

REPORT

FINAL

Niagara Falls Water Board

Sanitary Sewer System Management Plan

PREPARED FOR:

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<p style="text-align: center;">Niagara Falls Public Water Board Sanitary Sewer Rehabilitation Assessment and Ongoing SSO Abatement Plan</p>
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LIST OF ABBREVIATIONS

BMP	Best Management Practices
CIP	Capital Improvements Project; Capital Improvements Plan
CIPP	Cured-in-place Pipe
CMOM	Capacity, Management, Operations and Maintenance
CMMS	Computer-based Maintenance Management System
EORP	Also known as OERP – Emergency Overflow Response Plan
EPA	United States Environmental Protection Agency
EPM	Essential/Required Preventive Maintenance
FOG	Fats, Oils and Grease
GIS	Geographic Information System
IMMS	Integrated Maintenance Management Systems
I/I	Infiltration and Inflow
IS	Information System
MOM	Management, Operations and Maintenance
MRO	Maintenance and Repair Operations
NFWB	Niagara Falls Water Board
NPDES	National Pollutant Discharge Elimination System
NYSDEC	New York State Department of Environmental Conservation
OERP	Overflow Emergency Response Plan
O&M	Operation and Maintenance
PMP	Preventative Maintenance Program
POTW	Publicly Owned Treatment Works
RP	Record Plan (Record drawings of sewer construction)
SECAP	System Evaluation and Capacity Assurance Plan
SMP	Standard Maintenance Procedures
SOP	Standard Operating Procedures
SSO	Sanitary Sewer Overflow
SWMM	Stormwater Management Model
WIB	Water-in-Basement occurrences

SECTION 1

INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The Niagara Falls Water Board (NFWB) was issued a State Pollutant Discharge Elimination System (SPDES) Discharge Permit (NY-0026336) in April 2003 (refer to Appendix A). The permit required NFWB to implement Best Management Practices (BMPs) for Combined and Sanitary Sewer Overflows (SSOs) and to submit an approvable engineering report which includes:

- A description of the work completed since 1995 in accordance with the agreement between the City of Niagara Falls and NYSDEC Region 9, as defined and documented in the *LaSalle Area Corrective Action/Improvement Plan* (Malcolm Pirnie, 1997); and
- A Work Plan for continuation of the sewer system assessment, flow monitoring, inflow and infiltration (I/I) removal, correction and maintenance, including a schedule, with the goal of eliminating bypass from permitted sanitary sewer outfalls 013 through 019.

This report was compiled to meet the requirements of the NFWB SPDES permit with regard to SSO compliance and management practices.

Reference and guidance documents that were incorporated into this report include:

- The LaSalle Area Corrective Action Improvement Plan (Malcolm Pirnie, 1997), which outlined the actions that the City was required to complete in order to meet their obligation to NYSDEC;
- LaSalle Area (MH-6) Collection System Detailed I/I Investigation (Parsons, 1999);
- Frontier Area (MH-4) Collection System Detailed I/I Investigation (Parsons, 2000);
- Love Canal Area (MH-1) Collection System Detailed I/I Investigation (Parsons, 2001);
- The United States Environmental Protection Agency's (EPA's) forthcoming Capacity, Management, Operations and Maintenance (CMOM) requirements currently proposed under the SSO rule require proper collection system management, operations and maintenance. These forthcoming regulations are similar in nature to the requirements of the NFWB's SPDES Permit; and
- Stormwater Management Program (SWMP) to be developed by March 10, 2003 for coverage under the SPDES General Permit for Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s), Permit No. GP-02-02.

This Engineering Report includes the NFWB's sanitary sewer system management plan and supporting documentation for the Plan development. This report includes the following information, as required by the NFWB SPDES Permit NY-0026336, Schedule of Compliance, Section E:

- Documentation of the rehabilitation measures that have been implemented throughout the sanitary sewer system since the inception of the LaSalle Corrective Action Improvements Program is provided in Section 1.2.
- 2003 post-rehabilitation flow estimates are presented for each subarea in Section 2 of this report, including baseline and peak flows. Section 2 also includes a comparison of sanitary sewer flows prior to and post-rehabilitation; an estimate of the I/I removed through the rehabilitation program; estimated quantity of peak I/I remaining in the system; and significance of I/I on SSOs. Details of the flow data analysis are provided in Appendix B.
- A prioritized implementation plan and schedule for continuation of the rehabilitation program and I/I removal is presented in Section 3. The detailed rehabilitation measures are presented in Appendix C. Recommendations regarding the need for and feasibility of constructing additional conveyance or treatment facilities to mitigate SSOs are discussed. A small-scale program for addressing private property I/I was recommended.
- Section 4 presents a plan for continuation of the sewer system assessment, monitoring and maintenance, including an implementation schedule. The sanitary sewer system management plan incorporates SSO and CSO BMP #1 – Inspection and Maintenance Program, and BMP #15 – CSO and SSO BMP Annual Report. The documents prepared by NFWB to satisfy the requirements of these BMPs are included in Appendix D.

1.2 STATUS OF LASALLE AREA CORRECTIVE ACTION/ IMPROVEMENT PROGRAM IMPLEMENTATION

Since 1995, the City of Niagara Falls/NFWB has substantially completed the work described in the LaSalle Area Corrective Action/Improvement Program. A three-year sanitary sewer system assessment program was undertaken, which included flow monitoring, system inspection, condition assessment and identification of prioritized rehabilitation measures. High priority rehabilitation, I/I removal, and capacity enhancement measures have been implemented, with positive results.

Table 1.1 summarizes the types of collection system improvements that have been made during the course of the LaSalle Area Corrective Action/Improvement Program and the associated costs. Table 1.2 documents the detailed type of rehabilitation measures that have been implemented by sewer subarea, and the associated costs.

The agreement between NYSDEC and the City of Niagara Falls that was set forth in the LaSalle Corrective Action/Improvements Program has been satisfied. This Engineering report establishes the NFWB's plan for the continuation of the sanitary sewer assessment, monitoring, I/I removal and maintenance. Figure 1 depicts the historical Sanitary Sewer Overflow/bypass pumping locations. Table 1.3 summarizes the

wet weather bypass pumping history, and demonstrates that the bypass pumping/SSO trend has decreased considerably since the implementation of the program.

Table 1.1
Niagara Falls Water Board
Summary of Work Completed Since 1995
[in Accordance with the Agreement between
the City of Niagara Falls and NYSDEC]

Recommendation ¹	Estimated Cost (1995)	Status to Date ²	Cost to Date ³	Note
Upgrade Instrumentation and Telemetry				
1. 91st and Luick	\$40,600	Completed	\$65,953	Included electrical, pump, instrumentation and telemetry improvements
2. 81st and Frontier		Completed	\$77,000	Included electrical, pump, instrumentation and telemetry improvements; additional \$50,000 for diversion structure engineering
3. 81st and Stephenson		Completed	\$4,000	Additional \$25,000 for Cayuga LS pump and electrical upgrade
Water Quality Monitoring	N/A	Completed	N/A	Completed as part of I/I investigation project
Lift Station 8 Modification	\$47,500	Completed	\$20,000	
I/I Investigation and Abatement				
Initial Regional Study	N/A	Completed	\$270,000	
1. MH-6 Area				
Investigation	\$316,753	Completed	\$320,000	
Abatement	N/A	Completed, reduced estimated peak I/I from 2.67 to 1.98 mgd	\$44,230	MH repairs, MH lid insert and Cross connection correction
2. MH-1 Area				
Investigation	\$291,393	Completed	\$305,000	Additional \$23,000 for interconnection follow-up study
Abatement	N/A	Completed, reduced estimated peak I/I from to 3.41 to 2.11 mgd	\$89,000	MH repairs, MH lid inserts, cross connection correction, and spot repairs
3. MH-4 Area				
Investigation	\$295,972	Completed	\$267,000	Additional \$23,000 for interconnection follow-up study
Abatement	N/A	Completed, reduced estimated peak I/I from 5.25 to 2.38 mgd	\$88,545	MH repairs, MH lid inserts, cross connection correction, and spot repairs
Additional Capacity Improvement	N/A	N/A	\$351,160	Frontier Ave. Sewer Replacement and LS-6 Diversion Structure Upgrade
Re-Evaluation Need For Major Capital	N/A	Completed	\$149,900	

Note:

1. The recommendations and cost information are from Section 7 of Malcolm Pirnie 1997 Engineering Report, LaSalle Area Correction Action/Improvement Program, which was approved by NYSDEC Region 9 as agreement between City of Niagara Falls and the Region.
2. Estimated I/I information is from the MH-1, MH-4 and MH-6 sanitary sewer assessment reports (1999, 2000, and 2001) and the 2003 post-rehabilitation flow monitoring study.
3. Cost information as provided by Niagara Falls Water Board.

Table 1.2
Niagara Falls Water Board
Description of SSO Mitigation Measures
Implemented Since 1995



Subarea	Manhole Rehab	Manhole Lid Inserts	Cross-Connection Elimination	Spot Excavation	Cutting Protruding Laterals	Lift Station Upgrades	Engineering	Total
A	\$24,000	\$1,855		\$20,000		\$24,000		\$69,855
B	\$18,000	\$1,575			\$810	\$61,953		\$82,338
C	\$6,000	\$1,295		\$44,000				\$51,295
D	\$600	\$140						\$740
E	\$16,200	\$1,925		\$44,375		\$84,000		\$146,500
F	\$2,000	\$385		\$125,160				\$127,545
G	\$600	\$1,085						\$1,685
H	\$13,000	\$875						\$13,875
I	\$32,000	\$1,085				\$314,400		\$347,485
Total:	\$112,400	\$10,220	\$83,149	\$233,535	\$810	\$484,353	\$1,311,900	\$2,236,367

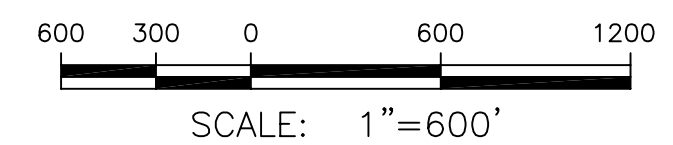
Table 1.3
Niagara Falls Water Board
Bypass Pumping History

	Wet Weather Bypass Pumping, Hours per Year													
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
MH-6 Area (LaSalle)														
West Rivershore	87	56.5	66.0	40.0	51.5	114.0	120.3	49.0	61.2	23.8	21.2	4.5	41.3	14.3
Cayuga Island/Griffon	9			22.0		20.3	3.0							
73/74 & Stephenson						71.5	86.0	53.5	47.6				4.8	
81/76 & Stephenson				10.0			8.5			4.3		1.5	15.9	
Yearly Pumping Hours :	96	56.5	66.0	72.0	51.5	205.8	217.8	102.5	108.8	28.0	21.2	6	62	14.3
MH-4 Area (Frontier)														
81st & Frontier	180	96.8	112.5	137.9	108.8	142.8	175.1	77.3	88.6	96.2	154.7	22.2	104.6	54.1
Military & Cayuga		16	8.0		12.0	39.8	57.3	6.0	16.5	23.3	12.3		45.7	8.8
78th & Lindbergh	71	17				40.0	102.5	25.3	27.6	29.7	30.8	4	31.1	
81st & Lindbergh						23.5	42.0		24.0	33.3	25.3	3.5	43.1	16.2
Bollier & Military						6.0		4.0	5.8				8.3	
Bollier & 82nd/81st					4.0	8.0			6.0	8.5				
Yearly Pumping Hours :	251	129.8	120.5	137.9	124.8	260.1	376.9	112.5	168.5	191.0	223.1	29.7	232.8	79.1
MH-1 Area (Eastern)														
91st & Luick	322.3	87.5	121.8	176.1	137.0	168.8	213.0	139.0	102.3	55.3	167.8	45.3	98.1	25.9
93rd & Colvin/Luick	88		5.0			45.5	84.5	26.8	45.0	30.2	18.4	14.5	65.6	6.7
89th/93rd & Cayuga	15		5.0			4.5	9.5		5.0	6.3	3.25		23.6	
93rd & Shantz							8.0							
S. Military (E. side)									27.8		9.25			
101st Street	45								16.0				10.1	9.3
Yearly Pumping Hours :	470.3	87.5	131.8	176.1	137.0	218.8	315.0	165.8	196.0	91.7	198.7	59.8	197.4	41.9
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Grand Total :	817.3	273.8	318.3	386.0	313.3	684.7	909.7	380.8	473.2	310.7	443	95.5	492.2	135.3



MAP LEGEND

- SANITARY SEWER LINE
 SEWER SUBAREA BOUNDARIES (1999)
 SEWER SUBAREA BOUNDARIES (2003)
 WET WEATHER BYPASS PUMPING LOCATIONS



SECTION 2

POST REHABILITATION FLOW MONITORING

2.1 “PEAK FLOW” ESTIMATION METHODOLOGY

A comprehensive post-rehabilitation flow study was conducted to separate and quantify the components within the various basins of the sanitary sewer system. Figure 2 depicts the sanitary sewer system layout and subarea configuration. Table 2.1 identifies the correlation between the new basin identification scheme, and the subarea numbering from the previous I/I studies. Flow monitoring results and rehabilitation recommendations utilize the new subarea identification scheme presented in Figure 2.

Table 2.1
Niagara Falls Water Board
Correlation of Subareas to Prior Studies

Sanitary Sewer Basins	Metered Subarea	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations 1999-2000
MH-1	A	8,9
	B	3,4,5,6,7
	C	1,2
MH-4	D	4
	E	1,2,3,5,7
	F	8
	G	6
MH-6	H	1,2,3,4
	I	5,6,7,8,9,10,11,12

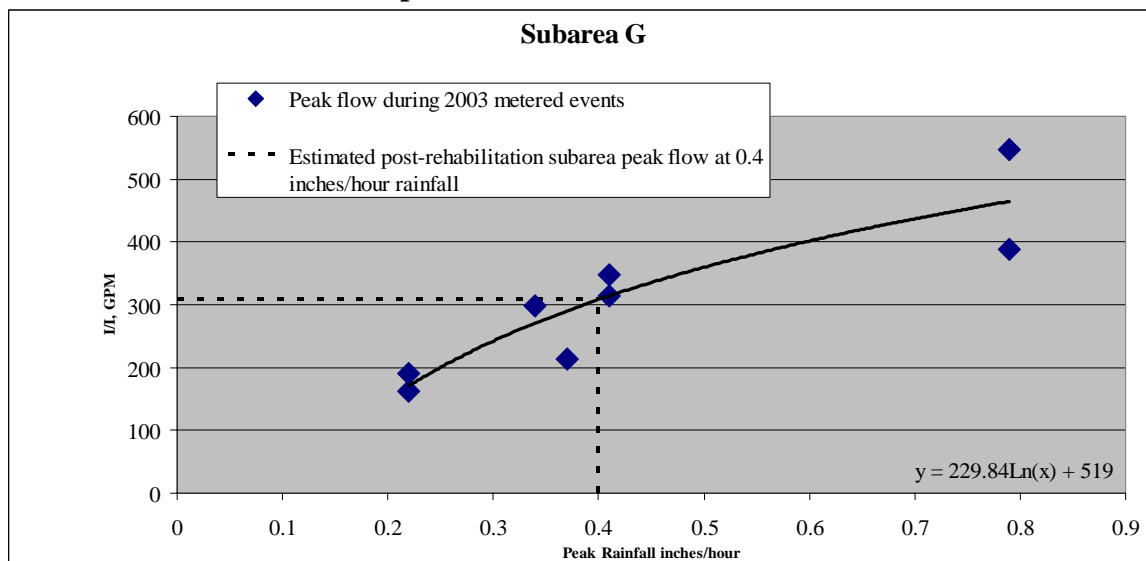
During the 2003 flow monitoring program, the relative amounts of I/I present in each designated subarea was quantified and compared to flow data obtained prior to implementing the noted sewer system improvements. This task consisted of the following components:

- Determination of flow meter locations that correlate with flow data which was obtained prior to the implementation of system improvements. Flow meter locations are depicted on Figure 2;
- Testing of the NFWB's flow meters and meter repairs as-needed; procurement of one additional/replacement probe;
- Installation of metering stations by NFWB crews;

- Collection of flow and rainfall data over a six-month period (mid-February 2003 through mid-July 2003);
- Analysis of flow data to determine average flow, peak flow, and to quantify I/I within metered subareas;
- Comparison of post-rehabilitation flow data to pre-rehabilitation flow data;
- Analysis of I/I abatement associated with system improvements; and
- Evaluation of additional flow reductions needed to achieve I/I abatement goals.

Flow data was collected and reviewed on a weekly basis for a six month period. The data from the meters was correlated with data from the rain gauge and SSO discharge/bypass data. Dry weather flows within each metered area were determined from the collected flow data. Infiltration for each area was calculated as the average dry weather flow in excess of water usage within that area (generally equal to about 80 gallons per capita per day). Utilizing the same analysis procedures that were accepted by NYSDEC on the City's previous I/I studies, inflow for a one-year peak storm event (0.4 inches per hour) was determined. As depicted in Figure 3, this was accomplished by adjusting the metered peak flows to account for SSO discharges that may have occurred, plotting the peak wet weather flow as a function of rainfall intensity, and developing a best-fit line to predict the relationship between rainfall intensity and peak flow by sewer sub-basin.

Figure 3
Example of Peak Flow Determination



The I/I data for each subarea was compared to peak flow data at a 0.4 inch per hour intensity storm prior to rehabilitation. The pre- and post-rehabilitation peak flow data was used to estimate the amount of extraneous flow that has been abated through rehabilitation efforts.

2.2 RESULTS

Tables 2.2 through 2.4 present a comparison between pre- and post-rehabilitation peak flows by Subarea, and the estimated percent peak flow reduction since the implementation of sewer system improvements. Appendix B contains detailed documentation of the wet and dry weather flow calculations for each subarea.

Table 2.2
MH-1 Area Peak Flow Reduction Summary

		Pre-Rehabilitation Peak I/I Estimated 0.4 inches/hour Rainfall			2003 Post Rehabilitation I/I Estimates				
Metered Subarea		Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea		2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, Q, GPM	Peak Hourly Rainfall Intensity, i, inches/hour	Total Rainfall, inches	Date of Rainfall
MH-1 Area									
C	1	0.50	348	509	90	83	0.22	0.46	4/6/2003
	2	0.23	161			85	0.22	0.55	5/2/2003
						44	0.37	0.37	5/6/2003
						133	0.79	0.80	5/11/2003
						99	0.34	0.58	5/20/2003
						97	0.79	1.57	7/10/2003
B	3	0.43	301	1,109	958	954	0.22	0.46	4/6/2003
	4	0.38	266			899	0.22	0.55	5/2/2003
	5	0.29	203			882	0.37	0.37	5/6/2003
	6	0.29	201			1024	0.79	0.80	5/11/2003
	7	0.20	139			nd	0.34	0.58	5/20/2003
						nd	0.79	1.57	7/10/2003
A	8	0.56	390	751	419	386	0.22	0.46	4/6/2003
	9	0.52	361			387	0.22	0.55	5/2/2003
						415	0.37	0.37	5/6/2003
						455	0.79	0.80	5/11/2003
						nd	0.34	0.58	5/20/2003
						nd	0.79	1.57	7/10/2003
Total MH-1 Area					956	1108	0.41	0.54	7/15/2003
						804	0.41	0.70	7/21/2003
		3.41	2,369	2,369	1,468				

2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	A	B	C	MH-1 Area at Mang St. East of 88th	MH-1 Area I/I Reduction 2001 to 2003:
Average DWF, mgd	0.18	0.18	0.10	0.47	901 gpm 1.30 mgd 38 percent
I/I at 0.4 inches/hour, mgd	0.60	1.38	0.13	2.11	
Estimated Peak Flow, mgd	0.79	1.56	0.24	2.58	
Ratio of WWF:DWF	4.3	8.7	2.2	5.5	

Note: None of the 2003 wet weather events included in this study/analysis resulted in SSOs in the MH-1 Area.

Table 2.3
MH-4 Area Peak Flow Reduction Summary

		Pre-Rehabilitation Peak I/I Estimated @ 0.4 inches per hour Rainfall			2003 Post Rehabilitation I/I Estimates				
Metered Subarea		Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea		2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, GPM	Peak Hourly Rainfall Intensity, inches/hour	Total Rainfall, inches	Date of Rainfall
MH-4 Area									
D	4	1.39	965		382	276	0.22	0.46	4/6/2003
						280	0.22	0.55	5/2/2003
						326	0.37	0.37	5/6/2003
						623	0.79	0.80	5/11/2003
						308	0.34	0.58	5/20/2003
						562	0.79	1.57	7/10/2003
						369	0.41	0.54	7/15/2003
						308	0.41	0.70	7/21/2003
E	1 2,3,7 5	0.43 0.35 0.50	299 243 347	889	640	531	0.22	0.46	4/6/2003
						688	0.22	0.55	5/2/2003
						570	0.37	0.37	5/6/2003
						925	0.79	0.80	5/11/2003
						651	0.34	0.58	5/20/2003
						790	0.79	1.57	7/10/2003
						572	0.41	0.54	7/15/2003
						386	0.41	0.70	7/21/2003
F	8	0.77	535		309	217	0.22	0.46	4/6/2003
						261	0.22	0.55	5/2/2003
						109	0.37	0.37	5/6/2003
						750	0.79	0.80	5/11/2003
						451	0.34	0.58	5/20/2003
						354	0.79	1.57	7/10/2003
						198	0.41	0.54	7/15/2003
						128	0.41	0.70	7/21/2003
G	6a 6b	1.02 0.79	708 549	1,257	308	162	0.22	0.46	4/6/2003
						190	0.22	0.55	5/2/2003
						214	0.37	0.37	5/6/2003
						388	0.79	0.80	5/11/2003
						298	0.34	0.58	5/20/2003
						546	0.79	1.57	7/10/2003
						315	0.41	0.54	7/15/2003
						348	0.41	0.70	7/21/2003
Total MH-4		2.05	1,424	3,646	1,640				

2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	D	E	F	G	MH-4 Area at Girard Ave. West of 73rd	MH-4 Area I/I Reduction 2001 to 2003:
Average DWF, mgd	0.15	0.20	0.13	0.13	0.61	
I/I at 0.4 inches/hour, mgd	0.55	0.92	0.45	0.44	2.36	2,006 gpm
Estimated Peak Flow, mgd	0.70	1.12	0.58	0.57	2.97	2.89 mgd
Ratio of WWF:DWF	4.7	5.6	4.4	4.4	4.9	55 percent

Note: The wet weather events shown in BOLD contributed to SSOs in the MH-4 Area on the dates noted.

Table 2.4
MH-6 Area Peak Flow Reduction Summary

		Pre-Rehabilitation Peak I/I Estimated 0.4 inches/hour Rainfall		2003 Post Rehabilitation I/I Estimates				
Metered Subarea		Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea	2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, GPM	Peak Hourly Rainfall Intensity, inches/hour	Total Rainfall, inches	Date of Rainfall
MH-6 Area								
H	1	0.47	326	138	119	0.22	0.46	4/6/2003
	2				157	0.22	0.55	5/2/2003
	3				128	0.37	0.37	5/6/2003
	4				167	0.79	0.80	5/11/2003
					65	0.34	0.58	5/20/2003
					139	0.79	1.57	7/10/2003
					186	0.41	0.54	7/15/2003
					143	0.41	0.7	7/21/2003
I	Cayuga Island	0.84	585	1,235	766	0.22	0.46	4/6/2003
	6	0.15	101		1007	0.22	0.55	5/2/2003
	7	0.20	136		1076	0.37	0.37	5/6/2003
	12	0.04	25		1780	0.79	0.80	5/11/2003
	5,11	0.54	376		1418	0.34	0.58	5/20/2003
	8,9,10	0.44	303		1506	0.79	1.57	7/10/2003
					1133	0.41	0.54	7/15/2003
					1176	0.41	0.7	7/21/2003
Total MH-6 Area w/ Cayuga Island		2.67	1,853	1,853	1,373			

2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	H	I	MH-6 Area 66th South of Frontier Ave.	MH-6 Area I/I Reduction 2001 to 2003:
Average DWF, mgd	0.20	0.81	1.01	480 gpm 0.69 mgd 26 percent
I/I at 0.4 inches/hour, mgd	0.20	1.78	1.98	
Estimated Peak Flow, mgd	0.40	2.59	2.99	
Ratio of WWF:DWF	2.0	3.2	3.0	

Note: None of the wet weather events included in this study/analysis resulted in SSOs in the MH-6 Area.

2.3 CONCLUSIONS

Post rehabilitation peak flow reductions ranged from 26 to 55 percent across the MH-1, MH-4 and MH-6 Areas. The peak flow reductions confirm the progress that was demonstrated by the substantial reductions in bypass pumping hours.

In order to facilitate the NFWB plan for ongoing sewer assessment, I/I removal and prioritization of maintenance activities, data points and metrics were established for the subareas as follows:

- Presence of historical SSOs in subarea/system component
- Presence of 2003 SSOs in subarea (If yes, tributary area is a priority for I/I mitigation)
- Trunk sewer diameter/trunk sewer or pump station capacity, mgd
- 2003 peak flow estimate (@ 0.4 inches per hour rainfall), mgd
- Ratio of peak flow to full flow system capacity (assuming clean sewers without surcharge)
- 2003 WWF:DFW ratio

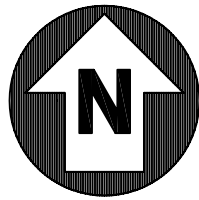
The nine subareas were prioritized for I/I abatement and capacity enhancements according to the following criteria:

- ratio of wet weather flow to dry weather flow; and
- the ability of the collection system to convey peak flows based on the analysis of flow monitoring data and bypass records.

The subarea prioritization is showed in Table 2.5.

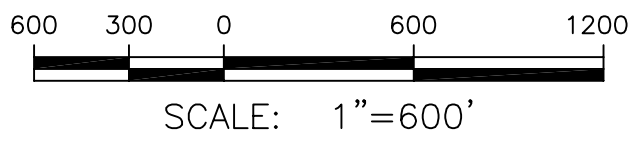
Table 2.5
Subarea Prioritization and Key Metrics


Area	Subarea	Ratio of WWF:DFW	Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	Priority Based on SSOs and Subsystem Capacity	Subarea Ranking	Weighting Factor
MH-1	B	8.7	1.38	High	1	9
MH-4	E	5.9	0.98	High	2	8
MH-4	D	4.2	0.48	Medium	3	7
MH-4	G	4.5	0.46	Medium	4	6
MH-1	A	4.3	0.60	Low	5	5
MH-6	I	3.2	1.78	Low	6	4
MH-4	F	4.6	0.46	Low	7	3
MH-1	C	2.2	0.13	Low	8	2
MH-6	H	2.0	0.20	Low	9	1



MAP LEGEND

- SANITARY SEWER LINE
- SEWER SUBAREA BOUNDARIES (1999)
- SEWER SUBAREA BOUNDARIES (2003)



NIAGARA FALLS WATER BOARD LASALLE AREA SEWER MAP		SANTARY SEWER SYSTEM AND SUBAREA DELINEATION MAP		FIGURE 2	REV. A
		 180 LAWRENCE BELL DRIVE, SUITE 104 WILLIAMSVILLE, NY 14221 PHONE (716) 633-7194 FAX (716) 633-7195		Issue Certification NOT FOR BIDDING OR CONSTRUCTION	
Job No. 743180		Designed X		Date	
Drawn MAB		Checked X		Rev	
Reviewed X		Approved X		Date	
Reg. No. X		ISSUED FOR REVIEW		By	
A		X		Description	

SECTION 3

TECHNICALLY AND ECONOMICALLY FEASIBLE MEASURES FOR SSO MITIGATION

3.1 I/I REDUCTION POTENTIAL

An SSO mitigation analysis was conducted for each of the nine sub-areas to identify maintenance and rehabilitation measures to mitigate I/I that directly contributes to SSOs, restore system capacity, and address significant structural defects noted during previous field investigations. Recommended rehabilitation, sewer cleaning and root control measures were evaluated individually to estimate their effectiveness in reducing the peak flow and enhancing the capacity of the existing system. An estimate of the potential peak flow reduction (in gallons per minute) associated with each type of recommended rehabilitation or maintenance measure was developed. Peak flows; as quantified in the 2003 flow monitoring and analysis program; were distributed amongst the identified problem types based on measured flow data, references of I/I by source type, and engineering judgment. Table 3.1 depicts the infrastructure defects types/categories, recommended rehabilitation measures, and assumed effectiveness of the rehabilitation measures in reducing the associated I/I. The significance of the infrastructure defect type on SSOs is also summarized.

An estimate of the peak sewer flow that could be achieved following implementation of an ongoing rehabilitation program was developed, and is documented in Appendix B, Attachment 3. A summary of the analysis is provided in Table 3.2.

The 2003 flow monitoring program and I/I analysis concluded that SSOs can be mitigated through implementation of the rehabilitation and maintenance programs. As shown in Table 3.2, in each of the nine subareas, it is anticipated that the peak flow can be reduced to within the trunk capacity and/or pump station capacity by addressing the identified public property I/I sources and system blockages. However, it should be noted that the implementation costs for SSO reduction shown for Subarea B includes the installation of a larger diameter sewer on Luick Avenue between 93rd Street and Lift Station 4. The need to provide additional conveyance capacity in this pipe segment is unconfirmed at this time, and will depend upon the success of the rehabilitation program in reducing peak flow that is tributary to this sewer.

Table 3.1
Sewer Defect Types and Rehabilitation Effectiveness

<u>I/I Source or Sanitary Sewer Defect Type:</u> <u>Recommended Abatement/Rehabilitation Measure</u>	<u>Impact on SSOs</u>	<u>Assumed Effectiveness of Mitigation Measure at I/I Reduction</u>
<u><i>Suspected Storm Sewer Inflow Source:</i></u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	90%
<u><i>Surface Water Inflow in Low-lying Manholes:</i></u> Manhole Insert Lid	Significant	90%
<u><i>Pipe Capacity Obstructions:</i></u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	60%
<u><i>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</i></u> General Manhole Repairs (Install boots, sealants)	Medium	85%
<u><i>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</i></u> Sectional CIPP Liner	Low	80%
<u><i>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</i></u> Spot CIPP Liner (short liner)	Low	65%
<u><i>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</i></u> Sanitary Sewer Spot Repair/Excavation	Medium	80%
<u><i>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</i></u> Chemical Grout	Low	65%
<u><i>Private Property Sources:</i></u> Defective service laterals, downspouts/foundation drain connections	Medium	NA
Unidentified Sources	NA	NA

Table 3.2
Summary of LaSalle Area SSO Mitigation Analysis

Subarea	Estimated 2003 Peak Flow in Trunk Sewer, mgd	Estimated Peak I/I in Subarea mgd	Maximum Estimated I/I Reduction Achievable through Rehabilitation Program, mgd	Estimated Peak Flow² Following Rehabilitation, mgd	Trunk Sewer or Pump Station Capacity, mgd	Estimated Rehabilitation and Capital Improvements Cost
A	0.79	0.60	0.18	0.61	1.65	\$240,000
B ³	1.56	1.38	1.04	0.52	1.82	\$1,520,000
C	2.23	0.13	0.04	2.19	2.68	\$300,000
D ⁴	0.63	0.58	0.27	0.25	0.71	\$280,000
E	1.82	0.92	0.24	1.58	2.00	\$320,000
F	5.22	0.46	0.23	4.98	5.30	\$430,000
G	2.82	0.46	0.22	2.60	3.20	\$260,000
H	2.99	0.20	0.07	2.92	3.30	\$470,000
I	2.59	1.78	0.41	2.18	2.70	\$880,000
Total Cost for Identified System Improvements⁵						\$4,700,000

1. Peak flow as estimated at 0.4 inches per hour of rainfall in 2003.
2. Assumes no additional flow will be added from new sources or increased flow from existing sources.
3. An estimated 0.5 mgd of I/I is associated with the Luick Avenue sewer, with an associated repair cost of \$505,000.
4. Includes \$60,000 for the Subarea D Private Property Pilot Program
5. Does not include costs for engineering services or completion of MOM components over 18 year program. Total program cost, with engineering and MOM components, is approximately \$6.3 million.

3.2 PRIORITIZATION OF SSO MITIGATION MEASURES

A ranking system was developed to prioritize the SSO mitigation measures on a system-wide basis. Identified rehabilitation/mitigation measures were compiled from the sewer system evaluation reports developed for the MH-1, MH-4 and MH-6 Areas. The NFWB has maintained a list of system improvements, which were referenced against the recommendations in the sanitary sewer evaluation reports. The remaining recommendations were evaluated to determine if new information had been gathered, new analysis methodologies have been developed, or different rehabilitation technologies may apply since the recommendations were established in the original reports. Where appropriate, the previous recommendations were modified to reflect the latest information available with regard to rehabilitation approach or implementation cost.

Weighting factors were assigned to each group of abatement measures, based on the following criteria:

- 1) The ranking of the sub-area where the defect is located with regard to total I/I and presence of SSOs within or downstream of the subarea;
- 2) The cost effectiveness of the mitigation measure in terms of implementation cost per volume of I/I reduced or capacity restored; and
- 3) The impact of the specific defect type and rehabilitation measure on SSOs.

3.3 REHABILITATION COST-EFFECTIVENESS RANKING

Mitigation measures were grouped by type and each subarea. The cost-effectiveness of each group of mitigation measures was calculated as the implementation cost per unit of extraneous flow reduction, as estimated from the flow monitoring and other sources of I/I data for various defect types. For measures related to capacity restoration (sewer cleaning, root removal and treatment, cutting protruding laterals), the cost-effectiveness was calculated as the implementation cost per unit of conveyance capacity restored. The cost-effectiveness of the identified measures was assigned with weighting factors as shown in Table 3.3. The most cost-effective measures have the highest weighting factor of 9, and the least cost-effective measures have the lowest weighting factor of 1.

Table 3.3
Abatement Measure Cost-Effectiveness Ranking

Cost of Implementation per MGD of Extraneous Flow Removed or Capacity Restored		Weighting Factor
<\$5,620/mgd		9
\$5,620 to \$17,780/mgd		8
\$17,780 to \$56,230/mgd		7
\$56,230 to \$177,820/mgd		6
\$177,820 to \$562,340/mgd		5
\$562,340 to \$1,778,280/mgd		4
\$1,778,280 to \$5,623,410/mgd		3
\$5,623,410 to \$ 17,782,790/mgd		2
\$17,782,790/mgd and higher		1

3.4 IMPACT OF SPECIFIC DEFECTS ON SSO REDUCTION

The significance of mitigation measures in reducing SSO was qualitatively ranked as high, medium or low. The guidelines in Table 3.4 were used to rank the defect types.

Table 3.4
Defect Type – Impact on SSO Ranking

Defect Type/Rehabilitation Methods	Significance on SSOs	Weighting Factor
<u>High Volume Inflow Sources, Severely Defective Manholes, and Severe Collection System Capacity Obstructions</u> Sewer cleaning, root treatment, cross-connection investigation and correction, rehabilitation of manholes with severe defects in rim / frame / cone / barrel.	High	9
<u>Defects with Low Volume Inflow, Moderately Defective Manholes and/or Rainfall Induced Infiltration</u> Rehabilitation of manholes with moderate defects in rim / frame / cone / barrel, or spot excavation and repair of broken pipe or pipe sag.	Medium	5
<u>Slightly Defective Manholes and Moderate Collection System Capacity Obstructions</u> Manhole with slight defects in rim / frame / cone / barrel, trenchless pipe lining or chemical grouting of severity 3 or 4 pipe defects, or cutting protruding laterals.	Low	1

3.5 SUMMARY OF SYSTEM-WIDE PRIORITIZED ABATEMENT MEASURES FOR PUBLIC SOURCES

The three weighting factors; Subarea Priority, Abatement Measure Cost Effectiveness and Impact of Defect on SSOs; were added together and a composite factor was assigned to each group of identified abatement measures. The maximum composite weighting factor for a group of mitigation measures was 27 (each factor had a maximum priority rating of 9), and the minimum composite weighting factor was 3. The system-wide list of abatement measures was then ranked based on the composite weighting factor, with the highest factors considered to be the highest priority. The prioritized list of mitigation measures is presented in Table 3.5.

Once the prioritized rehabilitation measures were identified, the measures were organized into a logical sequence for implementation of a rehabilitation plan. The SSO reduction measures are grouped according to implementation year(s)/budget cycles, in such a way that the measures with higher-ranking scores are generally implemented earlier than those with lower-ranking scores and similar types of work are grouped together. Detailed work schedules with specific locations, defect types, rehabilitation measures, and cost are grouped for each subarea and are presented in Appendix C. The

rehabilitation plan was incorporated into the sanitary sewer system Management Plan, presented in Section 4 of this report.

The ranking and prioritization of rehabilitation measures for public I/I sources indicates that the sewer capacity maintenance measures (including cleaning and root treatment) and storm sewer cross-connection elimination measures are of top priority and will be addressed within a short-term implementation period.

Historically, bypass pumping had been necessary at the intersection of 93rd Street and Luick Avenue due to wet weather flows in Subareas A and B exceeding the capacity in the Luick Avenue trunk sewer, east of Lift Station 4. As shown in Table 1.3, bypass pumping at that location had an historical average of about 40 hours per year between 1995 and 2002. Since the NFWB began implementing SSO mitigation measures in the MH-1 Area, bypass pumping at 93rd Street and Luick Avenue has been reduced to 6.8 hours in 2003 (occurring in one event during March 2003). There have been no recorded bypass events during 2004 in the Luick Avenue sewer, which indicates that peak flows are being managed within the system capacity. Since the Luick Avenue sewer upgrade was recommended in 2001, wet weather flows have been reduced within Subareas A and B, which may have eliminated the need to upgrade the sewer.

The estimated cost to upgrade the Luick Avenue sewer is about \$505,000. Depending on the system performance, this expenditure may be more effective at mitigating SSOs if directed to other prioritized rehabilitation measures. Therefore, prior to initiating the sewer upgrade, and following the completion of the higher priority rehabilitation measures that contribute peak flow to the Luick Avenue sewer, the NFWB will monitor peak flow and levels within this sewer segment. If the rehabilitation program is successful in reducing peak flow to within the available capacity of the Luick Avenue sewer, the upgrade of the sewer will not be needed, and available funds can be appropriated in accordance with the rehabilitation work plan.

The conditions of the sanitary sewer will change over time. Therefore, implementation of the rehabilitation program will be reassessed every five years to establish priorities and confirm the appropriateness of identified abatement measures.

Table 3.5
Niagara Falls Water Board
Prioritized System-Wide SSO Reduction Measures

SSO Mitigation Measure Reference			Subarea Ranking			Cost Ranking			SSO Impact Ranking		System-wide Prioritization	
Detailed Work Breakdown Reference Table No.	Problem Type/ Rehabilitation Method	Estimated Capacity Restored and/or I/I Reduced (mgd)	Name	I/I Rank	Weighting Factor	Cost	Unit Cost (\$/mgd)	Weighting Factor	Significance to SSO Reduction	Weighting Factor	Composite Factor	Priority Rank
B-6	Sewer Cleaning	0.180	B	1	9	\$1,997	\$11,094	8	High	9	26	1
B-7	Root Treatment	0.018	B	1	9	\$9,738	\$541,000	5	High	9	23	2
B-9	Cross-connection	0.290	B	1	9	\$110,000	\$378,918	5	High	9	23	3
B-11	Luick Sewer Upgrade	0.450	B	1	9	\$504,150	\$1,120,333	4	High	9	22	4
E-9	Cross-connection	0.142	E	2	8	\$40,000	\$281,690	5	High	9	22	5
E-6	Sewer Cleaning	0.030	E	2	8	\$12,290	\$409,667	5	High	9	22	6
D-6	Sewer Cleaning	0.060	D	3	7	\$4,300	\$71,667	6	High	9	22	7
D-9	Cross-connection	0.104	D	3	7	\$40,000	\$383,509	5	High	9	21	8
A-6	Sewer Cleaning	0.016	A	5	5	\$1,021	\$63,025	6	High	9	20	9
A-7	Root Treatment	0.049	A	5	5	\$4,738	\$96,301	6	High	9	20	10
F-6	Sewer Cleaning	0.054	F	7	3	\$588	\$10,889	8	High	9	20	11
G-9	Cross-connection	0.023	G	4	6	\$40,000	\$1,724,138	4	High	9	19	12
A-9	Cross-connection	0.064	A	5	5	\$20,000	\$312,989	5	High	9	19	13
G-6	Sewer Cleaning	0.004	G	4	6	\$23,160	\$5,790,000	2	High	9	17	14
I-6	Sewer Cleaning	0.003	I	6	4	\$4,358	\$1,452,667	4	High	9	17	15
C-6	Sewer Cleaning	0.008	C	8	2	\$922	\$109,762	6	High	9	17	16
B-4	Spot Excavation & Repair	0.018	B	1	9	\$193,900	\$10,538,043	2	Medium	5	16	17
I-7	Root Treatment	0.009	I	6	4	\$17,199	\$1,911,000	3	High	9	16	18
B-5	Grout Pipe	0.026	B	1	9	\$11,500	\$442,308	5	Low	1	15	19
C-7	Root Treatment	0.008	C	8	2	\$14,362	\$1,709,762	4	High	9	15	20
B-1	Manhole Rehabilitation	0.105	B	1	9	\$194,922	\$1,848,478	3	Low	1	13	21
B-8	Cut Protruding Laterals	0.004	B	1	9	\$8,000	\$1,904,762	3	Low	1	13	22
B-11	Love Canal Sewer Rehab	0.093	B	1	9	\$350,000	\$3,779,698	3	Low	1	13	23
C-9	Cross-connection	0.003	C	8	2	\$30,000	\$12,000,000	2	High	9	13	24
B-2	Spot CIPP	0.014	B	1	9	\$136,100	\$9,970,696	2	Low	1	12	25
E-3	Sectional CIPP	0.018	E	2	8	\$79,750	\$4,334,239	3	Low	1	12	26
A-4	Spot Excavation & Repair	0.011	A	5	5	\$117,400	\$10,482,143	2	Medium	5	12	27
I-4	Spot Excavation & Repair	0.154	I	6	4	\$790,000	\$5,143,229	3	Medium	5	12	28
F-4	Spot Excavation & Repair	0.073	F	7	3	\$120,000	\$1,643,836	4	Medium	5	12	29
H-6	Sewer Cleaning	0.001	H	9	1	\$6,042	\$10,070,000	2	High	9	12	30
H-7	Root Treatment	0.001	H	9	1	\$10,080	\$16,800,000	2	High	9	12	31
H-8	Cut Protruding Laterals	0.001	H	9	1	\$6,000	\$10,000,000	2	High	9	12	32

Table 3.5
Niagara Falls Water Board
Prioritized System-Wide SSO Reduction Measures

SSO Mitigation Measure Reference			Subarea Ranking			Cost Ranking			SSO Impact Ranking		System-wide Prioritization	
Detailed Work Breakdown Reference Table No.	Problem Type/ Rehabilitation Method	Estimated Capacity Restored and/or I/I Reduced (mgd)	Name	I/I Rank	Weighting Factor	Cost	Unit Cost (\$/mgd)	Weighting Factor	Significance to SSO Reduction	Weighting Factor	Composite Factor	Priority Rank
E-5	Grout Pipe	0.002	E	2	8	\$11,500	\$5,897,436	2	Low	1	11	33
E-2	Spot CIPP	0.015	E	2	8	\$174,800	\$11,692,308	2	Low	1	11	34
D-2	Spot CIPP	0.022	D	3	7	\$103,200	\$4,739,380	3	Low	1	11	35
D-3	Sectional CIPP	0.027	D	3	7	\$66,215	\$2,470,709	3	Low	1	11	36
G-2	Spot CIPP	0.059	G	4	6	\$101,000	\$1,726,496	4	Low	1	11	37
G-3	Sectional CIPP	0.128	G	4	6	\$90,250	\$705,078	4	Low	1	11	38
A-5	Grout Pipe	0.005	A	5	5	\$2,300	\$442,308	5	Low	1	11	39
I-5	Grout Pipe	0.062	I	6	4	\$6,900	\$111,741	6	Low	1	11	40
E-1	Manhole Rehabilitation	0.000	E	2	8	\$4,800	\$240,000,000	1	Low	1	10	41
D-5	Grout Pipe	0.001	D	3	7	\$4,600	\$7,076,923	2	Low	1	10	42
A-1	Manhole Rehabilitation	0.024	A	5	5	\$34,260	\$1,401,227	4	Low	1	10	43
D-1	Manhole Rehabilitation	0.000	D	3	7	\$600	\$300,000,000	1	Low	1	9	44
G-1	Manhole Rehabilitation	0.000	G	4	6	\$1,800	\$180,000,000	1	Low	1	8	45
A-2	Spot CIPP	0.006	A	5	5	\$54,400	\$9,299,145	2	Low	1	8	46
A-8	Cut Protruding Laterals	0.002	A	5	5	\$10,000	\$6,666,667	2	Low	1	8	47
F-3	Sectional CIPP	0.060	F	7	3	\$93,780	\$1,563,000	4	Low	1	8	48
C-5	Grout Pipe	0.016	C	8	2	\$6,900	\$442,308	5	Low	1	8	49
C-4	Spot Excavation & Repair	0.001	C	8	2	\$140,432	\$100,308,571	1	Medium	5	8	50
H-4	Spot Excavation & Repair	0.032	H	9	1	\$270,000	\$8,437,500	2	Medium	5	8	51
F-2	Spot CIPP	0.049	F	7	3	\$206,950	\$4,245,128	3	Low	1	7	52
I-2	Spot CIPP	0.002	I	6	4	\$38,000	\$19,487,179	1	Low	1	6	53
I-8	Cut Protruding Laterals	0.001	I	6	4	\$18,000	\$18,000,000	1	Low	1	6	54
H-5	Grout Pipe	0.015	H	9	1	\$11,700	\$782,609	4	Low	1	6	55
F-1	Manhole Rehabilitation	0.000	F	7	3	\$1,200	\$120,000,000	1	Low	1	5	56
C-1	Manhole Rehabilitation	0.002	C	8	2	\$30,642	\$17,023,333	2	Low	1	5	57
C-2	Spot CIPP	0.004	C	8	2	\$70,700	\$18,128,205	1	Low	1	4	58
H-2	Spot CIPP	0.023	H	9	1	\$167,400	\$7,358,242	2	Low	1	4	59

3.6 PRIVATE PROPERTY I/I MITIGATION

Subarea D (the subarea tributary to Lindberg Avenue, west of 81st Street) has historically experienced high wet weather flows which have contributed to bypass pumping. Smoke testing conducted during the 1999 I/I investigation identified several locations where smoke entered the storm sewers when injected into the sanitary sewers, indicating the presence of I/I sources in the subarea. A follow-up interconnection investigation was conducted in the summer of 2002 in an attempt to pinpoint the nature and location of the I/I sources. Smoke testing, in conjunction with CCTV inspection, was conducted in areas where potential interconnections were believed to exist. Several locations that were investigated within Subarea D produced inconclusive results as to the exact nature and location of the I/I source. In June of 2003 additional field work was conducted with a specialized CCTV camera to investigate suspected defective service laterals. In the fall of 2003 a short four (4) week flow monitoring program was conducted to monitor individual sewers in Subarea D, at the point of discharge into the Lindbergh Avenue collector sewer. High wet weather flows were identified on 77th Street north and south of Lindbergh Avenue and on 80th Street north of Lindbergh Avenue, which was consistent with the results of the prior field investigations indicating the presence of defects. Wet weather surcharging was observed on 80th Street north of Lindbergh.

The data obtained to date indicate that a combination of residential service lateral defects, storm sewer defects and potential uninspected private property roof drains and/or sump pump connections are the primary sources of the remaining I/I in Subarea D. Due to the difficult and sensitive nature of mitigating the private property I/I sources, it is proposed that a very focused investigation be conducted of the sewers along 77th and 80th Streets. The purpose of the proposed investigation on these two streets is to identify connected downspouts, catch basins or other public or private property defects that may not have been revealed during the initial investigation, and to collect data for use in evaluating a program to address defective service laterals.

The private property I/I investigation in Subarea D will serve as a pilot program, providing information for NFWB to assess the issues, implementation process and system performance benefits of addressing private property I/I. The private property I/I pilot program planned for this subarea includes five components: 1) cleaning the storm sewers on 77th and 80th Streets, 2) smoke testing the entire Subarea D to identify potential defective residential and catch basin laterals, 3) dye testing roof leaders at the school on 77th Street, 4) dye testing catch basins on 77th and 80th Streets that are either identified during smoke testing as being suspect or listed as potential cross-connections in Appendix C, Table D-9, and 5) evaluating potential funding sources and program mechanisms to facilitate residential lateral rehabilitation. The cost for completing this pilot program, as outlined, is included in the sanitary sewer system Management Plan presented in Section 4 of this report.

SECTION 4

SANITARY SEWER SYSTEM MANAGEMENT PLAN

4.1 INTRODUCTION

Parsons was retained by the NFWB to conduct a readiness review of their wastewater collection system management, operations and maintenance programs. This was due in part to comply with the NFWB SPDES Discharge Permit (NY 0026336). The readiness review consisted of reviewing all documentation related to the management, operation and maintenance (MOM) of the wastewater collection system, conducting interviews with staff, and conducting field observations of current work practices. The outcome of the readiness review was a comprehensive management plan that will establish programs for continual assessment of the sanitary sewer system, flow monitoring, I/I removal, correction and maintenance, and help NFWB manage their utility more efficiently. The NFWB is setting goals to enhance its ongoing program for the proper management, operation and maintenance of its sewer system to ensure compliance with the requirements of the SPDES Discharge Permit, and future potential regulations. The NFWB is expending a great deal of effort and resources to make improvements to its management, operation and maintenance programs. These program enhancements are being developed with consideration to establish a self-perpetuating structure of sound practices that will result in the best practical operation of the system into the future.

This Management Plan is presented to the NYSDEC for continuation of the sewer system assessment, flow monitoring, I/I removal, and maintenance with the goal of eliminating bypass to the maximum extent possible. The plan includes an implementation schedule, the development of programs for implementation, the development of Standard Operating Procedures (SOPs), and any continuing work that will be conducted in conjunction with identified BMPs (refer to Appendix D).

4.2 MANAGEMENT PLAN DEVELOPMENT

One of the first steps undertaken as part of the Management Plan development was to perform a Readiness Review. During this phase, relevant NFWB documents were collected and reviewed, staff interviews were conducted, and crews were observed performing typical work duties. Based on what was read, heard and observed, Parsons' experienced collection system experts worked with NFWB to identify potential areas of improvement ("gaps" from best practices) to facilitate compliance with the SPDES Discharge Permit. The Management Plan development process and findings are described below.

4.2.1 Records Review

Strategic documents, system evaluation reports, standard procedures, and a representative sample of records, reports, service requests and work orders were reviewed. These were evaluated to determine the degree to which they describe and

document current practices. Additionally, the records review process provided an understanding of NFWB policies and procedures, against which staff interviews and field observations were compared to determine if they are consistently followed.

4.2.2 Staff Interviews

The consultant conducted a series of confidential interviews. The purpose of these interviews was to develop a general understanding of the management philosophy and the current strategic goals for customer service, regulatory compliance and workflow protocols. The interviews were also conducted to assess the current state of management, operations and maintenance programs; the use of Information Systems (IS); and inter-sectional coordination communications. Continual discussions with staff members throughout the process provided additional information on the current state of NFWB and where improvements could be realized.

Although the majority of the interviews focused on management, operations and maintenance issues, which is the primary responsibility of NFWB's Sewer Collection System Maintenance, additional interviews were conducted with representatives from all departments that interface with the NFWB Department of Wastewater Facilities. While only a small sampling of employees could be interviewed, it is understood that each employee has a key role in the successful compliance with the SPDES Discharge Permit.

Staff members representing the following sections/functioning units were interviewed:

- Wastewater Facilities
- Wastewater Collection System Maintenance
- Engineering

4.2.3 Field Observations

Observations of field and on-site activities (work practices) were undertaken to assess whether the field procedures are consistent with the NFWB's established policies and practices, and to validate what was heard during the interview process. These observations also helped to provide immediate feedback to the crews for improvements that would facilitate SPDES compliance.

The major emphasis of the records review, staff interviews and field observations conducted as part of the readiness review process was to focus on the underlying causes of SSOs and the current management, operations and maintenance practices that can be improved to minimize or eliminate SSOs, and water in basement (WIBs) occurrences.

4.3 MANAGEMENT PLAN

The Management Plan is intended to describe the means and methods the utility has in place to ensure complete execution of a management, operations and maintenance program. This is the general description of the Management Plan and is derived from the pending EPA CMOM regulations.

The Management Plan must outline the goals of the MOM Program, the organizational structure to manage it, the legal authority to control I/I, design criteria,

benchmarking data and performance measures to attain the goals. A significant effort associated with the Management Plan implementation will be the development of programs that provide for planned inspections, tracking of collection system asset condition to enable early recognition of system problems, maintenance and expansions or major rehabilitation necessary to avoid capacity limitations. In addition, the Plan will incorporate the specific requirements of the BMPs for SSOs.

There are two objectives the Management Plan must satisfy. First, it must satisfy the requirements stated in the SPDES Discharge Permit signed by the State of New York on April 23, 2003. Second, it must serve to achieve the larger MOM goals that NFWB has established. The information in this Plan is structured such that NFWB will be able to clearly identify which elements apply directly to satisfying the SPDES Discharge Permit and, at the same time, comply with forthcoming federal regulations concerning SSOs. In addition, a reasonable schedule will be established and the importance of requirements on the compliance strategy schedule.

4.3.1 Goals and Objectives of the NFWB MOM Program

To help facilitate developing goals and objectives, a set of definitions was established. An **objective** is an outcome that is aimed at or strived for. A **goal** is the specific degree of satisfaction of a given objective, that is, the “bar” or target measure of an objective. A properly stated goal should address the following questions:

- What objective will be achieved?
- What will be done?
- To what degree will it be done?
- By when will it be achieved

The Management Plan documents the goals of the program; however, these will not be final goals. Being true to the MOM cycle, the goals will be periodically reviewed to confirm whether updates are necessary with respect to customer service, regulatory requirements, financial considerations and availability of resources.

A major objective of the NFWB will be to mitigate SSOs through implementation of the rehabilitation and MOM programs. The rehabilitation and MOM program goals include providing the highest level of customer service at the most reasonable cost; improving operational efficiency; avoiding preventable failures; prioritizing MOM compliance activities; and inspecting the structural integrity of the wastewater collection system.

4.3.2 Organizational Structure to Implement the Plan

A fully implemented Plan will require participation at all levels of the utility. The amount of involvement will range from individuals dedicated to the program to those that are only peripherally or occasionally involved. The strategy for satisfying this objective considers whether the existing NFWB organization structure is conducive to achieving compliance, and if not, what changes are warranted for effective deployment to satisfy the SPDES Discharge Permit. Measures of compliance have been evaluated and administrative, management, operations and maintenance staff are clearly identified and

lines of authority and chains of communication are delineated for planned and unplanned (emergency) events. A resource evaluation is currently being undertaken to determine the most efficient allocation of existing staff to achieve the overall goals of the NFWB. The results of the evaluation are expected to be available in September 2004. The evaluation will include recommendations to modify the current staffing plan as appropriate, as well as an implementation plan for the proposed staffing modifications. It is important to note that the maintenance staff who are responsible for execution of significant elements of MOM programs for the sanitary sewer system also have similar responsibilities for the storm sewers and the combined sewer areas and within the City of Niagara Falls. Therefore, the staffing plan and development of programs under this Sanitary Sewer Management Plan will be done in consideration of the full realm of responsibilities of the maintenance personnel.

4.3.3 Legal Authority to Control I/I

The legal authorities are provided through NFWB Part 1960 Wastewater Regulations, Section 1960.4 Use of Water Board POTW (b)(3).

4.3.4 Design Criteria

NFWB utilizes established standards and specifications for constructing, inspecting and testing of sewers and appurtenances. There is an agreement between the NFWB and the City of Niagara Falls for the City's Engineering Department to provide ongoing engineering and construction administration services for sewer design and repair. The City is currently providing such services to NFWB, utilizing their standard specifications and engineering practices, which have also been adopted by NFWB for new sewer construction and repair work.

4.3.5 Performance Measures to Determine Goal Attainment

A critical aspect of implementing the Management Plan is establishing performance measures that are aligned with the goals and objectives of each MOM program. Properly worded objectives can be supported by measurable goals, with each goal constructed so that performance measures can be linked to them.

Beyond the provision of establishing adequate capacity, NFWB is taking all feasible steps to mitigate the impact of SSOs and WIBs in the system. This involves evaluating the current work process and establishing standard operating procedures for system analysis, repair and maintenance. A key element of this is improved record keeping that will help in prioritizing maintenance work, monitoring improvements as well as providing a database for further system analysis and improvement.

4.4 PROGRAM DEVELOPMENT

The NFWB has a number of existing programs and plans under development that will be implemented to satisfy SPDES Permit requirements. One such program is the prioritization of areas for cleaning, televising and rehabilitation. During the three years the "Detailed I/I Investigation Program" took place, 80% of the sanitary sewer system was televised, and many defects of various degrees were identified and documented. A rehabilitation program has been recommended to address these defects on an ongoing

basis. Updated mapping of the sanitary sewer system has been developed, and compiled in AutoCad format to facilitate the ongoing MOM programs.

In addition, NFWB staff are in the process of developing a written Emergency Overflow Response Plan. The plan will include such topics as authority, general overflow response procedures, public advisory procedures, notification plan, media notification procedure, and distribution and maintenance of EORP. An important part of this program will be providing notification to parties with a reasonable potential for exposure to pollutants associated with an overflow event. The NFWB's plan for providing adequate public notification is set forth in the EORP. The NFWB has been providing quarterly notices in the Niagara Gazette, cautioning the public about SSOs. As an example, Appendix D includes a copy of December 2003 a public notice regarding SSOs and CSOs.

However, there are a number of programs that need to be developed or updated in order to meet the SPDES Permit requirements and the overall objectives of the MOM Plan. The programs to be developed and implemented under this Management Plan are described below. These programs will include written documentation of the specific program objectives, measurable performance goals, and documentation of the process by which the program will be executed.

- Inspection Program. This program will include procedures and forms for implemented programmatic collection system inspections and condition assessment. The program will be linked to prioritization and documentation of maintenance activities.
- Program for Prioritizing/Documenting Sewer Cleaning & CCTV Inspections. This program will provide for ongoing CCTV assessment of the sewer system. The program will focus on televising areas that had minor defects identified during the previous I/I investigations to monitor and reassess the pipe condition. Newly identified problem areas will also be included in the program.
- SOPs for All Work Practices. This program will document the work practices related to O&M, facilitate staff training, and provide for effective maintenance and operations.
- Root Removal and Treatment Program. This program will establish a process for prioritization, execution and documentation of root control activities.
- Rehabilitation Program. Prioritized rehabilitation work is outlined in Table 3.5 and forms the basis for the sanitary sewer rehabilitation program. The rehabilitation work conducted under this program will be documented by NFWB.
- Private Property I/I Removal Pilot Program (Subarea D). The private property I/I pilot program will focus on wet weather flows in Subarea D, as described in Section 3.6 of this report. The program will include detection and elimination of illicit connections, as well as evaluating alternative funding sources and methods to address residential lateral defects with I/I.

- Updating Intermunicipal Agreements. Agreements with satellite collection systems owners contributing flow to the NFWB sanitary sewers will be updated to strengthen provisions for enforcing I/I control.
- Annual SSO Data Evaluation and Problem Area Analysis. This program will include evaluation of SSO occurrences (location, volume, bypass pumping hours, probable cause, etc.) to document and analyze trends in SSOs. The SSO analysis program will provide input to other O&M programs, and documentation on the system performance.

The proposed development and implementation schedule for each of the Management Plan elements is provided in Table 4.1. The schedule represents a reasonable timeframe, taking into consideration that wastewater personnel work in both the sanitary and combined systems, and storm sewers. Table 4.2 includes a detailed breakdown of the anticipated work to be completed each year, including rehabilitation program projects and development of MOM program components. Reassessment of the rehabilitation priorities and recommendations on a five year cycle has also been included in the Management Plan, as outlined in Table 4.2, to document progress made during program implementation and also to ensure that projects and limited available funds are focused on priority areas, as these may change during program implementation.

This plan when fully implemented will provide for continuous assessment of the wastewater collection system for the NFWB.

Table 4.1
Niagara Falls Water Board
Sanitary Sewer System Management Plan
Schedule of Activities


Collection System Management Plan Program Development and Implementation Schedule	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
	J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	1Q 2Q 3Q 4Q	1Q 2Q 3Q 4Q	1Q 2Q 3Q 4Q	1Q 2Q 3Q 4Q
Competitive Assessment/Resource Plan							
Inspection Program							
Program for Prioritizing/Documenting Sewer Cleaning & CCTV Inspections							
Develop SOPs for All Work Practices							
Root Removal and Treatment Program							
Rehabilitation Program	Ongoing rehabilitation program with re-assessment every five years 						
Develop Private Property I/I Removal Pilot Program (Subarea D)							
Update Intermunicipal Agreements							
Annual SSO Data and Problem Area Analysis							

Table 4.2
Niagara Falls Water Board
Detailed Work Plan

SSO Mitigation Measure Reference			Subarea Ranking			Cost Ranking		SSO Impact Ranking		System-wide Prioritization		Cummulative Estimated Cost of Abatement Measures	Implementation Year w/ Anticipated Annual Funding Level of \$330,000
Detailed Work Breakdown Reference Table No.	Problem Type/ Rehabilitation Method	Estimated Capacity Restored and/or I/I Reduced (mgd)	Name	I/I Rank	Subarea Weighting Factor	Cost	Weighting Factor	Significance of Mitigation Measures to SSO Reduction	Weighting Factor	Composite Factor	Priority Rank		
B-6	Sewer Cleaning	0.180	B	1	9	\$1,997	8	High	9	26	1	\$1,997	Year 1
D-6	Sewer Cleaning	0.060	D	3	7	\$4,300	6	High	9	22	7	\$6,297	
E-6	Sewer Cleaning	0.030	E	2	8	\$12,290	5	High	9	22	6	\$18,587	
A-6	Sewer Cleaning	0.016	A	5	5	\$1,021	6	High	9	20	9	\$19,608	
F-6	Sewer Cleaning	0.054	F	7	3	\$588	8	High	9	20	11	\$20,196	
G-6	Sewer Cleaning	0.004	G	4	6	\$23,160	2	High	9	17	14	\$43,356	
C-6	Sewer Cleaning	0.008	C	8	2	\$922	6	High	9	17	16	\$44,278	
I-6	Sewer Cleaning	0.003	I	6	4	\$4,358	4	High	9	17	15	\$48,636	
H-6	Sewer Cleaning	0.001	H	9	1	\$6,042	2	High	9	12	30	\$54,678	
B-7	Root Treatment	0.018	B	1	9	\$9,738	5	High	9	23	2	\$64,416	
A-7	Root Treatment	0.049	A	5	5	\$4,738	6	High	9	20	10	\$69,154	
I-7	Root Treatment	0.009	I	6	4	\$17,199	3	High	9	16	18	\$86,353	
C-7	Root Treatment	0.008	C	8	2	\$14,362	4	High	9	15	20	\$100,715	
H-7	Root Treatment	0.001	H	9	1	\$10,080	2	High	9	12	31	\$110,795	
B-4	Spot Excavation & Repair (90th)	0.018	B	1	9	\$20,100	2	Medium	5	16	17	\$130,895	
A-8	Cut Protruding Laterals	0.002	A	5	5	\$10,000	2	Low	1	8	47	\$140,895	
B-8	Cut Protruding Laterals	0.004	B	1	9	\$8,000	3	Low	1	13	22	\$148,895	
H-8	Cut Protruding Laterals	0.001	H	9	1	\$6,000	2	High	9	12	32	\$154,895	
I-8	Cut Protruding Laterals	0.001	I	6	4	\$18,000	1	Low	1	6	54	\$172,895	
	Engineering					\$25,000						\$197,895	
B-9	Cross-connection	0.290	B	1	9	\$110,000	5	High	9	23	3	\$110,000	Year 2, 3 and 4
A-9	Cross-connection	0.064	A	5	5	\$20,000	5	High	9	19	13	\$130,000	
B-4	Spot Excavation & Repair (remain.)	0.018	B	1	9	\$173,800	2	Medium	5	16	17	\$303,800	
A-4	Spot Excavation & Repair	0.011	A	5	5	\$117,400	2	Medium	5	12	27	\$421,200	
B-2	Spot CIPP	0.014	B	1	9	\$136,100	2	Low	1	12	25	\$557,300	
A-2	Spot CIPP	0.006	A	5	5	\$54,400	2	Low	1	8	46	\$611,700	
B-5	Grout Pipe	0.026	B	1	9	\$11,500	5	Low	1	15	19	\$623,200	
A-5	Grout Pipe	0.005	A	5	5	\$2,300	5	Low	1	11	39	\$625,500	
4.1	MOM Components (SOPs; Inspection, CCTV & Cleaning Programs; IMAs; SSO analysis)					\$150,000						\$775,500	
	Engineering					\$140,000						\$915,500	
Re-evaluation of the need for Luick/Colvin Sewer Upgrade												\$150,000	Year 5

Table 4.2
Niagara Falls Water Board
Detailed Work Plan

SSO Mitigation Measure Reference			Subarea Ranking			Cost Ranking		SSO Impact Ranking		System-wide Prioritization		Cummulative Estimated Cost of Abatement Measures	Implementation Year w/ Anitcipated Annual Funding Level of \$330,000
Detailed Work Breakdown Reference Table No.	Problem Type/ Rehabilitation Method	Estimated Capacity Restored and/or I/I Reduced (mgd)	Name	I/I Rank	Subarea Weighting Factor	Cost	Weighting Factor	Significance of Mitigation Measures to SSO Reduction	Weighting Factor	Composite Factor	Priority Rank		
B-11	Luick Sewer Upgrade	0.450	B	1	9	\$504,150	4	High	9	22	4	\$504,150	Year 6, 7 and 8
D-9	Cross-connection	0.104	D	3	7	\$40,000	5	High	9	21	8	\$544,150	
E-9	Cross-connection	0.142	E	2	8	\$40,000	5	High	9	22	5	\$584,150	
G-9	Cross-connection	0.023	G	4	6	\$40,000	4	High	9	19	12	\$624,150	
C-9	Cross-connection	0.003	C	8	2	\$30,000	2	High	9	13	24	\$654,150	
B-1	Manhole Rehabilitation	0.105	B	1	9	\$194,922	3	Low	1	13	21	\$849,072	
A-1	Manhole Rehabilitation	0.024	A	5	5	\$34,260	4	Low	1	10	43	\$883,332	
4.1	Private Property Pilot Program					\$60,000						\$943,332	
	Engineering					\$200,000						\$1,143,332	
I-4	Spot Excavation & Repair	0.154	I	6	4	\$790,000	3	Medium	5	12	28	\$790,000	Year 9 and 10
	Engineering					\$180,000						\$970,000	
Re-evaluation of the need for Love Canal Sewer Rehabilitation												\$175,000	Year 11
B-11	Love Canal Sewer Rehab	0.093	B	1	9	\$350,000	3	Low	1	13	23	\$350,000	Year 12,13 and 14
F-4	Spot Excavation & Repair	0.073	F	7	3	\$120,000	4	Medium	5	12	29	\$470,000	
C-4	Spot Excavation & Repair	0.001	C	8	2	\$140,432	1	Medium	5	8	50	\$610,432	
H-4	Spot Excavation & Repair	0.032	H	9	1	\$270,000	2	Medium	5	8	51	\$880,432	
C-1	Manhole Rehabilitation	0.002	C	8	2	\$30,642	2	Low	1	5	57	\$911,074	
D-1	Manhole Rehabilitation	0.000	D	3	7	\$600	1	Low	1	9	44	\$911,674	
E-1	Manhole Rehabilitation	0.000	E	2	8	\$4,800	1	Low	1	10	41	\$916,474	
F-1	Manhole Rehabilitation	0.000	F	7	3	\$1,200	1	Low	1	5	56	\$917,674	
G-1	Manhole Rehabilitation	0.000	G	4	6	\$1,800	1	Low	1	8	45	\$919,474	
D-5	Grout Pipe	0.001	D	3	7	\$4,600	2	Low	1	10	42	\$924,074	
E-5	Grout Pipe	0.002	E	2	8	\$11,500	2	Low	1	11	33	\$935,574	
I-5	Grout Pipe	0.062	I	6	4	\$6,900	6	Low	1	11	40	\$942,474	
C-5	Grout Pipe	0.016	C	8	2	\$6,900	5	Low	1	8	49	\$949,374	
H-5	Grout Pipe	0.015	H	9	1	\$11,700	4	Low	1	6	55	\$961,074	
	Engineering					\$210,000						\$1,171,074	

Table 4.2
Niagara Falls Water Board
Detailed Work Plan

SSO Mitigation Measure Reference			Subarea Ranking			Cost Ranking		SSO Impact Ranking		System-wide Prioritization		Cummulative Estimated Cost of Abatement Measures	Implementation Year w/ Anticipated Annual Funding Level of \$330,000
Detailed Work Breakdown Reference Table No.	Problem Type/ Rehabilitation Method	Estimated Capacity Restored and/or I/I Reduced (mgd)	Name	I/I Rank	Subarea Weighting Factor	Cost	Weighting Factor	Significance of Mitigation Measures to SSO Reduction	Weighting Factor	Composite Factor	Priority Rank		
E-3	Sectional CIPP	0.018	E	2	8	\$79,750	3	Low	1	12	26	\$79,750	Year 15, 16 and 17
D-3	Sectional CIPP	0.027	D	3	7	\$66,215	3	Low	1	11	36	\$145,965	
G-3	Sectional CIPP	0.128	G	4	6	\$90,250	4	Low	1	11	38	\$236,215	
F-3	Sectional CIPP	0.060	F	7	3	\$93,780	4	Low	1	8	48	\$329,995	
D-2	Spot CIPP	0.022	D	3	7	\$103,200	3	Low	1	11	35	\$433,195	
G-2	Spot CIPP	0.059	G	4	6	\$101,000	4	Low	1	11	37	\$534,195	
E-2	Spot CIPP	0.015	E	2	8	\$174,800	2	Low	1	11	34	\$708,995	
F-2	Spot CIPP	0.049	F	7	3	\$206,950	3	Low	1	7	52	\$915,945	
I-2	Spot CIPP	0.002	I	6	4	\$38,000	1	Low	1	6	53	\$953,945	
C-2	Spot CIPP	0.004	C	8	2	\$70,700	1	Low	1	4	58	\$1,024,645	
H-2	Spot CIPP	0.023	H	9	1	\$167,400	2	Low	1	4	59	\$1,192,045	
	Engineering					\$210,000						\$1,402,045	
Re-evaluation of the system need for further Rehabilitation												\$200,000	Year 18
Total Program Cost												\$6,324,846	Years 1-18
Average Cost per Year												\$351,380	

APPENDIX A

NFWB SPDES DISCHARGE PERMIT (NY-0026336)



NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
State Pollutant Discharge Elimination System (SPDES)
DISCHARGE PERMIT
Special Conditions (Part 1)

First 3.99

Industrial Code: NA
Discharge Class (CL): 05
Toxic Class (TX): T
Major Drainage Basin: 01
Sub Drainage Basin: 01
Water Index Number: 0-158
Compact Area: IJC

SPDES Number: NY- 0026336
DEC Number: 9-2911-00056/00004
Effective Date (EDP): 06/01/03
Expiration Date (ExPD): 06/01/08
Modification Dates: 06/01/03
Attachment(s): General Conditions (Part II) Date: 11/90

This SPDES permit is issued in compliance with Title 8 of Article 17 of the Environmental Conservation Law of New York State and in compliance with the Clean Water Act, as amended, (33 U.S.C. §1251 et seq.) (hereinafter referred to as "the Act").

PERMITTEE NAME AND ADDRESS

Name: City of Niagara Falls
Street: 1200 Buffalo Avenue
City: Niagara Falls

Attention: William Bolents

State: NY Zip Code: 14302

is authorized to discharge from the facility described below:

FACILITY NAME AND ADDRESS

Name: City of Niagara Falls WWTP
Location (C,T,V): Niagara Falls (C)
Facility Address: 1200 Buffalo Avenue
City: Niagara Falls
NYTM -E: 657.2
From Outfall No.: 001

County: Niagara

State: NY Zip Code: 14302

NYTM - N: 4772.2

at Latitude: 43 ° 05 ' 20 " & Longitude: 79 ° 04 ' 00 "
into receiving waters known as: Niagara River via Adams Tailrace Tunnel

Class: A Special

and; (list other Outfalls, Receiving Waters & Water Classifications) see List of Additional Outfalls on Page 2

in accordance with the effluent limitations, monitoring requirements and other conditions set forth in Special Conditions (Part I) and General Conditions (Part II) of this permit.

DISCHARGE MONITORING REPORT (DMR) MAILING ADDRESS

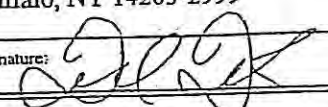
Mailing Name: City of Niagara Falls
Street: P.O. Box 69
City: Niagara Falls
Responsible Official or Agent: Mr. William Bolents

State: NY Zip Code: 14302-0069
Phone: (716) 286-4960

This permit and the authorization to discharge shall expire on midnight of the expiration date shown above and the permittee shall not discharge after the expiration date unless this permit has been renewed, or extended pursuant to law. To be authorized to discharge beyond the expiration date, the permittee shall apply for permit renewal not less than 180 days prior to the expiration date shown above.

DISTRIBUTION:

Bureau of Water Permits
Regional Water Engineer
EPA Region II
Niagara Falls Public Water Board/Water Authority
Rachel Walker
John Daniels

Permit Administrator: David S. Denk	
Address: 270 Michigan Avenue Buffalo, NY 14203-2999	
Signature: 	Date: 4/23/03

LIST OF DISCHARGES

<u>Outfall Number</u>	<u>Description</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Receiving Water</u>
001	Wastewater Treatment Plant	43° 05' 20"	79° 04' 00"	Niagara River
003	Falls Street Tunnel (CSO) ⁽¹⁾	43° 05' 24"	79° 04' 00"	Niagara River
004	Diversion Sewer	43° 05' 20"	79° 04' 00"	Niagara River
005	Walnut Avenue (CSO)	43° 05' 38"	79° 03' 48"	Niagara River
006	Gorge Pumping Station (CSO)	43° 05' 58"	79° 03' 38"	Niagara River
007	Cleveland Avenue (CSO)	43° 06' 26"	79° 03' 25"	Niagara River
008	Bath Avenue (CSO)	43° 06' 38"	79° 03' 29"	Niagara River
009	Chasm Avenue (CSO)	43° 06' 49"	79° 03' 33"	Niagara River
010	Maple Avenue (CSO)	43° 07' 32"	79° 03' 35"	Niagara River
011	Garfield Avenue (CSO)	43° 07' 56"	79° 03' 03"	Niagara River
013	Lift Station #4, 91st and Luick Avenue (SSO)	43° 05' 05"	78° 57' 20"	Cayuga Creek
014	Lift Station #6, 81st and Frontier Avenue (SSO)	43° 04' 50"	78° 58' 00"	Cayuga Creek
015	Lift Station #7, Military Road & Bollier Avenue (SSO)	43° 05' 30"	78° 57' 50"	Cayuga Creek
016	Lift Station #1, 81st Street and Stephenson Avenue (SSO)	43° 04' 45"	78° 58' 00"	Little Niagara River
017	Mang Avenue and Cayuga Drive (SSO)	43° 04' 26"	78° 58' 08"	Cayuga Creek
018	Crossover between West Rivershore Drive and 81st Street at Buffalo Avenue (SSO)	43° 04' 26"	78° 58' 08"	Little Niagara River
019	76 th Street and Stephenson Avenue (SSO)	43° 04' 42"	78° 58' 21"	Little Niagara River
01A	Head of Ice Shaft (Stormwater Outfall at WTP)			Niagara River
02A	Drop Shaft to International Paper Tunnel (Stormwater Outfall at WTP)			Niagara River

⁽¹⁾ List of Regulators on the Southside Interceptor/Falls Street Tunnel
During dry weather, all Falls Street Tunnel flows shall be directed to the WTP.

1. 19th Street
2A. 22nd Street
2B. 22nd Street
3A. 24th Street
3B. 24th Street
4A. 27th Street
4B. 27th Street
5. 30th Street
6A. Hyde Park Boulevard

6B. Hyde Park Boulevard
8. Royal Avenue
9. Falls Street
10. 12th Street
11A. 10th Street
11B. 10th Street
12. 4th Street and Rainbow Blvd.

PERMIT LIMITS, LEVELS AND MONITORING DEFINITIONS

WASTEWATER TYPE		RECEIVING WATER		EFFECTIVE	EXPIRING		
OUTFALL		This cell lists classified waters of the state to which the listed outfall discharges.		The date this page starts in effect.	The date this page is no longer in effect		
###	This cell describes the type of wastewater authorized for discharge. Examples include process wastewater, storm water, non-contact cooling water.						
PARAMETER	MINIMUM	MAXIMUM		UNITS	SAMPLE FREQ.	SAMPLE TYPE	
PH	The minimum level that must be maintained at all times.		The maximum level that may not be exceeded at any time.		SU		
PARAMETER	CALCULATED LIMIT	COMPLIANCE LEVEL	ACTION LEVEL	UNITS	MDL AND PQL	SAMPLE FREQUENCY	SAMPLE TYPE
	Monthly Avg. and Daily Max. are defined below. The calculated limit is the limit that has been derived based on the assumptions and rules in place at the time the permit is written. Examples of these assumptions include receiving water hardness, pH and temperature; rates of other discharges to the receiving stream; conservatism of substances in the environment; etc. If the assumptions or rules change, the calculated limit may, after due process, change. The Calculated Limit is developed without consideration of what level is technologically achievable or what can be quantitated analytically. If a calculated limit is not included in this column, but a compliance level is included in the next column, the calculated limit is the compliance level.	Daily Max. and Monthly Avg. are defined below. All determinations of compliance with substance specific discharge limits are made by comparing monitoring results to the compliance level. The compliance level is developed considering what can be quantitated analytically or what level is technologically achievable in the permittee's discharge at the time the permit is written.	Type I or Type II Action Levels are monitoring requirements, as defined below, that trigger additional monitoring and permit review when exceeded.	This can include units of flow, pH, Temperature, mass or concentration. Examples include SU, °F, µg/l, lbs/d, etc.	The method detection limits and practical quantitation limits that the permittee must make all reasonable efforts to achieve when measuring the parameter in the wastewater, including using a more sensitive approved analytical procedure.	Examples include Daily, 3/week, weekly, 2/month, monthly, quarterly, 2/yr and yearly.	Examples include grab, 24 hour composite and 3 grab samples collected over a 6 hour period.

DAILY DISCHARGE: The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for the purposes of sampling. For pollutants expressed in units of mass, the 'daily discharge' is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the 'daily discharge' is calculated as the average measurement of the pollutant over the day.

DAILY MAX: The highest allowable daily discharge.

MONTHLY AVG: The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month (Daily avg.).

ACTION LEVELS: Routine Action Level monitoring results, if not provided for on the Discharge Monitoring Report (DMR) form, shall be appended to the DMR for the period during which the sampling was conducted. If the additional monitoring requirement is triggered as noted below, the permittee shall undertake a short-term, high-intensity monitoring program for the parameter(s). Samples identical to those required for routine monitoring purposes shall be taken on each of at least three consecutive operating and discharging days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the additional monitoring requirement was triggered. Results may be appended to the DMR or transmitted under separate cover to the same address. If levels higher than the Action Levels are confirmed, the permit may be reopened by the Department for consideration of revised Action Levels or effluent limits. The permittee is not authorized to discharge any of the listed parameters at levels which may cause or contribute to a violation of water quality standards.

TYPE I: The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results in excess of the stated Action Level.

TYPE II: The additional monitoring requirement is triggered upon receipt by the permittee of any monitoring results that show the stated action level exceeded for four of six consecutive samples, or for two of six consecutive samples by 20 % or more, or for any one sample by 50 % or more.

FINAL PERMIT LIMITS AND MONITORING

OUTFALL NUMBER	LIMITATIONS APPLY:	RECEIVING WATER	EFFECTIVE	EXPIRING
001	<input checked="" type="checkbox"/> All Year <input type="checkbox"/> Seasonal from _____ to _____	Niagara River	June 1, 2003	June 1, 2008

PARAMETER	ENFORCEABLE EFFLUENT LIMITATIONS					MONITORING REQUIREMENTS				Foot Notes
	Type	Limitation	Units	Limitation	Units	Sample Frequency	Sample Type	Location Influent Effluent		
Flow	Monthly average			48	MGD	Continuous	Recorder		X	2
TOC	Monthly average			15200	lbs/day	1/day	24 hr. comp.	X	X	
TOC	7 day arithmetic mean			22800	lbs/day	1/day	24-hr. comp.	X	X	
Solids, Total Suspended	Monthly average	30	mg/l	12000	lbs/day	1/day	24-hr. comp.	X	X	
Solids, Total Suspended	7 day arithmetic mean	45	mg/l	18000	lbs/day	1/day	24-hr. comp.	X	X	
pH	Range	6.0-9.0	SU			Continuous	Recorder	X	X	1
Phosphorus, Total (as P)	Monthly average	1.0	mg/l			1/day	24-hr. comp.	X	X	
Priority Pollutant Scan		Monitor	ug/l			1/year	24-hr. comp.	X	X	3
Effluent Disinfection required: [X] All Year [] Seasonal from _____ to _____										
Coliform, Fecal	30 day geometric mean	200	No./100 ml			1/day	grab		X	
Coliform, Fecal	7 day geometric mean	400	No./100 ml			1/day	grab		X	
Chlorine, Total Residual	Daily Maximum	3.0	mg/l			1/hour	grab		X	

FOOTNOTES FOR PAGE 4

1. These pH limits shall be achieved 99% of the time on a monthly basis. Excursions outside these limits shall not exceed 60 minutes in duration, with no single excursion being outside the pH range of 4.0 to 11.0.

Any excursion outside the range of 4.0 to 11.0 shall be reported to the NYSDEC Region 9 office and included in the monthly operating report (Form 92-15-7).
2. The permittee shall include the times and durations of overflow of the 100 foot weir (bypass of carbon beds) in the monthly operating reports.
3. The Falls Street Tunnel shall be sampled once per year, at Drop Shaft #1, during dry weather, concurrently with the influent and effluent samples. The monitoring results for this requirement shall not be submitted on the Discharge Monitoring Reports, but shall be submitted in report form to the Regional Water Engineer, within 60 days of the end of the calendar year. The monitoring results shall be on personal computer diskette, in an Excel spreadsheet, and include the flow for the day the sample was taken. Sample type for all parameters shall be a 6 hour composite of 3 grab samples, one taken each 3 hours.

FINAL PERMIT LIMITS AND MONITORING

OUTFALL NUMBER	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
001	Municipal with contributing industries	Niagara River	June 1, 2003	June 1, 2008

PARAMETER	CALCULATED LIMIT		ENFORCEABLE COMPLIANCE LEVEL		MONITORING ACTION LEVEL		UNITS	MDL (µg/l)	PQL (µg/l; lb/d)	SAMPLE FREQUENCY	SAMPLE TYPE	FN
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	TYPE I	TYPE II						
Phenolics, Total			78				lbs/day			2/week	24 hr. comp.	4
BHC, sum (Hexachlorocyclohexanes)				0.59			lbs/day			2/month	24 hr. comp.	
Mirex	4.0 EE -7		0.16				lbs/day		0.4; 0.16	2/month	24 hr. comp.	5
Heptachlor + Heptachlor Epoxide			0.008				lbs/day			2/month	24 hr. comp.	
Mercury, Total		0.03		0.32			lbs/day		0.8; 0.32	1/week	Grab	5, 6
Hexachlorobenzene	0.001			0.080			lbs/day		0.2; 0.08	2/month	24-hr. comp.	5
PCB-1248	4.0 EE -7			0.12			lbs/day		0.3; 0.12	2/month	24-hr. comp.	2, 5
4,4'-DDD + 4,4'-DDE + 4,4'-DDT	4.4 EE -4		0.02				lbs/day		0.05; 0.02	2/month s	24-hr comp.	5

FINAL ACTION LEVELS AND MONITORING

OUTFALL NUMBER	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
001	Municipal with contributing industries	Niagara River	June 1, 2003	June 1, 2008

PARAMETER	CALCULATED LIMIT		ENFORCEABLE COMPLIANCE LEVEL		MONITORING ACTION LEVEL		UNITS	MDL (µg/l)	PQL (µg/l)	SAMPLE FREQUENCY	SAMPLE TYPE	FN
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	TYPE	TYPE						
Dichlorobenzenes						1.5	lbs/d			1/month	24 hr. comp.	
Di-N-Butyl Phthalate						1.9	lbs/d			1/month	24-hr. comp.	
Bromodichloromethane						1.3	lbs/d			1/month	24-hr. comp. of 3 grab samples, 1 taken each 8 hours	
Chloroform						3.4	lbs/d			1/month	"	
1,2-Dichloroethylenes						4.2	lbs/d			1/month	"	
Ethyl Benzene						2.6	lbs/d			1/month	"	
Methylene Chloride						1.3	lbs/d			1/month	"	
Monochlorotoluenes						2.0	lbs/d			1/month	"	7
1,1,2,2-Tetrachloroethane						1.2	lbs/d			1/month	"	
Tetrachloroethylene						1.8	lbs/d			1/month	"	
Trichloroethylene						4.2	lbs/d			1/month	"	
Aluminum, Total Recoverable						350	lbs/d			1/month	24 hr. comp.	
Chromium, Total						5.2	lbs/d			1/month	24-hr. comp.	
Copper, Total						1.1	lbs/d			1/month	24-hr. comp.	
Cyanide, Total						1.7	lbs/d			1/month	24 hr. comp.	
Lead, Total						9.0	lbs/d			1/month	24-hr. comp.	
Nickel, Total						40	lbs/d			1/month	24-hr. comp.	
Zinc, Total						35	lbs/d			1/month	24-hr. comp.	

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FINAL ACTION LEVELS AND MONITORING

OUTFALL NUMBER	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
001	Municipal with contributing industries	Niagara River	June 1, 2003	June 1, 2008

PARAMETER	CALCULATED LIMIT		ENFORCEABLE COMPLIANCE LEVEL		MONITORING ACTION LEVEL		UNITS	MDL (µg/l)	PQL (µg/l)	SAMPLE FREQUENCY	SAMPLE TYPE	FN
	Monthly Avg.	Daily Max.	Monthly Avg.	Daily Max.	TYPE I	TYPE II						
Chlorophenols						10	lbs/d			1/month	24 hr. comp.	3, 7
Trichlorophenols						13	lbs/d			1/month	24 hr. comp.	3, 7
Benzene				Monitor			lbs/d			1/quarter	24-hr. comp. of 3 grab samples, 1 taken each 8 hours	
Bromoform				Monitor			lbs/d			1/quarter	"	
Carbon Tetrachloride				Monitor			lbs/d			1/quarter	"	
Chlorobenzene				Monitor			lbs/d			1/quarter	"	
Dibromochloromethane				Monitor			lbs/d			1/quarter	"	
Monochlorobenzotrifluorides				Monitor			lbs/d			1/quarter	"	7
Toluene				Monitor			lbs/d			1/quarter	"	
1,1,2-Trichloroethane				Monitor			lbs/d			1/quarter	"	
Chloro-methyl-phenols				Monitor			lbs/d			1/quarter	24-hr. comp.	3
Dichlorophenols				Monitor			lbs/d			1/quarter	24-hr. comp.	3, 7
Endosulfan I + Endosulfan II + Endosulfan Sulfate				Monitor			lbs/d			1/quarter	24 hr. comp.	
Pentachlorophenol				Monitor			lbs/d			1/quarter	24-hr. comp.	3
Butyl Benzyl Phthalate				Monitor			lbs/d			1/quarter	24-hr. comp.	
Dichlorotoluenes				Monitor			lbs/d			1/quarter	24-hr. comp.	1
Diethyl Phthalate				Monitor			lbs/d			1/quarter	24-hr. comp.	
Dimethyl Phthalate				Monitor			lbs/d			1/quarter	24-hr. comp.	

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FINAL PERMIT MONITORING

OUTFALL NUMBER	WASTEWATER TYPE	RECEIVING WATER	EFFECTIVE	EXPIRING
001	Municipal with contributing industries	Niagara River	June 1, 2003	June 1, 2008

PARAMETER	CALCULATED LIMIT		ENFORCEABLE COMPLIANCE LEVEL		MONITORING ACTION LEVEL		UNITS	MDL ($\mu\text{g/l}$)	PQL ($\mu\text{g/l}$; lbs/d)	SAMPLE FREQUENCY	SAMPLE TYPE	FN
	Monthly Avg.	Daily Max.	Monthly AVE.	Daily Max.	TYPE I	TYPE II						
Di-N-Octyl Phthalate				Monitor			lbs/d			1/quarter	24-hr. comp.	
Naphthalene				Monitor			lbs/d			1/quarter	24-hr. comp.	
Nitrosodiphenylamine				Monitor			lbs/d			1/quarter	24-hr. comp.	
Trichlorobenzenes				Monitor			lbs/d			1/quarter	24-hr. comp.	
Dechlorane Plus				Monitor			lbs/d			1/quarter	24-hr. comp.	
Cadmium, Total				Monitor			lbs/d			1/quarter	24-hr. comp.	
Hexachlorobutadiene				Monitor			lbs/d			1/quarter	24-hr. comp.	
Tetrachlorobenzenes				Monitor			lbs/d			1/quarter	24-hr. comp.	7

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FOOTNOTES FOR PAGES 6 - 9

- (1) Individual isomers detected in the routine Gas Chromatograph/Mass Spectrograph (GS/MS) analysis shall be calculated using the response factor for the one isomer included in the standard.
- (2) The permittee must monitor this discharge for PCB-1248 using USEPA laboratory method 608. The laboratory must make all reasonable attempts to achieve a method detection limit (MDL) of 0.065 µg/l. The Department may reopen the permit to modify monitoring requirements in the future if the Department approves a method different than 608.
- (3) The discharge of these parameters are included in the final effluent limitation for Phenolics (Total) of 40 lbs/day.
- (4) Analysis by 4-amino antipyrine (4AAP) method.
- (5) The water quality based effluent limitation (WQBEL) is less than detection level, i.e. the most stringent Practical Quantitation Limit (PQL) published in DEC's Analytical Detectability and Quantitation Guidelines for Selected Environmental Parameters, 1988.

In accordance with DEC's Technical & Operational Guidance Series (TOGS) 1.3.3, when this situation occurs the enforceable compliance level shall be set at the PQL for the most sensitive analytical method. Additionally, in accordance with 40 CFR 132, Appendix F, Procedure 8, for discharges tributary to the Great Lakes, the permit shall contain a requirement for the permittee to conduct a Pollutant Minimization Program (PMP) for that pollutant. See the PMP Compliance Schedule in this permit.
- (6) EPA method 245.1 or 245.2 must be used for this mercury analysis.
- (7) Individual isomers detected in the routine Gas Chromatograph/Mass Spectrograph (GS/MS) analysis shall be calculated using the response factor for one (or more) predominant isomer(s) included in the standard.

PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS

- A. **DEFINITIONS.** Generally, terms used in this Section shall be defined as in the General Pretreatment Regulations (40 CFR Part 403). Specifically, the following definitions apply to terms used in this Section (PRETREATMENT PROGRAM IMPLEMENTATION REQUIREMENTS):
1. Categorical Industrial User (CIU)- an industrial user of the POTW that is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N;
 2. Local Limits - General Prohibitions, specific prohibitions and specific limits as set forth in 40 CFR 403.5.
 3. The Publicly Owned Treatment Works (the POTW) - as defined by 40 CFR 403.3(o) and that discharges in accordance with this permit.
 4. Program Submission(s) - requests for approval or modification of the POTW Pretreatment Program submitted in accordance with 40 CFR 403.11 or 403.18 and approved by letter dated May 8, 1985 and any amendments thereto.
 5. Significant Industrial User (SIU) -
 - a. Categorical Industrial Users (CIU)s;
 - b. Except as provided in 40 CFR 403.3(t)(2), any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater (excluding sanitary, non-contact cooling and boiler blowdown wastewater) to the POTW;
 - c. Except as provided in 40 CFR 403.3(t)(2), any other industrial user that contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant;
 - d. Any other industrial user that the permittee designates as having a reasonable potential for adversely affecting the POTW's operation or for violating a pretreatment standard or requirement.
 6. Substances of Concern- Substances identified by the New York State Department of Environmental Conservation Industrial Chemical Survey as substances of concern.
- B. **IMPLEMENTATION.** The permittee shall implement a POTW Pretreatment Program in accordance 40 CFR Part 403 and as set forth in the permittee's approved Program Submission(s). Modifications to this program shall be made in accordance with 40 CFR 403.18. Specific program requirements are as follows:
1. Industrial Survey. To maintain an updated inventory of industrial dischargers to the POTW the permittee shall:
 - a. Identify, locate and list all industrial users who might be subject to the industrial pretreatment program from the pretreatment program submission and any other necessary, appropriate and available sources. This identification and location list will be updated, at a minimum, every five years. As part of this update the permittee shall collect a current and complete New York State Industrial Chemical Survey form (or equivalent) from each SIU.
 - b. Identify the character and volume of pollutants contributed to the POTW by each industrial user identified in B.1.a above that is classified as a SIU.
 - c. Identify, locate and list, from the pretreatment program submission and any other necessary, appropriate and available sources, all significant industrial users of the POTW.

2. Control Mechanisms. To provide adequate notice to and control of industrial users of the POTW the permittee shall:

- a. Inform by certified letter, hand delivery courier, overnight mail, or other means which will provide written acknowledgment of delivery, all industrial users identified in B.1.a. above of applicable pretreatment standards and requirements including the requirement to comply with the local sewer use law, regulation or ordinance and any applicable requirements under section 204(b) and 405 of the Federal Clean Water Act and Subtitles C and D of the Resource Conservation and Recovery Act.
- b. Control through permit or similar means the contribution to the POTW by each SIU to ensure compliance with applicable pretreatment standards and requirements. Permits shall contain limitations, sampling frequency and type, reporting and self-monitoring requirements as described below, requirements that limitations and conditions be complied with by established deadlines, an expiration date not later than five years from the date of permit issuance, a statement of applicable civil and criminal penalties and the requirement to comply with Local Limits and any other requirements in accordance with 40 CFR 403.8(f)(1).

3. Monitoring and Inspection. To provide adequate, ongoing characterization of non-domestic users of the POTW, the permittee shall:

- a. Receive and analyze self-monitoring reports and other notices. The permittee shall require all SIUs to submit self-monitoring reports at least every six months unless the permittee collects all such information required for the report, including flow data.
- b. The permittee shall adequately inspect each SIU at a minimum frequency of once per year.
- c. The permittee shall collect and analyze samples from each SIU for all priority pollutants that can reasonably be expected to be detectable at levels greater than the levels found in domestic sewage at a minimum frequency of once per year.
- d. Require, through permits, each SIU to collect at least one 24 hour, flow proportioned composite (where feasible) effluent sample every six months and analyze each of those samples for all priority pollutants that can reasonably be expected to be detectable in that discharge at levels greater than the levels found in domestic sewage. The permittee may perform the aforementioned monitoring in lieu of the SIU except that the permittee must also perform the compliance monitoring described in 3.c.

4. Enforcement. To assure adequate, equitable enforcement of the industrial pretreatment program the permittee shall:

- a. Investigate instances of noncompliance with pretreatment standards and requirements, as indicated in self-monitoring reports and notices or indicated by analysis, inspection and surveillance activities. Sample taking and analysis and the collection of other information shall be performed with sufficient care to produce evidence admissible in enforcement proceedings or in judicial actions. Enforcement activities shall be conducted in accordance with the permittee's Enforcement Response Plan developed and approved in accordance with 40 CFR Part 403.
- b. Enforce compliance with all national pretreatment standards and requirements in 40 CFR Parts 406 - 471.
- c. Provide public notification of significant non-compliance as required by 40 CFR 403.8(f)(2)(vii).
- d. Pursuant to 40 CFR 403.5(e), when either the Department or the USEPA determines any source contributes pollutants to the POTW in violation of Pretreatment Standards or Requirements the Department or the USEPA shall notify the permittee. Failure by the permittee to commence an appropriate investigation and subsequent enforcement action within 30 days of this notification may result in appropriate enforcement action against the source and permittee.

5. Record keeping. The permittee shall maintain and update, as necessary, records identifying the nature, character, and volume of pollutants contributed by SIUs. Records shall be maintained in accordance with Part II. Section 10.3.a.
6. Staffing. The permittee shall maintain minimum staffing positions committed to implementation of the Industrial Pretreatment Program in accordance with the approved pretreatment program.

C. SLUDGE DISPOSAL PLAN. The permittee shall notify NYSDEC, and USEPA as long as USEPA remains the approval authority, 60 days prior to any major proposed change in the sludge disposal plan. NYSDEC may require additional pretreatment measures or controls to prevent or abate an interference incident relating to sludge use or disposal.

D. REPORTING. The permittee shall provide to the offices listed on the Monitoring, Reporting and Recording page of this permit and to the Chief-Water Permits and Compliance Branch; USEPA Region II; 290 Broadway, New York, NY 10007-1866; a periodic report, prepared and submitted in accordance with the consistent periodic reporting format established by the Department in the document entitled NYSDEC POTW Periodic Pretreatment Report - 1994, that briefly describes the permittee's program activities over the previous year. This report shall be submitted to the above noted offices within 60 days of the end of the reporting period. The reporting period shall be semi-annual, with reporting period(s) ending on June 30 and December 31 each year.

The periodic report shall include:

1. Industrial Survey. Updated industrial survey information in accordance with 40 CFR 403.12(I)(1) (including any NYS Industrial Chemical Survey forms updated during the reporting period).
2. Implementation Status. Status of Program Implementation, to include:
 - a. Any interference, upset or permit violations experienced at the POTW directly attributable to industrial users.
 - b. Listing of significant industrial users issued permits.
 - c. Listing of significant industrial users inspected and/or monitored during the previous reporting period and summary of results.
 - d. Listing of significant industrial users notified of promulgated pretreatment standards or applicable local standards who are on compliance schedules. The listing should include for each facility the final date of compliance.
 - e. Summary of POTW monitoring results not already submitted on Discharge Monitoring Reports and toxic loadings from SIU's organized by parameter.
 - f. A summary of additions or deletions to the list of SIUs, with a brief explanation for each deletion.
3. Enforcement Status. Status of enforcement activities to include:
 - a. Listing of significant industrial users in Significant Non-Compliance (as defined by 40 CFR 403.8(f)(2)(vii)) with federal or local pretreatment standards at end of the reporting period.
 - b. Summary of enforcement activities taken against non-complying significant industrial users. The permittee shall provide a copy of the public notice of significant violators as specified in 40 CFR Part 403.8(f)(2)(vii).

