



City of Winnipeg
Water and Waste Department

Combined Sewer Overflow Management Study

PHASE 3 Technical Memoranda

Appendix No. 7

ASSINIBOINE RIVER FECAL COLIFORM SURVEY

April 1999
0510-A-38

Internal Document by:

WARDROP
Engineering Inc.

and

TetrES
CONSULTANTS INC.

In Association With:

Gore & Storrie Limited and **EMA** Services Inc.

ASSINIBOINE RIVER FECAL COLIFORM SURVEY

The 1996 Assiniboine River fecal coliform survey showed that there was no single location, in the reach between the Assiniboine Park Footbridge and the Main Street Bridge. It showed, rather, that the concentrations increased more or less uniformly along the reach.

The matter was reported on in detail in the minutes of the Phase 3 progress meeting number 28, held in the City of Winnipeg offices, at 1500 Plessis Road, on April 17, 1997. An excerpt from these minutes and the pertinent overheads is attached.

TetrES Consultants Inc.

NOTES OF MEETING

held on April 17, 1997, 8:30 a.m. to 1:00 p.m.
at the City of Winnipeg Offices, 1500 Plessis Road, Winnipeg, MB

CSO MANAGEMENT STUDY - PHASE 3 PROGRESS MEETING NO. 28

ATTENDEES:

Ed Sharp	City of Winnipeg
Mike Shkolny	City of Winnipeg
Bill Borlase	City of Winnipeg
Paul Lagasse	City of Winnipeg
Al Zaleski	City of Winnipeg
Brian Station	City of Winnipeg
Diane Sacher	City of Winnipeg
George Rempel	TetrES Consultants
Nick Szoke	TetrES Consultants
Gord Steiss	Wardrop Engineering
Bob Gladding	Wardrop Engineering

NEXT MEETING: tentatively scheduled for
Wednesday, May 21, 1997; 1:00 p.m.

SUBMITTED BY: B. Gladding

DATE SUBMITTED: May 1, 1997

PROJECT NO: 0510-A-38-49

**THE FOLLOWING IS BASED ON THE BEST RECOLLECTION OF TetrES CONSULTANTS
INC. PLEASE NOTIFY THE RECORDER IMMEDIATELY OF ANY ERRORS OR OMISSIONS.**

Agenda Item 28:1 Problem Definition**Winter Outfall Surveys**

N. Szoke presented overheads OH28-4 to OH28-6 providing background and summarizing the results of the 1996/97 winter outfall surveys. OH28-5 emphasizes the value of the winter survey for the CSO study and stresses the need to integrate the information with the new FAST alarm system. The new FAST system is RTU-based and checks all sites in the City every three minutes. The new system has significantly greater potential than the old one. Data on OH28-6 indicate the value of the winter surveys in tracking the status of DWOs. Szoke noted that it would be valuable under the "Flowing" column to insert "no" against each outfall for which there is no evidence of flow.

ACTION: City(?)

Szoke recommended formalizing results of the winter outfall survey to some type of environmental report. This way the City would get credit for responsible environmental actions initiated internally rather than as a result of prompting from regulators.

ACTION: City(?)

Szoke continued with a discussion of the 1996 Assiniboine River Water Quality Survey. OH28-7 provides background and a summary of the results of the survey and is followed by the analysis. Szoke presented OH28-8 which is an air-photo (circa 1986) which indicates that, at least at the time it was taken, there was no evidence whatever of a backflow of Red River water into the Assiniboine. This had been questioned in the past as being a source of the elevated fecal coliform concentrations at the Main Street Bridge. B. Borlase noted that this separation of streams had also been noted on the boat tour in 1995.

The next series of slides is self-explanatory (OH28-10 and OH25-32 to OH25-35 and OH28-11 to OH28-20). The results at the Main Street Bridge indicated geometric mean coliform levels at the bridge in the order of 700 to 1,000 for 1992 through 1994. These dropped to 200 to 250 in the 1995/96 timeframe indicating an apparent improvement in the situation. OH28-21 is a plot of the geometric means for the 1996 DWO intensive program. As can be seen, it appears that there is a more or less steady increase in coliform concentrations from the Assiniboine Bridge down to the Main Street Bridge. Through the discussion, it was agreed that something similar would be done in 1997, in order to identify the specific sources of elevated fecal coliforms. Szoke noted that we had discussed the use of an ammonia probe at or near the various outfalls in order to isolate those which appear to be overflowing. Rempel noted that he would check with Phil Gray (XCG) with regard to the availability of a fecal coliform probe. The question was also raised whether such a survey should also be considered for the Red River. This will be discussed at the subsequent monitoring meeting.

ACTION: City/Study Team

The 1996 River Monitoring Program results are summarized in OH28-22. Szoke provided an overview of the results of the 1996 WPCC effluent quality monitoring. The results are summarized on OH28-23. As highlighted, fecal coliform concentration estimates started at 400,000 organisms per 100 mL in 1986 and gradually reduced to the current measured geometric means of 11,000 to 16,000 organisms per 100 mL for the North End and the South End WPCCs. The geometric means for the North End plant for 1995 and 1996, as compared to the geometric means at the North Perimeter Bridge, are provided on OH28-24 and OH28-25.

Similar plots are provided for the WEWPCC and the West Perimeter Bridge on OH28-26 and OH28-27. The plot for the SEWPCC 1995 and 1996 discharge are provided on OH28-28 and OH28-29. Borlase suggested that the results from the Fort Garry Bridge be added to the SEWPCC plots. He believed that these would provide a good indicator for river use.

ACTION: Study Team

OH28-30 provides a table of the 1995/96 geometric means, as plotted. As noted on OH28-31, it is recommended that the monitoring continue for 1997 at all three WPCCs, along with influent and effluent concentrations, on a bi-weekly basis for the full year. Szoke recommended that the City consider developing a database for the purpose of establishing performance assessment limits.

ACTION: City

Szoke tabled OH28-32 which provided his thoughts on the 1997 monitoring program. This "proposal" will provide a basis for upcoming detailed discussions of the monitoring program which will take place early in May. It was agreed that Szoke would prepare a draft protocol in advance of the meeting to help facilitate the discussions.

ACTION: Study Team/City

1996 Assiniboine River Fecal Coliform Survey

- **River Water Quality Modeling Indicated that DWOs may be occurring along the Assiniboine River and causing elevated FC concentrations near the confluence**
- **Prepared an intensive water quality monitoring program to “*find and fix*” DWOs**
 - 15 sampling locations identified downstream of Assiniboine Park Bridge
 - data collected once per week by City Lab staff
 - Biweekly and intensive survey results tabulated
- **Presentation and analysis of results**
- **Direction for 1997 River monitoring program**

