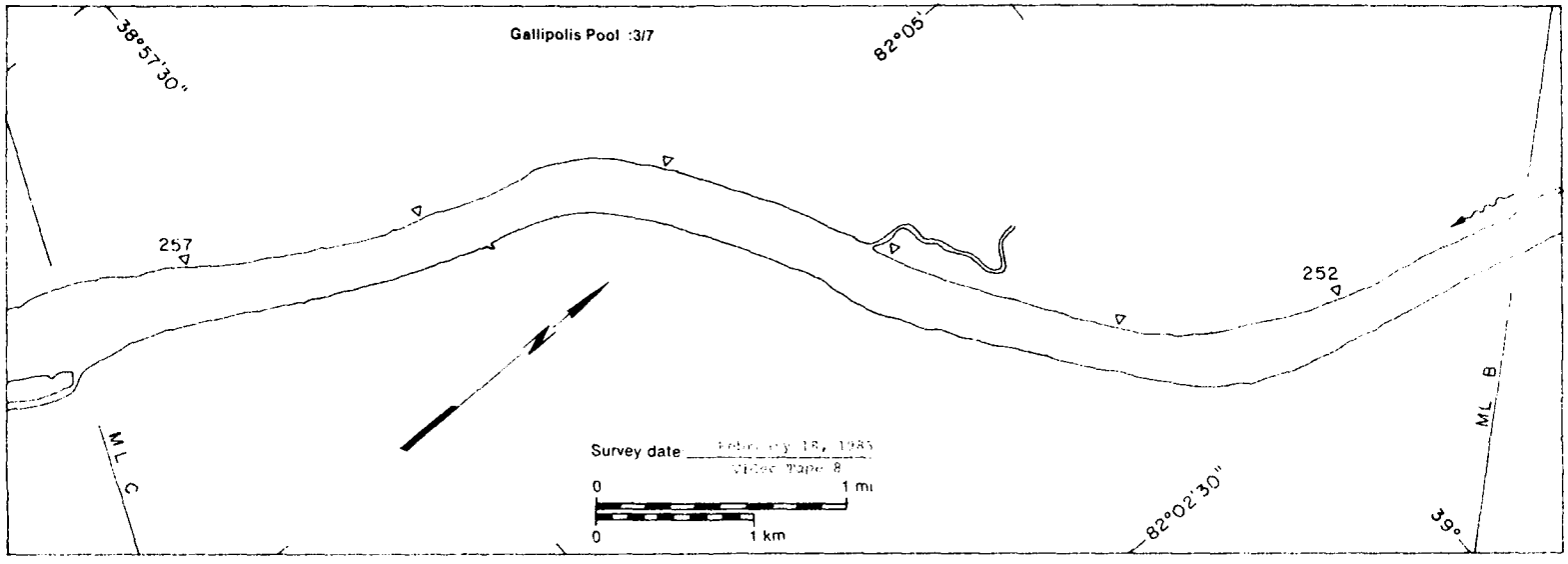
	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	19.51	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.38	5
Total Area ($m^2 \times 10^6$)	19.89	

18 February 1985

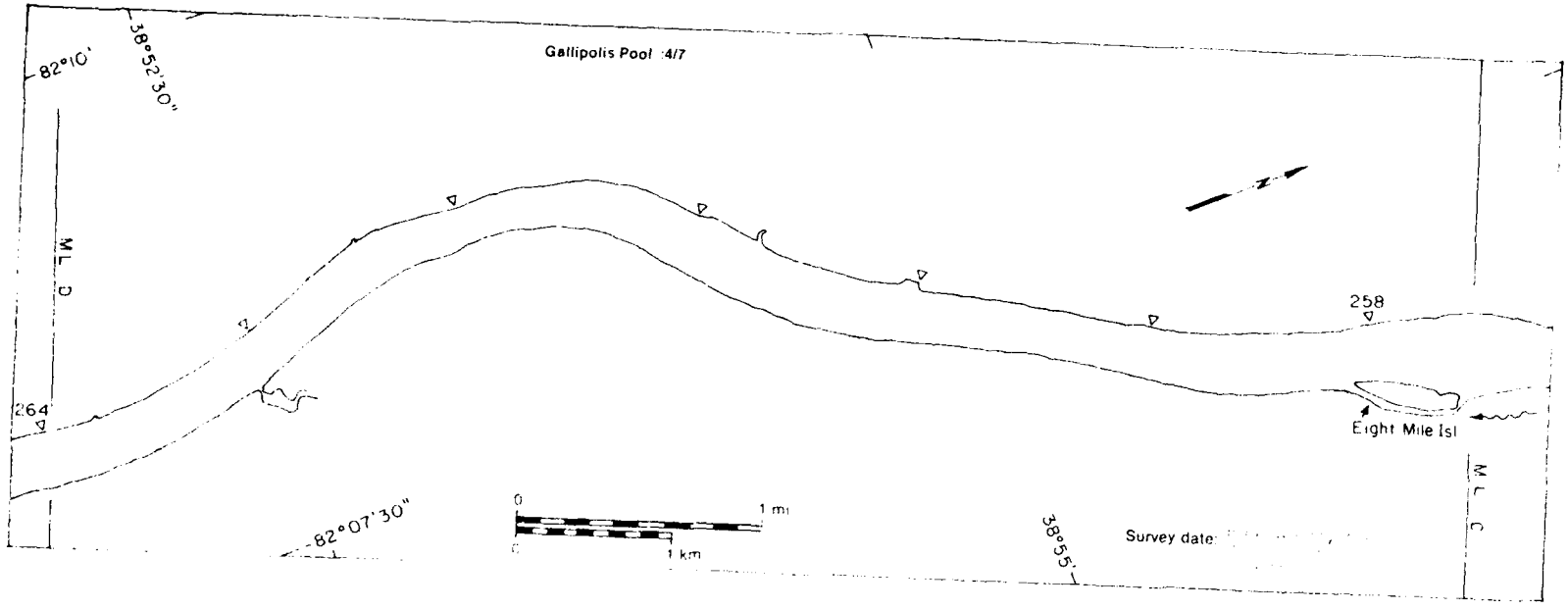


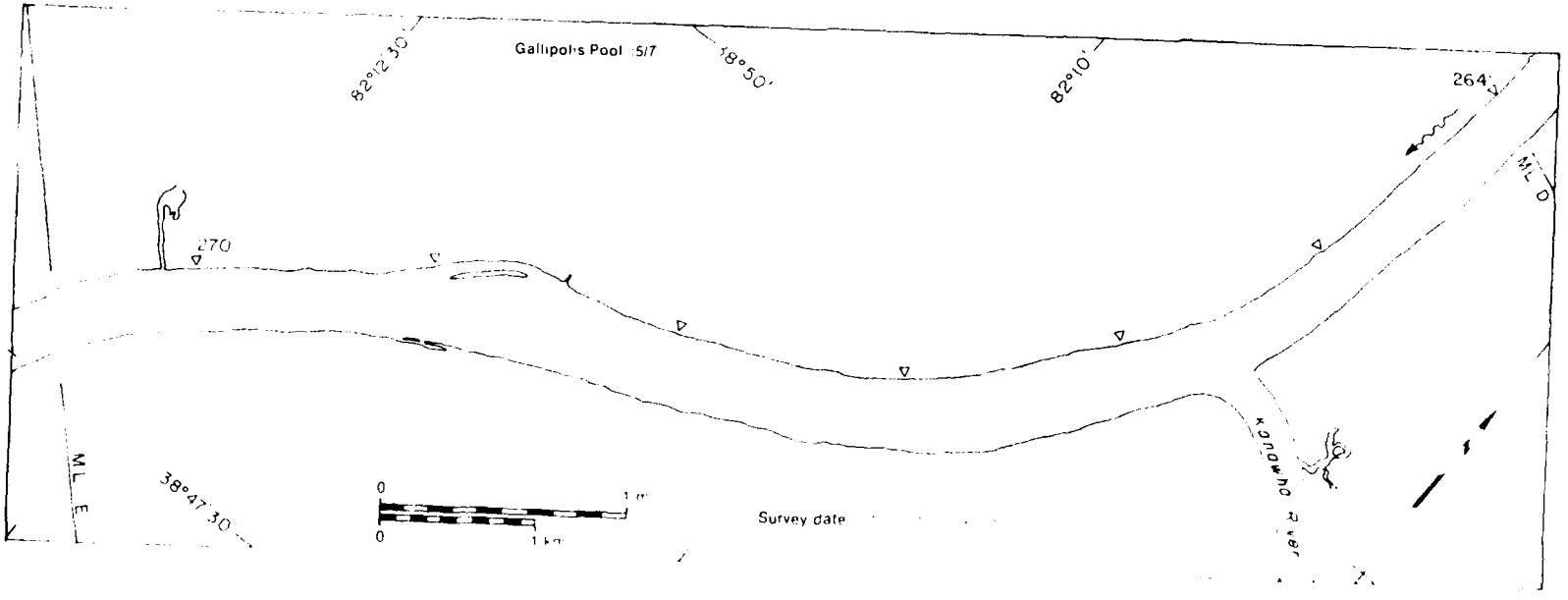


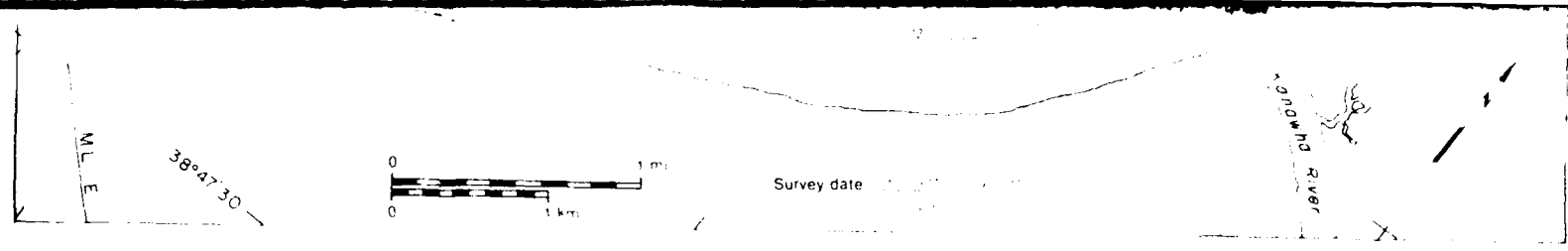

251
ML B
39°00'
82°00'
Survey date
0
1 mi
0
1 km

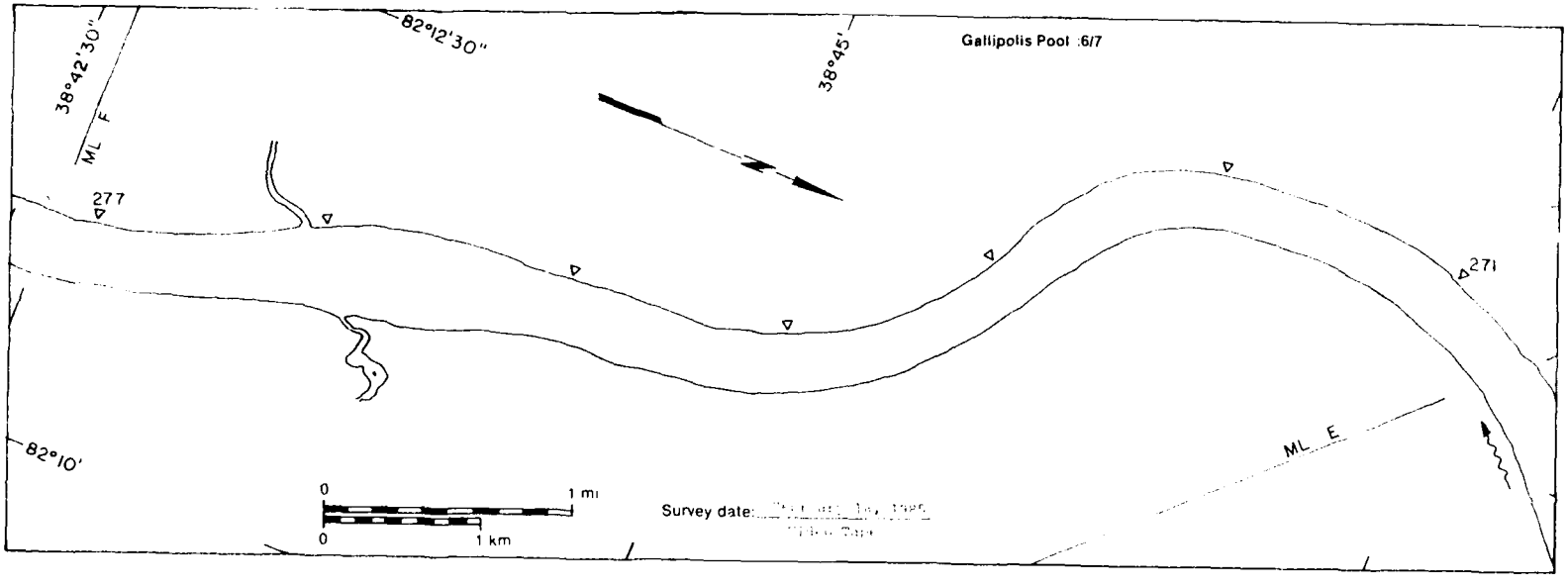

Gallipolis Pool :3/7
38°57'30"
82°05'
257
252
ML B
ML C
Survey date
0
1 mi
0
1 km
82°02'30"
39°

18 February 1985

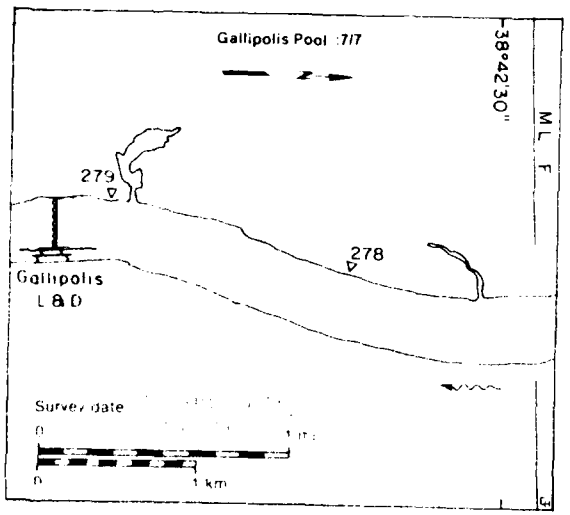


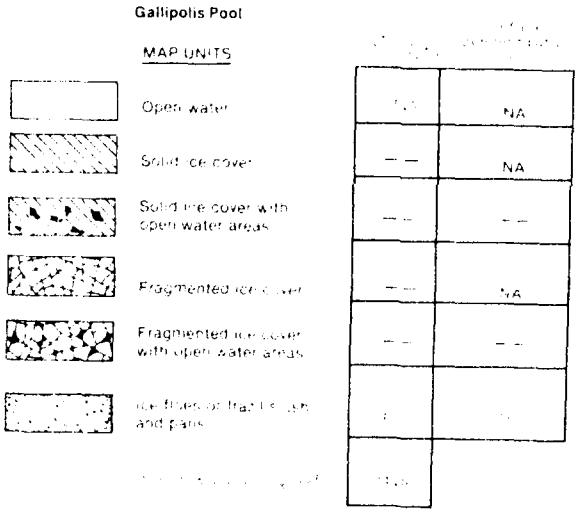


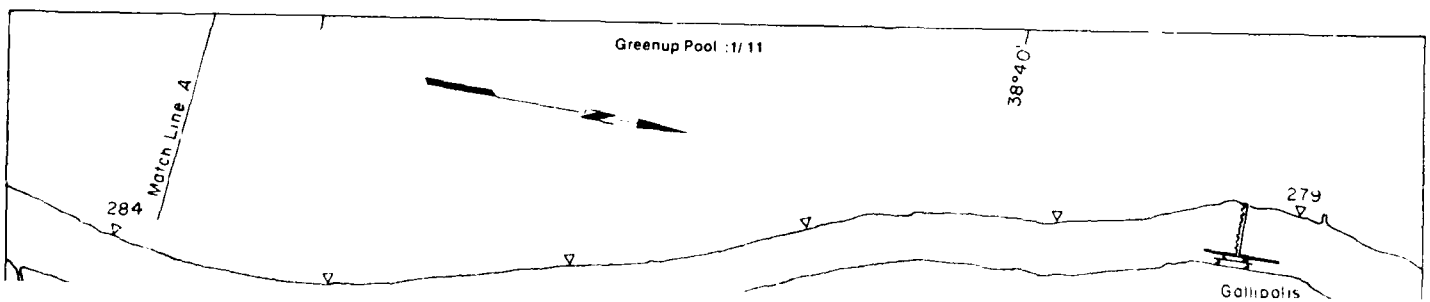

ML E
38°47'30"
0
1 mi
0
1 km
Survey date
Guyandotte River

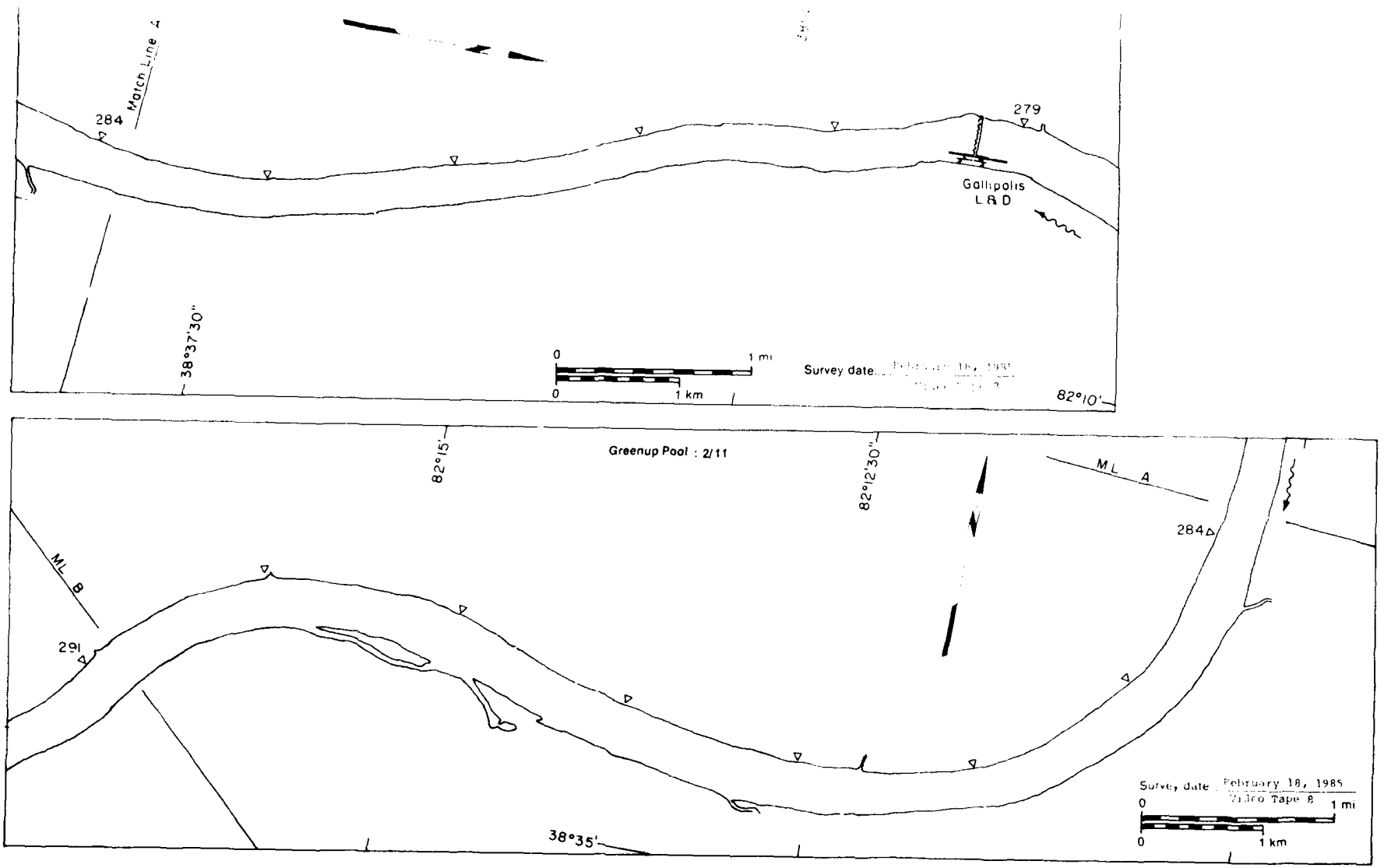

38°42'30"
82°12'30"
38°45'
Gallipolis Pool :6/7
ML F
277
271
82°10'
ML E
0
1 mi
0
1 km
Survey date:

18 February 1985

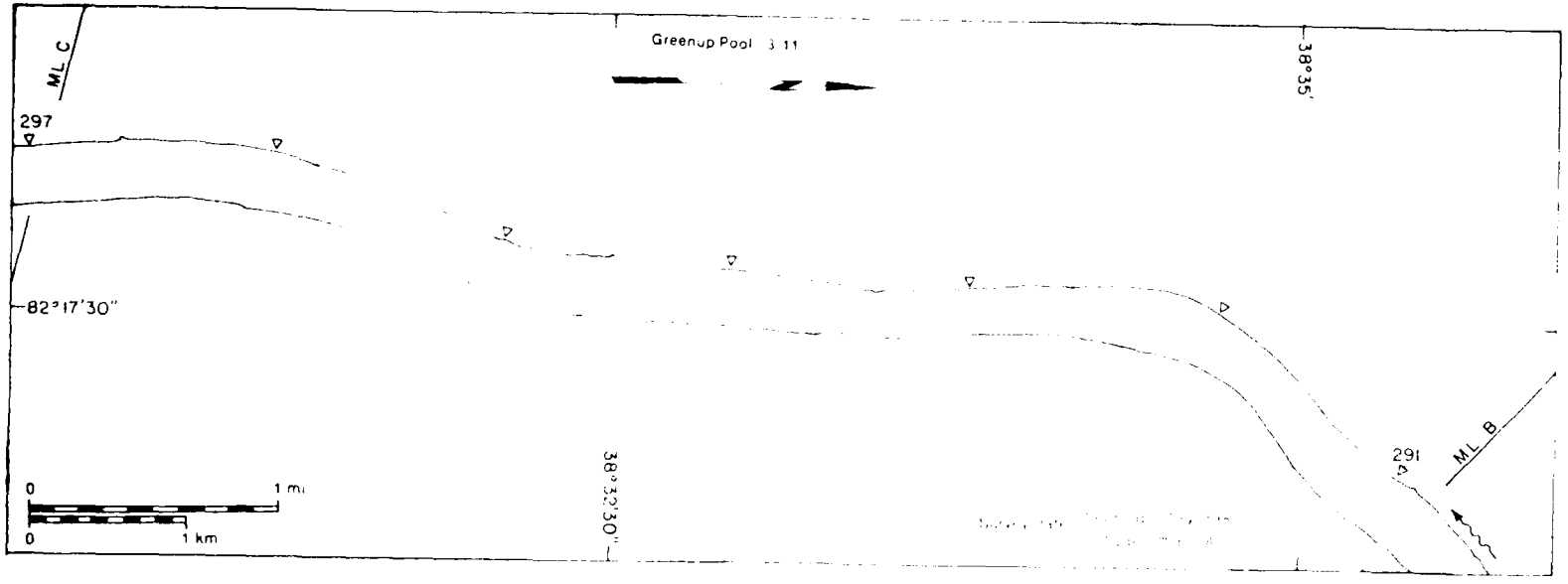


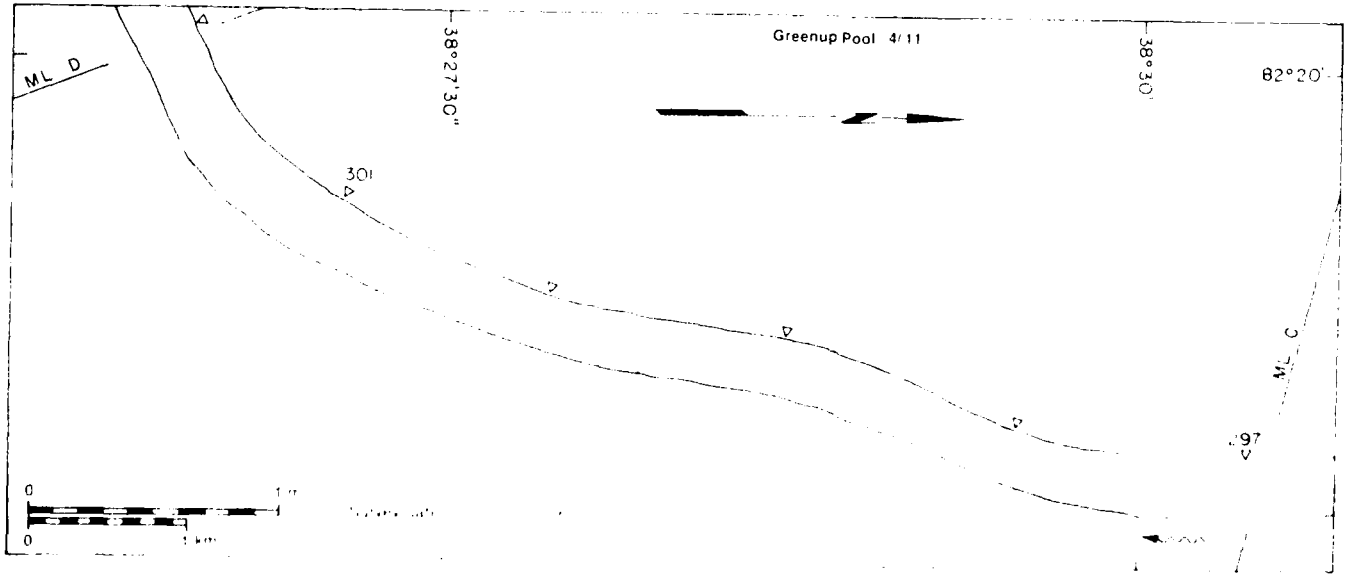


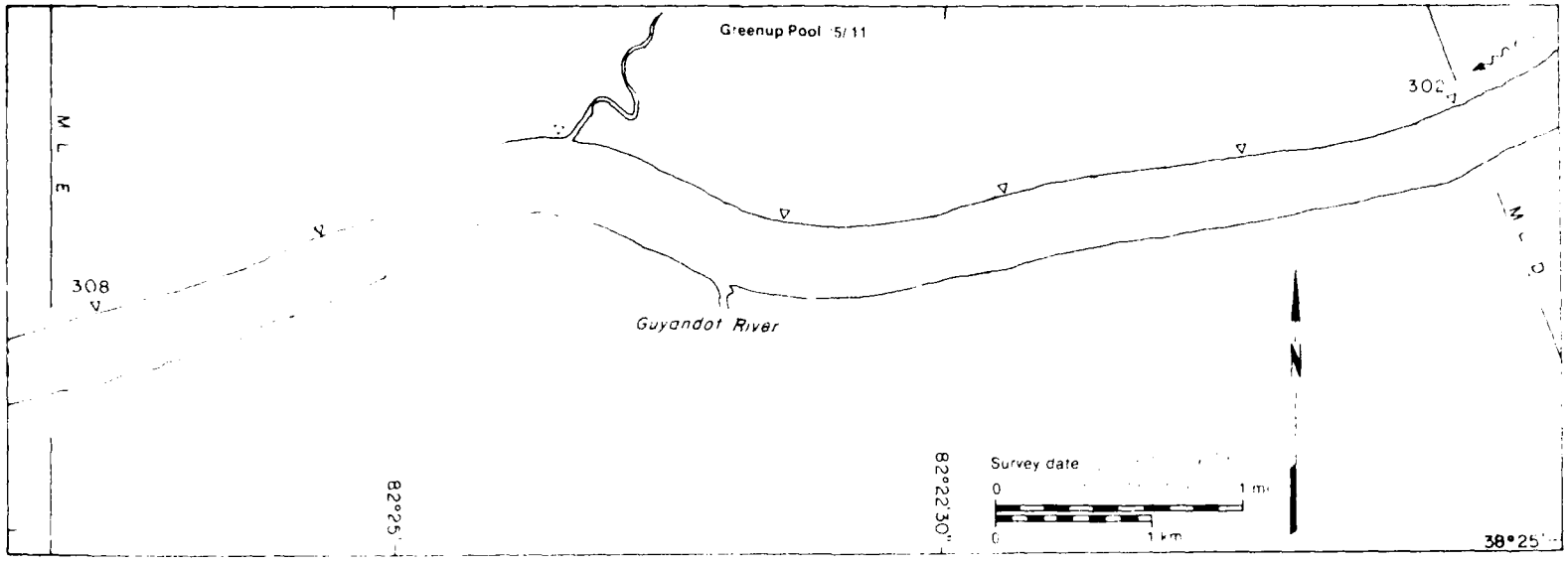



Match Line A
284
279
Gallipolis
L&D
38°37'30"
0
1 mi
0
1 km
Survey date
82°10'
Greenup Pool : 2/11
82°15'
82°12'30"
ML A
284
ML B
291
38°35'
Survey date February 18, 1985
Video Tape 8
0
1 mi
0
1 km

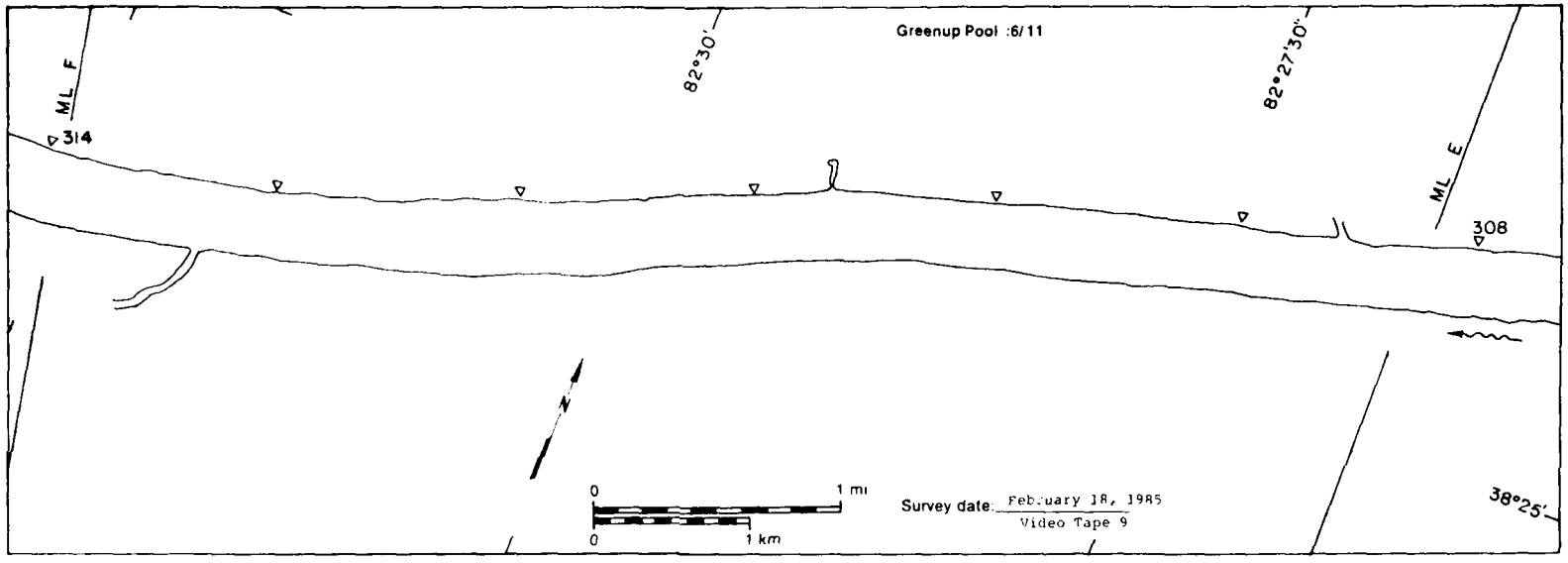
18 February 1985

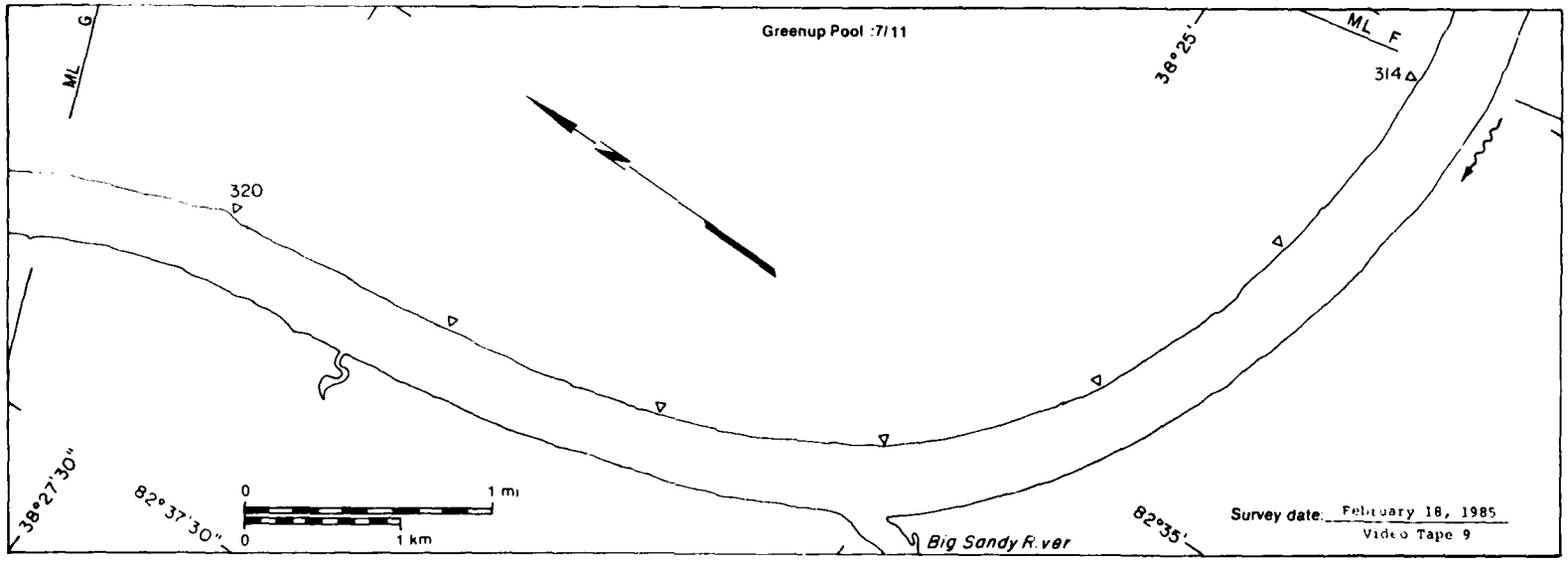


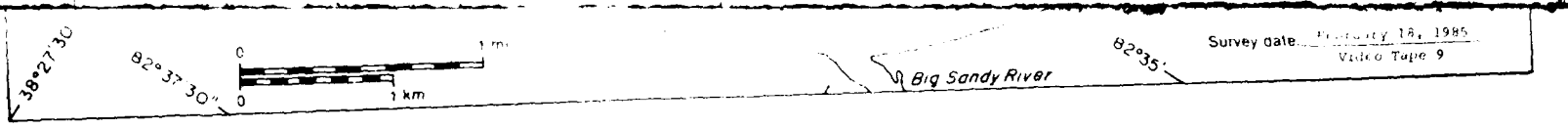


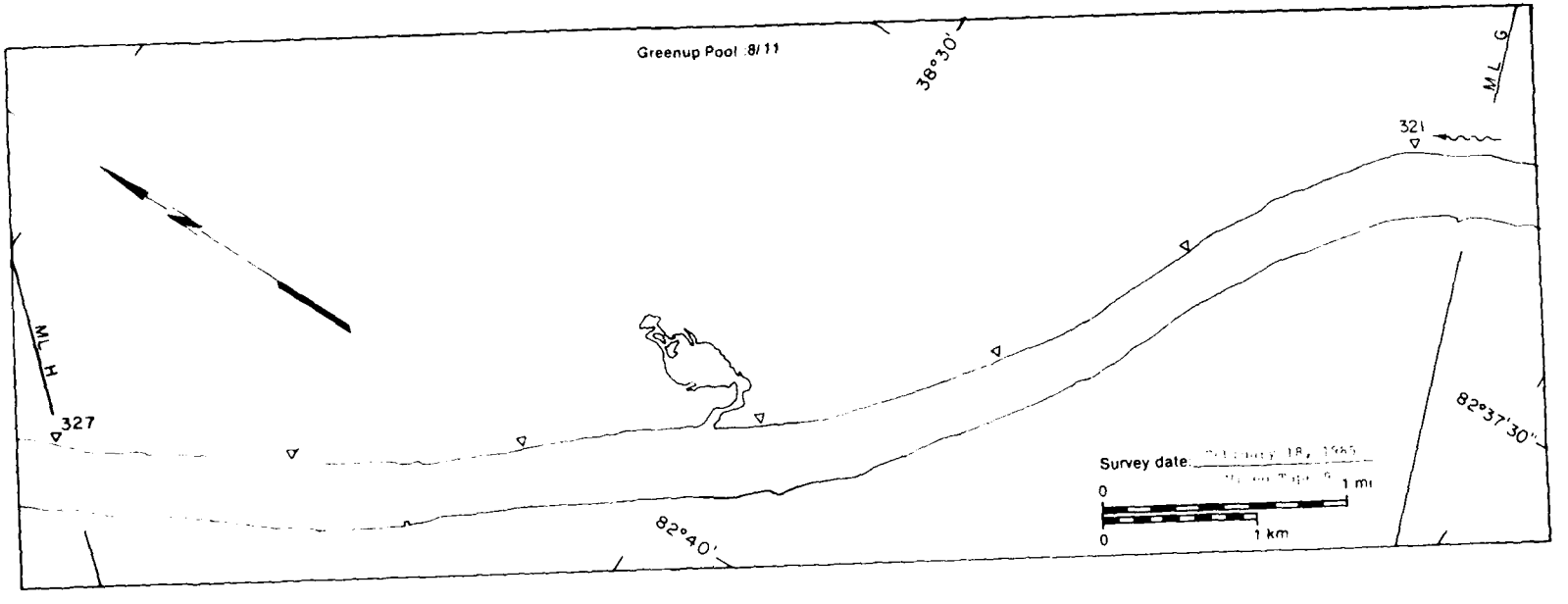

Greenup Pool 5/11
308
Guyandot River
82°25'
82°22'30"
Survey date
0
1 mi
0
1 km
38°25'

18 February 1985

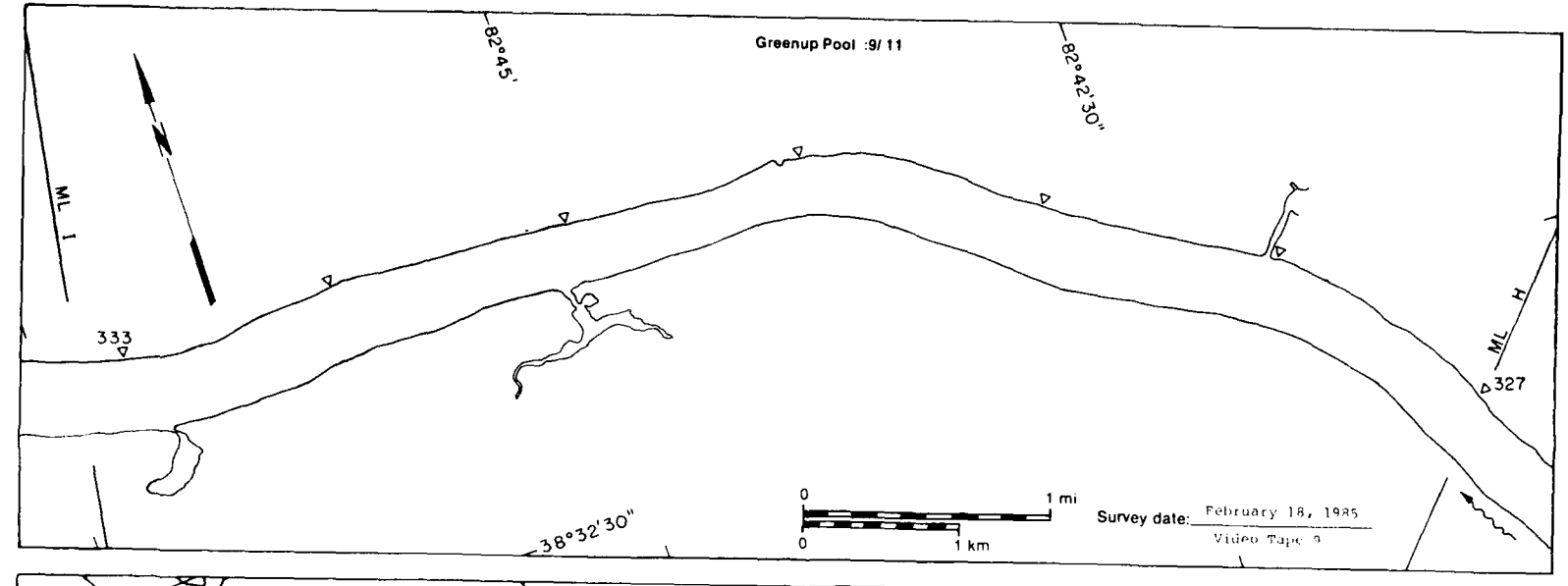


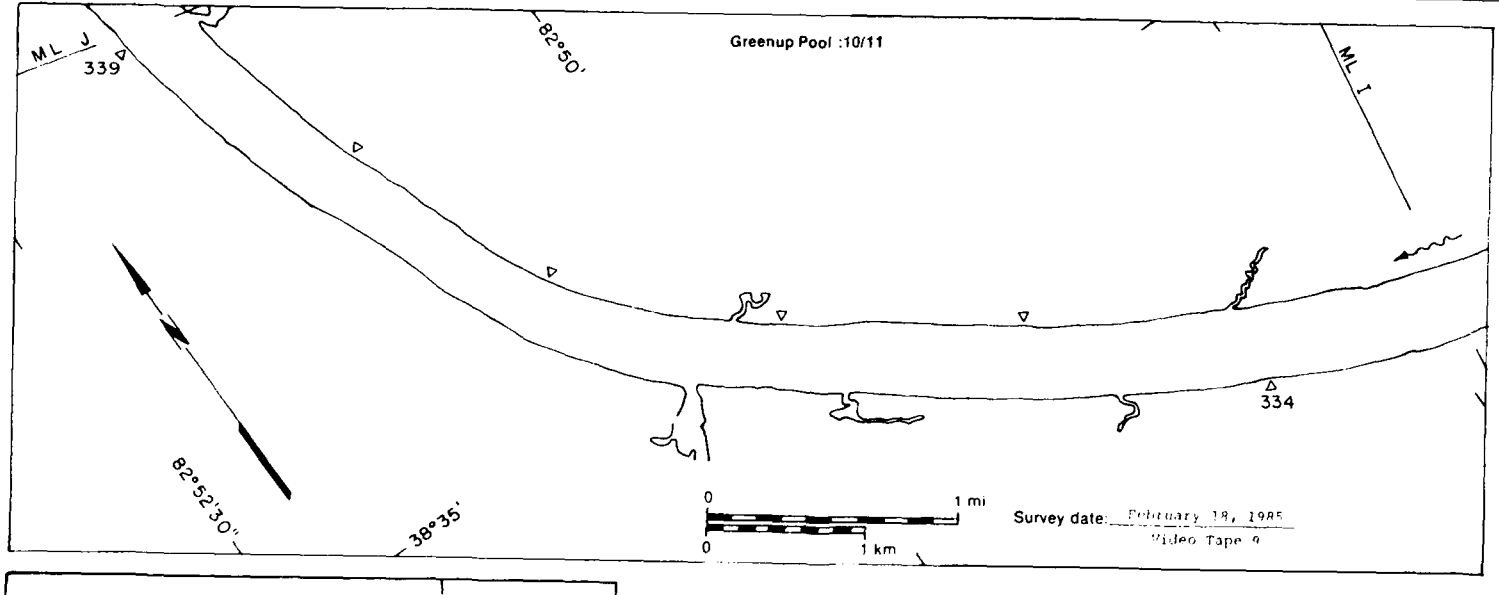


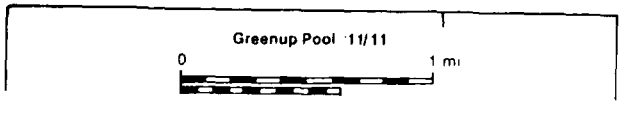

38°27'30"
82°37'30"
0
1 mi
0
1 km
Big Sandy River
82°35'
Survey date: February 18, 1985
Video Tape 9


Greenup Pool :8/11
38°30'
M L G
321
M L H
327
82°37'30"
82°40'
Survey date: February 18, 1985
0
1 mi
0
1 km

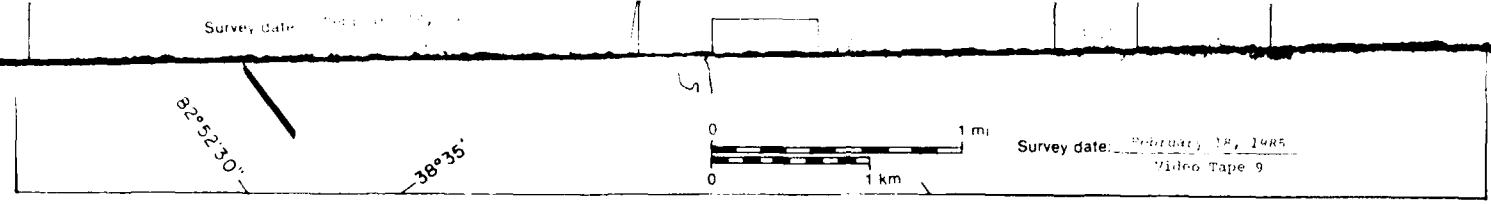
18 February 1985

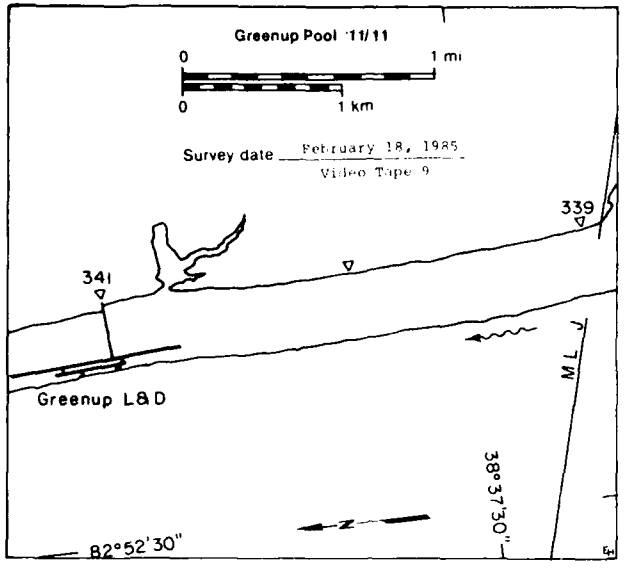






Greenup Pool

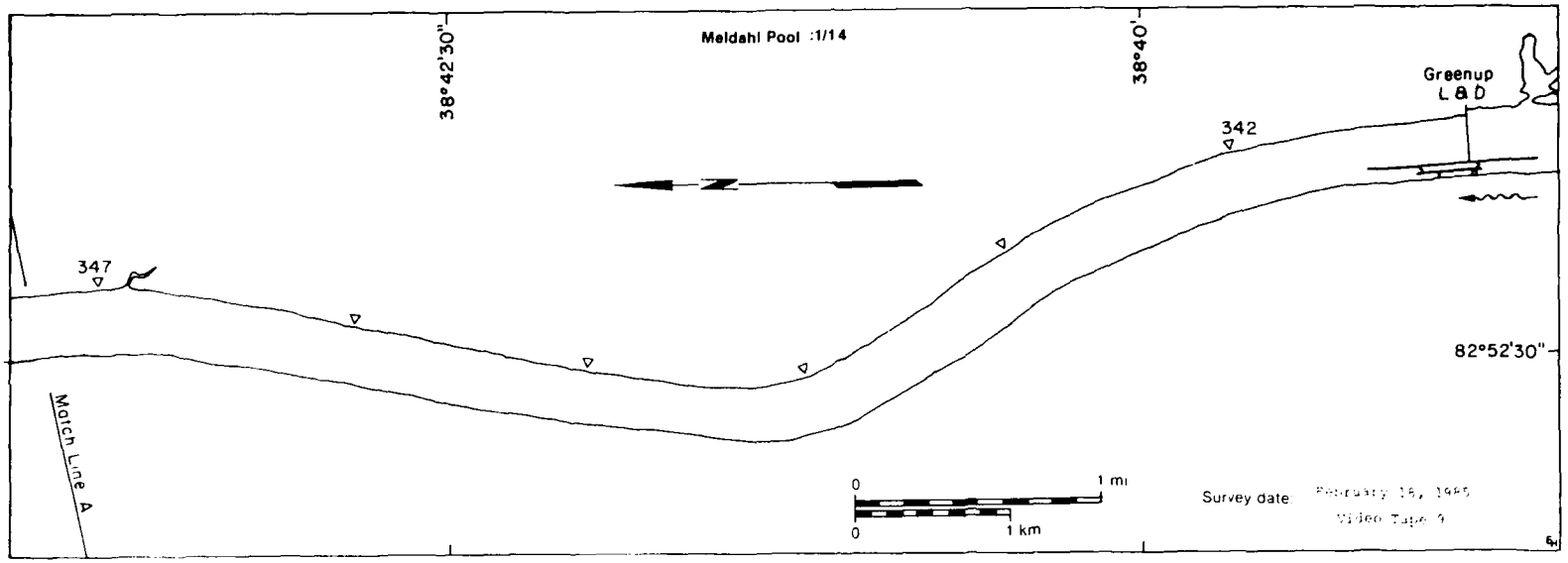


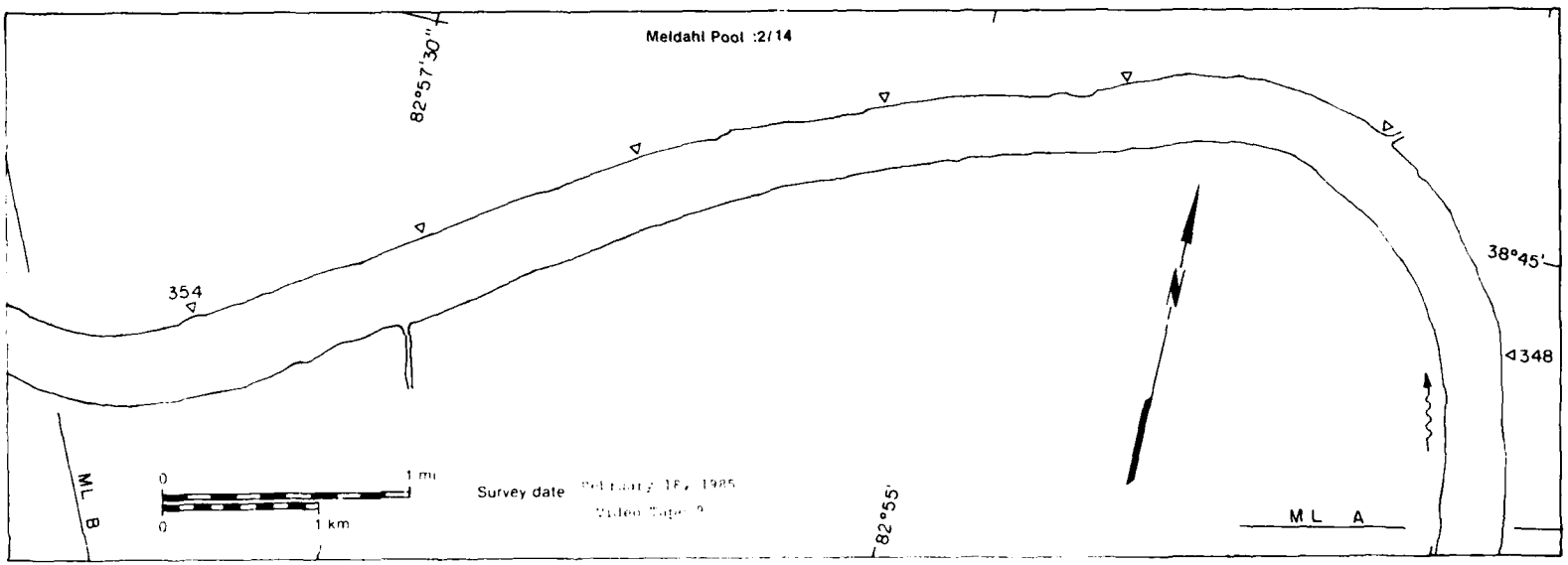


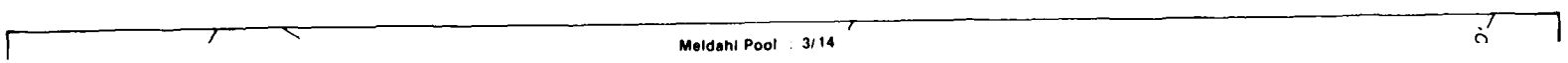
Greenup Pool

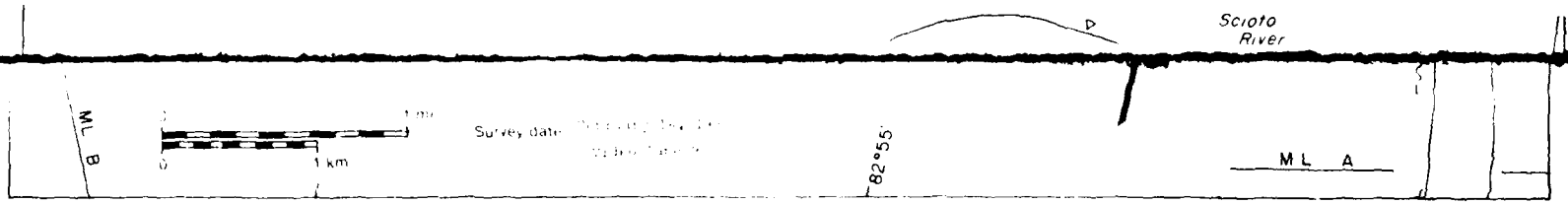
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	41.19	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	41.19	

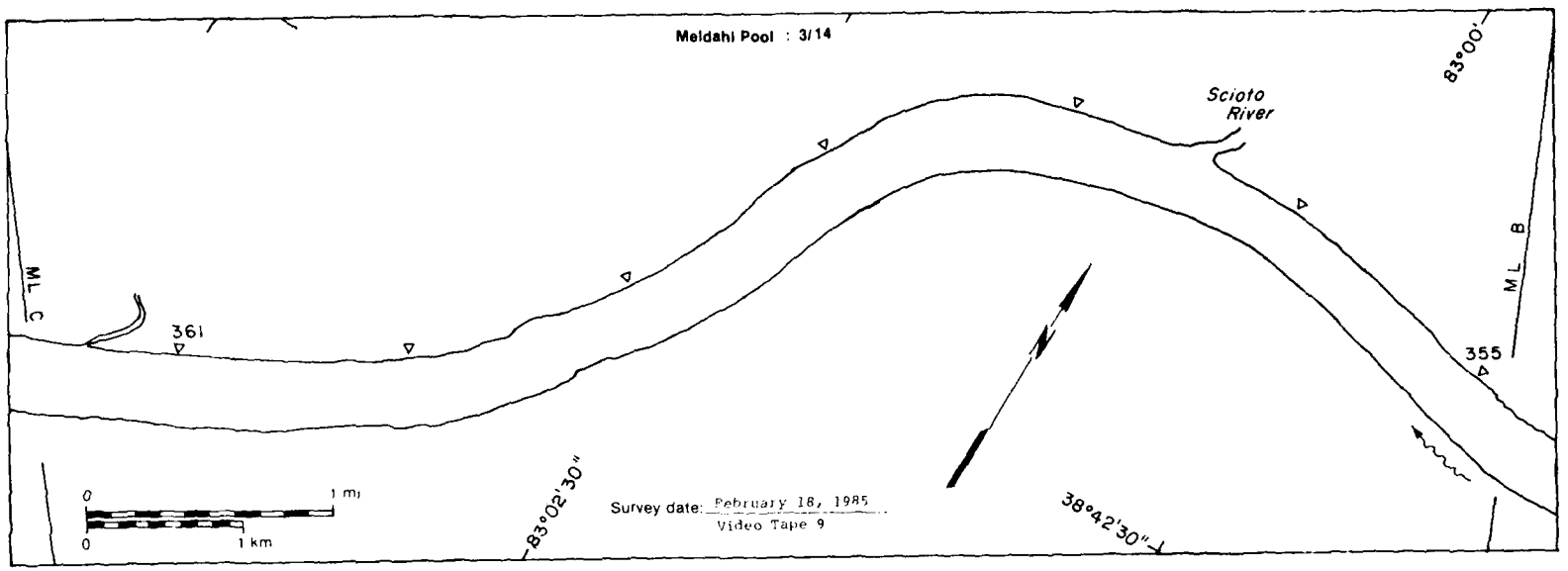
18 February 1985

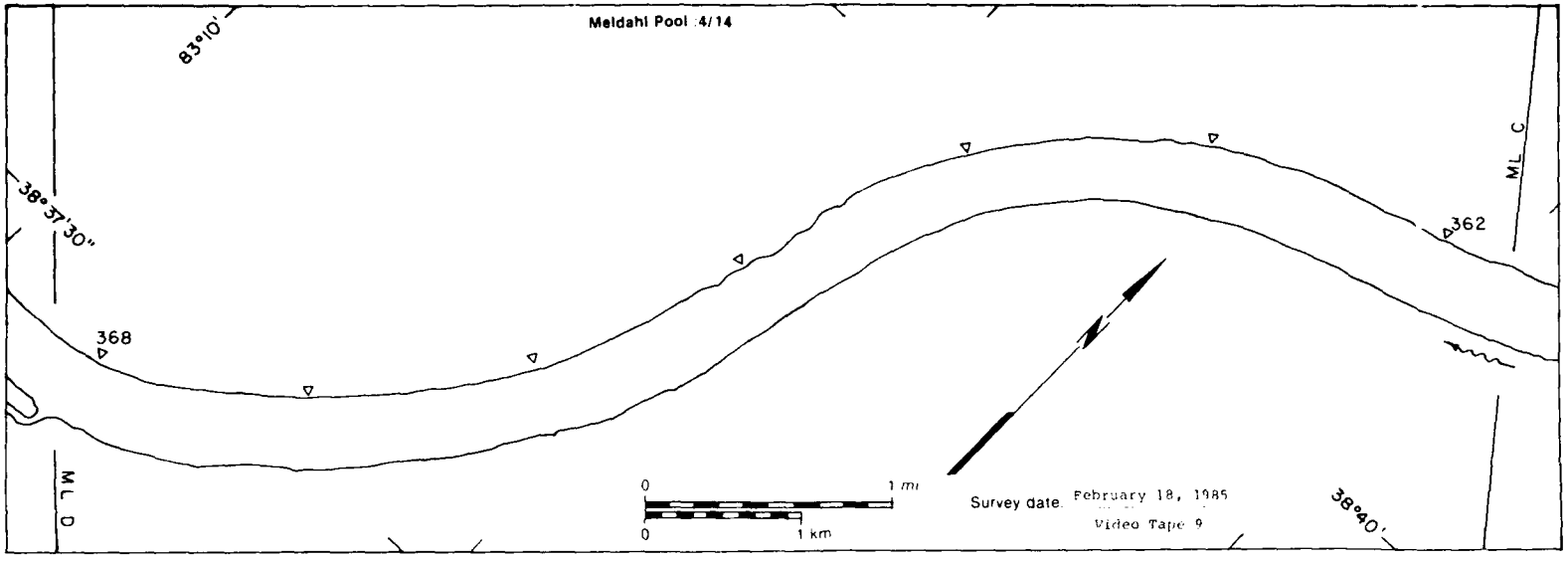


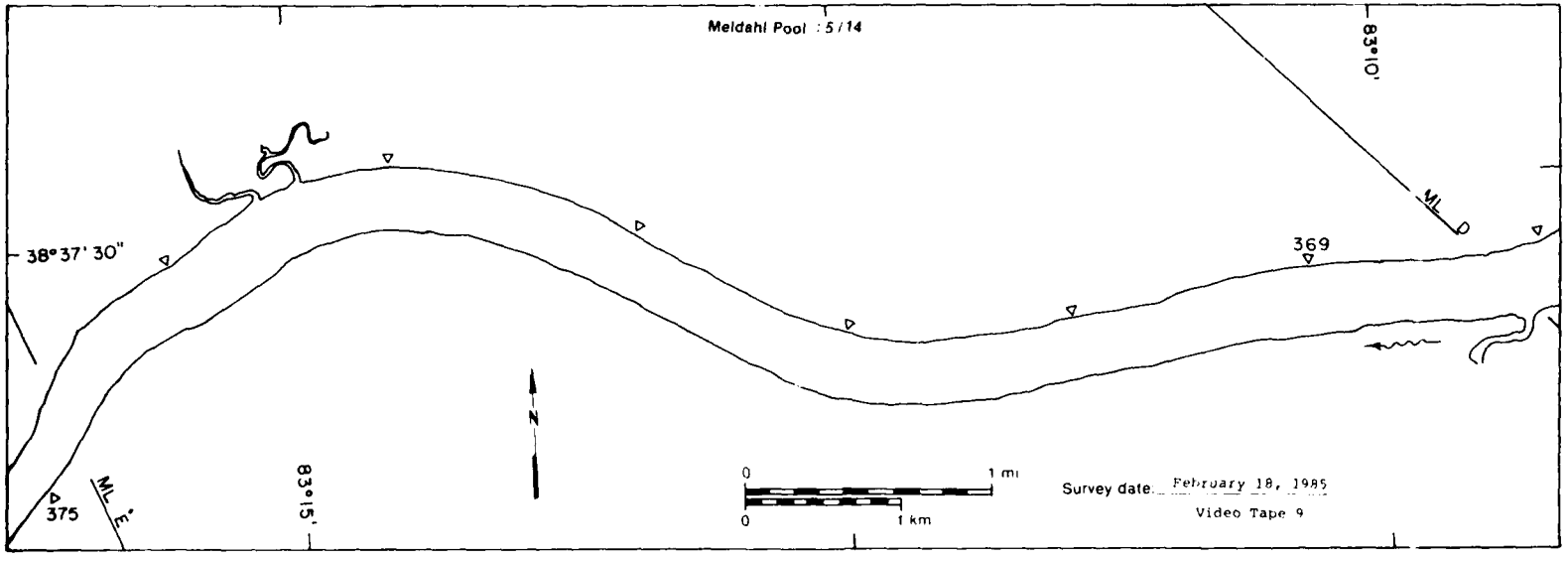


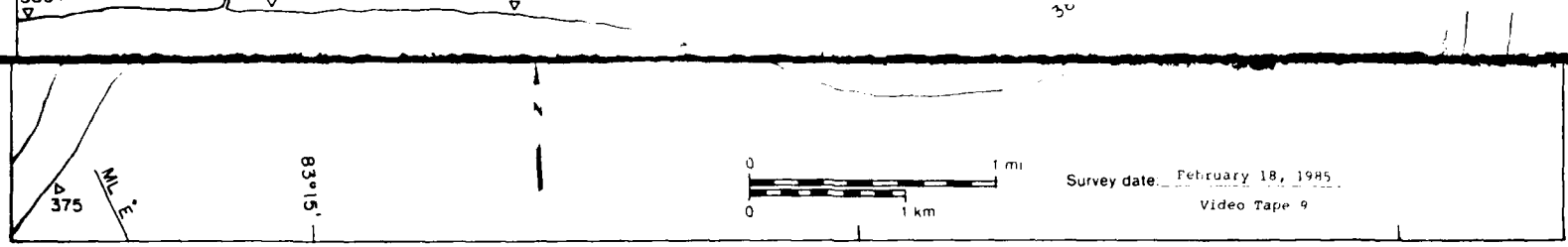


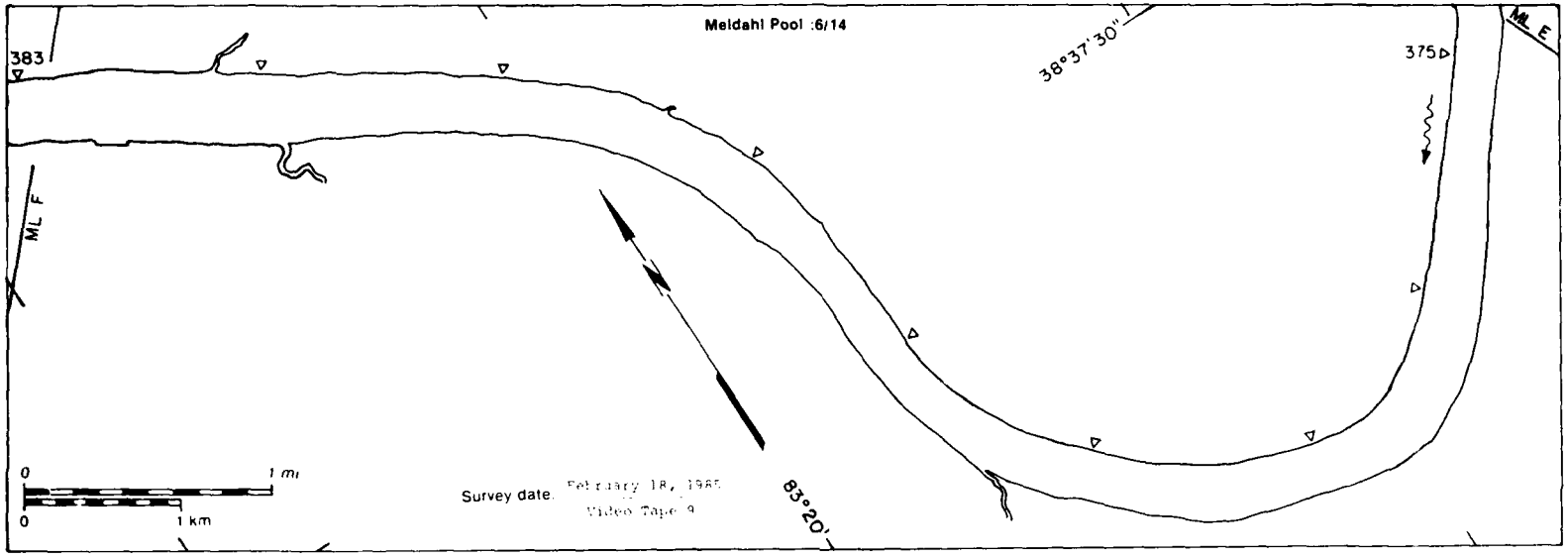

Scioto
River
ML B
0
1 km
Survey date:
82°55'
ML A


Meldahl Pool : 3/14
83°00'
Scioto
River
ML C
361
ML B
355
0
1 mi
0
1 km
83°02'30"
Survey date: February 18, 1985
Video Tape 9
38°42'30"

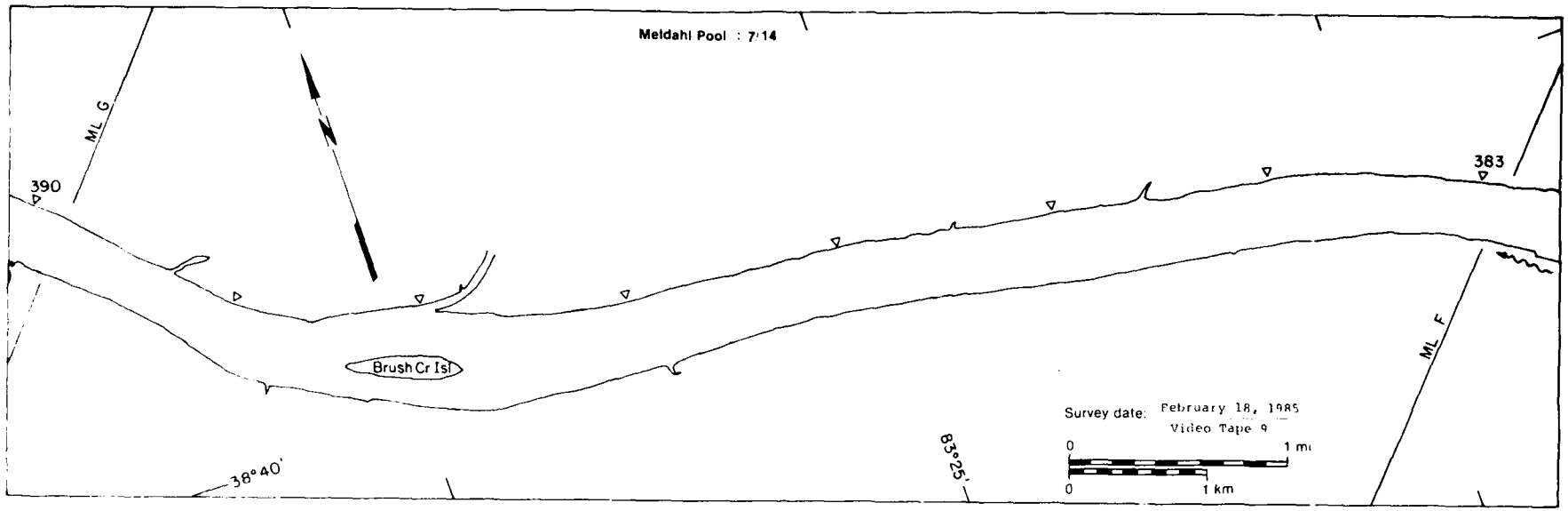

Meldahl Pool :4/14
83°10'
38°37'30"
368
362
ML C
ML D
0 1 mi
0 1 km
Survey date: February 18, 1985
Video Tape 9
38°40'

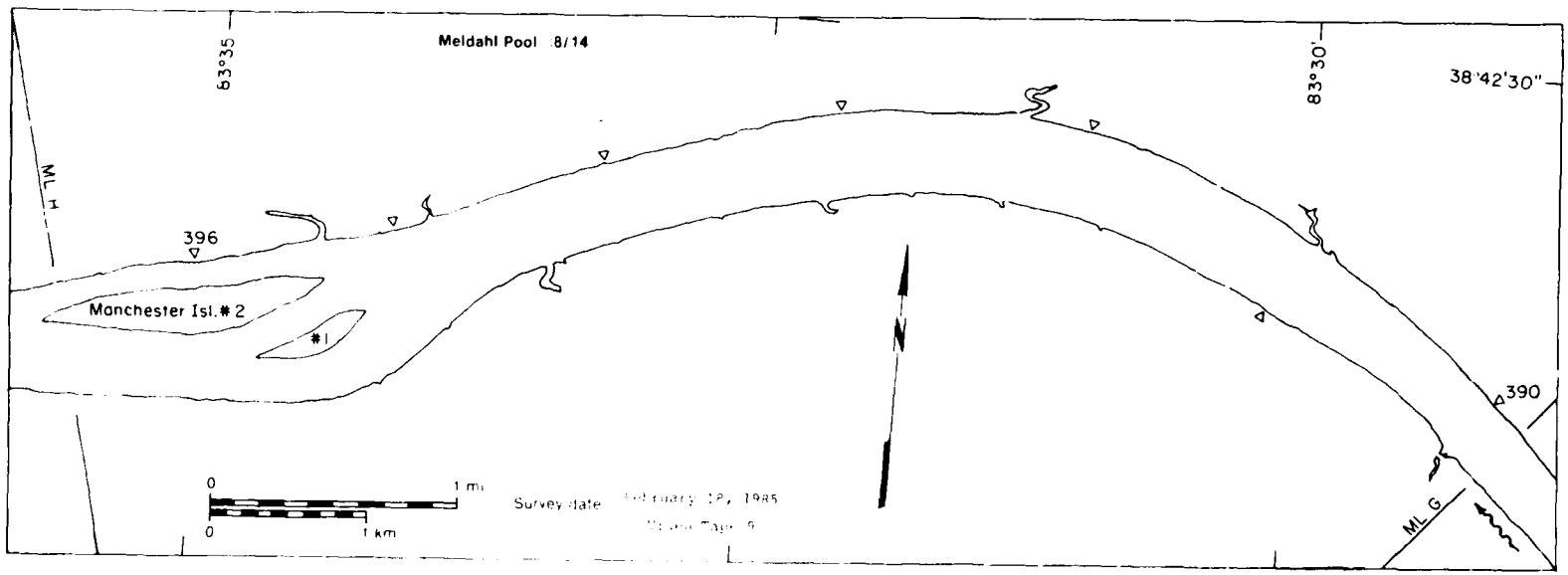

Meldahl Pool : 5/14
83°10'
38°37' 30"
369
ML D
ML E
375
83°15'
N
0 1 mi
0 1 km
Survey date: February 18, 1985
Video Tape 9

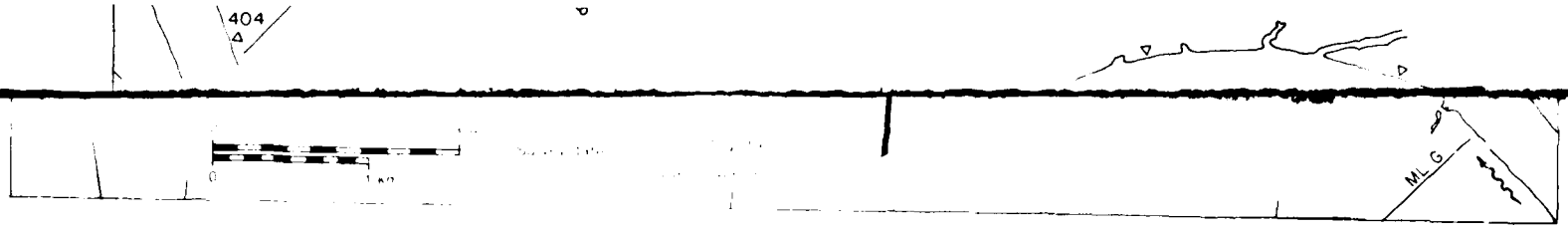

375
ML E
83°15'
0
1 mi
0
1 km
Survey date: February 18, 1985
Video Tape 9

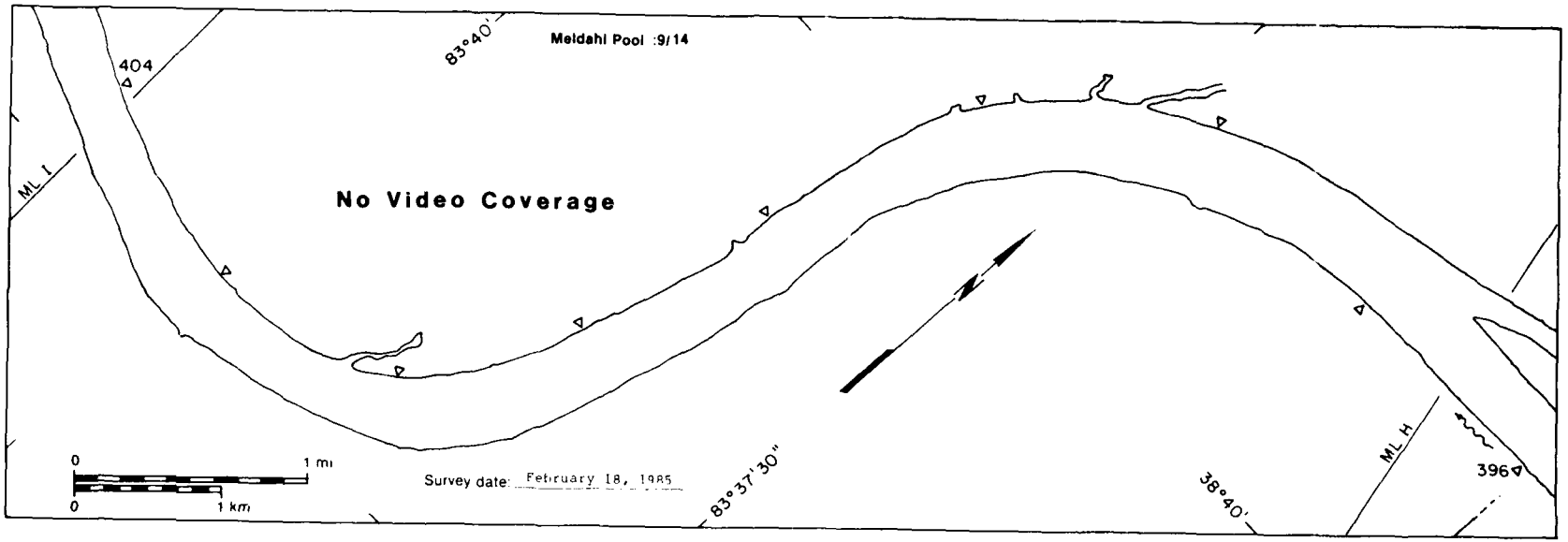

Meldahl Pool :6/14
383
ML F
38°37'30"
375
ML E
0
1 mi
0
1 km
Survey date: February 18, 1985
Video Tape 9
83°20'

18 February 1985

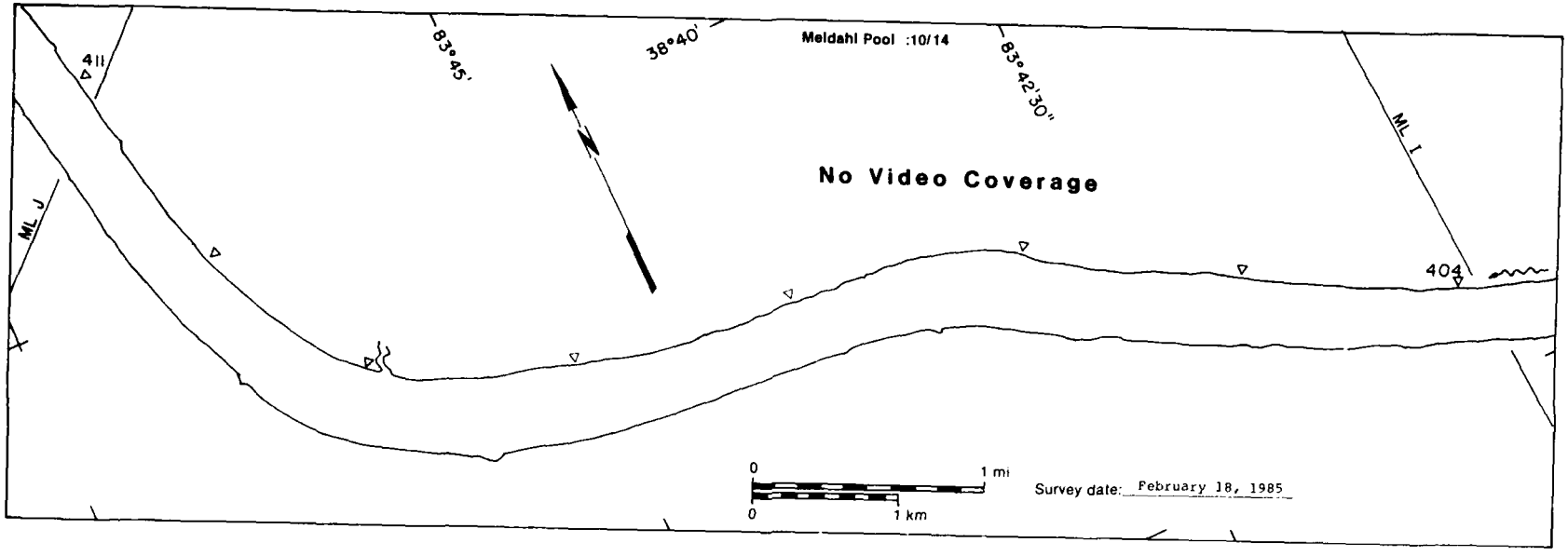


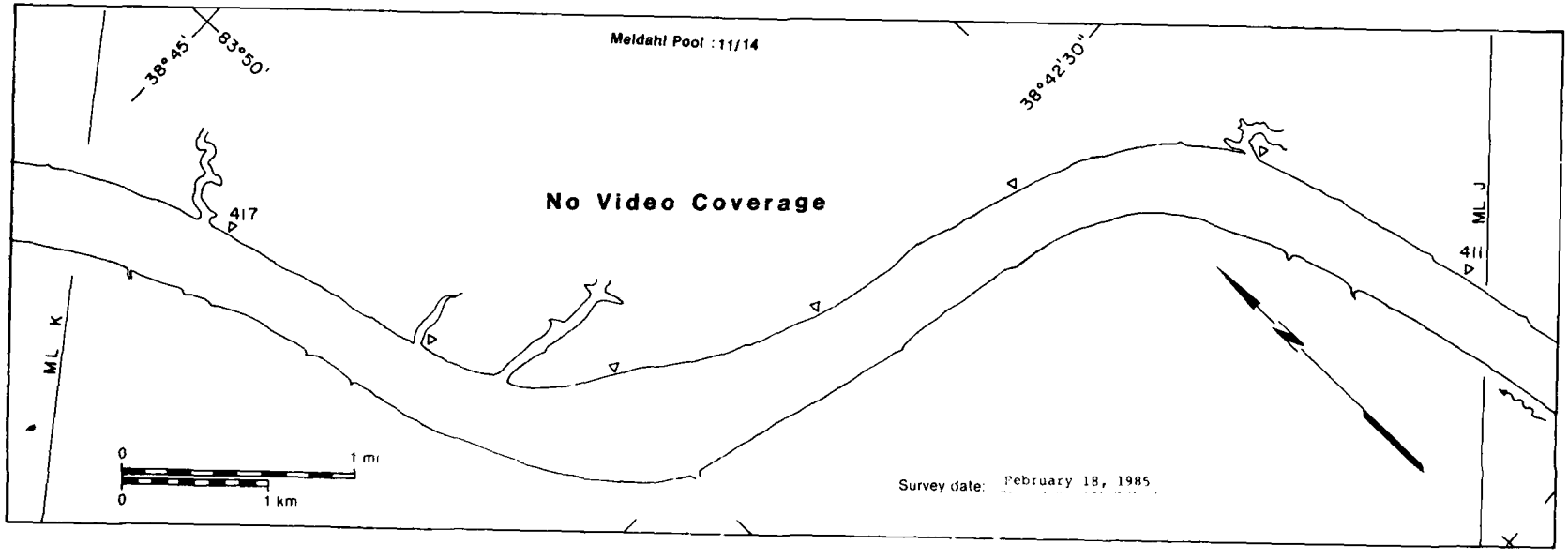


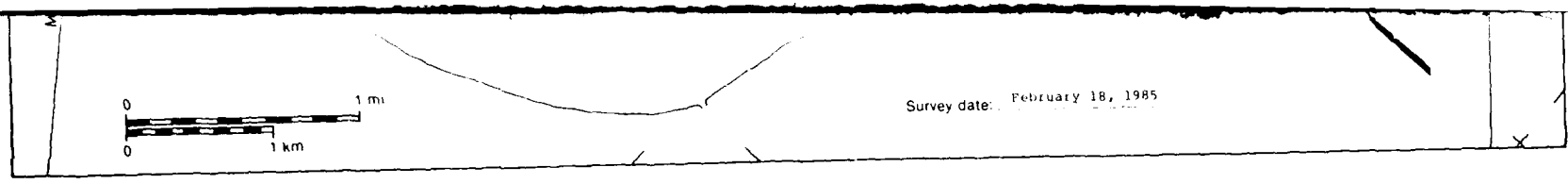

404
ML G
0
1 km

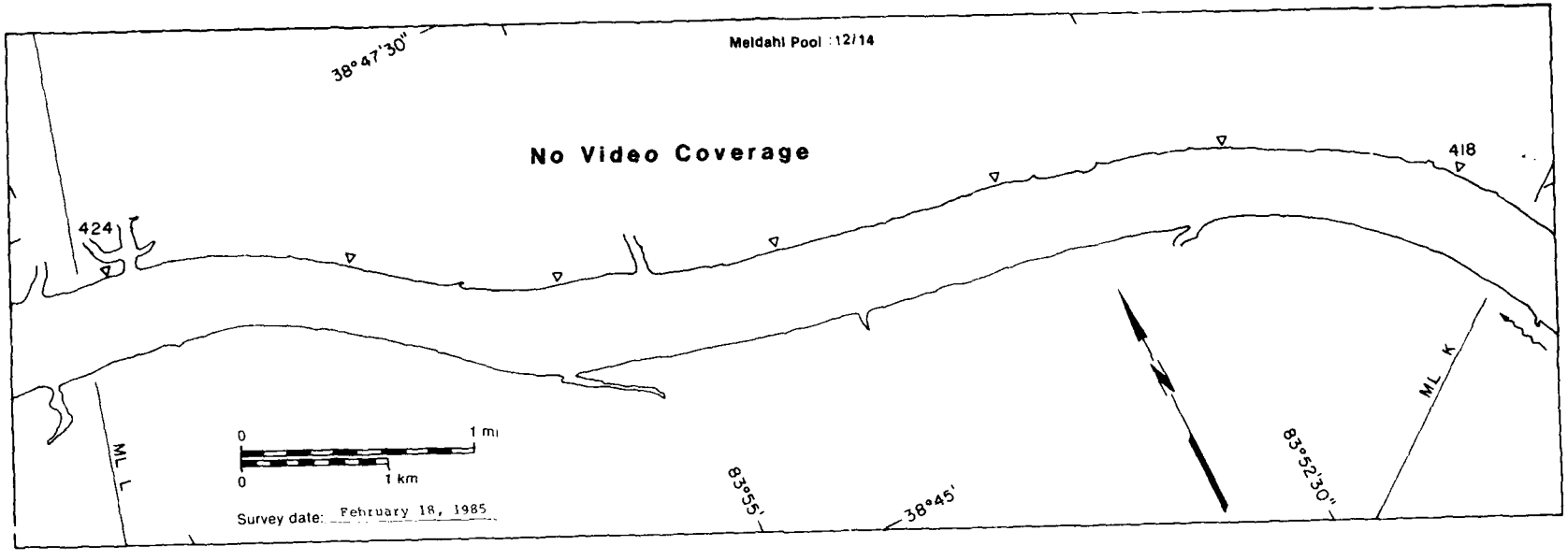

Meldahi Pool :9/14
83°40'
404
ML I
No Video Coverage
0
1 mi
0
1 km
Survey date: February 18, 1985
83°37'30"
38°40'
ML H
396

18 February 1985

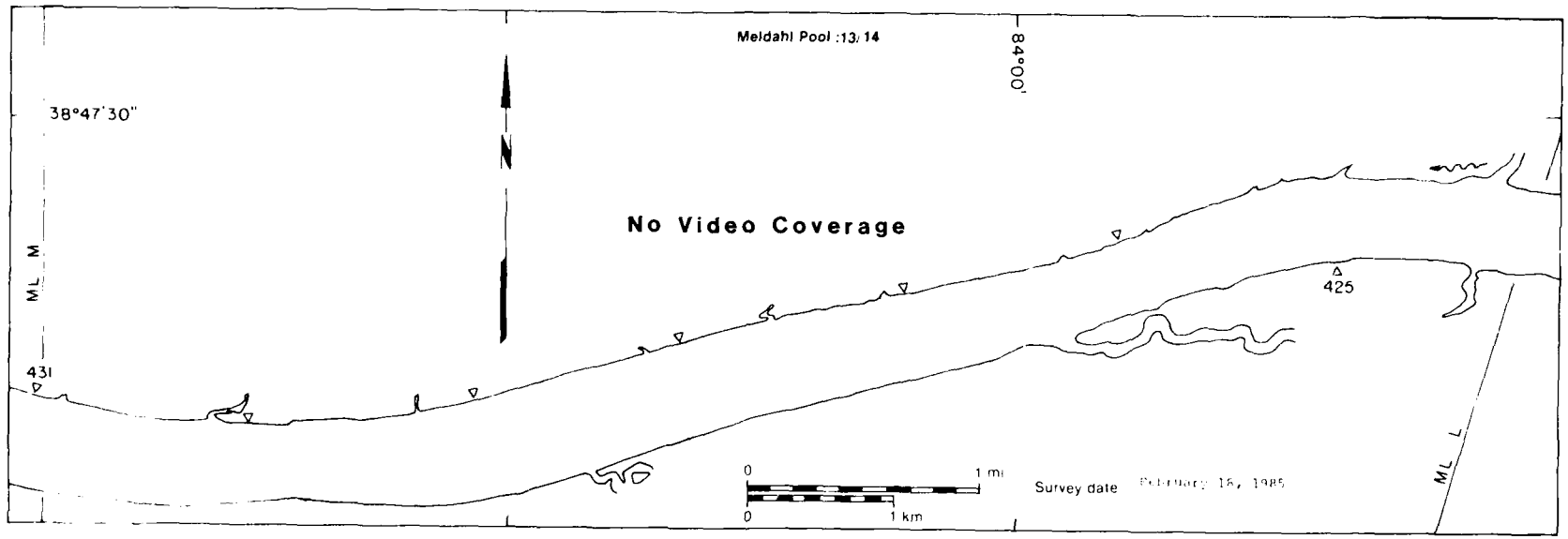


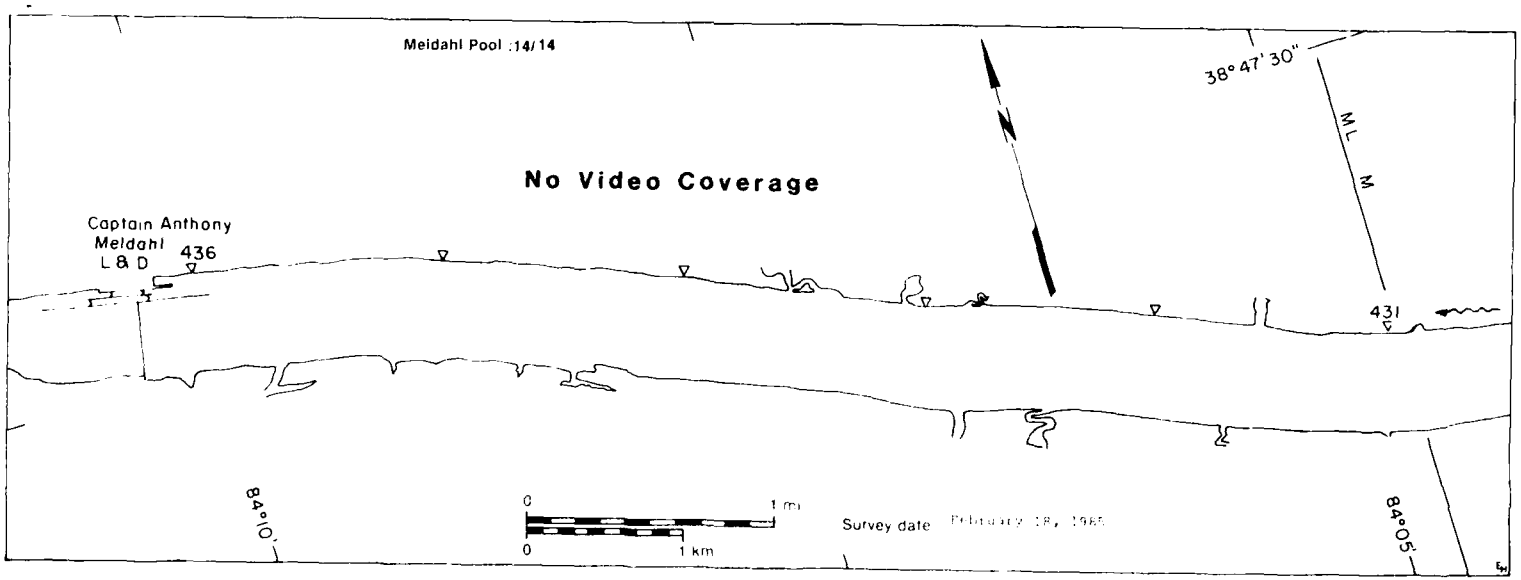



0
1 mi
0
1 km
Survey date: February 18, 1985

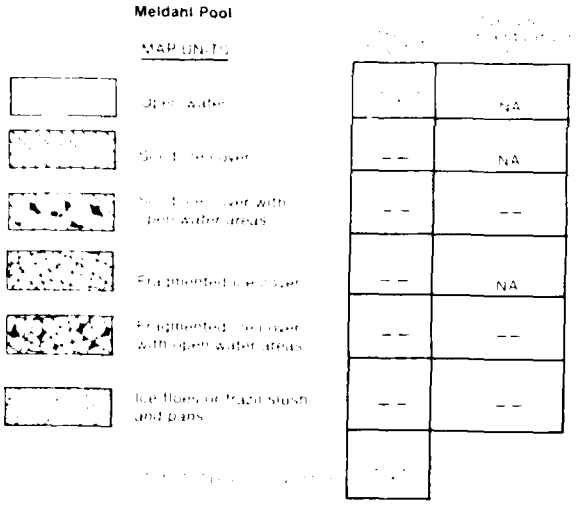

Meldahl Pool : 12/14
38°47'30"
No Video Coverage
418
424
ML K
ML L
0
1 mi
0
1 km
Survey date: February 18, 1985
83°55'
38°45'
83°52'30"

18 February 1985



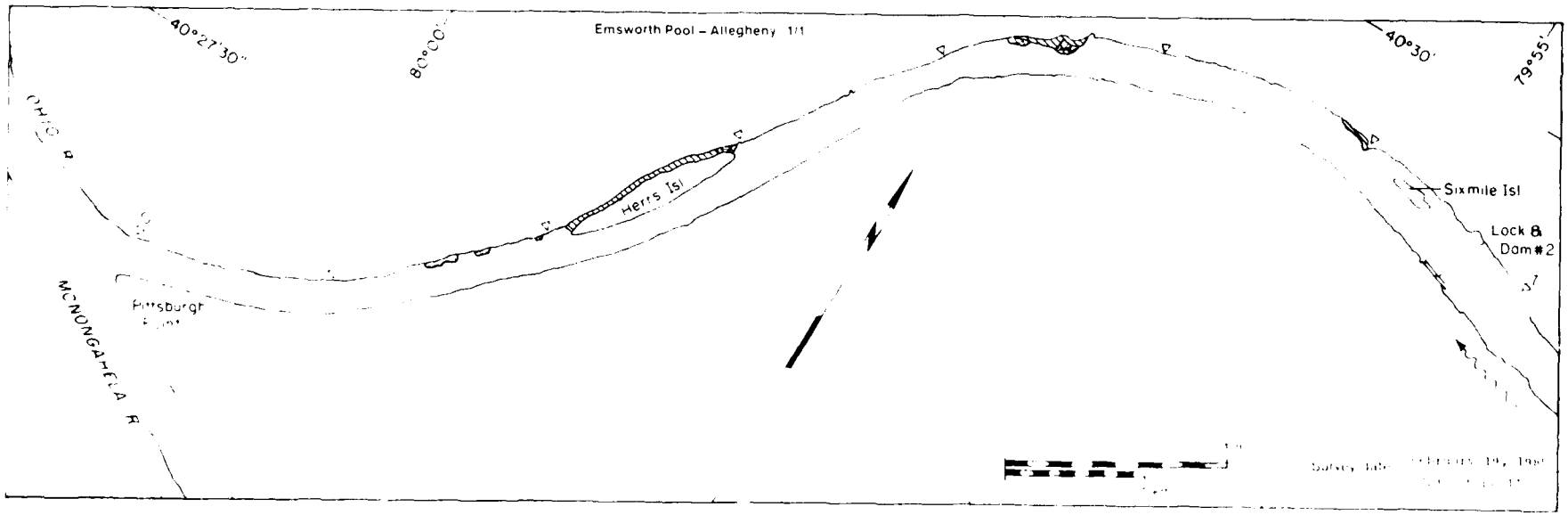


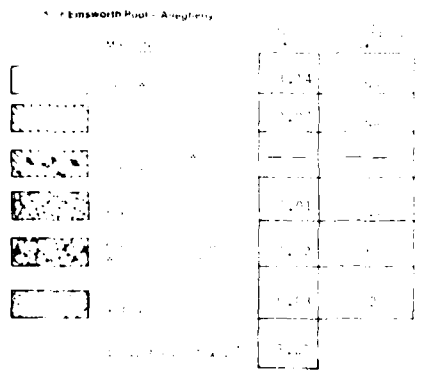
Meldahl Pool

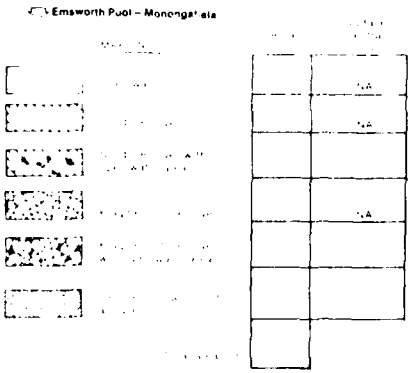

Meldahl Pool
MAP UNITS
NA
NA

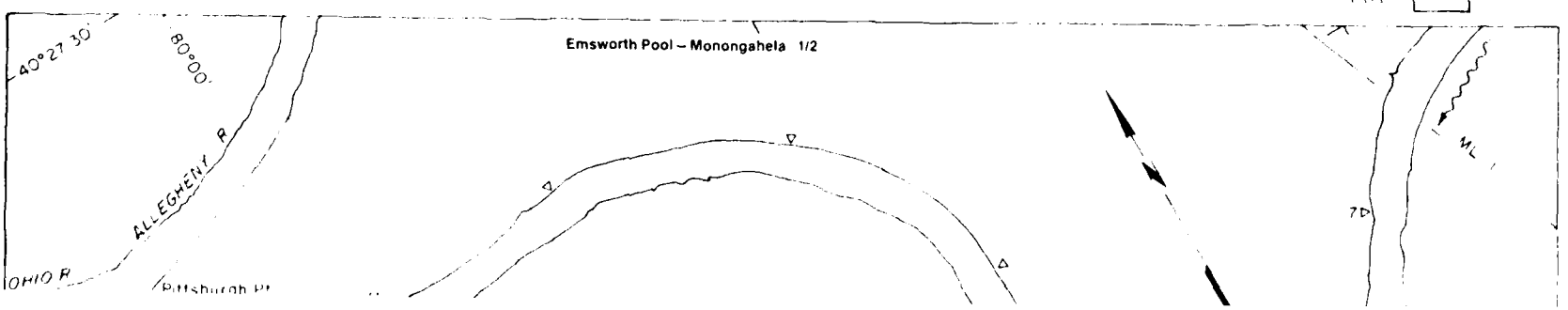
L

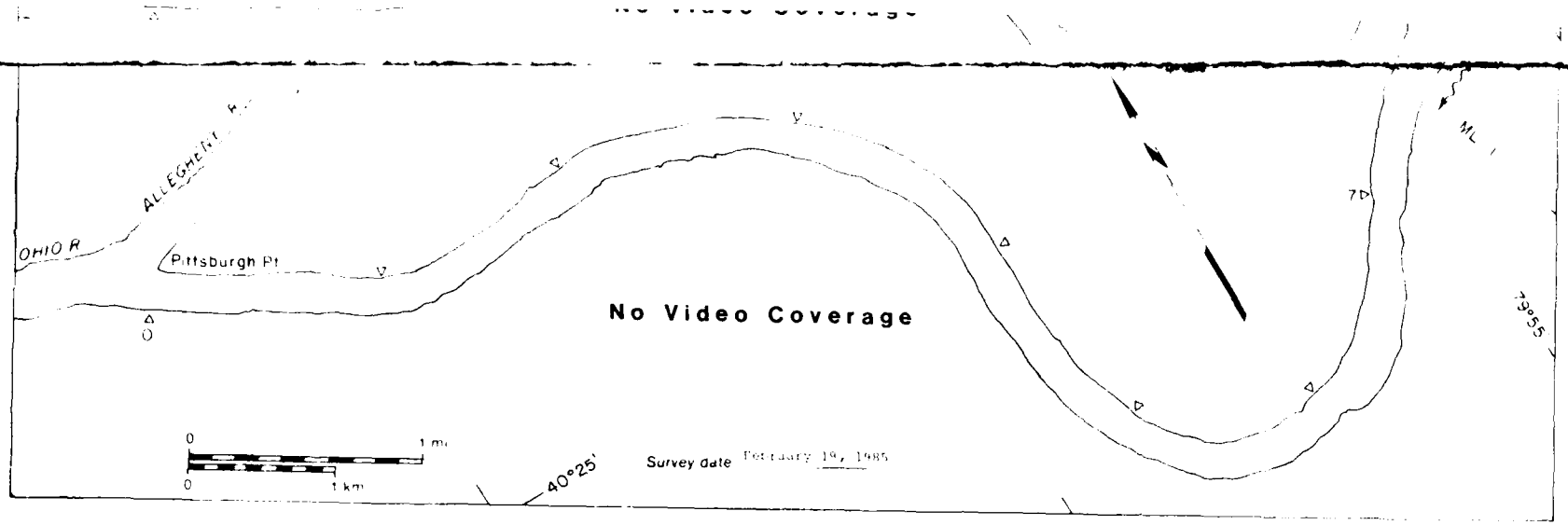
19 February 1985

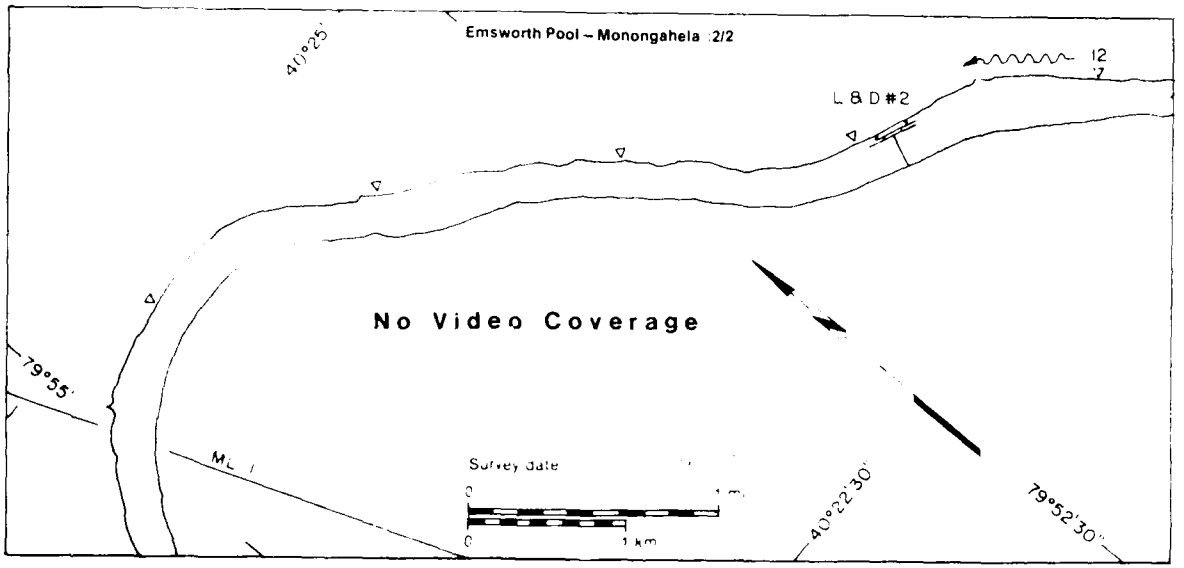




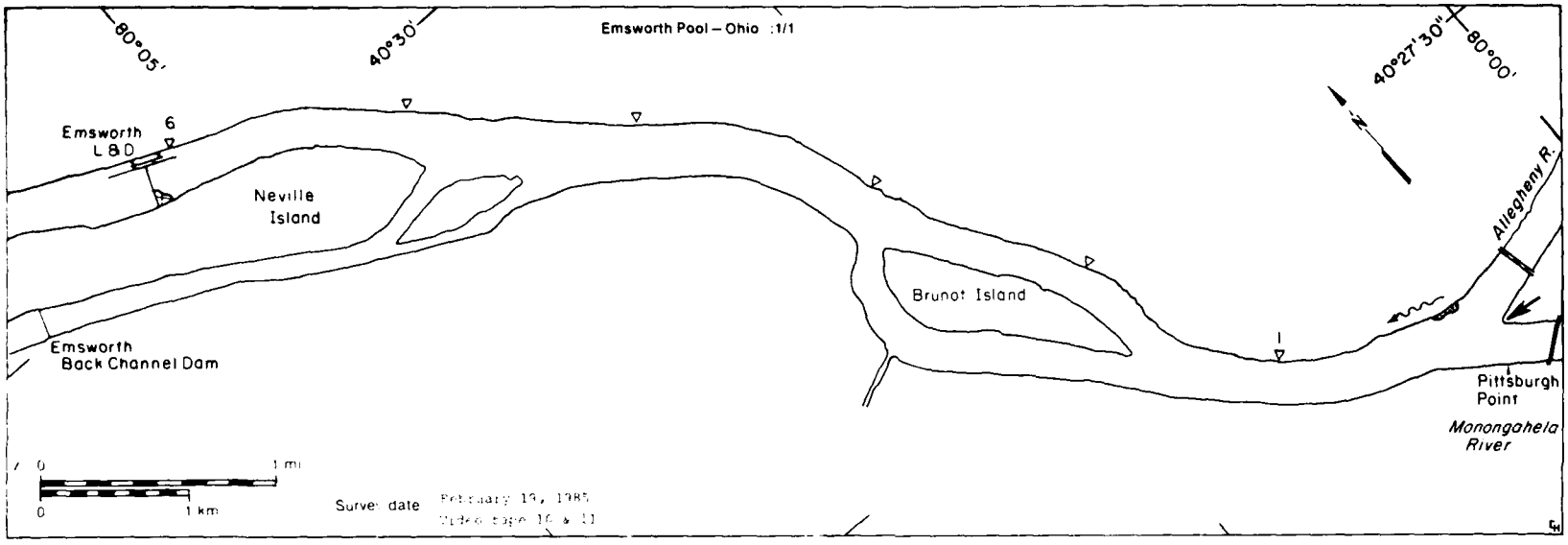





ALLEGHENY R
OHIO R
Pittsburgh Pt
No Video Coverage
0
1 mi
0
1 km
40°25'
Survey date February 19, 1985
79°55'
ML

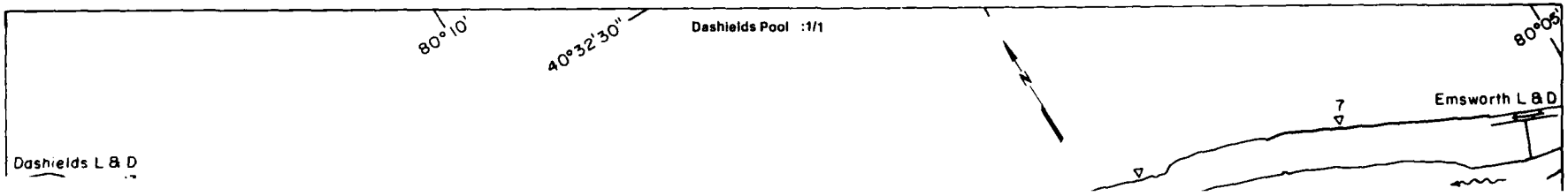

Emsworth Pool – Monongahela 2/2
40°25'
L & D #2
12
No Video Coverage
79°55'
ML
Survey date
0
1 km
40°22'30"
79°52'30"

