SECTION 3
2005 FOCUSED STUDY

3.1 TSS MONITORING DURING SPRING HIGH FLOW/ICE BREAKUP

3.1.1 Collection Summary

TSS sampling was conducted from the Main Street (WCMSB) and Alcoa Bridges (WCAB) from March 31 through April 3, 2005 (see **Figure 3-1** for sample locations). Twelve grab samples were collected each from the Main Street and Alcoa Bridges prior to and during the rising limb of the hydrograph. The sampling frequency outlined in the 2005 Monitoring Work Plan (Alcoa, March 2005) (i.e., hourly sampling during the rising limb of the hydrograph and once every two hours on the falling limb of the hydrograph) could not be achieved due to safety concerns and logistical challenges. However, sampling was conducted up to six times per day, as conditions permitted, with emphasis on the time period when ice was clearing and moving through the lower river. Water column samples were generally collected mid-channel at approximately 0.5 times the total water column depth at each location.

A total of 24 samples (not including QA/QC samples) were packaged and submitted to the Alcoa Massena ChemLab (ChemLab) in Massena, NY for TSS analysis consistent with the methodologies outlined in the 2005 Monitoring Work Plan (Alcoa, March 2005). QA/QC samples were collected as planned (one duplicate TSS sample per 20 field samples during a mobilization or a minimum of one per mobilization).

3.1.2 Results

3.1.2.1 Stage Height and Flow Data

Provisional stage height and flow data for the USGS gaging station at Chase Mills (# 04265432) were downloaded for the period of interest from the USGS website

[http://waterdata.usgs.gov/nwis/uv/?site_no=04265432]. Stage height and flow are measured every 15 minutes at this station, located approximately 11 miles upstream of the Main Street Bridge (WCMSB). Stage height data are also automatically measured and recorded at Alcoa Outfall 001 (**Figure 3-1**) throughout the year, and downloaded by the ChemLab for data storage. The stage height data for both Chase Mills and Outfall 001 gages, and the flow for Chase Mills, are presented in **Figure 3-2** for the March 31 through April 4, 2006 timeframe.

It should be noted that the USGS does not report flow data for the Chase Mills station during periods of ice cover, due to potential inaccuracies associated with ice-related backwater. For the winter of 2004/05, flow data from the Chase Mills gage stopped on December 15, 2004 and resumed at midnight on March 31, 2005, after ice had cleared from that portion of the river. Stage height data continued to be reported by USGS at Chase Mills throughout the winter, but their accuracy could be affected by the presence of ice (Phillips, April 2004).

3.1.2.2 Monitoring Results

TSS and river flow data for the sampling period are presented in **Table 3-1**. These data are plotted with respect to time, and in relation to stage height and flow on **Figure 3-2**. Similar temporal patterns were observed for all three parameters. Stage height (at Outfall 001) increased from about 5.5 ft. on April 1, peaked at 8.2 ft. on the April 3, and then returned to about 5.6 ft. on the April 4 (**Figure 3-2, top panel**). Between March 31 and April 4, instantaneous river flows increased from about 3,800 to 8,500 cfs and then declined to 7,800 cfs by end of day on April 4 (**Figure 3-2, middle panel**). TSS levels measured from the Main Street Bridge increased from 22 to 150 mg/L from March 31 to April 3 and then declined to approximately 68 mg/L late in the day on April 3 (**Figure 3-2, bottom panel**). At the Alcoa Bridge, TSS levels increased from 21 to 104 mg/L from March 31 to April 3, before decreasing to 59.2 mg/L in the last sample collected at 4:20 p.m. on April 3.

As expected, TSS levels increased as a function of stage height (**Figure 3-3**). The TSS concentrations at the Main Street and Alcoa Bridges were generally below 30 mg/L at a stage height of 6.0 ft. at the Outfall 001 gage; the levels increased to over 60 mg/L at a stage height of

8.0 ft. Similarly, TSS concentrations increased from below 30 mg/L at a stage height of 6.2 ft., to above 50 mg/L at a stage height of about 6.9 ft. at the Chase Mills gage.