16/04/96

78-7

ASSIPBOINE



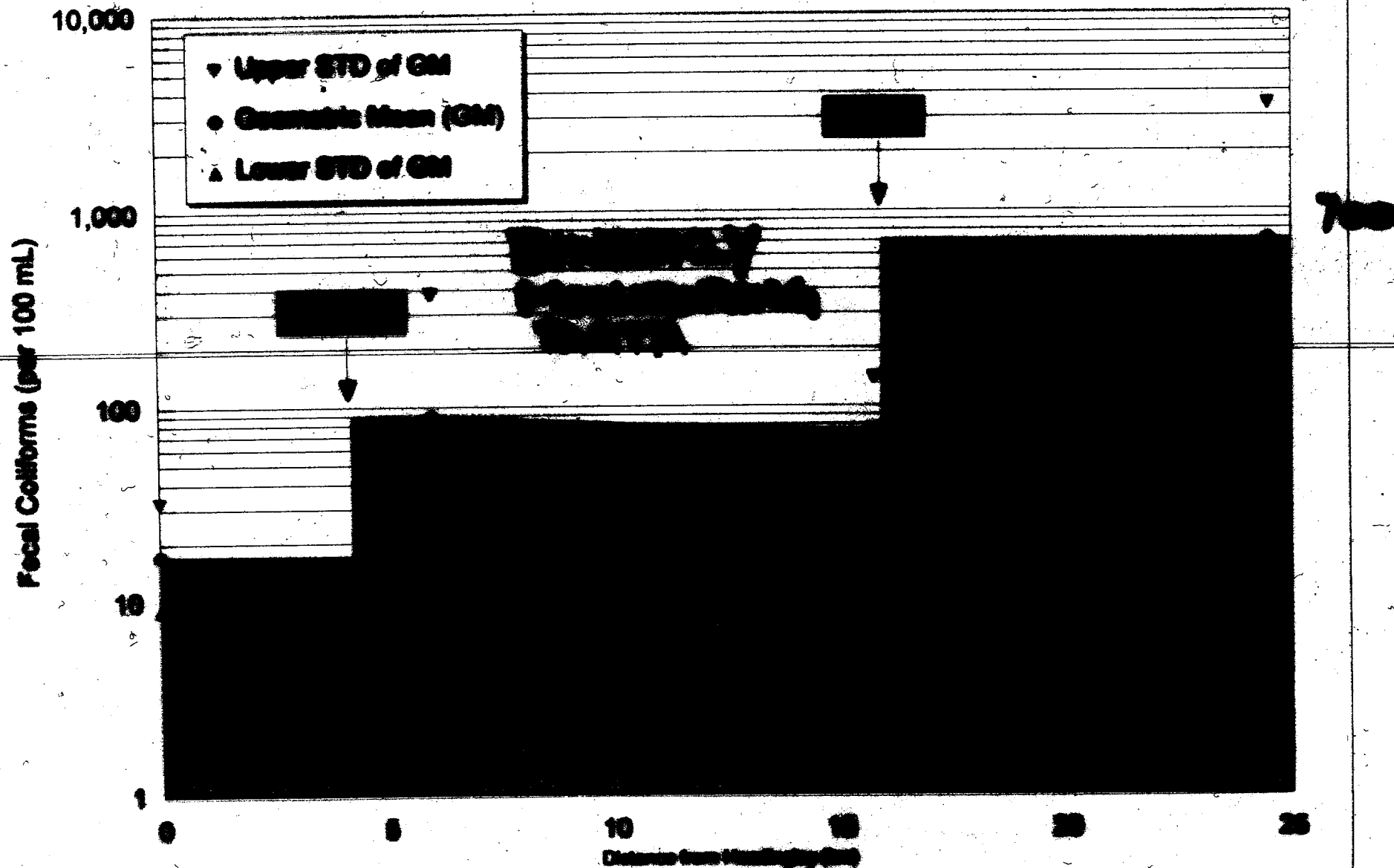
CSO Modeling

- **Dynamic Fecal Coliform Model Calibrated to Monitored River Water Quality**
 - 1992 consider a representative year
- **Large increase in FC concentration observed downstream of Assiniboine Park Bridge**
 - cursory analysis indicated that a single DWO could cause such an increase in observed levels
 - examined 1992, 93, 94, and 95 biweekly data
 - examined 1996 biweekly and intensive survey data
 - noticeable drop in concentration in 1995 and 1996
 - river flows important factor in dilution and travel time
- **1996 survey considered a dry weather base condition**

16/04/96

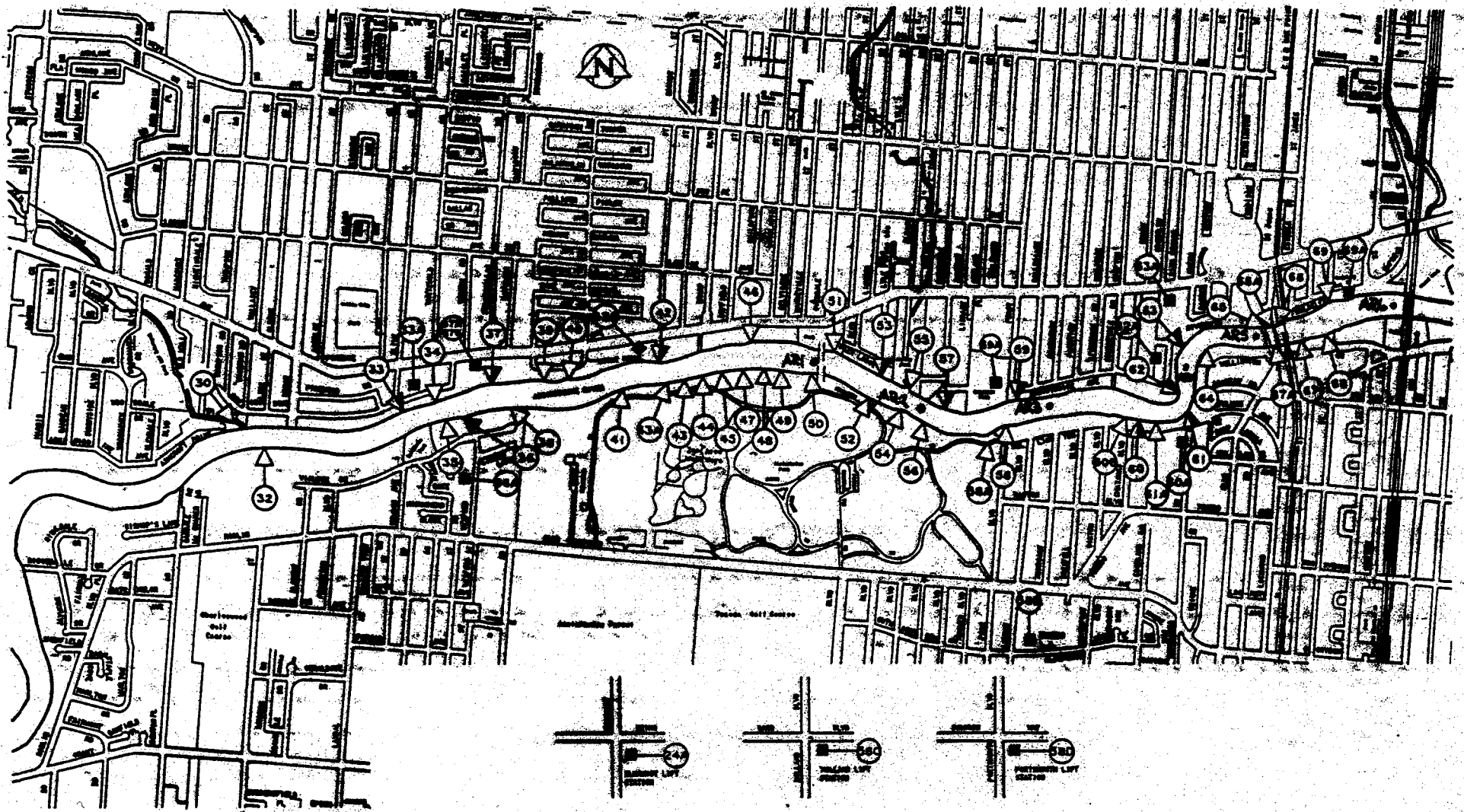
28-9

Assiniboine River - Monitored Fecal Coliform Levels 1992 - May to Sept.