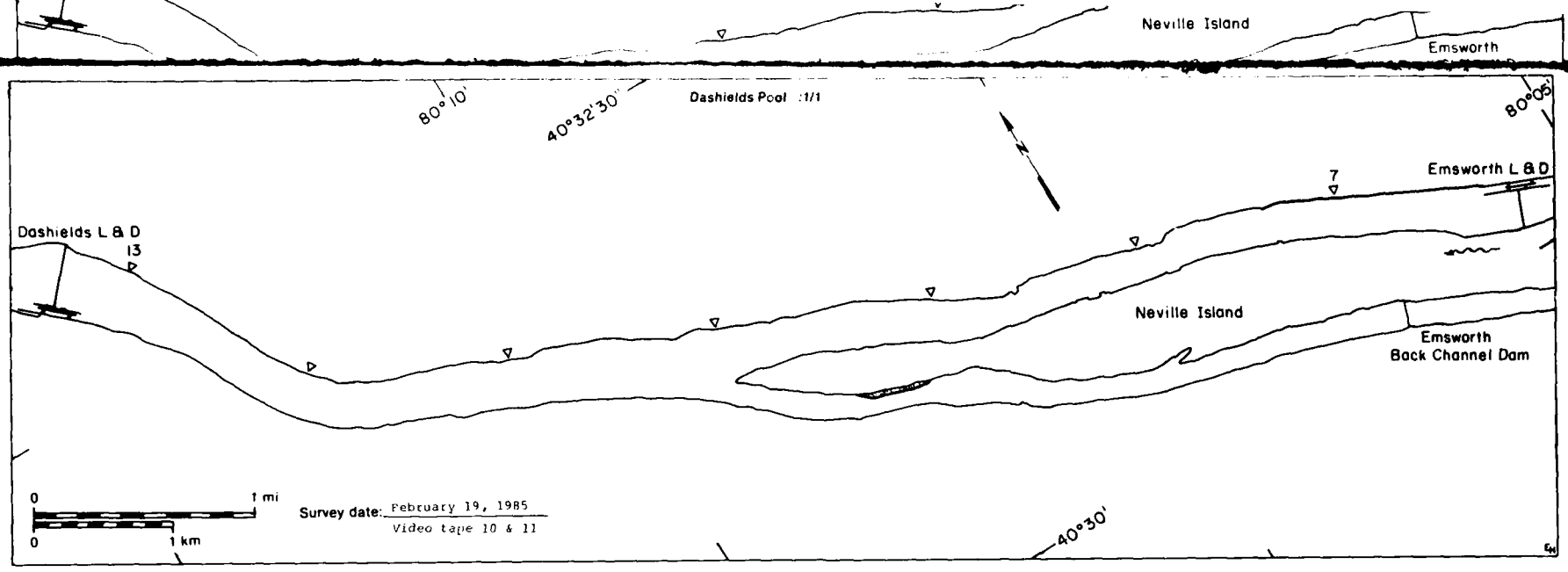
19 February 1985



Emsworth Pool – Ohio

MAP UNITS	Area ($km^2 \times 10^6$)	Surface concentration (%)
Open water	4.33	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	0.02	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	0.01	2
Total Area ($km^2 \times 10^6$)	4.42	

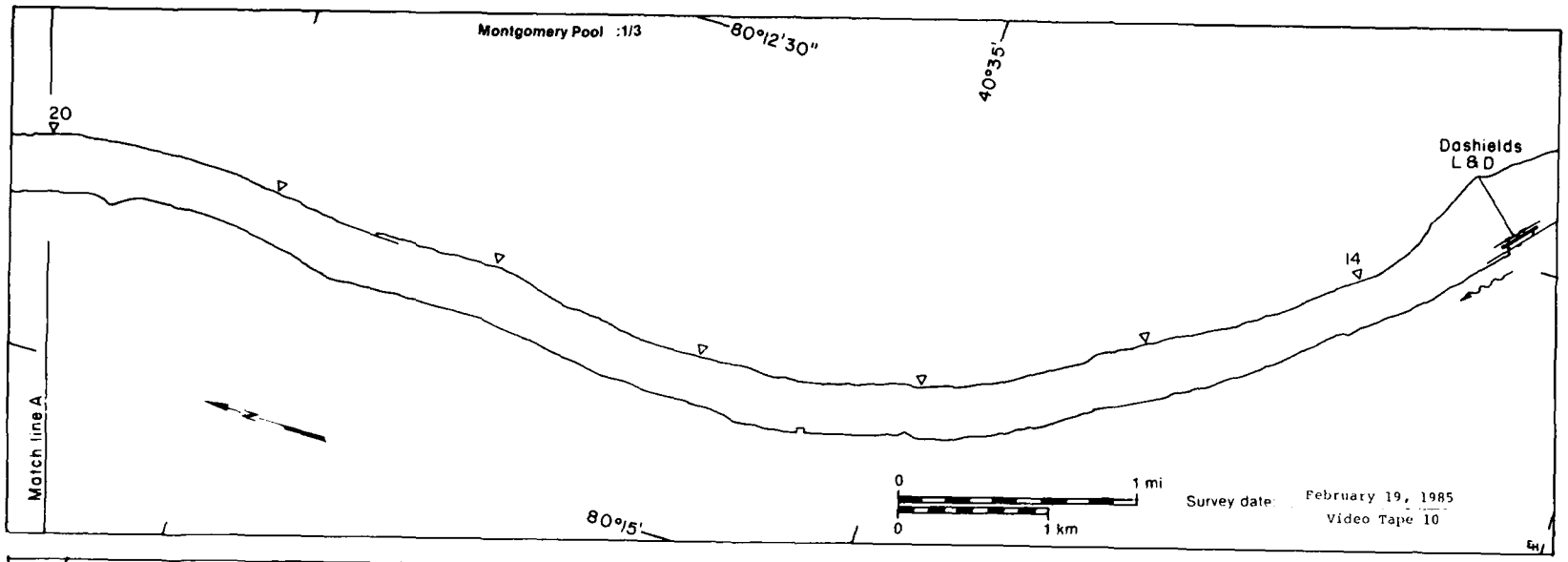


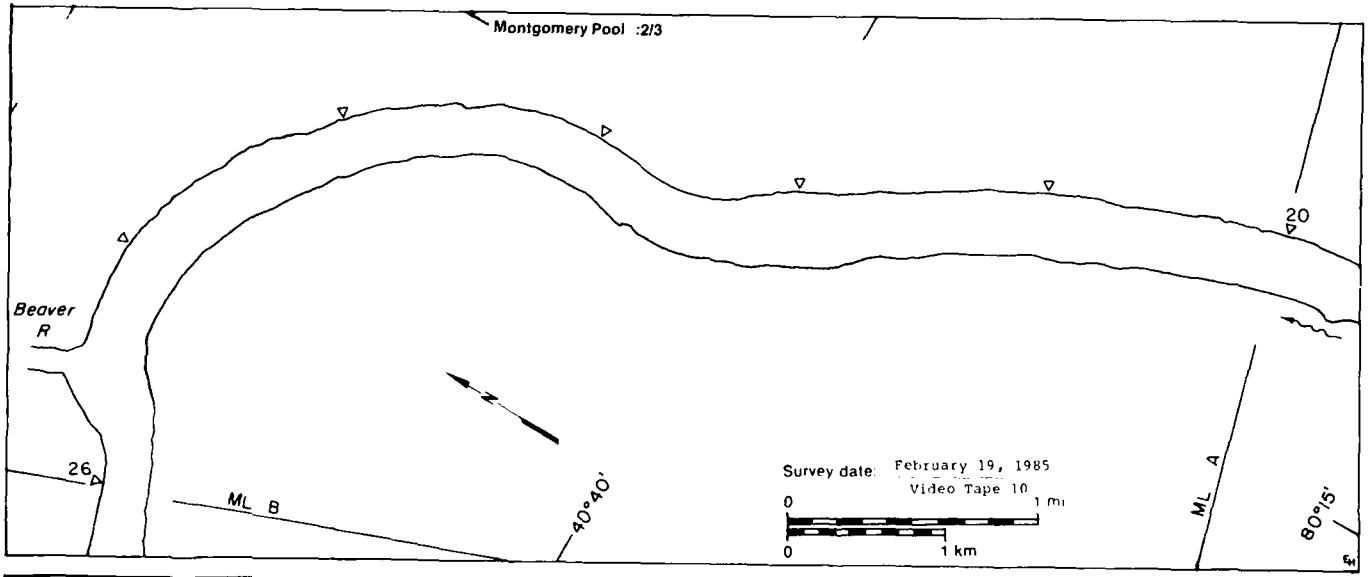


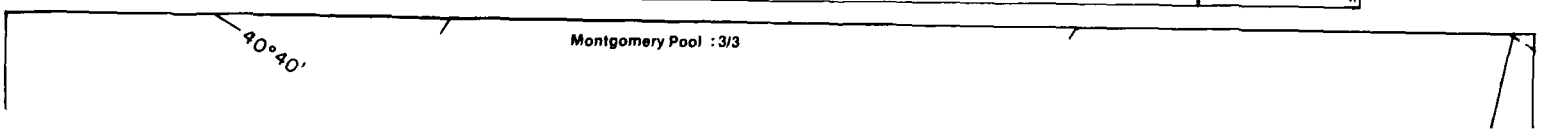
Dashields Pool

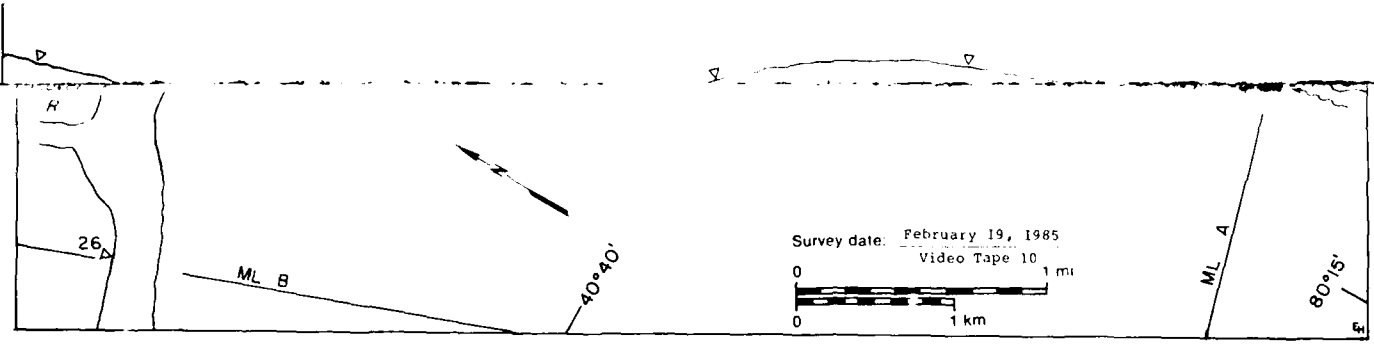
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.97	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.03	2
Total Area ($m^2 \times 10^6$)	5.00	

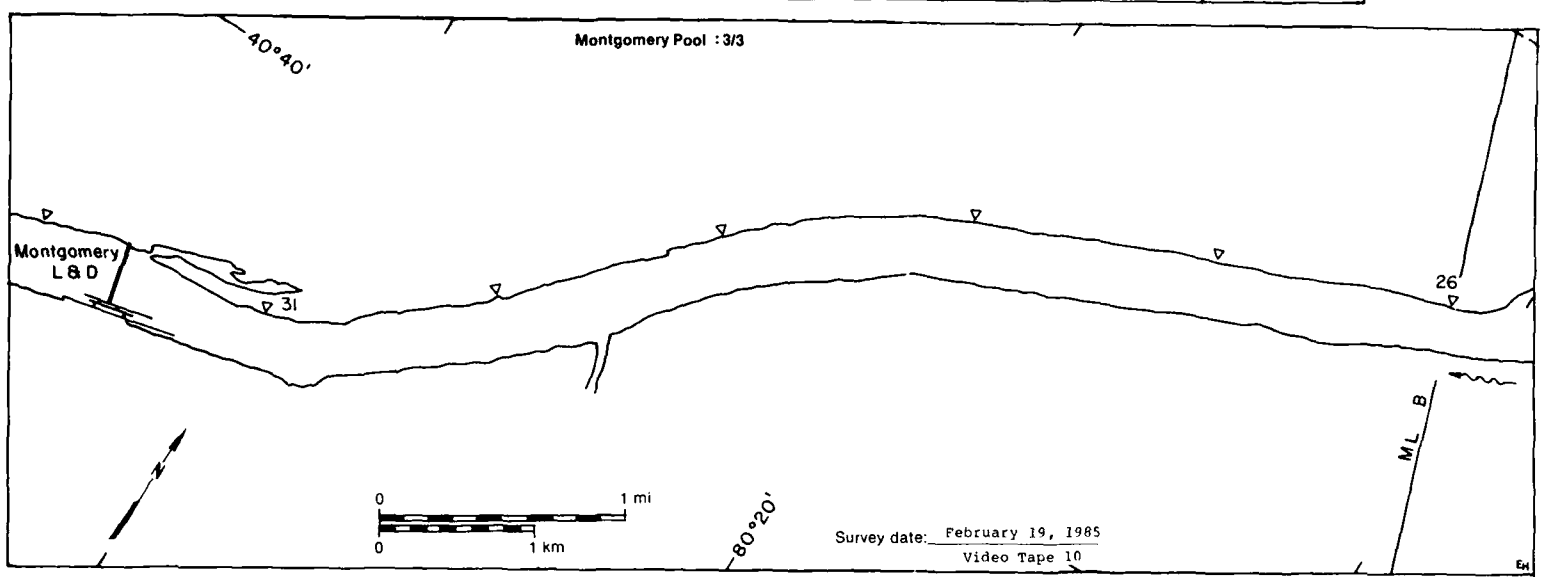
19 February 1985







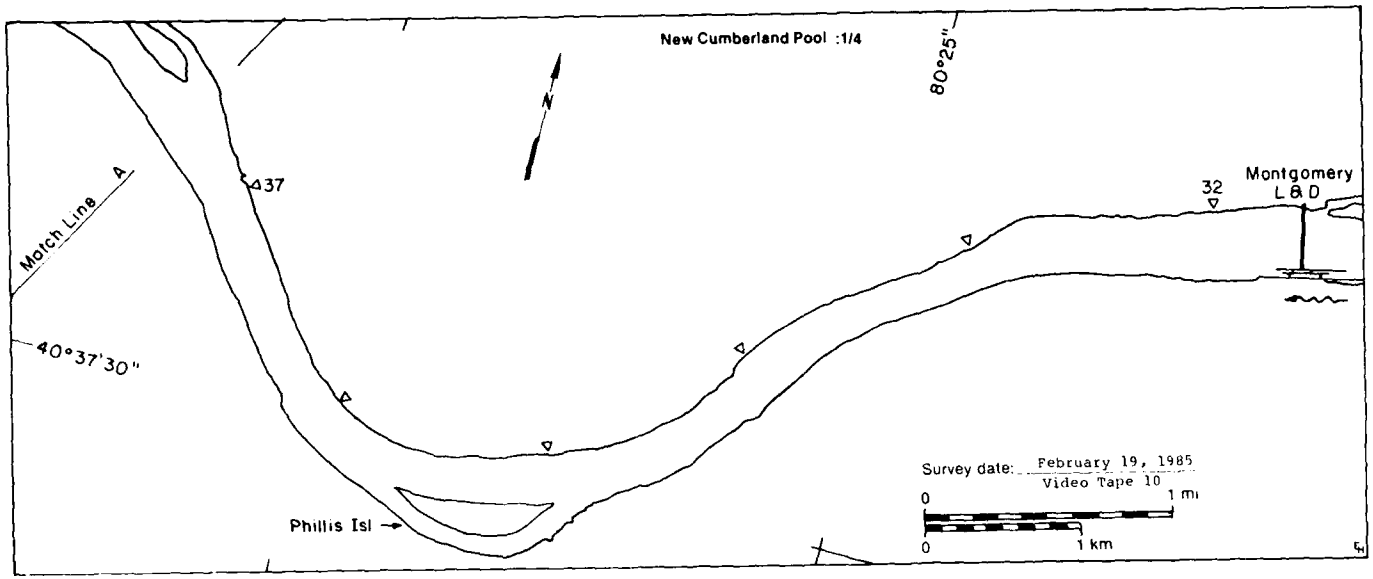


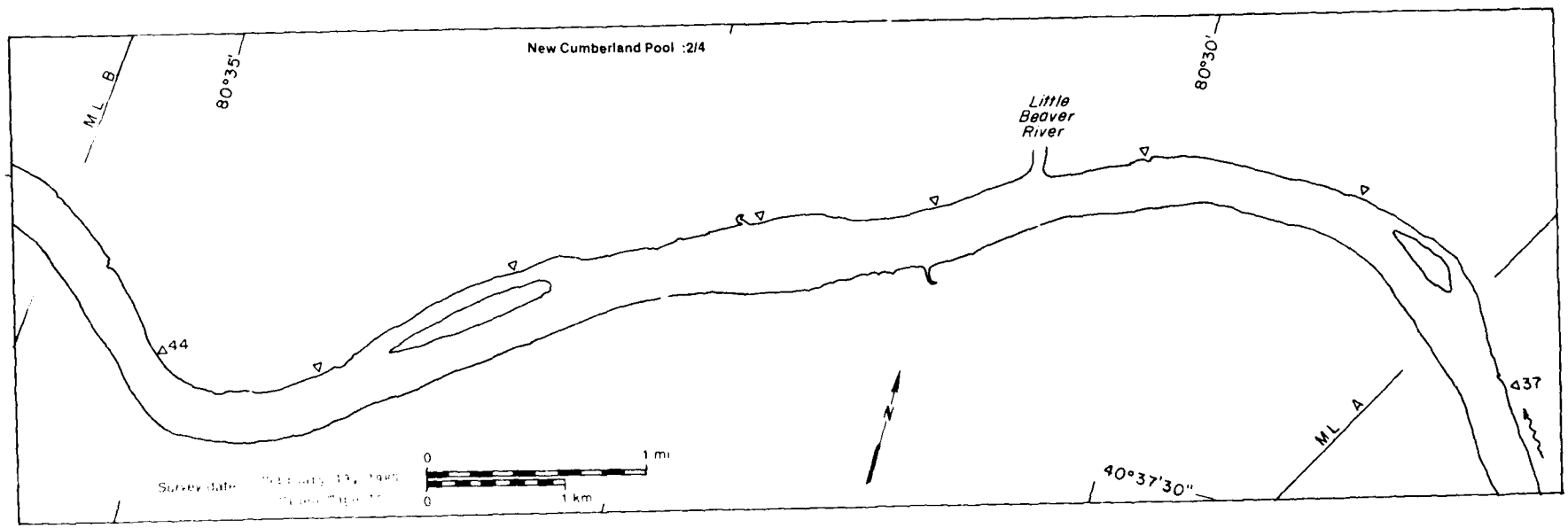


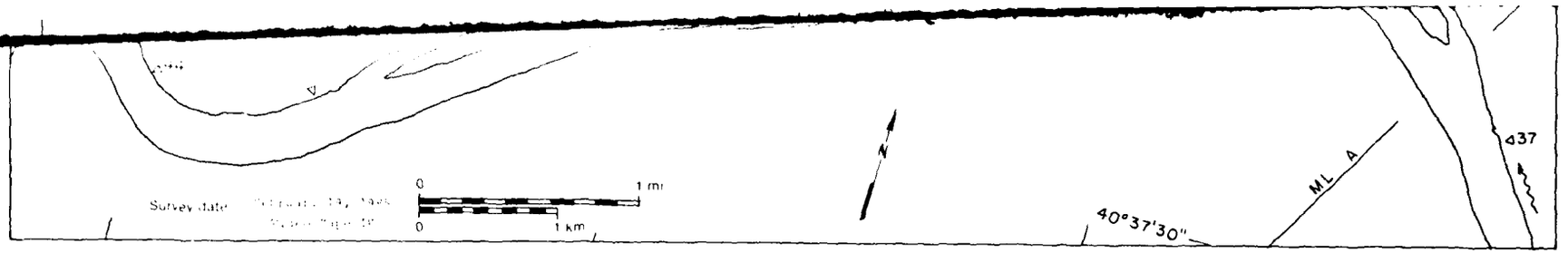
Montgomery Pool

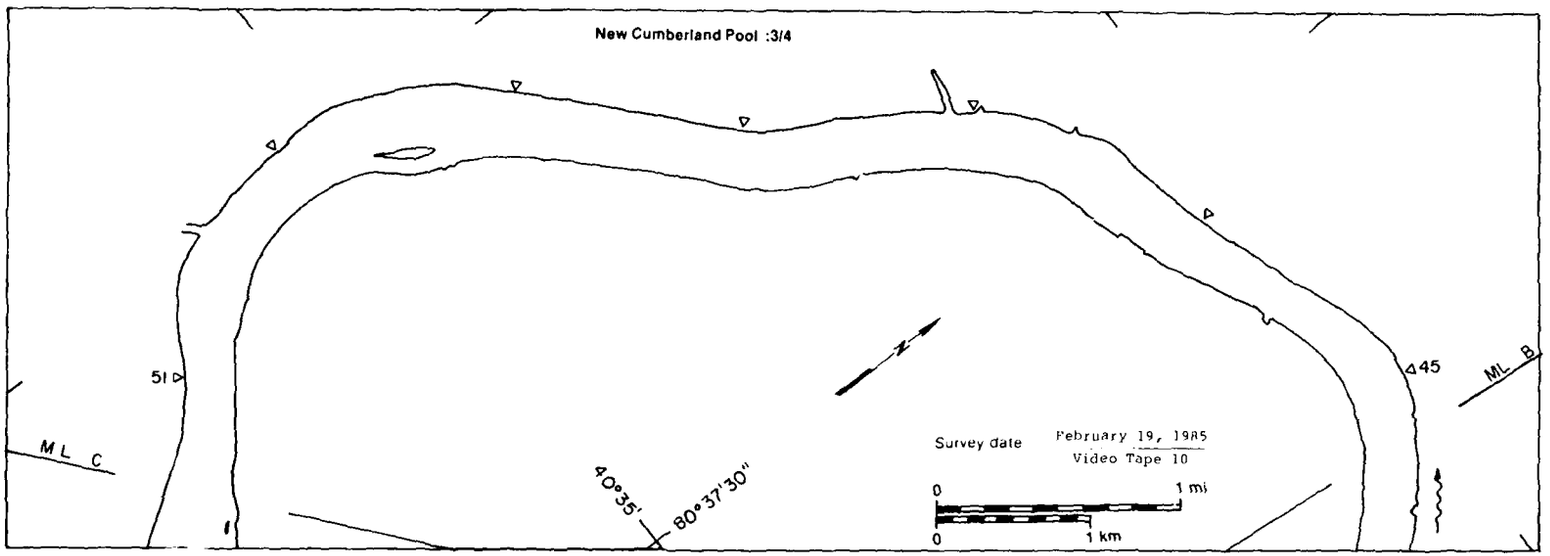
MAP UNITS	Area (m^2)	Surface concentration (%)
Open water	11.27	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27	

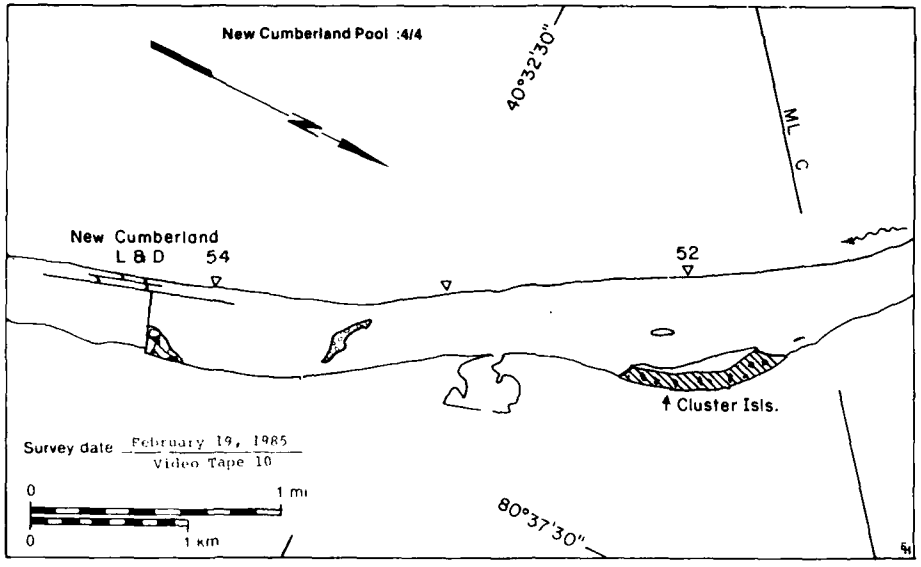
19 February 1985





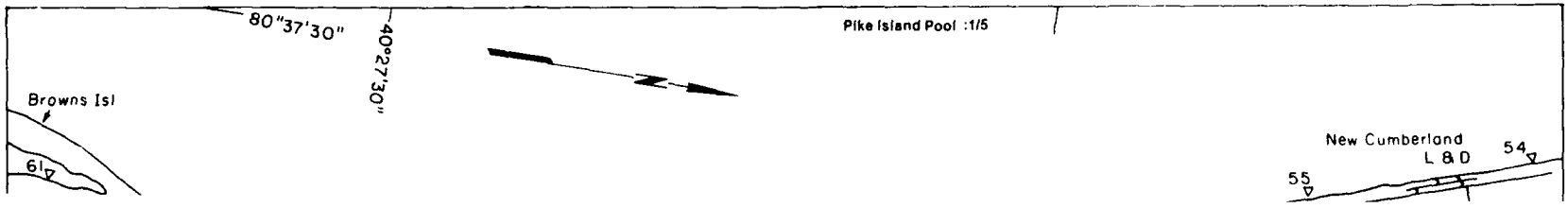

0
1 mi
0
1 km
ML A
40°37'30"
37

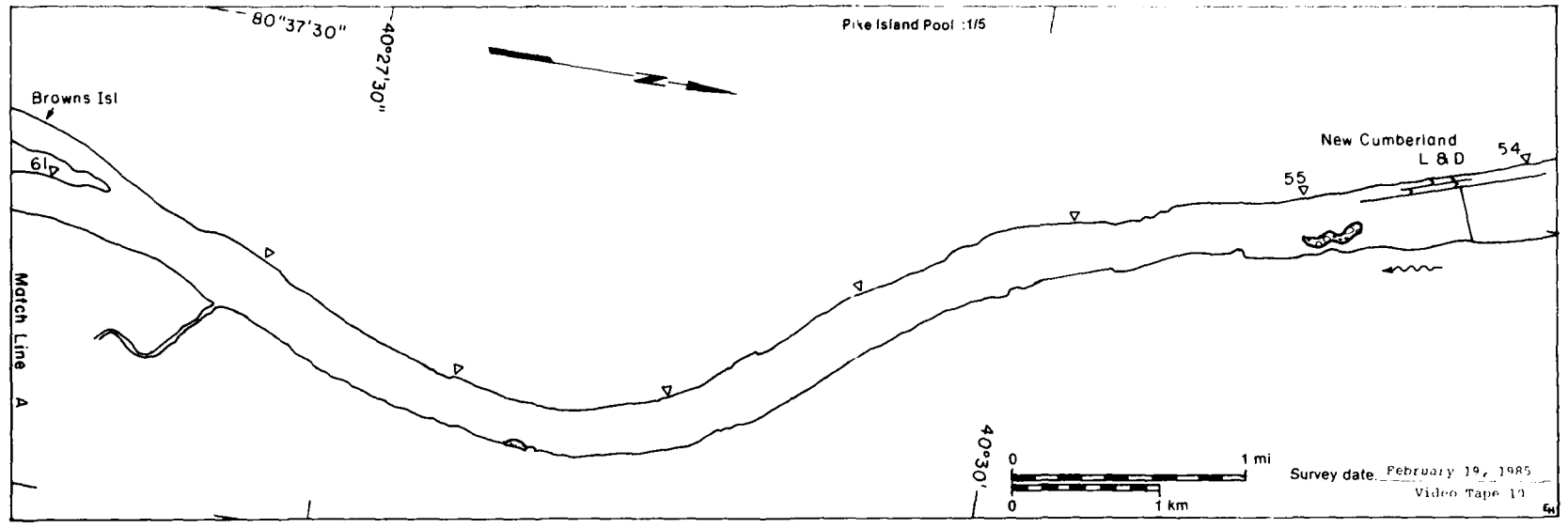

New Cumberland Pool :3/4
51
ML C
40°35'
80°37'30"
45
ML B
Survey date
February 19, 1985
Video Tape 10
0
1 mi
0
1 km

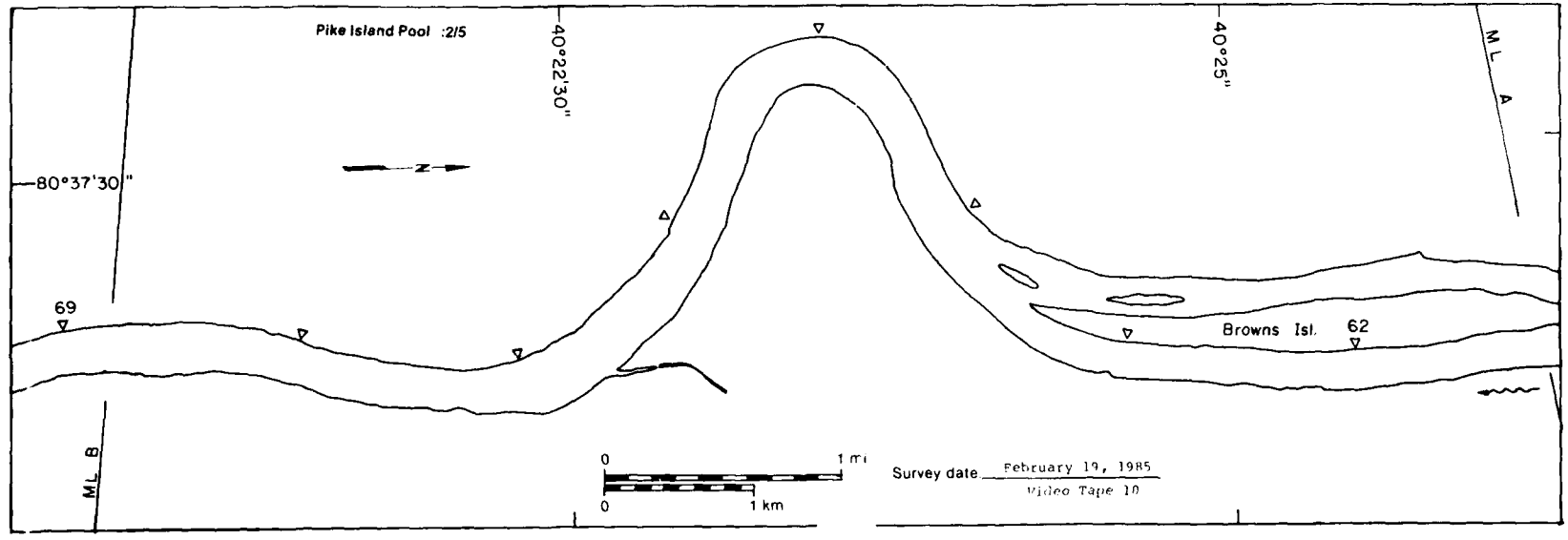


New Cumberland Pool

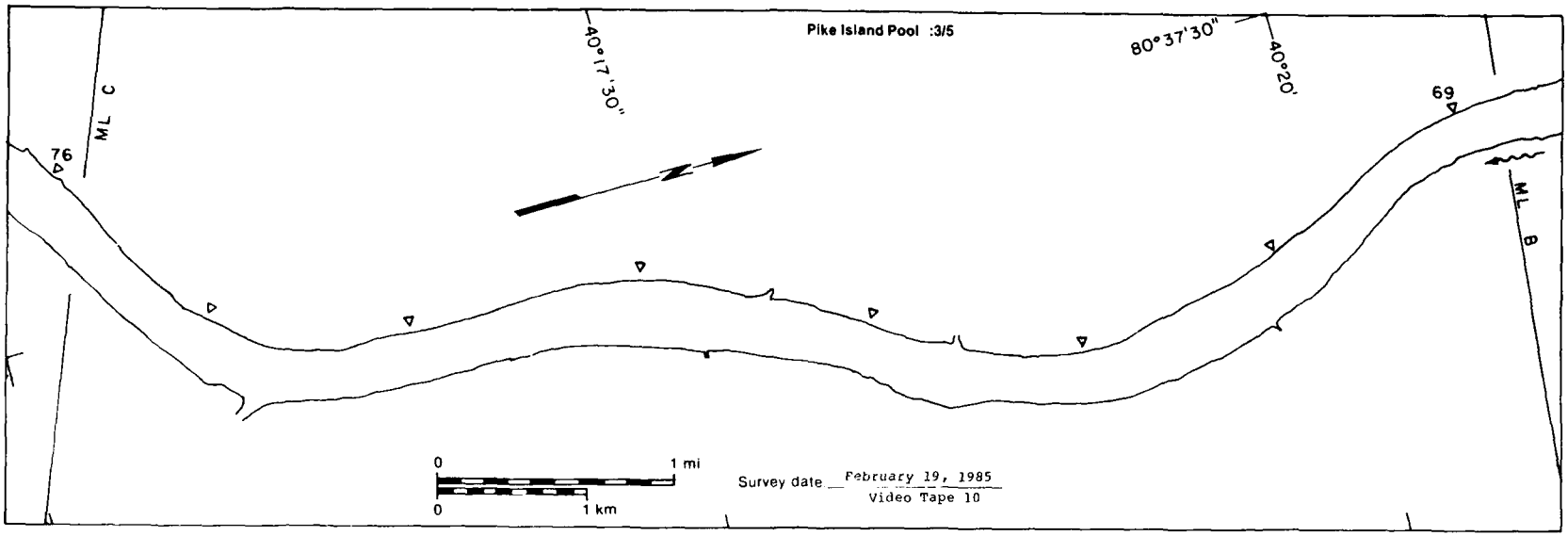
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.69	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	0.12	90
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.04	90
Ice floes or frazil slush and pans	0.02	1
Total Area ($m^2 \times 10^6$)	14.87	

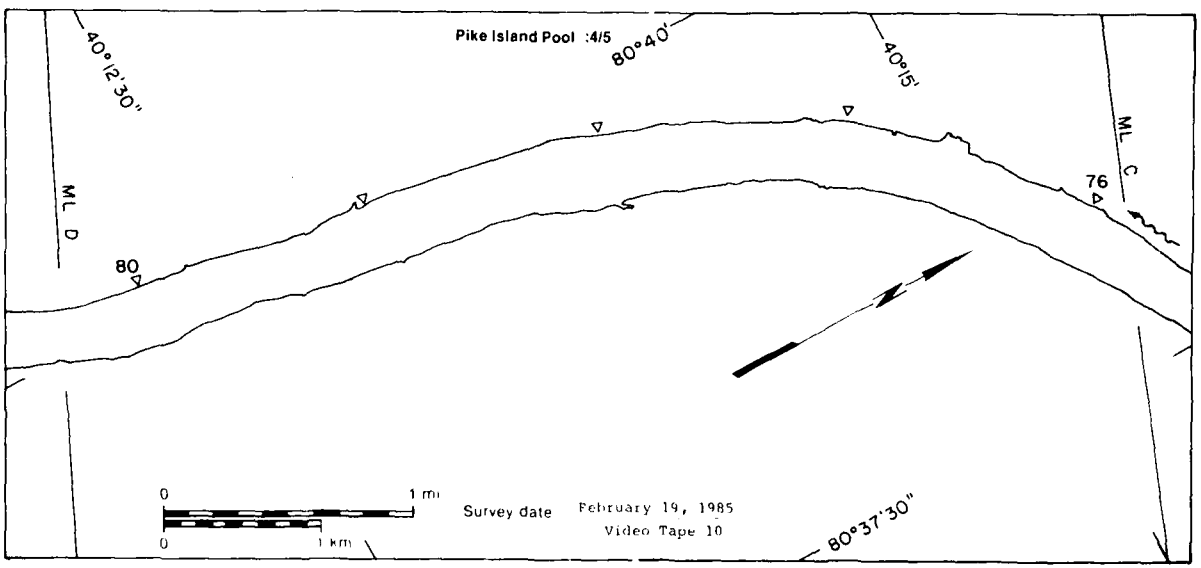


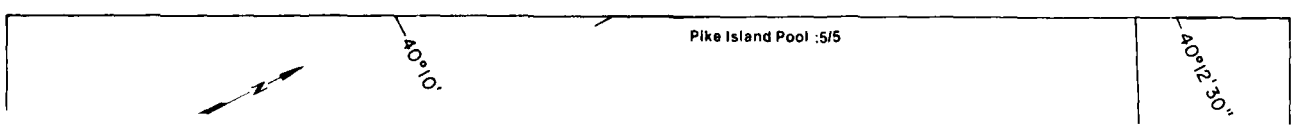

Pike Island Pool :1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date February 19, 1985
Video Tape 10

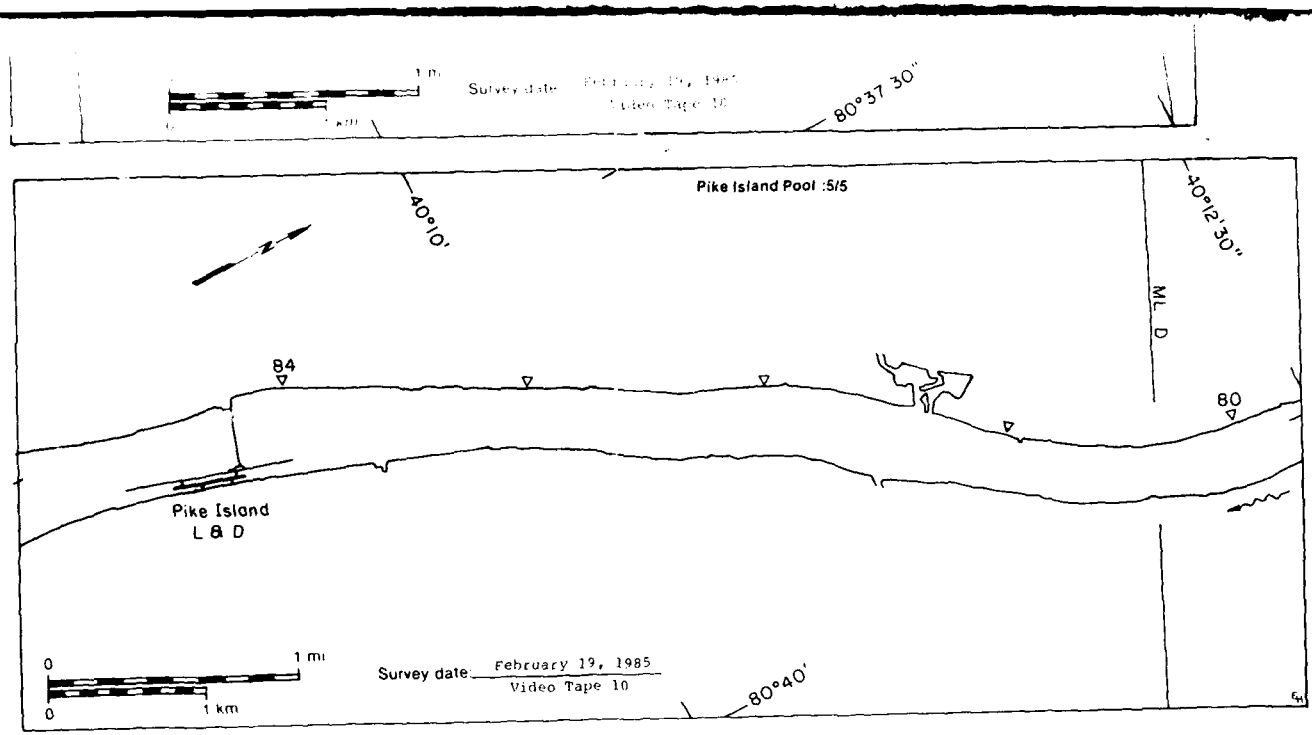

Pike Island Pool :2/5
40°22'30"
40°25"
ML A
80°37'30"
69
Browns Isl.
62
ML B
0
1 mi
0
1 km
Survey date February 19, 1985
Video Tape 10

19 February 1985







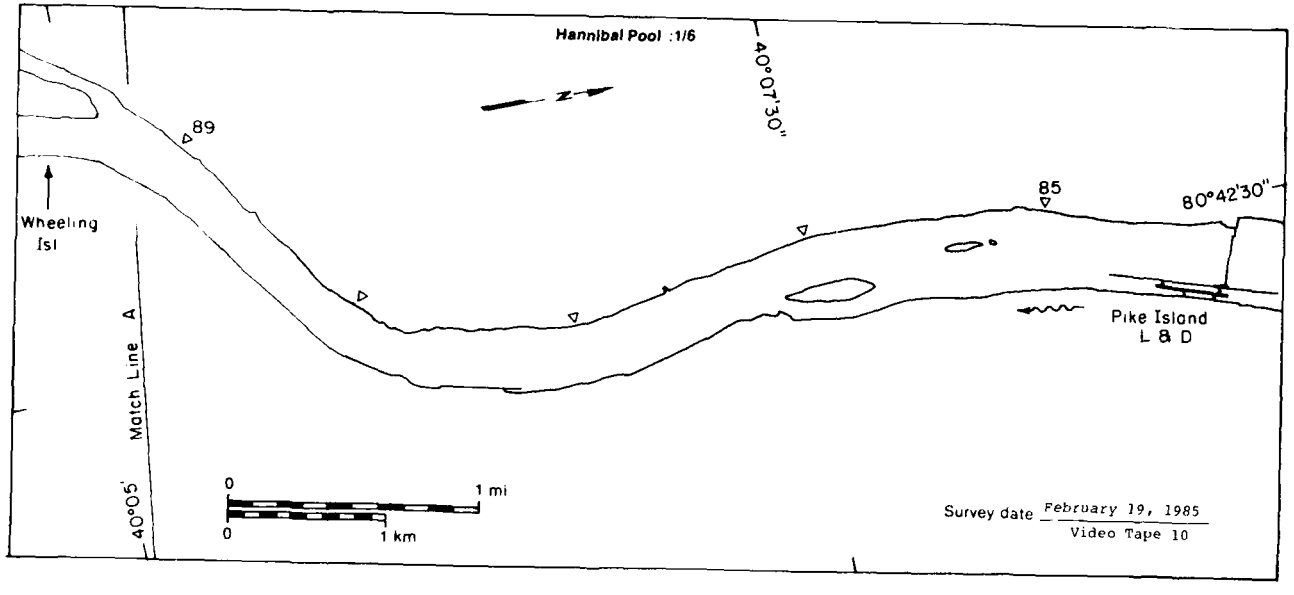


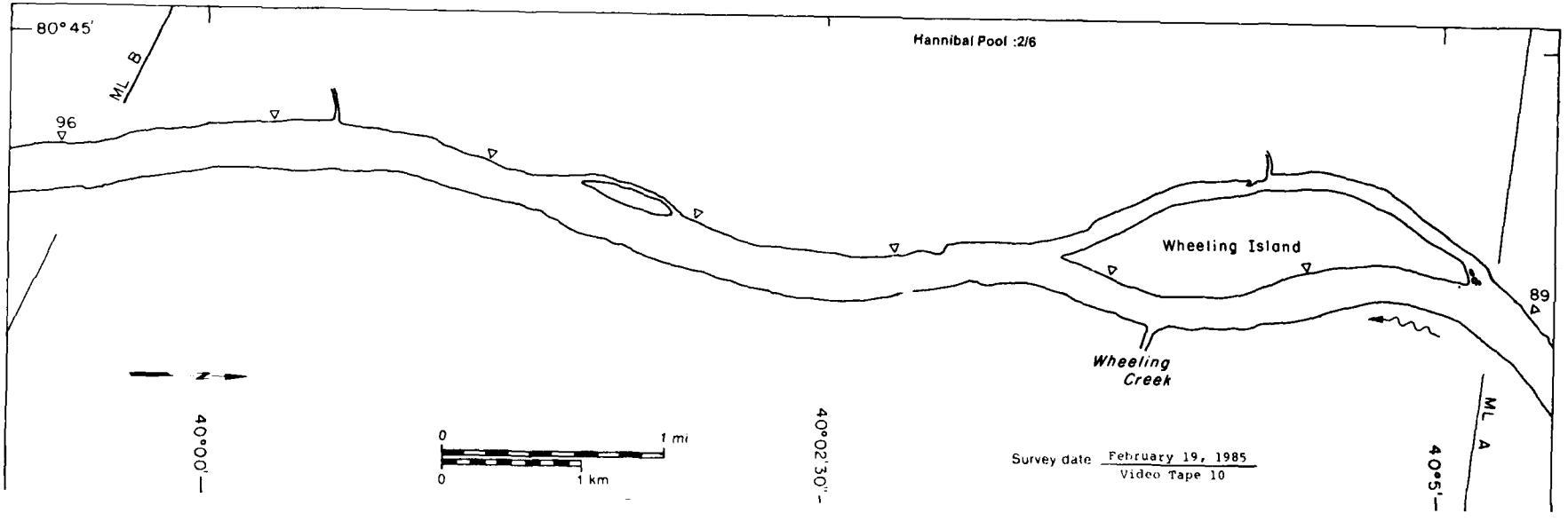
Pike Island Pool

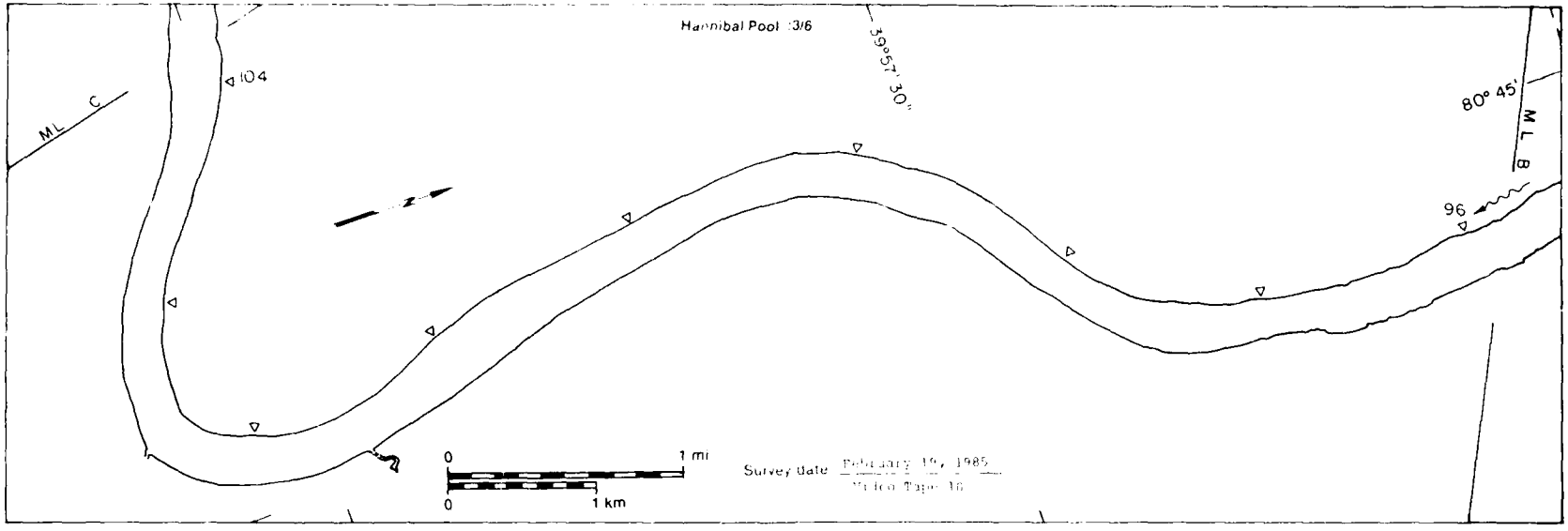
MAP UNITS

	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.89	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.03	1
Total Area ($m^2 \times 10^6$)	18.92	

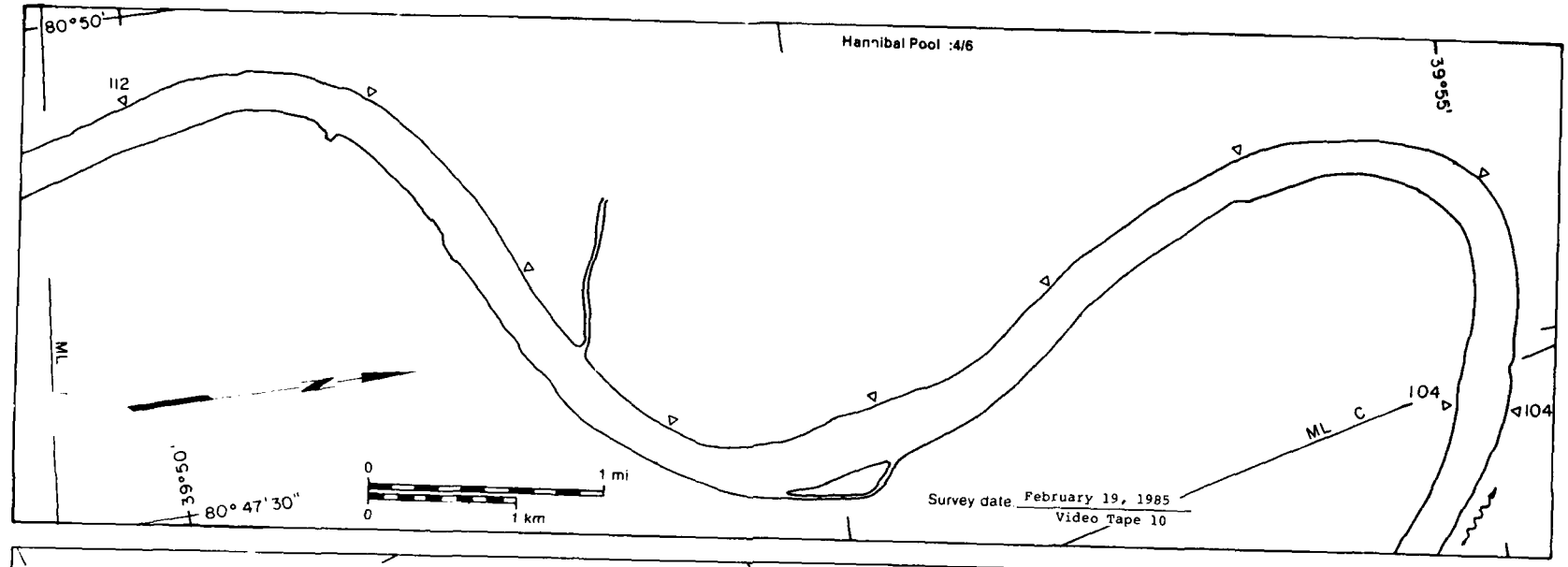
19 February 1985

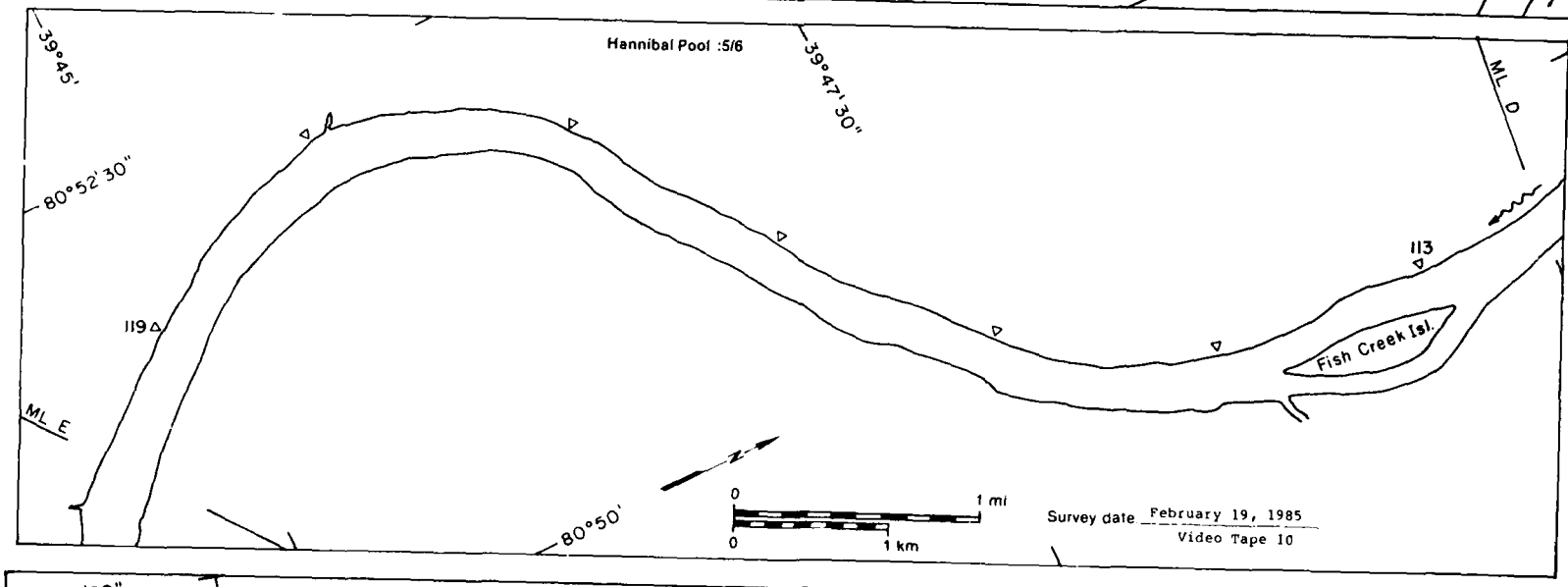


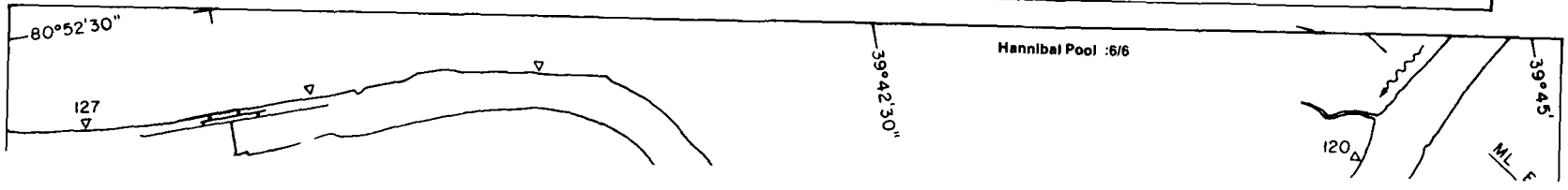


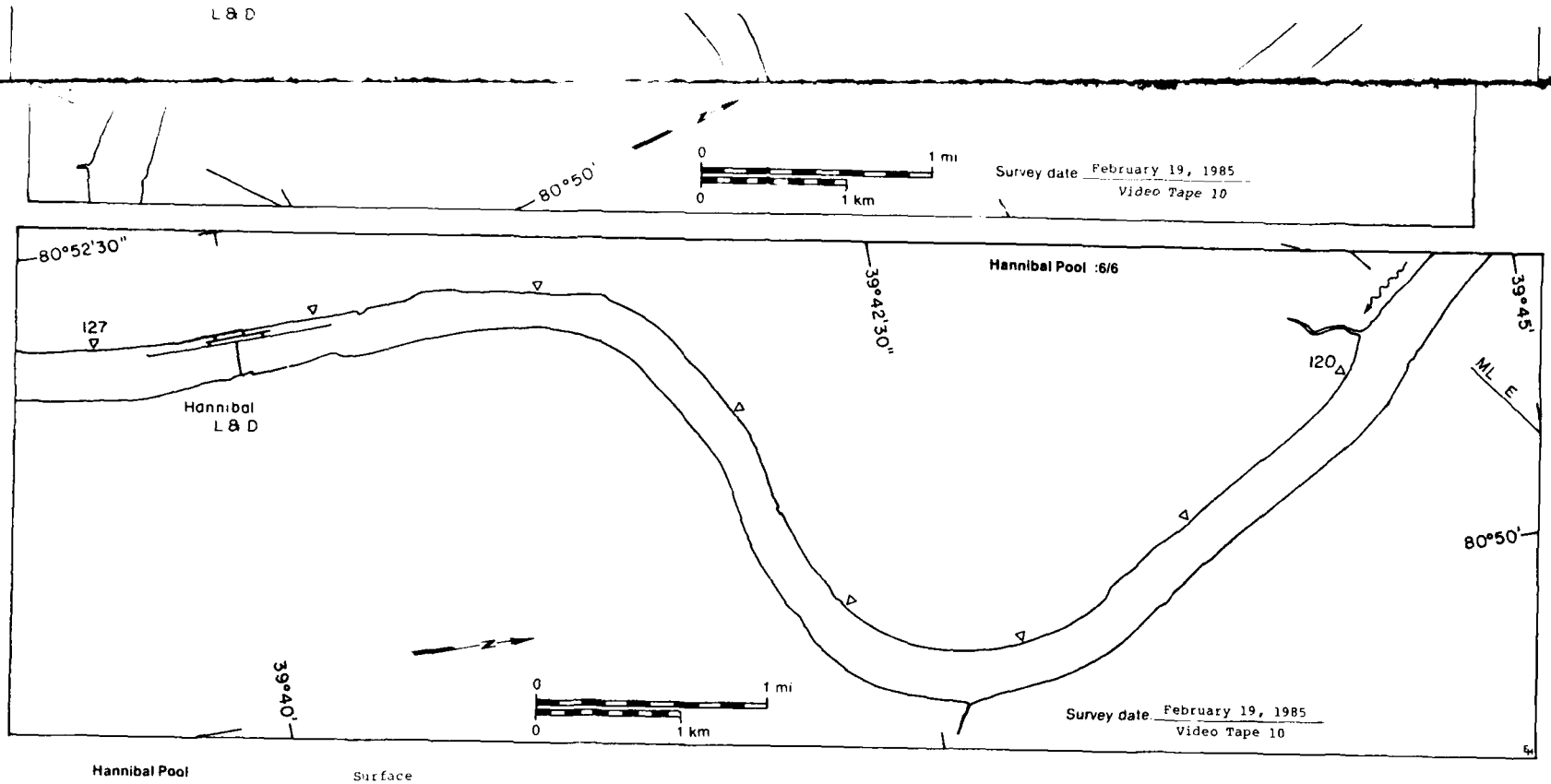

Hannibal Pool 13/6
39°57' 30"
80° 45'
104
96
ML C
MLB
0
1 mi
0
1 km
Survey date February 19, 1985
Video Tape 16

19 February 1985



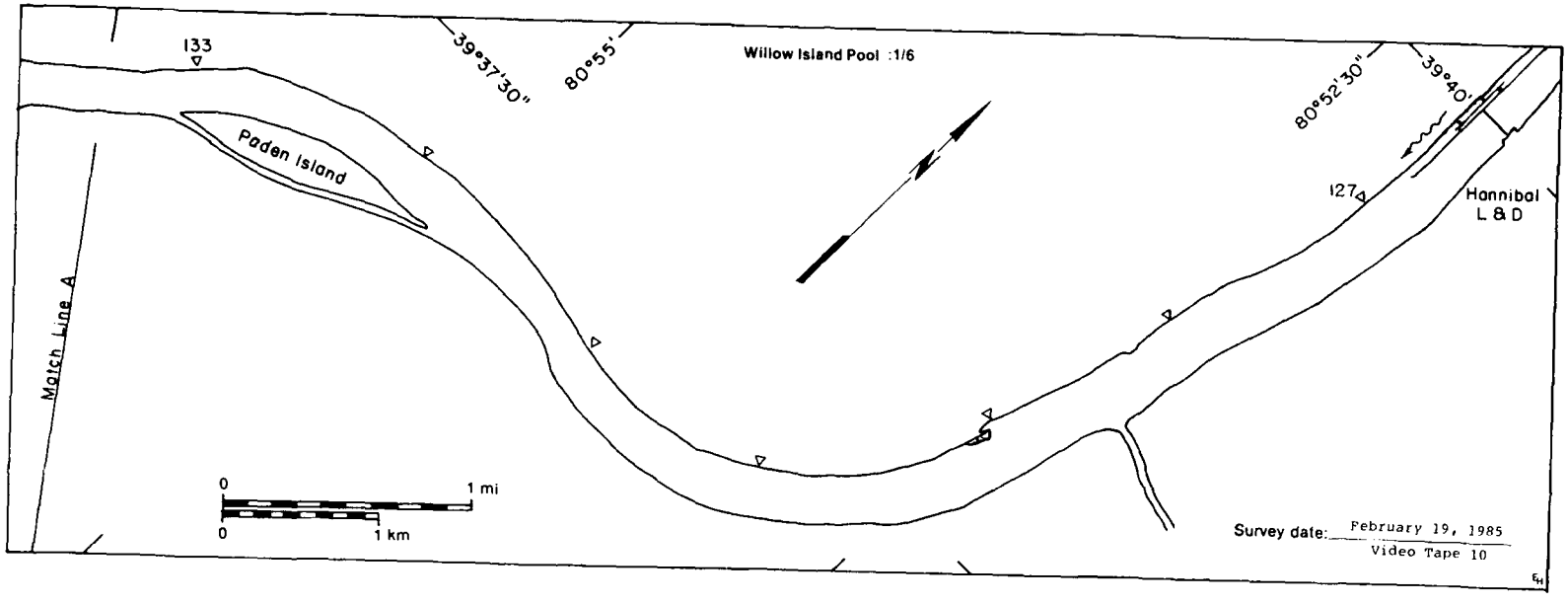


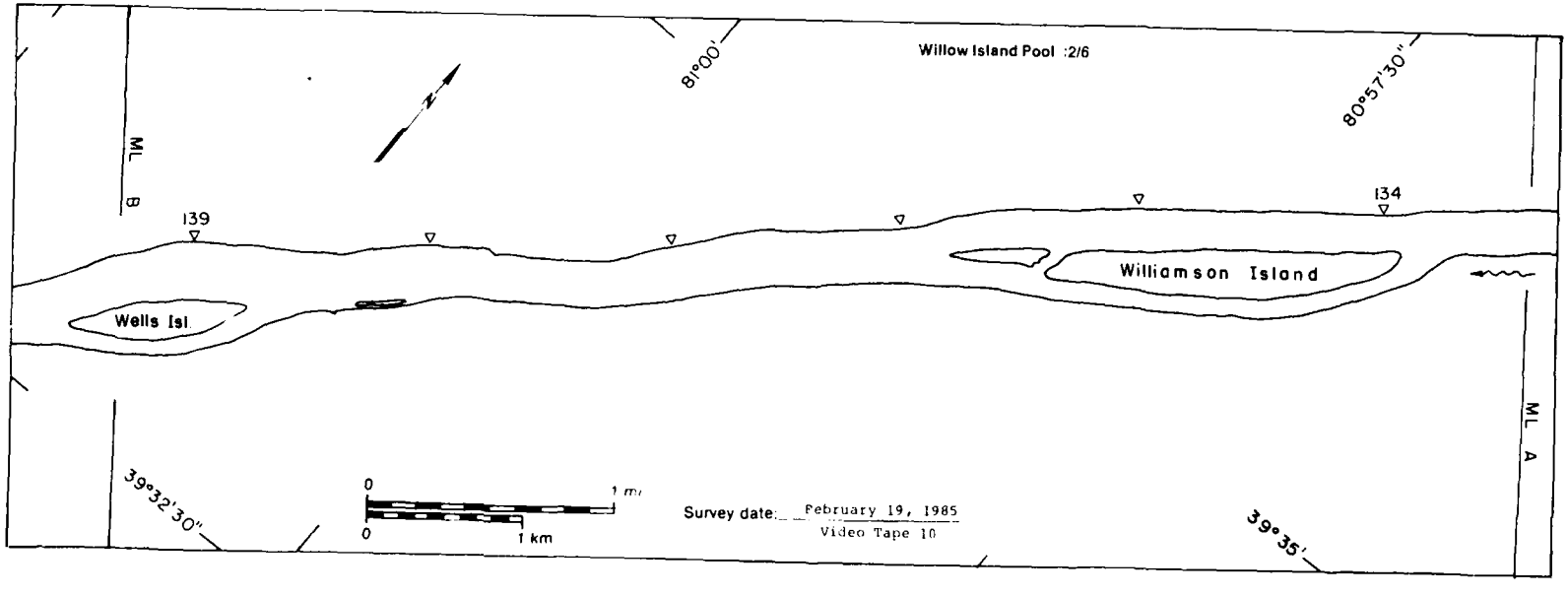


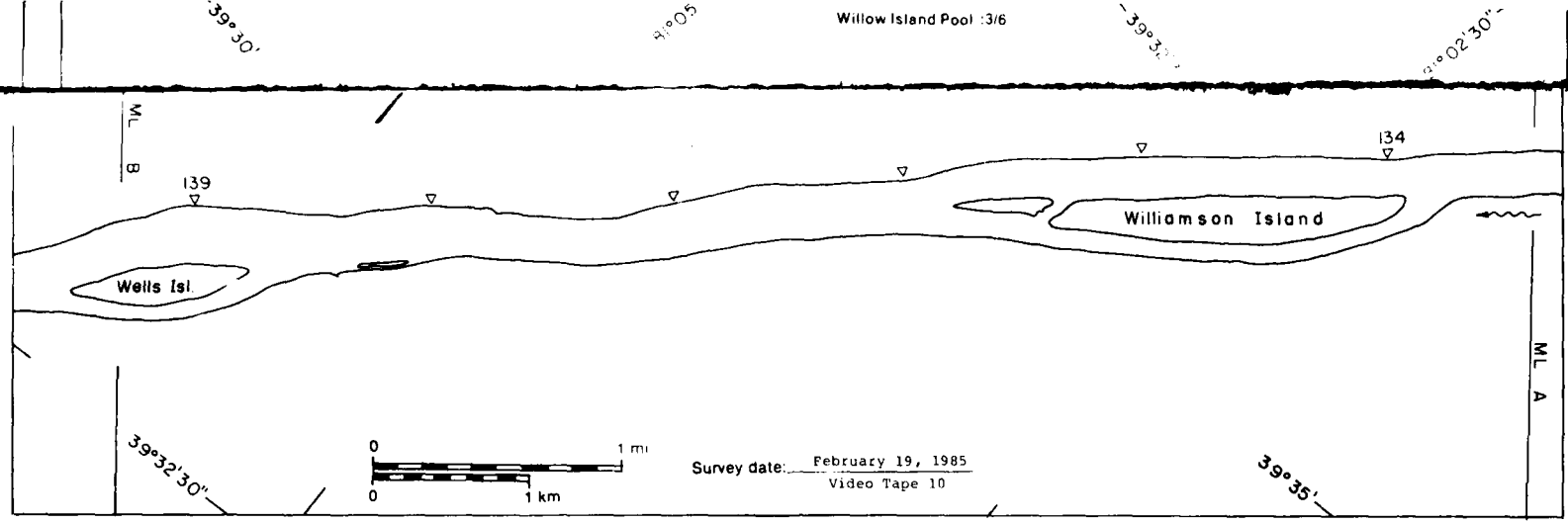


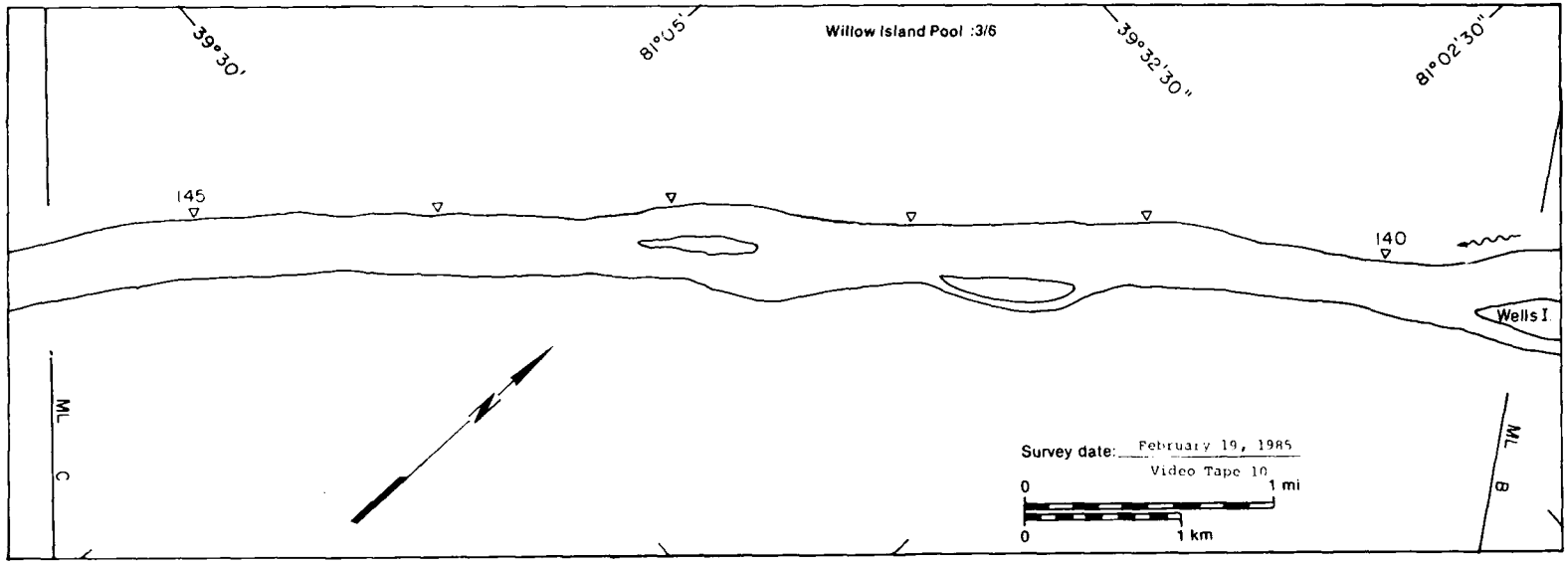
Hannibal Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	22.46	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cove	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	22.46	

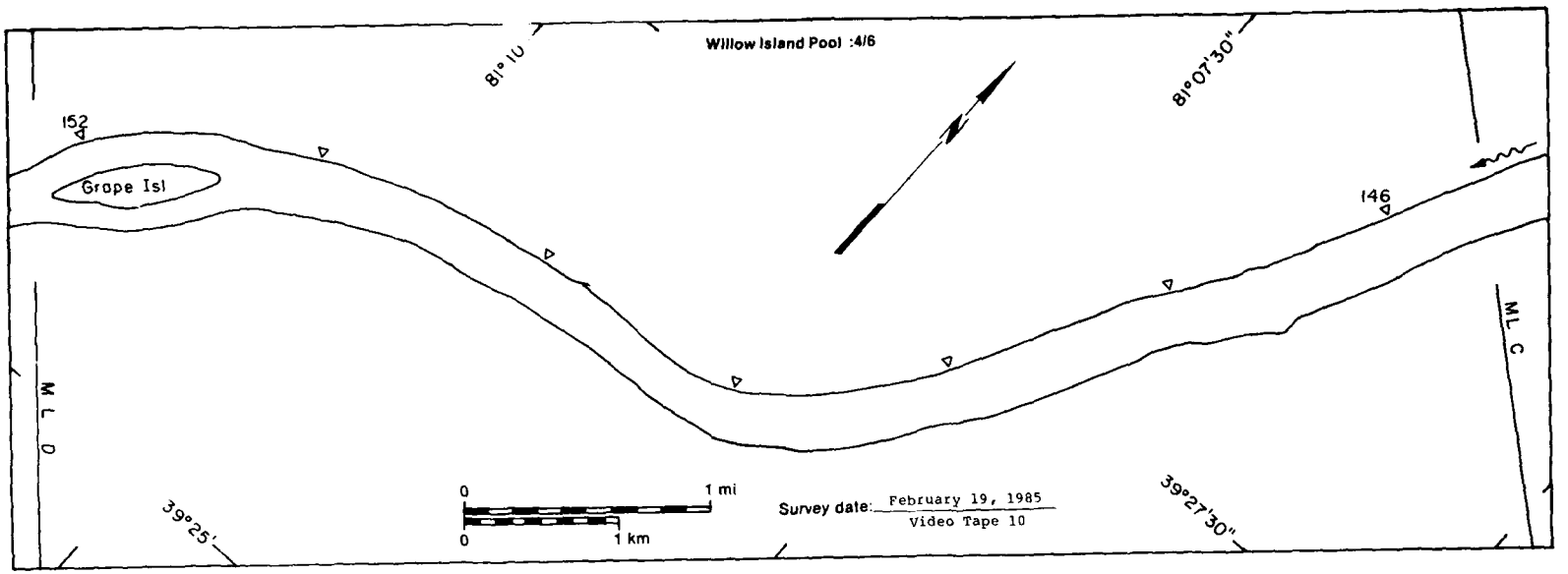

Willow Island Pool :1/6
133
39°37'30"
80°55'
Paden Island
Match Line A
80°52'30"
39°40'
127
Hannibal
L & D
0
1 mi
0
1 km
Survey date: February 19, 1985
Video Tape 10

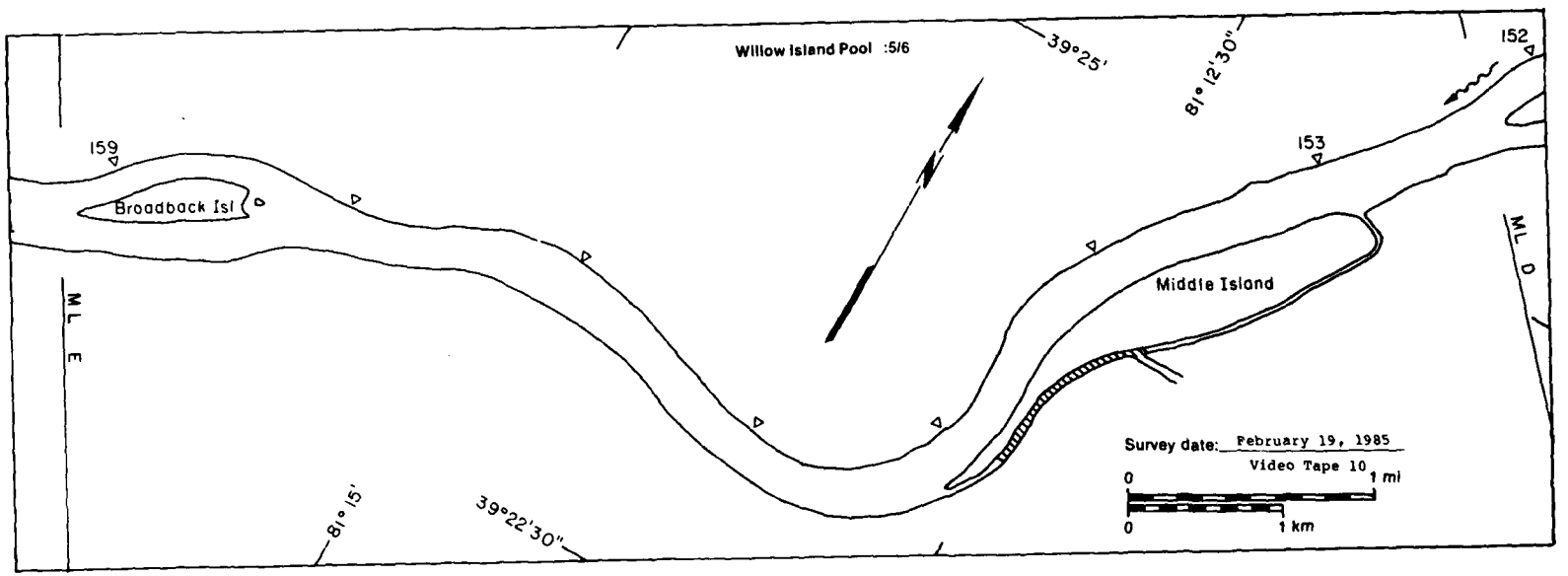

Willow Island Pool :2/6
81°00'
80°57'30"
ML B
139
134
Williamson Island
Wells Isl.
ML A
39°32'30"
0
1 km
Survey date: February 19, 1985
Video Tape 10
39°35'

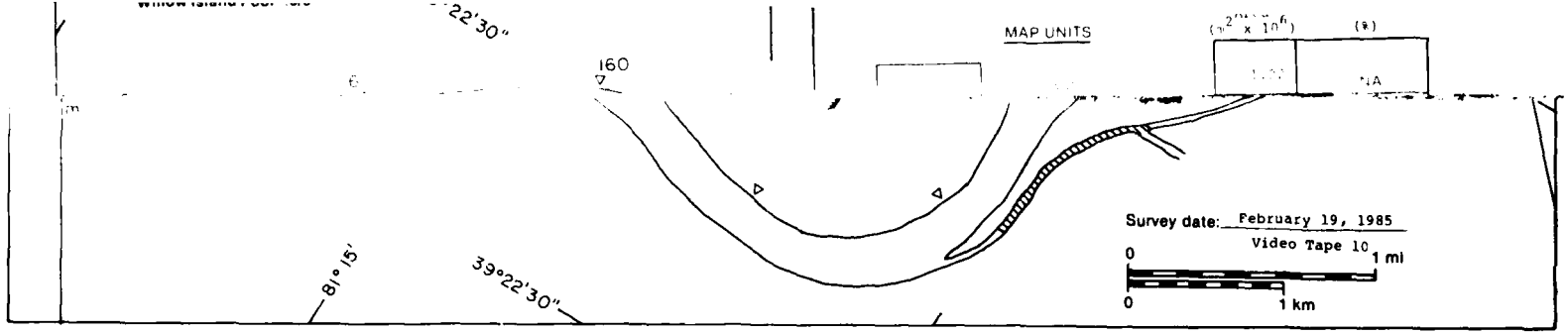

Willow Island Pool :3/6
39°30'
81°05'
39°32'30"
81°02'30"
ML B
139
134
Williamson Island
Wells Isl.
ML A
39°32'30"
0
1 mi
0
1 km
Survey date: February 19, 1985
Video Tape 10
39°35'

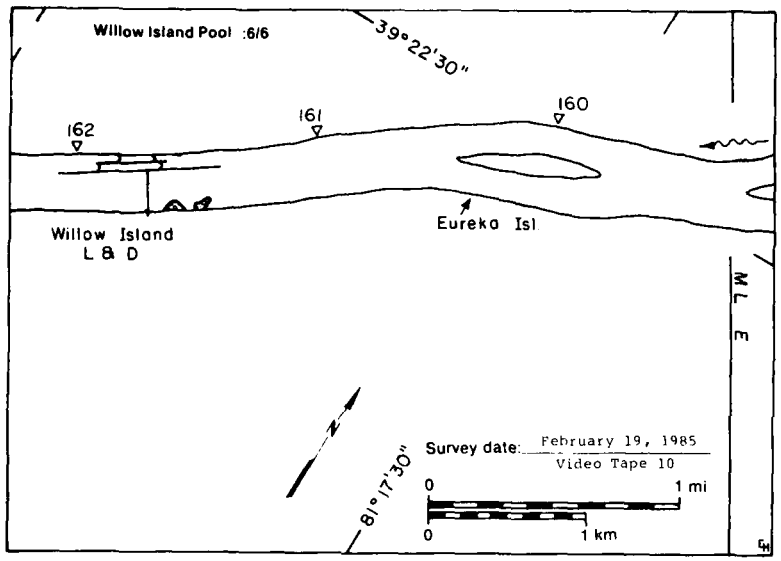

Willow Island Pool :3/6
39°30'
81°05'
39°32'30"
81°02'30"
145
140
Wells I.
ML C
ML B
Survey date: February 19, 1985
Video Tape 10
0
1 mi
0
1 km

19 February 1985



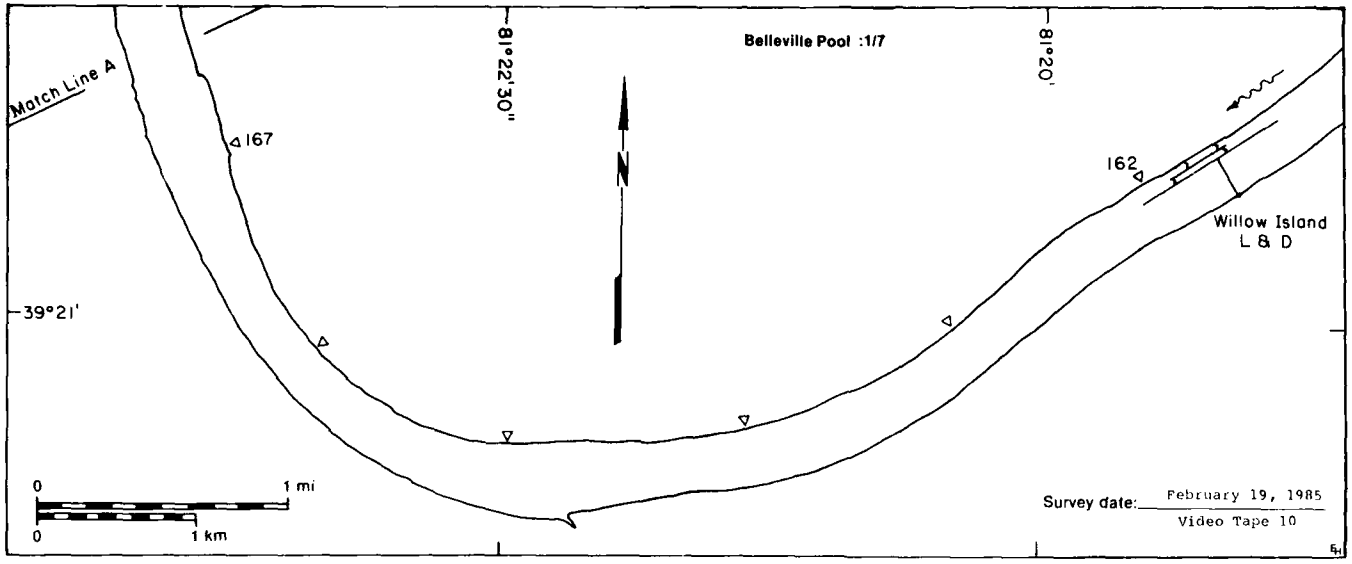


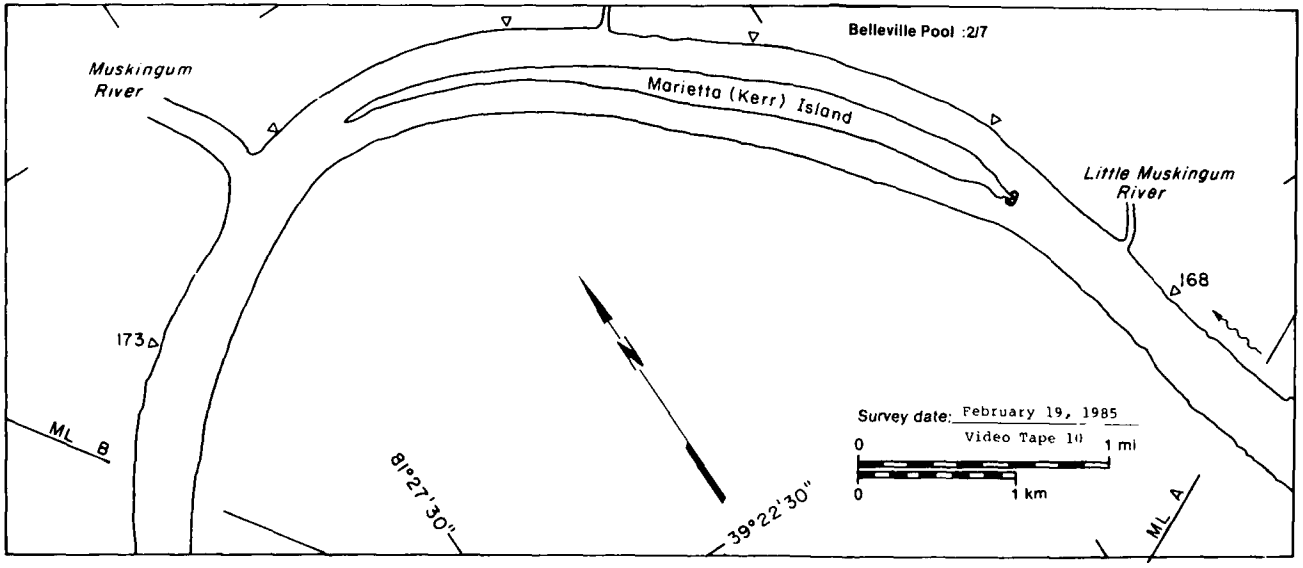


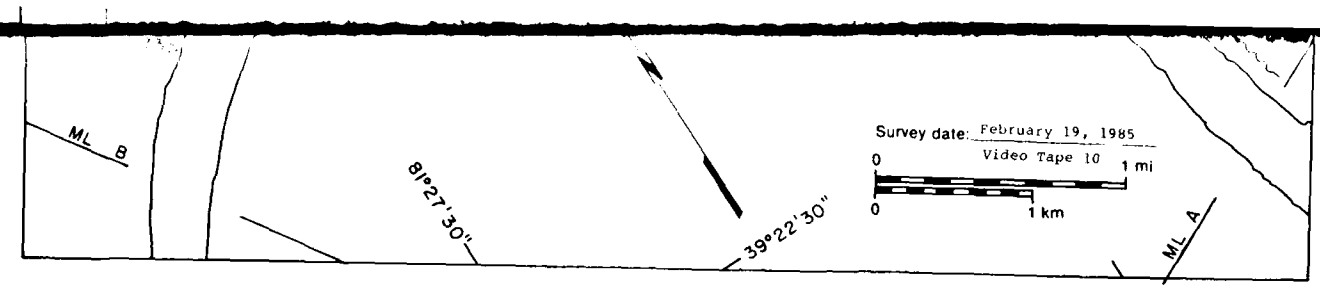


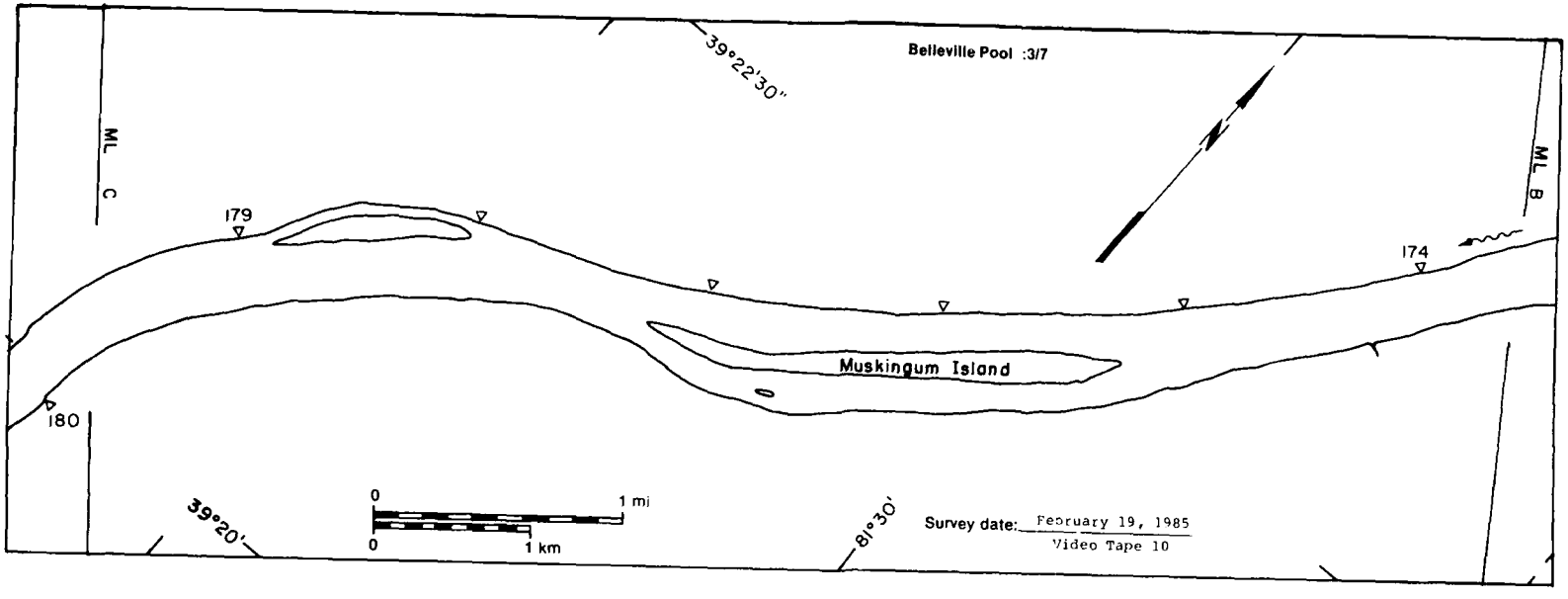
Willow Island Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	21.22	NA
Solid ice cover	--	NA
Solid ice cover with *open-water areas*	--	--
Fragmented ice cover	--	NA
Fragmented ice cover *with open-water areas*	--	--
Ice floes or frazil slush and pans	0.02	10
Total Area ($m^2 \times 10^6$)	21.24	

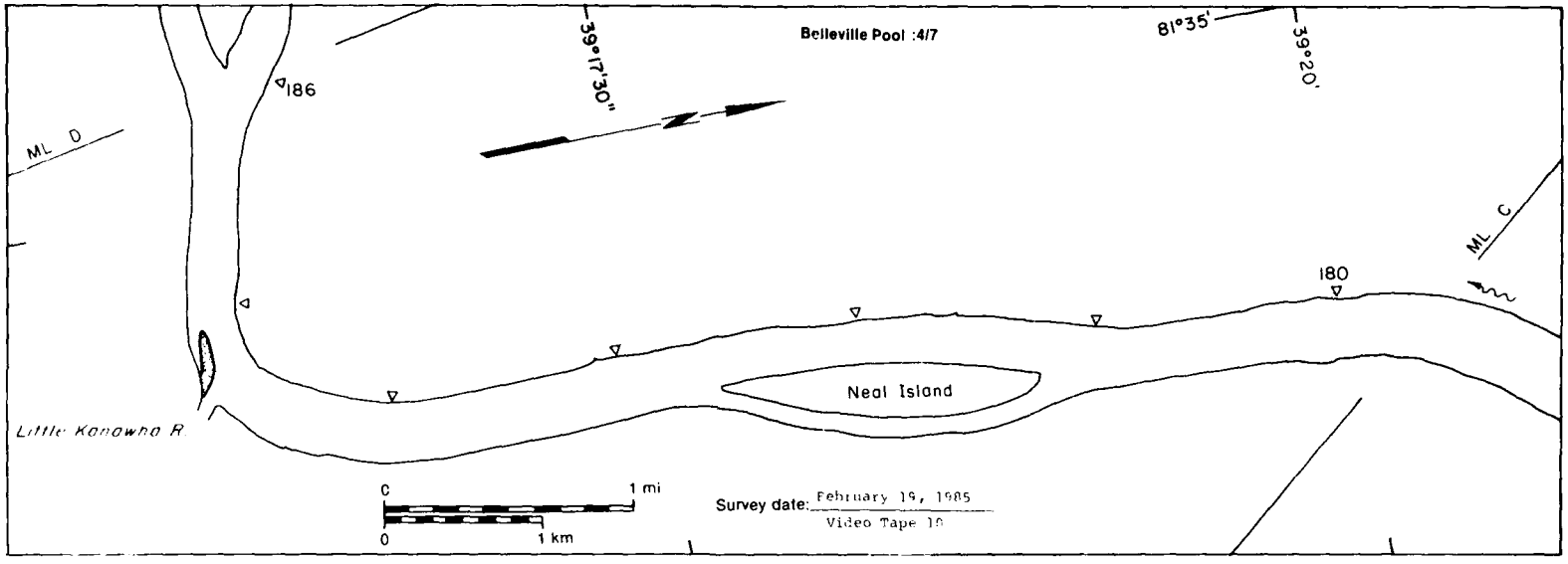

Belleville Pool :1/7
Match Line A
81°22'30"
81°20'
167
162
Willow Island
L & D
39°21'
0
1 mi
0
1 km
Survey date: February 19, 1985
Video Tape 10

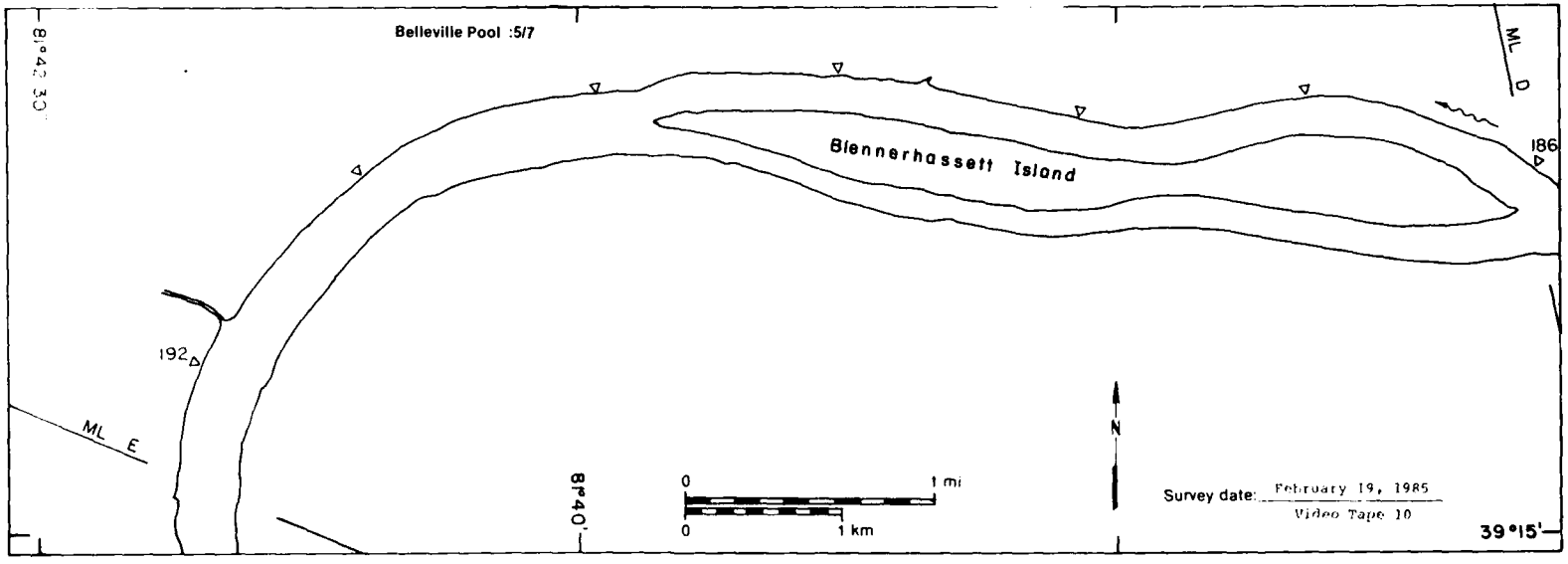

Belleville Pool :2/7
Muskingum
River
Marietta (Kerr) Island
Little Muskingum
River
168
173
ML B
81°27'30"
39°22'30"
Survey date: February 19, 1985
Video Tape 10
0
1 mi
0
1 km
ML A

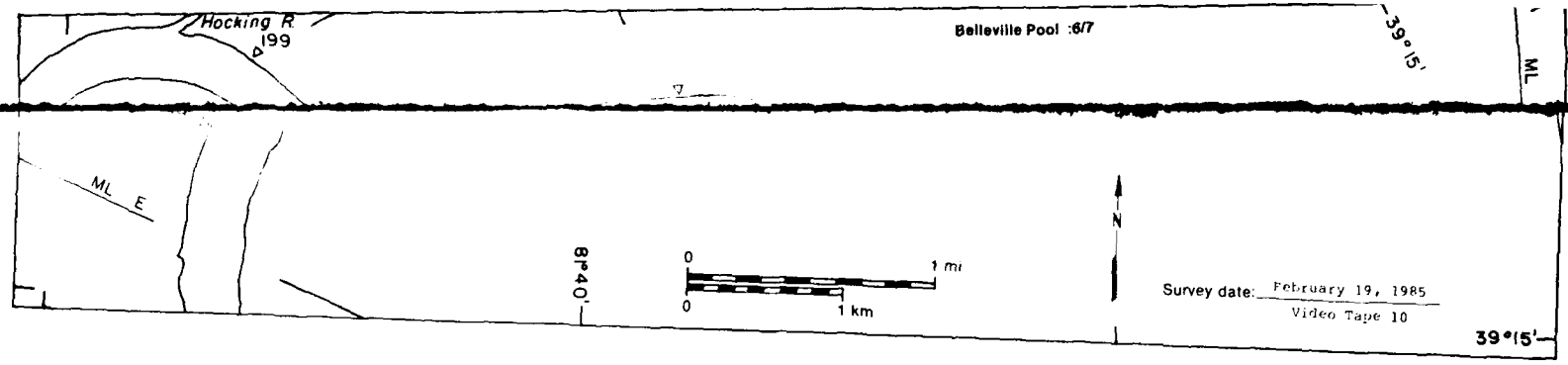

ML B
81°27'30"
39°22'30"
Survey date: February 19, 1985
Video Tape 10
0
1 mi
0
1 km
ML A

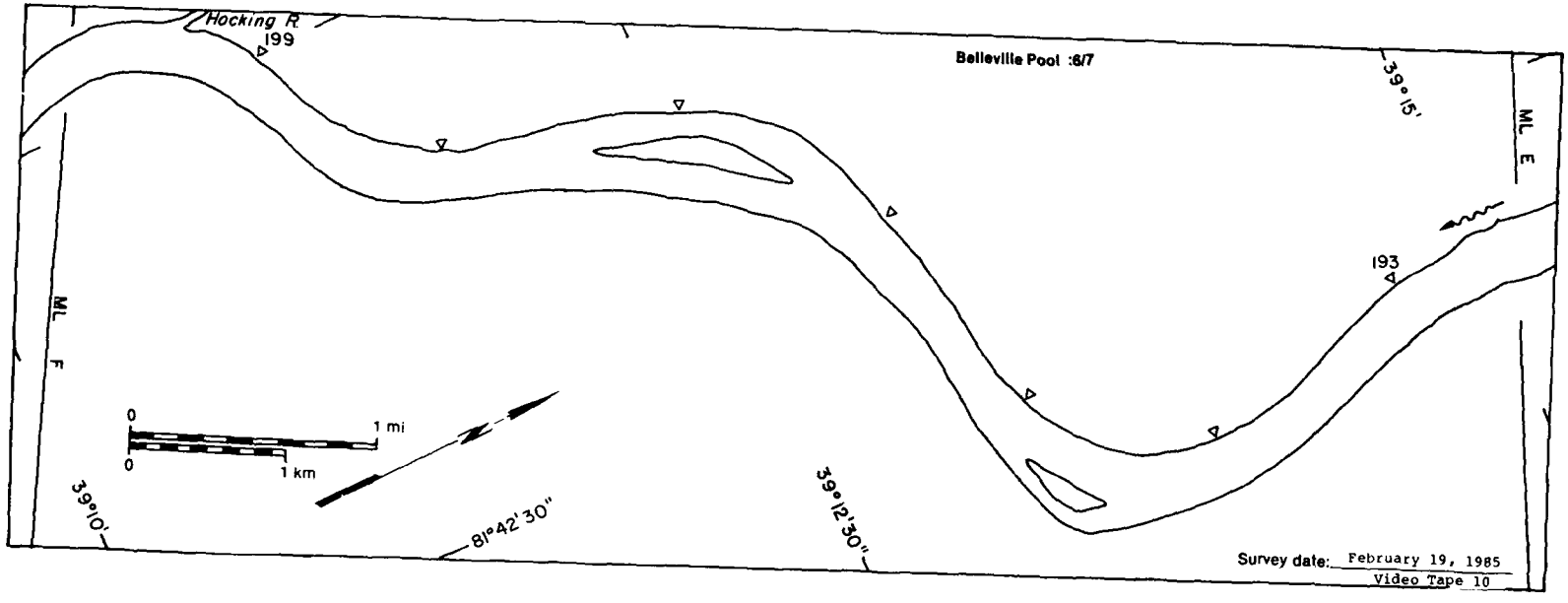

39°22'30"
Belleville Pool :3/7
ML C
179
ML B
174
Muskingum Island
180
39°20'
0
1 mi
0
1 km
81°30'
Survey date: February 19, 1985
Video Tape 10

19 February 1985

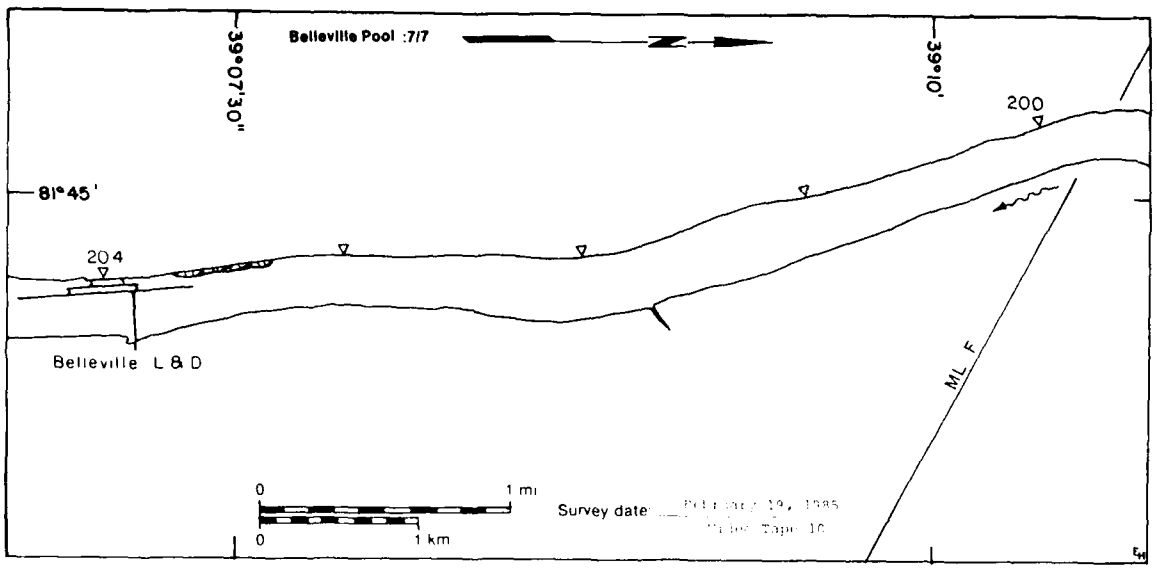





Hocking R.
199
Belleville Pool :6/7
39°15'
ML
ML E
8°40'
0
1 mi
0
1 km
N
Survey date: February 19, 1985
Video Tape 10
39°15'


Hocking R.
199
Belleville Pool :6/7
39°15'
ML E
193
ML F
0
1 mi
0
1 km
39°10'
81°42'30"
39°12'30"
Survey date: February 19, 1985
Video Tape 10

19 February 1985

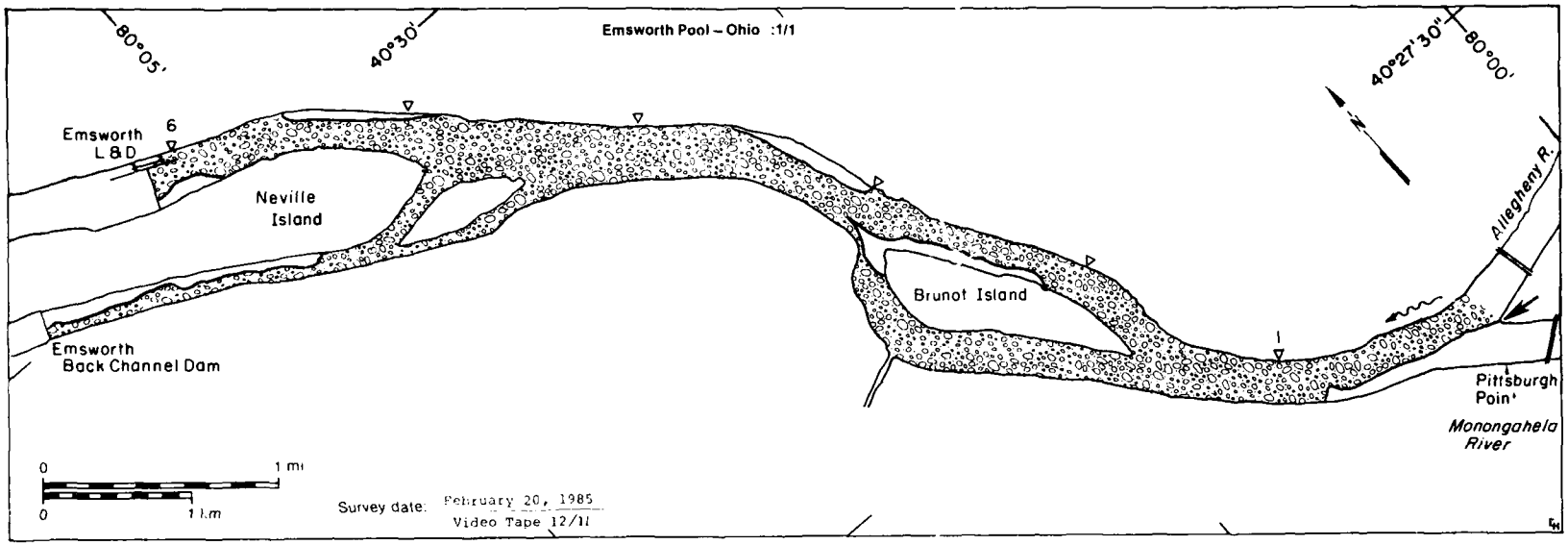


Belleville Pool

MAP UNITS

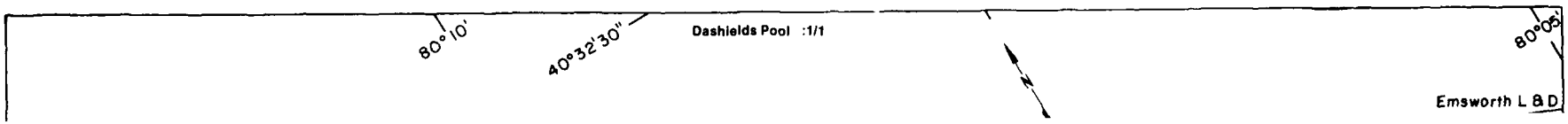
	Area ($ft^2 \times 10^6$)	Surface temperature (°C)
Open water	[illegible]	NA
Solid ice cover	[illegible]	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	0.02	NA
Ice [illegible] or frazil slush and [illegible]	[illegible]	[illegible]
[illegible]	[illegible]	

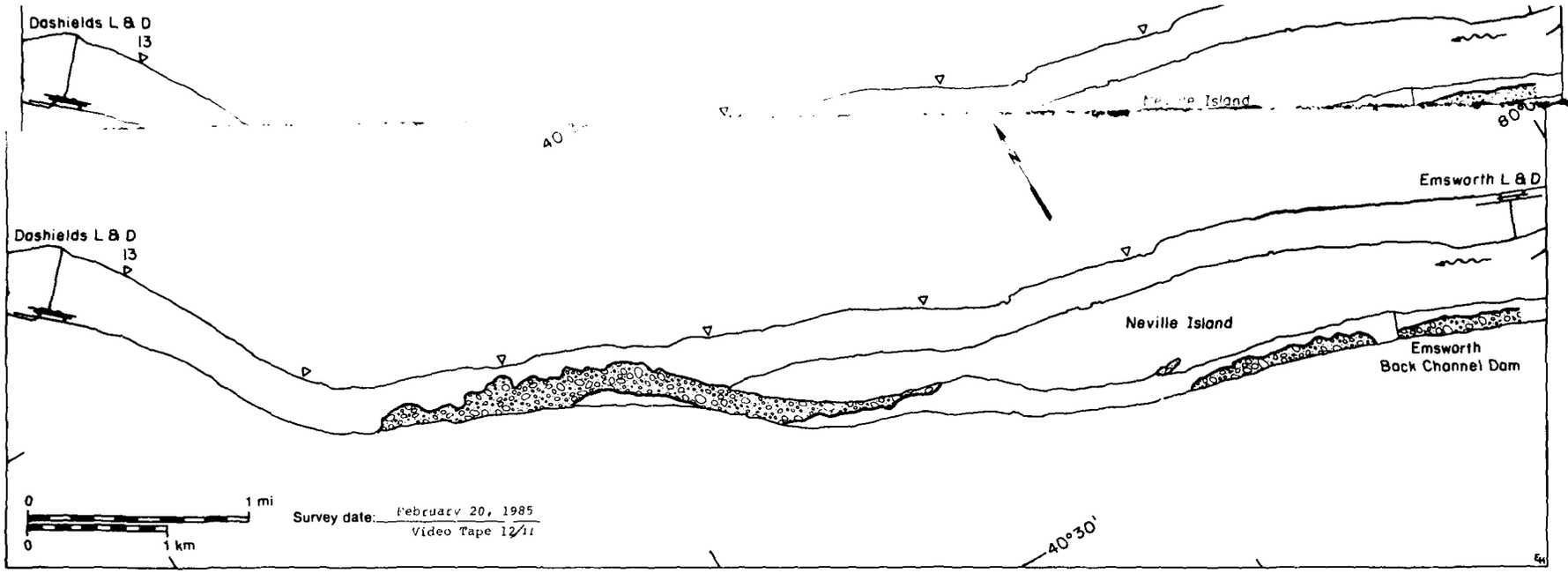
20 February 1985



Emsworth Pool – Ohio

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	0.69	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	3.80	5
Total Area ($m^2 \times 10^6$)	4.49	