3.1.2.3 Comparison to Historic Data

Data from March/April 2005 are compared to historic TSS measurements from the Main Street Bridge on **Figure 3-4**. TSS concentrations measured on the rising limb of the hydrograph in March/April 2005 (red diamonds) were generally higher than TSS levels measured previously from the river (under similar flow conditions) and several times higher than would be estimated using the rating curve that was previously developed for the Grasse River based on 1997/98 data (Alcoa, April 2001) (**Figure 3-4**). The rating curve will be updated with TSS and flow data collected during spring high flow/ice breakup monitoring in 2004 and 2005 to account for the greater concentrations of solids that enter the river during the spring high flow periods.

GRASSE RIVER STUDY AREA
MASSENA, NEW YORK

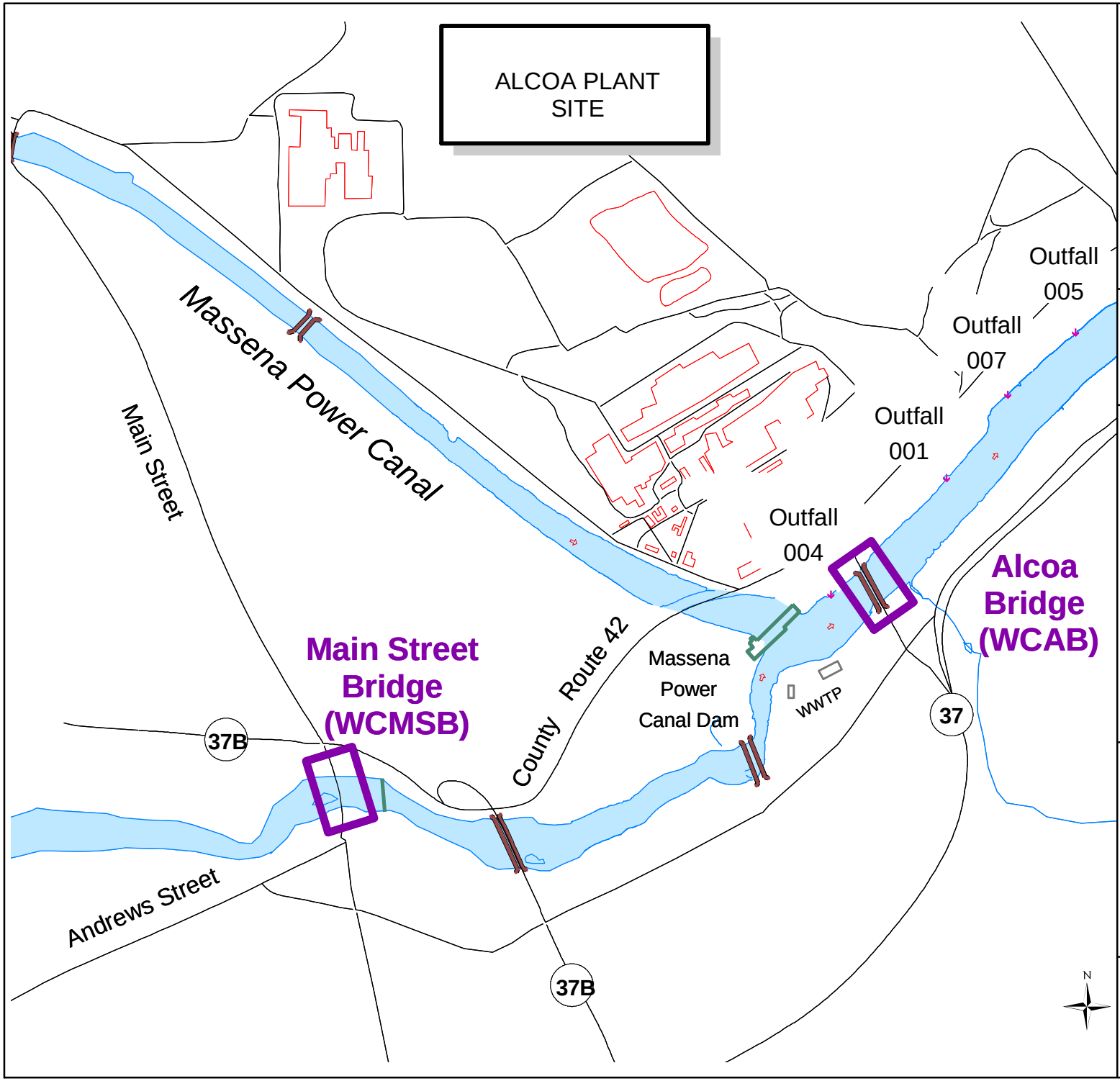
Table 3-1
TSS Data Collected During 2005 High Flow
Sampling at the Main Street and Alcoa Bridges