1996 ASSINIBOINE RIVER SURVEYS
KEY TO SAMPLE LOCATIONS

- AR-1 upstream side [west] of Assiniboine Park Footbridge
- AR-2 ~ 200 m downstream of Truro Creek
- AR-3 ~ 200 m downstream of Ferry Rd. CSO (#61) and Park Blvd. LDO (#58) [Bourkevale Park]
- AR-4 between Doncaster CSO (#61) and CSO south of Riverbend Cres east of Parkside Dr. (#63) [Wellington & Academy]
- AR-5 upstream side [west] of St. James Bridge
- AR-6 ~ 200 m downstream of Tylehurst CSO (#69) [upstream of railway bridge]
- AR-7 ~ 200 m downstream of Omand's Creek
- AR-8 upstream of Aubrey LS (#79A) [Wolsely & Palmerston]
- AR-9 downstream of Aubrey LS (#79A) [Palmerston & Arlington]
- AR-10 upstream side [west] of Maryland Bridge
- AR-11 ~ 200 m downstream of CSO at Wellington & Grosvenor (#87) [Wellington & Dorchester]
- AR-12 downstream of Cornish CSO (#88) [Eastgate & Cornish]
- AR-13 downstream of Colony CSO (#90) [opposite Granite Curling Club]
- AR-14 upstream side [west] of Donald Street Bridge
- AR-15 upstream side [west] of Main Street Bridge

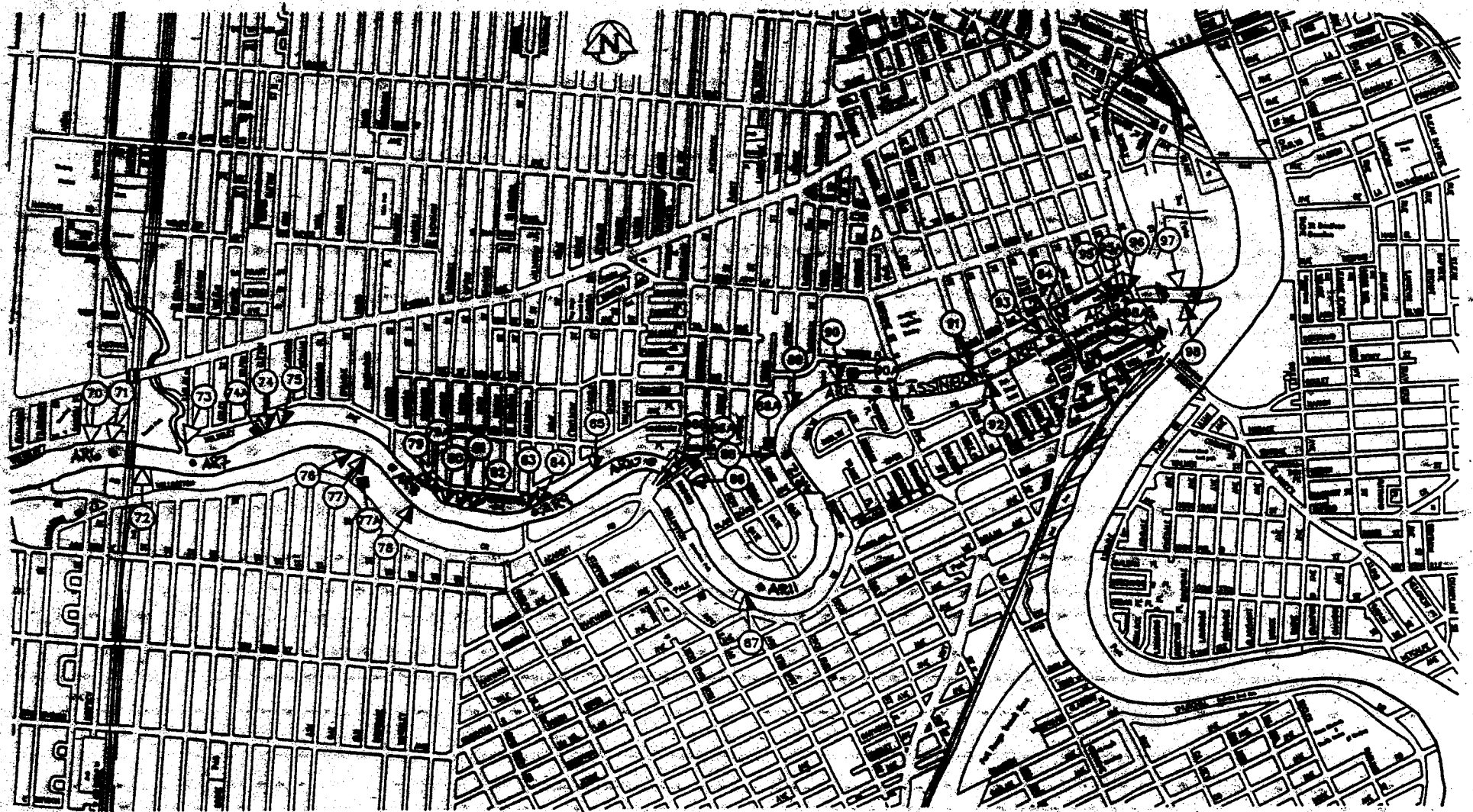


28-12

-  LAND DRAINAGE
-  SANITARY OVERFLOW
-  COMBINED SEWER OVERFLOW
-  LIFT STATION

RIVER AND TRIBUTARY STREAM
 OUTFALL EFFLUENT
 ASSINIBOINE RIVER
 STURGEON CREEK TO OKANOS CREEK

Figure 2



28-15

LEGEND:

