California Regional Water Quality Control Board
Colorado River Basin Region

IMPERIAL VALLEY SEDIMENTATION/SILTATION TMDL IMPLEMENTATION UPDATE

Staff Report to Regional Board

June 26, 2007

Prepared by Colorado River Basin
Regional Water Quality Control Board Staff

TABLE OF CONTENTS

1. INTRODUCTION

Water quality control plans (Basin Plans) designate beneficial uses (BUs) for water, establish water quality objectives (WQOs) to protect these BUs, and provide implementation and surveillance programs for meeting the WQOs. Water quality standards (WQSs) are made up of BUs, WQOs, and the State antidegradtion policy. The State Antidegradation Policy, BUs, and WQOs, together satisfy the definition of WQSs in the federal Clean Water Act.

CWA Section 303(d) requires the State to list impaired water bodies and to establish Total Maximum Daily Loads (TMDLs) for those pollutants causing water quality impairments to ensure that impaired water bodies attain their BUs. A TMDL is pollutant-specific and is the maximum amount of a pollutant that a water body can assimilate without violating its applicable WQSs.

The Alamo River, New River, and Imperial Valley Drains are listed as impaired on the State of California's CWA Section 303(d) List, in part, because sediment violated WQOs that protect BUs. Beneficial uses of the Alamo River, New River, and Imperial Valley Drains are: warm freshwater habitat (WARM); wildlife habitat (WILD); preservation of rare, threatened, or endangered species (RARE); water contact and non-contact water recreation (REC I and REC II); and freshwater replenishment (FRSH) (California Regional Water Quality Control Board Basin Plan as amended to date).

The Colorado River Basin Regional Water Quality Control Board (Regional Board) developed and adopted Sedimentation/Siltation TMDLs and Implementaion Plans (hereafter "silt TMDLs") for the Alamo River, New River, and Imperial Valley Drains. The State Water Resources Control Board (State Board) and the U.S. Environmental Protection Agency (USEPA) approved the silt TMDLs. Tabl 1.1 below, show the adopted and approved TMDLs.

Table 1.1: Sedimentation/Siltation TMDL Approval Dates

	Alamo River	New River	IV Drains
Regional Board Adoption	6/27/01	6/26/02	1/19/05
State Board Approval	2/19/02	11/19/02	7/21/05
USEPA Approval	6/28/02	3/31/03	9/30/05

Total Maximum Daily Loads

A TMDL is a quantification of the amount of a pollutant that a water body can receive and still meet WQSs. The maximum load of a pollutant is allocated to pollutant sources in the water body. These sources include point and nonpoint sources. Therefore, the TMDL is the sum of the separate pollutant allocations (wasteload allocations (WLAs) for point sources, load allocations (LAs) for

nonpoint sources) plus the allocations provided for natural background sources. TMDLs also consider seasonal variations and a margin of safety (MOS) which take into account any lack of knowledge concerning the relationship between allocations and water quality.

TMDLs are adopted by the Regional Board via a Basin Plan amendment . The amendment must also have an Implementation Plan. The TMDL Implementation Plan is a schedule of actions and milestones for completion by responsible parties during a specified time. Implementation actions and milestones facilitate achievement of WQS in the water body. The goal of the Implementation Plan is to demonstrate compliance with TMDL numeric targets.

The silt TMDLs cove approximately 500,000 acres of agricultural land in the Imperial Valley. For the purpose of compliance with the Silt TMDLs, farmers/growers in the Imperial Valley and the Imperial Irrigation District (IID) are the main responsible parties. The USEPA and the US Section of the International Boundary and Water Commission (IBWC) are also requested to submit a technical report on discharge of waste from Mexico. This report provides the Regional Board with updates on:

1- Water quality improvements in terms of sediment;
2- Implementation trends and effectiveness, including level of compliance;
3- Milestones attainment; and
4- Recommendations.

2. IMPLEMENTATION SCHEDULE

TMDL implementation officially begins after USEPA approval. The three silt TMDLs have essentially similar implementation schedules in order to ease implementation efforts by both farmers and Regional Board staff. To allow time for responsible parties to meet TMDL load reductions of silt, the compliance timelines consist of four phases, each with increasingly stringent water quality targets. The time period of Phase 1 begins one year after the date of USEPA approval. The implementation schedules for the silt TMDLs are shown in Tables 2.1, 2.2, and 2.3. Please see Appendix C for time graphs of water quality data.