Date	Time	Approx. Flow[1,2] (cfs)	Location Along Bridge[3]	TSS[4] (mg/L)
Main Street Bridge				
3/31/2005	12:45	4360	M	22.4
3/31/2005	16:20	3970	M	28.0
4/1/2005	10:40	4770	M	30.0
4/1/2005	15:55	4880	M	51.6
4/2/2005	5:30	4990	M	26.0 (24.0)
4/2/2005	13:20	4920	M	31.6
4/3/2005	9:30	7110	M	53.6 (52.8)
4/3/2005	10:30	7330	M	58.8
4/3/2005	11:30	7420	M	58.0
4/3/2005	13:30	7560	M	150.4
4/3/2005	14:50	7700	M	88.4
4/3/2005	16:10	7840	M	67.6
Alcoa Bridge				
3/31/2005	12:50	4360	L	19.6 (22.4)
3/31/2005	16:45	3910	L	26.4
4/1/2005	10:25	4690	L	23.2 (26.4)
4/1/2005	15:40	4770	L	32.4
4/2/2005	5:15	5070	M	24.4
4/2/2005	13:40	4800	M	29.2
4/3/2005	9:45	7380	M	45.2
4/3/2005	10:45	7330	M	53.6
4/3/2005	11:46	7520	M	50.0
4/3/2005	14:00	7420	M	104.0
4/3/2005	15:05	7470	M	82.8
4/3/2005	16:20	7840	M	59.2

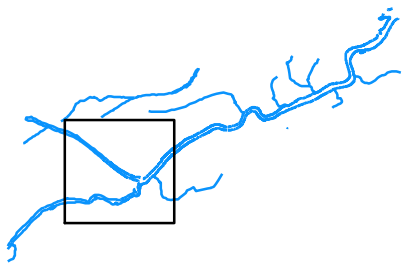
Notes:

1. Flow data are recorded in 15 minute intervals at the USGS gage on the Grasse River at Chase Mills and were downloaded from the USGS website.
2. Flow data shown are approximated to the value at the nearest 15 minute interval.
3. M = middle of bridge, L = left side of bridge looking downstream

   cfs = cubic feet per second, TSS = total suspended solids, mg/L = milligrams per liter
4. Results for duplicate samples are in parentheses.



LOCATOR MAP



GRAPHIC SCALE

1000 0 1000 Feet

LEGEND

- River Flow Direction Arrows
- Roads
- Wastewater Treatment Plant
- Alcoa Buildings
- Bridges
- Dams
- Grasse River + Tributaries Shoreline

Lower Grasse River Study Area
Massena, New York

Figure 3-1.
Water Column Sampling Locations
in March/April 2005 (TSS Sampling)