- 33 → LAND DRAINAGE
- 34 → SANITARY OVERFLOW
- 38 → COMBINED SEWER OVERFLOW
- 74A → LIFT STATION

RIVER AND TRIBUTARY STREAM
OUTFALL INVENTORY
ASSINIBOINE RIVER
OMAND'S CREEK TO RED RIVER

Figure 3

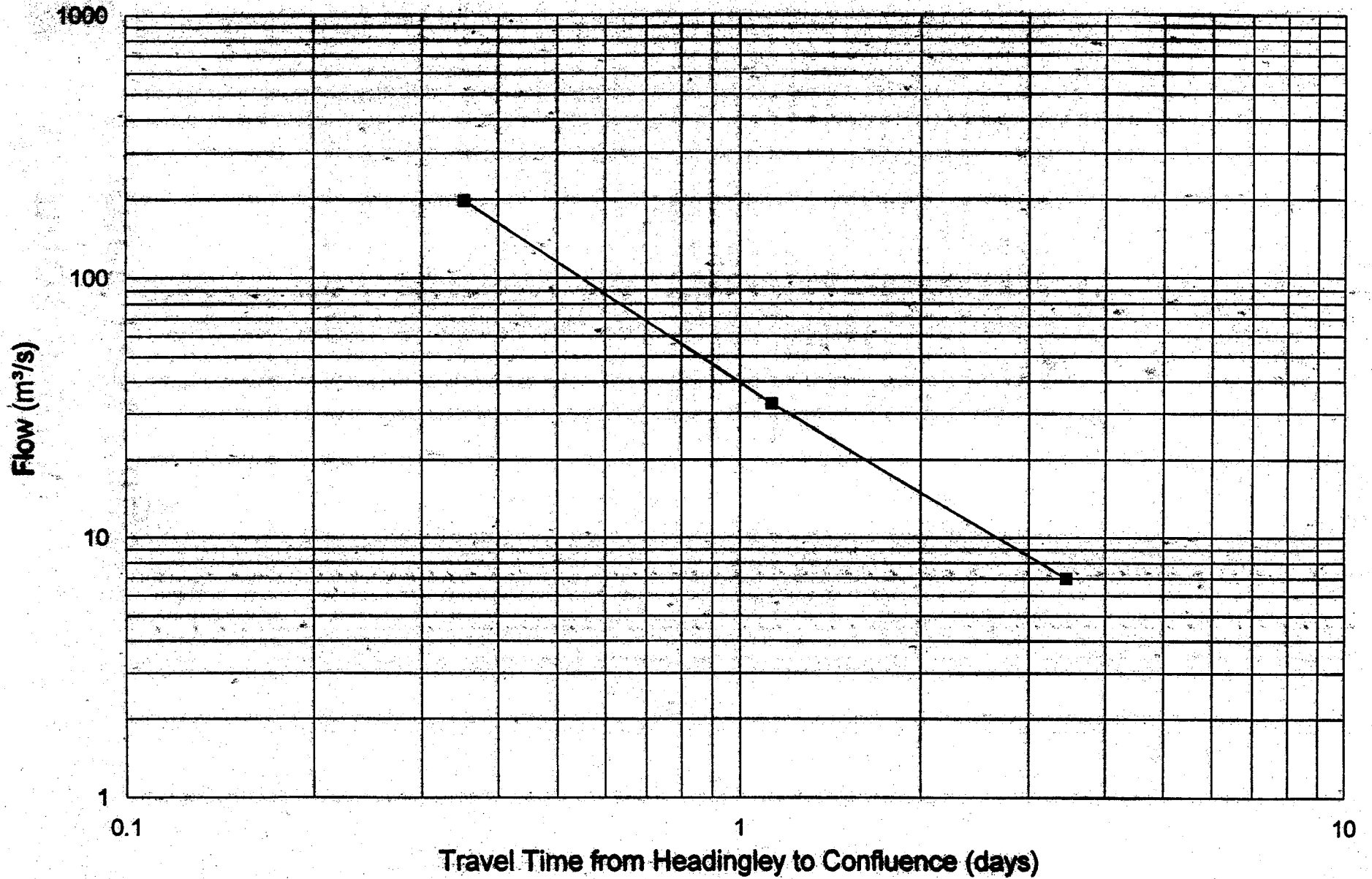
ASSIGNMENT FISCAL COLIFORM LEVELS (ppm/100ml)

DATE:	0	6	15.8	16.4	16.8	17.7	18.1	18.7	19.0	19.8	20.6	21.2	22.0	22.8	23.4	24.2	24.6
	HEADINGLY BRIDGE	WEST PERIMETER BRIDGE	ASSINIBOINE PARK BRIDGE (AR-1)	D/S of Truro Creek (AR-2)	D/S Ferry Rd CS Outfall (AR-3)	D/S Doncaster CS Outfall (AR-4)	St. James Bridge (AR-5)	D/S Tyshawnee Outfall (AR-6)	D/S Oman's Creek (AR-7)	U/S Aubrey LS (AR-8)	D/S Aubrey LS (AR-9)	U/S Maryland Bridge (AR-10)	Jessie CS Outfall Wellington & Greenway (AR-11)	D/S Cornish CS Outfall (AR-12)	D/S Colony CS Outfall (AR-13)	U/S Donald St Bridge (AR-15)	MAIN ST. BRIDGE
07-May-96	14	180	82														12
21-May-96	110	1400	150														250
04-Jun-96	15	40	25														40
18-Jun-96	80	50	85														270
08-Jul-96			590	370	120	190	250	230	310	250	120	630	750	730	1200	3100	1500
11-Jul-96	165	60	155														450
23-Jul-96	20	45	20														70
23-Jul-96			73	14	42	23	93	31	73	150	200	84	98	46	43	300	93
30-Jul-96			84	60	120	42	43	420	46	150	41	120	120	57	250	110	150
06-Aug-96			43	100	100	93	93	80	63	150	84	240	630	840	750	840	2400
07-Aug-96	15	85	75														380
13-Aug-96			31	57	31	43	84	46	63	63	130	84	210	150	240	100	42
20-Aug-96			130	570	990	99	630	840	350	160	1700	410	990	570	430	800	930
27-Aug-96			43	98	300	250	200	150	120	150	150	230	150	150	480	310	250
28-Aug-96	25	255	30														210
03-Sep-96			63	93	43	120	88	310	200	190	150	150	630	310	200	250	730
10-Sep-96			93	150	180	73	410	130	230	2500	230	310	230	480	230	430	430
11-Sep-96	90	120	70														425
17-Sep-96			430	370	150	220	190	630	370	990	480	630	310	840	420	250	590
24-Sep-96			230	420	200	190	430	460	310	630	300	3100	480	480	310	630	430
25-Sep-96	95	285	30														1830

28-14

Assiniboine River

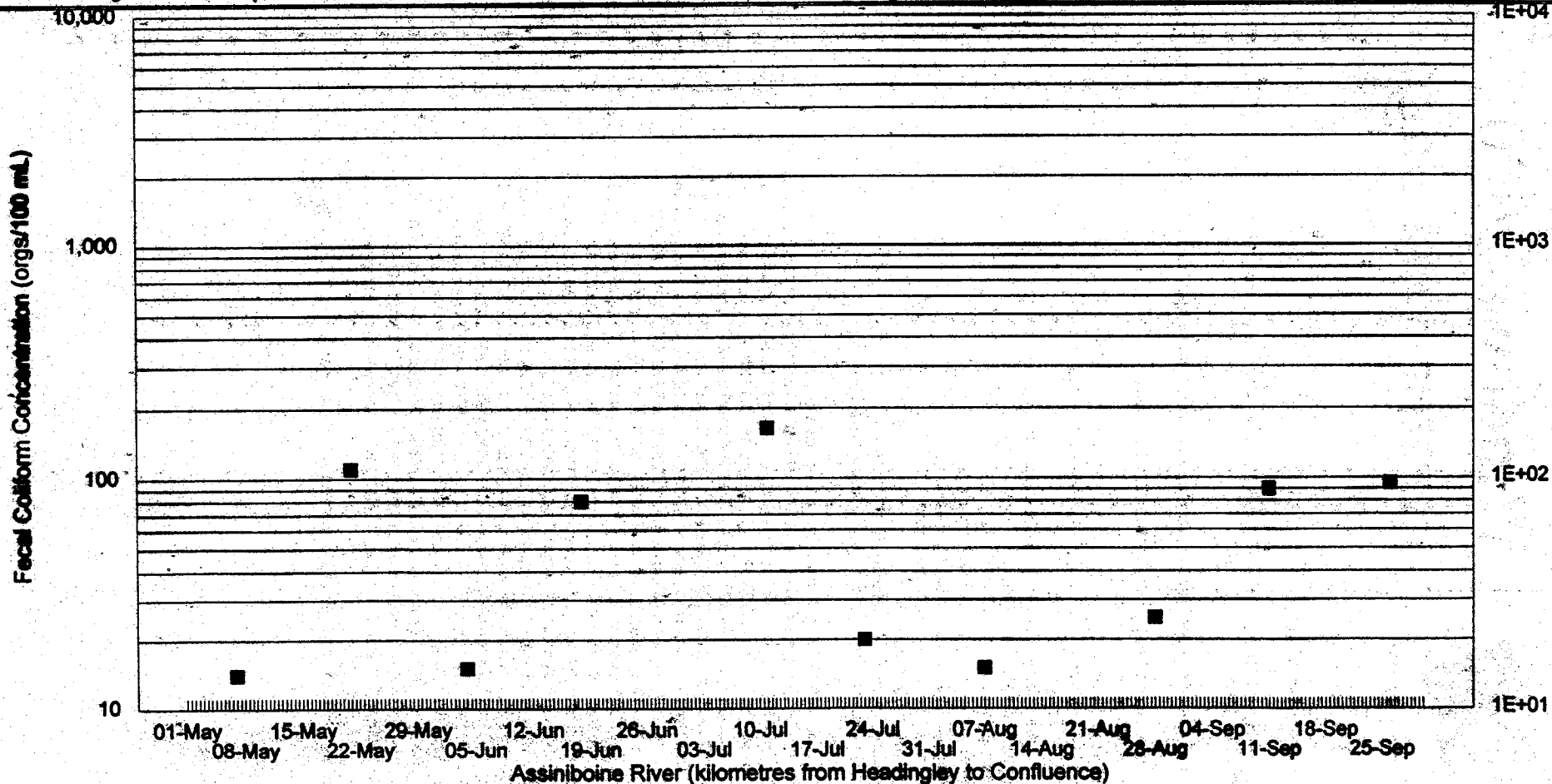
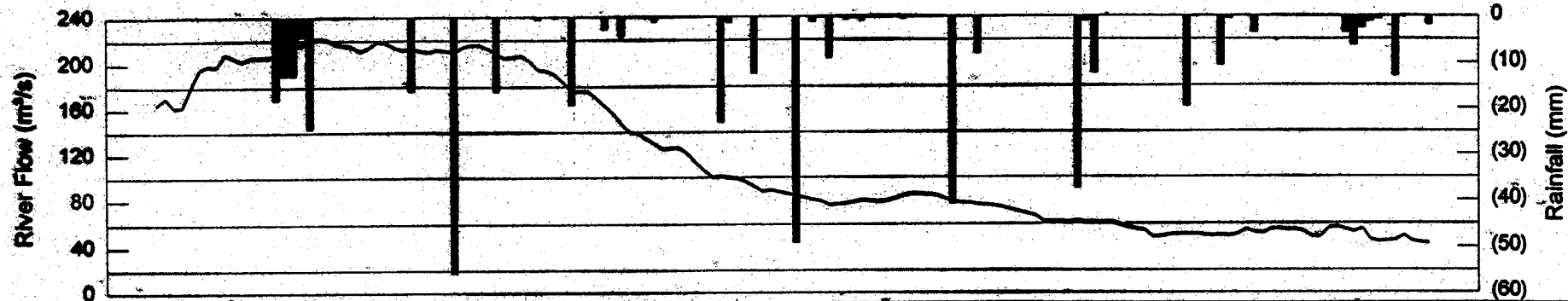
Travel Time from Headingley to Confluence