Table 2.1: Interim Numeric Targets for Attainment of Alamo River Silt TMDL

Phase	Time Period	Estimated Percent Load Reduction	Interim Target TSS (mg/L)
1	2002 – 2004	15%	320
2	2005 – 2008	25%	240
3	2009 – 2011	10%	216
4	2012 – 2014	8%	200

Table 2.2: Interim Numeric Targets for Attainment of New River Silt TMDL

Phase	Time Period	Estimated Percent Load Reduction	Interim Target TSS (mg/L)
1	2003 – 2005	5%	229
2	2006 – 2008	7%	213
3	2009 – 2011	4%	204
4	2012 – 2014	2%	200

Table 2.3: Interim Numeric Targets for Attainment of Imperial Valley Drains Silt TMDL

Phase	Time Period	Estimated Percent Load Reduction	Interim Target TSS (mg/L)
1	2005 – 2006	10%	376
2	2007 – 2009	25%	282
3	2010 – 2012	20%	226
4	2013 – 2015	12%	200

The silt TMDL targets are measured using total suspended solids (TSS) as an indicator of silt. Turbidity was also measured in order to determine a relationship between TSS and turbidity, which may allow turbidity to be used as an estimate of TSS concentrations in the future.

3. TMDL REQUIREMENTS

3.1 REGIONAL BOARD

As part of the overall Basin Plan surveillance and monitoring program, the Silt TMDLs provide for the Regional Board staff to monitor water quality improvements in the Alamo and New Rivers and the key Imperial Valley Drains. It also requires tracking of implementation of management practices by the responsible parties and report back implementation progress to the Regional Board periodically. Table 3.1, below, shows these and other required actions that are to be performed by Regional Board staff and their status of completion. As indicated in the Basin Plan and the TMDLs, Regional Board staff actions are limited to availability of funding resources.

Table 3.1: Regional Board Silt TMDL Implementation Requirements

Task	Due Date*	Status
Develop and Implement Quality Assurance Project Plans (QAPPs)	Alamo and New Rivers=180 days; I.V. Drains= 30 days	Complete
Implementation Tracking Plan (ITP)	Alamo and New Rivers=180 days; I.V. Drains= 30 days	Incomplete
TMDL Implementation Tracking	180 days	Ongoing
Monitoring	180 days	Ongoing
Assessment and Reporting	NA	Up to date

* Number of days after USEPA approved the TMDL

a. Quality Assurance Project Plans (QAPPs)

The Silt TMDLs Implementation Plans require that the QAPPs for monitoring silt include sampling station descriptions; monthly measurements of field turbidity, laboratory turbidity, TSS; and quarterly monitoring of stream flow velocity, DDT and DDT metabolites within the water column. Deadlines for completion for the Alamo River and New River Silt TMDL QAPPs was 180 days after approval of the TMDLs by USEPA. Regional Board staff completed those QAPPs prior to deadline, therefore, staff elected to shorten the deadline to complete the Imperial Valley Drains QAPP to one month after USEPA approval.

b. Implementation Tracking Plan (ITP)

The deadline for ITP development was 180 days after USEPA approval of the Alamo River and New River Silt TMDLs, and one month after USEPA approval of the Imperial Valley Drains Silt TMDL.

The required objectives of the ITP are:

- Assess/track/account for practices already in place;
- Measure the attainment of milestones;
- Determine compliance with NPDES permits, WLAs and LAs; and
- Report progress toward implementation of NPS water quality control, in accordance with the SWRCB NPS Program Plan (PROSIP).

Because the Imperial County Farm Bureau's (ICFB)'s 319(h) grant requires ICFB to have and implement an ITP with the same essential elements of the ITP that the Regional Board staff is supposed to develop and implement, Regional Board staff is using the ICFB's ITP to satisfy the TMDLs tracking requirements and to maximize Regional Board's limited resources. Tasks stated in the grant include developing a database to monitor sediment control practices for farmers throughout the Imperial Valley.

c. TMDL Implementation Tracking

The Basin Plan states that implementation of sediment control activities shall be tracked by Regional Board staff and shall be reported to the Regional Board at least yearly. Regional Board staff is conducting tracking of sediment control activities. Updates of sediment control activities have been provided to the Regional Board in the form of staff report presentations on a yearly basis.

d. Monitoring

Silt TMDL water quality monitoring follows the schedule in Table 3.2. With the exception of stream flow, DDT and DDT metabolites, samples were collected according to the monitoring schedule. Regional Board staff decided to terminate analysis of DDT and DDT metabolites due in part to the properties of DDT. DDT tends to adhere to sediment particles, and as a result, its presence is not readily detectable in the water column. Therefore, the most suitable place to measure DDT is in the suspended sediment, which requires a substantial amount of sample to obtain the required amount of sediment. Due to time and equipment costs, the sample collection was deemed cost prohibitive. Also due to funding issues, stream flow measurements were terminated. As funding becomes available, Regional Board staff will expand sediment monitoring and data collection activities.