BEST MANAGEMENT PRACTICES FOR COMBINED AND SANITARY SEWER OVERFLOWS

The permittee shall implement the following Best Management Practices (BMPs). These BMPs are designed to implement operation & maintenance procedures, utilize the existing treatment facility and collection system to the maximum extent practicable, and implement sewer design, replacement and drainage planning, to maximize pollutant capture and minimize water quality impacts from combined sewer overflows. The BMPs are equivalent to the "Nine Minimum Control Measures" required under the USEPA National Combined Sewer Overflow policy. -

1. CSO/SSO Maintenance/Inspection - The permittee shall have a written maintenance and inspection program for all SSOs and CSOs listed on page 2 of this permit. This program shall include all regulators tributary to these CSOs and SSOs, and shall be conducted during periods of both dry and wet weather. This is to insure that no discharges occur during dry weather and that the maximum amount of wet weather flow is conveyed to the POTW for treatment. This program shall consist of inspections with required repair, cleaning and maintenance done as needed and shall include a continuing sewer system investigation to detect and correct illegal connections to the combined and sanitary sewers as defined by the City's Sewer Use Ordinance.

Inspection reports shall be completed indicating visual inspection, any observed flow, incidence of rain or snowmelt, condition of equipment and work required. These reports shall be in a format approved by the Region 9 Office and submitted to the Region with the monthly operating report (Form 92-15-7).

2. Maximum Use of Collection System for Storage - The permittee shall optimize the collection system by operating and maintaining it to minimize the discharge of pollutants from SSOs and CSOs. It is intended that the maximum amount of in-system storage capacity be used (without causing service backups) to minimize CSOs and bypasses and convey the maximum amount of combined sewage to the Niagara Falls treatment plant in accordance with Item 4 below.

This shall be accomplished by an evaluation of the hydraulic capacity of the system but should also include a continuous program of flushing or cleaning to prevent deposition of solids and the adjustment of regulators and weirs to maximize storage.

3. Industrial Pretreatment - The approved Industrial Pretreatment Program shall consider SSOs and CSOs in the calculation of local limits for indirect discharges. Discharge of persistent toxics upstream of SSOs and CSOs will be in accordance with guidance under (NYSDEC Division of Water Technical and Operational Guidance Series (TOGS) 1.3.8 New Discharges to POTWs. For industrial operations characterized by use of batch discharge, consideration shall be given to the feasibility of a schedule of discharge during conditions of no SSO & CSO. For industrial discharges characterized by continuous discharge, consideration must be given to the collection system capacity to maximize delivery of waste to the treatment plant. Non-contact cooling water should be excluded from the combined system to the maximum extent practicable. Direct discharges of cooling water must apply for a SPDES permit.

To the maximum extent practicable, consideration shall be given to maximize the capture of industrial waste containing toxic pollutants and this wastewater should be given priority over residential/commercial service areas for capture and treatment by the POTW. For new industry, these factors shall be considered in siting with preference to service by areas not tributary to SSOs or CSOs or having sufficient capacity to deliver all industrial wastewater during all conditions to the POTW.

4. Maximize Flow to POTW - Factors cited in Item 2. above shall also be considered in maximizing flow to the POTW. Maximum delivery to the POTW is particularly critical in treatment of "first-flush" flows. The Niagara Falls treatment plant shall be capable of receiving the peak design hydraulic loading rates for all process units. During wet weather events, WWTP primary influent flow * rates shall exceed 65 MGD before any regulators are closed, the Gorge pump station pumping rates are reduced or any bypass of the carbon beds is allowed. The permittee shall maximize treatment of wet weather flows in excess of 65 MGD. This paragraph shall not apply if all available beds (and in no event less than 22 beds) are in operation and if achievement of these requirements is not physically possible. * (Primary influent flows shall be defined as flows from the Southside interceptor plus flows from the Gorge pumping station plus WWTP recycle flows as measured by main pump and gorge force main totalizers/recorders.)

The permittee shall continue the optimization program for treatment of storm flows and industrial wastewater at the WWTP. Specifically, the upper flow limit before overflow of the 100 foot weir and regulator bypass shall be increased through process

improvements where practicable. Annual reports on storm flow and pollutant treatment optimization shall be submitted to the Department by January 31st, each year.

The permittee shall operate all Regulators in a manner consistent with maximization of the conveyance of industrial wastewater to the treatment plant via the Southside Interceptor during high flow conditions in the system. The permittee shall operate the regulators in the Southside Interceptor (see page 2) during dry weather in a manner to insure that industrial wastewater is conveyed to the permittee's wastewater treatment plant and not to the Falls Street Tunnel.

5. Wet Weather Operating Plan - The permittee shall maximize treatment during wet weather events. This shall be accomplished by having a wet weather operating plan containing procedures so as to operate unit processes to treat maximum flows while not appreciably diminishing effluent quality or destabilizing treatment upon return to dry weather operation. The wet weather operations plan shall be submitted to the Region 9 Office for review and approval within 12 months after the effective date of this permit.

The submission of a wet weather operating plan is a one time requirement that shall be done to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the submission. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT".

6. Prohibition of Dry Weather Overflow - Dry weather overflows from the combined and sanitary sewer systems are prohibited. The occurrence of any dry weather overflow shall be promptly abated and reported to the NYSDEC Region 9 Office within 24 hours. A written report shall also be submitted within fourteen (14) days of the time the permittee becomes aware of the occurrence. Such reports shall contain the information listed in the General Conditions (Part II), Section 5(b) of the SPDES permit.

The permittee shall submit to the Regional Water Engineer an SSO Bypass Report, along with the Monthly Operating Report, that summarizes, for each day that an overflow occurs at an SSO, an estimate of the total volume and duration of each overflow, measurements of the total amount of rainfall, and visual observations of water quality at each outfall when possible.

7. Control of Floatable and Settleable Solids - The discharge of floating solids, oil and grease, or solids of sewage origin which cause deposition in the receiving waters, is a violation of the NYS Narrative Water Quality Standards contained in Part 703. As such, the permittee shall implement best management practices in order to eliminate or minimize the discharge of these substances. All of the measures cited in Items 1, 2, 4 & 5 above shall constitute approvable "BMPs" for mitigation of this problem. If aesthetic problems persist, the permittee should institute additional BMP's including but not limited to: street sweeping, litter control laws, installation of floatables traps in catch basins (such as hoods), booming and skimming of CSOs, and disposable netting on CSO outfalls. In cases of severe or excessive floatables generation, booming and skimming should be considered an interim measure prior to implementation of final control measures. Public education on harmful disposal practices of personal hygienic devices may also be necessary including but not limited to: public broadcast television, printed information inserts in sewer bills, or public health curricula in local schools.

8. Combined Sewer System Replacement - Replacement of combined sewers shall not be designed or constructed unless approved by NYSDEC. When replacement of a combined sewer is necessary it shall be replaced by separate sanitary and storm sewers to the greatest extent possible. These separate sanitary and storm sewers shall be designed and constructed simultaneously but without interconnections to maximum extent practicable. When combined sewers are replaced, the design should contain cross sections which provide sewage velocities which prevent deposition of organic solids during low flow conditions.

9. Combined Sewer/Extension - Combined sewer/extension, when allowed should be accomplished using separate sewers. These sanitary and storm sewer extensions shall be designed and constructed simultaneously but without interconnections. No new source of storm water shall be connected to any separate sanitary sewer in the collection system.

If separate sewers are to be extended from combined sewers, the permittee shall demonstrate the ability of the sewerage system to convey, and the treatment plant to adequately treat, the increased dry-weather flows. Upon a determination by the Region 9 Regional Water Engineer an assessment shall be made by the permittee of the effects of the increased flow of sanitary sewage or industrial waste on the strength of CSOs and their frequency of occurrence including the impacts upon best usage of the permittee should use techniques such as collection system and water quality modeling contained in the

Water Environment Federation Manual of Practice FD-17 Combined Sewer Overflow Pollution Treatment

10. If, there are documented, recurrent instances of sewage backing up into house(s) or discharges of raw sewage onto the ground surface from surcharging manholes, the permittee shall, upon letter notification from DEC, prohibit further connections that would make the surcharging/back-up problems worse.

By attaching a letter to the monthly operating report, the permittee shall inform the Department of all reported instances known to the permittee of sewage backing up into houses or discharge of raw sewage from surcharging manholes onto the ground surface and the conditions (wet weather, sewer blockage, etc.) which caused this to occur.

11. Septage and Hauled Waste - The discharge or release of septage or hauled waste upstream of an SSO or CSO is prohibited.
12. Control of Run-off - It is recommended that the impacts of run-off from new development in areas served by combined sewers or separate sewers be reduced by implementing practices and technologies included in the NYSDEC publication - REDUCING THE IMPACTS OF STORM WATER RUNOFF FROM NEW DEVELOPMENT.
13. Public Notification - The permittee shall have installed and shall continue to maintain identification signs at all outfalls owned and operated by the permittee in accordance with the Discharge Notification Requirements in this permit.

The permittee shall implement a public notification program to inform citizens of the location and occurrence of CSO and SSO events. This program shall include a mechanism (public media broadcast, standing beach advisories, newspaper notice etc.) to alert potential users of the receiving waters affected by CSOs and SSOs. The program shall include a system to determine the nature and duration of conditions that are potentially harmful to users of these receiving waters due to CSOs and SSOs:

14. Characterization and Monitoring - The permittee shall characterize the combined sewer system, determine the frequency of overflows, and identify CSO impacts in accordance with Combined Sewer Overflows, Guidance for Nine Minimum Controls, EPA, 1995, Chapter 10. These are minimum requirements, more extensive characterization and monitoring efforts may be required as part of the Long Term Control Plan.
15. Annual report - The permittee shall submit an annual report summarizing implementation of the above best management practices (BMPs). The report shall list existing documentation of implementation of the BMPs and shall be submitted by January 31st of each year to the offices listed on the Recording, Reporting and Additional Monitoring page of this permit. Examples of recommended documentation of the BMPs are found in Combined Sewer Overflows, Guidance for Nine Minimum Controls, EPA, 1995. The actual documentation shall be stored at a central location and be made available to DEC upon request.

LONG TERM CONTROL PLAN

The permittee shall develop a Long-Term Control Plan in accordance with the Guidance For Long-Term Control Plan, EPA, September, 1995, which will address the elements contained in Sections A through D below:

I. Phase I

A. Public Participation

The permittee shall prepare and implement a public participation plan that outlines how the permittee will ensure participation of the public throughout the LTCP development process.

B. CSS Characterization

The permittee shall develop and implement a plan that will result in a comprehensive characterization of the Combined Sewer Systems (CSS), including the interceptor sewer system, developed through records review, monitoring, modeling, and other means as appropriate to establish the existing baseline conditions, evaluate the effectiveness of the CSO technology-based controls (BMPs), and determine the baseline conditions upon which the LTCP will be based. The characterization shall adequately address the response of the CSS to various precipitation events; identify the number, location, frequency, and characteristics of CSOs; and identify water quality impacts that result from CSOs.

To complete the characterization, the permittee shall employ the following methods:

1. Rainfall Records Review - The permittee shall examine the complete rainfall records for the geographic areas of the CSS and evaluate the flow variations in the receiving water body to correlate between the CSOs and receiving water conditions.
2. CSS Records Review - The permittee shall review and evaluate all available CSS records and undertake field inspections and other necessary activities to identify the number, location, and frequency of CSOs and their location relative to sensitive areas and to pollution sources, such as significant industrial users, in the collection system.
3. CSO and Water Quality Monitoring - The permittee shall develop and submit a monitoring program that measures the frequency, duration, flow rate, volume, and pollutant concentration of CSOs and assesses the impact of the CSOs on receiving waters. Monitoring shall be performed at a representative number of CSOs for a representative number of events. The monitoring program shall include CSOs and ambient receiving waterbody monitoring and, where appropriate, other monitoring protocols, such as biological assessments, toxicity testing, and sediment sampling.
4. Identification of Sensitive Areas - The permittee shall identify sensitive areas to which its CSOs occur. These areas shall include waters with threatened or endangered species and their designated critical habitat, waters with primary contact recreation, public drinking water intakes or their designated protection areas and any other areas identified by the permittee or permitting authority, in coordination with appropriate State or Federal agencies.
5. CSS and Receiving Water Modeling - The permittee may employ models, which include appropriate calibration and verification with field measurements, to aid in the characterization. If models are used, they shall be identified by the permittee along with an explanation of why the model was selected and used in the characterization.

C. CSO Control Alternatives

1. a. Presumptive Approach - The permittee shall develop a range of CSO control alternatives that would meet EPA's requirements for the presumptive approach. These alternatives shall consist of: (1) no more than 4-6 overflow events per year that do not meet the minimum treatment specified (see (2) and (3) below); or (2) the elimination or capture for treatment of no less than 85% by volume of the combined sewage collected during precipitation events on a system-wide annual average basis; or (3) the elimination or removal of no less than the mass of the pollutants, identified as causing water quality impairment during the characterization, monitoring, and modeling effort for the volumes that would be eliminated or captured for treatment in (2) above. Combined sewer flows remaining after implementation of (1) and (2) above should receive a minimum of: primary clarification to remove floatables and settleable solids, solids and floatables disposal, and disinfection of effluent, if necessary, to meet water quality standards (WQS) according to 6NYCRR Part 703.

b. Demonstrative Approach - Alternatively, the permittee shall develop a range of CSO control alternatives that would meet EPA's requirements for the demonstrative approach. The alternatives should demonstrate each of the following: (1) the planned control program is adequate to meet WQS and protect designated uses, based on the results of B.3 and B.5

of WQS or the receiving waters designated uses or contribute to impairment, based on the results of B.3 and B.5 above, and (3) the planned control program will provide the maximum pollution reduction benefits reasonably attainable, and (4) the planned control program is designed to allow cost effective expansion or retrofitting if additional controls are subsequently determined to be necessary to meet WQS or designated uses.

2. Evaluation of CSO Control Alternatives - The permittee shall evaluate each of the alternatives developed in accordance with C.1 a. or b. to select the CSO controls that will ensure compliance with CWA requirements. The permittee shall consider expansion of the POTW treatment plant(s) secondary and primary capacity as one alternative.

3. Cost/Performance Considerations - The permittee shall develop and submit cost/performance curves that demonstrate the relationship among the set of CSO control alternatives that correspond to the ranges identified in C.1 a. or b. above.

4. Identification of the selected CSO Control Alternatives - The permittee shall submit a description of the alternatives that were considered, the chosen alternative(s) that will be implemented and the reasoning behind the selection.

5. Schedule - The permittee shall submit a schedule for design and construction of the selected CSO control facilities and/or implementation of other measures. The schedule may be phased based on the relative importance of the adverse impacts on water quality standards and on the permittee's financial capability.

D. Subsequent Requirements

1. Operational Plan - The wet weather operating plan that is required in the treatment plant's CSO Best Management Practices may be required to be updated as a result of modifications to the CSS made during the implementation of the LTCP.

2. Post-Construction Compliance Monitoring Program - The permittee shall develop and submit a post-construction monitoring program that (a) is adequate to ascertain the effectiveness of the CSO controls and (b) can be used to verify attainment of water quality standards. The program shall include a plan that details the monitoring protocols to be followed, including CSO and ambient monitoring and, where appropriate, other monitoring protocols, such as biological assessments, whole effluent toxicity testing, and sediment sampling.

II. LTCP Compliance Dates

A. The permittee shall submit a semi-annual report, beginning by Dec 1, 2003, describing the progress/status of the LTCP development.

B. The permittee shall submit 2 copies of the following plans to the Regional Water Engineer for review and approval by June 1, 2004 which shall be developed in accordance with the requirements specified in Sections I. A. & B. above:

1. Public Participation Plan
2. CSS Characterization Monitoring and Modeling Plan

C. The permittee shall submit two copies of a completed Phase I LTCP to the Regional Water Engineer for review by DEC approval of 2. above + 24 months which shall be developed in accordance with the requirements specified in Sections I. B. & C. above:

1. CSS Characterization Monitoring and Modeling Results
2. CSO Controls Evaluation and Cost Performance Curves, for the selected CSO controls
3. CSO Control Alternatives Identification
4. Construction and Implementation Schedule, including any supporting analyses

III. Phase II

Upon DEC approval of the Phase I LTCP, the Department will propose a modification to the SPDES permit in accordance with 6 NYCRR - Part 621, to include a schedule of compliance for design and construction and/or implementation of the selected CSO control methods and development of an operational plan and post-construction monitoring in accordance with I. D. above.

SANITARY SEWER OVERFLOWS PROHIBITED

In accordance with General Condition 11.2 of this permit and 40 CFR 122.41, bypasses of the collection and treatment system without treatment are prohibited except when (1) the bypass is necessary to prevent loss of life, personal injury, public health hazard or severe property damage and (2) there is no feasible alternative to the bypass and (3) the permittee complies with the notice requirements in General Condition 5.

Bypassing from the following sanitary sewer overflow points in the City of Niagara Falls that are known to or have the potential to be bypass points is prohibited except as noted above:

Outfall No.	Description	Latitude	Latitude	Receiving Stream
013	Lift Station #4, 91 st St. & Luick Ave.	43°05'05"	78°57'20"	Cayuga Creek
014	Lift Station #6, 81 st St. & Frontier Ave.	43°04'50"	78°58'00"	Cayuga Creek
015	Lift Station #7, Military Rd. & Bollier Ave.	43°05'30"	78°57'50"	Cayuga Creek
016	Lift Station #1, 81 st St. & Stephenson Ave.	43°04'45"	78°58'00"	Little Niagara River
017	Mang Ave. & Cayuga Dr.	43°04'26"	78°58'08"	Cayuga Creek
018	Crossover betw. W. Rivershore Dr. & 81 st St. at Buffalo Ave.	43°04'26"	78°58'08"	Little Niagara River
019	76 th St. & Stephenson Ave.	43°04'42"	78°58'21"	Little Niagara River

FIVE YEAR TOXICITY TESTING PROGRAM, TIER 2 - CHRONIC TEST

The permittee shall implement an effluent toxicity monitoring program beginning in January of the calendar years ending in 1 and 6. Subsequent modifications to or renewal of this permit does not reset or revise the deadline set forth in the preceding sentence unless a new deadline is set explicitly by such permit modification or renewal. The effluent toxicity testing program shall be as follows:

Monitoring Requirements

Outfall No.	Effluent Parameter	Units	Sample Frequency	Sample Type
001	Effluent Toxicity	% Effluent	Quarterly during calendar years ending in [1] or [6]	24 hr. Composite/renewal

- (a) Effluent toxicity shall mean the toxicity of the effluent in chronic static renewal tests as specified in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Third Edition, EPA/600/4-91/002 (1994), or the most recent editions (herein referred to as the EPA Chronic Manuals). Both a vertebrate and invertebrate species shall be used for the tests. Where the outfall being tested is to freshwaters, freshwater organisms shall be tested. Dilution water shall be collected according to the EPA Chronic Manuals. Each test run shall be 'bracketed' with a test of pure effluent and a test of effluent diluted sufficiently such that at least one diluted sample shows no toxic effects. Appropriate dilutions between the endpoints shall be tested to allow calculation of the Maximum Allowable Waste Concentration. Receiving water shall be used as dilution water unless the Department approves a different source. Effluent sampling and holding shall be done as outlined in of the EPA Chronic Manuals. Any deviation from procedures in the EPA Chronic Manuals requires prior written approval by the Department.
- (b) The Maximum Allowable Waste Concentration (MAWC) in % Effluent, for both a vertebrate and an invertebrate species, shall be determined and reported. The MAWC in % Effluent shall be compared to the calculated Instream Waste Concentration (IWC) of the effluent. The IWC in % Effluent shall be determined using the monthly average effluent flow at the time of sampling and a critical receiving water flow of 7,440 cubic feet per second for the Niagara River. If the permittee wishes to perform a mixing zone study to determine a site-specific dilution for the purposes of toxicity testing, the details of the study shall be submitted to the Department for review and approval before commencement of the study. Upon approval of the study, DEC shall reopen the permit and modify it to include a compliance schedule containing study deliverables and suspending toxicity testing until determination and approval of the site-specific dilution.
- (c) The results of each toxicity test shall be submitted no later than 60 days following the end of each test period. These reports shall be submitted to the Regional Water Engineer at 270 Michigan Ave, Buffalo, New York, 14203-2999 and the Toxicity Testing Unit, Bureau of Watershed Assessment and Research, 625 Broadway, Albany, NY 12233-3503.
- (d) Where practicable, monitoring of chemical and physical parameters limited in this permit shall be coordinated so that the resulting analysis is also representative of the samples used for toxicity testing.
- (e) Discharges which use chlorination as part of the waste treatment process should be dechlorinated prior to toxicity testing or samples shall be taken immediately prior to the chlorination system.

TOXICITY REDUCTION EVALUATION COMPLIANCE SCHEDULE

- (a) In accordance with Department guidance on whole effluent toxicity monitoring and control, Department staff will evaluate the results of acute and/or chronic toxicity testing of discharges authorized by this permit. Based on this evaluation, the DEC may require the permittee to perform a Toxicity Reduction Evaluation (TRE). The permittee shall be notified of any requirement to perform a TRE by letter notification of the DEC Regional Water Engineer, including the Department's rationale for such requirement. Within 60 days of such notification the permittee shall submit an approvable proposal for Toxicity Reduction Evaluation to the Bureau of Watershed Assessment and Research, 625 Broadway, Albany, NY 12233-3502. The TRE proposal shall be directed towards identifying the source of the toxicity, describing procedures to reduce the toxicity to an acceptable level, identifying monitoring parameters suitable for insuring control of the toxicity, and proposing a schedule for completing the TRE.
- (b) Within 14 days of receipt of written approval of the TRE proposal by DEC Regional Water Engineer, the permittee shall implement the approved TRE proposal in accordance with the proposed schedule.
- (c) The completed TRE, including data findings and recommendations for corrective action, permit limits, and proposed self-monitoring requirements shall be submitted to the Bureau of Watershed Assessment and Research at the address noted in (a) on this page. The Department will review the TRE and may redraft the permit to incorporate one or more of the following, consistent with the provisions of applicable law and regulation: substance specific numerical limits, toxicity limits, monitoring requirements, and/or a schedule of compliance that will ensure acceptable toxicity levels of the effluent.

SPECIAL CONDITIONS

A. Discharge No. 003, Falls Street Tunnel

During the period beginning on effective date of this permit modification (EDPM) and lasting until this permit expires, the discharge from the Falls Street Tunnel to the Niagara River shall be sampled on the second Thursday and fourth Thursday of each month on a grab sample basis. [If any Thursday so designated for sampling falls on a holiday, the sampling may be rescheduled (and so noted on the preceding Monthly Operating Report) for the day immediately preceding or following the holiday]. If there is no flow to the Niagara River on the sampling day, the permittee shall report 'no discharge' on the Monthly Operating Report for that sample. If there is a flow to the Niagara River from the Falls Street Tunnel when the sample person (personnel) collect(s) the sample, the permittee shall report the flow on the Monthly Operating Report. If the flow exceeds 35 MGD, the permittee shall report ">35 MGD" on the Monthly Operating Report. Flow from the discharge point shall be monitored on a continuous basis.

Each of the grab samples collected in accordance with this section shall be analyzed for all of the substances listed on pages 6 - 9 of this permit. The results of that sample analysis shall be reported on the Monthly Operating Report.

Beginning on July 1, 1994, the permittee shall, annually, submit to the USEPA-Region II, a summary of monitoring results (including the flows in the Monthly Operating Report, dates of sampling and concentration(s) for individual substances) for samples of outfall 003 discharges from the previous year.

SCHEDULES OF COMPLIANCE

a) Pollutant Minimization Plan

a) Pollutant Minimization Plan															
Action Code	Outfall Number(s)	Compliance Action	Due Date												
	001	<p>A completed, approvable Pollutant Minimization Plan (PMP) plan shall be submitted to the Regional Water Engineer at the addresses listed below .</p> <p>The goal of this program will be to meet the calculated water quality based effluent limit for the following substances:</p> <table><thead><tr><th>Substance</th><th>Water Quality Based Effluent Limit ug/l</th></tr></thead><tbody><tr><td>Mirex</td><td>1 E-6</td></tr><tr><td>Mercury</td><td>0.07</td></tr><tr><td>Hexachlorobenzene</td><td>0.003</td></tr><tr><td>PCBs</td><td>1 E-6</td></tr><tr><td>Sum of 4,4'-DDE, 4,4'-DDD, & 4,4'-DDT</td><td>1.1 E-3</td></tr></tbody></table> <p>The PMP plan shall be developed in accordance with Appendix F to 40 CFR Part 132, Procedure 8, documented in narrative form, and shall include any necessary plot plans, drawings or maps. Other documents already prepared for the facility such as a Safety Manual or a Spill Prevention, Control and Countermeasure (SPCC) plan or Best Management Practices Plan (BMP) may be used as part of the plan and incorporated by reference. At a minimum, the plan shall include:</p> <ol style="list-style-type: none">1. An on-going potential source identification, evaluation and prioritization program;2. Practical Quantification Levels or effluent specific quantification levels and analytical methods for each parameter;3. A program for periodic monitoring designed to quantify and, over time, track the reduction of discharges of the substances noted above - including conclusions based on the results of Mercury analysis using EPA Method 1631, and PCB analysis using EPA Method 1668A; and4. An approvable schedule for submission of <u>a control strategy</u> for reducing discharges via cost-effective control measures, including but not limited to site treatment or remediation for the substances noted above and <u>a schedule of implementation</u> of that control strategy. The DEC approved schedule for submission of a control strategy will become enforceable under this permit. <p>The control strategy and the schedule for implementation of the control strategy will also become enforceable under this permit.</p> <p>The PMP plan shall be modified whenever changes at the facility increase the potential for discharge of the substance(s) noted above or where ongoing monitoring indicates that the plan is ineffective.</p> <p>An annual status report shall be prepared and submitted to the Regional Water Engineer that summarizes the effectiveness of the PMP control strategy and includes all PMP monitoring results and all control measures implemented during the previous calendar year.</p>	Substance	Water Quality Based Effluent Limit ug/l	Mirex	1 E-6	Mercury	0.07	Hexachlorobenzene	0.003	PCBs	1 E-6	Sum of 4,4'-DDE, 4,4'-DDD, & 4,4'-DDT	1.1 E-3	<p>April 1, 2006</p> <p>Upon DEC approval of the control strategy and schedule of implementation</p> <p>March 1st of the year after DEC approval of the control strategy and schedule of implementation and every March 1st thereafter</p>
Substance	Water Quality Based Effluent Limit ug/l														
Mirex	1 E-6														
Mercury	0.07														
Hexachlorobenzene	0.003														
PCBs	1 E-6														
Sum of 4,4'-DDE, 4,4'-DDD, & 4,4'-DDT	1.1 E-3														

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b) Mercury

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001	<p>The permittee shall commence a one year study of EPA Method 1631. The permittee shall collect two simultaneous grab samples per month and analyze one using EPA Method 1631 and the other using EPA Method 245.1 or 245.2 for Total Mercury. Neither result will be used to assess compliance with effluent limitations or be reported on the DMR.</p> <p>The permittee shall submit the results of the one year study. The submission shall include the laboratory data, in units of concentration, and the daily flow for the day on which the sample was collected. Mercury data shall be reported in units of parts per billion. The permittee shall also report the laboratory(s) performing the analyses.</p>	<p>Oct 1, 2003</p> <p>Dec 1, 2004</p>

c) PCBs

Action Code	Outfall Number(s)	Compliance Action	Due Date
	001	<p>The permittee shall commence a one year study of EPA Method 1668A. The permittee shall collect two simultaneous grab samples per month and analyze one for 209 PCB Congeners using EPA Method 1668A and the other for PCB-1248 using EPA Method 608. Neither result will be used to assess compliance with effluent limitations or be reported on the DMR.</p> <p>The permittee shall submit the results of the one year study. The results shall be reported in electronic format, with the following tabulated rows: PCB Aroclor, individual PCB Congener, total PCB Congeners (considering non-detect results to be equal to zero), detection limit for each Congener and Aroclor, and the daily flow for the day on which the sample was collected; and columns for each date that samples were collected. All Aroclor and congener sampling results shall be reported in parts per trillion. The permittee shall also report the laboratory(s) performing the analyses.</p>	<p>Oct 1, 2004</p> <p>Dec 1, 2005</p>

d) Stormwater Pollution Prevention Plan

Action Code	Outfall Number(s)	Compliance Action	Due Date
	01A 02A	<p>Under USEPA regulation 40 CFR Part 122.27 (b)(14)(ix), the permittee's Wastewater Treatment Plant discharges "stormwater associated with industrial activity". The permittee shall, therefore, develop a Storm Water Pollution Prevention Plan (SWPPP) for the WWTP that meets the requirements of Part III of SPDES "General Permit GP-98-03 for Storm Water Discharges Associated With Industrial Activity except Construction Activity" and submit it to DEC for approval. Compliance with this requirement will exempt the permittee from the responsibility to seek coverage for this activity under GP-98-03, and its amendments.</p> <p>The permittee shall implement the approved SWPPP.</p>	<p>June 1, 2004</p> <p>DEC approval + 3 months</p>

e) Sanitary Sewer Overflows

Action Code	Outfall Number(s)	Compliance Action	Due Date
	013-019	<p>1. The permittee shall submit an approvable Engineering Report which shall include:</p> <ul style="list-style-type: none"> a. A description of work completed, since 1995, in accordance with the agreement between the City of Niagara Falls and NYSDEC Region 9 (i.e. the LaSalle area sewer collection system evaluation project) which shall include, at a minimum : sewer system assessment; flow monitoring; I&I removal; correction; and maintenance. b. A <u>plan</u> for continuation of the sewer system assessment, flow monitoring, I&I removal, correction, and maintenance, including an approvable <u>schedule</u> with the goal of elimination of bypasses from Outfalls 013 - 019. <p>Continuing work shall be done in conjunction with SSO and CSO BMP #1, including the annual report required in BMP #15.</p> <p>2. Begin implementation of the approved <u>plan</u> in 1.b. above, in accordance with the schedule therein.</p> <p>3. The <u>schedule</u> contained in 1.b. above shall become part of and enforceable under this permit.</p>	June 30, 2004 Upon DEC approval of the Engineering Report

The above compliance actions are one time requirements. The permittee shall comply with the above compliance actions to the Department's satisfaction once. When this permit is administratively renewed by NYSDEC letter entitled "SPDES NOTICE/RENEWAL APPLICATION/PERMIT", the permittee is not required to repeat the submission. The above due dates are independent from the effective date of the permit stated in the letter of "SPDES NOTICE/RENEWAL APPLICATION/PERMIT."

- f) The Department may reopen the permit to include limits or action levels as a result of the information developed during implementation of the compliance schedules.
- g) The permittee shall submit a written notice of compliance or non-compliance with each of the above schedule dates no later than 14 days following each elapsed date, unless conditions require more immediate notice under terms of the General Conditions (Part II), Section 5. All such compliance or non-compliance notification shall be sent to the locations listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS. Each notice of non-compliance shall include the following information:
1. A short description of the non-compliance;
 2. A description of any actions taken or proposed by the permittee to comply with the elapsed schedule requirements without further delay and to limit environmental impact associated with the non-compliance;
 3. A description of any factors which tend to explain or mitigate the non-compliance; and
 4. An estimate of the date the permittee will comply with the elapsed schedule requirement and an assessment of the probability that the permittee will meet the next scheduled requirement on time.
- h) The permittee shall submit copies of any document required by the above schedule of compliance to NYSDEC Regional Water Engineer at the location listed under the section of this permit entitled RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS and to the Bureau of Water Permits, 625 Broadway, Albany, N.Y. 12233-3505, unless otherwise specified in this permit or in writing by the Department.

DISCHARGE NOTIFICATION REQUIREMENTS

- a) The permittee shall, except as set forth in (c) below, maintain the existing identification signs at all outfalls to surface waters, which have not been waived by the Department in accordance with 17-0815-a. The sign(s) shall be conspicuous, legible and in as close proximity to the point of discharge as is reasonably possible while ensuring the maximum visibility from the surface water and shore. The signs shall be installed in such a manner to pose minimal hazard to navigation, bathing or other water related activities. If the public has access to the water from the land in the vicinity of the outfall, an identical sign shall be posted to be visible from the direction approaching the surface water. If the outfall discharges combined sewage, the sign shall display the words: Wet Weather Discharge.

The signs shall have minimum dimensions of eighteen inches by twenty four inches (18" x 24") and shall have white letters on a green background and contain the following information:

N.Y.S. PERMITTED DISCHARGE POINT

SPDES PERMIT No.: NY _____

OUTFALL No. : _____

For information about this permitted discharge contact:

Permittee Name: _____

Permittee Contact: _____

Permittee Phone: () - ### - #####

OR:

NYSDEC Division of Water Regional Office Address :

NYSDEC Division of Water Regional Phone: () - ### - #####

- b) For each discharge required to have a sign in accordance with a), the permittee shall provide for public review at a repository accessible to the public, copies of the Discharge Monitoring Reports (DMRs) as required by the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of this permit. This repository shall be open to the public, at a minimum, during normal daytime business hours. The repository may be at the business office repository of the permittee or at an off-premises location of its choice (such location shall be the village, town, city or county clerk's office, the local library or other location as approved by the Department). In accordance with the RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS page of your permit, each DMR shall be maintained on record for a period of three years.
- c) If, upon November 1, 1997, the permittee has installed signs that include the information required by 17-0815-a(2)(a), but do not meet the specifications listed above, the permittee may continue to use the existing signs for a period of up to five years, after which the signs shall comply with the specifications listed above.
- d) The permittee shall periodically inspect the outfall identification signs in order to ensure that they are maintained, are still visible and contain information that is current and factually correct.

MONITORING LOCATIONS

The permittee shall take samples and measurements, to comply with the monitoring requirements specified in this permit, at the location(s) specified below:

- Effluent samples shall be 24 hour flow proportioned composites taken after chlorination in the chlorine contact chambers but before the discharge combines with the industrial cooling water in the Diversion Sewer.
- The influent samples shall be the composite of separate 24 hour flow proportioned samples of the Gorge Force Main and the Main Wet Well. Recycled flows shall not be included in the influent sample.

RECORDING, REPORTING AND ADDITIONAL MONITORING REQUIREMENTS

- a) The permittee shall also refer to the General Conditions (Part II) of this permit for additional information concerning monitoring and reporting requirements and conditions.
- b) The monitoring information required by this permit shall be summarized, signed and retained for a period of three years from the date of the sampling for subsequent inspection by the Department or its designated agent. Also, monitoring information required by this permit shall be summarized and reported by submitting:
- ☒ (if box is checked) completed and signed Discharge Monitoring Report (DMR) forms for each 1 month reporting period to the locations specified below. Blank forms are available at the Department's Albany office listed below. The first reporting period begins on the effective date of this permit and the reports will be due no later than the 28th day of the month following the end of each reporting period.
- ☐ (if box is checked) an annual report to the Regional Water Engineer at the address specified below. The annual report is due by February 1 and must summarize information for January to December of the previous year in a format acceptable to the Department.
- ☐ (if box is checked) a monthly "Wastewater Facility Operation Report..." (form 92-15-7) to the:
- ☐ Regional Water Engineer and/or ☐ County Health Department or Environmental Control Agency specified below

Send the original (top sheet) of each DMR page to:

Department of Environmental Conservation
Division of Water
Bureau of Water Compliance Programs
625 Broadway
Albany, New York 12233-3506
Phone: (518) 457-8954

Send the first copy (second sheet) of each DMR page to:

Department of Environmental Conservation
Regional Water Engineer, Region 9
270 Michigan Avenue
Buffalo, New York

Phone: (716) 851-7000

Send an additional copy of each DMR page to:

Niagara County Health Department
5467 Upper Mountain Road
Lockport, NY 14094 (716) 439-7444

- c) Noncompliance with the provisions of this permit shall be reported to the Department as prescribed in the attached General Conditions (Part II)
- d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.
- e) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculations and recording of the data on the Discharge Monitoring Reports.
- f) Calculation for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified in this permit.
- g) Unless otherwise specified, all information recorded on the Discharge Monitoring Report shall be based upon measurements and sampling carried out during the most recently completed reporting period.
- h) Any laboratory test or sample analysis required by this permit for which the State Commissioner of Health issues certificates of approval pursuant to section five hundred two of the Public Health Law shall be conducted by a laboratory which has been issued a certificate of approval. Inquiries regarding laboratory certification should be sent to the Environmental Laboratory Accreditation Program, New York State Health Department Center for Laboratories and Research, Division of Environmental Sciences, The Nelson A. Rockefeller Empire State Plaza, Albany, New York 12201.

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • **FAX:** (518) 402-9168
Website: www.dec.state.ny.us



STATEMENT OF STATE POLLUTANT DISCHARGE ELIMINATION
SYSTEM (SPDES) PERMIT MODIFICATION
TO BE KEPT WITH SPDES PERMIT NUMBER NY 0026336.
NIAGARA FALLS (C) WASTEWATER TRTMNT PLNT
DEC ID 929110005600004
EFFECTIVE 27 FEBRUARY 2004

Per Department of Environmental Conservation amendment to the regulations governing the administration of the State Pollutant Discharge Elimination System Permit, this permit is hereby modified to mandate compliance with New York State Environmental Conservation Law, 6 NYCRR Part 750 entitled State Pollutant Discharge Elimination System (SPDES) Permits.

This Department initiated modification to your permit deletes the former 'Part II General Conditions' requirements and all references to them from your permit, and further amends the permit requiring you to comply with 6 NYCRR 750-2, entitled Operating in Accordance with a SPDES Permit.

New York State Department of Environmental Conservation
Division of Environmental Permits, 4th Floor
625 Broadway, Albany, New York 12233-1750
Phone: (518) 402-9167 • FAX: (518) 402-9168
Website: www.dec.state.ny.us



11 February 2004

NIAGARA FALLS (C) WILLIAM BOLENTS
1200 BUFFALO AVE PO BOX 69
NIAGARA FALLS, NY 143020069

Re: Department Initiated Permit Modification
DEC ID: 929110005600004
SPDES Number: NY 0026336

Dear Permittee:

The purpose of this correspondence is to notify you of a Department initiated modification to the above-referenced State Pollutant Discharge Elimination System (SPDES) permit. This modification is undertaken in accordance with the provisions of the Uniform Procedures Act [6 NYCRR 621.14(a)(4)] and is due to the amendment of the existing regulation governing the administration of SPDES permits (6 NYCRR 750). The amendments incorporate provisions of the 'Part II General Conditions' supplement that serves as an additional set of conditional requirements to your SPDES permit. These amendments may be found in the enclosed copy of 6 NYCRR 750 in Section 750-2, entitled 'Operating in Accordance with a SPDES Permit.' You may also access this regulation from the internet on the Department's website at <http://www.dec.state.ny.us/website/regs/750.htm> for html format or <http://www.dec.state.ny.us/website/dow/part750.pdf> for a two sided format suitable for binding and copying.

The amendment of 6 NYCRR 750 duplicates many of the provisions of the 'Part II General Conditions' supplement, and includes some revisions and additions to those conditions. The following is a general list of locations within section of 6 NYCRR 750-2 that contain new and significant information pertaining to your permit.

- 750-2.1 General Provisions of a SPDES Permit
(b), (f), and (k)
- 750-2.3 Inspection and Entry
(f)
- 750-2.4 Operator and Permittee Liability
750-2.5 Routine Monitoring, Recording, and Reporting
(a)- (2)-(iii) and (v); (4); (5)
(b)- (1); (2); (3)
(c)- (1); (2)-(vii)
(d)- (1)-(i) and (ii); (2); (3)-(iv)
- 750-2.6 Special Reporting Requirements for Dischargers that are not POTWs
- 750-2.7 Incident Reporting

- 750-2.8 Disposal System Operation and Quality Control
 - (a)- (1); (2)-(i); (5); (6)
 - (c)- (2)
 - (d)
 - (e)
 - (f)
- 750-2.9 Additional Conditions Applicable to Publicly Owned Treatment Works
 - (a)- (2); (4)
 - (b)- (1); (2); (3); (4); (5); (6); (7)
 - (c)
- 750-2.10 Special Provisions- New or Modified Disposal Systems or Service Areas
 - (a); (b); (d); (e); (f); (g); (h); (i)
- 750-2.11 Closure Requirements for Disposal Systems

Also, please note that the telephone number designated by the Regional Water Engineer to receive after business hours reports (as set forth in 6 NYCRR 750-1.2(a)(73) is now (518)-457-7362.

The Department initiated modification to your permit deletes the 'Part II General Conditions' and all references to them from your permit, and further amends the permit requiring you to comply with 6 NYCRR 750-2. The specific language of the modification is contained in the attached modification page that is to be appended to your existing permit.

The Department's Uniform Procedures Act affords permittees the right to comment on Department initiated permit changes [6 NYCRR 621.14(d)]. After reviewing the content of 6 NYCRR 750-2 and its effect on your SPDES permit, should you have any objections to the permit modification, you may submit a written statement to the Department giving reasons why the permit should not be modified, request a hearing, or both. Any statement or request for hearing must be made within 15 calendar days of the mailing of this letter. Failure to submit a timely request or statement will result in the modification of your permit 15 days from the date of this letter, February 25, 2004.

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If you have any questions on this action, please contact Andrea Sheeran at the above address, or by telephone at (518) 402-9179.

Sincerely,

William R. Adriance

William R. Adriance
Chief Permit Administrator

cc: RPA
RWE
BWP
file

APPENDIX B
FLOW MONITORING DATA

ATTACHMENT B.1

NIAGARA FALLS PUBLIC WATER AUTHORITY

POST REHABILITATION FLOW MONITORING ASSESSMENT

DRY WEATHER FLOW DATA

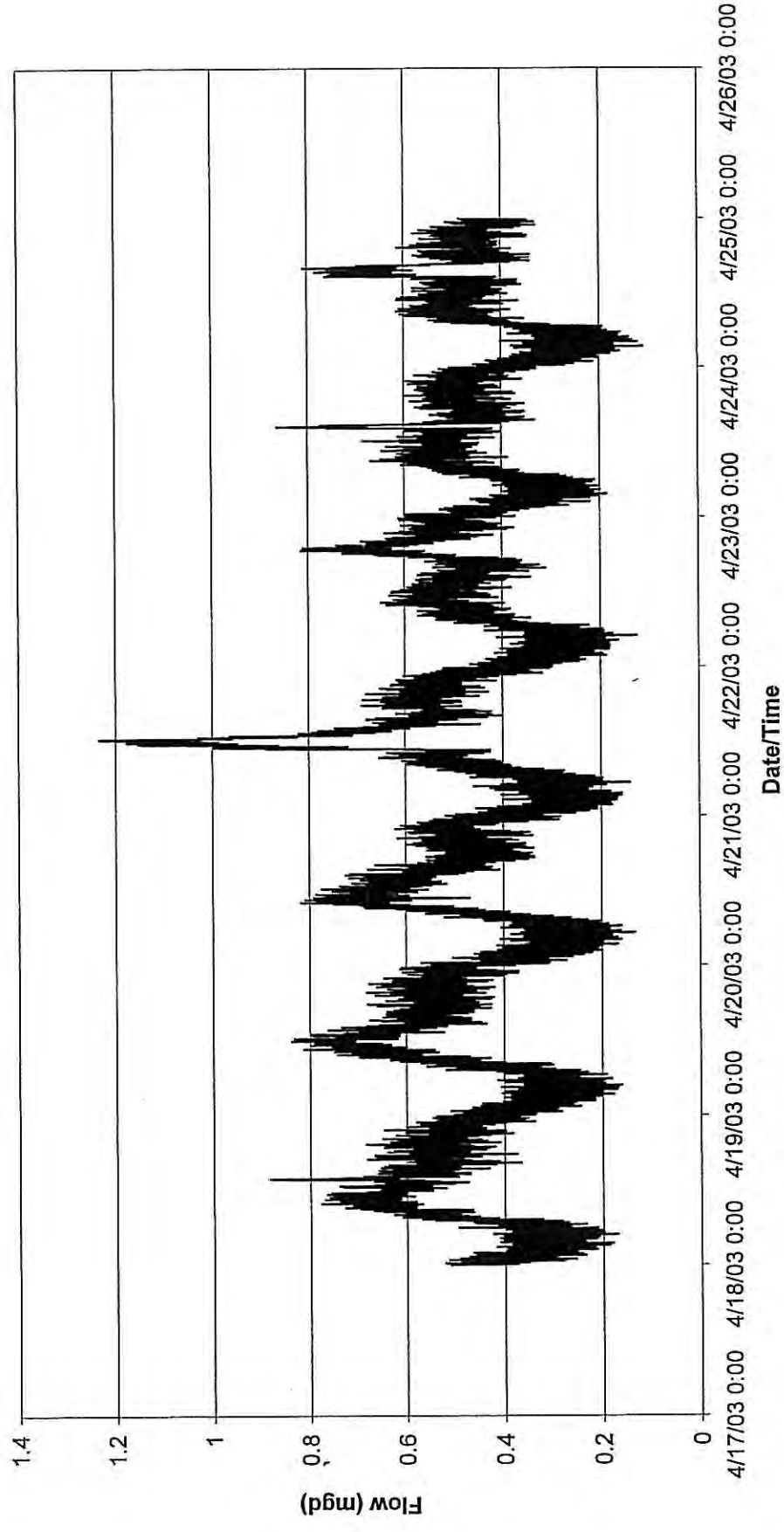
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Dry Weather Flow Calculations
Time Period: April 2003

Metered Subareans								
Meter Name	Detailed I/I Investigations, 1999-2001	Theoretical DWF		Average DWF		Infiltration		
		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)	
MH-1								
93rd Street 1 MH South of Cayuga Creek	8,9	0.132	92	0.221	154	0.089	62	
* 91st Street and Luick Avenue	3,4,5,6,7,8,9	0.273	190	0.365	253	0.092	64	
Mang Avenue and 88th Street	1,2,3,4,5,6,7,8,9	0.333	231	0.475	330	0.142	99	
MH-4								
80th Street and Lindbergh Avenue	4	0.081	56	0.216	150	0.135	94	
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.224	156	0.459	319	0.235	163	
* Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.420	292	0.634	440	0.214	148	
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.691	480	1.372	953	0.681	473	
MH- 6								
66th Street and Frontier Avenue	All MH-6 Area	0.446	310	1.312	911	0.866	602	
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.340	236	0.924	642	0.584	406	
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.00	0.00	0.00	0.00	0.00	0.00	

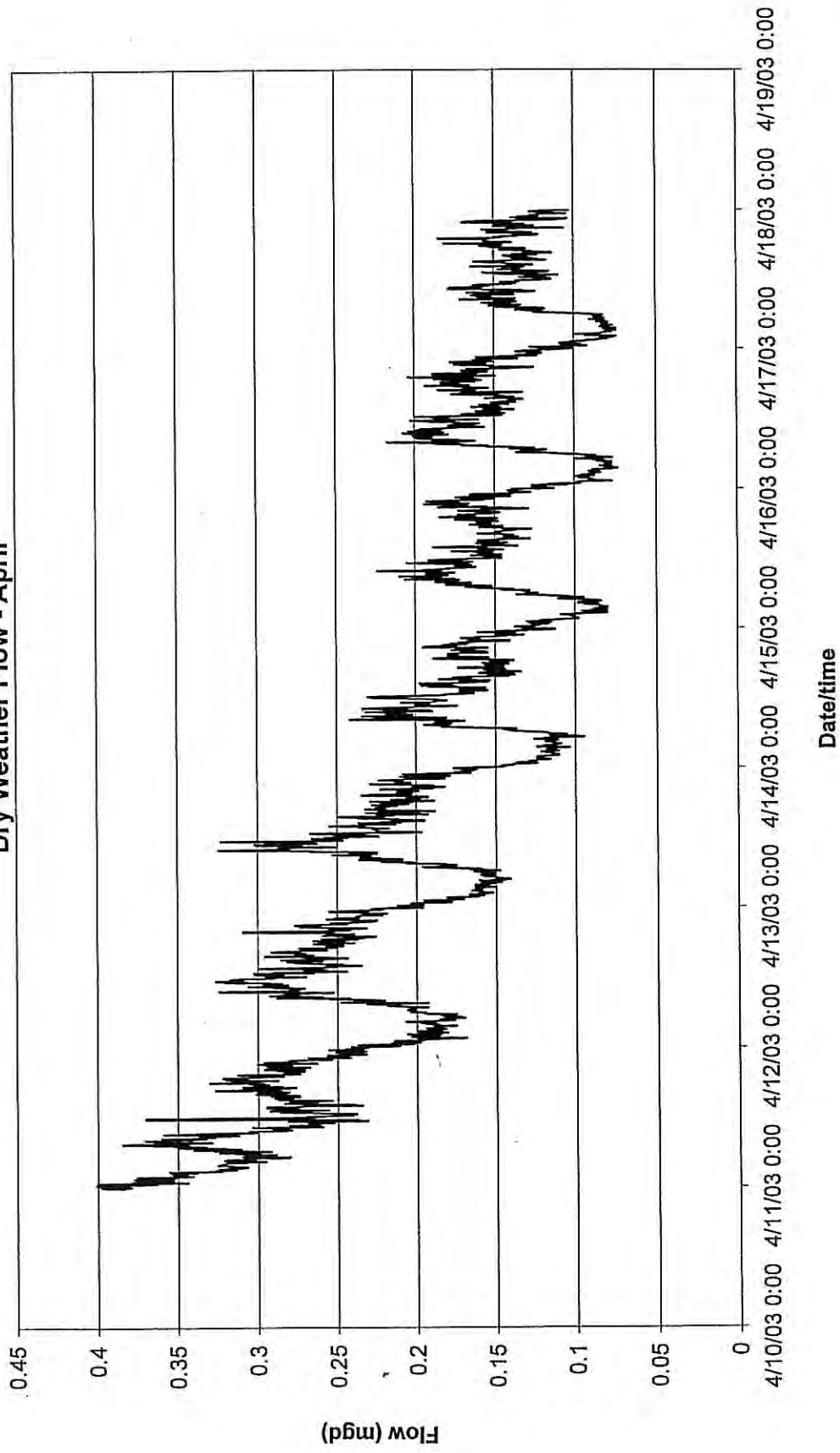
Areas	Metered Subareans		Detailed I/I Investigations, 1999-2001		Theoretical DWF		Average DWF		Infiltration	
	Post Rehabilitation Flow Monitoring Assessment, 2003				(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1	A		8,9		0.132	92	0.221	154	0.089	62.1
	B		3,4,5,6,7		0.141	98	0.144	100	0.003	1.8
	C		1,2		0.060	42	0.110	77	0.050	35.0
	D		4		0.081	56	0.216	150	0.135	93.6
MH-4	E		1,2,3,5,7		0.143	99	0.243	169	0.100	69.5
	F		8		0.047	33	0.279	194	0.232	161.2
	G		6		0.087	60	0.158	110	0.071	49.6
	H		1,2,3,4		0.106	74	0.388	269	0.282	195.8
MH-6	I		5,6,7,8,9,10,11,12		0.340	236	0.924	642	0.584	405.9

*Velocity of some data used in this calculation was estimated due to probe malfunction.

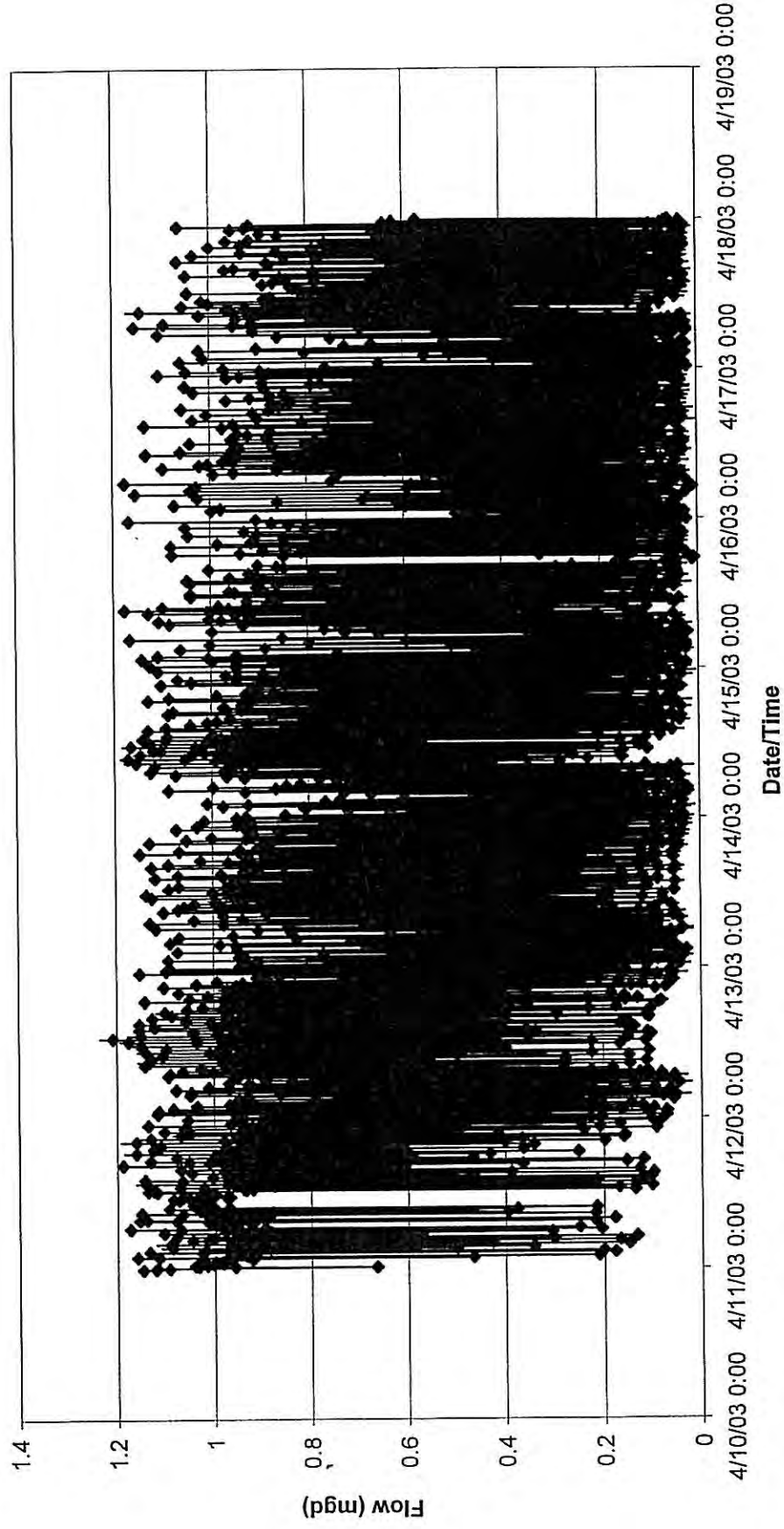
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Dry Weather Flow - April



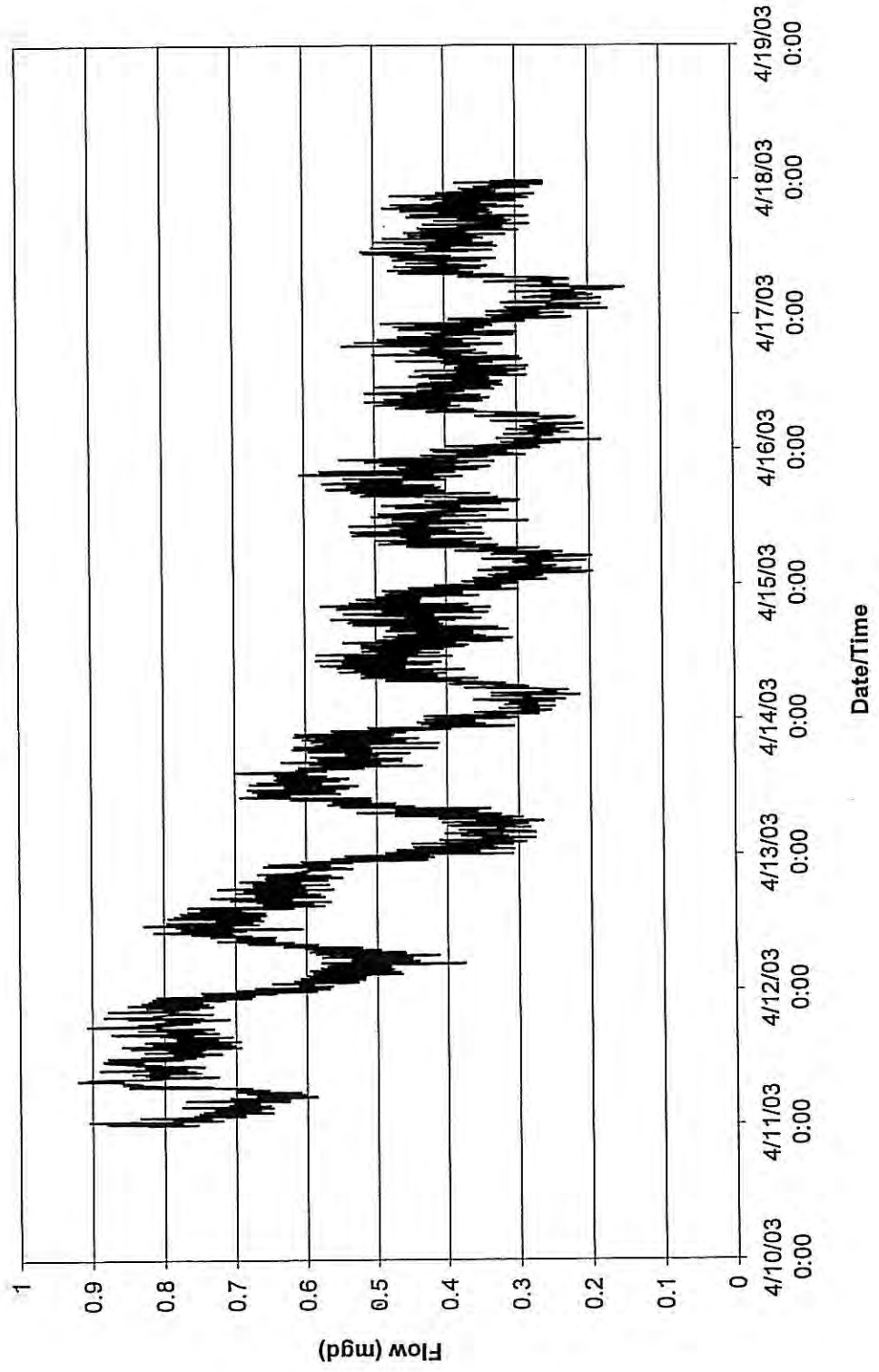
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Dry Weather Flow - April



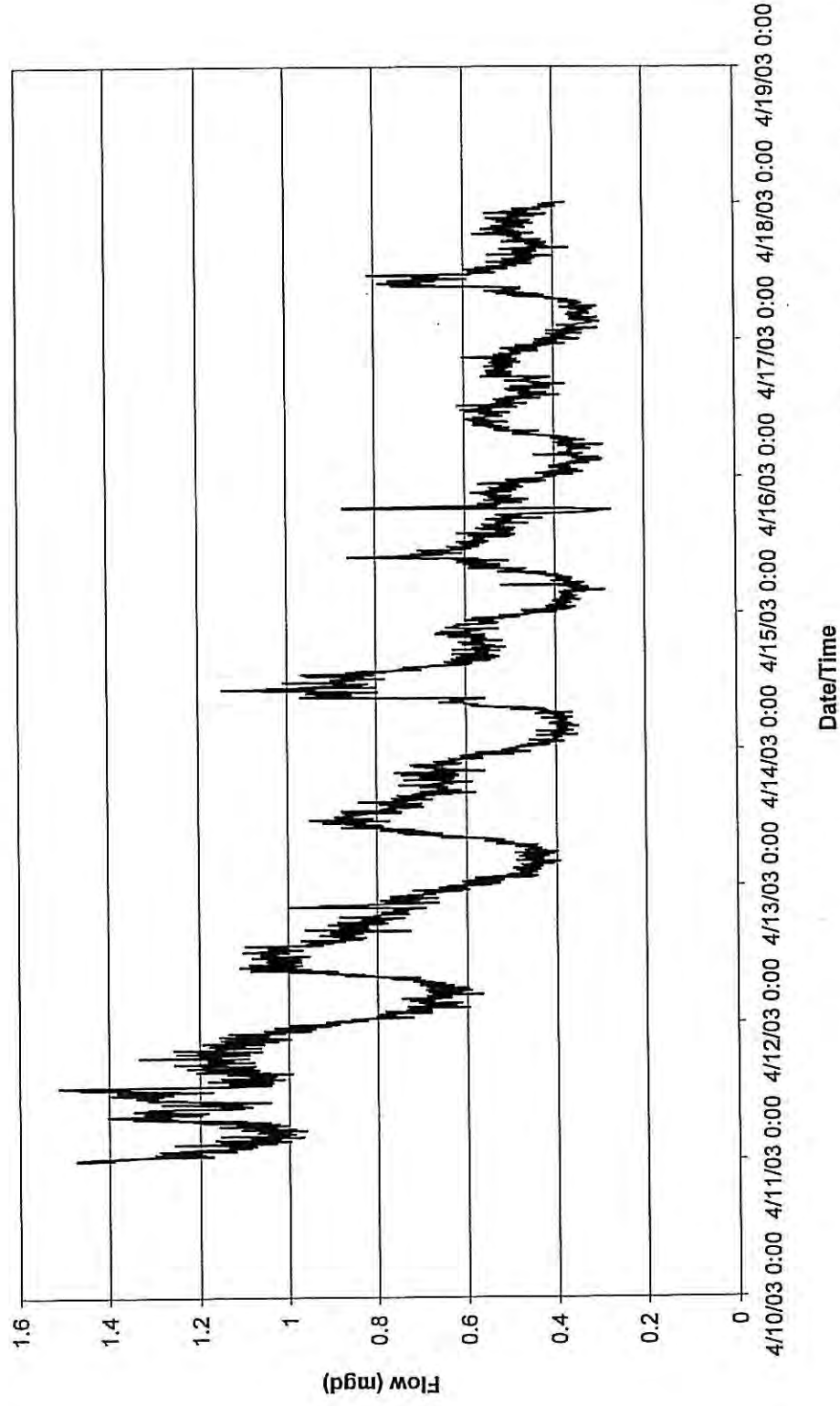
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Dry Weather Flow - April



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81 Street - North of Frontier Avenue
Dry Weather Flow - April

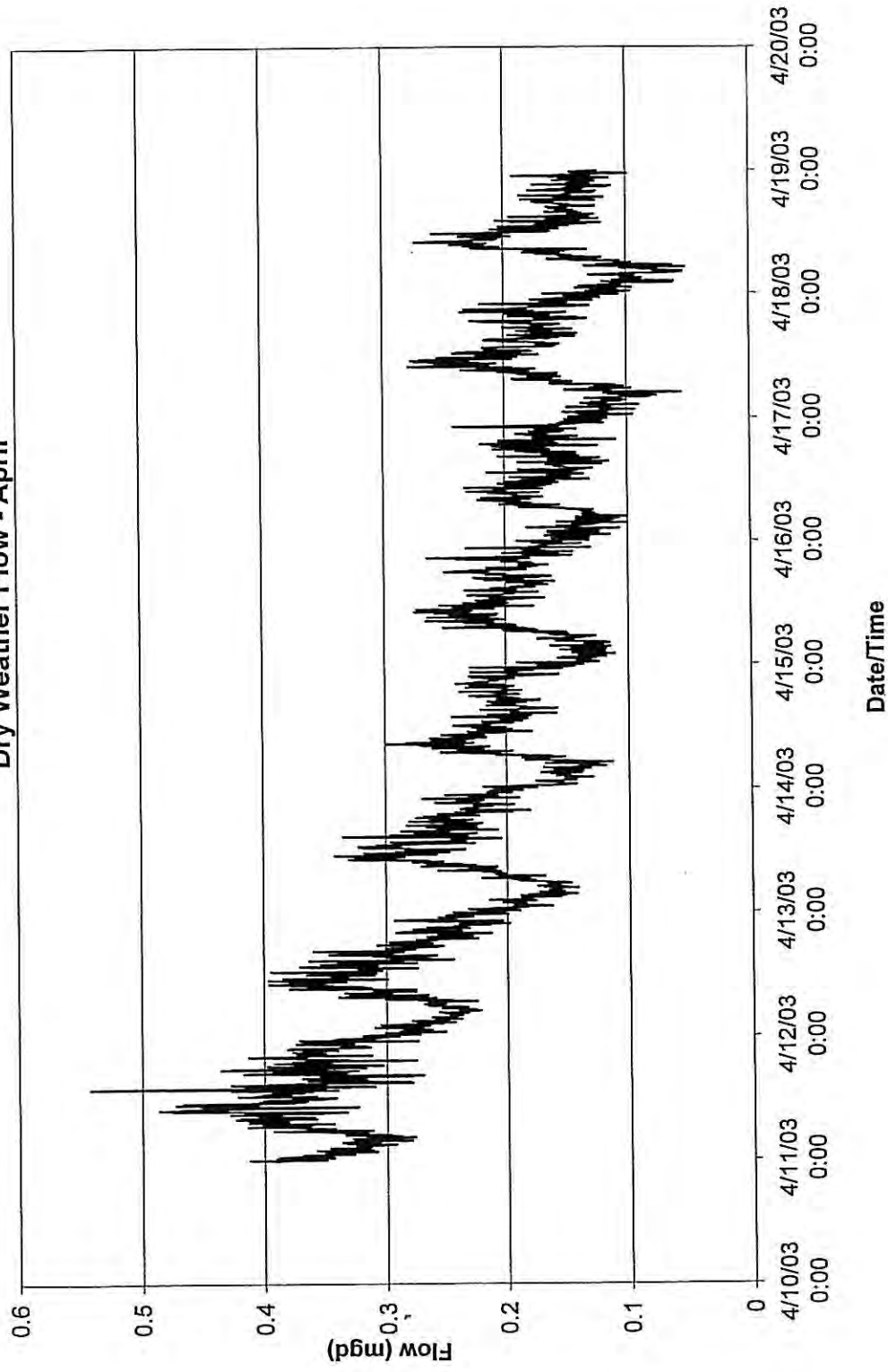


Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Dry Weather Flow - April

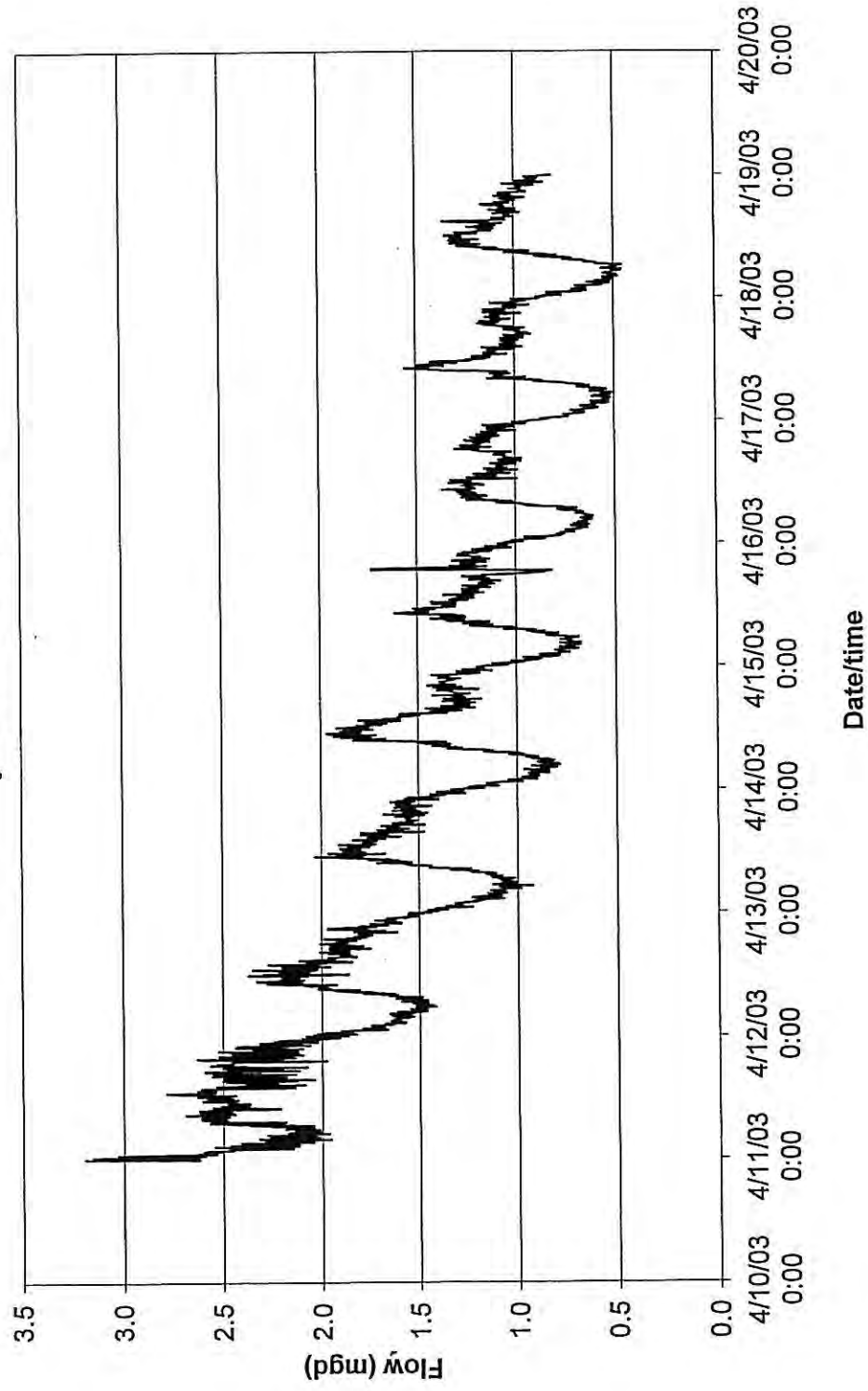


Flow Values have been adjusted due the malfunctioning of the Prob

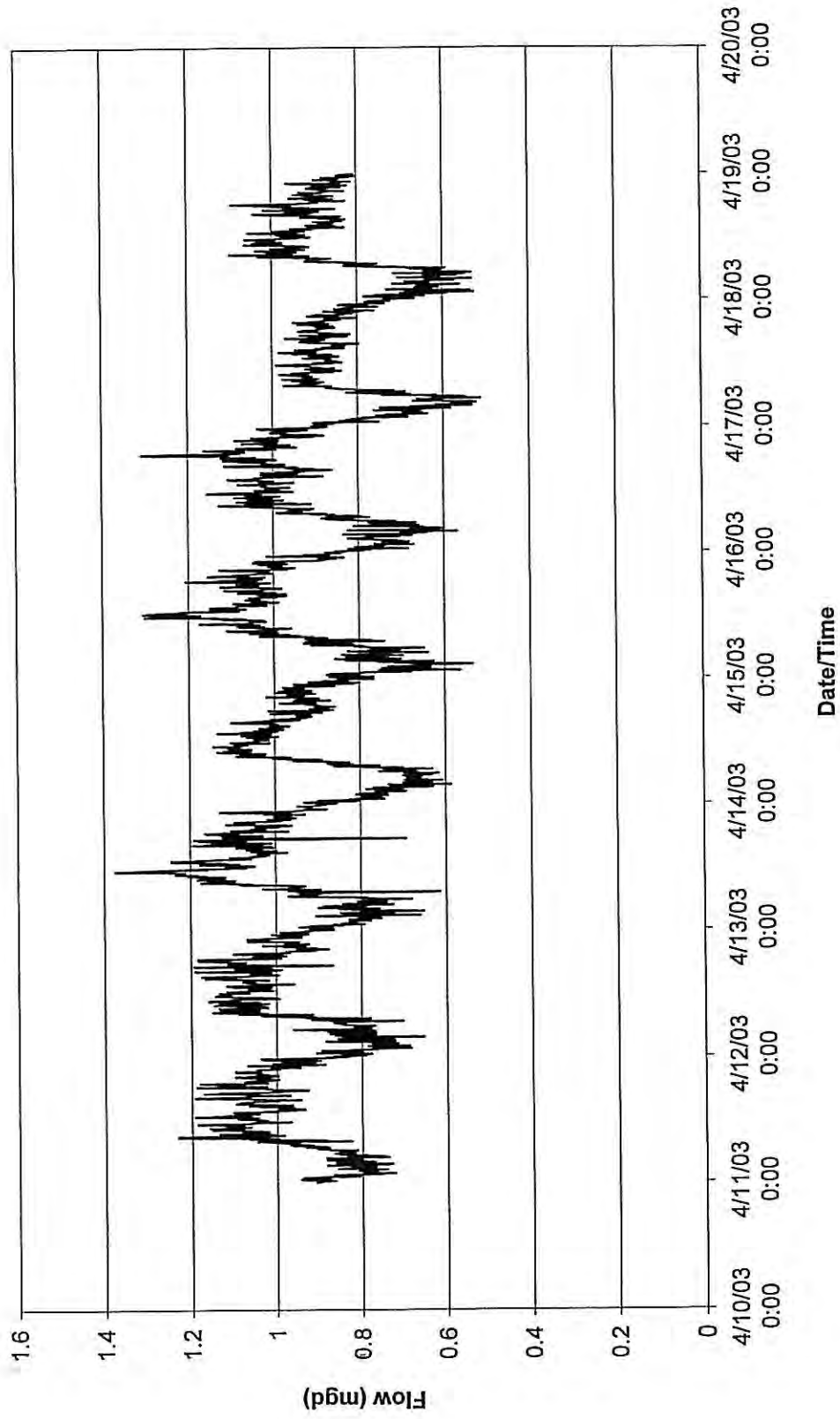
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Dry Weather Flow - April



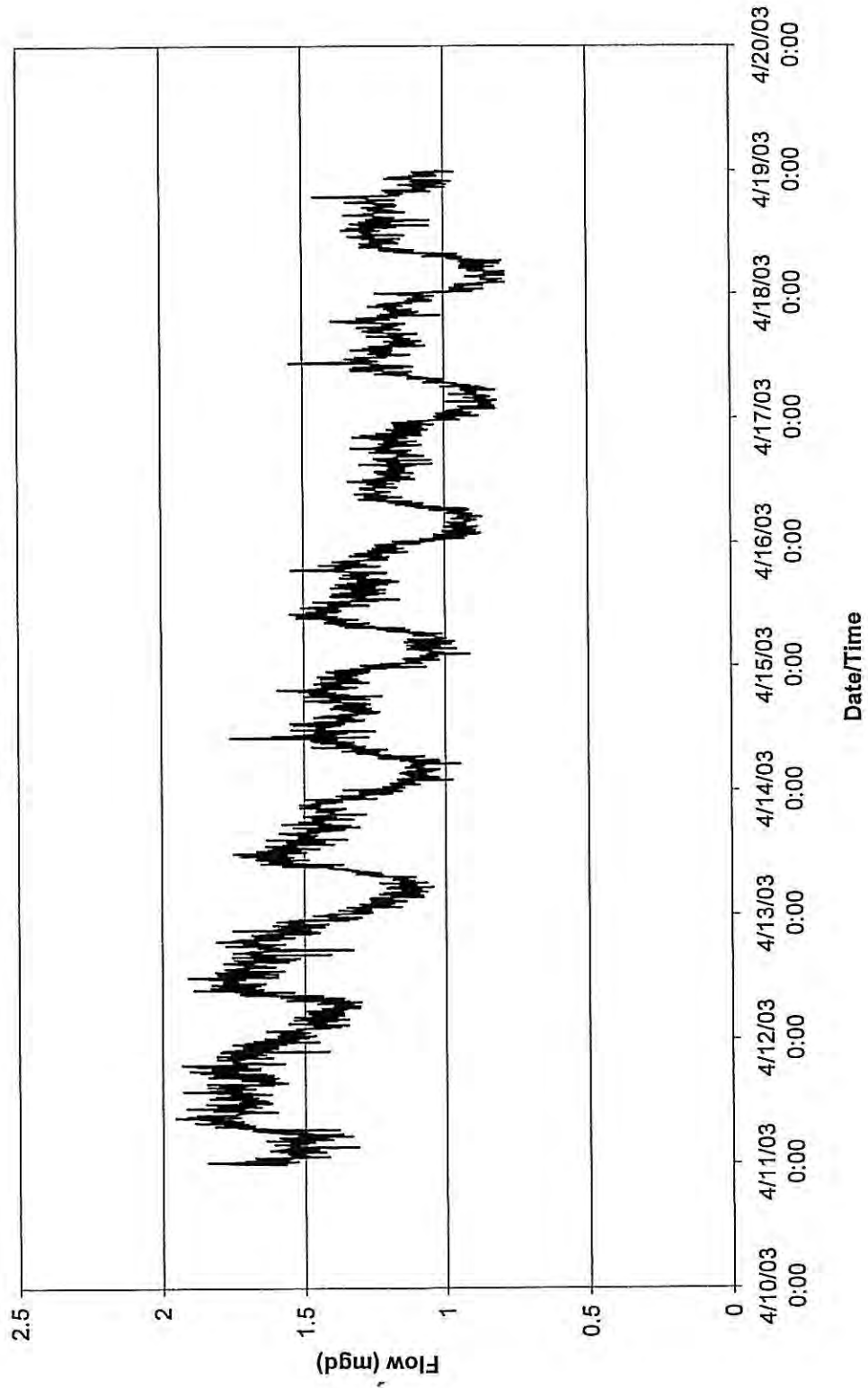
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Dry Weather Flow - April



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Dry Weather Flow - April



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Dry Weather Flow - April



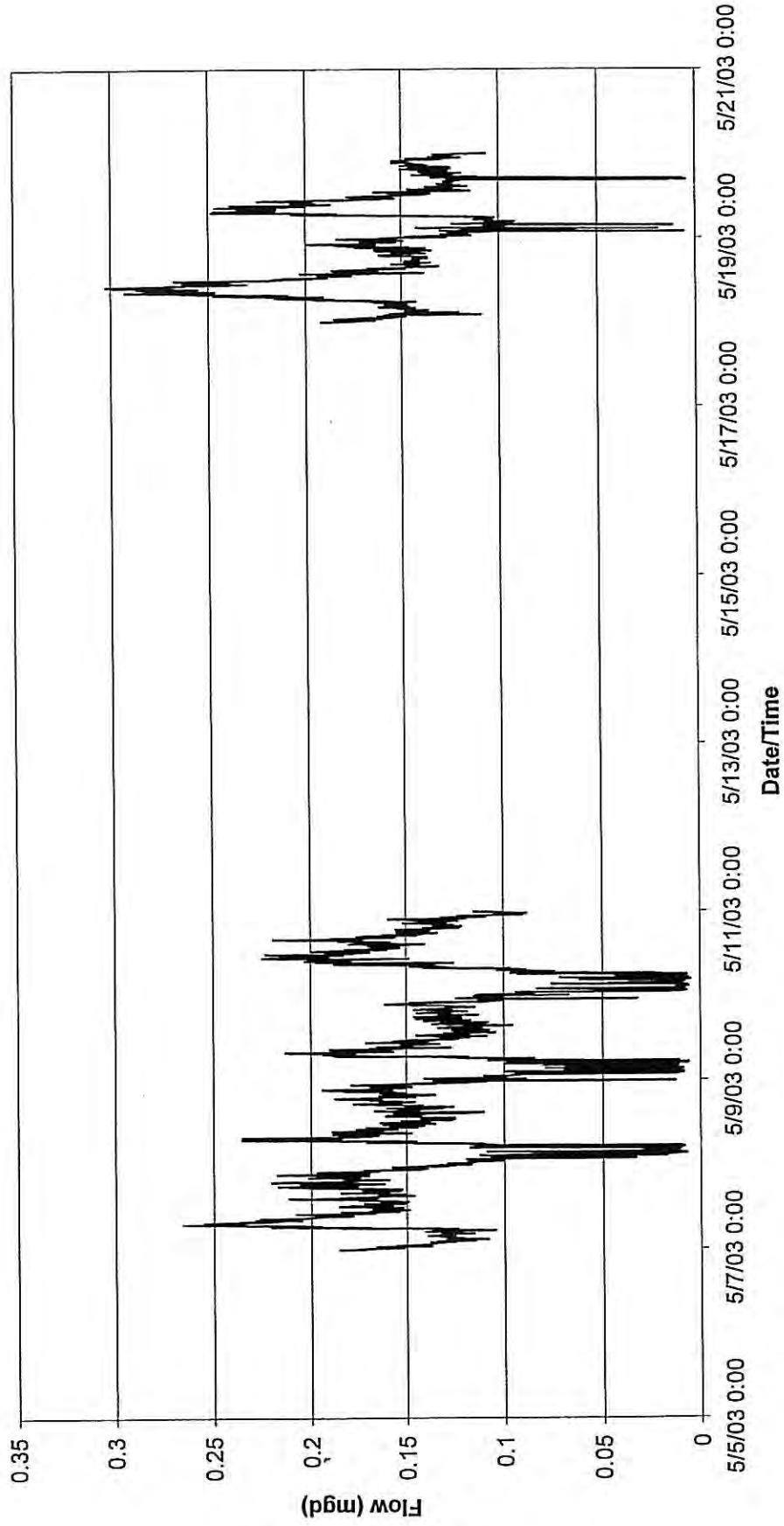
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Dry Weather Flow Calculations
Time Period: May 2003

Metered Subarears							
Meter Name	Detailed I/I Investigations, 1999-2001	Theoretical DWF		Average DWF		Infiltration	
		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1							
*93rd Street 1 MH south of Cayuga Creek	8,9	0.132	92	0.144	100	0.012	8
* 91st Street and Luick Avenue	3,4,5,6,7,8,9	0.273	190	0.359	249	0.086	60
Mang Avenue and 88th Street	1,2,3,4,5,6,7,8,9	0.333	231	0.453	315	0.120	83
MH-4							
80th Street and Lindbergh Avenue	4	0.081	56	0.164	114	0.083	58
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.224	156	0.369	256	0.145	101
*Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.420	292	0.592	411	0.172	119
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.691	480	1.069	743	0.378	263
MH- 6							
66th Street and Frontier Avenue	All MH- 6 Area	0.446	310	1.117	776	0.671	466
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.340	236	0.939	652	0.599	416
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.00	0.00	0.00	0.00	0.00	0.00

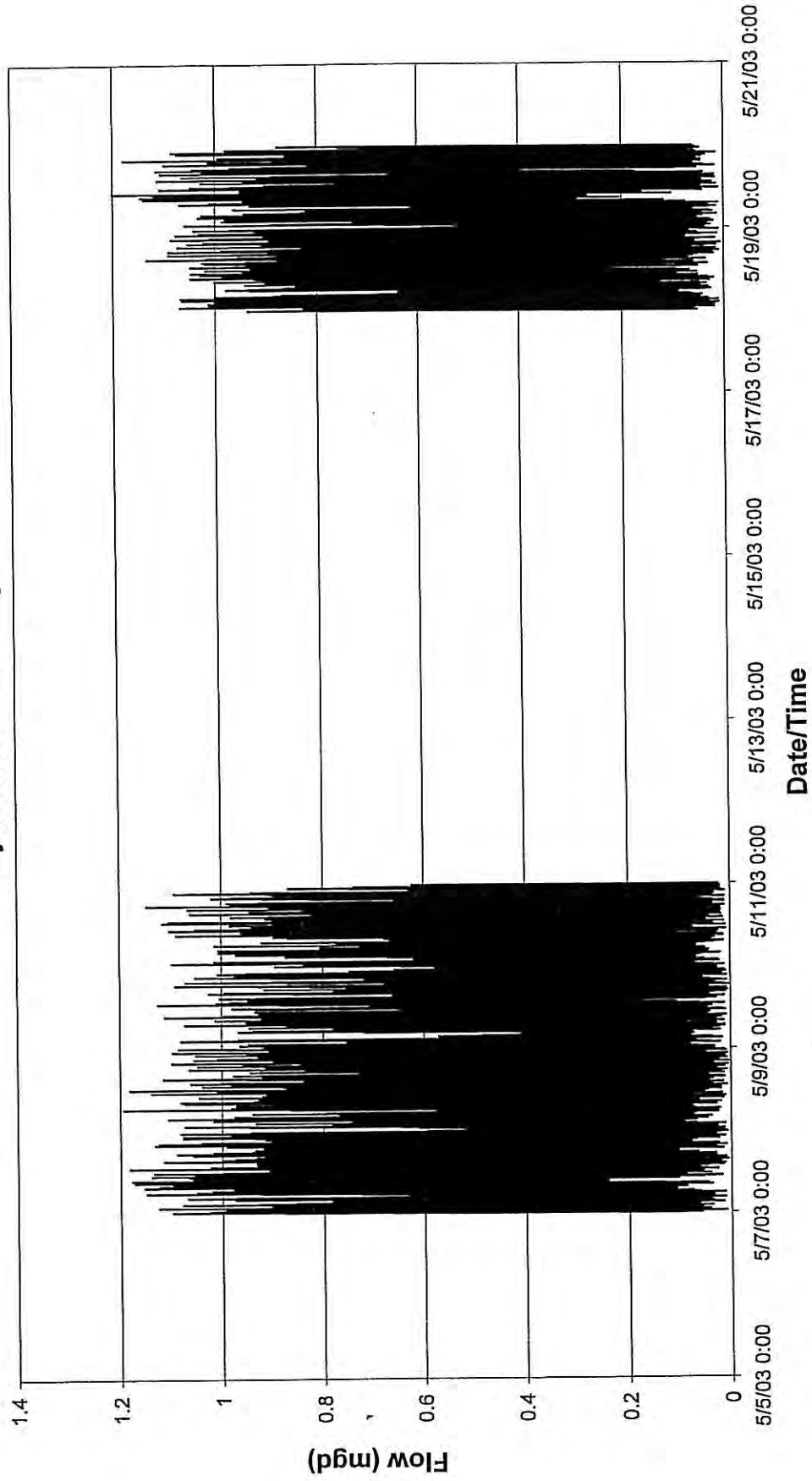
Metered Subarears									
Areas	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Theoretical DWF		Average DWF		Infiltration		
			(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)	
MH-1	A	8,9	0.132	92	0.144	100	0.012	8.2	
	B	3,4,5,6,7	0.141	98	0.215	149	0.074	51.6	
	C	1,2	0.060	42	0.094	65	0.034	23.6	
MH-4	D	4	0.081	56	0.164	114	0.083	57.7	
	E	1,2,3,5,7	0.143	99	0.205	142	0.062	42.9	
	F	8	0.047	33	0.108	75	0.061	42.7	
	G	6	0.087	60	0.139	97	0.052	36.1	
	H	1,2,3,4	0.106	74	0.177	123	0.071	49.6	
MH-6	I	5,6,7,8,9,10,11,12	0.340	236	0.939	652	0.599	416.2	

* Some velocity data used in the calculation of average dry weather flow was estimated due to probe malfunction.