28-15

1996 Assiniboine River Water Quality Survey

HEADINGLY BRIDGE

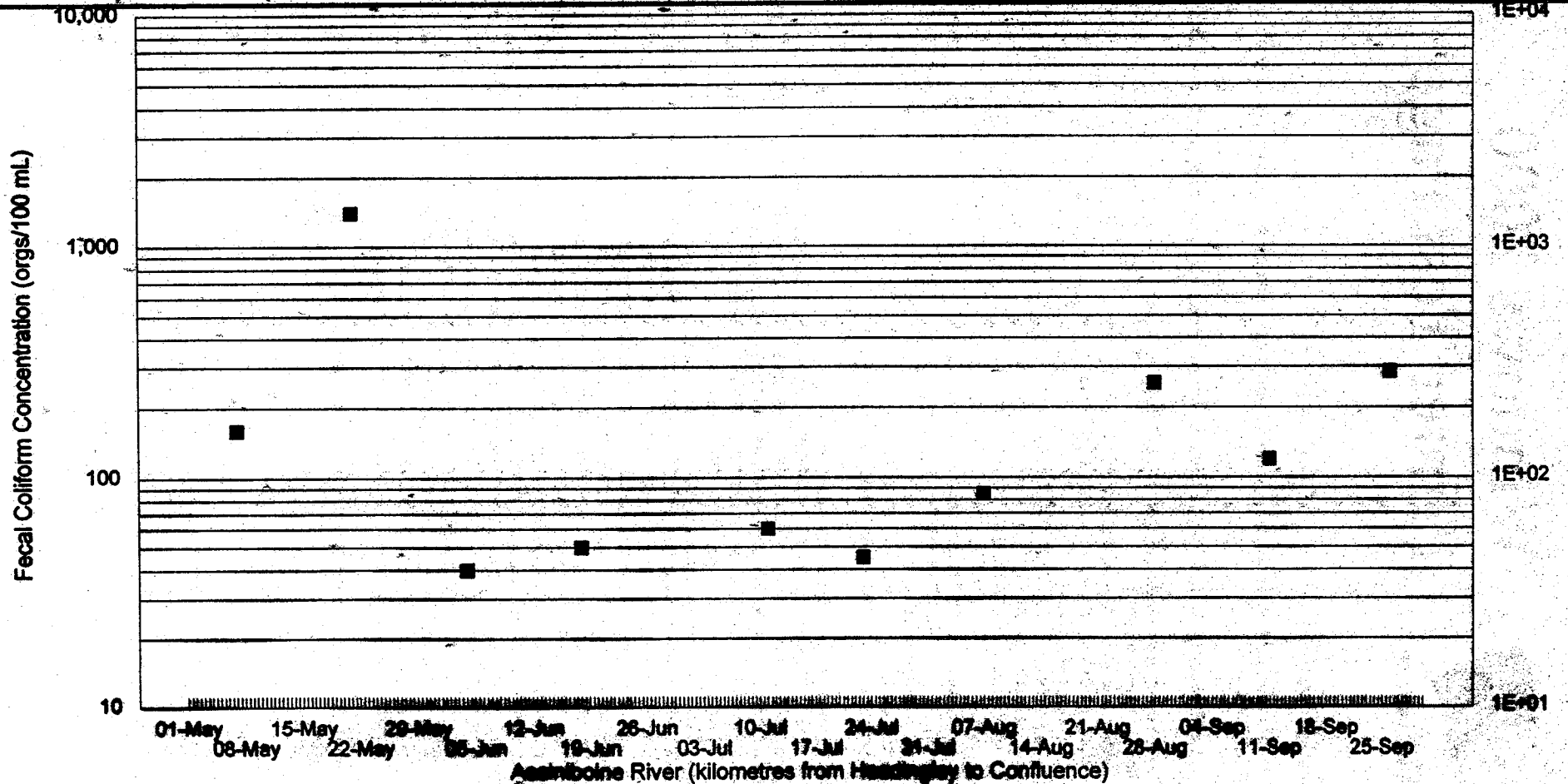
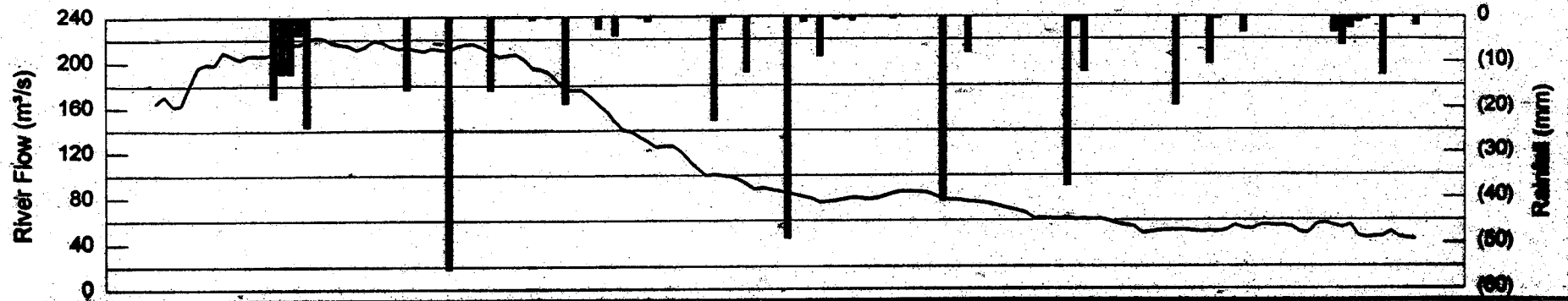