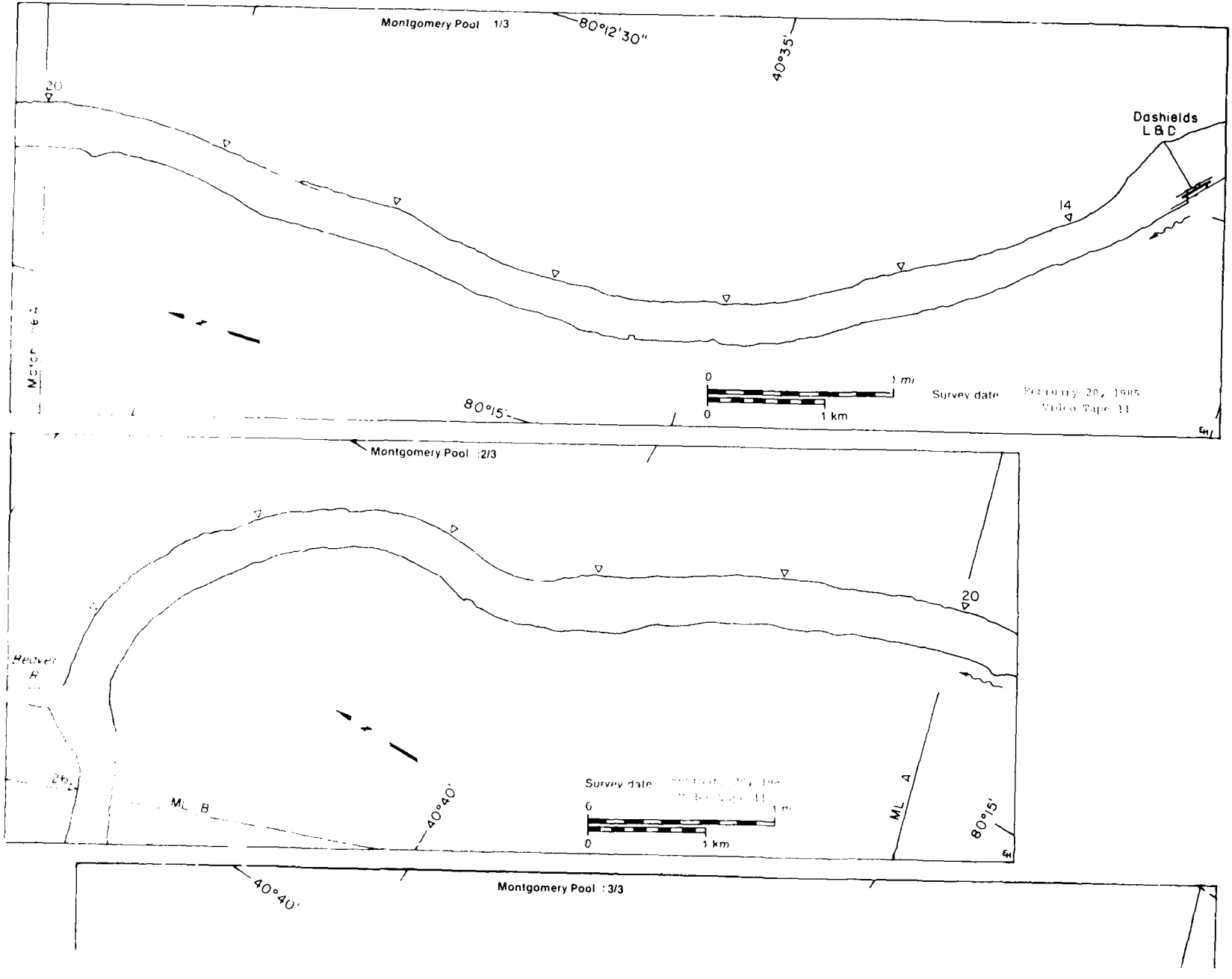


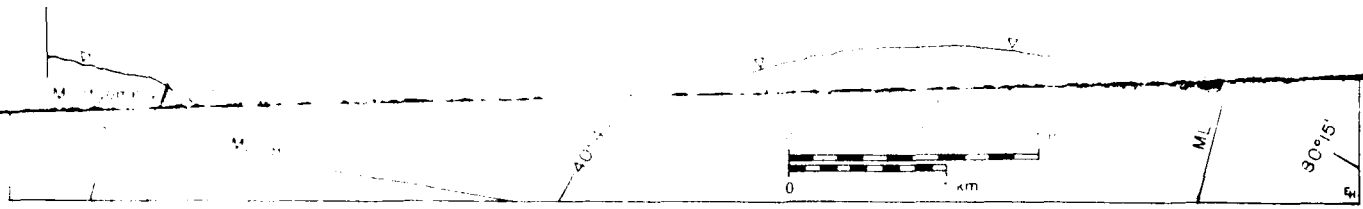


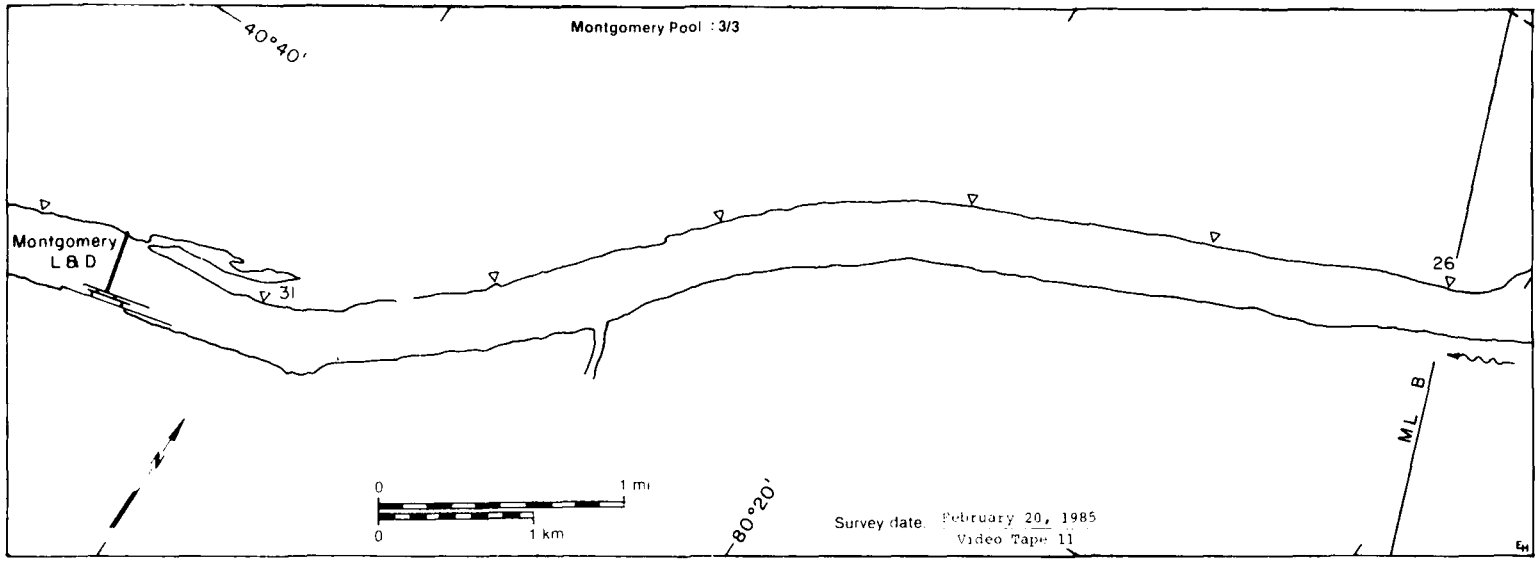
Dashields Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.16	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.84	I
Total Area ($m^2 \times 10^6$)	5.00	

20 February 1985



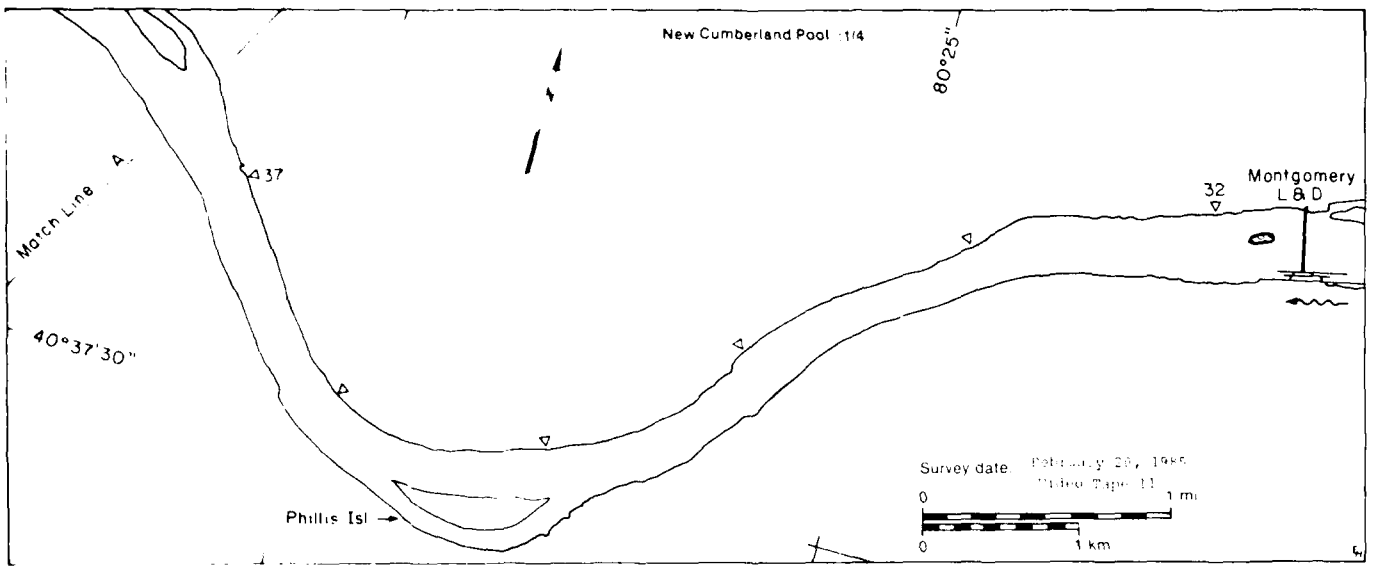


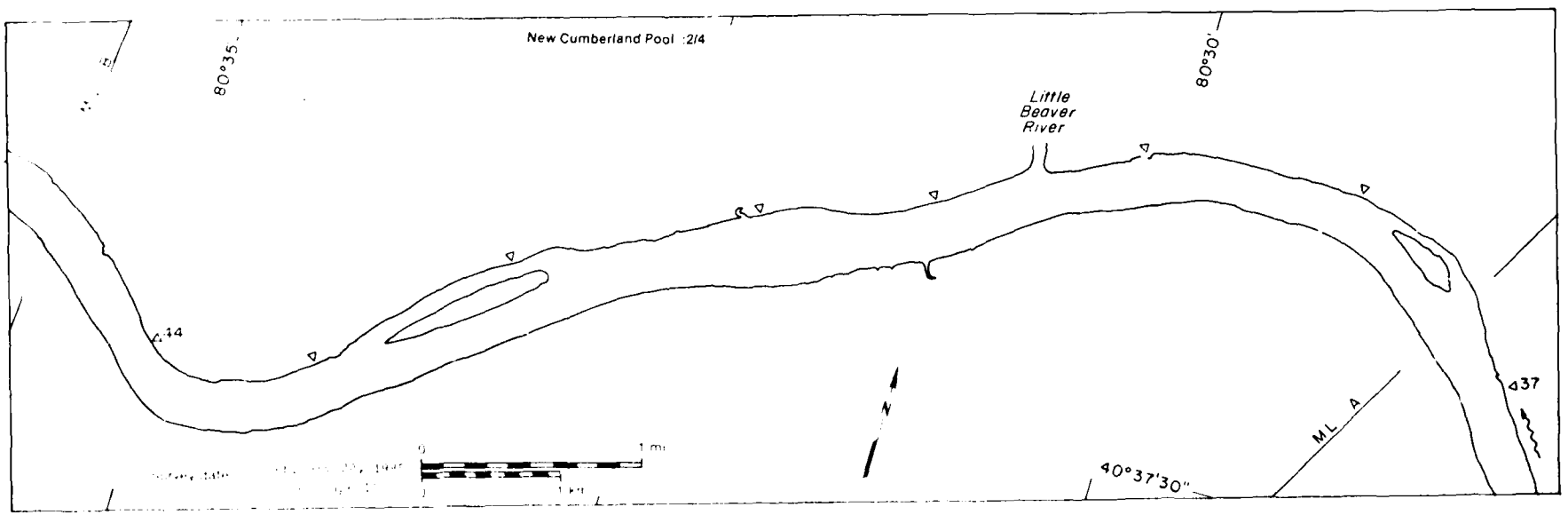


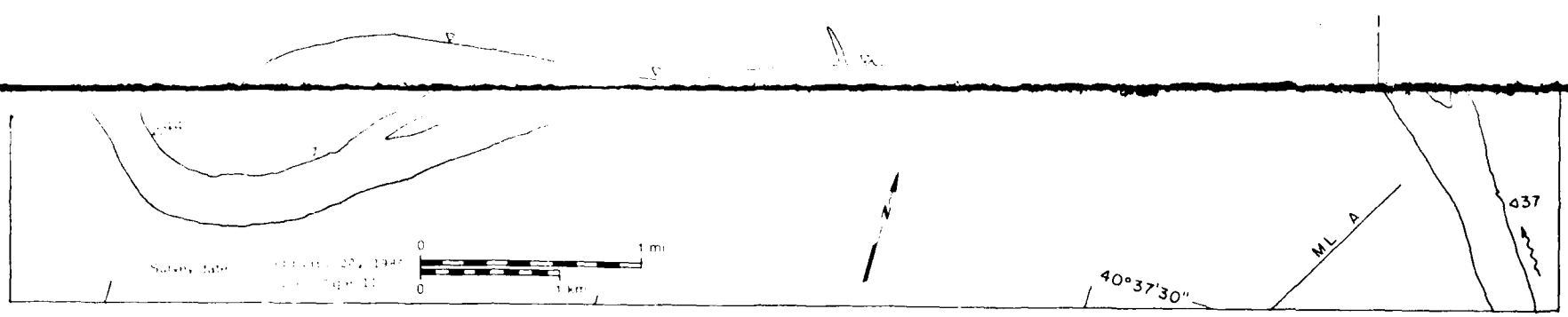
Montgomery Pool

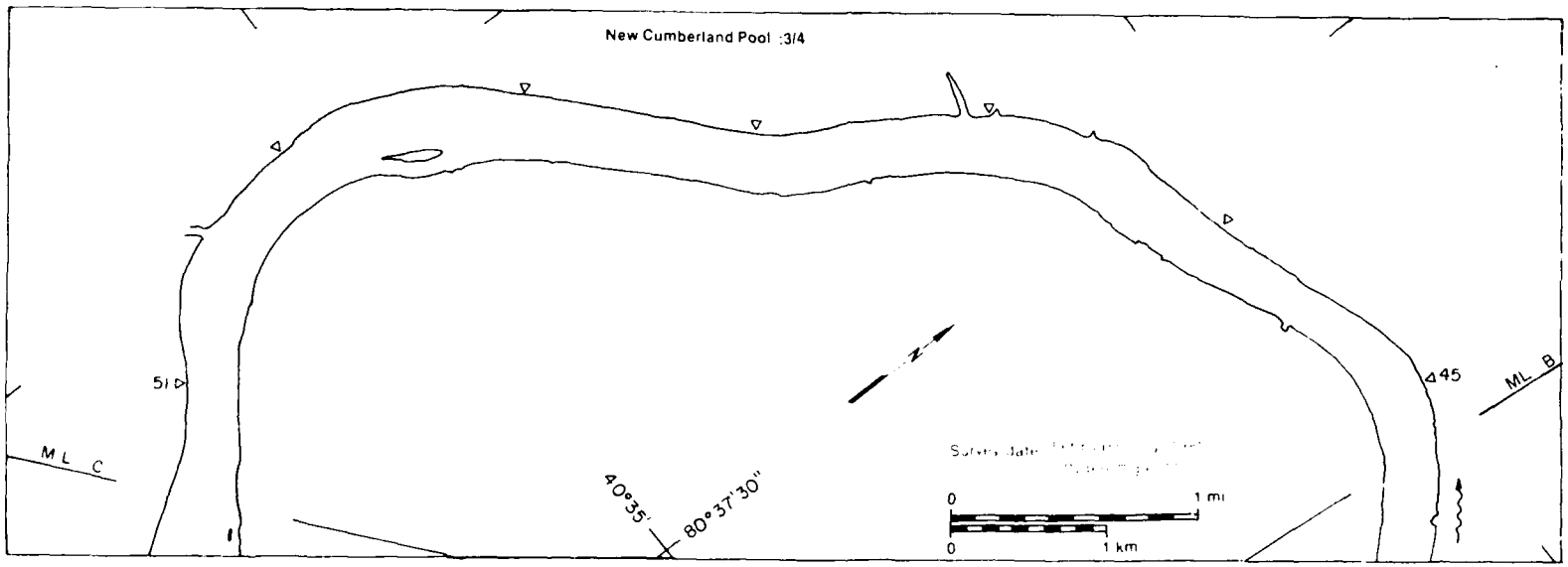
MAP UNITS	Area ($ft^2 \times 10^6$)	Surface concentration (%)
Open water	11.27	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($ft^2 \times 10^6$)	11.27	

20 February 1985

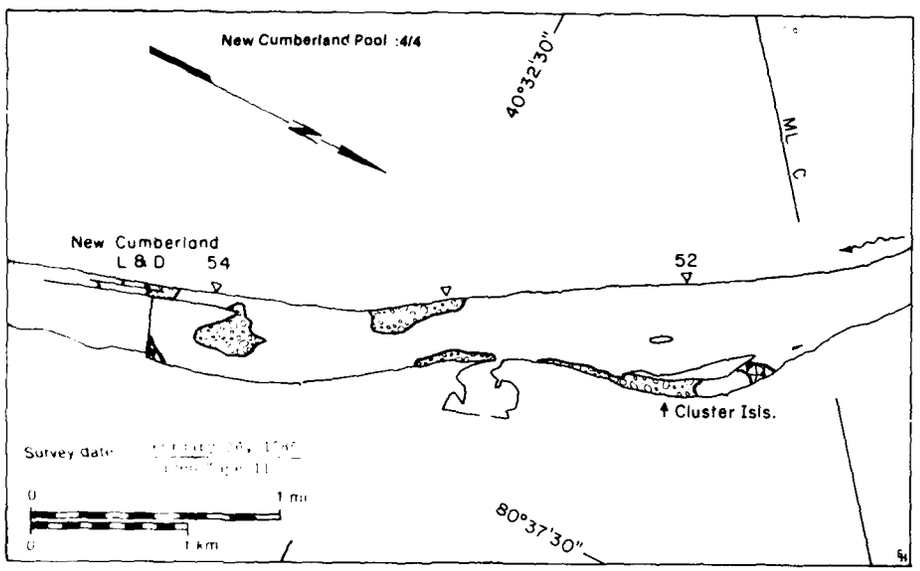





0
1 mi
0
1 km
N
40°37'30"
ML A
437

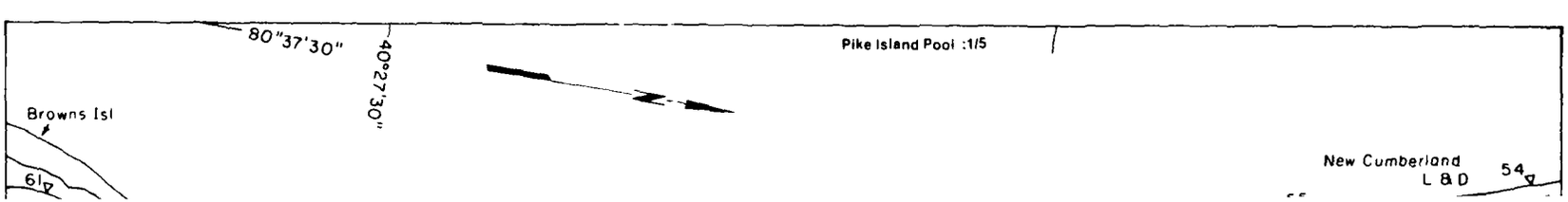

New Cumberland Pool :3/4
N
0
1 mi
0
1 km
40°35'
80°37'30"
ML B
ML C
445
51

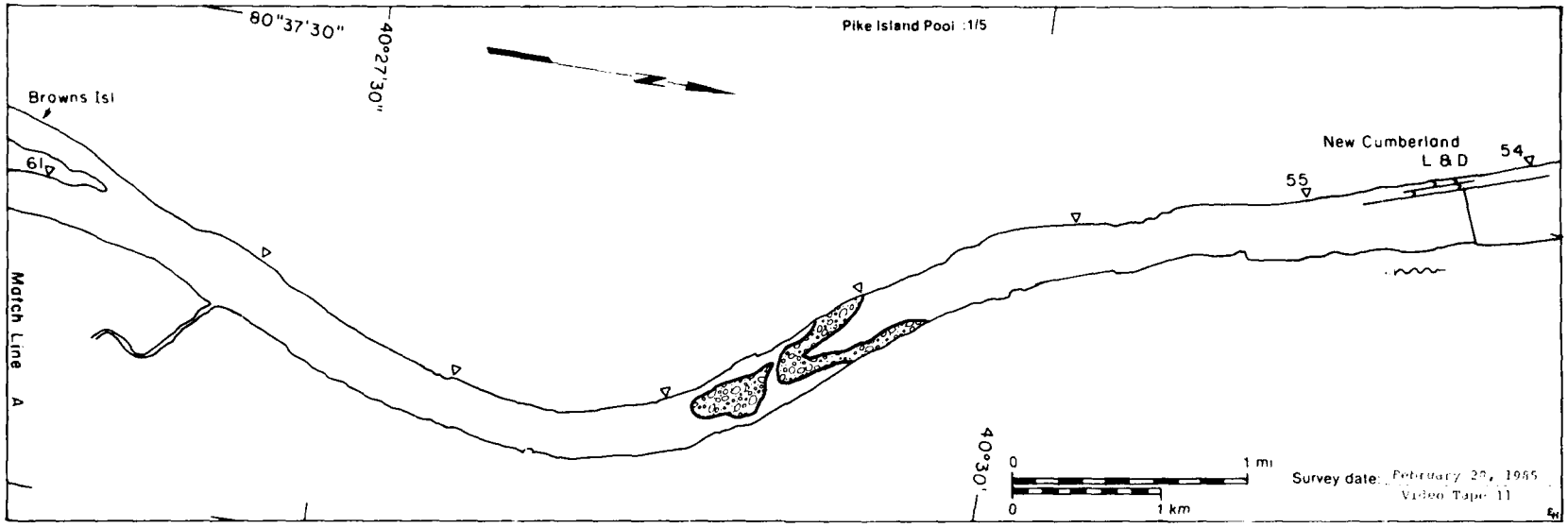
20 February 1985

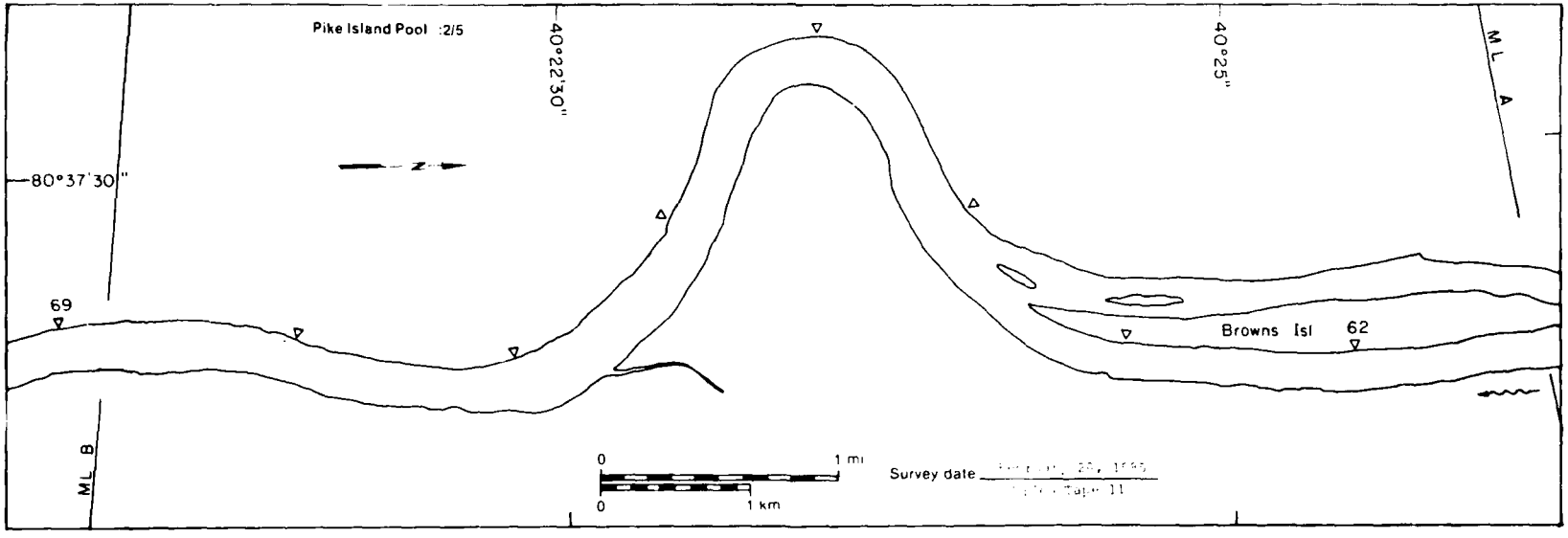


New Cumberland Pool

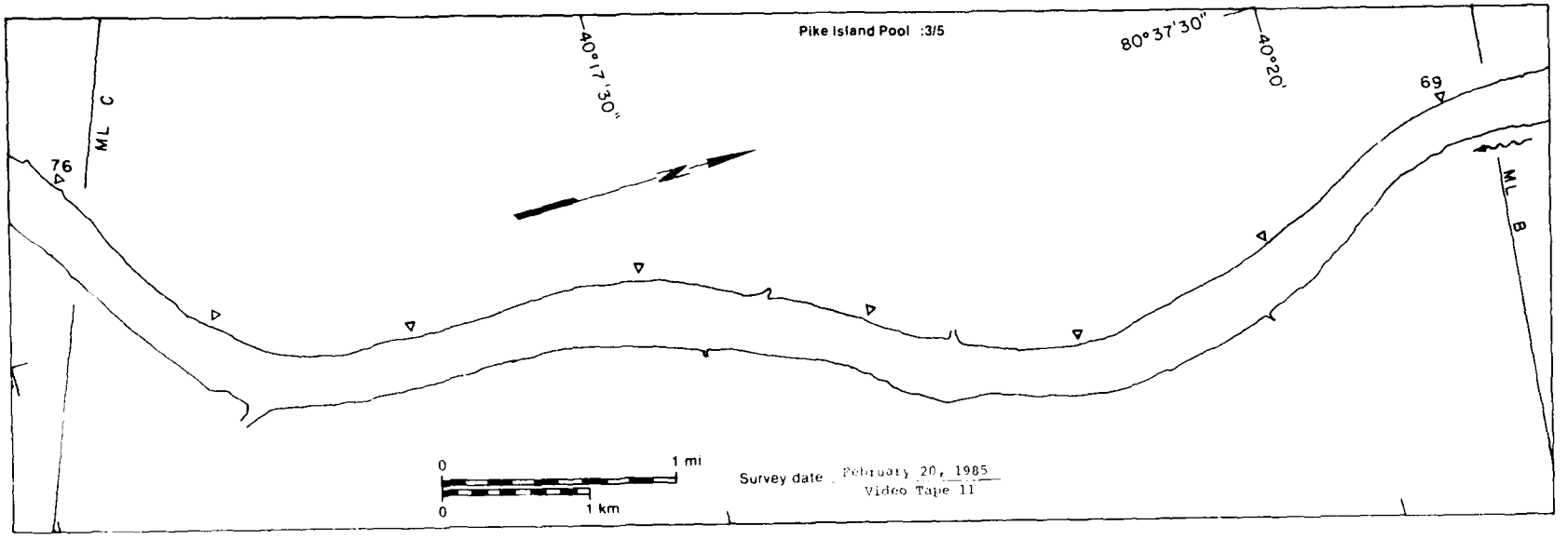
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.52	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	0.03	90
Ice floes or frazil slush and pans	0.32	2
Total Area ($m^2 \times 10^6$)	14.87	

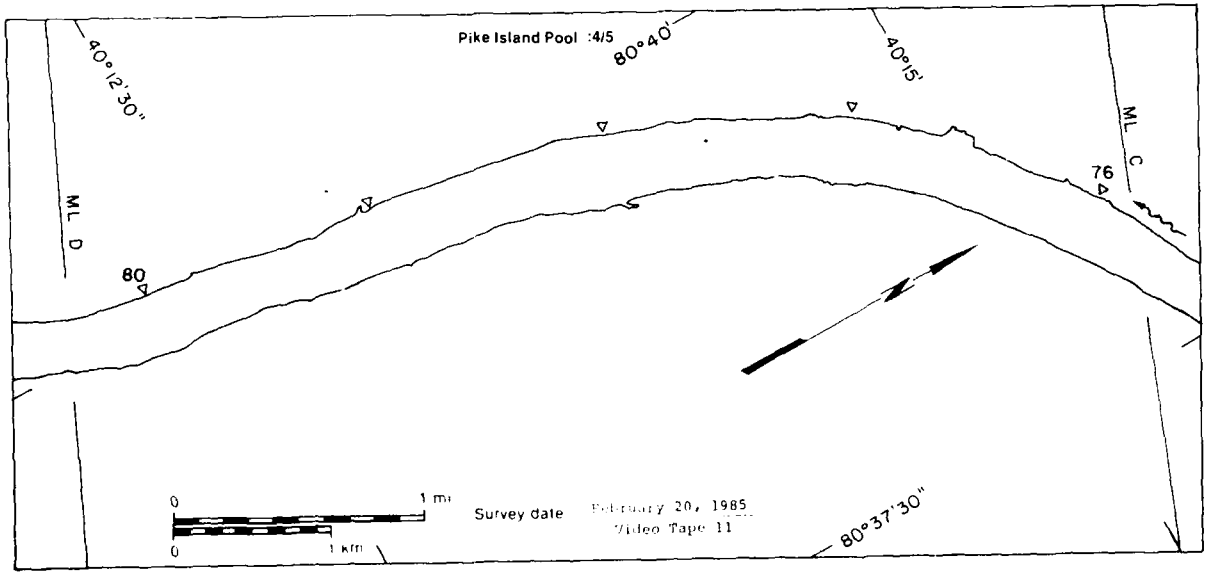


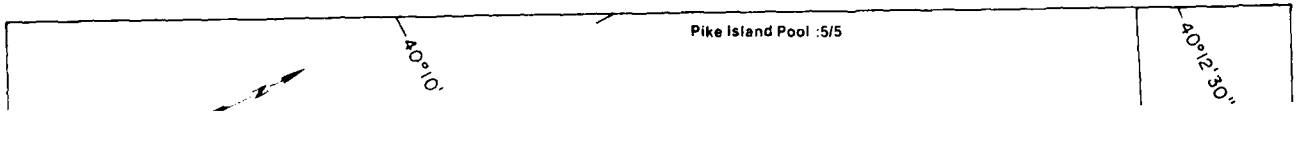

Pike Island Pool :1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: February 25, 1995
Video Tape 11

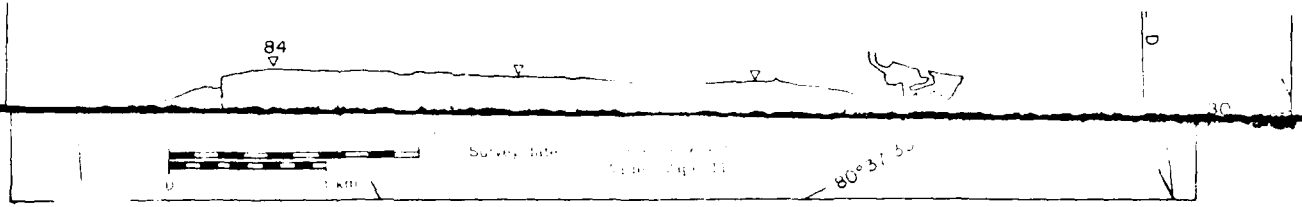

Pike Island Pool :2/5
40°22'30"
40°25'
ML A
80°37'30"
69
Browns Isl
62
ML B
0
1 mi
0
1 km
Survey date

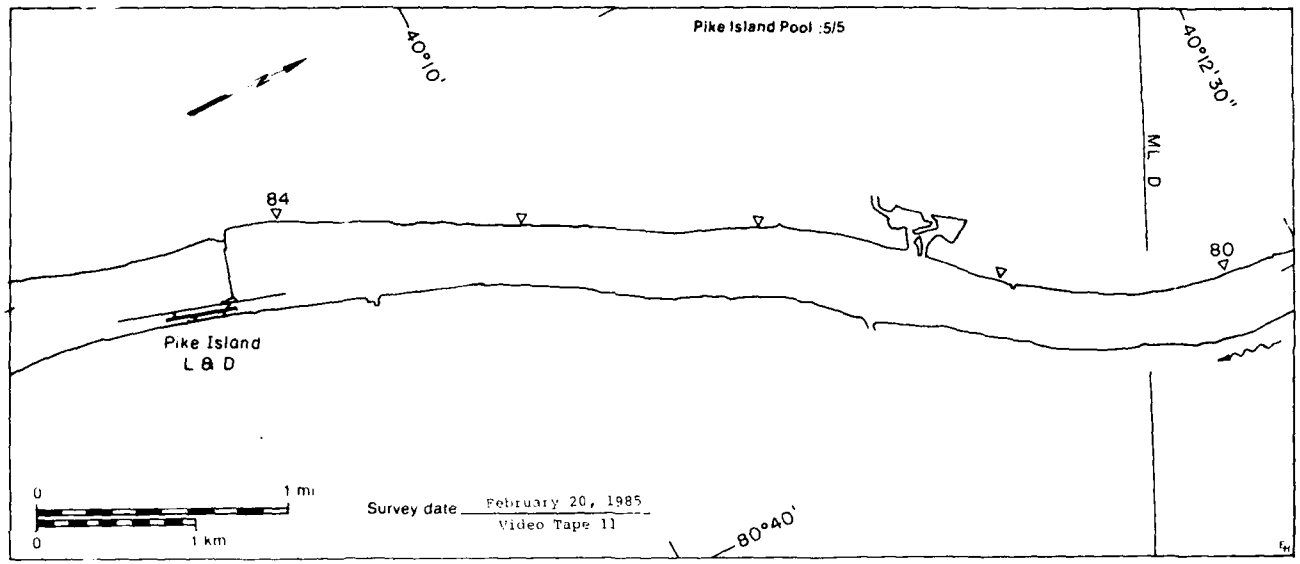
20 February 1985







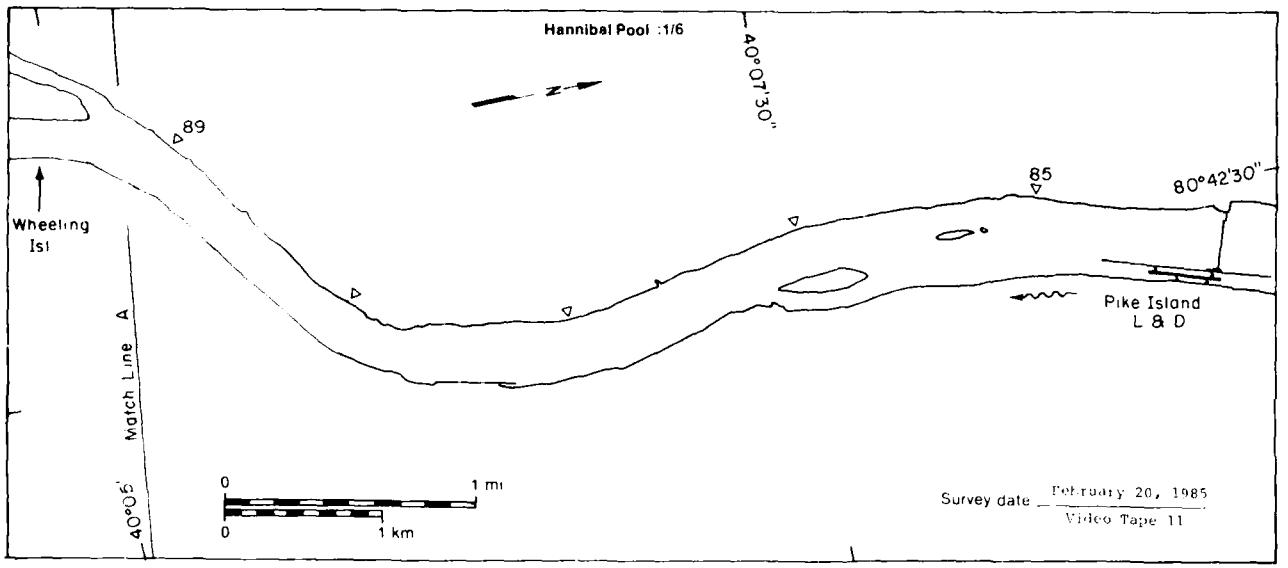


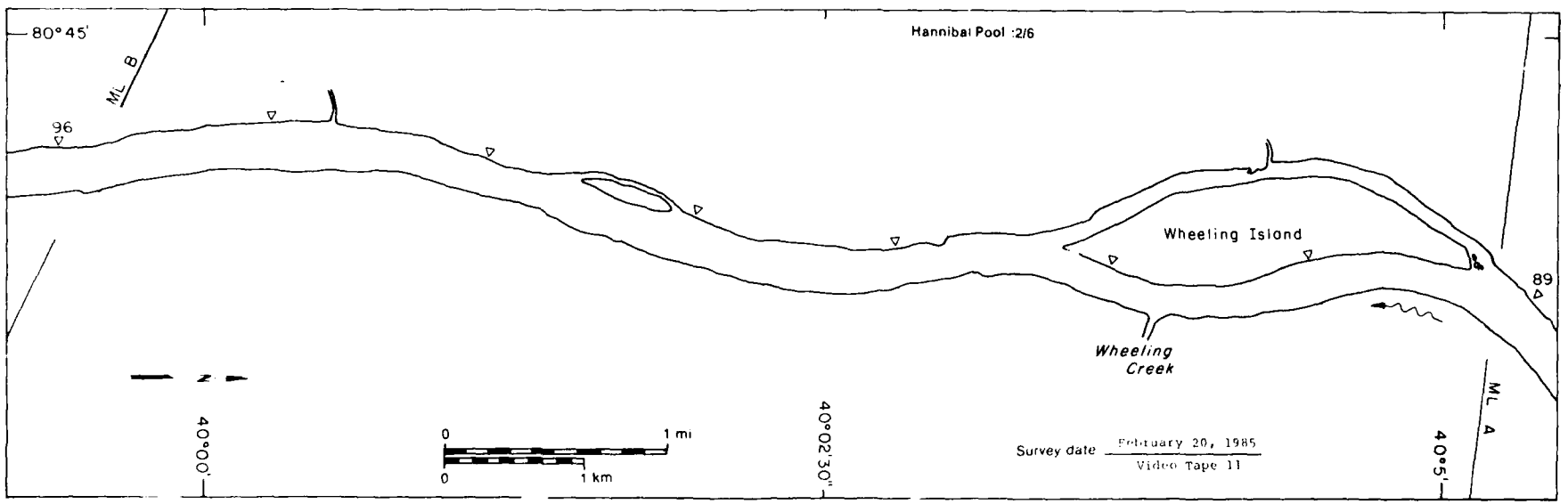


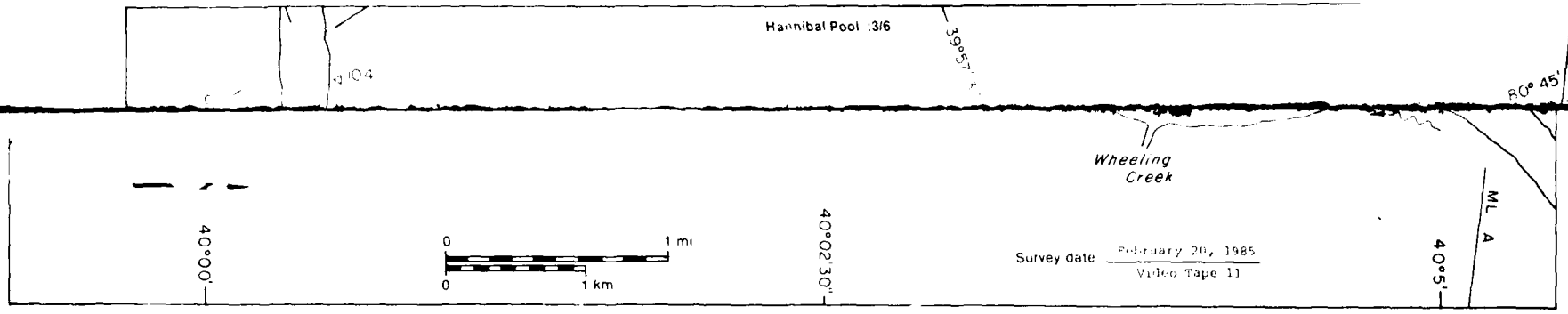
Pike Island Pool

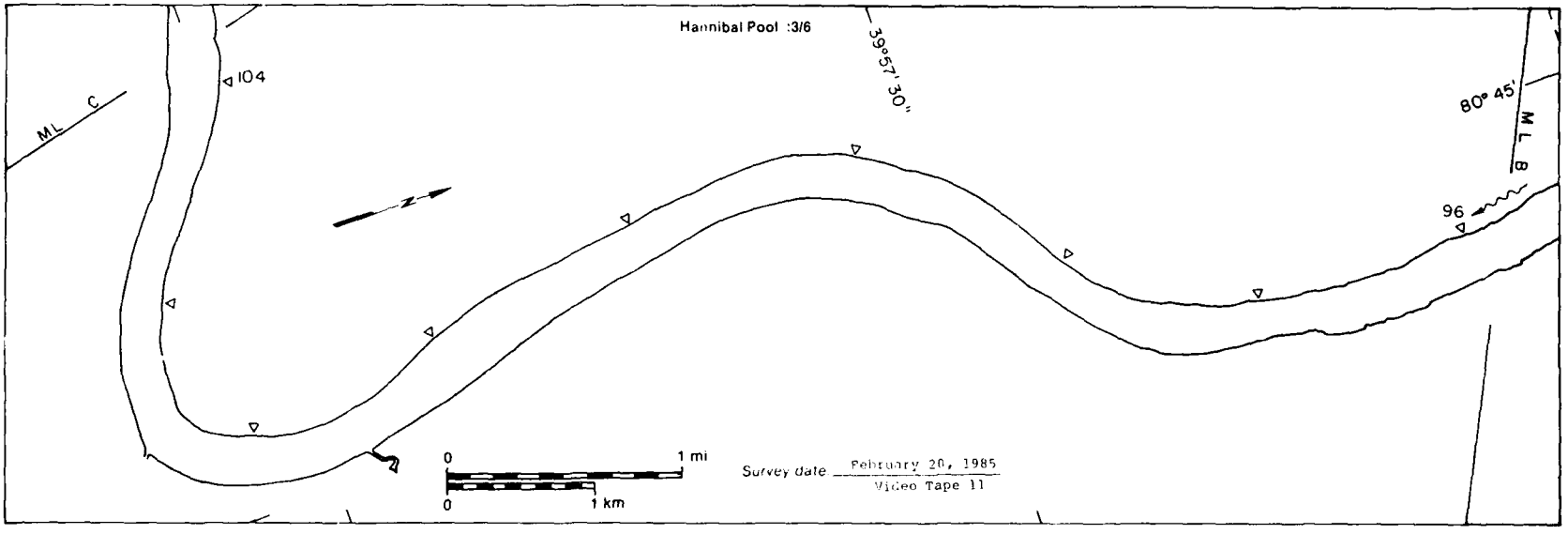
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.64	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.28	1
Total Area ($m^2 \times 10^6$)	18.92	

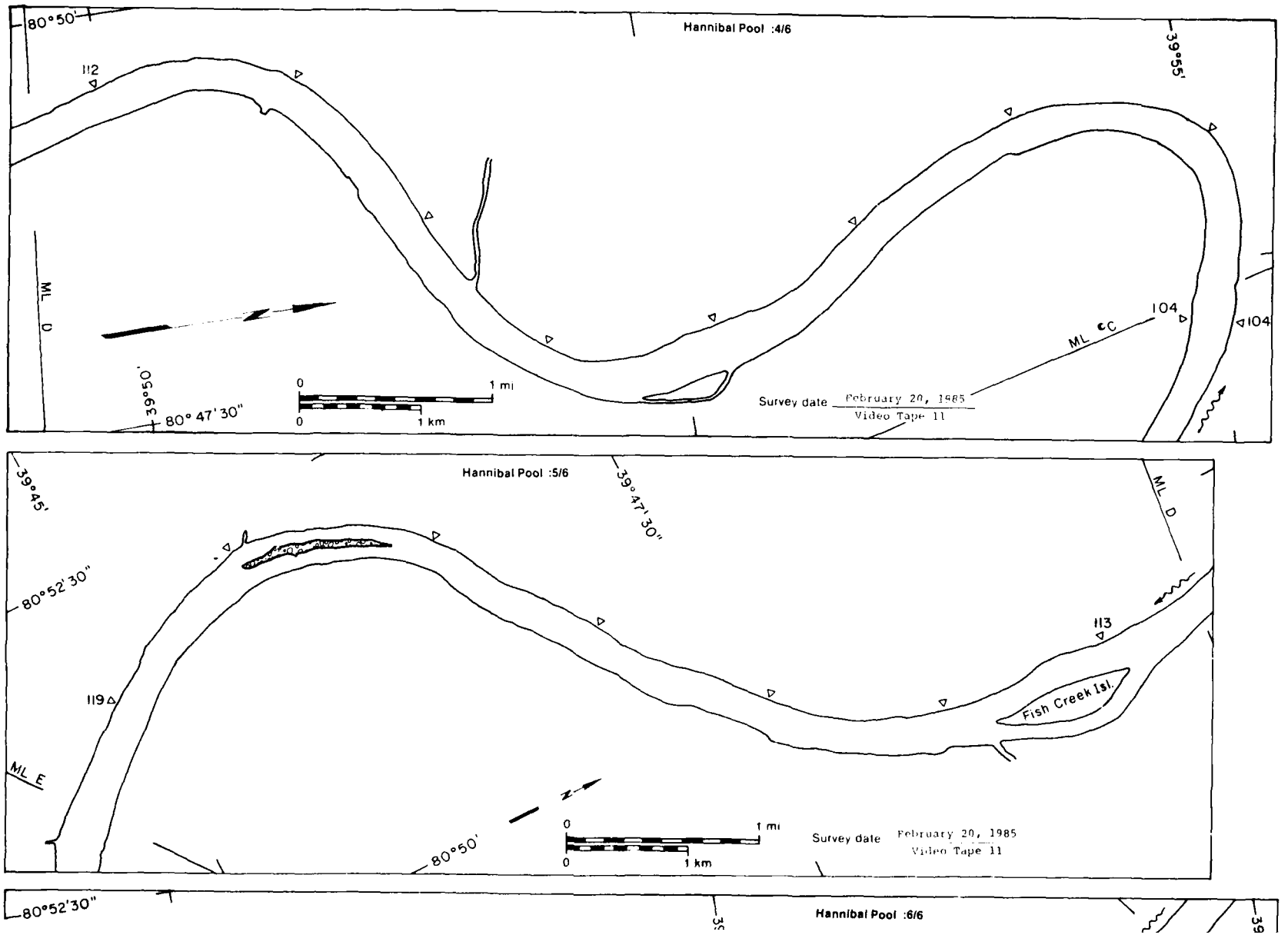
20 February 1985

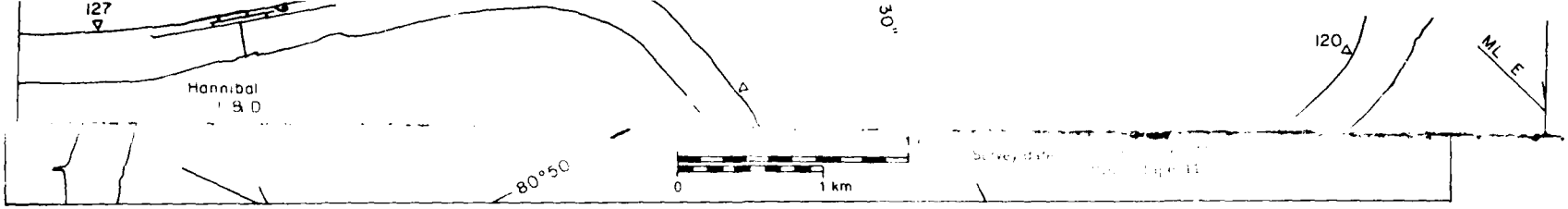


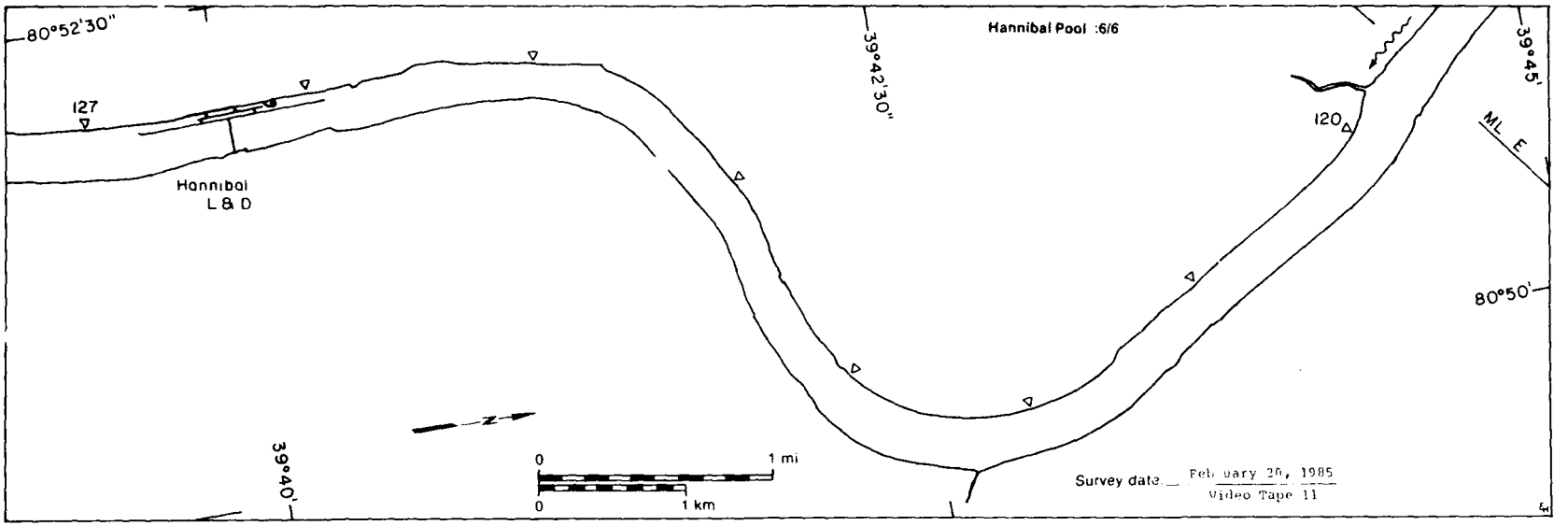



Hannibal Pool :3/6
39°57'30"
104
80° 45'
Wheeling Creek
ML A
40°00'
40°02'30"
40°05'
0
1 mi
0
1 km
Survey date February 20, 1985
Video Tape 11


Hannibal Pool :3/6
39°57'30"
104
ML C
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date February 20, 1985
Video Tape 11


Hannibal Pool :4/6
80°50'
39°55'
112
104
104
ML D
ML CC
39°50'
80° 47' 30"
0
1 mi
0
1 km
Survey date February 20, 1985
Video Tape 11
Hannibal Pool :5/6
39°45'
39°47'30"
80°52'30"
ML D
113
119
Fish Creek Isl.
ML E
80°50'
0
1 mi
0
1 km
Survey date February 20, 1985
Video Tape 11
80°52'30"
Hannibal Pool :6/6

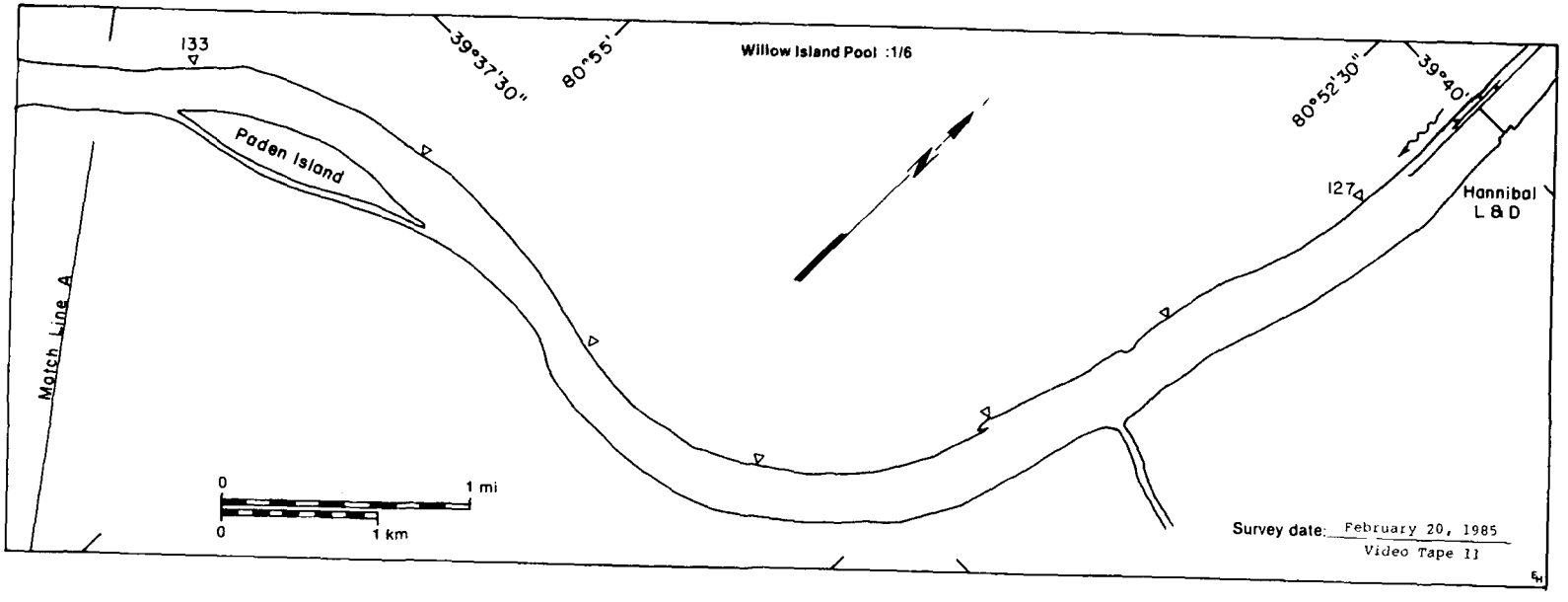


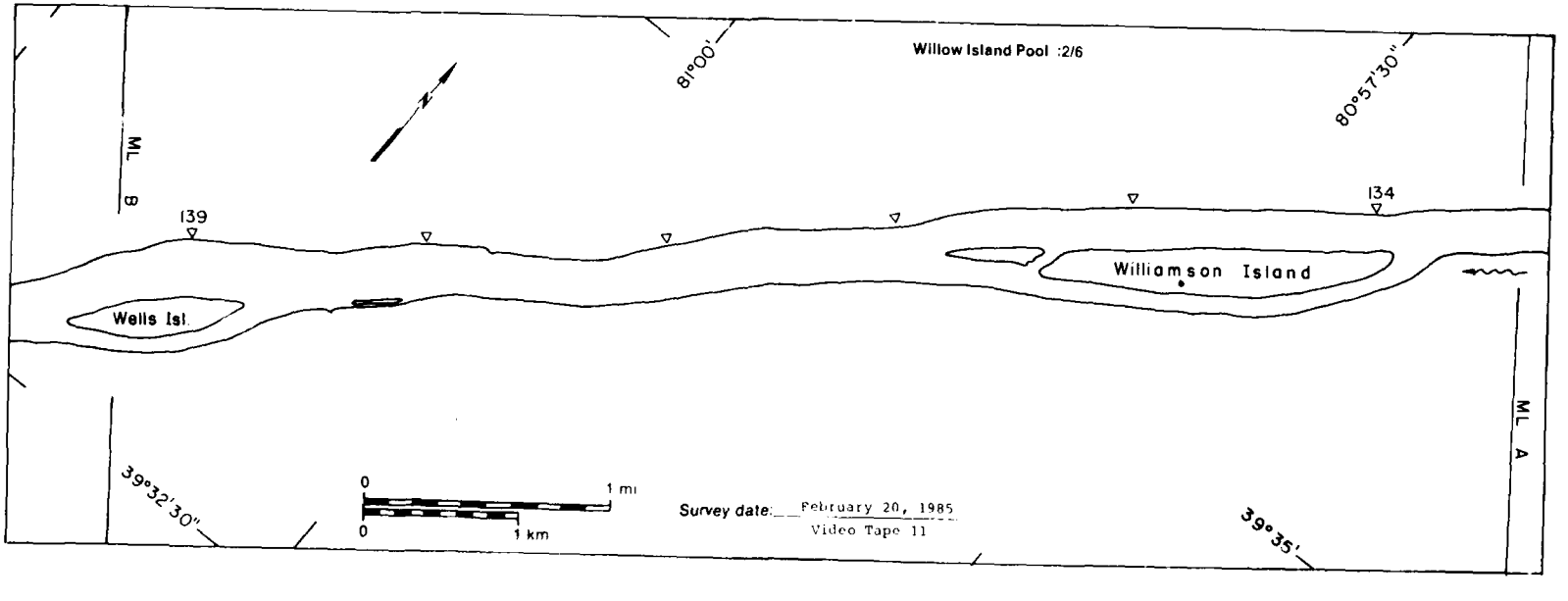


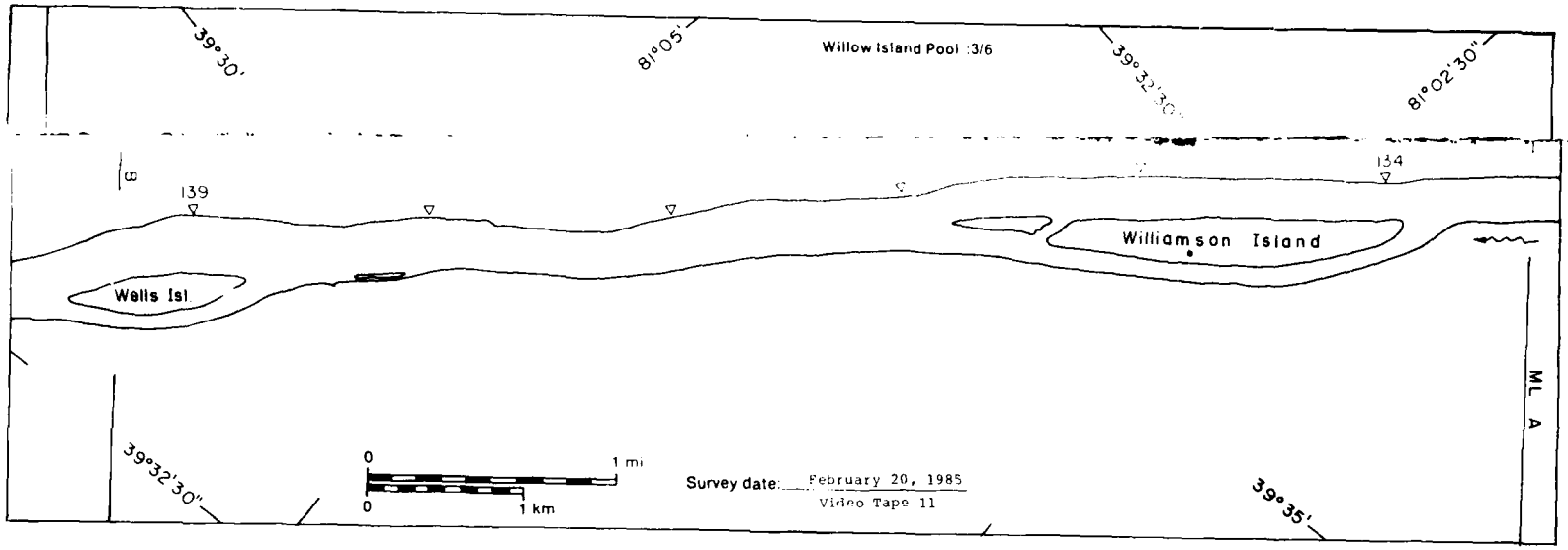
Hannibal Pool

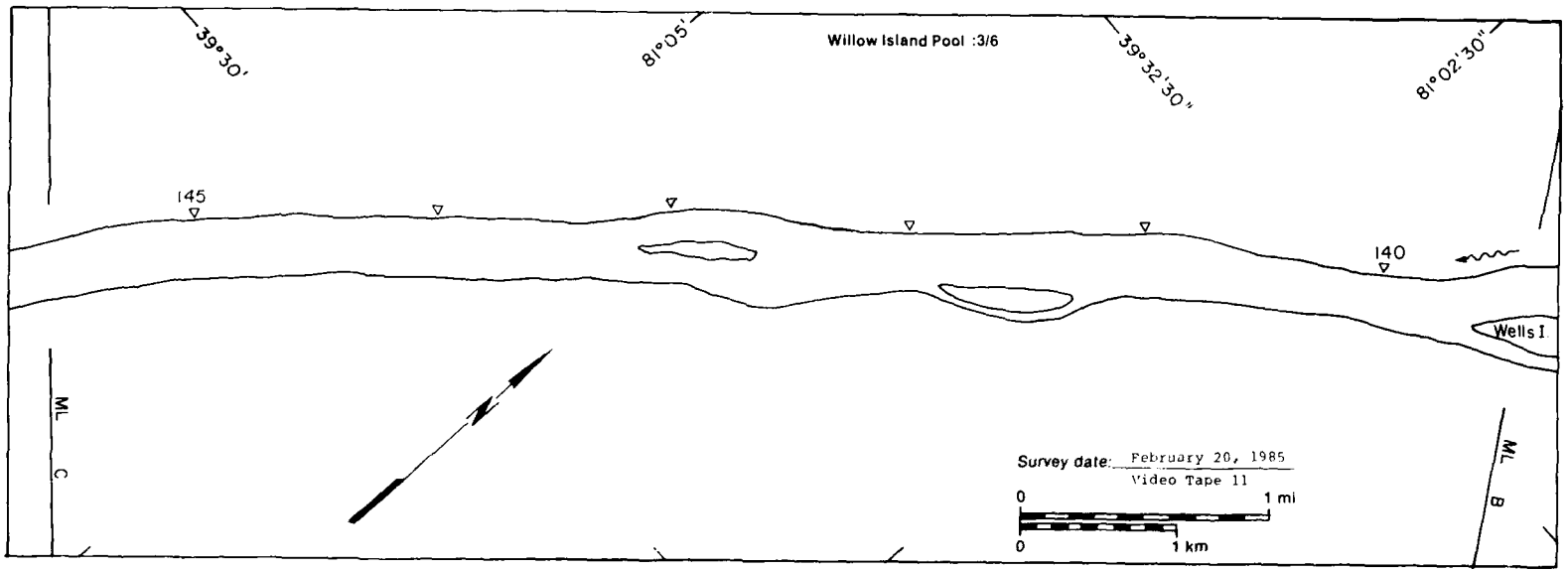
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	22.35	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	0.11	?
Total Area ($m^2 \times 10^6$)	22.46	

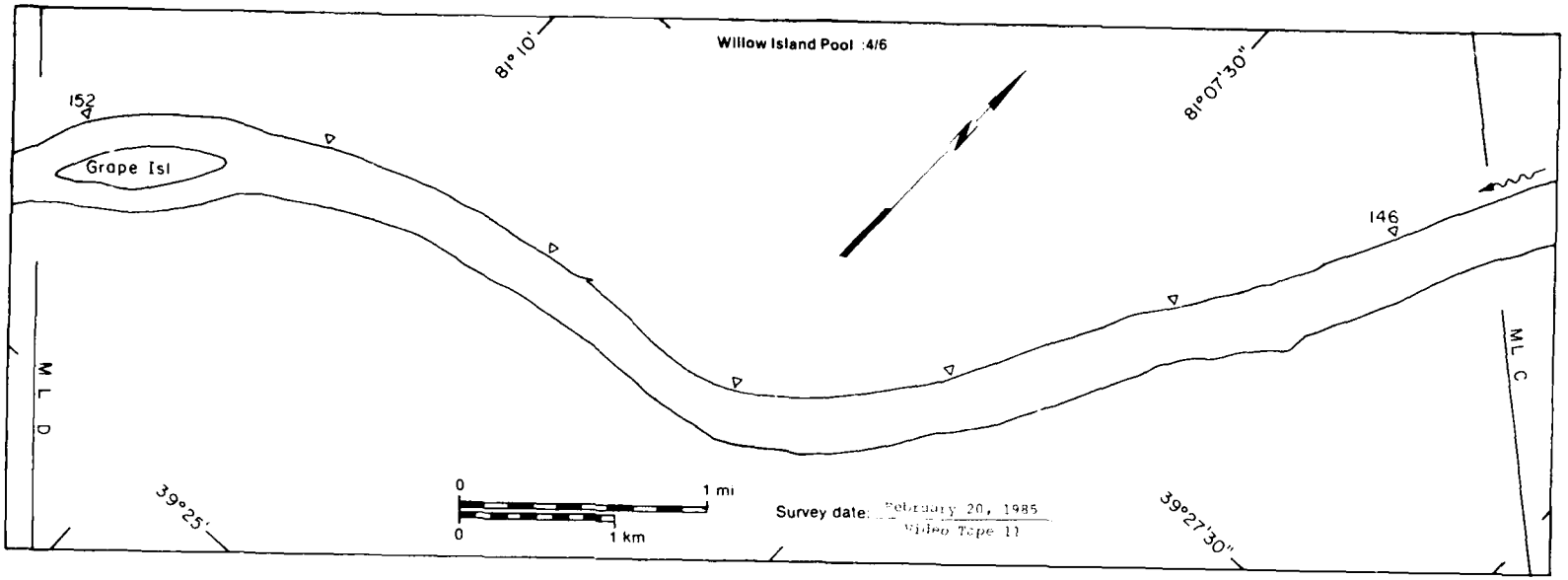
20 February 1985

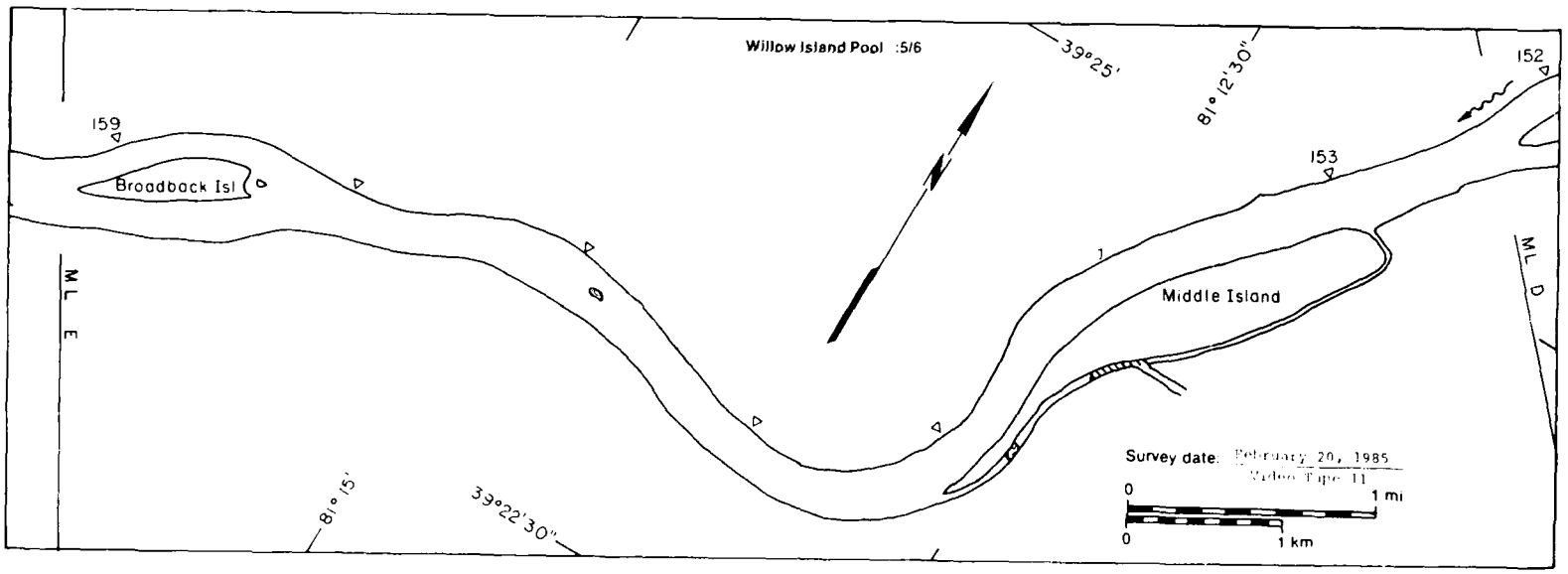


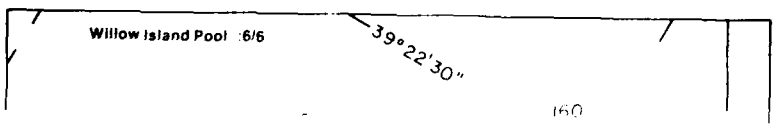



39°30'
81°05'
Willow Island Pool :3/6
39°32'30"
81°02'30"
134
139
Williamson Island
Wells Isl
ML A
39°32'30"
0
1 mi
0
1 km
Survey date: February 20, 1985
Video Tape 11
39°35'

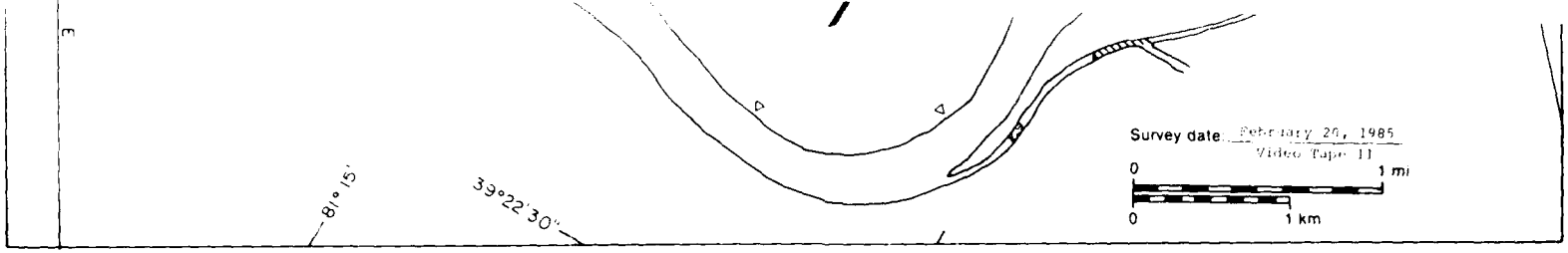

39°30'
81°05'
Willow Island Pool :3/6
39°32'30"
81°02'30"
145
140
Wells I
ML C
ML B
Survey date: February 20, 1985
Video Tape 11
0
1 mi
0
1 km

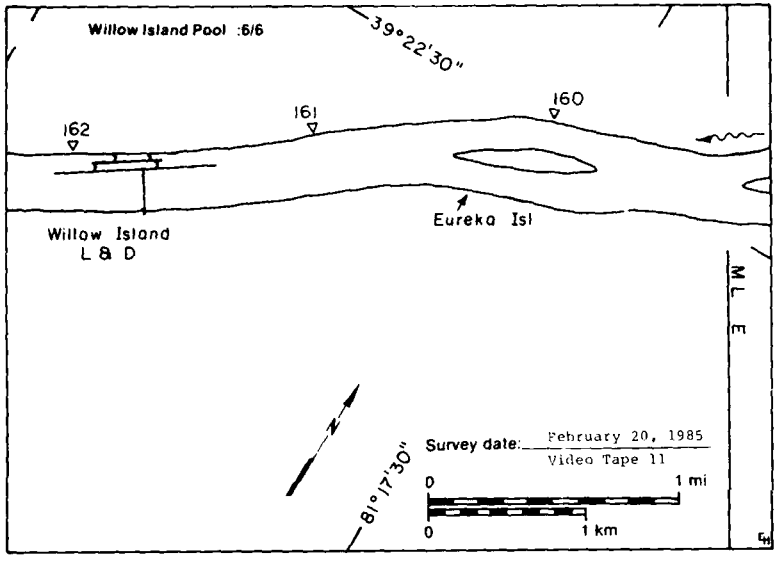

Willow Island Pool :4/6
81°10'
81°07'30"
152
Grape Isl
146
M L D
M L C
39°25'
39°27'30"
0
1 mi
0
1 km
Survey date: February 20, 1985
Video Tape 11


Willow Island Pool :5/6
39°25'
81°12'30"
159
Broadback Isl
152
153
Middle Island
M L E
M L D
81°15'
39°22'30"
Survey date: February 20, 1985
Video Tape 11
0
1 mi
0
1 km


Willow Island Pool :6/6
39°22'30"
160

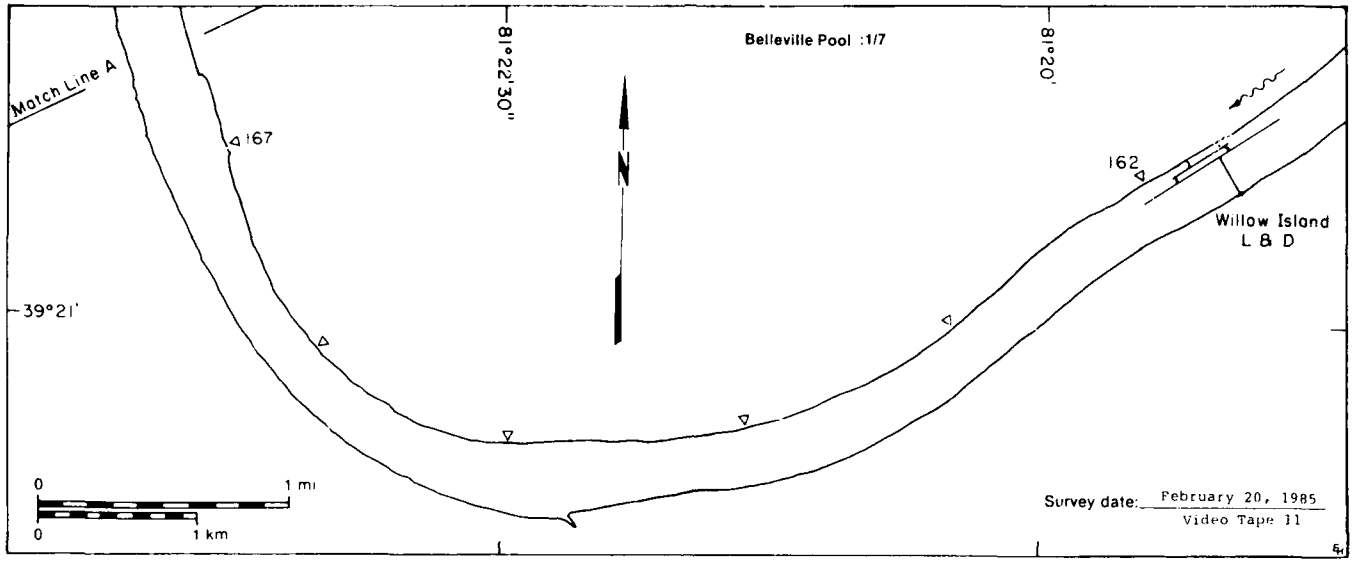

Willow Island Pool

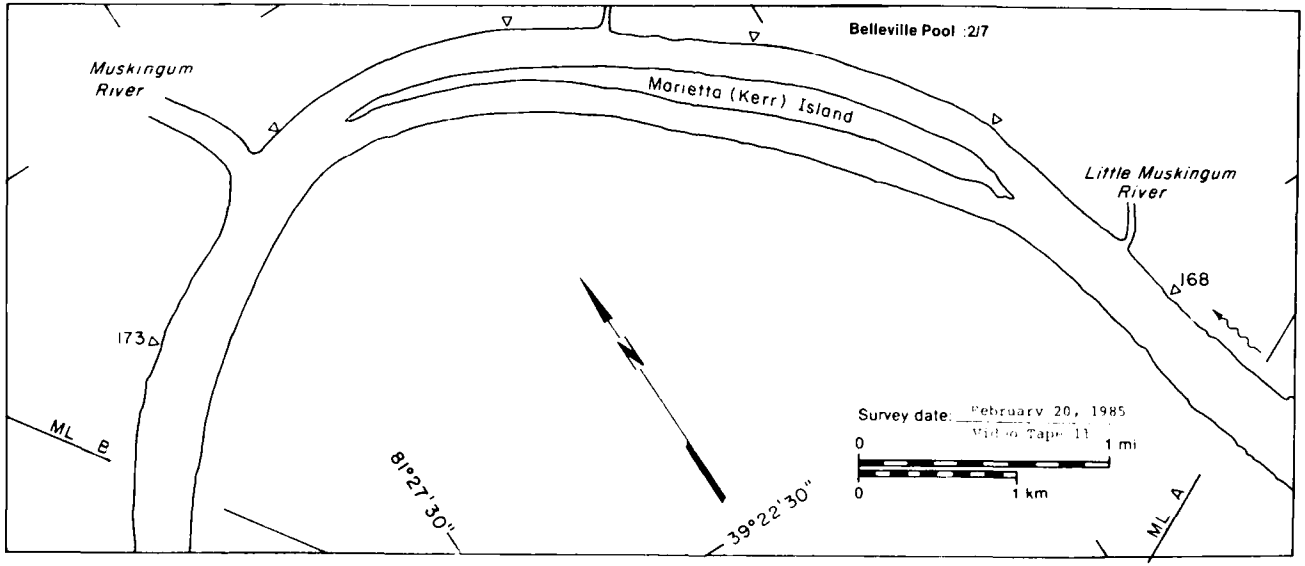


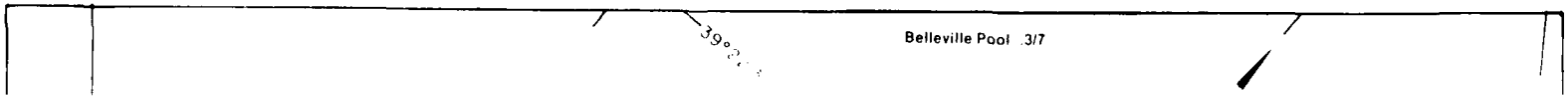


Willow Island Pool

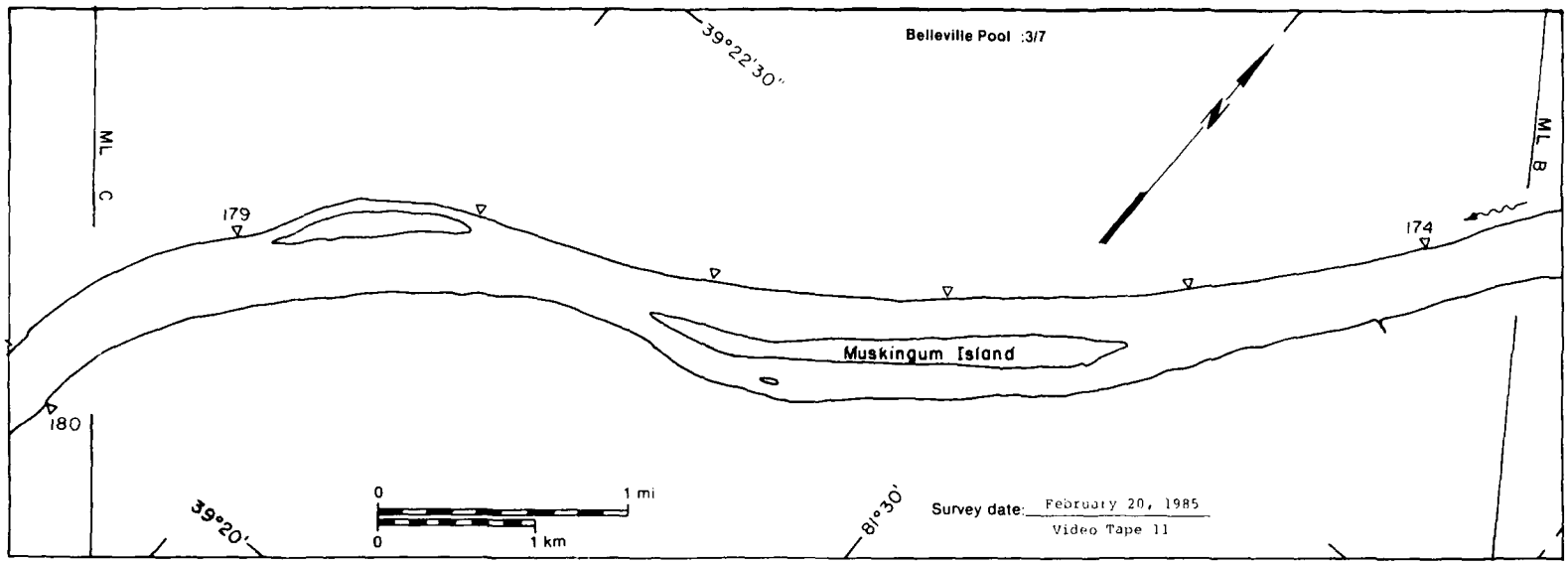
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	21.21	NA
Solid ice cover	0.03	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	Trace	2
Total Area ($m^2 \times 10^6$)	21.24	

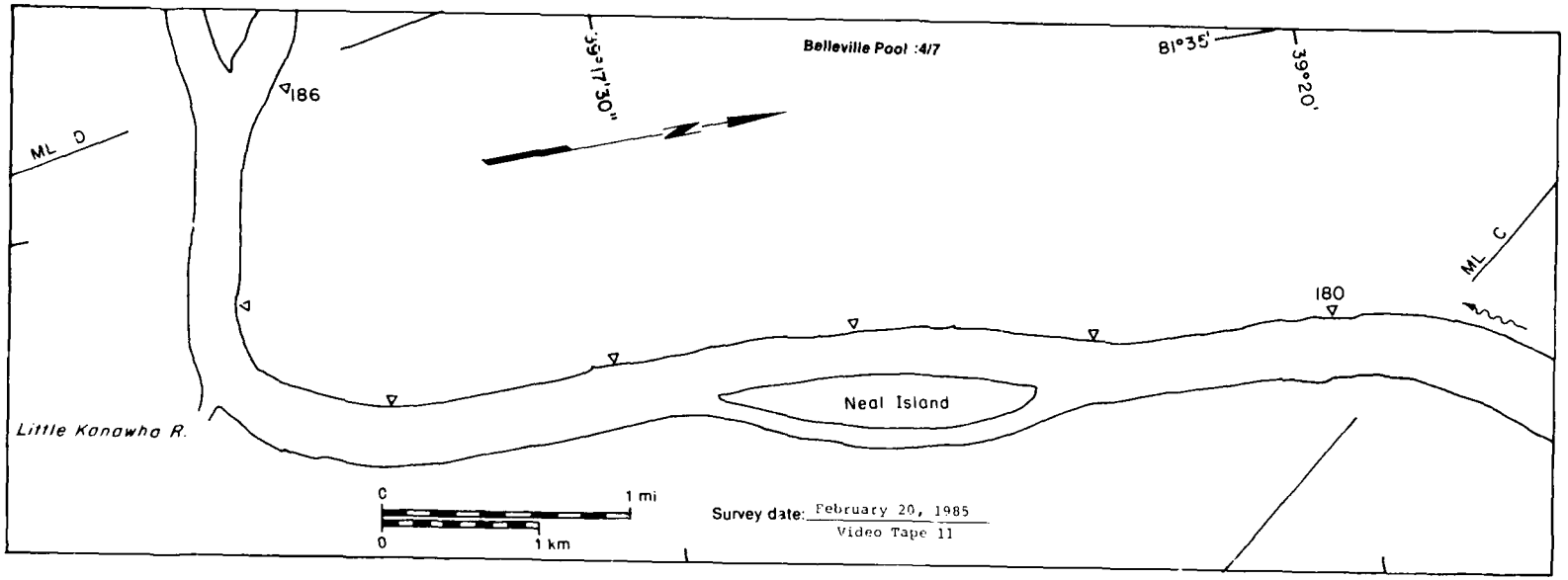

Belleville Pool :1/7
Match Line A
81°22'30"
81°20'
167
162
Willow Island
L & D
39°21'
0
1 mi
0
1 km
Survey date: February 20, 1985
Video Tape 11

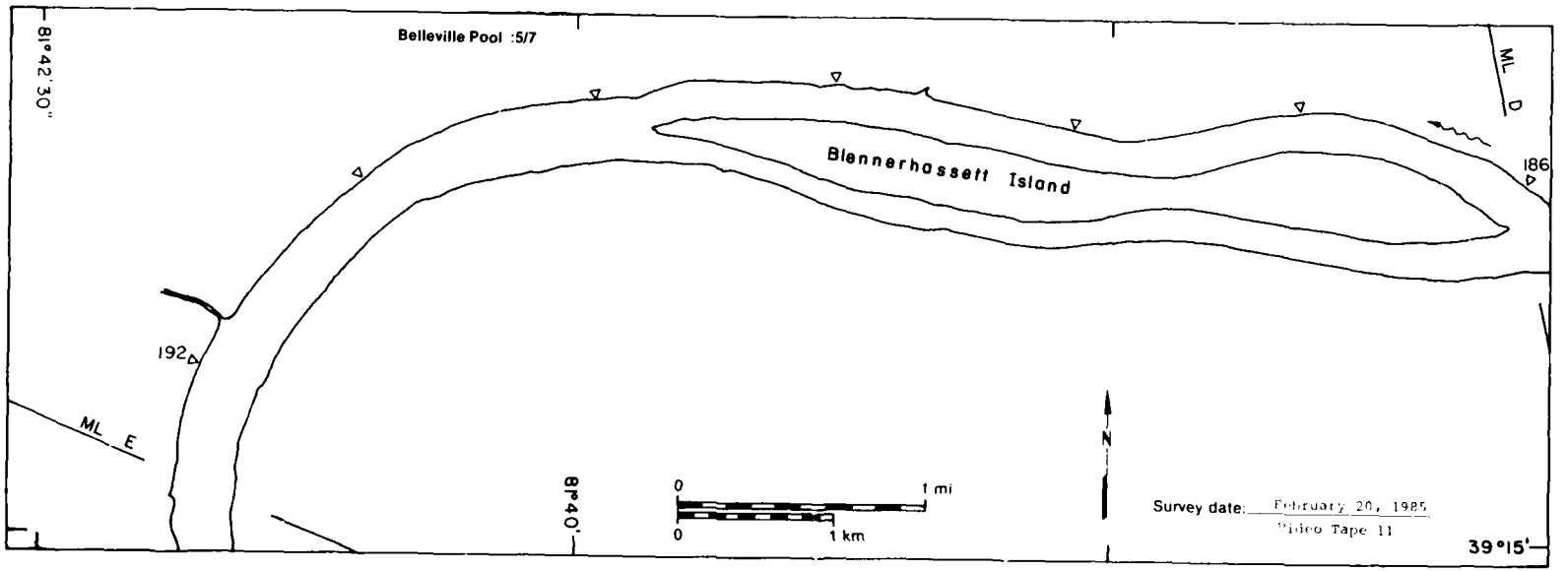

Belleville Pool :2/7
Muskingum
River
Marietta (Kerr) Island
Little Muskingum
River
168
173
ML B
81°27'30"
39°22'30"
Survey date: February 20, 1985
Video Tape 11
0
1 mi
0
1 km
ML A


Belleville Pool :3/7

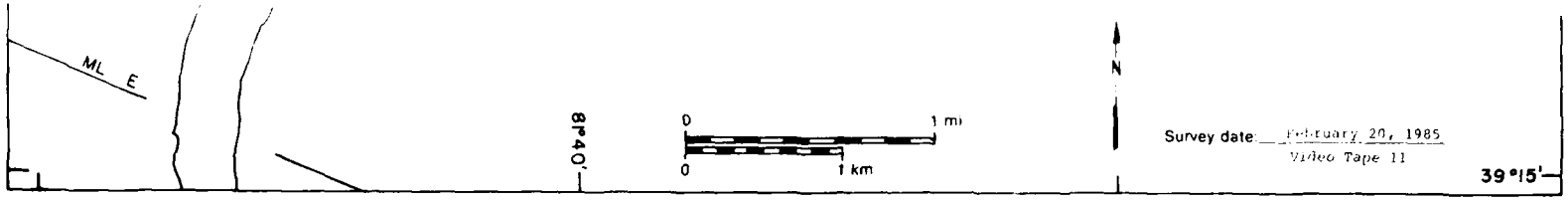

ML B
81°27'30"
39°22'30"
0
1 km
ML A

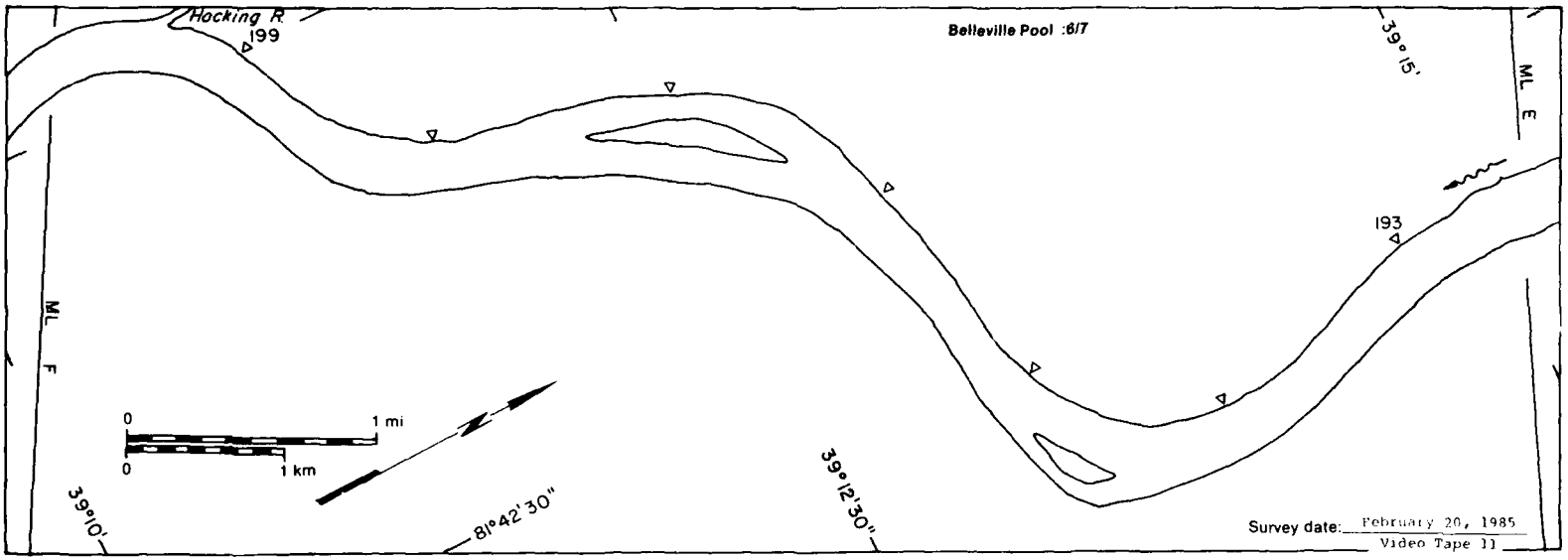

Belleville Pool :3/7
39°22'30"
ML C
ML B
179
174
Muskingum Island
180
0
1 mi
0
1 km
39°20'
81°30'
Survey date: February 20, 1985
Video Tape 11


Belleville Pool :4/7
81°35'
39°20'
39°17'30"
186
ML D
ML C
180
Neal Island
Little Kanawha R.
0
1 mi
1 km
Survey date: February 20, 1985
Video Tape 11

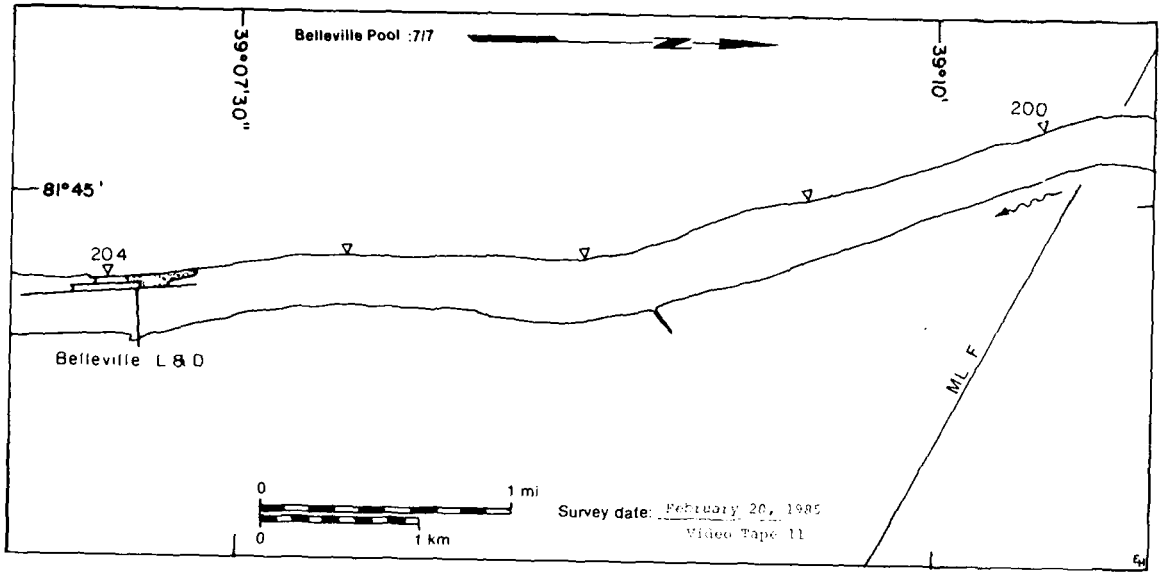

Belleville Pool :5/7
81°42'30"
ML D
186
Blennerhassett Island
192
ML E
81°40'
0
1 mi
1 km
N
Survey date: February 20, 1985
Video Tape 11
39°15'


Hocking R
199
Belleville Pool :6/7


ML E
81°40'
0
1 mi
0
1 km
N
Survey date: February 20, 1985
Video Tape 11
39°15'


Hocking R.
199
Belleville Pool :6/7
39°15'
ML E
193
ML F
0
1 mi
0
1 km
39°10'
81°42'30"
39°12'30"
Survey date: February 20, 1985
Video Tape 11

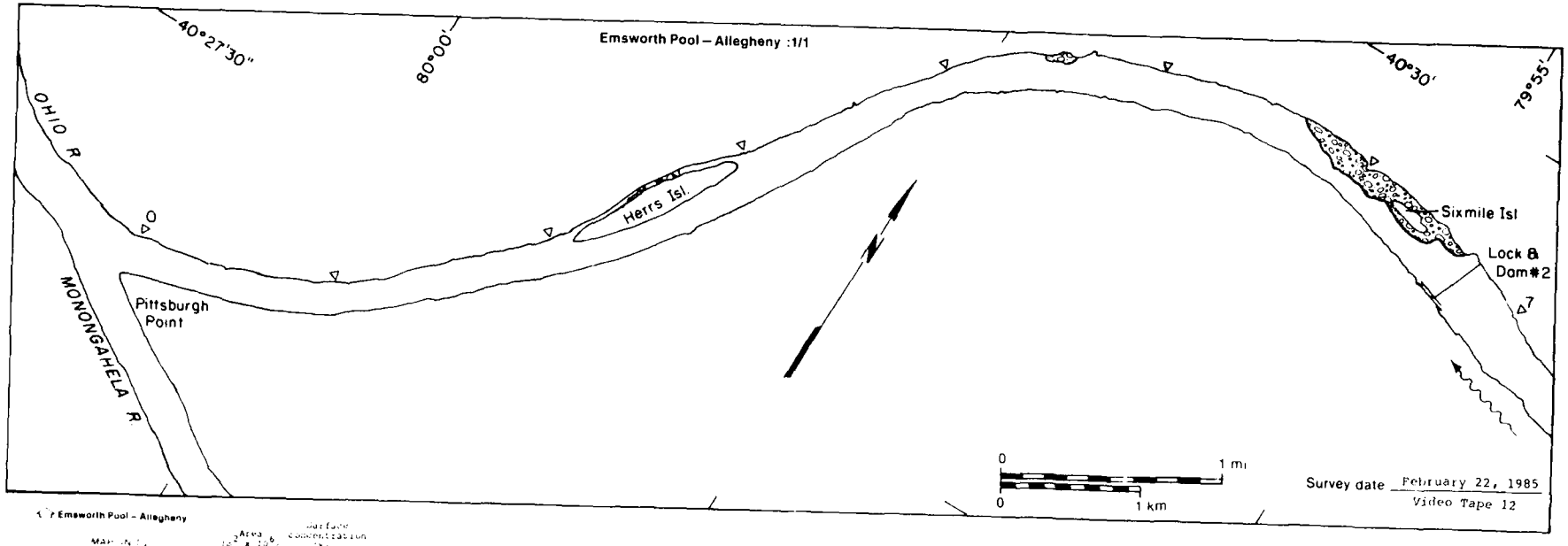
20 February 1985



Belleville Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	27.24	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	3.04	1
Total Area ($m^2 \times 10^6$)	27.28	

22 February 1985

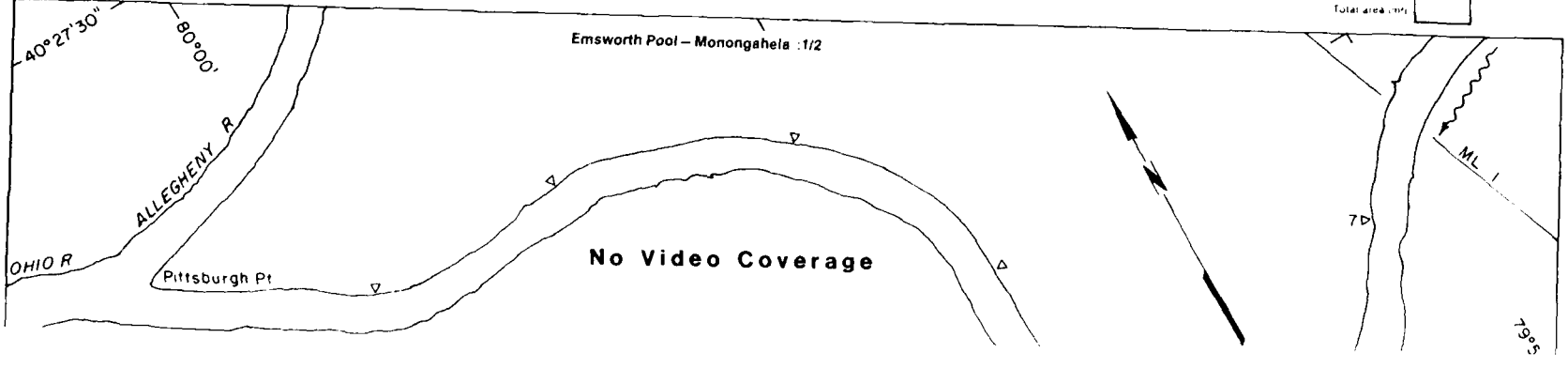


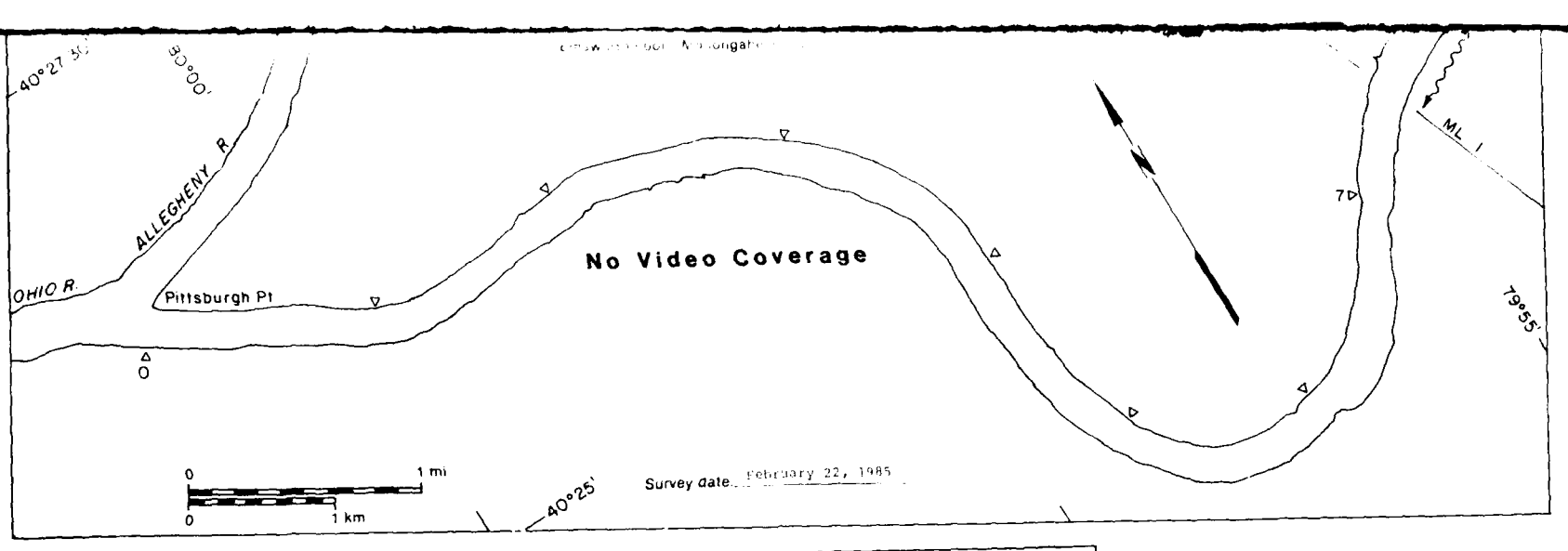
Emsworth Pool – Allegheny

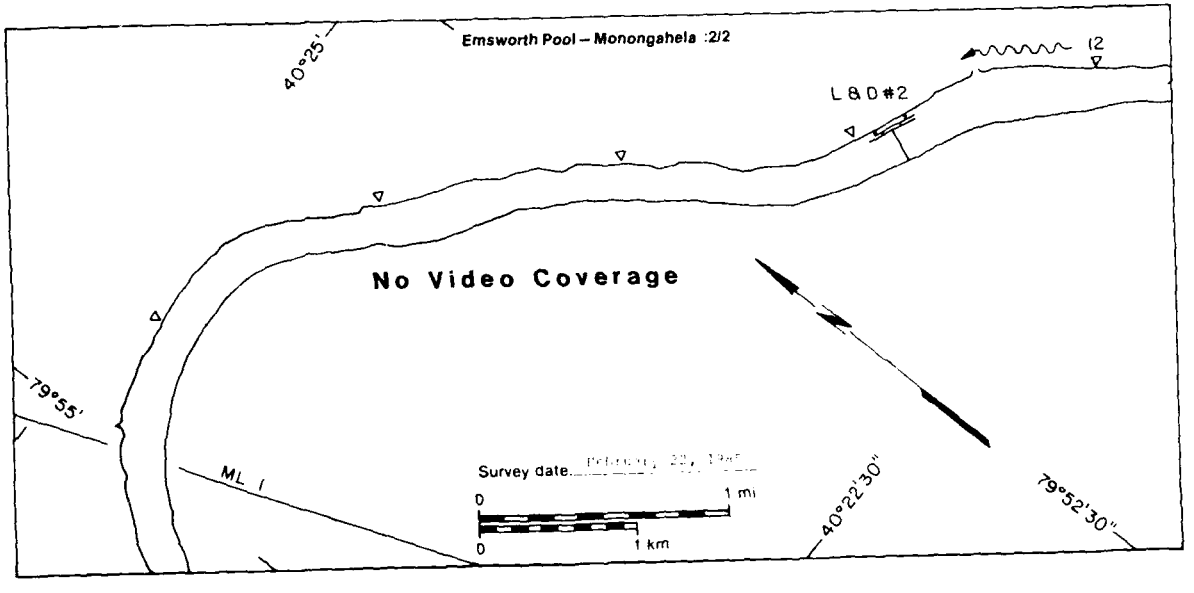
MAP UNITS	Area ($km^2 \times 10^6$)	Surface concentration (%)
Open water	3.02	NA
Solid ice cover	--	--
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	0.02	80
Ice floes on mud flats, sandbars and banks	0.23	1
Total Area ($km^2 \times 10^6$)	3.27	

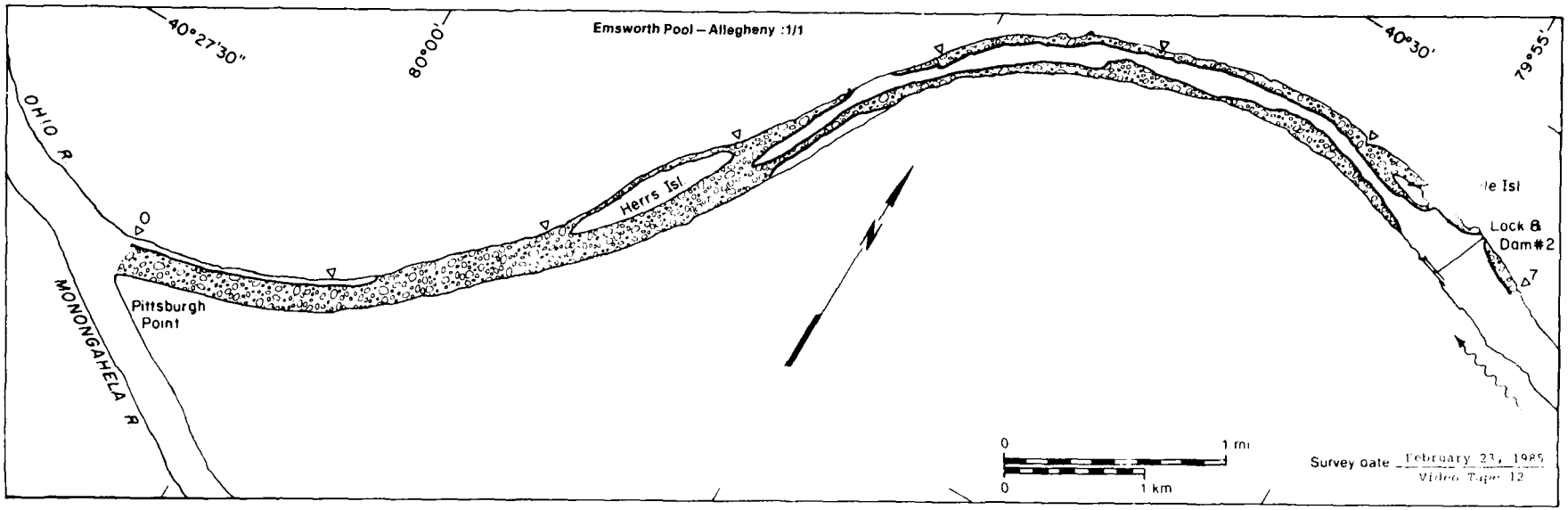
Emsworth Pool – Monongahela

MAP UNITS	Area	Surface concentration (%)
Open water		NA
Solid ice cover		NA
Solid ice cover with open water areas		
Fragmented ice cover		NA
Fragmented ice cover with open water areas		
Ice floes on mud flats, sandbars and banks		
Total area (mi)		




40°27 30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
No Video Coverage
ML 1
79°55'
0
0
1 mi
0
1 km
40°25'
Survey date: February 22, 1985


Emsworth Pool – Monongahela :2/2
40°25'
L&D#2
12
No Video Coverage
79°55'
ML 1
Survey date: February 22, 1985
0
1 mi
0
1 km
40°22'30"
79°52'30"