Table 3.2: Silt TMDL Water Quality Analyses

Analyses	Frequency
Stream flow	Quarterly
Field Turbidity	Monthly
Laboratory Turbidity	Monthly
TSS	Monthly
DDT and DDT Metabolites	Quarterly

e. Assessment and Reporting

The Basin Plan requires, on a yearly basis, Regional Board staff to prepare a report assessing compliance with TMDL Implementation Goals and Milestones. This report is presented in a staff report to the Regional Board. The purpose of the report is to address the following:

- Water quality improvement in terms of total suspended sediments, total sediment loads, Total DDT, and DDT metabolites;
- Trends in Management Practice (MP) implementation;
- MP effectiveness
- Whether milestones were met on time or at all. If milestones were not met, provide reasons and recommendations; and
- Level of compliance with measures and timelines in Program Plans and Drainshed Plans.

3.2 FARMER/LANDOWNERS, RENTERS/LESSEES, OPERATORS/GROWERS

Pursuant to Section 4.E.1.1 of the Basin Plan, farm landowners, renter/lessees, and/or operators/growers are required to submit self-determined Sediment Control Programs to the Regional Board by a predetermined date (see Table 3.3), and on an annual basis thereafter.

Table 3.3: Sediment Control Program Due Dates for Farmers

TMDL	Due Date
Alamo River Silt	September 28, 2003
New River Silt	June 30, 2004
Imperial Valley Drains Silt	March 30, 2006

The Sediment Control Programs may be submitted by an individual directly to the Regional Board, or through a group of individuals who form a Group Sediment Control Program. Regional Board staff has strongly recommended that individuals work with the Imperial County Farm Bureau to submit a Group Plan through the Farm Bureau's Watershed Program. In either case, the Sediment Control Programs are required to include:

1. Name of farm landowner, business address, mailing address, and phone number;
2. Name of farm operator/grower, business address, mailing address, and phone number;
3. Problem assessment, including site conditions, crop(s), potential or current nonpoint source problems, problem severity, and problem frequency;

4. Statement of goals (measurable outcomes or products);
5. Existing and/or alternative sediment management practices (technical/economic feasibility, desired outcome, etc.);
6. Timetable for implementation of management practices (measured in either water quality improvement or level of implementation);
7. Monitoring, including progress toward goals, and effectiveness of management decisions;
8. Mechanism for reporting planned and completed implementation actions to the Regional Board.

Imperial County Farm Bureau has been the leading force behind organizing and implementing the Sediment Control Programs in the Imperial Valley.

3.3 IMPERIAL IRRIGATION DISTRICT (IID)

The Basin Plan requires IID to submit to the Regional Board a revised Drain Water Quality Improvement Plan (DWQIP) for sampling key Imperial Valley Drains for silt, information regarding agricultural dischargers, a quality assurance project plan (QAPP), and monthly, quarterly, and annual monitoring reports to the Regional Board Executive Officer.

Table 3.4: IID Silt TMDL Implementation Requirements

Task	Due Date	Status
DWQIP	9/28/03	Complete
QAPP	10/28/03	Complete
Farmer/Grower Database	60 days after approval of DWQIP	Complete
Monthly, quarterly, and annual reports	15th of each month	Up to date

The DWQIP addresses control and monitoring of drain maintenance operations within the Alamo and New River watersheds and dredging operations in the Alamo and New Rivers. In addition to monitoring the water quality impacts of dredging, the plan monitors a representative number of drains to provide an idea of the silt load originating from fields. IID was awarded $499,894 of Proposition 40 funds to implement its DWQIP under the state's current grant cycle (2006-2008).

On a semi-annual basis, IID is required to submit names, mailing addresses, and locations of fields of water account holders within the IID service area. Data includes account number, parcel number, irrigation canal and gate numbers,

discharge drain names, area and location of fields within a parcel, and crop information.

Regional Board staff issued an Administrative Civil Liability Complaint (ACLC) against IID on December 16, 2004, for failing to submit a report required by Section 13267 of the CWC to satisfy Siltation/Sedimentation TMDL requirements for the New and Alamo Rivers. The report was due on November 14, 2004.