Assiniboine River (kilometres from Headingley to Confluence)

28-16

1996 Assiniboine River Water Quality Survey

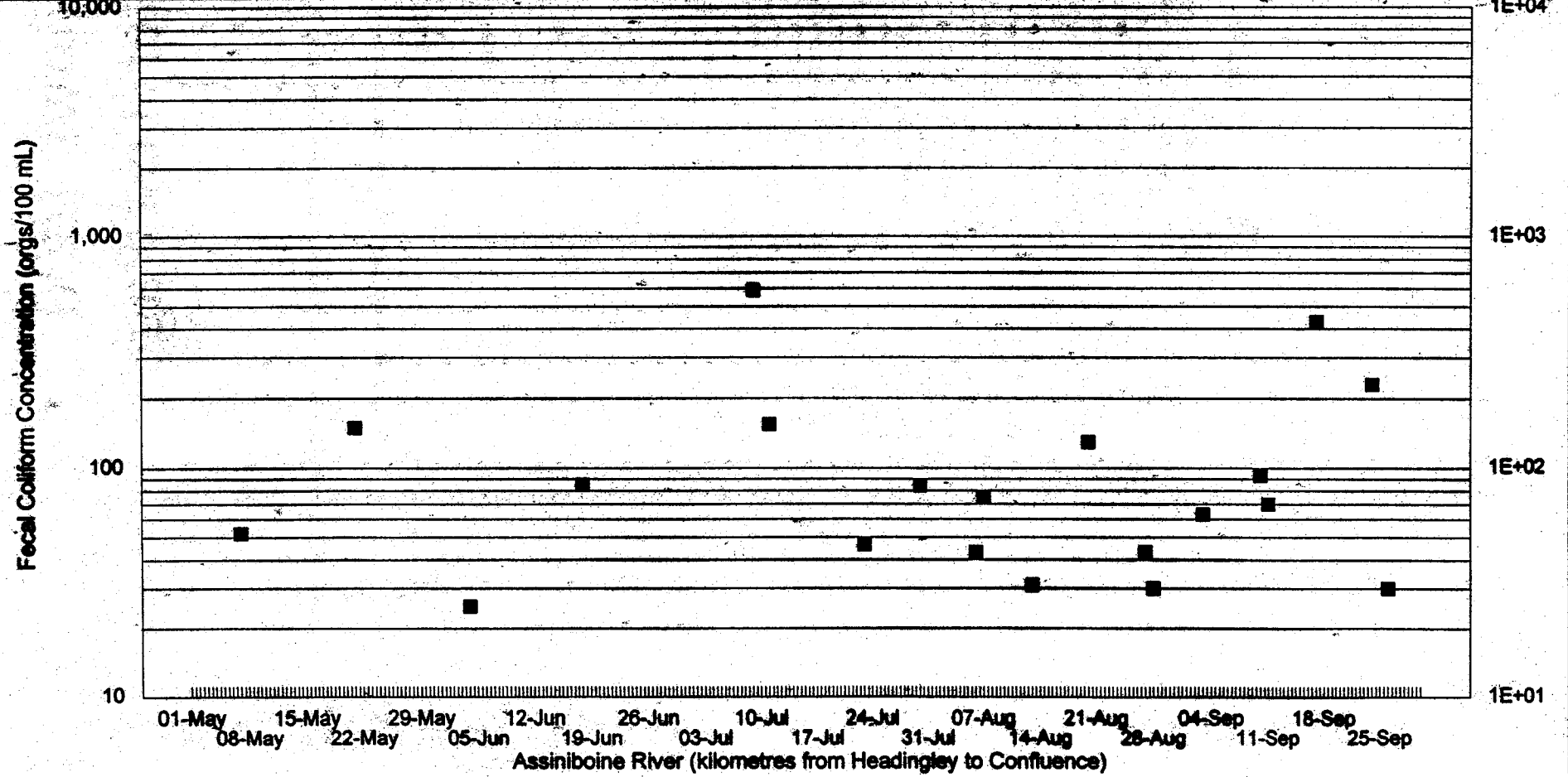
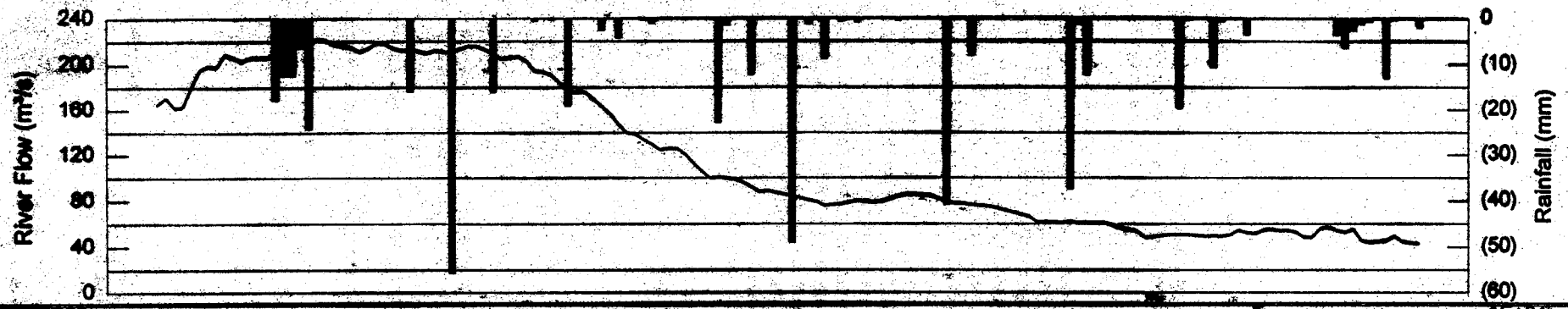
WEST PERIMETER BRIDGE



28-17

1996 Assiniboine River Water Quality Survey

ASSINIBOINE PARK BRIDGE (AR-1)