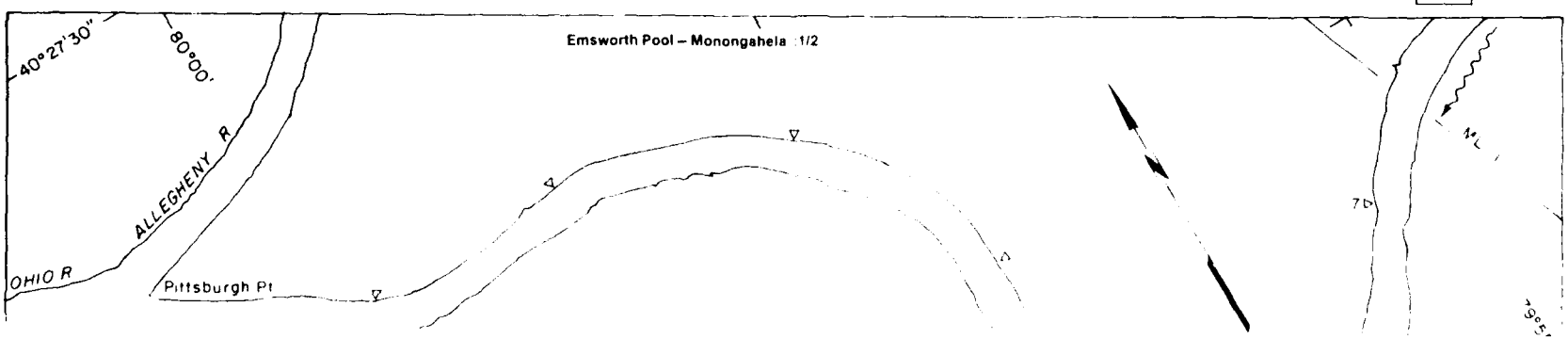


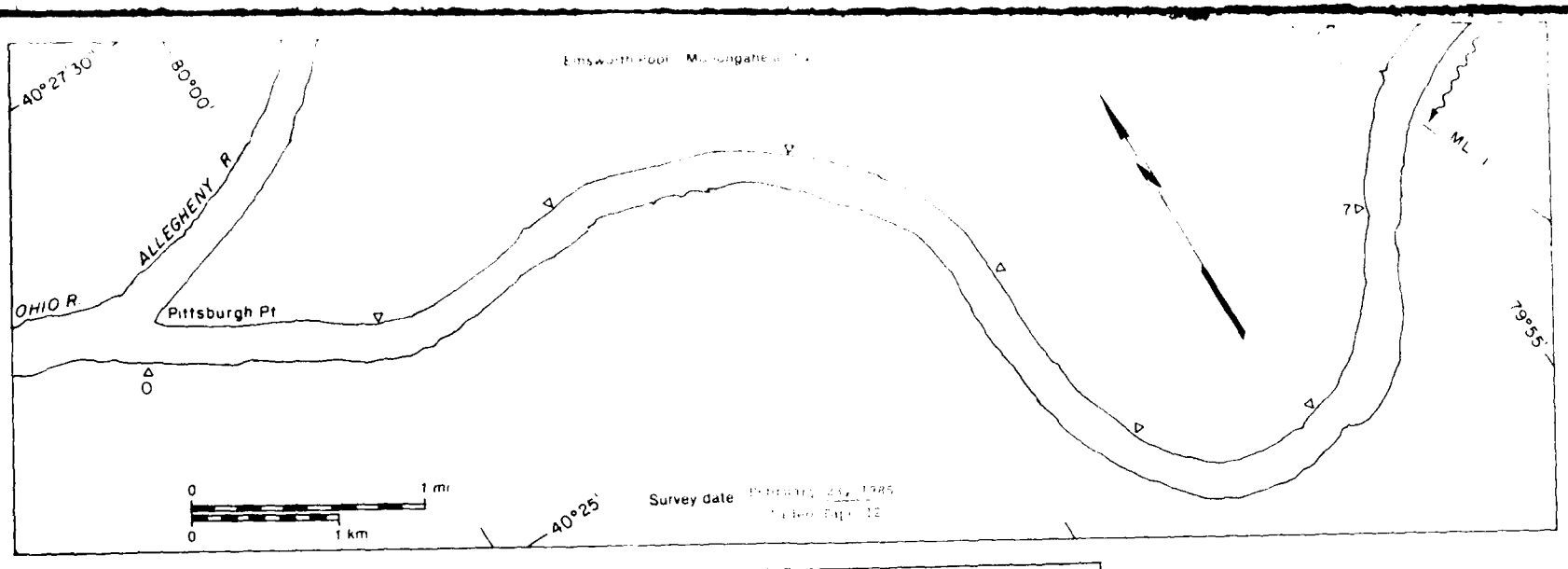
Emsworth Pool – Allegheny

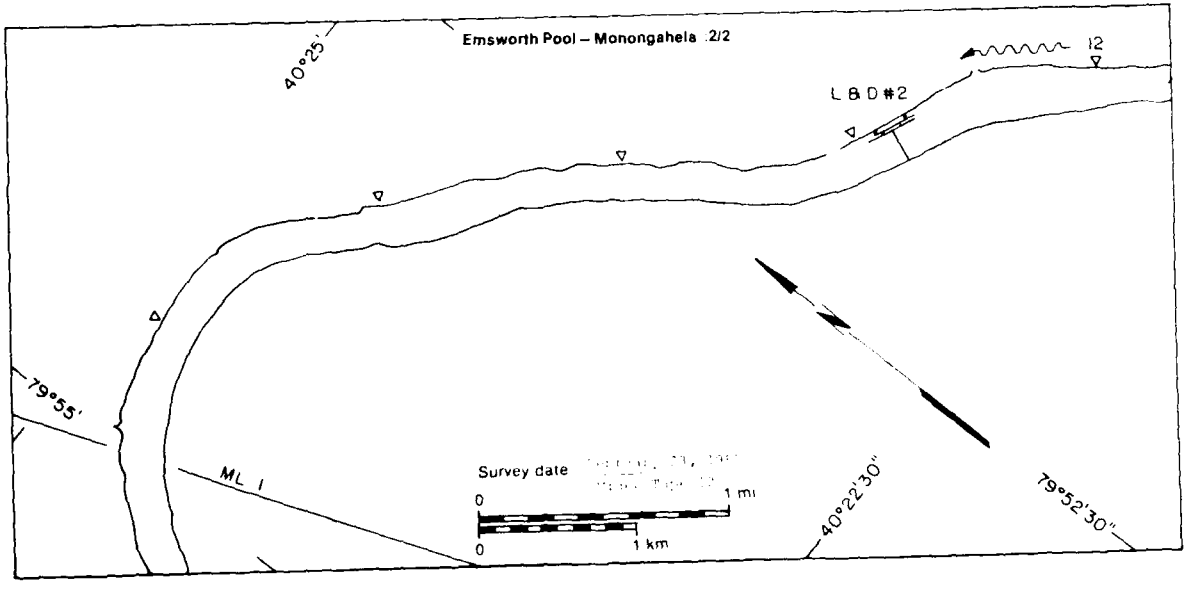
MAP Unit	Area (m^2 x 10^6)	Surface concentration (%)
Open water	1.17	n.a
Solid ice cover	--	n.a
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	n.a
Fragmented ice cover with open water areas	--	--
Surface flow [illegible] and banks	2.10	5
Total Area (m^2 x 10^6)	3.27	

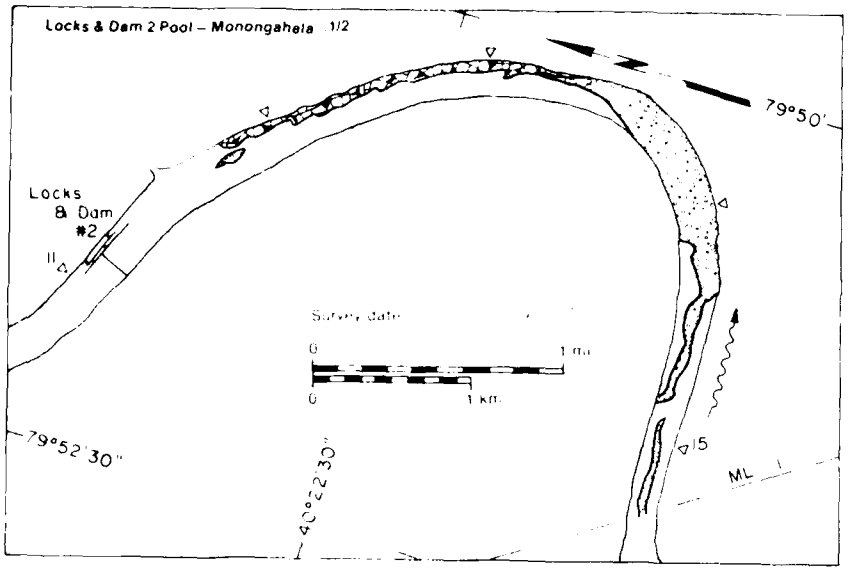
Emsworth Pool – Monongahela

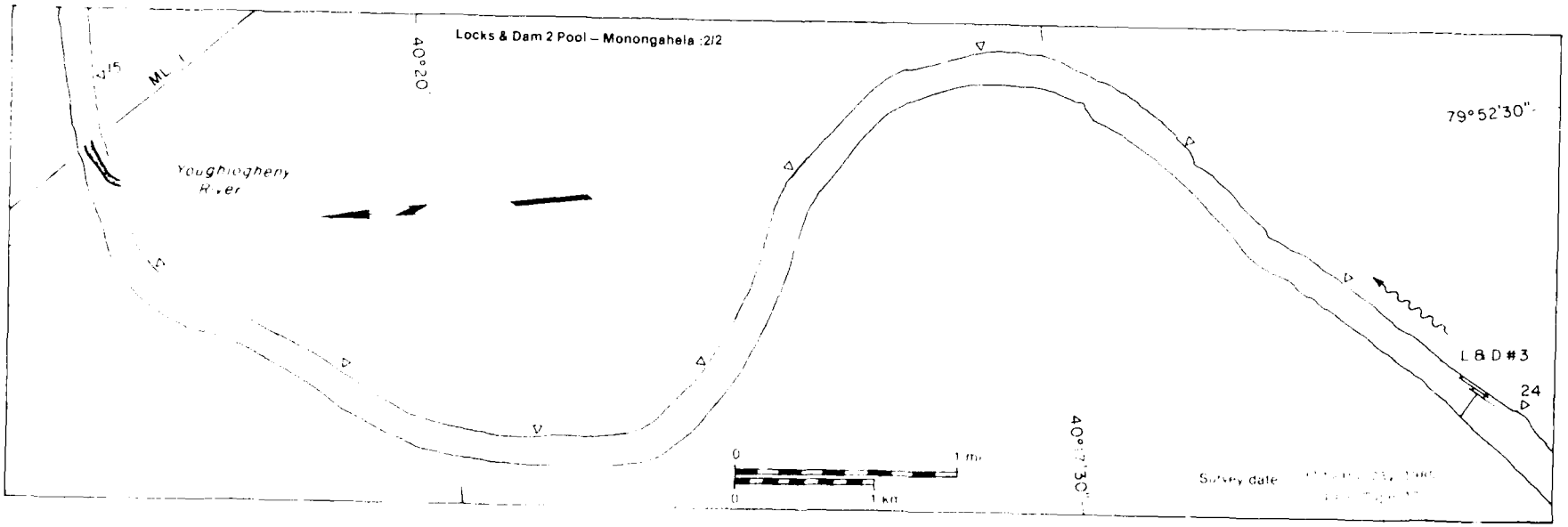
MAP Unit	Area (m^2 x 10^6)	Surface concentration (%)
Open water	4.73	n.a
Solid ice cover	--	n.a
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	n.a
Fragmented ice cover with open water areas	--	--
Surface flow [illegible] and banks	--	--
Total Area (m^2 x 10^6)	4.73	




40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7D
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date

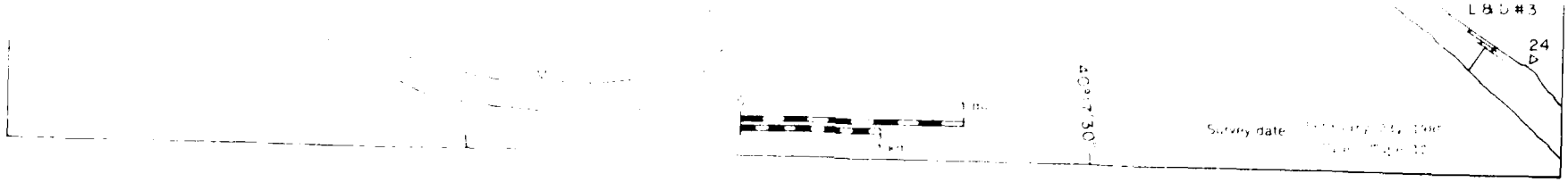

40°25'
Emsworth Pool – Monongahela .2/2
12
L&D#2
79°55'
ML 1
Survey date
0
1 mi
0
1 km
40°22'30"
79°52'30"





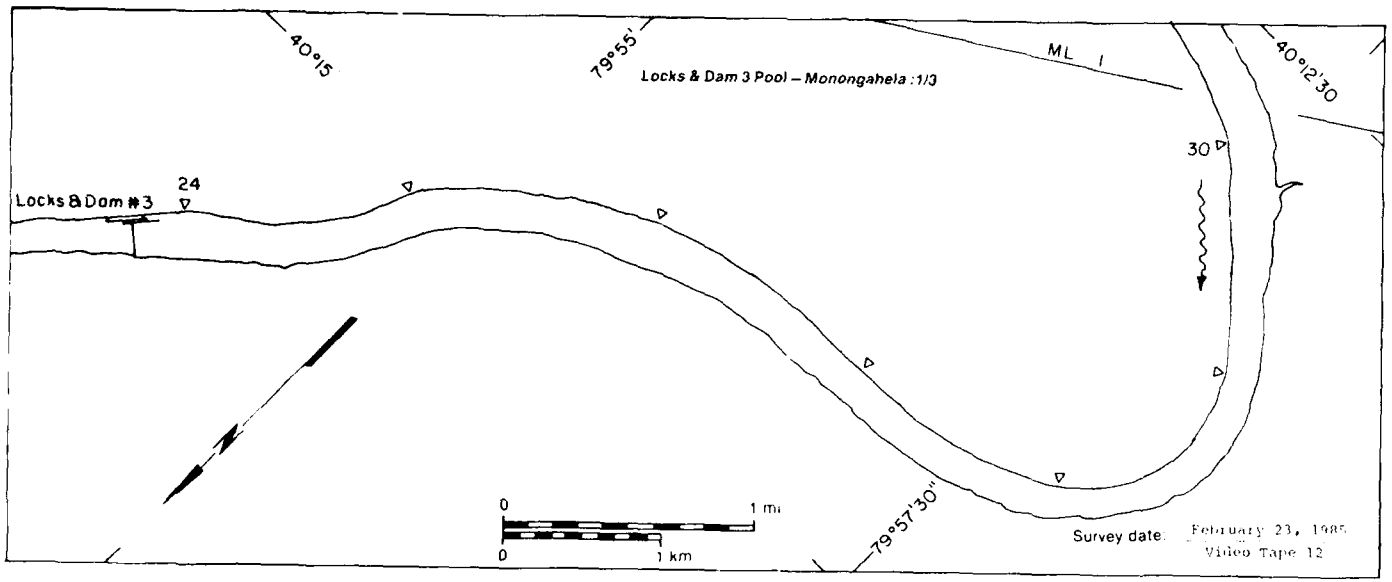
Locks & Dam 2 Pool – Monongahela

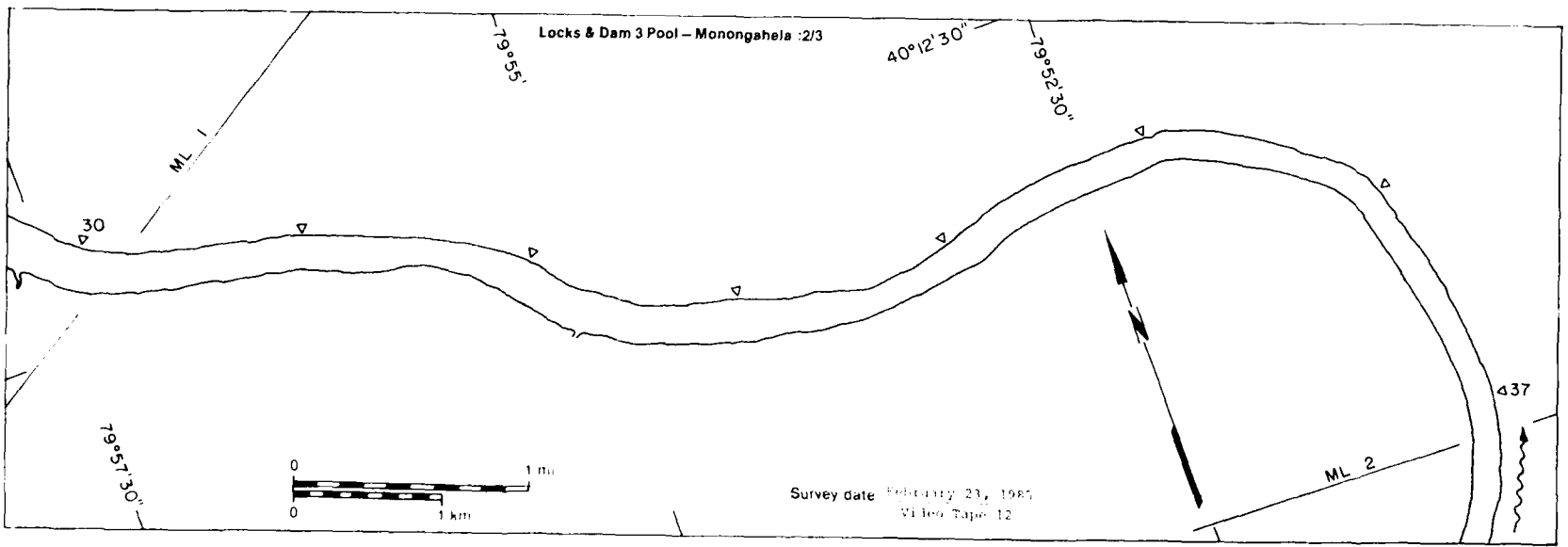
MAP UNITS

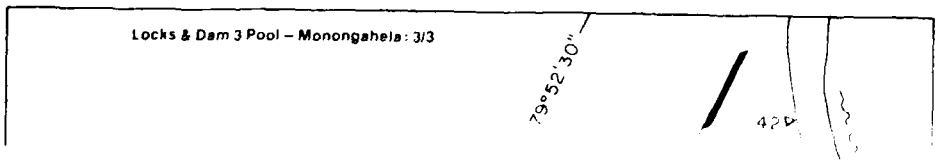


Locks & Dam 2 Pool – Monongahela

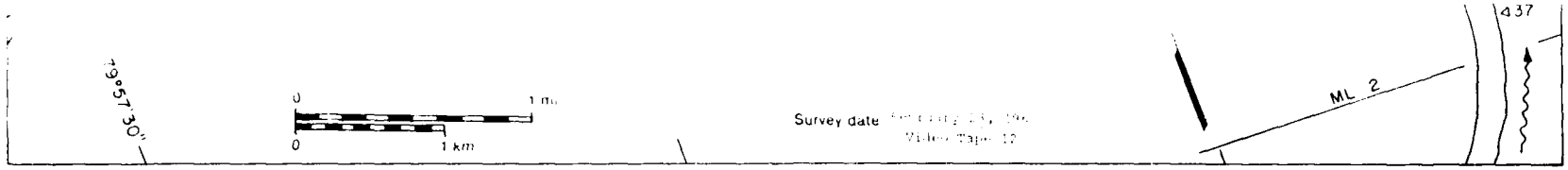
MAP UNITS	Area ($ft^2 \times 10^6$)	Surface concentration (%)
Open water	3.09	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	1.17	80
Ice floes of fragmented ice and ice	0.51	10
Total area ($ft^2 \times 10^6$)	4.77	

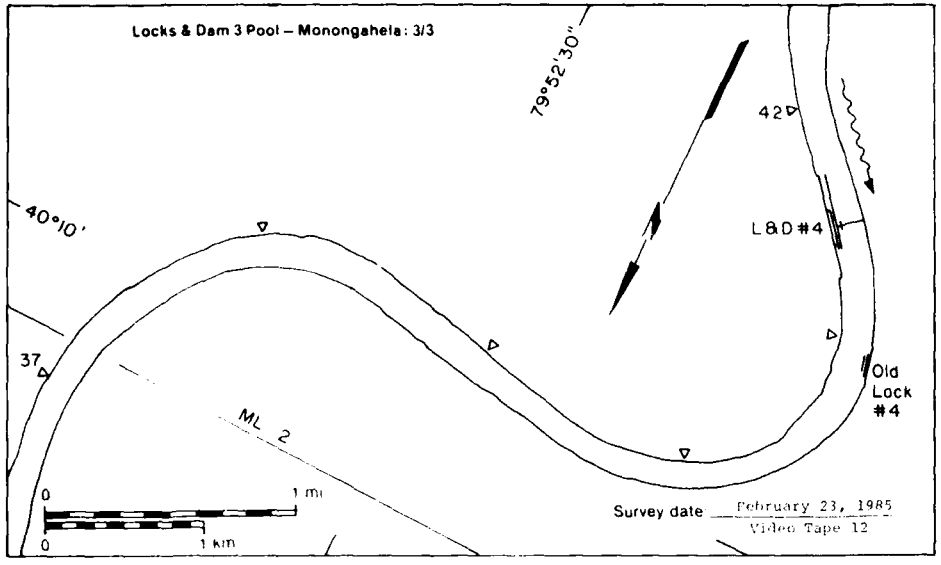

40°15'
79°55'
Locks & Dam 3 Pool – Monongahela :1/3
ML 1
40°12'30"
30
Locks & Dam #3
24
0
1 mi
0
1 km
79°57'30"
Survey date: February 23, 1985
Video Tape 12


79°55'
Locks & Dam 3 Pool – Monongahela :2/3
40°12'30"
79°52'30"
ML 1
30
37
79°57'30"
0
1 mi
0
1 km
Survey date: February 23, 1985
Video Tape 12
ML 2


Locks & Dam 3 Pool – Monongahela: 3/3
79°52'30"
42


Locks & Dam 3 Pool – Monongahela
MARKINGS

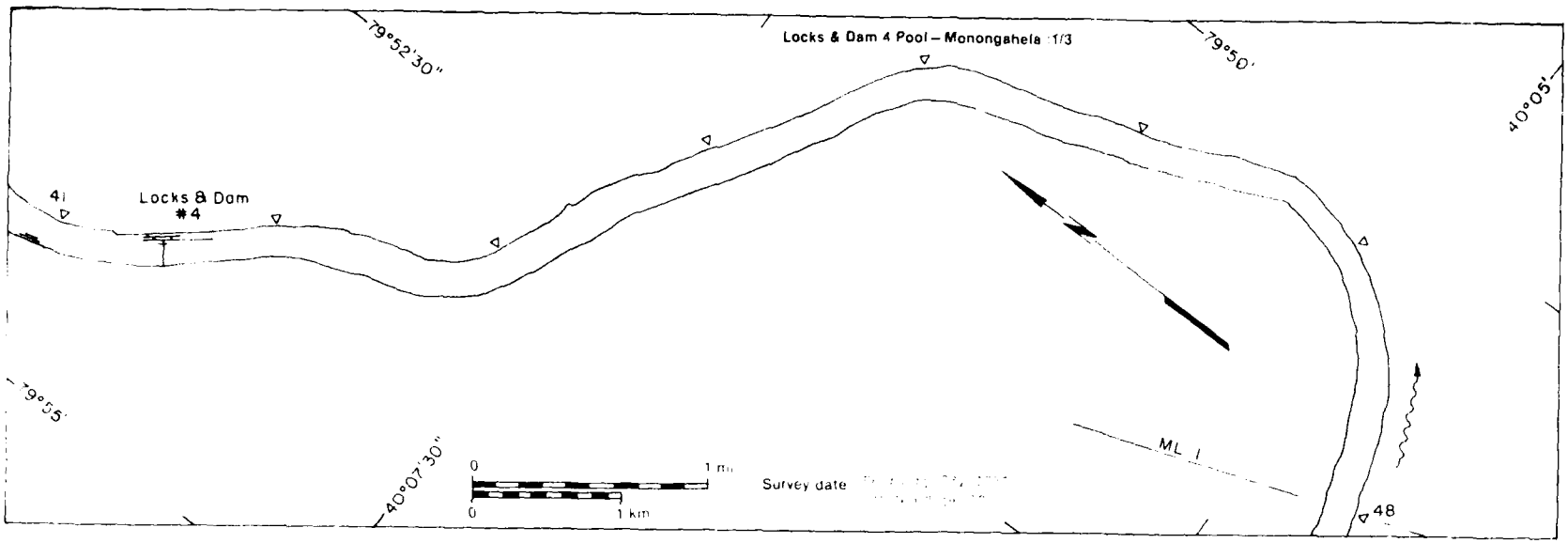


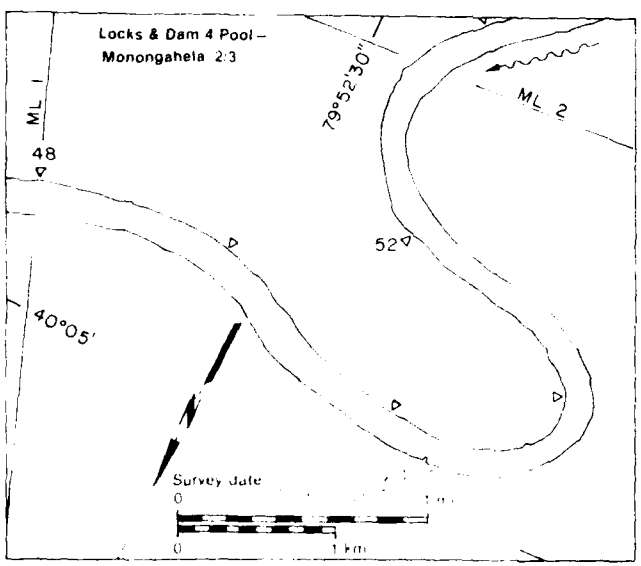


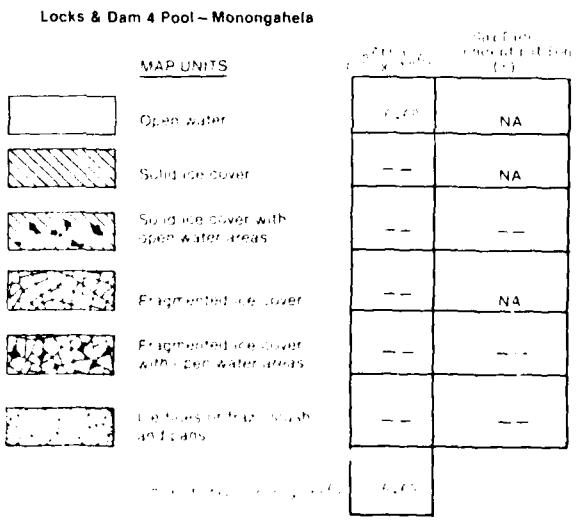
Locks & Dam 3 Pool – Monongahela

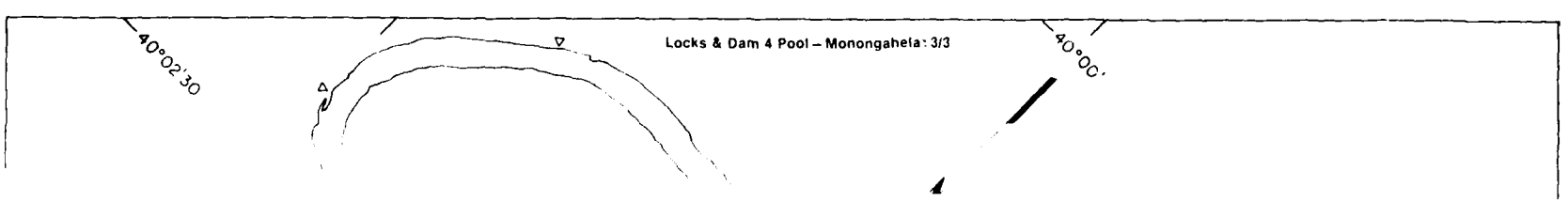
MAP UNITS		
Open water	[illegible]	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	[illegible]	

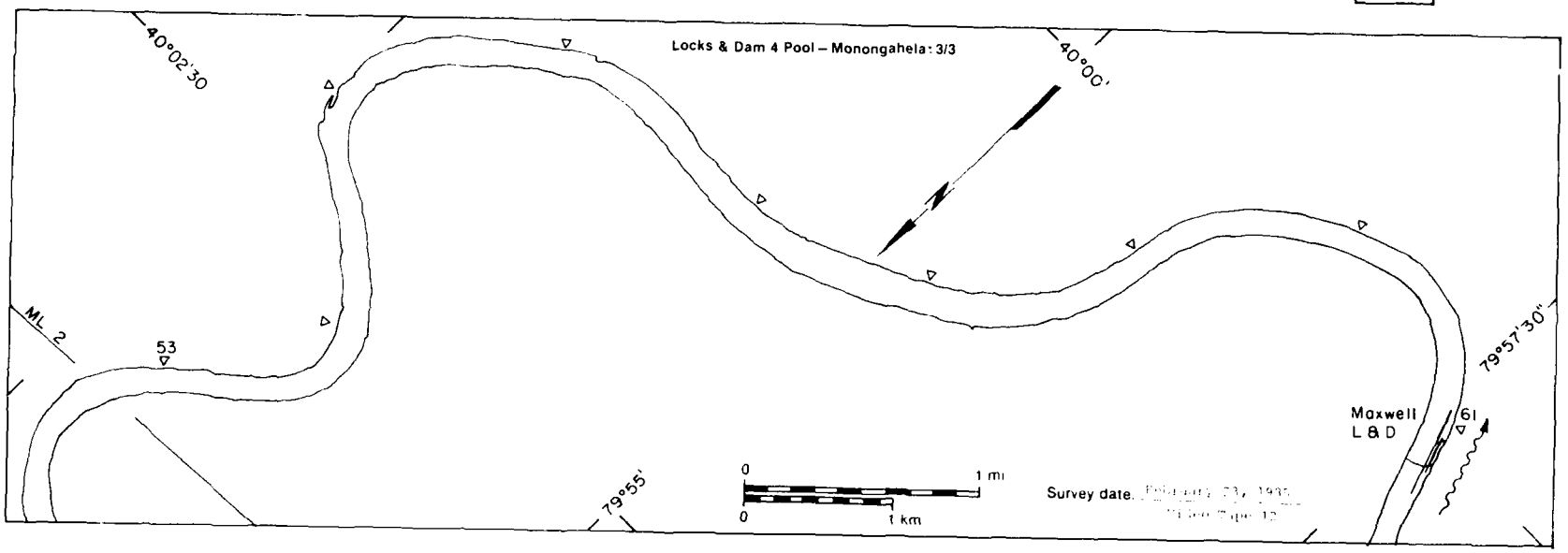
23 February 1985

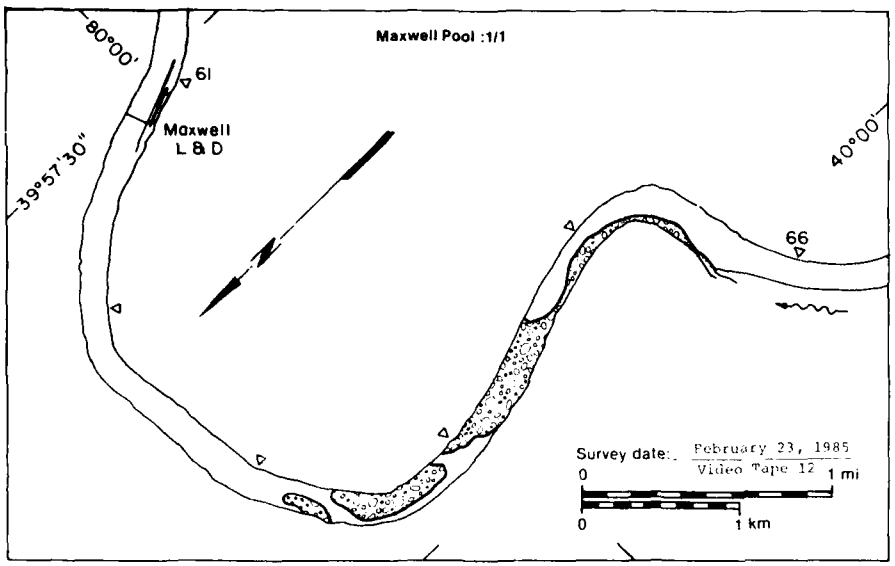








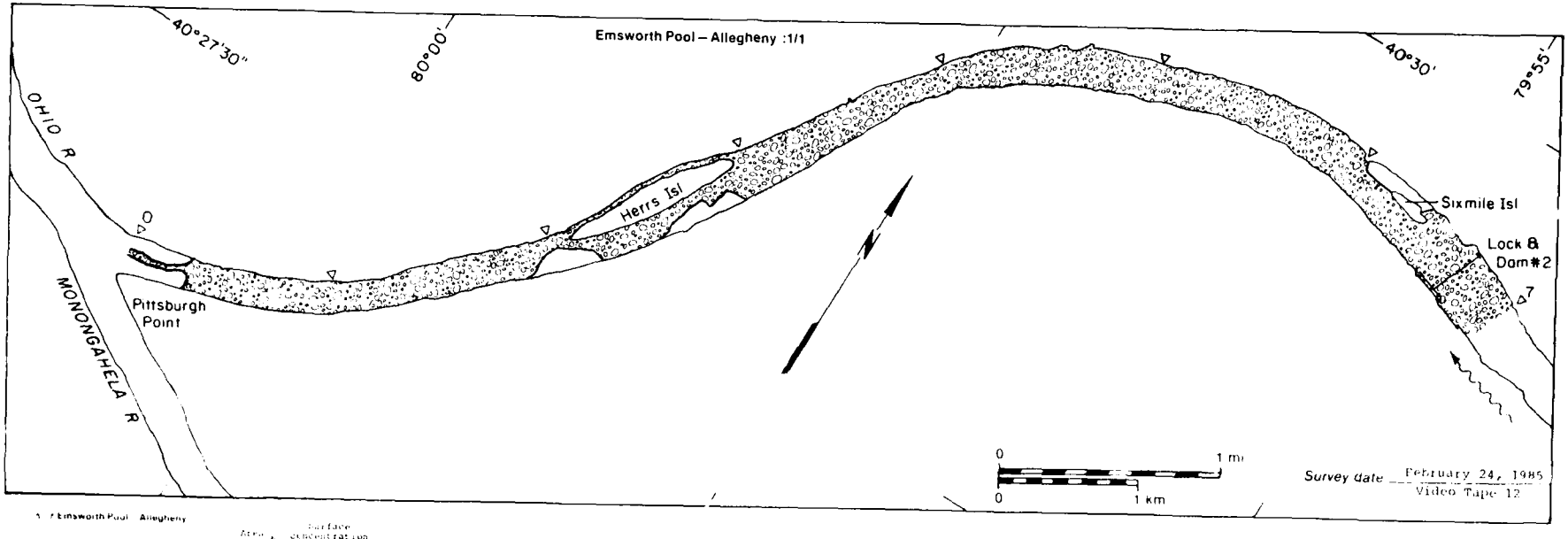

Locks & Dam 4 Pool – Monongahela: 3/3
40°02'30
40°00'
79°57'30"
79°55'
ML 2
53
Maxwell
L&D
61
0
1 mi
0
1 km
Survey date.



Maxwell Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface Concentration (%)
Open water	1.12	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	0.44	c
Total Area ($m^2 \times 10^6$)	1.56	

24 February 1985

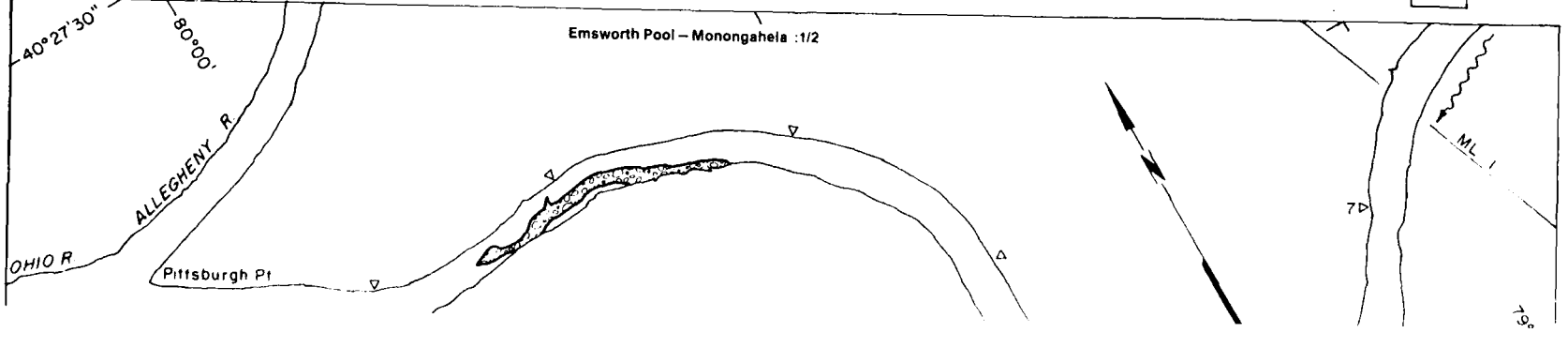


Emsworth Pool – Allegheny

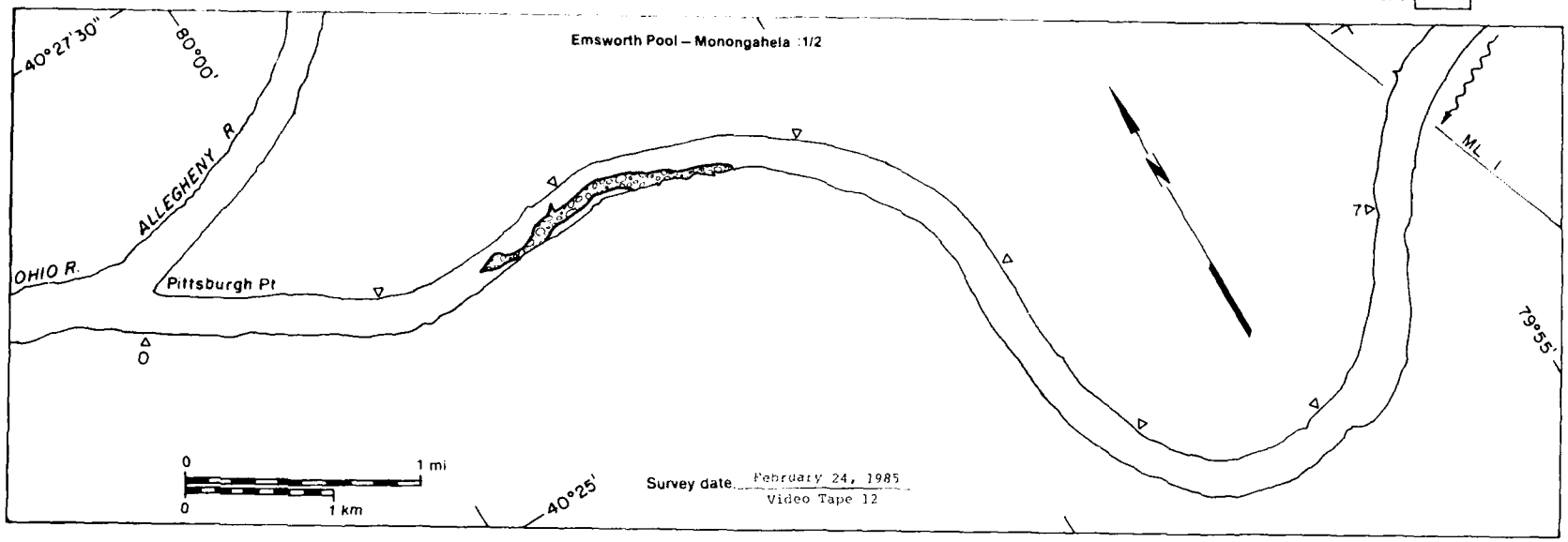
Area ($m^2 \times 10^6$)	Surface concentration (%)
0.37	n/a
--	n/a
--	--
--	n/a
--	--
1.02	1
Total Area ($m^2 \times 10^6$) 3.27	

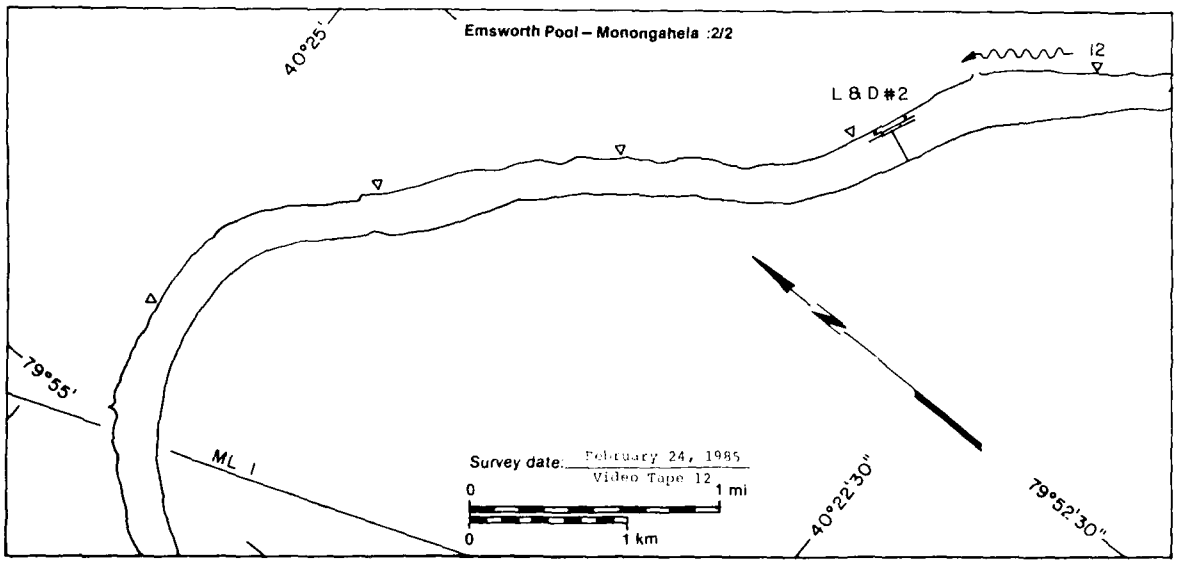
Emsworth Pool – Monongahela

Area ($m^2 \times 10^6$)	Surface concentration (%)
4.56	n/a
--	n/a
--	--
--	n/a
--	--
0.17	10
Total Area ($m^2 \times 10^6$) 4.73	

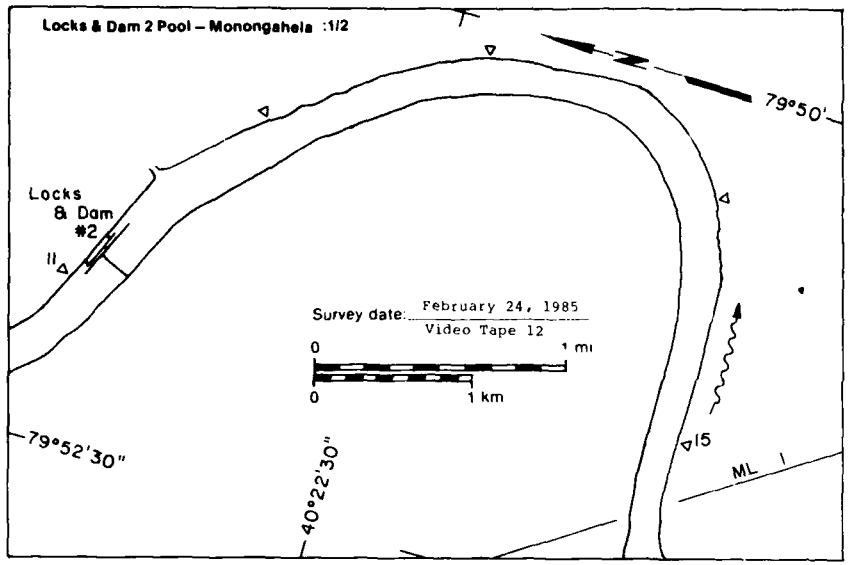


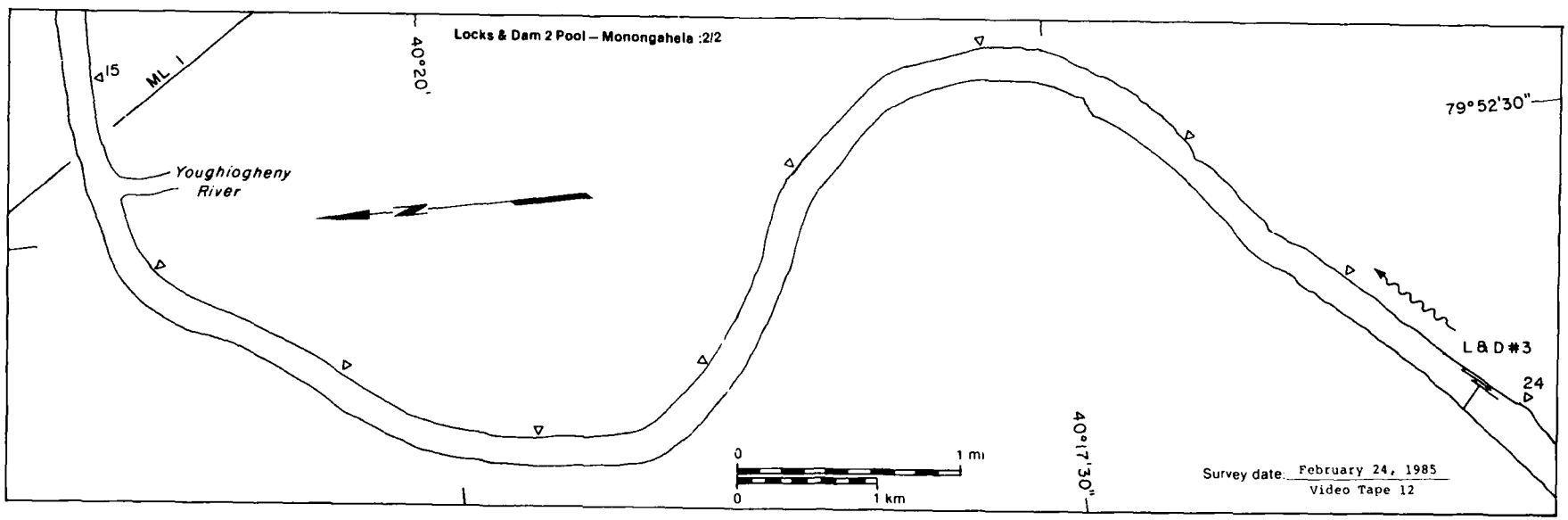
Actual Area ($ft^2 \times 10^6$) 4.73





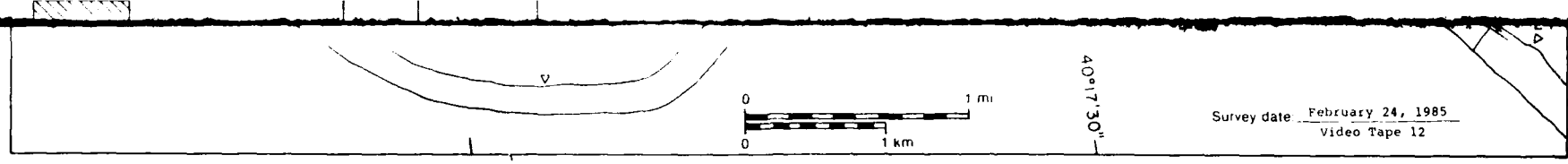
24 February 1985





Locks & Dam 2 Pool – Monongahela

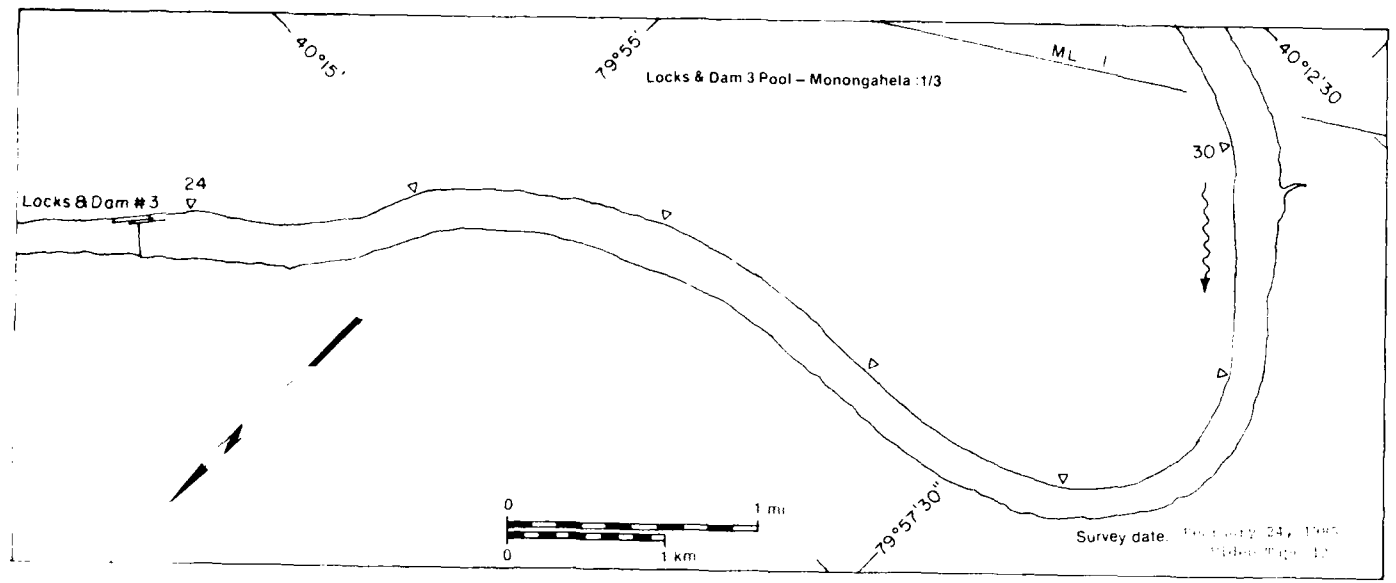
MAP UNITS

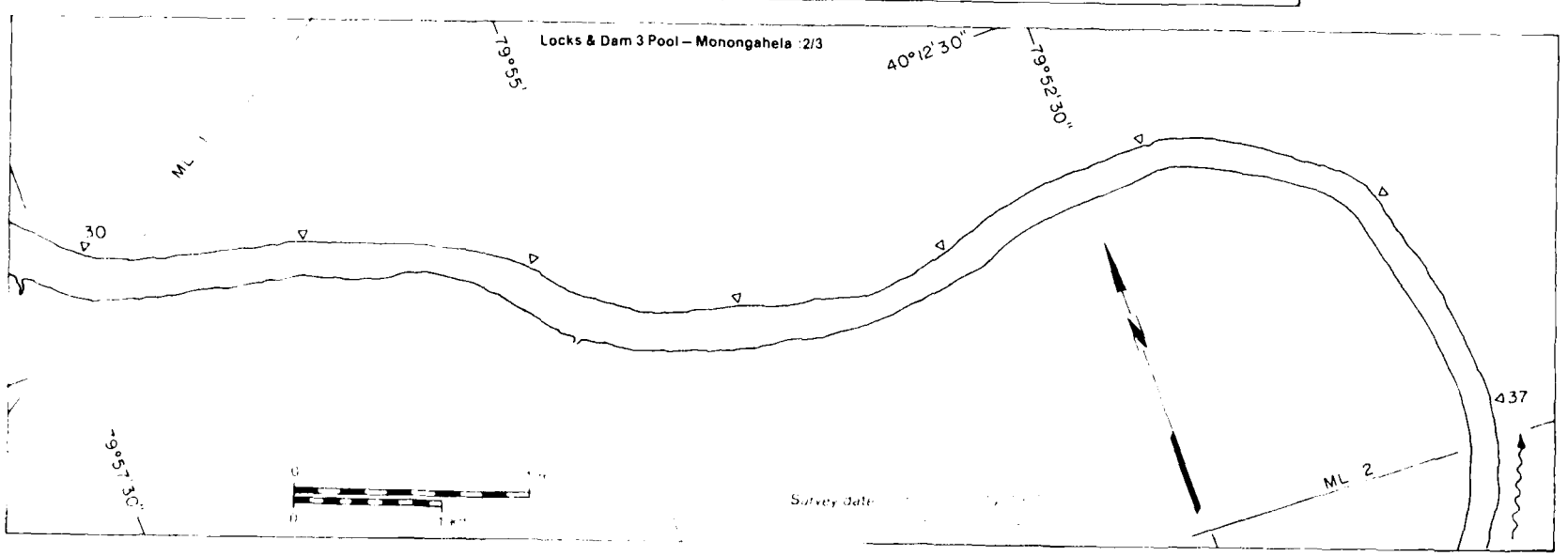


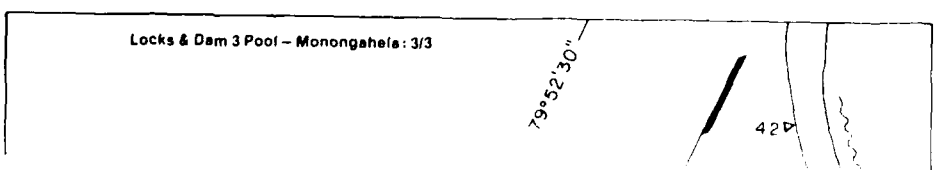
Locks & Dam 2 Pool – Monongahela

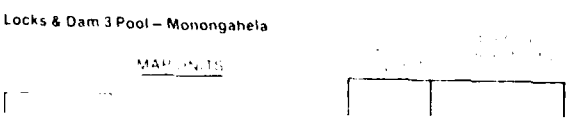
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.77	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.77	

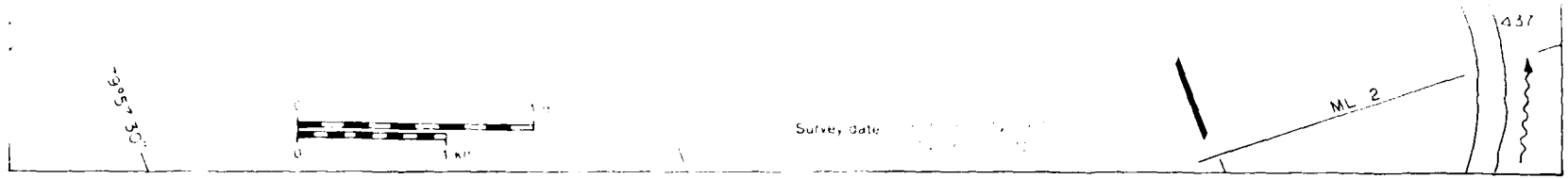
24 February 1985

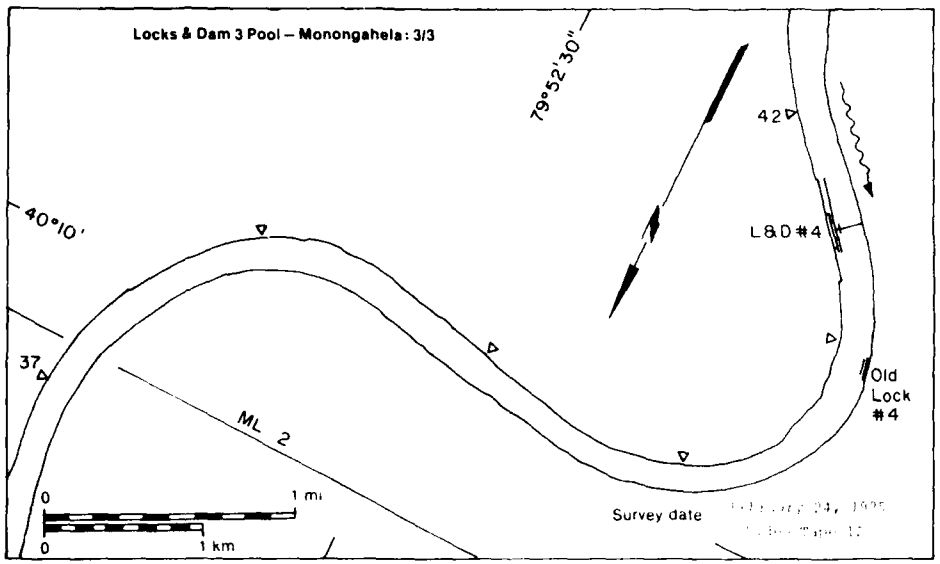








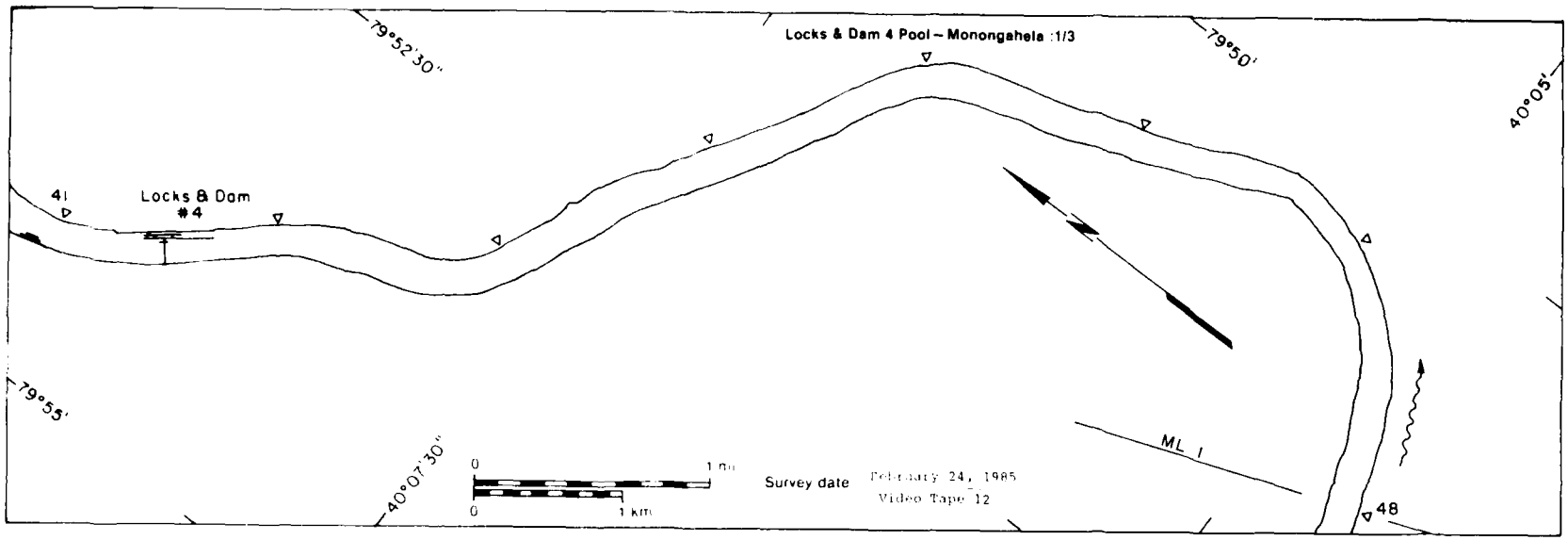


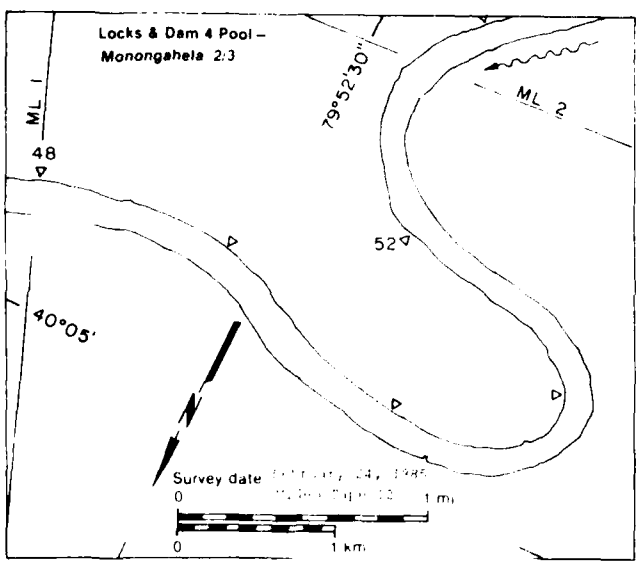


Locks & Dam 3 Pool – Monongahela

MAP UNITS	Area $km^2 \times 10^6$	Surface concentration
Open water	6.64	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area $km^2 \times 10^6$	6.64	

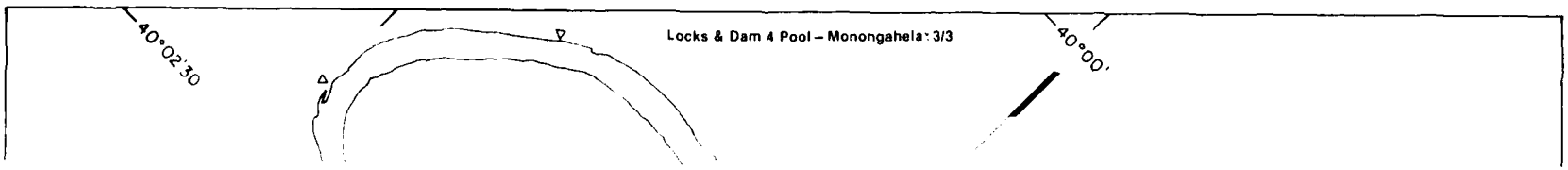
24 February 1985

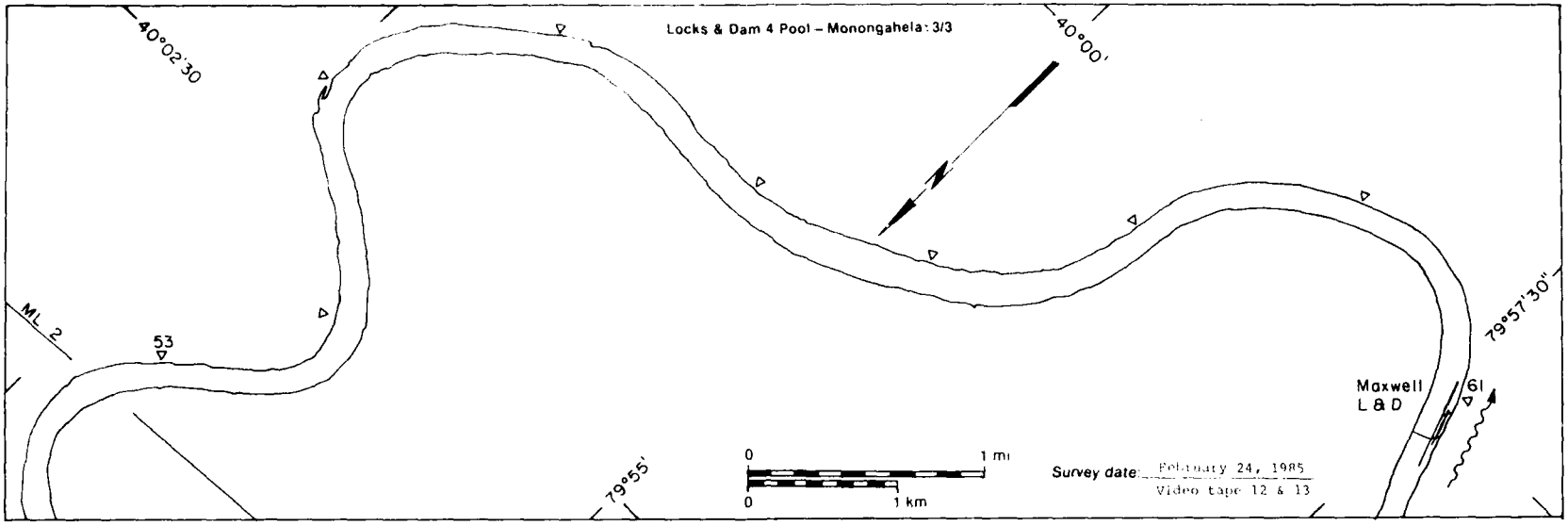




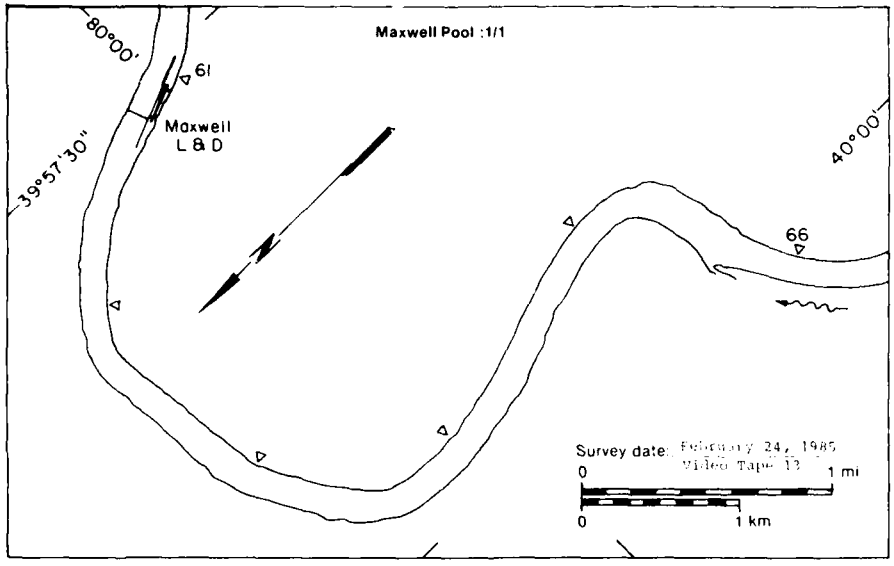
Locks & Dam 4 Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	5.60	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	6.60	



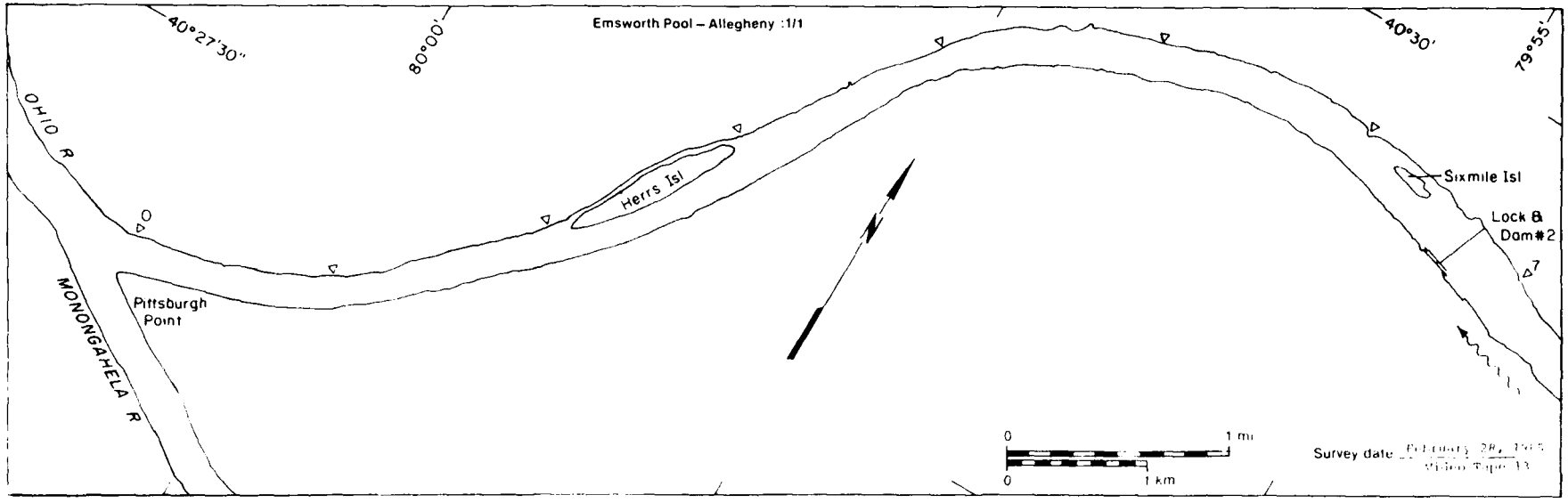

Locks & Dam 4 Pool – Monongahela: 3/3
40°02'30
40°00'
79°57'30"
79°55'
ML 2
53
61
Maxwell
L&D
0
1 mi
0
1 km
Survey date: February 24, 1985
Video tape 12 & 13

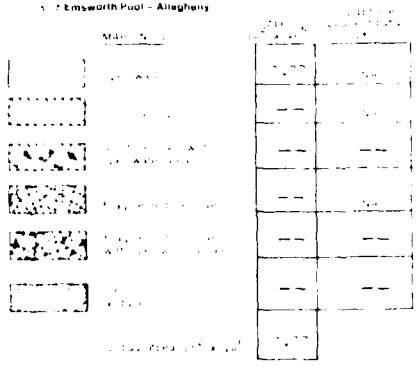
24 February 1985

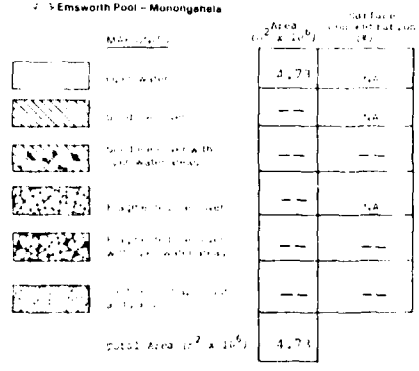


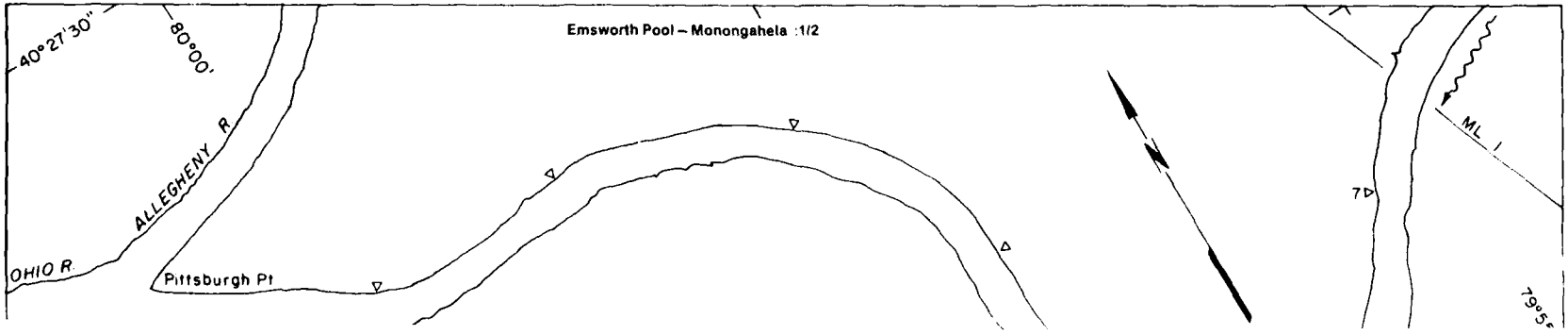
Maxwell Pool

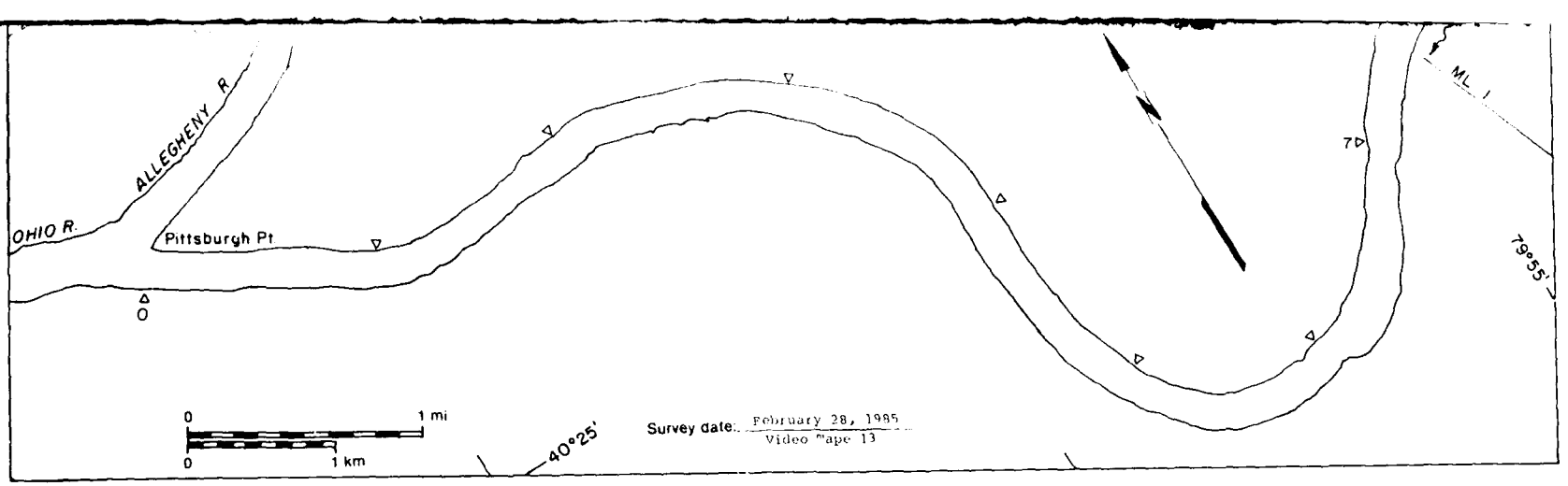
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	1.56	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	-
Ice floes or frazil slush and pans	--	- -
Total Area ($m^2 \times 10^6$)	1.56	

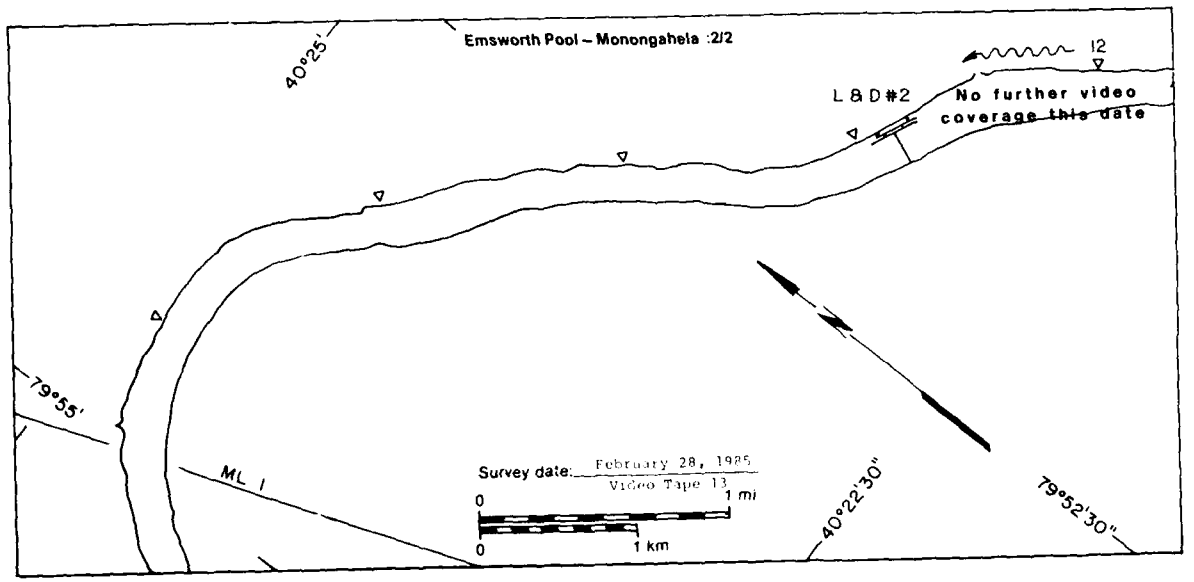

Emsworth Pool – Allegheny :1/1
40°27'30"
80°00'
40°30'
79°55'
OHIO R
MONONGAHELA R
Herrs Isl
Sixmile Isl
Lock & Dam#2
Pittsburgh Point
0
1 mi
0
1 km
Survey date



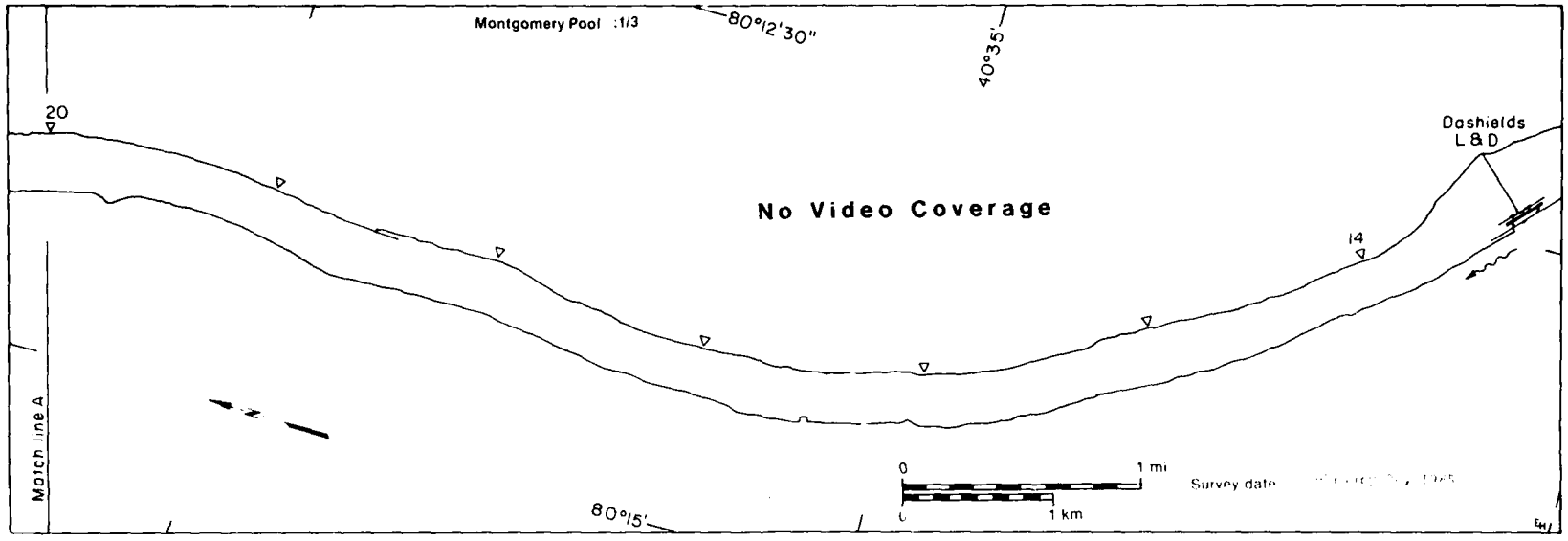


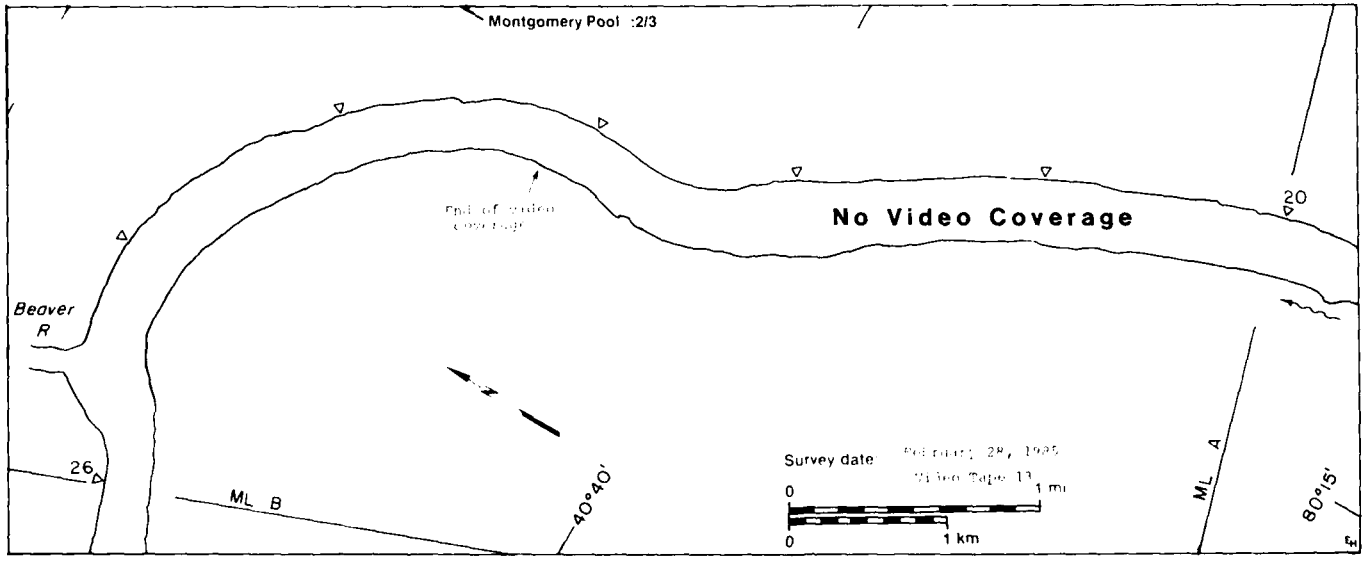

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R
OHIO R
Pittsburgh Pt
ML 1
79°55'

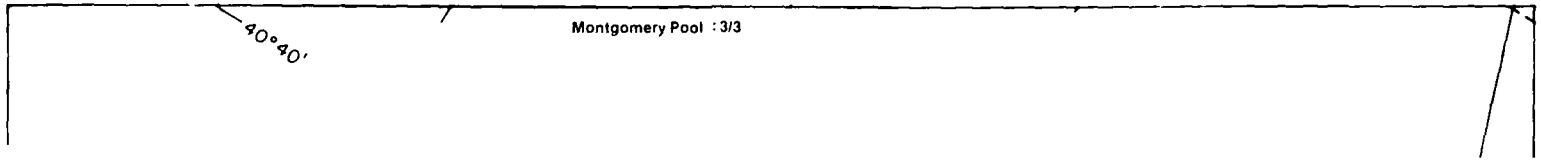

ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date: February 28, 1985
Video Tape 13

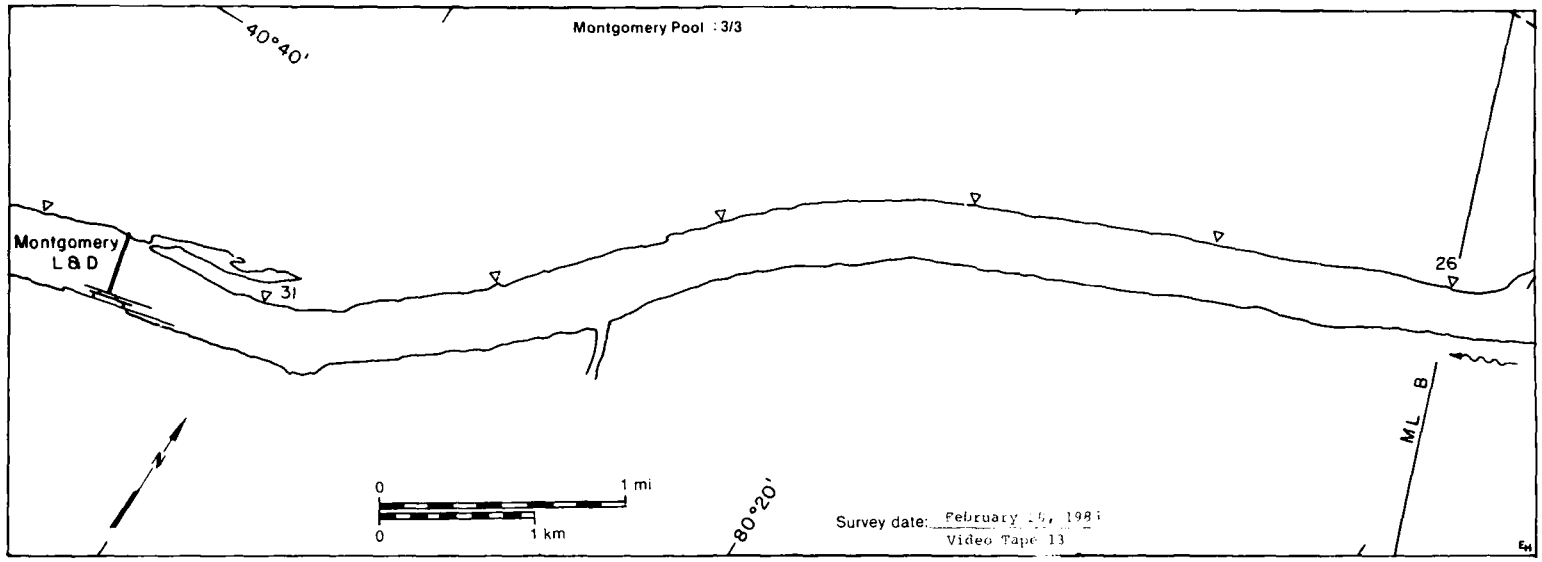

Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
No further video coverage this date
79°55'
ML 1
Survey date: February 28, 1985
Video Tape 13
0
1 mi
0
1 km
40°22'30"
79°52'30"

28 February 1985





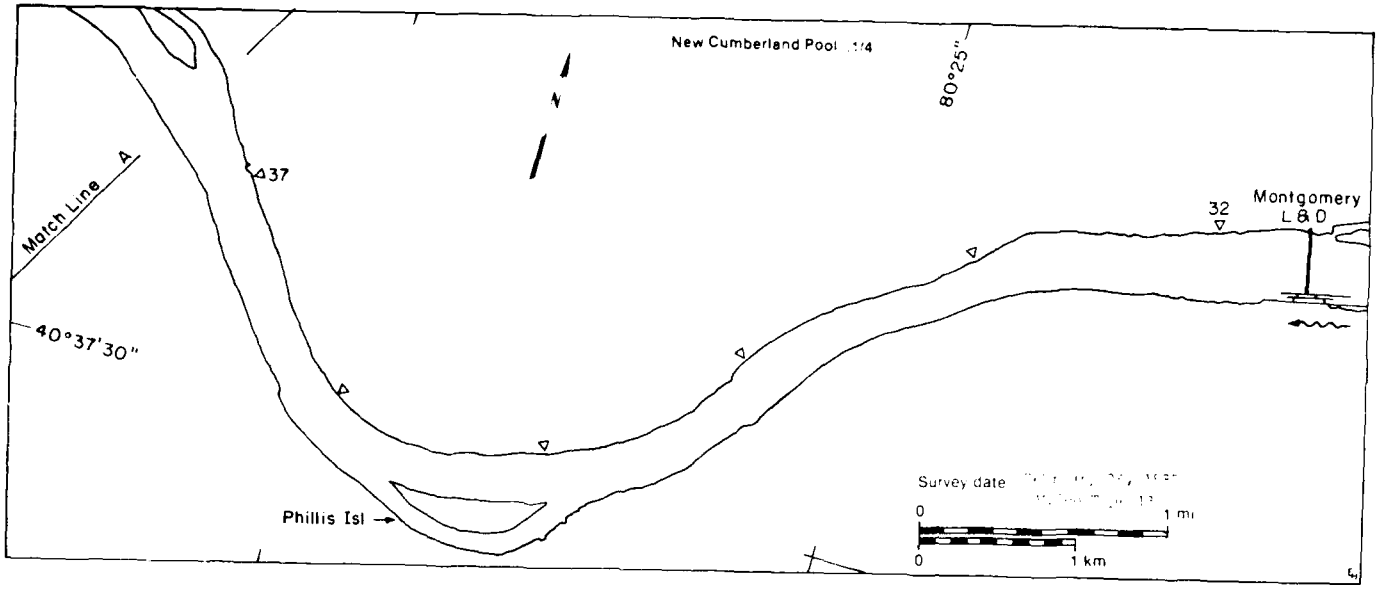


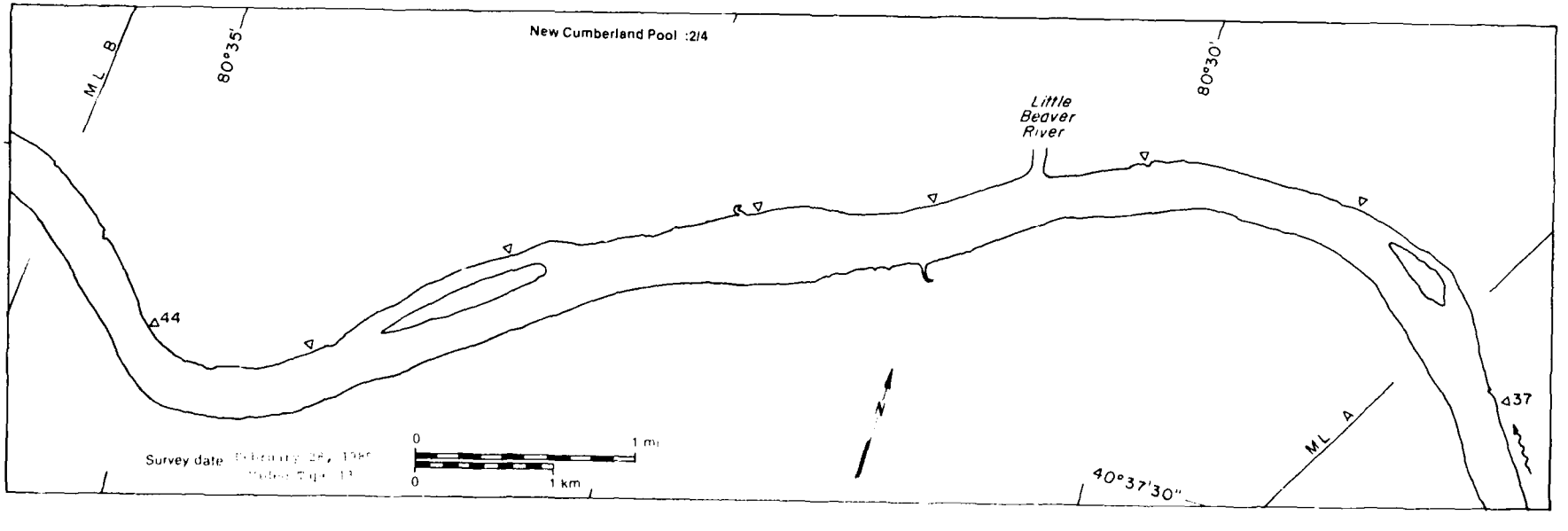


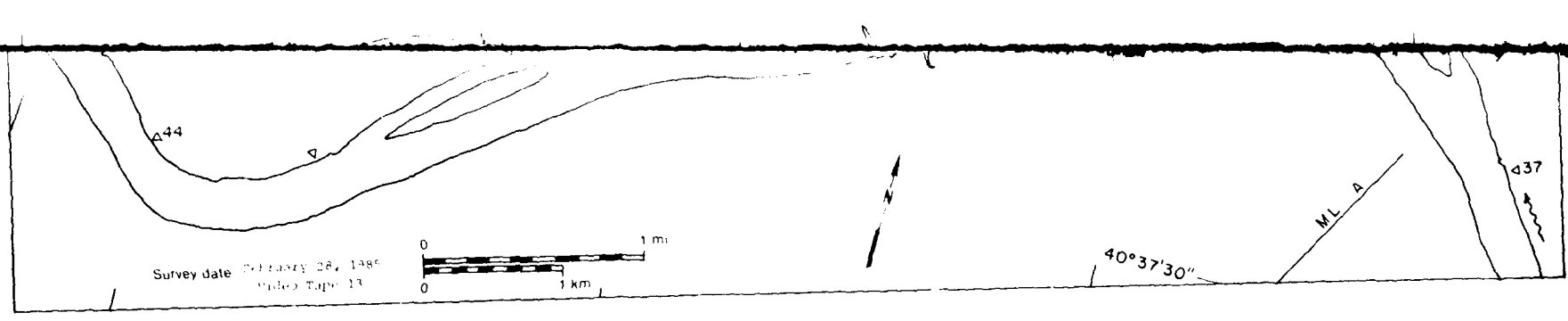
Montgomery Pool

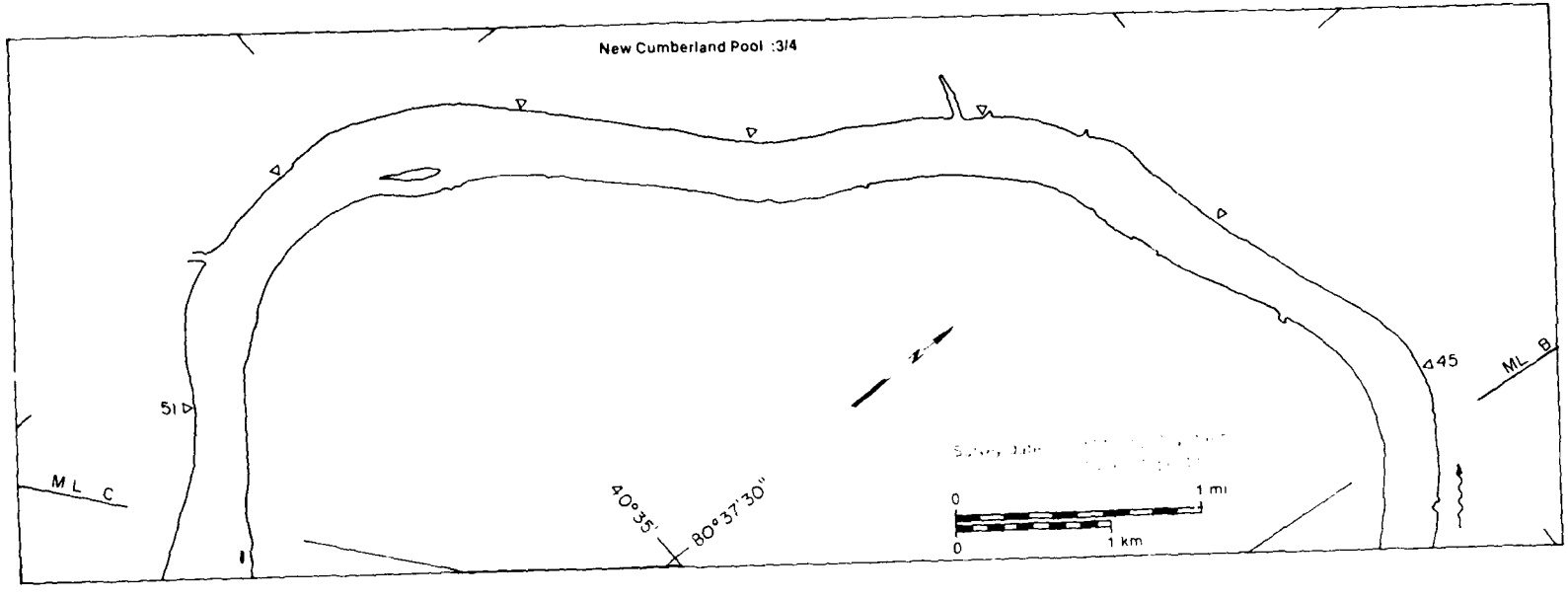
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	5.30	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27*	

*Includes 5.97 no video coverage

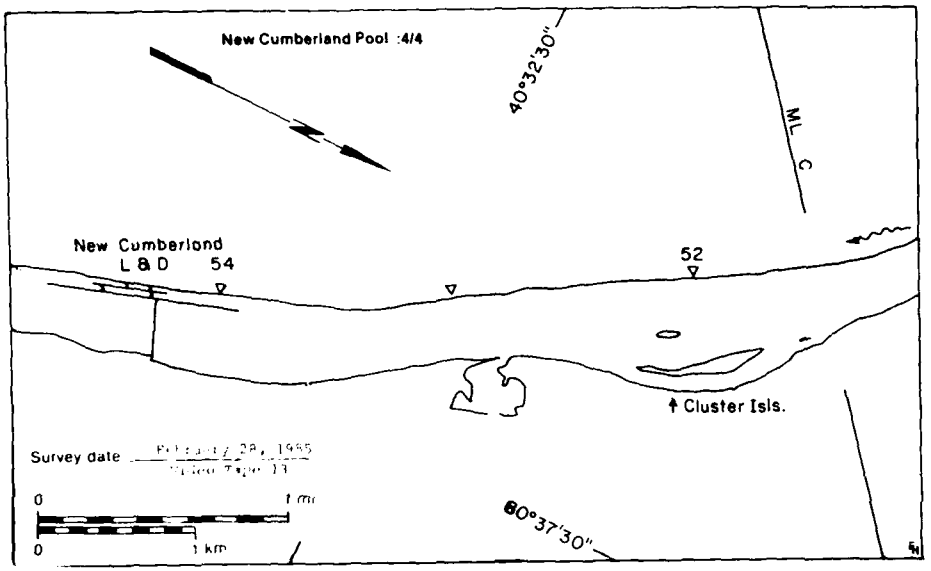

New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery
L&D
40°37'30"
Phillis Isl
Survey date
0
1 mi
0
1 km


New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little
Beaver
River
44
37
ML A
40°37'30"
Survey date
0
1 mi
0
1 km


44
37
ML A
40°37'30"
0
1 mi
0
1 km
Survey date

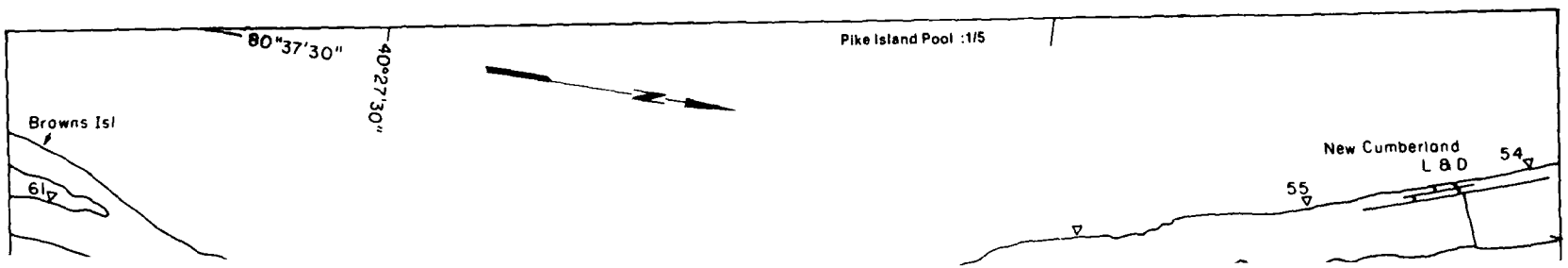

New Cumberland Pool :3/4
51
45
ML B
ML C
40°35'
80°37'30"
0
1 mi
0
1 km

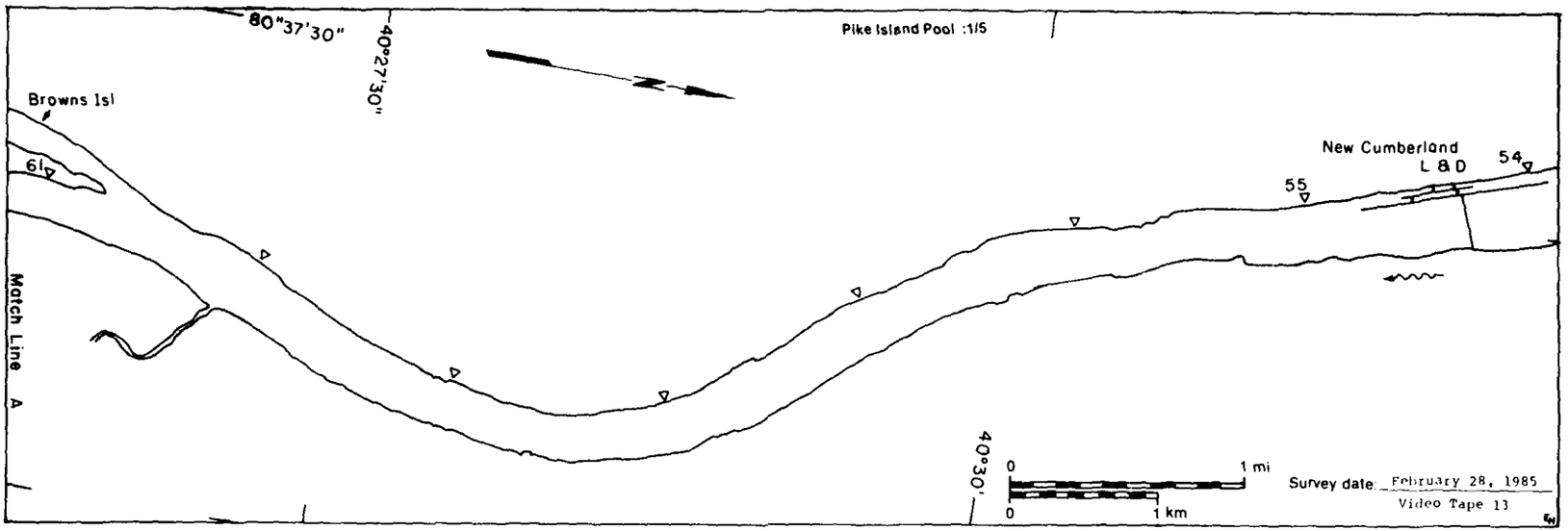
28 February 1985

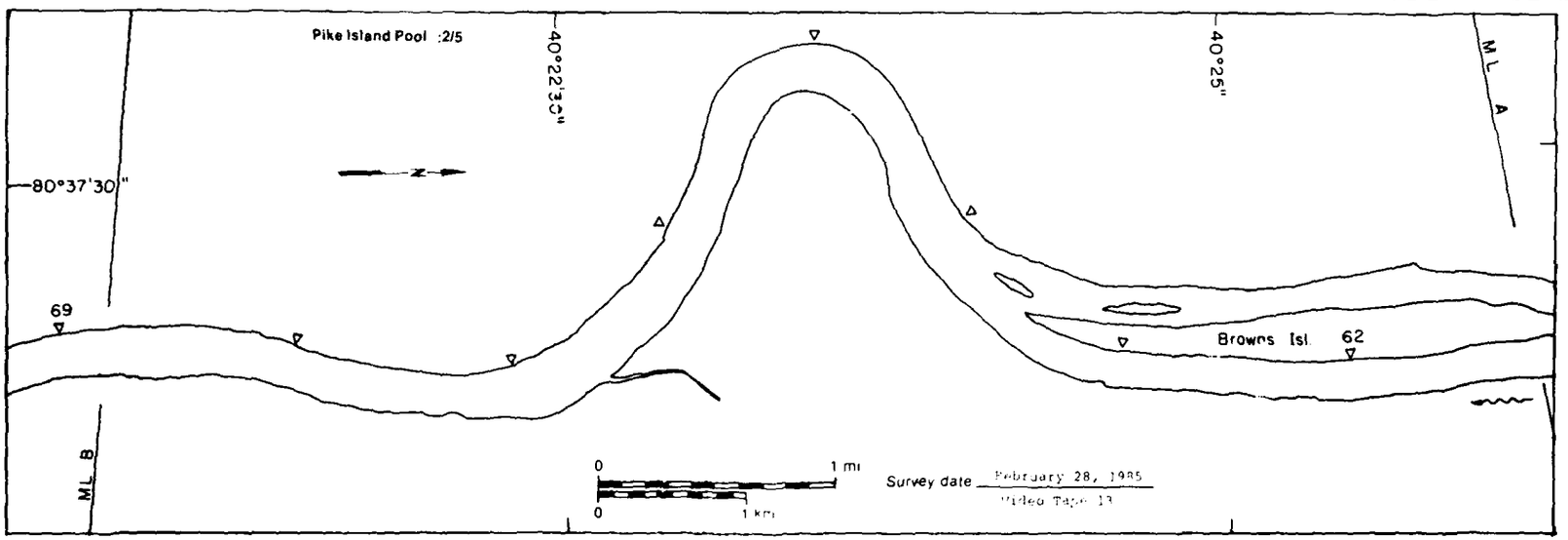


New Cumberland Pool

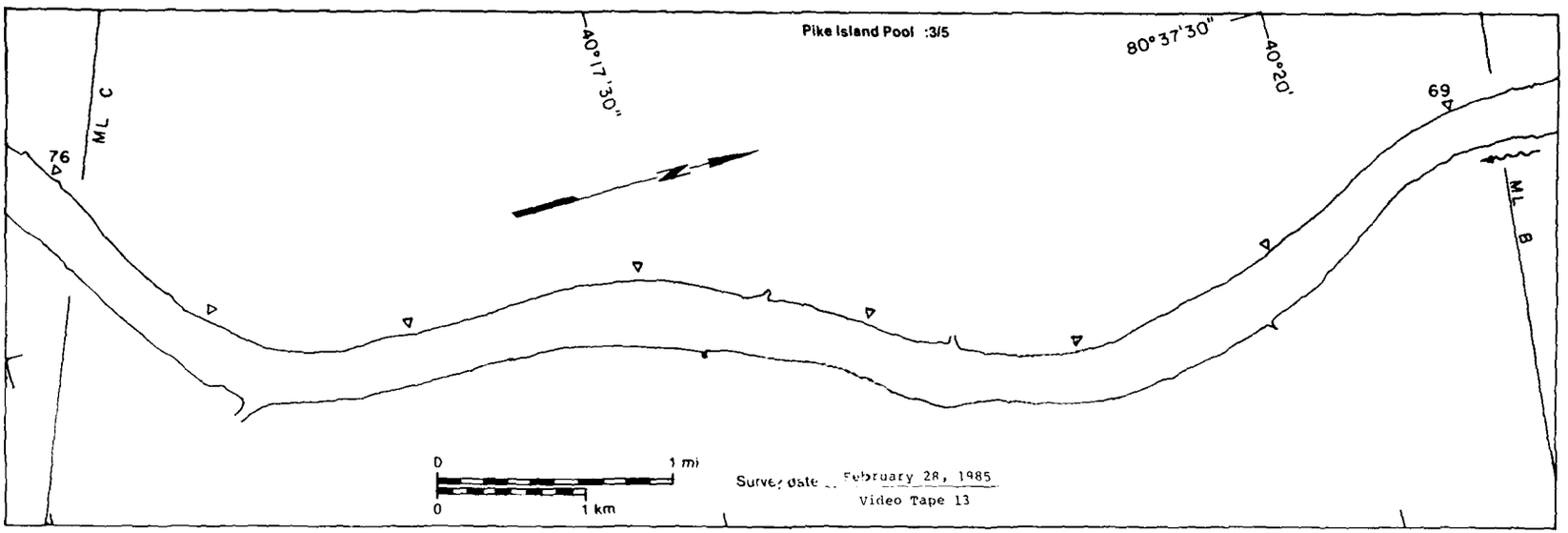
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	14.87	

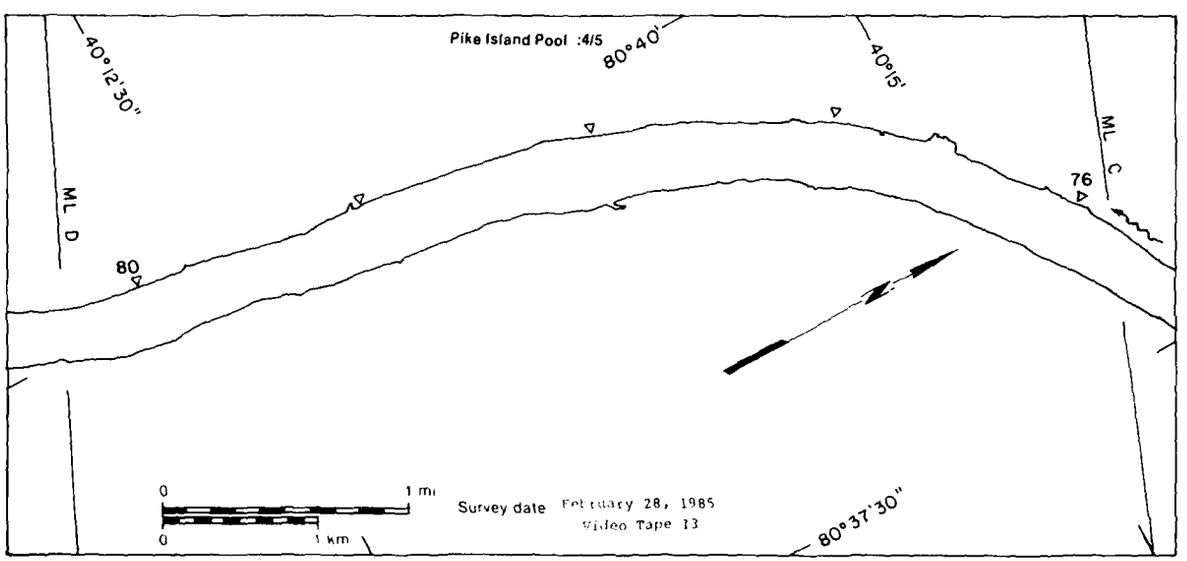


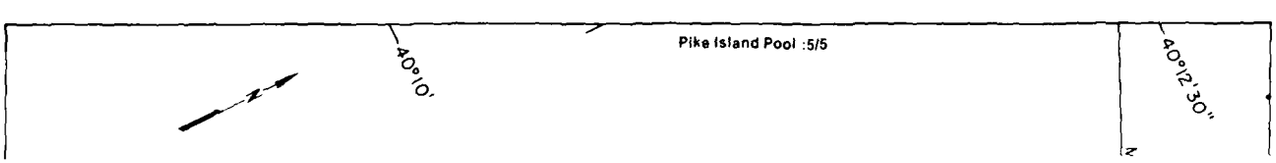

80°37'30"
40°27'30"
Pike Island Pool :1/5
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: February 28, 1985
Video Tape 13