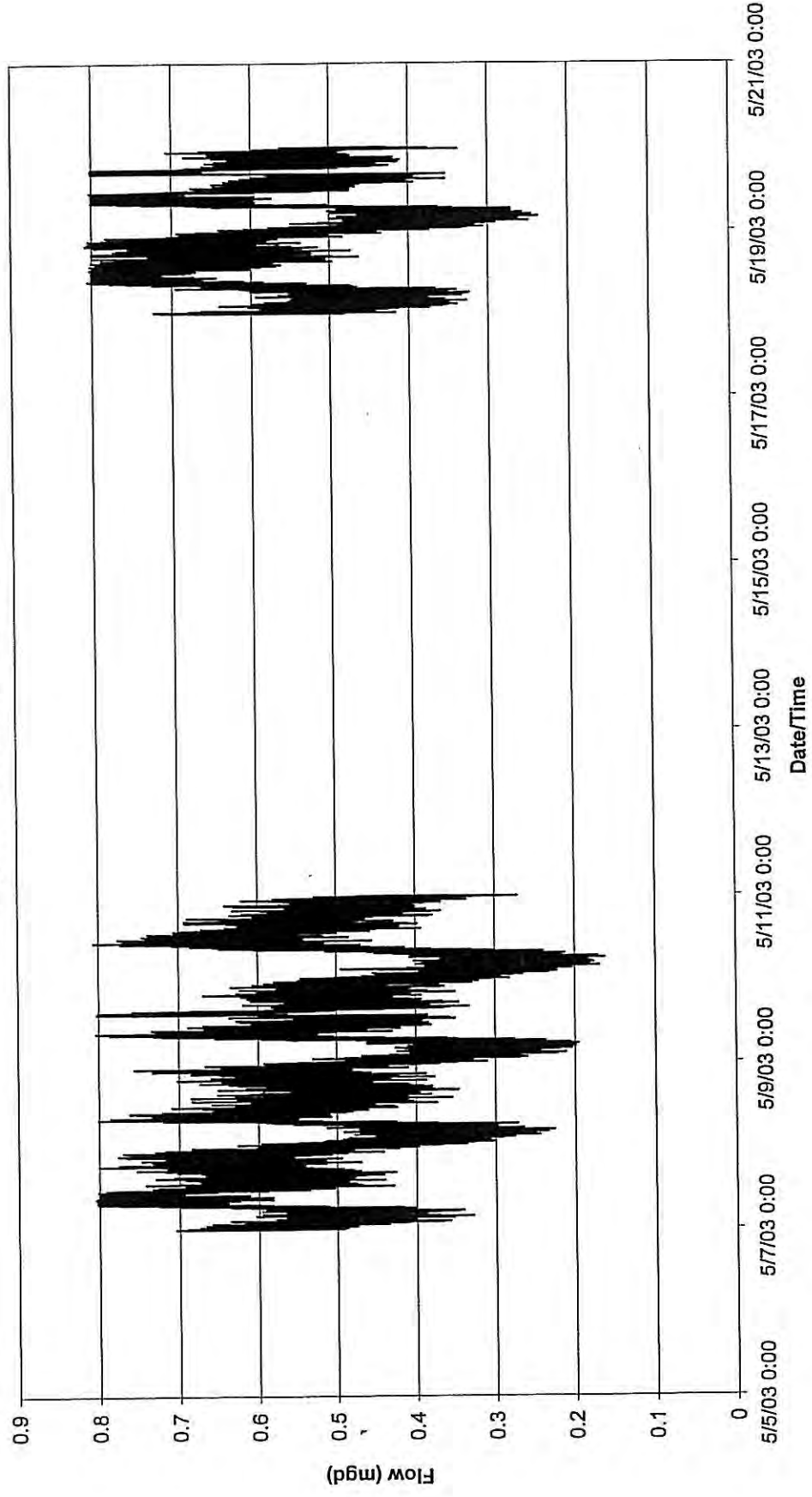
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
May, 2003



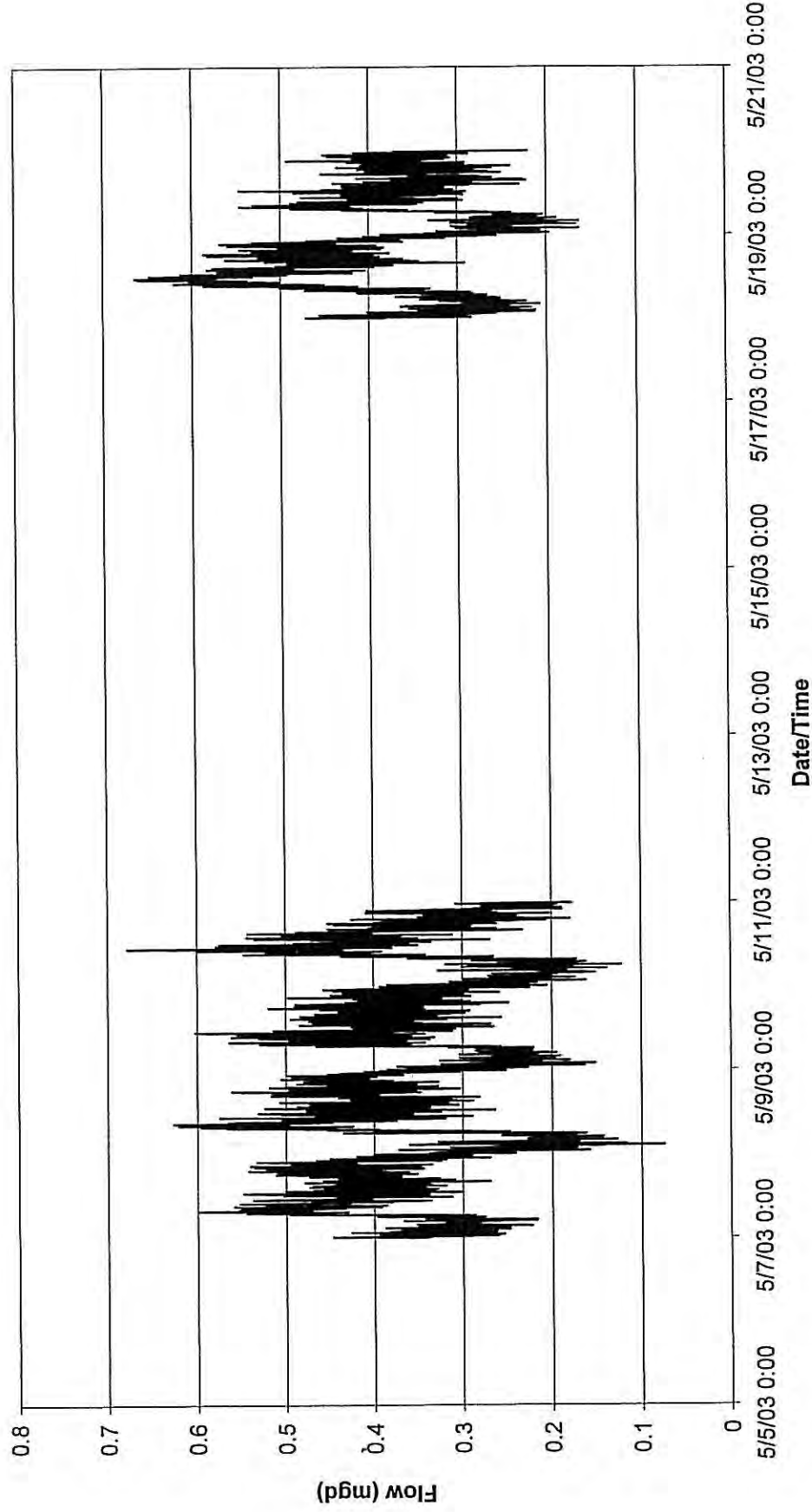
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Dry Weather Flow - May



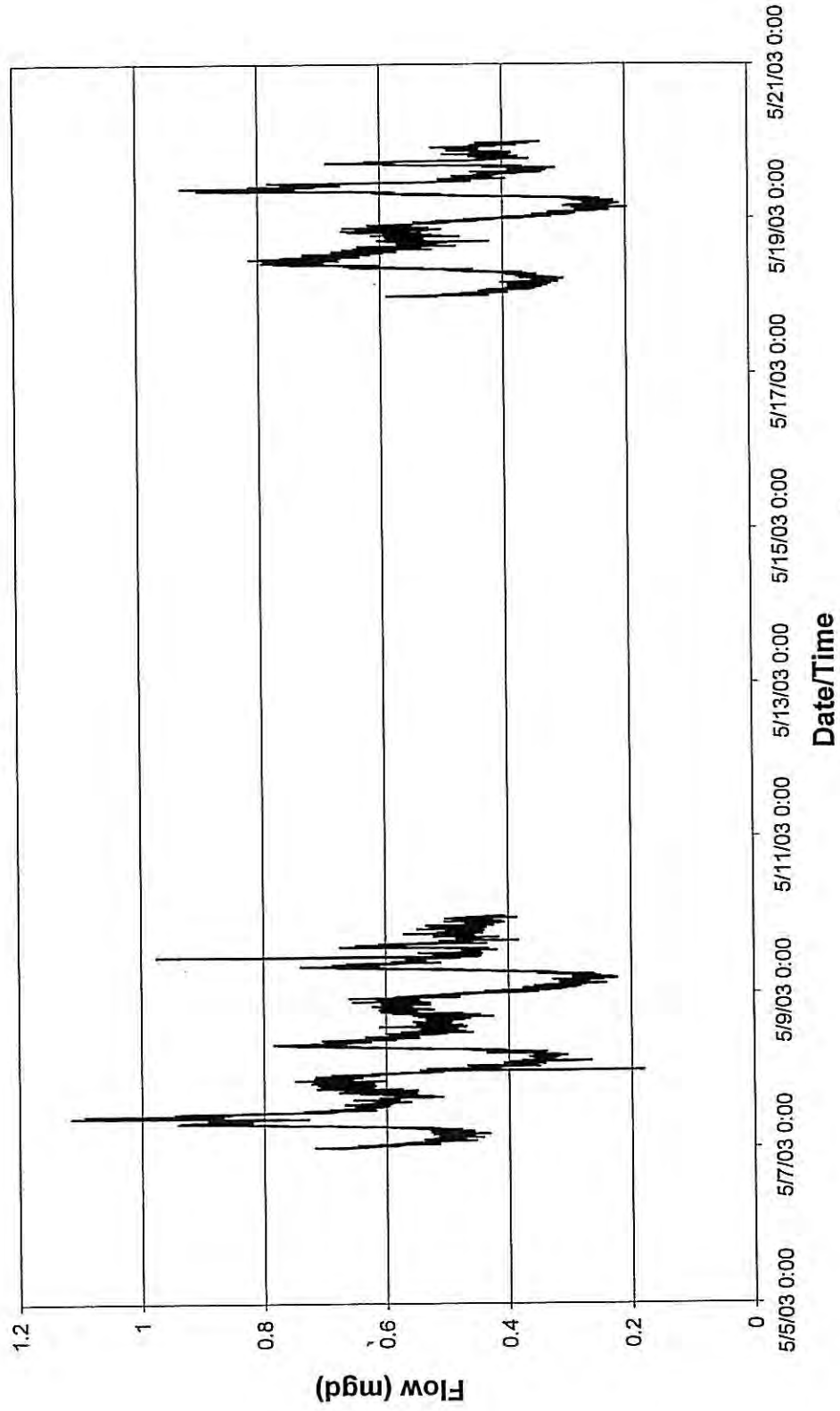
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Dry Weather Flow - May 2003



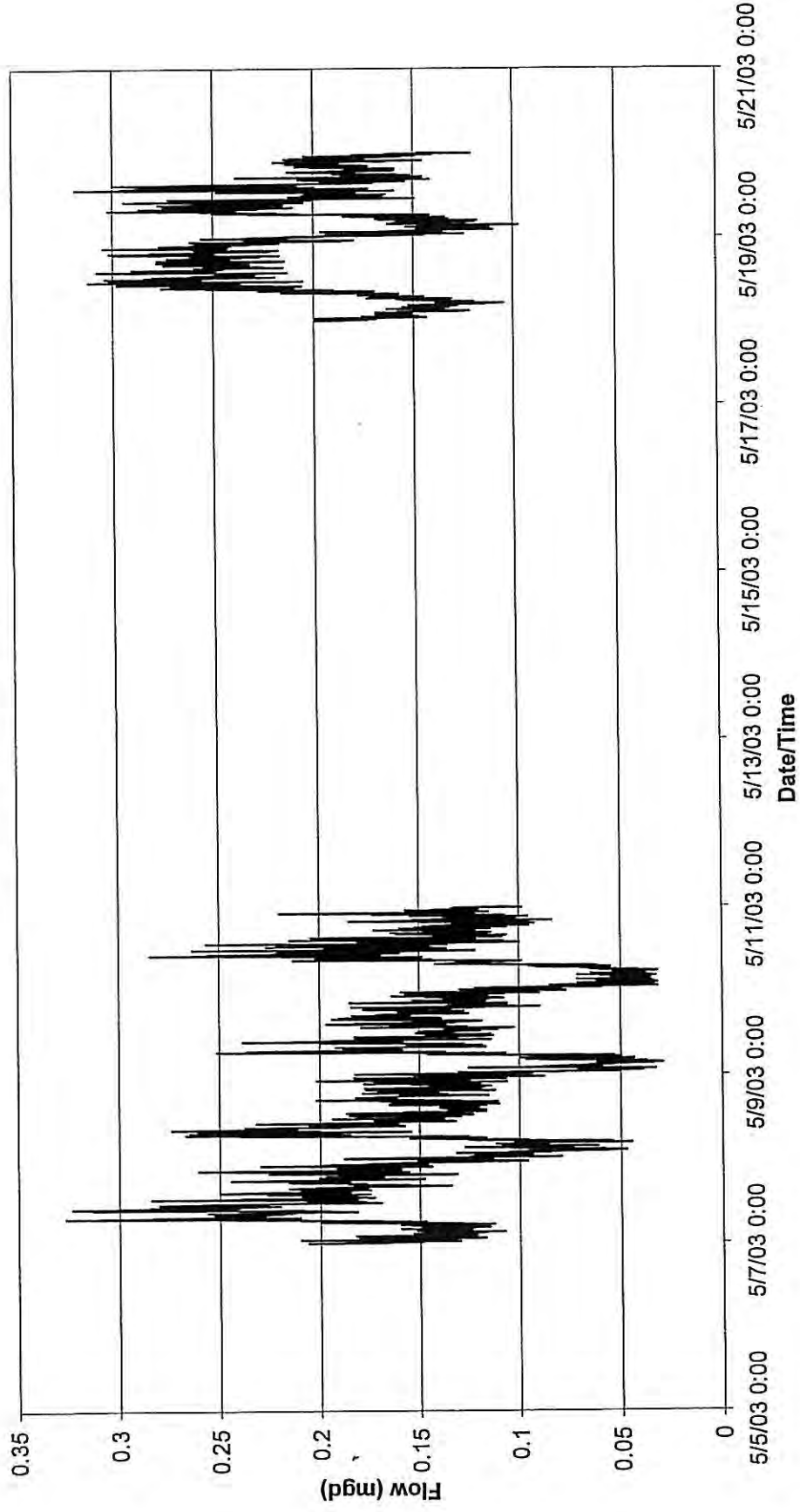
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier
Dry Weather Flow - May



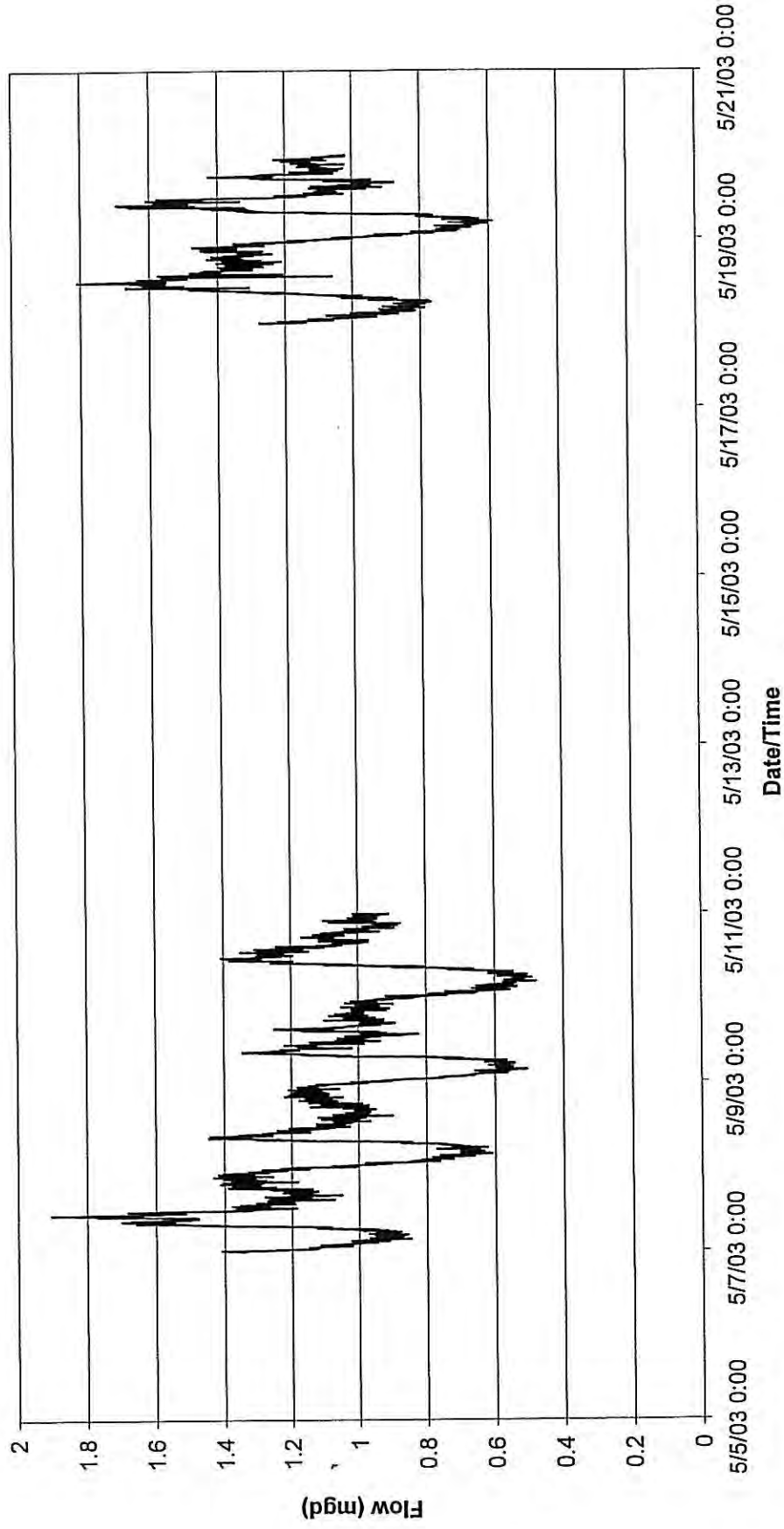
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Flow from East on Frontier Avenue
Dry Weather Flow - May



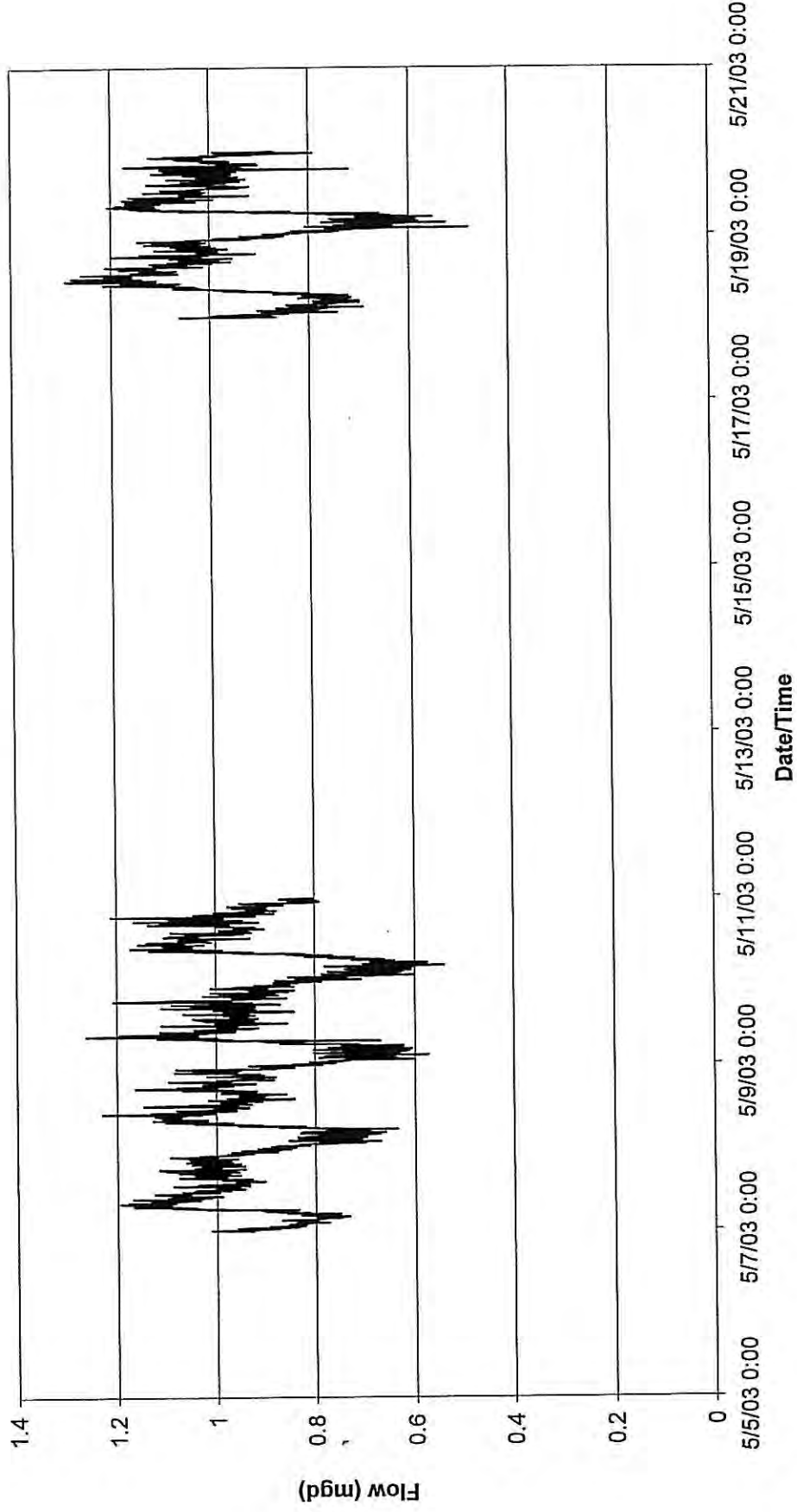
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Dry Weather Flow - May



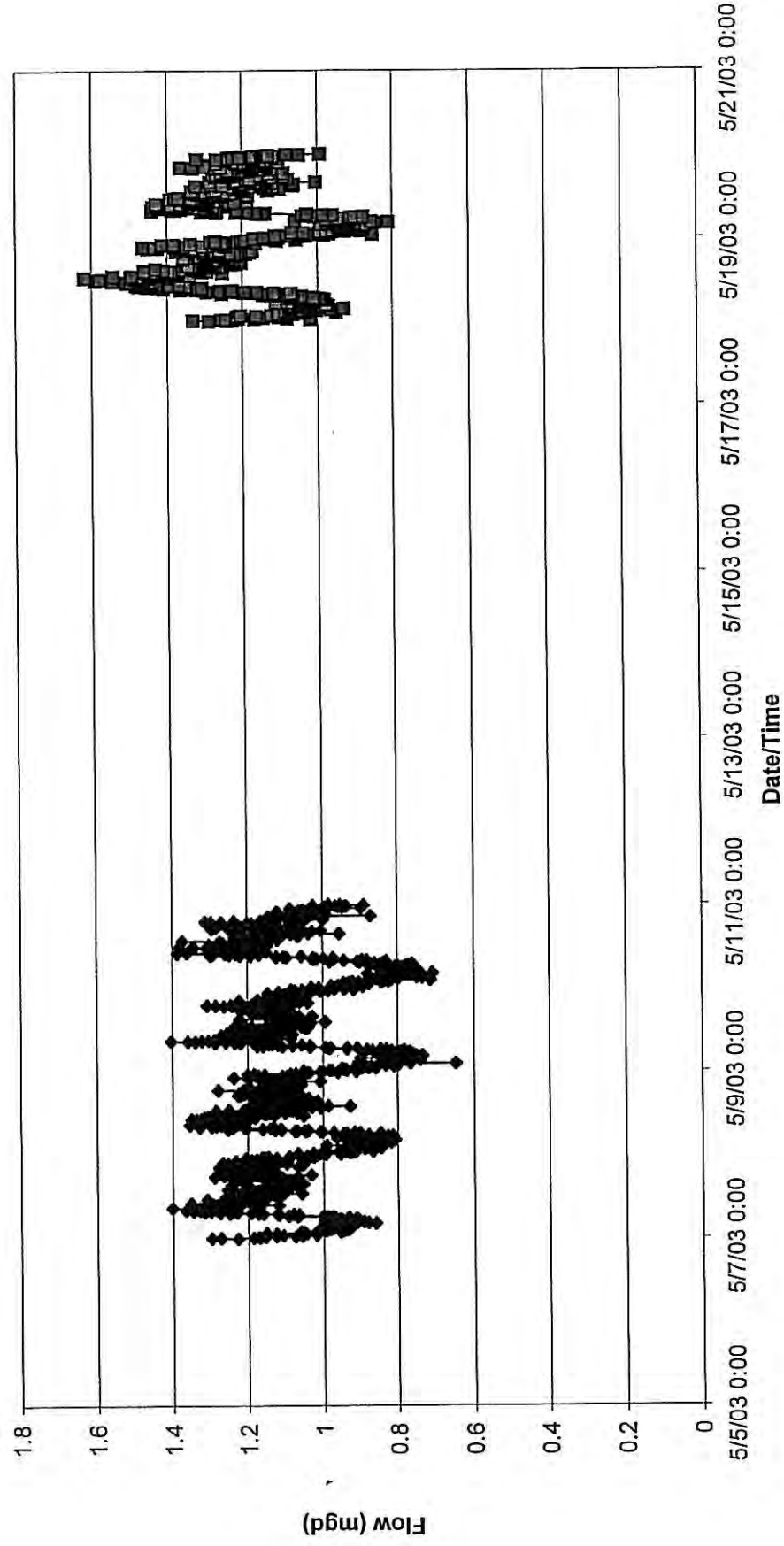
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd and Girard Avenue
Flow on Girard Avenue
Dry Weather Flow - May



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - South of Stephenson Avenue
Dry Weather Flow - May



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th and Frontier Avenue
Flow on 66th Street
Dry Weather Flow - May



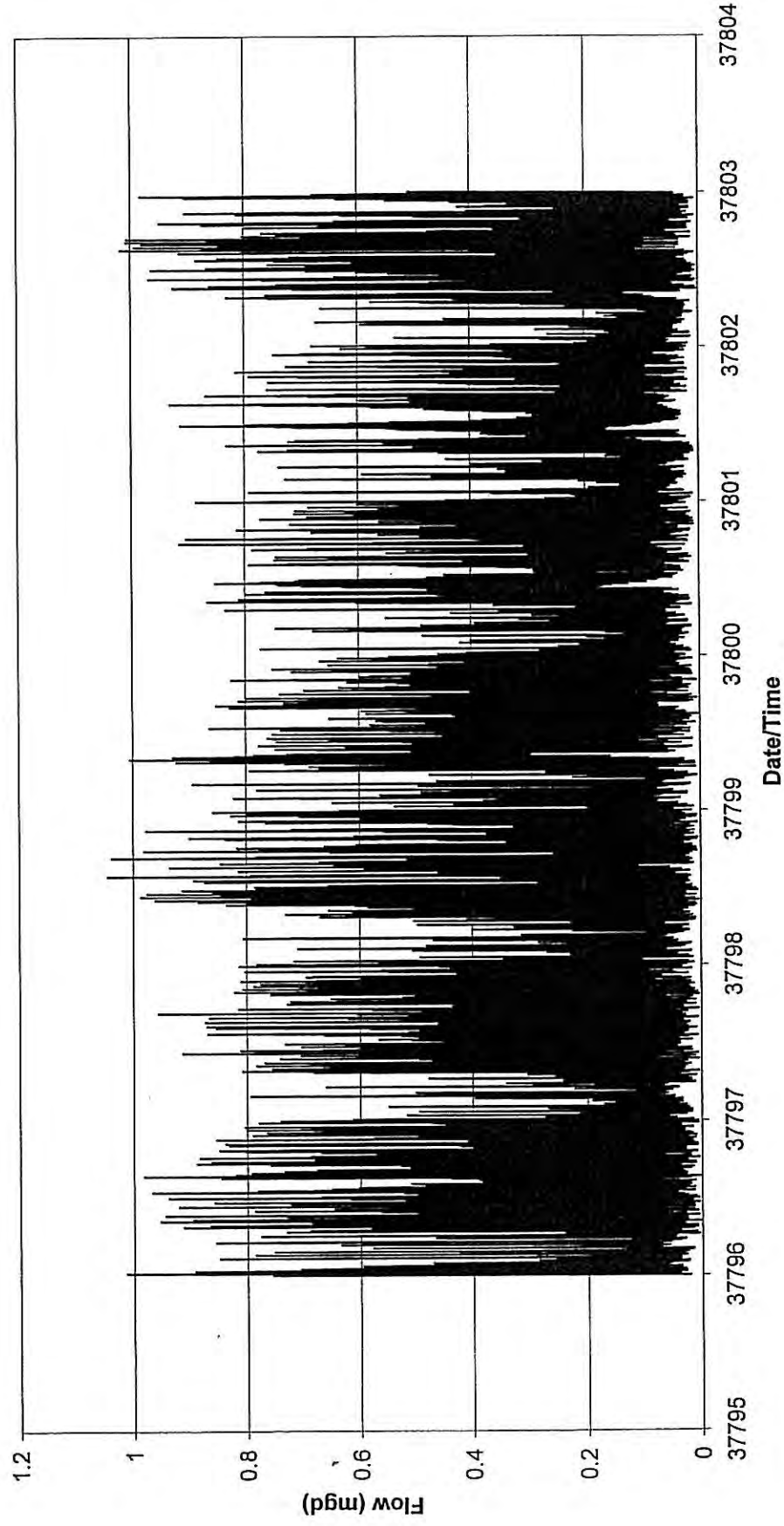
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Dry Weather Flow Calculations
Time Period: June 2003

Metered Subarears							
Meter Name	Detailed I/I Investigations, 1999-2001	Theoretical DWF (mgd)	Theoretical DWF (gpm)	Average DWF (mgd)	Average DWF (gpm)	Infiltration (mgd)	Infiltration (gpm)
MH-1							
93rd Street 1 MH South of Cayuga Creek	8,9	0.132	92	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.273	190	0.309	165	0.036	165
Mang Avenue and 88th Street	1,2,3,4,5,6,7,8,9	0.333	231	0.399	239	0.066	239
MH-4							
80th Street and Lindbergh Avenue	4	0.081	56	0.104	72	0.023	16
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.224	156	0.249	173	0.025	17
* Frontier Avenue, Flow from East of 81st Street	6, MH-1	0.420	292	0.479	333	0.059	41
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.691	480	0.796	553	0.105	73
MH-6							
66th Street and Frontier Avenue	All MH-6 Area	0.446	309.72	0.805	559	0.36	249.23
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.340	236	0.672	467	0.332	231
81st Street, Cross Over Pipe	LS-6/LS-1	0.00	0.00	0.00	0.00	0.00	0.00

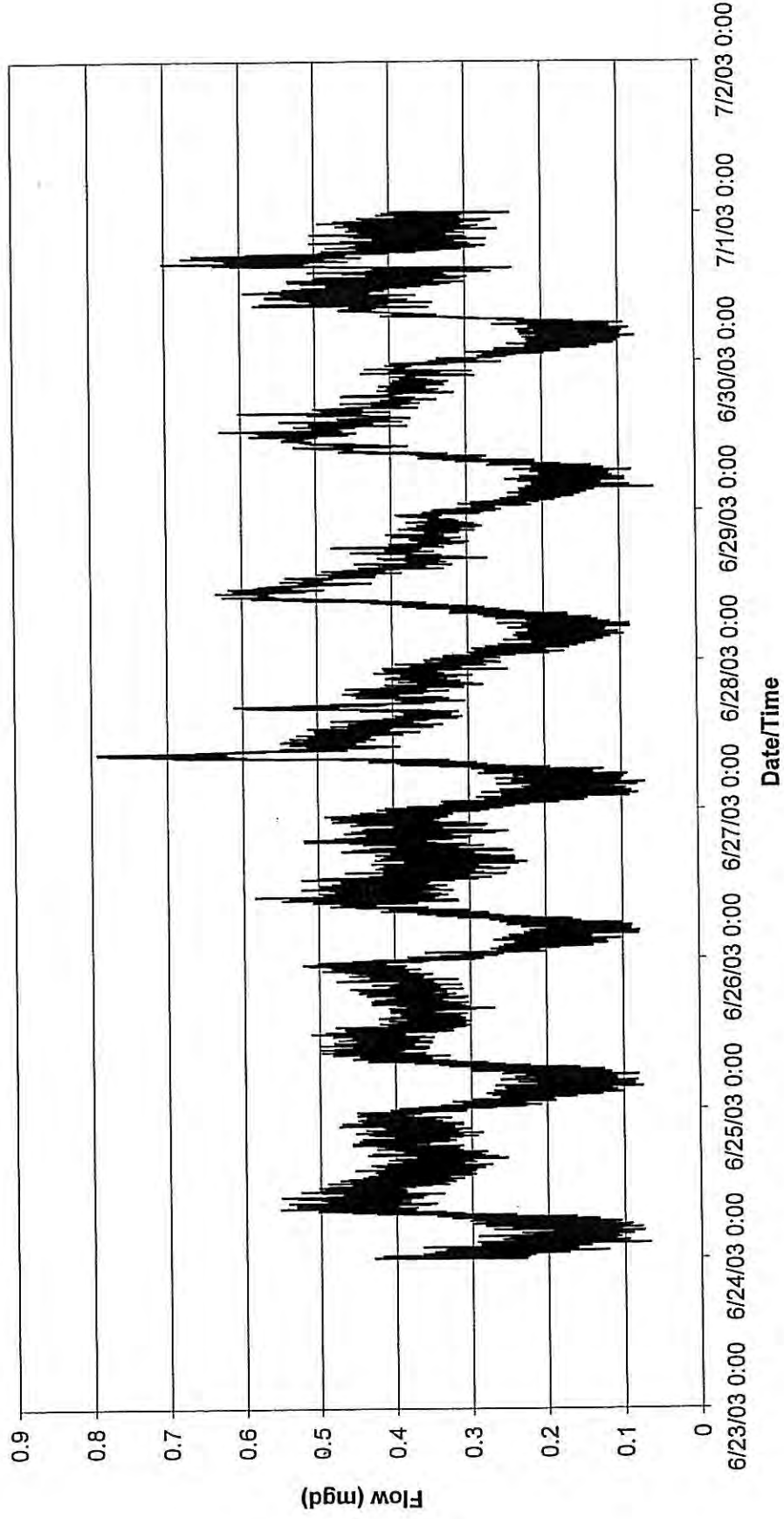
Metered Subarears							
Areas	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Theoretical DWF (mgd)	Theoretical DWF (gpm)	Average DWF (mgd)	Average DWF (gpm)	Infiltration (gpm)
MH-1	A	8,9	0.132	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	0.141	No Data	No Data	No Data	No Data
	C	1,2	0.060	42	0.090	63	21
MH-4	D	4	0.081	56	0.104	72	16
	E	1,2,3,5,7	0.143	99	0.145	101	1
	F	8	0.047	33	0.068	47	14
	G	6	0.087	60	0.080	56	-5
	H	1,2,3,4	0.106	310	0.133	559	249
MH-6	I	5,6,7,8,9,10,11,12	0.340	236	0.672	467	231

*Some velocity data used in the calculation of the average dry weather flow was estimated due to probe malfunctioning.

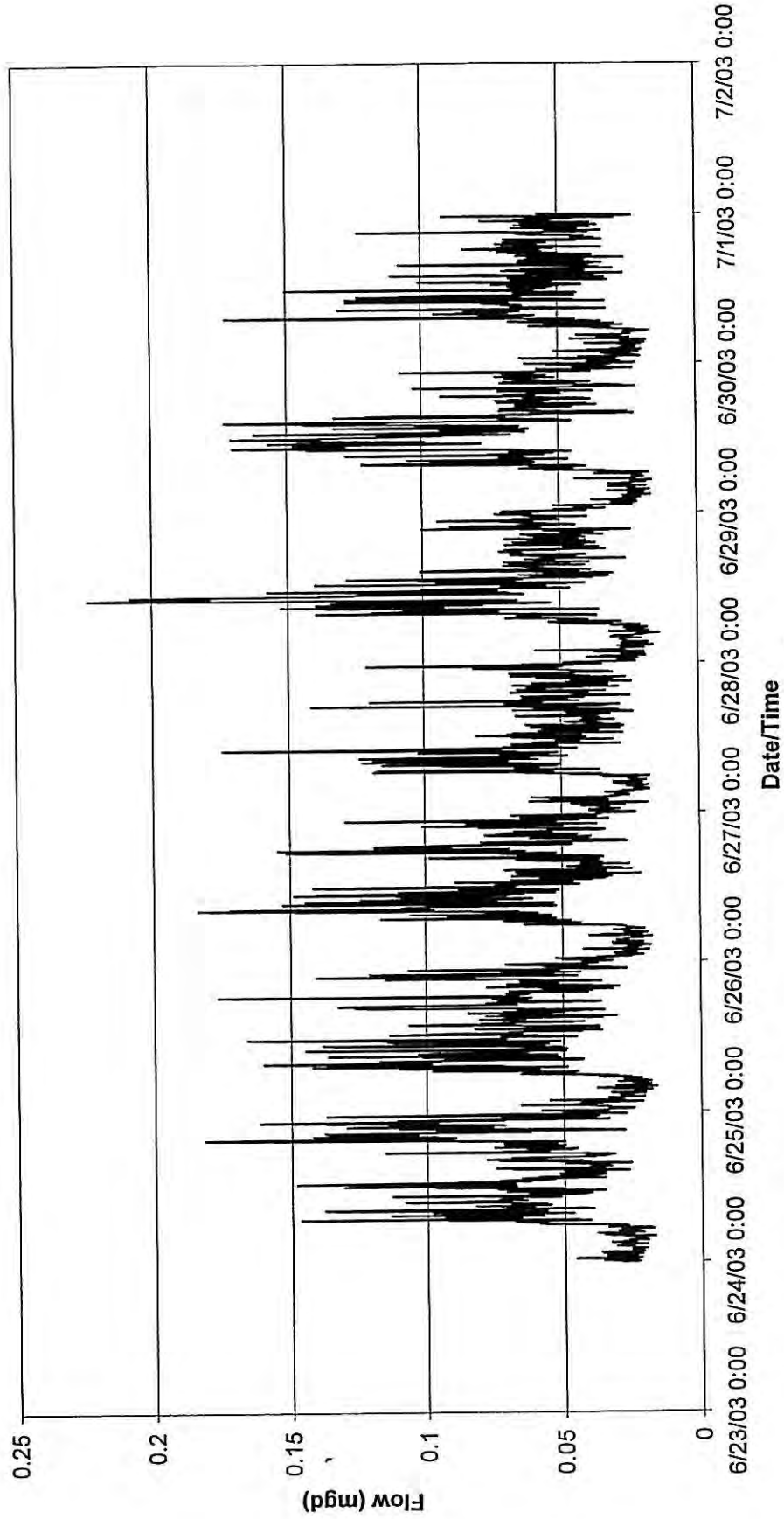
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Dry Weather Flow - June



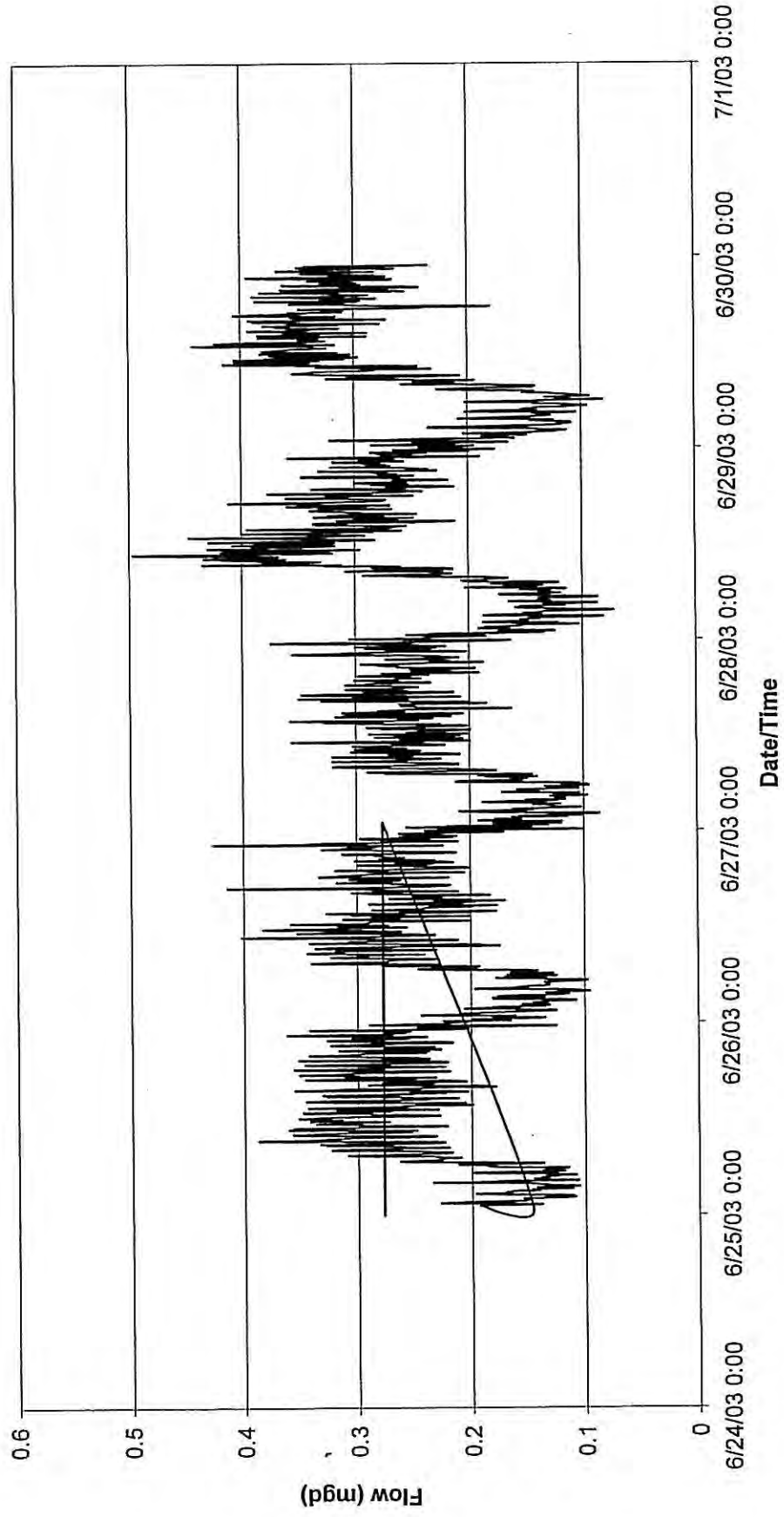
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Mang Avenue and 88th Street
Flow on Mang Avenue
Dry Weather Flow - June



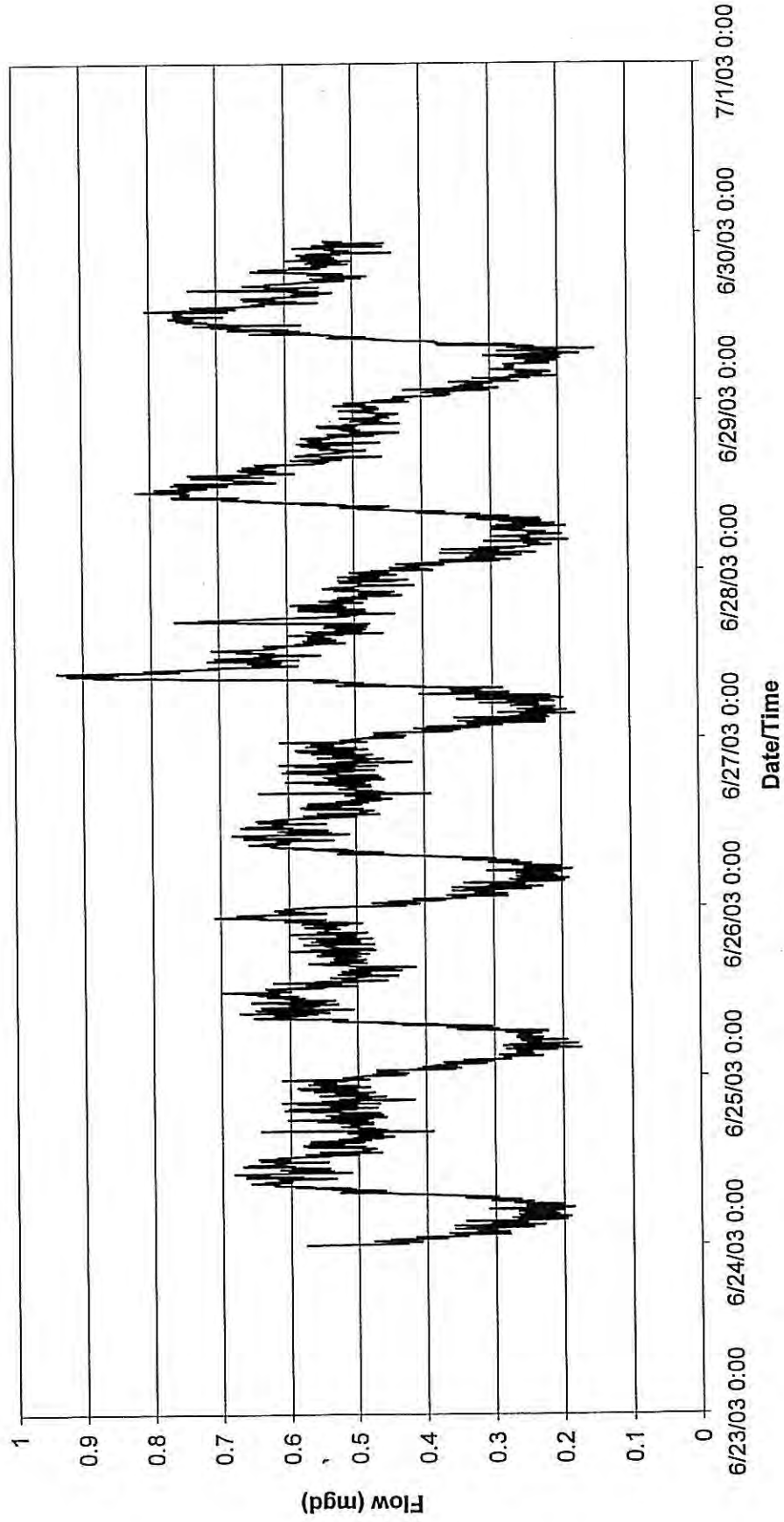
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Dry Weather Flow - June



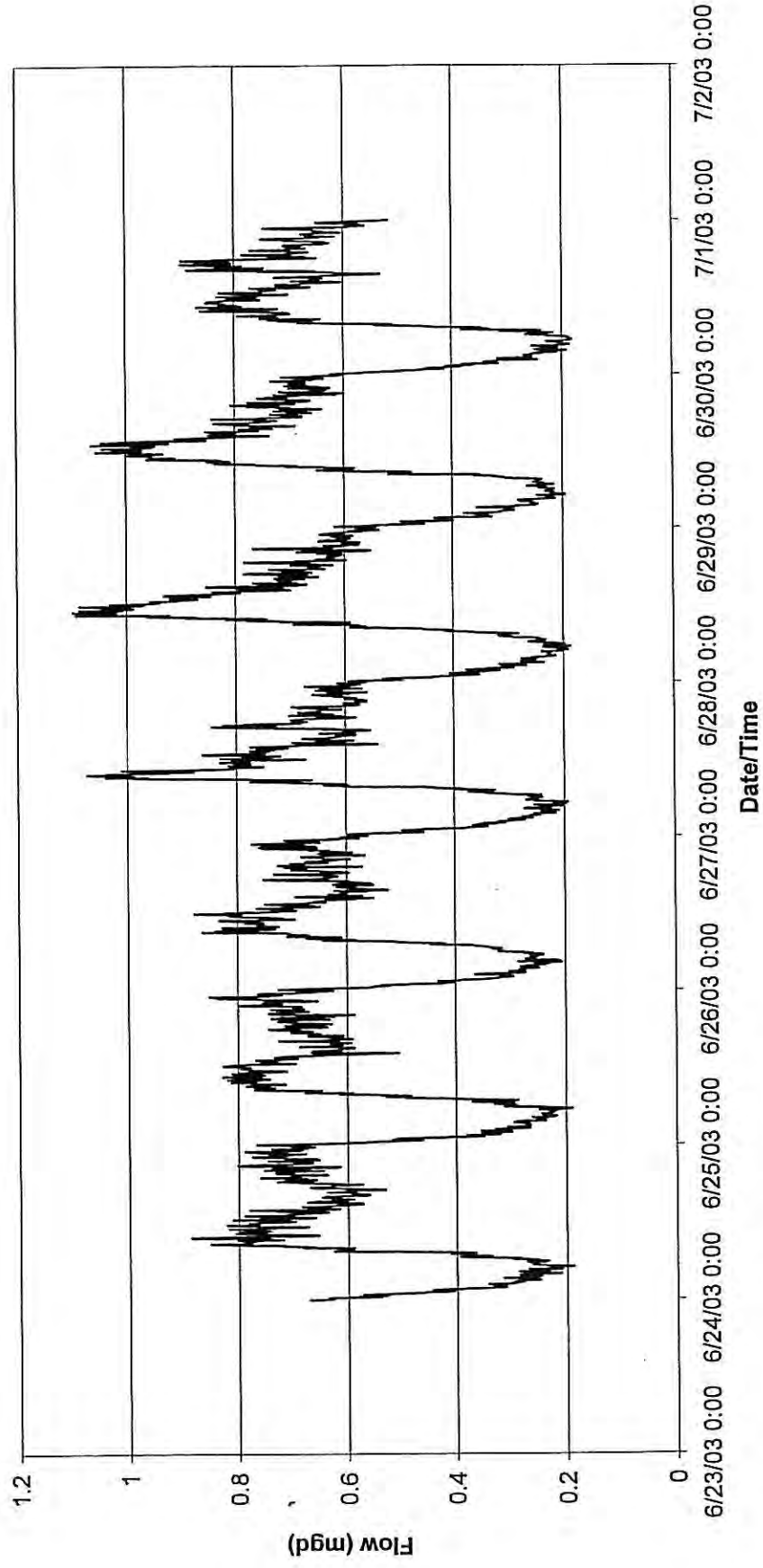
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - North of Frontier Avenue
Flow on 81st Street
Dry Weather Flow - June



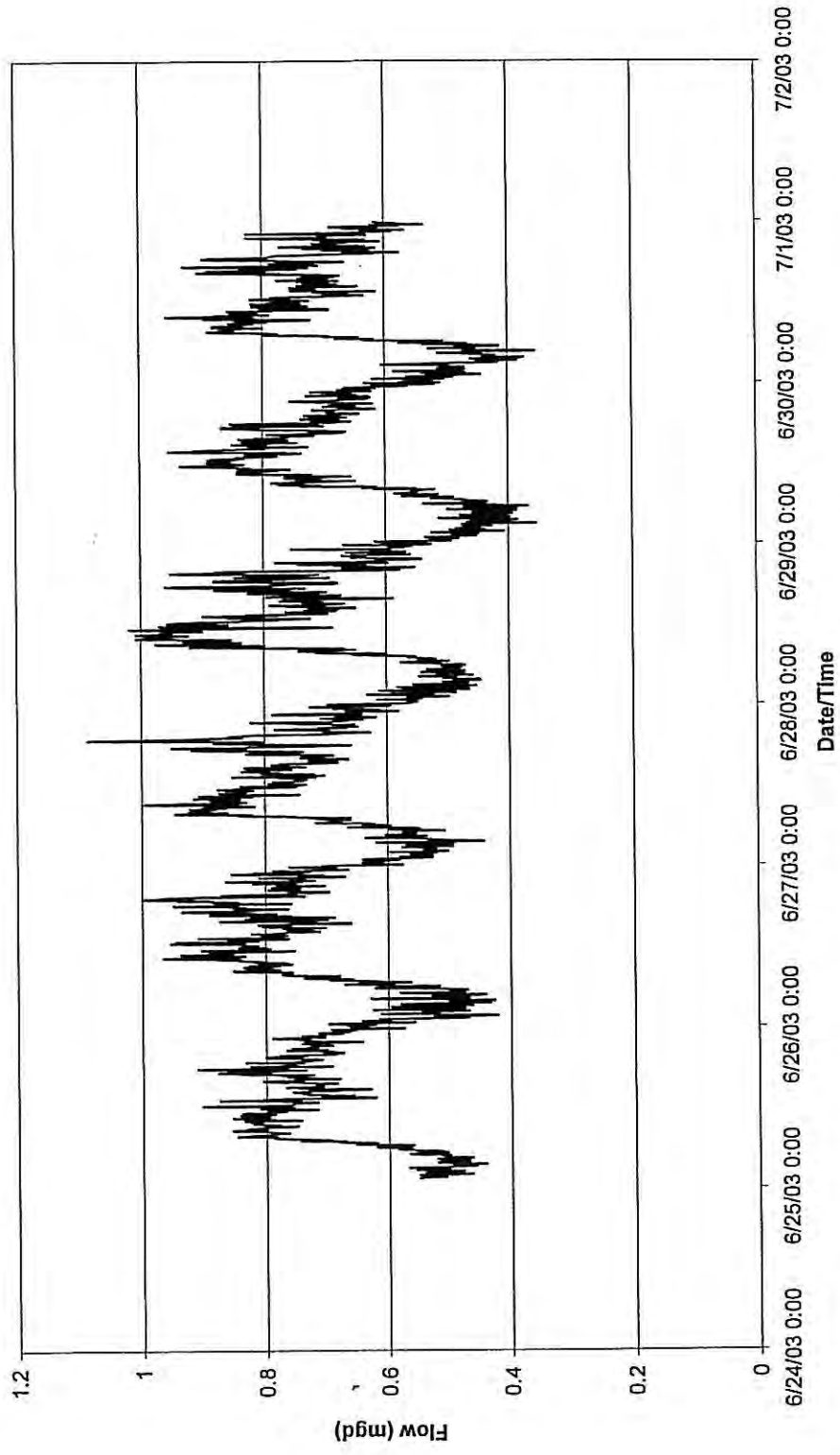
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Frontier Avenue - East of 81st Street
Flow on Frontier Avenue
Dry Weather Flow - June



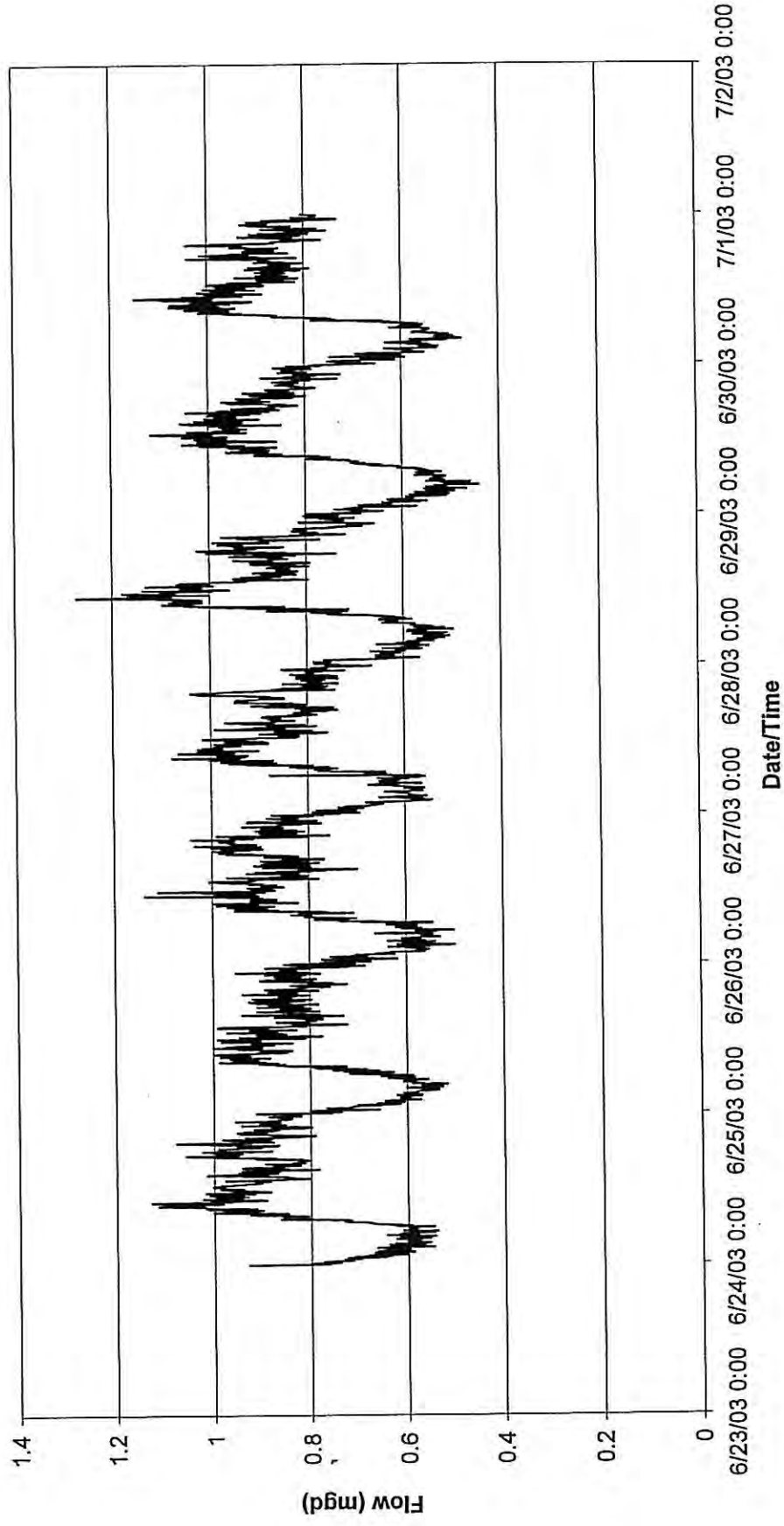
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd and Girard Avenue
Flow on Girard Avenue
Dry Weather Flow - June



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - South of Stephenson Avenue
Flow on 81st Street
Dry Weather Flow - June



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Dry Weather Flow - June



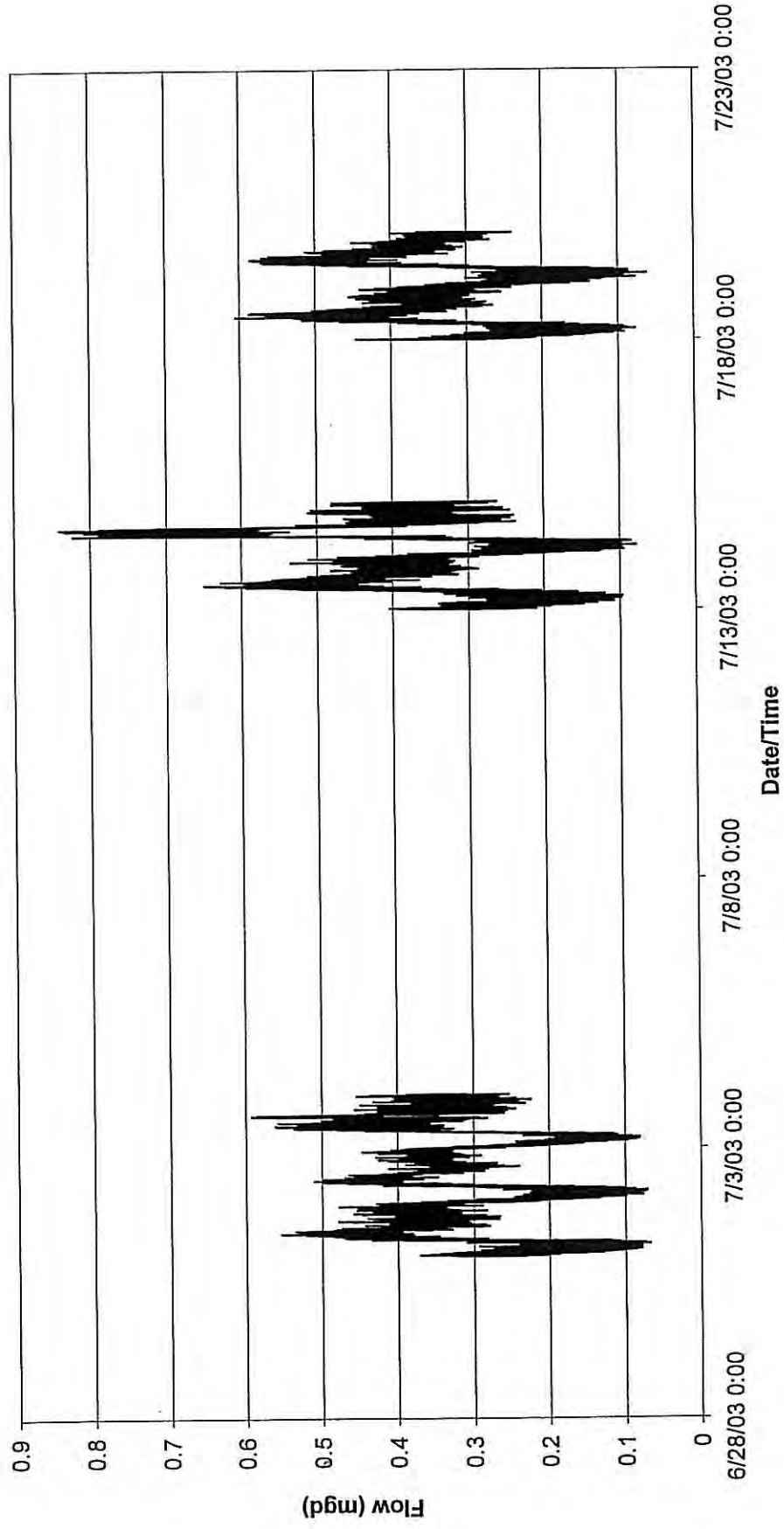
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Dry Weather Flow Calculations
Time Period: July 2003

Metered Subareans													
Meter Name	Detailed I/I Investigations, 1999-2001	Theoretical DWF (mgd)			Average DWF (mgd)			Infiltration (mgd)					
MH-1													
93rd Street 1 MH South of Cayuga Creek	8,9	0.132	92	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.252	175	0.295	205	0.043	30						
Mang Avenue and 88th Street	1,2,3,4,5,6,7,8,9	0.333	231	0.420	292	0.087	60						
MH-4													
Lindbergh Avenue at 80th Street	4	0.081	56	0.103	72	0.022	15						
81st Street North of Frontier Avenue	1,2,3,5,7,4	0.224	156	0.307	213	0.083	58						
*Frontier Avenue East of 81st Street	6, MH- 1	0.420	292	0.568	394	0.148	103						
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.691	480	0.929	645	0.238	165						
MH- 6													
66th Street and Frontier Avenue	All MH- 6 Area	0.446	310	0.849	589	0.403	280						
81st Street, Flow From South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.340	236	0.735	510	0.395	274						
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.00	0.00	0.00	0.00	0.00	0.00						

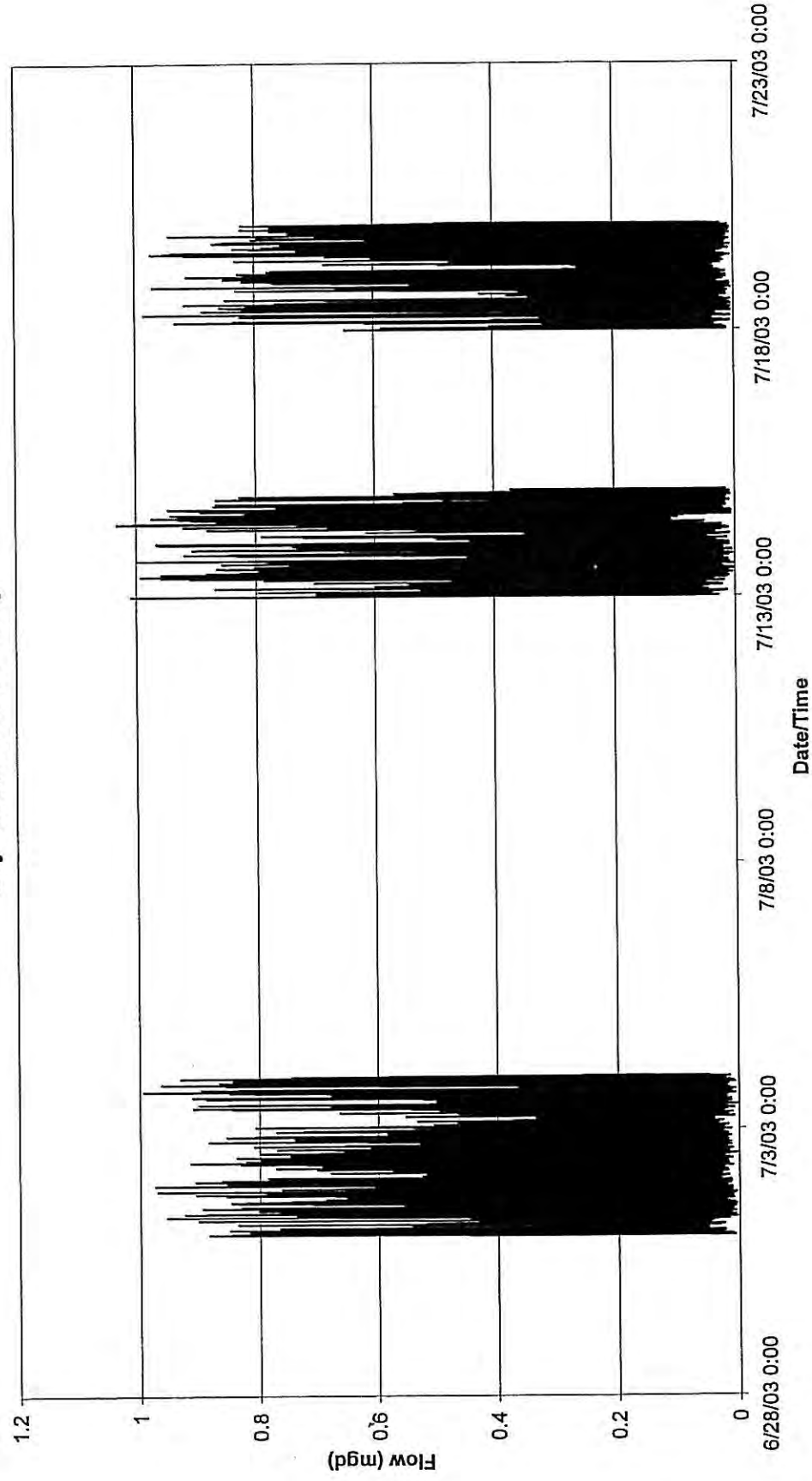
Metered Subareans		Detailed I/I Investigations, 1999-2001						Theoretical DWF (mgd) (gpm)			Average DWF (mgd) (gpm)			Infiltration (mgd) (gpm)		
Areas	Post Rehabilitation Flow Monitoring Assessment, 2003															
MH-1	A	8,9						0.132	92	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7						0.120	83	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2						0.081	56	0.125	87	0.04	31			
MH-4	D	4						0.081	56	0.103	72	0.022	15			
	E	1,2,3,5,7						0.143	99	0.204	142	0.061	42			
	F	8						0.047	33	0.054	38	0.007	5			
	G	6						0.087	60	0.148	103	0.061	42			
	H	1,2,3,4						0.106	74	0.114	79	0.008	5			
MH-6	I	5,6,7,8,9,10,11,12						0.340	236	0.735	510	0.395	274			

*Velocity of some data used in the calculation of the average dry weather flow was estimated due to probe malfunctioning.

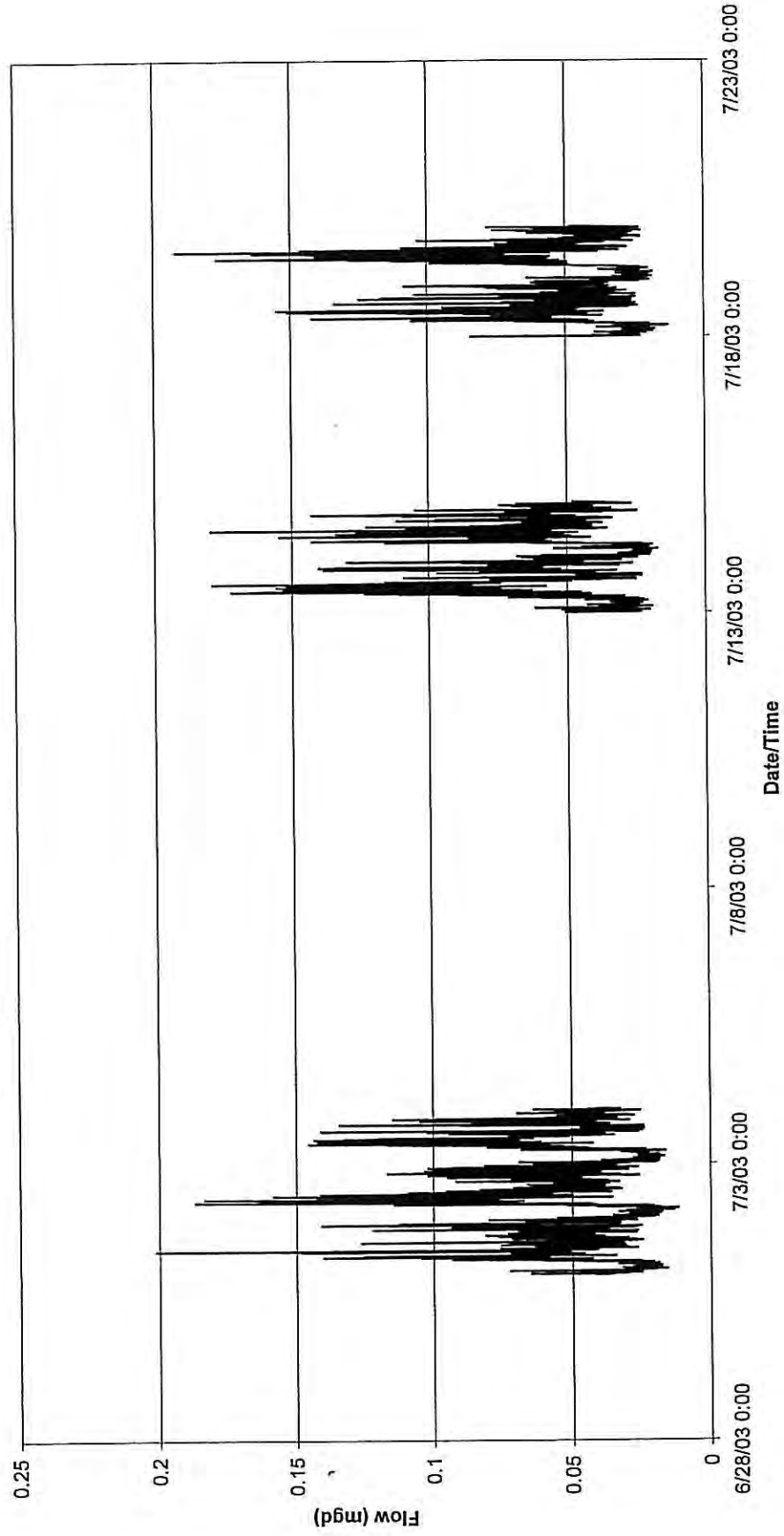
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Mang Avenue and 88th Street
Flow on Mang Avenue
Dry Weather Flow - July



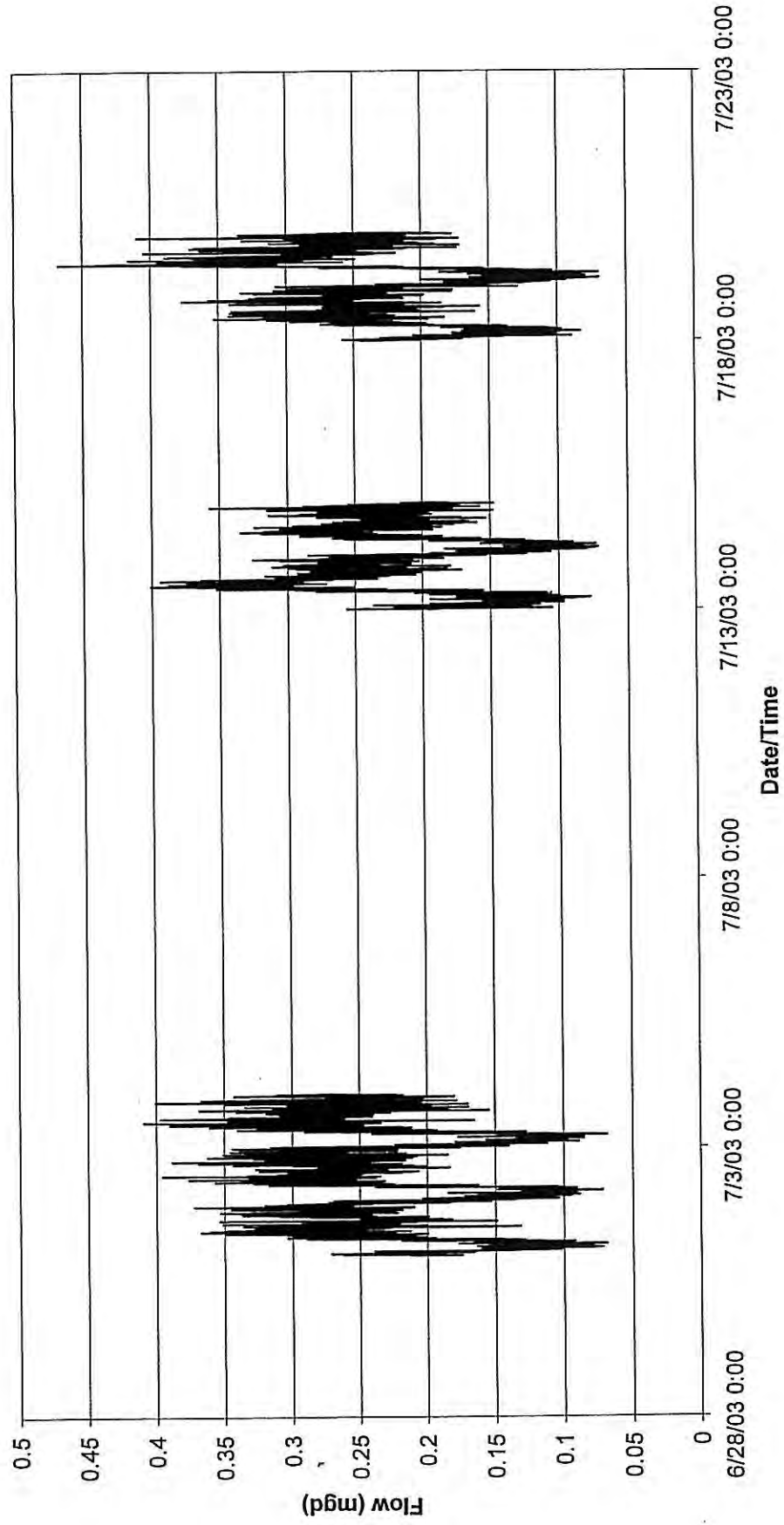
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Dry Weather Flow - July



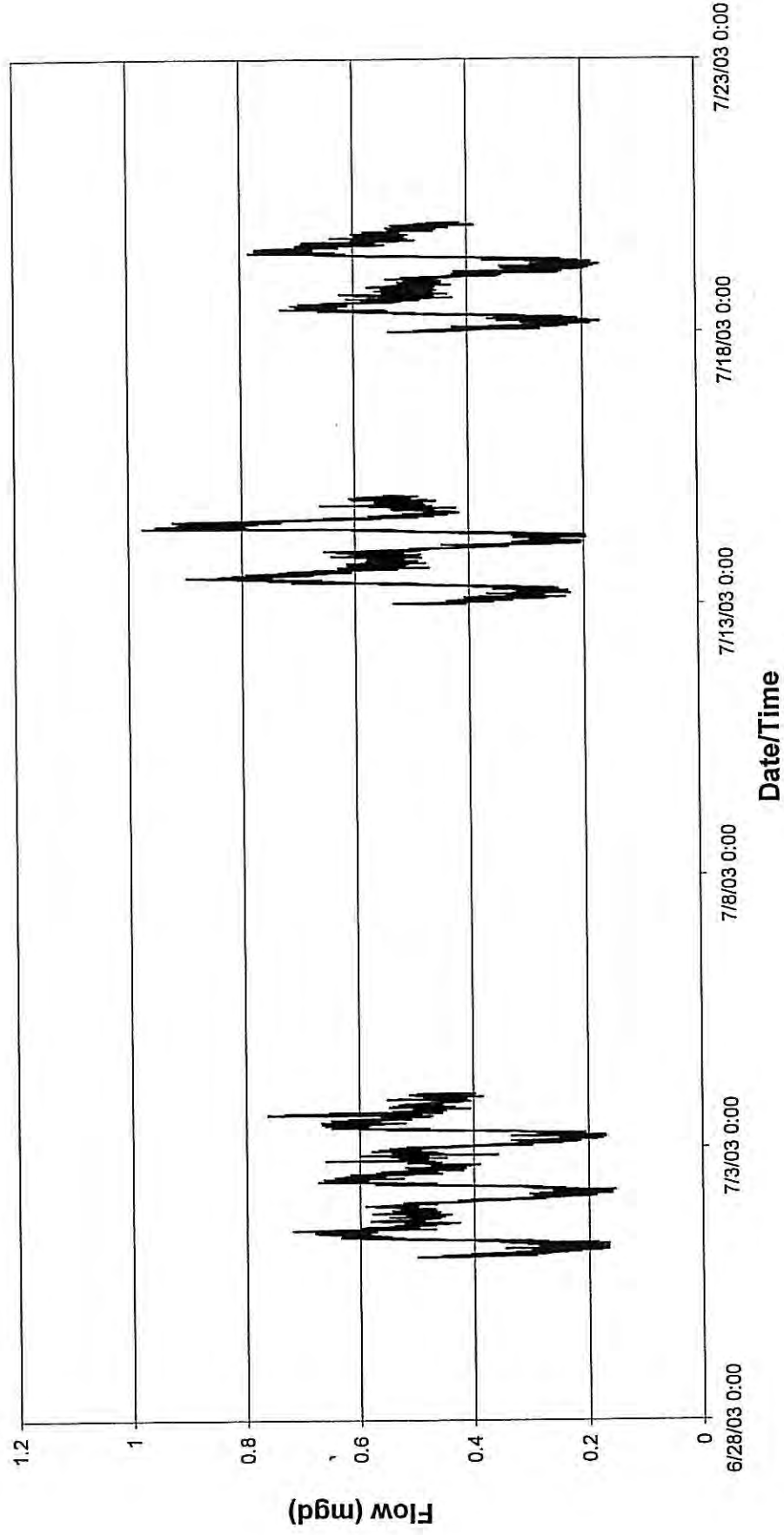
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Dry Weather Flow - July



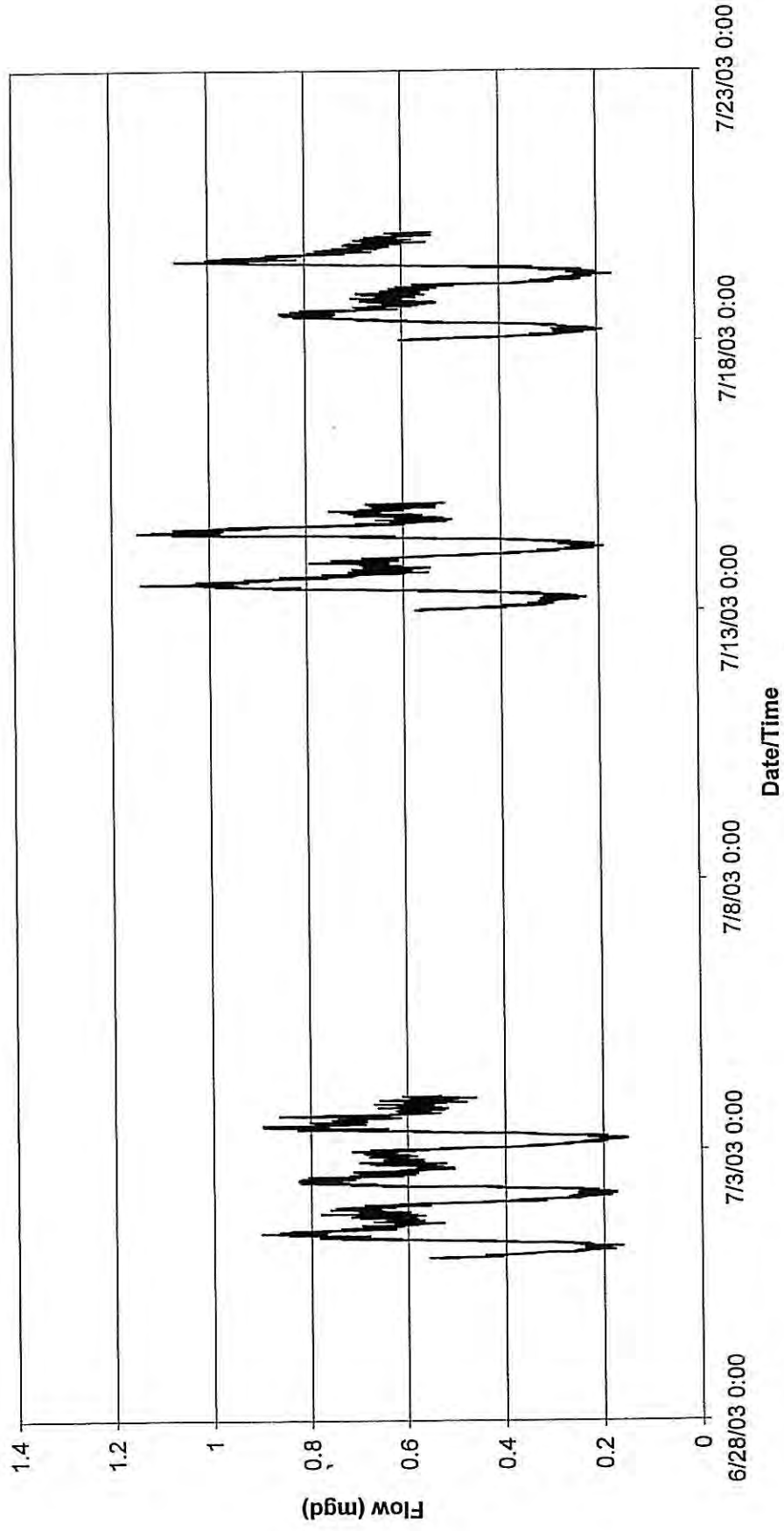
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - North of Frontier Avenue
Flow on 81st Street
Dry Weather Flow - July



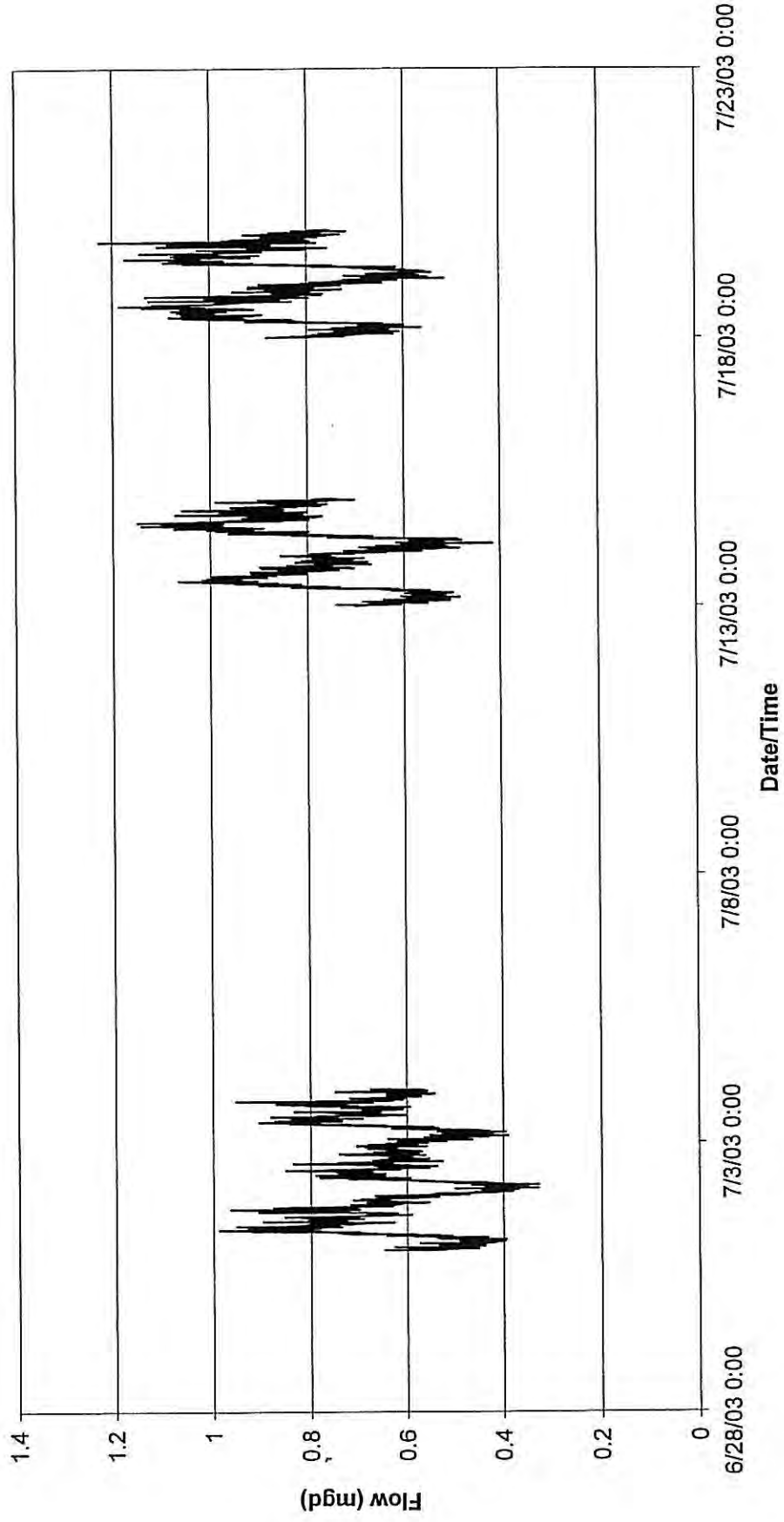
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Frontier Avenue - East of 81st Street
Flow on Frontier Avenue
Dry Weather Flow - July



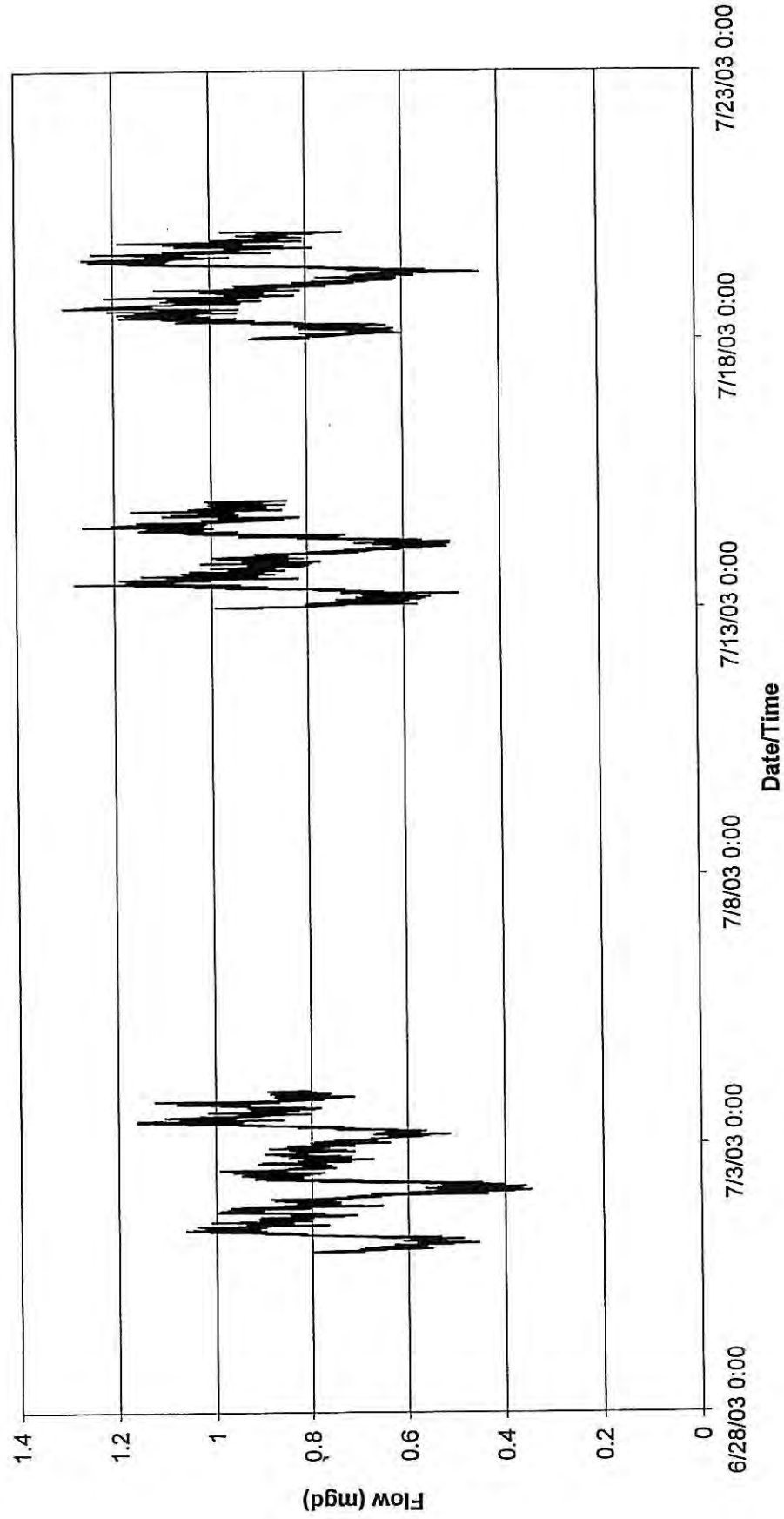
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Dry Weather Flow - July



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - South of Stephenson Avenue
Flow on 81st Street
Dry Weather Flow - July



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Dry Weather Flow - July



ATTACHMENT B.2

NIAGARA FALLS PUBLIC WATER AUTHORITY

POST REHABILITATION FLOW MONITORING ASSESSMENT

WET WEATHER FLOW DATA

Niagara Falls Public Water Authority
Summary of Rain Events During Study Period
April to July 2003

Date of Rain Event	Inches of Rain During Event	Duration of Rain Event (hours)	Peak Hour Rainfall Intensity (Inches/hour)	Average Intensity (inches/hour)
04.06.2003	0.46	2.7	0.22	0.17
05.02.2003	0.55	5.3	0.22	0.10
05.06.2003	0.37	1.1	0.37	0.34
05.11.2003	0.80	1.2	0.79	0.69
05.20.2003	0.58	2.8	0.34	0.20
05.23.2003	0.40	3.9	0.26	0.10
06.04.2003	0.14	11.3	0.12	0.01
06.08.2003	0.73	4.8	0.37	0.15
06.13.2003	0.43	9.3	0.28	0.05
07.05.2003	0.18	0.8	0.72	0.22
07.10.2003	1.57	5.4	0.79	0.29
07.15.2003	0.54	2.2	0.41	0.25
07.21.2003	0.70	13.3	0.41	0.05

Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
April 6, 2003

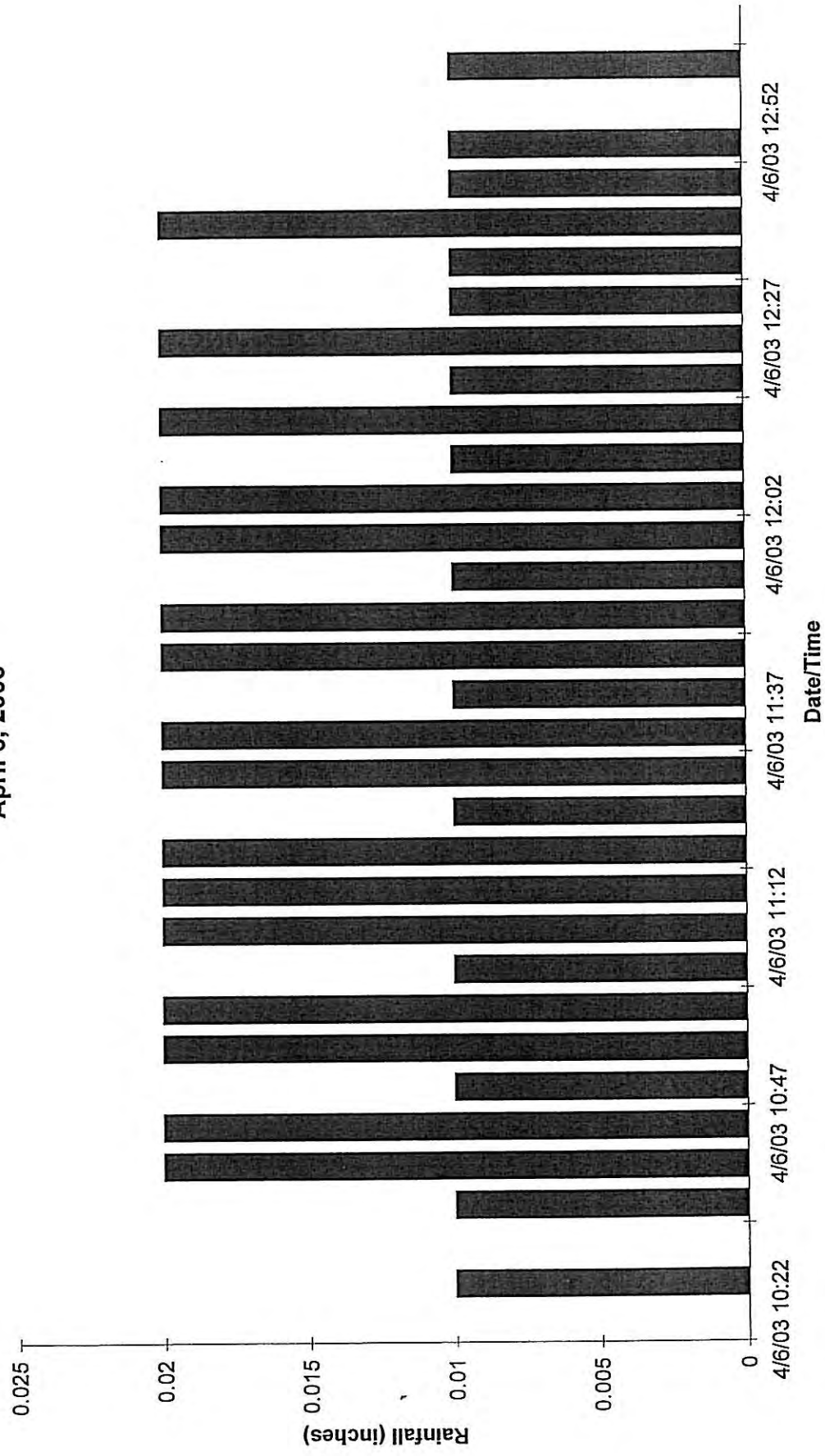
Peak Rainfall Intensity = 1 (inches/hour) = 0.21
Average Rainfall Intensity (inches/hour) = 0.17
Total Rainfall (inches) = 0.46

Metered Subareans						
Meter Name	Detailed I/I Investigations, 1999-2001	Average DWF		Metered Average Peak WWF		Inflow
		(mgd)	(gpm)	(mgd)	(gpm)	
MH-4						
93rd Street 1 MH South of Cayuga Creek	8,9	0.221	154	0.812	564	410
91st Street South of Luick Avenue	3,4,5,6,7,8,9	0.365	253	2.330	1618	1365
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.475	330	2.560	1778	1448
MH-6						
80th Street and Lindbergh Avenue	4	0.216	150	0.613	426	276
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.459	319	1.621	1126	807
*Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.634	440	2.951	2049	1609
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	1.372	953	5.163	3586	2633
MH- 6						
66th Street and Frontier Avenue	All MH-6	1.312	911	2.587	1796	885
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.924	642	2.027	1408	766
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0	0.0	0.0	0.0

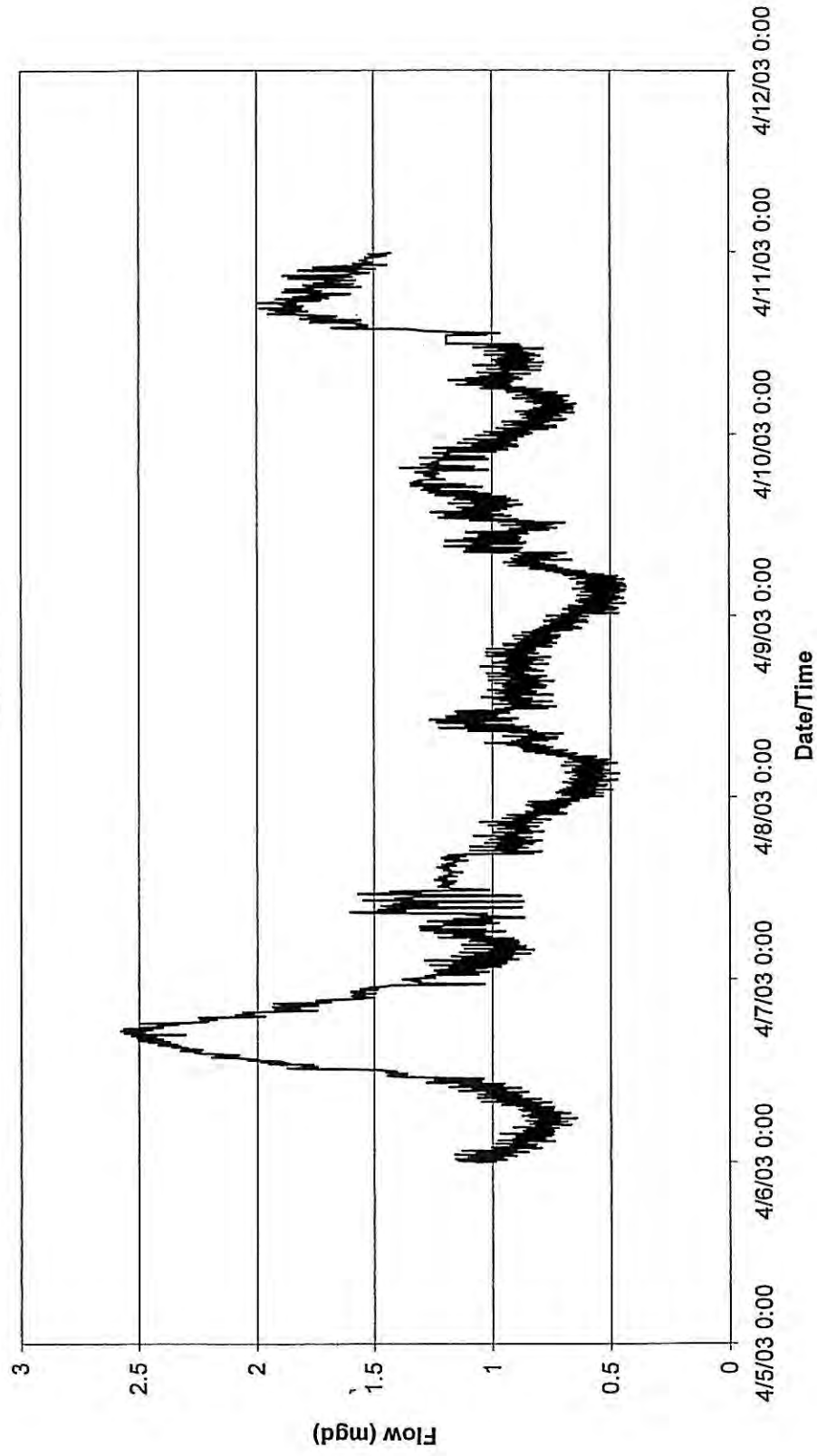
Metered Subareans							
Areas	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF		Average Peak WWF		Inflow
			(mgd)	(gpm)	(mgd)	(gpm)	
MH-1	A	8,9	0.221	154	0.812	564	410
	B	3,4,5,6,7	0.144	100	1.518	1054	954
	C	1,2	0.110	77	0.230	160	83
MH-4	D	4	0.216	150	0.613	426	276
	E	1,2,3,5,7	0.243	169	1.008	700	531
	F	8	0.279	194	0.591	411	217
	G	6	0.158	110	0.391	272	162
	H	1,2,3,4	0.388	269	0.559	388	119
MH-6	I	5,6,7,8,9,10,11,12	0.924	642	2.027	1408	766

* Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

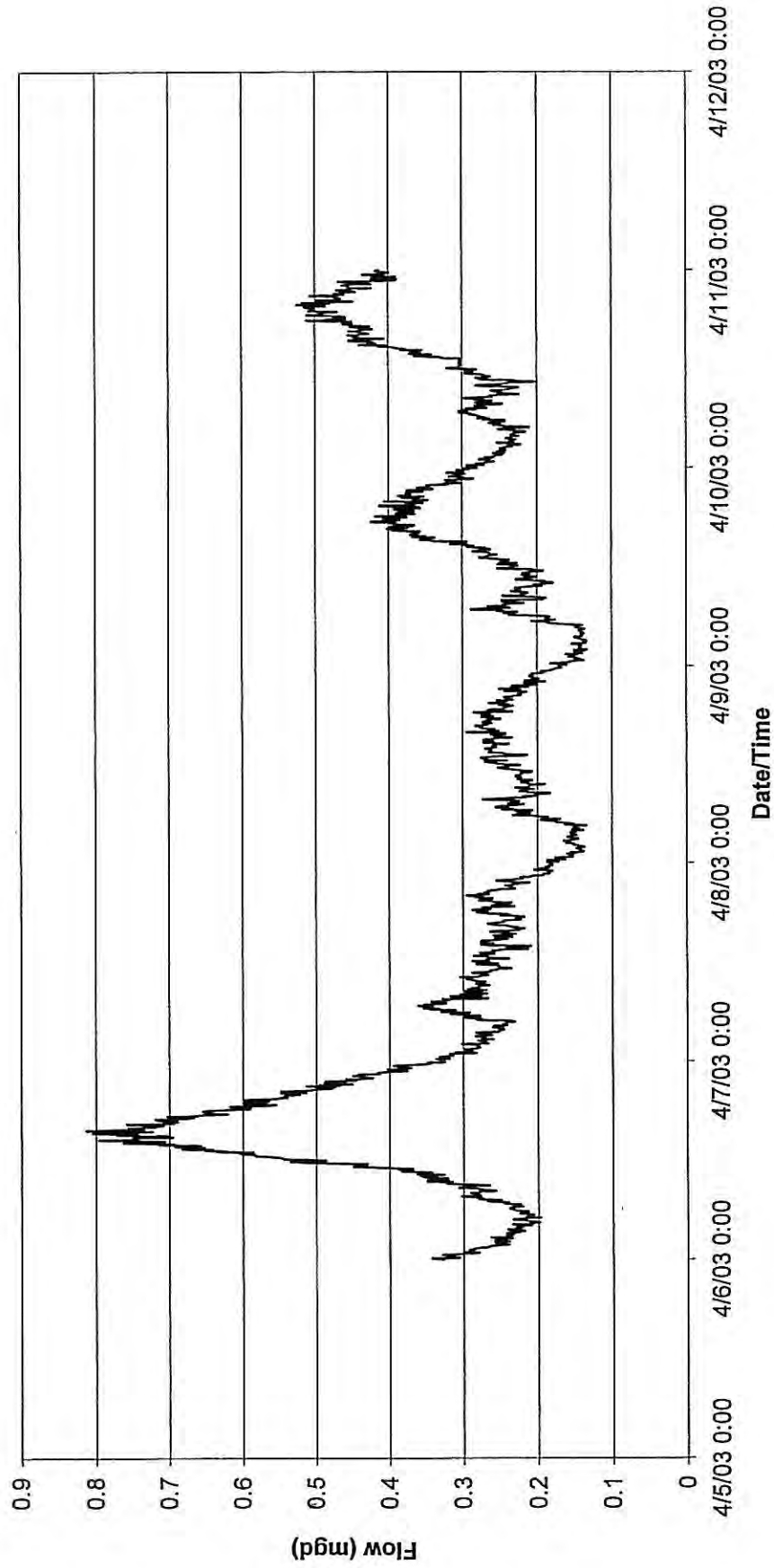
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Data
April 6, 2003



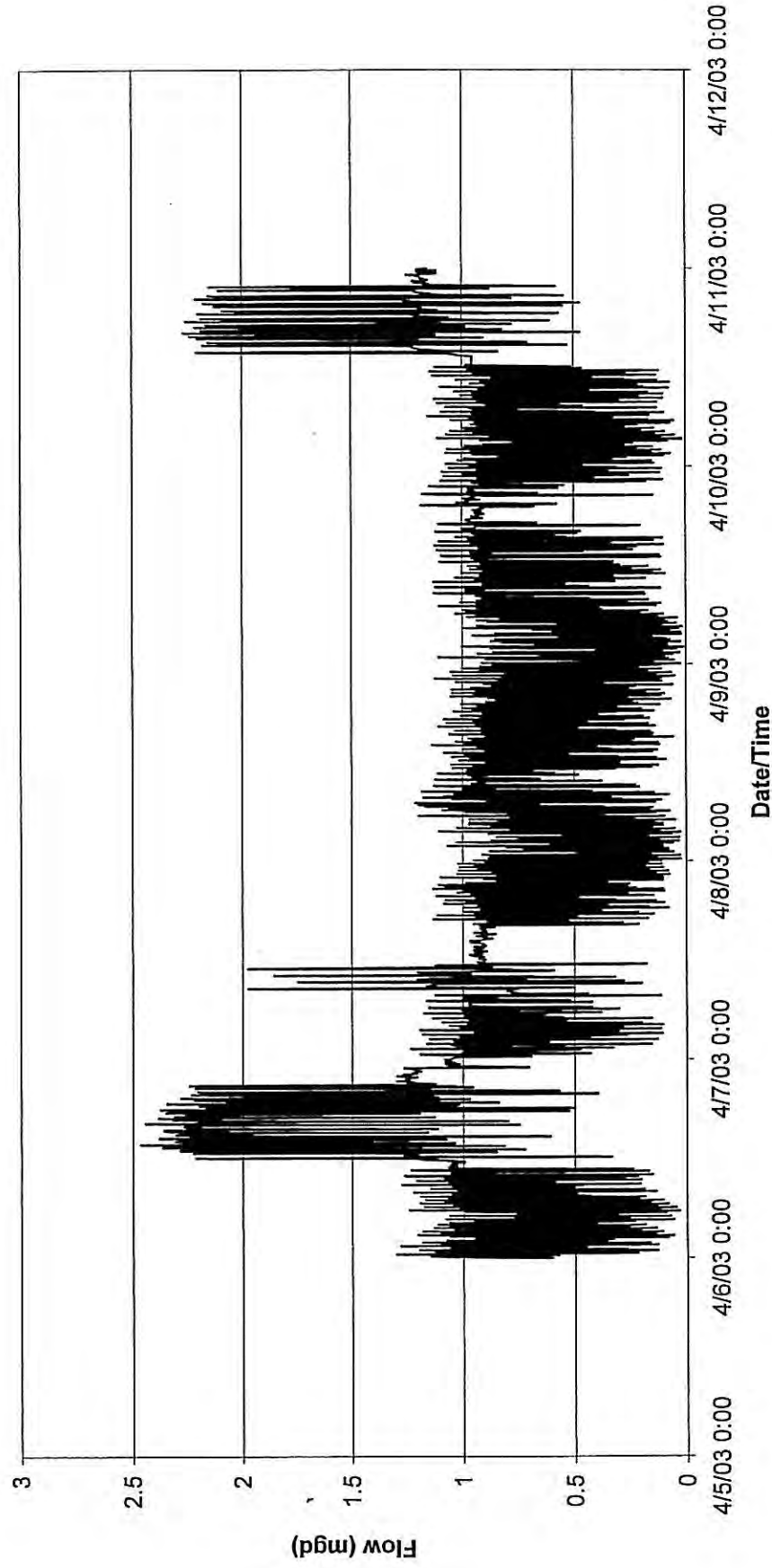
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
April 6, 2003



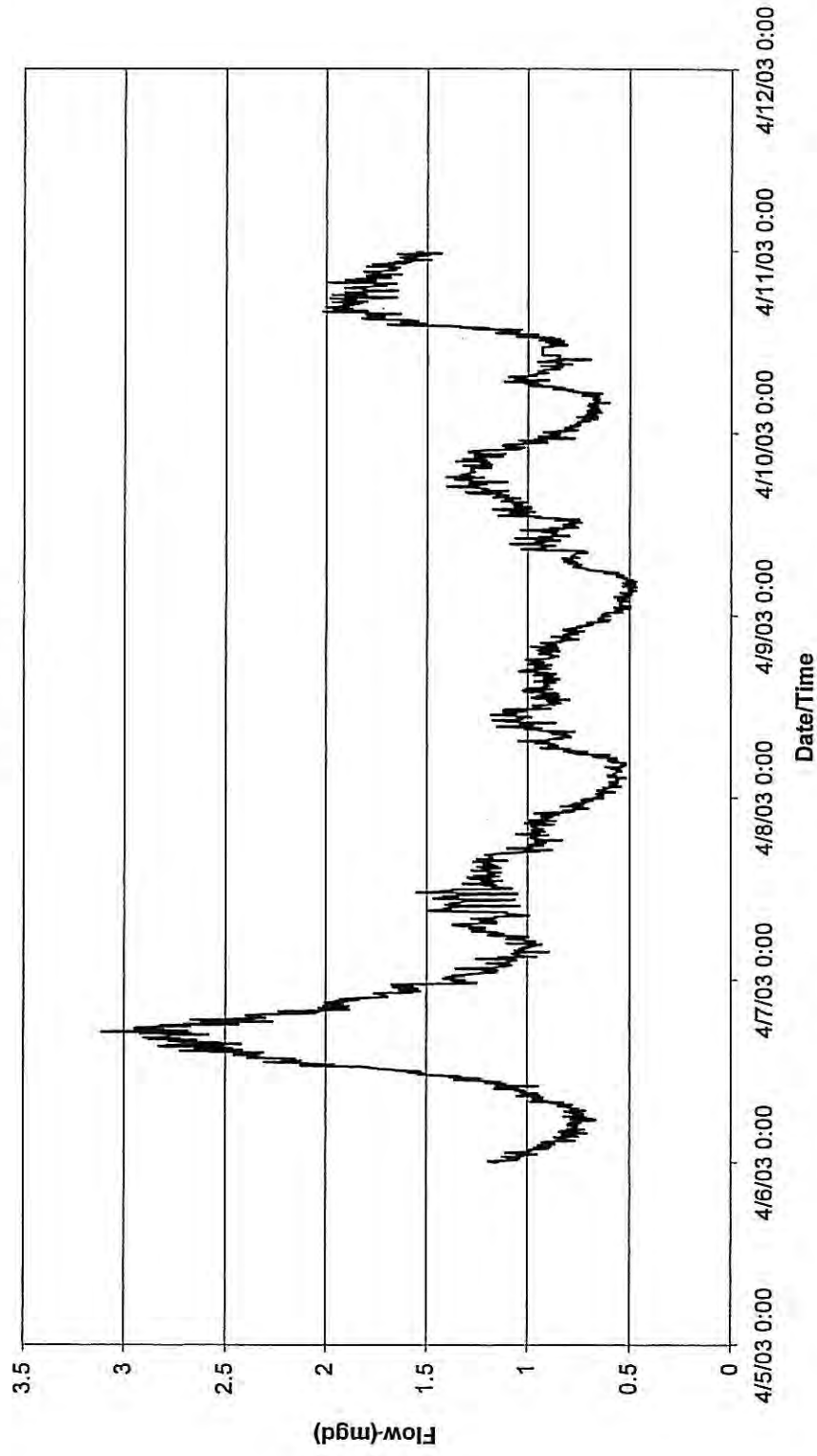
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
April 6, 2003



Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 91st Street and Luick Avenue
 Flow on Luick Avenue
 Wet Weather Flow
 April 6, 2003

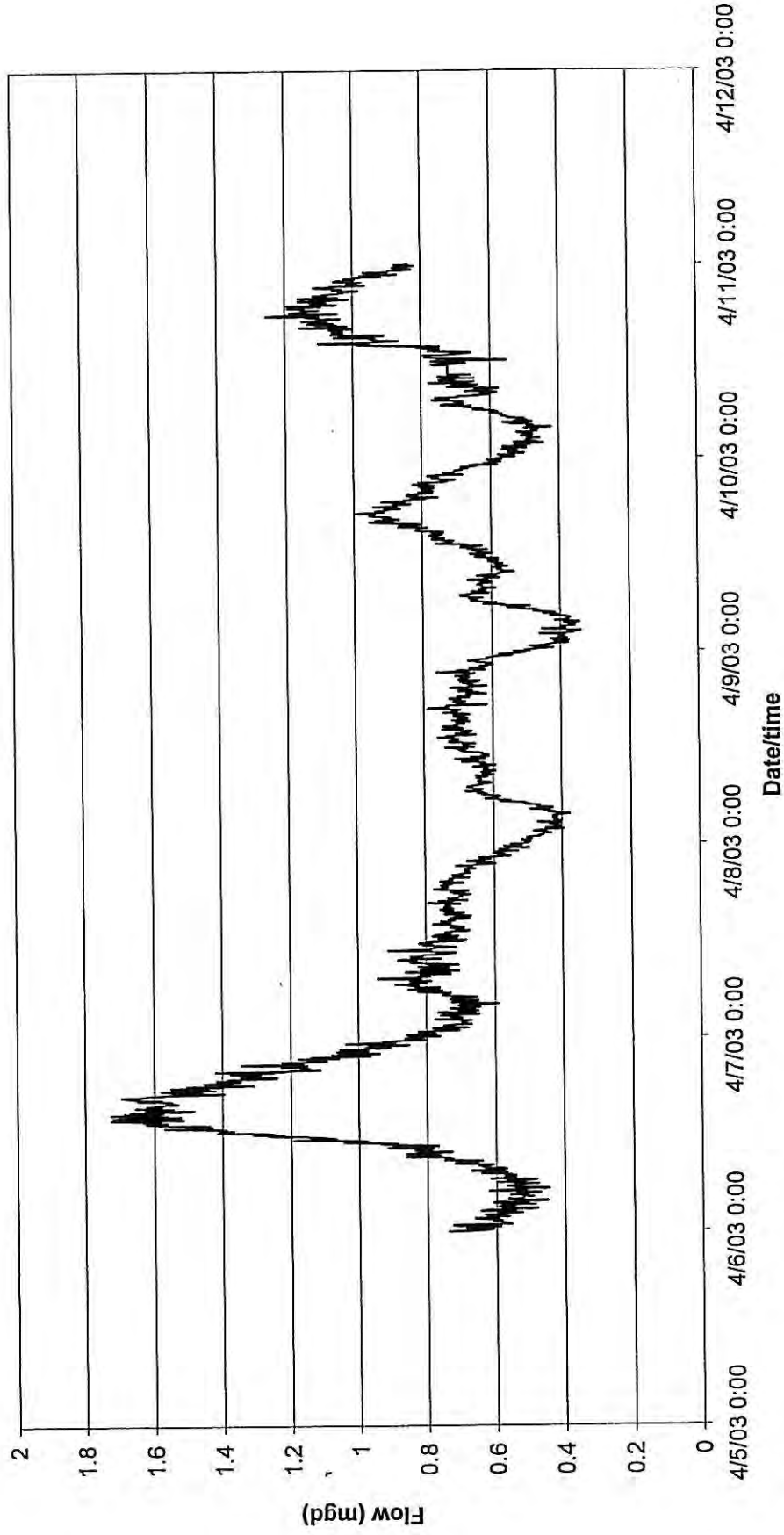


Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
April 6, 2003

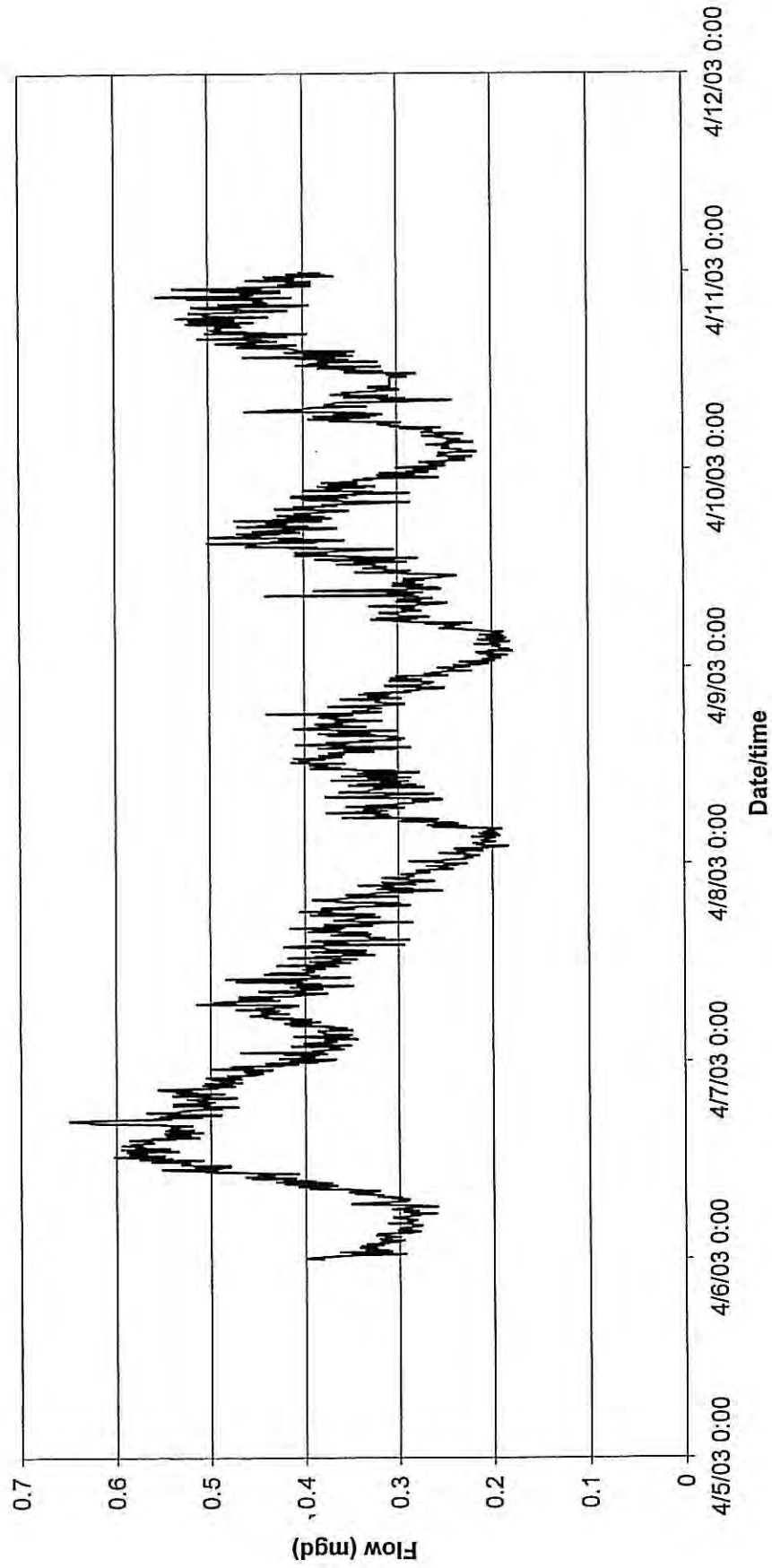


Flow Values have been adjusted due the malfunctioning of the Probe

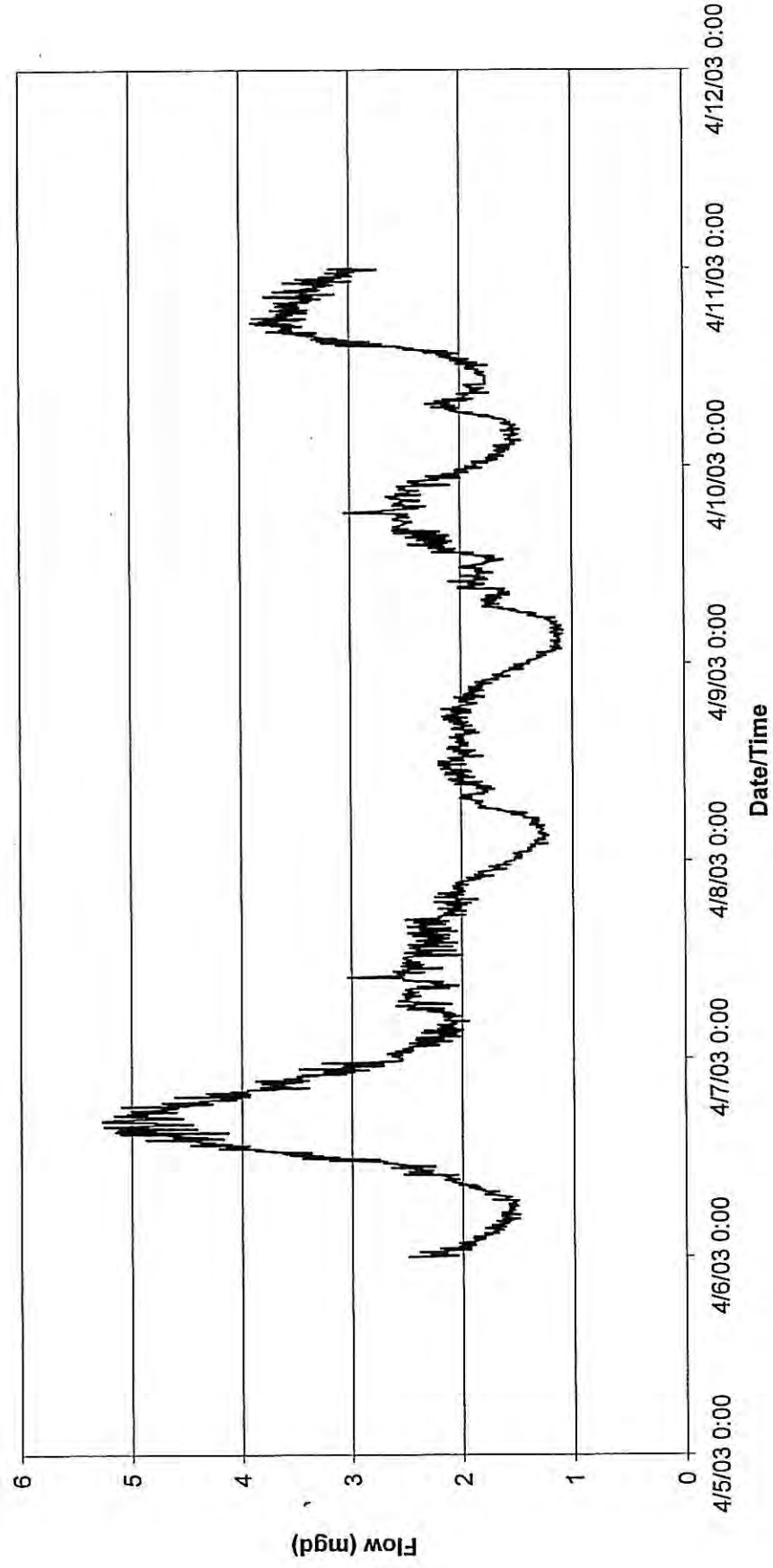
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
April 6, 2003



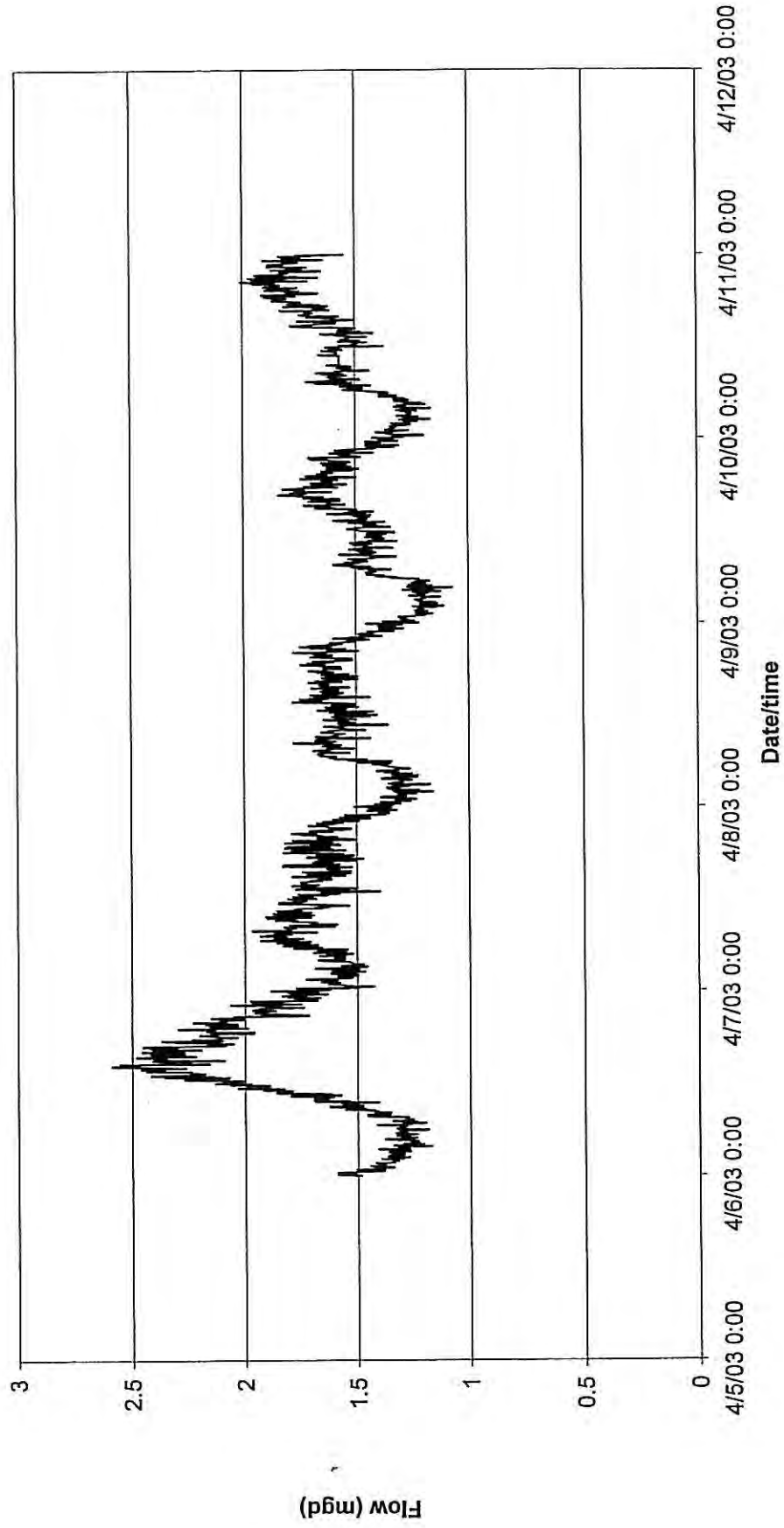
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
April 6, 2003



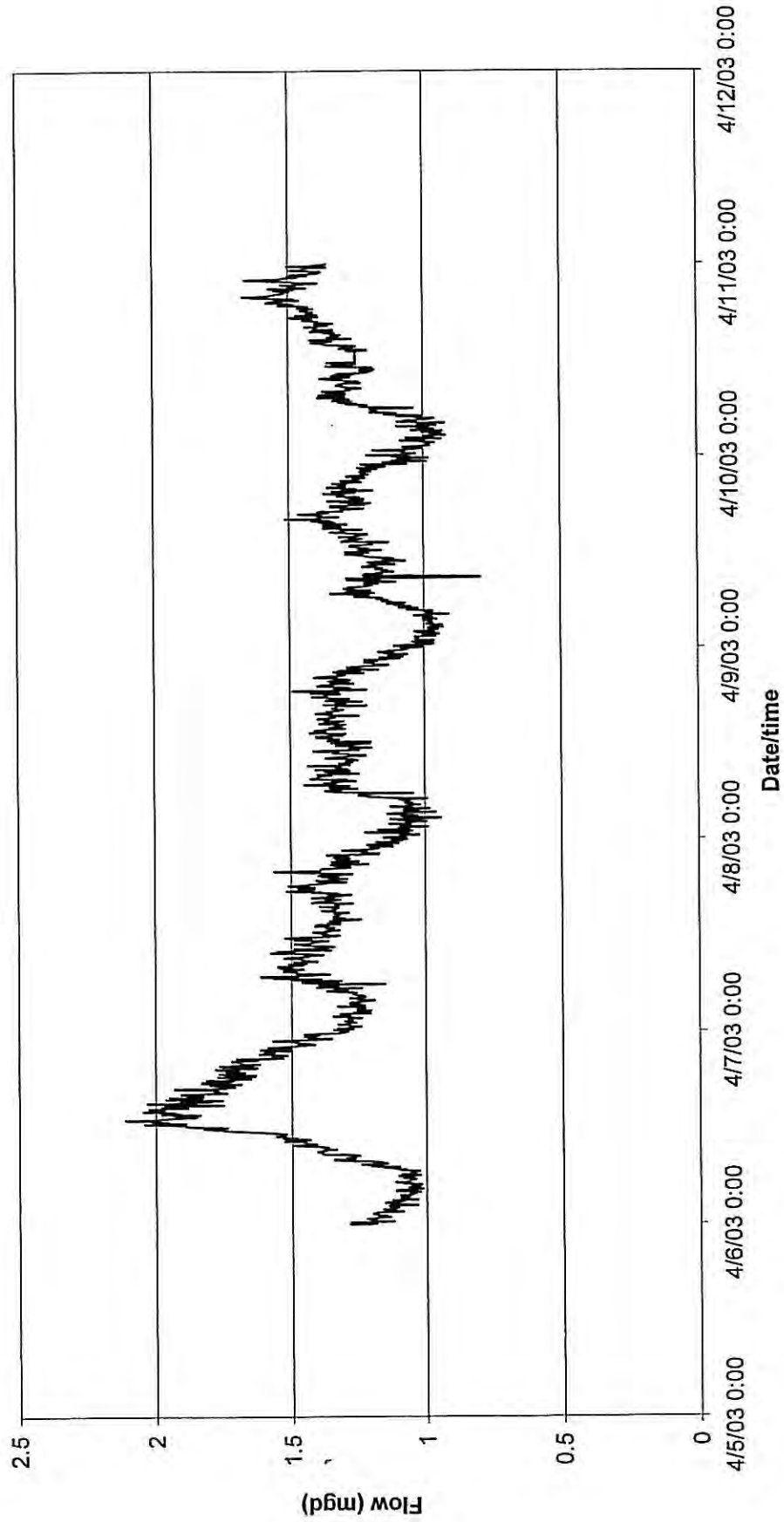
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
April 6, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
April 6, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Wet Weather Flow
April 6, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: May 2, 2003

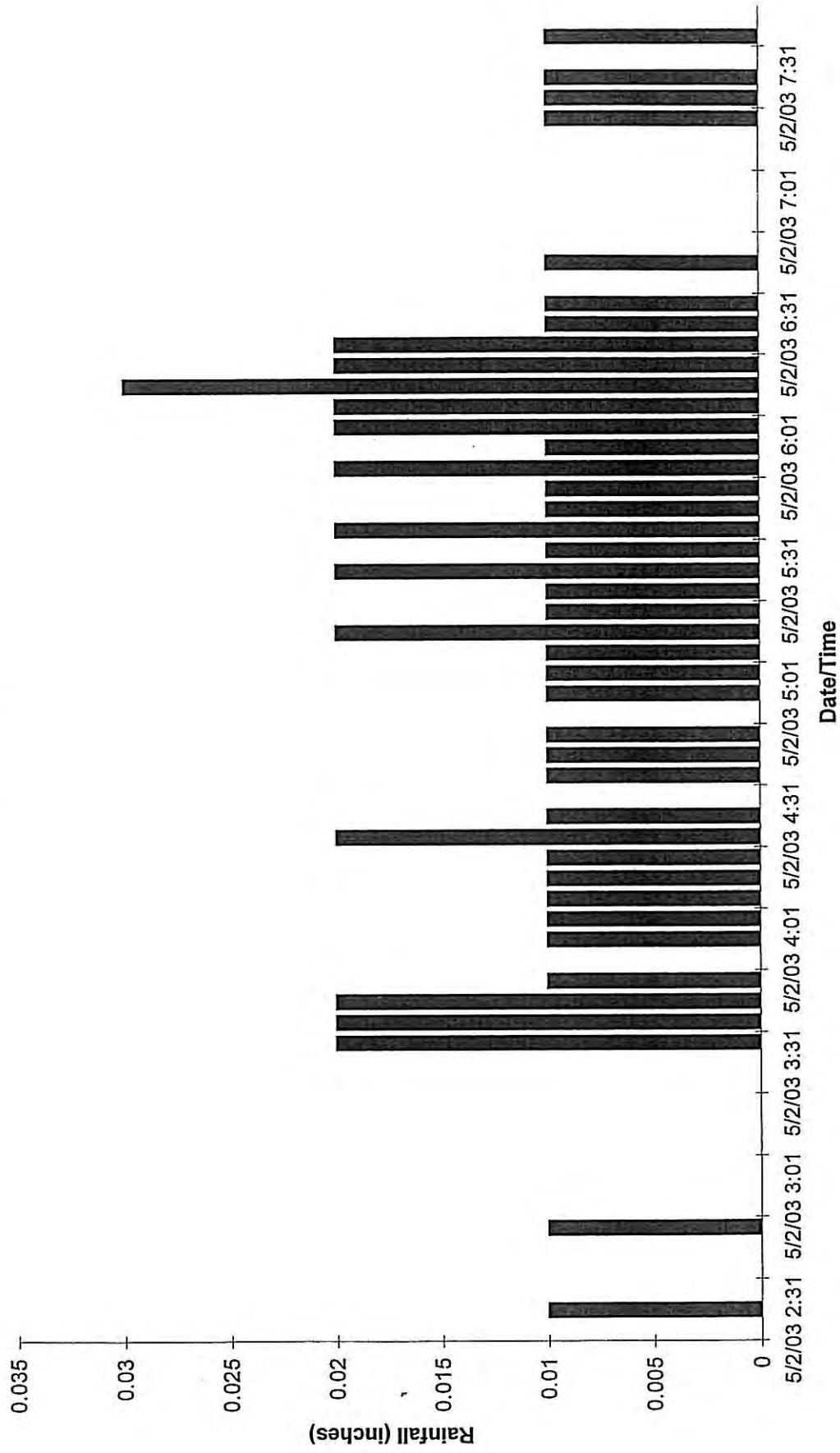
Peak Rainfall Intensity = i (inches/hour) = 0.22
 Average Rainfall Intensity (inches/hour) = 0.105
 Total Rainfall (inches) = 0.55

Meter Name	Metered Subareas				Metered Average Peak WWF				Inflow	
	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)		(mgd)	(gpm)			(mgd)	(gpm)
MH-1										
93rd Street 1 MH South of Cayuga Creek	8,9	0.144	100		0.728	505			0.584	405
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.359	249		2.237	1553			1.878	1304
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.453	315		2.453	1703			2.000	1389
MH-4										
80th Street and Lindbergh Avenue	4	0.164	114		0.567	394			0.403	280
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.369	256		1.763	1224			1.394	968
*Frontier Avenue, Flow from East of 81st Street	6, MH-1	0.592	411		2.865	1990			2.273	1579
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	1.069	743		5.112	3550			4.043	2807
MH-6										
66th Street and Frontier Avenue	All MH-6	1.117	776		2.793	1940			1.676	1164
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.939	652		2.390	1660			1.451	1007
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0		0.0	0.0			0.0	0.0

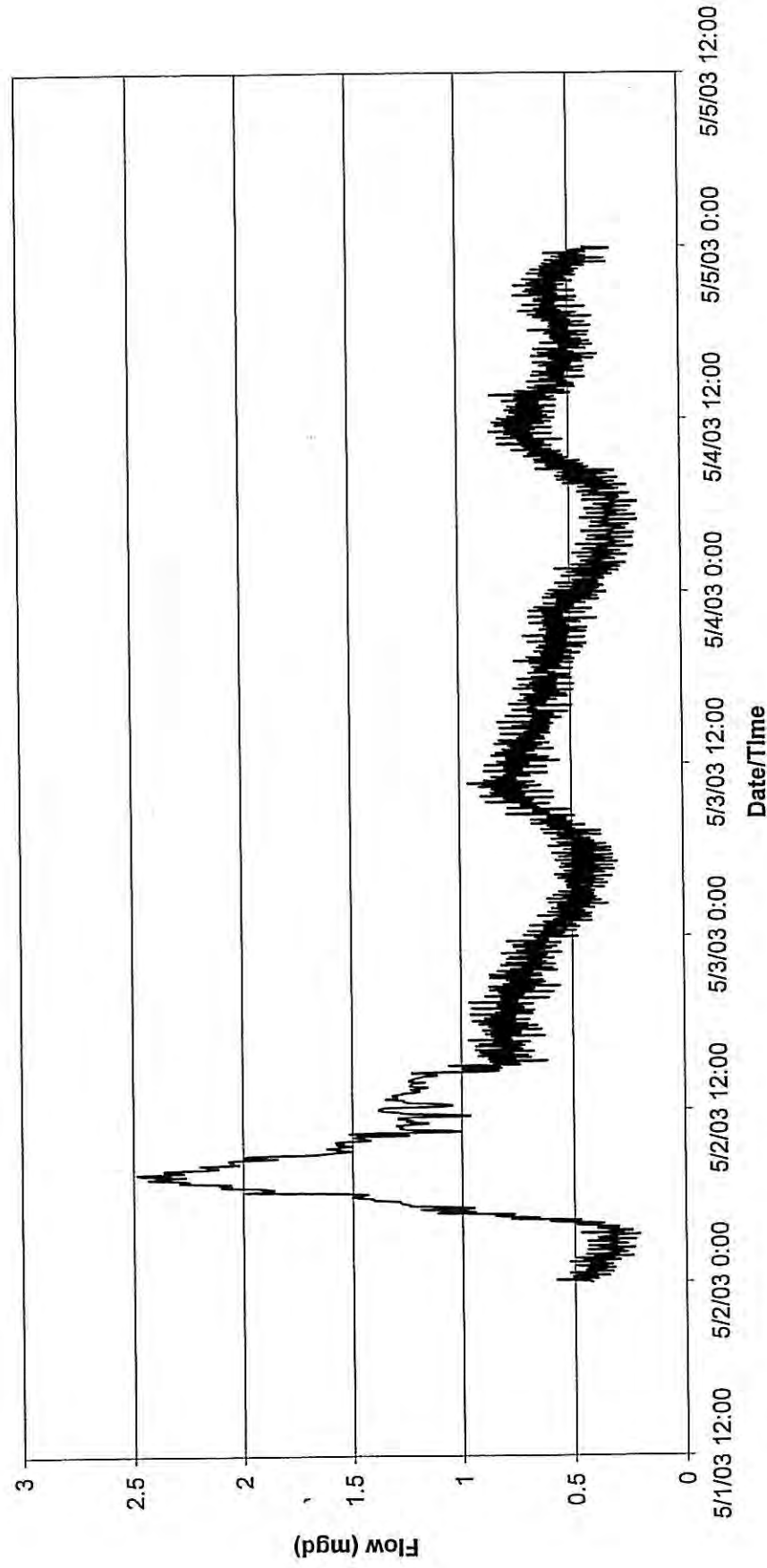
Areas	Metered Subareas				Metered Average Peak WWF				Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)	(mgd)	(gpm)			(mgd)	(gpm)
MH-1	A	8,9	0.144	100	0.728	505			0.584	405
	B	3,4,5,6,7	0.215	149	1.509	1048			1.294	899
	C	1,2	0.094	65	0.216	150			0.122	85
MH-4	D	4	0.164	114	0.567	394			0.403	280
	E	1,2,3,5,7	0.205	142	1.196	830			0.991	688
	F	8	0.108	75	0.484	336			0.376	261
	G	6	0.139	97	0.412	286			0.273	190
	H	1,2,3,4	0.177	123	0.403	280			0.225	157
MH-6	I	5,6,7,8,9,10,11,12	0.939	652	2.390	1660			1.451	1007

*Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

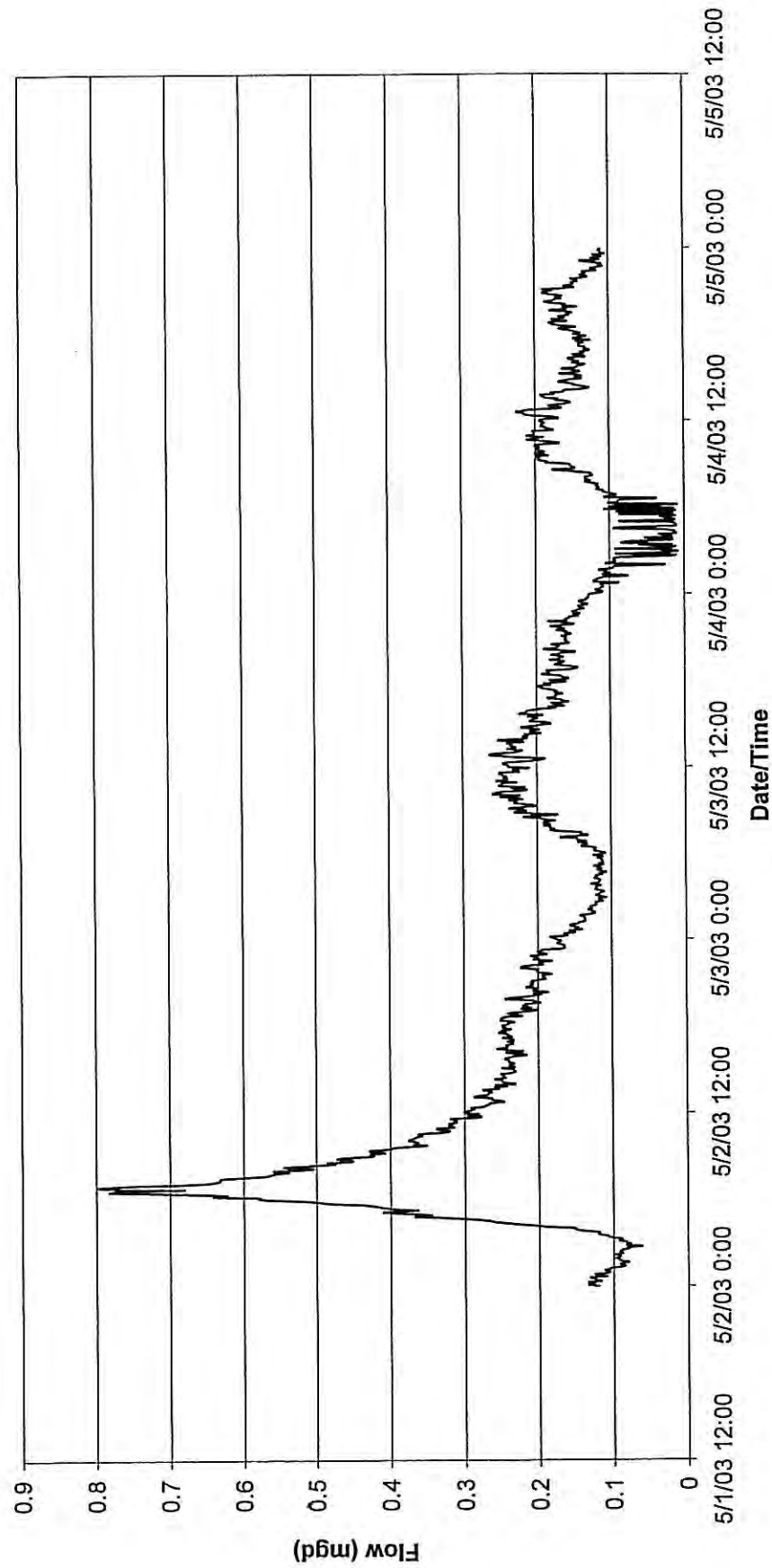
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - May 2, 2003



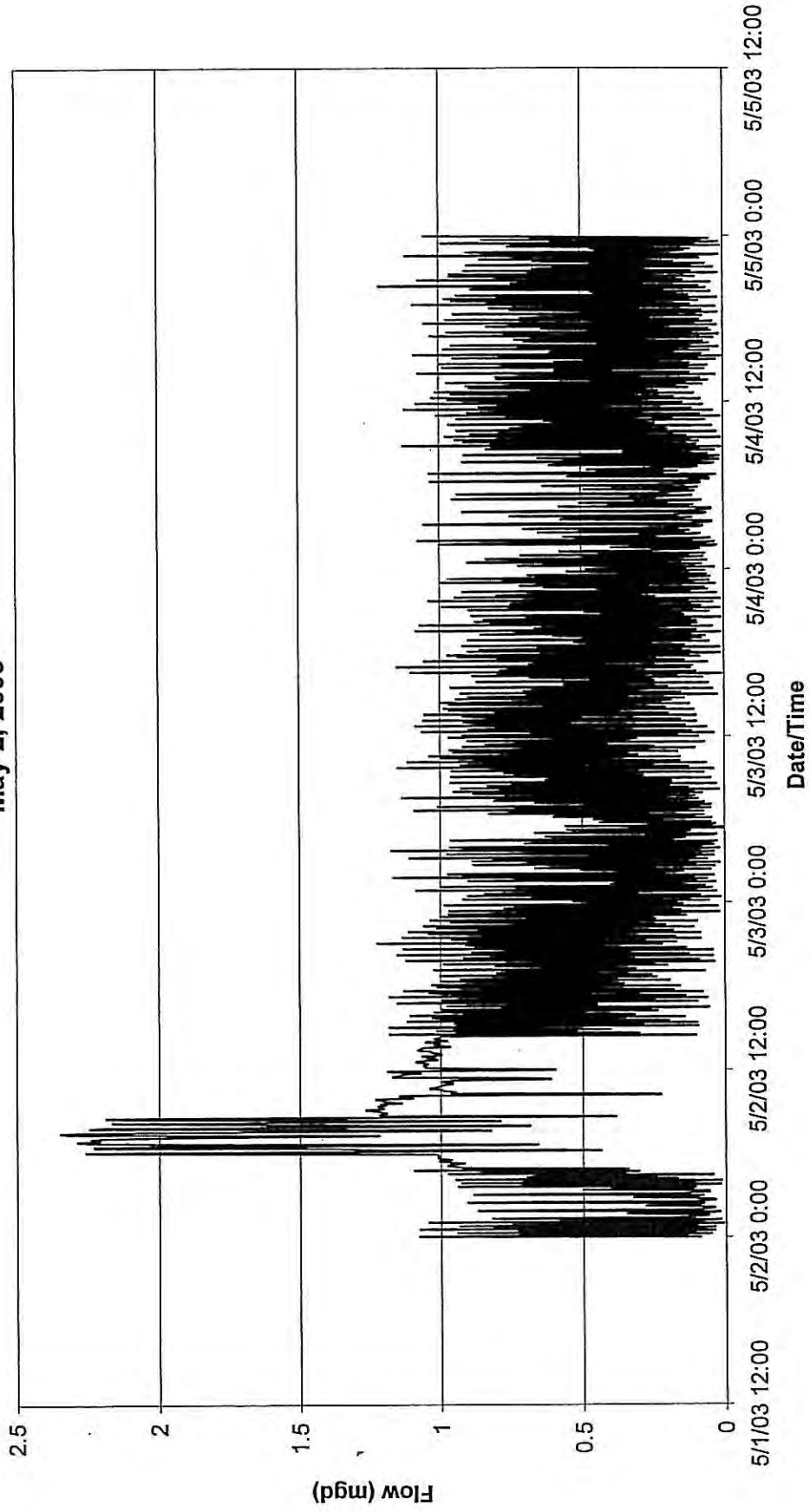
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
May 2, 2003



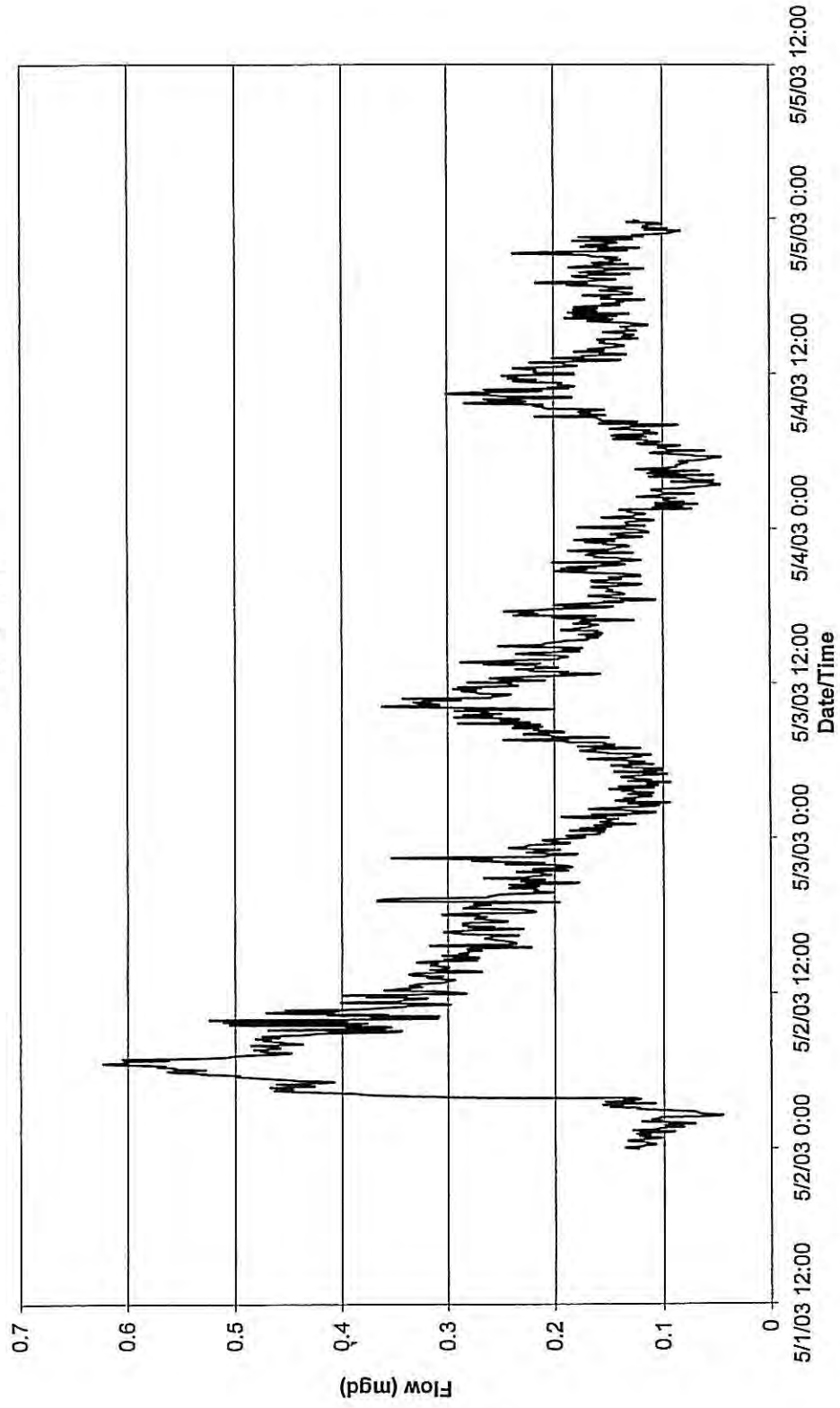
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
May 2, 2003



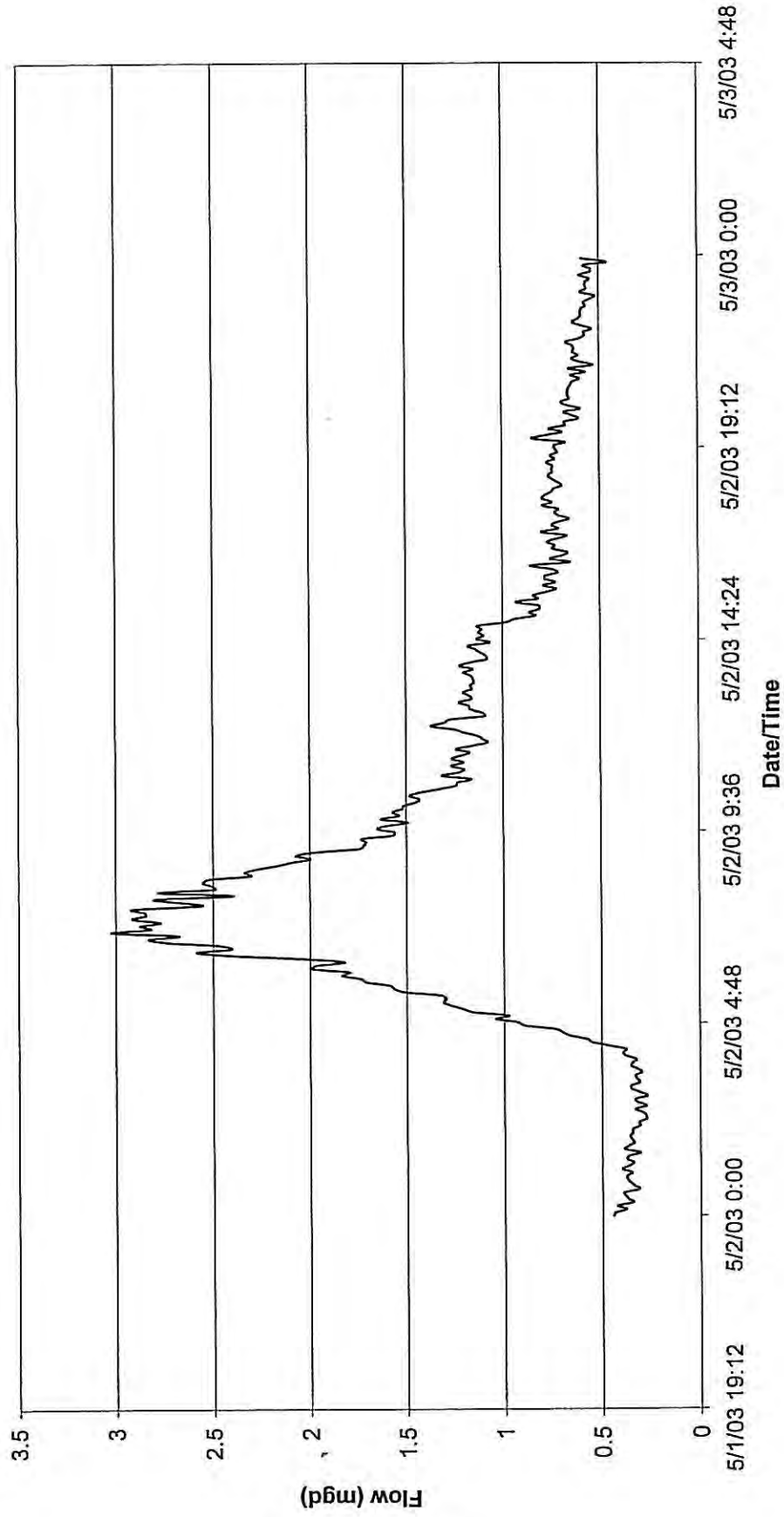
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
May 2, 2003



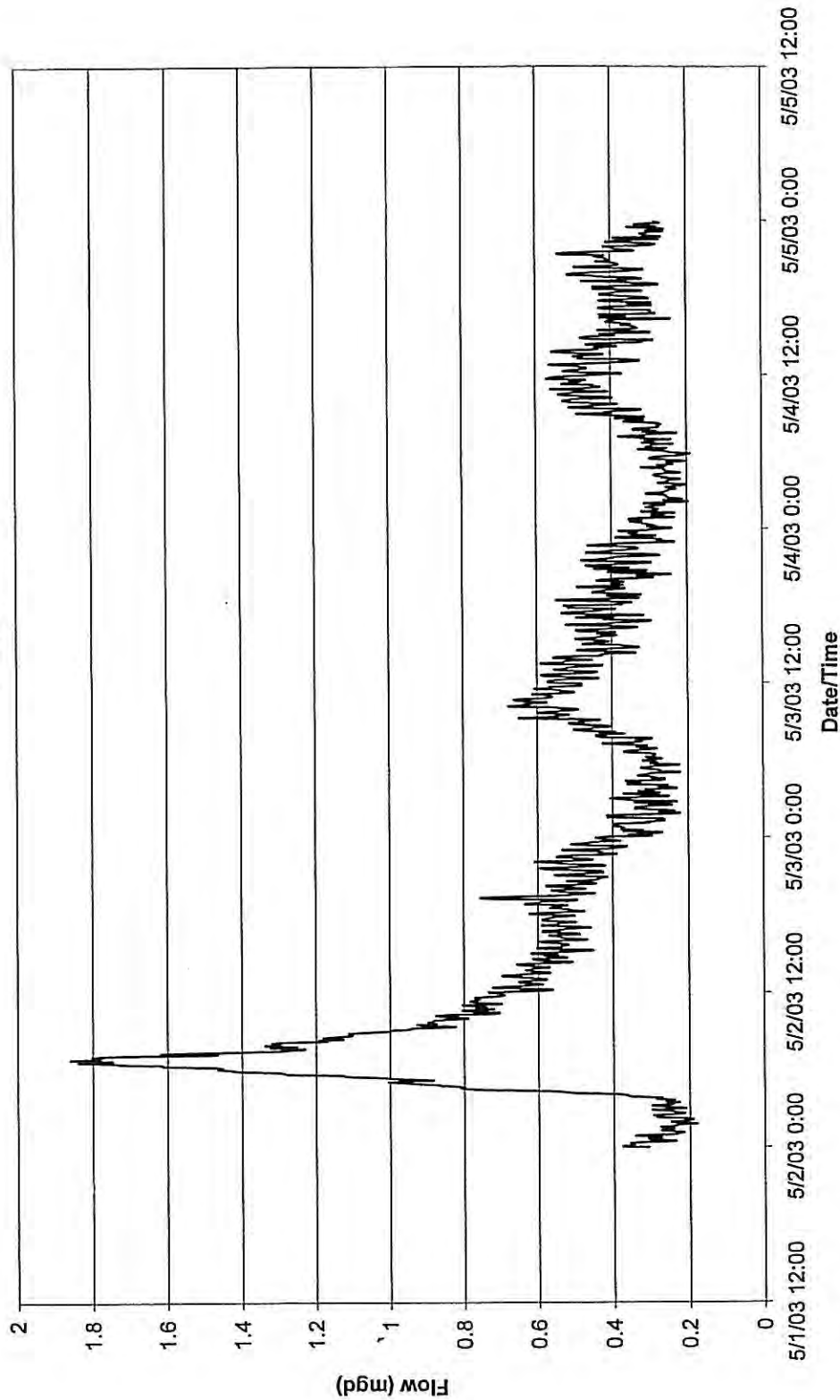
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
May 2, 2003



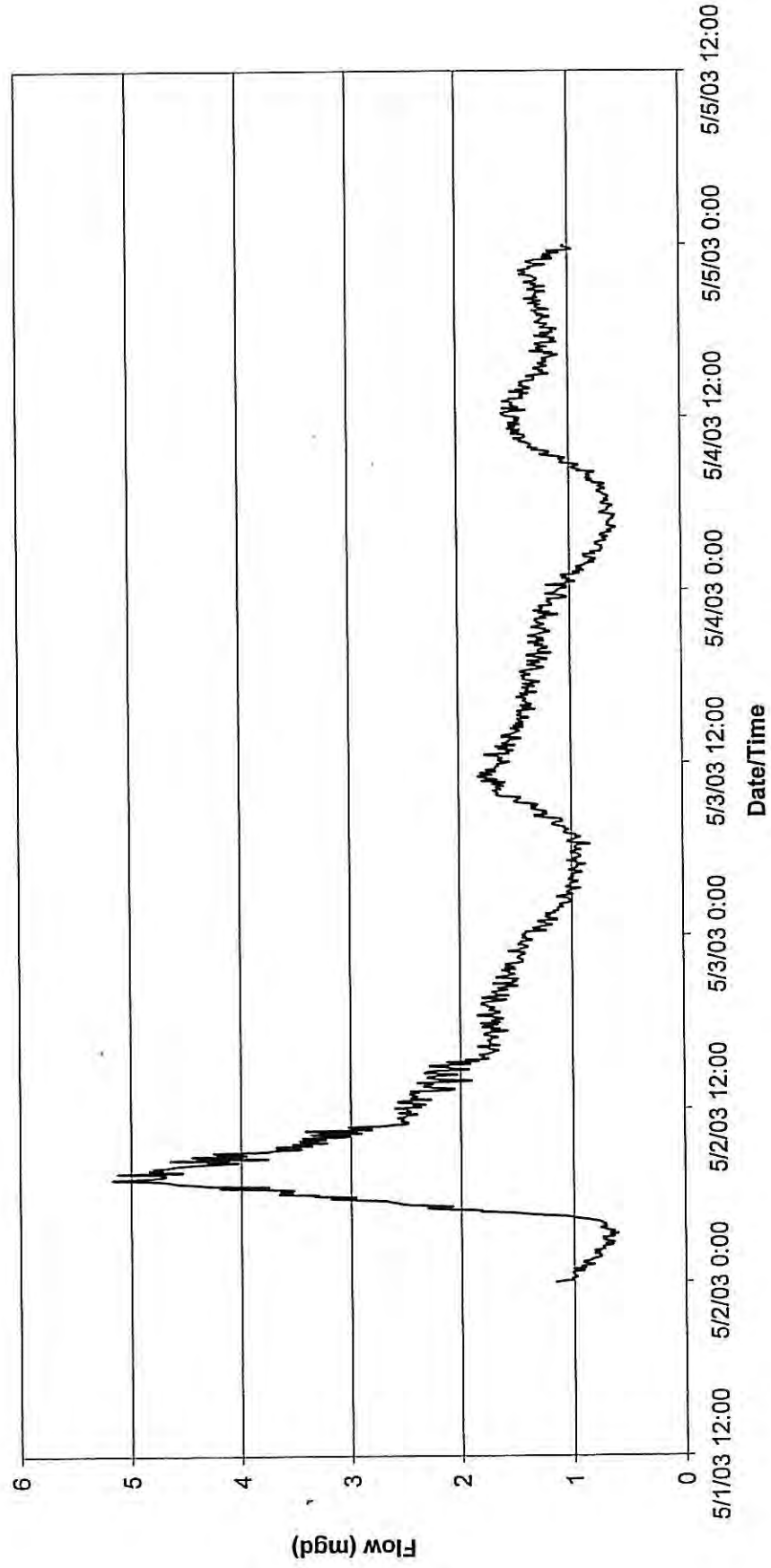
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
May 2, 2003



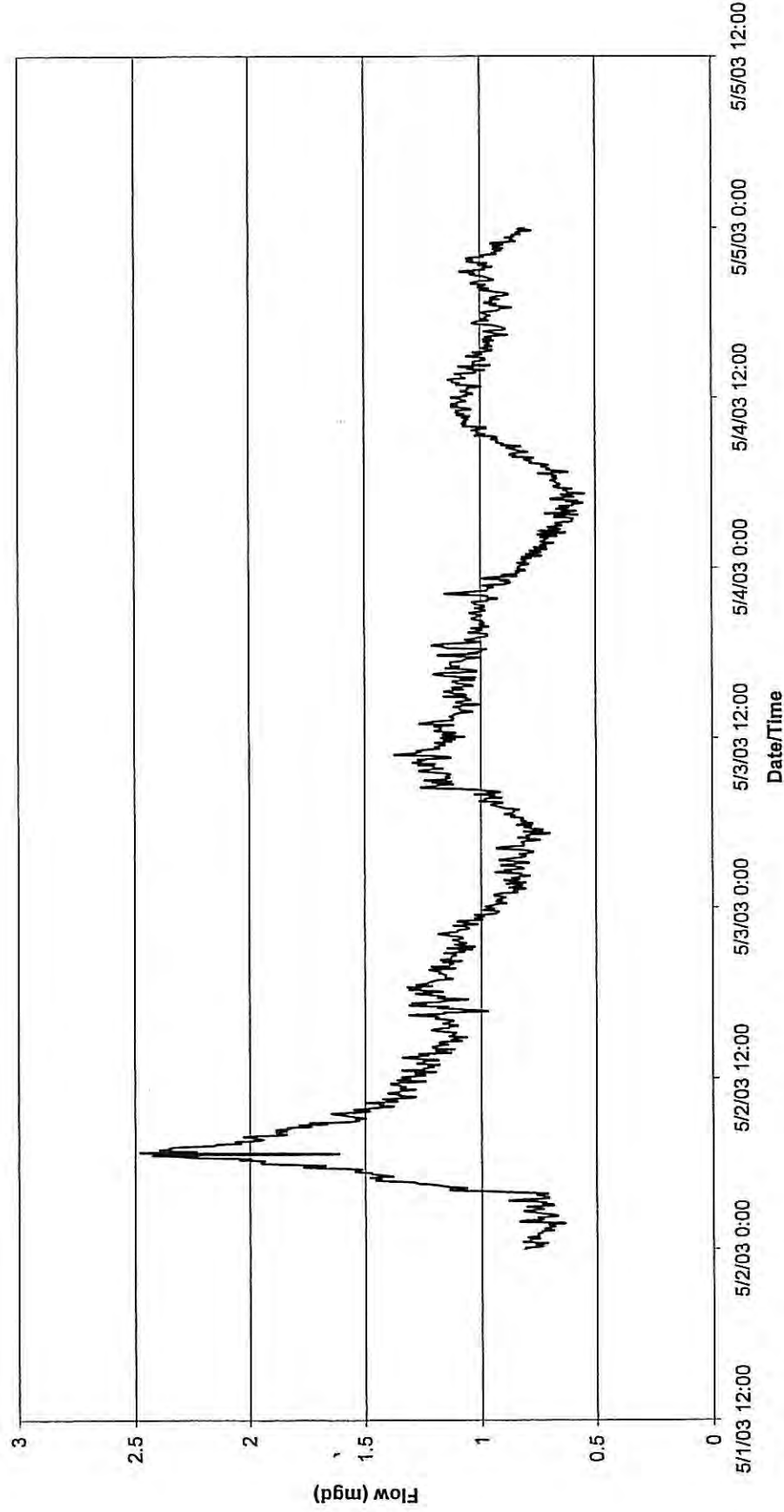
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on 81st Street - North of Frontier Avenue
 Wet Weather Flow
 May 2, 2003



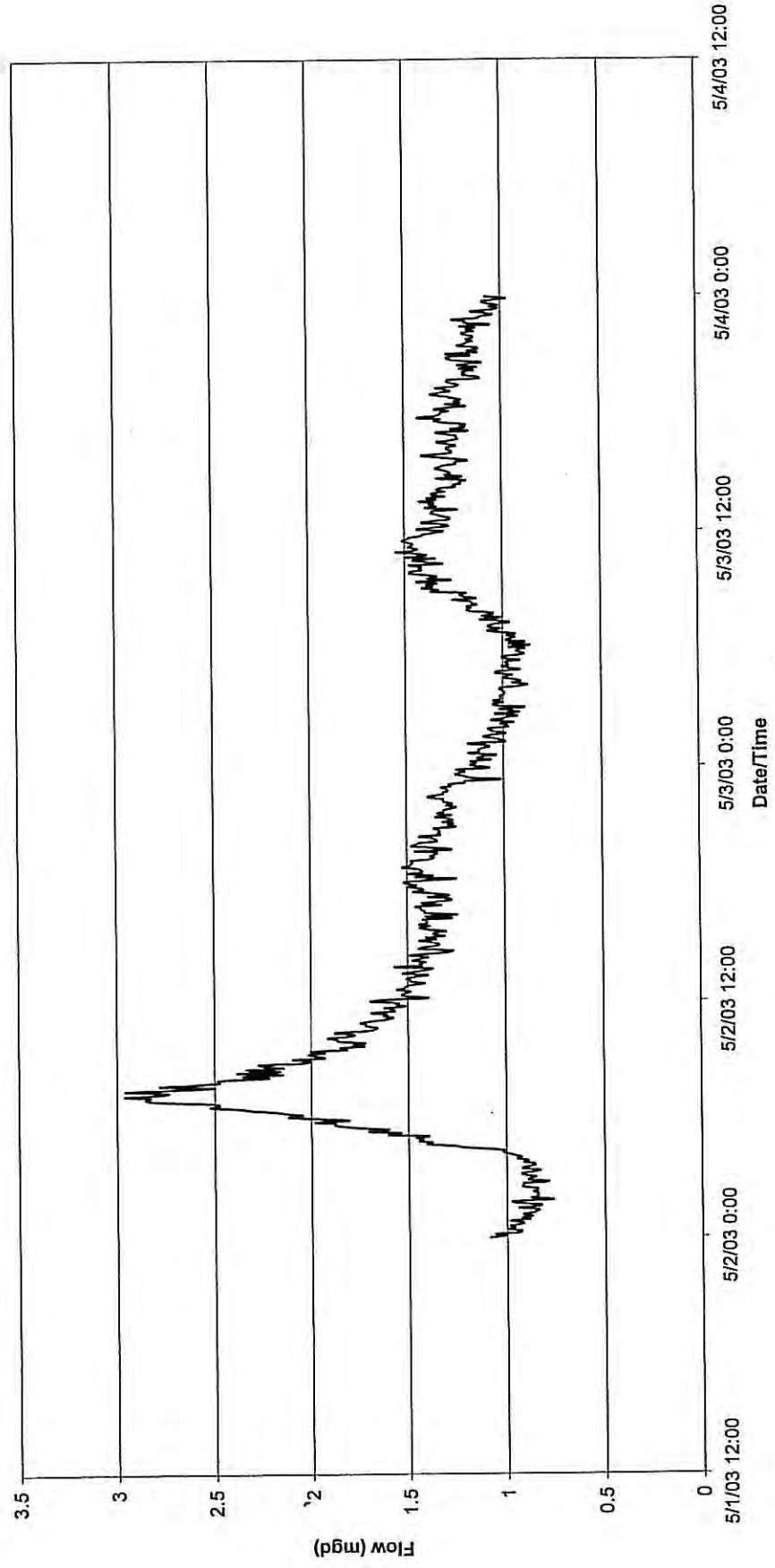
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
May 2, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Wet Weather Flow
May 2, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
May 2, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: May 6, 2003

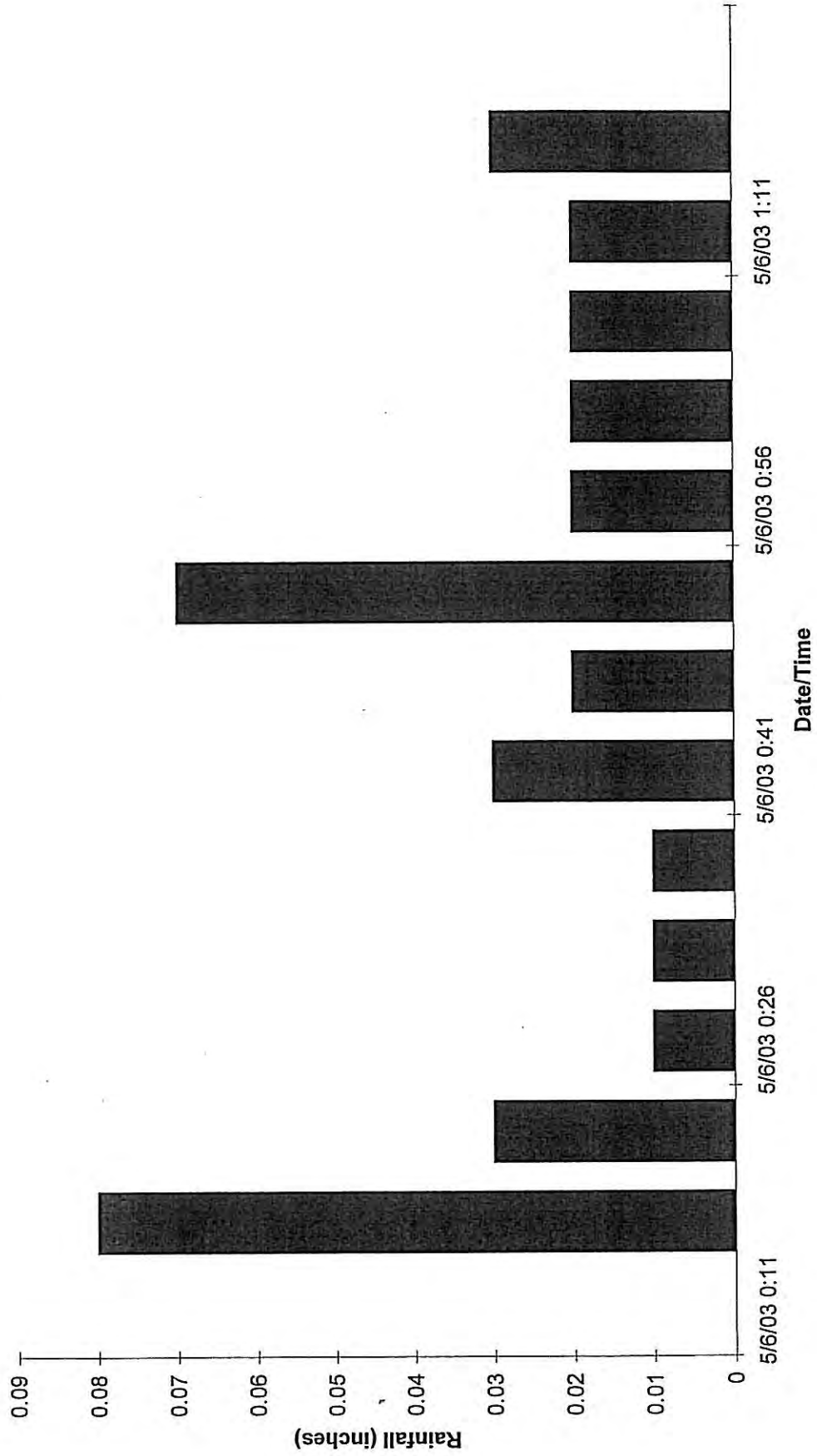
Peak Rainfall Intensity = 1 (inches/hour) = 0.37
Average Rainfall Intensity (inches/hour) = 0.342
Total Rainfall (inches) = 0.37

Meter Name	Metered Subareas				Metered Average Peak WWF				Inflow	
	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)		(mgd)	(gpm)			(mgd)	(gpm)
MH-1										
93rd Street 1 MH South of Cayuga Creek	8,9	0.144	100		0.767	533			0.623	433
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.359	249		2.252	1564			1.893	1315
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.453	315		2.539	1763			2.086	1448
MH-4										
80th Street and Lindbergh Avenue	4	0.164	114		0.633	440			0.469	326
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.369	256		1.659	1152			1.290	896
*Frontier Avenue, Flow from East	6, MH-1	0.592	411		2.985	2073			2.393	1662
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	1.069	743		4.910	3410			3.841	2667
MH-6										
66th Street and Frontier Avenue	All MH - 6 Area	1.117	776		2.850	1979			1.734	1204
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.939	652		2.489	1728			1.550	1076
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0		0.0	0.0			0.0	0.0

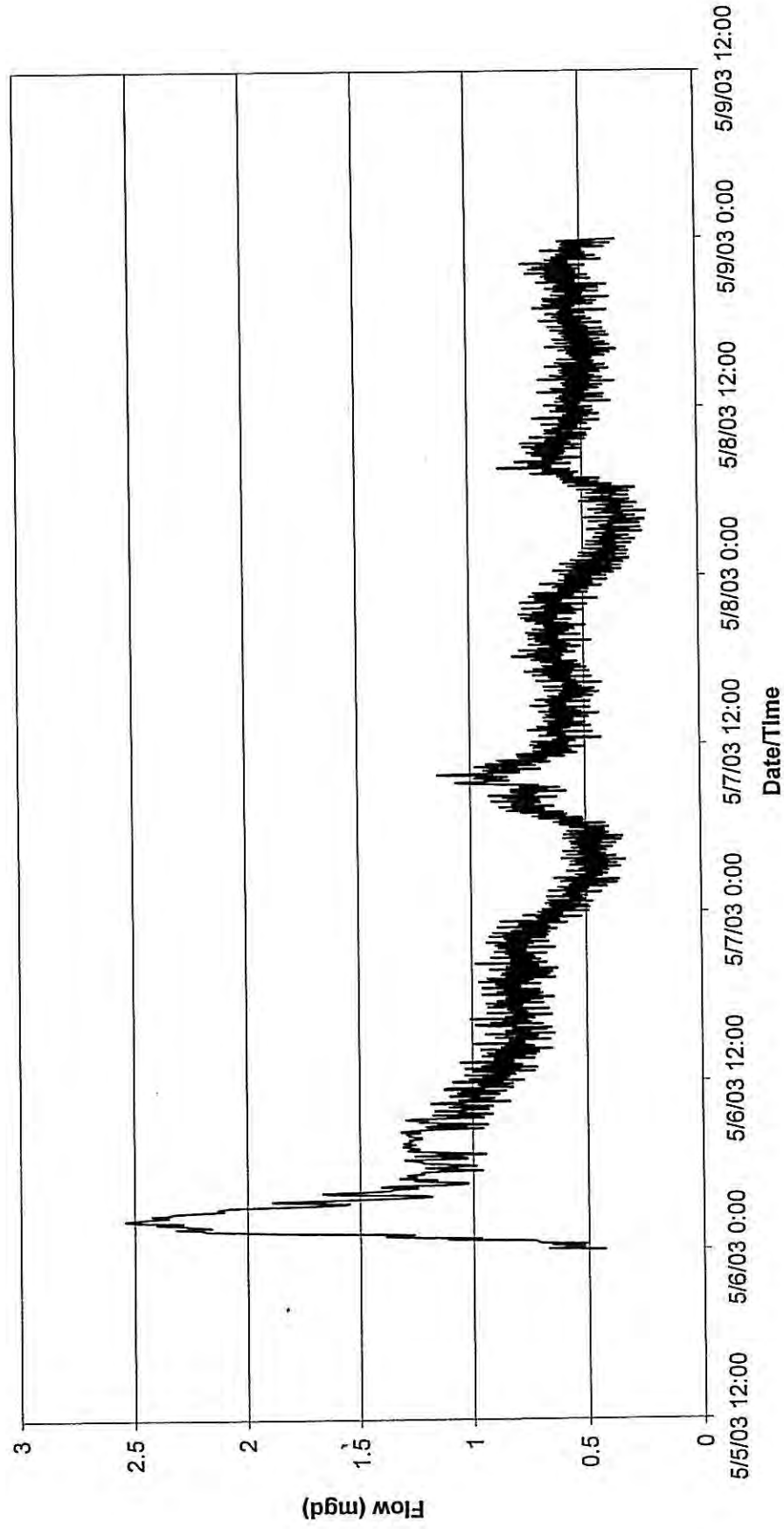
Areas	Metered Subareas				Metered Average Peak WWF				Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)	(mgd)	(gpm)			(mgd)	(gpm)
MH-1	A	8,9	0.144	100	0.767	533			0.623	433
	B	3,4,5,6,7	0.215	149	1.485	1031			1.270	882
	C	1,2	0.094	65	0.286	199			0.192	134
MH-4	D	4	0.164	114	0.633	440			0.469	326
	E	1,2,3,5,7	0.205	142	1.026	713			0.821	570
	F	8	0.108	75	0.266	185			0.157	109
	G	6	0.139	97	0.446	310			0.307	214
	H	1,2,3,4	0.177	123	0.362	251			0.184	128
MH-6	I	5,6,7,8,9,10,11,12	0.939	652	2.489	1728			1.550	1076

* Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

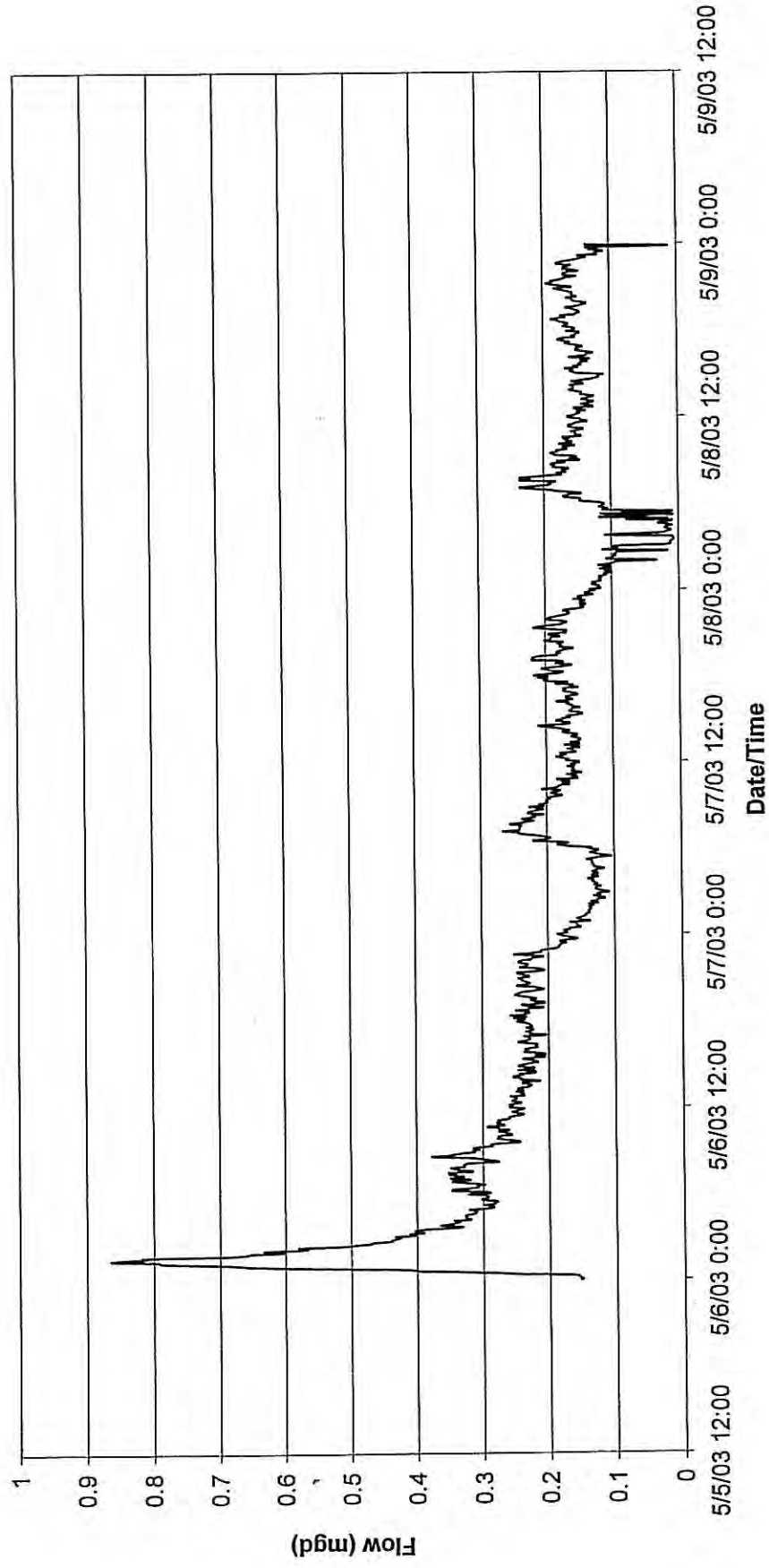
Niagara Falls Public Water Authority
Post rehabilitation Flow Monitoring Assessment
Rainfall Chart - May 6, 2003



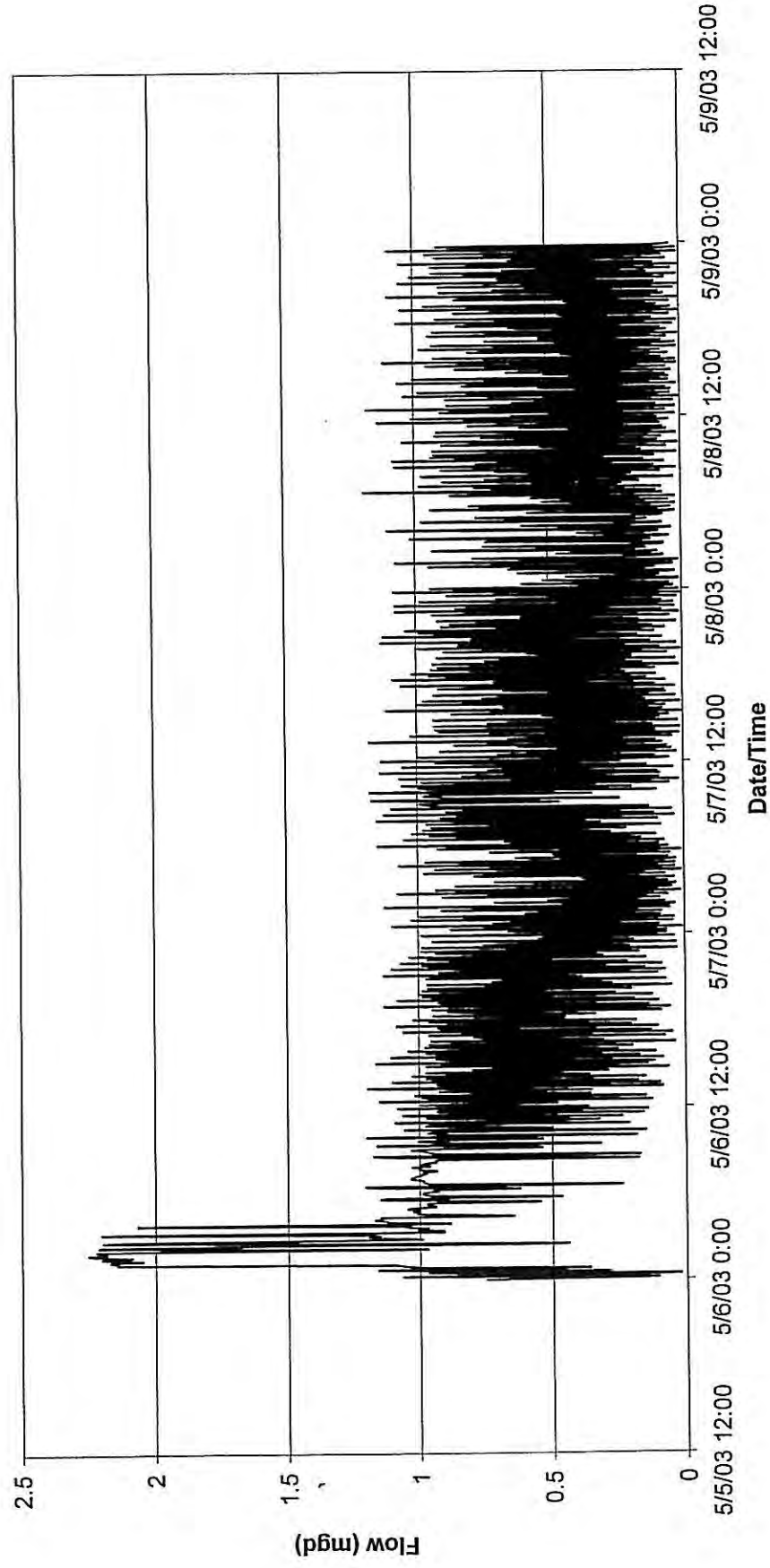
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Wet Weather Flow
May 6, 2003



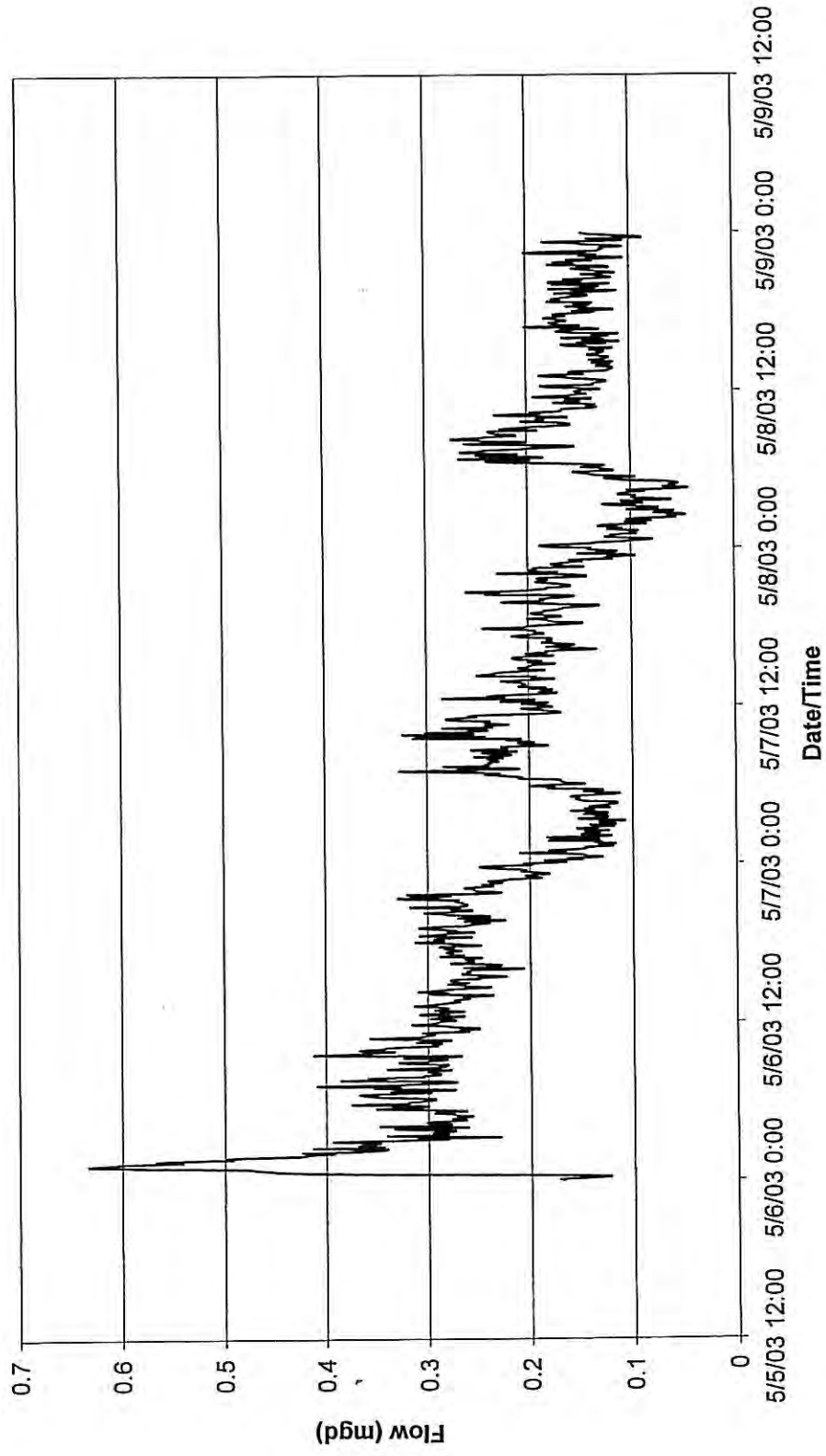
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
May 6, 2003



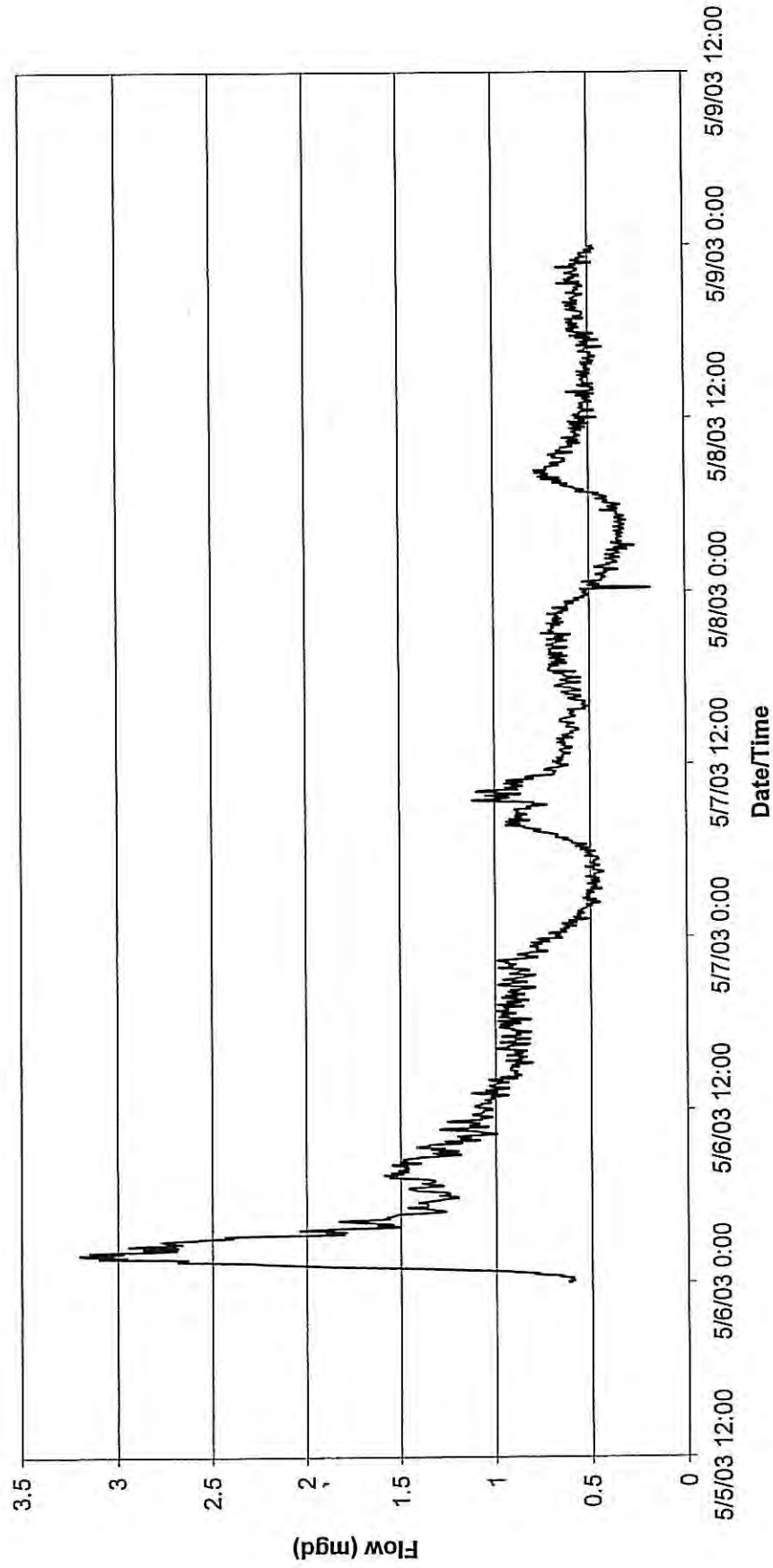
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
May 6, 2003



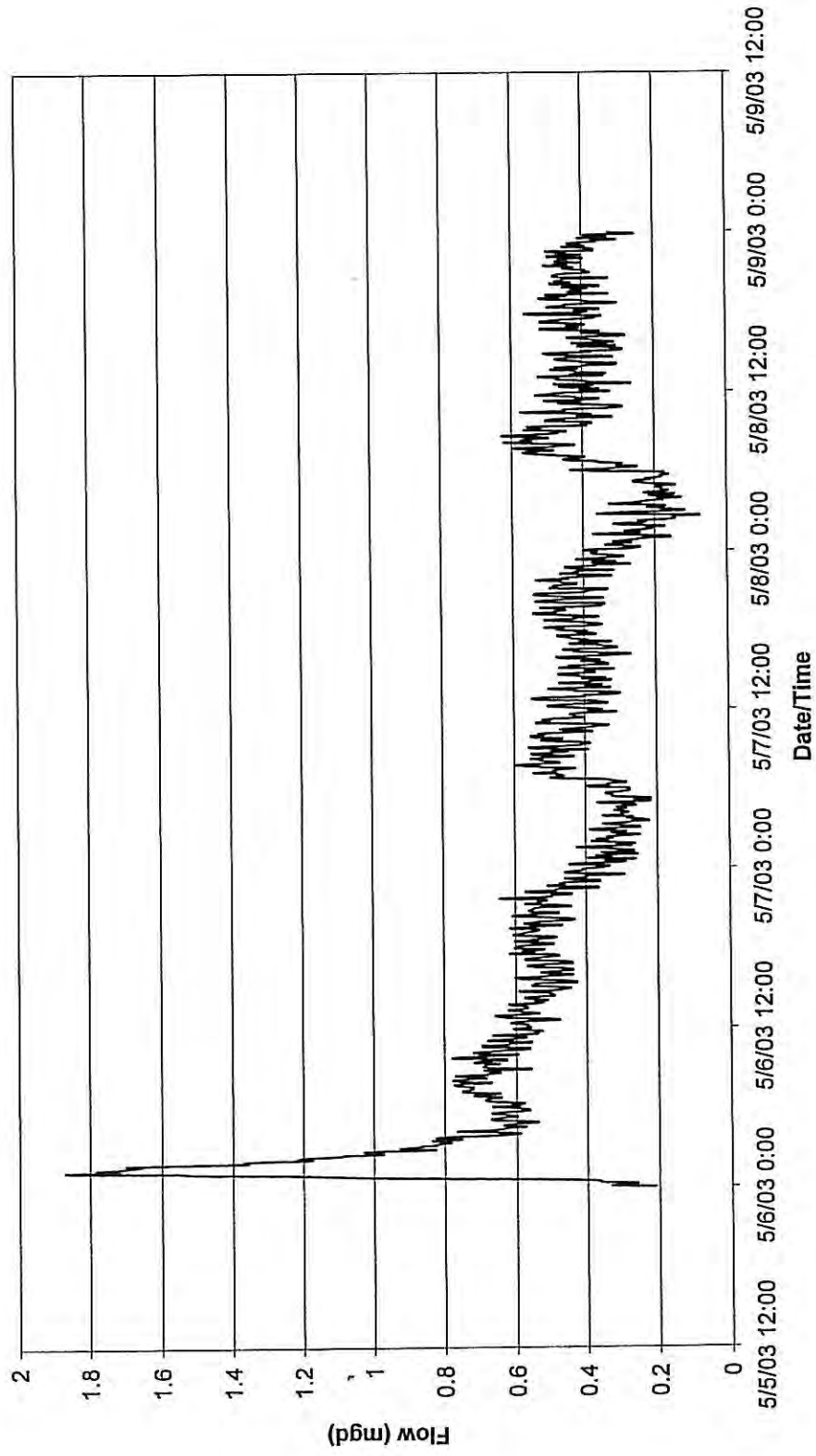
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather flow
May 6, 2003



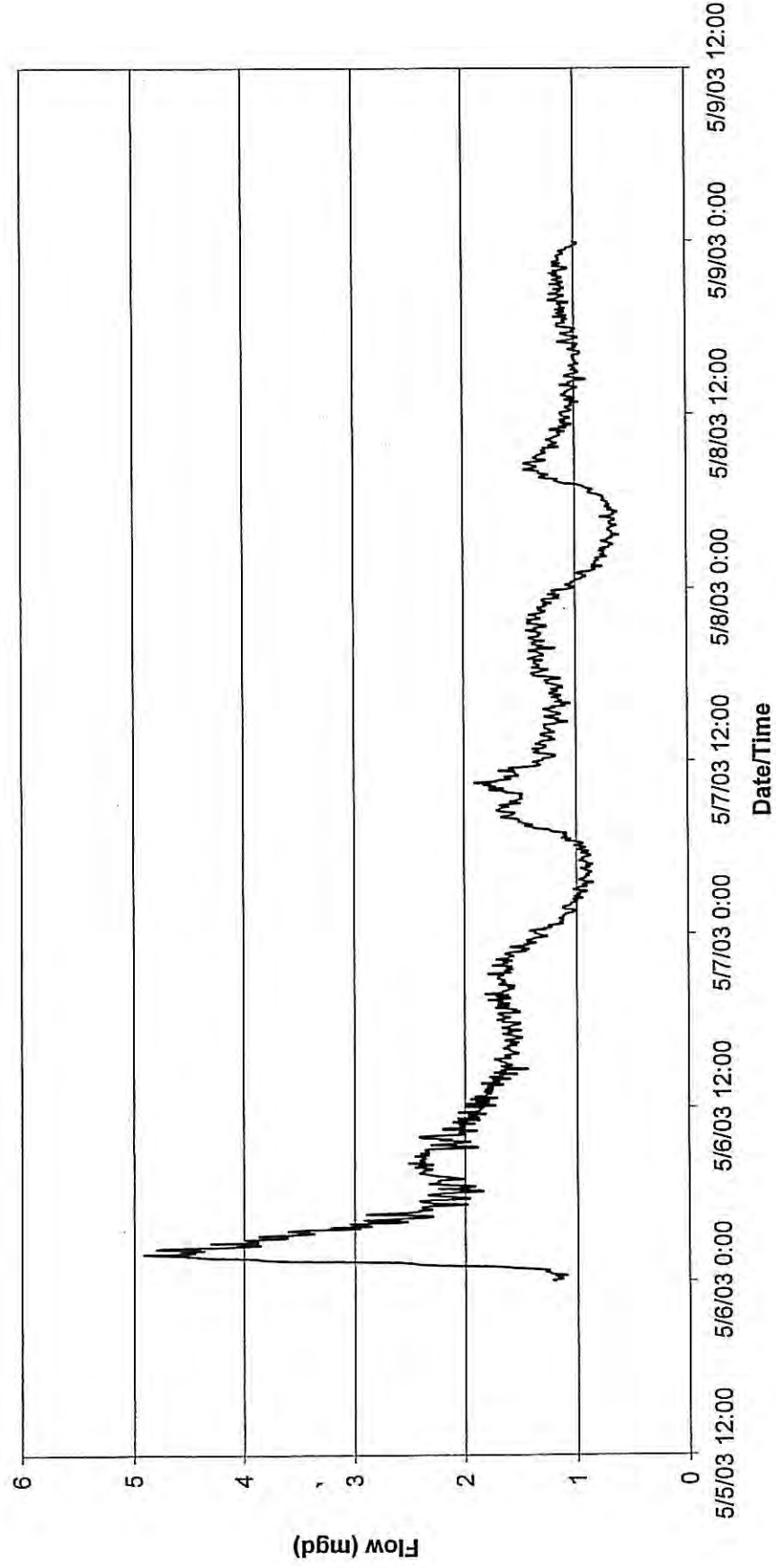
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
May 6, 2003



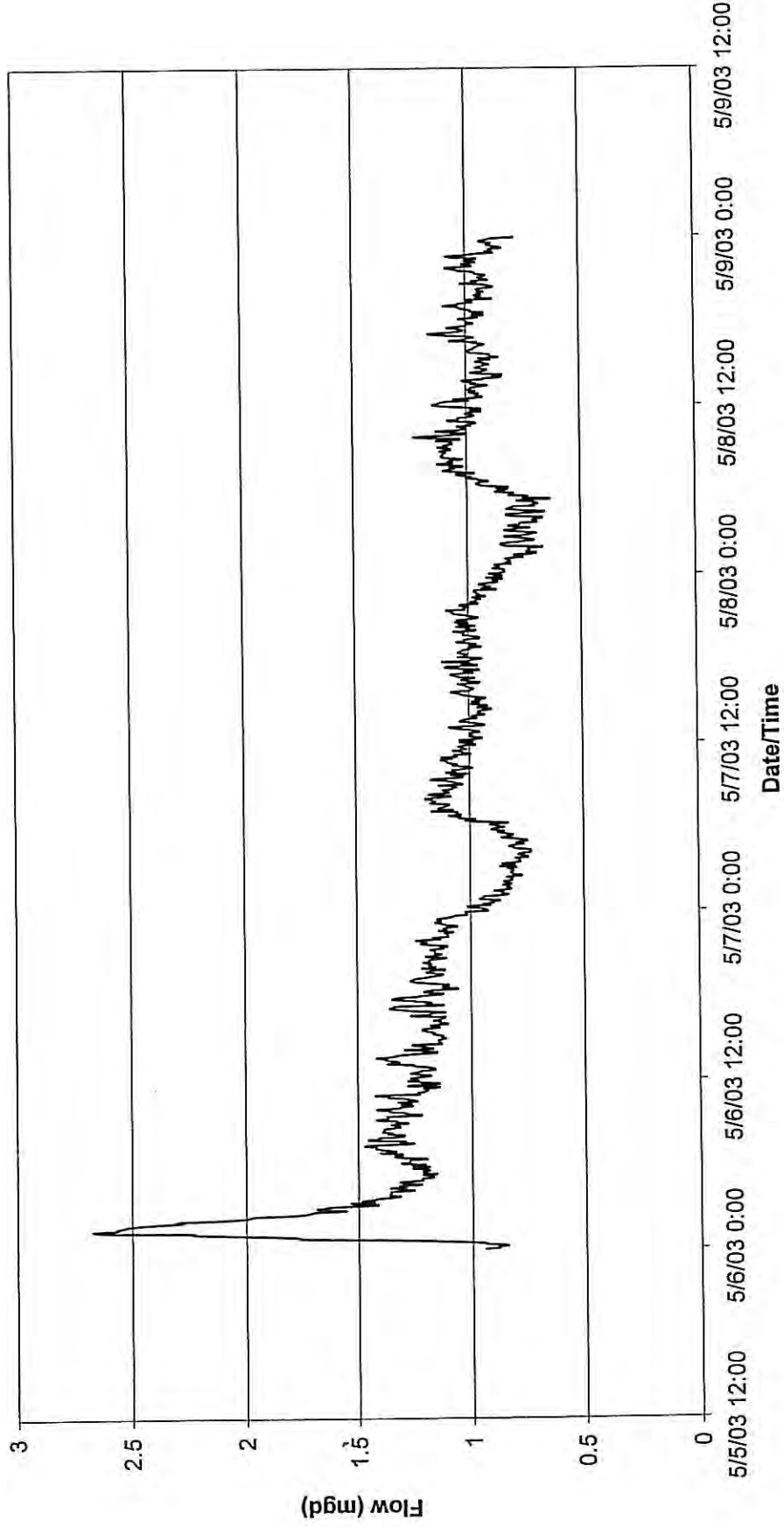
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
May 6, 2003



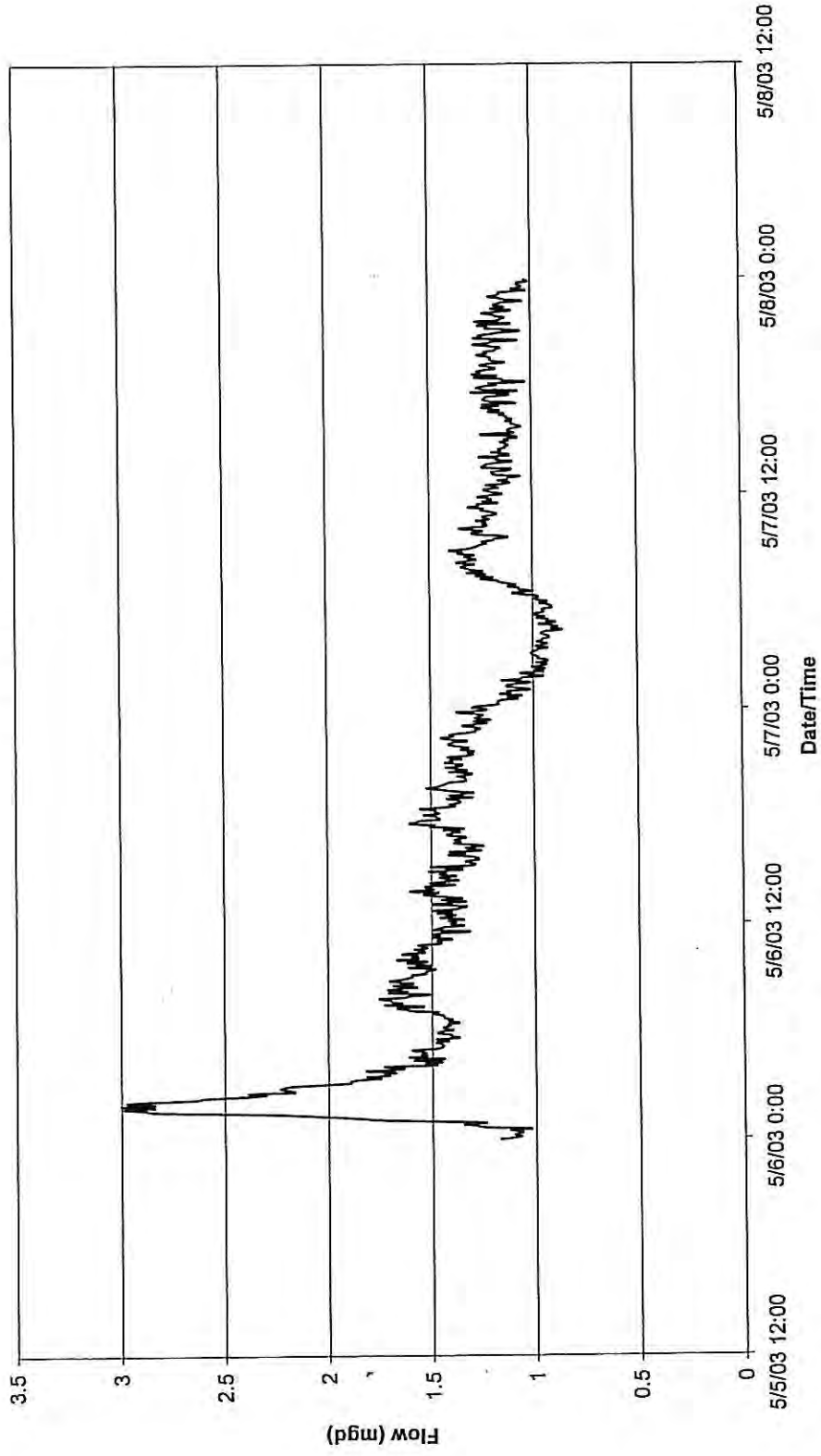
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
May 6, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Wet Weather Flow
May 6, 2003



Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 66th Street and Frontier Avenue
 Flow on 66th Street
 Wet Weather Flow
 May 6, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: May 11, 2003

Peak Rainfall Intensity = i (inches/hour) = 0.79

Average Rainfall Intensity (inches/hour) = 0.69

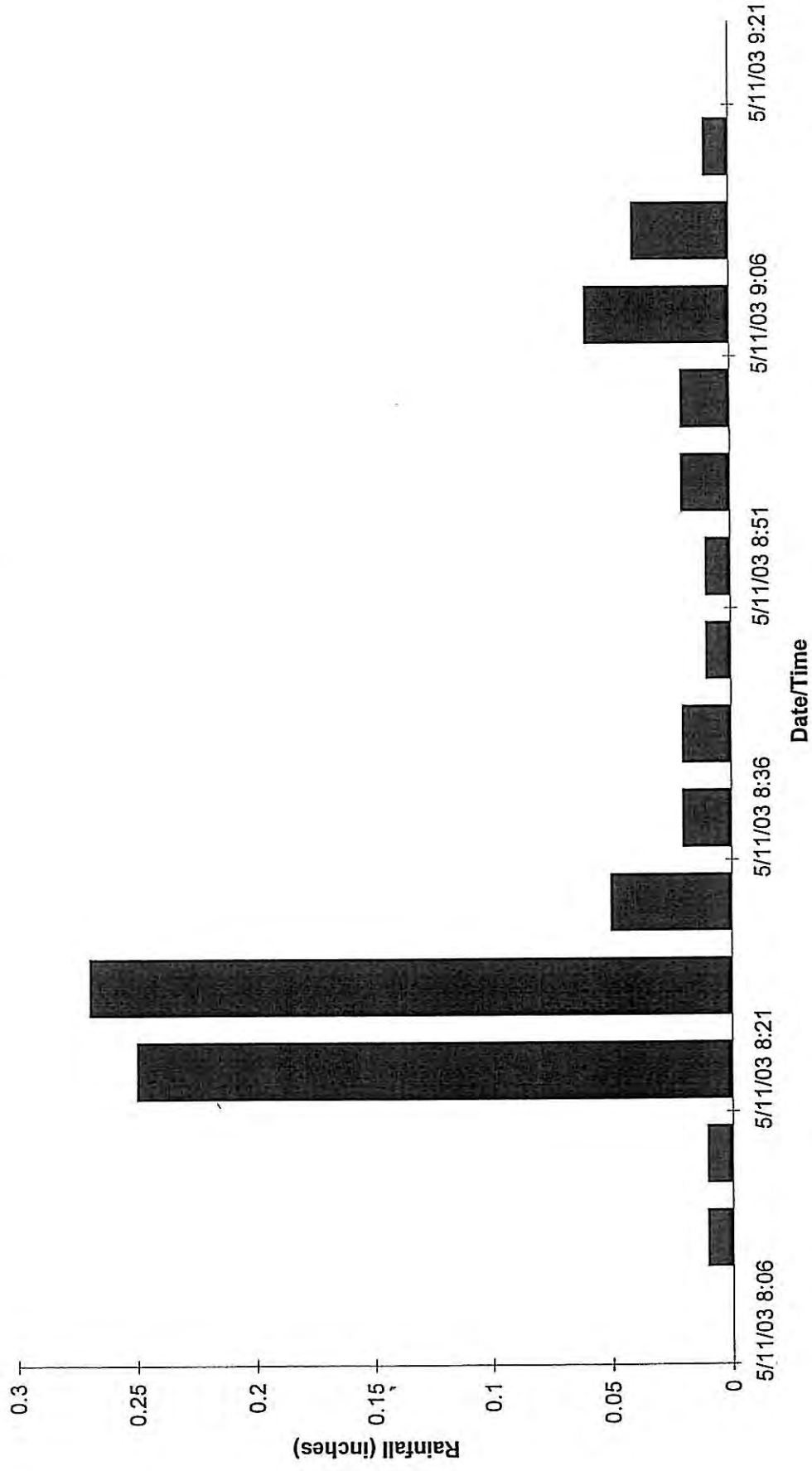
Total Rainfall = 0.8 inches

Note the balance of flow between LS-6, LS-1, trunk sewer capacities, cross-over pipe, and LS-6 bypass pump.