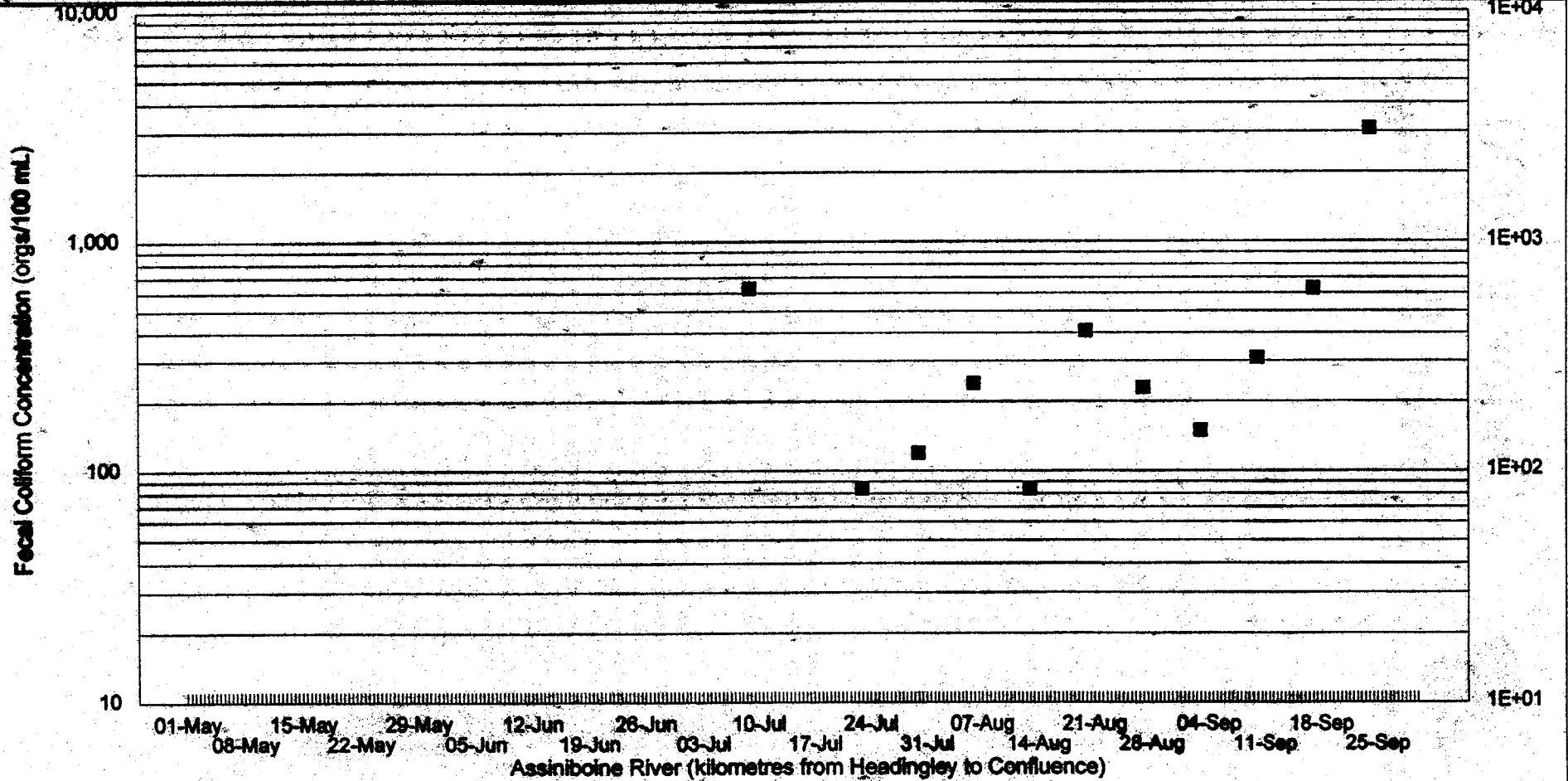
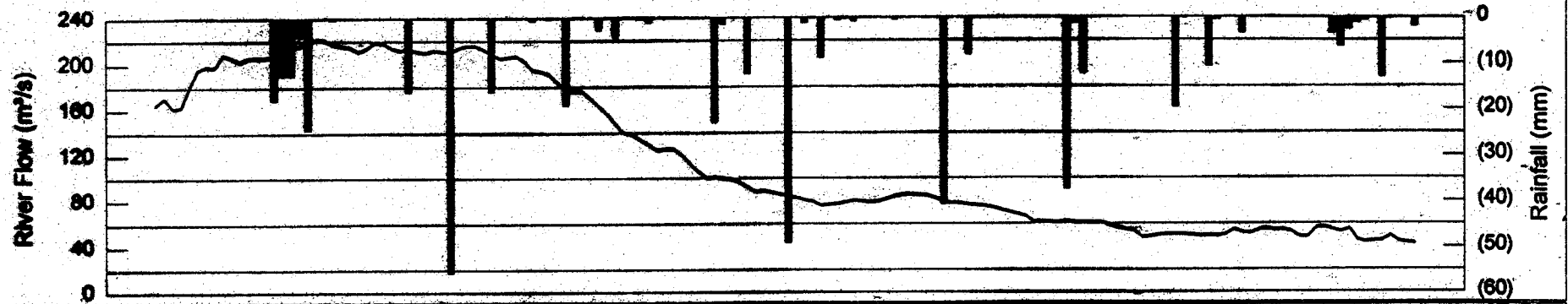


Assiniboine River (kilometres from Headingley to Confluence)

28-18

1996 Assiniboine River Water Quality Survey

US Maryland Bridge (AR-10)

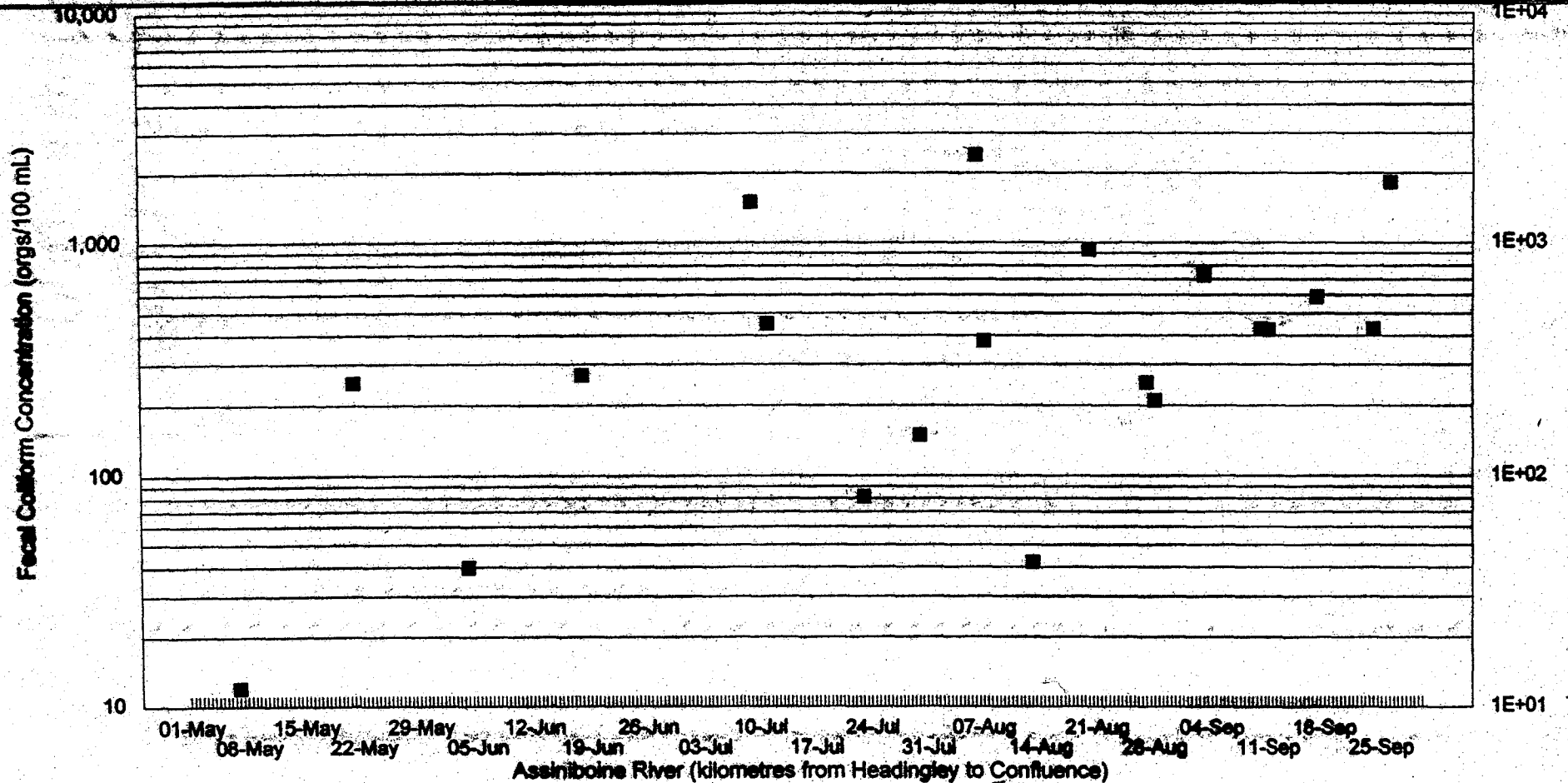
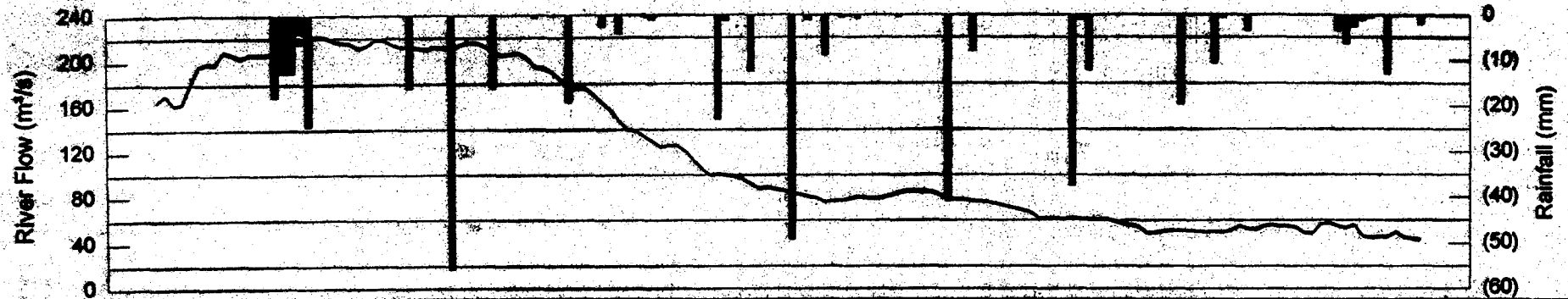