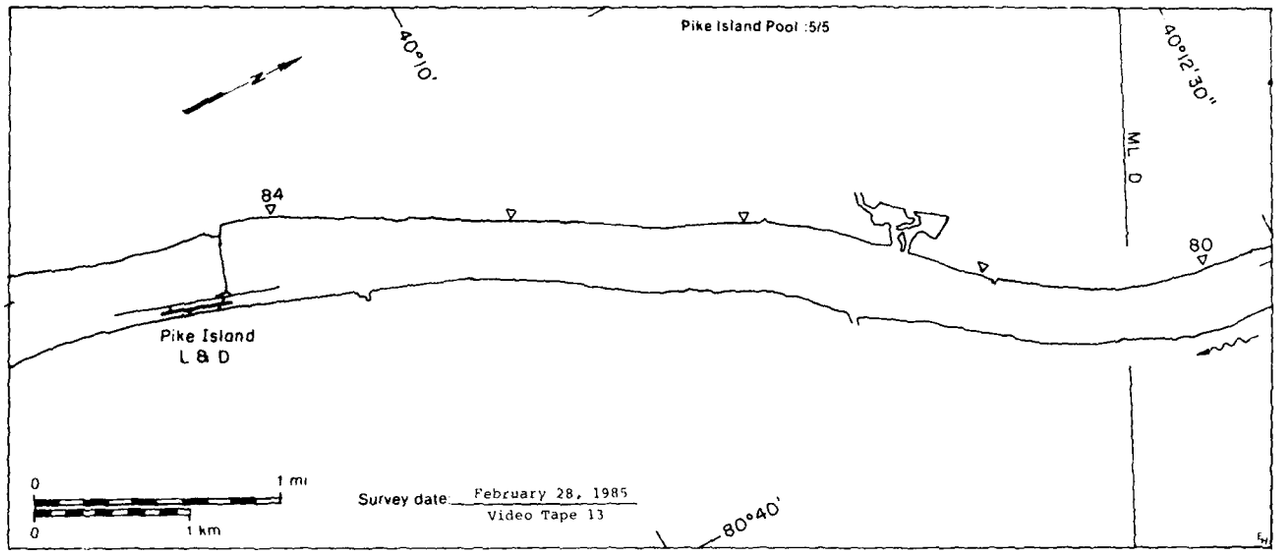

Pike Island Pool :2/5
40°22'30"
40°25"
ML A
80°37'30"
69
Browns Isl
62
ML B
0
1 mi
0
1 km
Survey date February 28, 1985
Video Tape 13

28 February 1985





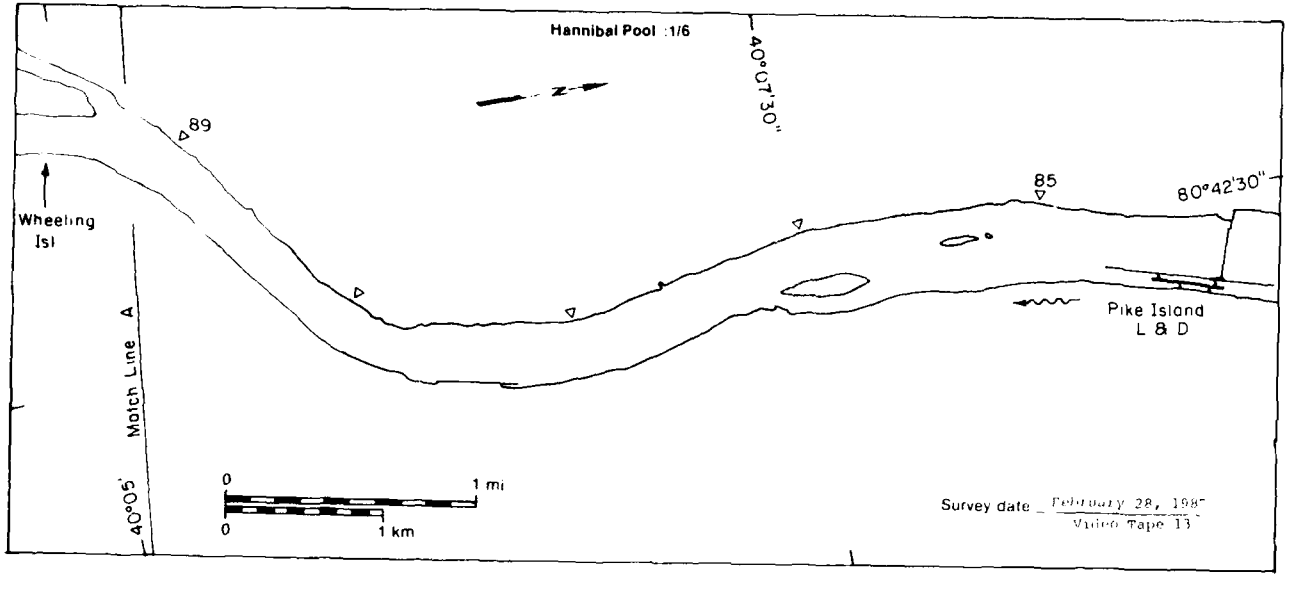


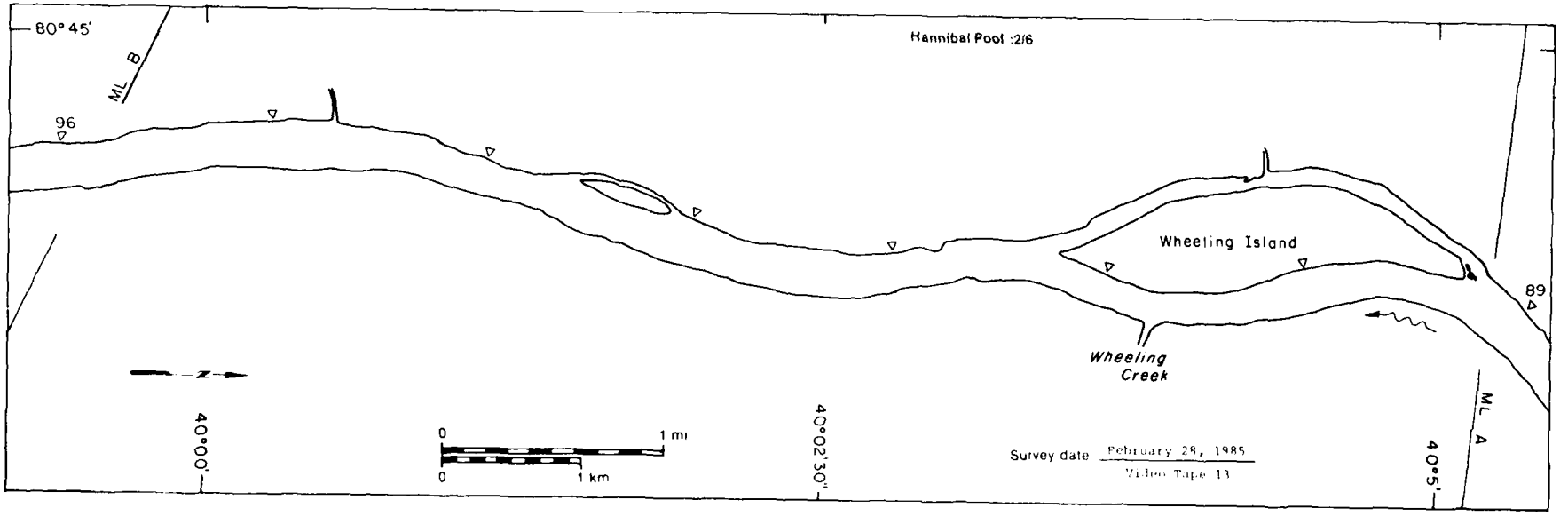


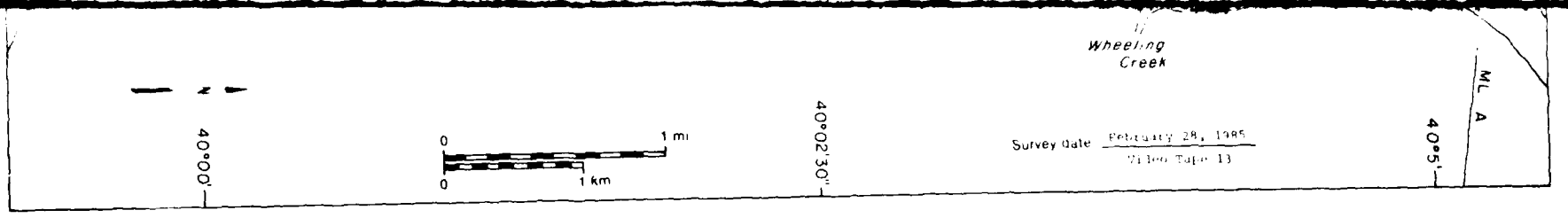
Pike Island Pool

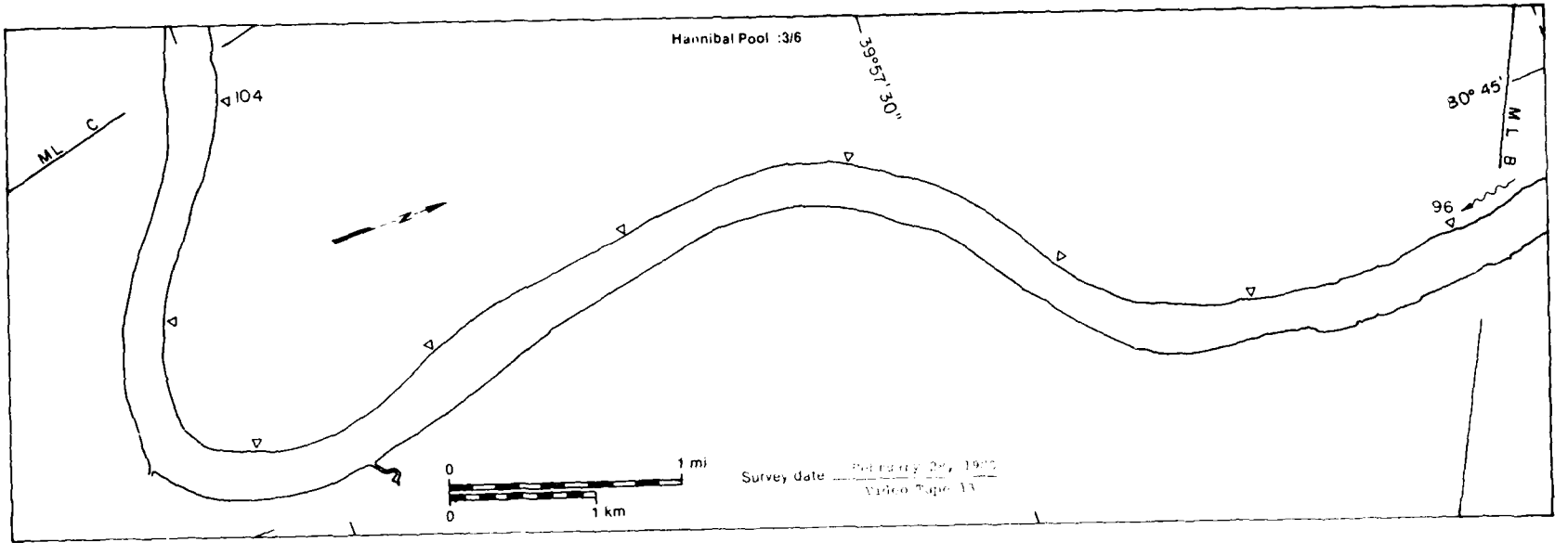
MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	18.92	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area (m^2 x 10^6)	18.92	

28 February 1985

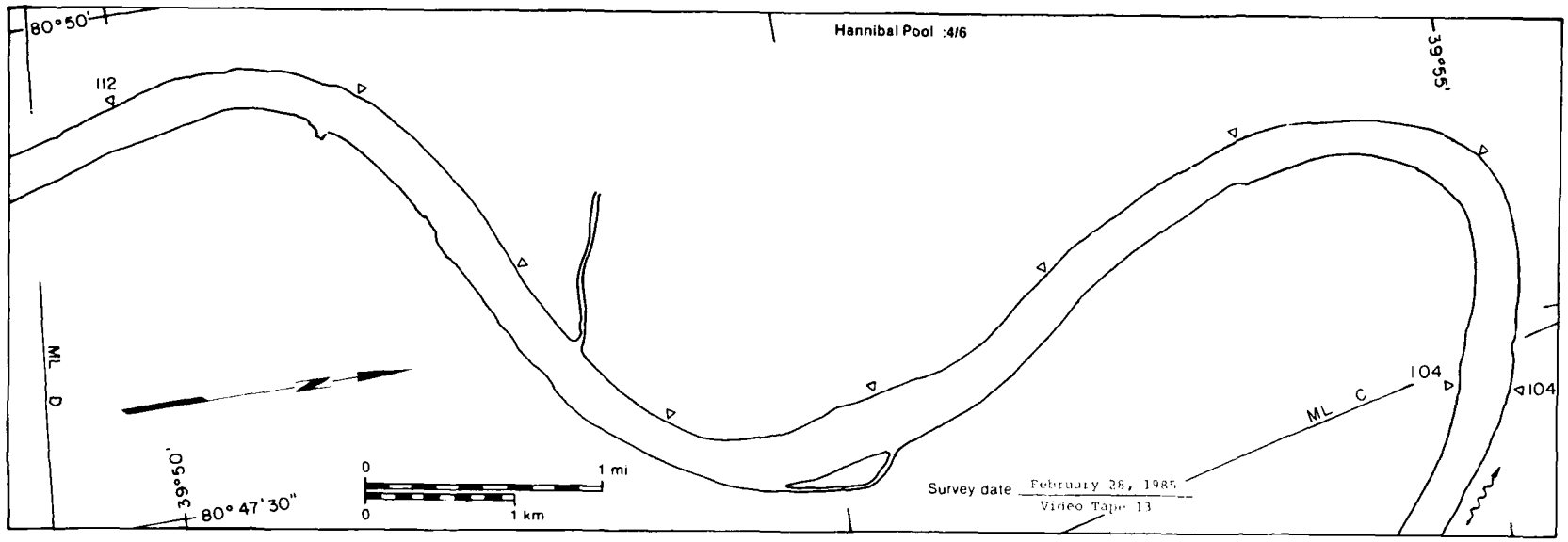


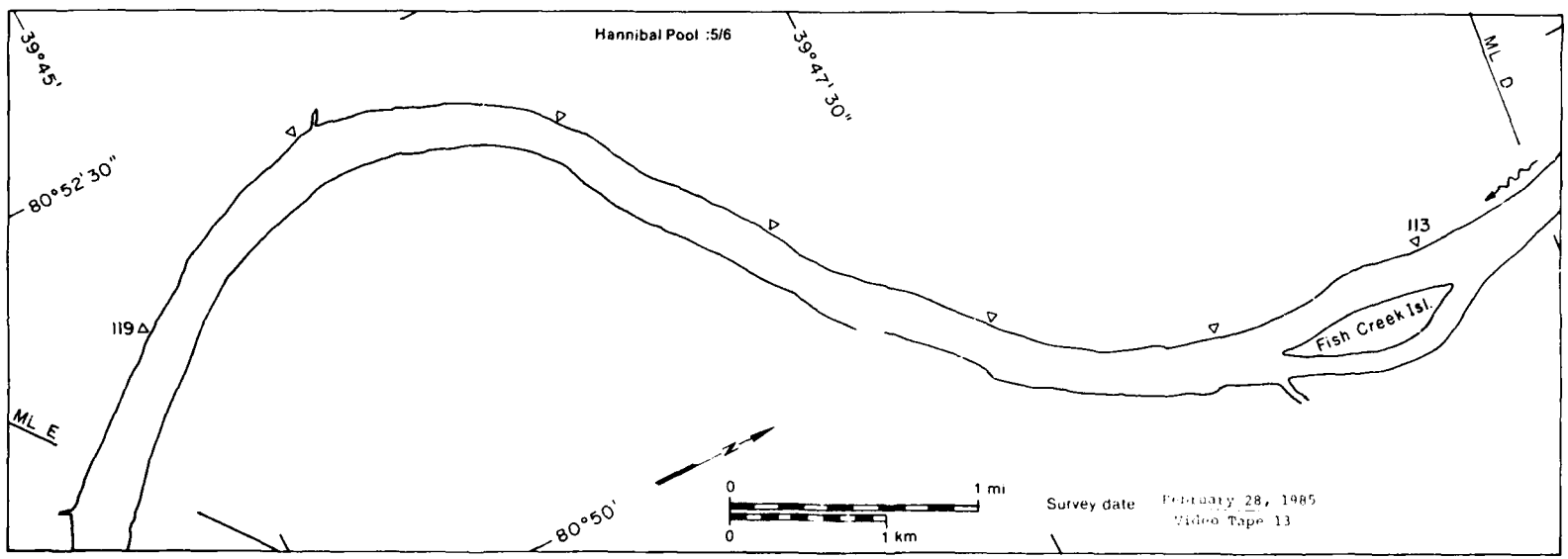


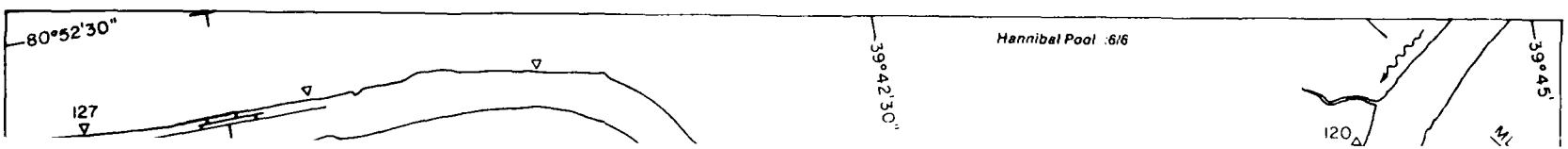

Wheeling
Creek
ML A
40°00'
40°02'30"
40°05'
0
1 mi
0
1 km
Survey Date February 28, 1985
Video Tape 13

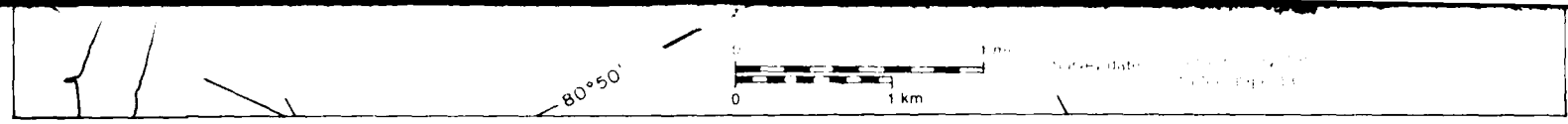

Hannibal Pool :3/6
39°57'30"
104
ML C
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date February 2%, 1985
Video Tape 13

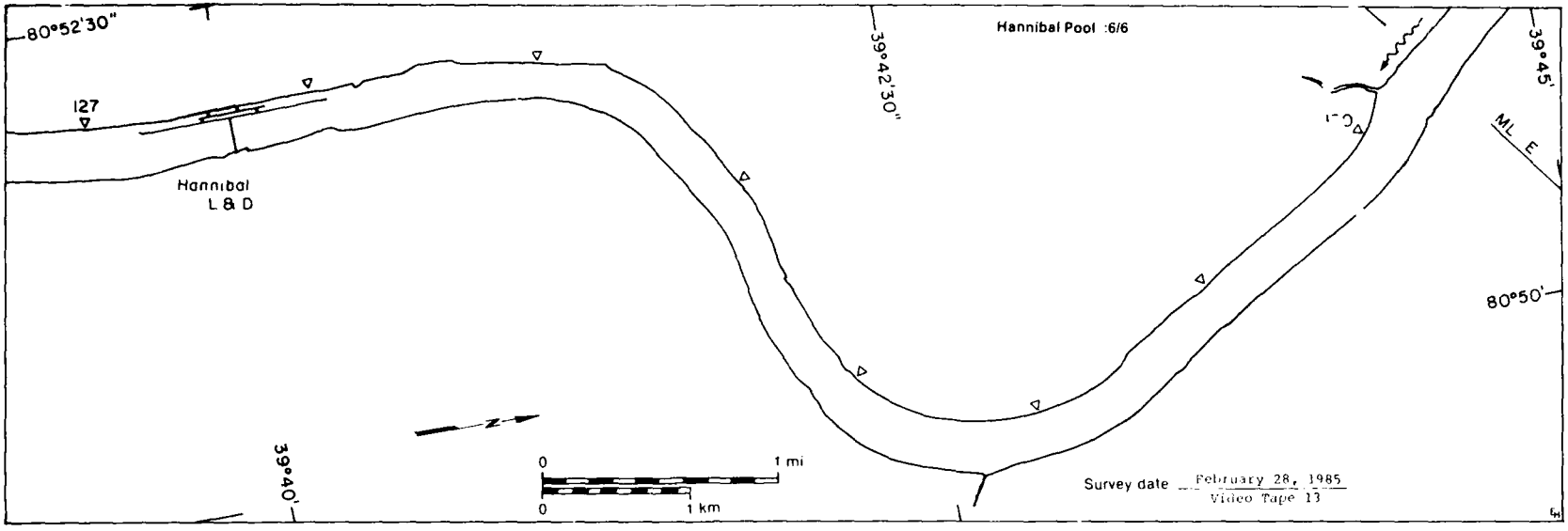
28 February 1985





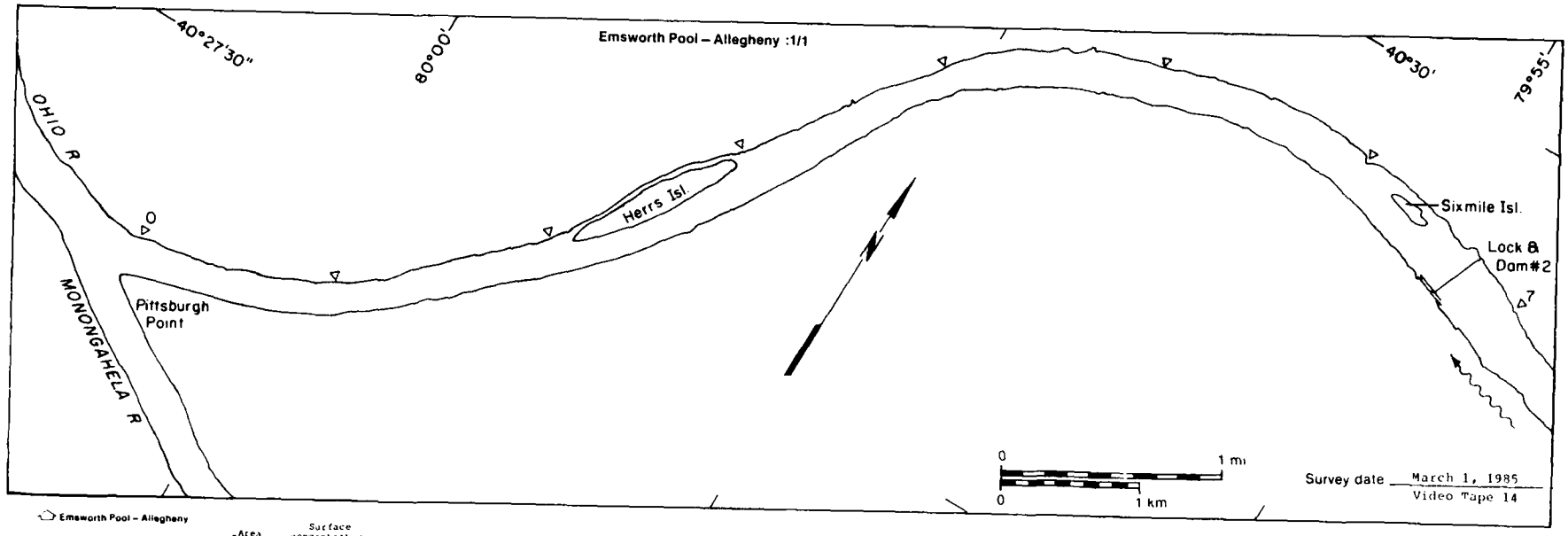






Hannibal Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	22.46	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	22.46	

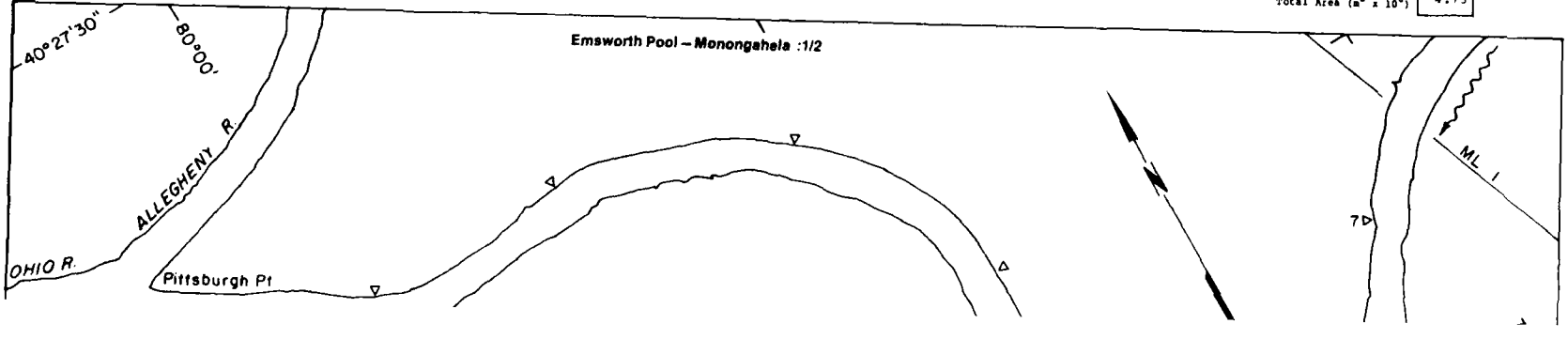


Emsworth Pool – Allegheny

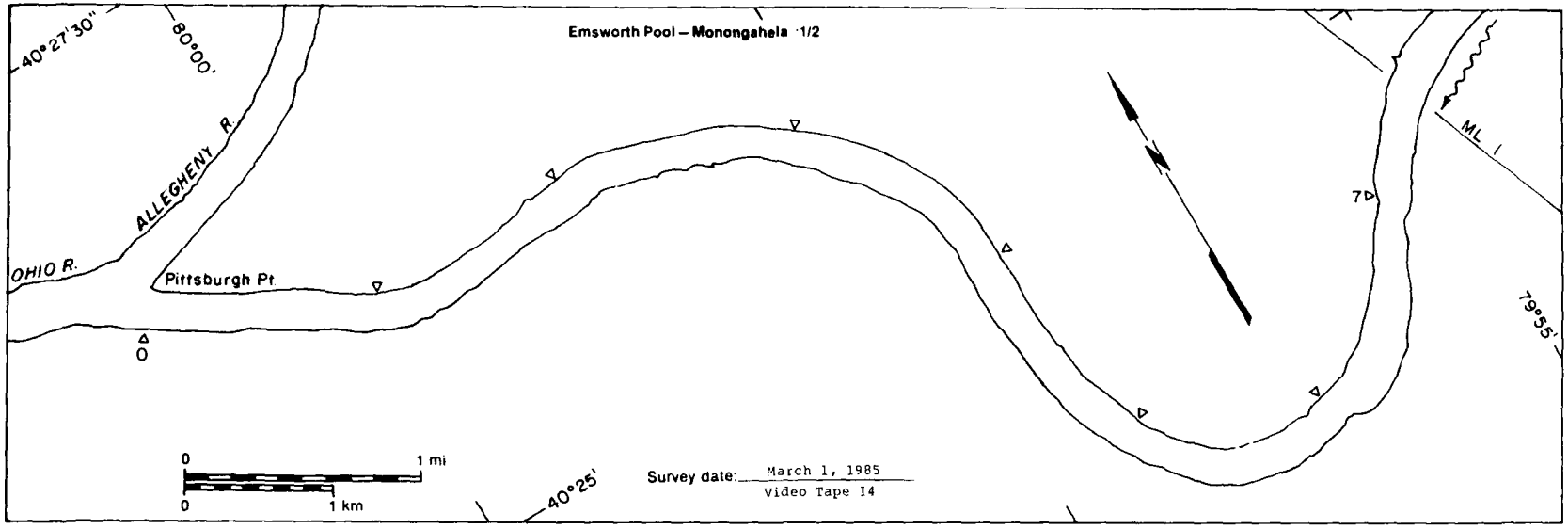
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.27	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	3.27	

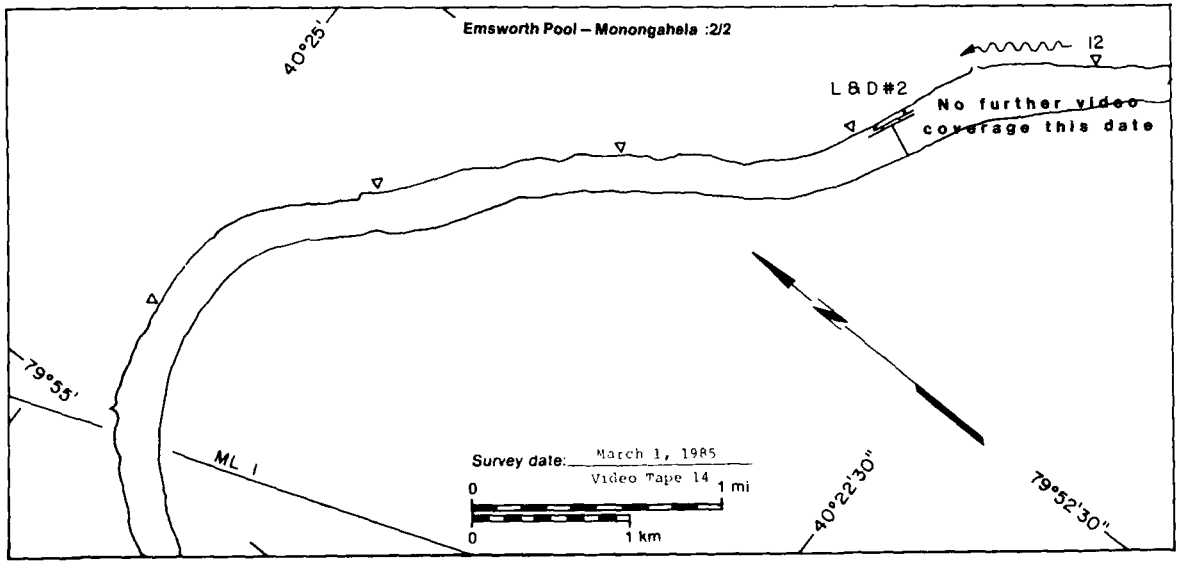
Emsworth Pool – Monongahela

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.73	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.73	

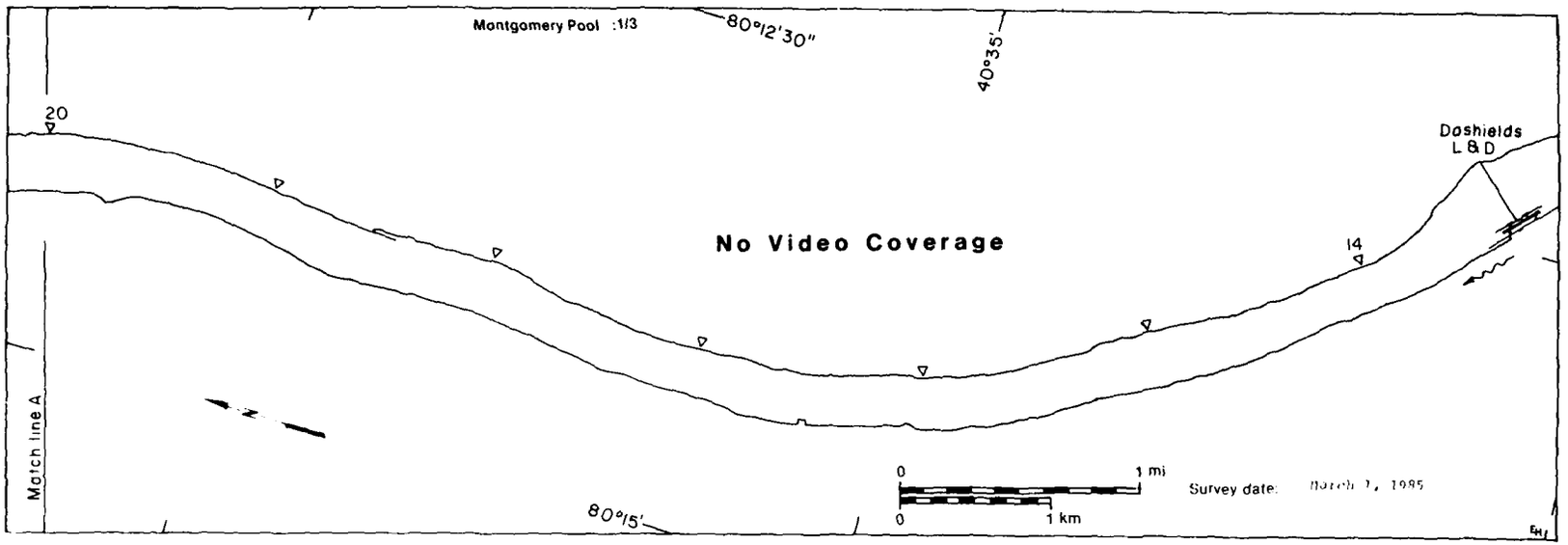


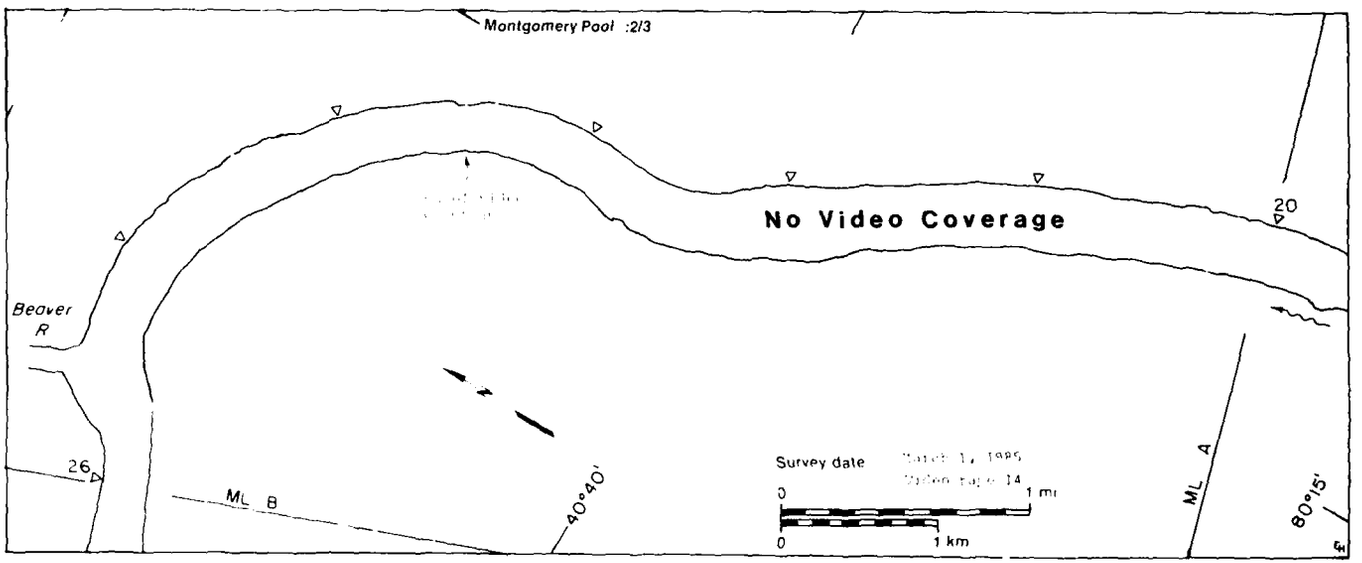
Total Area ($m^2 \times 10^6$) 4.73

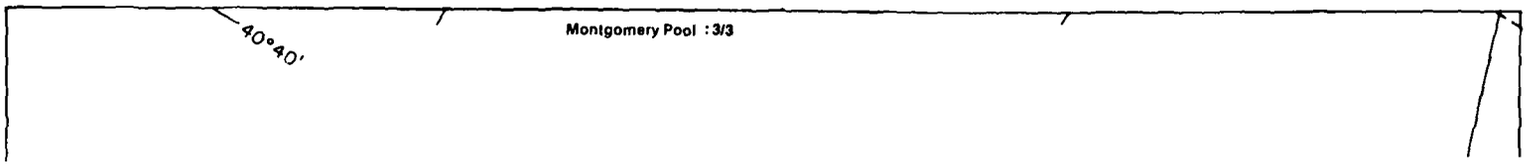


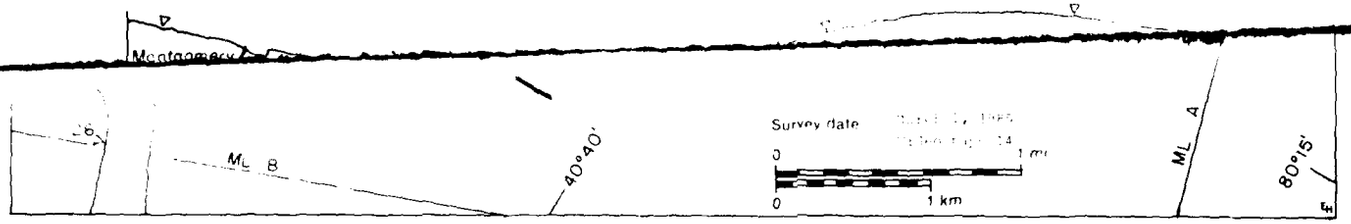


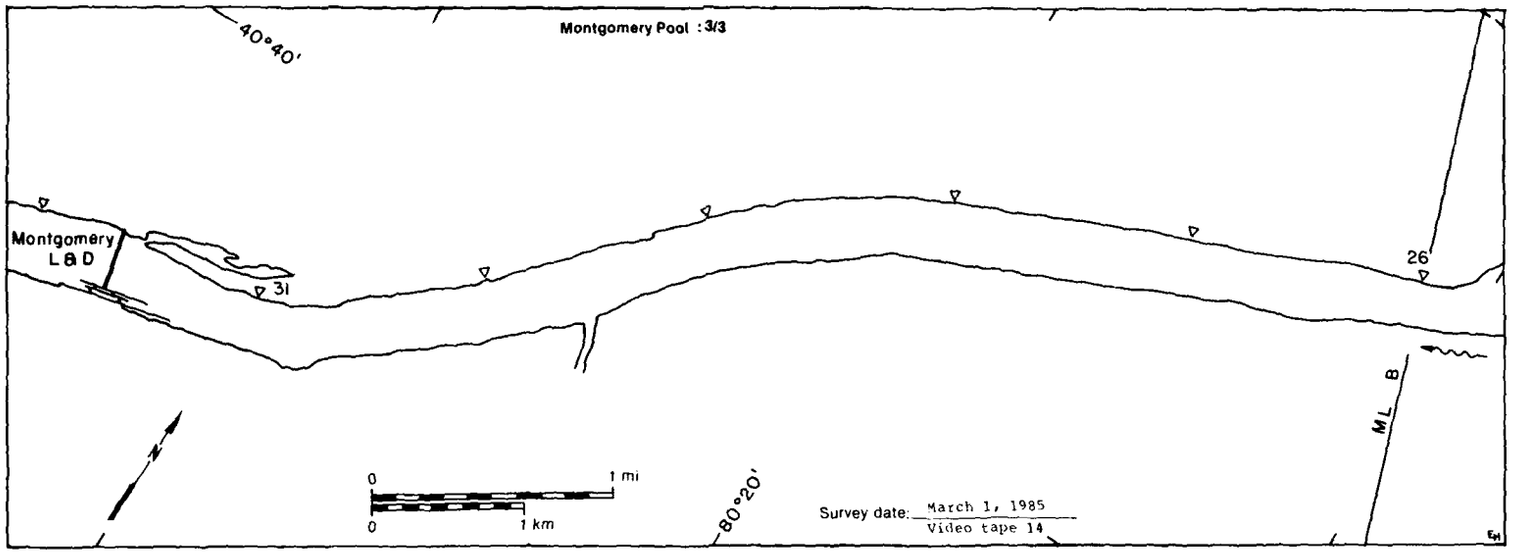
1 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Dashields L&D
No Video Coverage
14
Match line A
0
1 mi
0
1 km
Survey date:
80°15'


Montgomery Pool :2/3
No Video Coverage
20
Beaver R
26
ML B
40°40'
Survey date
0
1 mi
0
1 km
ML A
80°15'


40°40'
Montgomery Pool :3/3

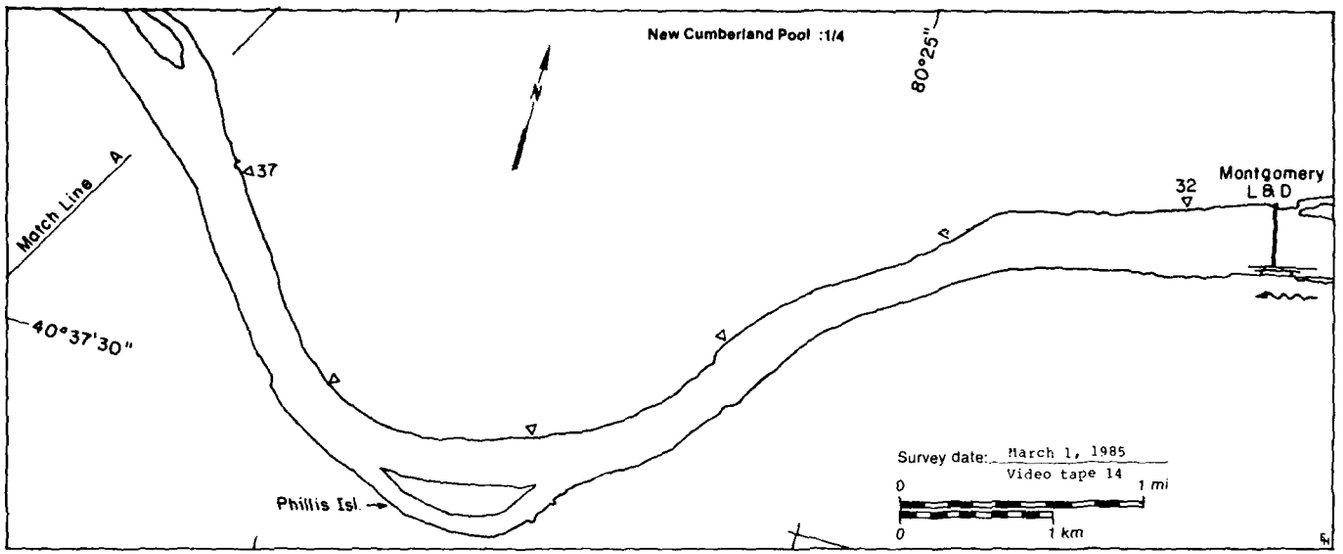


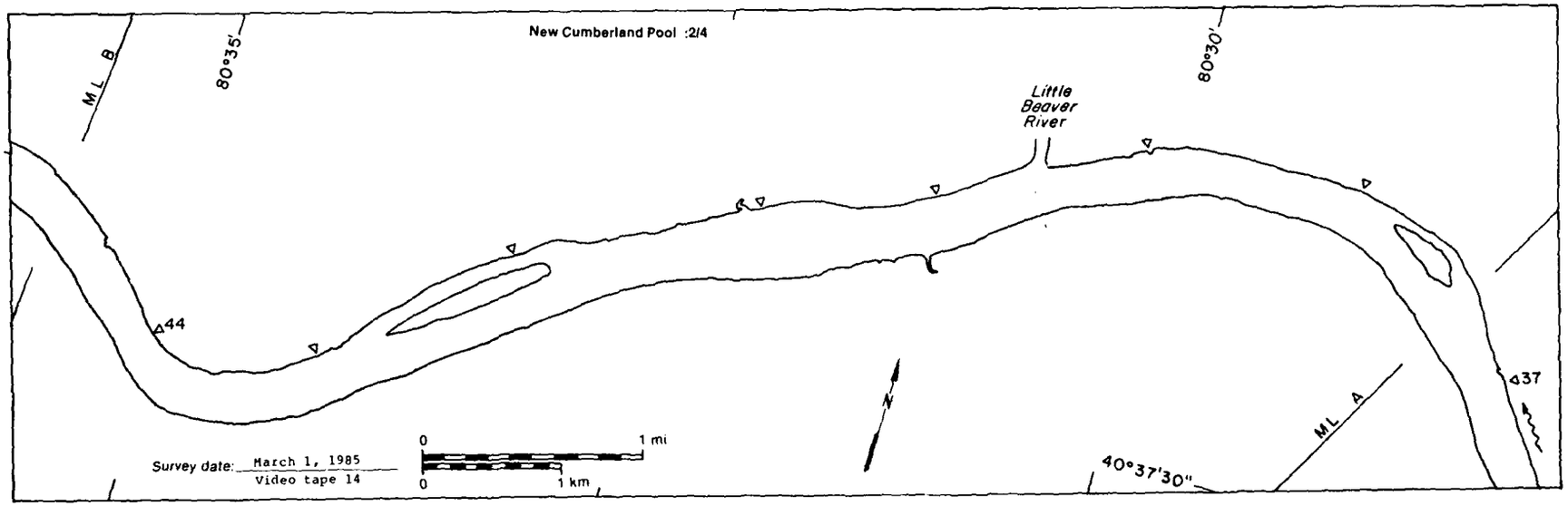


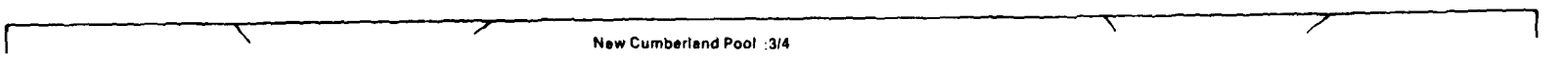
Montgomery Pool

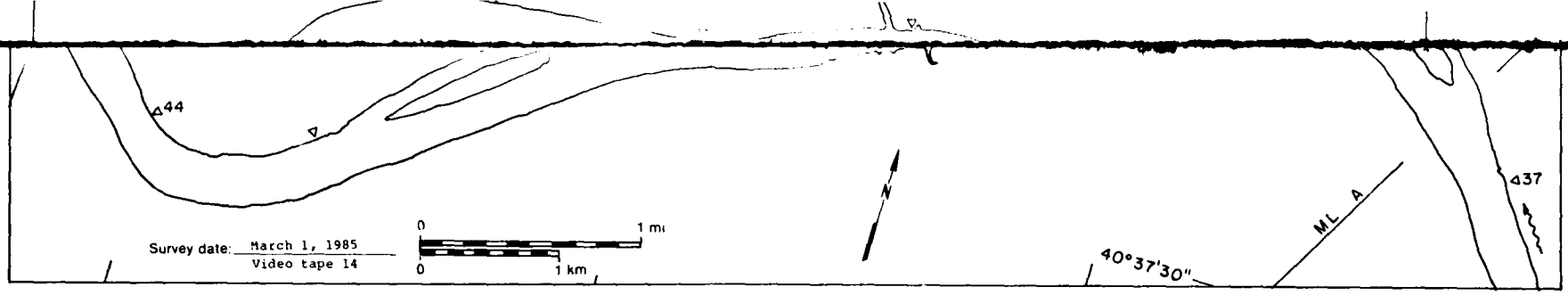
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	5.03	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27*	

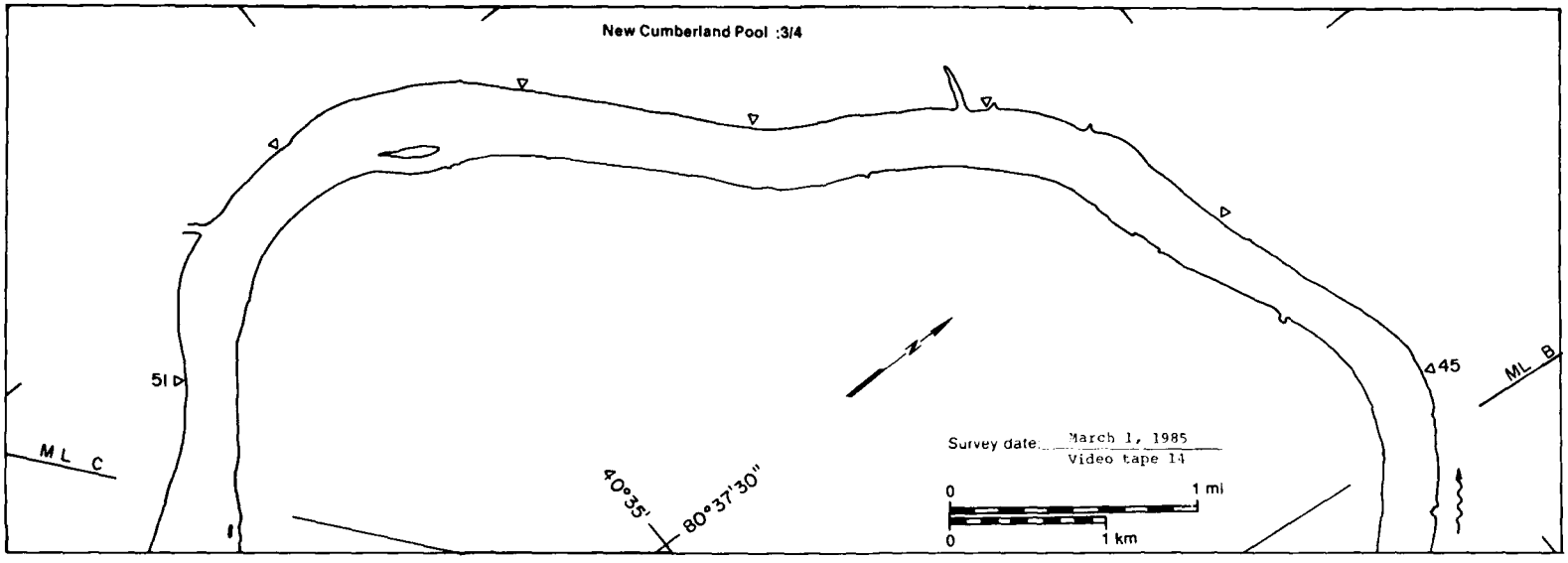
*Includes 6.24 no video coverage


New Cumberland Pool :1/4
80°25"
N
Match Line A
37
32
Montgomery
L&D
40°37'30"
Phillis Isl.
Survey date: March 1, 1985
Video tape 14
0
1 mi
0
1 km

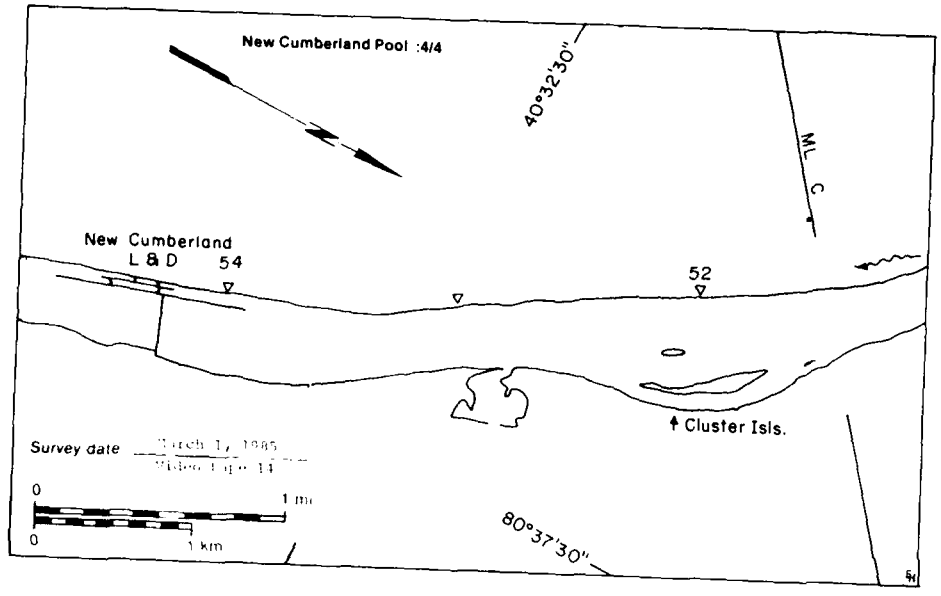

New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little
Beaver
River
44
37
ML A
40°37'30"
Survey date: March 1, 1985
Video tape 14
0
1 mi
0
1 km


New Cumberland Pool :3/4


44
37
Survey date: March 1, 1985
Video tape 14
0
1 mi
0
1 km
40°37'30"
ML A

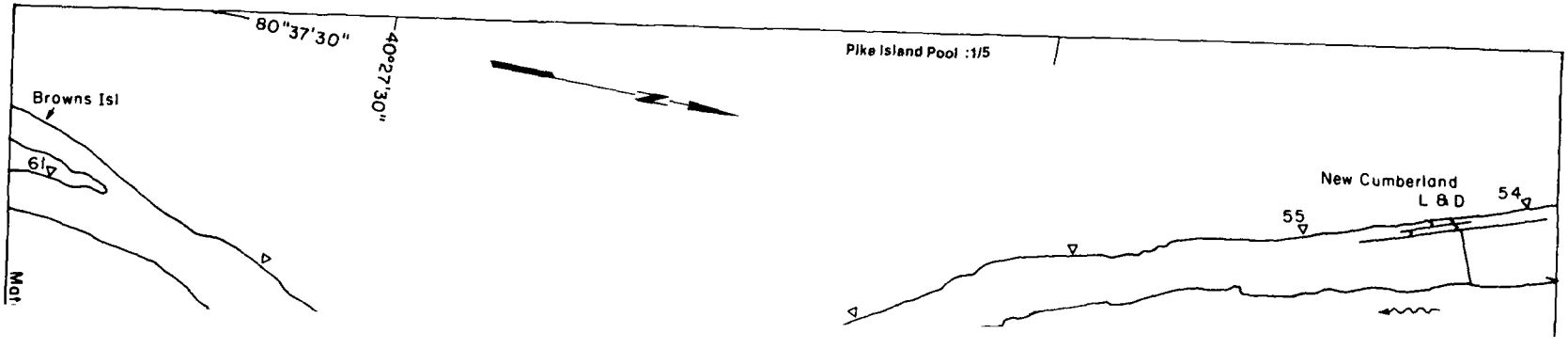

New Cumberland Pool :3/4
51
45
ML B
ML C
40°35'
80°37'30"
Survey date: March 1, 1985
Video tape 14
0
1 mi
0
1 km

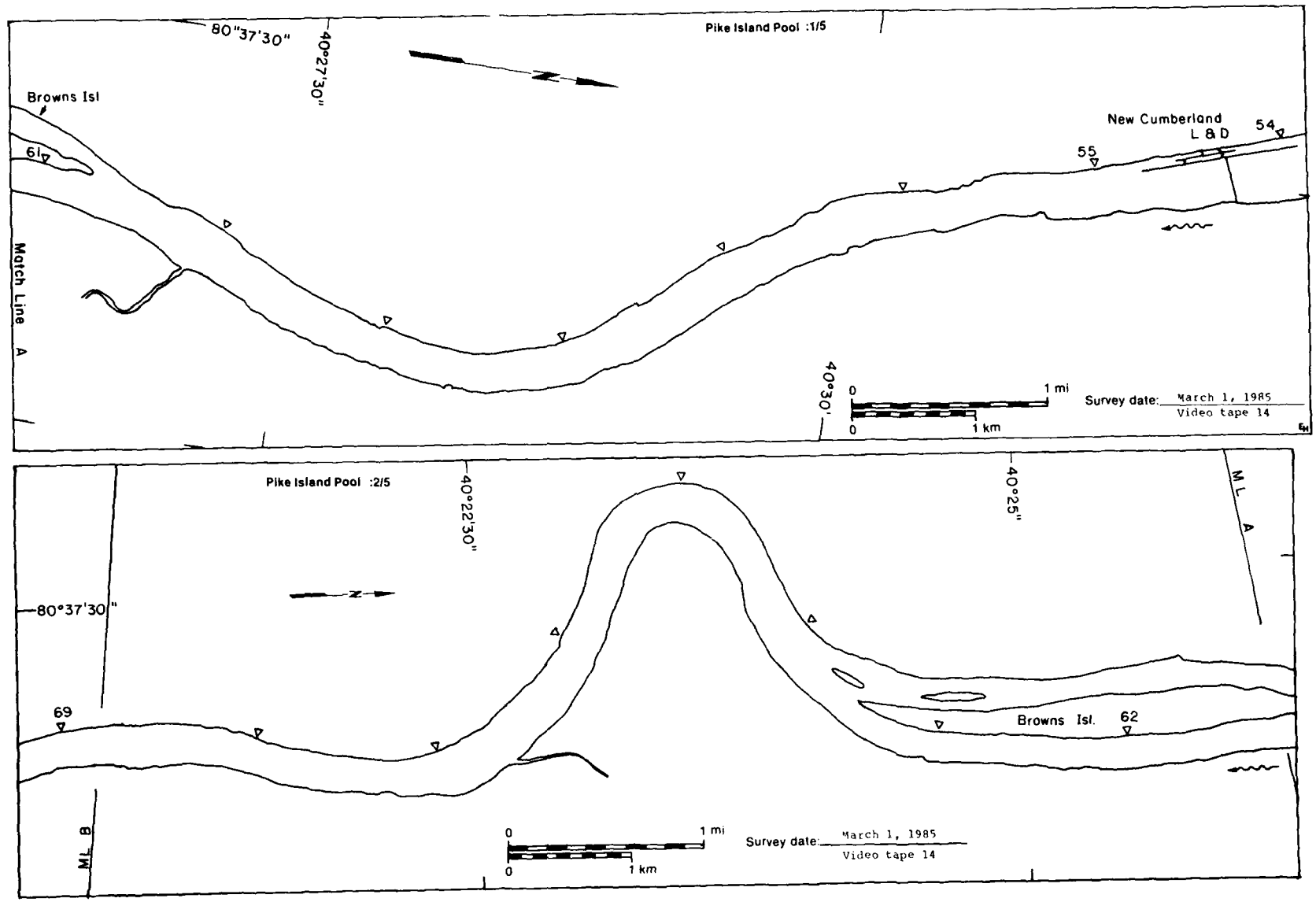
1 March 1985

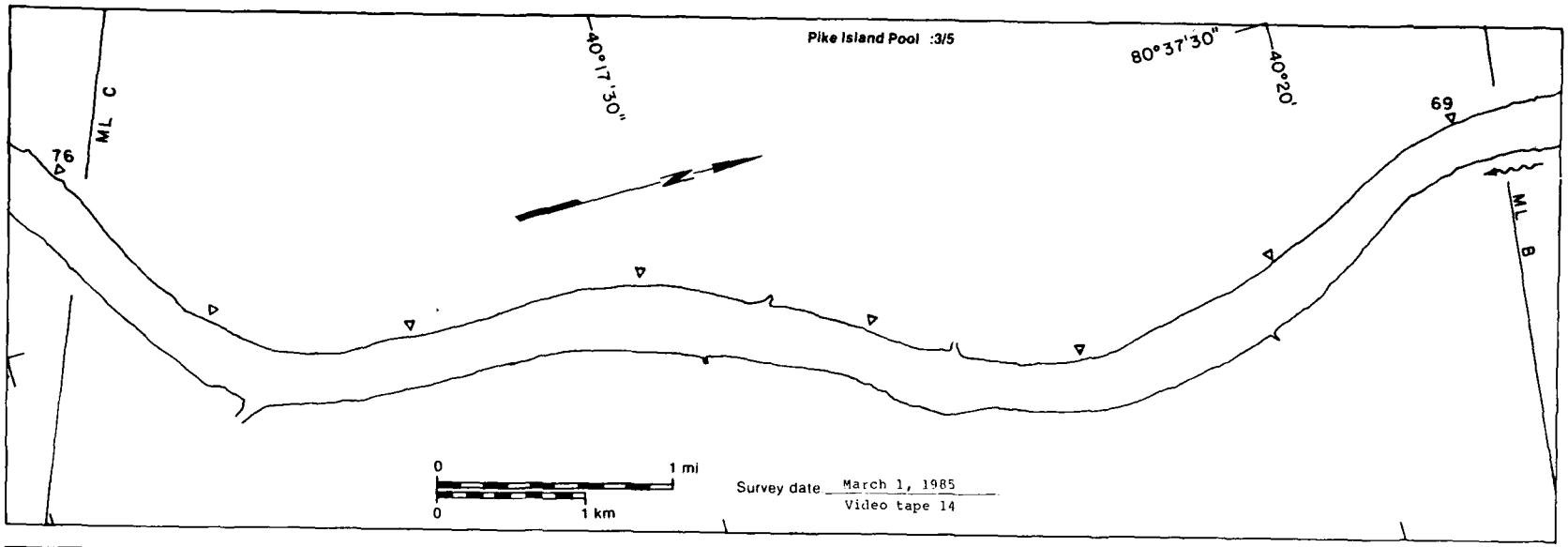


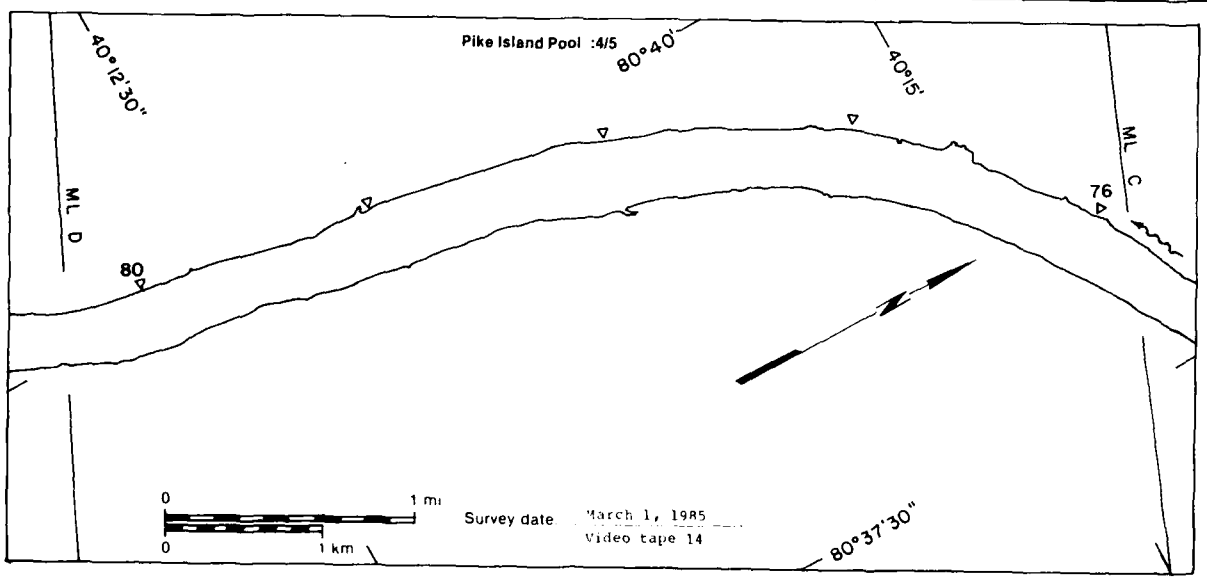
New Cumberland Pool

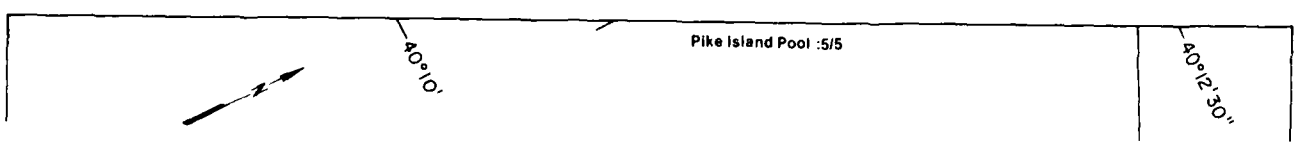
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	14.87	

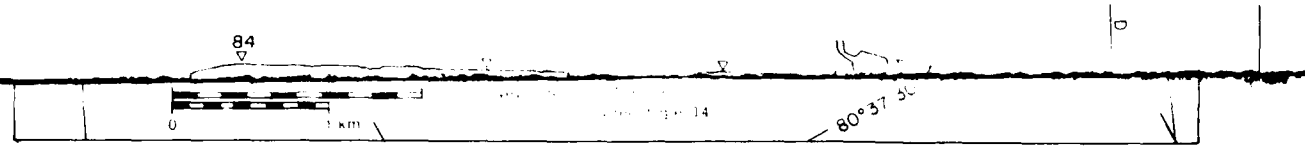


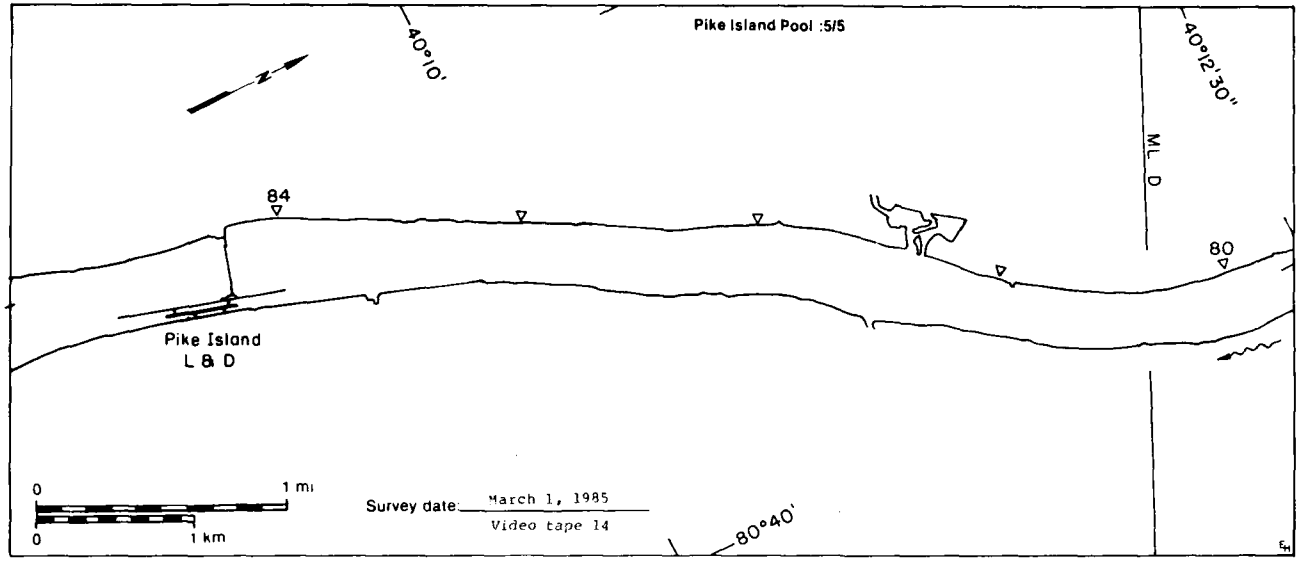

Pike Island Pool :1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L&D
54
55
March Line A
40°30'
0
1 mi
0
1 km
Survey date: March 1, 1985
Video tape 14
Pike Island Pool :2/5
40°22'30"
40°25"
M L A
80°37'30"
69
Browns Isl.
62
M L B
0
1 mi
0
1 km
Survey date: March 1, 1985
Video tape 14


Pike Island Pool :3/5
40°17'30"
80°37'30"
40°20'
ML C
ML B
76
69
0
1 mi
0
1 km
Survey date March 1, 1985
Video tape 14


Pike Island Pool :4/5
40°12'30"
80°40'
40°15'
ML D
ML C
80
76
0
1 mi
0
1 km
Survey date March 1, 1985
Video tape 14
80°37'30"


Pike Island Pool :5/5
40°10'
40°12'30"

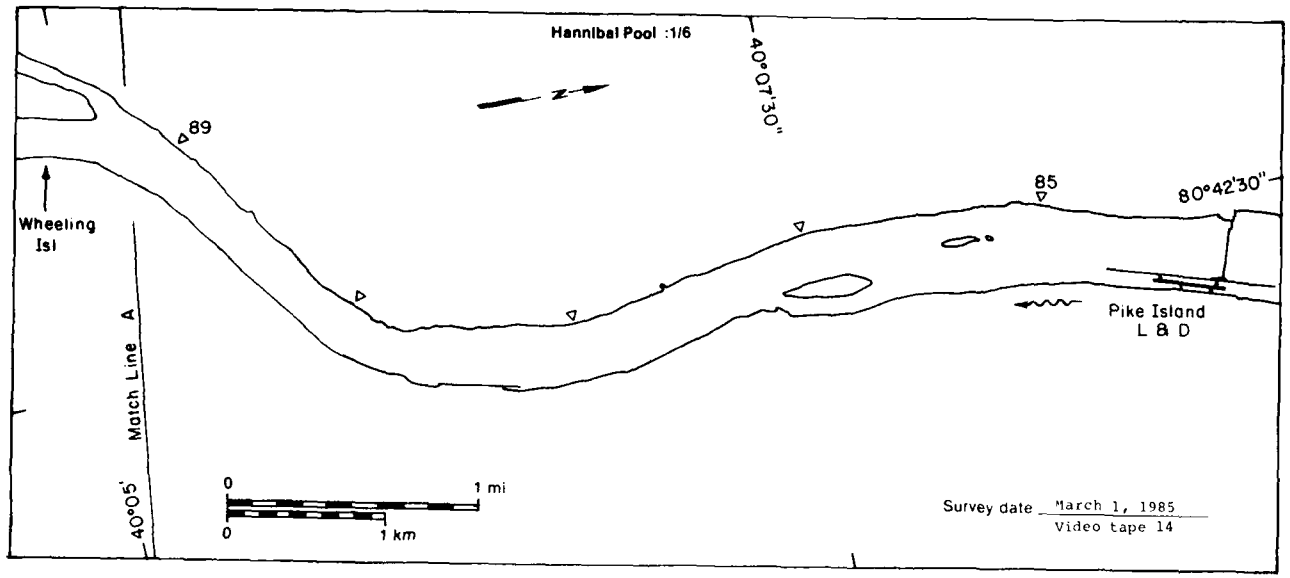


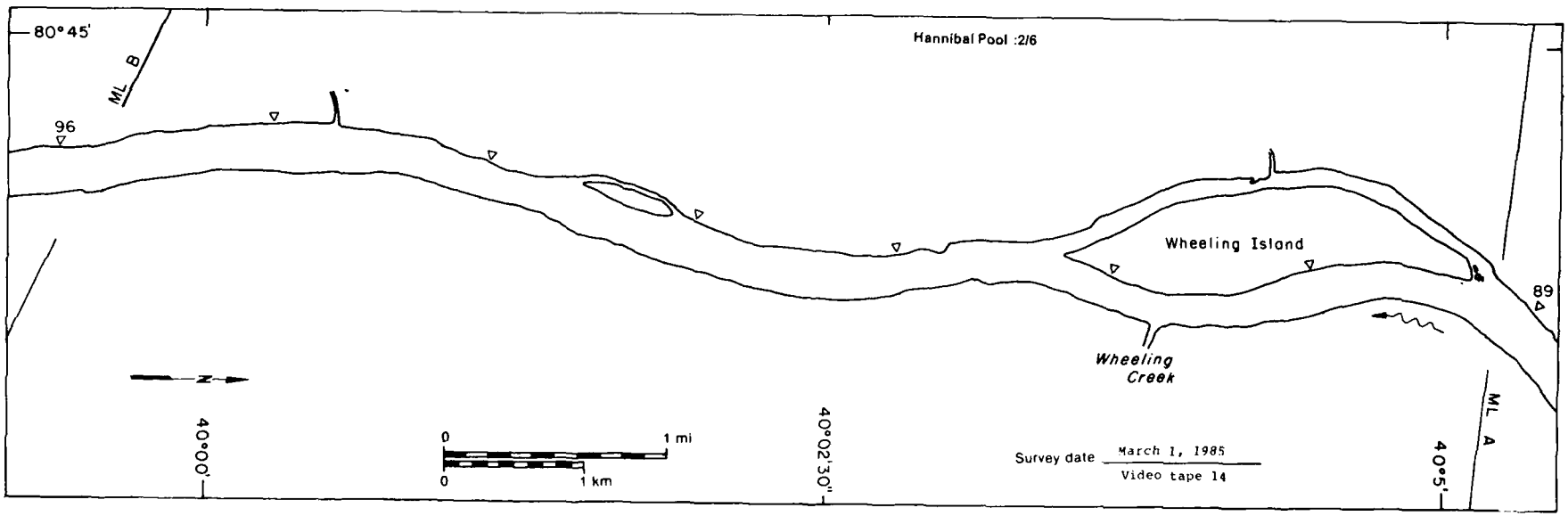


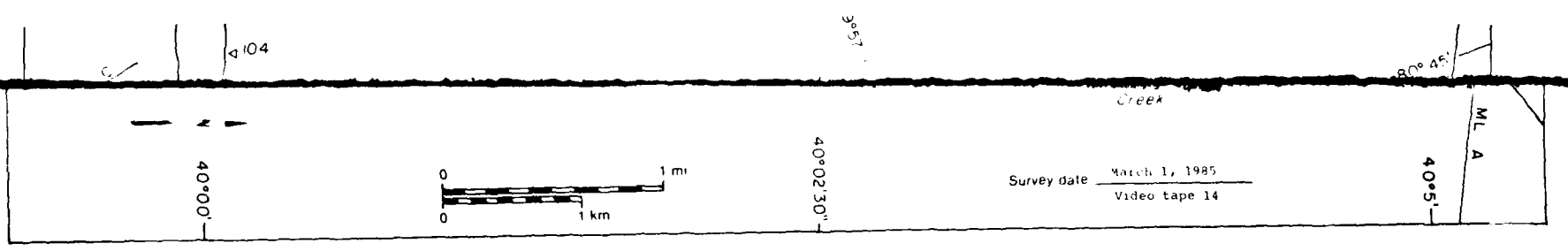
Pike Island Pool

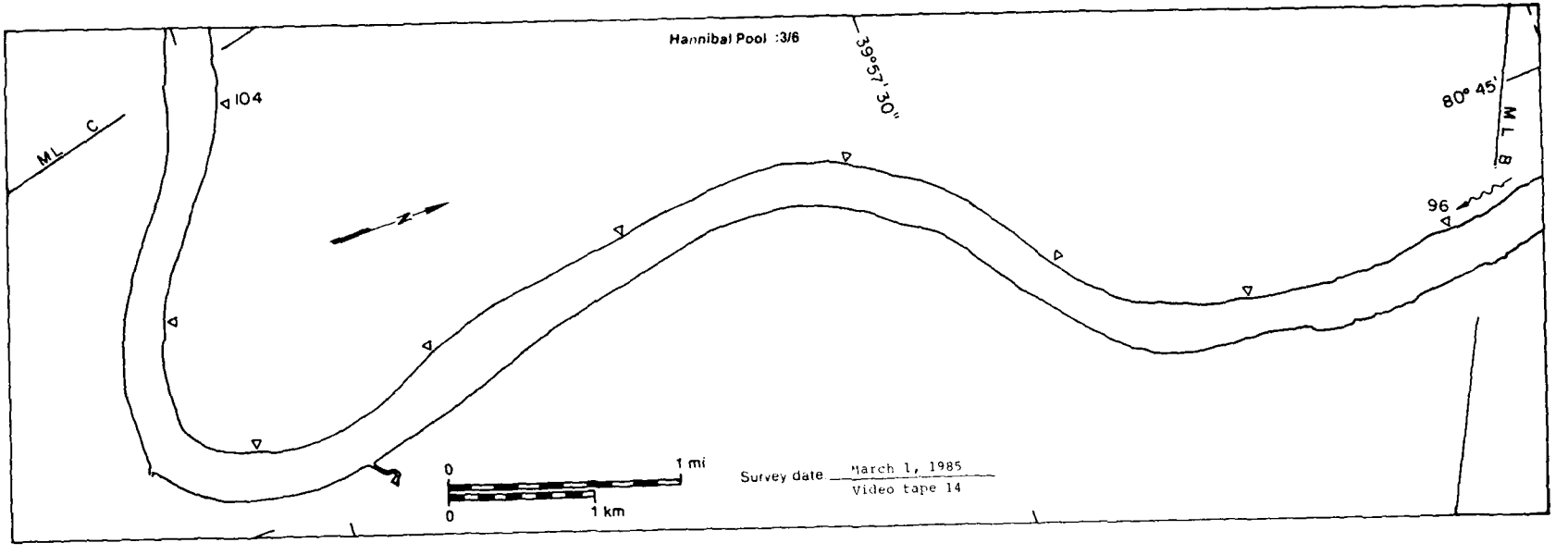
MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	18.92	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area (m^2 x 10^6)	18.92	

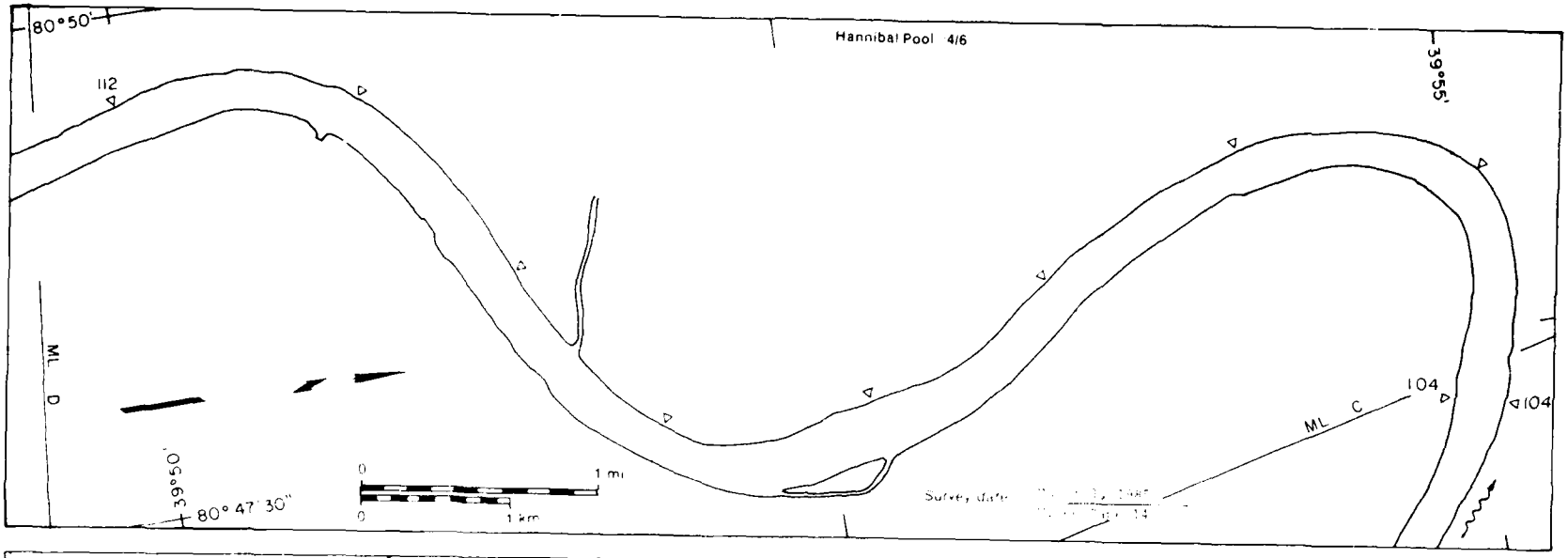
1 March 1985

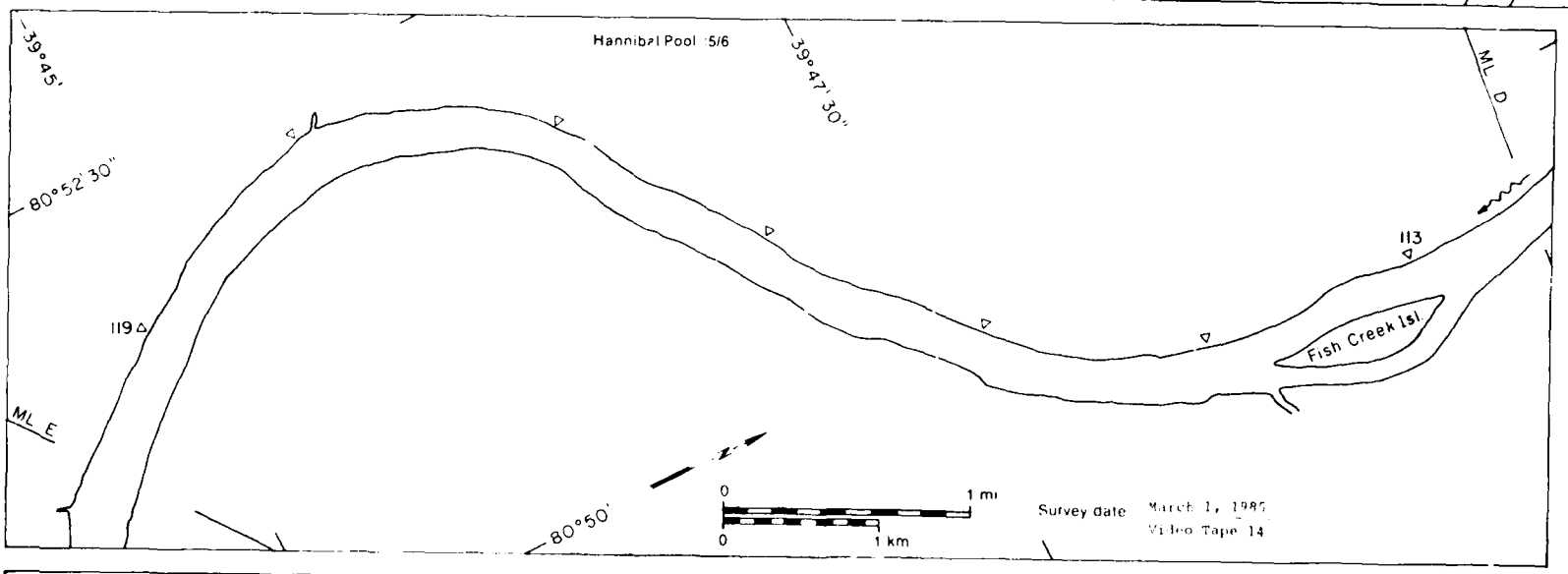

Hannibal Pool :1/6
40°07'30"
N
89
85
80°42'30"
Wheeling Isl
Match Line A
Pike Island L & D
40°05'
0
1 mi
0
1 km
Survey date March 1, 1985
Video tape 14

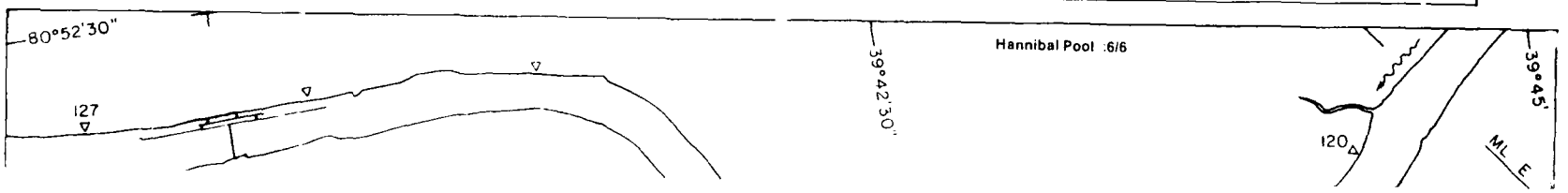

80°45'
ML B
Hannibal Pool :2/6
96
Wheeling Island
89
Wheeling Creek
N
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 1, 1985
Video tape 14
ML A
40°05'

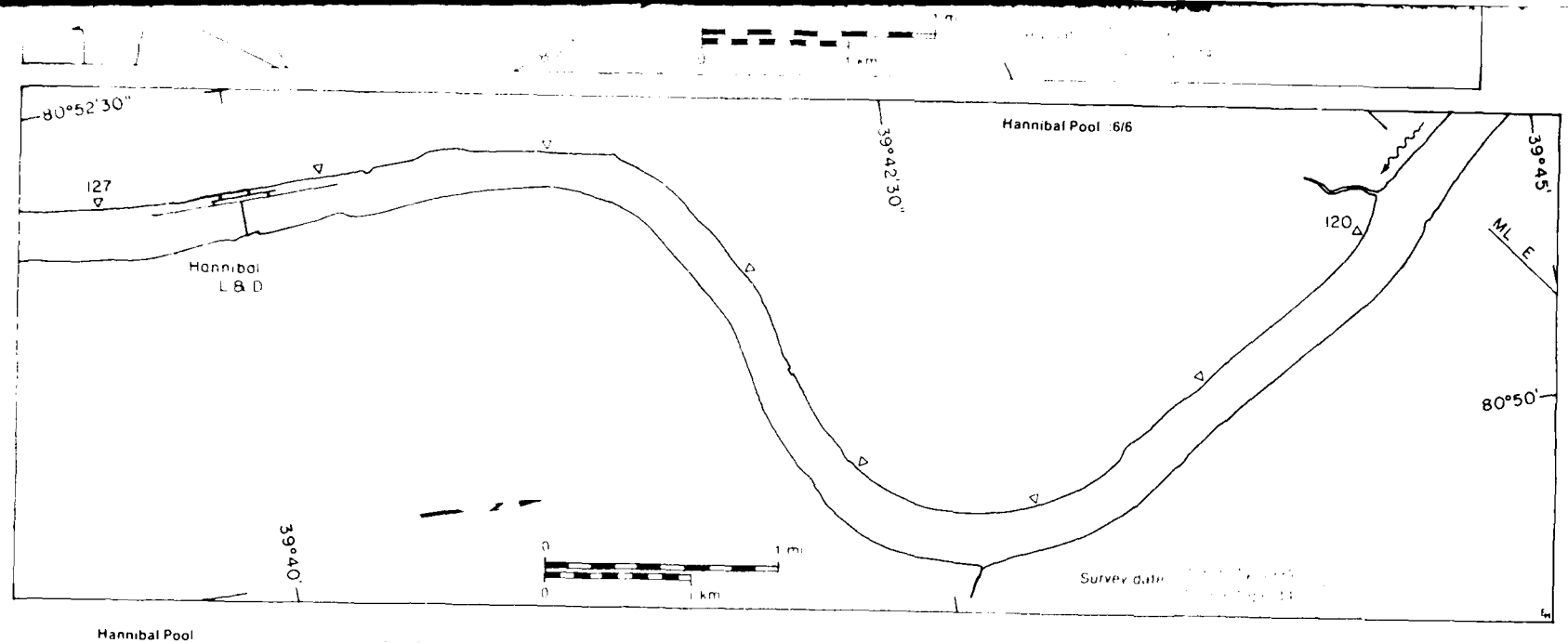

104
39°57'
80° 45'
Creek
ML A
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 1, 1985
Video tape 14
40°5'


Hannibal Pool :3/6
39°57'30"
104
ML C
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date March 1, 1985
Video tape 14

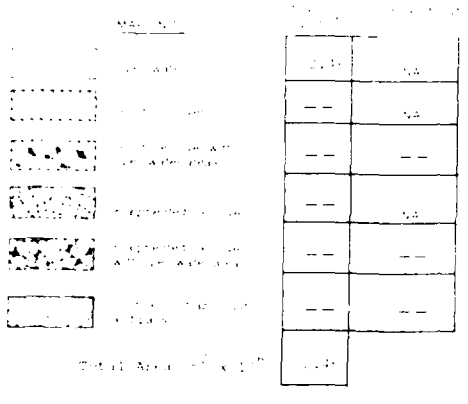

80°50'
Hannibal Pool 4/6
39°55'
112
ML D
39°50'
80° 47' 30"
0
1 mi
0
1 km
Survey date
ML C
104
104


Hannibal Pool 5/6
39°45'
39°47' 30"
ML D
80°52'30"
113
119
Fish Creek Isl
ML E
80°50'
0
1 mi
0
1 km
Survey date March 1, 1985
Video Tape 14

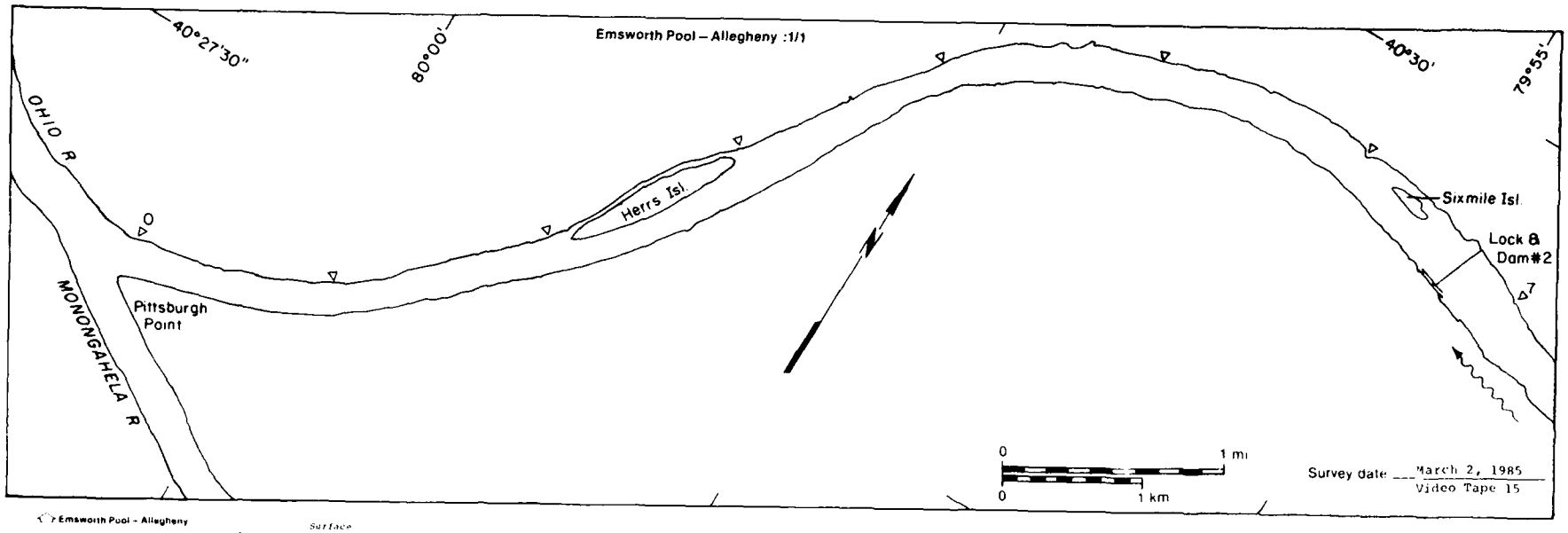

80°52'30"
Hannibal Pool 6/6
39°42'30"
39°45'
127
120
ML E



Hannibal Pool



2 March 1985

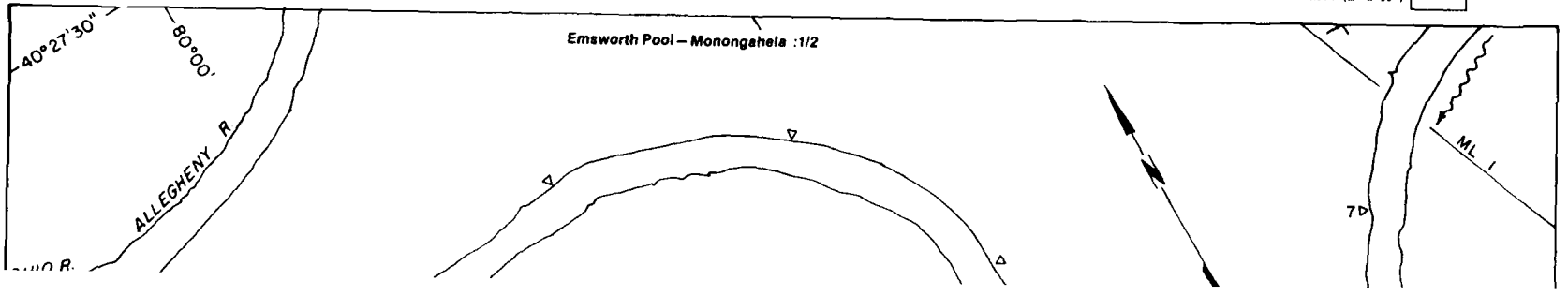


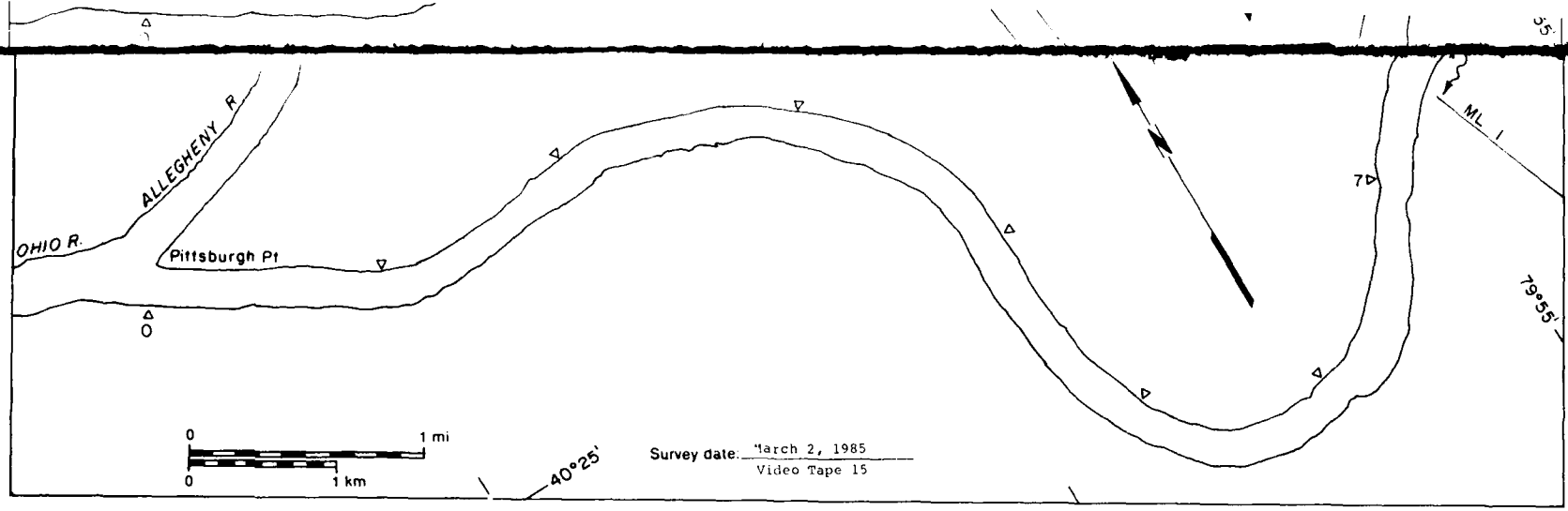
Emsworth Pool – Allegheny

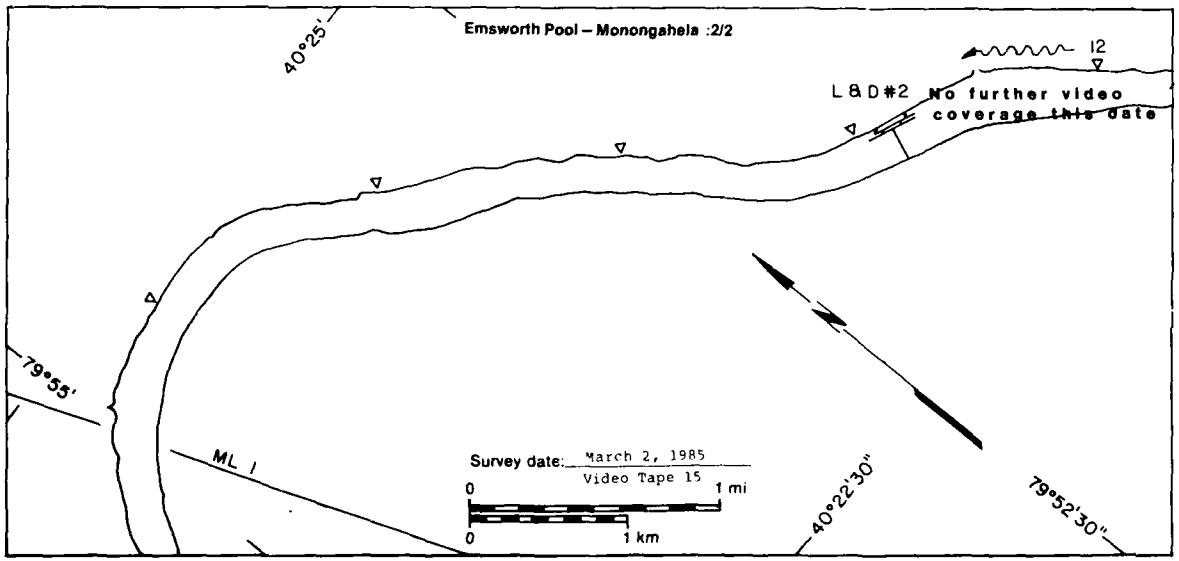
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.27	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

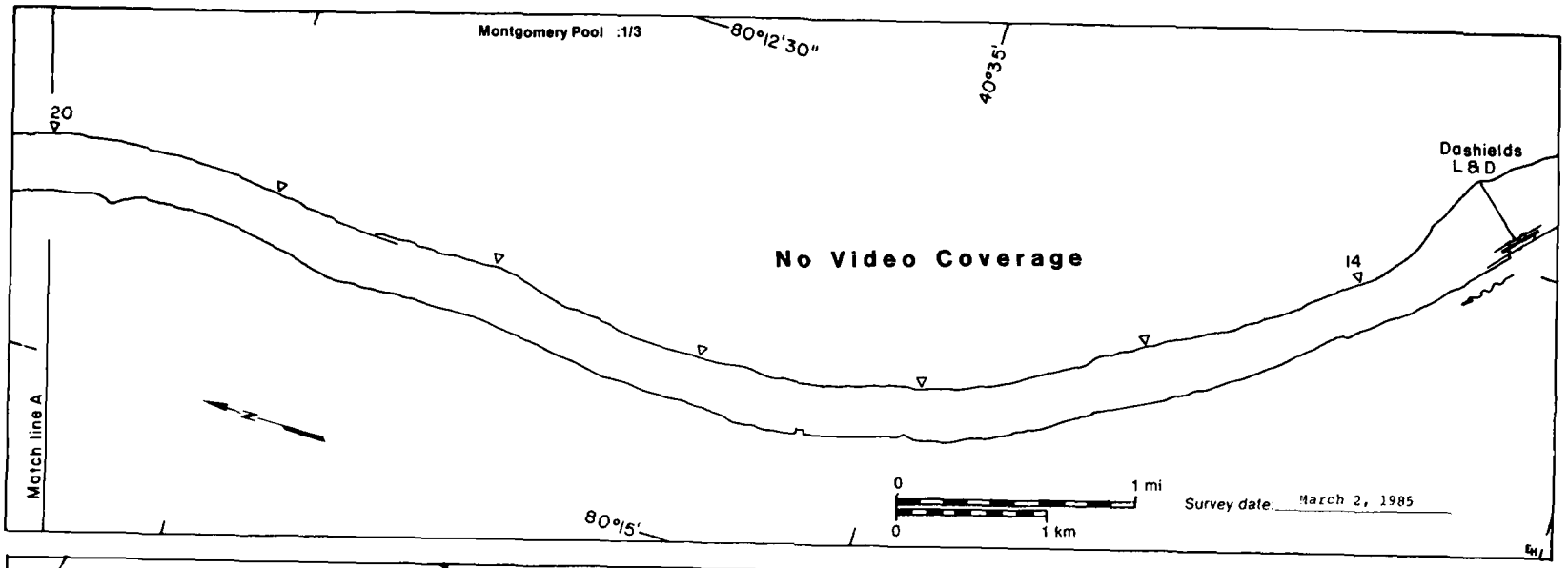
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.73	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	4.73	

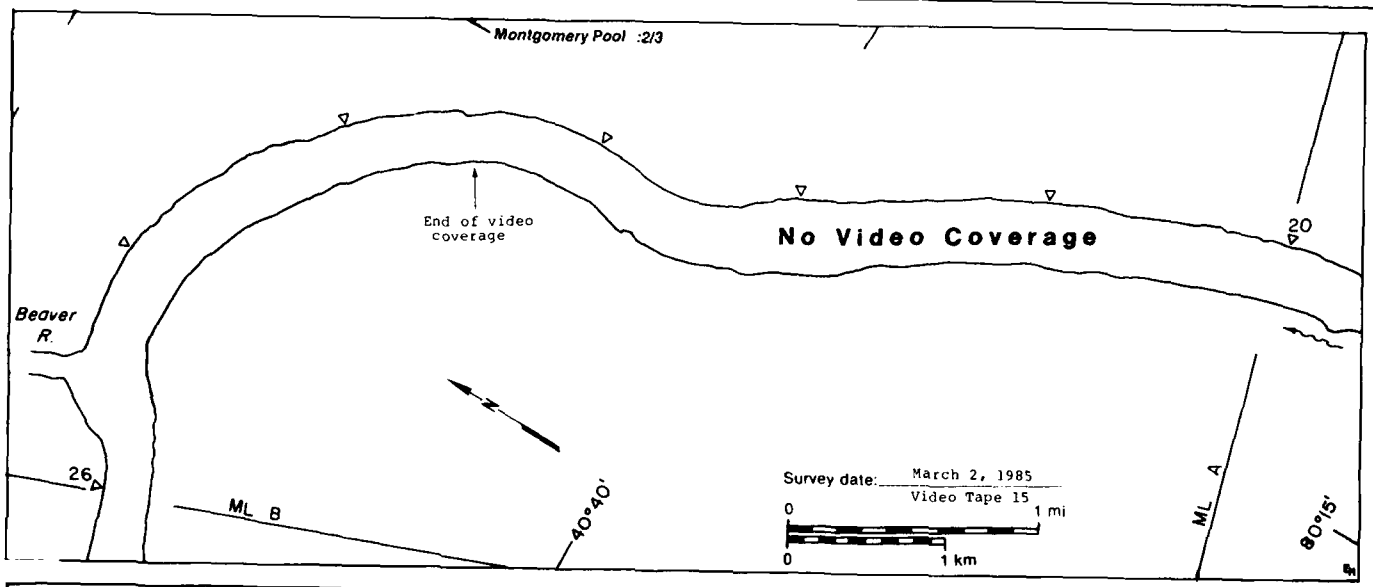


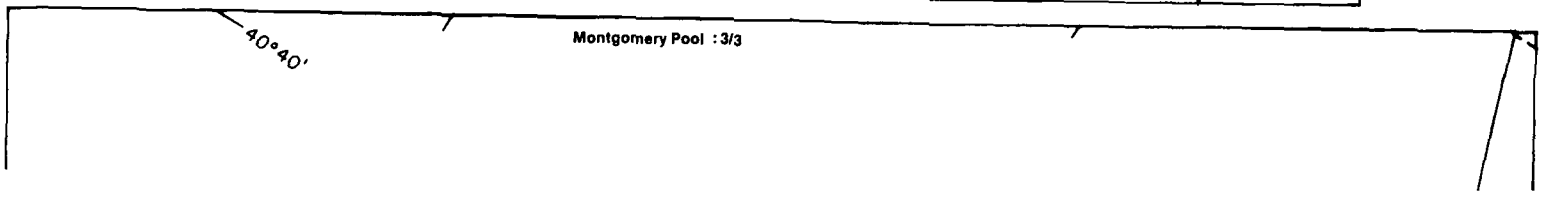

ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date: March 2, 1985
Video Tape 15

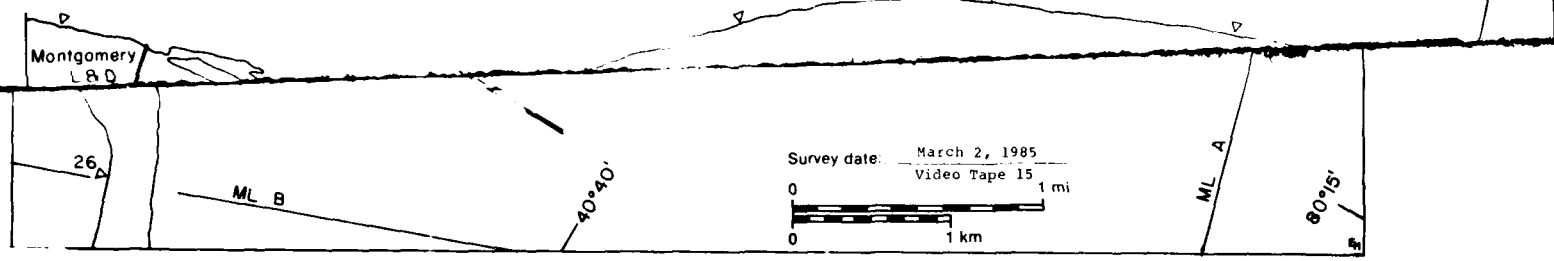

Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
No further video coverage this date
79°55'
ML 1
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km
40°22'30"
79°52'30"

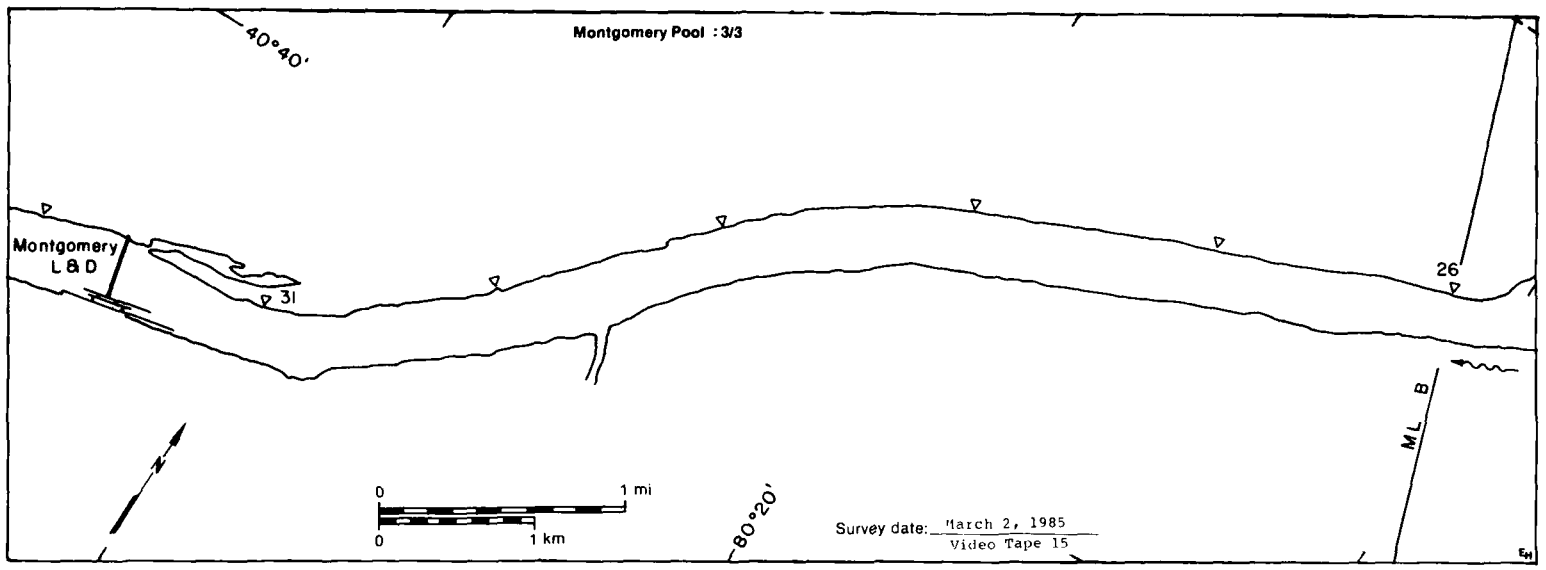
2 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Dashields L&D
No Video Coverage
14
Match line A
0
1 mi
0
1 km
Survey date: March 2, 1985
80°15'