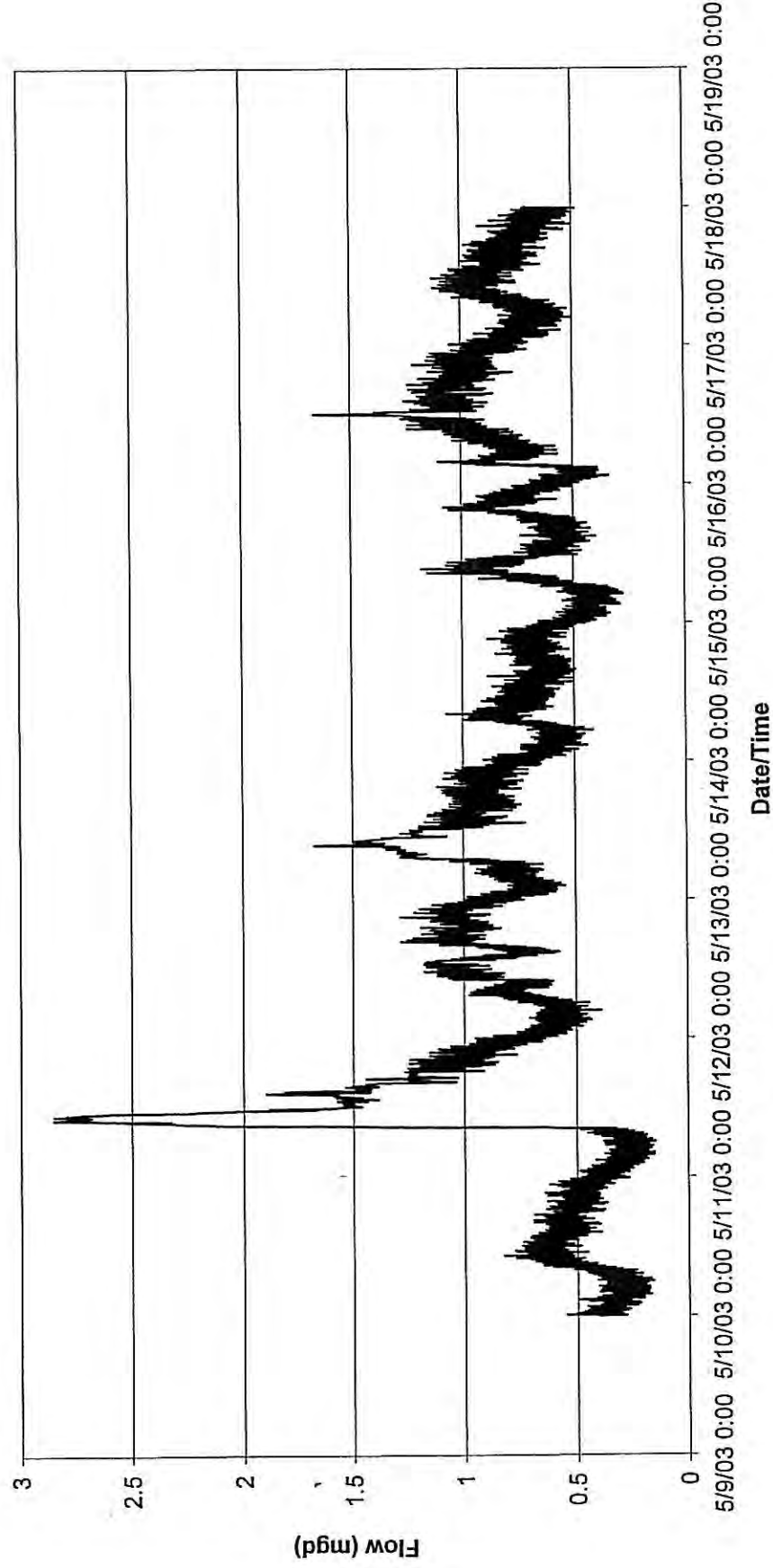
Metered Subareas		Detailed I/I Investigations, 1999-2001		Average DWF		Metered Average Peak WWF		Inflow	
Meter Name				(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1									
93rd Street 1 MH South of Cayuga Creek		8,9		0.170	118	0.826	573	0.656	455
91st Street and Luick Avenue		3,4,5,6,7,8,9		0.359	249	2.489	1728	2.130	1479
88th Street and Mang Avenue		1,2,3,4,5,6,7,8,9		0.453	315	2.775	1927	2.322	1612
MH-4									
80th Street and Lindbergh Avenue		4		0.164	114	1.005	698	0.841	584
81st Street, Flow from North of Frontier Avenue		1,2,3,5,7,4		0.369	256	2.472	1717	2.103	1460
*Frontier Avenue, Flow from East of 81st Street		6, MH- 1		0.592	411	3.473	2412	2.881	2001
73rd Street and Girard Avenue		8, MH-1,1,2,3,5,7,4,6		1.069	743	5.459	3791	4.390	3049
Bypass Pump in LS-6, 0.4 hours				NA	NA	2.160	1500	NA	NA
MH- 6									
66th Street and Frontier Avenue		All MH- 6 Area		1.117	776	4.083	2835	2.966	2060
81st Street, Flow from South of Stephenson Avenue		5,6,7,8,9,10,11,12		0.939	652	3.503	2432	2.563	1780
81st Street, Cross Over Pipe		Cross Over Pipe at LS-6/LS-1		0.0	0.0	0.162	113	0.0	0.0

Areas	Metered Subareas		Average DWF		Average Peak WWF		Inflow
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	(mgd)	(gpm)	(mgd)	(gpm)	
MH-1	A	8,9	0.170	118	0.826	573	455
	B	3,4,5,6,7	0.189	131	1.663	1155	1024
	C	1,2	0.094	65	0.286	198	133
MH-4	D	4	0.164	114	1.005	698	584
	E	1,2,3,5,7	0.205	142	1.467	1019	876
	F	8	0.108	75	1.314	913	837
MH-6	G	6	0.139	97	0.698	485	388
	H	1,2,3,4	0.177	123	0.418	290	167
	I	5,6,7,8,9,10,11,12	0.939	652	3.503	2432	1780

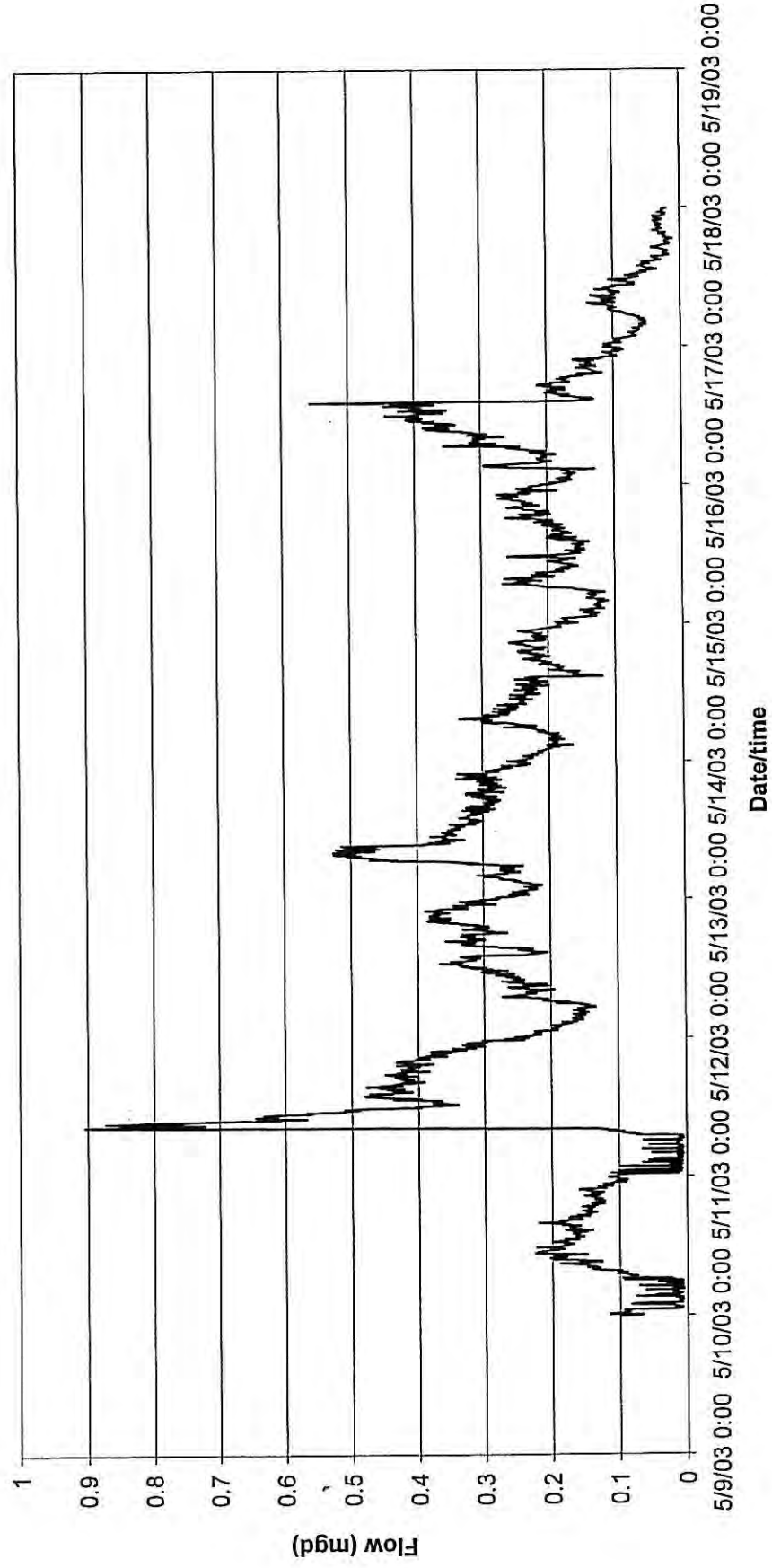
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - May 11, 2003



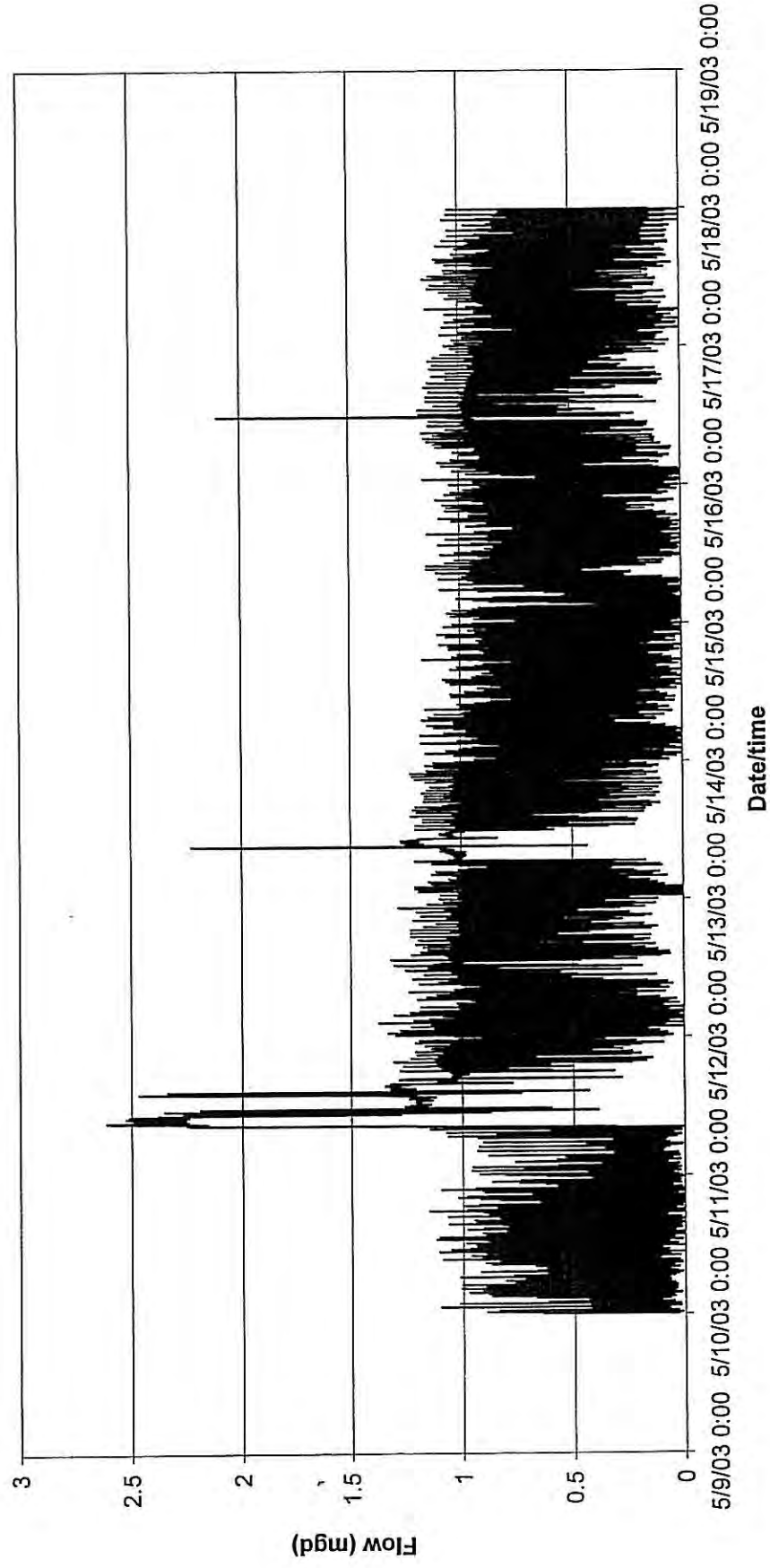
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
May 11, 2003



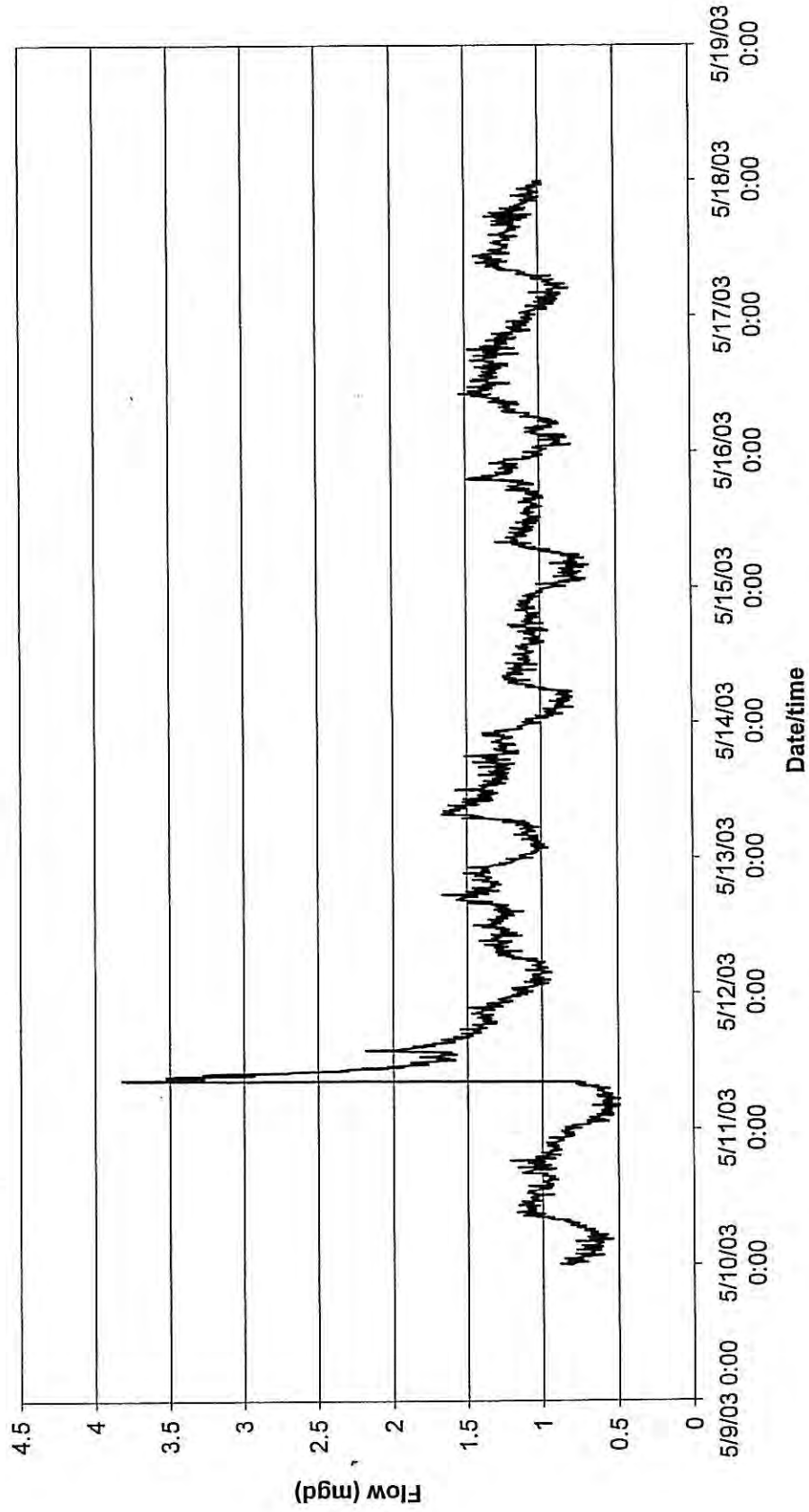
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
May 11, 2003



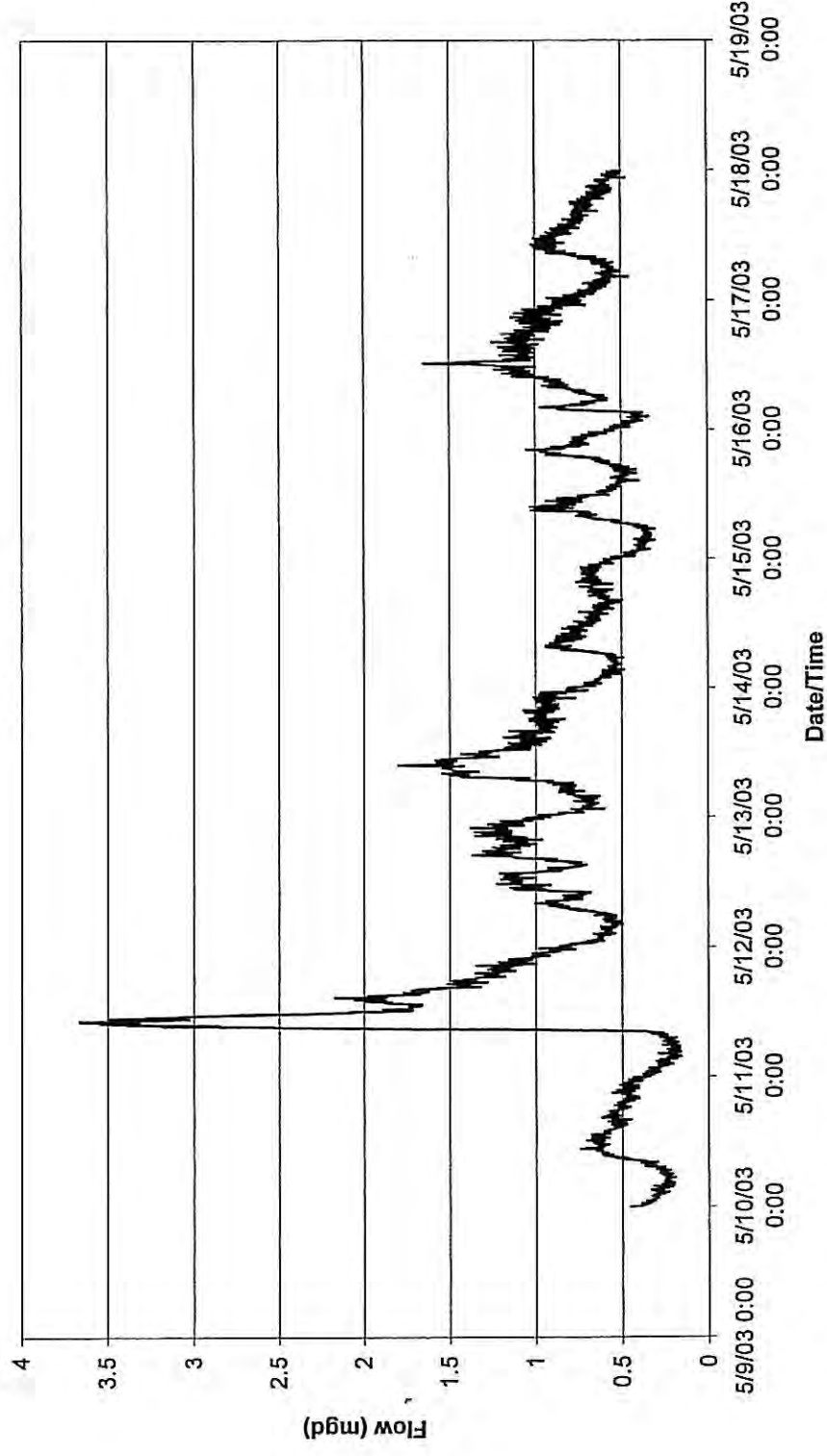
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
May 11, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - South of Stephenson Avenue
Wet Weather Flow
May 11, 2003

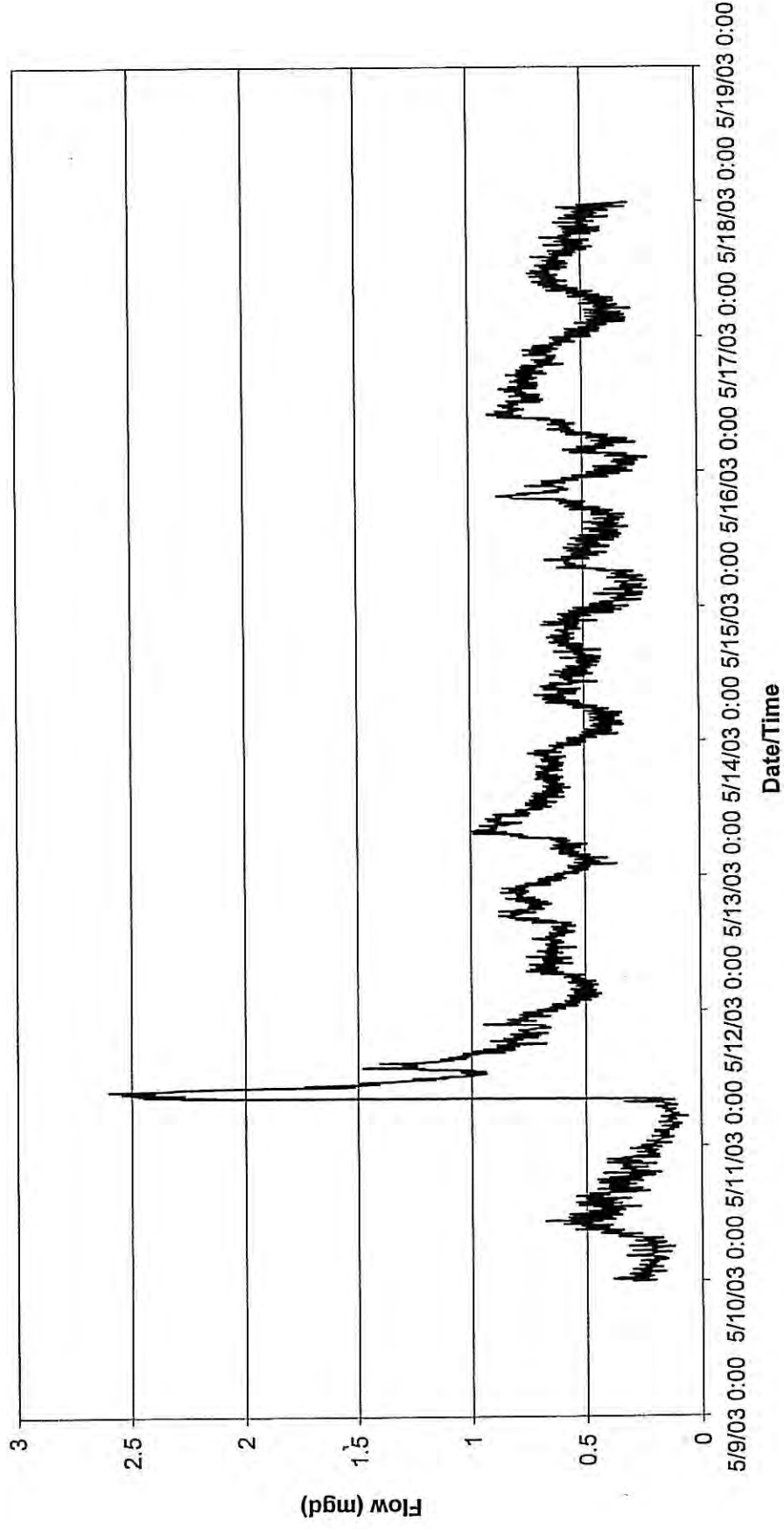


Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
May 11, 2003

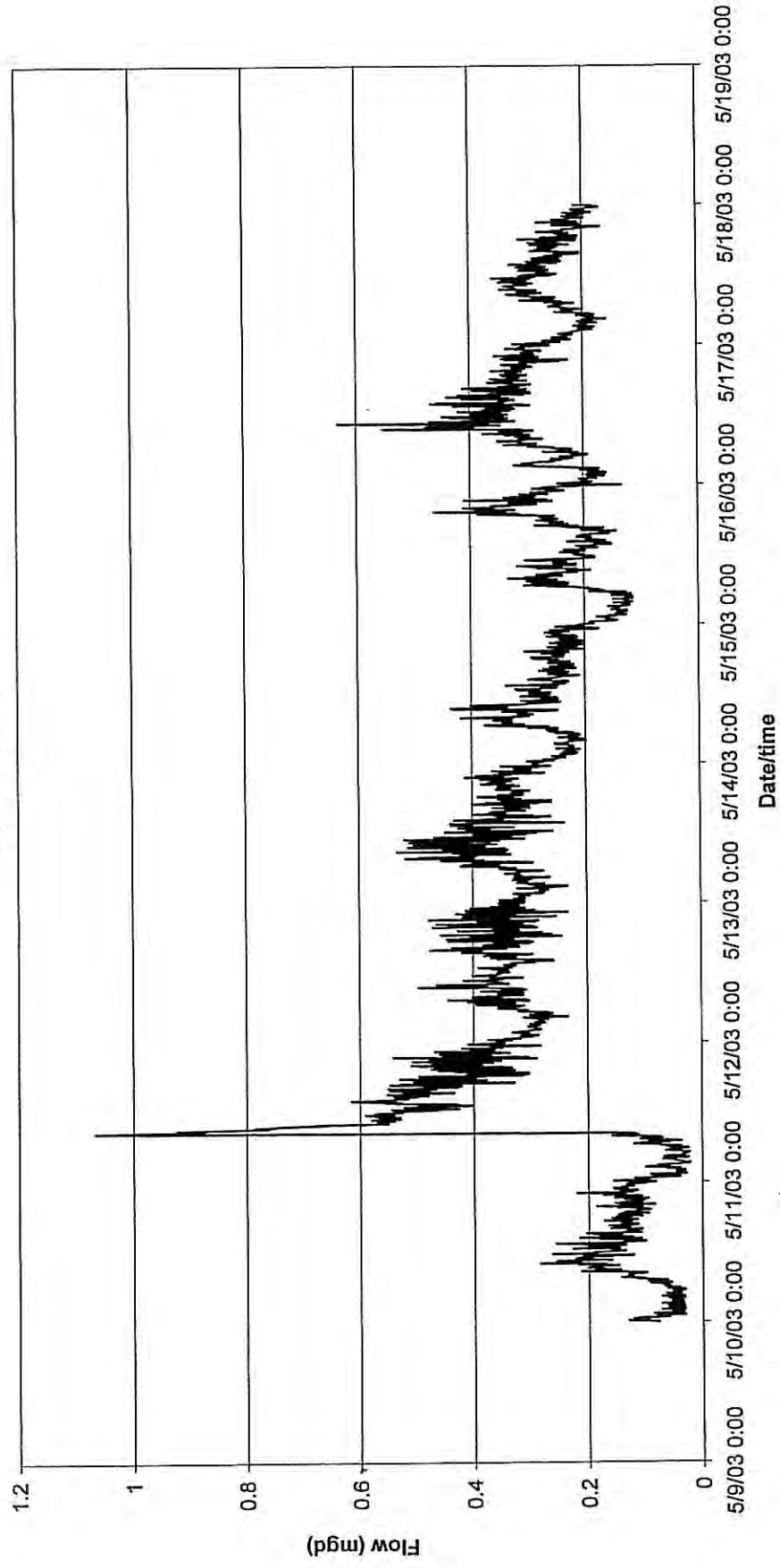


Flow Values have been adjusted due the malfunctioning of the Probe

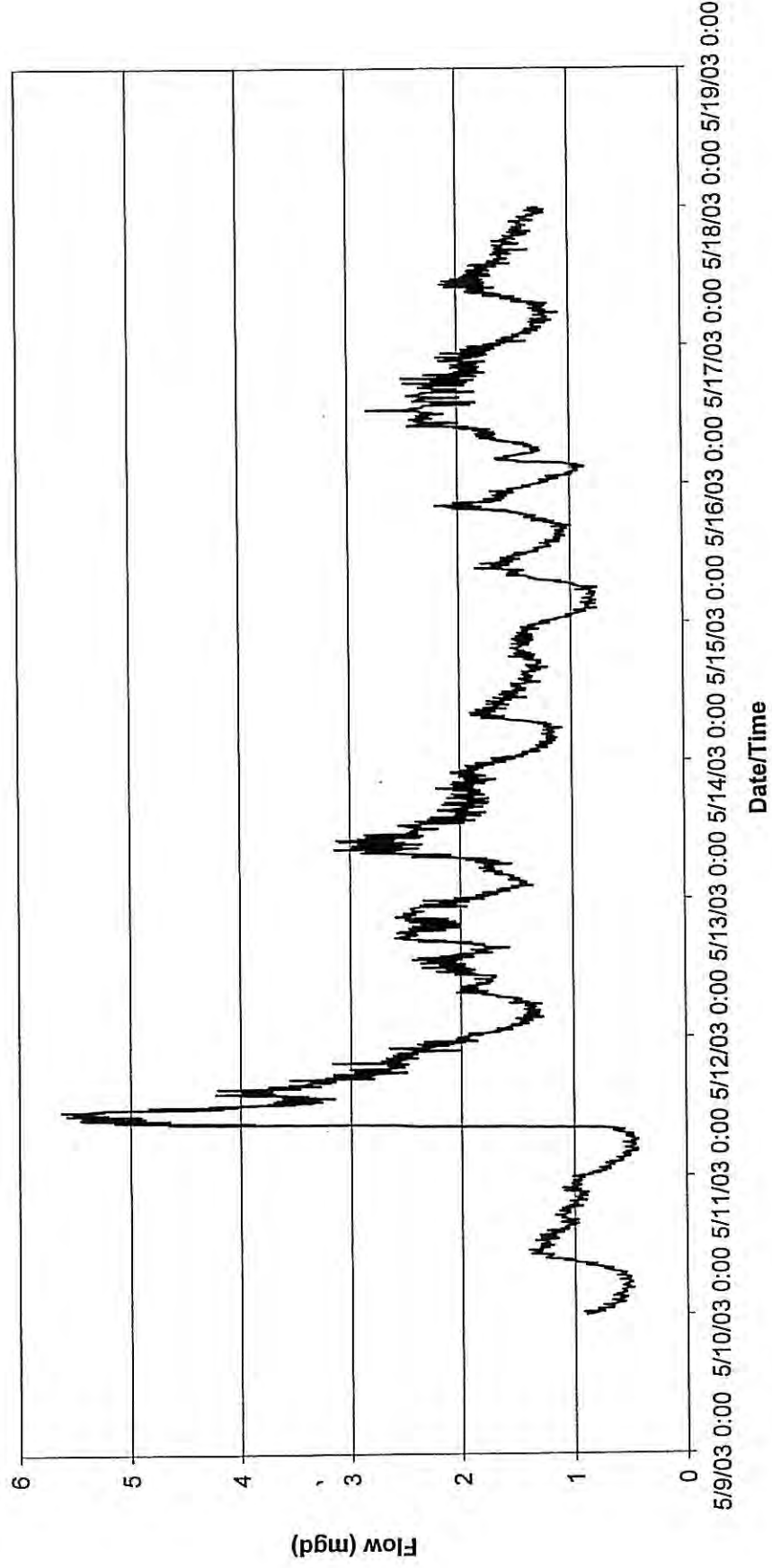
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
May 11, 2003



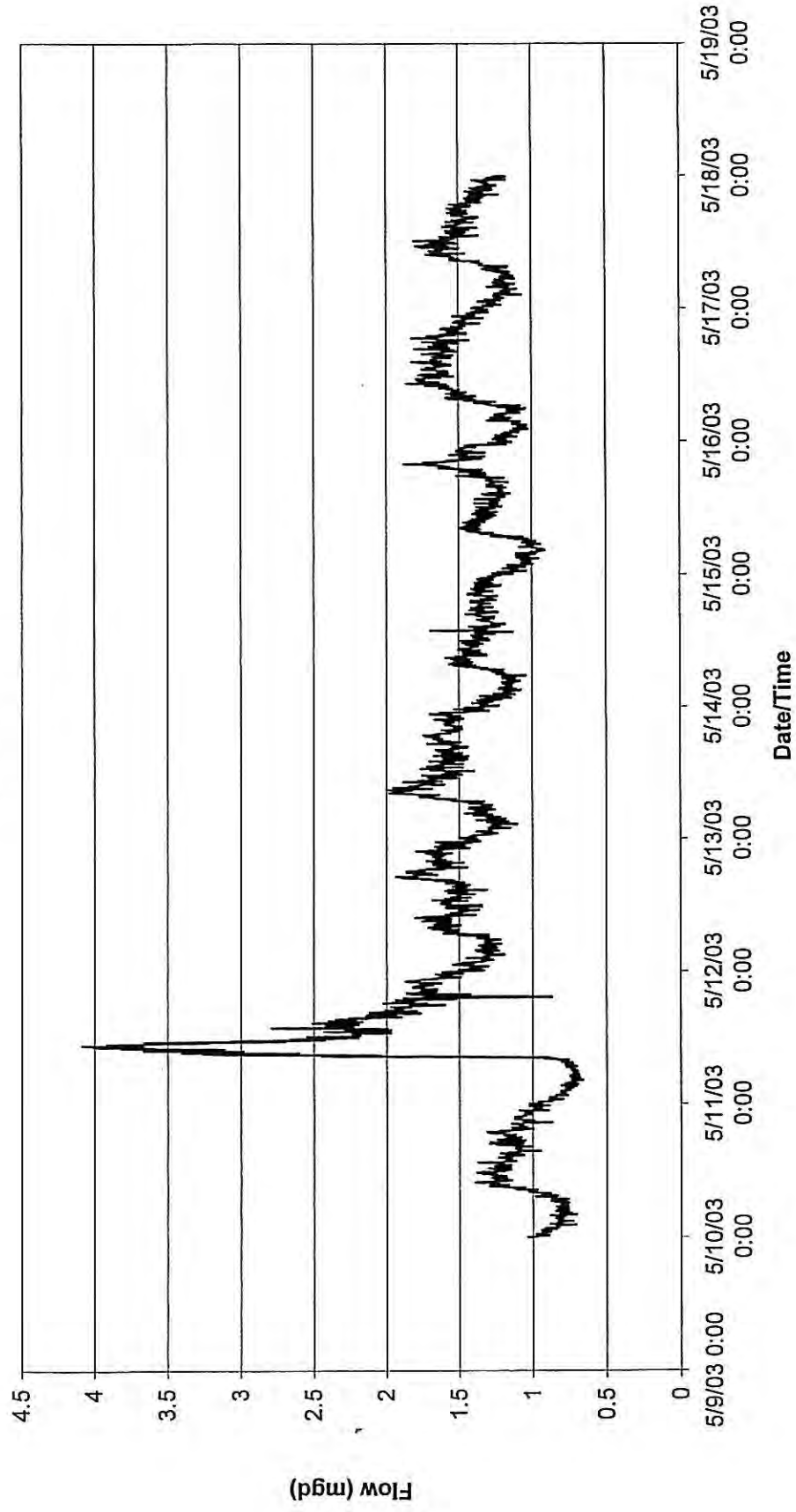
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
May 11, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
May 11, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
May 11, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Date: May 20, 2003

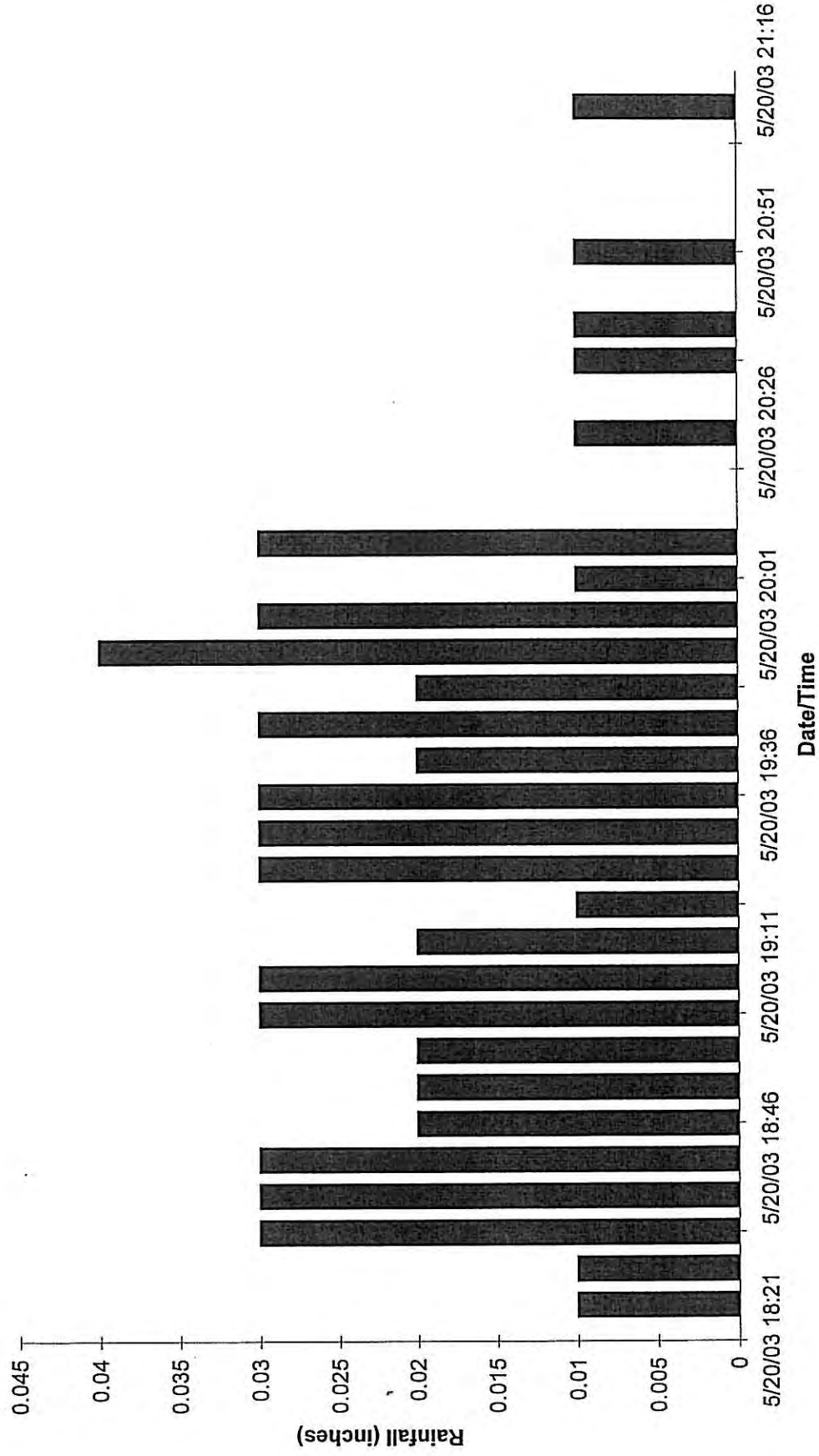
Peak Rainfall Intensity $i = (\text{inches/hour}) = 0.34$
 Average Rainfall Intensity $(\text{inches/hour}) = 0.086$
 Total Rainfall $(\text{inches}) = 0.6$

Trunk Sewer
Capacity, mgd

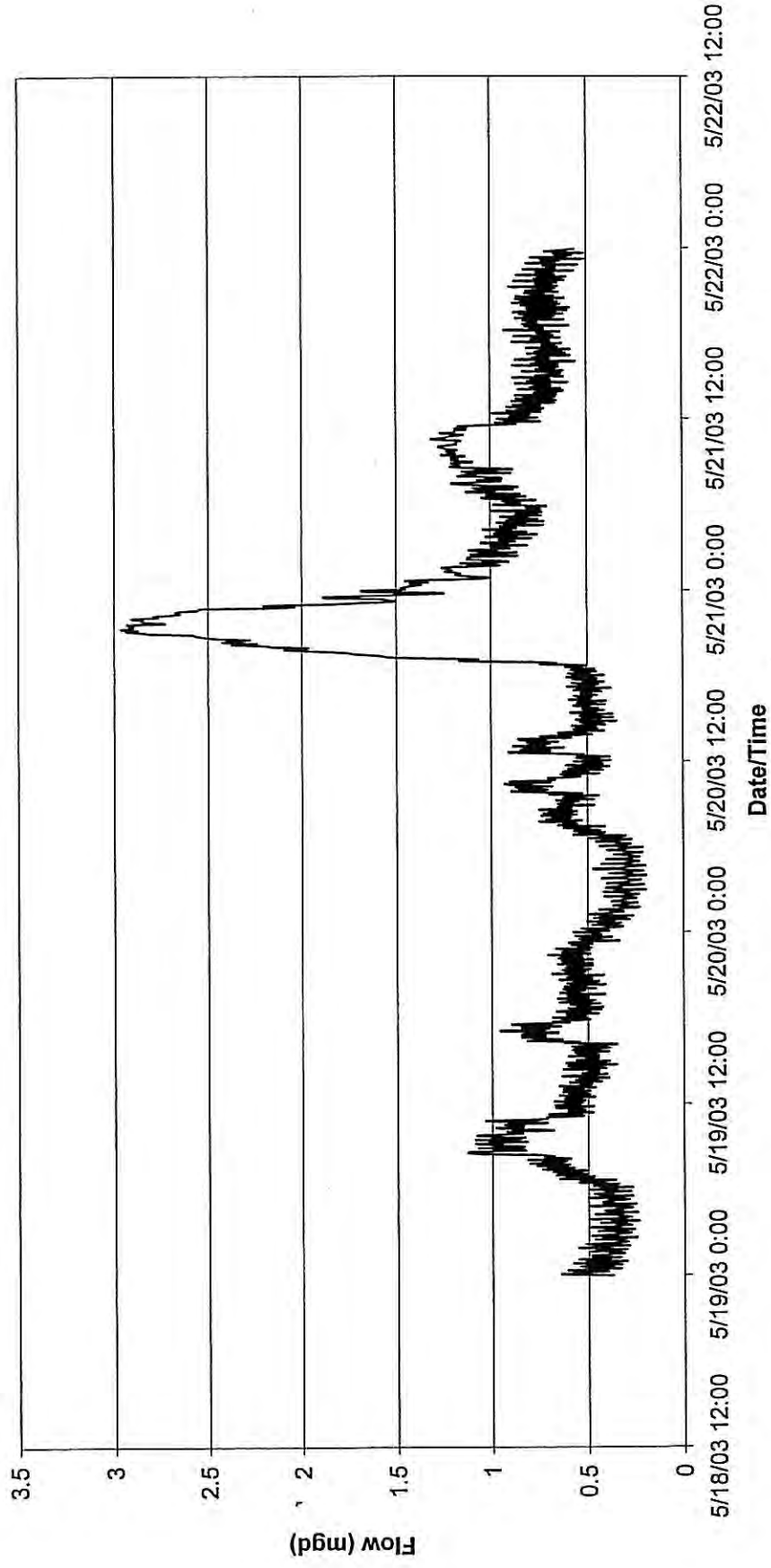
Metered Subareas		Metered Average Peak		Inflow	
Meter Name	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	Average DWF (gpm)	WWF (mgd)	WWF (gpm)
MH-1					
93rd Street 1 MH South of Cayuga Creek	8,9	0.170	118	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.359	249	2.556	1775
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.453	315	2.792	1939
MH-4					
80th Street and Lindbergh Avenue	4	0.164	114	0.607	422
81st Street Flow from North of Frontier Avenue	1,2,3,5,7,4	0.369	256	2.032	1411
Frontier Avenue, Flow from East	6, MH- 1	0.592	411	3.360	2333
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	1.069	743	5.070	3521
Bypass Pump in LS-6, 0.6 hours		NA	NA	2.16	1500
MH- 6					
66th Street and Frontier Avenue	All MH-6 Area	1.117	776	3.292	2286
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.939	652	3	2084
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.000	0.0	0.020	14

Areas	Metered Subarens				Metered Average Peak				Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	Average DWF (gpm)	Average Peak WWF (mgd)	Average Peak WWF (gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1	A	8,9	0.170	118	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	0.189	131	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.094	65	0.236	164	0.142	99	0.142	99
MH-4	D	4	0.164	114	0.607	422	0.443	308	0.443	308
	E	1,2,3,5,7	0.205	142	1.425	990	1.220	847	1.220	847
	F	8	0.108	75	0.758	527	0.650	451	0.650	451
	G	6	0.139	97	0.568	394	0.429	298	0.429	298
	H	1,2,3,4	0.177	123	0.271	188	0.093	65	0.093	65
MH-6	I	5,6,7,8,9,10,11,12	0.939	652	2.981	2070	2.042	1418	2.042	1418

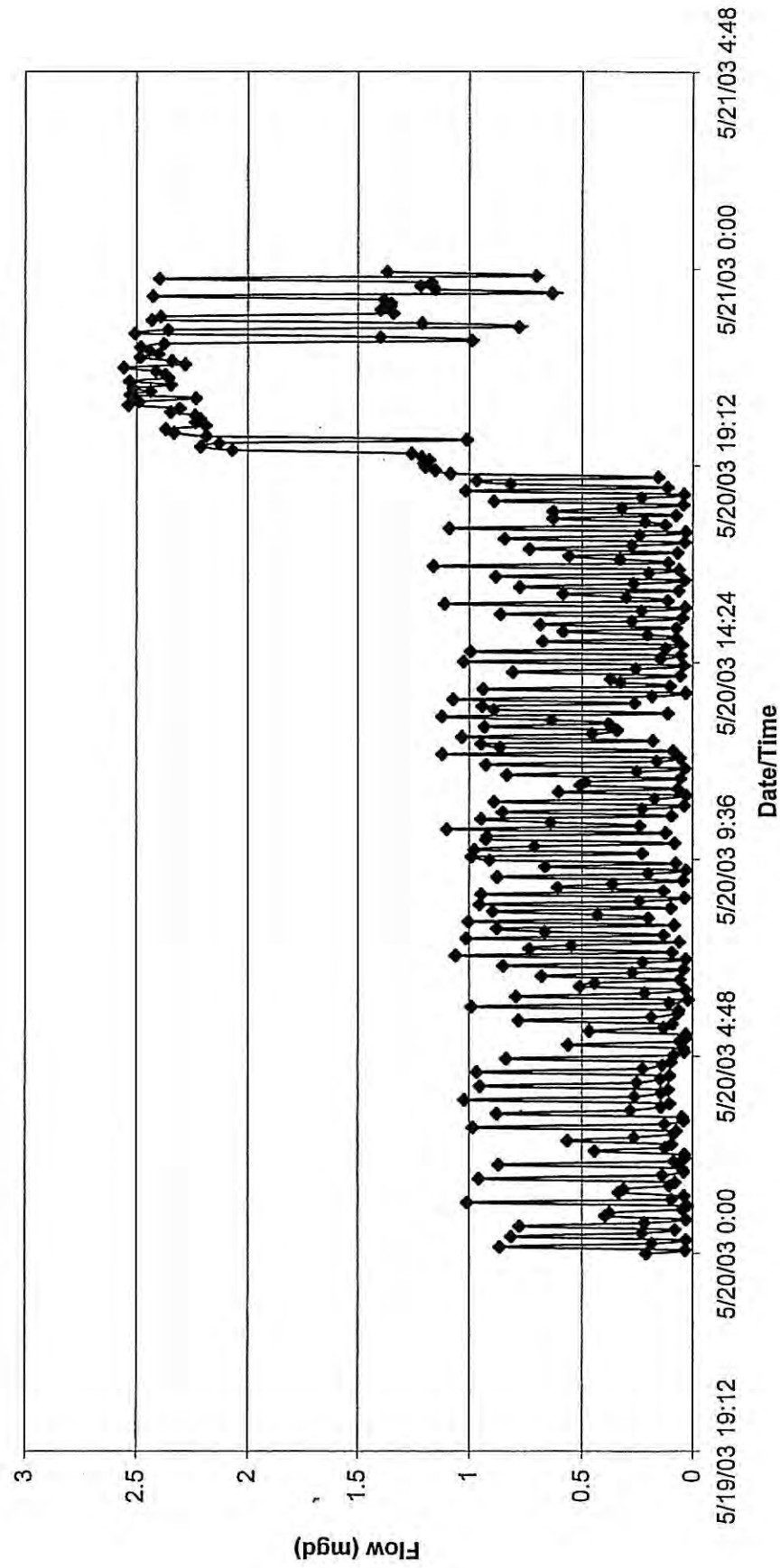
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - May 20, 2003



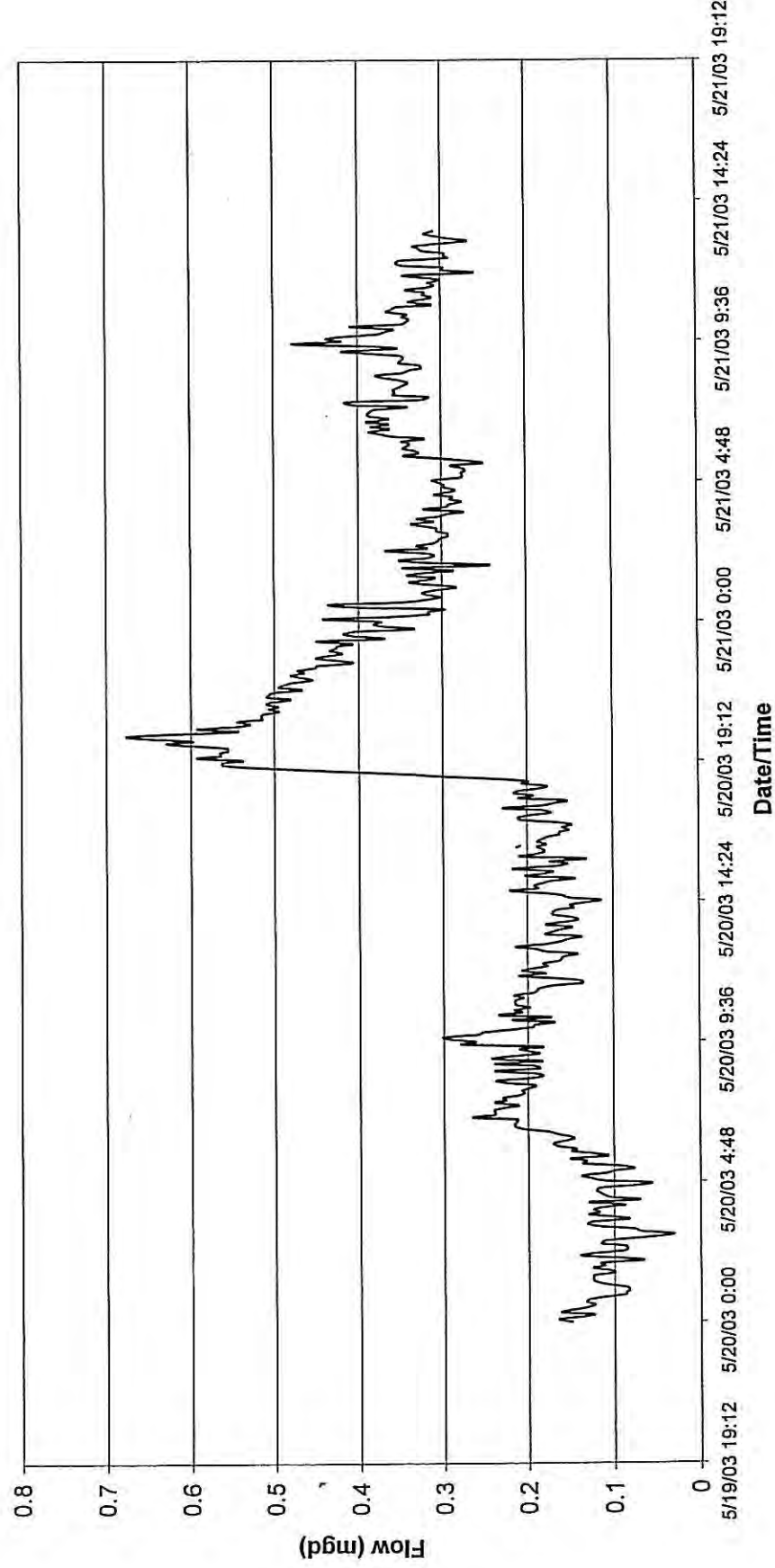
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
May 20, 2003



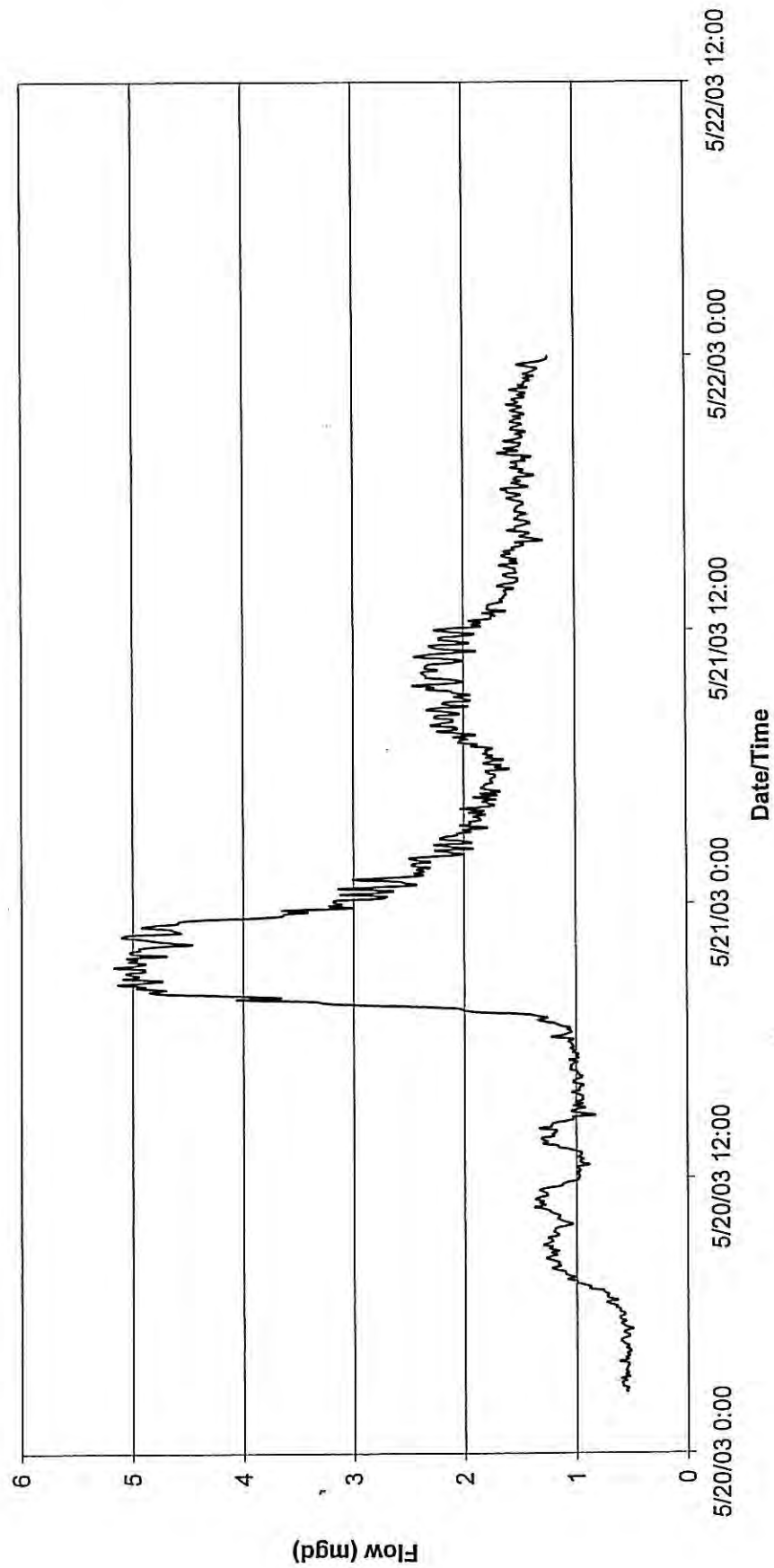
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
May 20, 2003



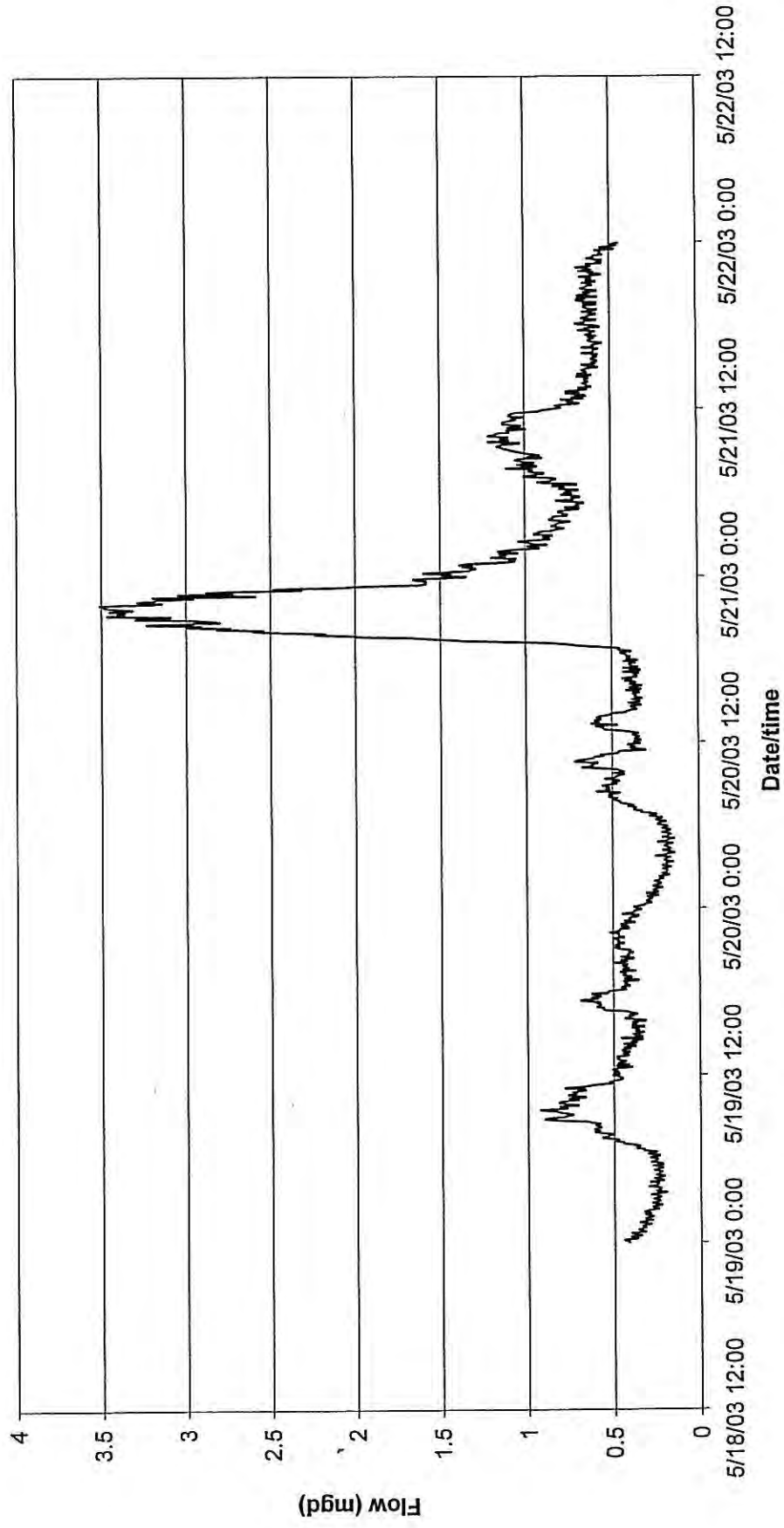
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 80th Street and Lindbergh Avenue
 Flow on Lindbergh Avenue
 Wet Weather Flow
 May 20, 2003



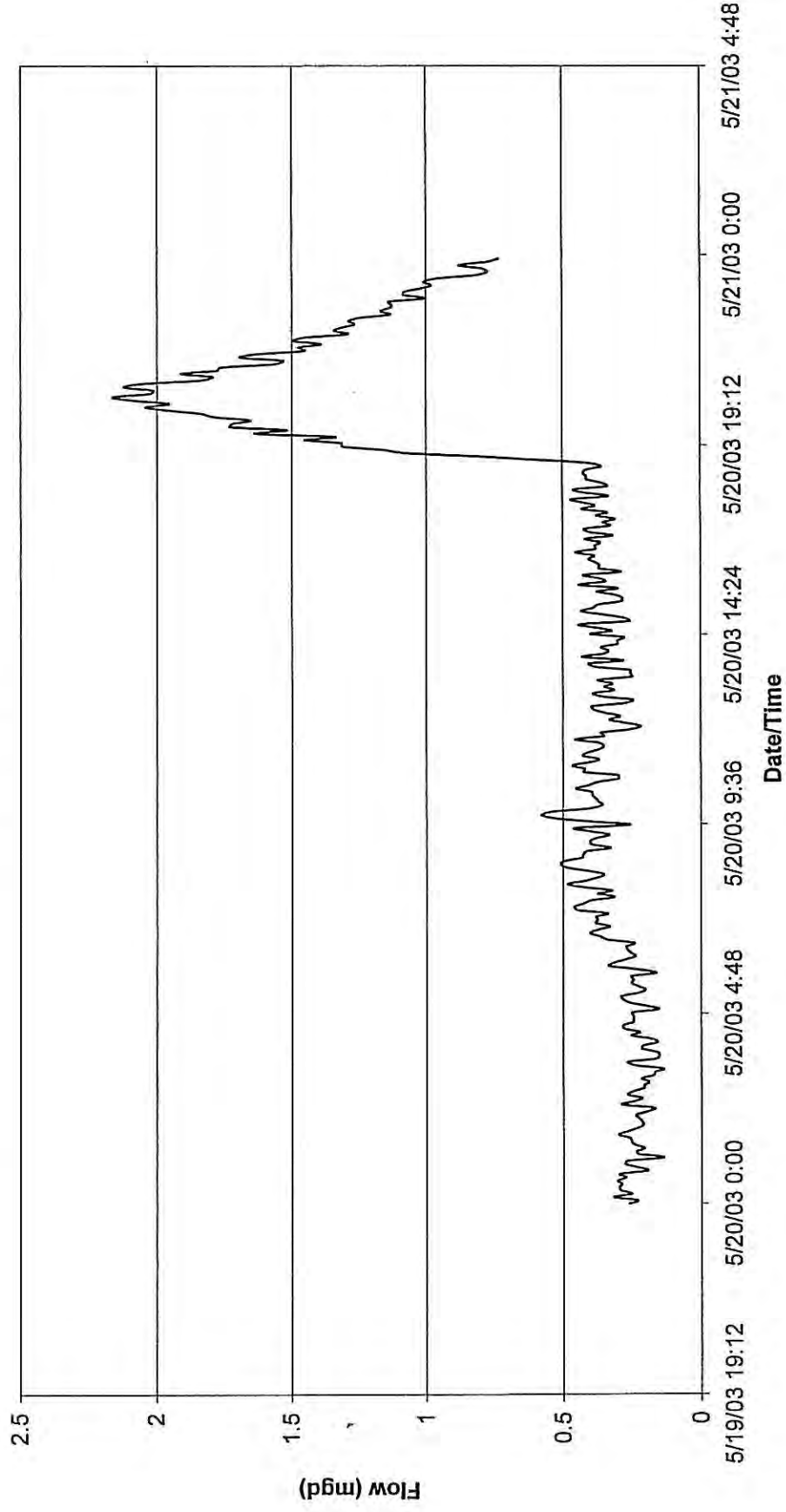
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
May 20, 2003



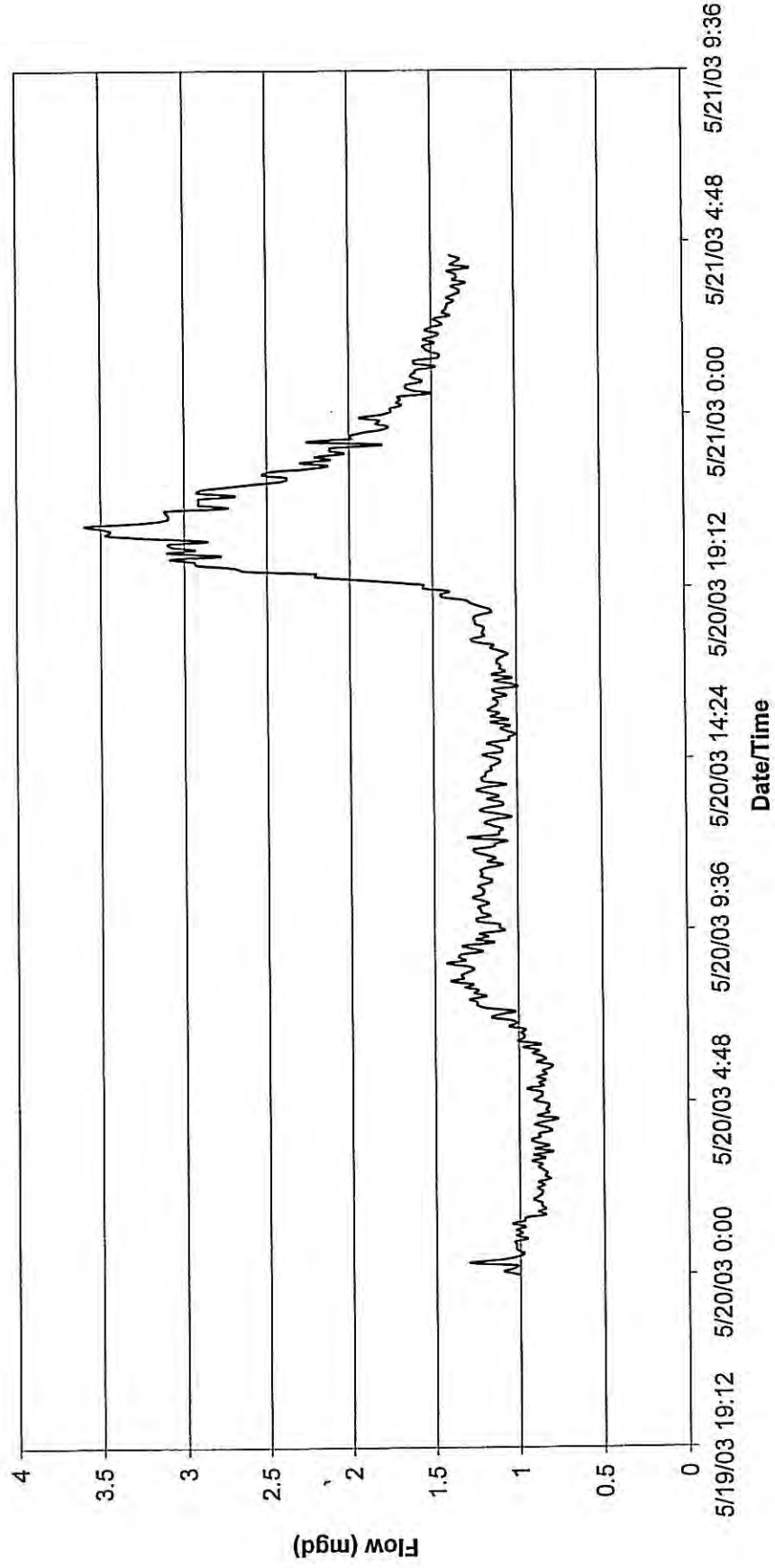
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East on 81st Street
Wet Weather Flow
May 20, 2003



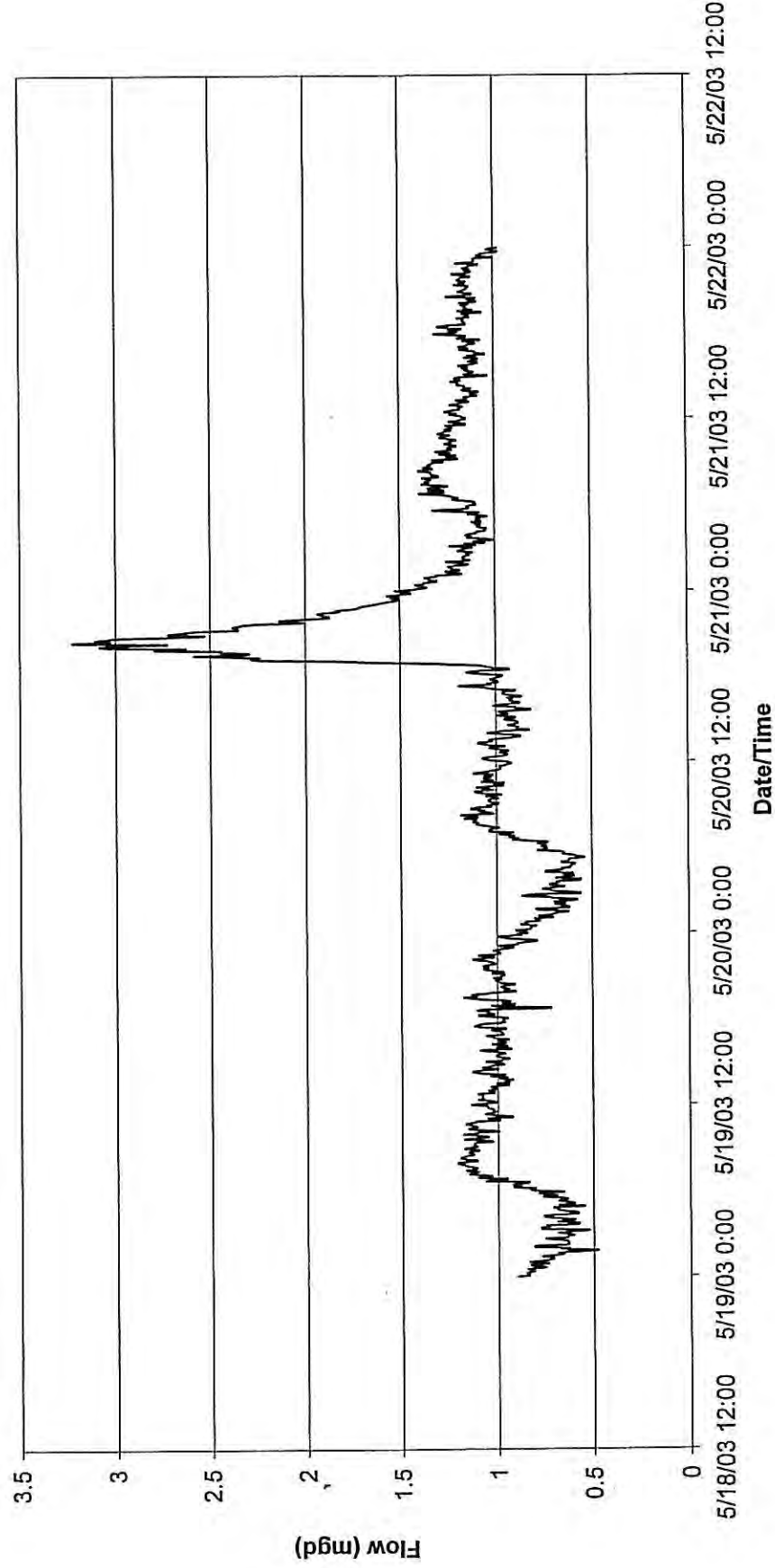
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
May 20, 2003



Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 66th Street and Frontier Avenue
 Flow on 66th Street
 Wet Weather Flow
 May 20, 2003



Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on 81st Street - South of Stephenson Avenue
 Wet Weather Flow
 May 20, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: May 23, 2003

Peak Rainfall Intensity = i (inches/hour) = 0.26
Average Rainfall Intensity (inches/hour) = 0.102
Total Rainfall (inches) = 0.4

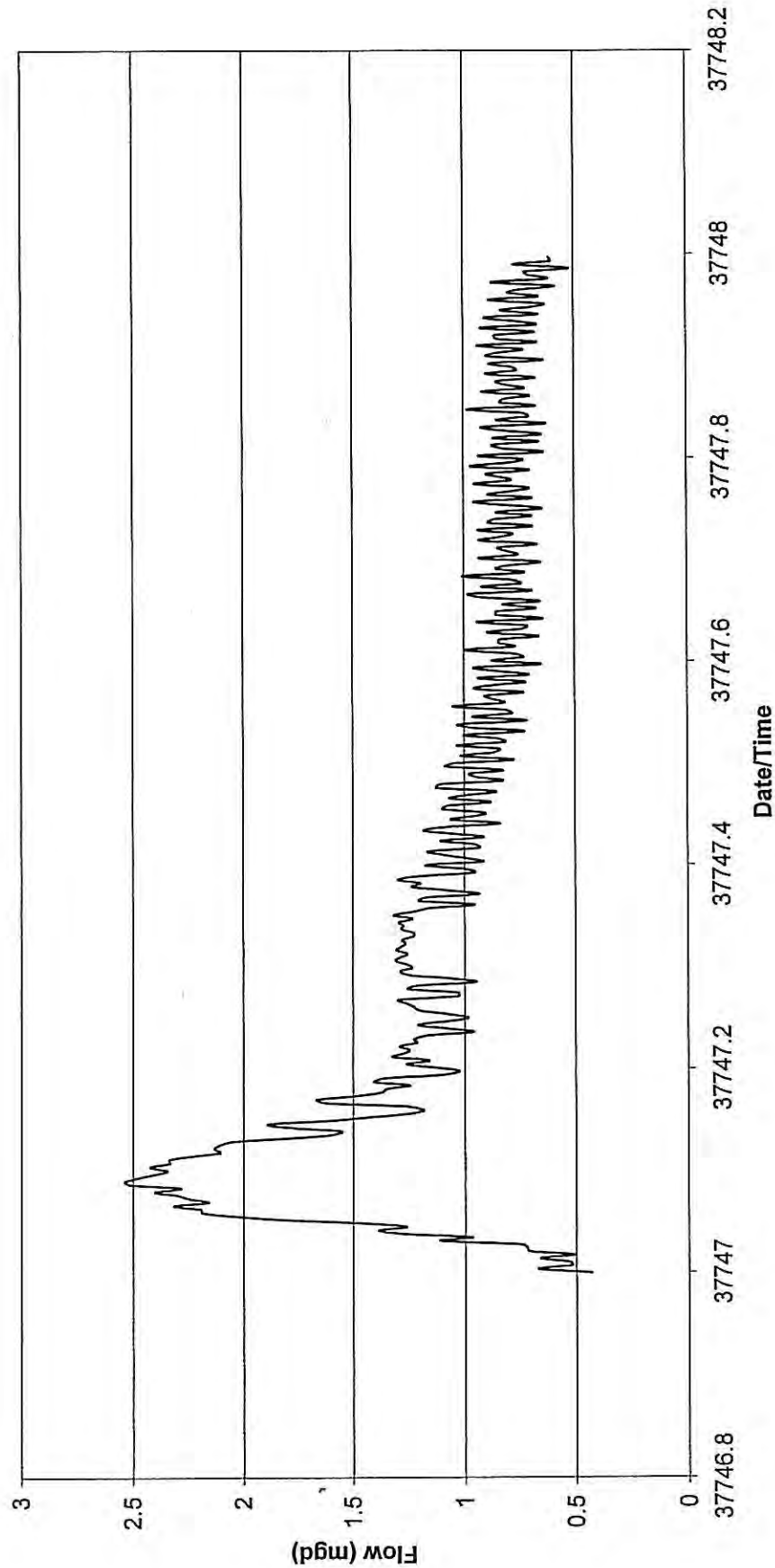
Meter Name	Metered Subareas				Metered Average Peak WWF				Inflow	
	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)		(mgd)	(gpm)			(mgd)	(gpm)
MH-1										
93rd Street 1 MH South of Cayuga Creek	8,9	0.144	100	No Data	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.359	249	1.871	1299	1.512	1050			
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.453	315	2.040	1417	1.587	1102			
MH-4										
80th Street and Lindbergh Avenue	4	0.164	114	0.547	380	0.383	266			
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.369	256	1.439	999	1.070	743			
*Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.592	411	2.983	2071	2.391	1660			
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	1.069	743	4.832	3356	3.763	2613			
MH-6										
66th Street and Frontier Avenue	All MH- 6 Area	1.117	776	2.582	1793	1.465	1017			
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.939	652	2.202	1530	1.263	877			
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0	0.0	0.0	0.0	0.0			

Areas	Metered Subareas				Metered Average Peak WWF				Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)	(mgd)	(gpm)			(mgd)	(gpm)
MH-1	A	8,9	0.144	100	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	0.215	149	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.094	65	0.169	117	0.1	52		
MH-4	D	4	0.164	114	0.547	380	0.383	266		
	E	1,2,3,5,7	0.205	142	0.892	620	0.687	477		
	F	8	0.108	75	0.410	285	0.302	210		
	G	6	0.139	97	0.943	655	0.804	558		
	H	1,2,3,4	0.177	123	0.379	263	0.202	140		
MH-6	I	5,6,7,8,9,10,11,12	0.939	652	2.202	1530	1.263	877		

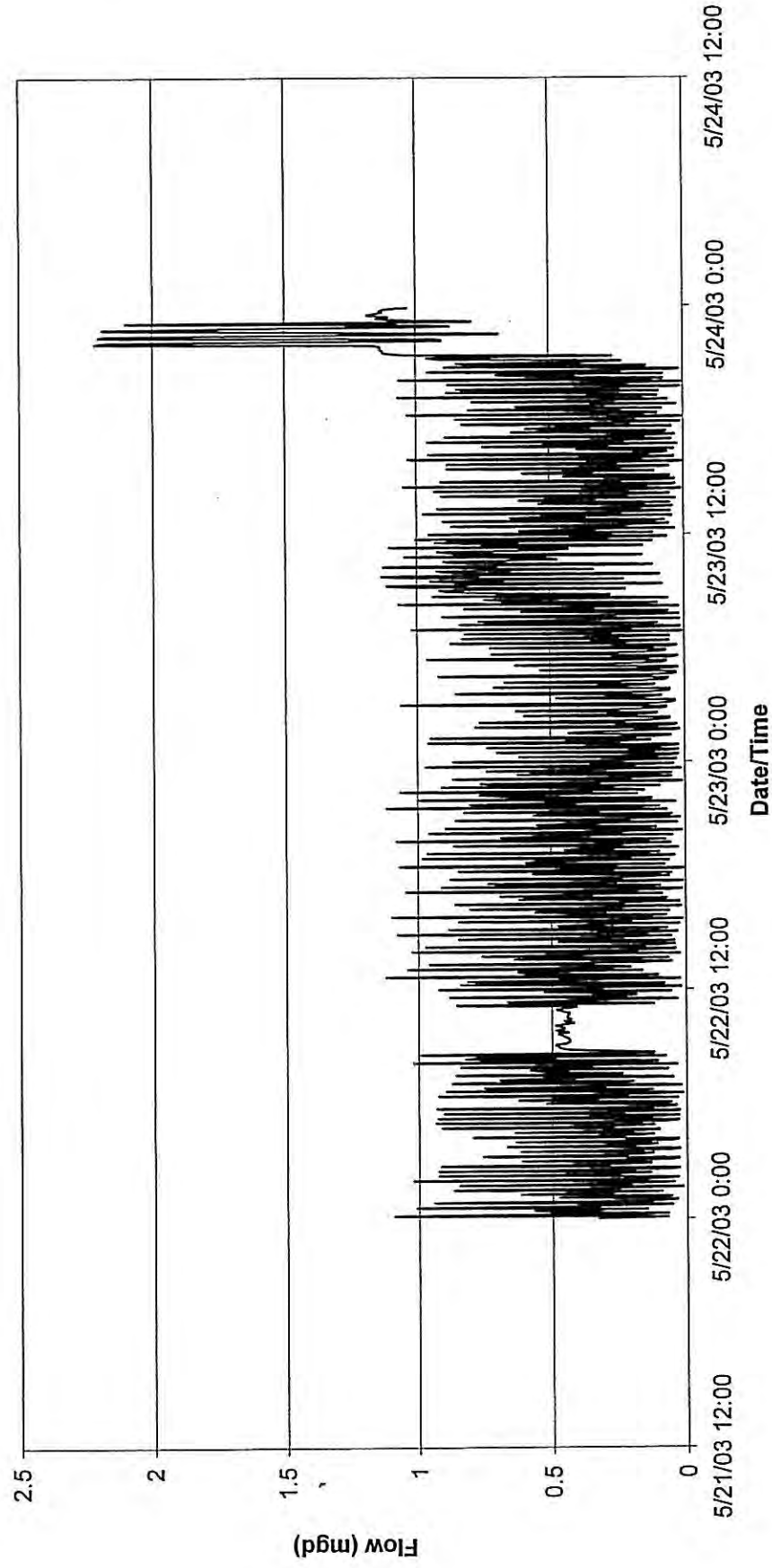
*Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

[illegible]

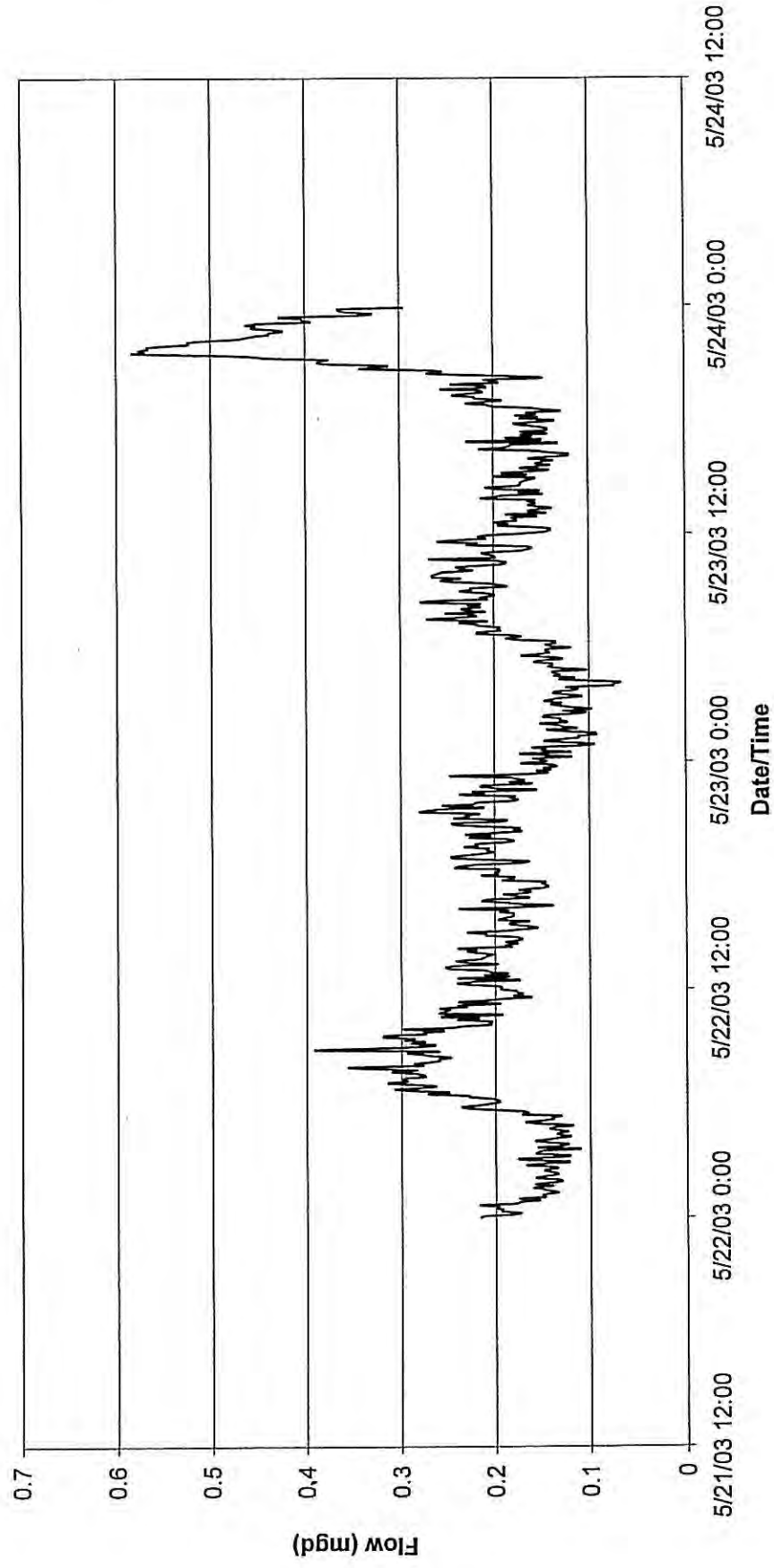
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
May 23, 2003



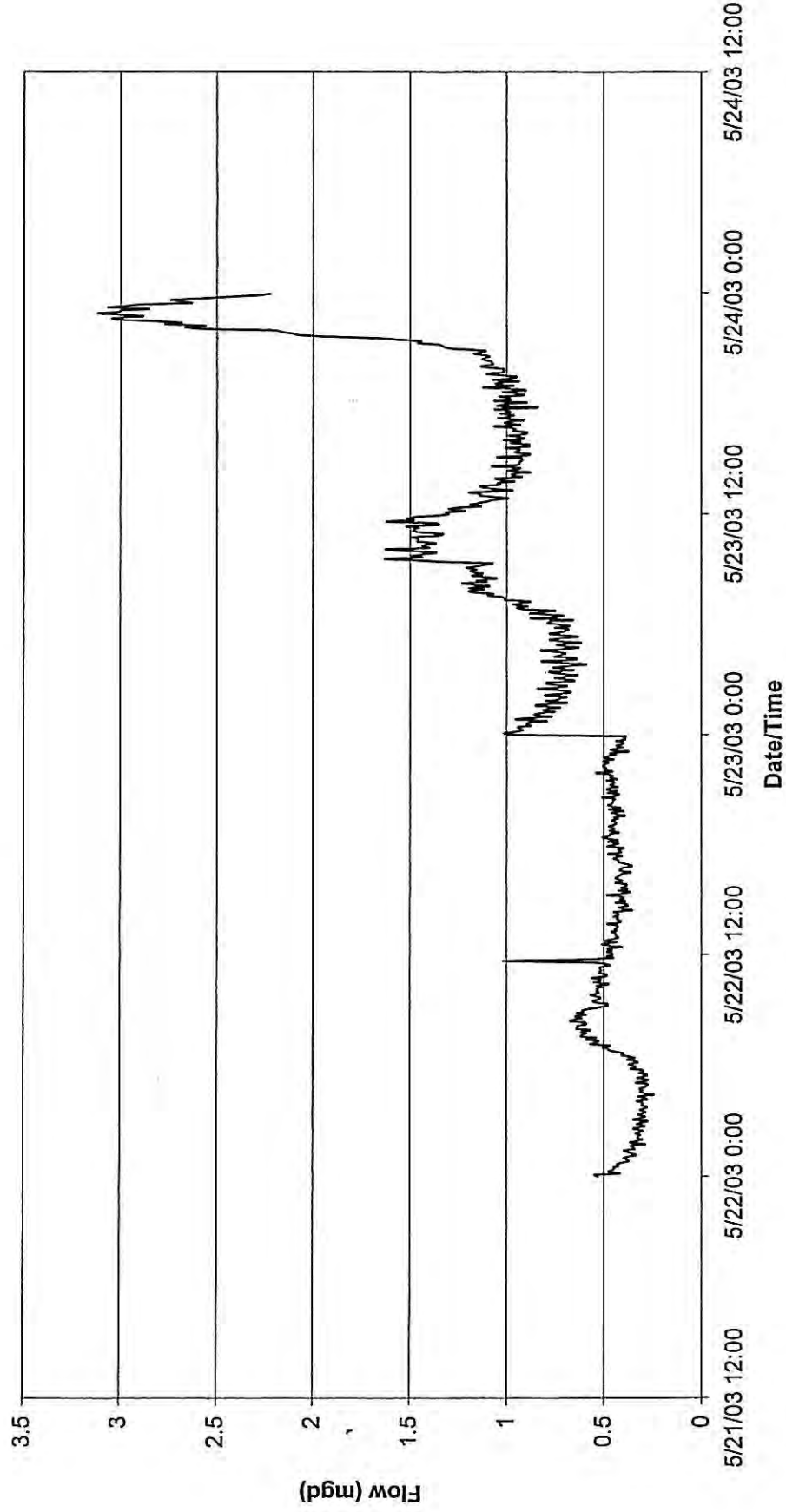
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
May 23, 2003



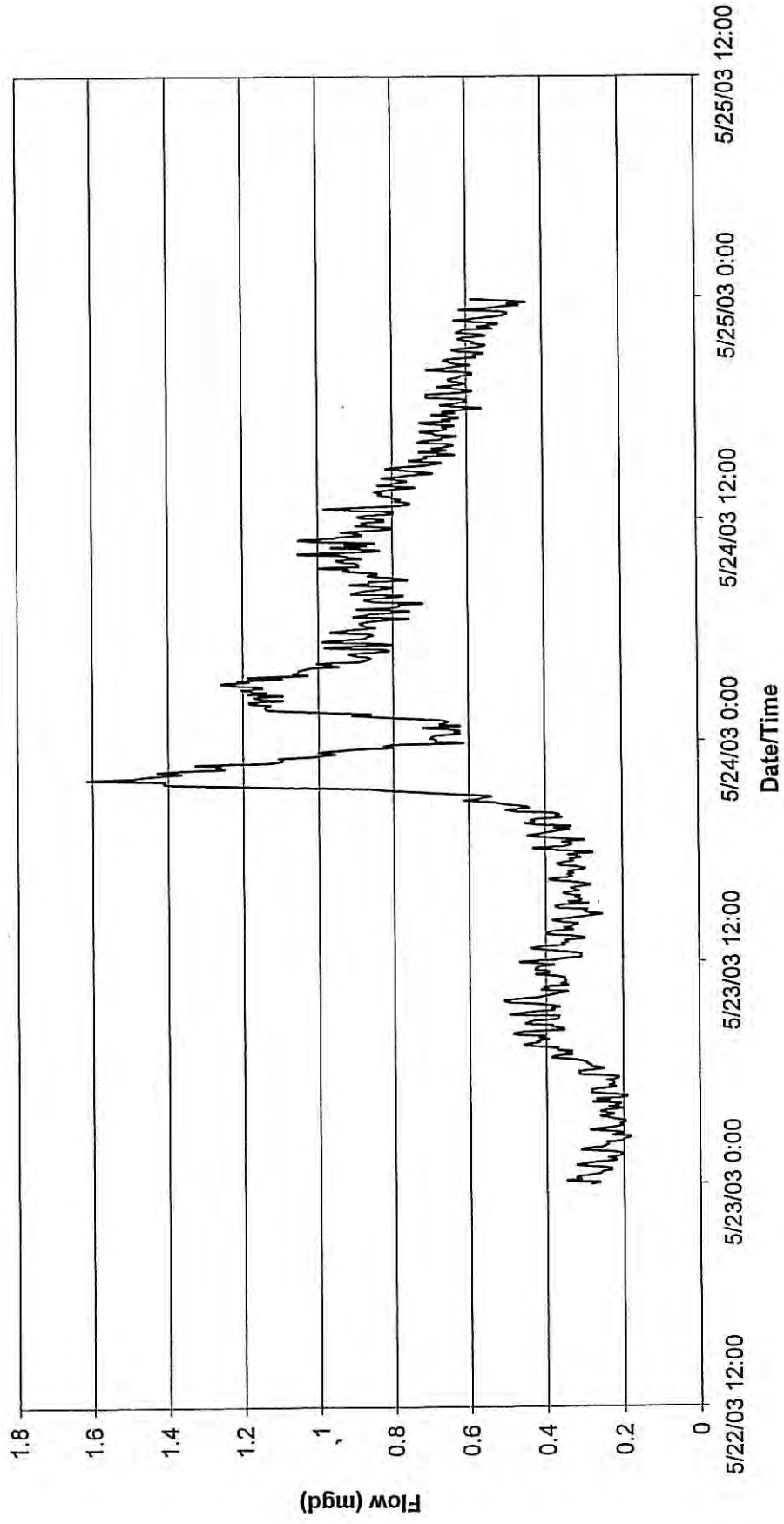
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
May 23, 2003