ALCOA

April 2004

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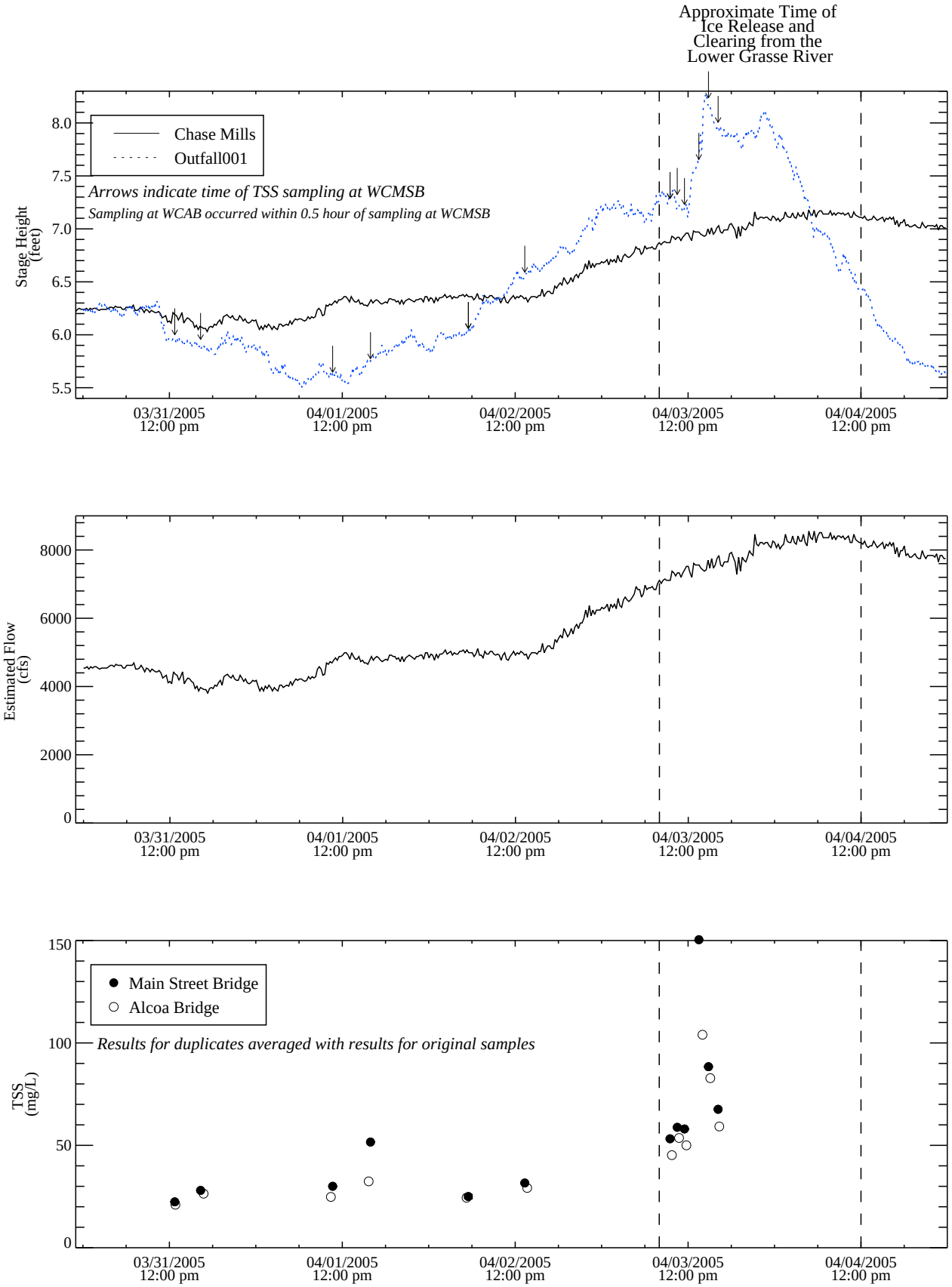

Figure 3-2. Stage Height, Flow, and Total Suspended Solids From March 31 - April 4, 2005

Grasse River stage height and flow recorded every 15 minutes at the USGS Chase Mills gage (#04265432).
Flows before 3/31/05 were not reported due to ice at this location.
Stage height also measured every 5 minutes using a staff gage adjacent to Outfall 001.
Grab samples for TSS analysis were collected at mid-depth.