Montgomery Pool :2/3
End of video coverage
No Video Coverage
20
Beaver R.
26
ML B
40°40'
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km
ML A
80°15'


40°40'
Montgomery Pool :3/3



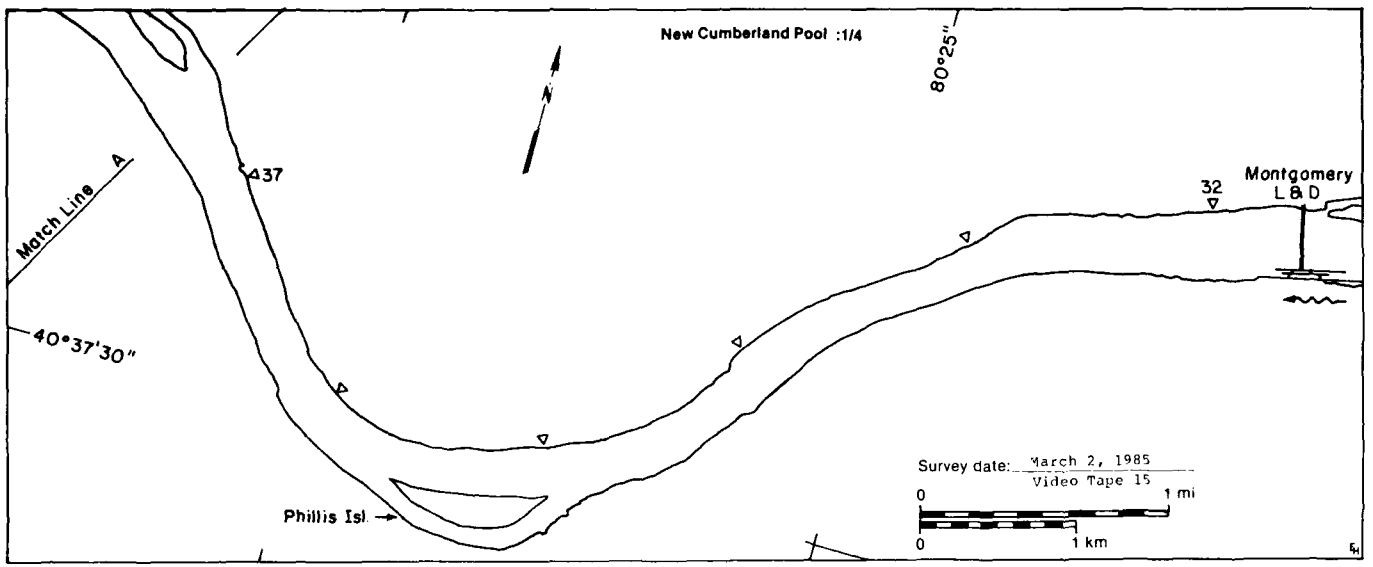


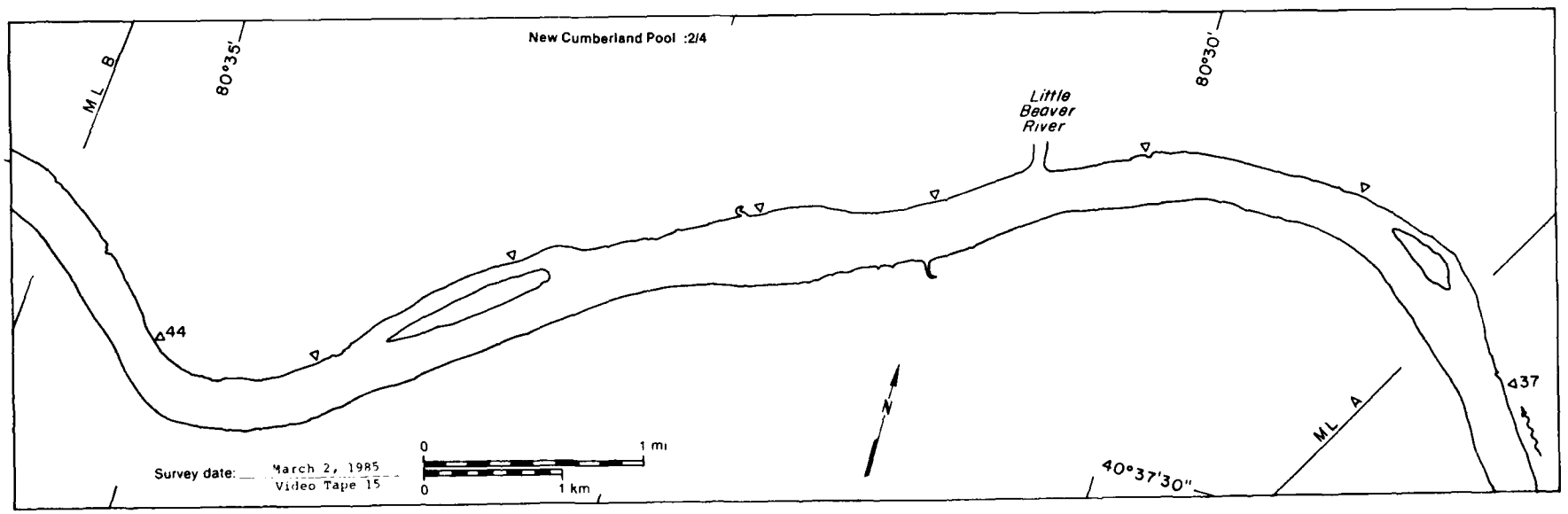
Montgomery Pool

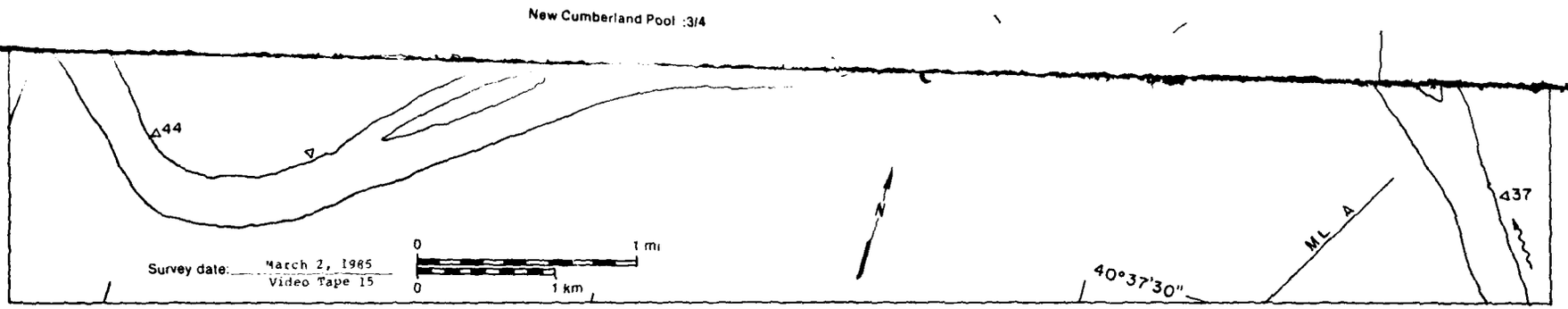
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	11.27	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27*	

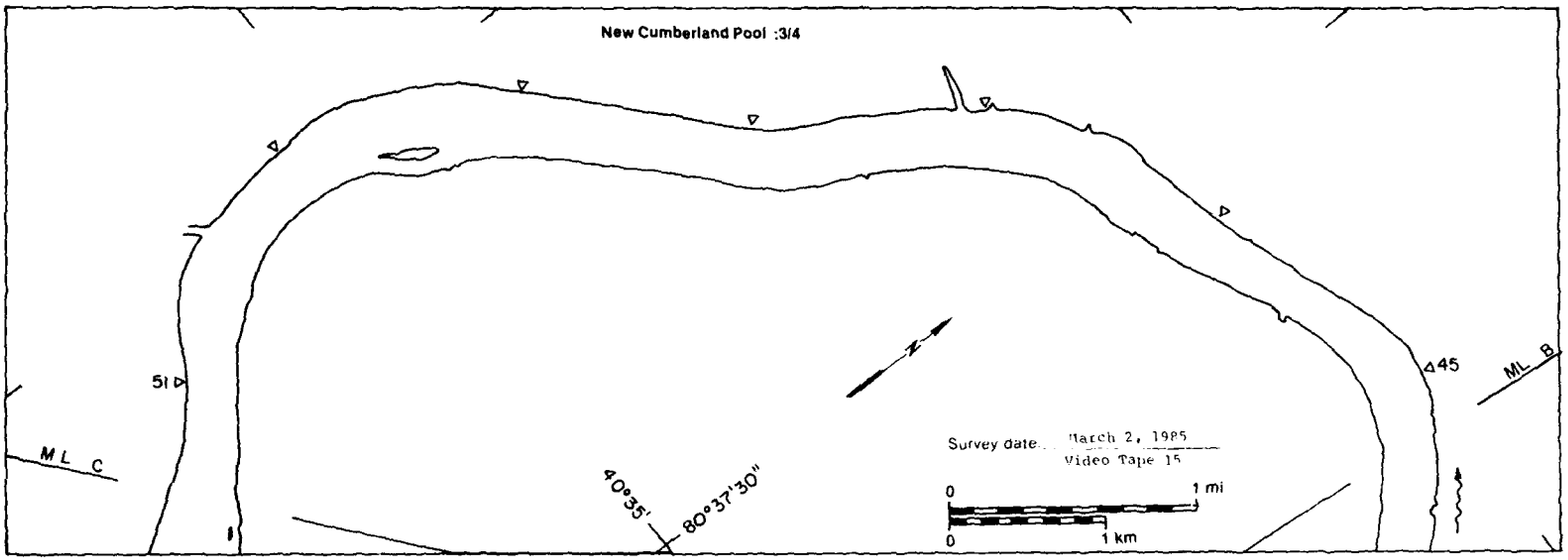
*Includes 6.24 no video coverage

2 March 1985

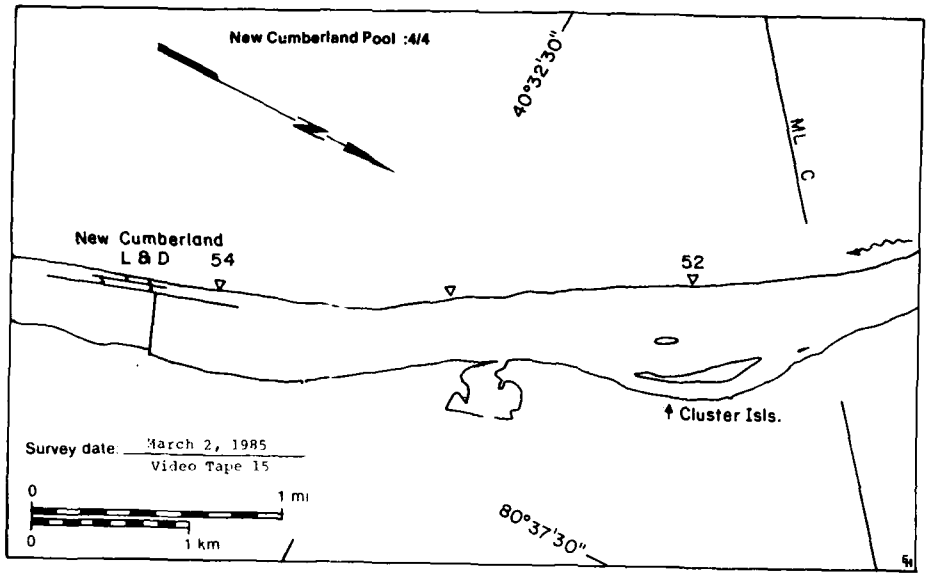

New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery
L & D
40°37'30"
Phillis Isl.
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km


New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little
Beaver
River
44
37
ML A
40°37'30"
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km


New Cumberland Pool :3/4
44
437
N
ML A
40°37'30"
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km

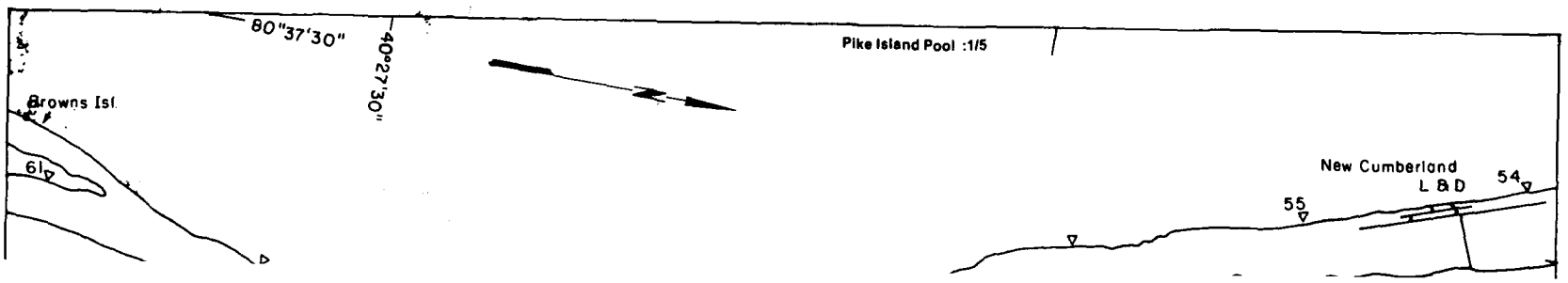

New Cumberland Pool :3/4
51
45
N
ML B
ML C
40°35'
80°37'30"
Survey date: March 2, 1985
Video Tape 15
0
1 mi
0
1 km

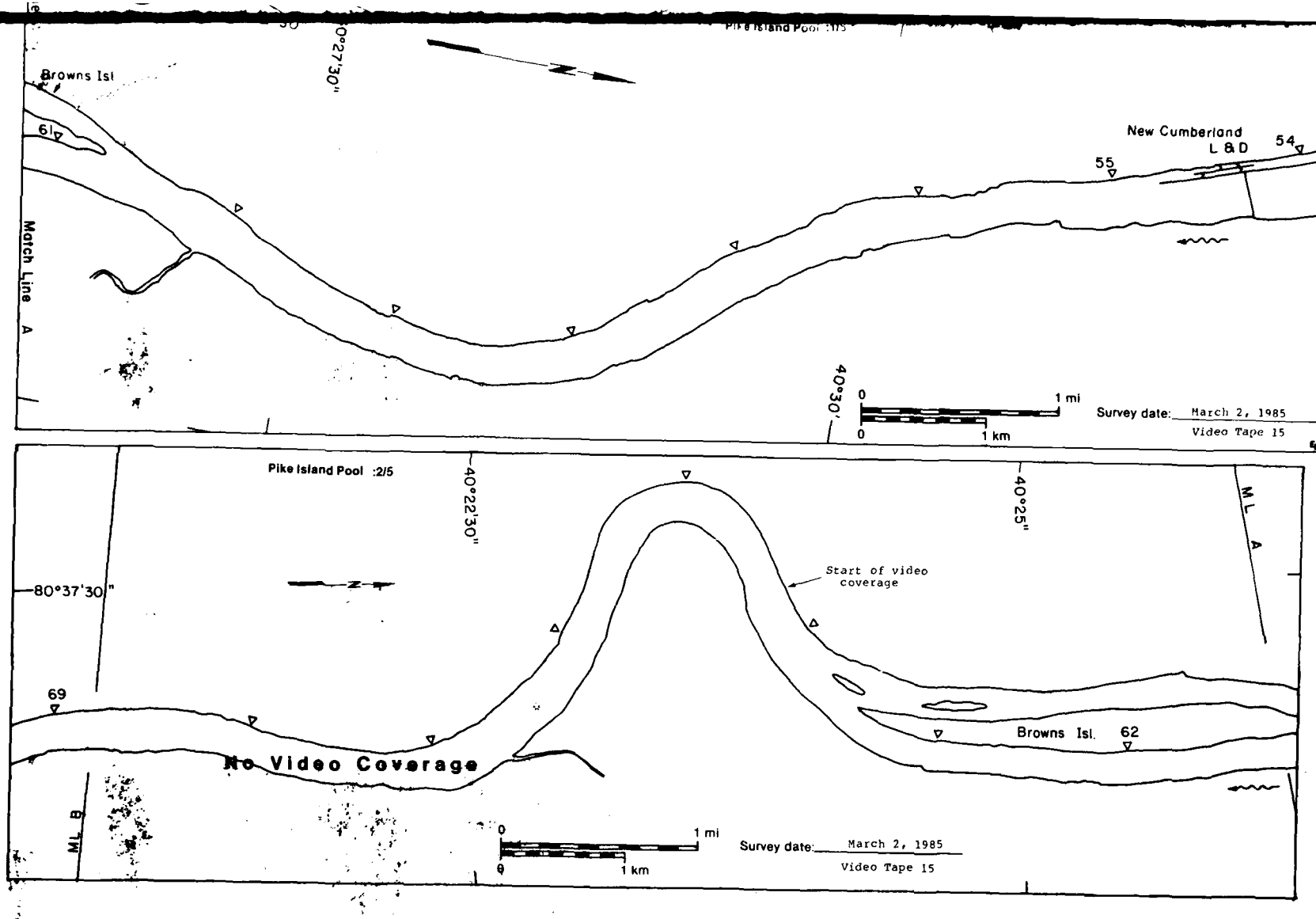
2 March 1985



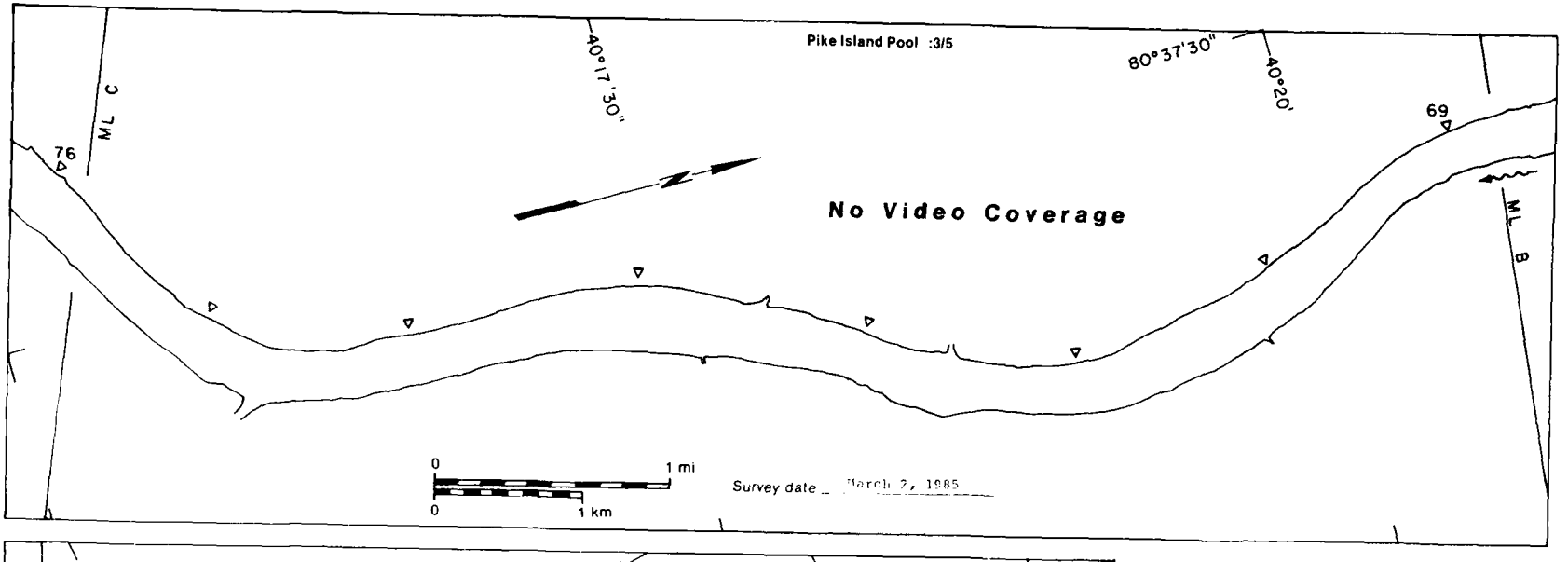
New Cumberland Pool

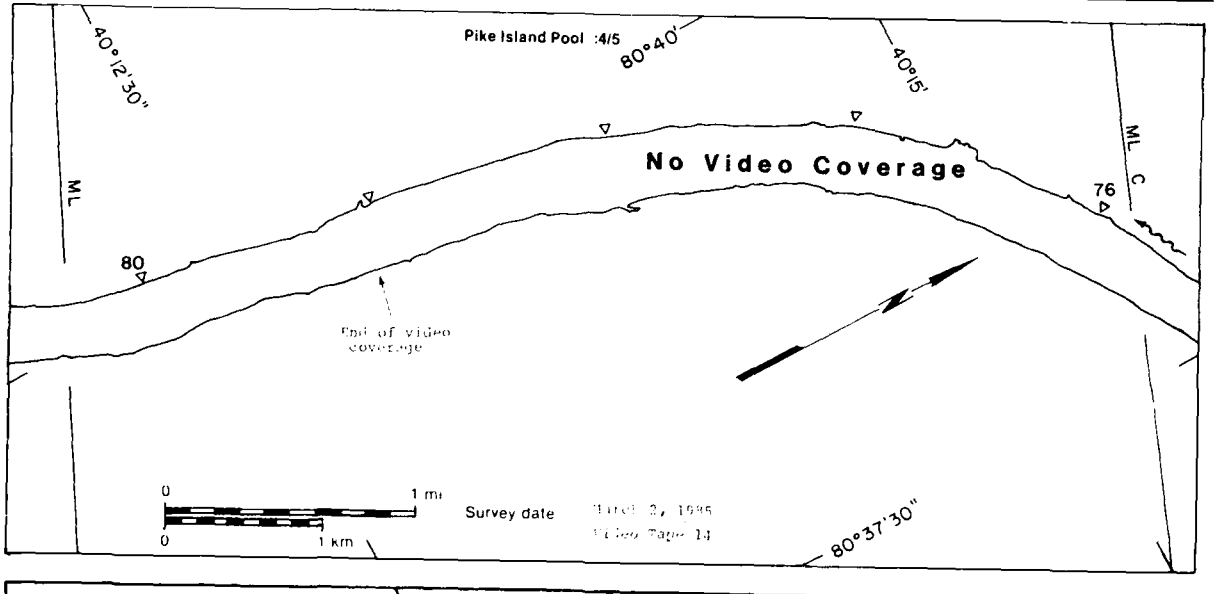
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	14.87	

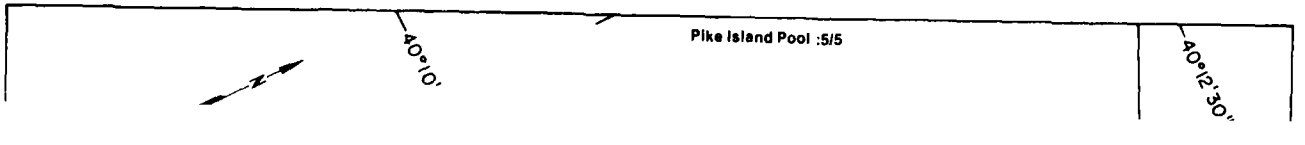


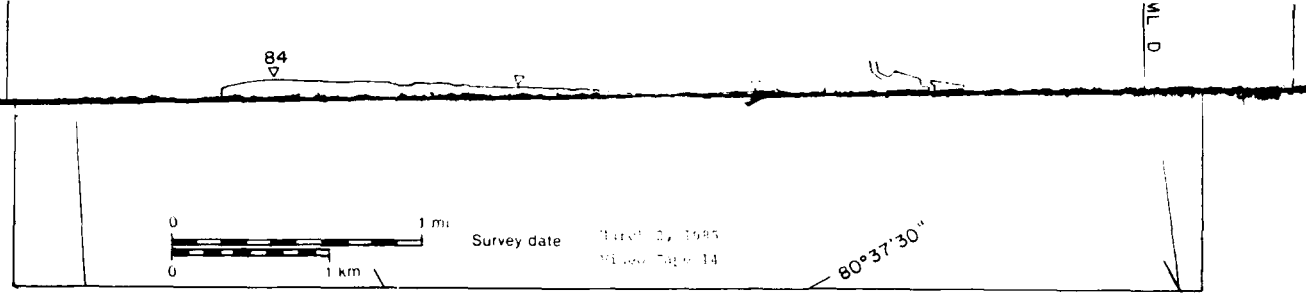

Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: March 2, 1985
Video Tape 15
Pike Island Pool :2/5
40°22'30"
40°25"
80°37'30"
Start of video coverage
69
No Video Coverage
Browns Isl.
62
ML A
ML B
0
1 mi
0
1 km
Survey date: March 2, 1985
Video Tape 15

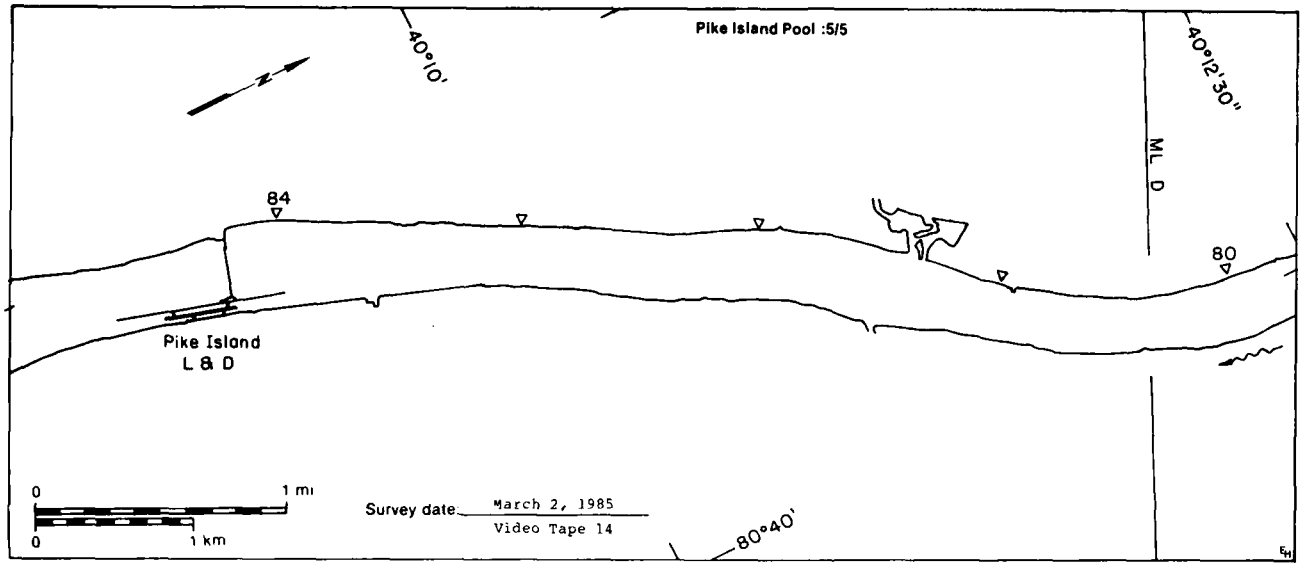
2 March 1985


Pike Island Pool :3/5
40°17'30"
80°37'30"
40°20'
ML C
76
69
ML B
No Video Coverage
0
1 mi
0
1 km
Survey date _ March 2, 1985


Pike Island Pool :4/5
40°12'30"
80°40'
40°15'
ML C
ML
No Video Coverage
76
80
End of video coverage
0
1 mi
0
1 km
Survey date March 2, 1985
Video Tape 14
80°37'30"


Pike Island Pool :5/5
40°10'
40°12'30"



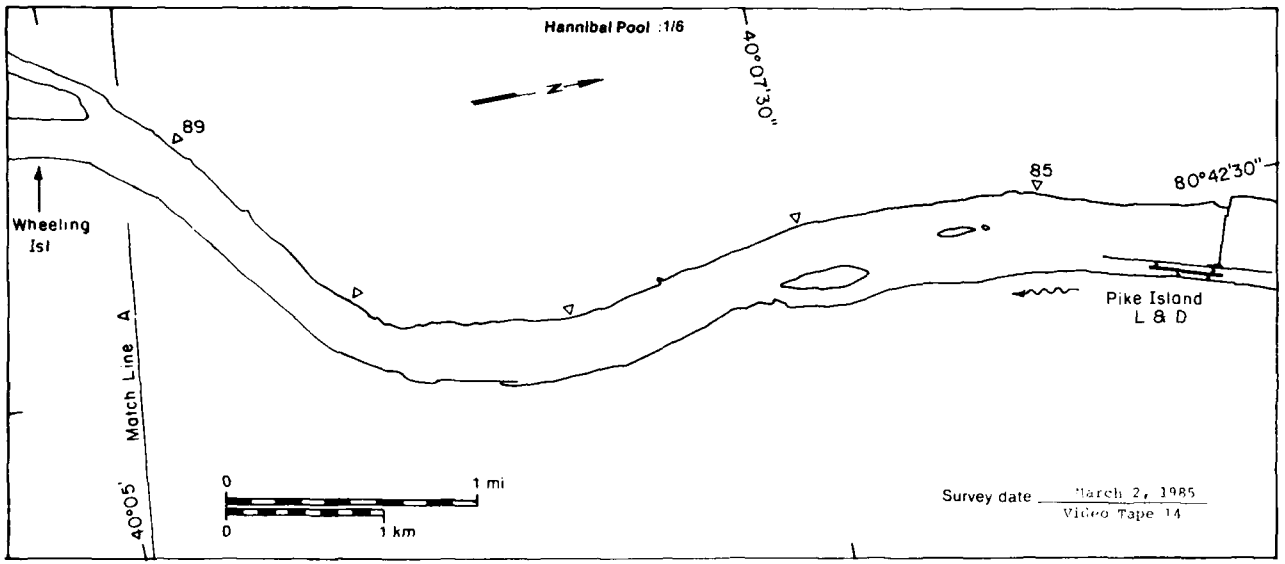


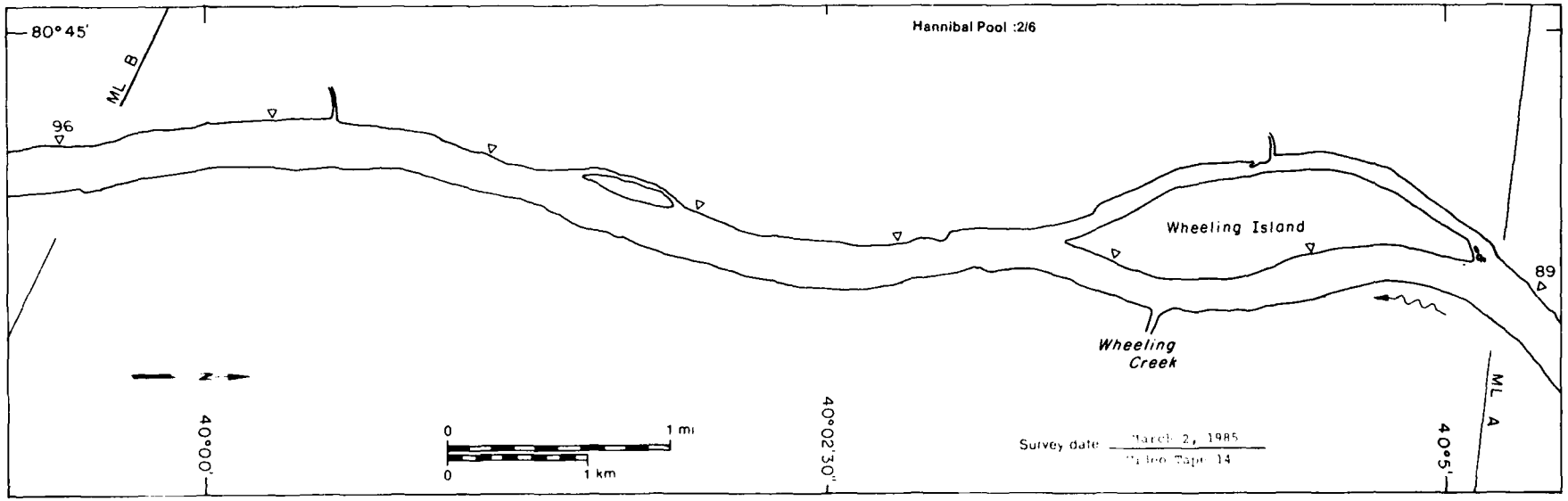
Pike Island Pool

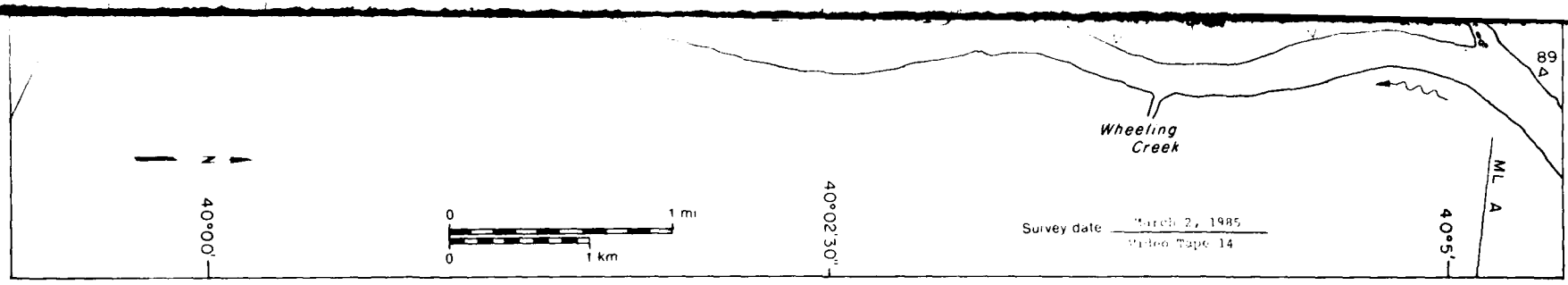
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	9.97	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	18.92*	

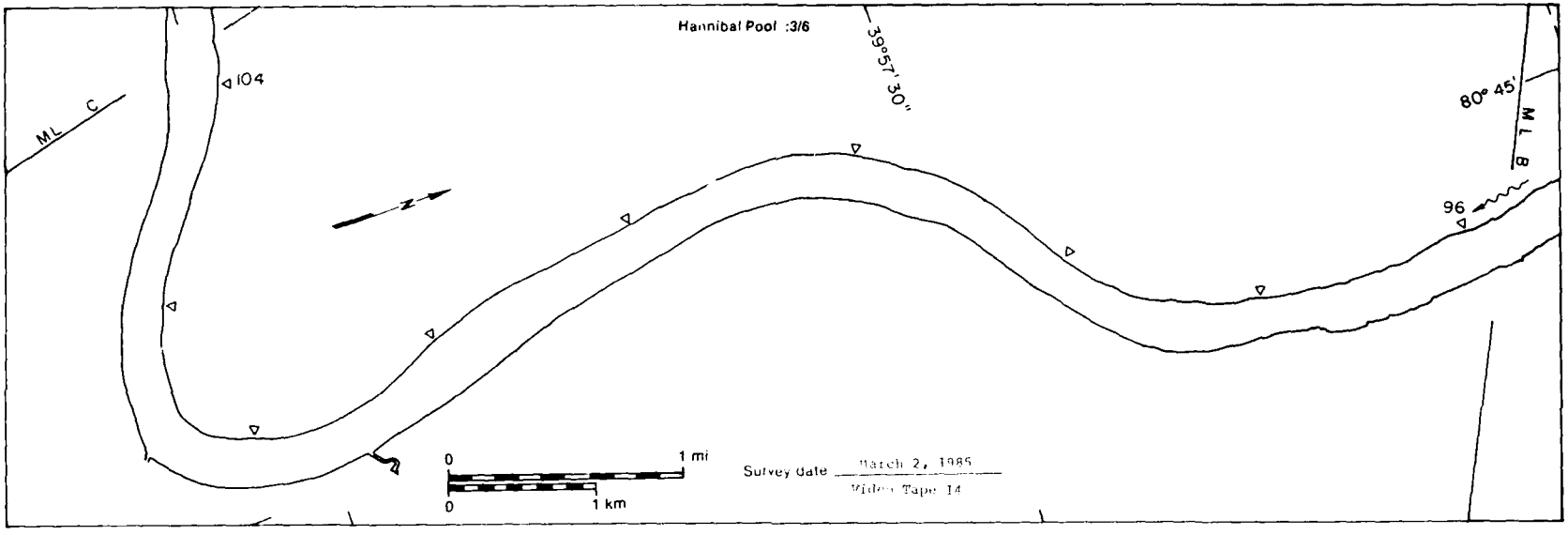
*Includes 8.95 no video coverage

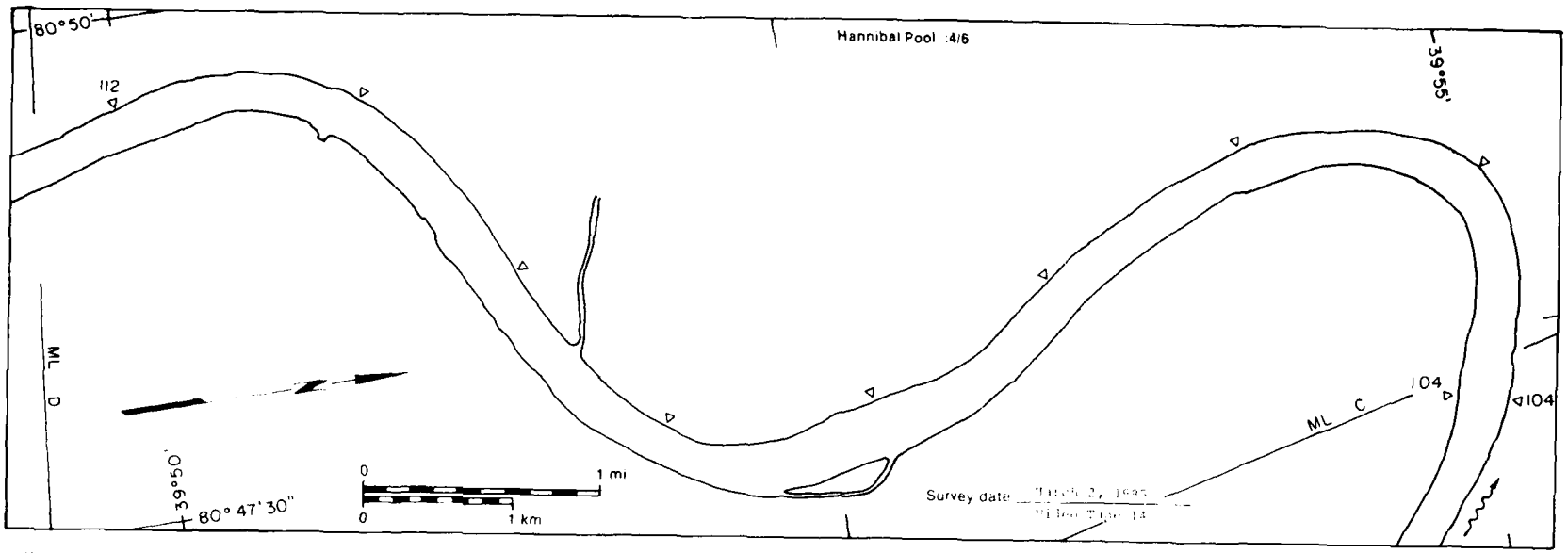
2 March 1985

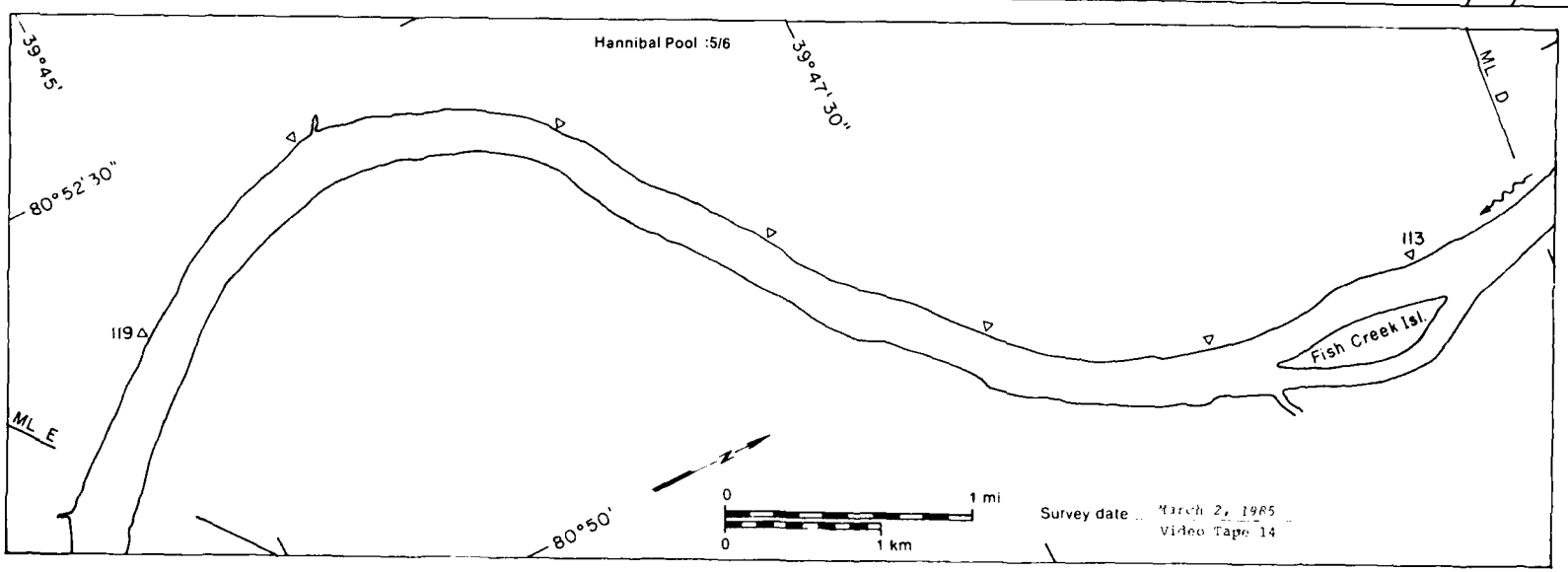

Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Pike Island L & D
Match Line A
40°05'
0
1 mi
0
1 km
Survey date March 2, 1985
Video Tape 14

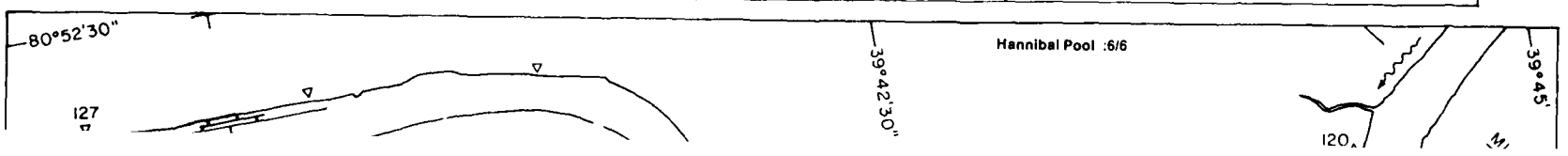

80°45'
ML B
Hannibal Pool :2/6
96
Wheeling Island
89
Wheeling Creek
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 2, 1985
Video Tape 14
ML A
40°5'

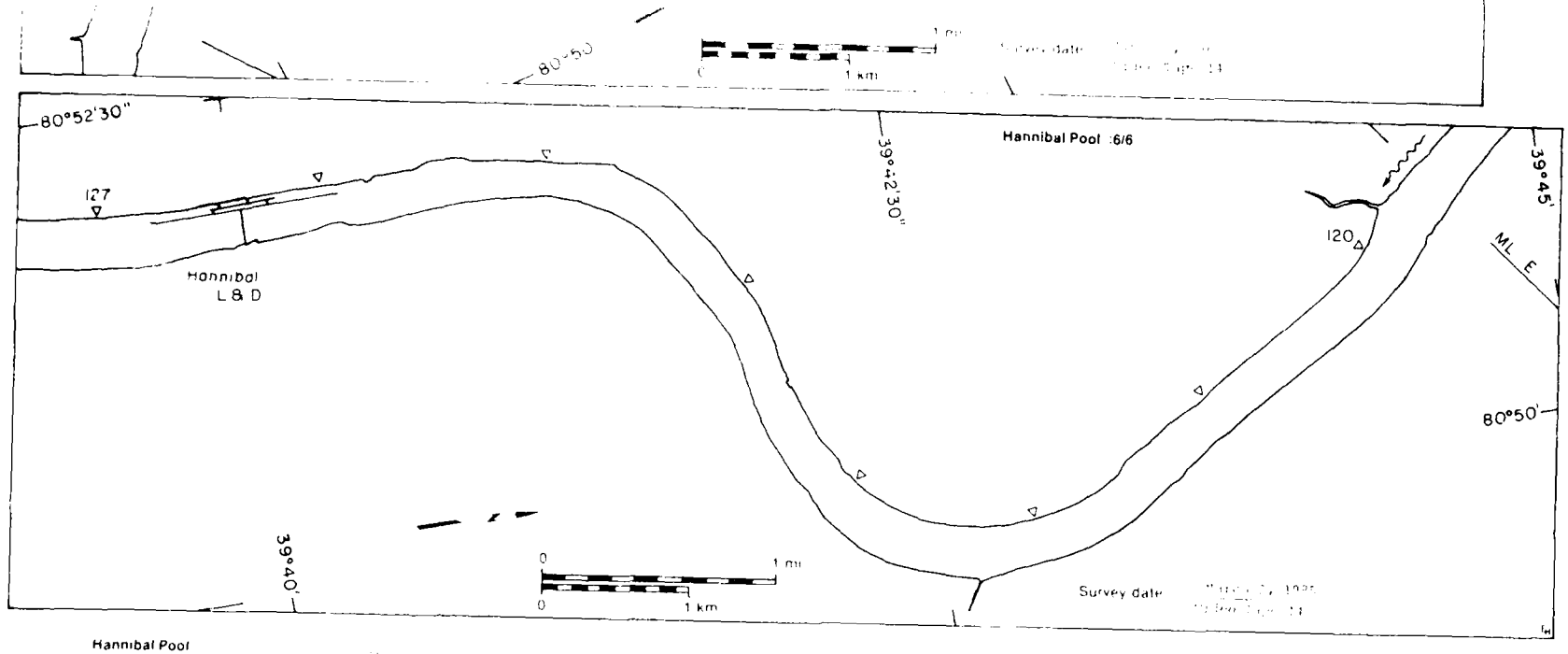

89
Wheeling
Creek
ML A
40°00'
40°02'30"
40°5'
0
1 mi
0
1 km
Survey date March 2, 1985
Video Tape 14


Hannibal Pool :3/6
104
ML C
39°57'30"
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date March 2, 1985
Video Tape 14

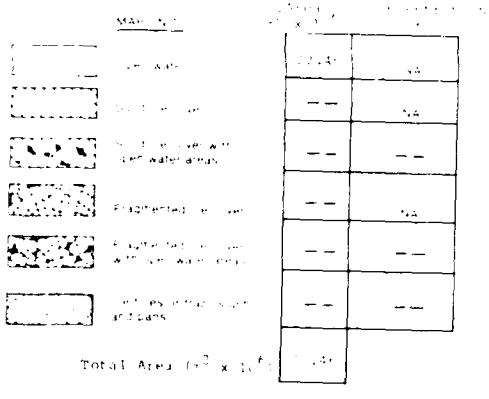

Hannibal Pool :4/6
80°50'
39°55'
112
ML D
39°50'
80° 47' 30"
0
1 mi
0
1 km
ML C
104
104
Survey date March 2, 1985
Video Tape 14


Hannibal Pool :5/6
39°45'
39°47'30"
80°52'30"
ML D
113
119
Fish Creek Isl.
ML E
80°50'
0
1 mi
0
1 km
Survey date March 2, 1985
Video Tape 14

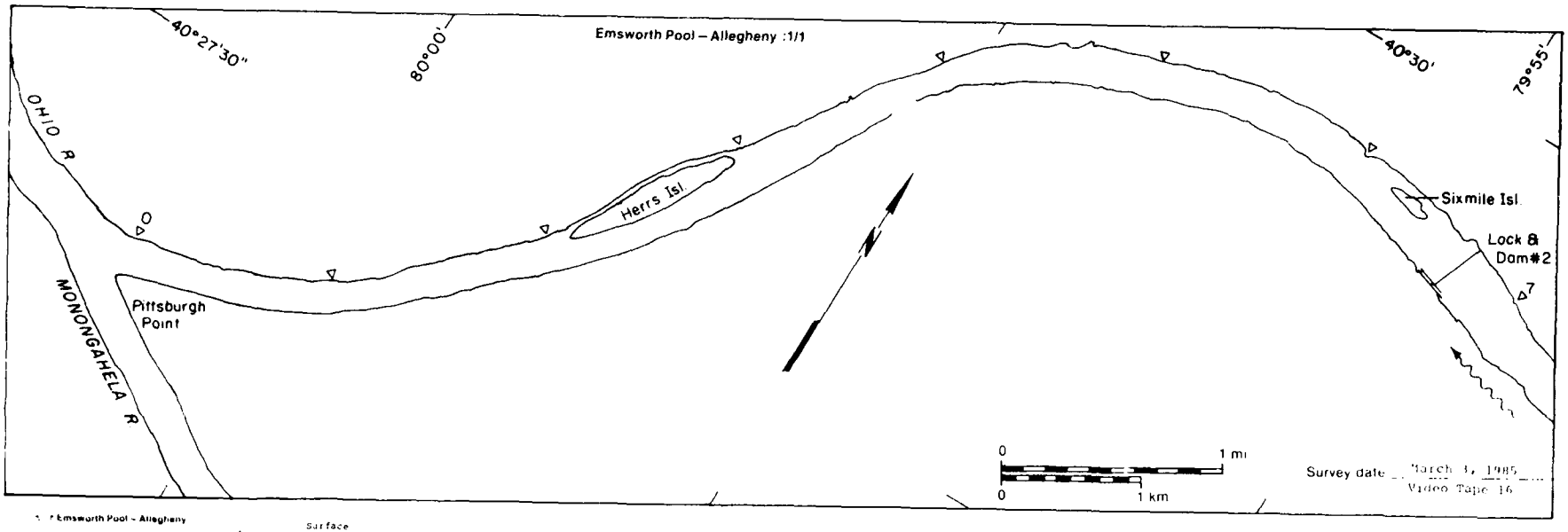

80°52'30"
Hannibal Pool :6/6
39°42'30"
39°45'
127
120



Hannibal Pool



3 March 1985

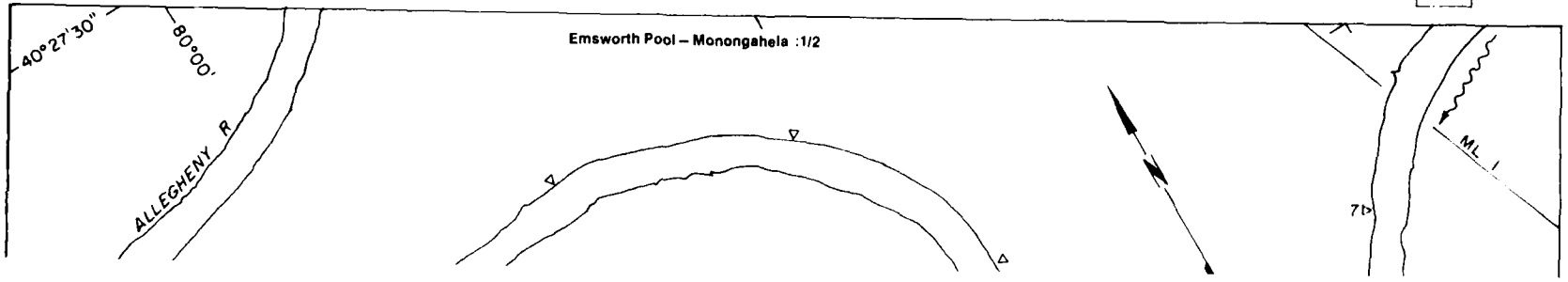


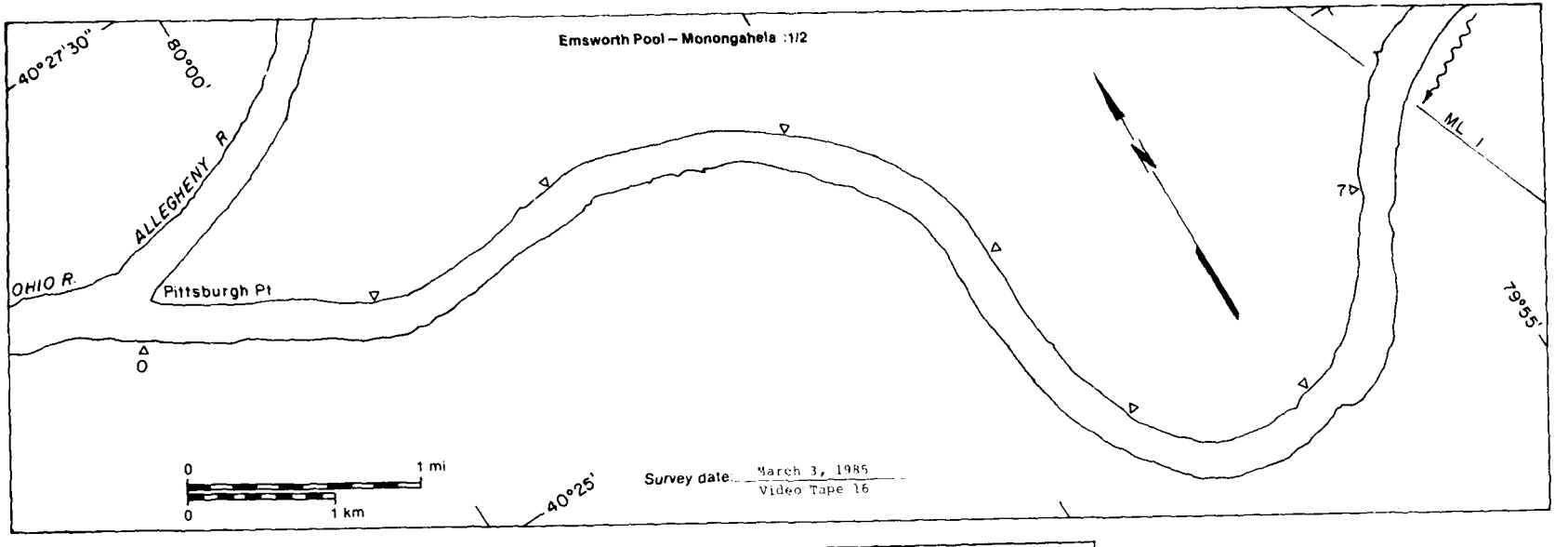
Emsworth Pool – Allegheny

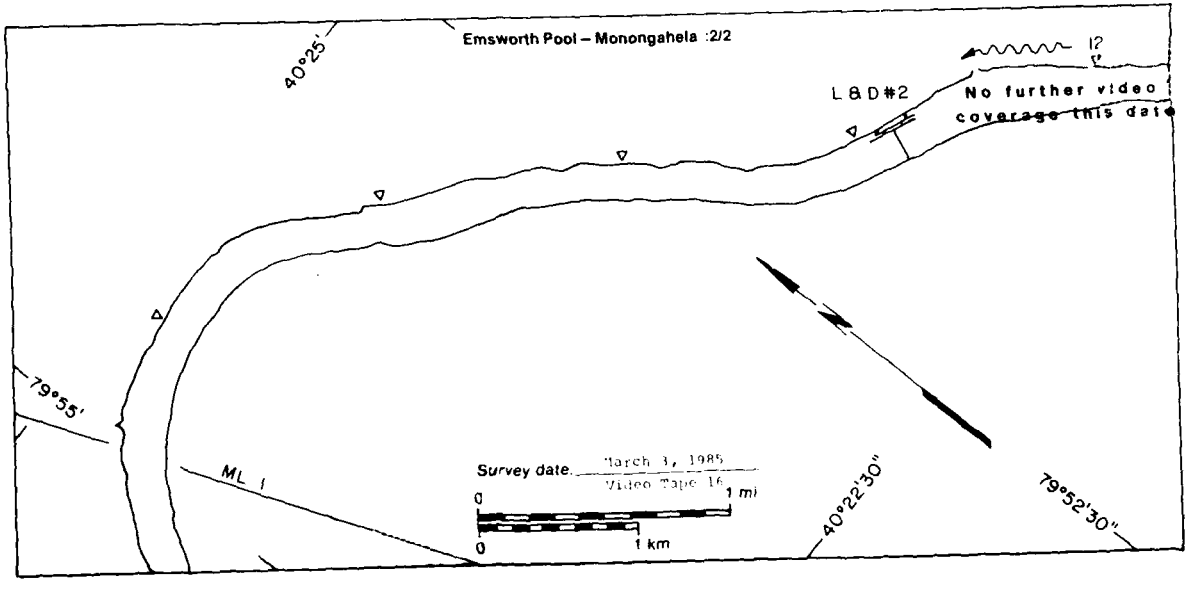
Map No.	Area ($m^2 \times 10^6$)	Surface concentration (%)
	3.27	
	--	
	--	--
	--	
	--	--
	--	--
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

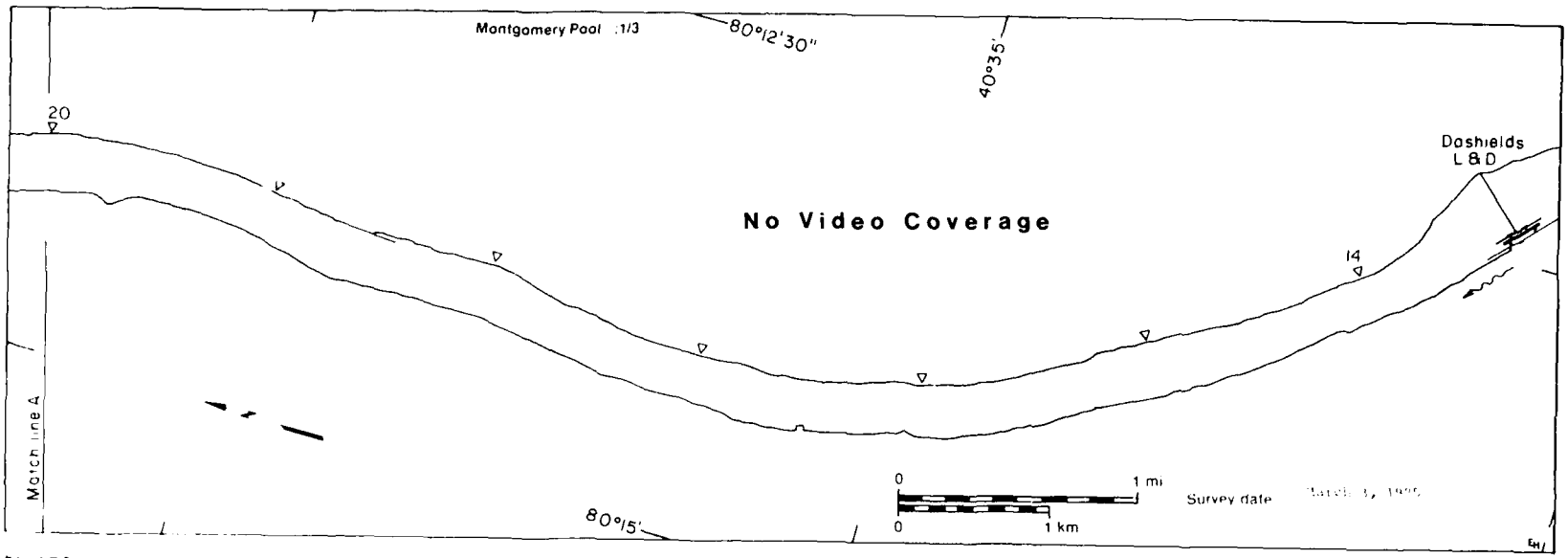
Map No.	Area ($m^2 \times 10^6$)	Surface concentration (%)
	4.73	
	--	
	--	--
	--	
	--	--
	--	--
Total Area ($m^2 \times 10^6$)	4.73	

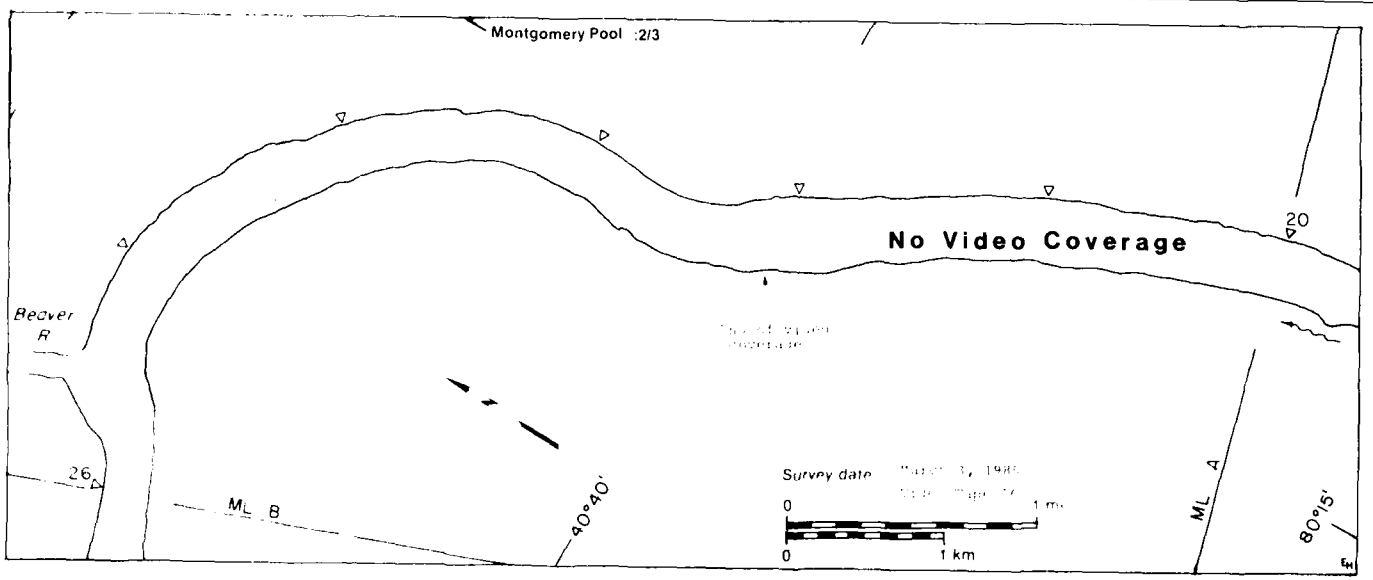


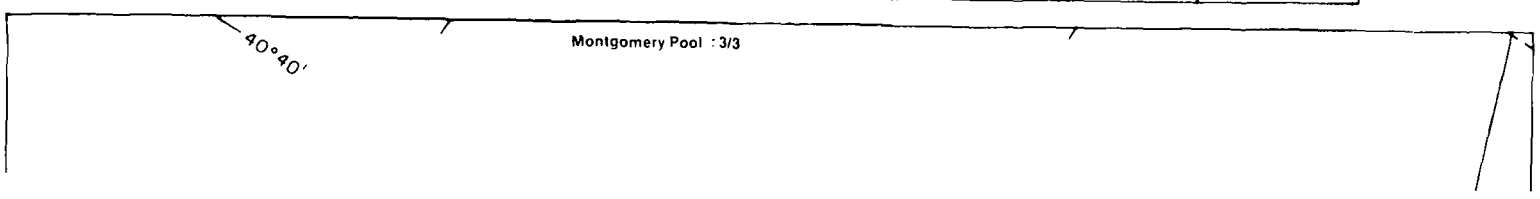

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
ML 1
79°55'
40°25'
0
1 mi
1 km
Survey date: March 3, 1985
Video Tape 16

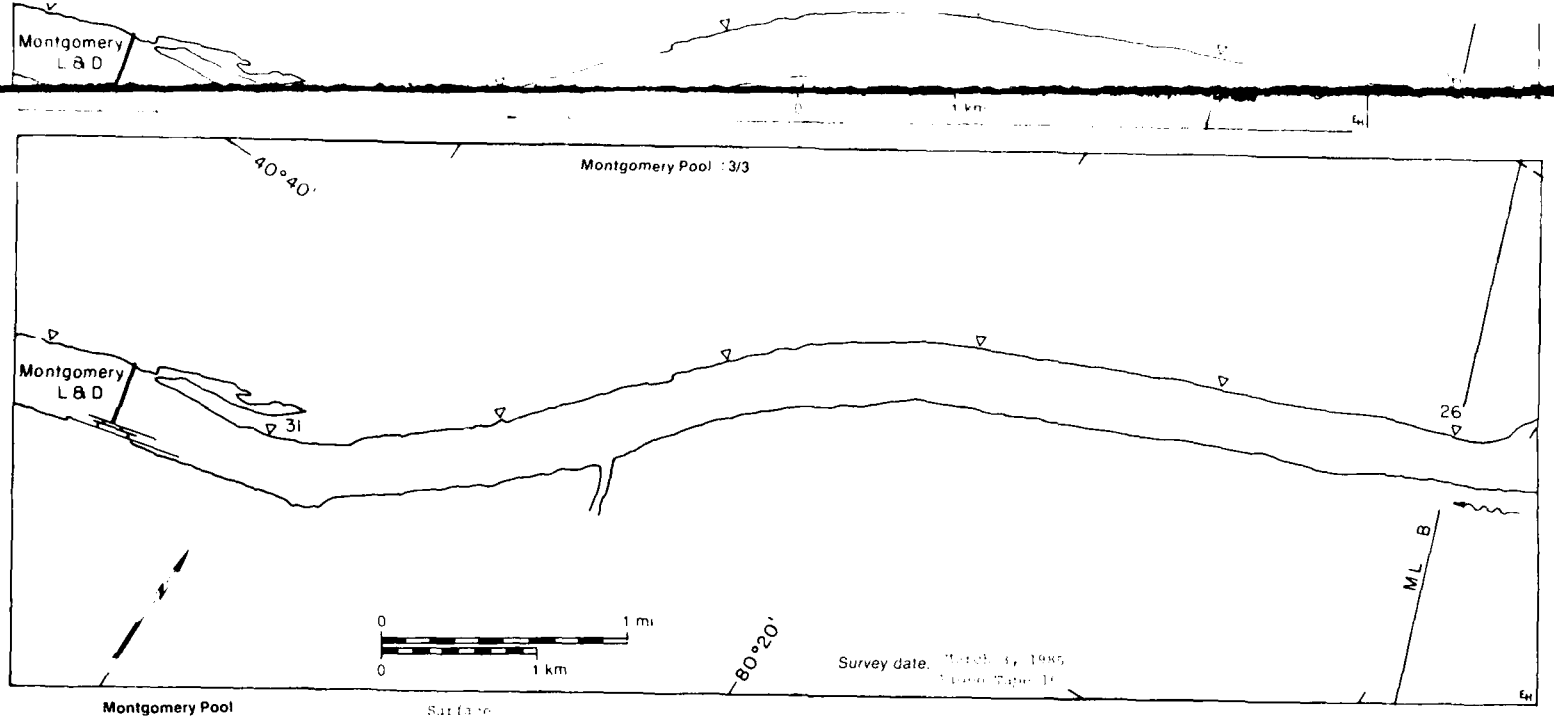

Emsworth Pool – Monongahela :2/2
40°25'
L&D#2
No further video
coverage this dat
79°55'
ML 1
Survey date: March 3, 1985
Video Tape 16
0
1 mi
1 km
40°22'30"
79°52'30"

3 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Dashields
L&D
No Video Coverage
14
Match Line A
0
1 mi
0
1 km
Survey date
80°15'


Montgomery Pool :2/3
No Video Coverage
20
Beaver
R
26
ML B
40°40'
Survey date
0
1 mi
0
1 km
ML A
80°15'


40°40'
Montgomery Pool :3/3

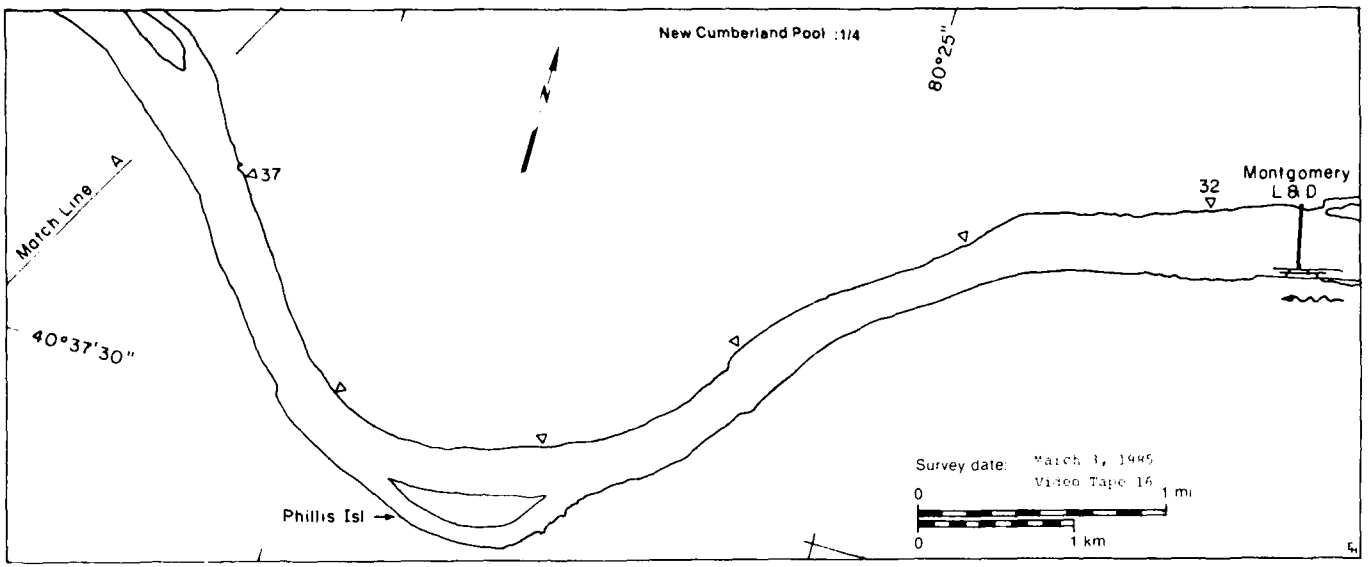


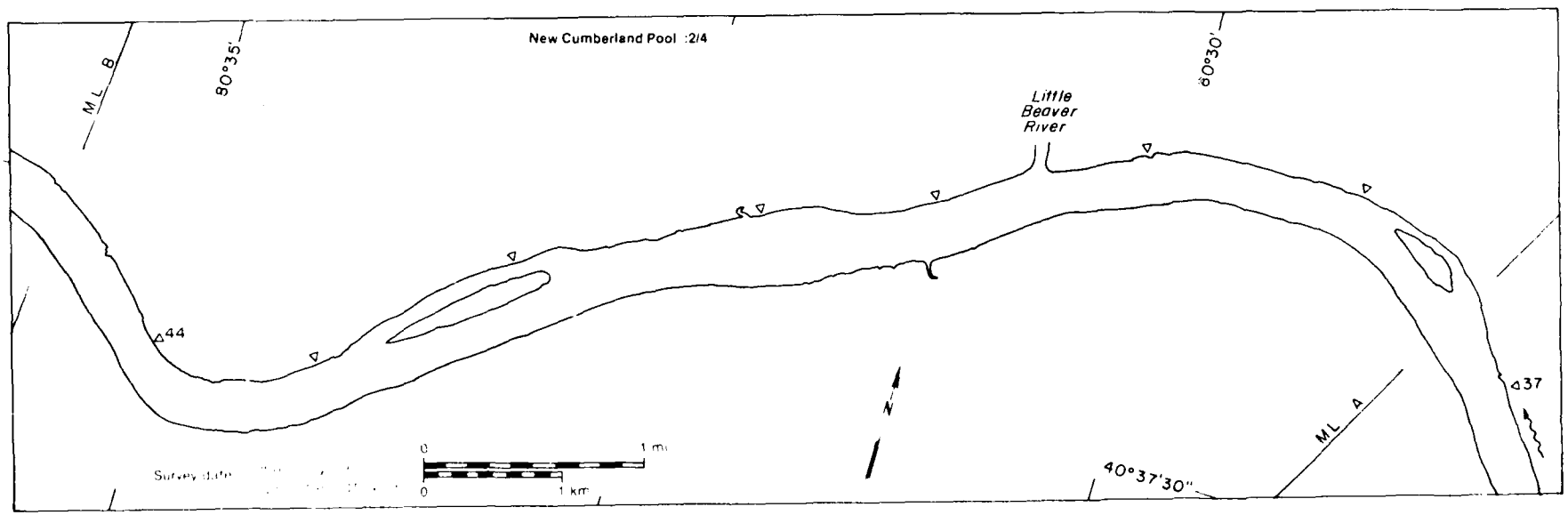
Montgomery Pool

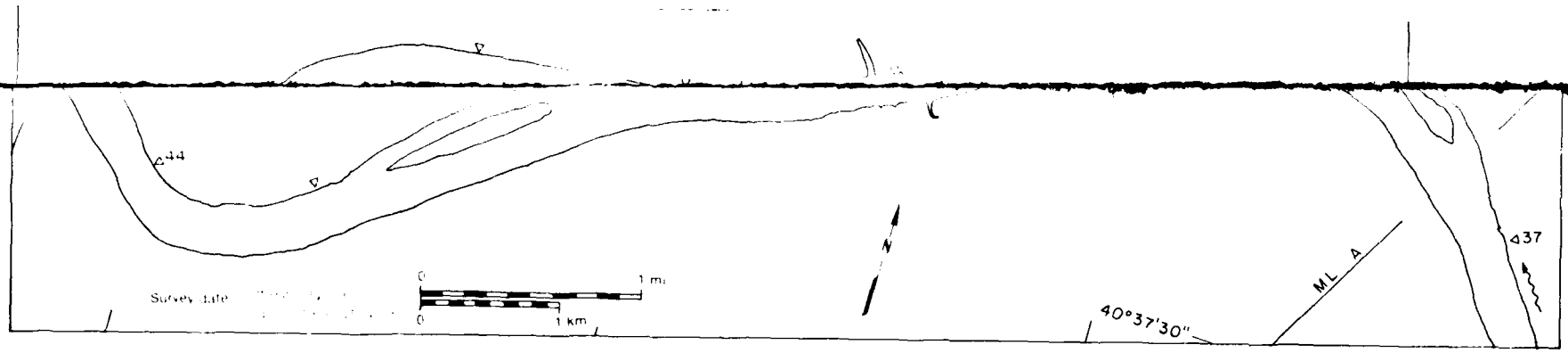
MAP UNITS

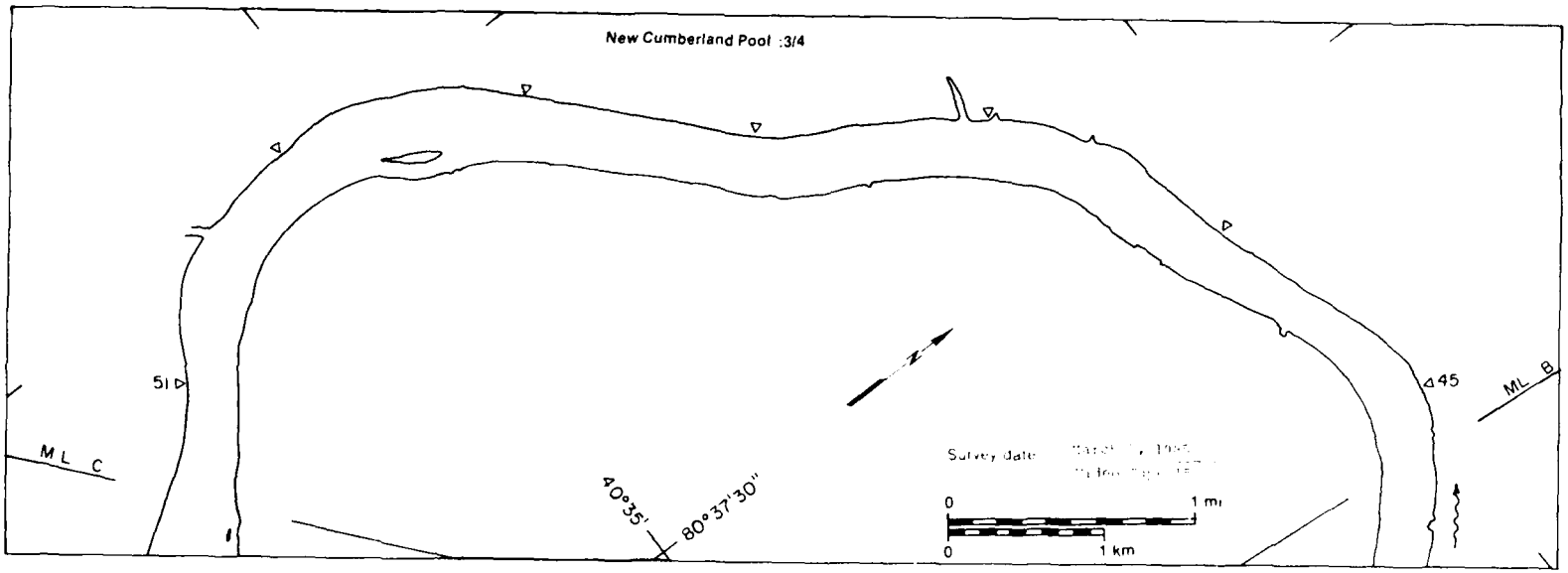
	Area ($km^2 \times 10^6$)	Surface concentration (-)
Open water	[illegible]	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and jams	--	--
Total Area ($km^2 \times 10^6$)	11.[illegible]*	

*Includes 5.28 [illegible] Slush concentration

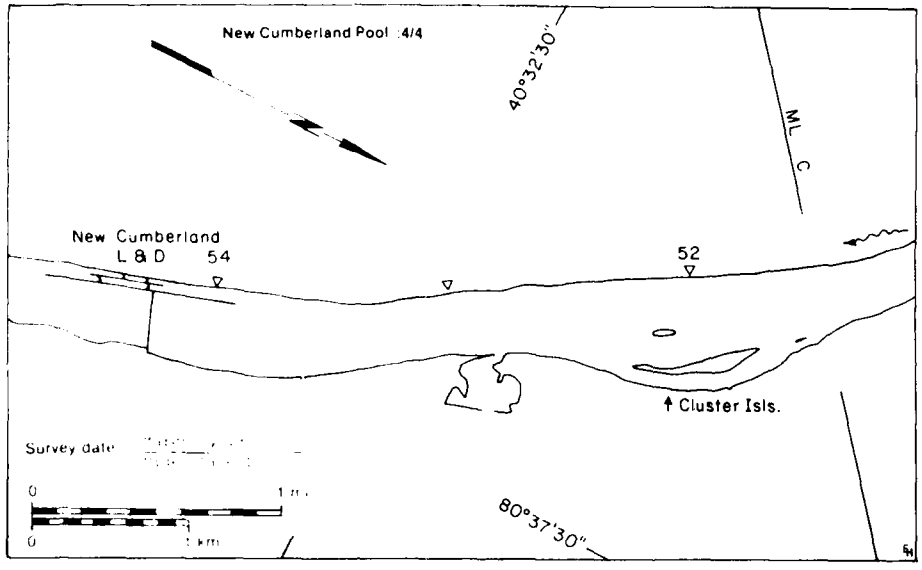

New Cumberland Pool :1/4
80°25"
March Line A
37
32
Montgomery
L&D
40°37'30"
Phillis Isl
Survey date: March 3, 1985
Video Tape 16
0
1 mi
0
1 km


New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little
Beaver
River
44
37
ML A
40°37'30"
0
1 mi
0
1 km


44
37
ML A
40°37'30"
0
1 mi
0
1 km

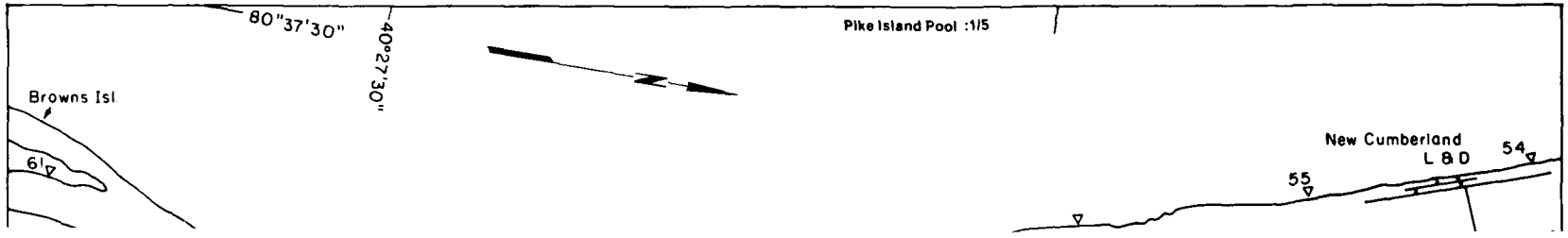

New Cumberland Pool :3/4
51
45
ML B
ML C
40°35'
80°37'30"
0
1 mi
0
1 km

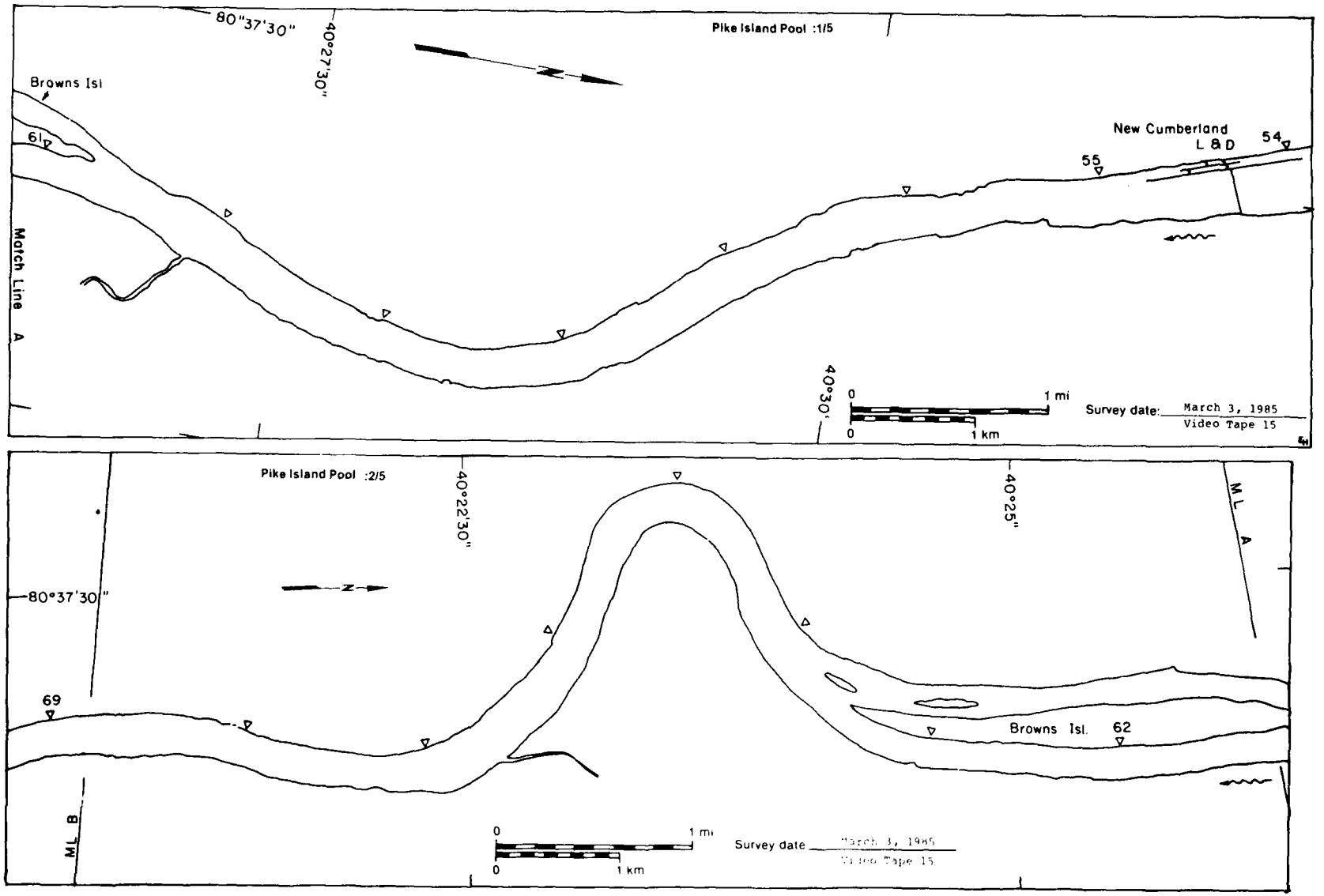
3 March 1985

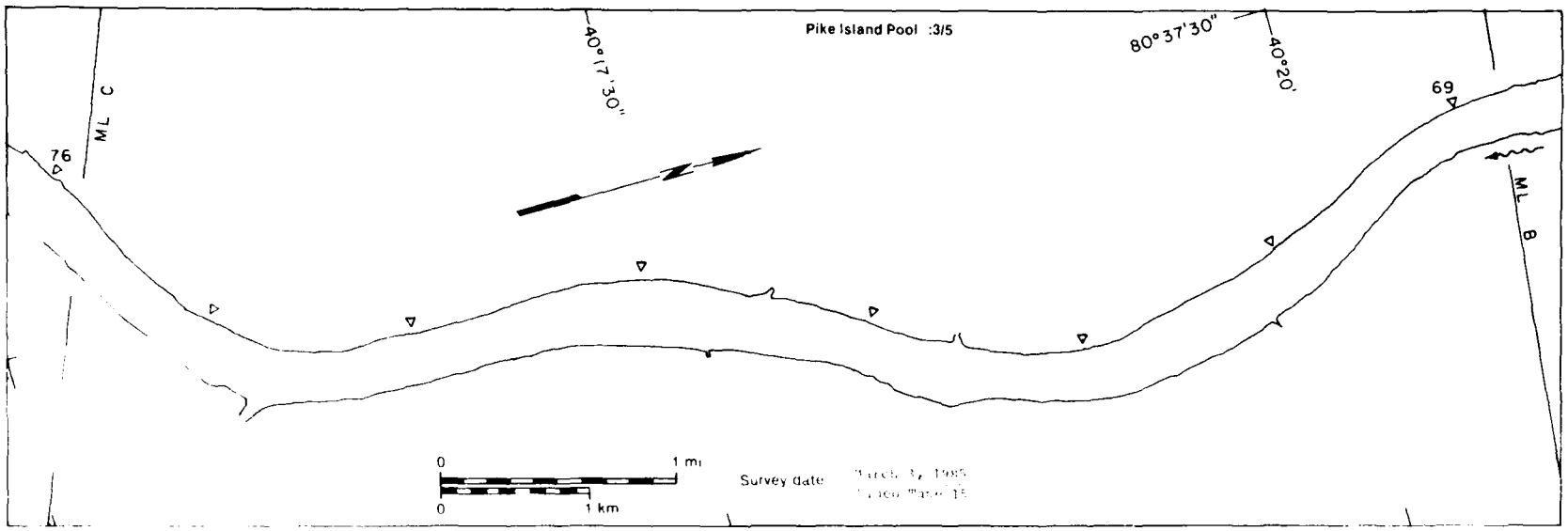


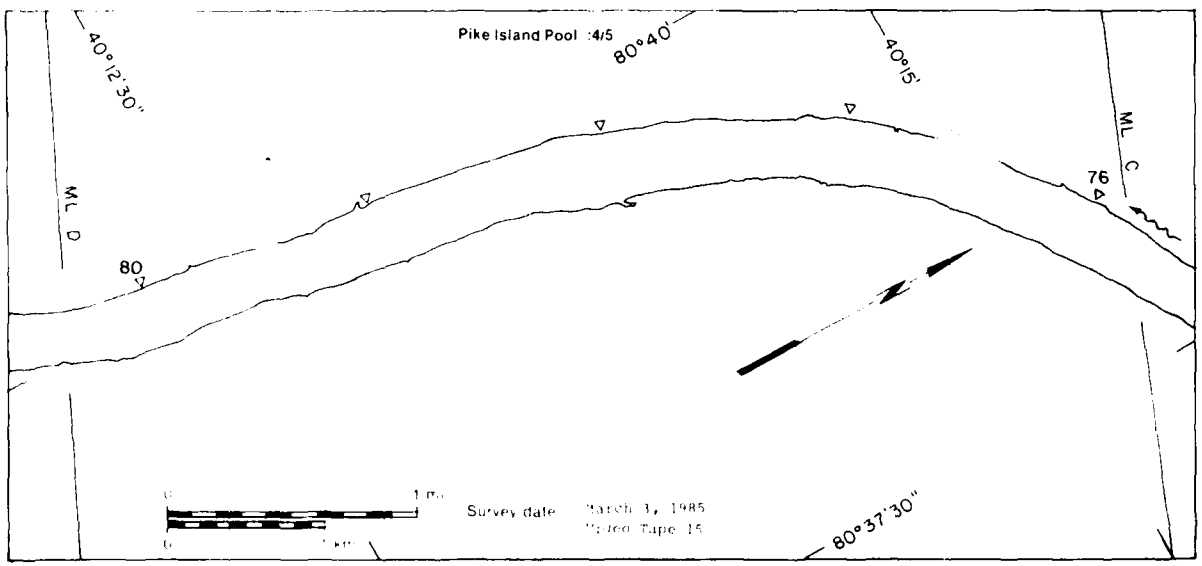
New Cumberland Pool

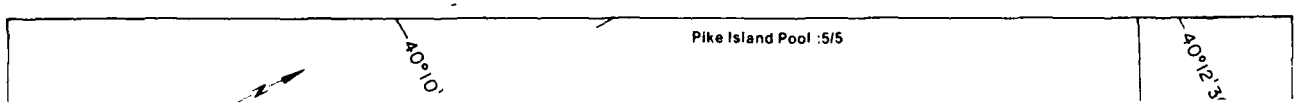
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	14.87	

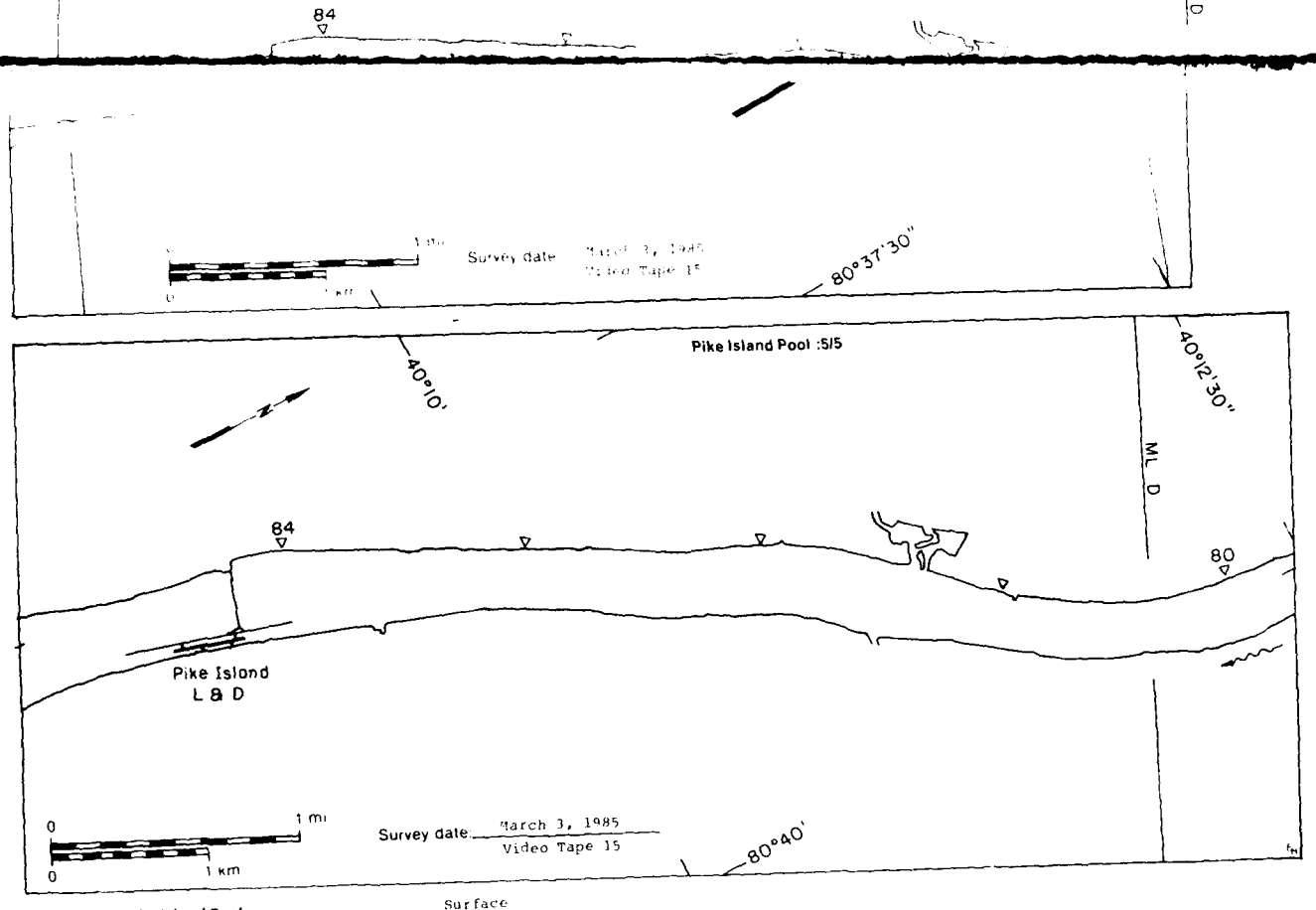



Pike Island Pool :1/5
80°37'30"
40°27'30"
Browns Isl
61
New Cumberland
L & D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date: March 3, 1985
Video Tape 15
Pike Island Pool :2/5
40°22'30"
40°25"
ML A
80°37'30"
69
Browns Isl.
62
ML B
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15


Pike Island Pool :3/5
40°17'30"
80°37'30"
40°20'
ML C
76
69
ML B
0
1 mi
0
1 km
Survey date


Pike Island Pool :4/5
40°12'30"
80°40'
40°15'
ML D
80
ML C
76
Survey date
80°37'30"


Pike Island Pool :5/5
40°10'
40°12'3

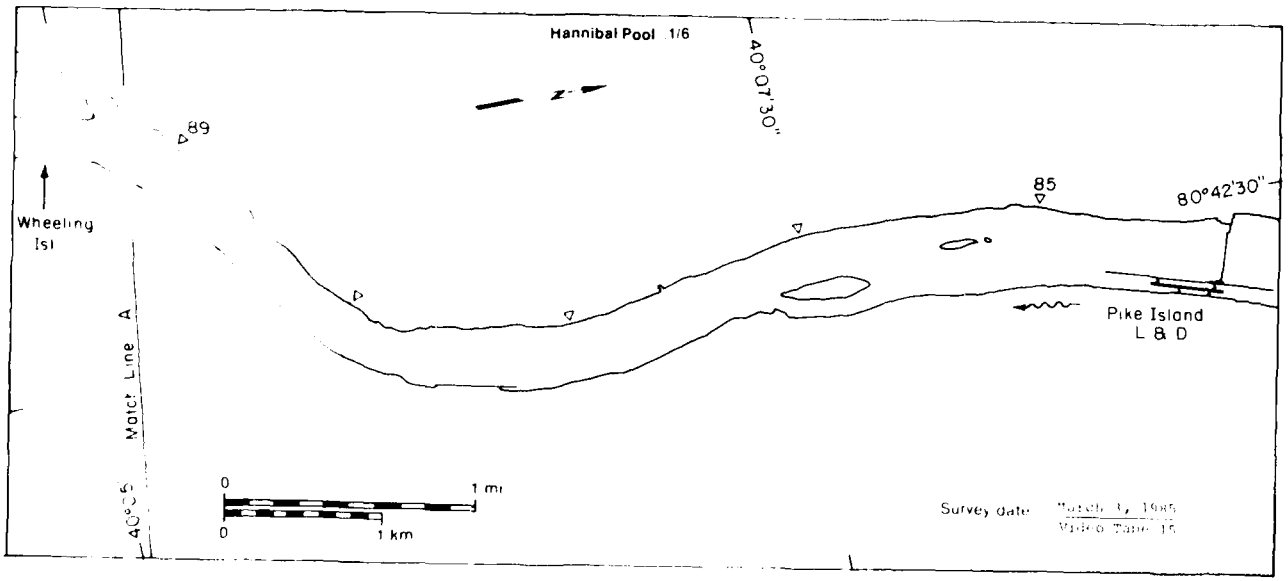


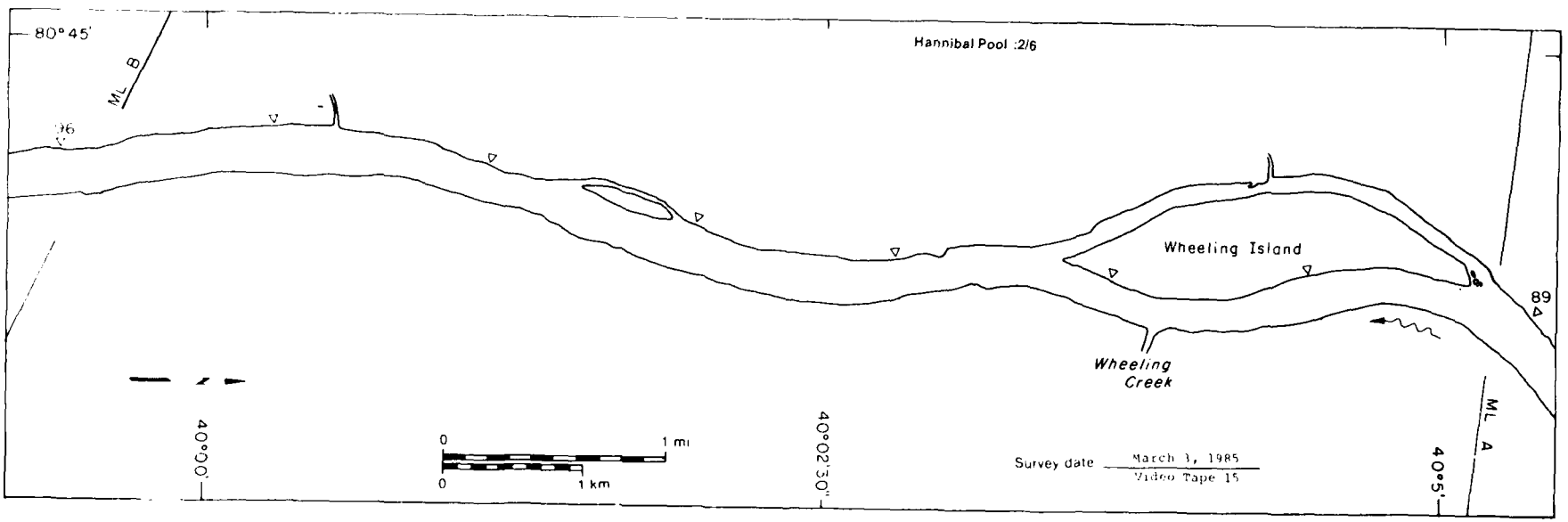
Pike Island Pool

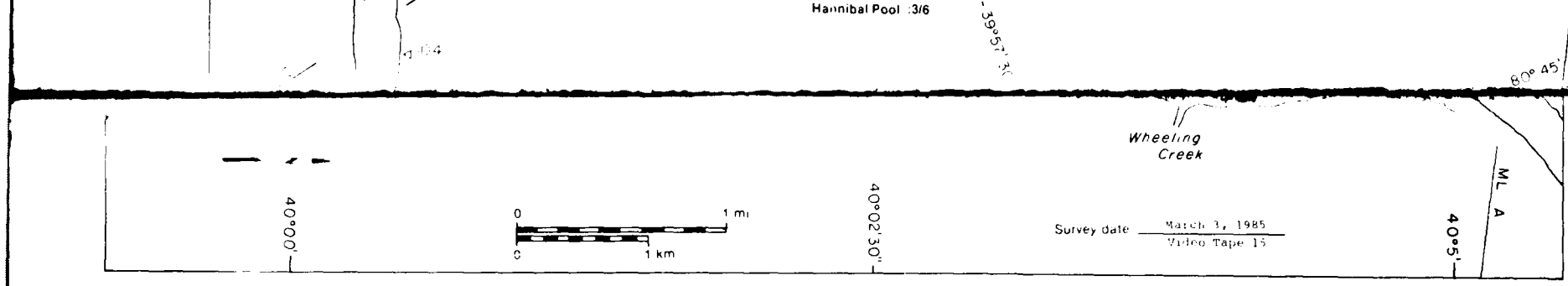
MAP UNITS

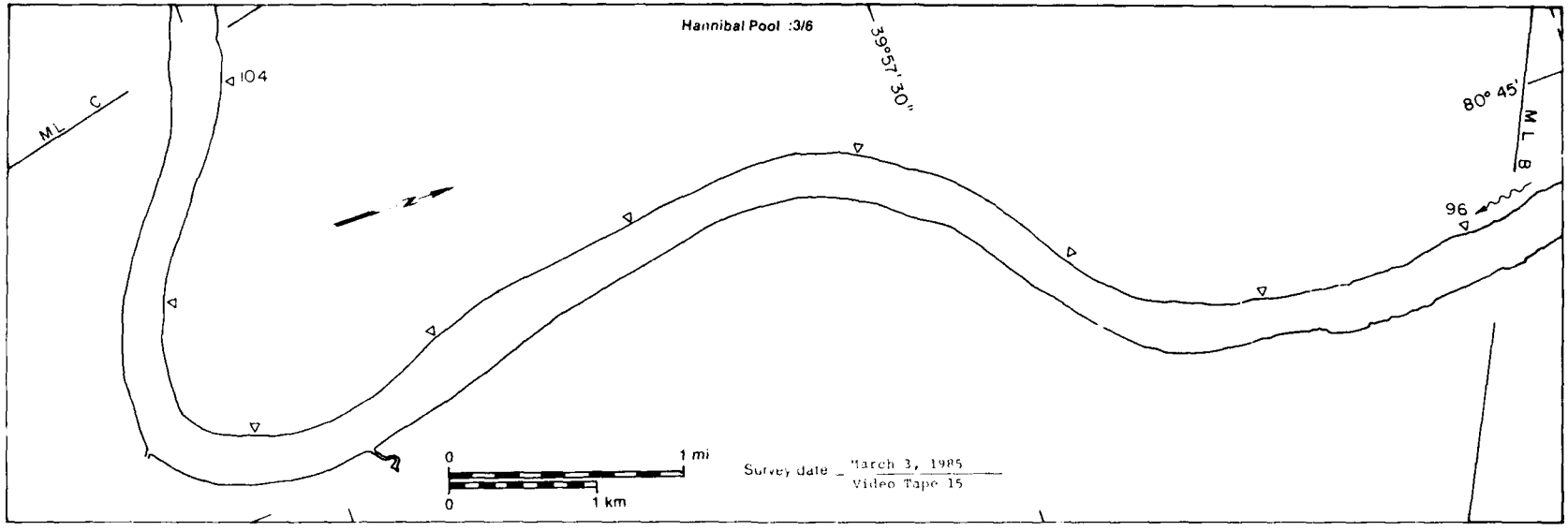
	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.92	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	18.92	

3 March 1985

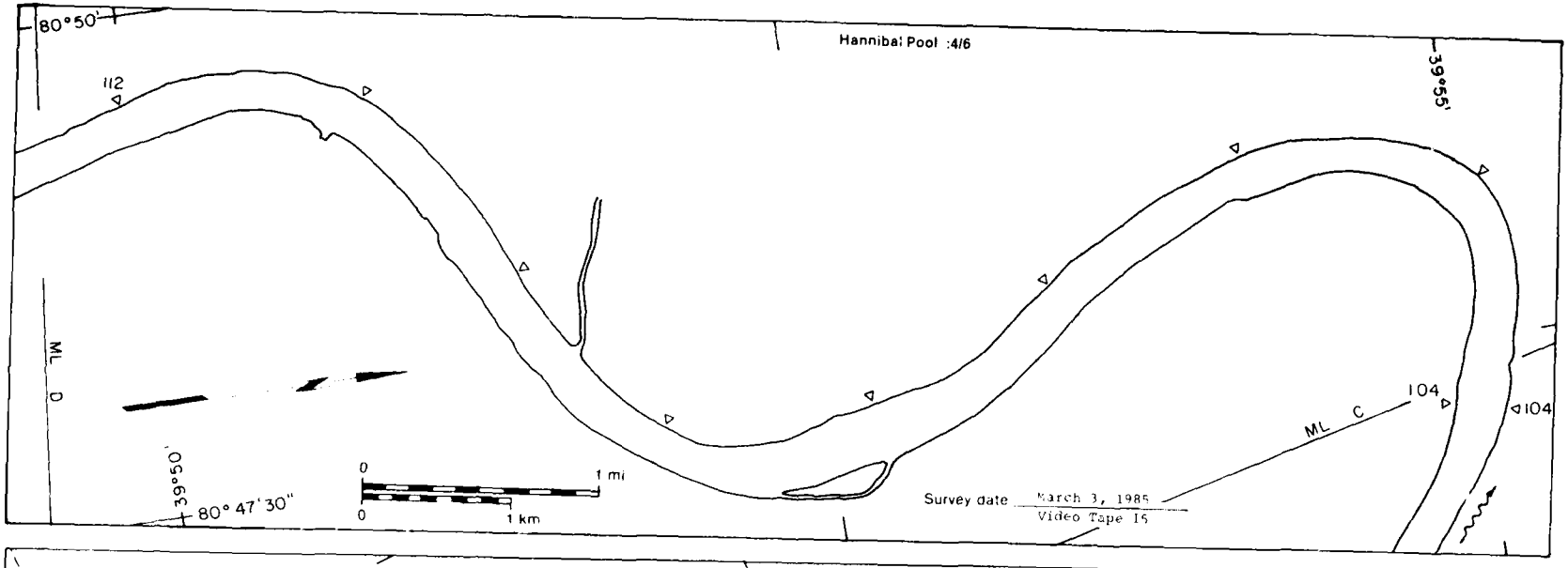

Hannibal Pool 1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Match Line A
Pike Island
L & D
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15

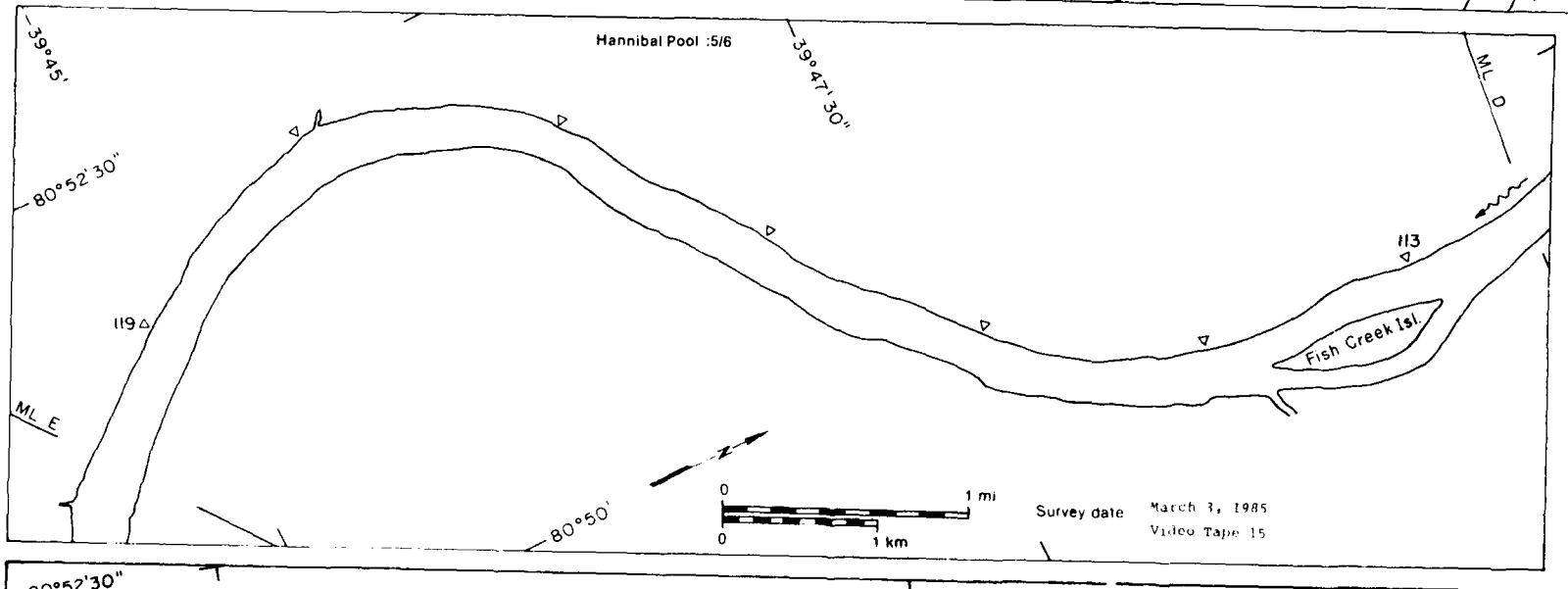

80°45'
ML B
Hannibal Pool :2/6
Wheeling Island
89
Wheeling
Creek
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 3, 1985
Video Tape 15
ML A
40°5'