Assiniboine River (kilometres from Headingley to Confluence)

28-19

1996 Assiniboine River Water Quality Survey

MAIN St. BRIDGE

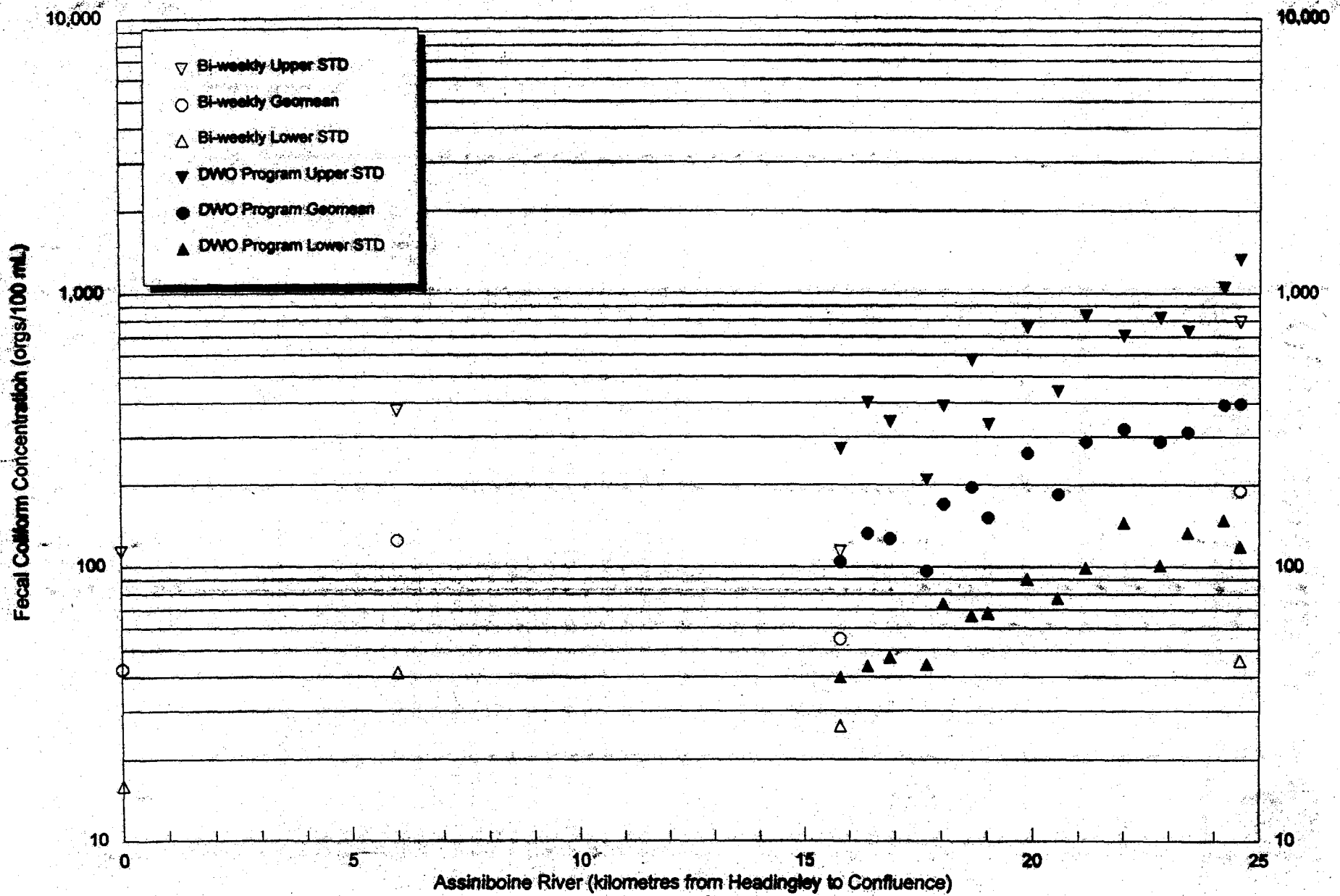


Assiniboine River (kilometres from Headingley to Confluence)

28-87

Comparison of Monitored Fecal Coliform Concentration

1998 Routine Bi-weekly and Weekly DWO Program



28-21A

Comparison of Measured Fuel Cell Output Characteristics with the Engineering Design

1954

Fuel Cell Output (amps/100 ml)



10-21 B

1996 River Monitoring Results

DWO

- **No single location identified as the main cause for elevated FC levels in the Assiniboine River**
 - important consideration for compliance assessment
- **Need to compare with FAST alarm data to confirm that DWOs were not occurring**
- **River flow is an important consideration when assessing monitored water quality data**
 - need to perform a mass analysis (flow * conc.) to compare previous years on same basis.
- **Considerable difference in results between Biweekly data and intensive program for same locations, however, trend is the same.**
- **Ongoing Identification and Correction of DWO through Winter Outfall Survey could be a significant factor in reducing instream FC levels.**
- **Disinfection of WEWPCG effluent would not significantly reduce FC levels in Assiniboine River**
- **Similar River Water Quality Monitoring Campaign Recommended for Red River in 1997, (flow permitting).**
 - Details to be discussed at a separate meeting

16/04/96

28-22