Data tables: riverflow_ChaseMills, riverflow_trans, water_field

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Tue Jul 25 10:29:07 2006

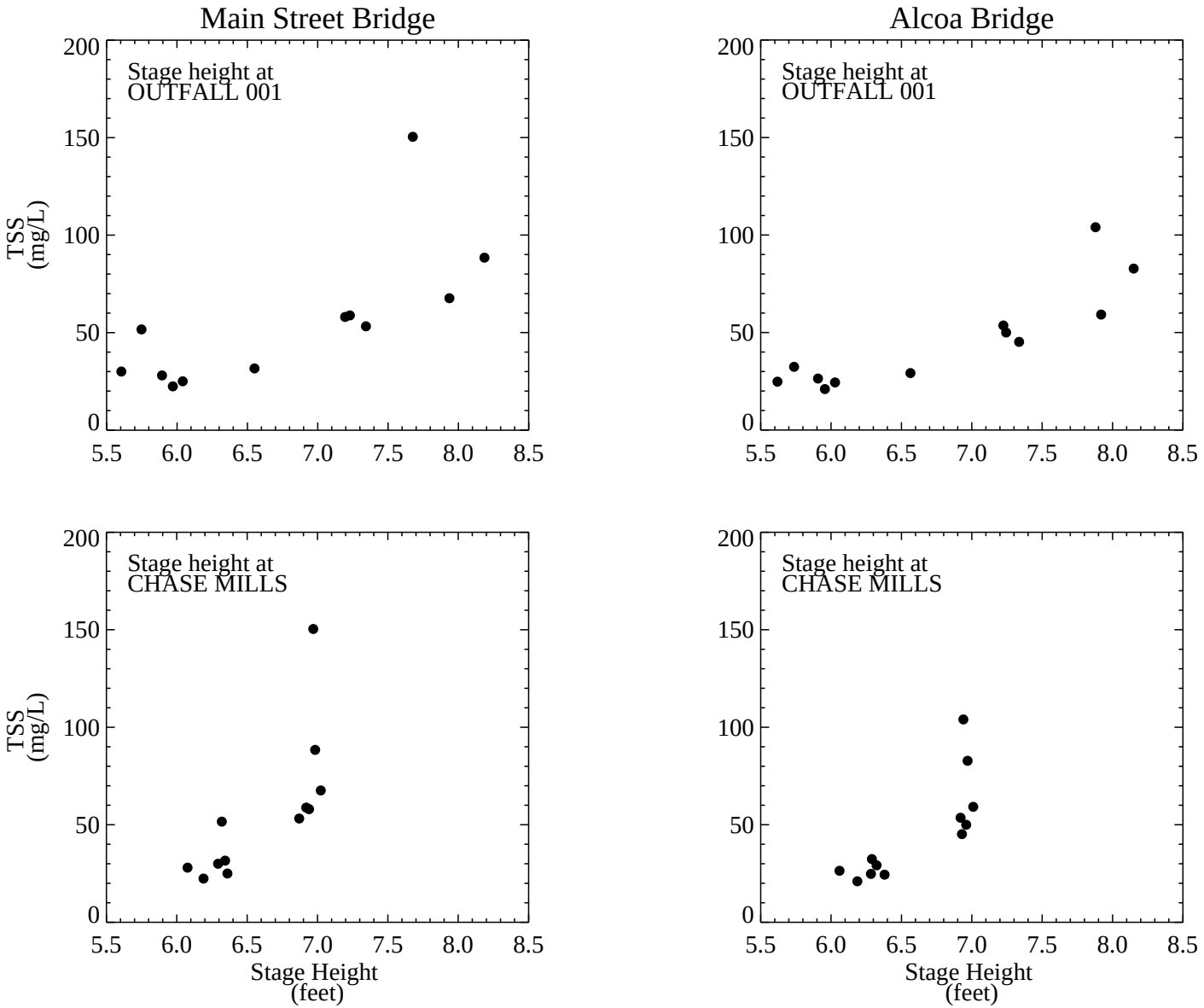

Figure 3-3. Water Column TSS Concentrations Versus Stage Height (March 31 - April 3, 2005)

TSS results for duplicates averaged with results for original samples; TSS measurements made on the rising limb of the hydrograph. Grasse River stage height measured every 5 minutes at Outfall 001 and every 15 minutes at USGS Chase Mills gage (#04265432).