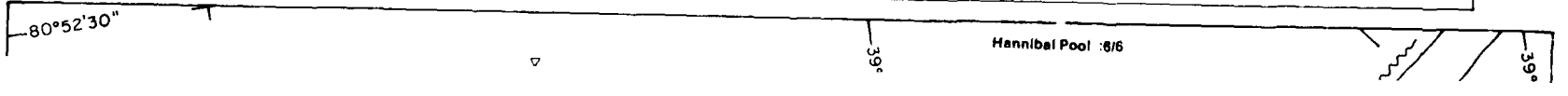

Hannibal Pool :3/6
39°57'30"
80° 45'
Wheeling
Creek
ML A
40°00'
40°02'30"
40°5'
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15

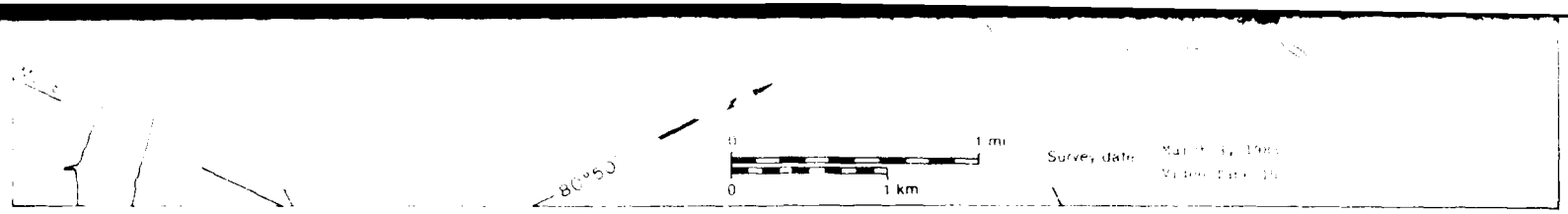

Hannibal Pool :3/6
39°57'30"
104
ML C
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15

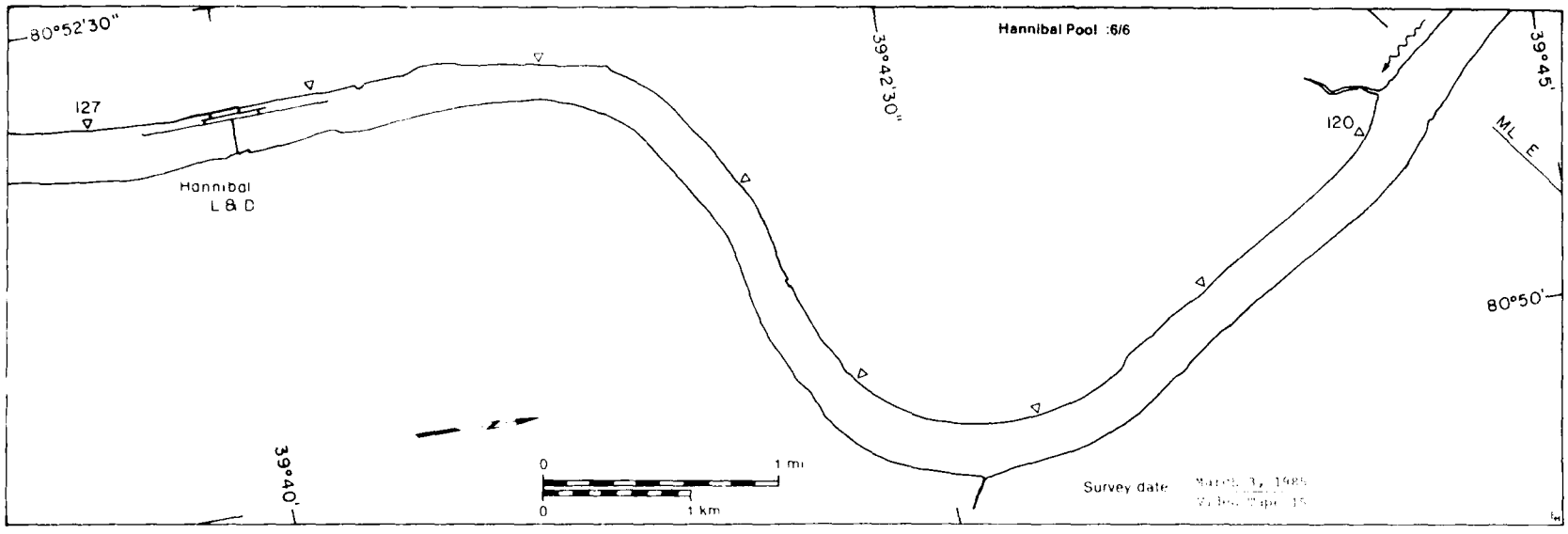
3 March 1985

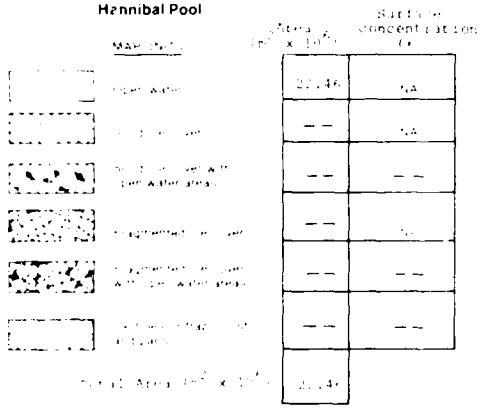

80°50'
Hannibal Pool :4/6
39°55'
112
ML D
39°50'
80° 47' 30"
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15
ML C
104
104

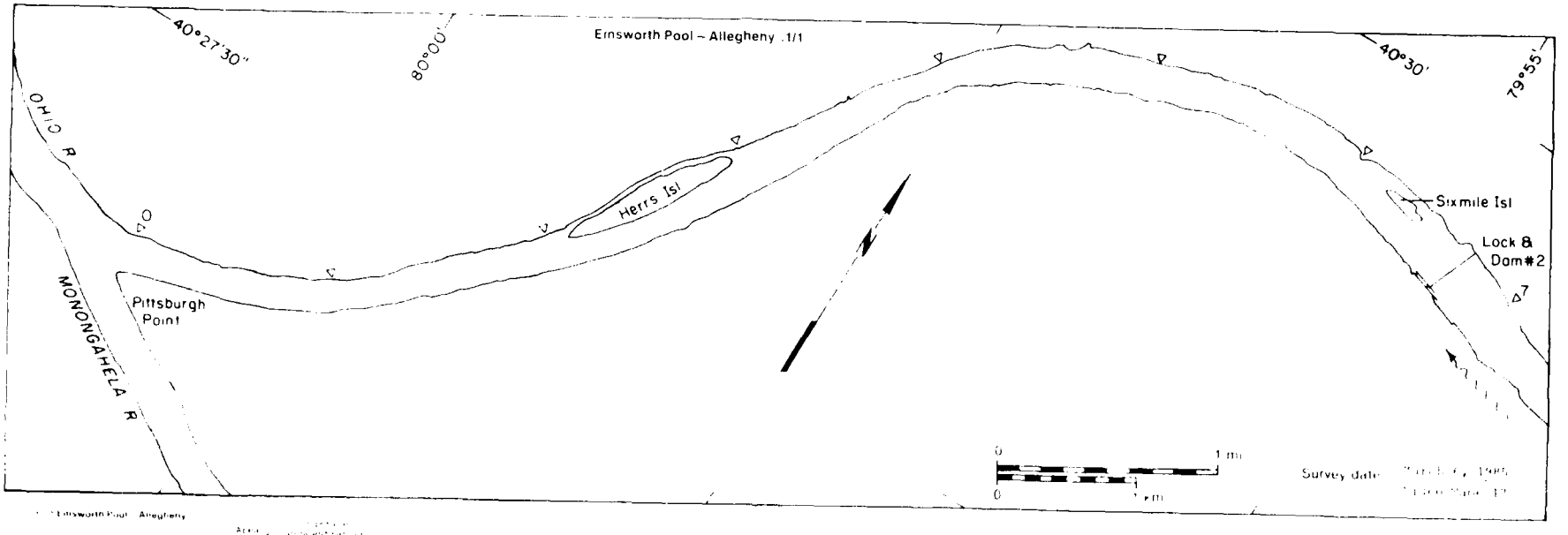

Hannibal Pool :5/6
39°45'
39°47'30"
80°52'30"
ML D
113
119
Fish Creek Isl.
ML E
80°50'
0
1 mi
0
1 km
Survey date March 3, 1985
Video Tape 15

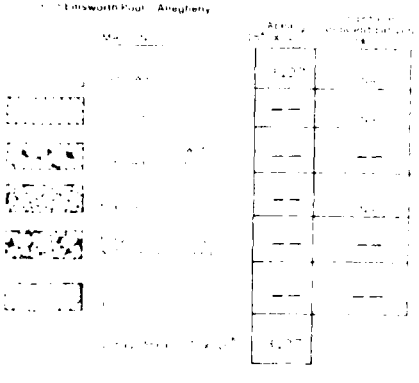

80°52'30"
Hannibal Pool :6/6

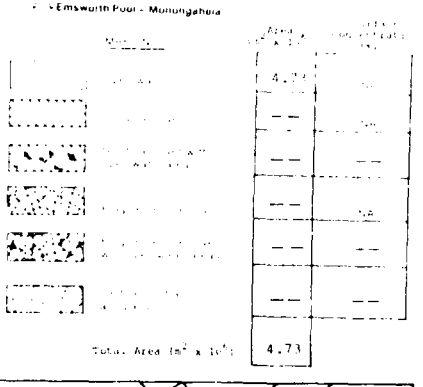

80°50'
0
1 mi
0
1 km
Survey date

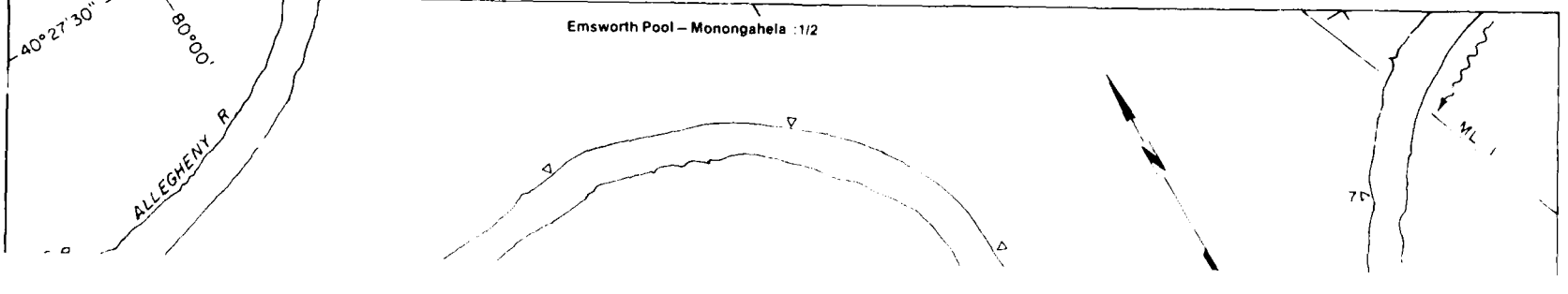

80°52'30"
39°42'30"
Hannibal Pool :6/6
39°45'
127
120
Hannibal
L & D
ML E
80°50'
39°40'
0
1 mi
0
1 km
Survey date

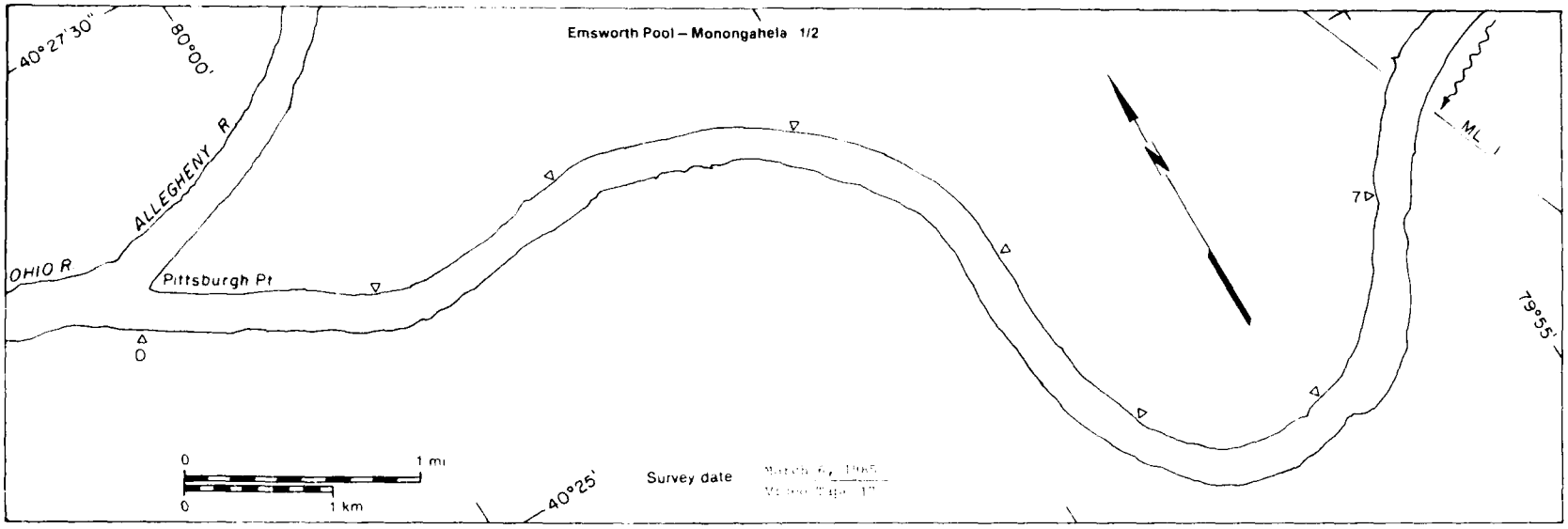

Hannibal Pool

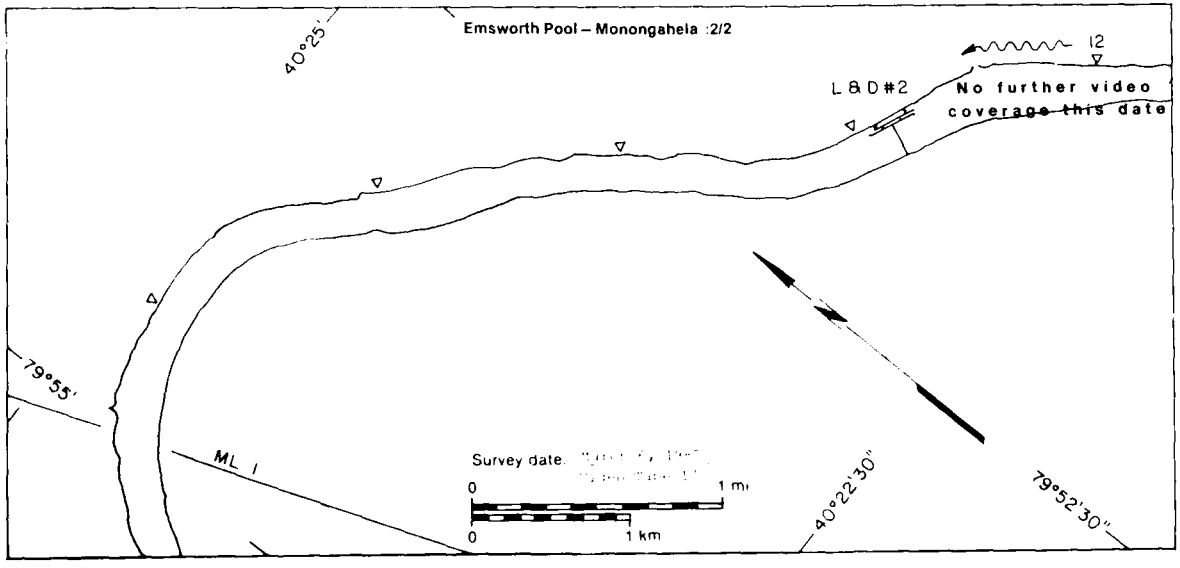

Emsworth Pool – Allegheny :1/1
40°27'30"
80°00'
40°30'
79°55'
OHIO R
MONONGAHELA R
Herrs Isl
Sixmile Isl
Lock 8
Dom#2
Pittsburgh
Point
0
1 mi
0
1 km
Survey date



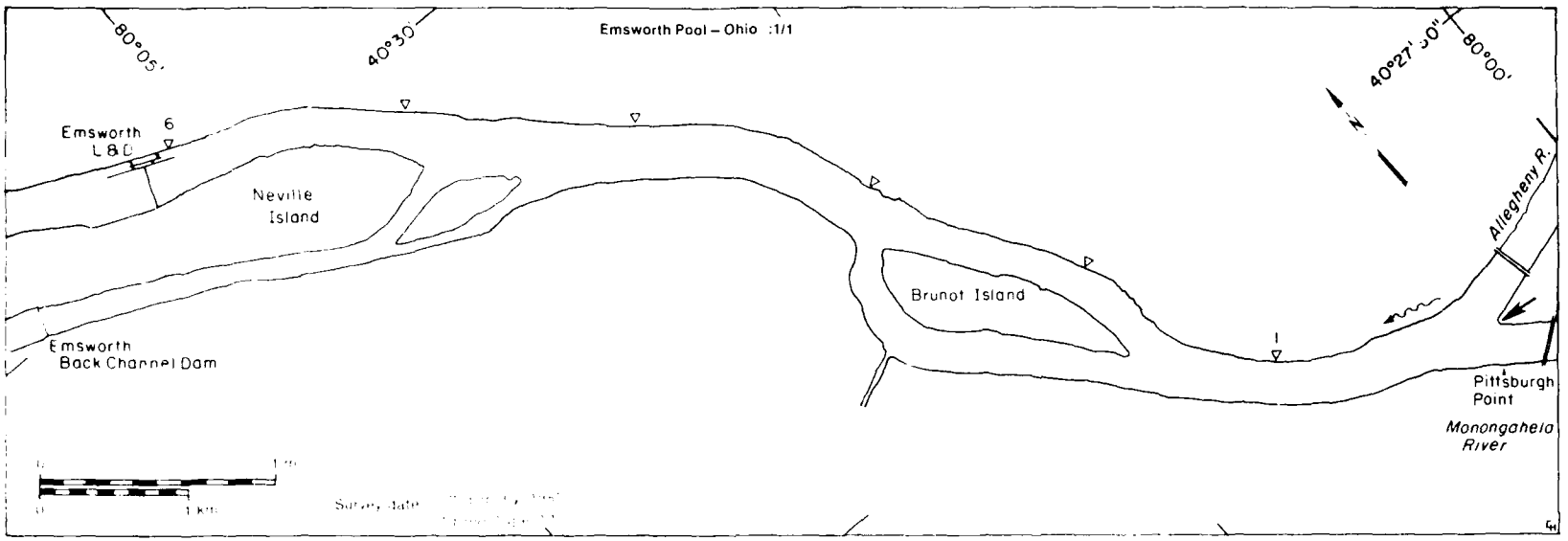



Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R
ML

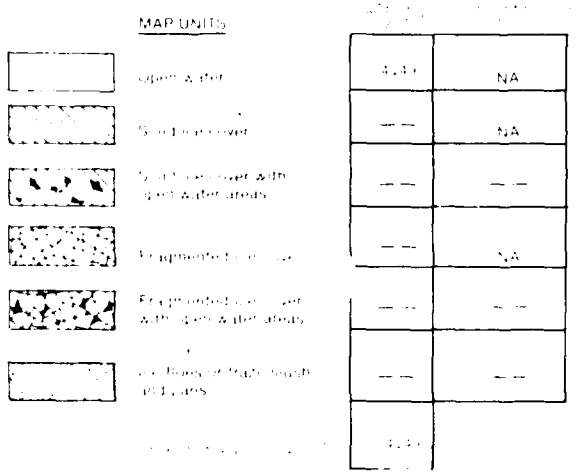

Emsworth Pool – Monongahela 1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date

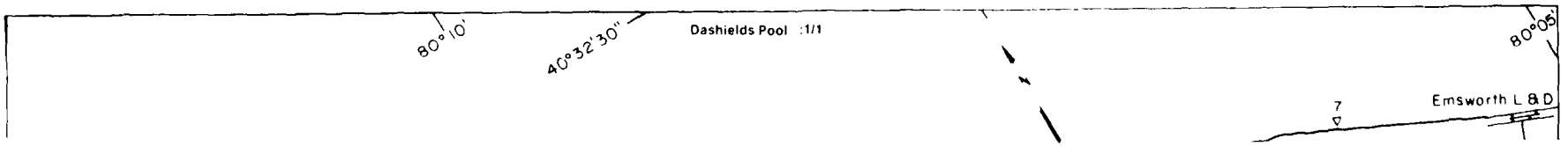

Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
No further video
coverage this date
79°55'
ML 1
Survey date:
0
1 mi
0
1 km
40°22'30"
79°52'30"

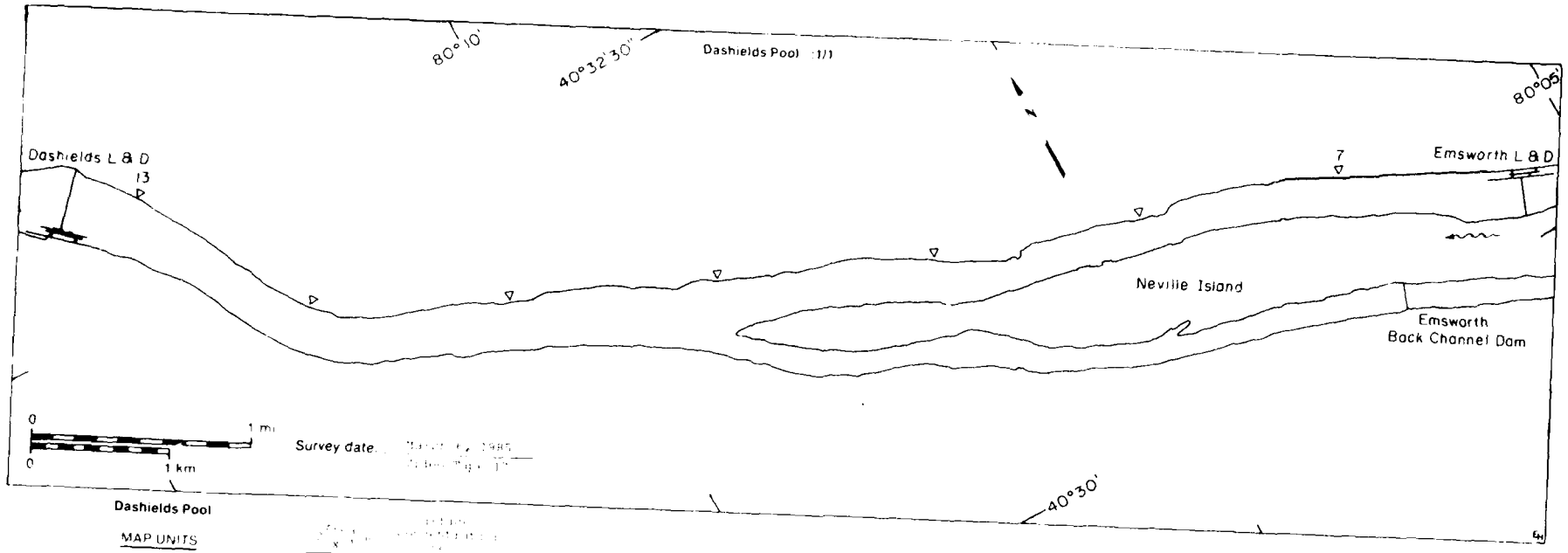
6 March 1985



Emsworth Pool – Ohio





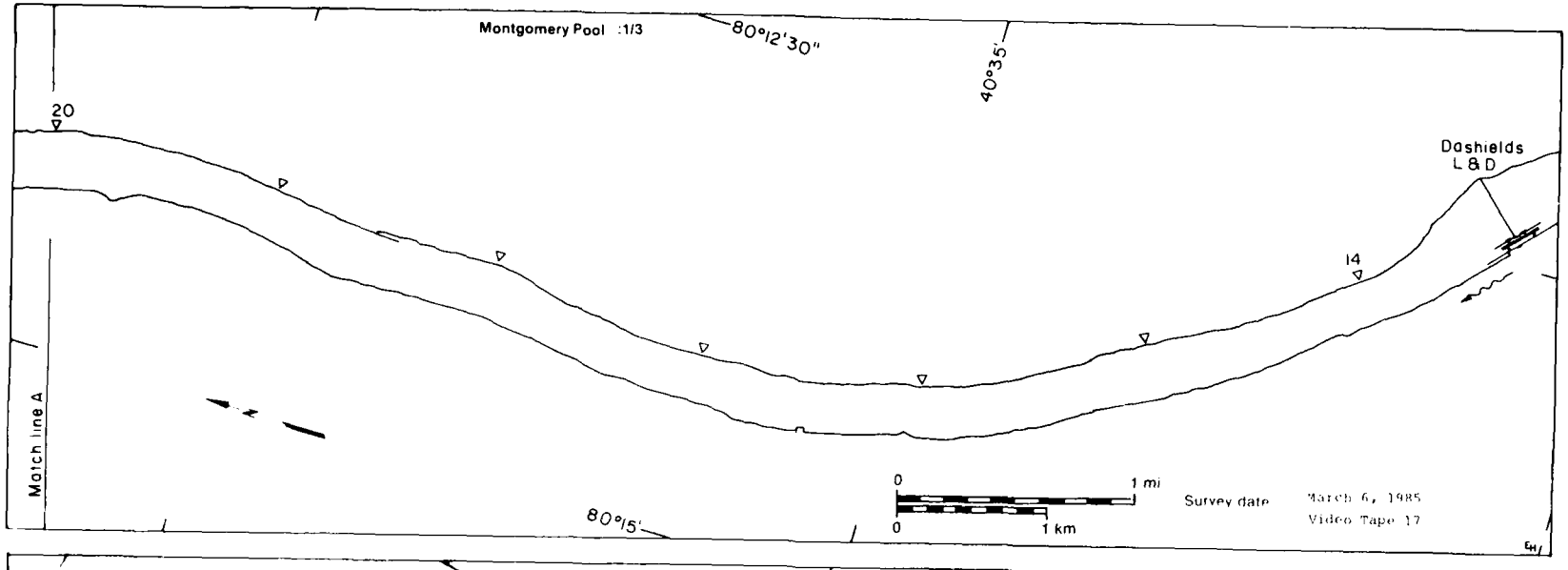


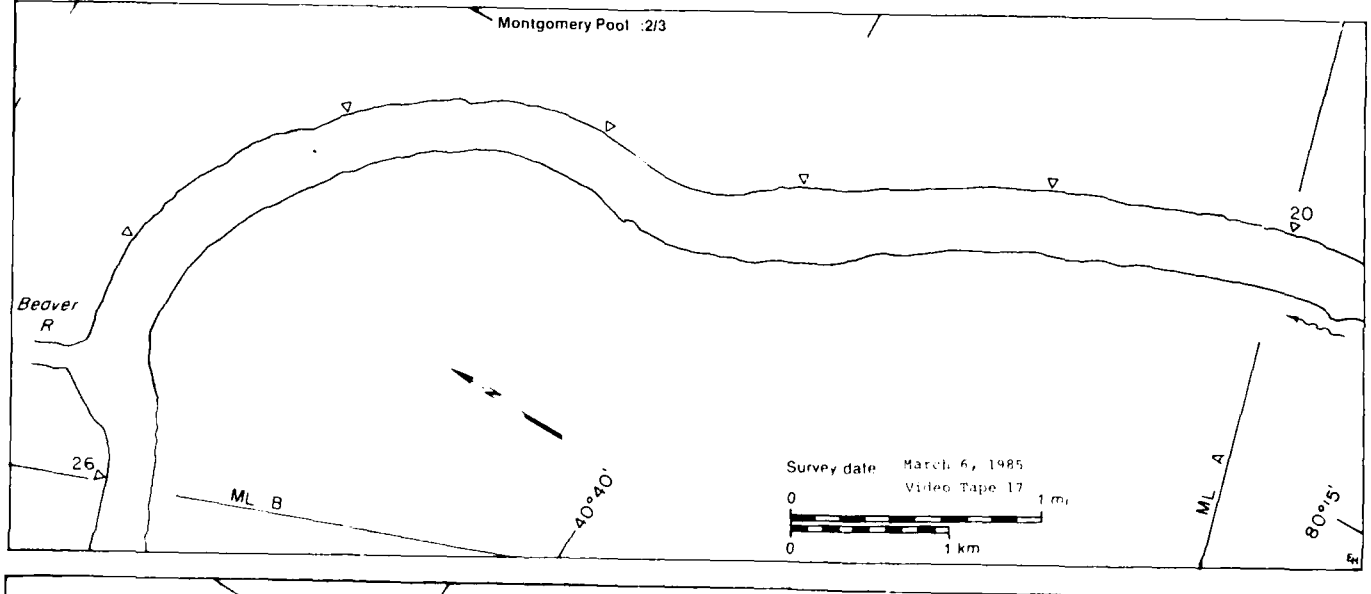
MAP UNITS

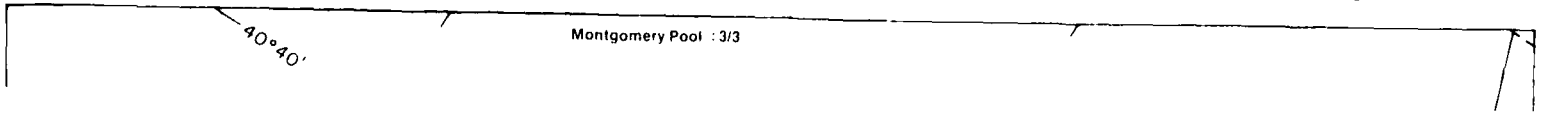
- Open water
- Solid ice cover
- Solid ice cover with open water areas
- Fragmented ice cover
- Fragmented ice cover with open water areas
- Ice floes or frazil slush and pans

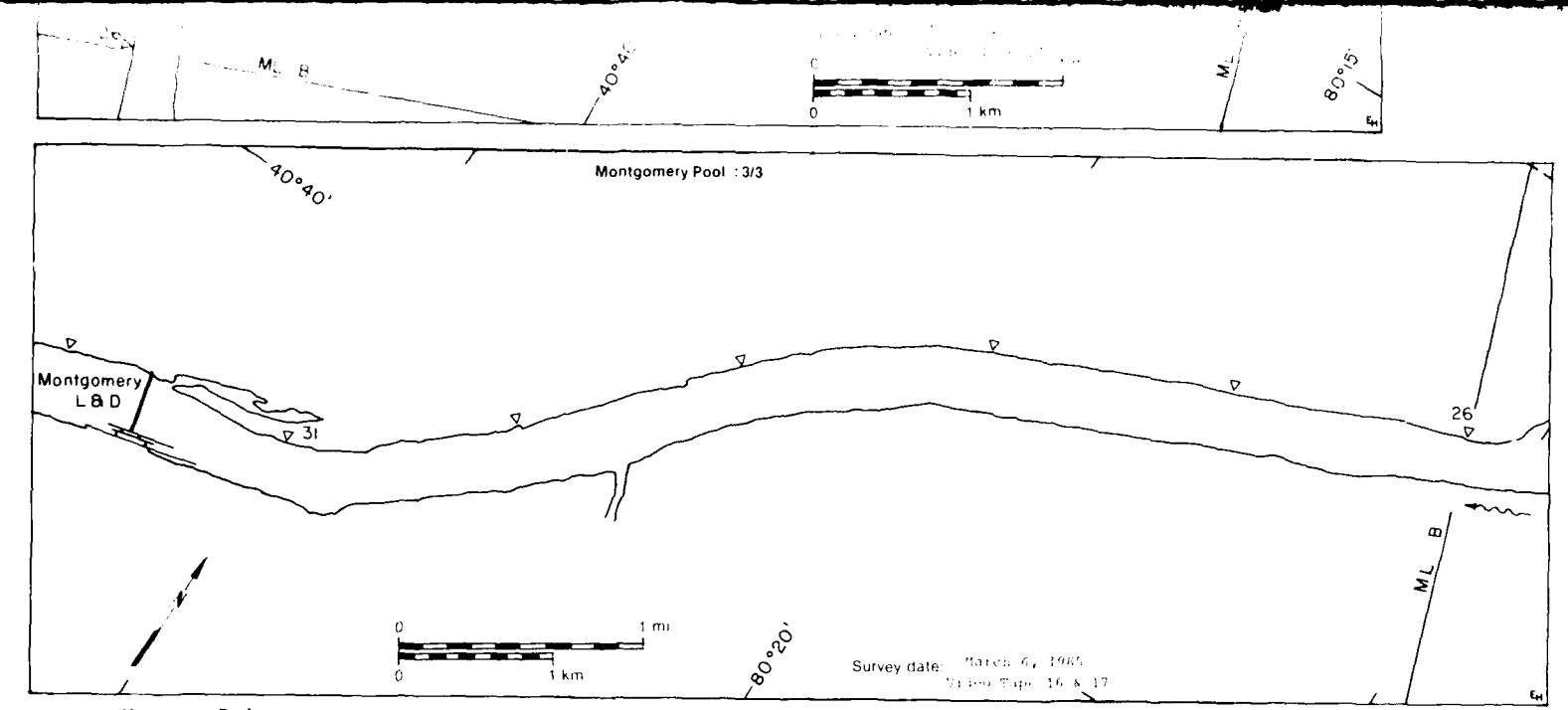
	NA
— —	NA
— —	— —
— —	NA
— —	— —
— —	— —

6 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Dashields
L&D
14
Match line A
80°15'
0
1 mi
0
1 km
Survey date March 6, 1985
Video Tape 17

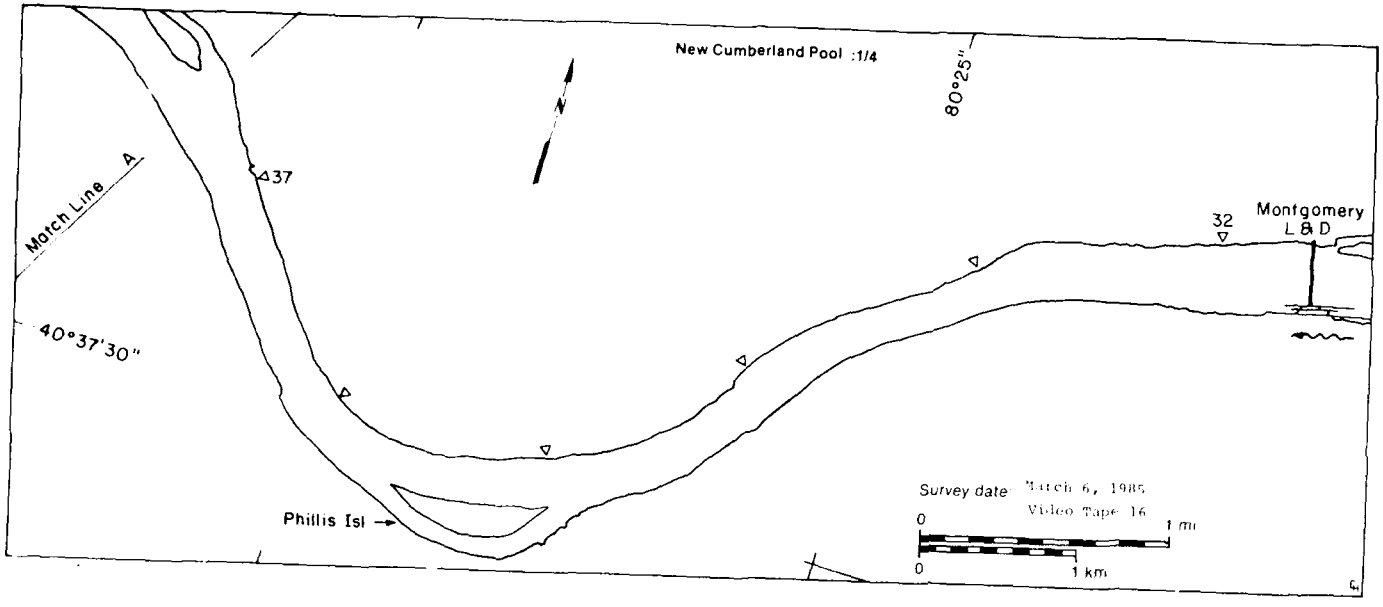

Montgomery Pool :2/3
20
Beaver
R
26
ML B
40°40'
Survey date March 6, 1985
Video Tape 17
0
1 mi
0
1 km
ML A
80°5'

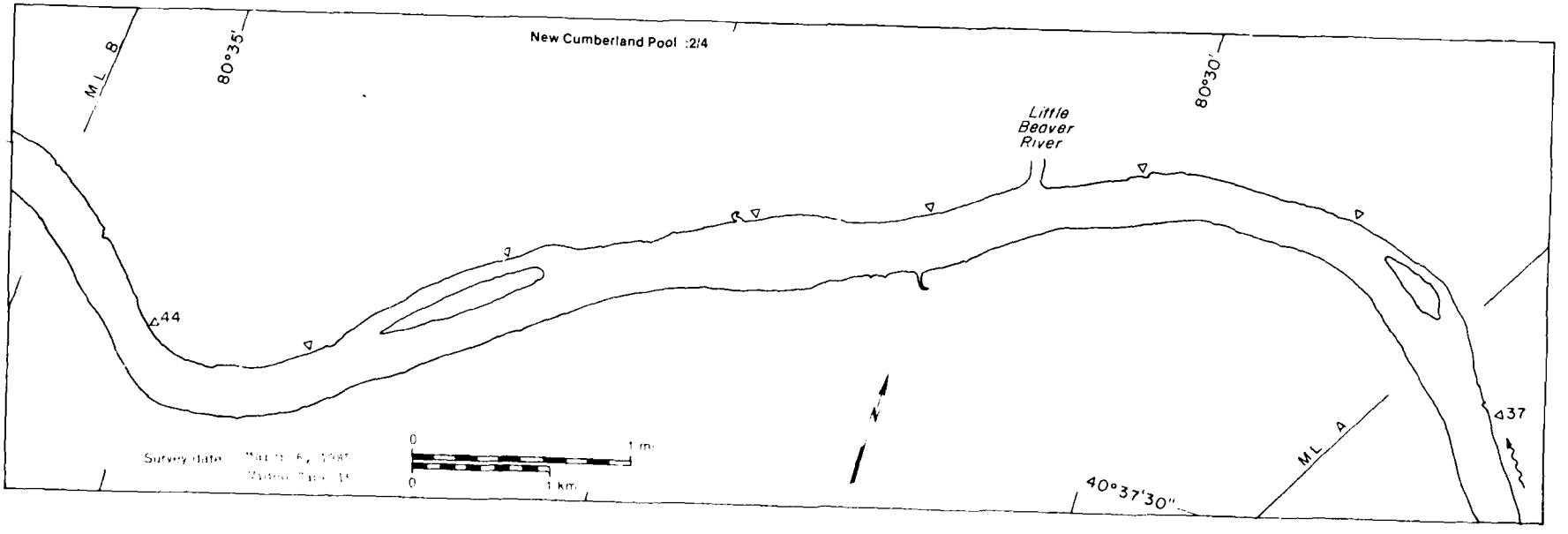

40°40'
Montgomery Pool : 3/3

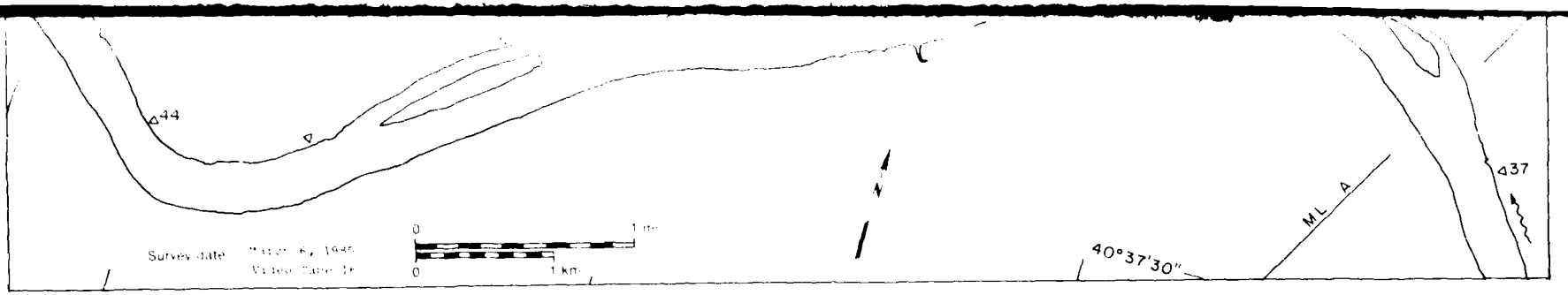


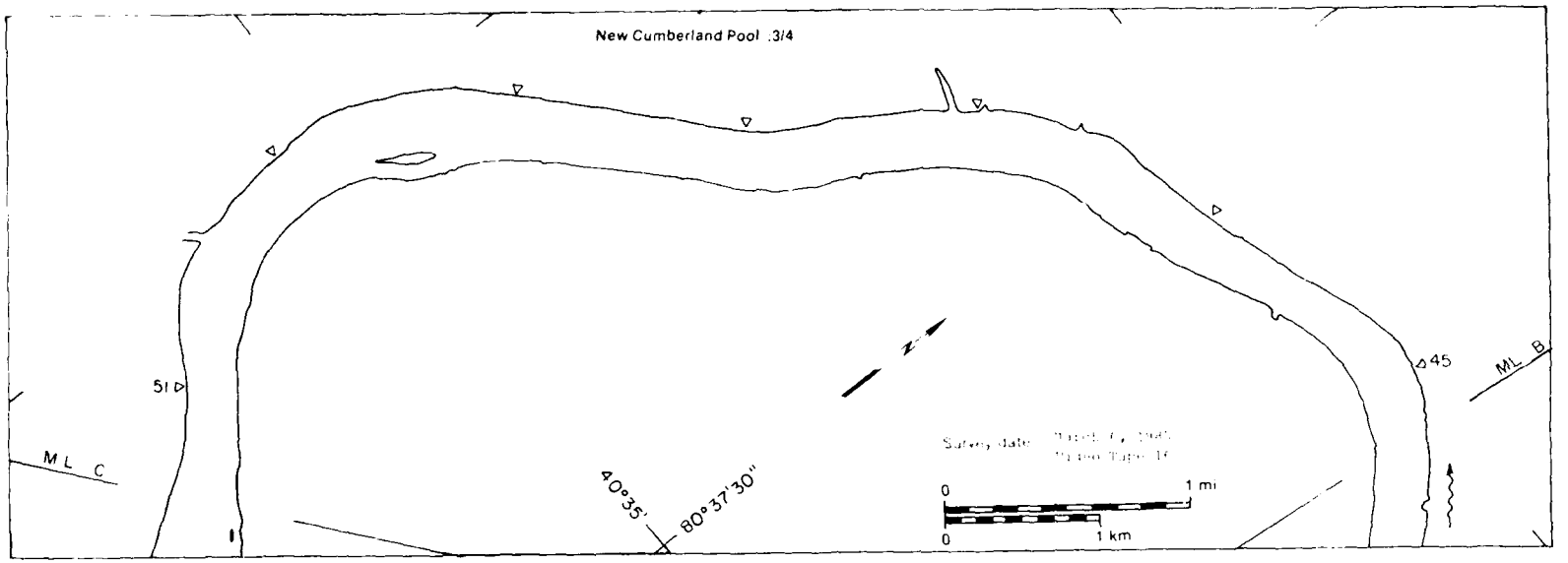
Montgomery Pool

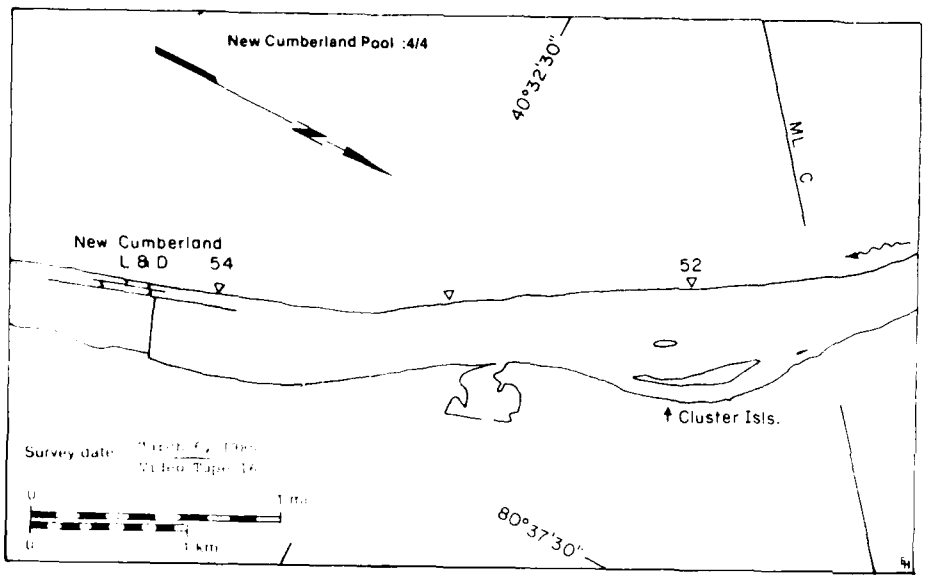
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	11.27	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27	


New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery
L & D
40°37'30"
Phillis Isl
Survey date: March 6, 1985
Video Tape 16
0
1 mi
0
1 km


New Cumberland Pool :2/4
M L B
80°35'
80°30'
Little
Beaver
River
44
37
M L A
40°37'30"
0
1 mi
0
1 km

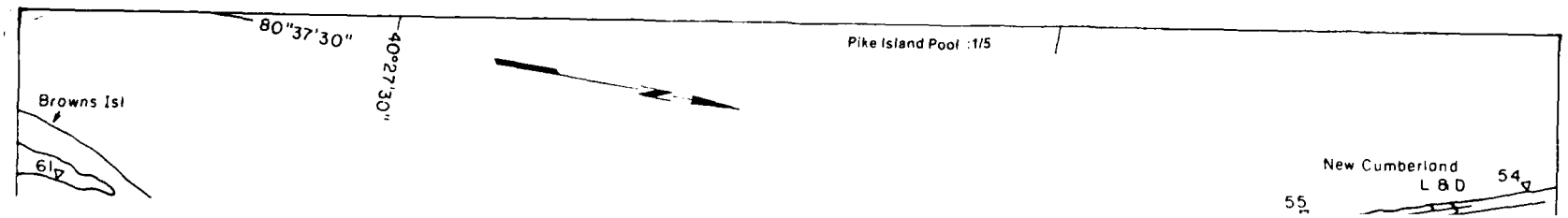

44
37
0
1 mi
0
1 km
ML A
40°37'30"

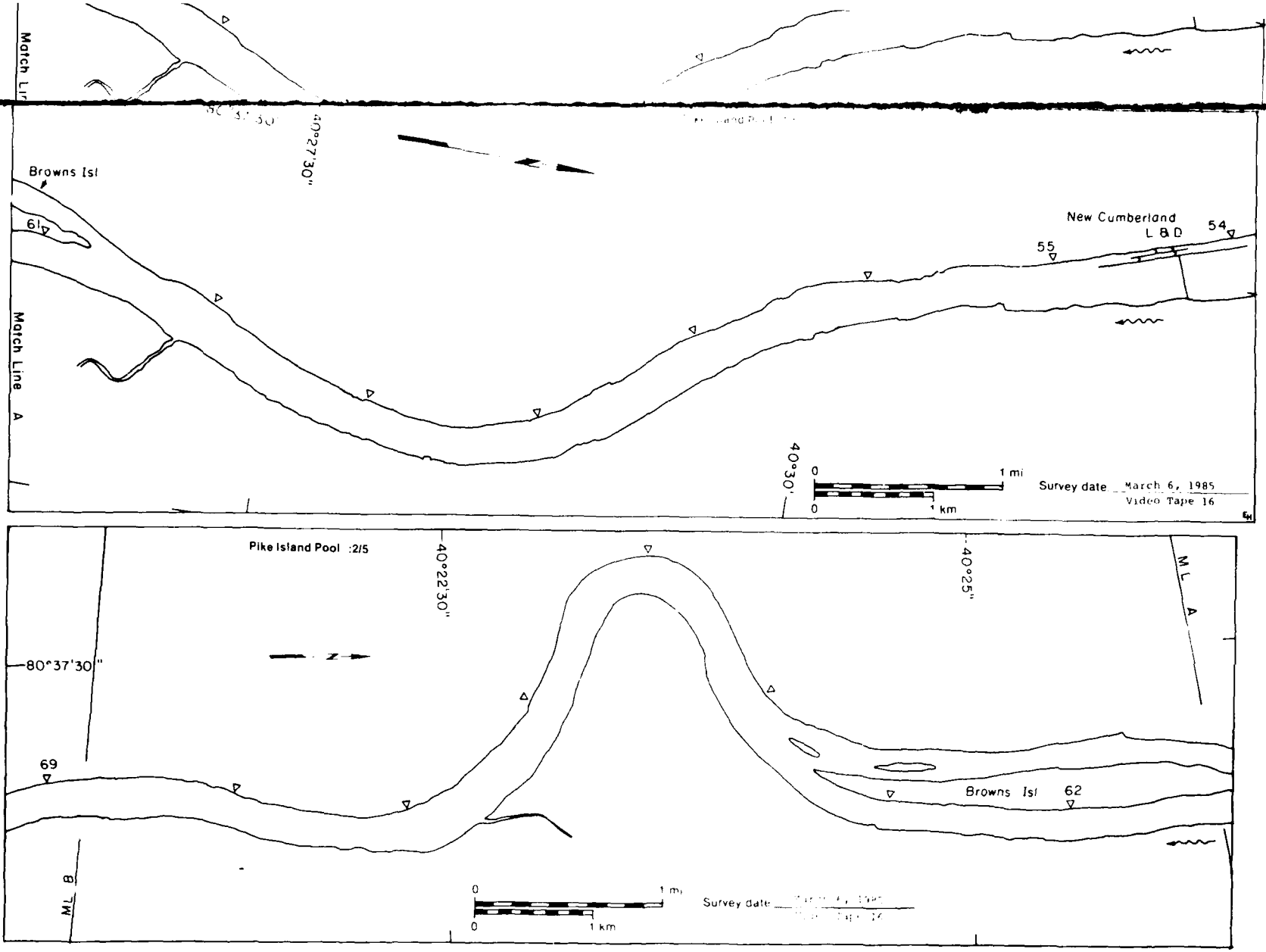

New Cumberland Pool .3/4
51
45
ML B
ML C
40°35'
80°37'30"
0
1 mi
0
1 km



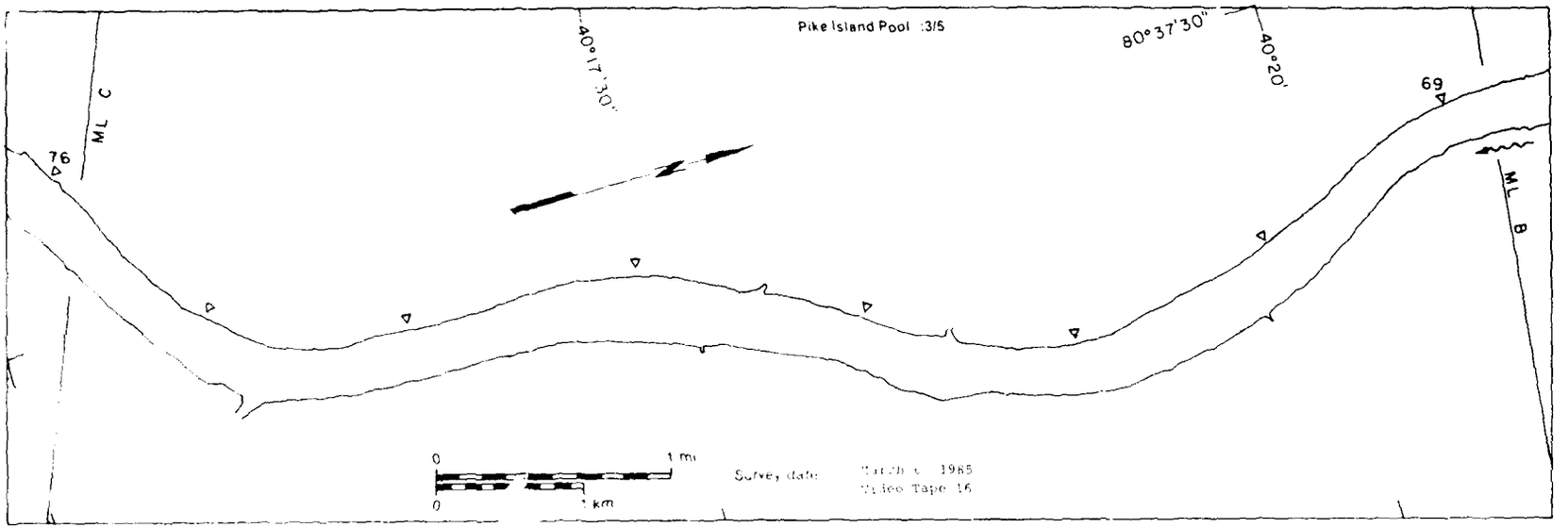
New Cumberland Pool

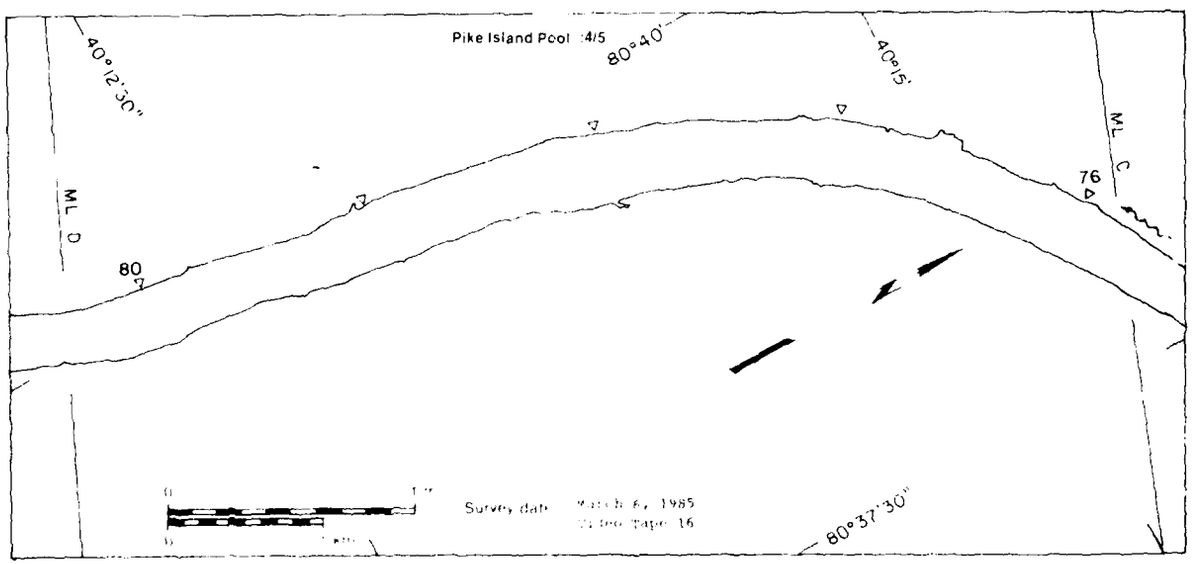
MAP UNITS	Area ($km^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($km^2 \times 10^6$)	14.87	

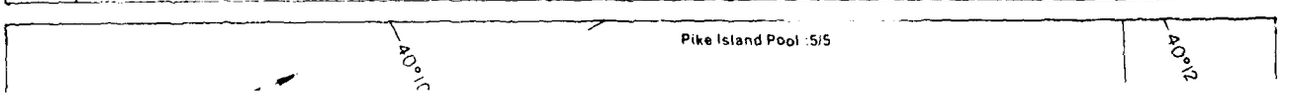


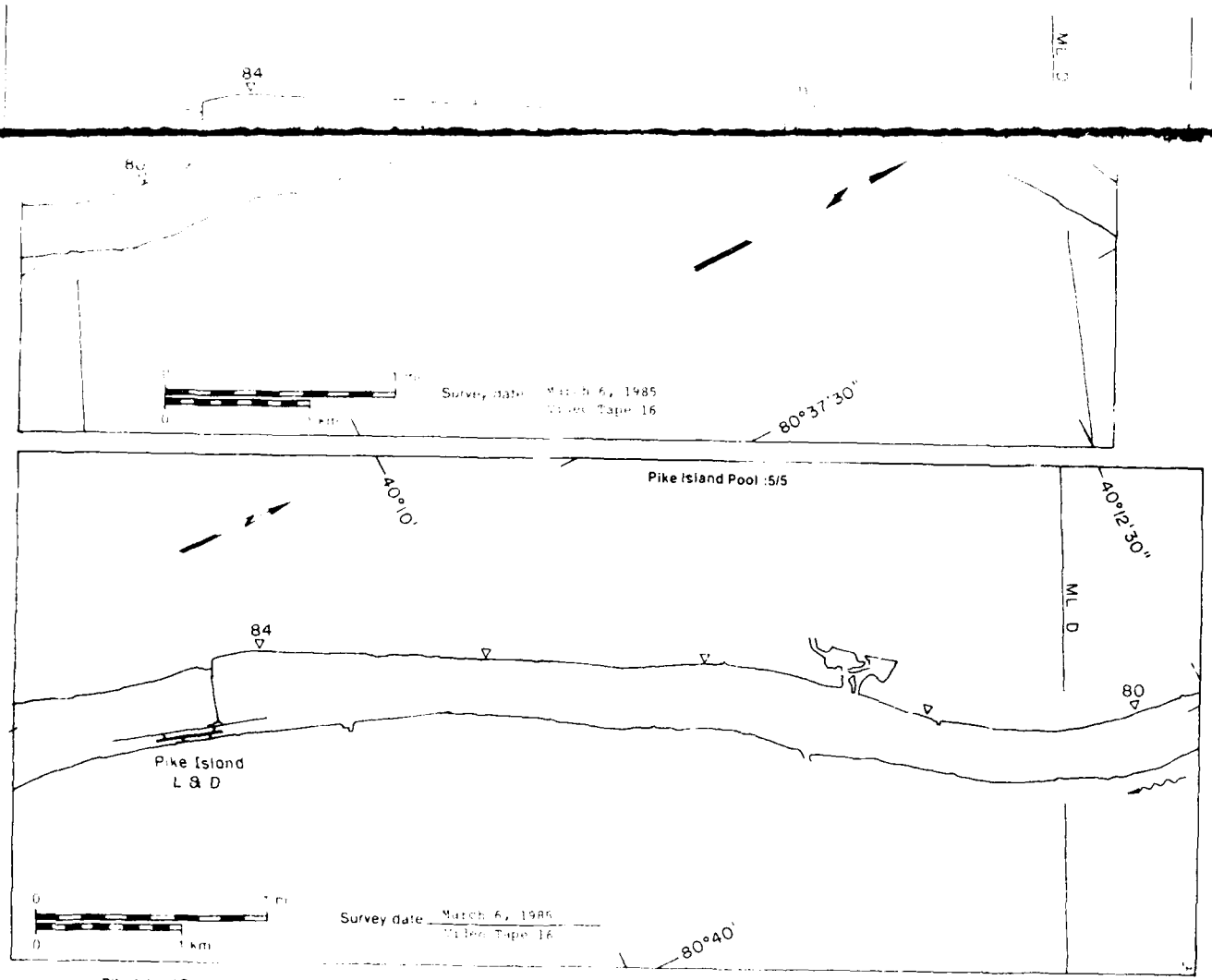

Match Line
40°27'30"
Browns Isl
61
New Cumberland
L&D
54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date March 6, 1985
Video Tape 16
Pike Island Pool :2/5
40°22'30"
40°25"
M L A
80°37'30"
69
Browns Isl
62
M L B
0
1 mi
0
1 km
Survey date

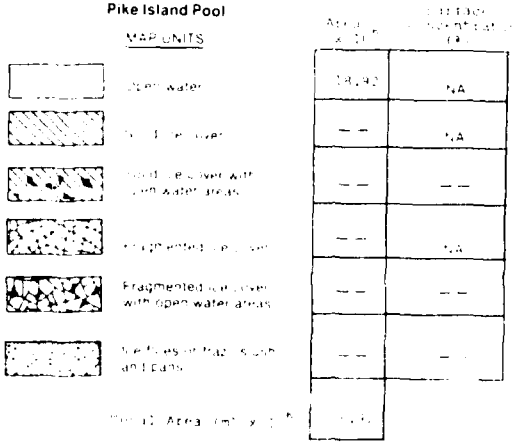
6 March 1985


Pike Island Pool :3/5
40°17'30"
80°37'30"
40°20'
69
76
ML C
ML B
0
1 mi
0
1 km
Survey date

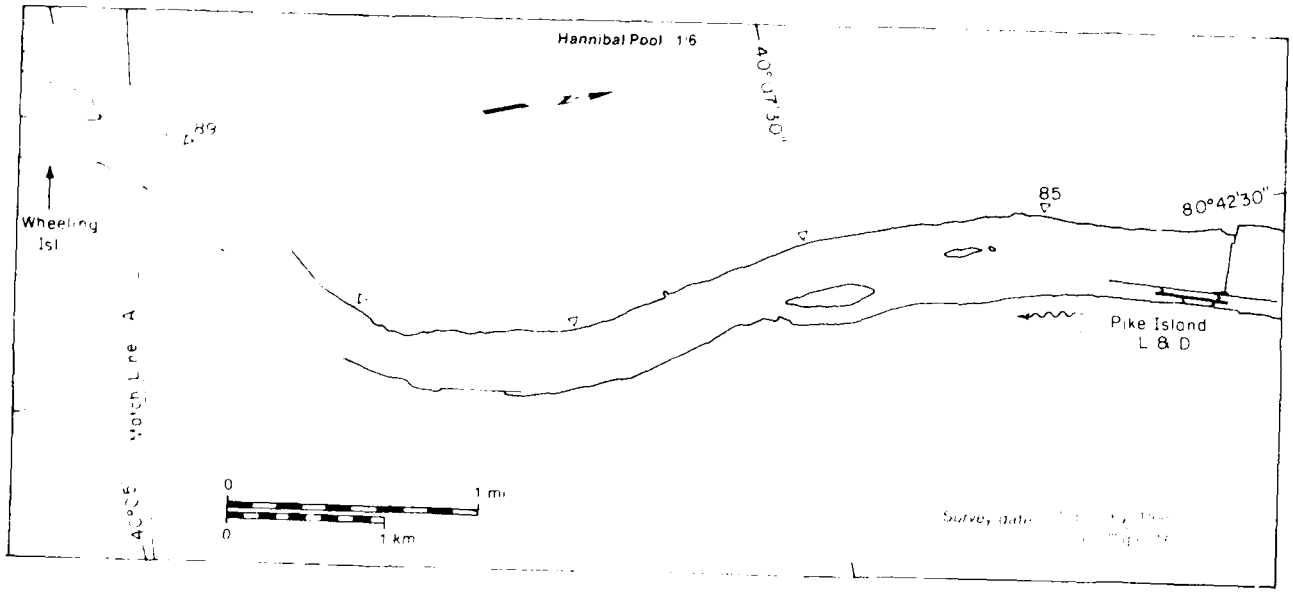

Pike Island Pool :4/5
80°40'
40°15'
40°12'30"
ML C
ML D
76
80
Survey date
80°37'30"

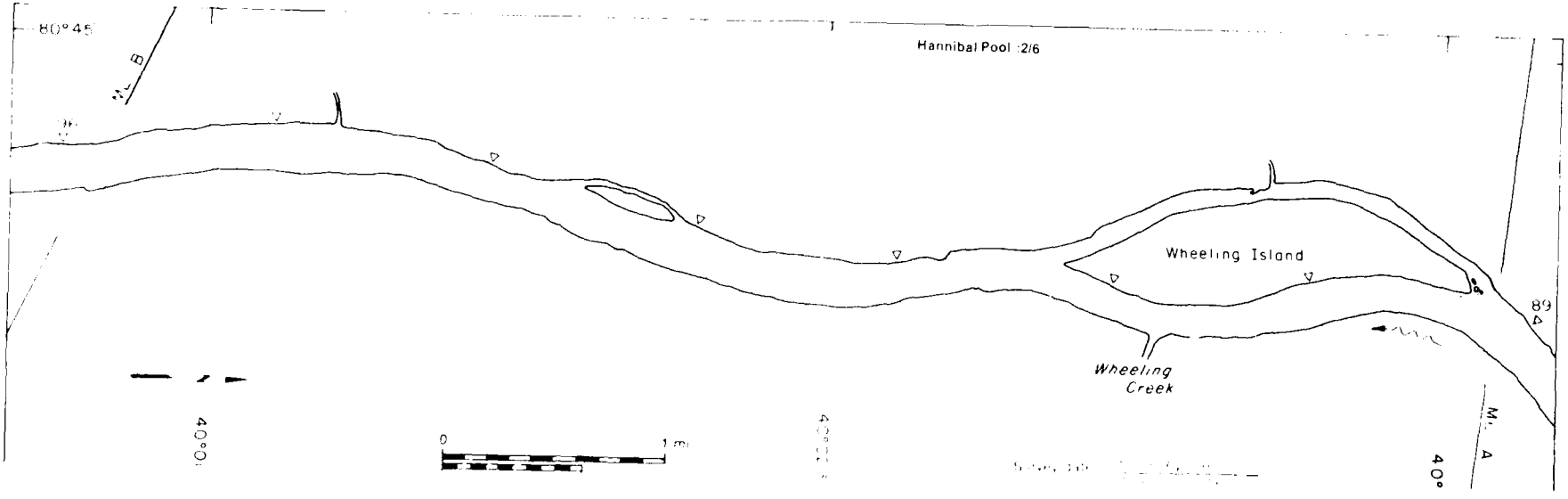

Pike Island Pool :5/5
40°12

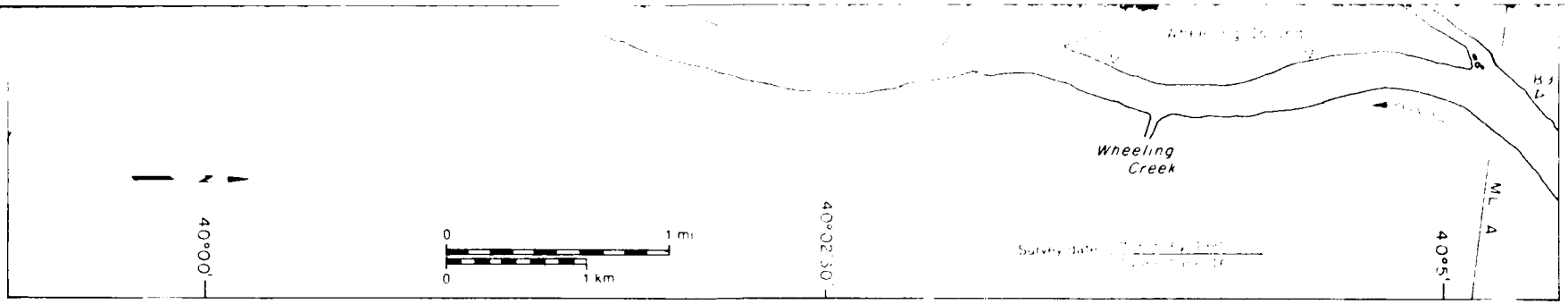

84
80°37'30"
Survey date March 6, 1985
Pike Island Pool :5/5
40°10'
40°12'30"
ML D
84
80
Pike Island
L & D
0
1 km
Survey date March 6, 1985
80°40'

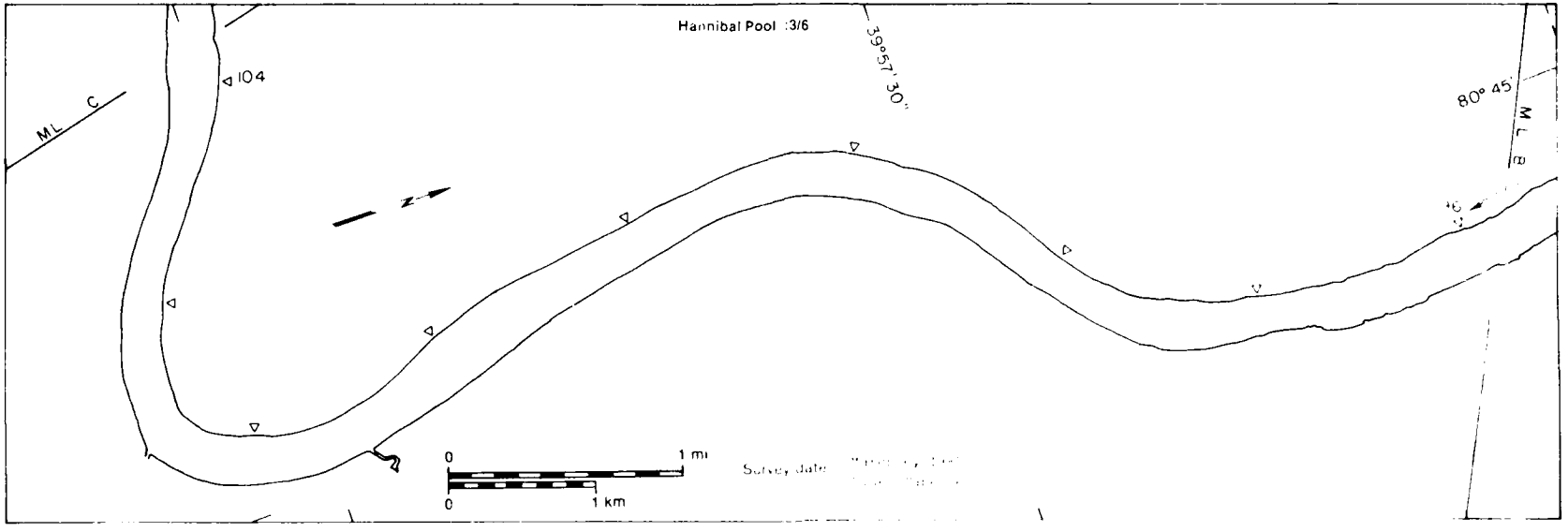

Pike Island Pool
MAP UNITS
Open water
Fragmented ice cover with open water areas
NA

6 March 1985

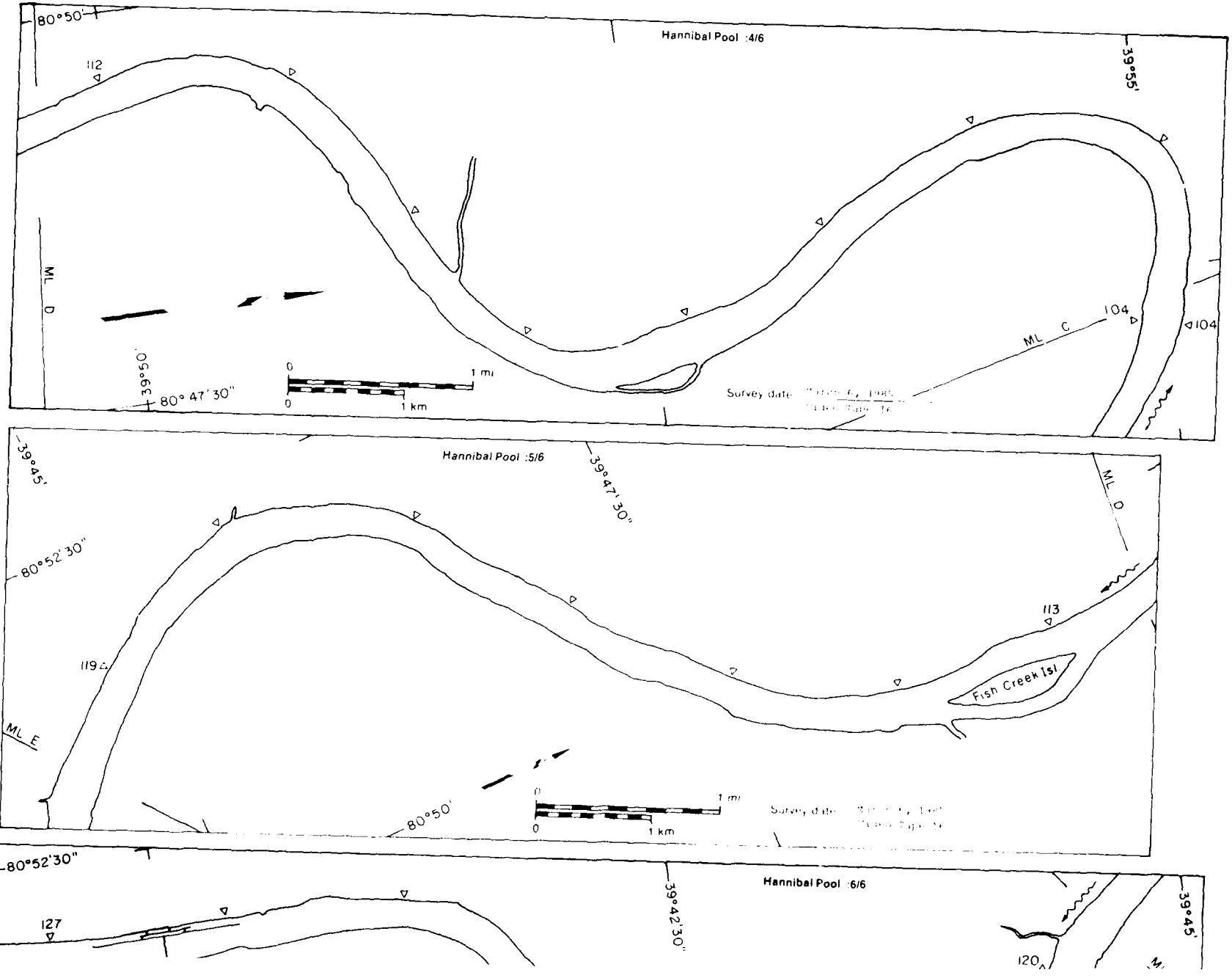

Hannibal Pool 1/6
40°37'30"
Wheeling Isl
85
80°42'30"
Pike Island L & D
0
1 mi
0
1 km

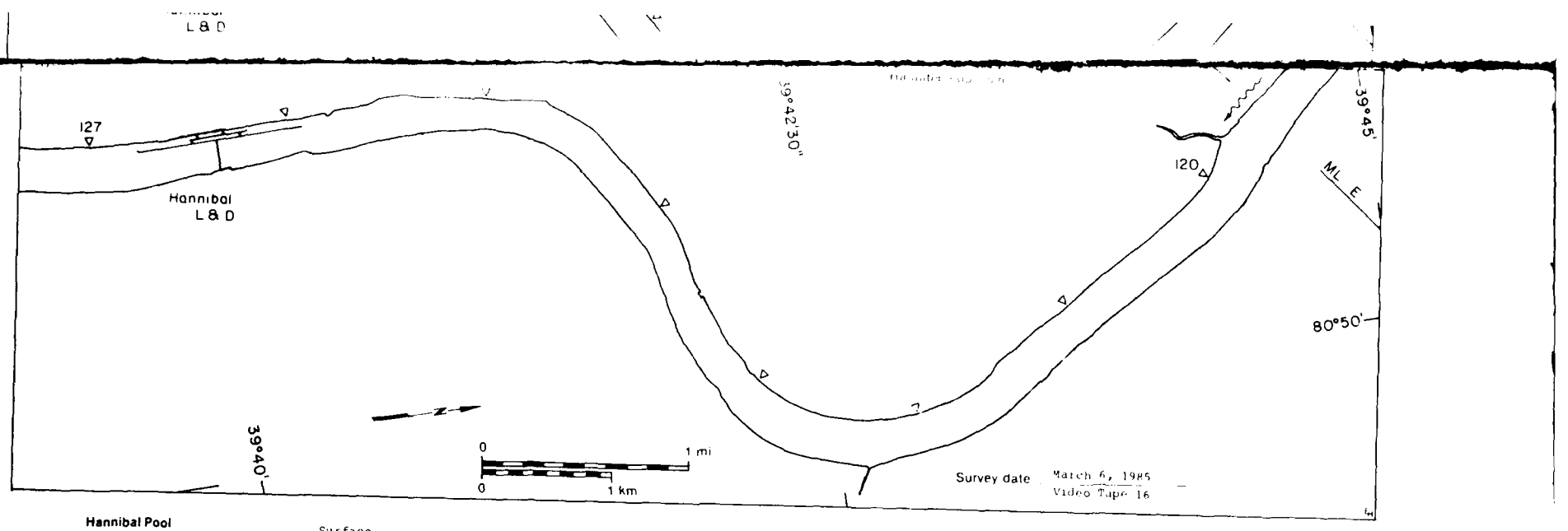

80°45
Hannibal Pool 2/6
Wheeling Island
89
Wheeling Creek
0
1 mi


Wheeling
Creek
40°00'
40°02'30"
40°05'
ML A
0
1 mi
0
1 km


Hannibal Pool :3/6
39°57'30"
80° 45
ML C
ML B
104
0
1 mi
0
1 km

6 March 1985

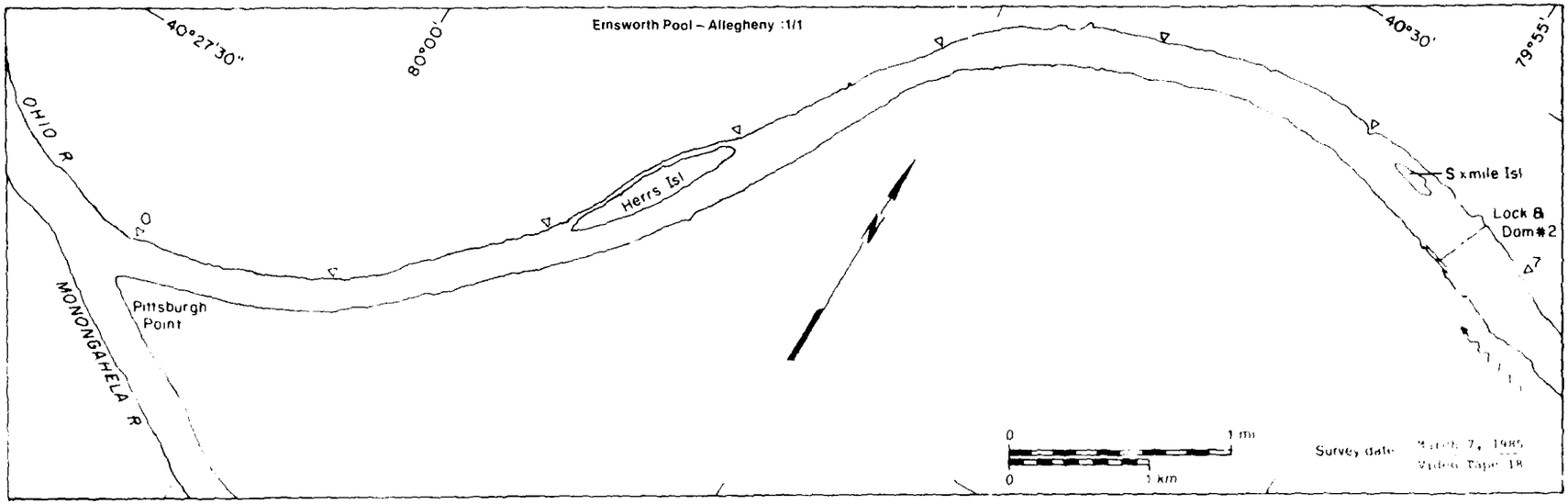

Hannibal Pool :4/6
80°50'
39°55'
112
104
104
ML D
ML C
39°50'
80° 47' 30"
0
1 mi
0
1 km
Survey date
Hannibal Pool :5/6
39°45'
39°47'30"
80°52'30"
ML D
113
119
Fish Creek Isl
ML E
80°50'
0
1 mi
0
1 km
Survey date
80°52'30"
Hannibal Pool :6/6
39°42'30"
39°45'
127
120

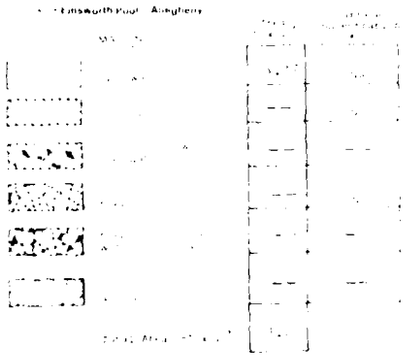


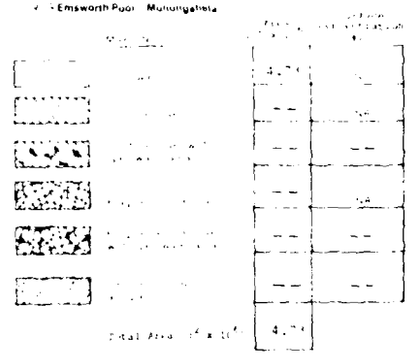
Hannibal Pool

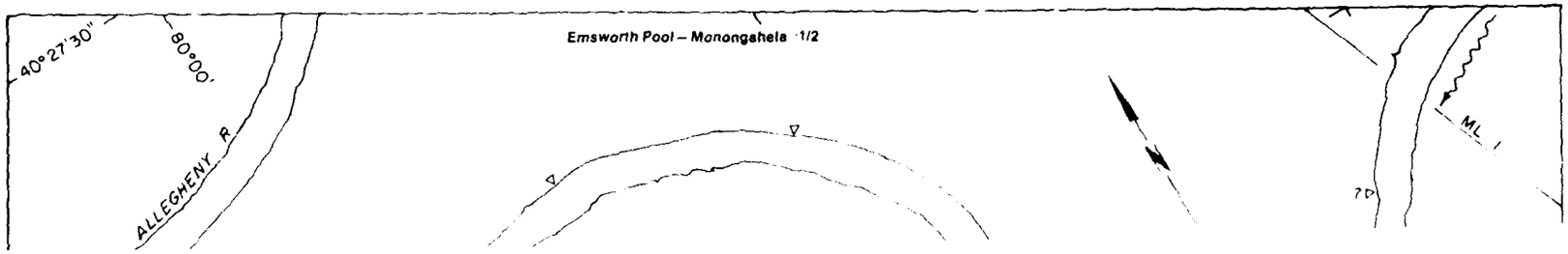
MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	22.46	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area (m^2 x 10^6)	22.46	

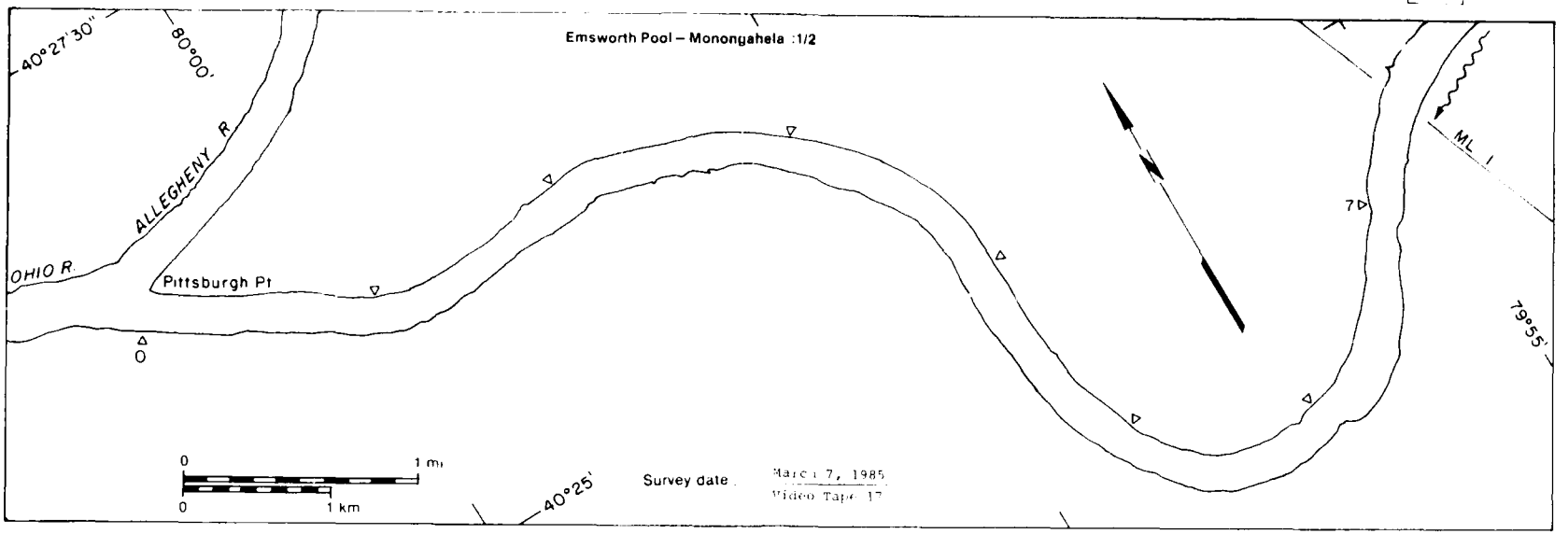
7 March 1985

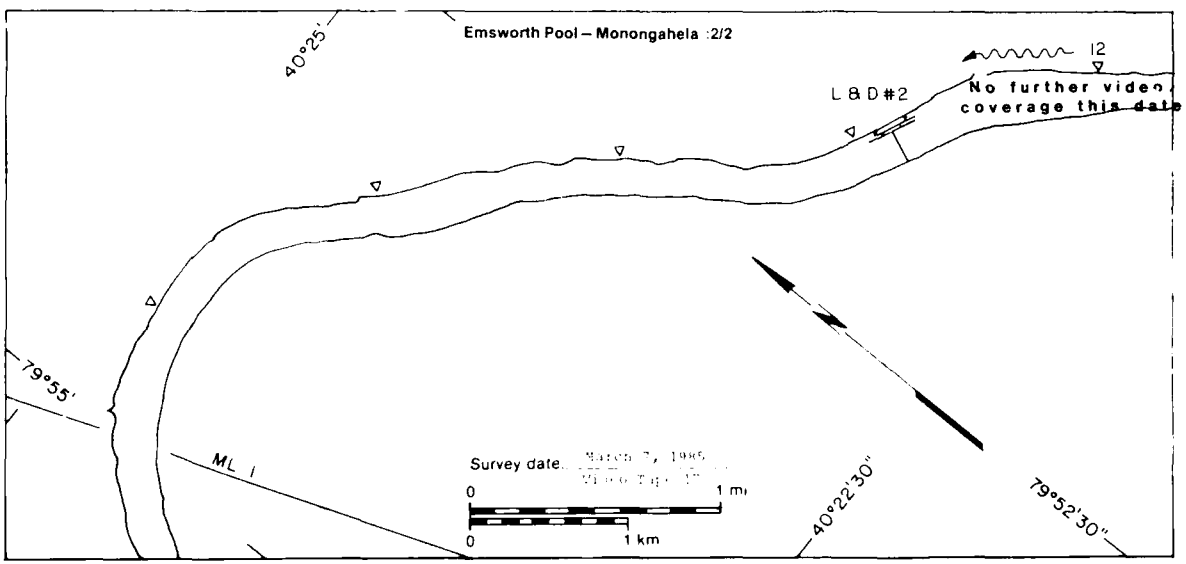

Emsworth Pool – Allegheny :1/1
40°27'30"
80°00'
40°30'
79°55'
OHIO R
MONONGAHELA R
Herrs Isl
Pittsburgh Point
S xmile Isl
Lock & Dam #2
0
1 mi
0
1 km
Survey date: March 7, 1985
Video Tape 18



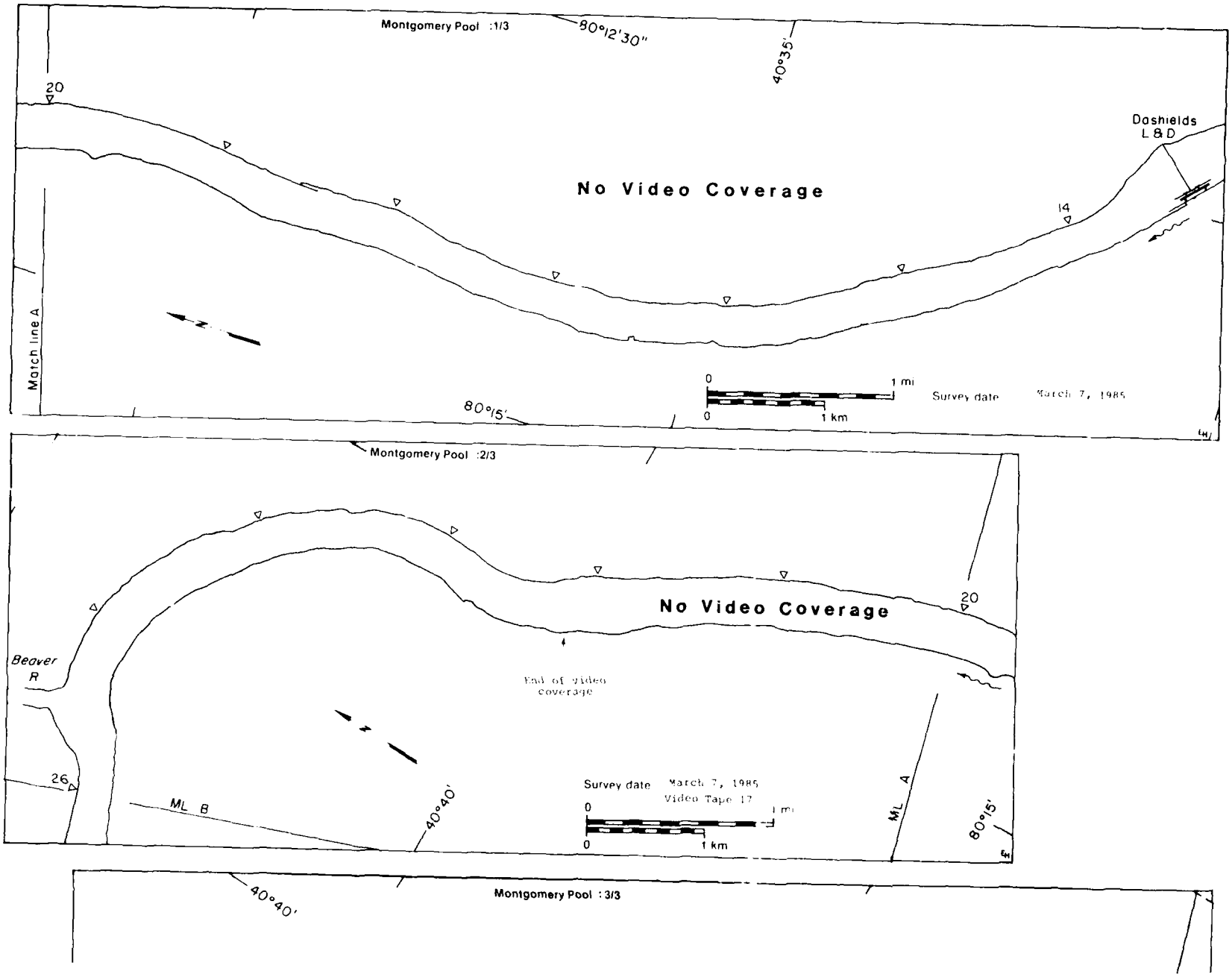


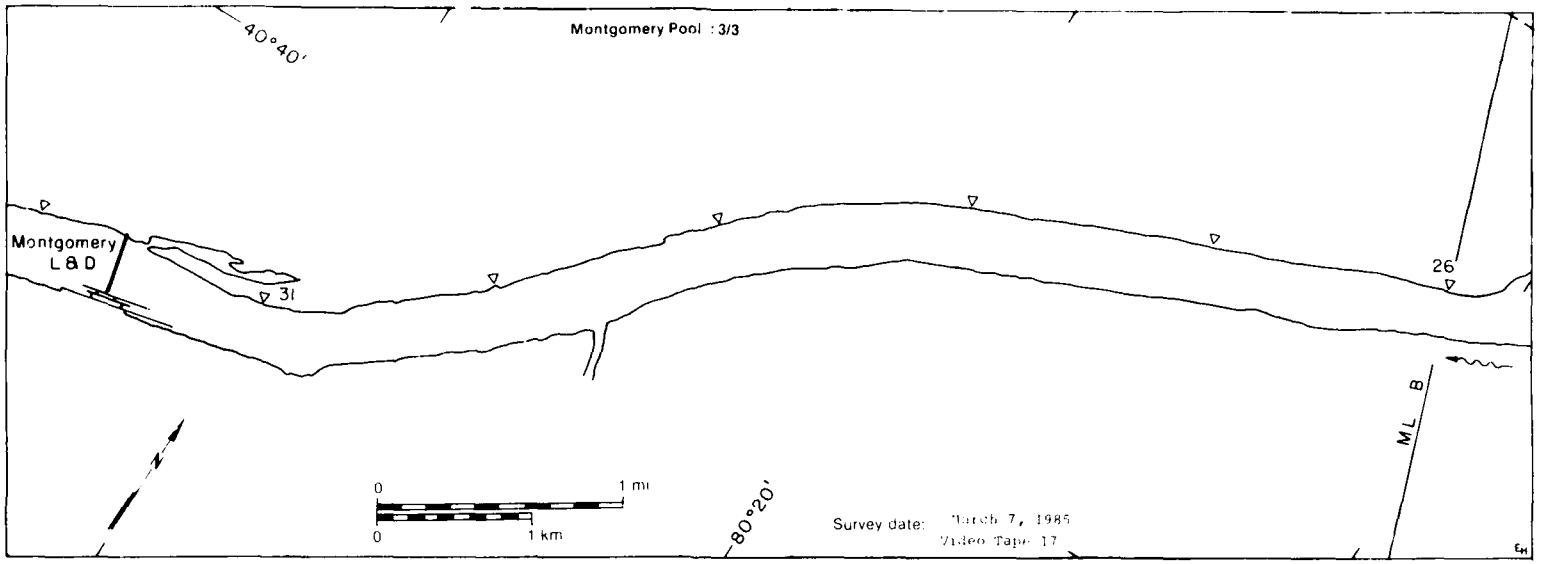

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R
ML


Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date:
March 7, 1985
Video Tape 17


Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
No further video
coverage this date
79°55'
ML 1
Survey date:
March 7, 1985
Video Tape 17
0
1 mi
0
1 km
40°22'30"
79°52'30"

7 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Dashields L&D
No Video Coverage
14
March line A
0
1 mi
0
1 km
Survey date March 7, 1985
80°15'
Montgomery Pool :2/3
No Video Coverage
20
Beaver R
End of video coverage
26
ML B
40°40'
Survey date March 7, 1985
Video Tape 17
0
1 mi
0
1 km
ML A
80°15'
40°40'
Montgomery Pool :3/3

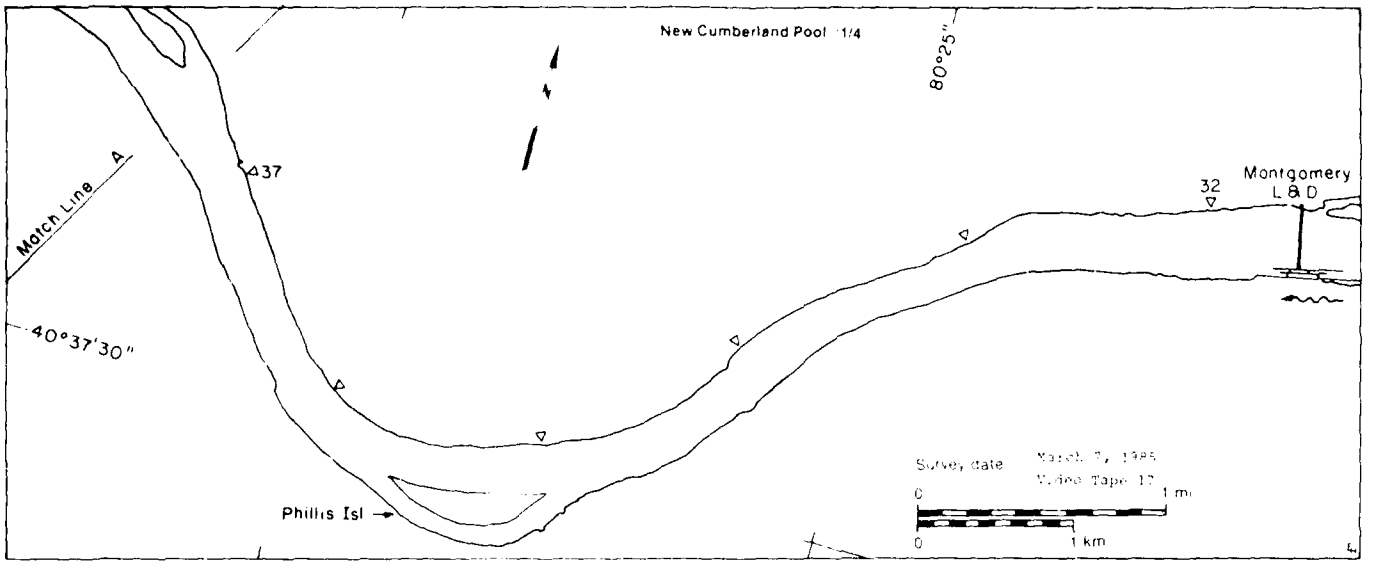


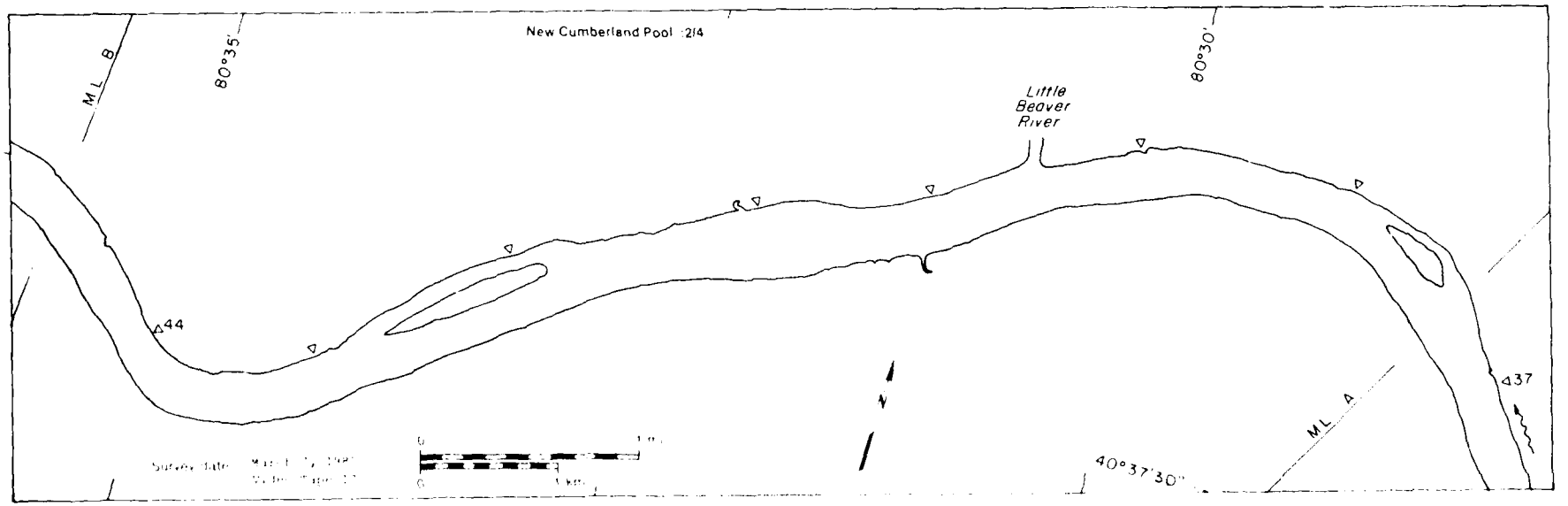
Montgomery Pool

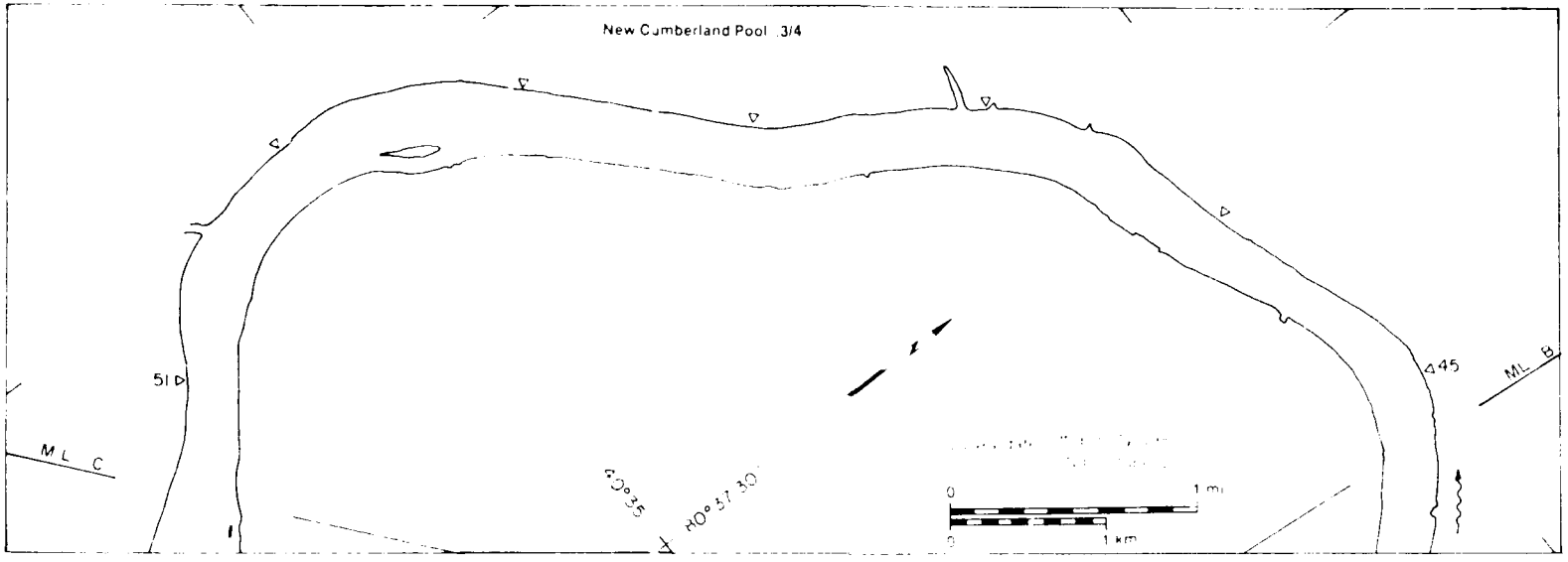
MAP UNITS	Area ($km^2 \times 10^6$)	Surface concentration (%)
Open water	5.09	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($km^2 \times 10^6$)	11.37*	

*Includes 5.28 sq km ice coverage

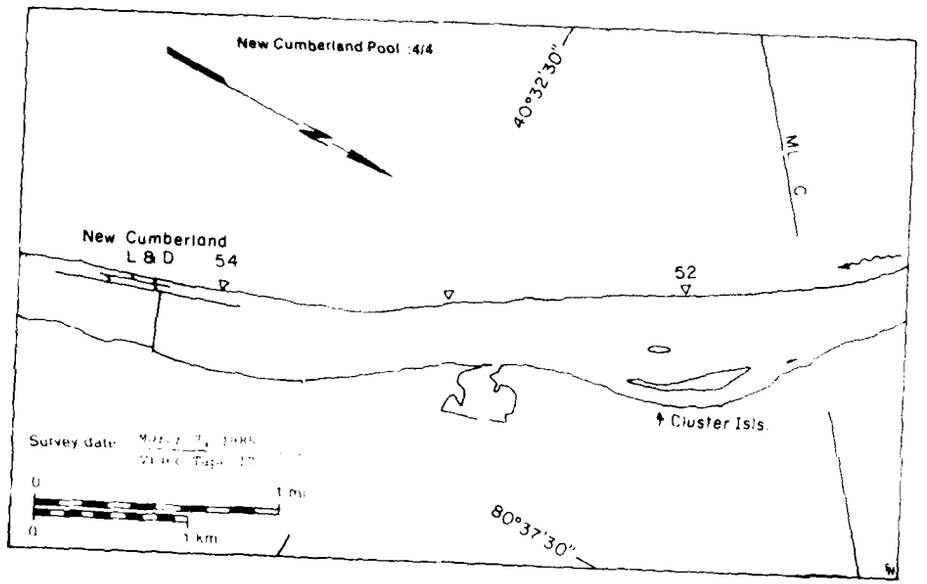
7 March 1985


New Cumberland Pool 1/4
80°25"
Match Line A
37
32
Montgomery
L & D
40°37'30"
Phillis Isl
Survey date
0
1 mi
0
1 km


New Cumberland Pool 2/4
ML B
80°35'
80°30'
Little
Beaver
River
44
437
ML A
40°37'30"