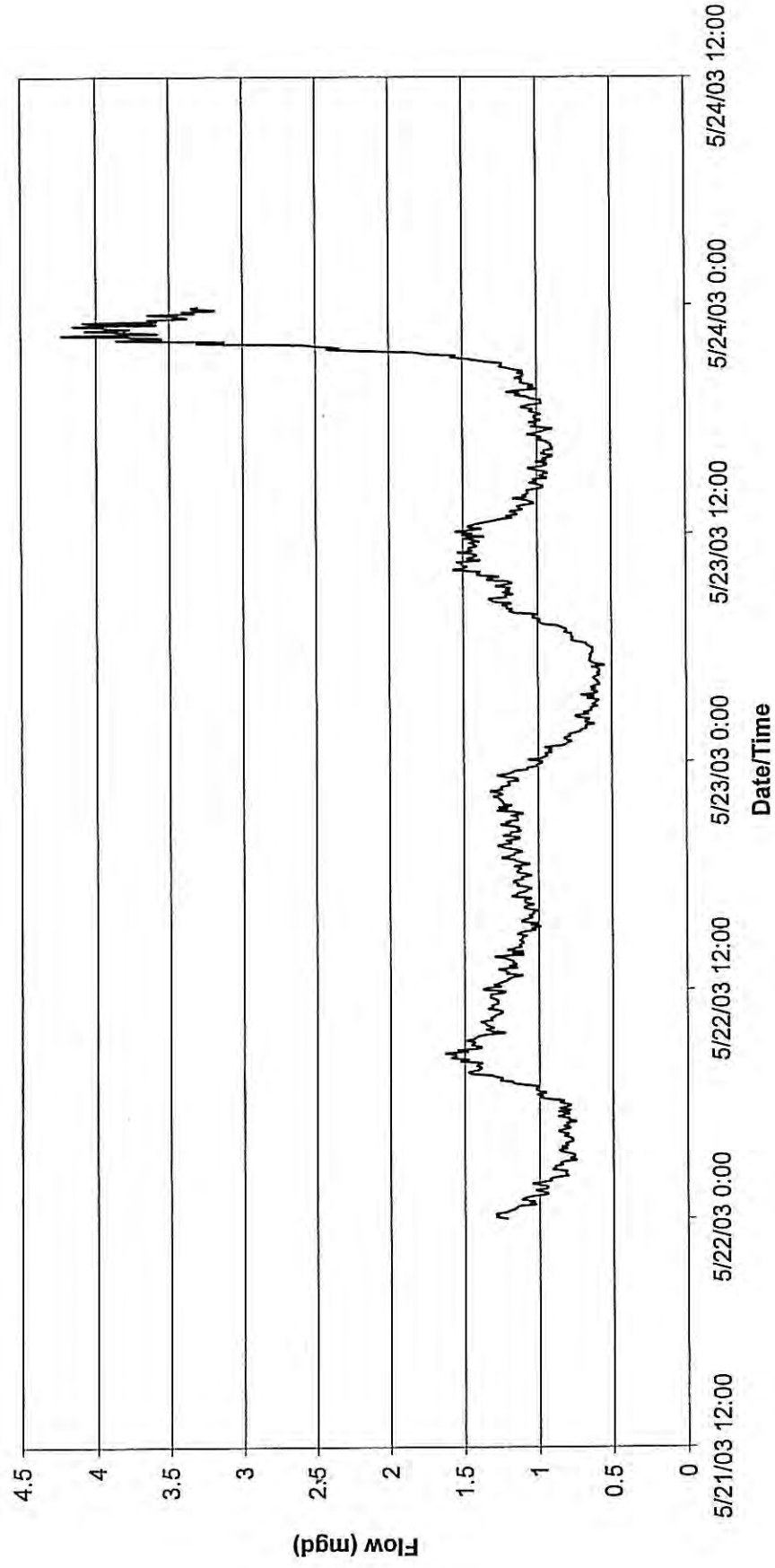
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
May 23, 2003



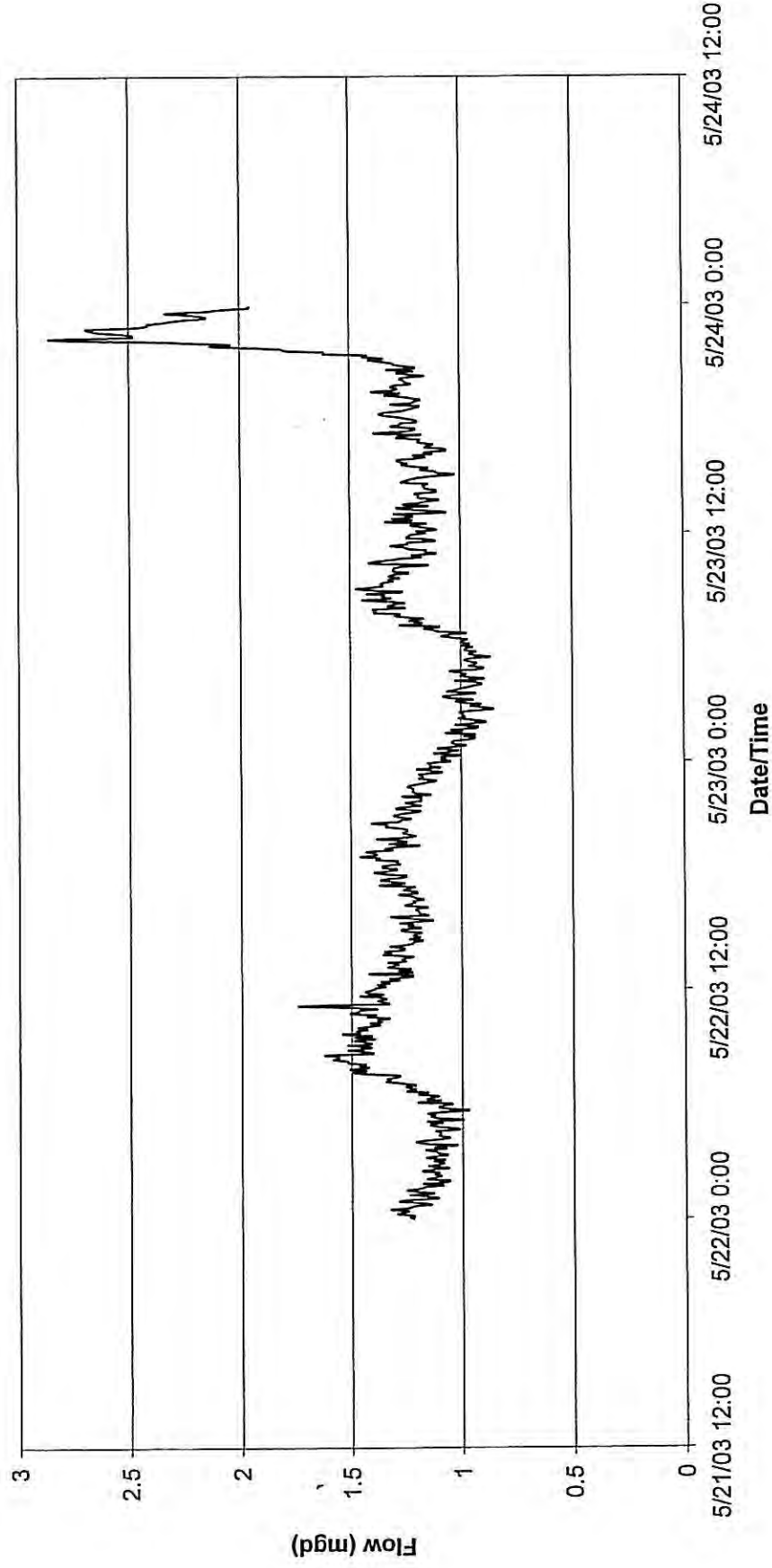
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
May 23, 2003



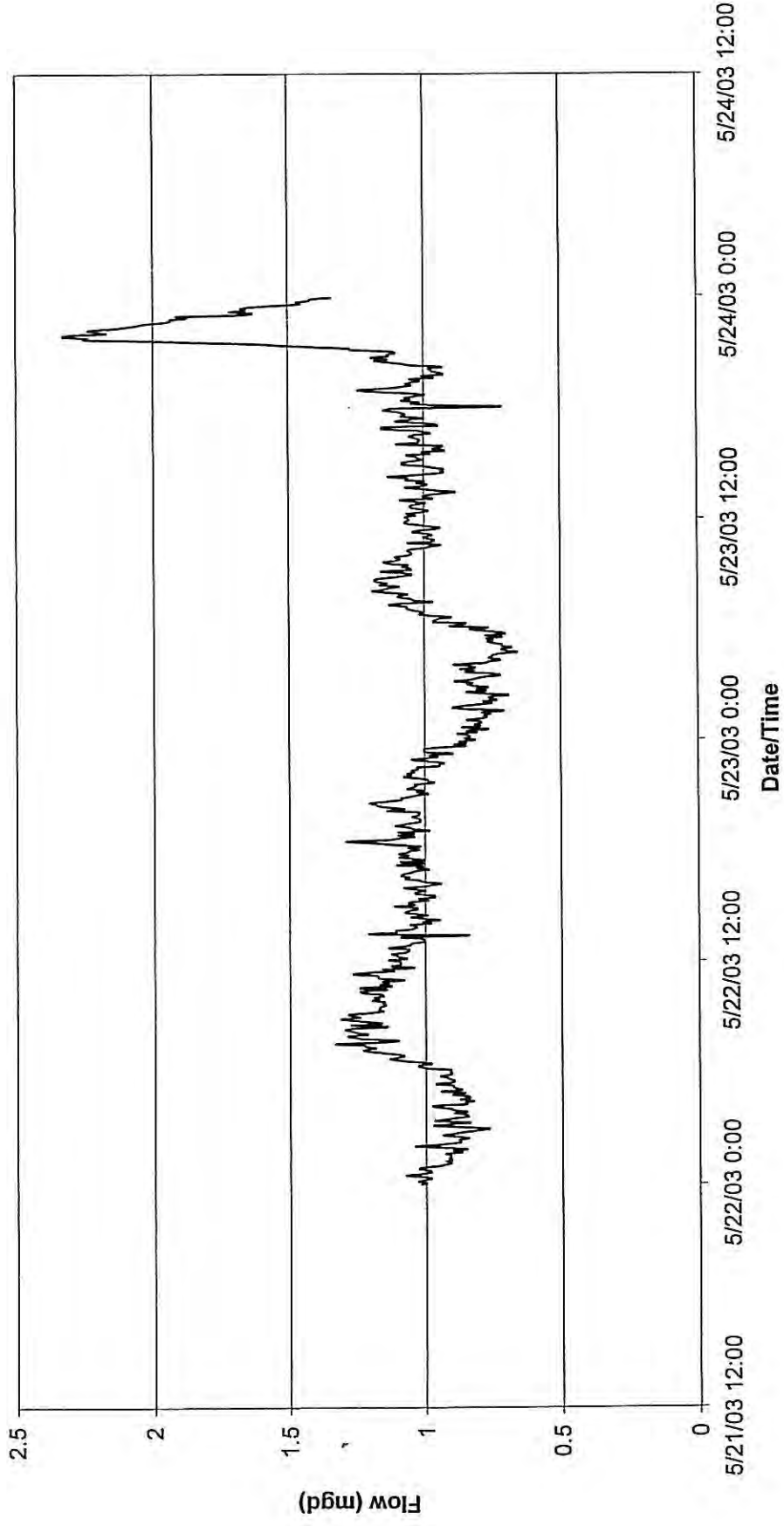
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
May 23, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
May 23, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street -South of Stephenson Avenue
Wet Weather Flow
May 23, 2003



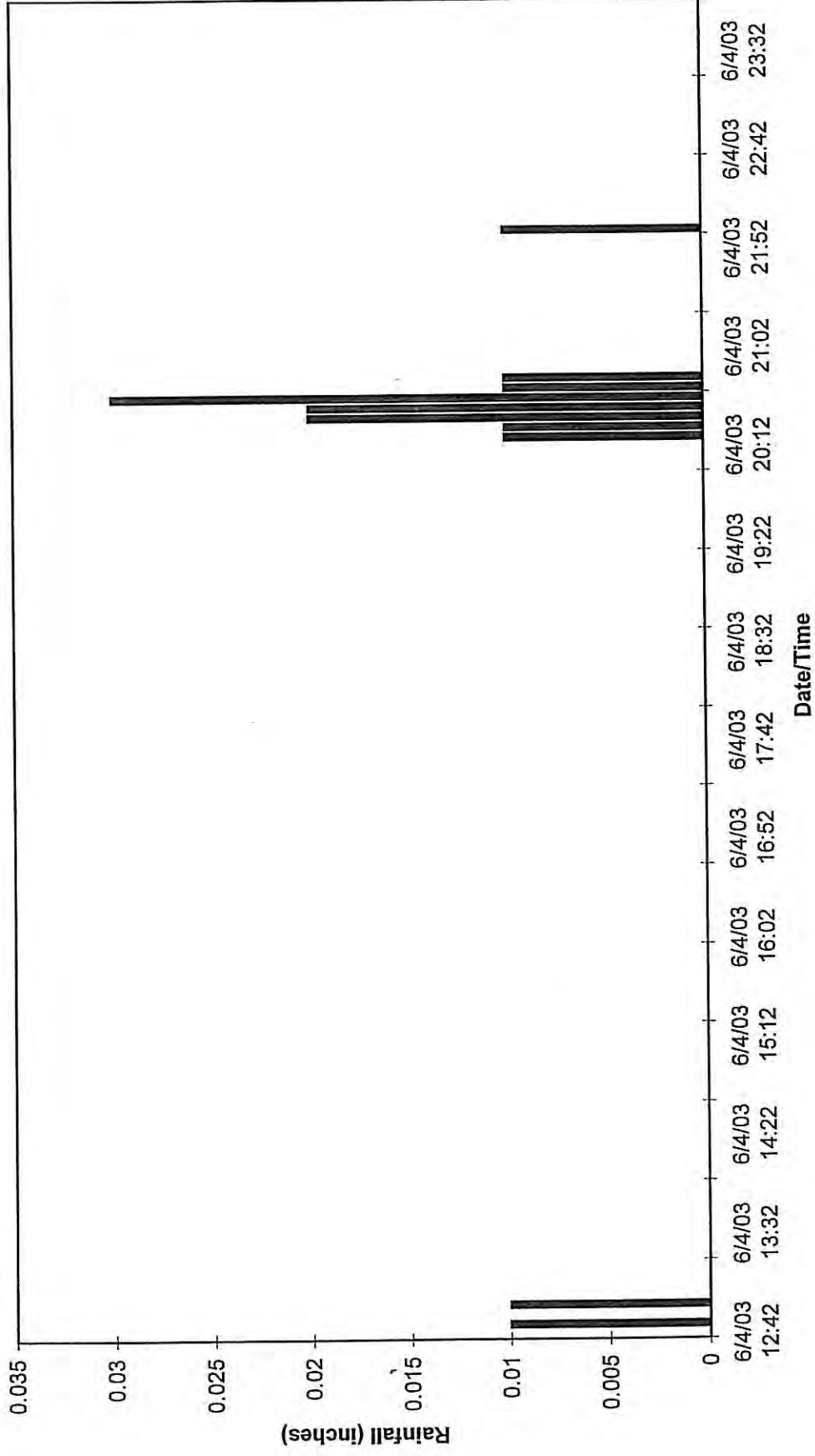
Peak Rainfall Intensity = i (inches/hour) = 0.12
Average Rainfall Intensity (inches/hour) = 0.12
Total Rainfall (inches) = 0.14

Metered Subareas									
Meter Name	Detailed I/I Investigations, 1999-2001	Average DWF		WWF		Inflow			
		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)		
93rd Street 1 MH South of Cayuga Creek	8,9	No Data	No Data	0.044	30	No Data	No Data		
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.309	190	1.059	736	0.750	521		
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.399	231	1.349	937	0.950	660		
MH-4									
80th Street and Lindbergh Avenue	4	0.104	72	0.381	264	0.277	192		
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.249	173	0.702	488	0.453	315		
*Frontier Avenue, Flow from East of 81st Street	6, MH-1	0.479	333	1.334	927	0.955	663		
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.796	553	No Data	No Data	No Data	No Data		
MH-6									
66th Street and Frontier Avenue	All MH-6 Area	0.805	559	1.383	961	0.578	402		
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.672	467	1.165	809	0.493	342		
81st Street, Cross Over Pipe	LS-6/LS-1	0.0	0.0	0.0	0.0	0.0	0.0		

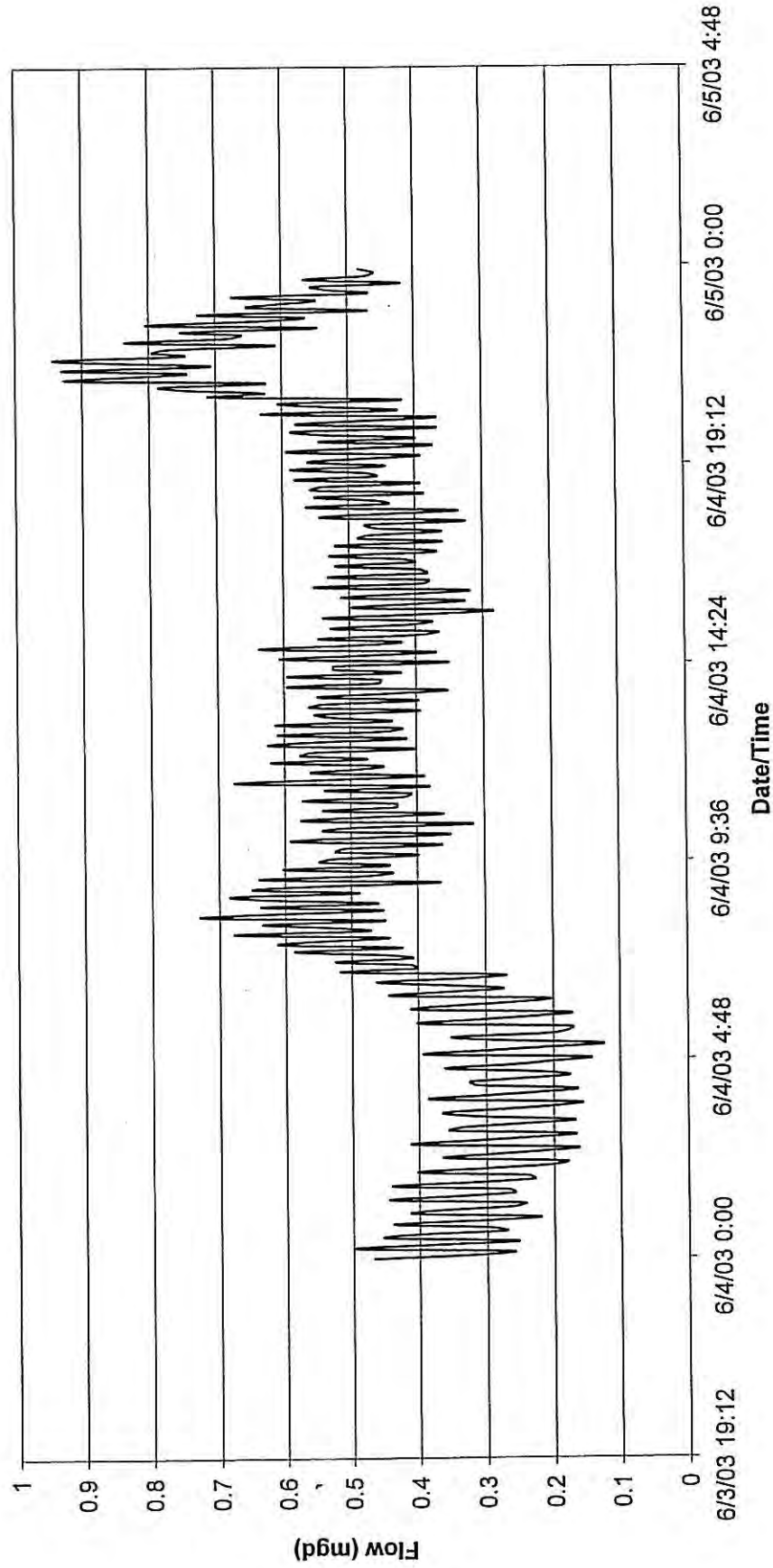
Metered Subareas									
Areas	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF		Average Peak WWF		Inflow		
			(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)	
MH-1	A	8,9	No Data	No Data	0.044	30	No Data	No Data	
	B	3,4,5,6,7	No Data	No Data	1.016	705	No Data	No Data	
	C	1,2	0.090	63	0.29	201	0.250	138,603	
MH-4	D	4	0.104	72	0.381	264	0.3	192	
	E	1,2,3,5,7	0.145	101	0.321	223	0.2	122	
	F	8	0.068	47	No Data	No Data	No Data	No Data	
	G	6	0.080	56	-0.015	-10	0.2	139	
	H	1,2,3,4	0.133	92	0.218	152	0.1	60	
MH-6	I	5,6,7,8,9,10,11,12	0.672	467	1.165	809	0.5	342	

* Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

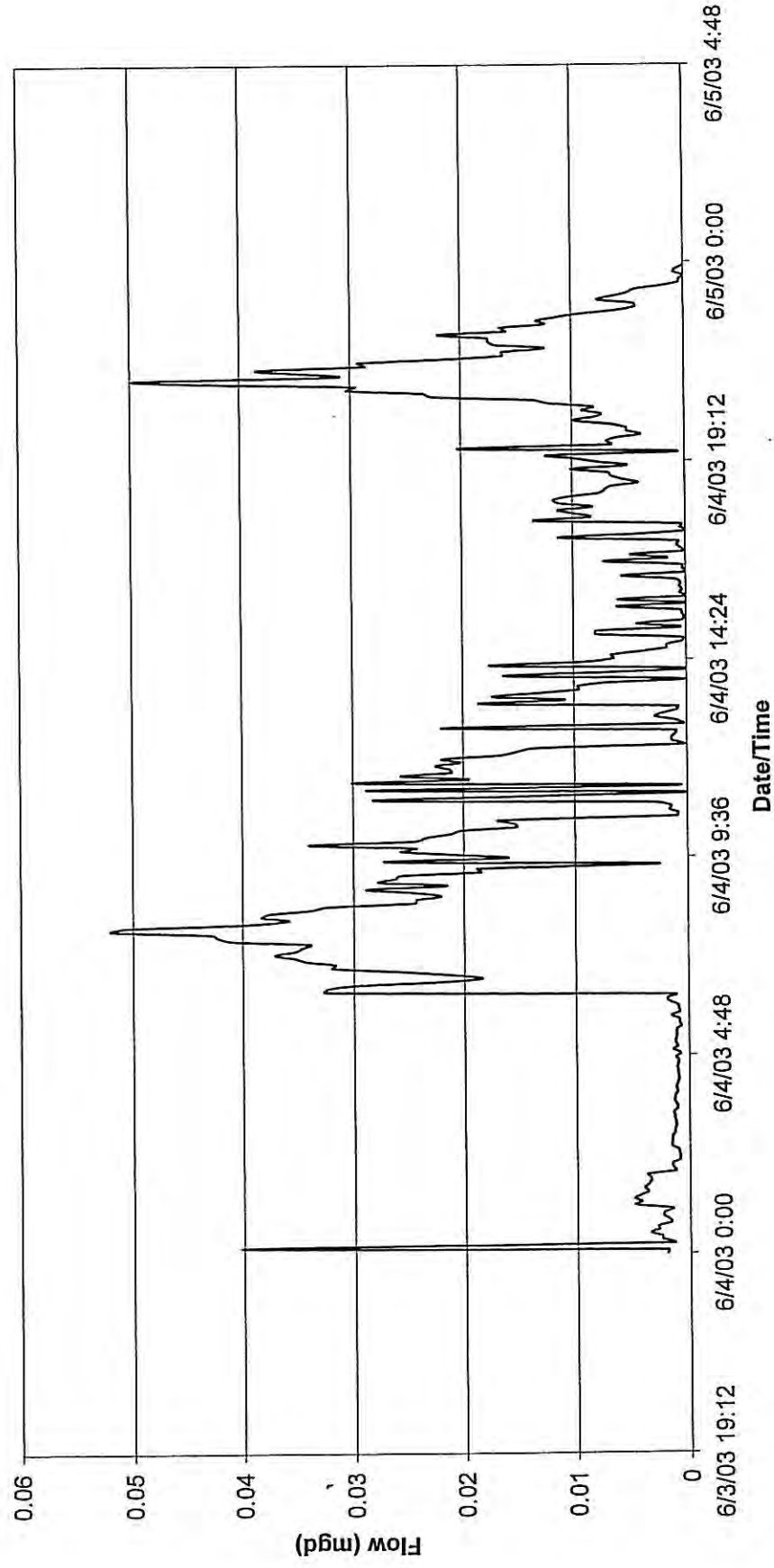
**Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - June 4, 2003**



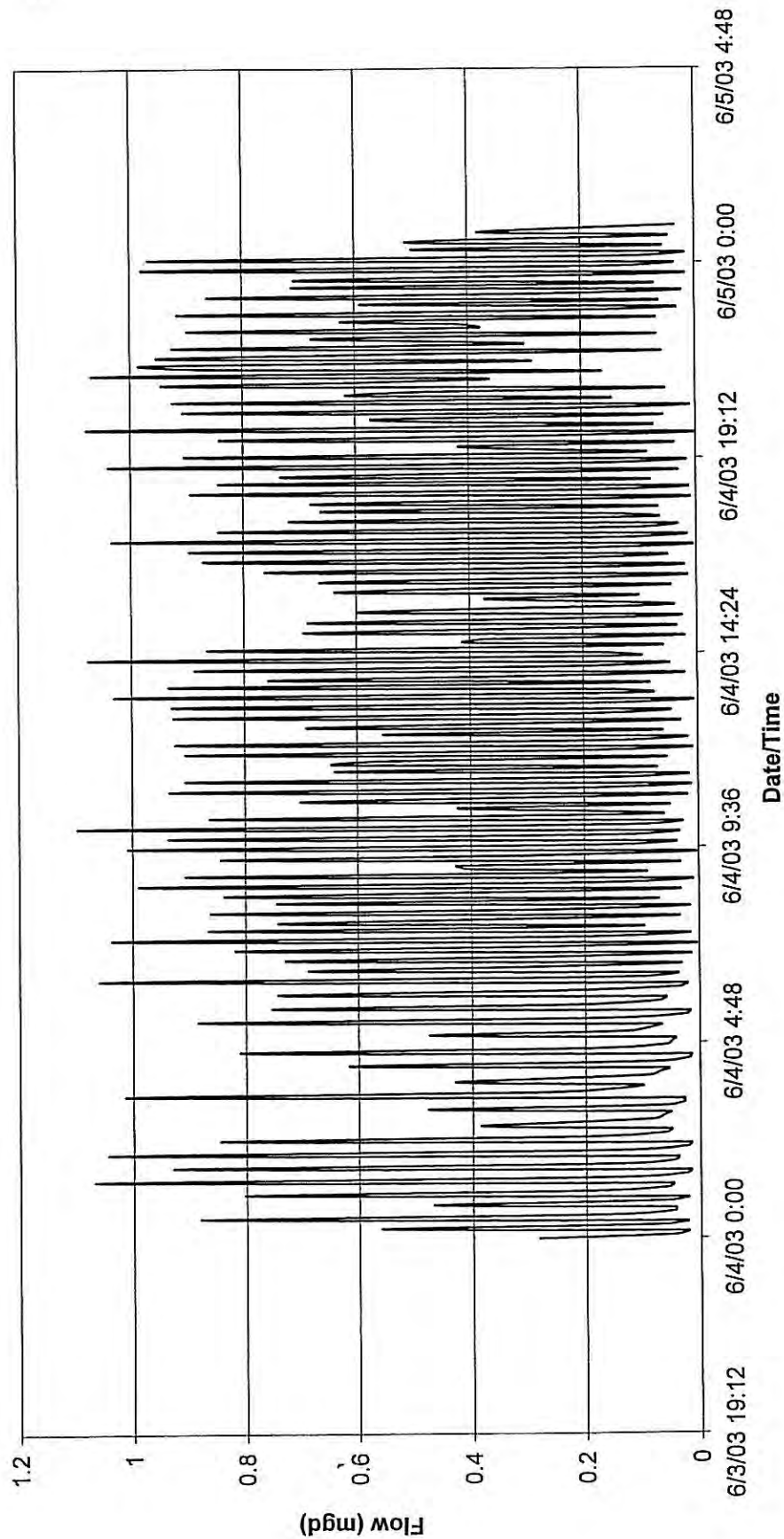
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88 Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
June 4, 2003



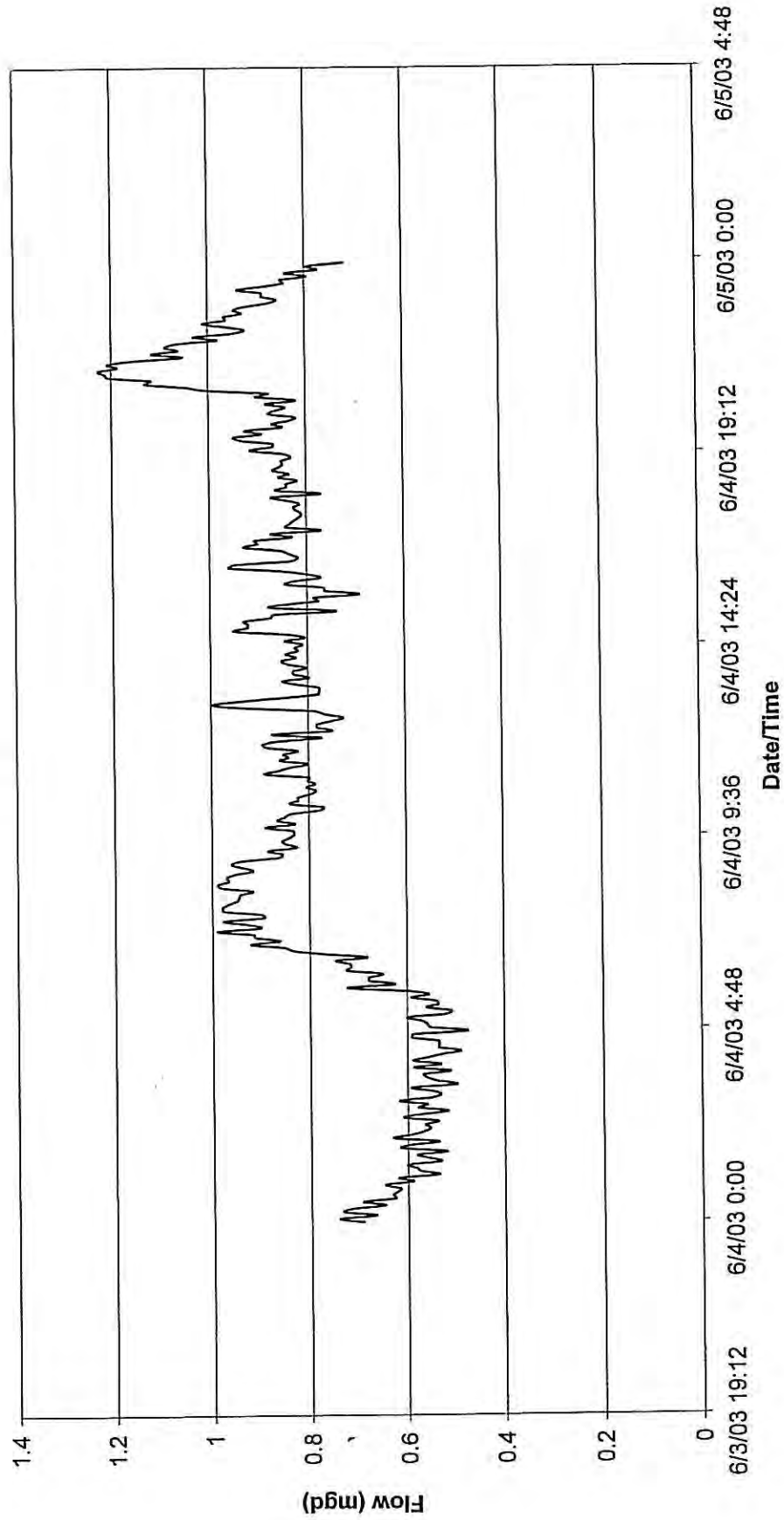
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
June 4, 2003



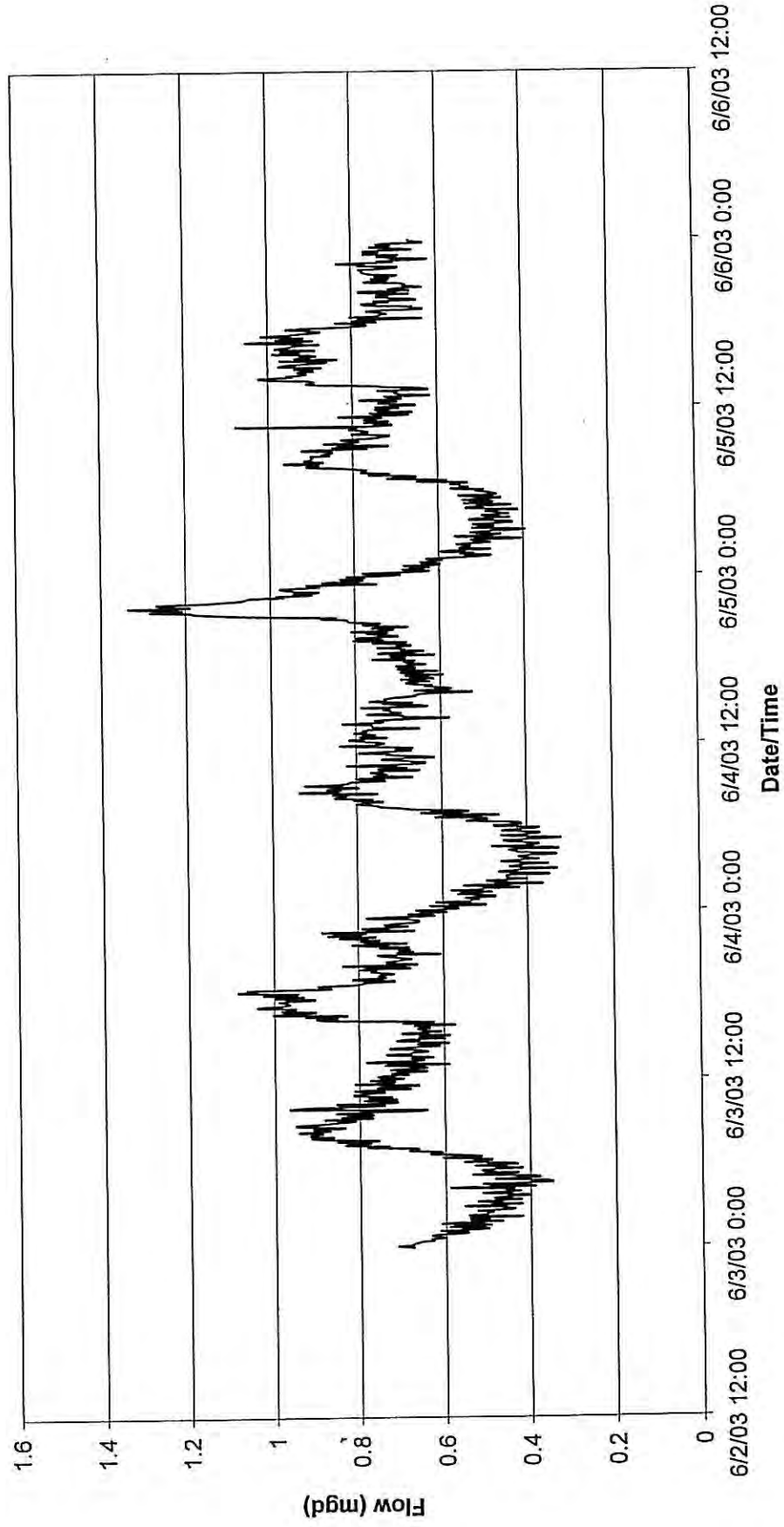
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
June 4, 2003



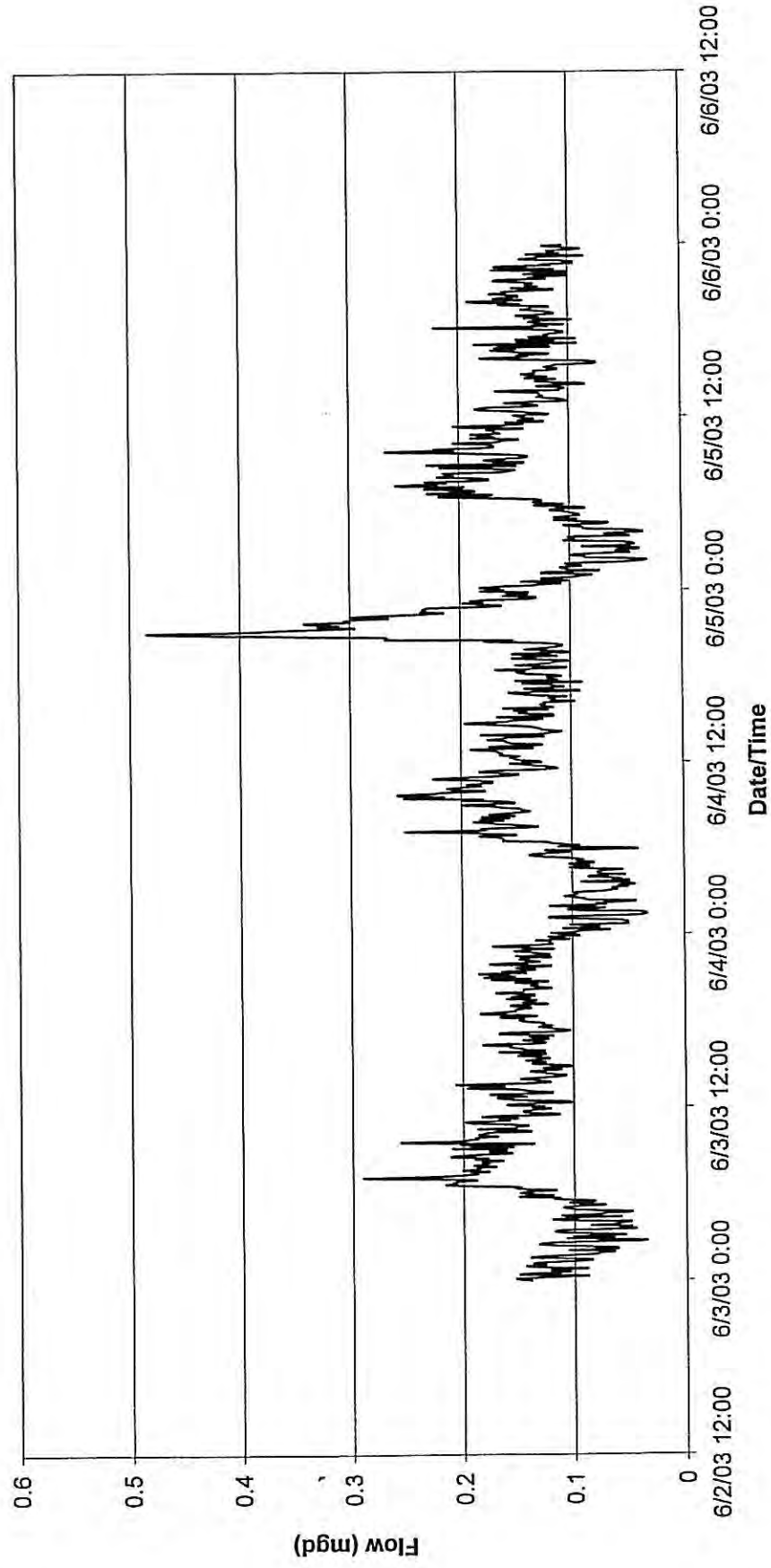
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on 81st Street - South of Stephenson Avenue
 Wet Weather Flow
 June 4, 2003



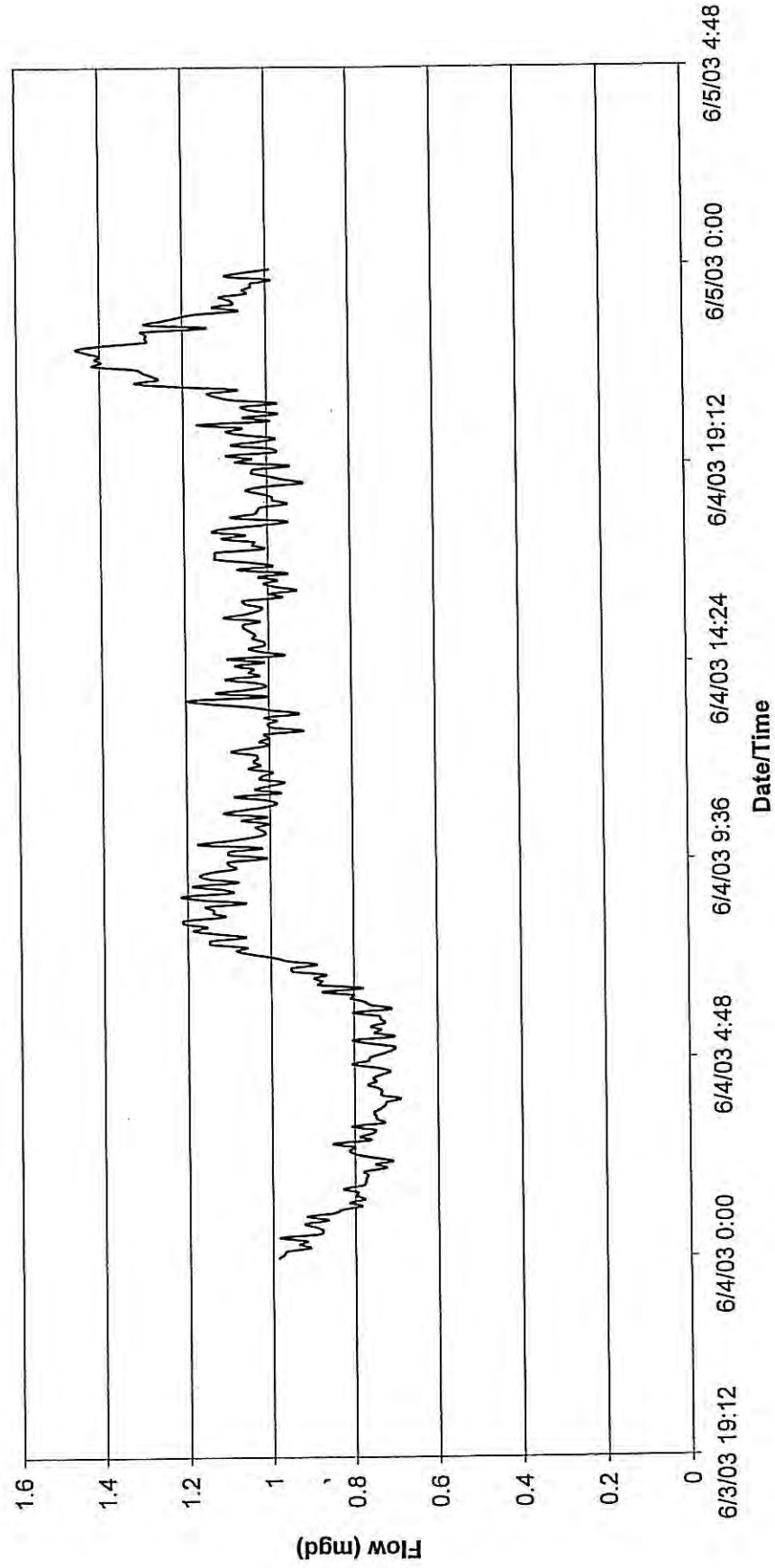
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East on 81st Street
Wet Weather Flow
June 4, 2003



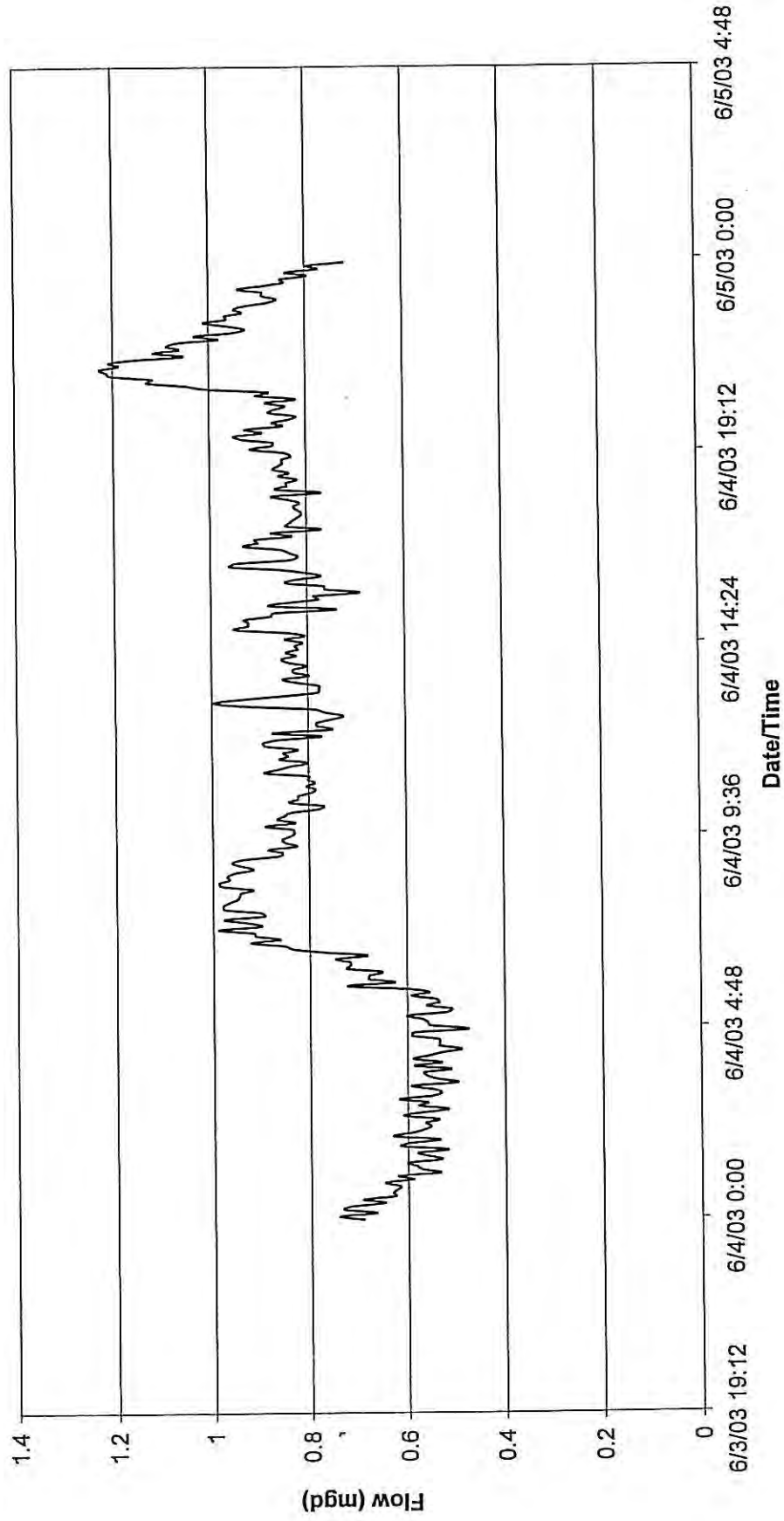
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
June 4, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
June 4, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Wet Weather Flow
June 4, 2003



**Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations**

Time Period: June 8, 2003

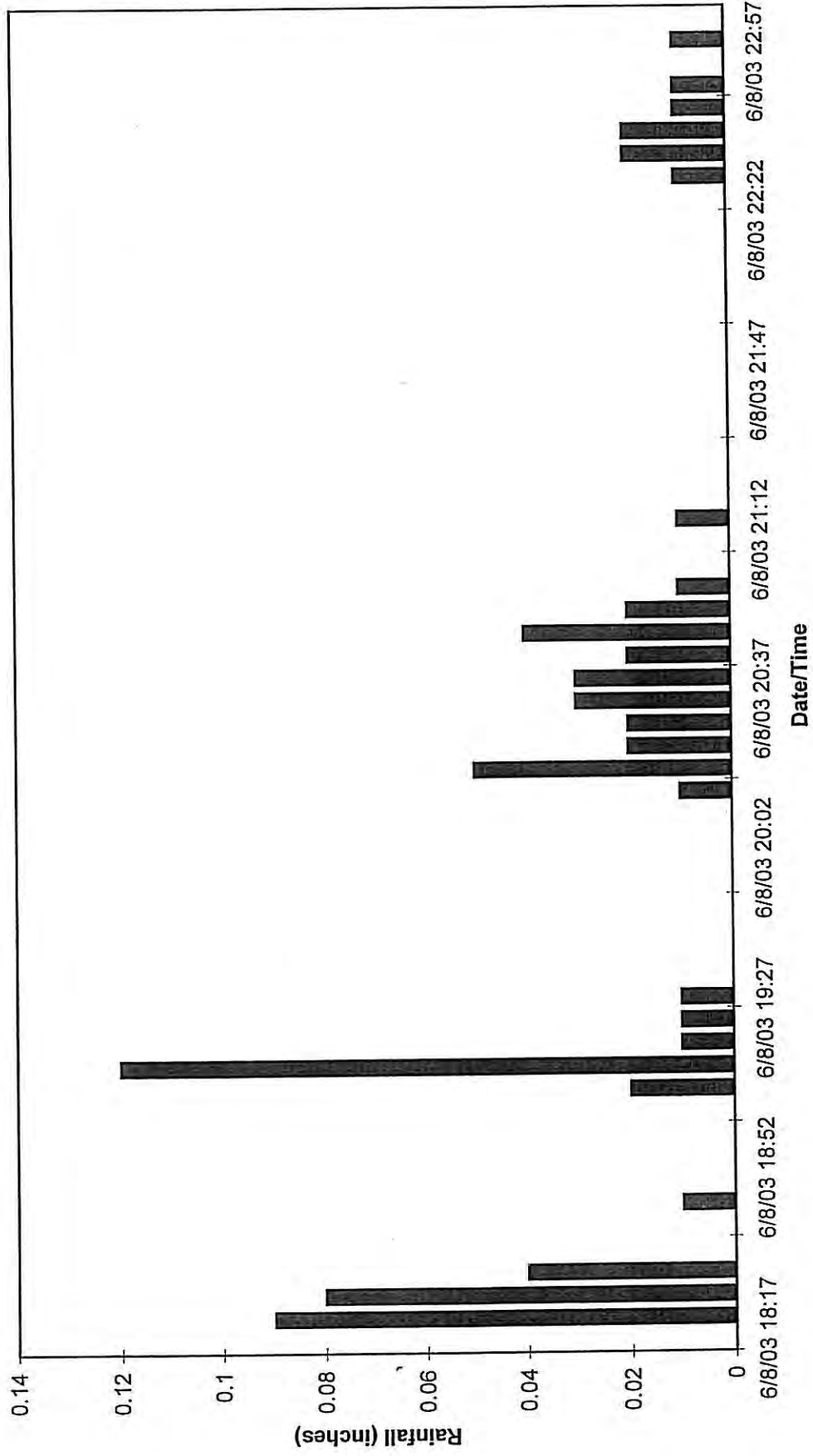
Peak Rainfall Intensity = i (Inches/hour) = 0.37
Average Rainfall Intensity (Inches/hour) = 1.97
Total Rainfall (Inches) = 0.73

Meter Name	Metered Subarears				Metered Average Peak			
	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)		WWF (mgd)	(gpm)	Inflow (mgd)	(gpm)
MH-1								
93rd Street 1 MH South of Cayuga Creek	8,9	No Data	No Data		0.091	64	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.309	190		0.312	216	0.003	2
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.399	231		2.241	1556	1.842	1279
MH-4								
80th Street and Lindbergh Avenue	4	0.104	72		0.585	406	0.481	334
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.249	173		1.664	1155	1.415	983
*Frontier Avenue Flow from East of 81st Street	6, MH-1	0.479	333		2.998	2082	2.519	1749
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.796	553		No Data	No Data	No Data	No Data
MH-6								
66th Street and Frontier Avenue	All MH-6 Area	0.805	559		2.835	1969	2.030	2.84
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.672	467		0.985	684	0.313	0.30
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.000	0.000		0.000	0.000	0.000	0.000

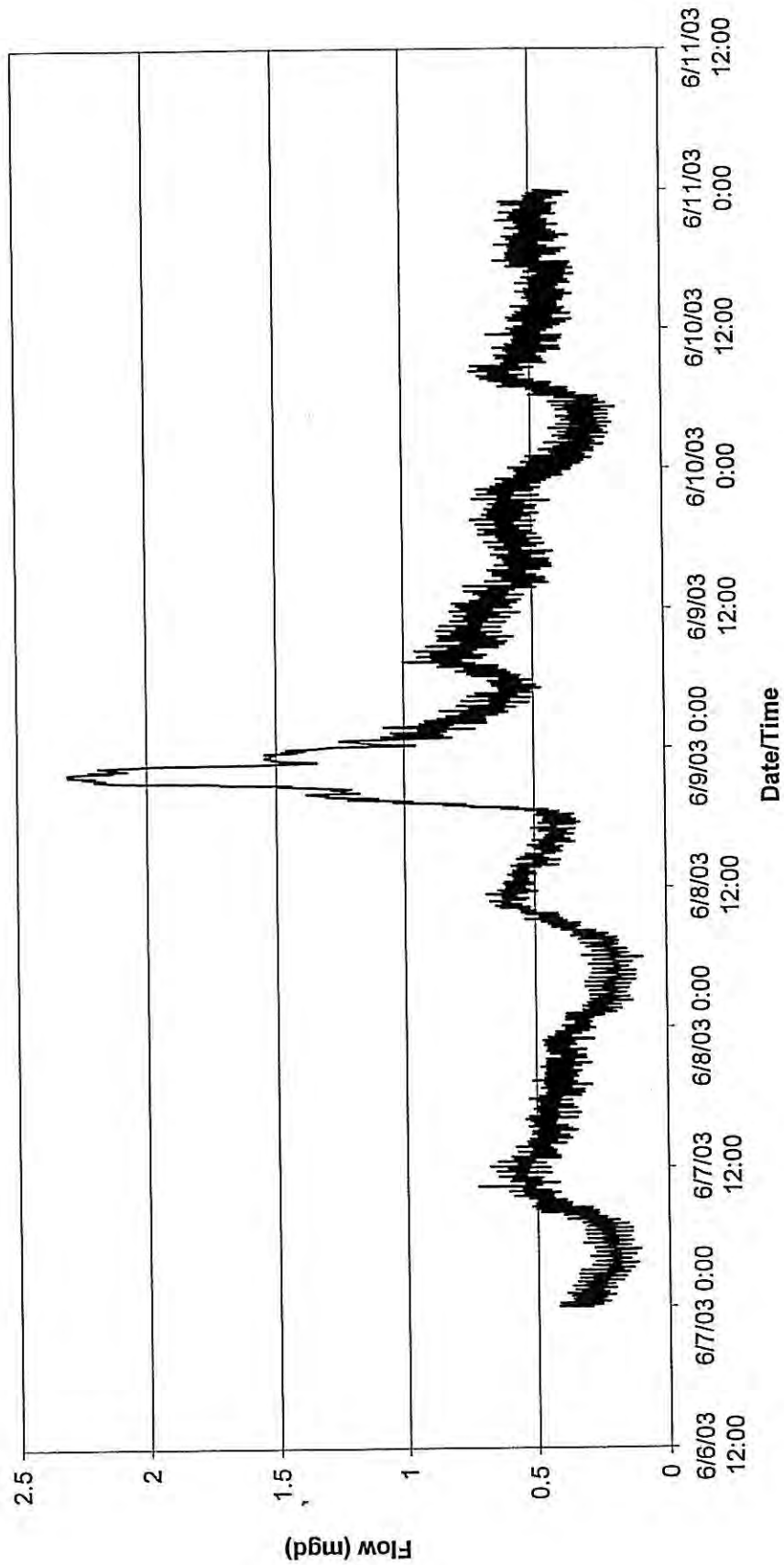
Areas	Metered Subarears				Metered Average Peak			
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)	WWF (mgd)	(gpm)	Inflow (mgd)	(gpm)
MH-1	A	8,9	No Data	No Data	0.09	64	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	0.22	153	No Data	No Data
	C	1,2	0.090	63	1.93	1340	1.8	1277
	D	4	0.104	72	0.585	406	0.5	334
MH-4	E	1,2,3,5,7	0.145	101	1.079	750	0.9	649
	F	8	0.068	47	No Data	No Data	No Data	No Data
	G	6	0.080	56	0.757	526	0.7	470
	H	1,2,3,4	0.133	92	1.850	1285	1.7	1193
MH-6	I	5,6,7,8,9,10,11,12	0.672	467	0.985	684	0.3	217

Average DWF for Flow from Frontier Avenue have been adjusted due to malfunctioning of the probe.

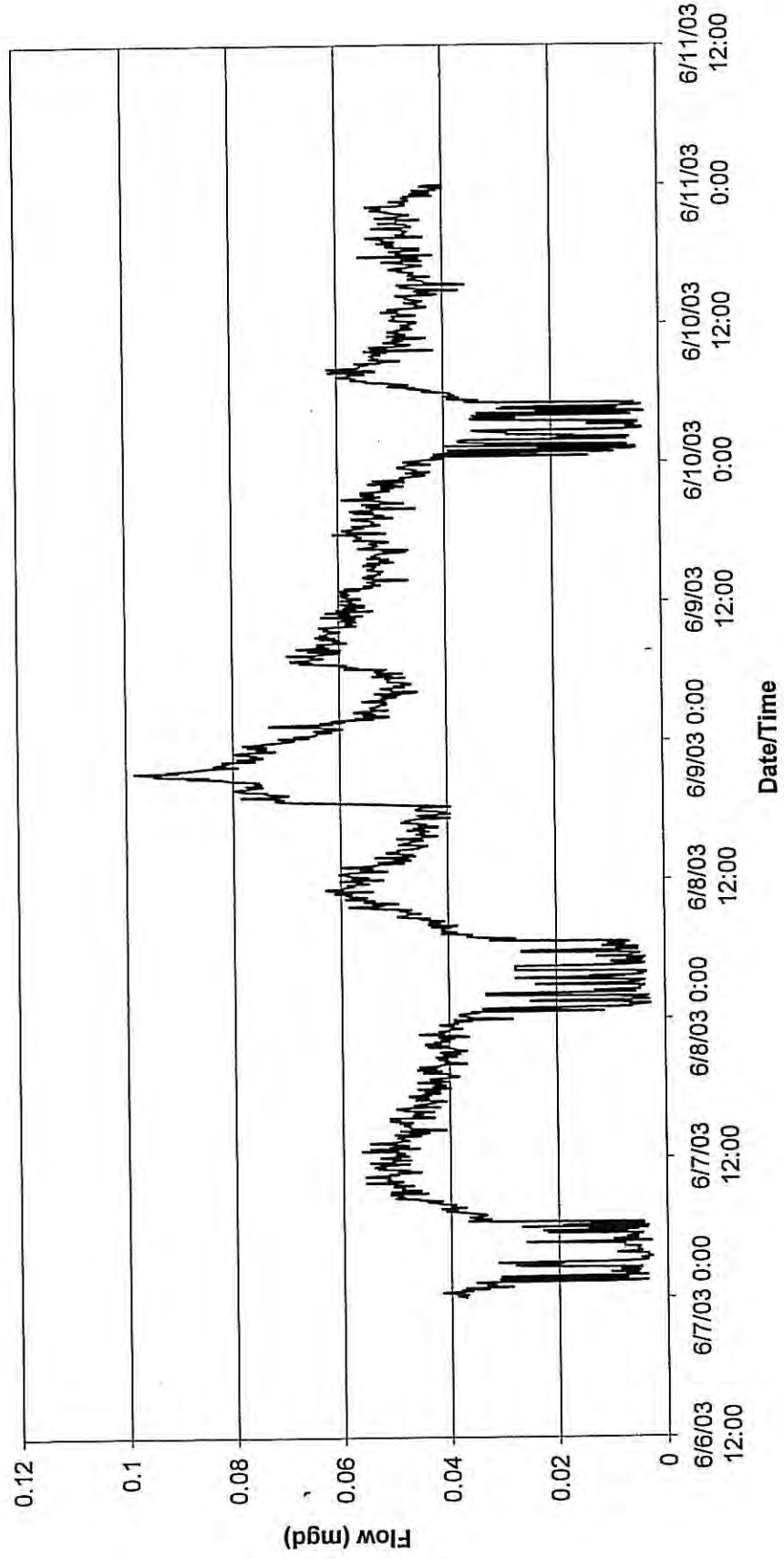
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - June 8, 2003



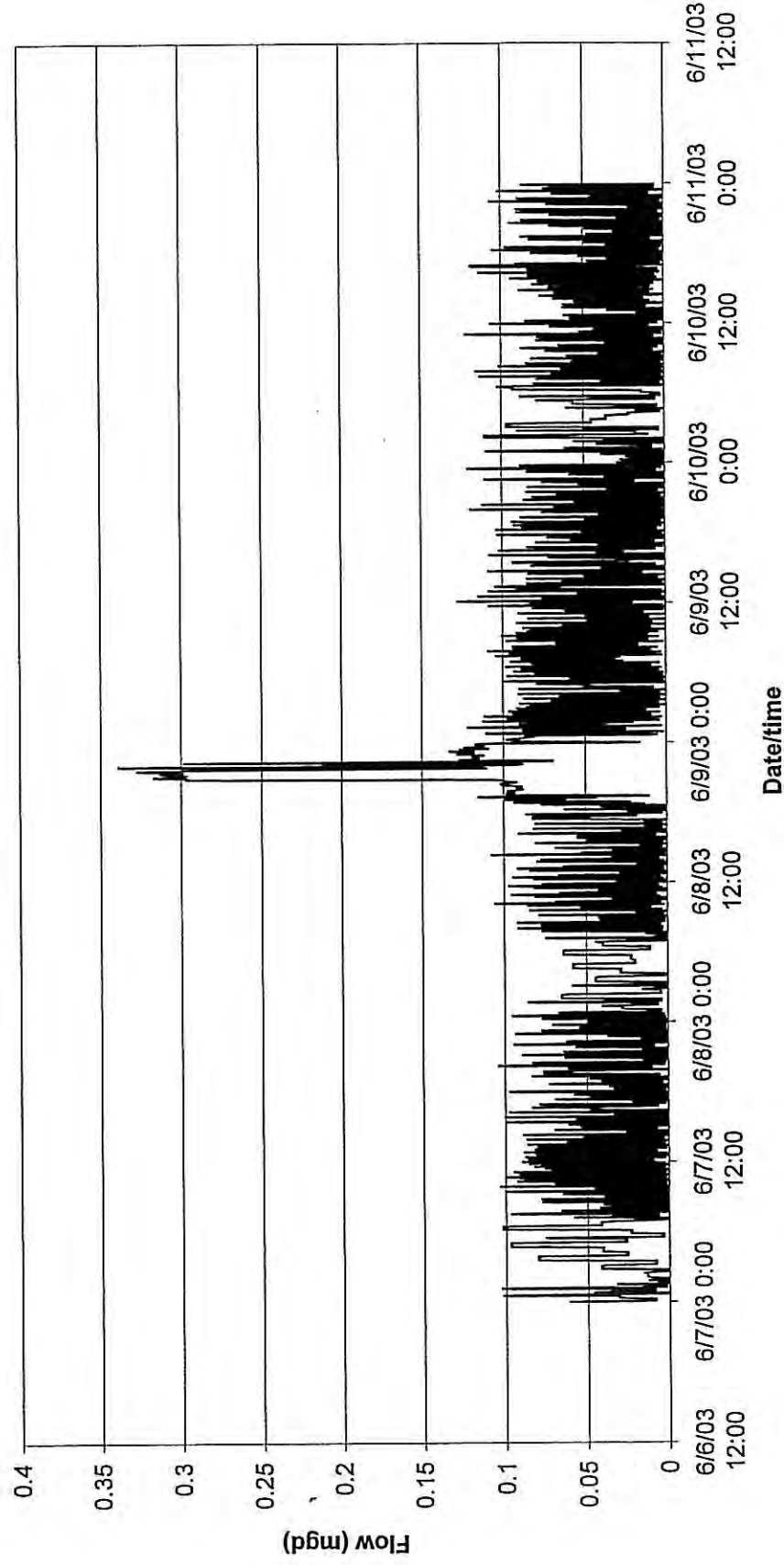
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88 Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
June 8, 2003



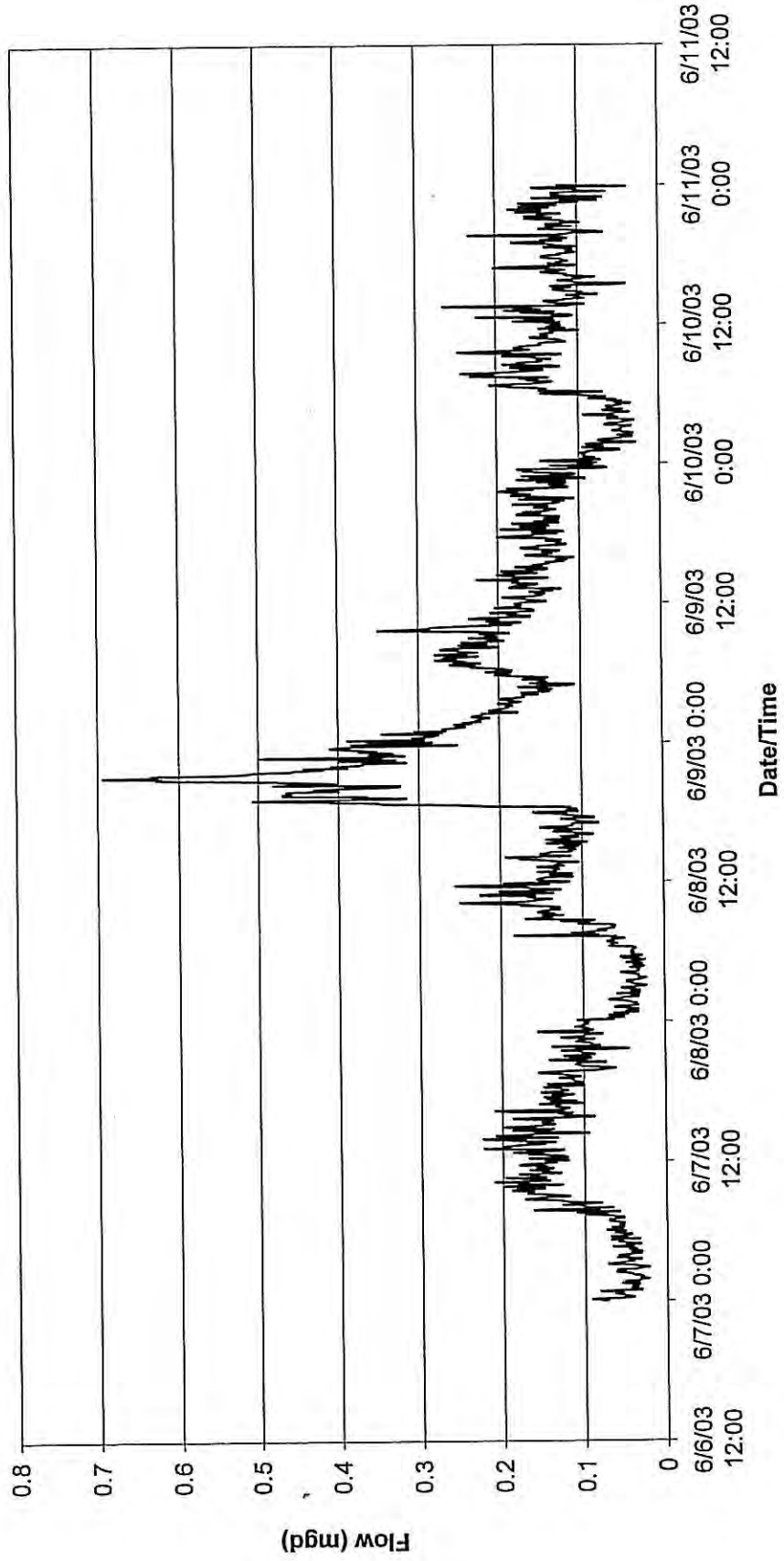
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
93rd Street 1 MH South of Cayuga Creek
Flow on 93rd Street
Wet Weather Flow
June 8, 2003



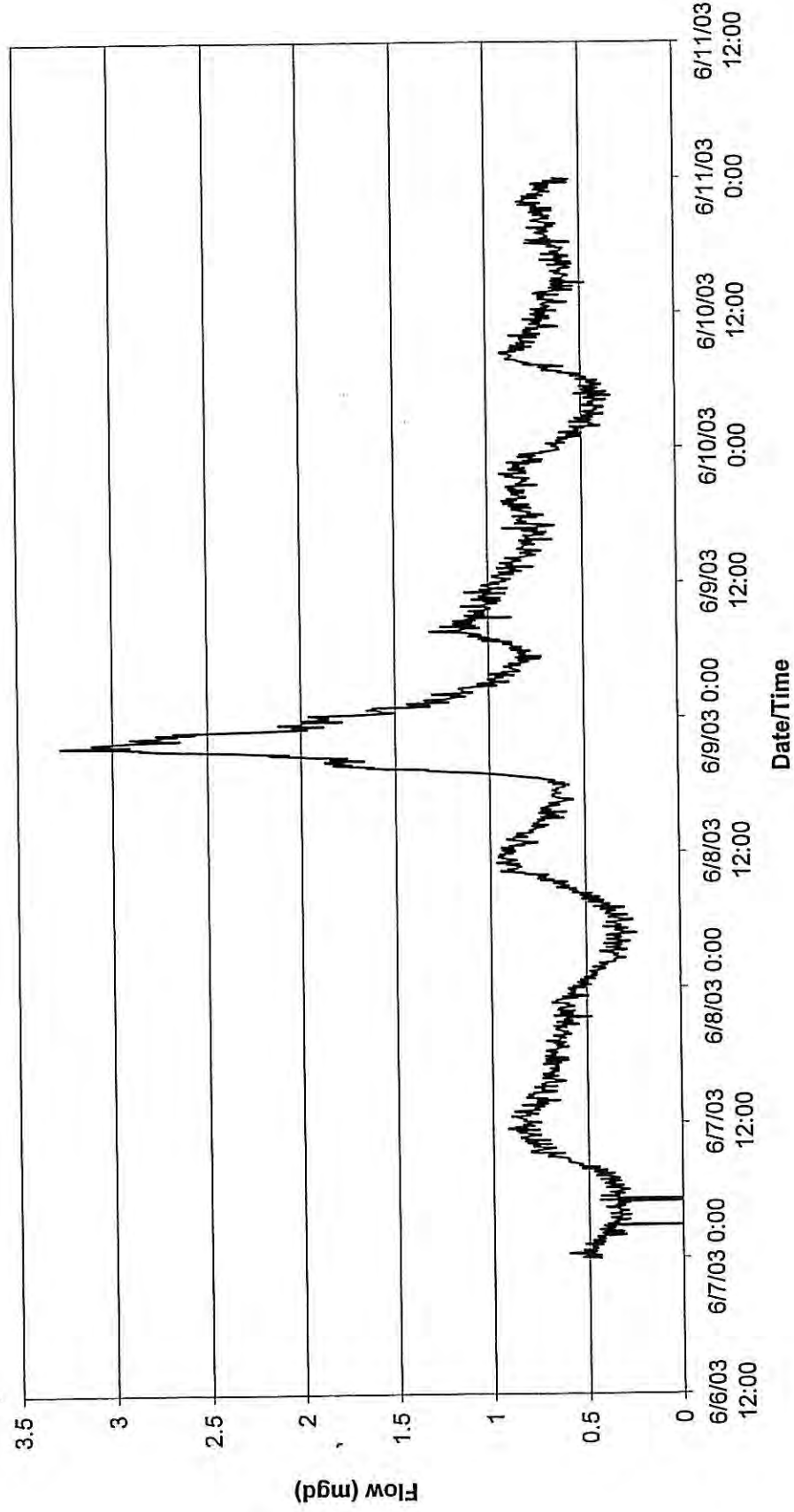
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
June 8, 2003



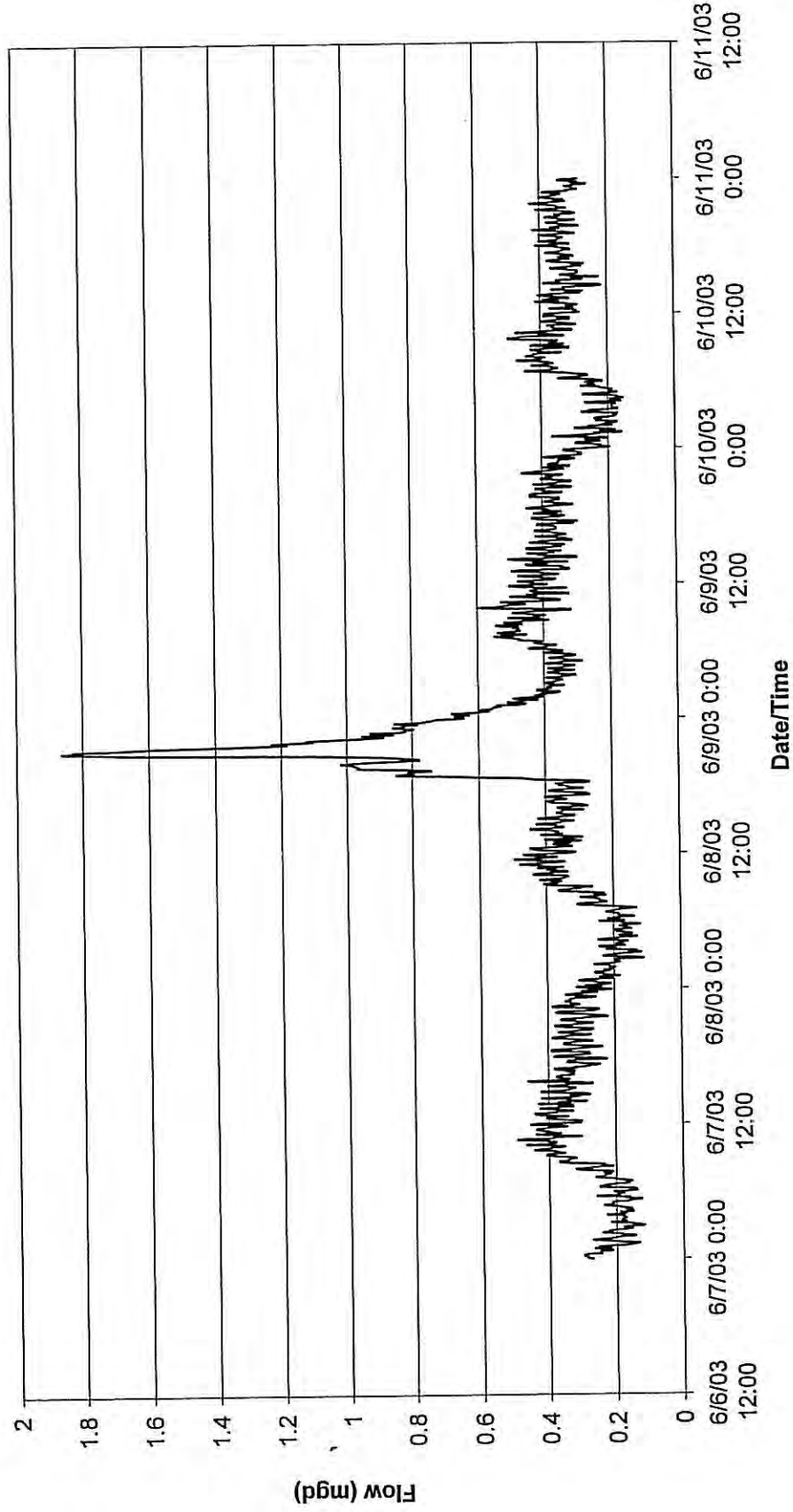
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
June 8, 2003



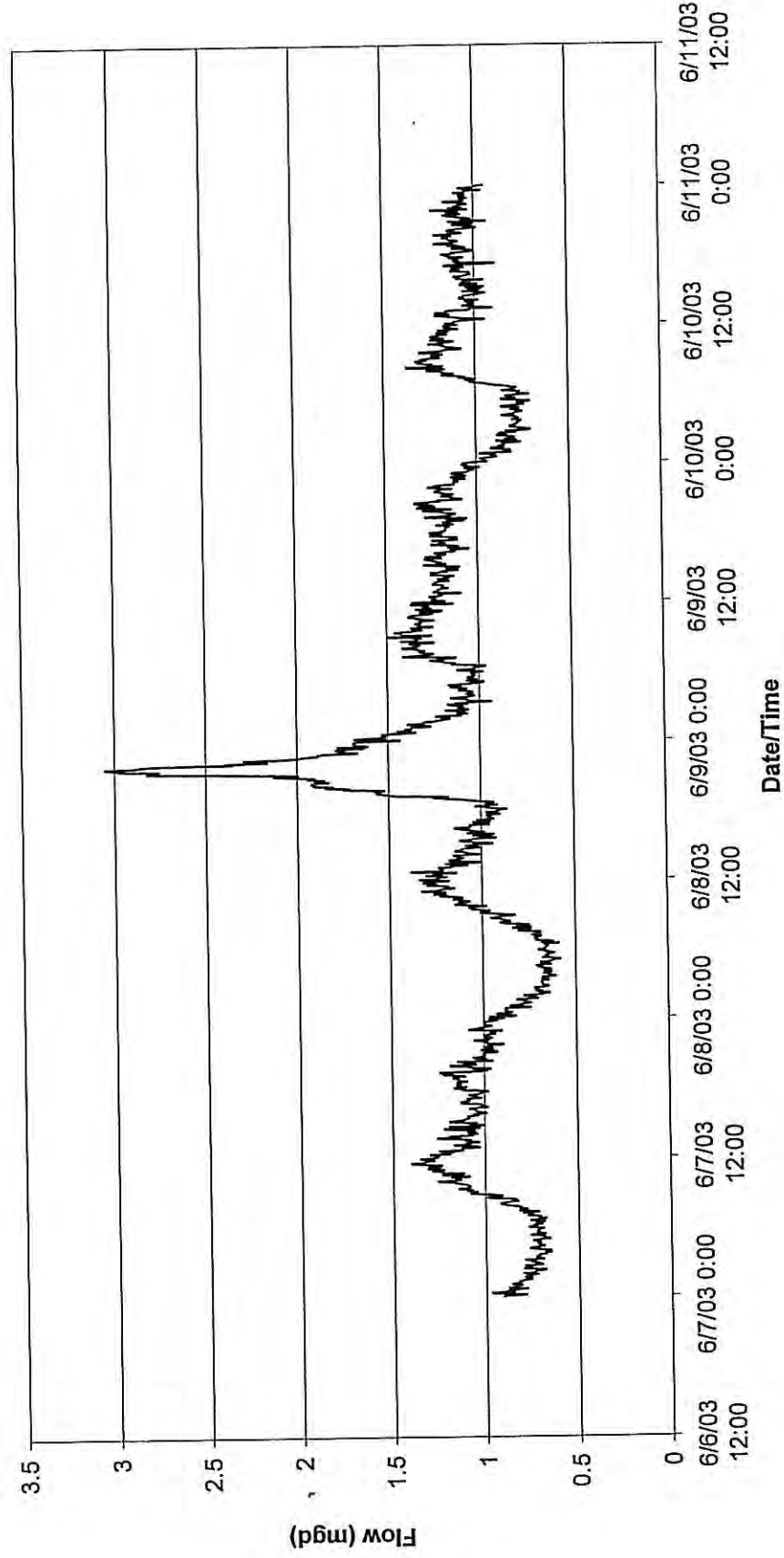
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
June 8, 2003



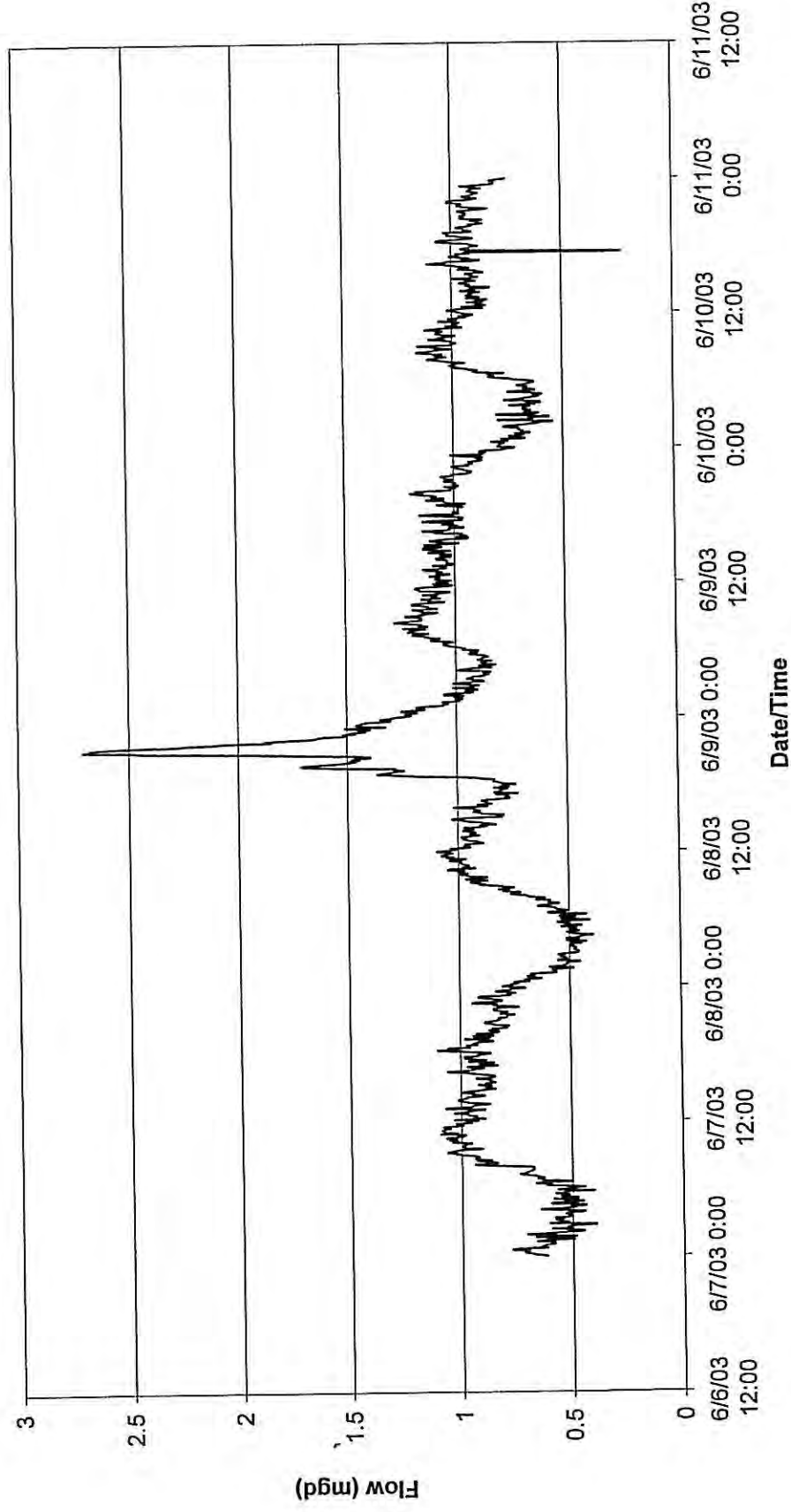
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
June 8, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
June 8, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street- South of Stephenson Avenue
Wet Weather Flow
June 8, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: June 13, 2003

Peak Rainfall Intensity = 1 (inches/hour) = 0.3

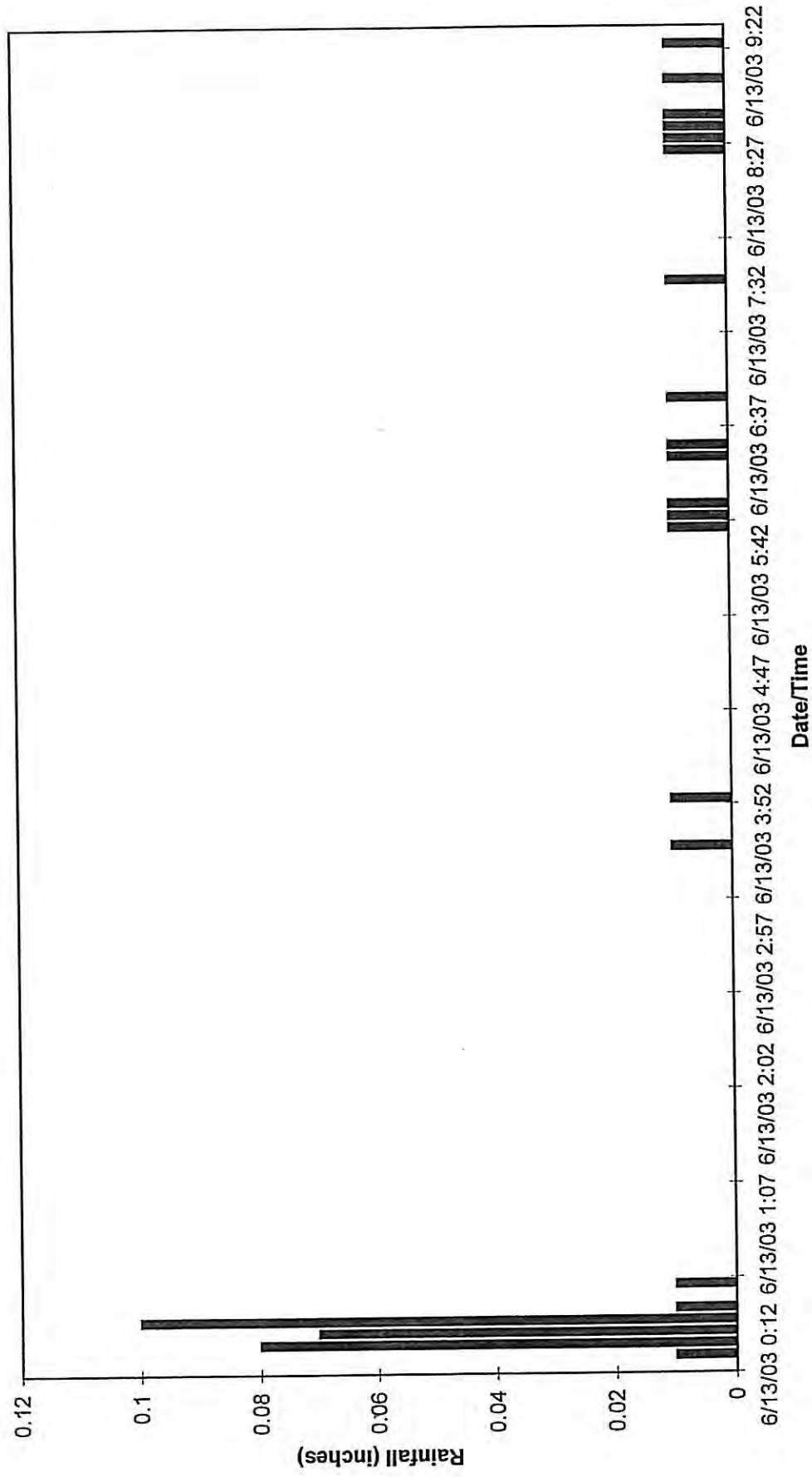
Average Rainfall Intensity (inches/hour) = 0.05

Total Rainfall (inches) = 0.43

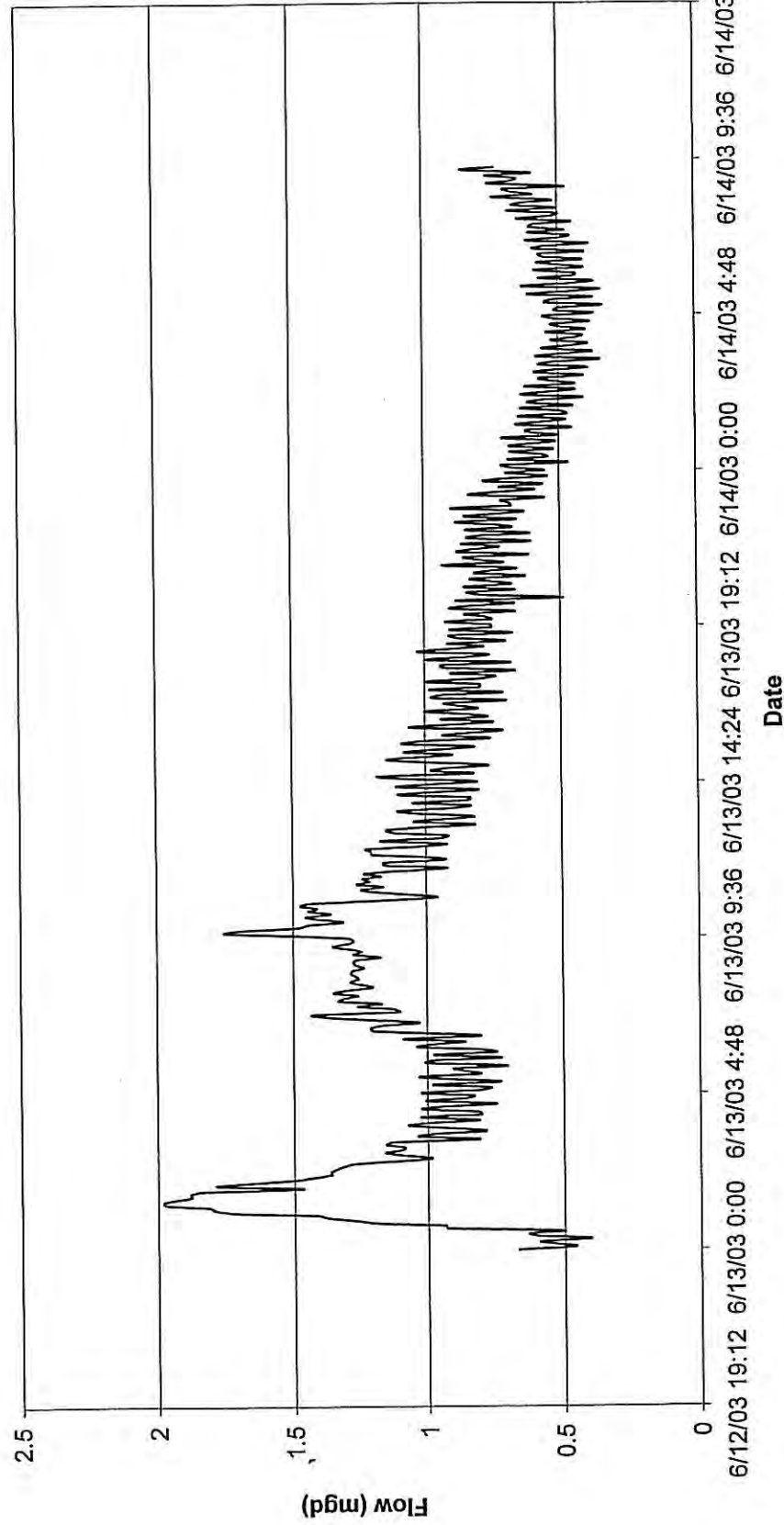
Areas	Meter Name	Metered Subareas				Metered Average Peak WWF				Inflow	
		Detailed I/I Investigations, 1999-2001	Average DWF (mgd)	(gpm)	No Data	(mgd)	(gpm)	No Data	(mgd)	(gpm)	No Data
MH-1	93rd Street 1 MH South of Cayuga Creek	8,9	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	91st Street and Luick Avenue	3,4,5,6,7,8,9	0.309	190	0.341	237	0.038	26			
	88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.399	231	1.860	1292	1.461	1015			
MH-4	80th Street and Lindbergh Avenue	4	0.104	72	0.469	326	0.365	253			
	81st Street Flow from North of Frontier Avenue	1,2,3,5,7,4	0.249	173	1.001	695	0.752	522			
	*Frontier Avenue Flow from East	6, MH-1	0.479	333	2.356	1636	1.876	1303			
	73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.796	553	No Data	No Data	No Data	No Data			
MH-6	66th Street and Frontier Avenue	All MH-6 Area	0.805	559	1.702	1182	0.897	623			
	81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.672	467	1.321	918	0.383	266			
	81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.00	0.00	0.00	0.00	0.00	0.00			
MH-1	A	8,9	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.090	63	1.519	1055	1.4	992			
	D	4	0.104	72	0.469	326	0.4	253			
MH-4	E	1,2,3,5,7	0.145	101	0.532	369	0.4	269			
	F	8	0.068	47	No Data	No Data	No Data	No Data	No Data	No Data	No Data
	G	6	0.080	56	0.496	344	0.4	289			
	H	1,2,3,4	0.133	92	0.381	264	0.2	172			
MH-6	I	5,6,7,8,9,10,11,12	0.672	467	1.321	918	0.6	451			

*Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

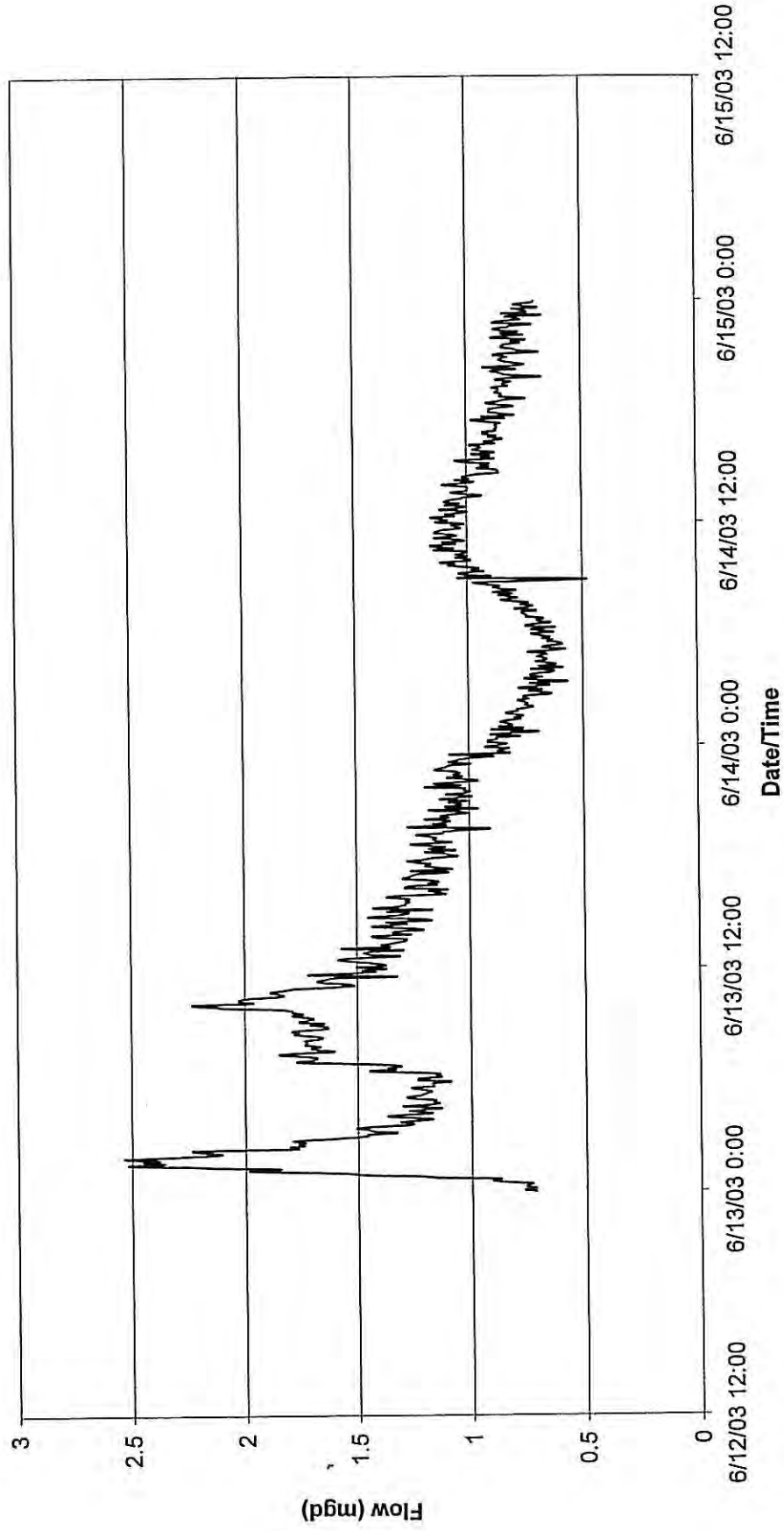
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - June 13, 2003



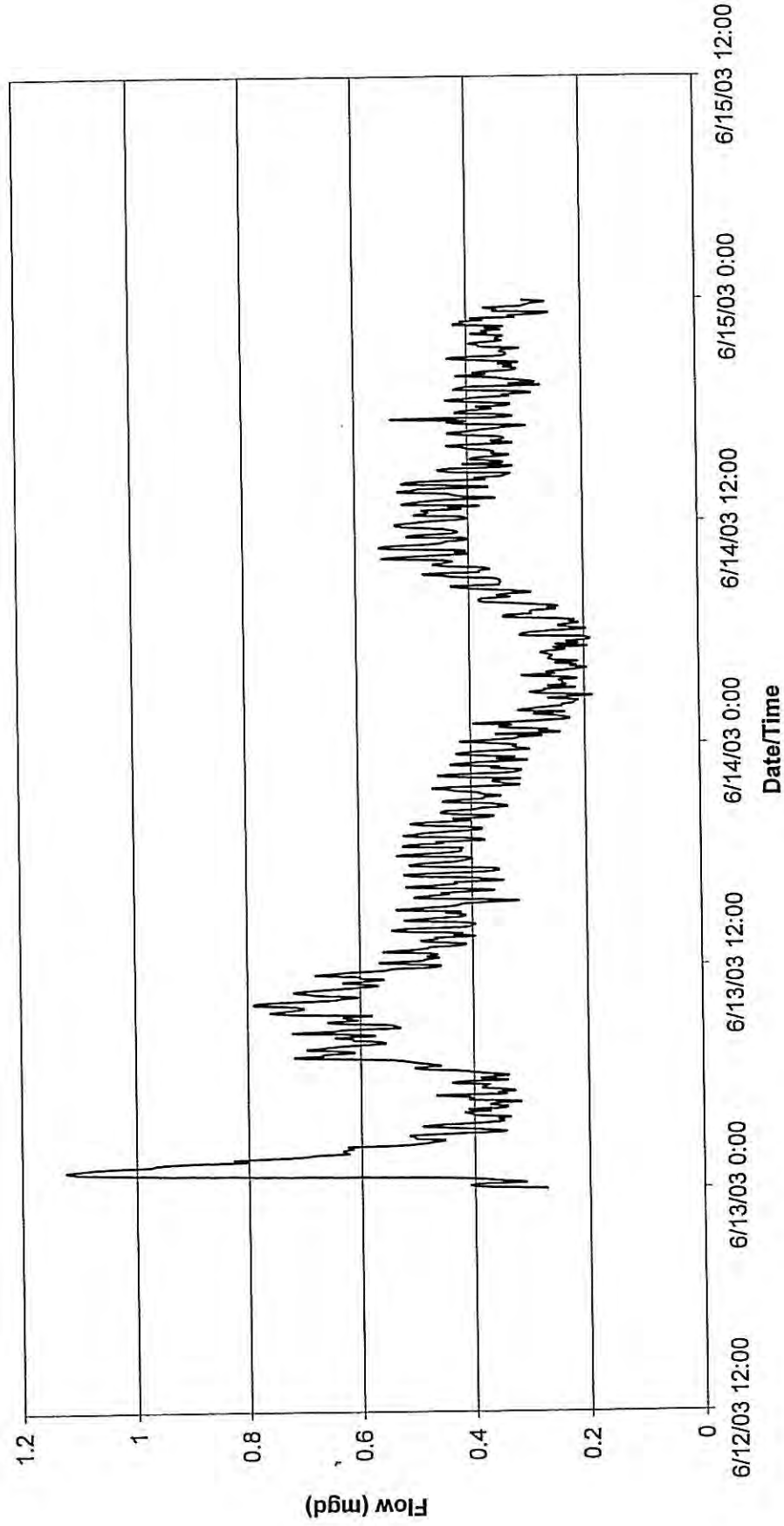
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88 Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
June 13, 2003