Data tables: riverflow_ChaseMills, riverflow_trans, water_field

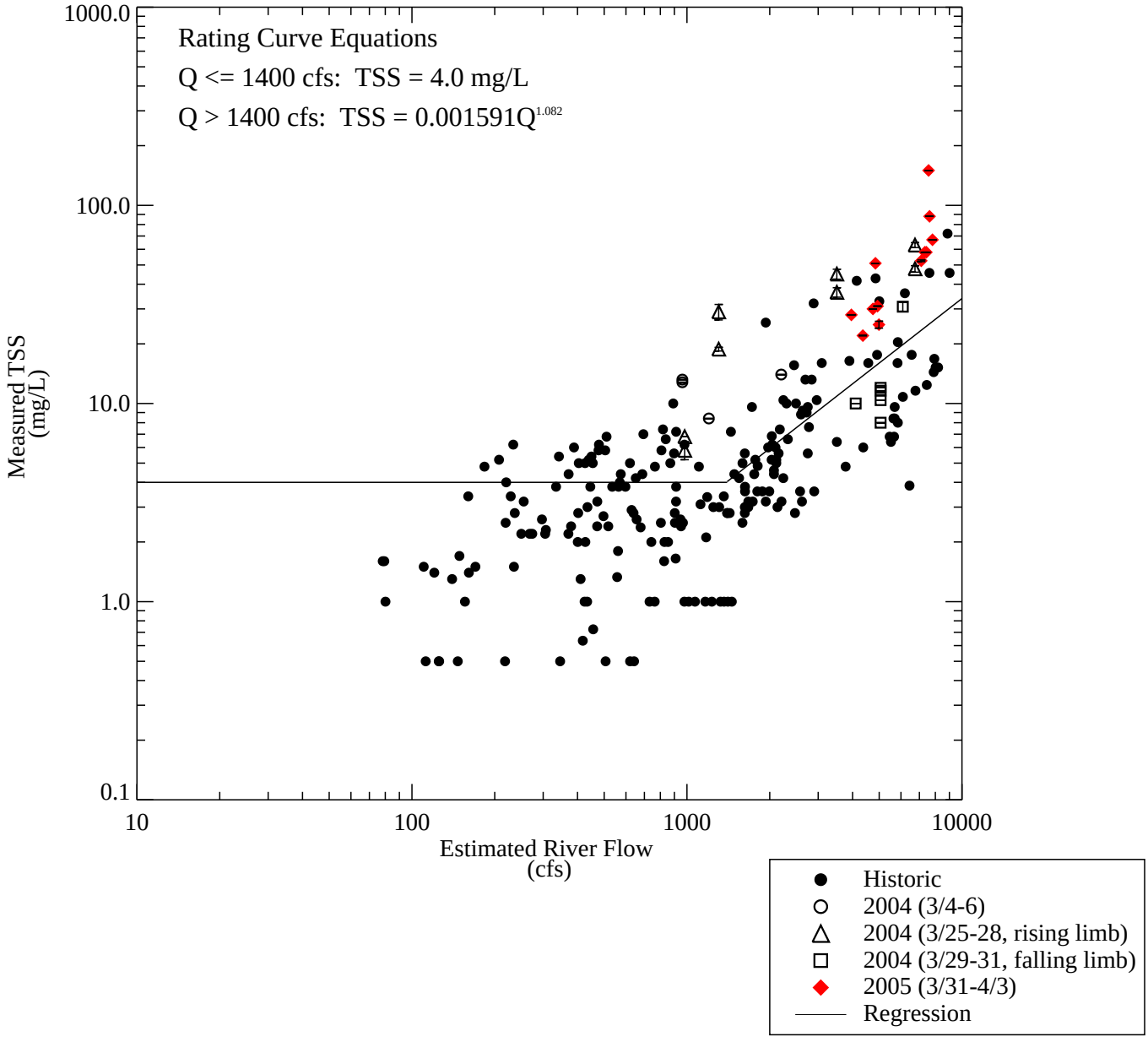

Figure 3-4. Solids Concentrations Measured at the Main Street Bridge / WC001 as a Function of River Flow

Mean +/- range shown for TSS data collected at same time during 2004 and 2005; historic data from 1997 through 2003.

Flows based on site-specific data (transducer or tapedown) when available; when site-specific data not available, flows estimated from USGS records on the Oswegatchie River or on the Grasse River at Chase Mills.

Rating curve was generated from 1997 and 1998 data; non-detect concentrations set to half the detection limit.

Data tables: riverflow_hist, riverflow_tape, riverflow_trans, riverflow_ChaseMills, water_field

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