New Cumberland Pool 3/4
51
445
ML C
ML B
40° 37' 30"
0
1 mi
1 km

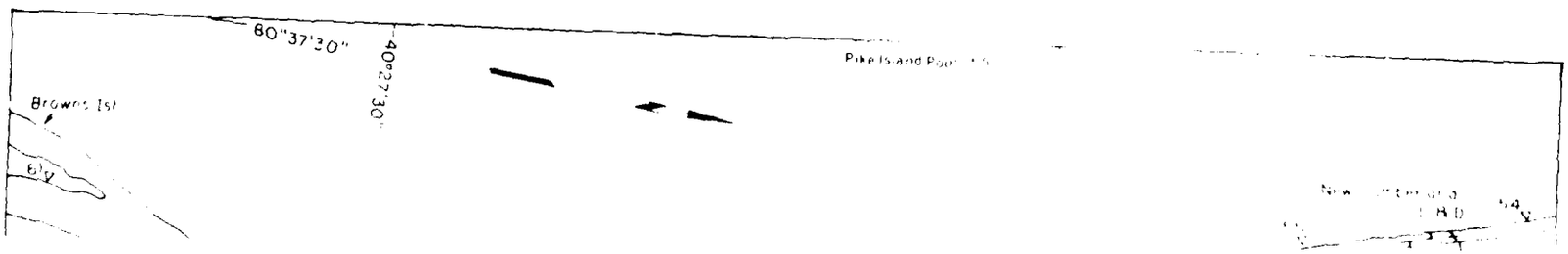
7 March 1985

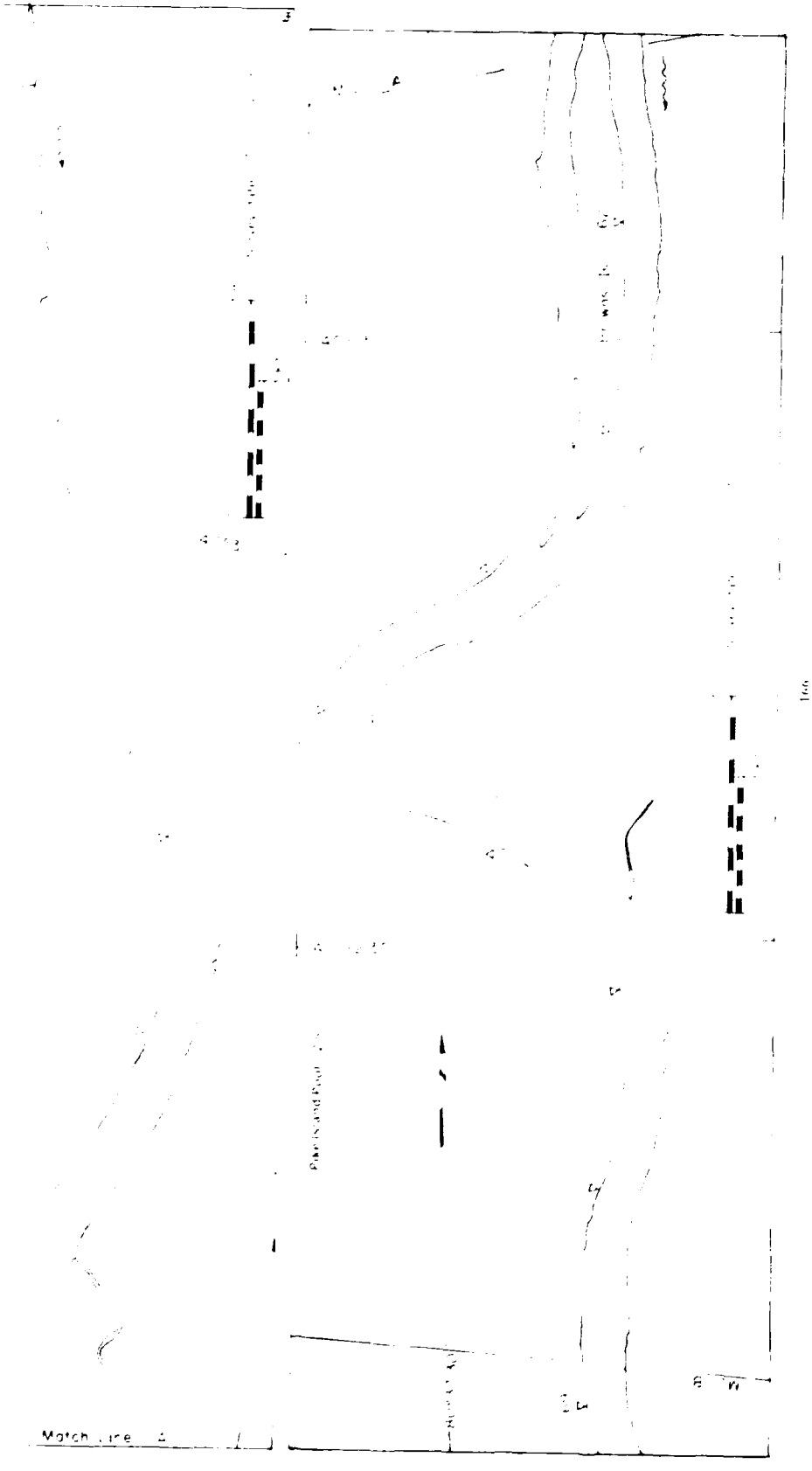


New Cumberland Pool

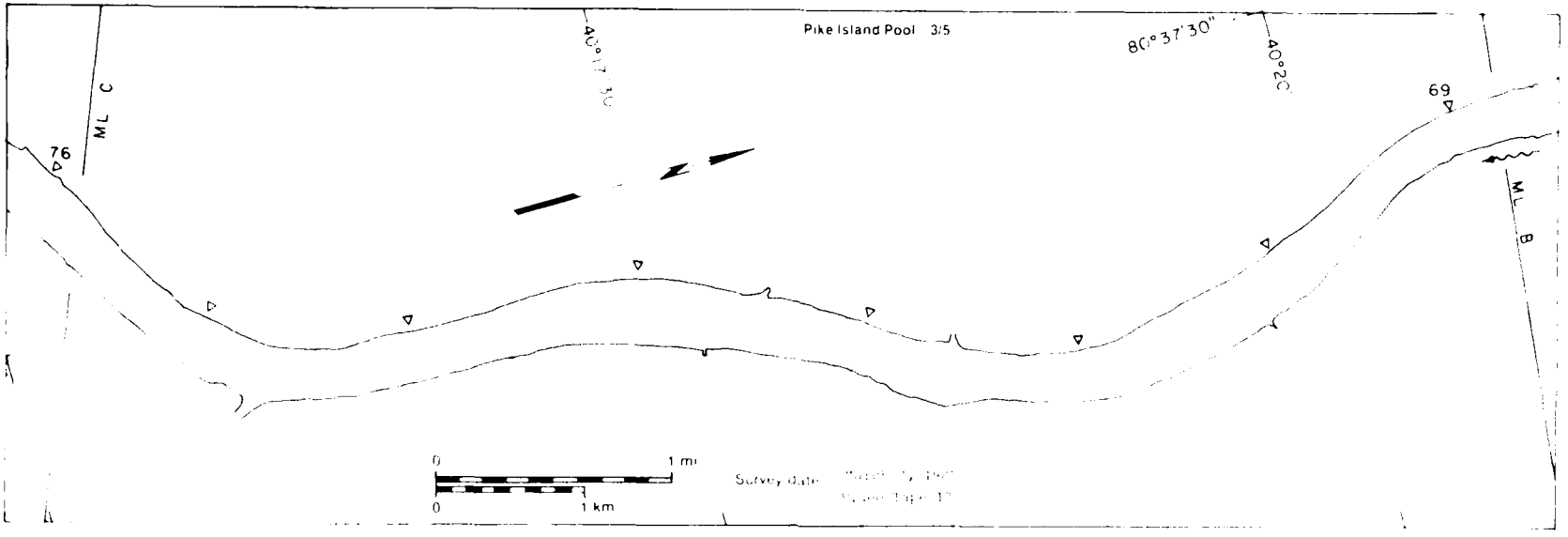
MAP UNITS

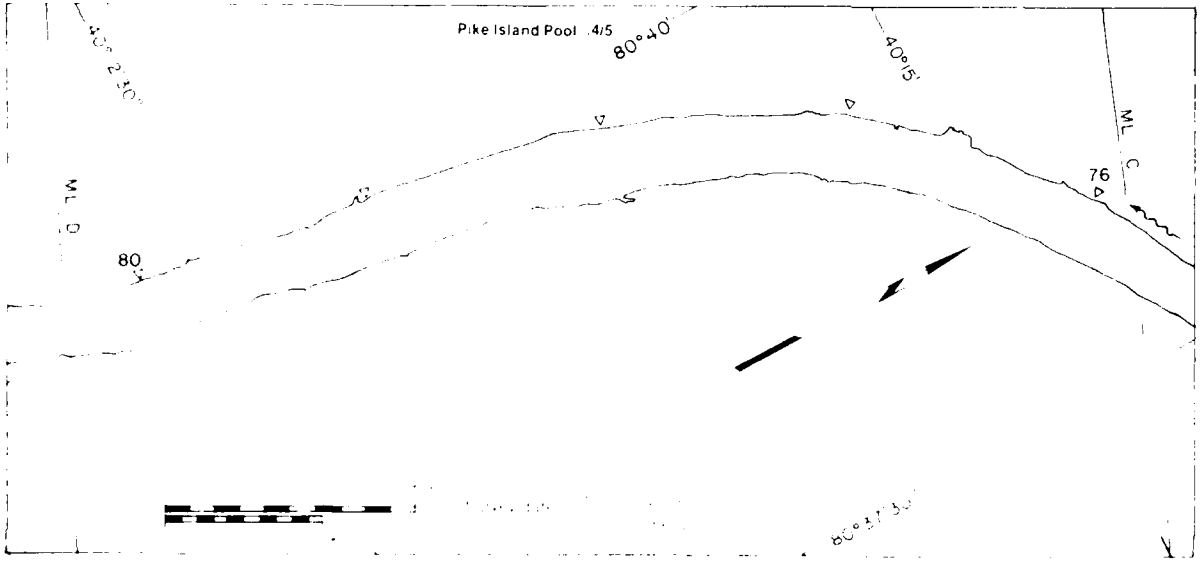
	Area ($ft^2 \times 10^6$)	Surface concentration (%)
Open water	14.8*	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($ft^2 \times 10^6$)	14.8*	

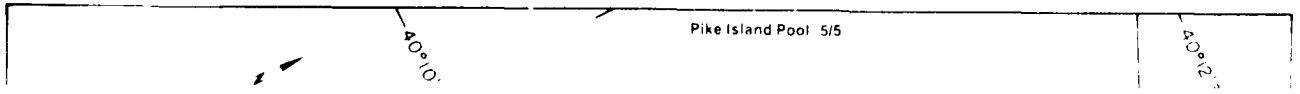


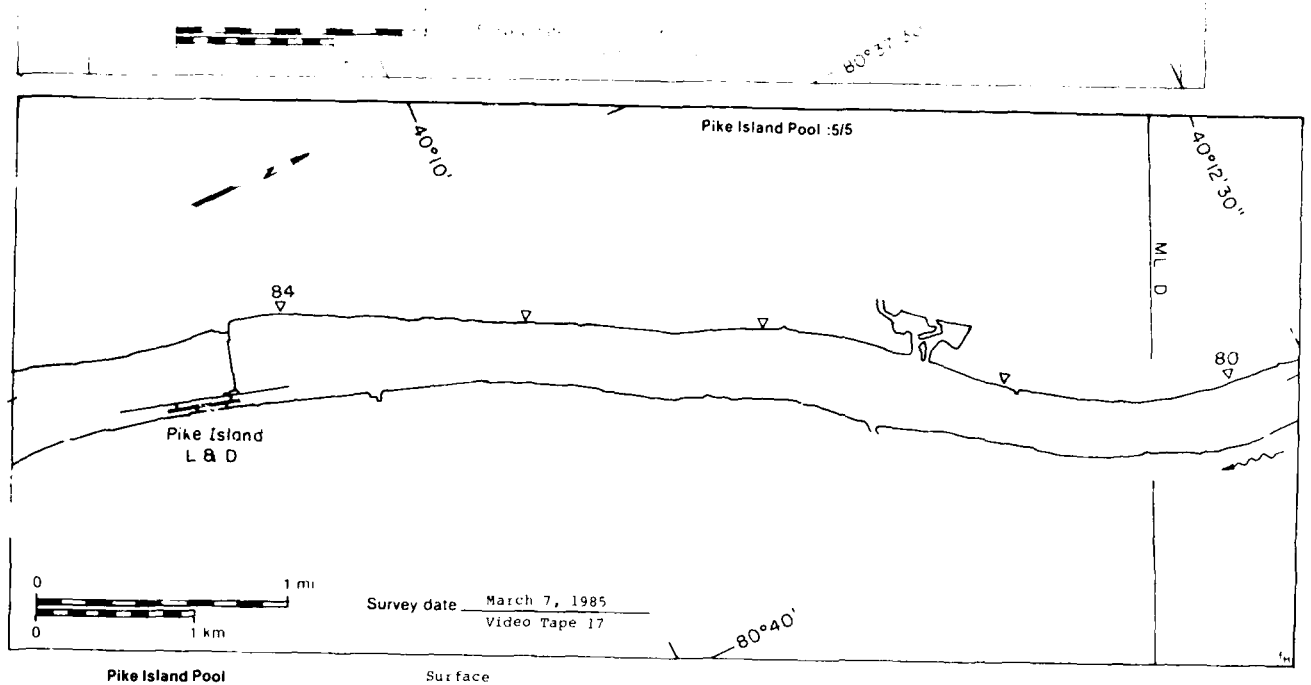

Match line

7 March 1985


Pike Island Pool 3/5
40°17'30"
80°37'30"
40°20'
69
76
ML C
ML B
0
1 mi
0
1 km


Pike Island Pool 4/5
80°40'
40°15'
ML C
ML D
76
80

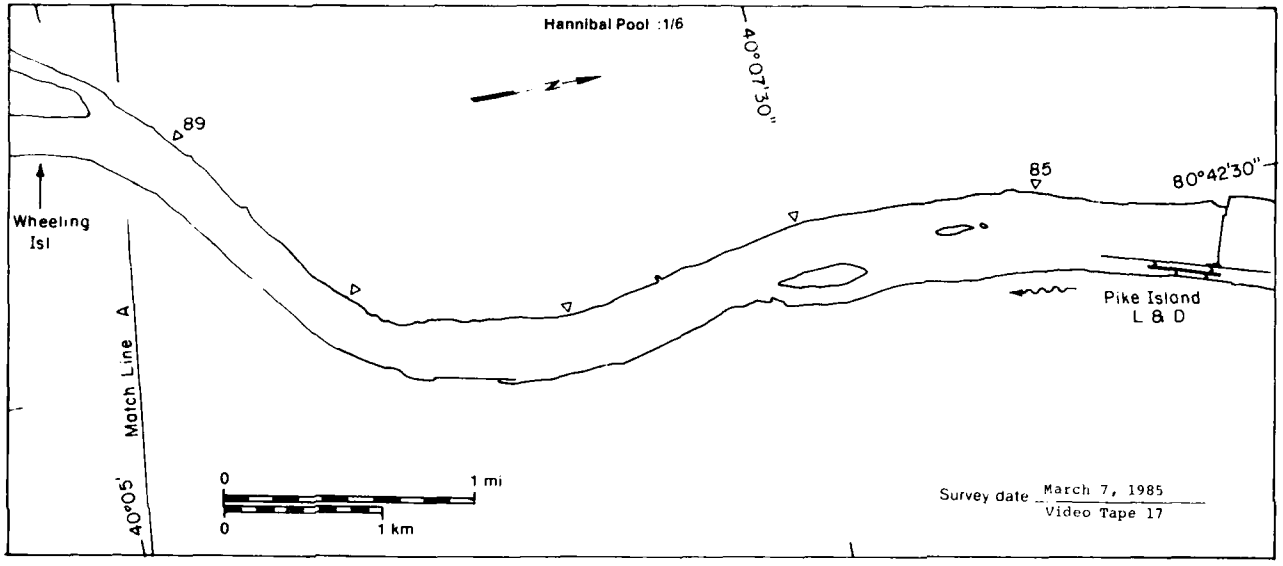

Pike Island Pool 5/5
40°10'
40°12'

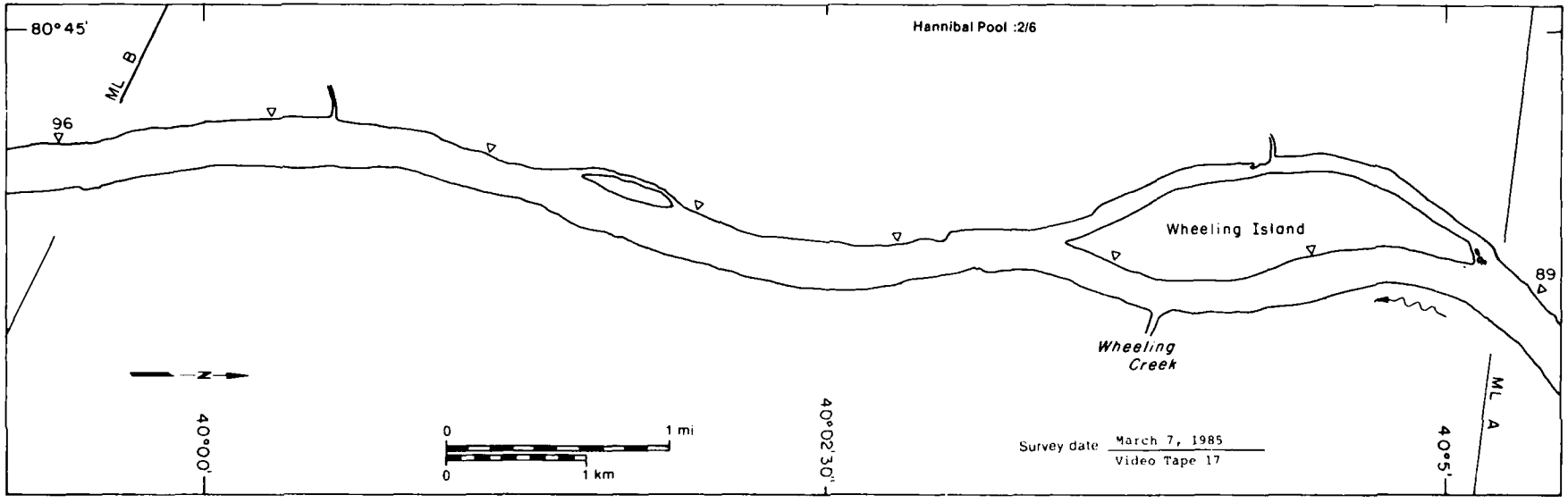


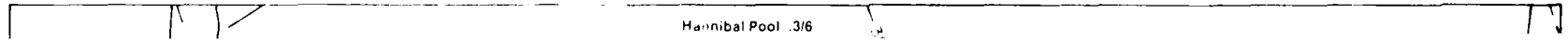
Pike Island Pool

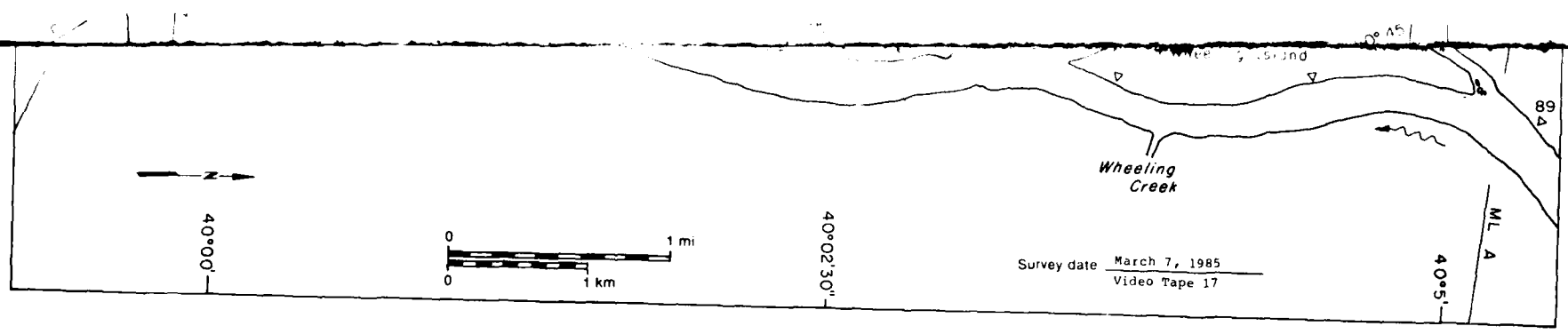
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.92	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	18.92	

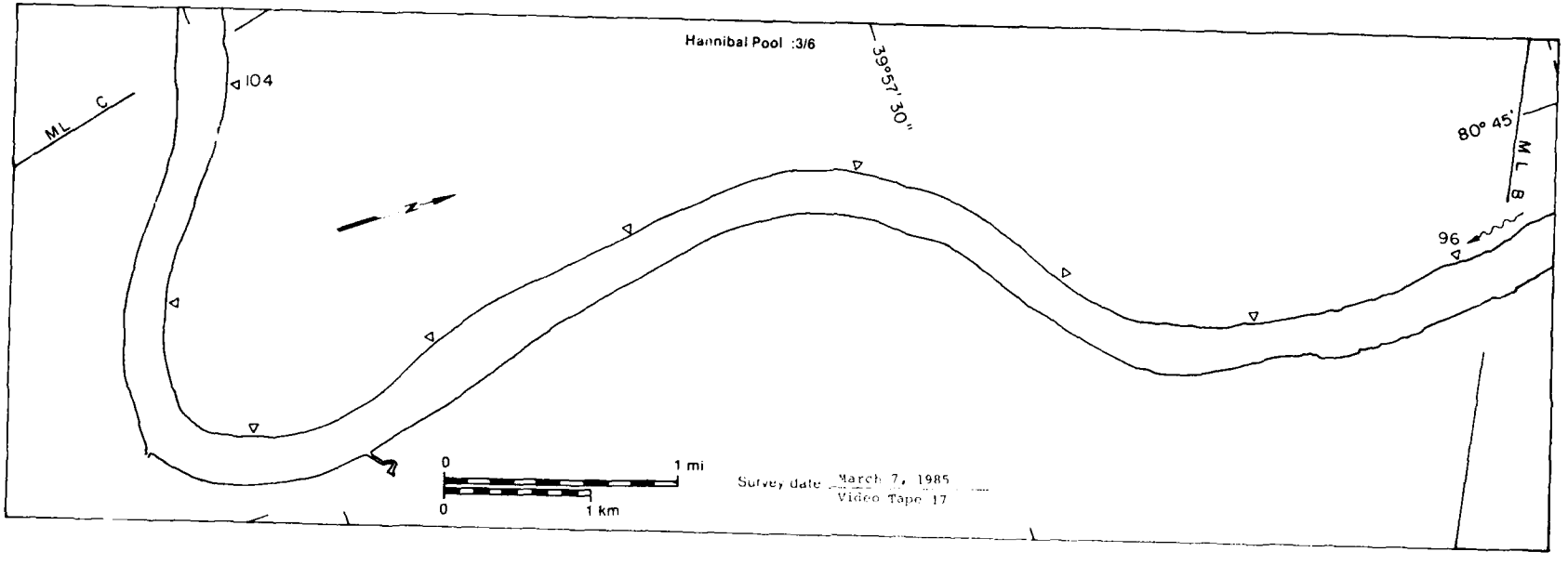
7 March 1985


Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Pike Island L & D
Match Line A
40°05'
0
1 mi
0
1 km
Survey date March 7, 1985
Video Tape 17

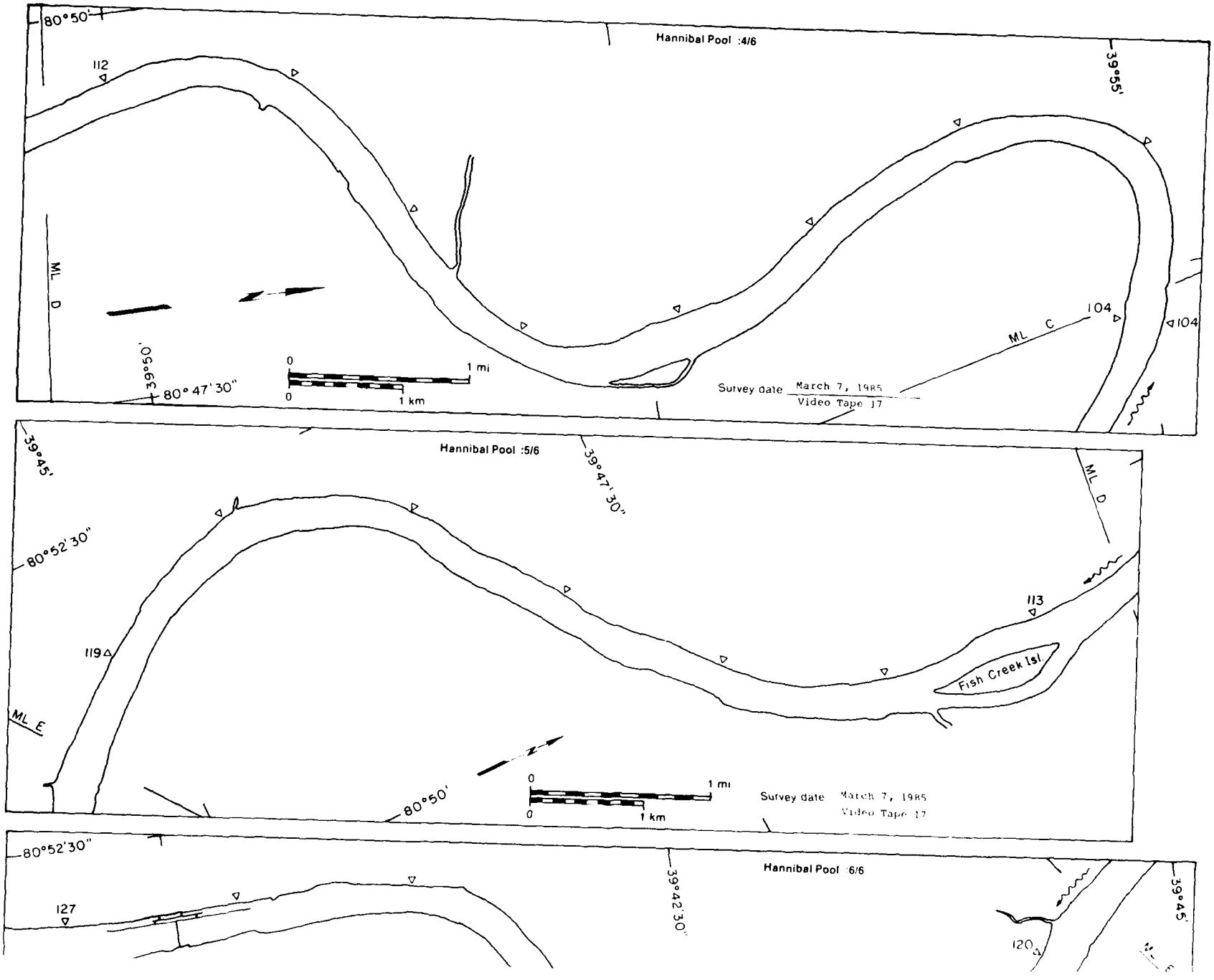

80°45'
Hannibal Pool :2/6
ML B
96
Wheeling Island
89
Wheeling Creek
ML A
40°00'
40°02'30"
40°05'
0
1 mi
0
1 km
Survey date March 7, 1985
Video Tape 17

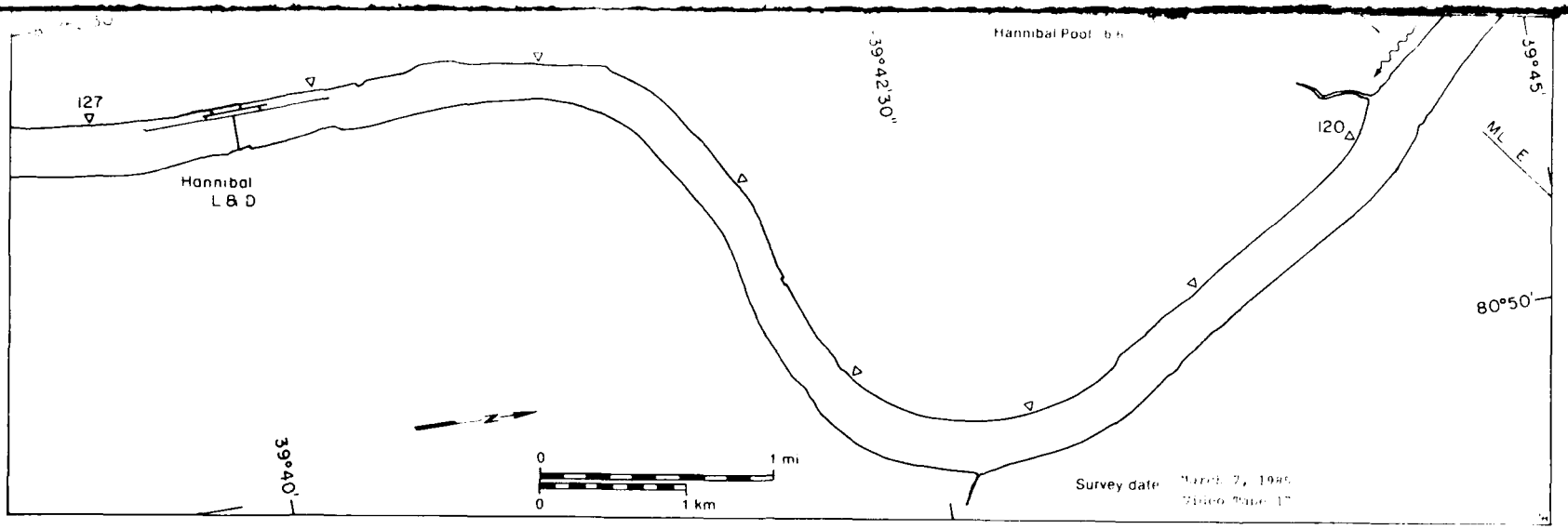

Hannibal Pool .3/6


89
Wheeling
Creek
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 7, 1985
Video Tape 17
40°5'
ML A


Hannibal Pool :3/6
39°57'30"
104
ML C
80° 45'
ML B
96
0
1 mi
0
1 km
Survey date March 7, 1985
Video Tape 17

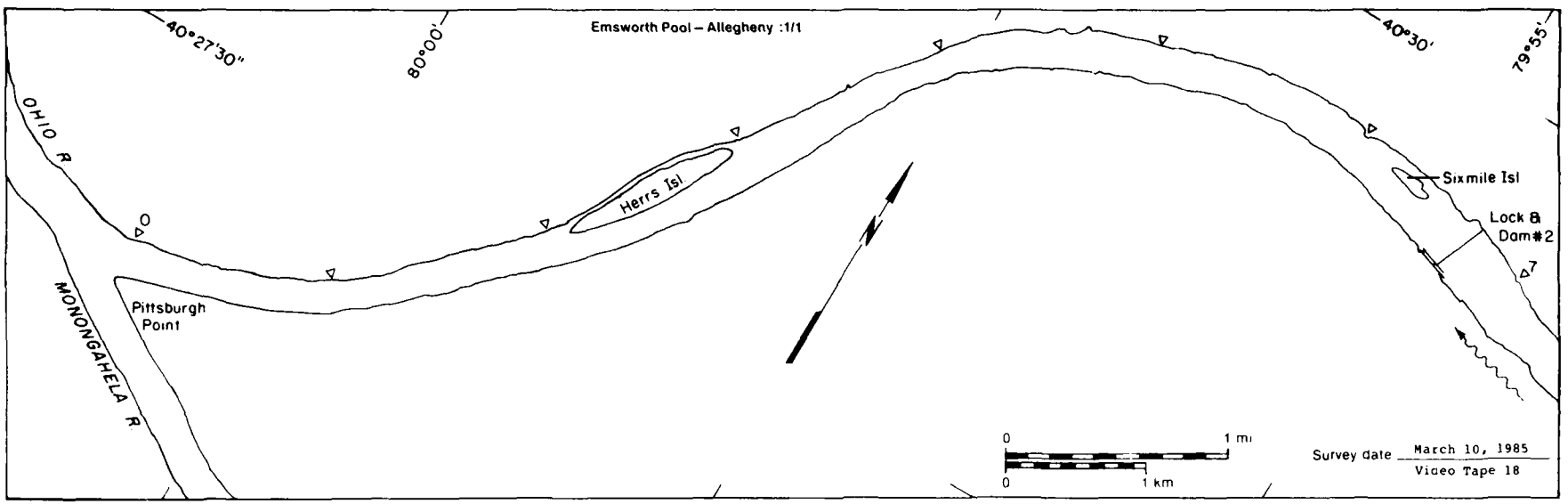
7 March 1985


Hannibal Pool :4/6
80°50'
39°55'
112
104
104
ML D
ML C
39°50'
80° 47' 30"
0
1 mi
0
1 km
Survey date March 7, 1985
Video Tape 17
Hannibal Pool :5/6
39°45'
39°47'30"
80°52'30"
ML D
113
119
Fish Creek Isl
ML E
80°50'
0
1 mi
0
1 km
Survey date March 7, 1985
Video Tape 17
80°52'30"
Hannibal Pool :6/6
39°42'30"
39°45'
127
120



Hannibal Pool

MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	22.46	N/A
Solid ice cover	--	N/A
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	N/A
Fragmented ice cover with open water areas	--	--
[illegible]	--	--
Total Area ($m^2 \times 10^6$)	[illegible]	

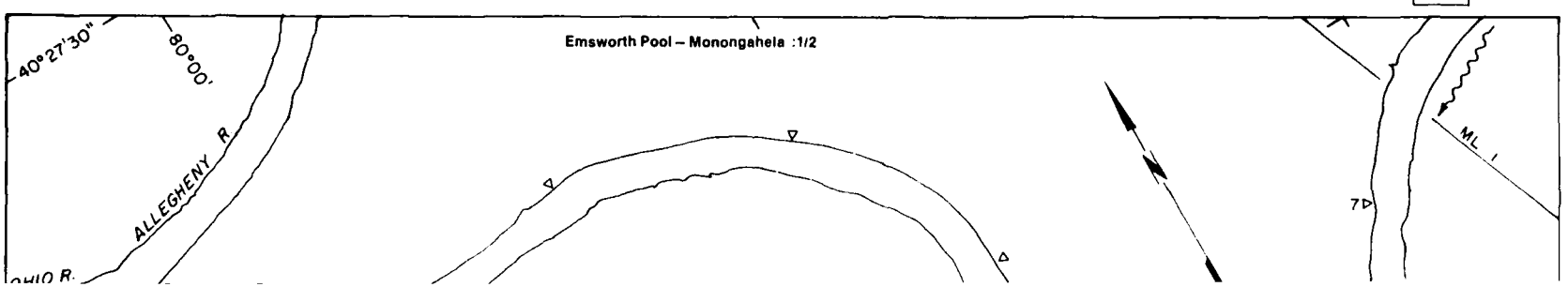


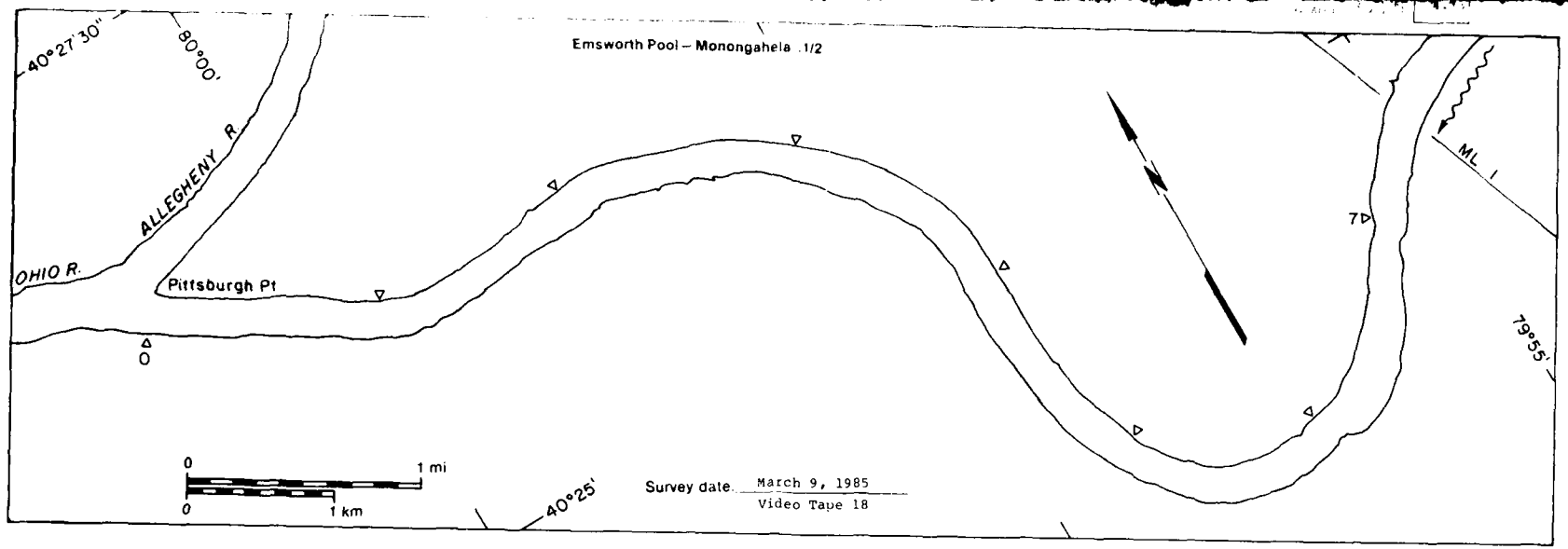
Emsworth Pool – Allegheny

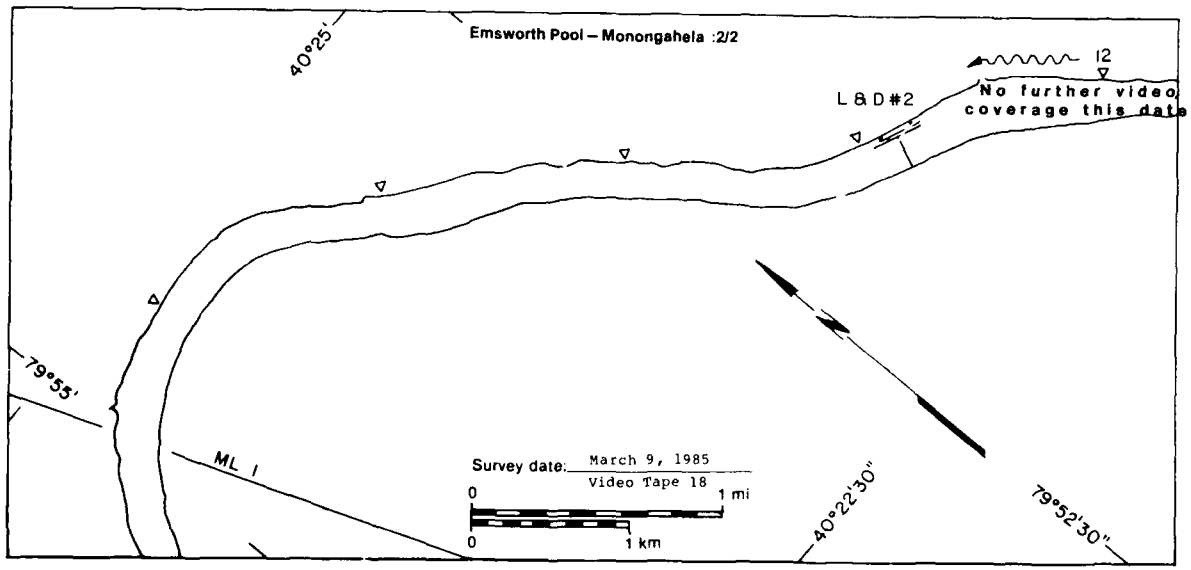
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	3.27	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes of hard slush and balls	--	--
Total Area ($m^2 \times 10^6$)	3.27	

Emsworth Pool – Monongahela

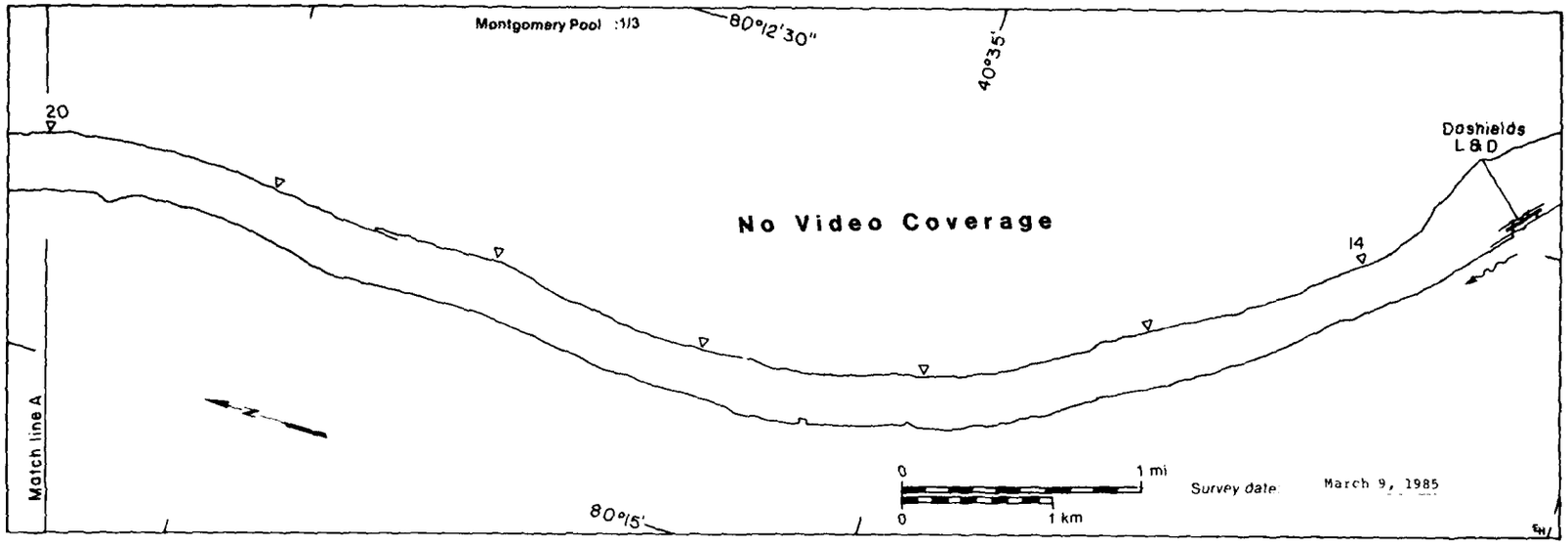
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	4.73	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes of hard slush and balls	--	--
Total Area ($m^2 \times 10^6$)	4.73	

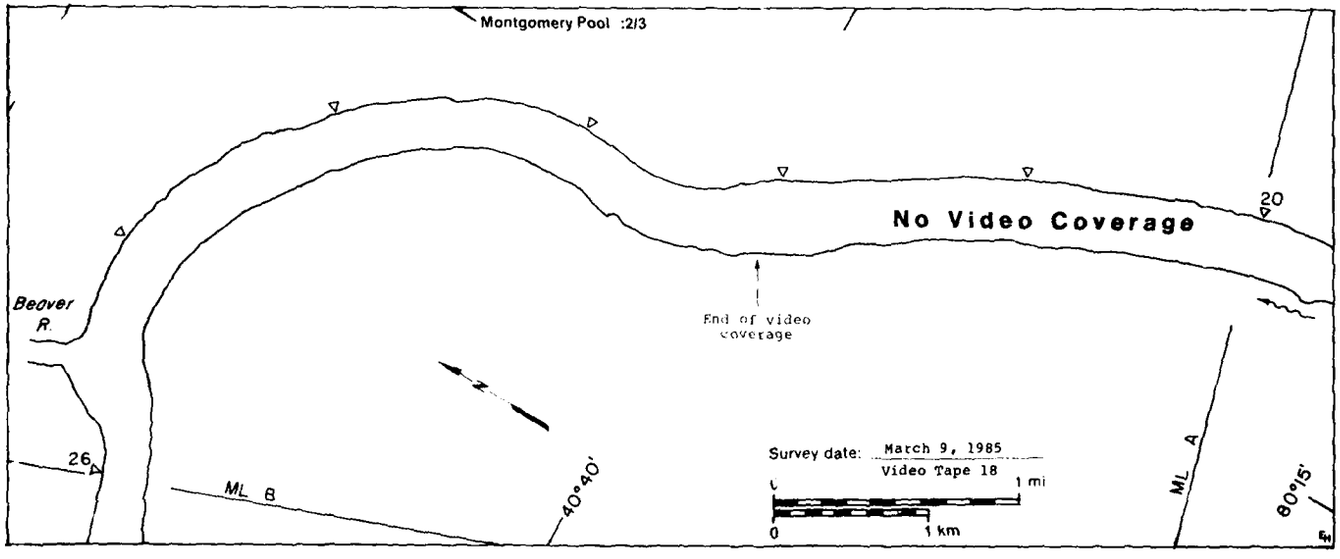


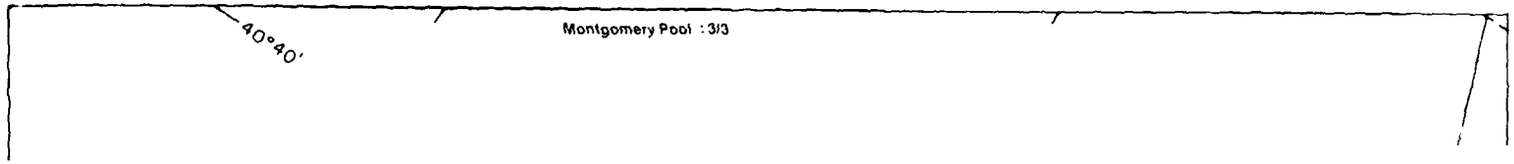

Emsworth Pool – Monongahela :1/2
40°27'30"
80°00'
ALLEGHENY R.
OHIO R.
Pittsburgh Pt
0
7
ML 1
79°55'
0
1 mi
0
1 km
40°25'
Survey date: March 9, 1985
Video Tape 18

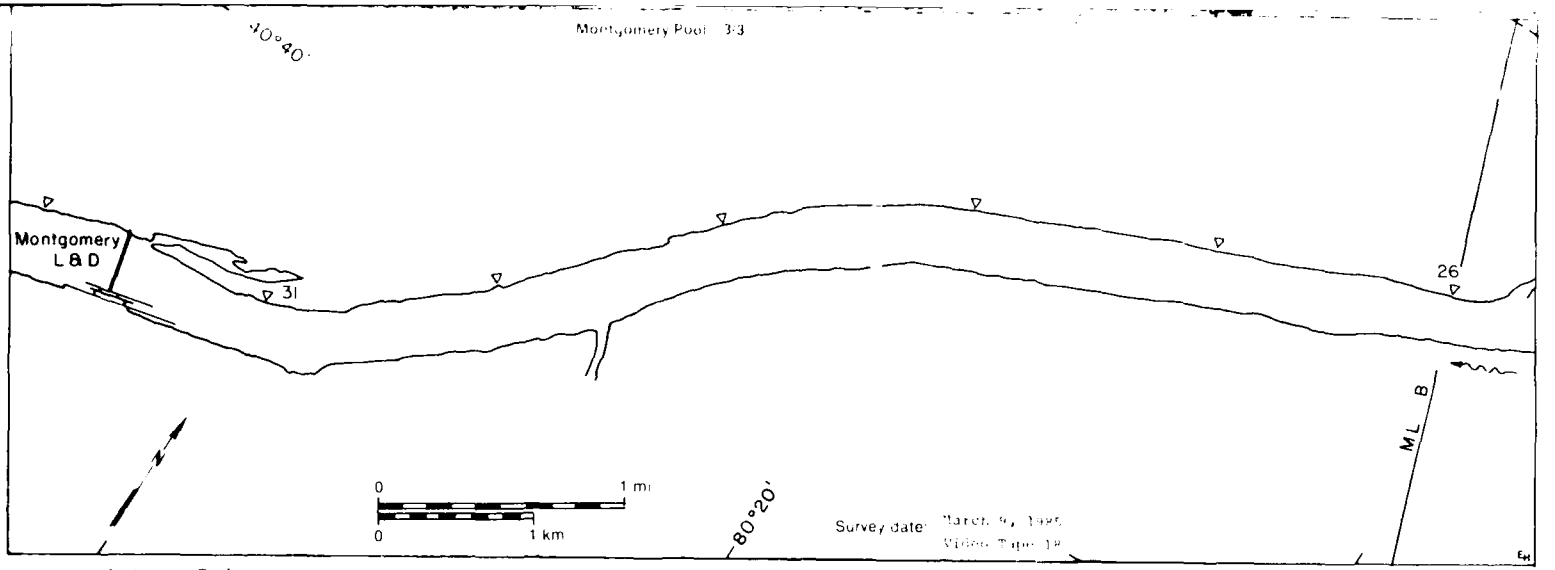

Emsworth Pool – Monongahela :2/2
40°25'
12
L&D#2
No further video coverage this date
79°55'
ML 1
Survey date: March 9, 1985
Video Tape 18
0
1 mi
0
1 km
40°22'30"
79°52'30"

9 March 1985


Montgomery Pool :1/3
80°12'30"
40°35'
20
Doshields L&D
No Video Coverage
14
Match line A
0
1 mi
Survey date
March 9, 1985
0
1 km
80°15'


Montgomery Pool :2/3
No Video Coverage
20
Beaver R.
End of video coverage
26
ML B
40°40'
Survey date: March 9, 1985
Video Tape 18
0
1 mi
0
1 km
ML A
80°15'


40°40'
Montgomery Pool :3/3

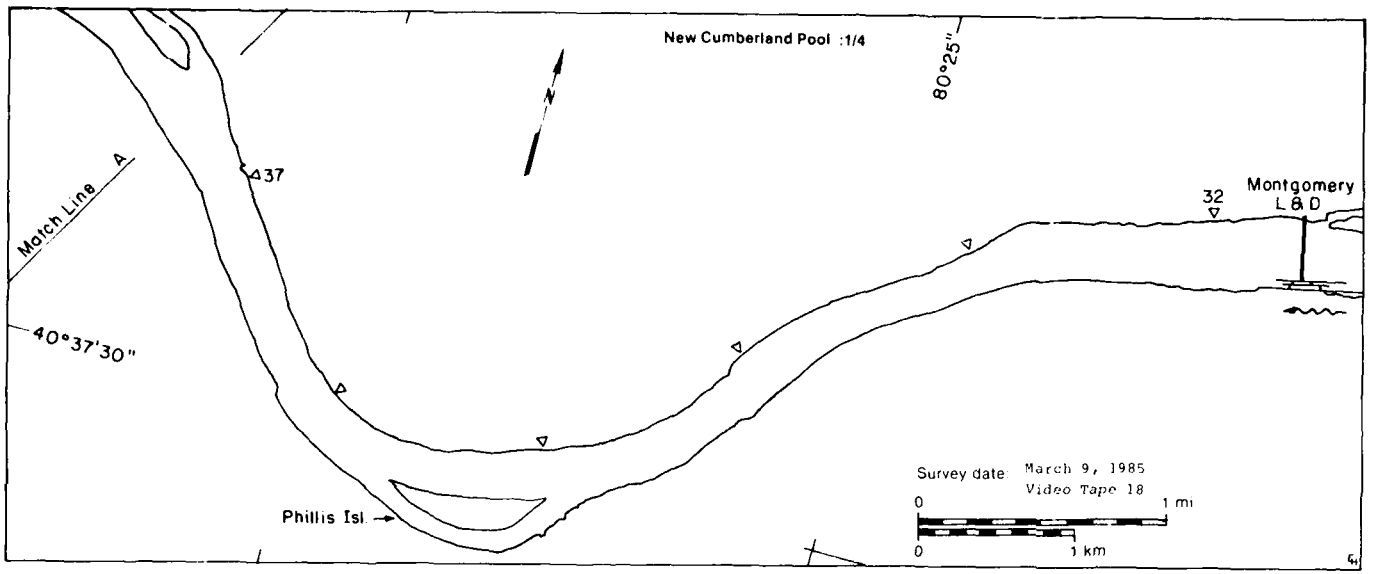


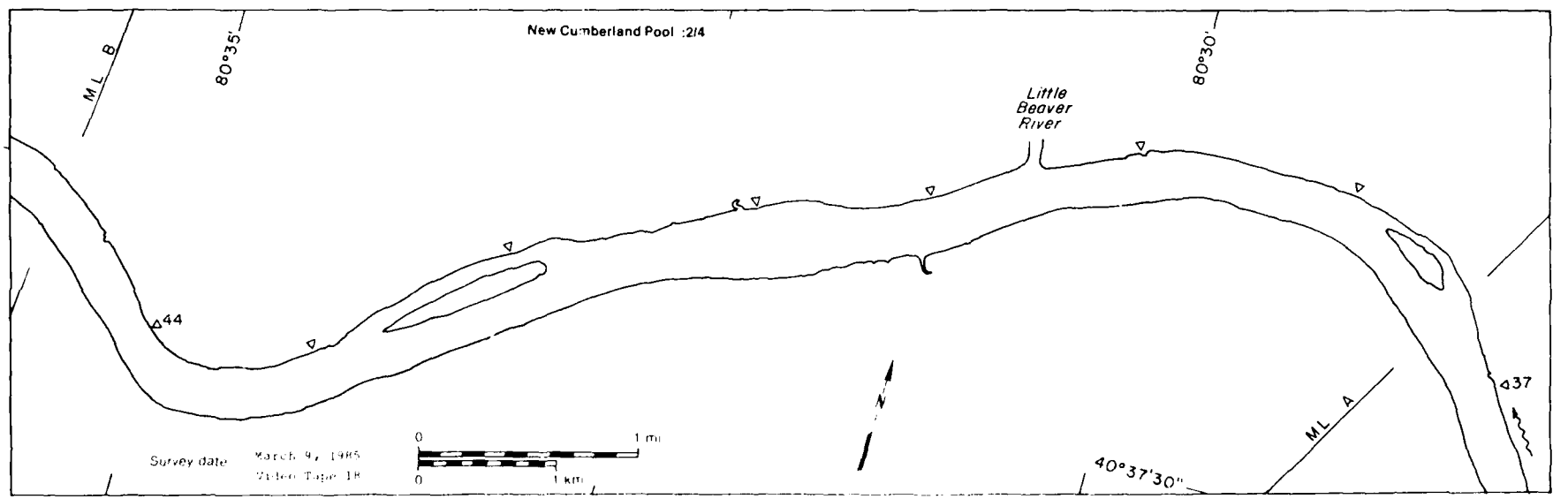
Montgomery Pool

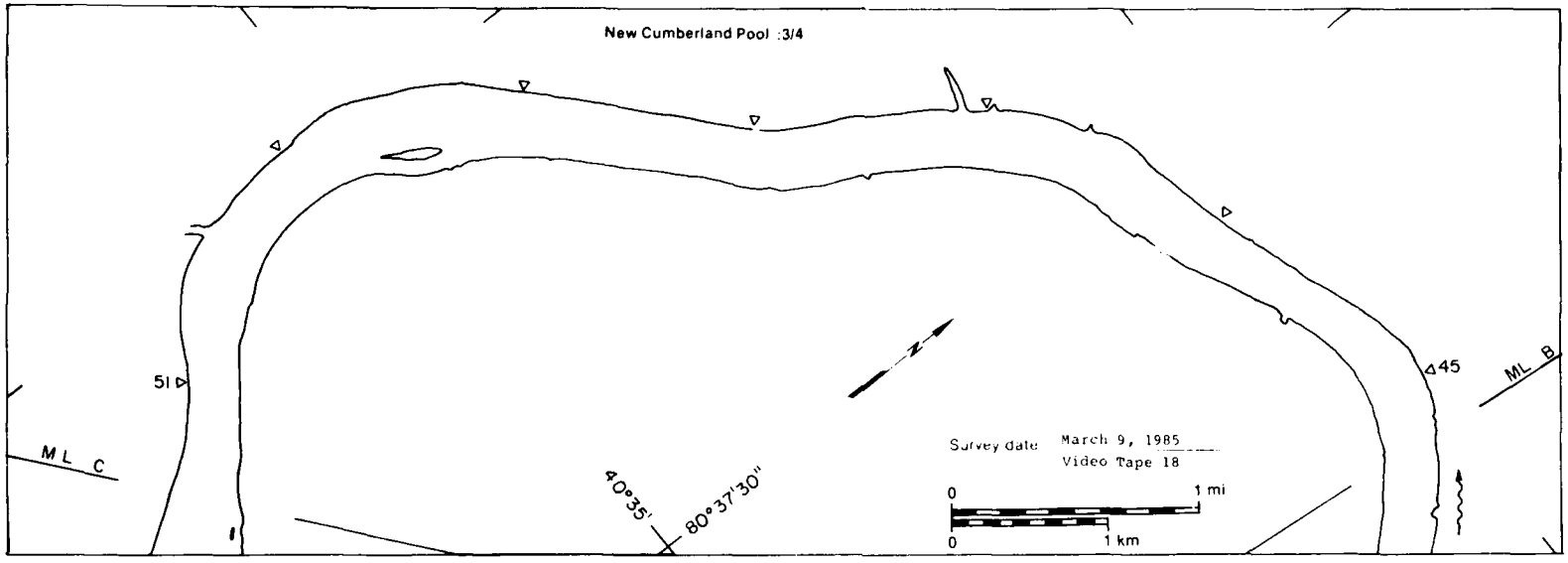
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	5.99	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	11.27*	

*Includes 5.28 no video coverage

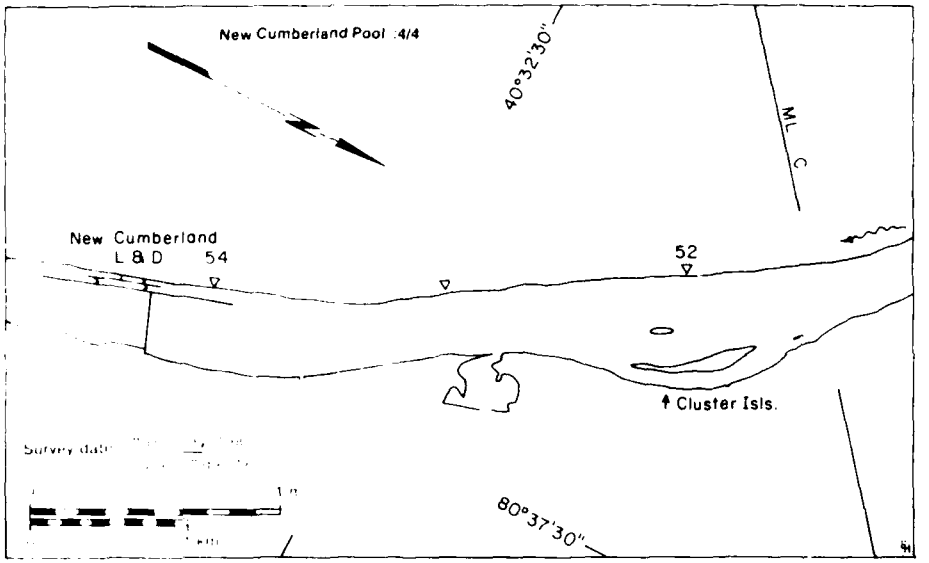
9 March 1985


New Cumberland Pool :1/4
80°25"
Match Line A
37
32
Montgomery L&D
40°37'30"
Phillis Isl.
Survey date: March 9, 1985
Video Tape 18
0
1 mi
0
1 km


New Cumberland Pool :2/4
ML B
80°35'
80°30'
Little Beaver River
44
37
ML A
40°37'30"
Survey date: March 9, 1985
Video Tape 18
0
1 mi
0
1 km

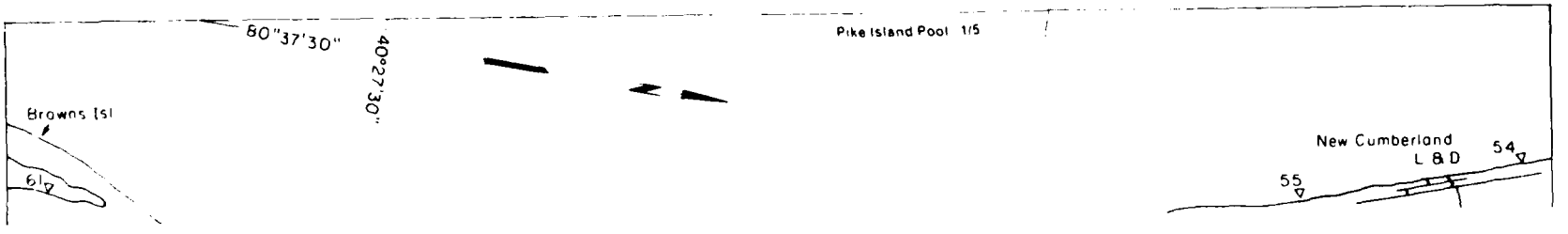

New Cumberland Pool :3/4
51
45
ML C
ML B
40°35'
80°37'30"
40°37'30"
Survey date March 9, 1985
Video Tape 18
0
1 mi
0
1 km

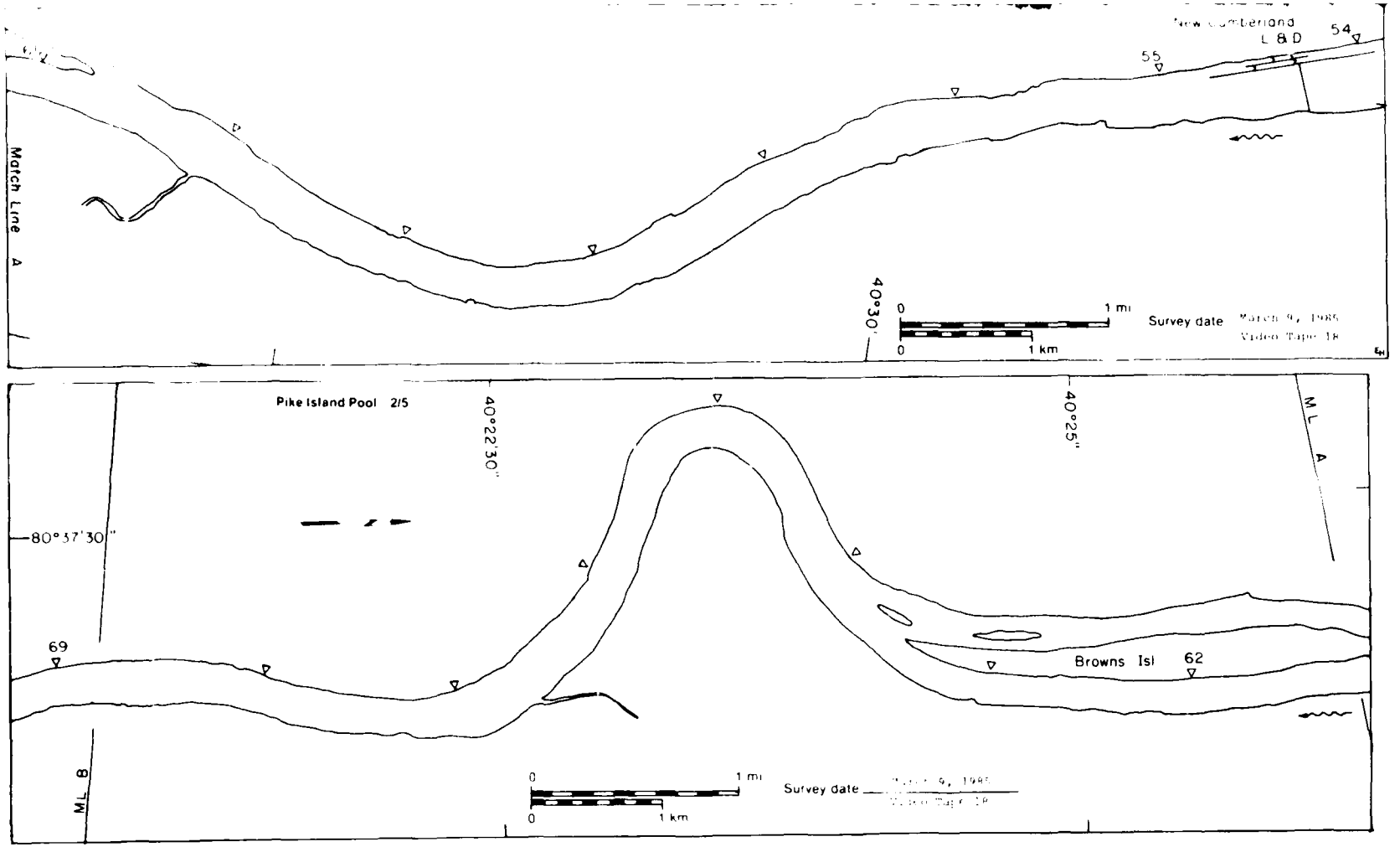
9 March 1985



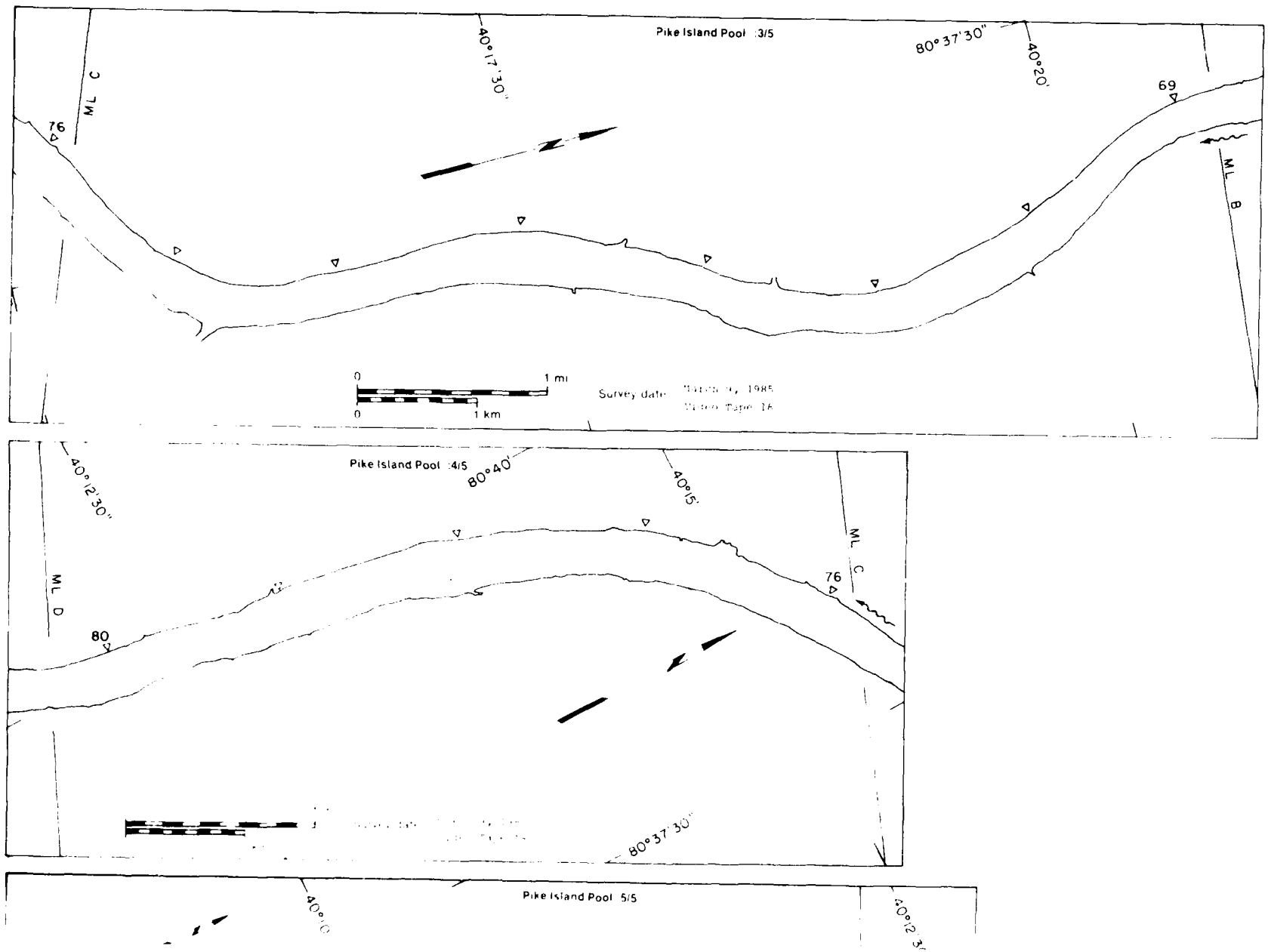
New Cumberland Pool

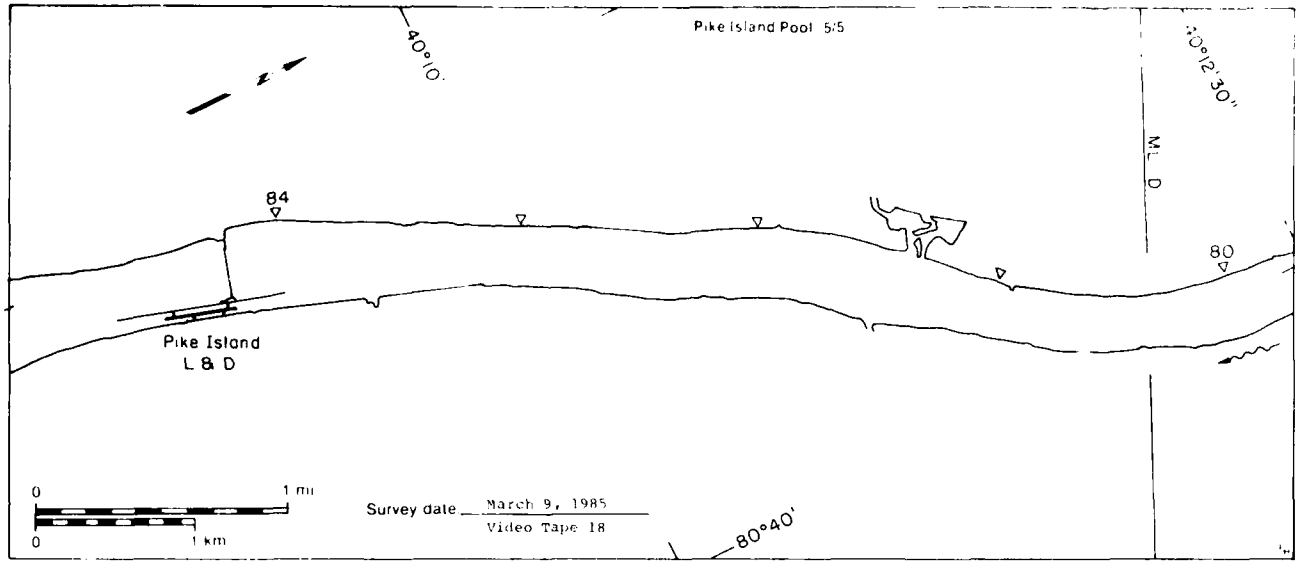
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	14.87	NA
Solid ice cover	--	NA
Solid ice cover with open-water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open-water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	14.87	




New Cumberland
L&D 54
55
Match Line A
40°30'
0
1 mi
0
1 km
Survey date March 9, 1985
Video Tape 18
Pike Island Pool 2/5
40°22'30"
40°25"
ML A
80°37'30"
69
Browns Isl 62
ML B
0
1 mi
0
1 km
Survey date

9 March 1985

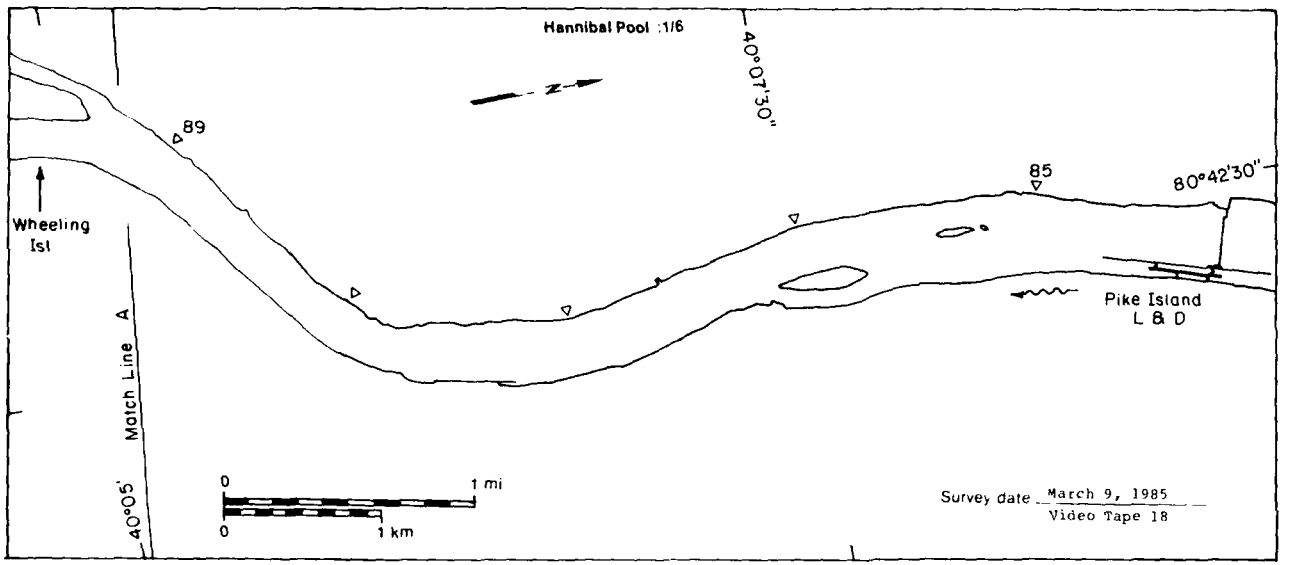

Pike Island Pool 3/5
40°17'30"
80°37'30"
40°20'
ML C
ML B
76
69
0
1 mi
0
1 km
Survey date
Pike Island Pool 4/5
40°12'30"
80°40'
40°15'
ML D
ML C
80
76
80°37'30"
Pike Island Pool 5/5
40°10'
40°12'30"

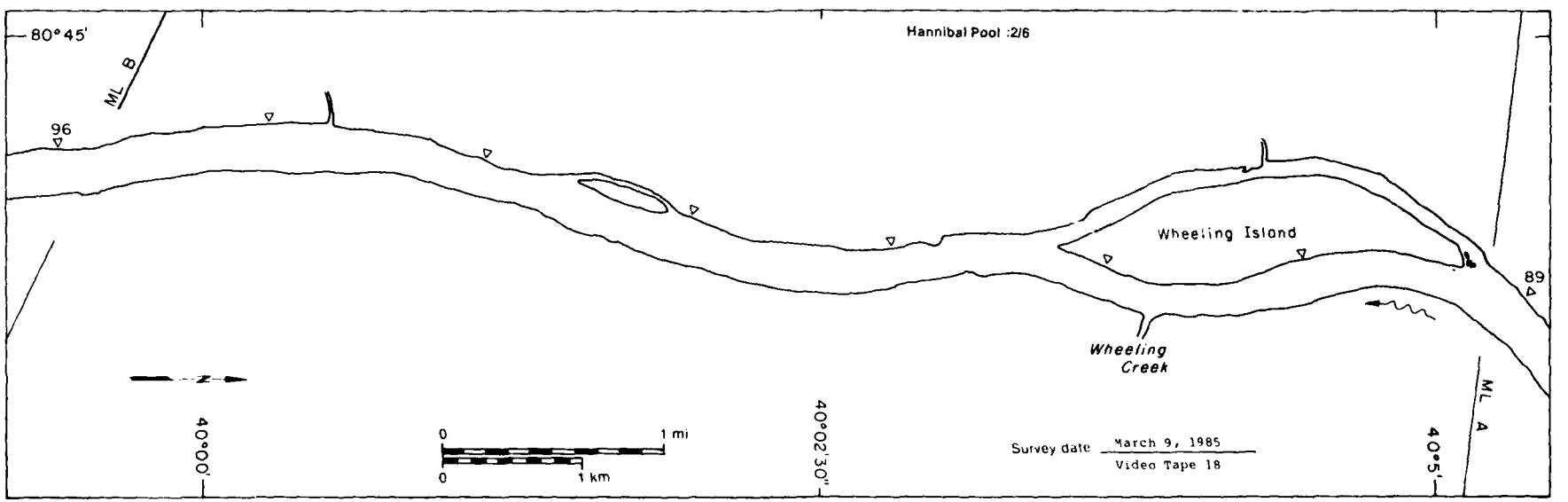


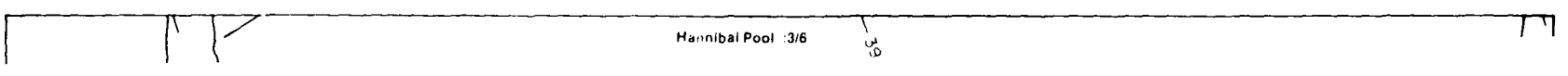
Pike Island Pool

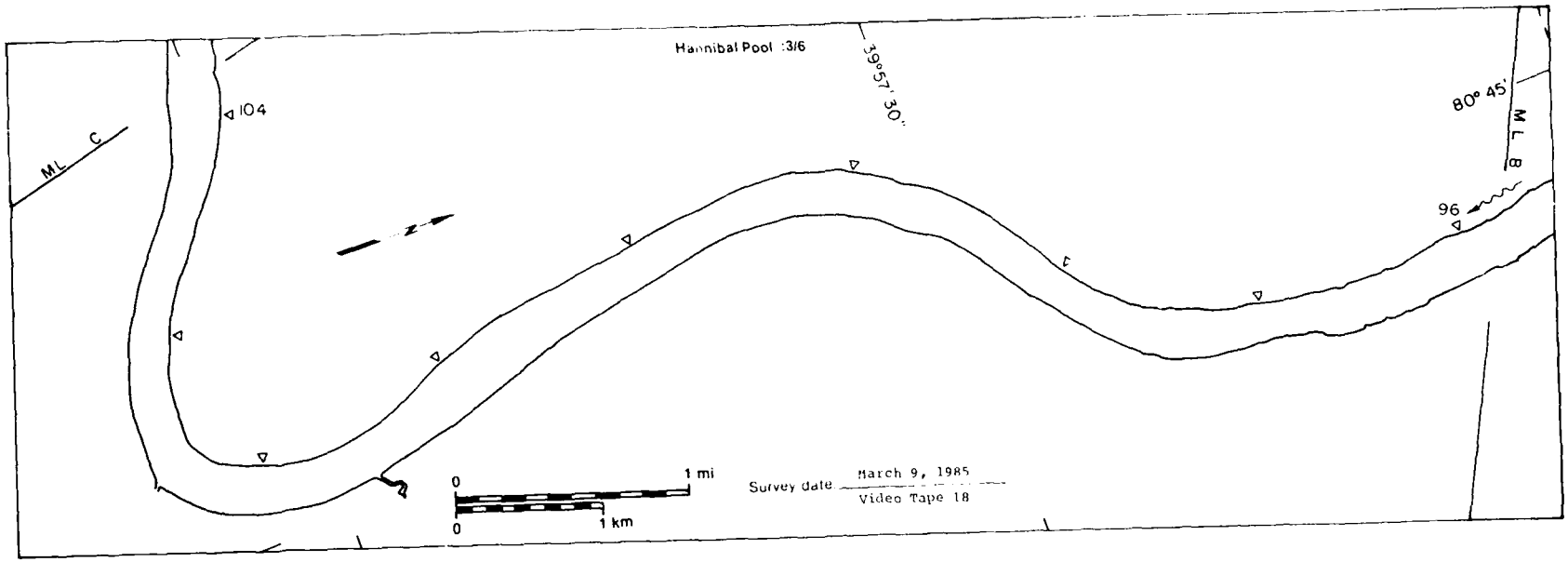
MAP UNITS	Area ($m^2 \times 10^6$)	Surface concentration (%)
Open water	18.92	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area ($m^2 \times 10^6$)	18.92	

9 March 1985

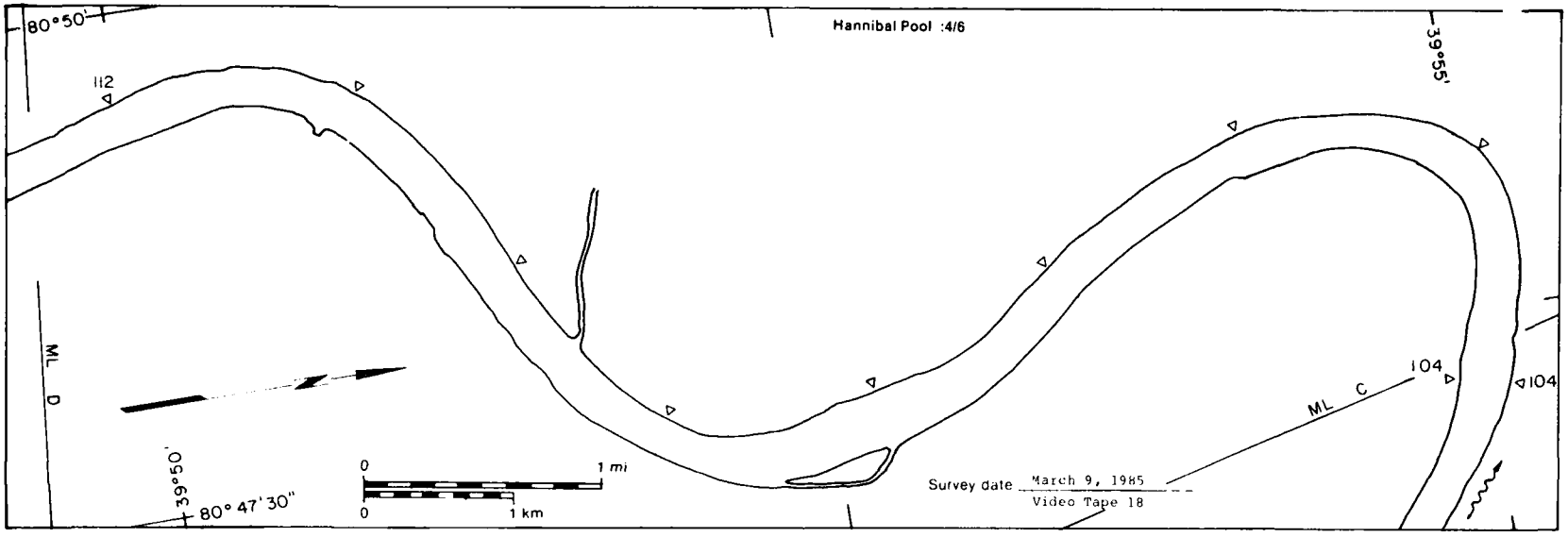

Hannibal Pool :1/6
40°07'30"
89
85
80°42'30"
Wheeling Isl
Match Line A
Pike Island L & D
40°05'
0
1 mi
0
1 km
Survey date March 9, 1985
Video Tape 18

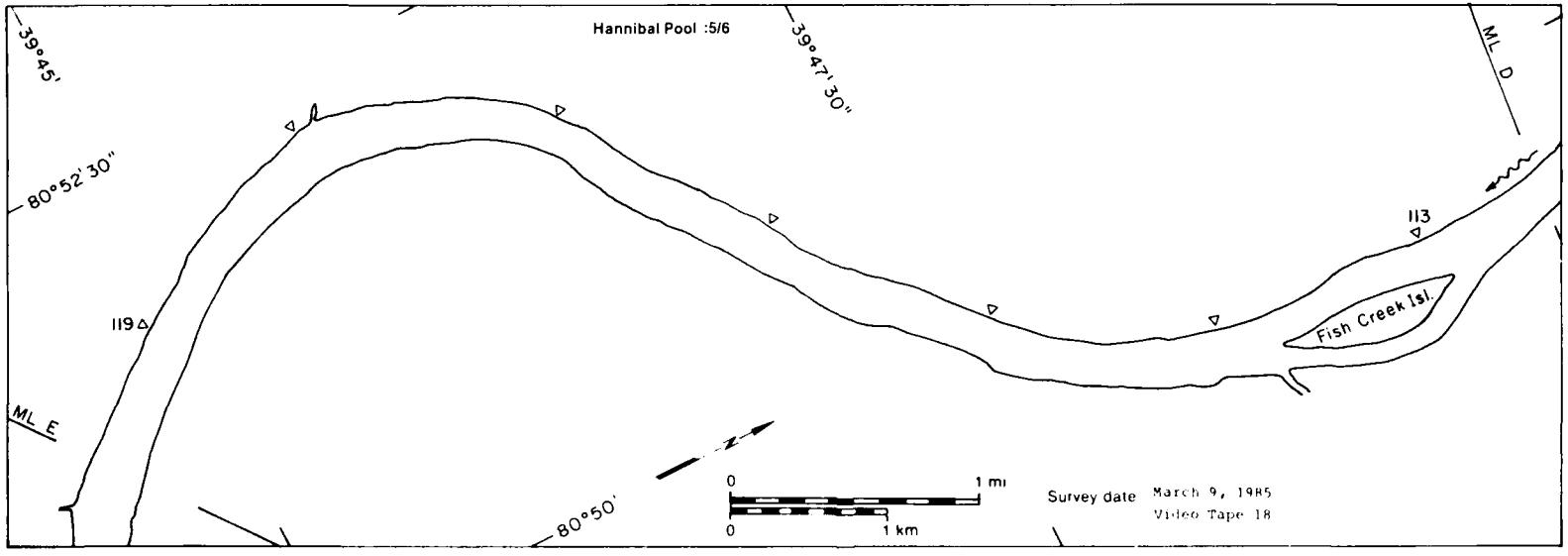

80°45'
ML B
Hannibal Pool :2/6
96
Wheeling Island
89
Wheeling Creek
40°00'
0
1 mi
0
1 km
40°02'30"
Survey date March 9, 1985
Video Tape 18
ML A
40°5'


Hannibal Pool :3/6
39

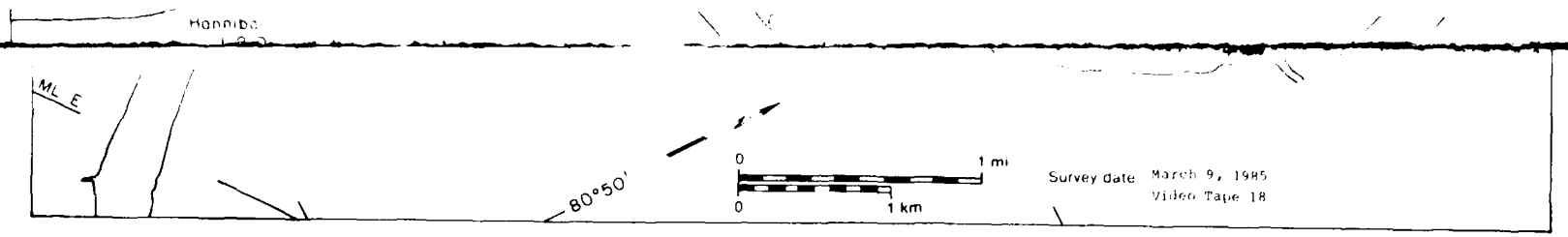

Hannibal Pool :3/6
39°57' 30"
80° 45'
WLB
104
96
ML
C
0
1 mi
0
1 km
Survey date March 9, 1985
Video Tape 18

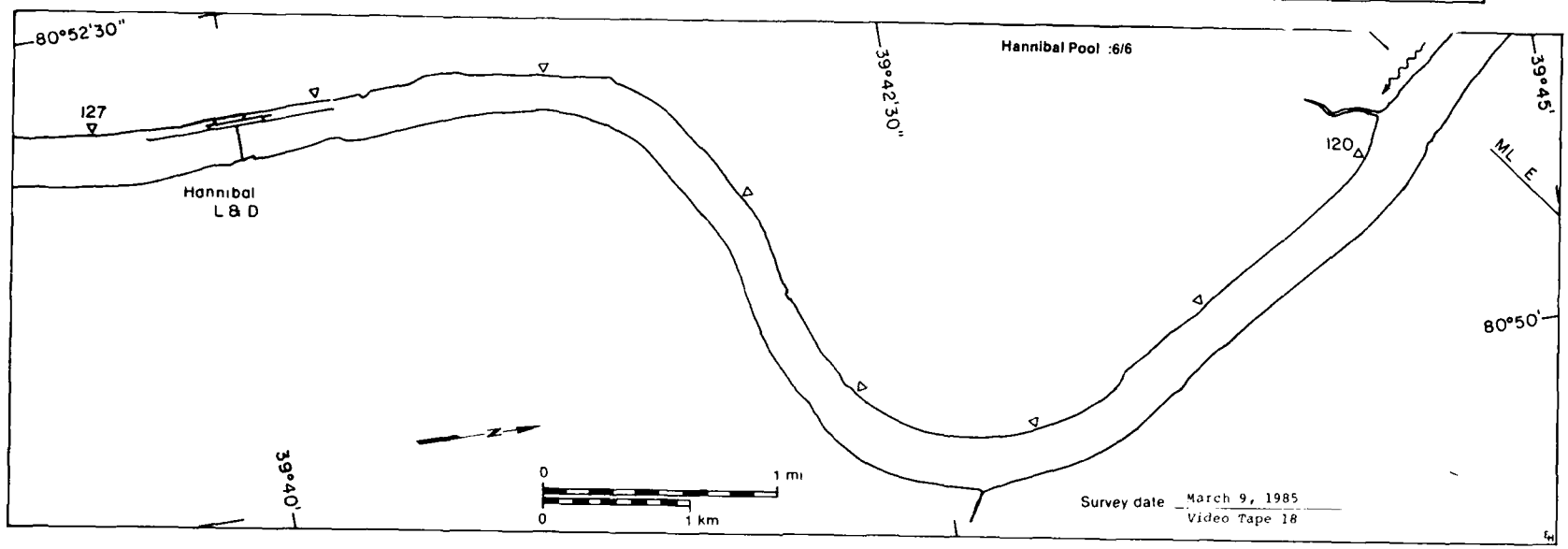
9 March 1985


Hannibal Pool :4/6
80°50'
39°55'
112
ML D
39°50'
80° 47' 30"
0 1 mi
0 1 km
Survey date March 9, 1985
Video Tape 18
ML C
104
104


Hannibal Pool :5/6
39°45'
39°47'30"
ML D
80°52'30"
113
119
Fish Creek Isl.
ML E
80°50'
0 1 mi
0 1 km
Survey date March 9, 1985
Video Tape 18


80°52'30"
Hannibal Pool :6/6
39°42'30"
39°45'
127
120
ML





Hannibal Pool

MAP UNITS	Area (m^2 x 10^6)	Surface concentration (%)
Open water	22.46	NA
Solid ice cover	--	NA
Solid ice cover with open water areas	--	--
Fragmented ice cover	--	NA
Fragmented ice cover with open water areas	--	--
Ice floes or frazil slush and pans	--	--
Total Area (m^2 x 10^6)	22.46	

APPENDIX A: AREAS OF MAPPED ICE UNITS

See Table 1 for descriptions

For summary of Appendix A data, see inside back cover

Emsworth Pool - Allegheny River (area = 3.27×10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 23	0.15	0.14	0			2.42	0.56	95	0.53	0			3.09
January 24	0.16	0.29	0.16	80	0.13	2.22	0.39	95	0.37	0			3.06
January 28	0.19	0.07	0.12	80	0.10	2.36	0.53	95	0.50	0.01	2	0	3.03
January 29	0.15	0.09	0.14	80	0.11	2.26	0.63	90	0.57	0			3.03
January 30	0.23	0.18	0.14	85	0.12	2.13	0.58	95	0.55	0.01	20	0	2.98
February 4	0.65	1.95	0.07	95	0.07	0	0.59	60	0.35	0.01	5	0	2.37
February 8	1.22	0.28	0			0.05	1.22	80	1.38	0			1.71
February 19	3.14	0.07	0			0.01	0.02	90	0.02	0.03	2	0	0.10
February 22	3.02	0	0			0	0.02	80	0.02	0.23	1	0	0.02
February 23	1.17	0	0			0	0			2.10	5	0.11	0.11
February 24	0.25	0	0			0	0			3.02	1	0.03	0.03
February 28	3.27	0	0			0	0			0			0
March 1	3.27	0	0			0	0			0			0
March 2	3.27	0	0			0	0			0			0
March 3	3.27	0	0			0	0			0			0
March 6	3.27	0	0			0	0			0			0
March 7	3.27	0	0			0	0			0			0
March 10	3.27	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Emsworth Pool - Monongahela River (area = 4.73×10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 29	3.23	0	0			0.74	1.40	80	1.12	0.36	10	0.04	1.90
January 29	3.71	0	0			0.30	0.43	70	0.30	0.33	45	0.15	0.72
February 4	0.61	0	0			3.00	0.52	90	0.47	1.01	80	0.9	3.83
February 23	4.73	0	0			0	0						
February 24	4.56	0	0										

Date	Open water area (10^6 m^2)	Solid ice cover area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 28	3.33	0	0			0.74	1.40	80	1.12	0.36	10	0.04	1.90
January 29	3.71	0	0			0.39	0.43	70	0.28	0.33	45	0.15	0.72
February 4	0.61	0	0			2.09	0.52	90	0.47	1.51	50	0.36	3.32
February 23	4.73	0	0			0	0			0			0
February 24	4.56	0	0			0	0			0.17	10	0.02	0.02
February 28	4.73	0	0			0	0			0			0
March 1	4.73	0	0			0	0			0			0
March 2	4.73	0	0			0	0			0			0
March 3	4.73	0	0			0	0			0			0
March 6	4.73	0	0			0	0			0			0
March 7	4.73	0	0			0	0			0			0
March 10	4.73	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Lock and Dam 2 Pool - Monongahela River (area = 4.77 x 10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 28	4.36	0	0			0	0.04	90	0.04	0.37	10	0.04	0.08
January 29	4.38	0	0			0	0			0.39	30	0.12	0.12
February 4	0.97	0.03	0			0.12	2.64	70	1.85	1.01	20	0.20	2.20
February 23	4.00	0	0			0	0.17	80	0.14	0.51	10	0.05	0.19
February 24	4.77	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Lock and Dam 3 Pool - Monongahela River (area = 6.64 x 10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 28	1.74	0.21	-			2.15	1.19	75	0.89	1.56	20	0.31	3.36
January 29	0.44	1.76	1.26	30	0.65	2.15	2.04	90	1.84	0.19	30	0.06	5.86
February 4	1.61	0.94	0.35	90	0.32	1.22	1.93	75	1.45	0.59	10	0.06	3.99
February 23	6.64	0	0			0	0			0			0
February 24	6.64	0	0			0	0			0			0

*Total area equals ice area.
**Sum of all ice areas for all map units.

Lock and Dam 4 Pool - Monongahela River (area = 6.60 x 10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 28	0.77	4.19	0			0	1.61	80	1.29	0.03	2	0	5.48
January 29	0.08	3.71	0.08	60	0.05	1.63	1.10	95	1.05	0			6.44
February 4	1.09	1.11	0.03	90	0.03	0.56	3.26	80	2.61	0.55	30	0.17	4.48
February 23	6.60	0	0			0	0			0			0
February 24	6.60	0	0			0	0			0			0

*Total area equals ice area.
**Sum of all ice areas for all map units.

Maxwell Pool - Monongahela River (area = 1.56 x 10^6 m^2)†

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total ice area** (10^6 m^2)

Maxwell Pool - Mississippi River (area = 1.50×10^6 m^2)†

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Solid ice cover with open water areas: Ice conc. (%)	Solid ice cover with open water areas: Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Fragmented ice cover with open water areas: Ice conc. (%)	Fragmented ice cover with open water areas: Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice floes or frazil slush and pans: Ice conc. (%)	Ice floes or frazil slush and pans: Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 28	0.05	1.08	0			0	0.43	80	0.34	0			1.42
January 29	0	0.95	0			0.17	0.44	95	0.42	0			1.54
February 4	0.17	0.42	0			0	0.97	80	0.78	0			1.20
February 23	1.12	0	0			0	0			0.44	5	0.02	0.02
February 24	1.56	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

†Pool only from mile 61.2 to mile 66.

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
Racine Pool-Ohio River (area = 19.89 x 10^6 m^2)													
February 18	19.51	0	0			0	0			0.38	5	0.02	0.02
Gallipolis Pool - Ohio River (area = 24.65 x 10^6 m^2)													
February 18	24.65	0	0			0	0			0			0
Greenup Pool - Ohio River (area = 41.19 x 10^6 m^2)													
February 18	41.19	0	0			0	0			0			0
Meldahl Pool - Ohio River (area = 73.77 x 10^6 m^2)													
February 18	73.77	0	0			0	0			0			0

* Total area equals ice area.

** Sum of all ice areas for all map units.

Emsworth Pool - Ohio River (area = 4.49 x 10^6 m^2)

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
January 30	0.28	1.79	0			0	2.42	80	1.94	0			3.73
February 16	0.98	0	0			0.32	3.19	60	1.91	0			2.23
February 19	4.39	0	0			0.02	0			0.01	2	0	0.02
February 20	0.69	0	0			0	0			3.80	5	0.19	0.19
March 6	4.49	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Dashields Pool - Ohio River (area = [illegible] x 10^6 m^2)

Date												
January 30	0.28	4.72	0		0	0.42	80	1.94	0			3.73
February 16	3.99	0	0		0.5	3.19	60	1.91	0			2.23
February 19	4.89	0	0		0.02	0			0.01	2	0	0.02
February 20	0.69	0	0		0	0			3.80	5	0.19	0.19
March 6	4.49	0	0		0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Dashields Pool - Ohio River (area = $5.00 \times 10^6 m^2$)

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area ($10^6 m^2$)	Total area* ($10^6 m^2$)	Total area ($10^6 m^2$)	Ice conc. (%)	Ice area ($10^6 m^2$)	Total area* ($10^6 m^2$)	Total area ($10^6 m^2$)	Ice conc. (%)	Ice area ($10^6 m^2$)	Total area ($10^6 m^2$)	Ice conc. (%)	Ice area ($10^6 m^2$)	($10^6 m^2$)
January 30	3.15	0.47	0			0	1.34	70	0.94	0.04	20	0.01	1.42
February 16	4.23	0	0			0	0.26	80	0.21	0.51	5	0.03	0.24
February 19	4.97	0	0			0	0			0.03	2	0	0
February 20	4.16	0	0			0	0			0.84	1	0.01	0.01
March 6	5.00	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Montgomery Pool - Ohio River (area = 11.27 x 10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Solid ice cover with open water areas: Ice conc. (%)	Solid ice cover with open water areas: Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Fragmented ice cover with open water areas: Ice conc. (%)	Fragmented ice cover with open water areas: Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice floes or frazil slush and pans: Ice conc. (%)	Ice floes or frazil slush and pans: Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 30	2.13	5.30	0			0	6.71	75	4.28	0.04	10	0	7.67
February 8†	1.29	0	0			1.14	5.93	90	5.34	0			6.48
February 16	4.90	2.30	0			0	5.18	70	3.63	1.10	5	0.06	3.79
February 17††	3.42		0			0	0.28	90	0.25	0.39	10	0.04	0.29
February 18	11.27	0	0			0	0			0			0
February 20	11.27	0	0			0	0			0			0
February 24†††	5.70	0				0	0			0			0
March 1†	5.04	0	0			0	0			0			0
March 2	11.27	0	0			0	0			0			0
March 3††	5.99	0	0			0	0			0			0
March 6	11.27	0	0			0	0			0			0
March 7††	5.99	0	0			0	0			0			0
March 9††	5.99	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

***5.07 m^2 x 10^6 of reach not covered on video tape.

†2.92 m^2 x 10^6 of reach not covered on video tape.

††7.18 m^2 x 10^6 of reach not covered on video tape.

†††4.24 m^2 x 10^6 of reach not covered on video tape.

††††5.29 m^2 x 10^6 of reach not covered on video tape.

New Cumberland Pool - Ohio River (area = 14.87 x 10^6 m^2)

Video acquisition date	Open water: Total area (10^6 m^2)	Solid ice cover: Total area* (10^6 m^2)	Solid ice cover with open water areas: Total area (10^6 m^2)	Solid ice cover with open water areas: Ice conc. (%)	Solid ice cover with open water areas: Ice area (10^6 m^2)	Frag. ice cover: Total area* (10^6 m^2)	Fragmented ice cover with open water areas: Total area (10^6 m^2)	Fragmented ice cover with open water areas: Ice conc. (%)	Fragmented ice cover with open water areas: Ice area (10^6 m^2)	Ice floes or frazil slush and pans: Total area (10^6 m^2)	Ice floes or frazil slush and pans: Ice conc. (%)	Ice floes or frazil slush and pans: Ice area (10^6 m^2)	Total ice area** (10^6 m^2)
January 30	2.01	6.55	0			0	5.82	70	4.07	0.49	5	0.02	10.64
February 8	5.74	2.57	0			0.13	6.53	90	5.87	0.05	30	0.02	8.76
February 16	7.67	1.45	0			0	5.35	70	3.63	1.04	10	0.10	4.23

Date													
February 15	[illegible]	6.[illegible]				0	5.82	70	4.07	0.49	5	0.02	10.64
February 8	5.76	2.83	0			2.19	4.60	80	3.67	2.05	30	0.02	9.76
February 16	7.63	3.4[illegible]	0			0	5.15	70	3.61	1.64	10	0.16	4.22
February 17	15.19	0.23	0			0	0.06	80	0.05	1.39	5	0.07	0.35
February 19	14.69	0	0.13	30	0.11	0	0.04	90	0.04	0.02	1	0	0.15
February 20	14.52	0	0			0	0.03	90	0.03	0.32	2	0.01	0.04
February 29	14.87	0	0			0	0			0			0
March 1	14.87	0	0			0	0			0			0
March 2	14.87	0	0			0	0			0			0
March 3	14.87	0	0			0	0			0			0
March 6	14.87	0	0			0	0			0			0
March 7	14.87	0	0			0	0			0			0
March 9	14.87	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

Pike Island Pool - Ohio River (area = 18.92 x 10^6 m^2)

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
January 30	15.64	0	0			0	1.00	50	0.50	2.28	5	0.11	0.61
February 8	12.82	0	0			0	3.61	90	3.25	2.49	40	1.00	4.25
February 16	16.93	0	0			0	0			1.99	5	0.10	0.10
February 17	17.95	0	0			0	0			0.97	2	0.02	0.02
February 19	18.89	0	0			0	0			0.03	1	0	0
February 20	18.64	0	0			0	0			0.28	1	0	0
February 28	18.92	0	0			0	0			0			0
March 1	18.92	0	0			0	0			0			0
March 2†	9.97	0	0			0	0			0			0
March 3	18.92	0	0			0	0			0			0
March 6	18.92	0	0			0	0			0			0
March 7	18.92	0	0			0	0			0			0
March 9	18.92	0	0			0	0			0			0

*Total area equals ice area.

**Sum of all ice areas for all map units.

†8.95 m^2 x 10^6 of reach not covered on video tape.

Hannibal Pool - Ohio River (area = 22.46 x 10^6 m^2)

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
January 30	18.49	0.24	0			0.17	1.91	75	1.43	1.65	5	0.08	1.92
February 8	18.77	0.03	0			0	1.01	90	0.91	2.65	30	0.80	1.74
February 16	15.33	0	0			0	5.94	50	2.97	1.29	10	0.13	3.05
February 17	22.38	0.01	0			0	0.01	93	0.01	0.06	20	0.01	0.03
February 19	22.46	0	0			0	0			0			0
February 20	22.35	0	0			0	0			0.11	1	0	0
February 28	22.46	0	0			0	0			0			0
March 1	22.46	0	0			0	0			0			0
March 2	22.46	0	0			0	0			0			0

January 30	18.49	0.24	0	0.17	1.91	95	1.47	1.65	5	0.08	1.92
February 8	18.77	0.03	0	0	1.91	90	0.91	2.65	30	0.80	1.74
February 16	15.33	0	0	0	5.84	50	2.92	1.29	10	0.13	3.05
February 17	22.38	0.01	0	0	0.01	90	0.01	0.06	20	0.01	0.03
February 19	22.46	0	0	0	0			0			0
February 20	22.35	0	0	0	0			0.11	1	0	0
February 28	22.46	0	0	0	0			0			0
March 1	22.46	0	0	0	0			0			0
March 2	22.46	0	0	0	0			0			0
March 3	22.46	0	0	0	0			0			0
March 6	22.46	0	0	0	0			0			0
March 7	22.46	0	0	0	0			0			0
March 9	22.46	0	0	0	0			0			0

*Total area equals ice area.
**Sum of all ice areas for all map units.

Willow Island Pool - Ohio River (area = 21.24 x 10^6 m^2)

	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
Video acquisition date	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
February 8	19.39	0	0			0.03	0.95	90	0.86	0.87	40	0.35	1.24
February 16	20.99	0.16	0			0.04	0.03	80	0.02	0.02	10	0	0.22
February 18	20.82	0	0			0	0.18	90	0.16	0.24	1	0	0.16
February 19	21.22	0	0			0	0			0.02	10	0	0
February 20	21.21	0.03	0			0	0			Trace	2	0	0.03

*Total area equals ice area.
**Sum of all ice areas for all map units.

Belleville - Ohio River (area = 27.28 x 10^6 m^2)

Video acquisition date	Open water	Solid ice cover	Solid ice cover with open water areas			Frag. ice cover	Fragmented ice cover with open water areas			Ice floes or frazil slush and pans			Total ice area**
	Total area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area* (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	Total area (10^6 m^2)	Ice conc. (%)	Ice area (10^6 m^2)	(10^6 m^2)
February 9	24.92	0.31	0			0.11	0.37	60	0.22	1.57	30	0.47	1.11
February 16	22.92	0	0			0.26	4.65	50	2.33	0.35	5	0.02	2.61
February 18	26.76	0.02	0			0	0.35	80	0.28	0.15	2	0	0.30
February 19	27.22	trace	0			0	0.02	90	0.02	0.04	1	0	0.02
February 20	27.24	0	0			0	0			0.04	1	0	0

*Total area equals ice area.

**Sum of all ice areas for all map units.

APPENDIX B: VIDEO TAPE COVERAGE

Tape Number	River	River Miles	Date
1	Allegheny	0-6	23 January 85
2	Allegheny	0-7	24 January 85
		0-7	28 January 85
	Monongahela	0-66	28 January 85
	Allegheny	0-7	29 January 85
	Monongahela	0-66	29 January 85
3	Ohio	126-0	30 January 85
	Allegheny	0-17	30 January 85
4	Allegheny	0-17	4 February 85
	Monongahela	0-66	4 February 85
	Ohio	205-135	8 February 85
5	Ohio	137-0 (missing 17-4)	8 February 85
	Allegheny	0-7	8 February 85
6	Ohio	204-0	16 February 85
7	Ohio	24-127	17 February 85
8	Ohio	127- 306	18 February 85
9	Ohio	305-396	18 February 85
10	Ohio	204-10	19 February 85
11	Ohio	10-0	19 February 85
	Allegheny	0-17	19 February 85
	Ohio	204-10	20 February 85
12	Ohio	17-0	20 February 85
	Allegheny	0-25	22 February 85
	Allegheny	0-17	23 February 85
	Monongahela	0-66	23 February 85
	Allegheny	0-17	24 February 85
	Monongahela	0-53	24 February 85
13	Monongahela	57-66	24 February 85
	Ohio	126-22	28 February 85
	Monongahela	0-13	28 February 85
	Allegheny	0-69	28 February 85
14	Ohio	128-24	1 March 85
	Monongahela	0-12	1 March 85
	Allegheny	0-65	1 March 85
	Ohio	127-79	2 March 85
15	Ohio	64-22	2 March 85
	Monongahela	0-12	2 March 85
	Allegheny	0-64	2 March 85
	Ohio	127-38	3 March 85
16	Ohio	38-22	3 March 85
	Allegheny	0-64	3 March 85
	Monongahela	0-12	3 March 85
	Ohio	127- 26	6 March 85
17	Ohio	26-0	6 March 85
	Monongahela	0-12	6 March 85
	Allegheny	0-64	6 March 85
	Ohio	127-22	7 March 85
	Monongahela	0-12	7 March 85
18	Allegheny	0-65	7 March 85
	Ohio	128-22	9 March 85
	Monongahela	0-12	9 March 85
	Allegheny	0-55	10 March 85

ADDENDUM: SUMMARY OF ICE CONDITIONS, 1984–85

(Full data in Appendix A)

The table below has been added to the atlas because it provides a greatly simplified summary of ice conditions during the 1984–85 winter as observed on the video tapes. Thus the reader can more conveniently study this table than study all the tables in Appendix A.

The accompanying graphs provide data on regional air temperature and river discharge. The reader can use these graphs to determine temperature and discharge conditions prior to and after an aerial video ice observation, during the time when ice was not apparent, and during the time when video tapes were not taken.

The tabular and graphical data which follow may be useful in understanding the distribution of ice as observed, and in estimating ice characteristics during the times when the rivers were not documented on the video tapes.

		Total ice (all ice types)		*Predominant ice type*		
	Date	*Total ice area ($\times 10^6$) (m^2)*	*Percent* of river*	*Name*	*Total ice area ($\times 10^6$) (m^2)*	*Percent* of river*
Allegheny River (3.27×10^6 m^2)						
First ice observed	23 Jan 85†	3.09	95	Fragmented ice cover	2.42	74
Maximum ice extent observed	23 Jan 85†	3.09	95	Fragmented ice cover	2.42	74
Last ice observed	24 Feb 85	0.03	1	Ice floes or frazil slush and pans	0.03	1
Monongahela River (24.30×10^6 m^2)						
First ice observed	28 Jan 85†	12.24	50	Solid ice cover	5.28	22
Maximum ice extent observed	4 Feb 85	15.19	63	Fragmented ice cover with open-water areas	7.16	30
Last ice observed	24 Feb 85	0.02	0	Ice floes or frazil slush and pans	0.02	0
Ohio River Above Hannibal Dam (77.01×10^6 m^2)						
First ice observed	30 Jan 85†	25.99	34	Fragmented ice cover with open-water areas	13.16	17
Maximum ice extent observed	30 Jan 85†	25.99	34	Fragmented ice cover with open-water areas	13.16	17
Last ice observed	20 Feb 85	0.24	0	Ice floes or frazil slush and pans	0.21	0
Ohio River Below Hannibal Dam (208.02×10^6 m^2)						
First ice observed	8 Feb 85†	2.35	1	Fragmented ice cover with open-water areas	1.08	1
Maximum ice extent observed	16 Feb 85	2.83	1	Fragmented ice cover with open-water areas	2.35	1
Last ice observed	20 Feb 85**	0.03	0	Solid ice cover	0.03	0

* Rounded to nearest percent.

† First date of video coverage.

** Last date of video coverage.