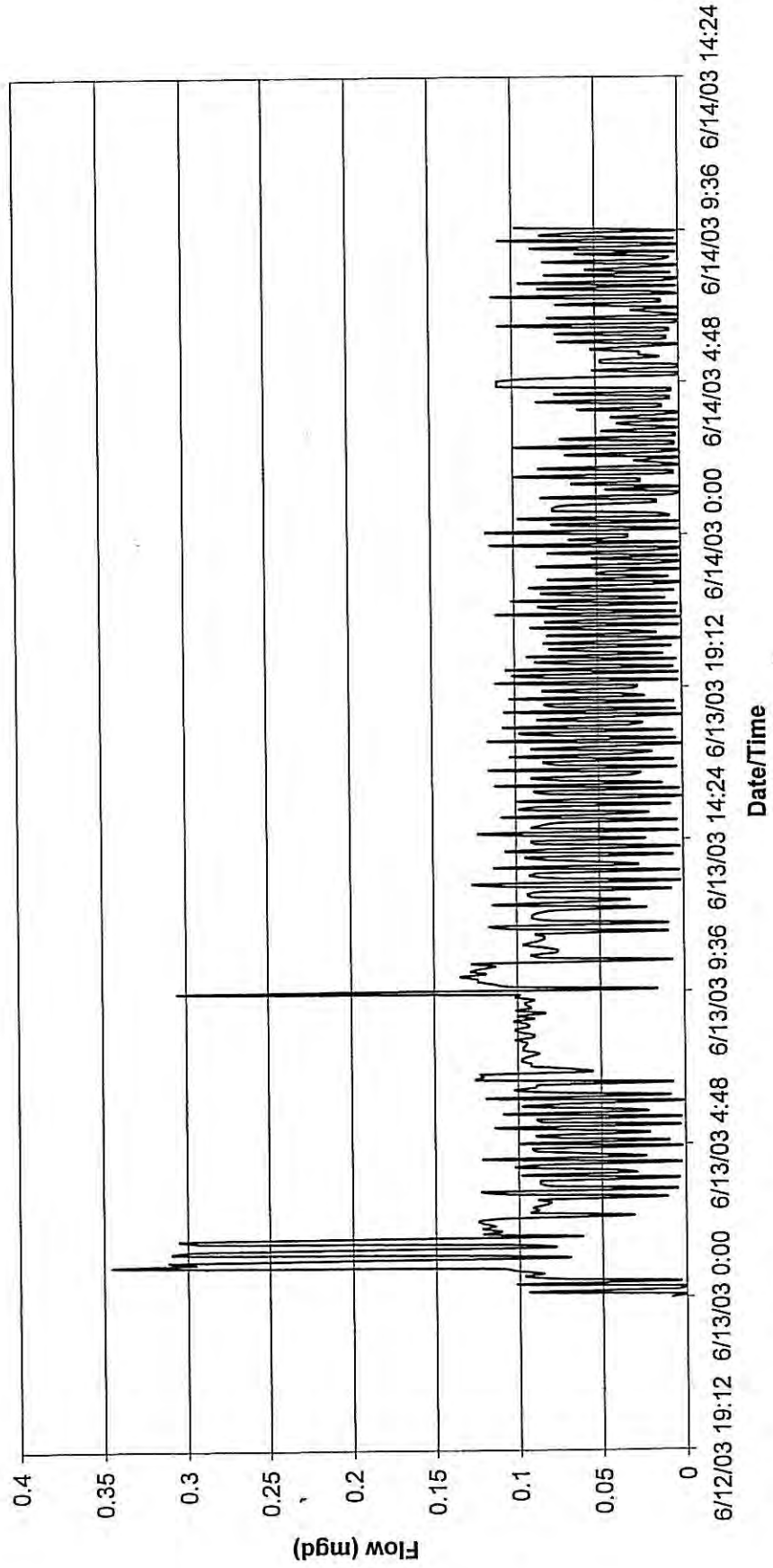
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
June 13, 2003



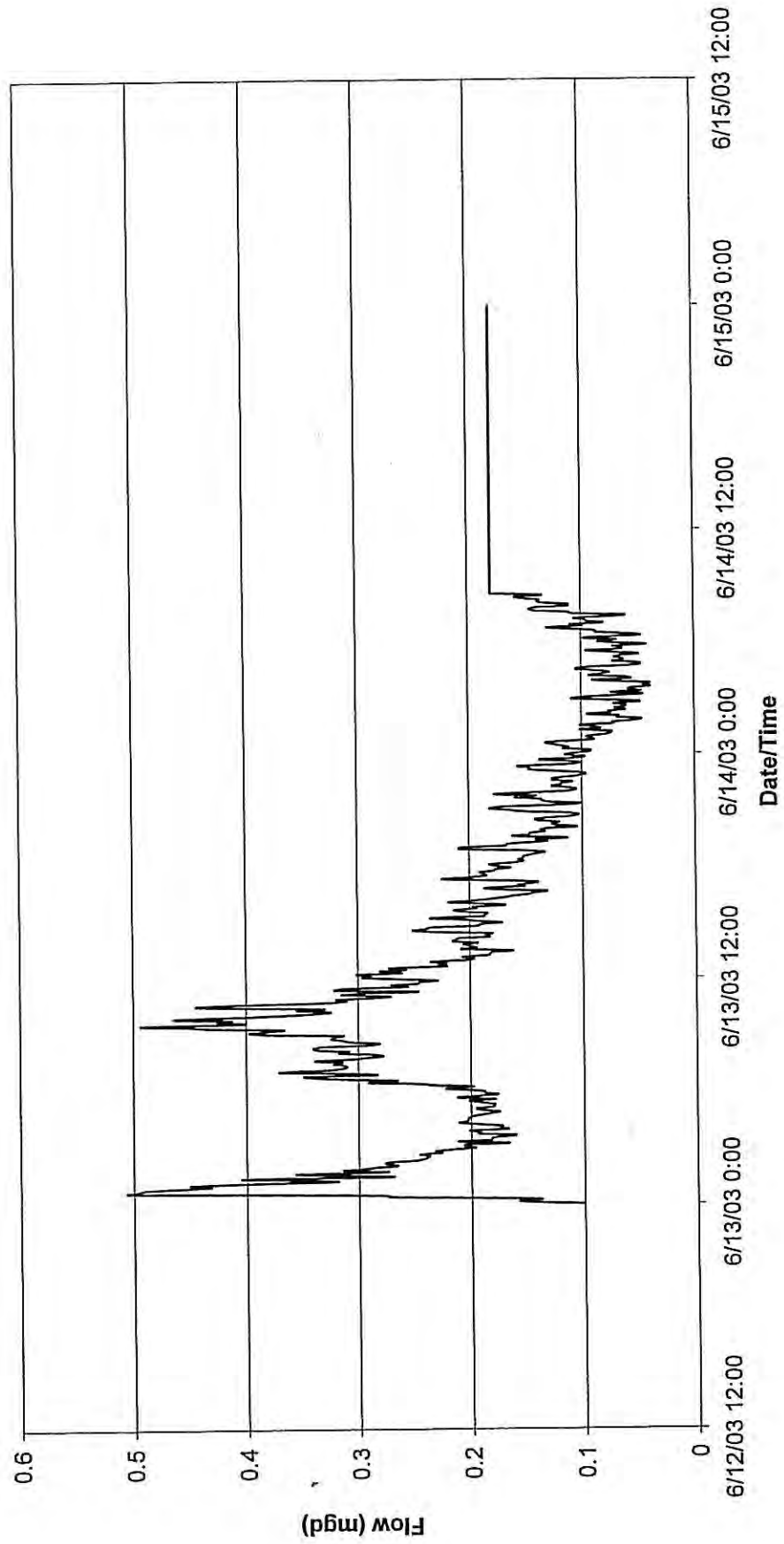
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on 81st Street - North of Frontier Avenue
 Wet Weather Flow
 June 13, 2003



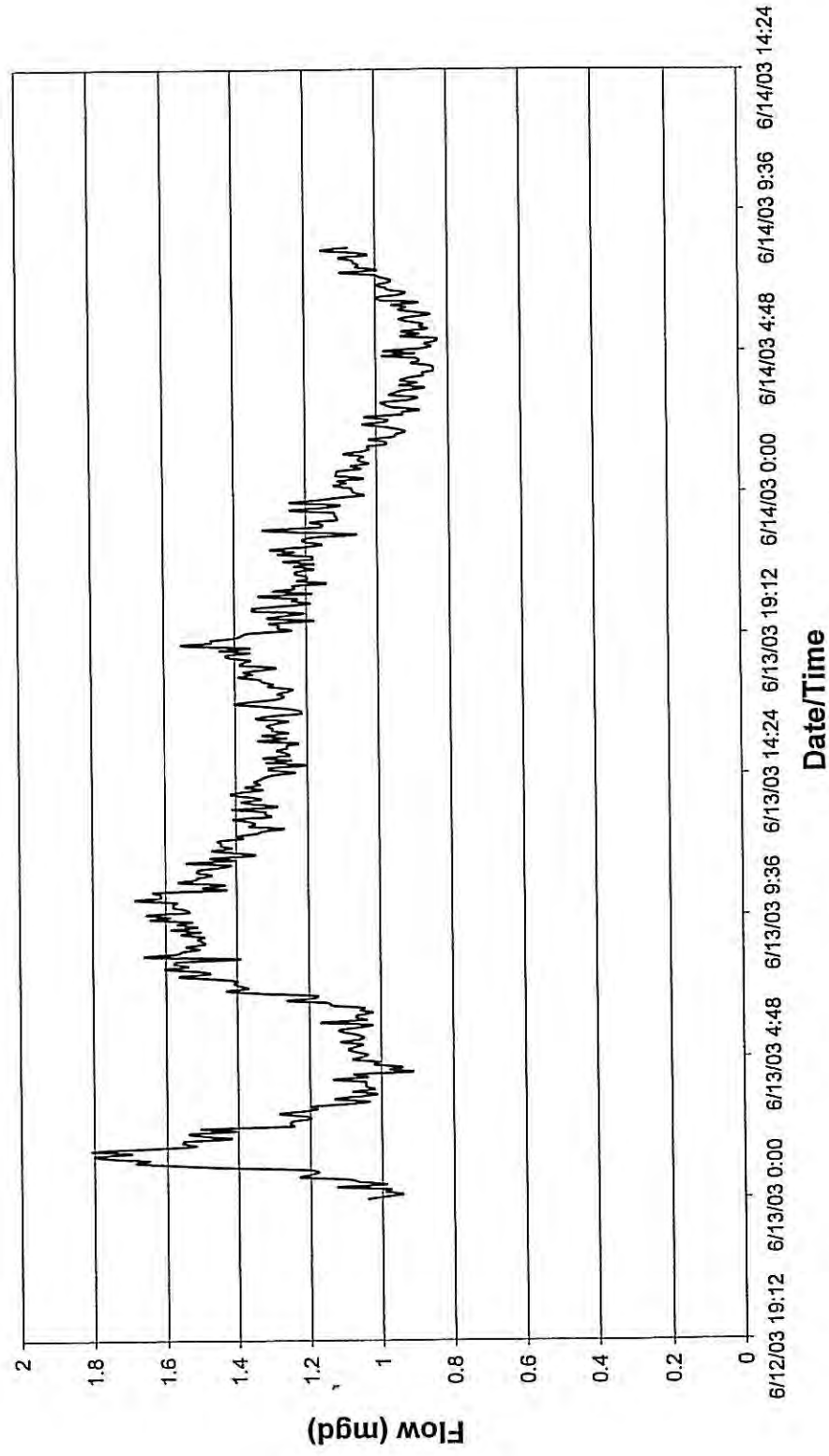
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
June 13, 2003



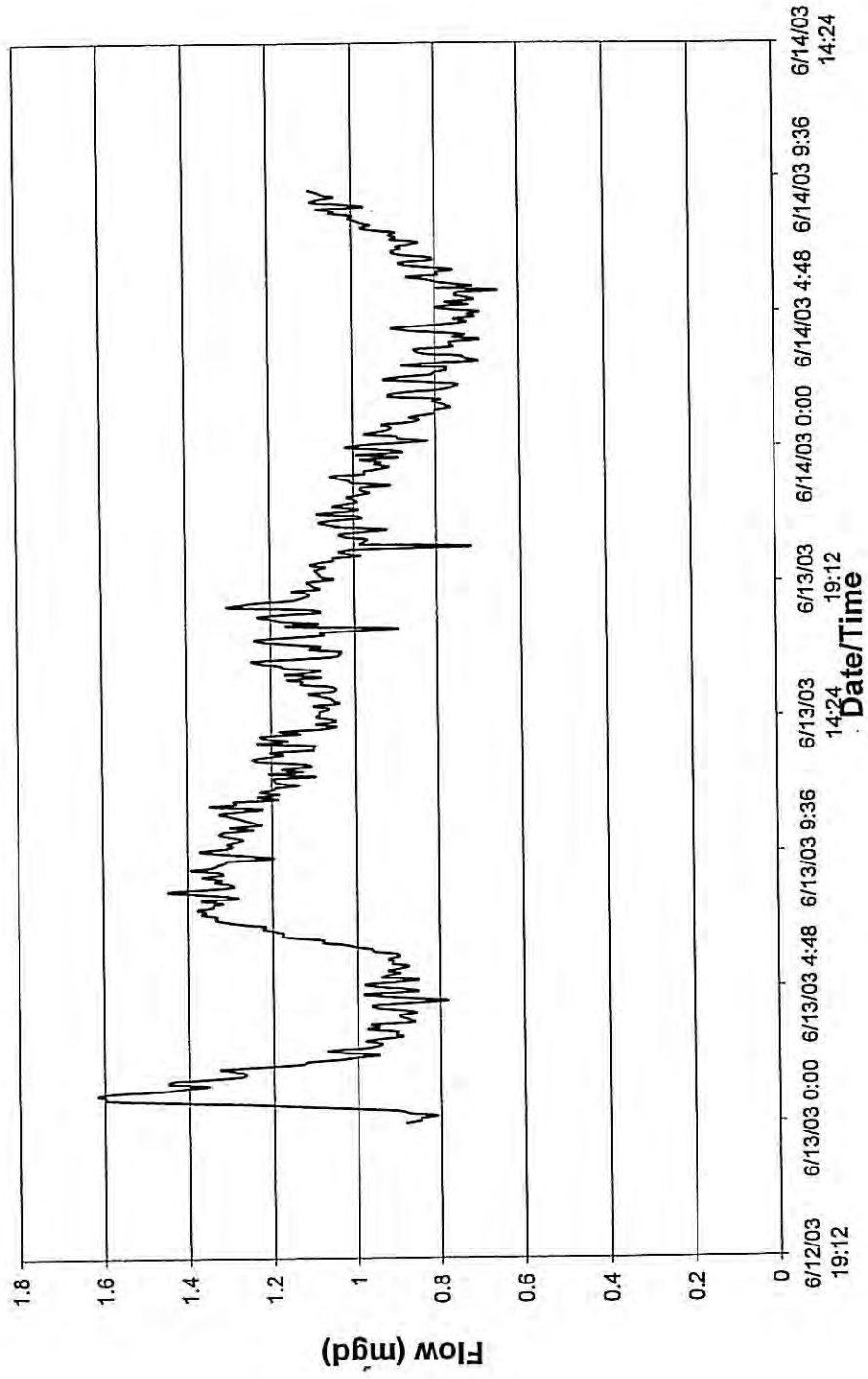
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
June 13, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
June 13, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street-South of Stephenson Avenue
Wet Weather Flow
June 13, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: July 5, 2003

Peak Rainfall Intensity = 1 (inches/hour) = 0.33

Average Rainfall Intensity = 1 (inches/hour) = 0.216

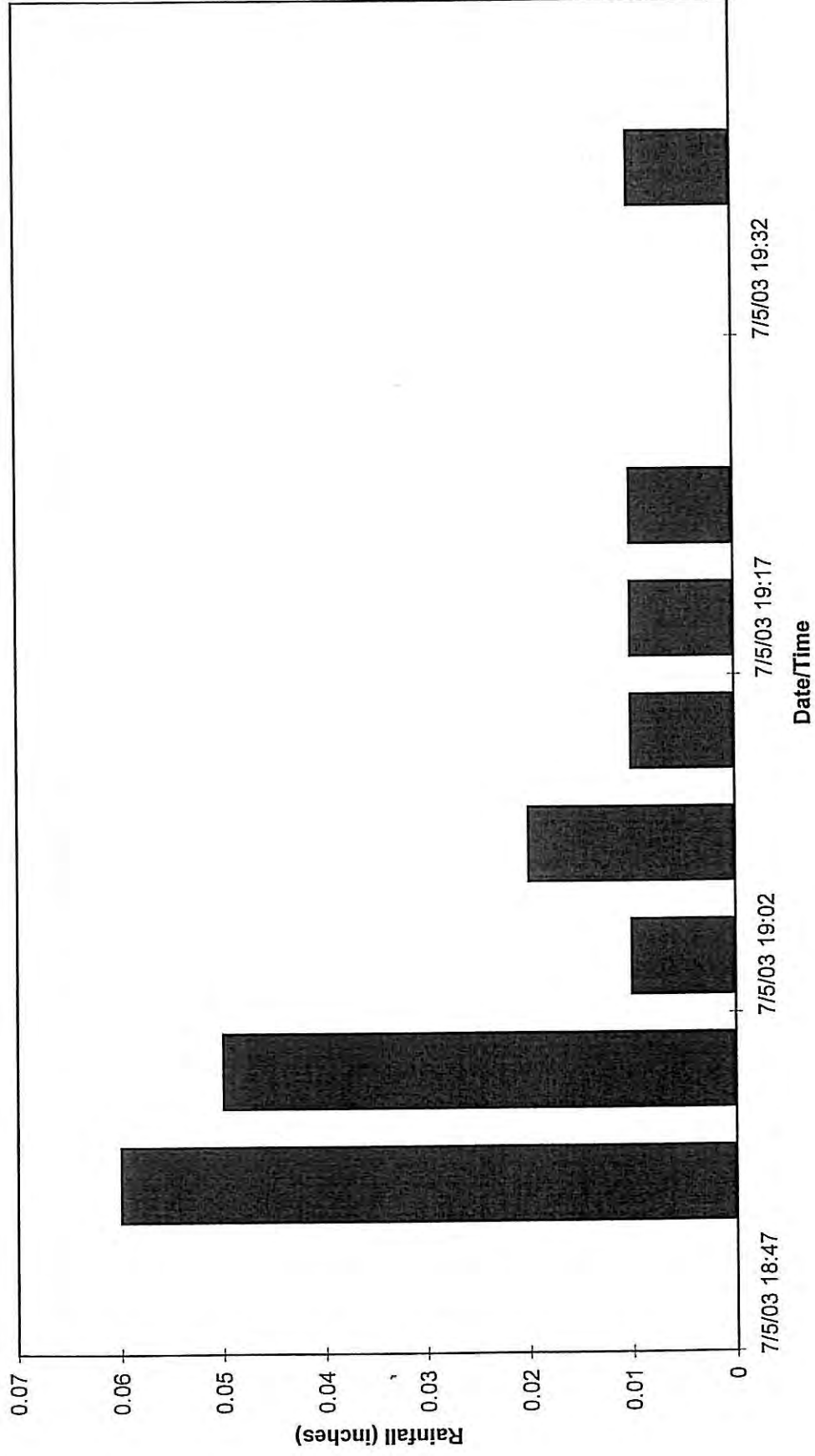
Total Rainfall (inches) = 0.18

Meter Name	Metered Subareas		Average DWF		Metered Average Peak WWF		Inflow	
	Detailed I/I Investigations, 1999-2001		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1								
93rd Street 1 MH South of Cayuga Creek	8,9	No Data	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.295	205	1,383	961	1,088	756	
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.420	292	1,613	1,120	1,193	829	
MH-4								
80th Street and Lindbergh Avenue	4	0.103	72	0,555	386	0,452	314	
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.307	213	1,398	971	1,091	757	
*Frontier Avenue Flow from East of 81st Street	6, MH- 1	0.568	394	2,206	1,532	1,638	1,138	
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.929	645	3,732	2,591	2,803	1,946	
MH- 6								
66th Street and Frontier Avenue	All MH-6 Area	0.849	589	2,03	1,413	1,186	823	
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.735	510	1,14	793	0,406	282	
81st Street, Cross Over Flow	Cross Over Pipe at LS-6/LS-1	0.0	0.0	0.0	0.0	0.0	0.0	

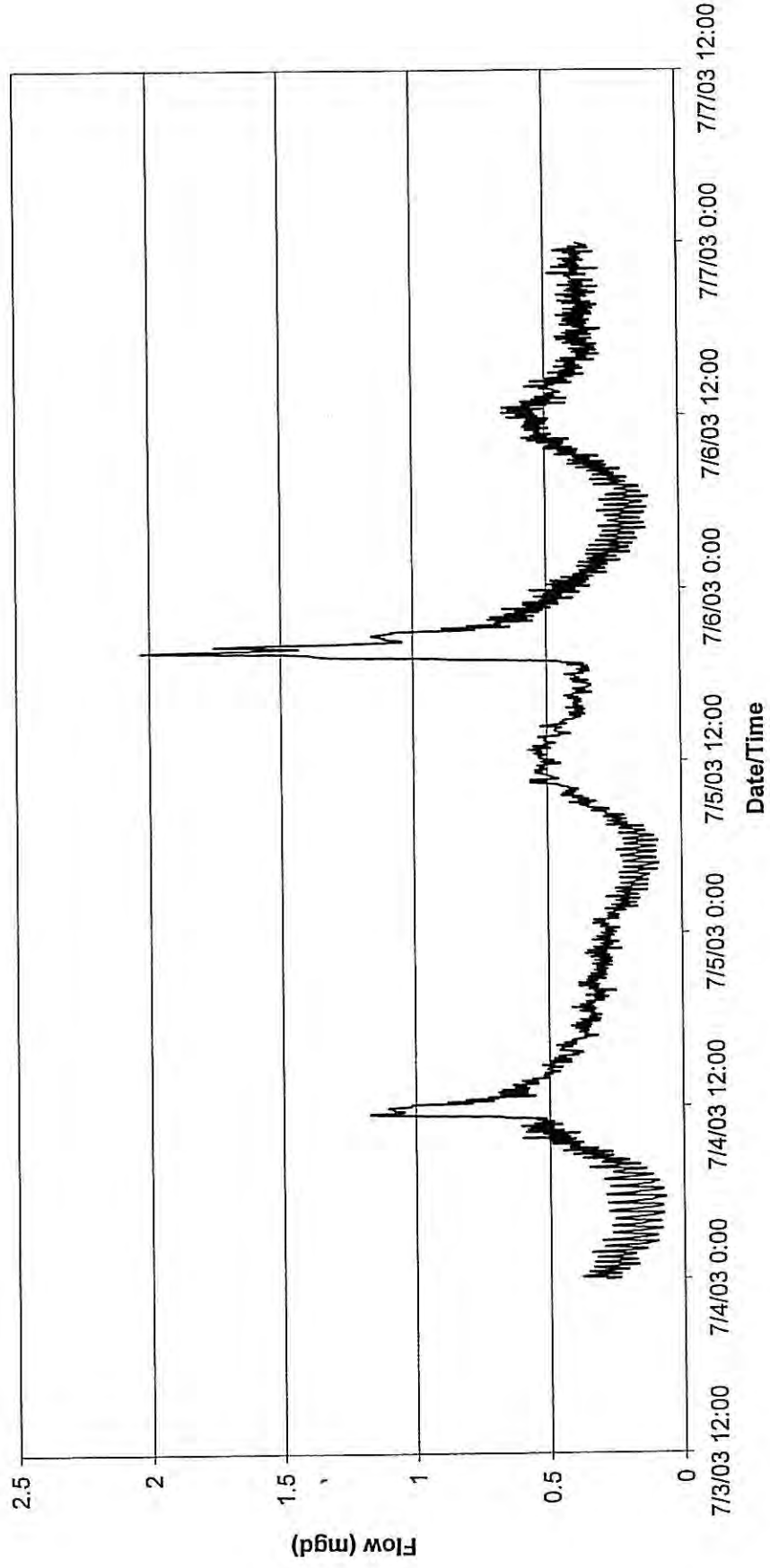
Areas	Metered Subareas		Average DWF		Average Peak WWF		Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1	A	8,9	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.125	87	0,230	160	0,105	73,00
MH-4	D	4	0.103	72	0,555	386	0,452	314
	E	1,2,3,5,7	0.204	142	0,842	585	0,638	443
	F	8,MH-1,2,3,5,7,4,6	0.054	38	0,128	89	0,074	51
	G	6	0.148	103	0,593	412	0,445	309
	H	1,2,3,4	0.114	79	0,893	620	0,779	541
MH-6	I	5,6,7,8,9,10,11,12	0.735	510	1,141	793	0,406	282

* Average DWF for Flow from East of Frontier Avenue have been adjusted due to malfunctioning of the probe.

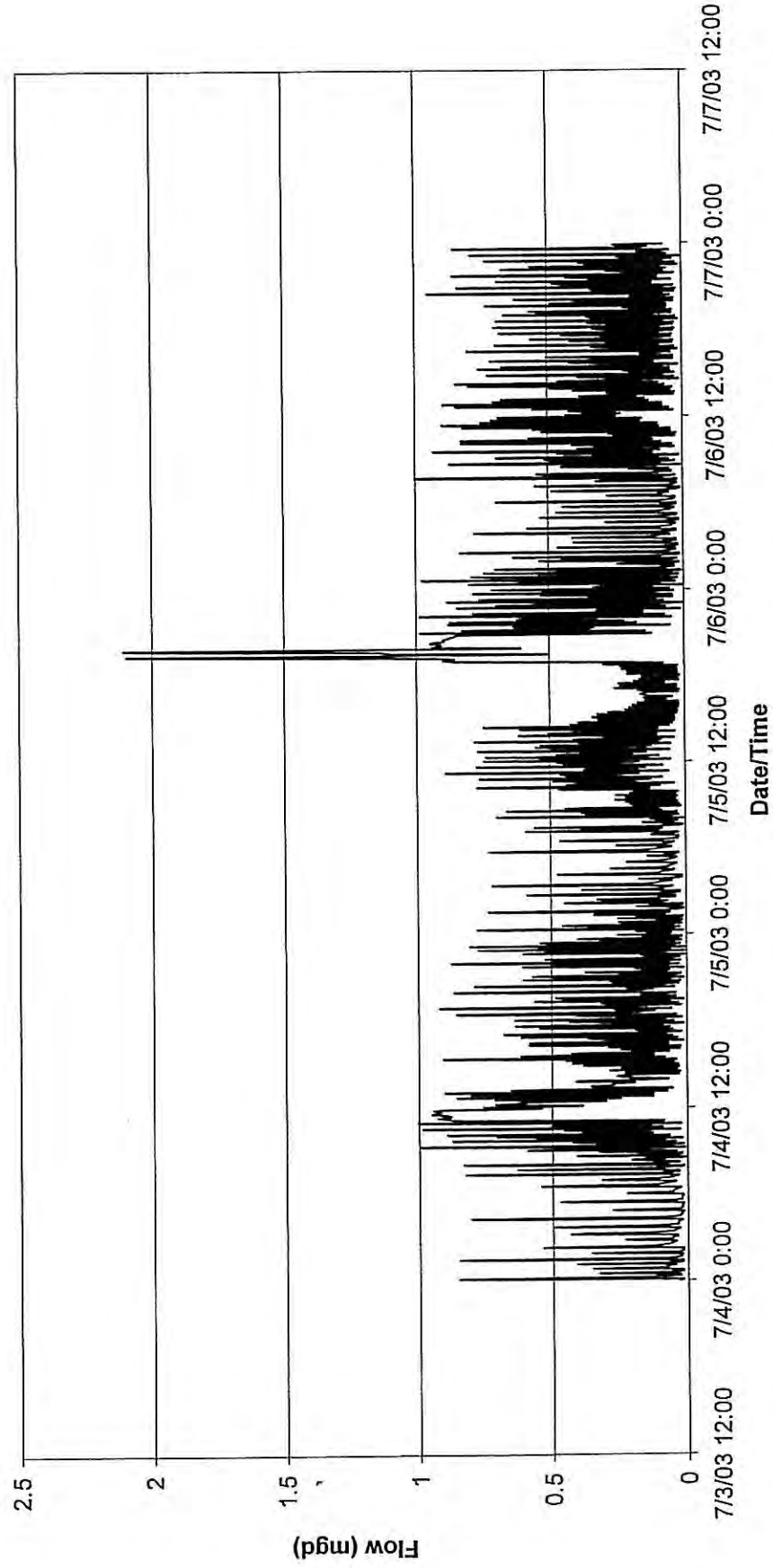
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - July 5, 2003



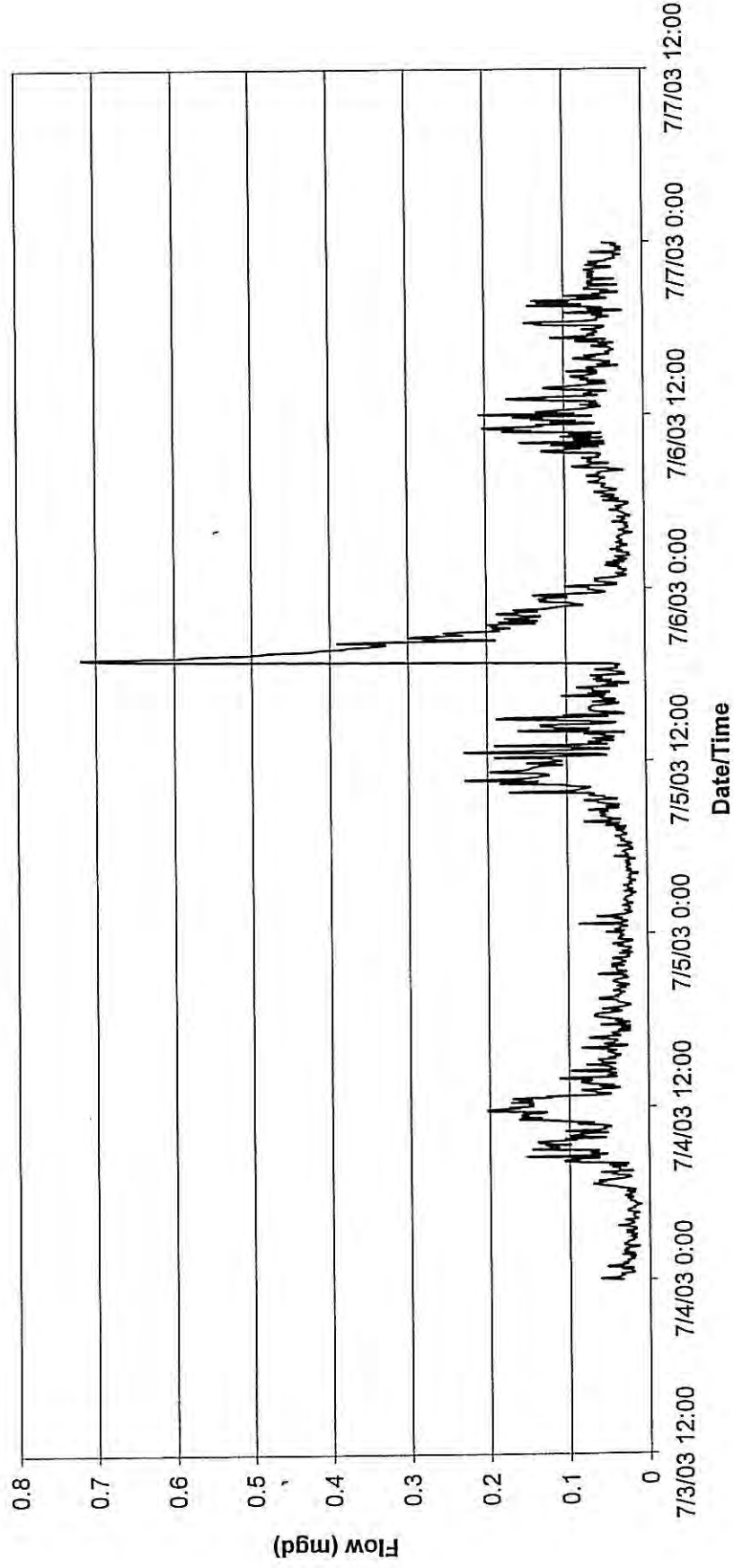
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
July 5, 2003



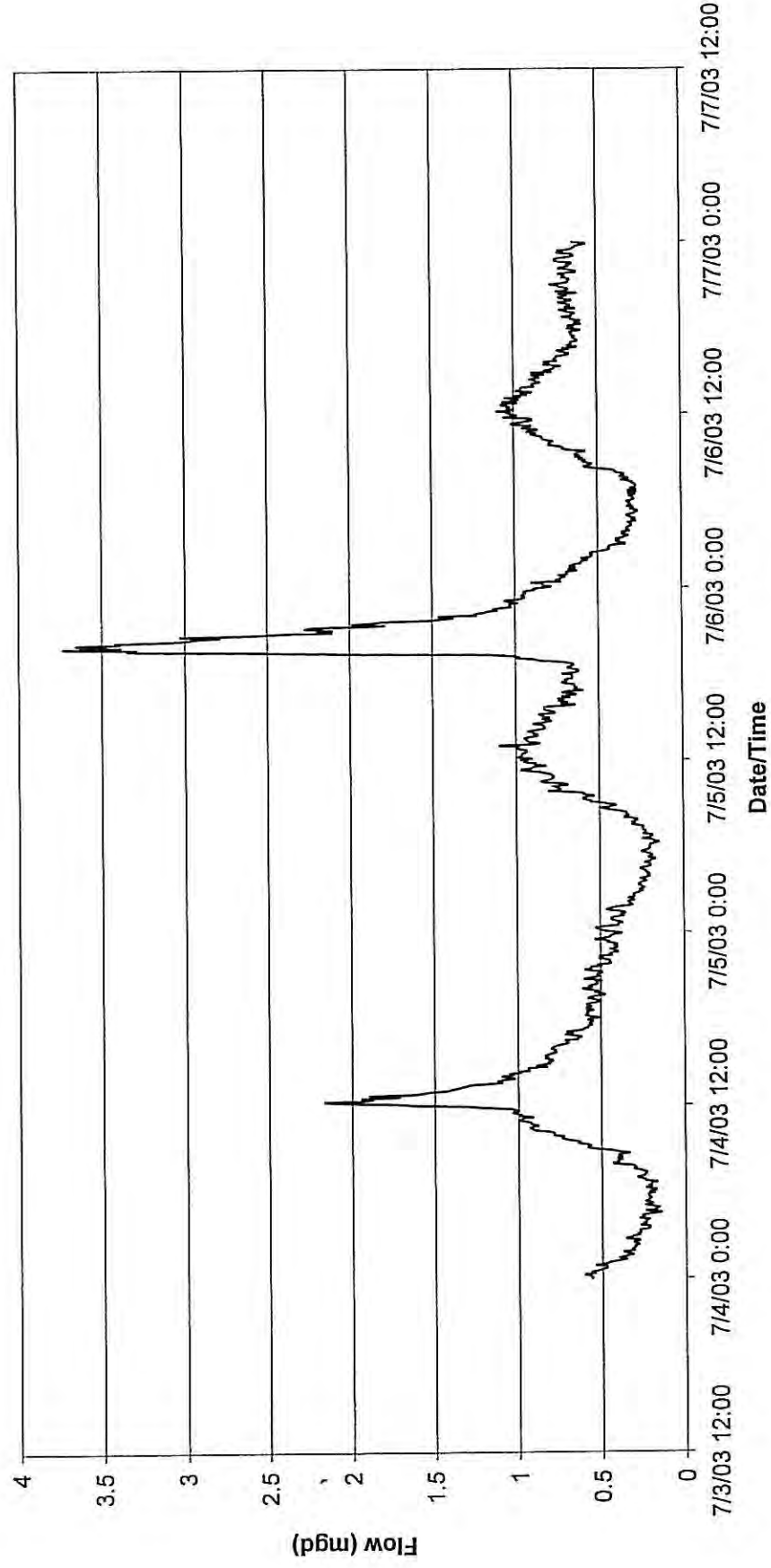
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
July 5, 2003



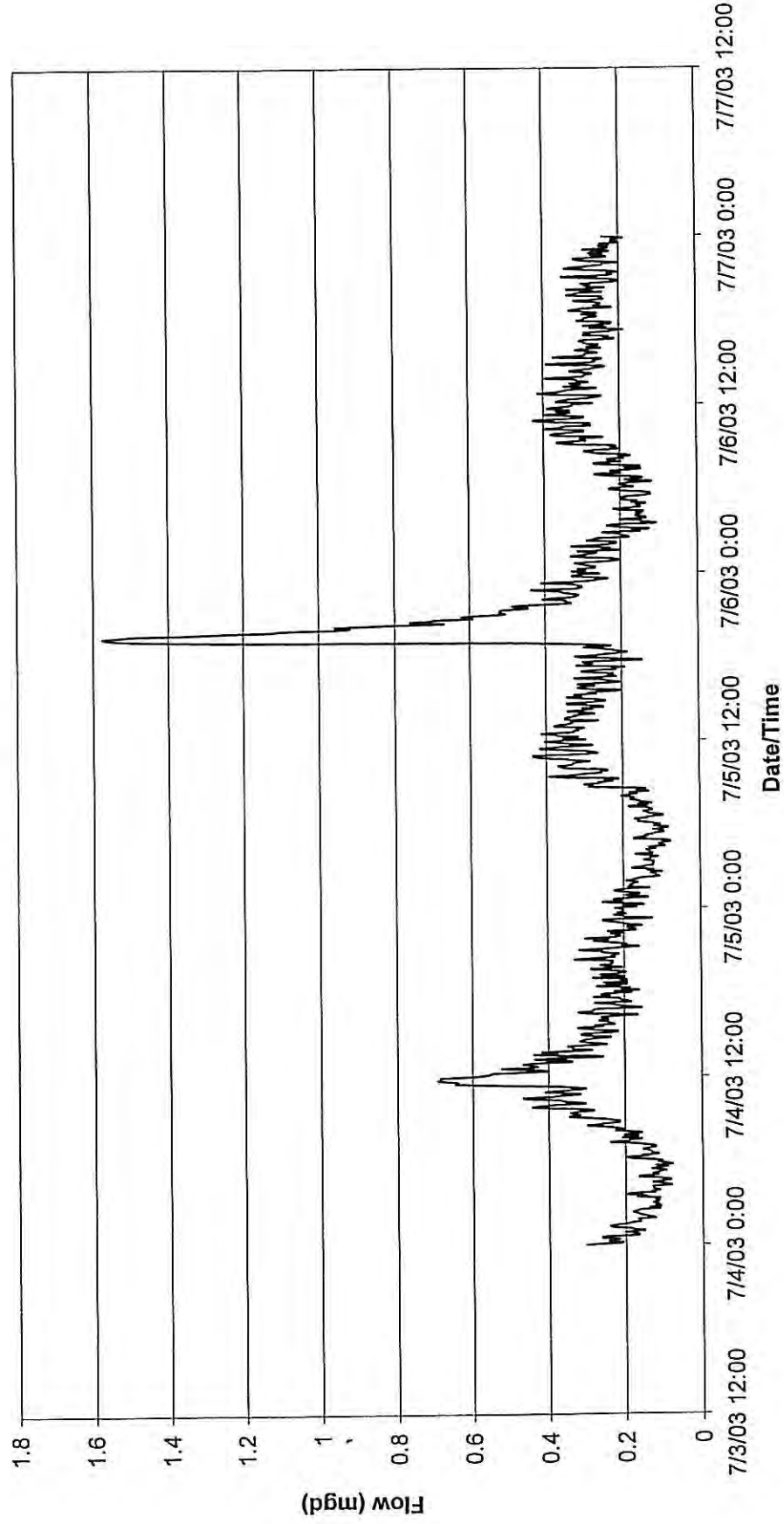
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
July 5, 2003



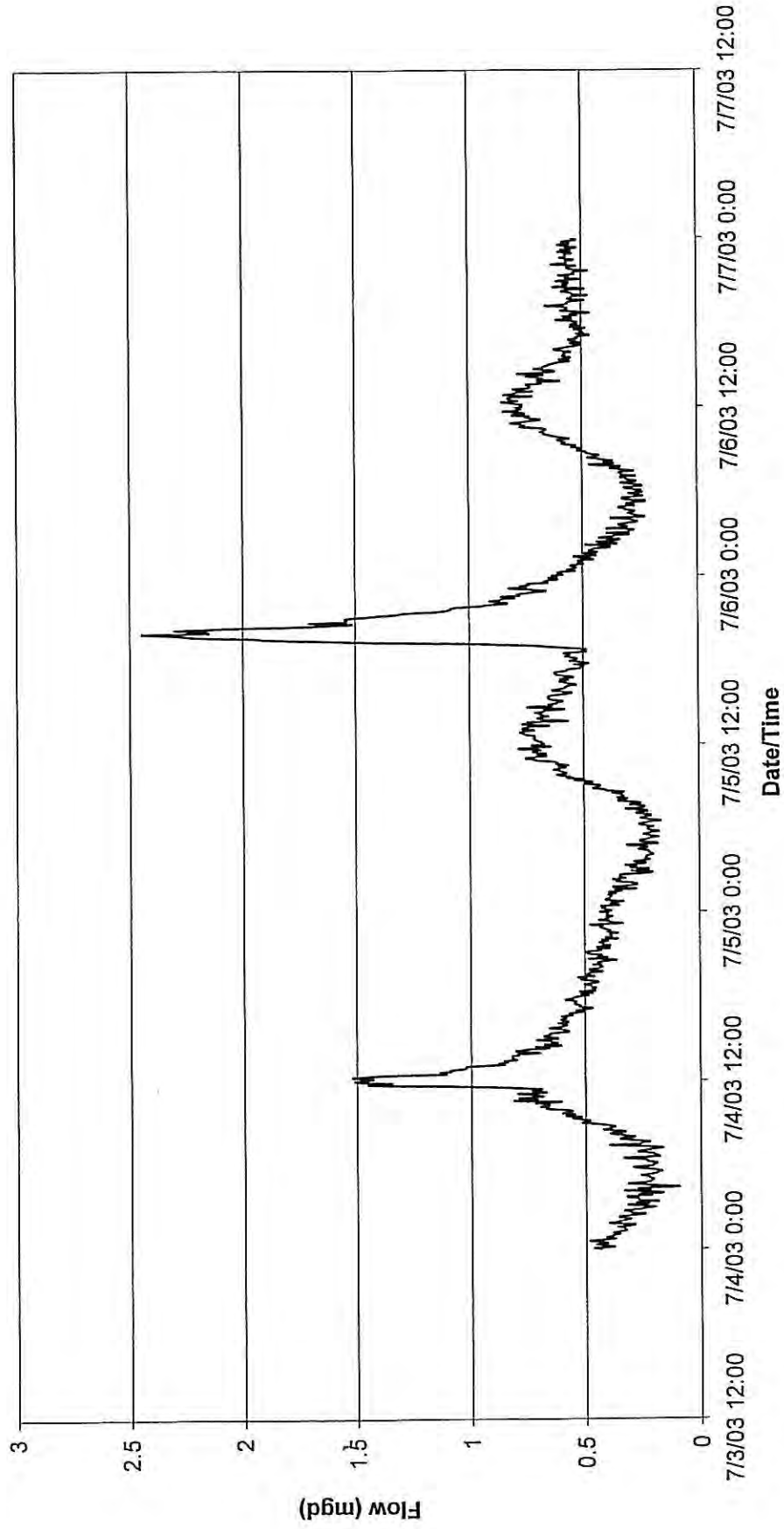
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
July 5, 2003



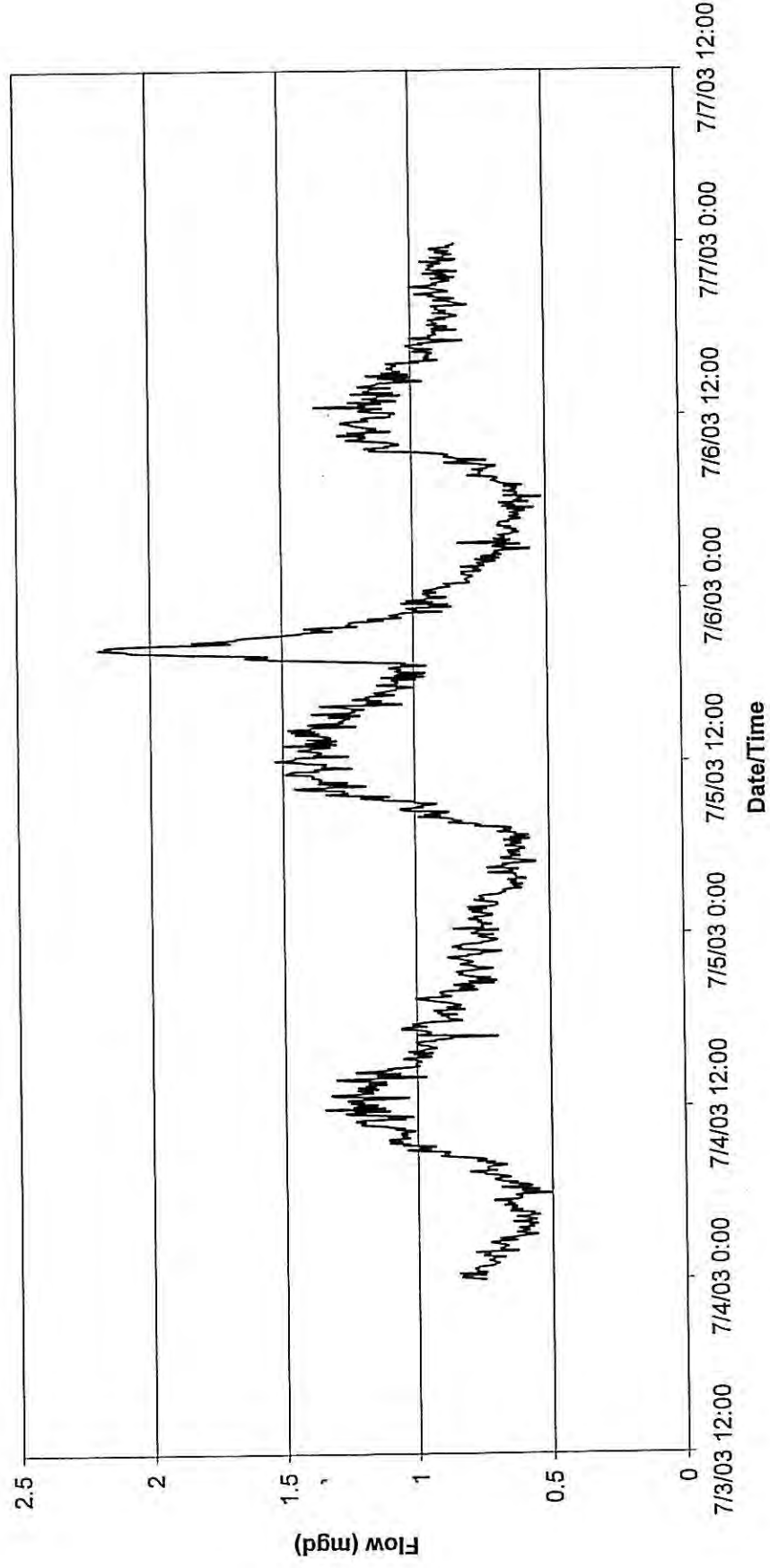
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - North of Frontier Avenue
Wet Weather Flow
July 5, 2003



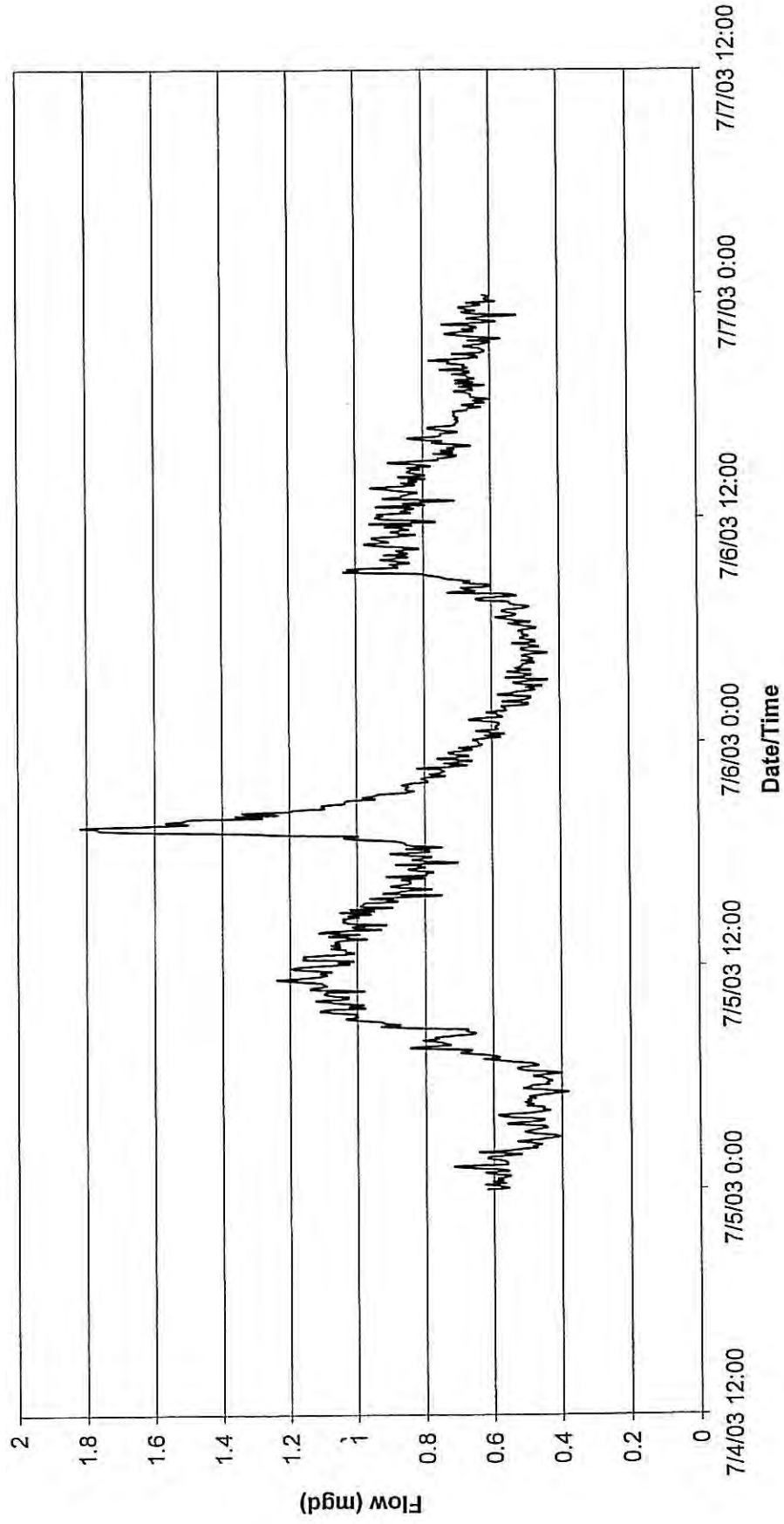
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue East of 81st Street
Wet Weather Flow
July 5, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
July 5, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow South of Stephenson Avenue on 81st Street
Wet Weather Flow
July 5, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: July 10, 2003

Peak Rainfall Intensity = i (inches/hour) = 0.79

Average Rainfall Intensity (inches/hour) = 0.290

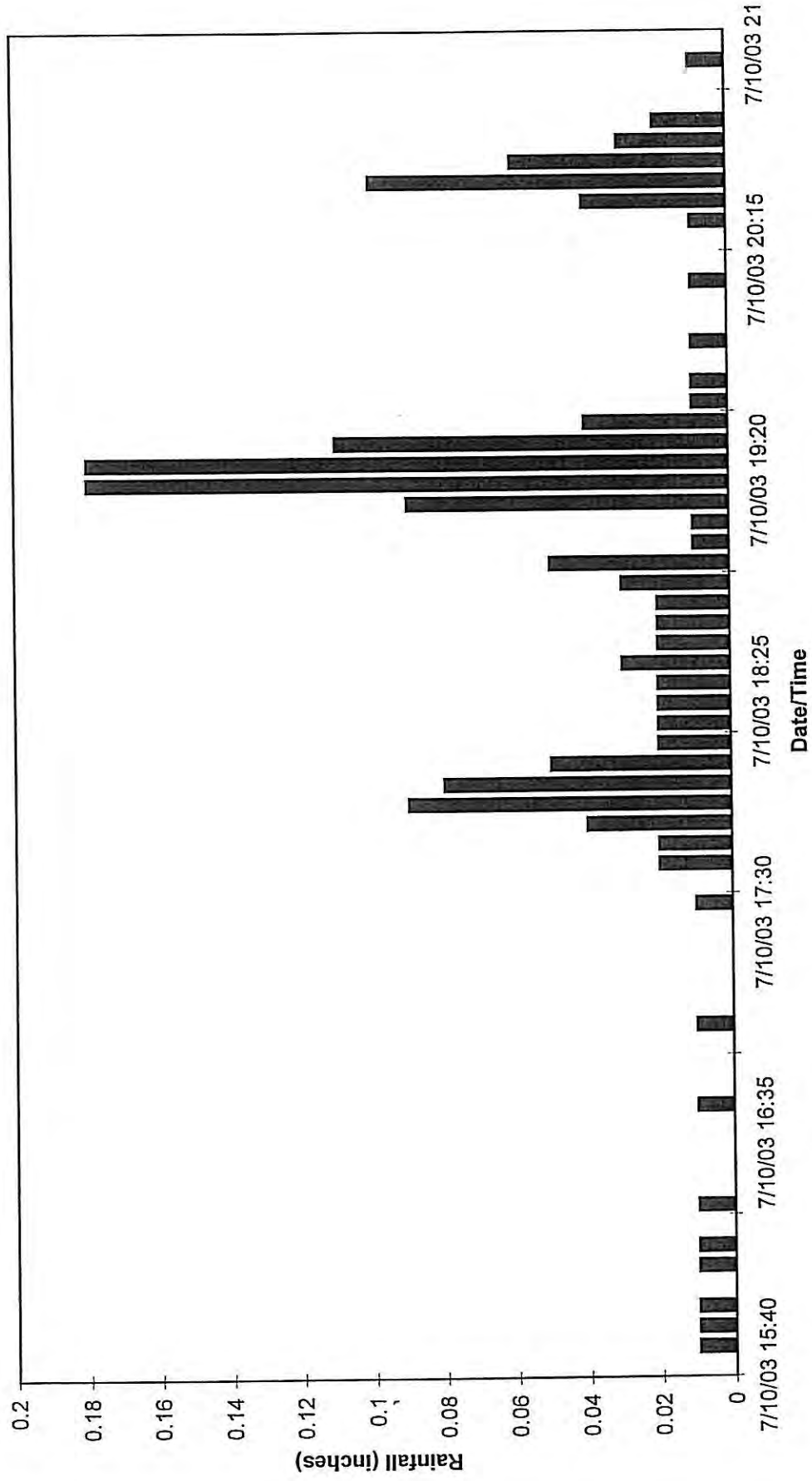
Total Rainfall (inches) = 1.57

Meter Name	Metered Subareas		Average DWF		Metered Average Peak WWF		Inflow	
	Detailed I/I Investigations, 1999-2001		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1								
93rd Street I MH south of Cayuga Creek	8,9	No Data	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.295	205	1459	1.807	1255		
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.420	292	2367	1.947	1352		
MH-4								
80th Street and Lindbergh Avenue	4	0.103	72	0.912	633	0.809	562	
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.307	213	2.253	1.946	1351		
Frontier Avenue East of 81st Street	6, MH-1	0.568	394	3.302	2.734	1898		
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.929	645	4.885	3.956	2747		
MH-6								
66th Street and Frontier Avenue	All MH-6 Area	0.849	589	3.192	2.344	1628		
81st Street South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.735	510	2.904	2.169	1506		
81st Street, Cross Over Pipe (flow was measured, but estimate was assumed based on flow balance of other meters)	Cross Over Pipe at LS-6/LS-1	0.0	0.0	0.350	243	0.0	0.0	0.0

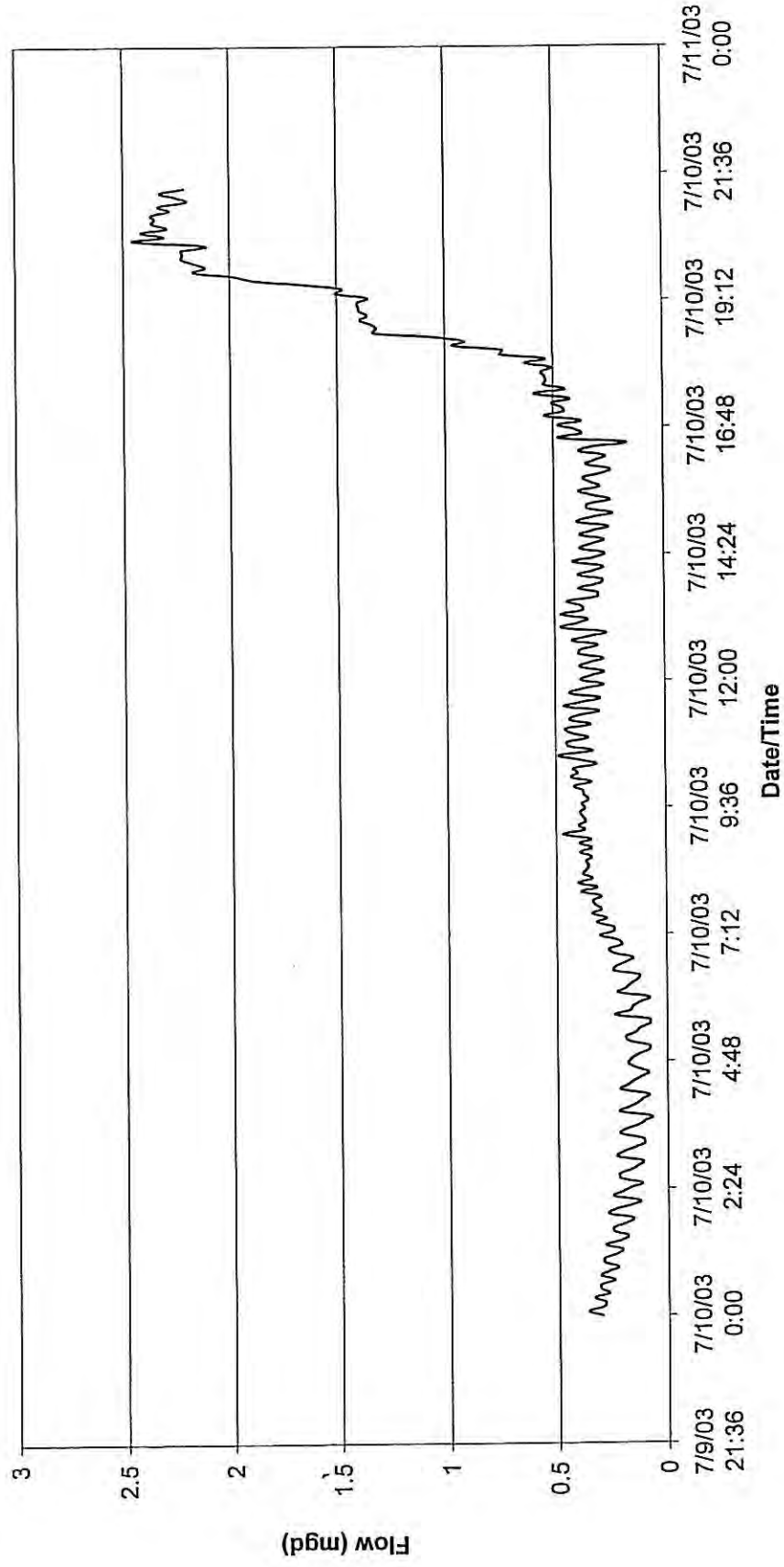
Areas	Metered Subareas		Average DWF		Peak WWF		Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1	A	8,9	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.125	87	0.265	184	0.14	97
	D	4	0.103	72	0.912	633	0.8	562
MH-4	E	1,2,3,5,7	0.204	142	1.341	931	1.1	790
	F	8	0.054	38	0.564	392	0.5	354
	G	6	0.148	103	0.935	649	0.8	546
	H	1,2,3,4	0.114	79	0.314	218	0.2	139
MH-6	I	5,6,7,8,9,10,11,12	0.735	510	2.904	2017	2.2	1506

* Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

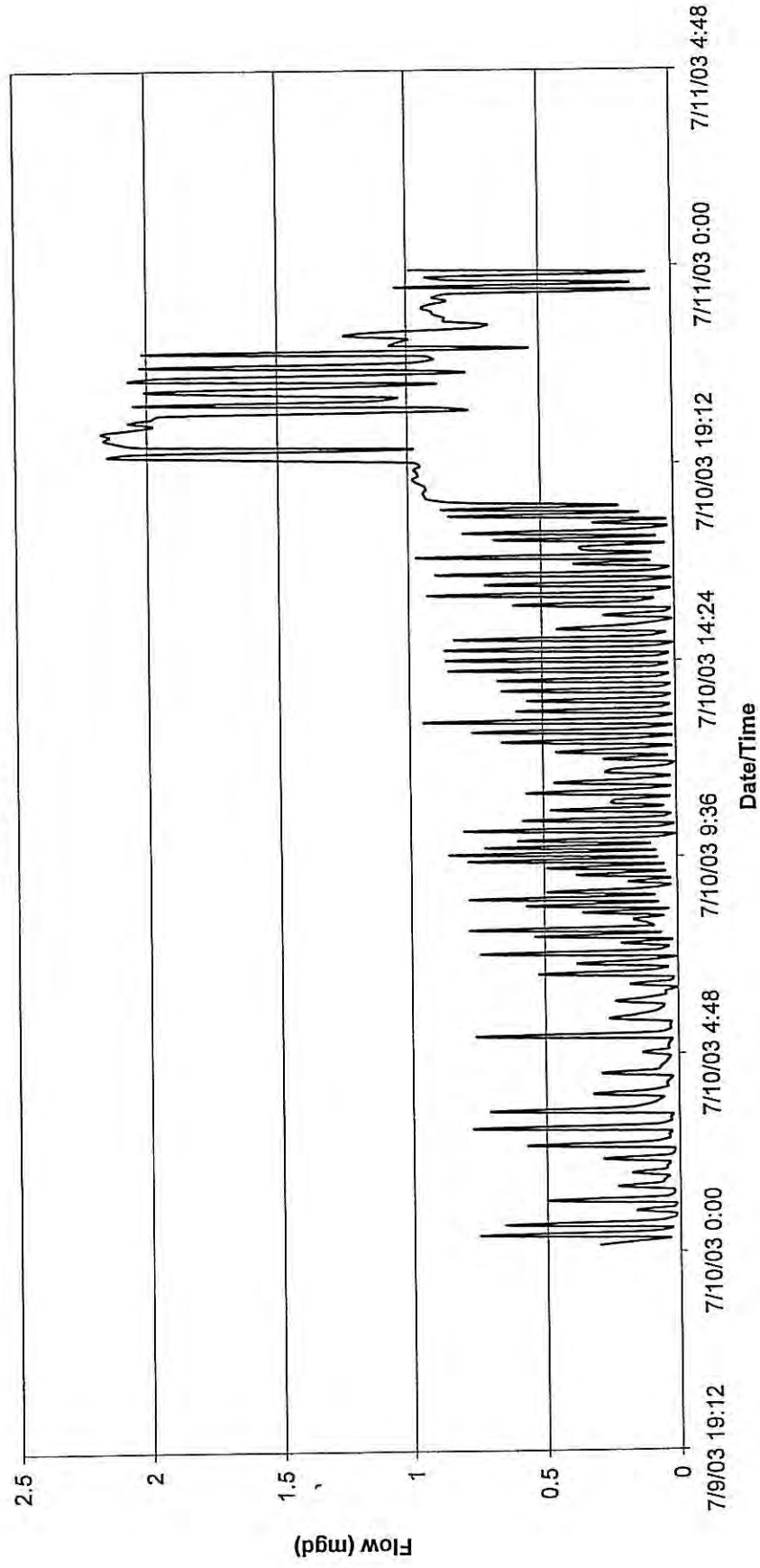
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - July 10, 2003



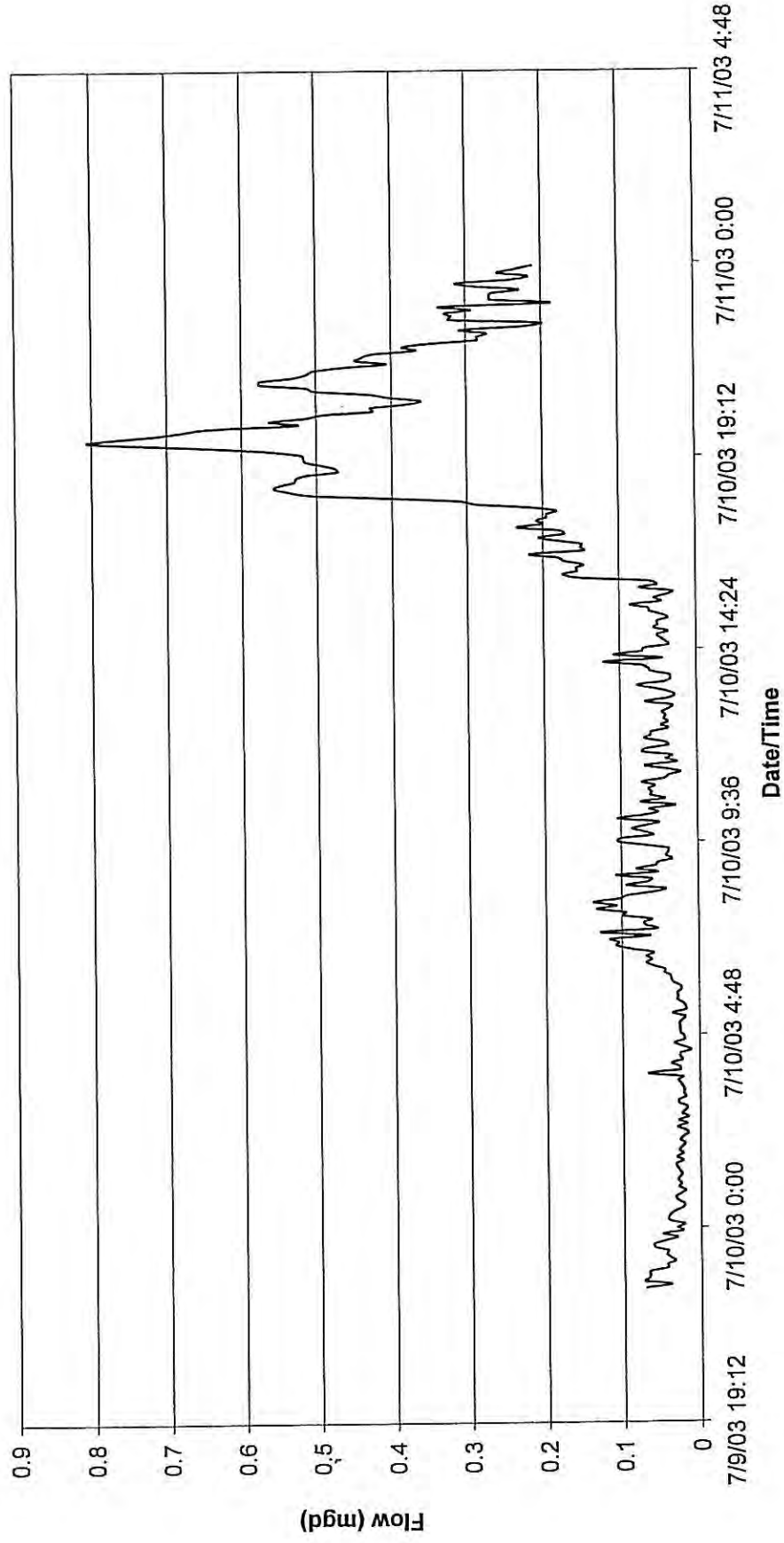
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Mang Avenue at 88th Street
Flow on Mang Avenue
Wet Weather Flow
July 10, 2003



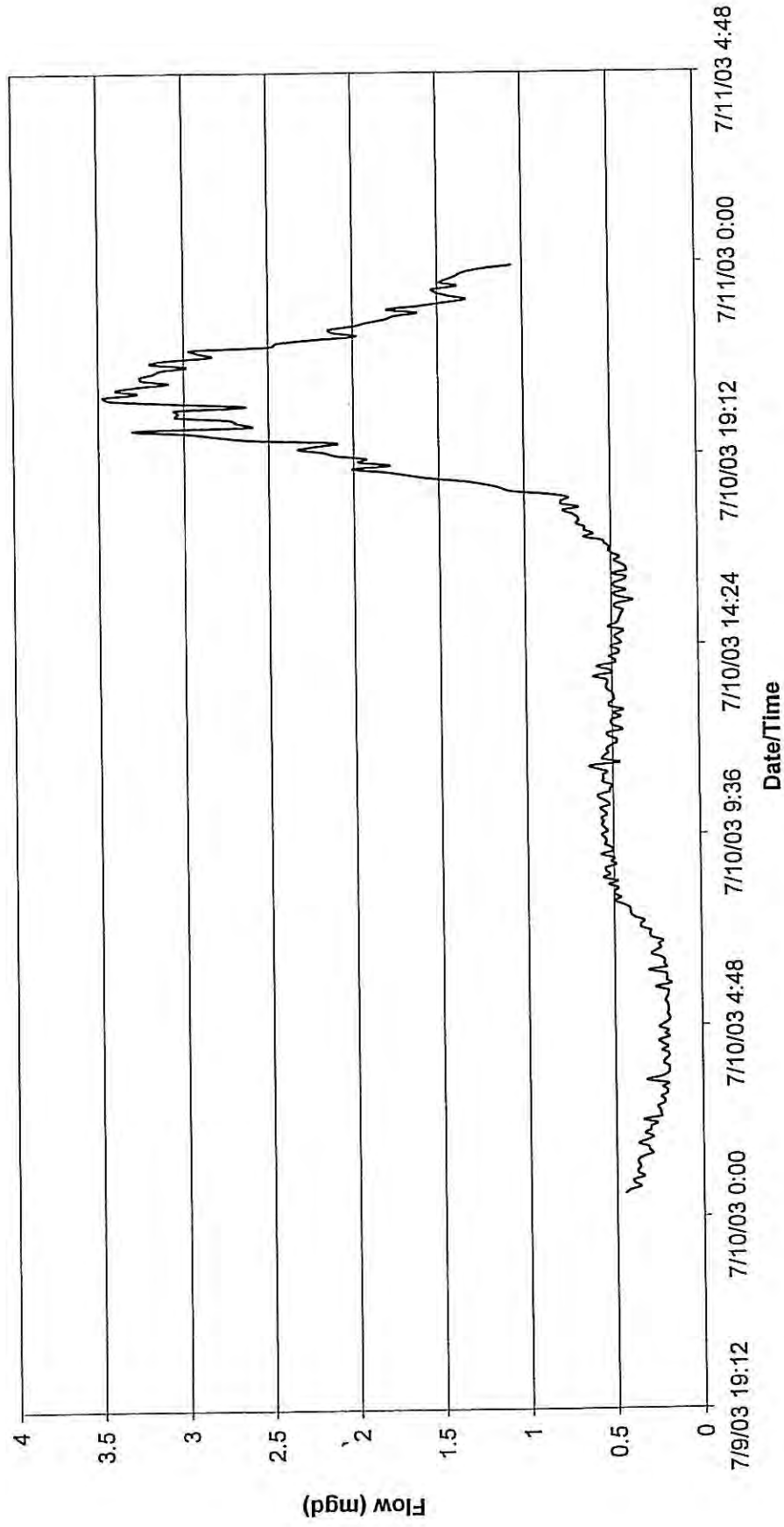
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street at Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
July 10, 2003



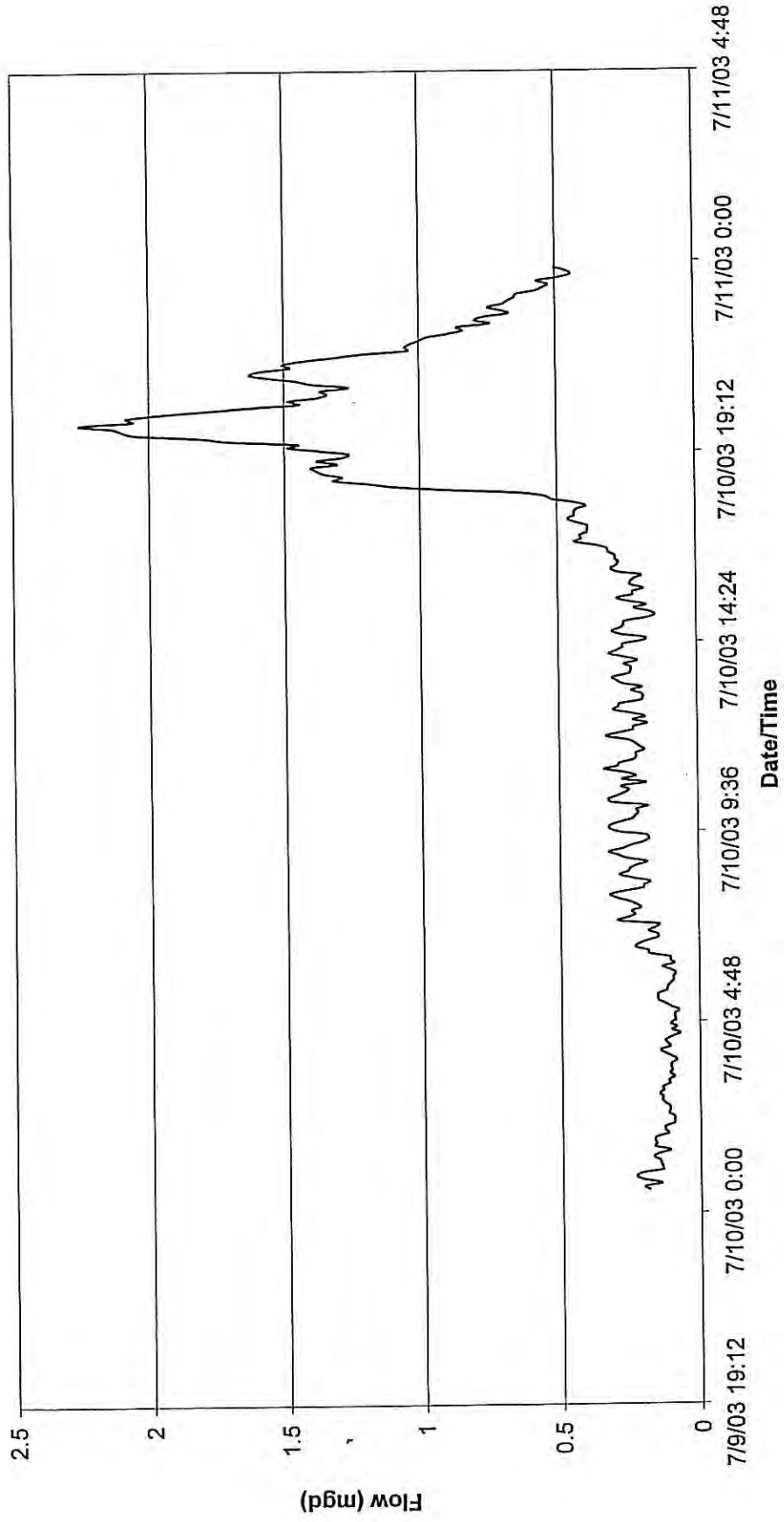
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on Lindbergh Avenue at 80th Street
 Wet Weather Flow
 July 10, 2003



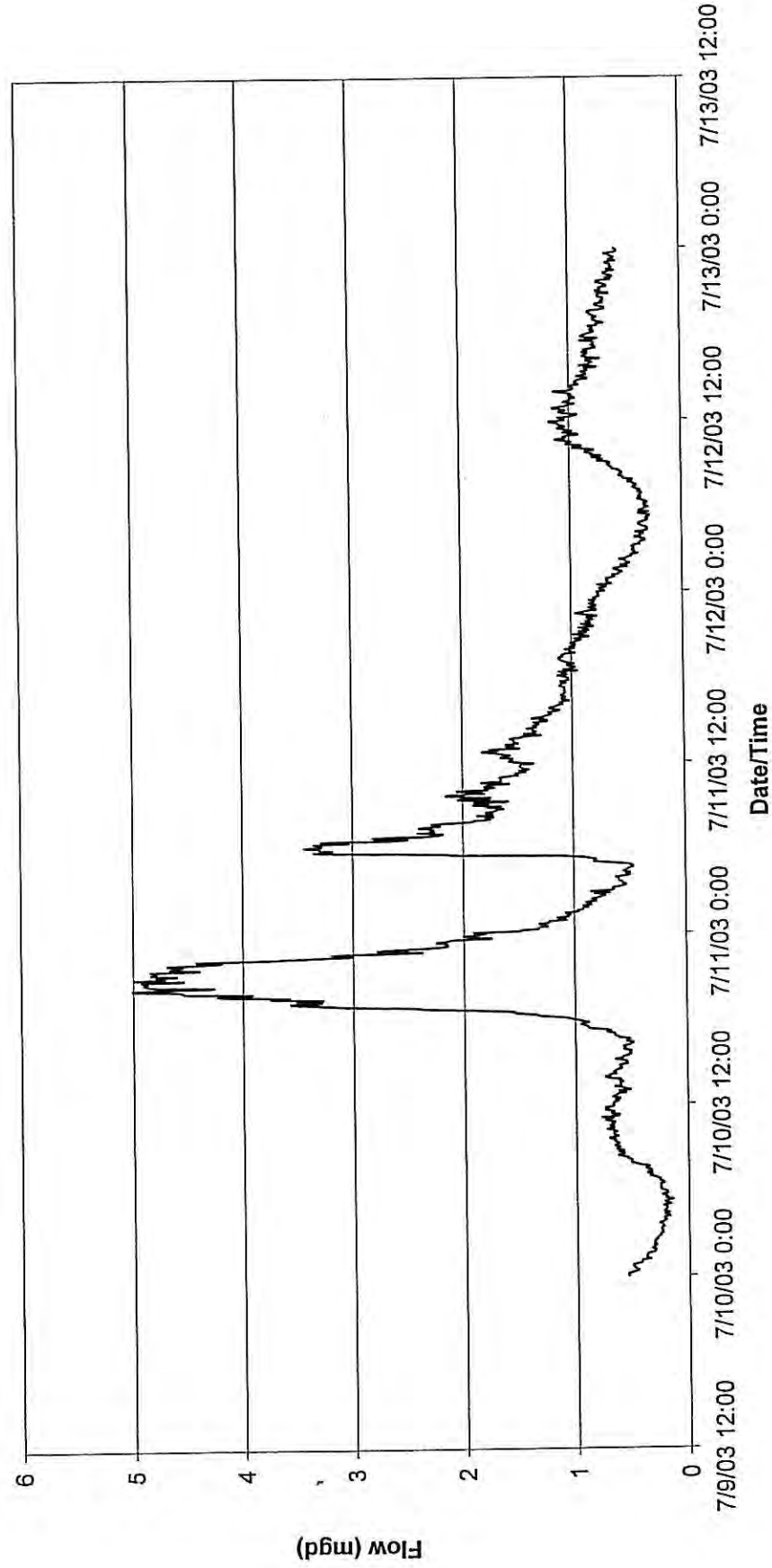
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue East of 81st Street
Wet Weather Flow
July 10, 2003



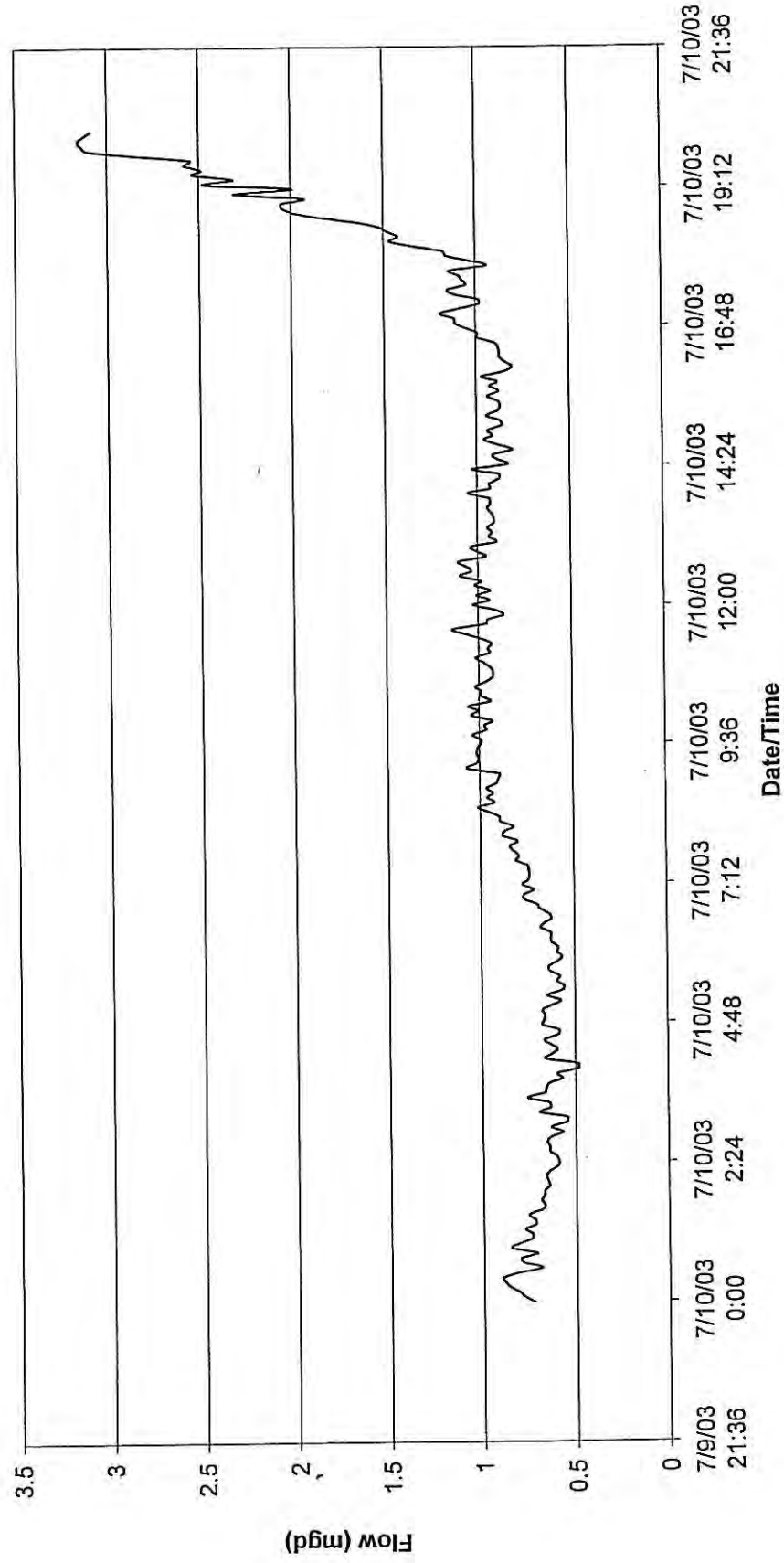
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
81st Street - North of Frontier Avenue
Wet Weather Flow
July 10, 2003



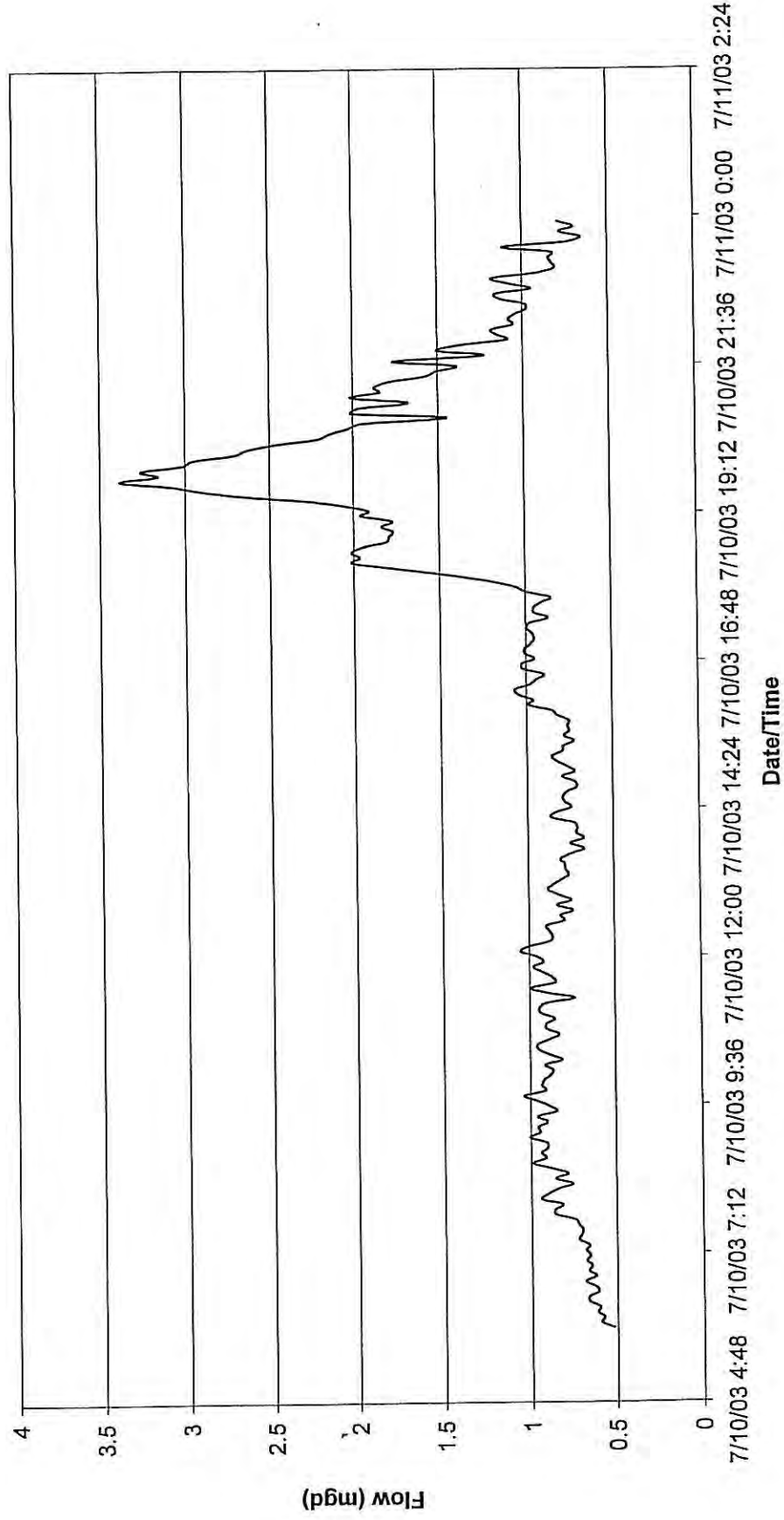
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
July 10, 2003



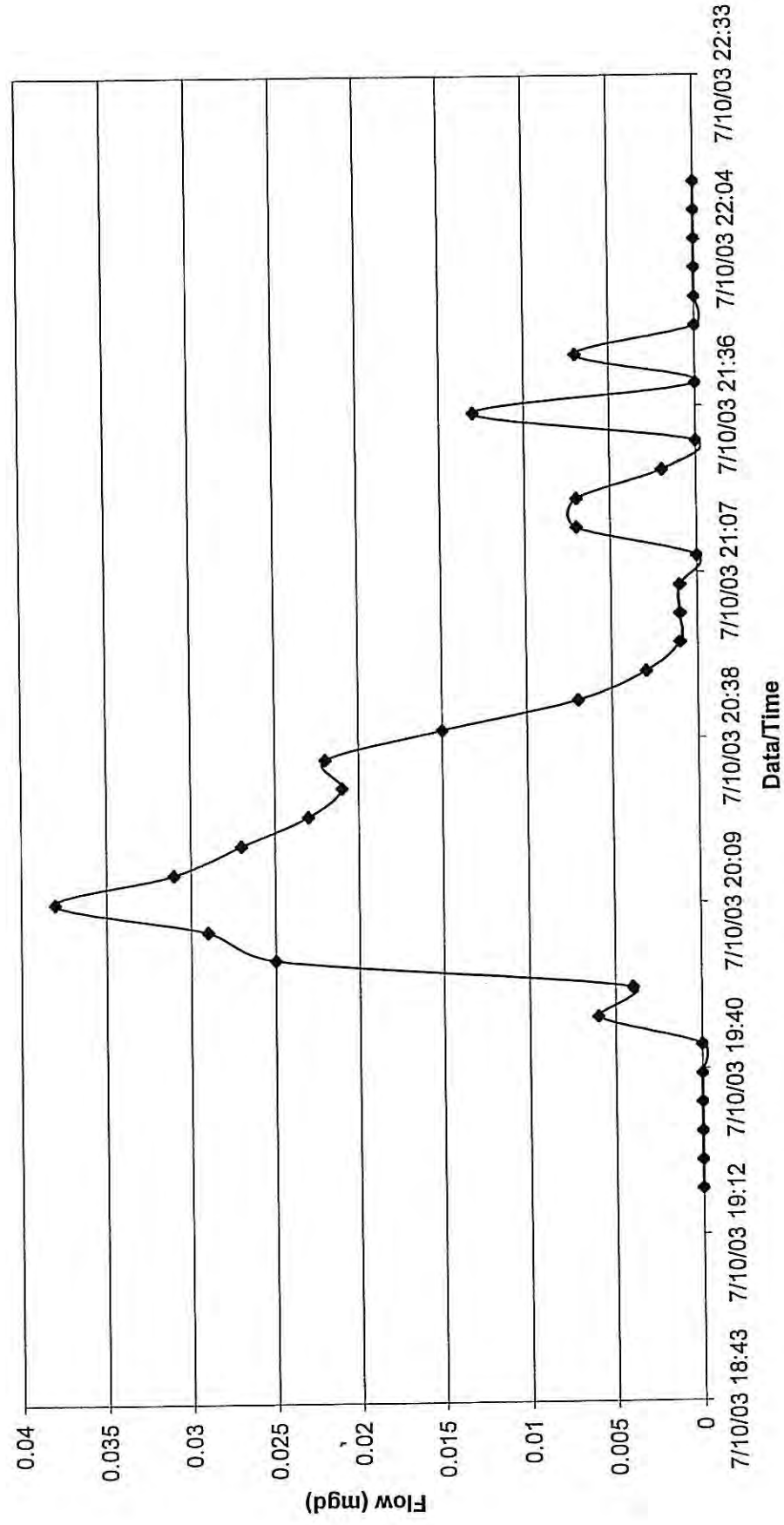
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
July 10, 2003



Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow South of Stephenson Avenue on 81st Street
 Wet Weather Flow
 July 10, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
LS-6 Cross Over Pipe
Wet Weather Flow
July 10, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: July 15, 2003

Peak Rainfall Intensity = 1 (inches/hour) = 0.41

Average Rainfall Intensity (inches/hour) = 0.25

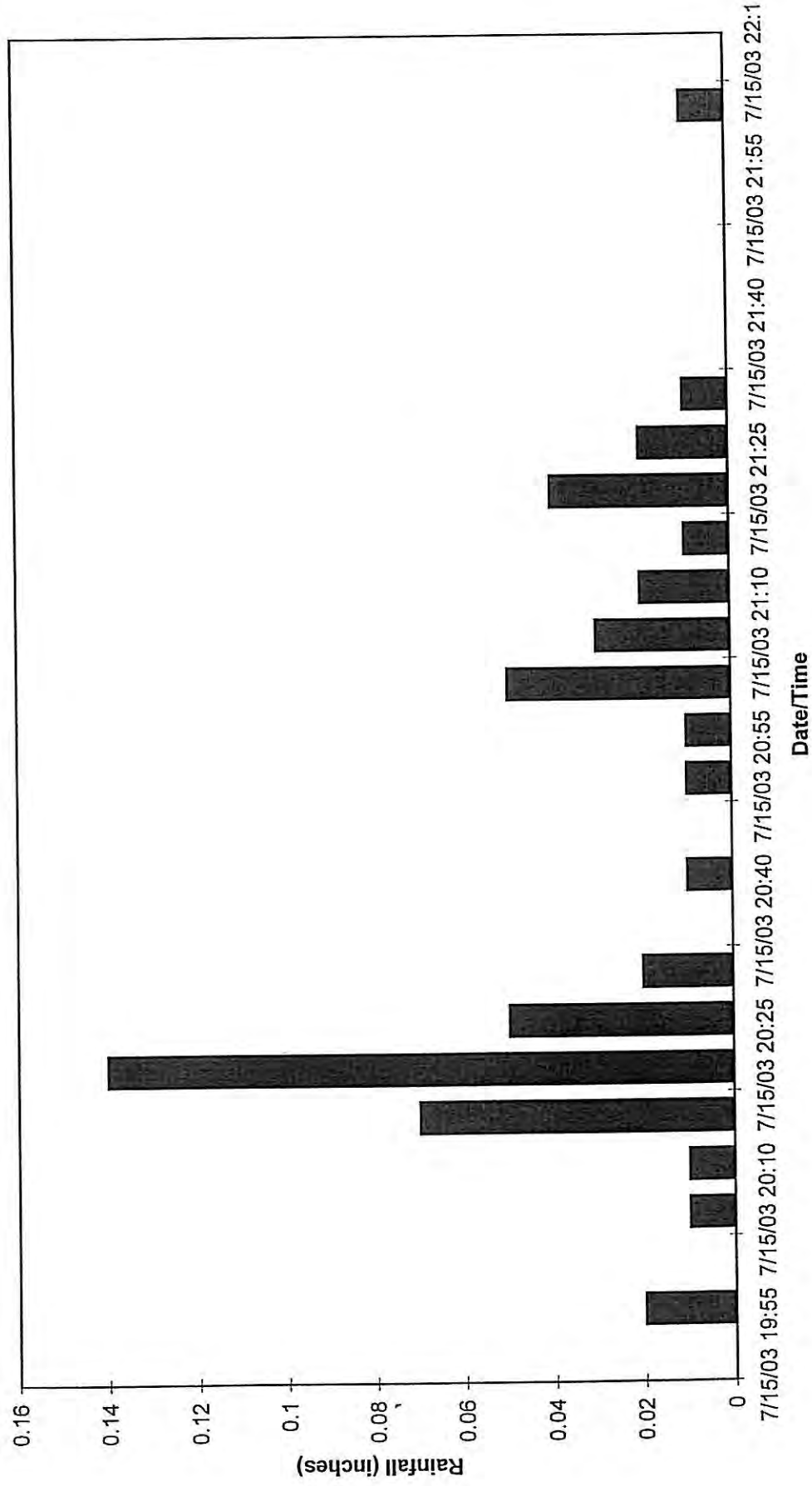
Total Rainfall (inches) = 0.54

Metered Subareas												
Meter Name	Detailed I/I Investigations, 1999-2001	Average DWF			Metered Average Peak WWF			Inflow				
		(mgd)	(gpm)		(mgd)	(gpm)		(mgd)	(gpm)			
MH-1												
93rd Street 1 MH south of Cayuga Creek	8,9	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.295	205	205	1.973	1370	1370	1.678	1165			
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.420	292	292	2.016	1400	1400	1.596	1108			
MH-4												
80th Street and Lindbergh Avenue	4	0.103	72	72	0.635	441	441	0.532	369			
81st Street, Flow, from North of Frontier Avenue	1,2,3,5,7,4	0.307	213	213	1.662	1154	1154	1.355	941			
* Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.568	394	394	2.617	1818	1818	2.049	1423			
73rd Street and Girard Avenue	8, MH-1,1,2,3,5,7,4,6	0.929	645		4.619	3208		3.690	2562			
MH-6												
66th Street and Frontier Avenue	All MH-6 Area	0.849	589		2.748	1908		1.899	1319			
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.735	510		2.366	1643		1.631	1133			
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0		0.0	0.0		0.0	0.0			

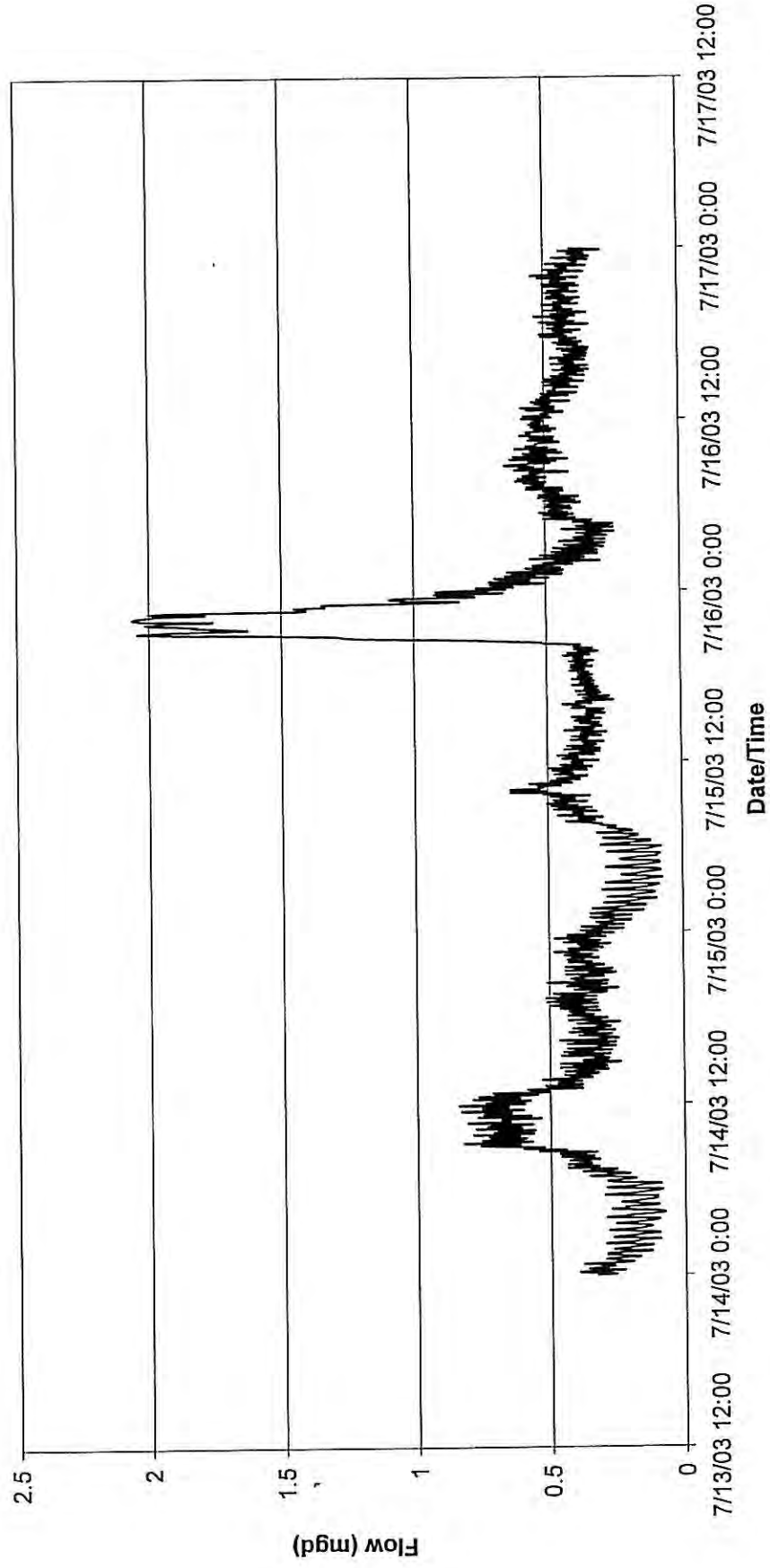
Areas	Metered Subareas		Average DWF		Average Peak WWF		Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
			No Data	No Data	No Data	No Data	No Data	No Data
MH-1	A	8,9	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.125	87	0.205	142	0.08	56
MH-4	D	4	0.103	72	0.635	441	0.532	369
	E	1,2,3,5,7	0.204	142	1.027	713	0.823	572
	F	8	0.054	38	0.340	236	0.286	198
	G	6	0.148	103	0.601	418	0.453	315
	H	1,2,3,4	0.114	79	0.382	265	0.268	186
MH-6	I	5,6,7,8,9,10,11,12	0.735	510	2.366	1643	1.631	1133

*Average DWF for Flow from East on Frontier Avenue has been adjusted due to malfunctioning of the probe.

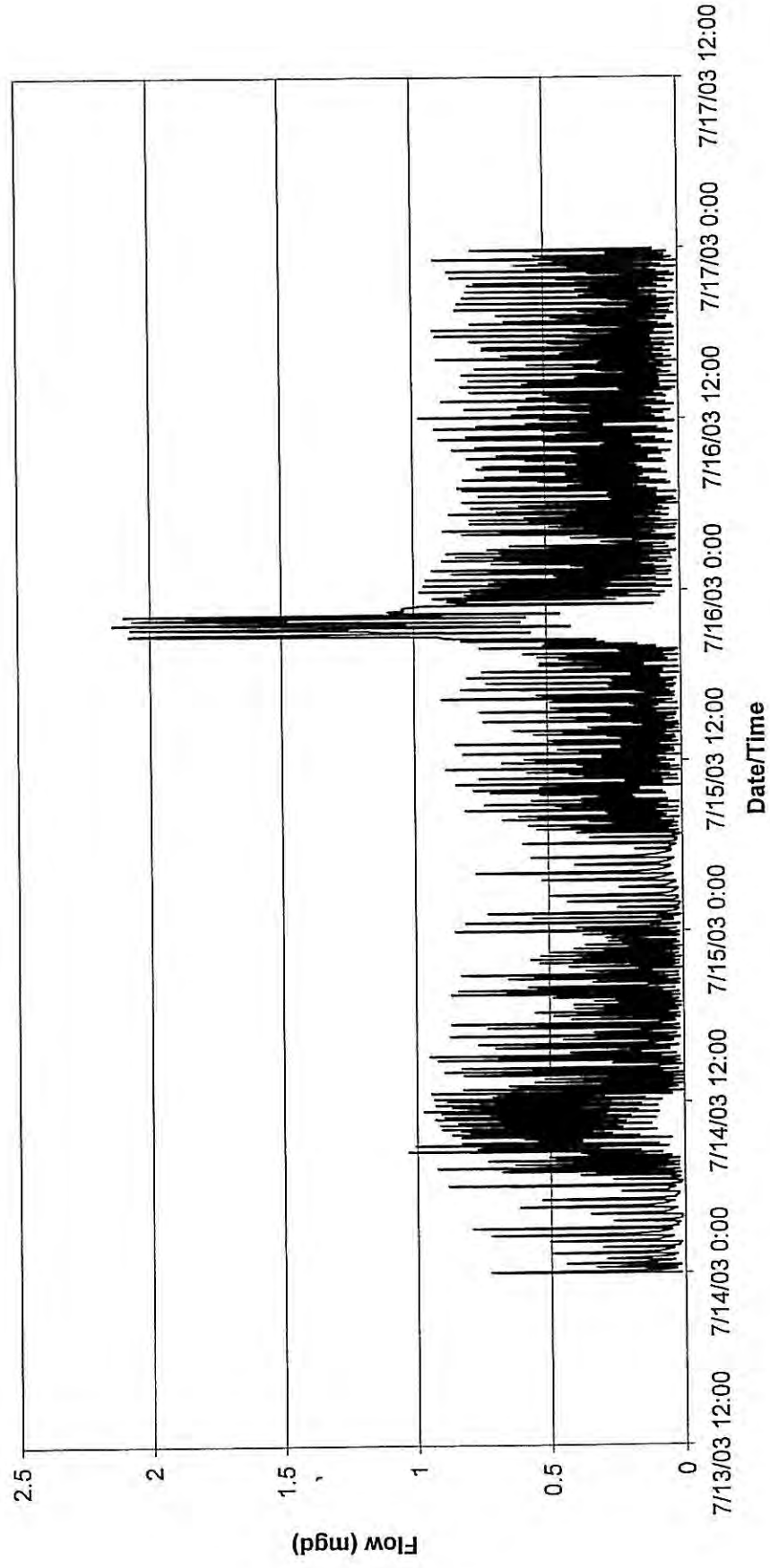
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - July 15, 2003



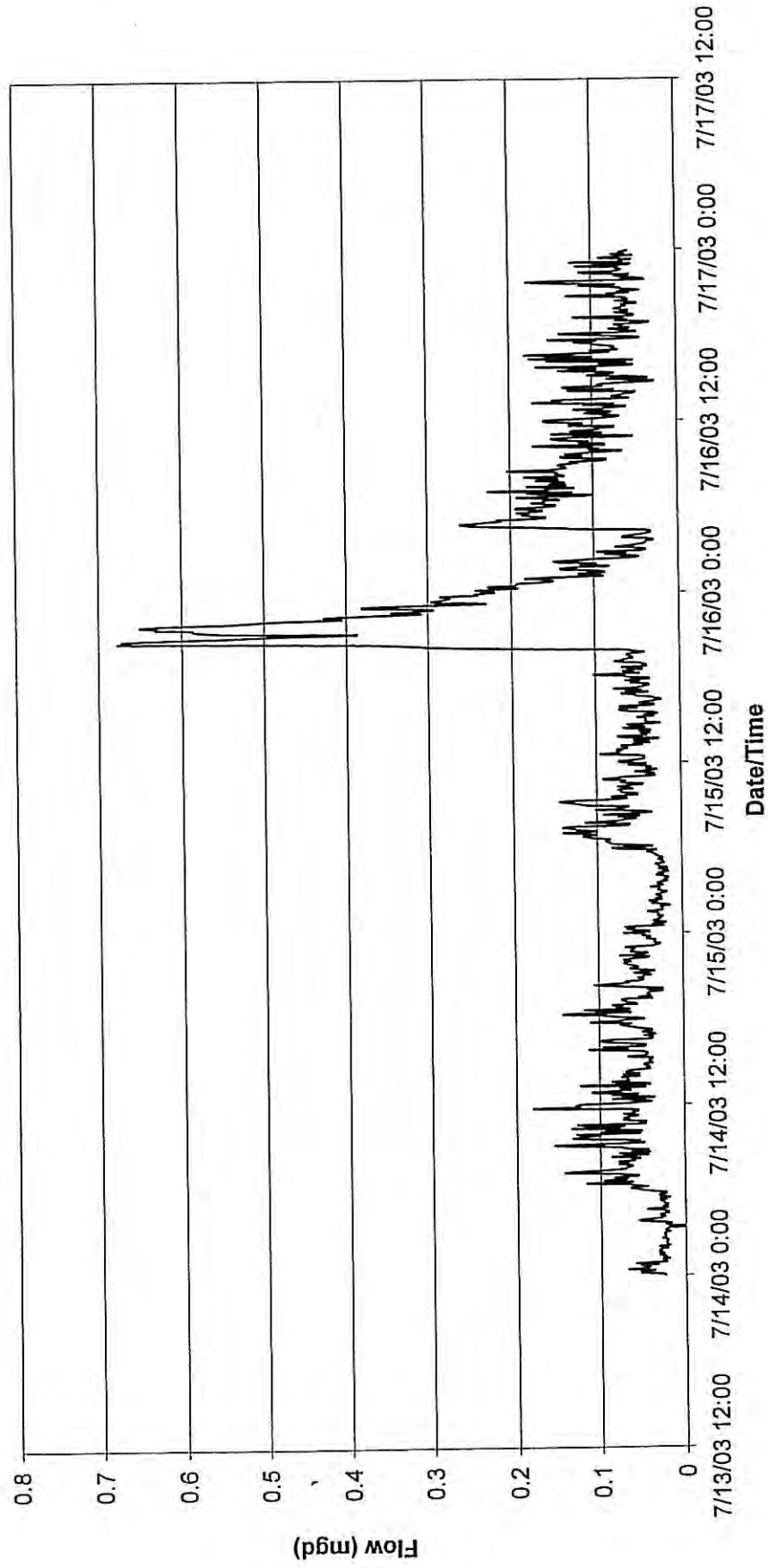
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
July 15, 2003



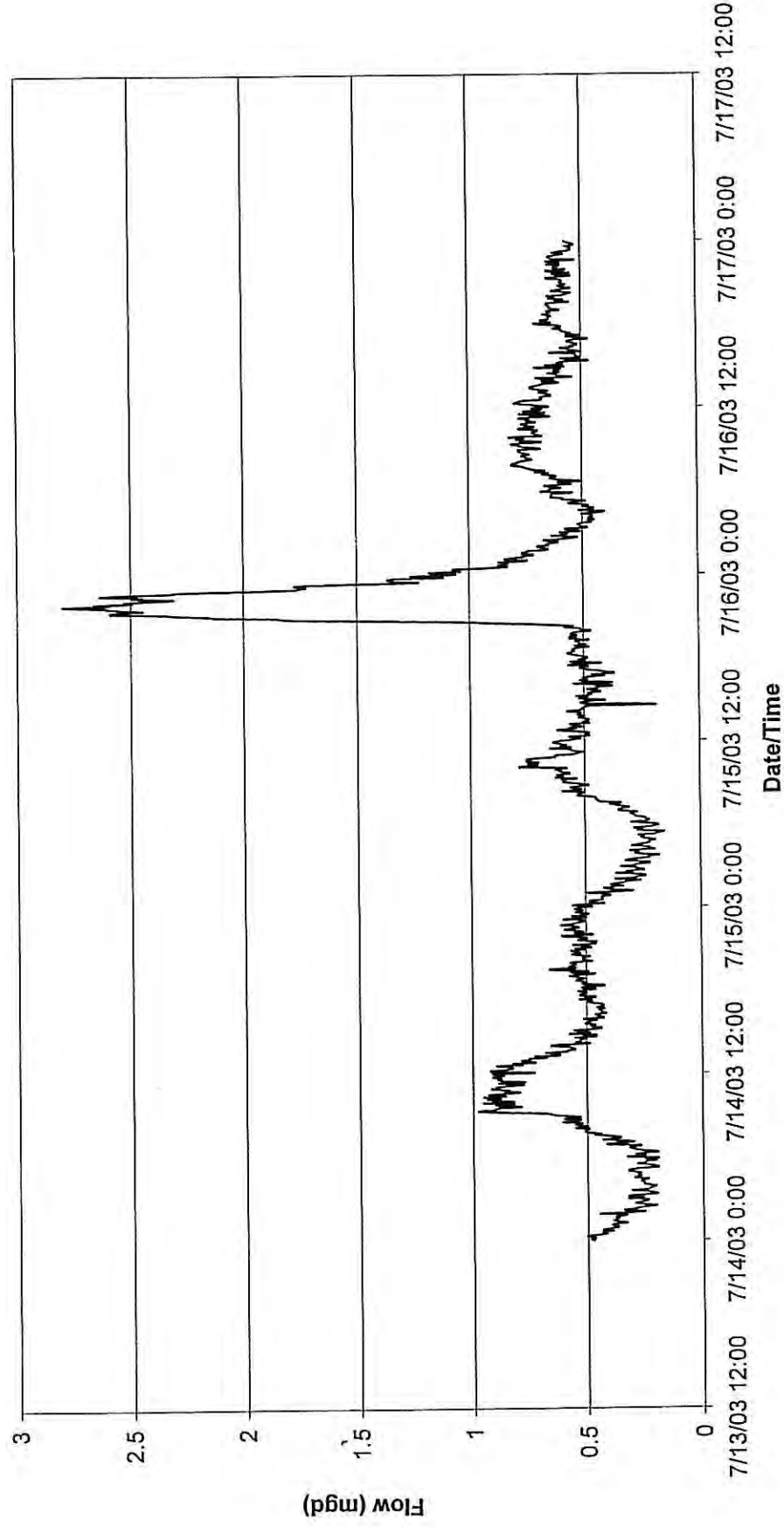
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
July 15, 2003



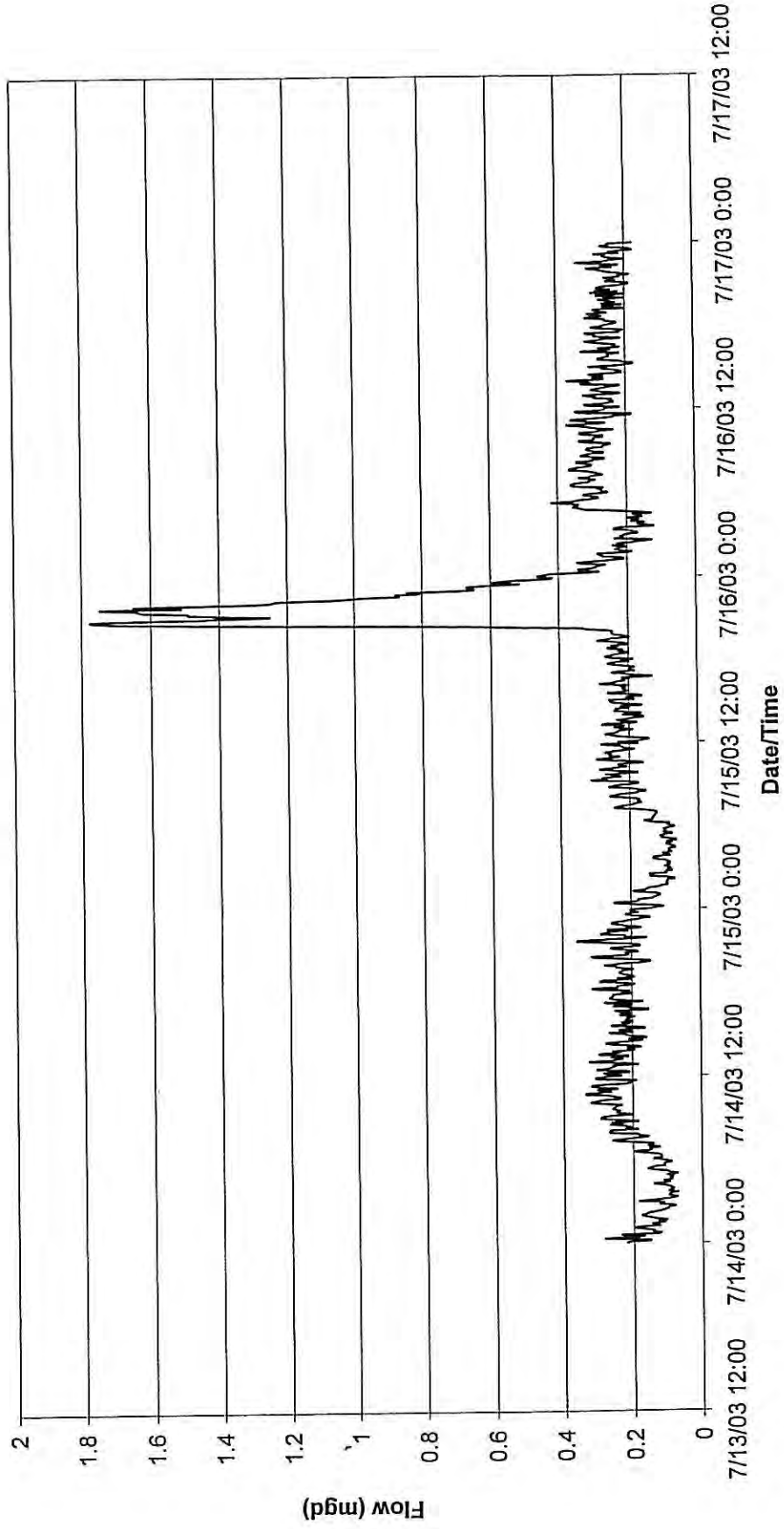
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
July 15, 2003



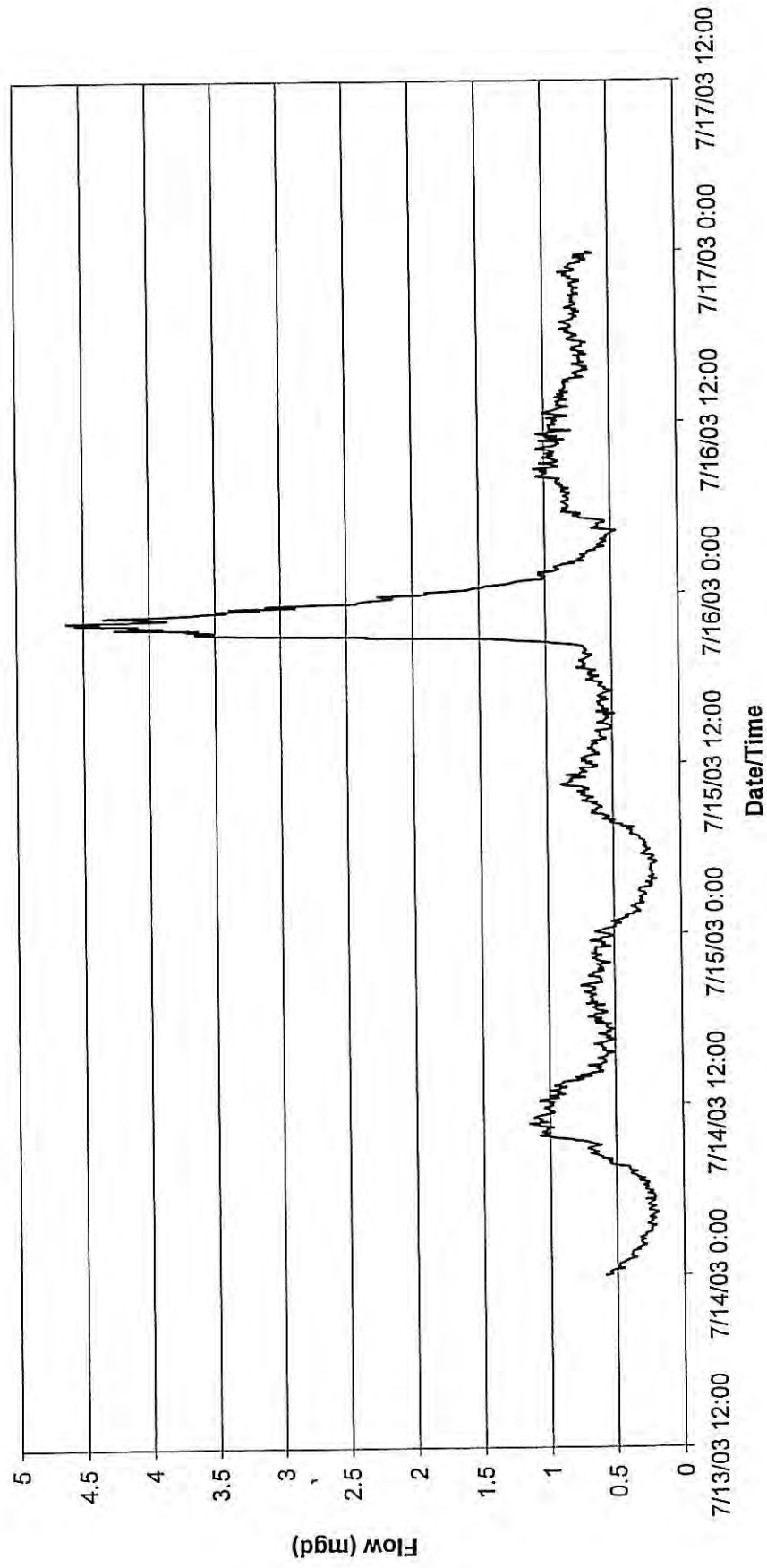
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
July 15, 2003



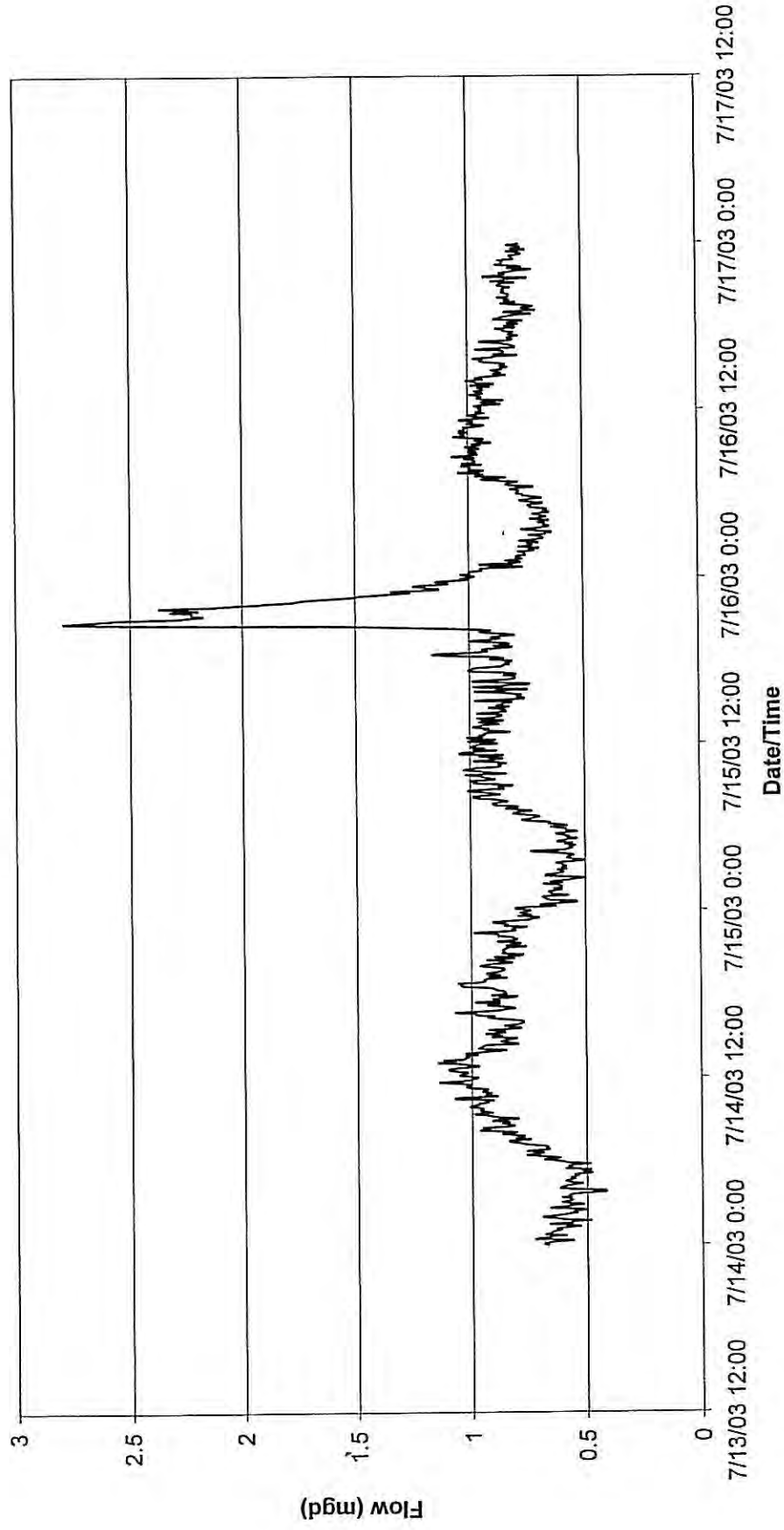
Niagara Falls Public Water Authority
 Post Rehabilitation Flow Monitoring Assessment
 Flow on 81st Street - North of Frontier Avenue
 Wet Weather Flow
 July 15, 2003



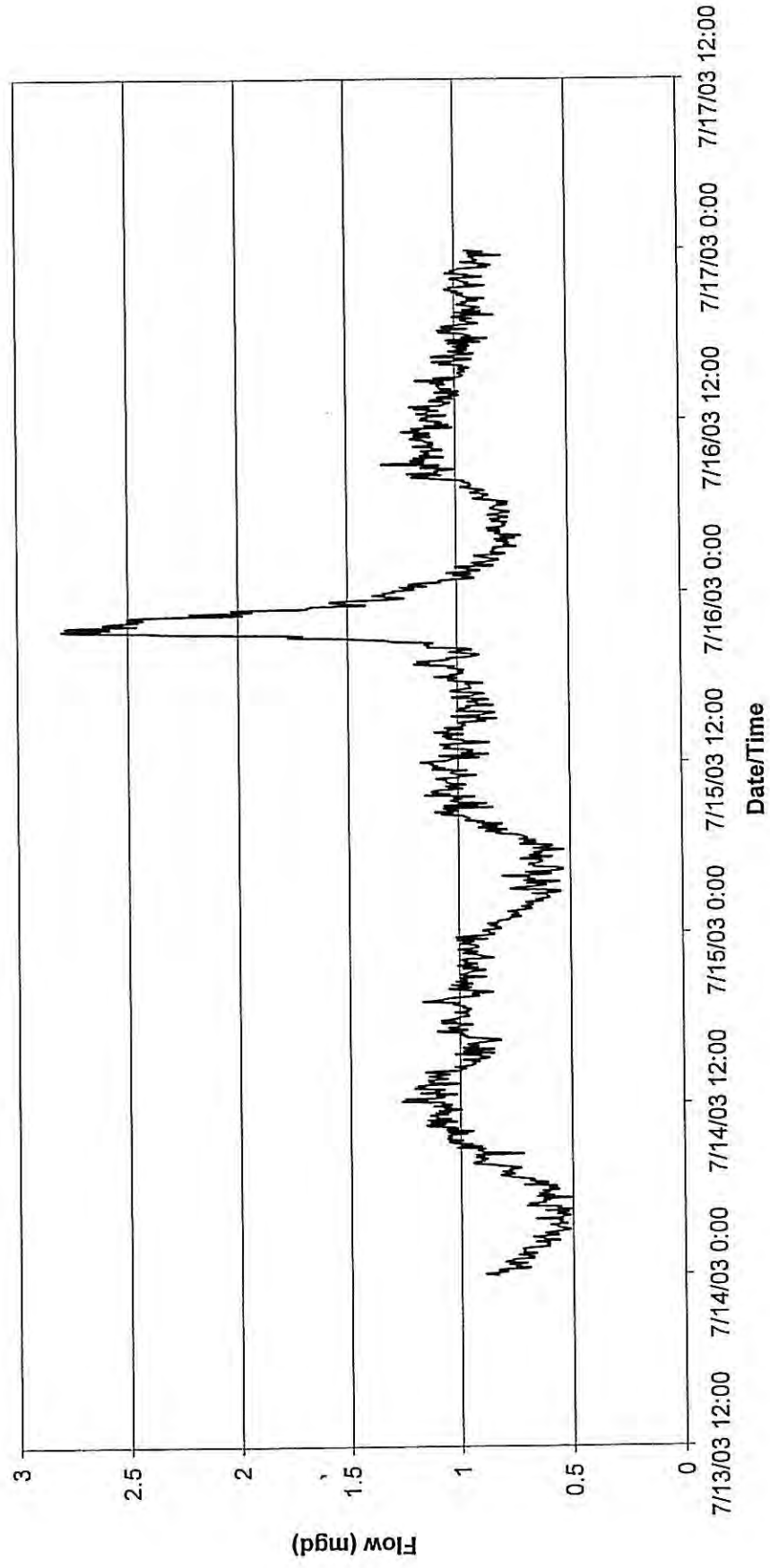
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
July 15, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - South of Stephenson Avenue
Wet Weather Flow
July 15, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
July 15, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Wet Weather Flow Calculations
Time Period: July 21, 2003

Peak Rainfall Intensity = i (inches/hour) = 0.41

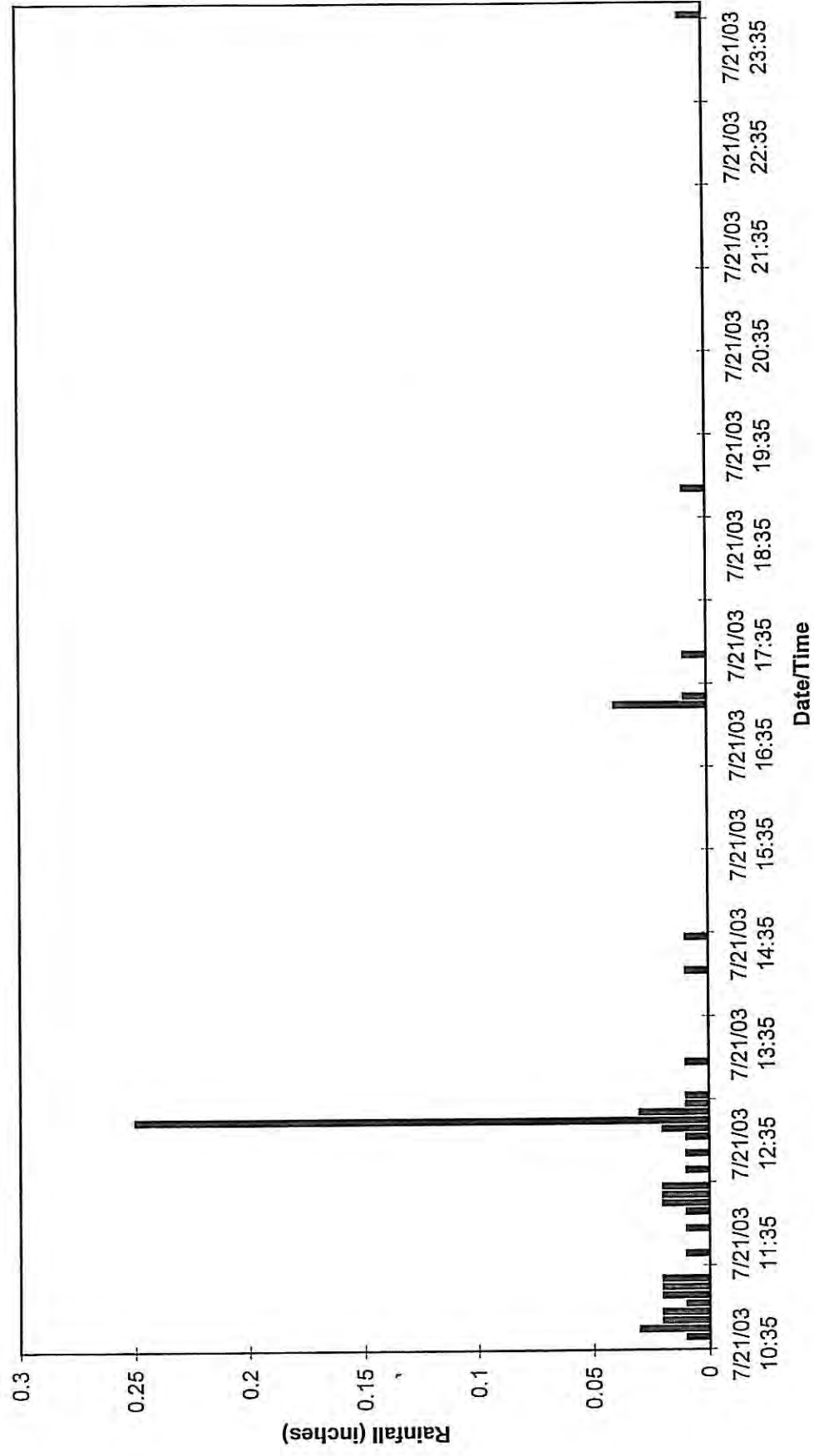
Average Rainfall Intensity (inches/hour) = 0.05

Total Rainfall (inches) = 0.7

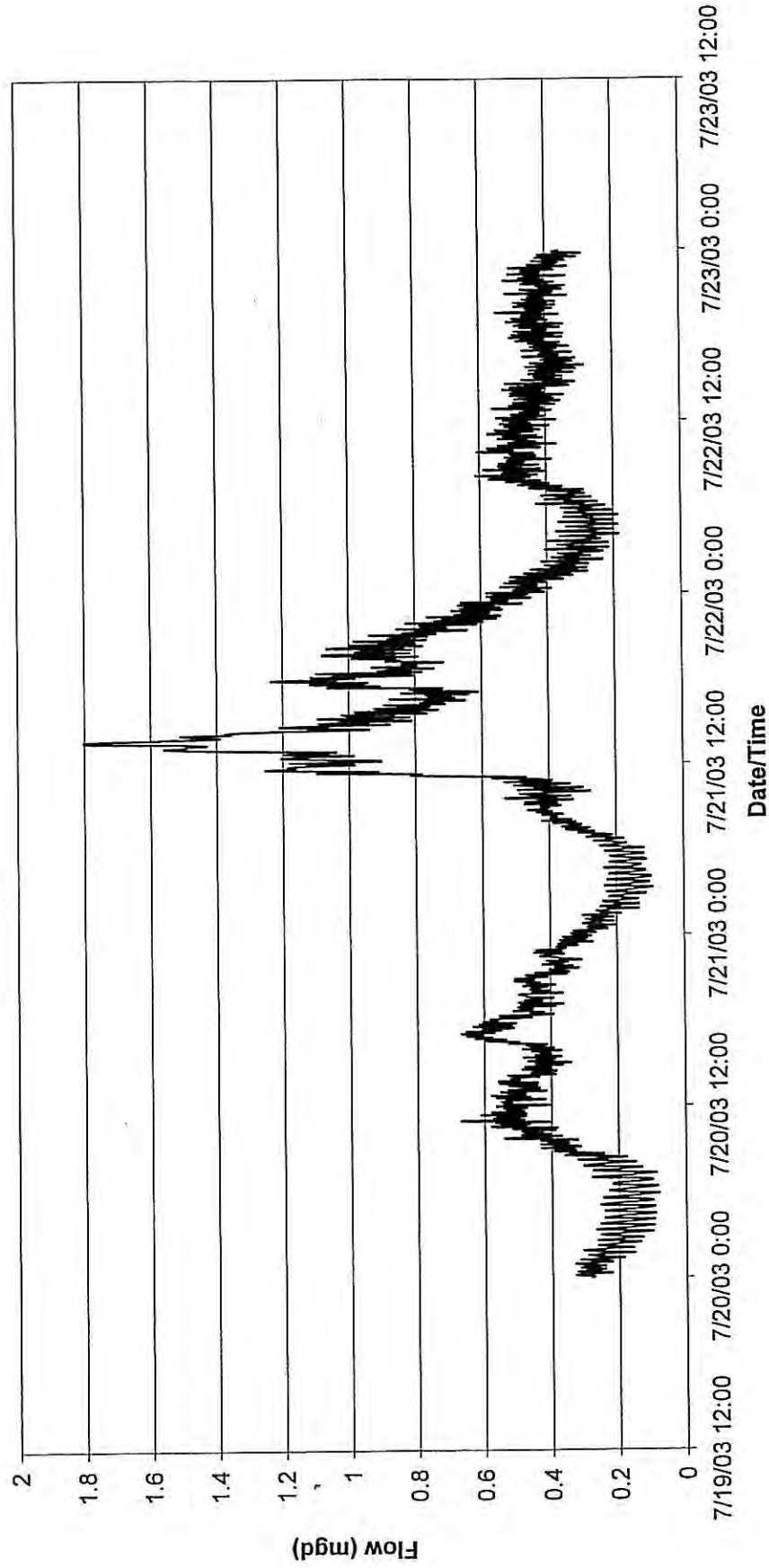
Metered Subarears							
Meter Name	Detailed I/I Investigations, 1999-2001	Average DWF		Metered Peak WWF		Inflow	
		(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1							
93rd Street 1 MH south of Cayuga Creek	8,9	No Data	No Data	No Data	No Data	No Data	No Data
91st Street and Luick Avenue	3,4,5,6,7,8,9	0.295	205	1.252	869	0.957	664
88th Street and Mang Avenue	1,2,3,4,5,6,7,8,9	0.420	292	1.578	1096	1.158	804
MH-4							
80th Street and Lindbergh Avenue	4	0.103	72	0.547	380	0.444	308
81st Street, Flow from North of Frontier Avenue	1,2,3,5,7,4	0.307	213	1.307	907	1.000	694
Frontier Avenue, Flow from East of 81st Street	6, MH- 1	0.568	394	2.227	1547	1.659	1152
*73rd Street and Girard Avenue	8, MH-1, 1,2,3,5,7,4,6	0.929	645	3.839	2666	2.910	2021
MH- 6							
66th Street and Frontier Avenue	All MH- 6 Area	0.849	589	2.748	1908	1.899	1319
81st Street, Flow from South of Stephenson Avenue	5,6,7,8,9,10,11,12	0.735	510	2.429	1687	1.694	1176
81st Street, Cross Over Pipe	Cross Over Pipe at LS-6/LS-1	0.0	0.0	0.0	0.0	0.0	0.0

Areas	Metered Subarears		Average DWF		Average Peak WWF		Inflow	
	Post Rehabilitation Flow Monitoring Assessment, 2003	Detailed I/I Investigations, 1999-2001	(mgd)	(gpm)	(mgd)	(gpm)	(mgd)	(gpm)
MH-1	A	8,9	No Data	No Data	No Data	No Data	No Data	No Data
	B	3,4,5,6,7	No Data	No Data	No Data	No Data	No Data	No Data
	C	1,2	0.125	87	0.327	227	0.202	140
MH-4	D	4	0.103	72	0.547	380	0.444	308
	E	1,2,3,5,7	0.204	142	0.760	527	0.556	386
	F	8	0.054	38	0.305	212	0.185	128
	G	6	0.148	103	0.649	451	0.501	348
	H	1,2,3,4	0.114	79	0.319	222	0.205	143
MH-6	I	5,6,7,8,9,10,11,12	0.735	510	2.429	1687	1.694	1176

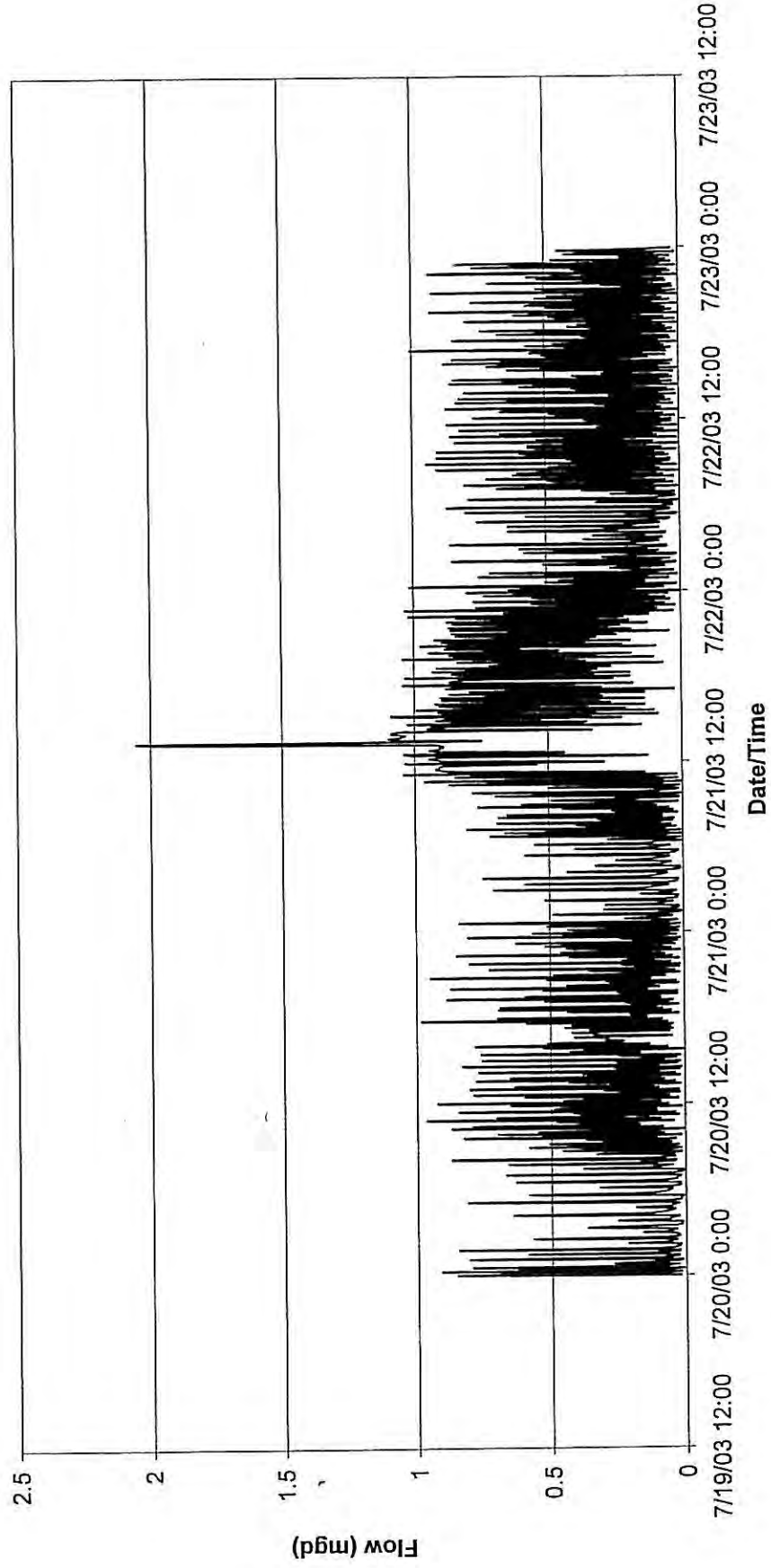
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Rainfall Chart - July 21, 2003



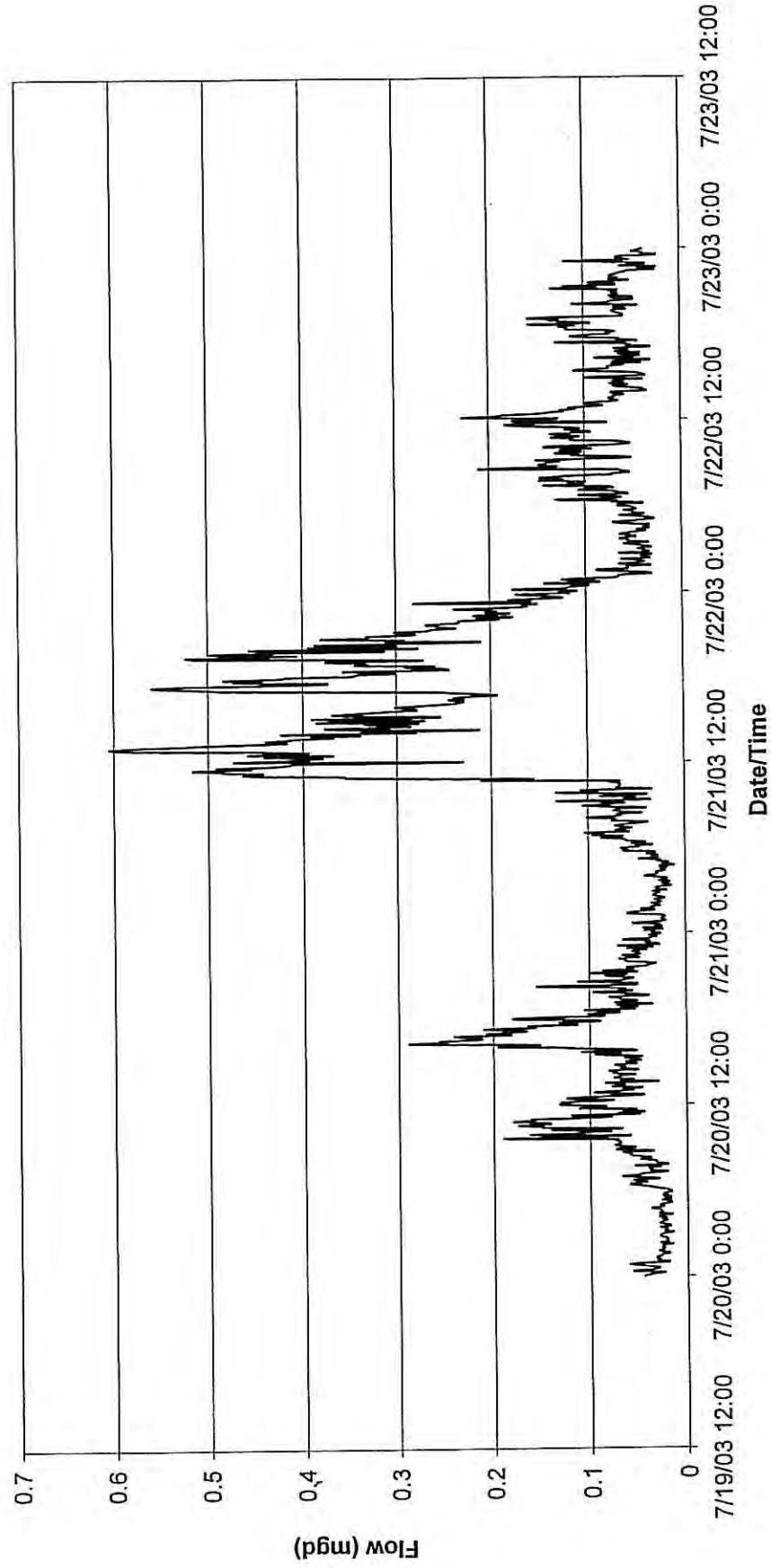
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
88th Street and Mang Avenue
Flow on Mang Avenue
Wet Weather Flow
July 21, 2003



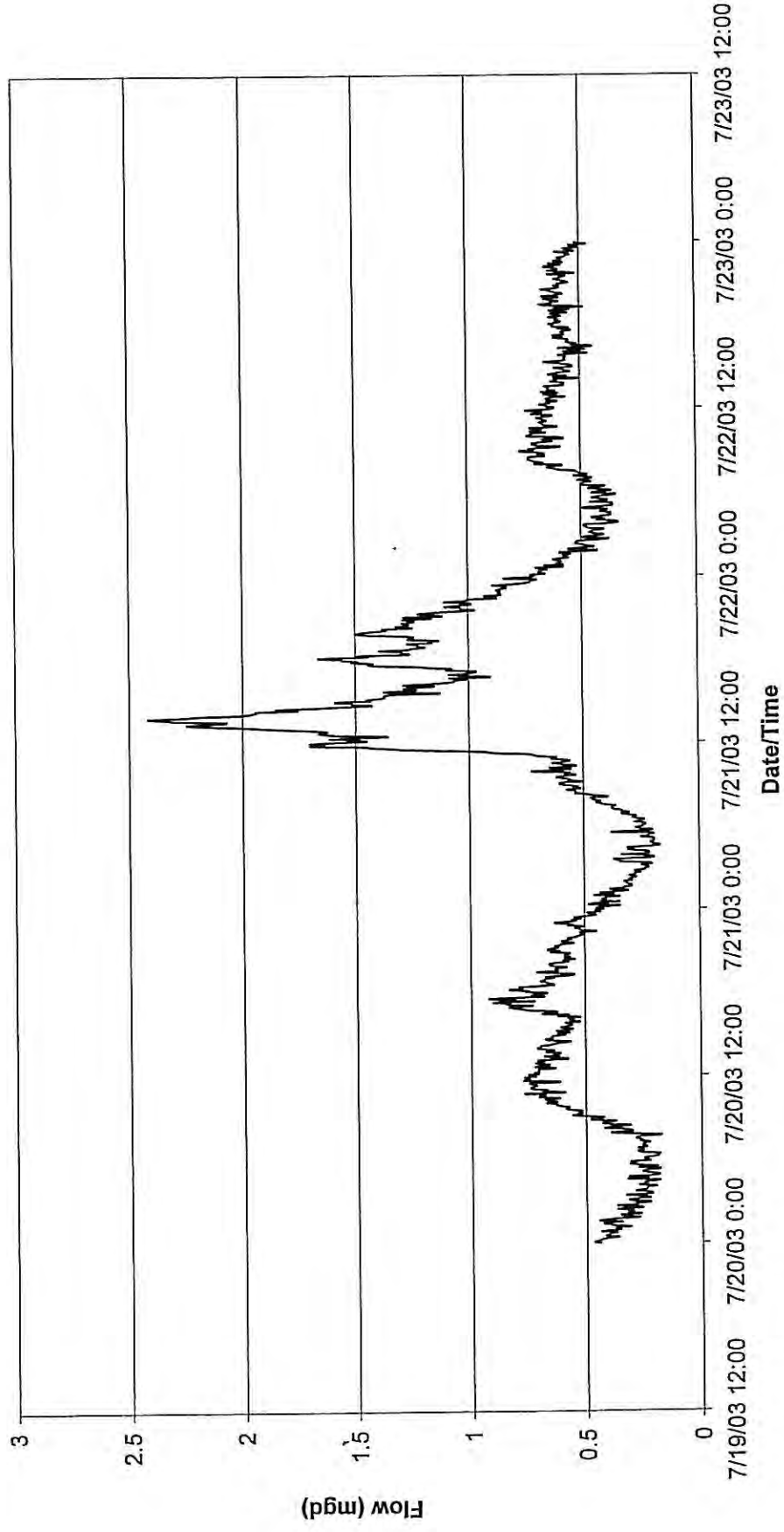
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
91st Street and Luick Avenue
Flow on Luick Avenue
Wet Weather Flow
July 21, 2003



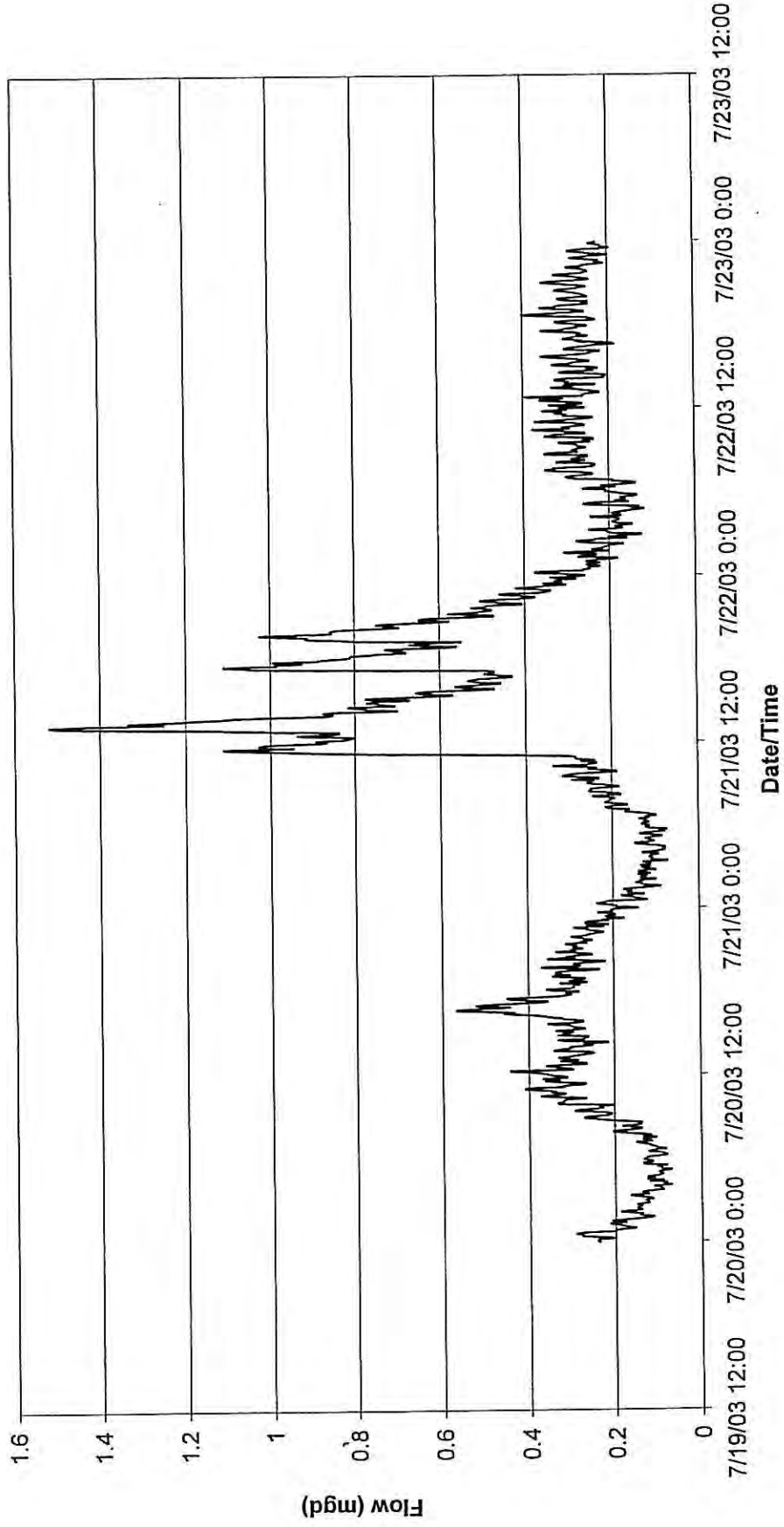
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
80th Street and Lindbergh Avenue
Flow on Lindbergh Avenue
Wet Weather Flow
July 21, 2003



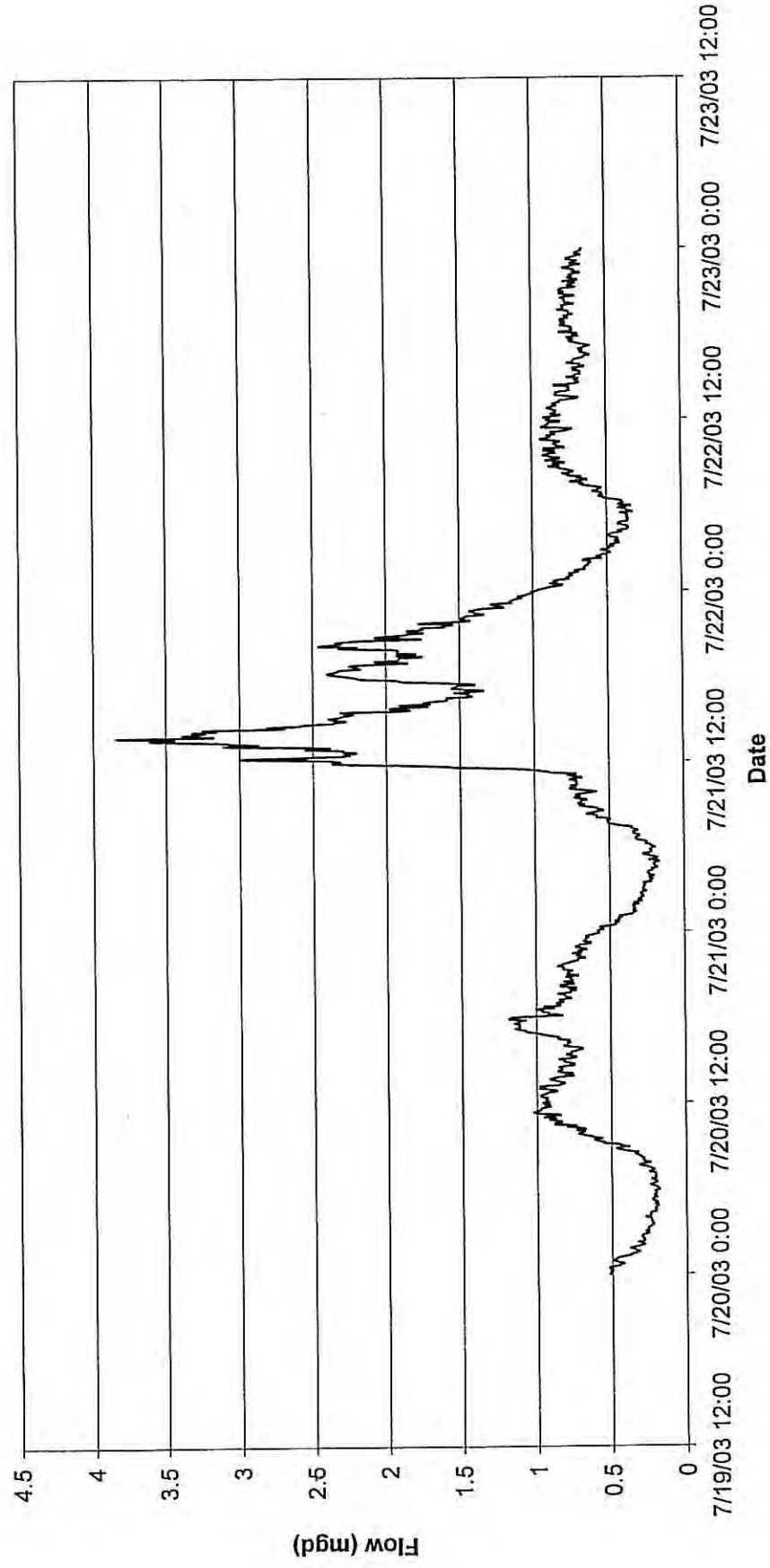
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on Frontier Avenue - East of 81st Street
Wet Weather Flow
July 21, 2003



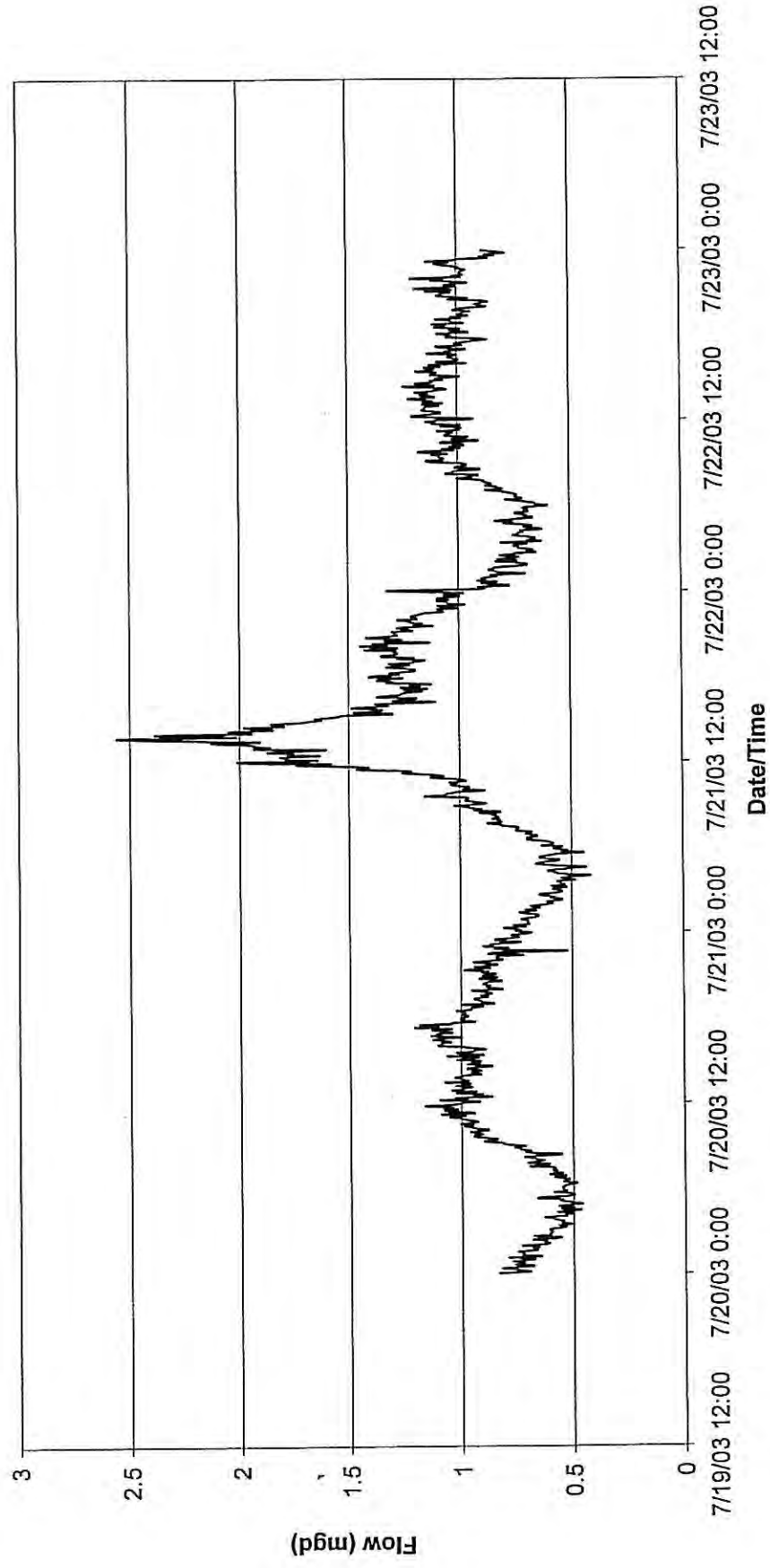
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - North of Frontier Avenue
Wet Weather Flow
July 21, 2003



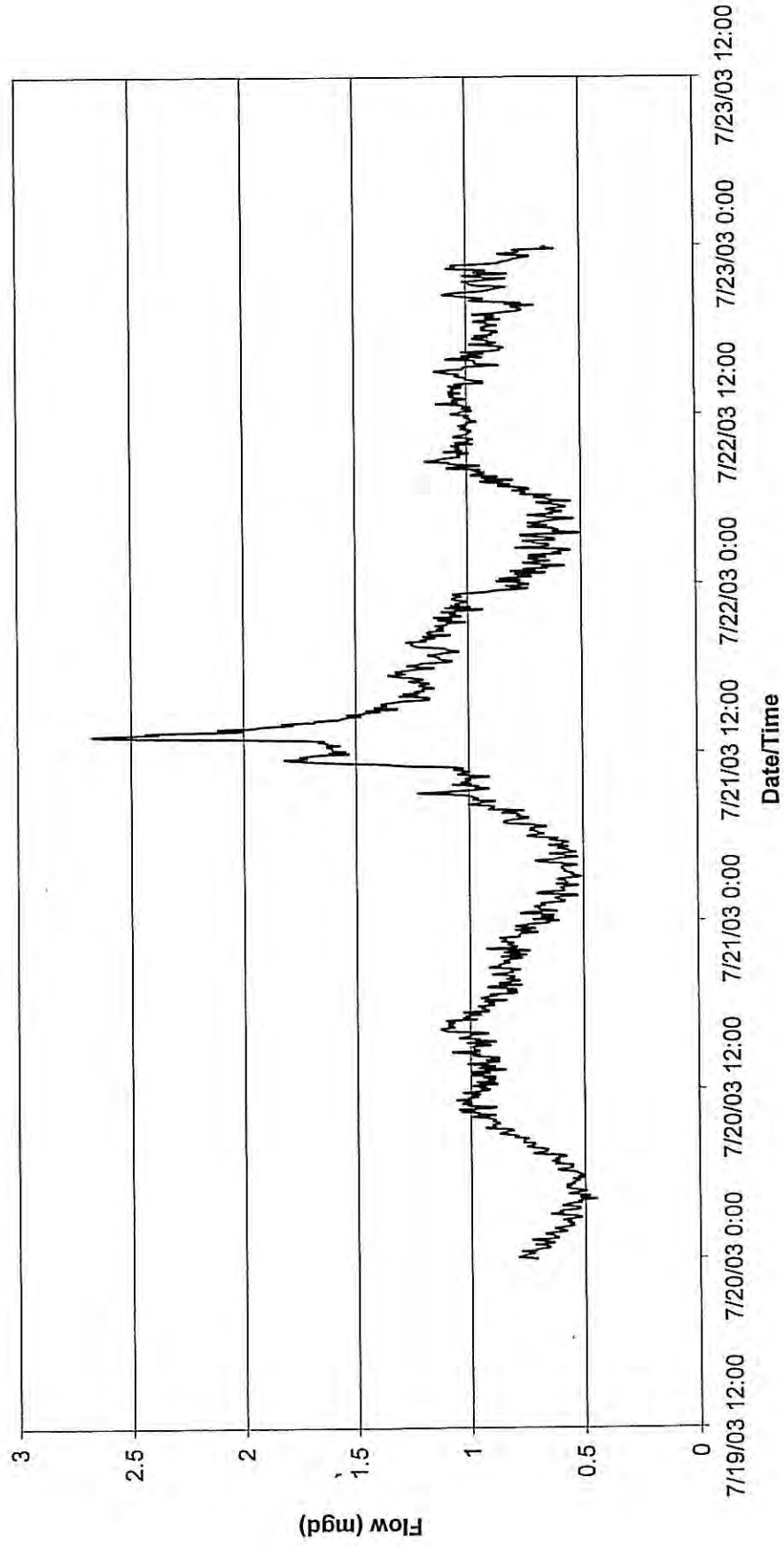
Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
73rd Street and Girard Avenue
Flow on Girard Avenue
Wet Weather Flow
July 21, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
66th Street and Frontier Avenue
Flow on 66th Street
Wet Weather Flow
July 21, 2003



Niagara Falls Public Water Authority
Post Rehabilitation Flow Monitoring Assessment
Flow on 81st Street - South of Stephenson Avenue
Wet Weather Flow
July 21, 2003



ATTACHMENT B.3

NIAGARA FALLS PUBLIC WATER AUTHORITY

POST REHABILITATION FLOW MONITORING ASSESSMENT

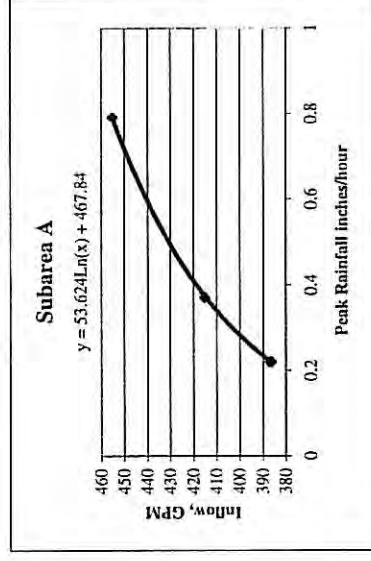
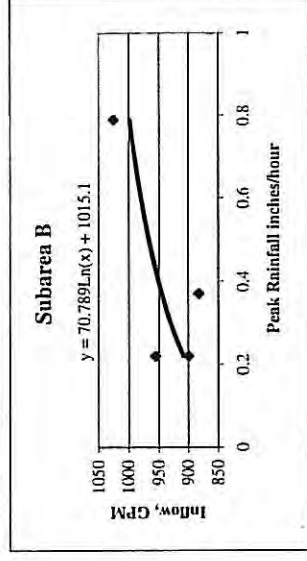
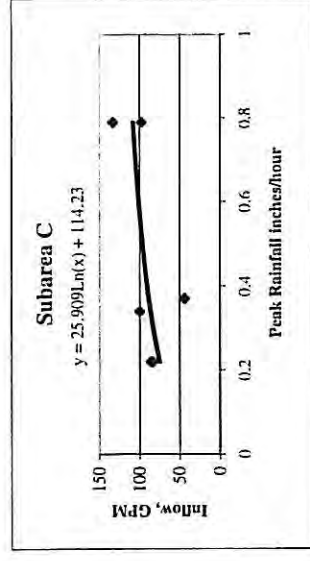
I/I REDUCTION ANALYSIS

**Niagara Falls Water Board
Post-Rehabilitation Flow Monitoring
Subsystem Capacity and SSO Analysis**

Sanitary Sewer Subsystem Physical Component (Trunk Sewer or Lift Station)	Key Subsystem Component Data and Metrics									
	Previous I/I Investigation Tributary Subareas	2003 Tributary Subareas	Historical SSOs in Subsystem/Component	2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	Trunk Sewer Diameter	Trunk Sewer or Pump Station Capacity, mgd	2003 Peak One-Year Flow Estimate, mgd	Ratio of Peak One-year Flow to Capacity	2003 WWF:DFW Ratio	Priority of Subsystem for Rehabilitation based on Capacity/SSOs
MH-1 Area										
93rd Street, North of Luick, South of Cayuga Creek	8,9	A	yes	no	14" CIP Lined	1.65	0.79	48%	4.3	low
Colvin/Luick Avenue East of 91st Street	4,5,6,7	B	yes	yes	15" VCP	1.82	1.56	86%	8.7	high
Lift Station 4 (Luick Ave.)	3,4,5,6,7,8,9	A,B	yes	yes	NA	2.32	2.35	101%	NA	NA
Pasadena Avenue	1,2,3,4,5, 6,7,8,9	A,B,C	no	no	18" VCP	2.68	2.23	83%	4.8	low (for Subarea C)
MH-4 Area										
Lindbergh Avenue East of 81st Street	4	D	yes	yes	10"	0.71	0.70	99%	4.7	med
81st Street North of Frontier Avenue	1,2,3,4,5,7	D, E	yes	yes	15"	2.00	1.82	91%	5.2	high (for Subarea E)
Frontier Ave. East of 81st Street	6, MH-1	A,B,C,G	yes	yes	20" VCP	3.20	2.80	88%	4.7	med (for Subarea G)
Lift Station 6 (Frontier Ave.)	1,2,3,4,5, 6,7,MH-1	A,B,C, D,E,G	yes	yes	NA	4.50	4.62	103%	NA	NA
Frontier Ave. d/s of LS-6	MH-1, MH-4	A,B,C,D, E,F,G	no	no	24" RCP/VCP	5.30	5.20	98%	4.8	low
MH-6 Area										
81st Street South of Stephenson Ave.	Cayuga Island 5,6,7,8,9, 10,11,12	I	yes	no	18" VCP	2.70	2.59	96%	3.19	low
Lift Station 1 (Stephenson Ave.)	Cayuga Island 5,6,7,8,9, 10,11,12 Crossover Pipe	I	yes	no	NA	4.30	2.59	60%	NA	low
Stephenson Avenue d/s of LS-1	Cayuga Island 5,6,7,8,9, 10,11,12 Crossover Pipe	I	yes	no	21" PVC/ 20" VCP	3.10	2.59	83%	3.19	low
66th Street South of Frontier Ave.	MH-6, Crossover Pipe	H,I	no	no	24"	3.30	2.99	91%	2.95	low

Niagara Falls Water Board
Sanitary Sewer Post Rehabilitation
Flow Monitoring Program
MH-1 Area Peak Flow Reduction Summary

Pre-Rehabilitation Peak I/I Estimated 0.4 inches/hour Rainfall		2003 Post Rehabilitation I/I Estimates				
Metered Subarea	Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea	2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, Q, GPM	Peak Hourly Rainfall Intensity, i, inches/hour	Total Rainfall, inches
MH-1 Area						
C	1	0.50	348	83	0.22	0.46
	2	0.23	161	85	0.22	0.55
				44	0.37	0.37
				133	0.79	0.80
				99	0.34	0.58
B				97	0.79	1.57
				954	0.22	0.46
				899	0.22	0.55
				882	0.37	0.37
				1024	0.79	0.80
A				nd	0.34	0.58
				nd	0.79	1.57
				386	0.22	0.46
				387	0.22	0.55
				415	0.37	0.37
				455	0.79	0.80
				nd	0.34	0.58
				nd	0.79	1.57
Total MH-1 Area		3.41	2,369	2,369	1,468	



2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	A	B	C	MH-1 Area at Mang St. East of 88th	MH-1 Area I/I Reduction 2001 to 2003:
Average DWF, mgd	0.18	0.18	0.10	0.47	
I/I at 0.4 inches/hour, mgd	0.60	1.38	0.13	2.11	901 gpm
Estimated Peak Flow, mgd	0.79	1.56	0.24	2.58	1.30 mgd
Ratio of WWF:DWF	4.3	8.7	2.2	5.5	38 percent

2.11

Note: None of the wet weather events included in this study/analysis resulted in SSOs in the MH-1 Area.

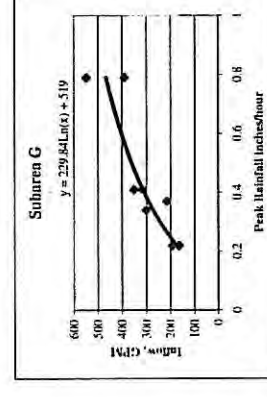
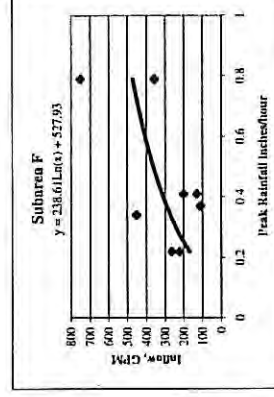
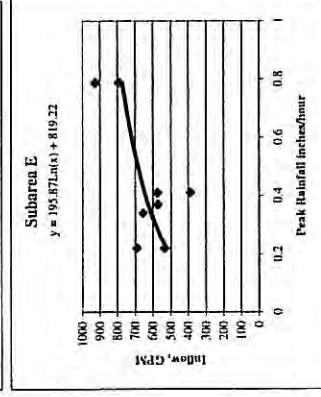
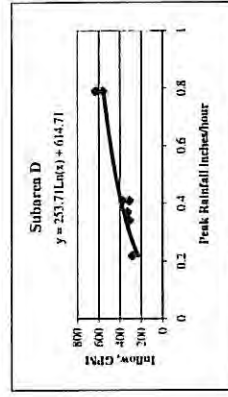
Niagara Falls Water Board
Sanitary Sewer Post-Rehabilitation
Flow Monitoring Program
MH-4 Area Peak Flow Reduction Summary

Metered Subarea	Pre-Rehabilitation Peak I/I Estimated		2003 Post Rehabilitation I/I Estimates			
	Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea	2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, GPM	Peak Hourly Rainfall Intensity, inches/hour	Total Rainfall, Inches
MH-4 Area						
D	4	1.39	965	276	0.22	0.46
				280	0.22	0.55
				326	0.37	0.37
				623	0.79	0.80
			382	308	0.34	0.58
				562	0.79	1.57
				369	0.41	0.54
				308	0.41	0.70
				531	0.22	0.46
				688	0.22	0.55
				570	0.37	0.37
			640	925	0.79	0.80
				651	0.34	0.58
				790	0.79	1.57
				572	0.41	0.54
				386	0.41	0.70
				217	0.22	0.46
				261	0.22	0.55
				109	0.37	0.37
				750	0.79	0.80
			309	451	0.34	0.58
				354	0.79	1.57
				198	0.41	0.54
				128	0.41	0.70
				162	0.22	0.46
				190	0.22	0.55
				214	0.37	0.37
				388	0.79	0.80
			308	298	0.34	0.58
				546	0.79	1.57
				315	0.41	0.54
				348	0.41	0.70
Total MH-4 Area			2.05	1,424	3.646	1.640

2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	D	E	F	G	MH-4 Area at Girard Ave. West of 73rd	MH-4 Area I/I Reduction 2001 to 2003:
Average DWF, mgd	0.15	0.20	0.13	0.13	0.61	
I/I at 0.4 inches/hour, mgd	0.55	0.92	0.45	0.44	2.36	2,006 gpm
Estimated Peak Flow, mgd	0.70	1.12	0.58	0.57	2.97	2,89 mgd
Ratio of WWF/DWF	4.7	5.6	4.4	4.4	4.9	55 percent
I/I Reduction	0.6					

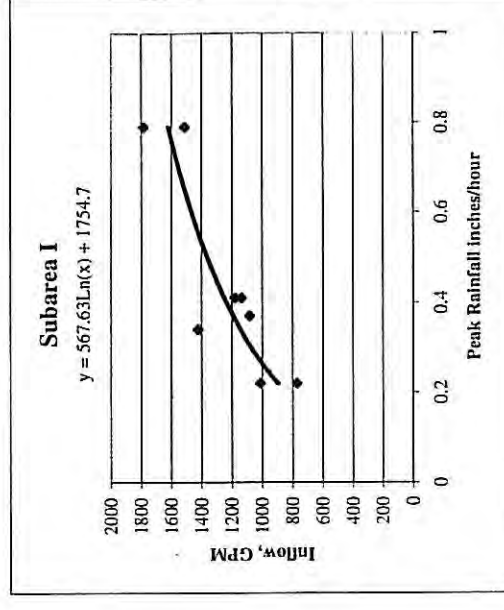
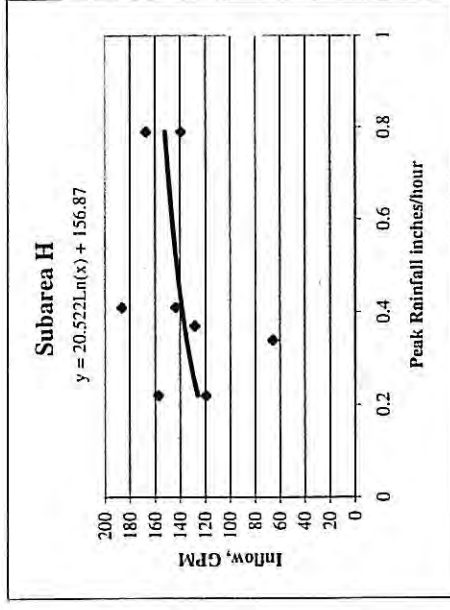
Note: The wet weather events shown in BOLD contributed to SSOs in the MH-4 Area on the dates noted.



Niagara Falls Water Board
Sanitary Sewer Post Rehabilitation
Flow Monitoring Program

MH-6 Area Peak Flow Reduction Summary

Metered Subarea	Pre-Rehabilitation Peak I/I Estimated 0.4 inches/hour Rainfall		2003 Post Rehabilitation I/I Estimates			
	Peak I/I, MGD by Subarea	Peak I/I, GPM Pre-Rehabilitation Flow by Subarea	2003 I/I Estimate at 0.4 inches/hour Rainfall	2003 Metered Inflow, GPM	Peak Hourly Rainfall Intensity, inches/hour	Total Rainfall, inches Date of Rainfall
MH-6 Area						
H	0.47	326	138	119 157 128 167 65 139 186 143	0.22 0.22 0.37 0.79 0.34 0.79 0.41 0.41	0.46 0.55 0.37 0.80 0.58 1.57 0.54 0.7 4/6/2003 5/2/2003 5/6/2003 5/11/2003 5/20/2003 7/10/2003 7/15/2003 7/21/2003
I	0.84 0.15 0.20 0.04 0.54 0.44	585 101 136 25 376 303	1,527	766 1007 1076 1780 1418 1506 1133 1176	0.22 0.22 0.37 0.79 0.34 0.79 0.41 0.41	0.46 0.55 0.37 0.80 0.58 1.57 0.54 0.7 4/6/2003 5/2/2003 5/6/2003 5/11/2003 5/20/2003 7/10/2003 7/15/2003 7/21/2003
Total MH-6 Area w/ Cayuga Island	2.67	1,853	1,373			



2003 Peak Flow Estimate at 0.4 inches/hour Rainfall

	H	I	MH-6 Area 66th South of Frontier Ave.	MH-6 Area I/I Reduction 2001 to 2003;
Average DWF, mgd	0.20	0.81	1.01	
I/I at 0.4 inches/hour, mgd	0.20	1.78	1.98	
Estimated Peak Flow, mgd	0.40	2.59	2.99	480 gpm
Ratio of WWF:DWF	2.0	3.2	3.0	0.69 mgd 26 percent

Note: None of the wet weather events included in this study/analysis resulted in SSOs in the MH-6 Area.

Niagara Falls Water Board
LaSalle Area SSO Mitigation Analysis
Subarea A

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abatemant Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.451	Grouted one interconnection location (1 of 3) See Table A-9	90%	0.406	0.342	0.109	0.045	\$20,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.087	Completed 53 of 53 MHs	90%	0.078	0.078	0.009	0.009	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.112		60%	0.067	0.000	0.112	0.045	\$15,759
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.097	Completed 24 of 39 MHs See Table A-1	85%	0.082	0.058	0.039	0.015	\$34,260
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.009		65%	0.006	0.000	0.009	0.003	\$54,400
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.016	Completed 1 of 6 locations See Table A-4	80%	0.013	0.002	0.014	0.003	\$117,400
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.008		65%	0.005	0.000	0.008	0.003	\$2,300
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	NA		NA	NA	0	NA	NA	NA
Unidentified Sources:	NA	0.30		NA	0	0	0.3	0.3	NA
Total		1.080			0.658	0.480	0.600	0.422	\$244,119

Pre-Rehabilitation Peak I/I from Previous Study, mgd	1.08
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.48
Assumed I/I Reduction from Implemented Abatement Measures, %	45%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.60
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.60
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.42
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	0.61

Sanitary Sewer Subsystem Physical Component	93rd Street, North of Luick, South of Cayuga Creek
Previous I/I Investigation Tributary Subareas	8, 9
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	no
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	low
Trunk Sewer Diameter	14" CIP lined
Trunk Sewer or Pump Station Capacity, mgd	1.65
2003 Peak One-Year Flow Estimate, mgd	0.79
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.60
Ratio of Peak One-year Flow to Capacity	0.48
2003 WWF:DFW Ratio	4.30

<u>2003 SSO Summary for Subarea A:</u>
89th/93rd & Cayuga0 hours
<u>2002 SSO Summary for Subarea A:</u>
89th/93rd & Cayuga23.6 hours

Niagara Falls Water Board
LaSalle Area SSO Mitigation Analysis
Subarea B

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abateman t Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.417	Completed 2 of 11 locations.	90%	0.375	0.085	0.332	0.042	\$110,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.074	Completed 45 of 45 MHs	90%	0.067	0.067	0.007	0.007	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.067	Flushed 93rd to LS-6; Cut one protuding leateral on 91st (1 of 5 laterals)	60%	0.040	0.000	0.067	0.027	\$19,735
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.197	Completed 18 of 77 MHs	85%	0.167	0.062	0.135	0.030	\$194,922
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.021		65%	0.014	0.000	0.021	0.007	\$136,100
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.023		80%	0.018	0.000	0.023	0.005	\$193,900
<u>Luick/Colvin Sewer Upgrade</u>	Significant	0.5		90%	0.450	0.000	0.500	0.050	\$504,150
<u>Love Canal Area Sewer Rehabilitation</u>	Low	0.214	Installed Mechanical Plugs	90%	0.193	0.100	0.114	0.021	\$350,000
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.04		65%	0.026	0.000	0.040	0.014	\$11,500
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	NA		NA	0	0	NA	NA	NA
Unidentified Sources:	NA	0.047		NA	0	0	0.141	0.141	NA
Total		1.600			1.350	0.314	1.380	0.344	\$1,520,307

Pre-Rehabilitation Peak I/I from Previous Study, mgd	1.60
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.22
Assumed I/I Reduction from Implemented Abatement Measures, %	14%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	1.380
2003 Estimated I/I Allocated to Remaining Sources, mgd	1.380
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.34
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	0.52

Sanitary Sewer Subsystem	Colvin/Luick Avenue
Physical Component	East of 91st Street
Previous I/I Investigation Tributary Subareas	4,5,6,7
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	yes
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	high
Trunk Sewer Diameter	15" VCP
Trunk Sewer or Pump Station Capacity, mgd	1.82
2003 Peak One-Year Flow Estimate, mgd	1.56
Estimated 2003 I/I, mgd	
@ 0.4 in/hour rainfall	1.38
Ratio of Peak One-year Flow to Capacity	0.86
2003 WWF:DFW Ratio	8.69

<u>2003 SSO Summary for Subarea B:</u>	
93rd & Colvin/Luick	6.8 hours
LS-4, Luick	24.7 hours

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LaSalle Area SSO Mitigation Analysis
Subarea C

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abatemant Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.535	Grouted three potential cross-connection pipes on Pasadena at MH 39, 91st at MH 88 and 89th at MH 48	90%	0.482	0.479	0.056	0.054	\$30,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.061	Completed 37 of 37 MHs	90%	0.055	0.055	0.006	0.006	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.028		60%	0.017	0.000	0.028	0.011	\$15,284
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.048	Completed 7 of 18 MHs	85%	0.041	0.039	0.009	0.007	\$30,642
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.006		65%	0.004	0.000	0.006	0.002	\$70,700
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.008	Completed one excavation on Pasadena to repair a broken pipe	80%	0.006	0.005	0.003	0.002	\$140,432
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.024		65%	0.016	0.000	0.024	0.008	\$6,900
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	NA		NA	NA	NA	NA	NA	NA
Unidentified Sources:	NA	Negligible		NA	NA	NA	NA	NA	NA
Total		0.710			0.620	0.578	0.132	0.090	\$293,958

Pre-Rehabilitation Peak I/I from Previous Study, mgd	0.73
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.60
Assumed I/I Reduction from Implemented Abatement Measures, %	82%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.13
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.13
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.09
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	2.19

Sanitary Sewer Subsystem Physical Component	91st, 92st ,Jayne Place
Previous I/I Investigation Tributary Subareas	4,5,6,7,8,9
Historical SSOs in Subsystem/Component	no
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	no
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	low
Trunk Sewer Diameter	18" VCP
Trunk Sewer or Pump Station Capacity, mgd	2.68
2003 Peak One-Year Flow Estimate, mgd	2.23
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.13
Ratio of Peak One-year Flow to Capacity	0.83
2003 WWF:DFW Ratio	4.80

<u>2003 SSO Summary for Subarea C:</u>
0 hours
<u>2002 SSO Summary for Subarea C:</u>
0 hours

Niagara Falls Water Board
LaSalle Area SSO Mitigation Analysis
Subarea D

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abatemant Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.997	Completed 2 of 2 locations	90%	0.897	0.793	0.204	0.100	\$40,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.005	Completed 4 of 4 MHs	90%	0.005	0.004	0.001	0.001	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.2		60%	0.120	0.000	0.200	0.080	\$4,300
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.005	Completed repair 1 of 1 MH, remaining 2 MHs to be cleaned	85%	0.004	0.004	0.001	0.001	\$600
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0.0335		80%	0.027	0.000	0.034	0.007	\$66,215
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.0335		65%	0.022	0.000	0.034	0.012	\$103,200
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.001		65%	0.001	0.000	0.001	0.000	\$4,600
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	0.004		NA	0.000	0	0.004	0.004	NA
Unidentified Sources:	NA	0.102		0	0	0	0.102	0.102	NA
Total		1.381			1.075	0.801	0.580	0.306	\$218,915

Pre-Rehabilitation Peak I/I from Previous Study, mgd	1.39
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.81
Assumed I/I Reduction from Implemented Abatement Measures, %	58%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.58
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.58
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.20
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	0.25

Sanitary Sewer Subsystem Physical Component	Lindbergh west of 81st
Previous I/I Investigation Tributary Subareas	4
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	No
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	Medium
Trunk Sewer Diameter	10" VCP
Trunk Sewer or Pump Station Capacity, mgd	0.71
2003 Peak One-Year Flow Estimate, mgd	0.63
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.58
Ratio of Peak One-year Flow to Capacity	0.89
2003 WWF:DFW Ratio	4.20

<u>2003 SSO Summary for Subarea D:</u>	
78th & Lindbergh	0
<u>2002 SSO Summary for Subarea D:</u>	
78th & Lindbergh	33.1 hours

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Subarea E

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abateman t Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source :</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.41	Grouted two potential cross-connection pipes on 82nd & Laughlin and on 83rd & Pershing	90%	0.369	0.227	0.183	0.041	\$40,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.07	Completed 55 of 55 MHs	90%	0.063	0.063	0.007	0.007	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.102		60%	0.061	0.000	0.102	0.041	\$12,290
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.075	Repaired 19 of 19 MHs, remaining 16 MHs to be cleaned	85%	0.064	0.064	0.011	0.011	\$4,800
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0.023		80%	0.018	0.000	0.023	0.005	\$79,750
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.023		65%	0.015	0.000	0.023	0.008	\$174,800
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.009	Completed one excavation on 81st (1 of 1 excavation location)	80%	0.007	0.007	0.002	0.002	\$0
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.003		65%	0.002	0.000	0.003	0.001	\$11,500
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	0.029		NA	0	0	0.029	0.029	NA
Unidentified Sources:	NA	0.54		NA	0	0	0.537	0.537	NA
Total		1.281			0.599	0.361	0.920	0.682	\$323,140

Pre-Rehabilitation Peak I/I from Previous Study, mgd	1.28
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.36
Assumed I/I Reduction from Implemented Abatement Measures, %	28%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.92
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.92
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.68
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	1.58

Sanitary Sewer Subsystem Physical Component (main sewers)	Boiler Ave., 81st Street north of Frontier Avenue, Lindbergh Avenue east of 81st Street
Previous I/I Investigation Tributary Subareas	1,2,3,5,7
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	yes
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	high
81st Street Trunk Sewer Diameter	15" VCP
81st Street Trunk Sewer Capacity, mgd	2
2003 Flow Estimate at 0.4 inches/hour rainfall (Subareas D &E), mgd	1.82
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall, Subarea E	0.92
Ratio of Peak One-year Flow to Capacity	0.90
2003 WWF:DFW Ratio	5.90

<u>2003 SSO Summary for Subarea E:</u>	
81st & Lindbergh	16.2 hours, one event
81st & Frontier	54.1 hours, > 6 events
<u>2002 SSO Summary for Subarea E:</u>	
81st & Lindbergh	43.1 hours
81st & Frontier	104.6 hours

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Subarea F

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abatemant Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0		90%	0.000	0.000	0.000	0.000	\$0
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.02	Completed 11 of 11 MHs	90%	0.018	0.018	0.002	0.002	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.09		60%	0.054	0.000	0.090	0.036	\$588
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.015	Repaired 1 of 1 MH, remaining 4 MHs to be cleaned	85%	0.013	0.013	0.002	0.002	\$1,200
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0.075		80%	0.060	0.000	0.075	0.015	\$93,780
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.075		65%	0.049	0.000	0.075	0.026	\$206,950
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.44	Completed 2 of 5 locations.	80%	0.352	0.279	0.161	0.088	\$120,000
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0		65%	0.000	0.000	0.000	0.000	\$0
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	0.002		NA	0	0	0.002	0.002	NA
Unidentified Sources:	NA	0.053		NA	0	0	0.053	0.053	NA
Total		0.770			0.546	0.310	0.460	0.225	\$422,518

Pre-Rehabilitation Peak I/I from Previous Study, mgd	0.77
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.31
Assumed I/I Reduction from Implemented Abatement Measures, %	40%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.46
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.46
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.22
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	4.98

Sanitary Sewer Subsystem Physical Component	74th & 75th
Previous I/I Investigation Tributary Subareas	8
Historical SSOs in Subsystem/Component	No
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	No
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	Low
Trunk Sewer Diameter	24" VCP
Trunk Sewer or Pump Station Capacity, mgd	5.3
2003 Peak One-Year Flow Estimate, mgd	5.22
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.46
Ratio of Peak One-year Flow to Capacity	0.98
2003 WWF:DFW Ratio	4.60

<u>2003 SSO Summary for Subarea F:</u>
NA
<u>2002 SSO Summary for Subarea F:</u>
NA

Niagara Falls Water Board
LaSalle Area SSO Mitigation Analysis
Subarea G

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abatemant Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	1.468	Grouted two potential cross-connection locations. (2 of 9)	90%	1.321	1.298	0.170	0.147	\$40,000
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.042	Completed 32 of 32 MHs	90%	0.038	0.038	0.004	0.004	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.02		60%	0.012	0.000	0.020	0.008	\$23,160
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.005	Repaired 1 of 1 MH, remaining 6 MHs to be cleaned	85%	0.004	0.004	0.001	0.001	\$1,800
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0.16		80%	0.128	0.000	0.160	0.032	\$90,250
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.09		65%	0.059	0.000	0.090	0.032	\$101,000
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0		65%	0.000	0.000	0.000	0.000	\$0
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	0.015		NA	0	0	0.015	0.015	NA
Unidentified Sources:	NA	NA		NA	0	0	NA	NA	NA
Total		1.800			1.562	1.340	0.460	0.238	\$256,210

Pre-Rehabilitation Peak I/I from Previous Study, mgd	1.81
Assumed I/I Reduction from Implemented Abatement Measures, mgd	1.35
Assumed I/I Reduction from Implemented Abatement Measures, %	75%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.46
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.46
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.24
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	2.60

Sanitary Sewer Subsystem Physical Component	Pershing, Munson, Mang, 88th & Military south of Jacob
Previous I/I Investigation Tributary Subareas	6
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	yes
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	Medium
Trunk Sewer Diameter	20" VCP
Trunk Sewer or Pump Station Capacity, mgd	3.2
2003 Peak One-Year Flow Estimate, mgd	2.82
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.46
Ratio of Peak One-year Flow to Capacity	0.88
2003 WWF:DFW Ratio	4.50

<u>2003 SSO Summary for Subarea G:</u>	
Military & Cayuga	8.8 Hours
<u>2002 SSO Summary for Subarea G:</u>	
Military & Cayuga	45.7 Hours

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Subarea H

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abateman t Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<i>Suspected Storm Sewer Inflow Source:</i> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0		90%	0.000	0	0.000	0.000	\$0
<i>Surface Water:</i> Manhole Insert Lid	Significant	0.033	- Installed 25 of 25 MH Lid Inserts	90%	0.030	0.030	0.003	0.003	\$0
<i>Pipe Capacity Obstructions:</i> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.003		60%	0.002	0.000	0.003	0.001	\$22,122
<i>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</i> General Manhole Repairs (Install boots, sealants)	Medium	0.283	Completed 11 of 11 manholes See Table H-1	85%	0.241	0.241	0.042	0.042	\$0
<i>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</i> Sectional CIPP Liner	Low	0		80%	0.000	0.000	0.000	0.000	\$0
<i>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</i> Spot CIPP Liner (short liner)	Low	0.035		65%	0.023	0.000	0.035	0.012	\$167,400
<i>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</i> Sanitary Sewer Spot Repair/Excavation	Medium	0.04		80%	0.032	0.000	0.040	0.008	\$270,000
<i>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</i> Chemical Grout	Low	0.023		65%	0.015	0.000	0.023	0.008	\$11,700
<i>Private Property Sources:</i> Defective service laterals, downspouts/foundation drain connections	NA	0.053	NA	NA	NA	0.000	0.053	0.053	NA
Unidentified Sources:	NA		NA	NA	NA	NA	NA	NA	NA
Total		0.470			0.342	0.270	0.200	0.128	\$471,222

Pre-Rehabilitation Peak I/I from Previous Study, mgd	0.47
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.27
Assumed I/I Reduction from Implemented Abatement Measures, %	58%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	0.20
2003 Estimated I/I Allocated to Remaining Sources, mgd	0.20
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	0.13
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	2.92

Sanitary Sewer Subsystem Physical Component	61st to 76st North of Perry Ave, South of Frontier
Previous I/I Investigation Tributary Subareas	MH-6 crossover Pipe
Historical SSOs in Subsystem/Component	no
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	no
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	low
Trunk Sewer Diameter	24"
Trunk Sewer or Pump Station Capacity, mgd	3.3
2003 Peak One-Year Flow Estimate, mgd	2.99
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	0.20
Ratio of Peak One-year Flow to Capacity	0.91
2003 WWF:DFW Ratio	2.65

<u>2003 SSO Summary for Subarea H:</u>	
61st Street through 76st Street	0 hours
<u>2002 SSO Summary for Subarea H:</u>	
61st Street through 76st Street	0 hours

Niagara Falls Water Board
LaSalle Area SSO Mitigation Analysis
Subarea I

I/I Source or Sanitary Sewer Defect Type: Recommended Abatement/Rehabilitation Measure	Impact on SSOs	Pre-rehab Estimated Peak I/I or Capacity Reduction from Source Type, mgd	June 2004 Implementation Status of Previously Recommended Rehabilitation Measures	Assumed Effectiveness of Mitigation Measure at I/I Reduction	Estimated Highest Achievable I/I Reduction/ Capacity Restoration, mgd	Estimated I/I Reduction/ Capacity Restoration from Implemented Abateman t Measures, mgd	Estimated Current Remaining Peak I/I or Capacity Reduction from Source Type, mgd	Estimated Lowest Achievable Remaining Peak I/I or Capacity Reduction, mgd	Estimated Cost to Implement Remaining Recommendations
<u>Suspected Storm Sewer Inflow Source:</u> Conduct field investigation to confirm source (as needed), eliminate known connections from catch basins to sanitary sewer, repair defective catch basin laterals.	Significant	0.24	- All repairs at 8 locations completed (8 of 8) See Table I-9	90%	0.216	0.216	0.024	0.024	\$0
<u>Surface Water:</u> Manhole Insert Lid	Significant	0.069	- Installed 53 of 53 MH Lid Inserts	90%	0.062	0.062	0.007	0.007	\$0
<u>Pipe Capacity Obstructions:</u> Sewer Cleaning, Chemical Root Treatment, Cutting Protruding Laterals	Significant	0.2		60%	0.120	0.000	0.200	0.080	\$39,557
<u>Manhole Frame/Rim Leaks, Cracks in Cone/Barrel:</u> General Manhole Repairs (Install boots, sealants)	Medium	0.256	Completed 31 of 31 Manholes Table I-1	See	85%	0.218	0.218	0.038	\$0
<u>Severity 3 or 4 Broken or Cracked Pipe, where four or more repairs are needed in a single pipe section (MH to MH):</u> Sectional CIPP Liner	Low	0		80%	0.000	0.000	0.000	0.000	\$0
<u>Severity 3 or 4 Broken Pipe, where less than four repairs are needed in a single pipe section (MH to MH):</u> Spot CIPP Liner (short liner)	Low	0.003		65%	0.002	0.000	0.003	0.001	\$38,000
<u>Severity 3 or 4 Broken Pipe, either shallow pipe or collapsed portion:</u> Sanitary Sewer Spot Repair/Excavation	Medium	0.192		80%	0.154	0.000	0.192	0.038	\$790,000
<u>Severity 3 or 4 Cracked Pipe, Open Joints in Sanitary Sewer:</u> Chemical Grout	Low	0.095		65%	0.062	0.000	0.095	0.033	\$6,900
<u>Private Property Sources:</u> Defective service laterals, downspouts/foundation drain connections	NA	0.65		NA	NA	0.000	0.650	0.650	NA
Unidentified Sources:	NA	0.495		NA	NA		0.571	0.495	NA
Total		2.200			0.833	0.496	1.780	1.367	\$874,457

Pre-Rehabilitation Peak I/I from Previous Study, mgd	2.20
Assumed I/I Reduction from Implemented Abatement Measures, mgd	0.42
Assumed I/I Reduction from Implemented Abatement Measures, %	19%
2003 Subarea I Metered I/I @ 0.4 inches/hour rainfall, mgd	1.78
2003 Estimated I/I Allocated to Remaining Sources, mgd	1.78
Estimated Lowest Achievable I/I Allocated to Remaining Sources Following Future Rehabilitation, mgd	1.37
Estimated Peak Subarea I Flow [@ 0.4 inches/hour rainfall] Following Recommended Rehabilitation, mgd	2.18

Sanitary Sewer Subsystem	78th Street through 85th
Physical Component	Street South of Frontier
Previous I/I Investigation Tributary Subareas	Cayuga Island 5,6,7,8,9,10,11,12
Historical SSOs in Subsystem/Component	yes
2003 SSOs in Subsystem (If Yes, Tributary Area is a Priority for I/I Mitigation)	no
Priority of Subsystem for Rehabilitation based on Capacity/SSOs	low
Trunk Sewer Diameter	18" VCP
Trunk Sewer or Pump Station Capacity, mgd	2.7
2003 Peak One-Year Flow Estimate, mgd	2.59
Estimated 2003 I/I, mgd @ 0.4 in/hour rainfall	1.78
Ratio of Peak One-year Flow to Capacity	0.96
2003 WWF:DFW Ratio	3.19

<u>2003 SSO Summary for Subarea I:</u> 78th Street through 85th Street South of Frontier	0 hours
<u>2002 SSO Summary for Subarea I:</u> 78th Street through 85th Street South of Frontier	0 hours