During the last couple of years, ICFB has expressed concerns about the adverse water quality impacts that IID's dredging operations continue to have on sediment concentrations in the Imperial Valley Drains. Regional Board staff feels that these impacts threaten the overall progress made by the farmers and overall success of the program. More recently, in May 2007, as a result of the expressed concerns, IID Board Members directed its staff to coordinate with ICFB staff to address their concerns.

3.4 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA)

Pursuant to Section 4.E.1.3 of the Basin Plan, the USEPA and/or U.S. Section of the International Boundary and Water Commission (IBWC) are requested to submit a technical report describing the proposed control measures, monitoring plan and reporting procedures, and quality assurance procedures that the U.S. government proposes to take to ensure that discharges of wastes from Mexico do not violate or contribute to a violation of the Alamo River or New River Silt TMDLs. The federal government failed to comply with this request. Report due dates for both the Alamo and New River TMDLs are shown in Table 3.5.

Table 3.5: USEPA Silt TMDL Technical Report Due Dates

TMDL	Due Date	Status
Alamo River	9/28/03	Incomplete
New River	6/30/04	Incomplete

3.5 IMPERIAL COUNTY FARM BUREAU (ICFB)

The Basin Plan specifies recommended actions for the Imperial County Farm Bureau. Farm Bureau received multiple federal 319(h) grants to implement these recommended actions. They were awarded a $370,400 319(h) grant in 2004 and a $379,400 319(h) grant in 2007. Implementation tasks include outreach and education of the farming community, formation of drainshed groups, and collection/submittal of drainshed sediment control plans. A list of Farm Bureau tasks is shown in Table 3.6.

Table 3.6: Farm Bureau Recommended Actions for TMDL Implementation

Task	Due Date	Status
Letter to Farmers	7/28/03	Complete
Participant Information to Regional Board	9/28/03	Complete
Watershed Program Plan	9/28/03	Complete
Watershed Program Plan Reports	Semi-monthly	Complete
Tracking and Reporting Procedures	10/28/03	Complete
Tracking Reports	Semi-monthly	Up to Date
Annual Tracking Reports	February 15th	Up to Date

The first recommended action is a letter to all farmers/growers within the Alamo River, New River, and Imperial Valley Drains watersheds describing the Farm Bureau Voluntary Watershed Program. According to the terms of their 319(h) grant, the Farm Bureau is required to submit on an annual basis, a list of program participants organized by drainshed, and a Watershed Program Plan. The Watershed Program Plan identifies measurable environmental and programmatic goals; describes aggressive, reasonable milestones and timelines for development and implementation of TMDL outreach plans and sub-watershed plans; and describes a commitment to develop and implement a tracking and reporting program. The Farm Bureau is also required to submit semi-monthly reports describing the progress of each sub-watershed groups, any technical assistance workshops planned or conducted, and any other pertinent information. The Farm Bureau has consistently delivered these tasks on time.

The Farm Bureau developed a website that allows farmers to submit individual sediment control plans electronically. In addition to an electronic copy of the database, the data is also accessible via the internet (http://www.ivtmdl.com), which allows access to up-to-date information.

The Farm Bureau estimates approximately 97% of the farmers within the Alamo and New River watersheds have filed sediment control plans through their Watershed Program. One farmer/grower has exercised the option to file a sediment control plan directly with the Regional Board.

Regional Board staff consistently receives data from the Farm Bureau by the annual deadline. Originally, staff thought that the Farm Bureau database could be merged with a database obtained from Imperial County Assessor's Office that contains parcel information. However, issues in querying the database surfaced because a one-to-one relationship could not be established. To date, Regional Board staff is working with the Farm Bureau to develop a more efficient database system.

During implementation of the Silt TMDLs, Regional Board staff met with ICFB staff and IID staff on numerous occasions to work on issues related to the TMDL database and determining TMDL compliance. Staff from all three agencies work

together to gather the necessary information to generate a fairly good method of determining who is, and who is not, submitting up to date Water Quality Control Plans/Sediment Control Programs each year. The ICFB has received several environmental awards from both the Governor's Office and the USEPA for its excellent work in implementing the TMDL.

4. ENFORCEMENT

Enforcement is a high priority for the State and Regional Boards. The Colorado River Basin Region Enforcement Unit follows a progressive enforcement approach as specified in the State Board's Enforcement Policy

The Regional Board issued four Administrative Civil Liability Complaints (ACLC) in 2004 to farmers who did not submit a group or individual Sediment Control Program to the Regional Board (or to ICFB). Within one week of recipt of the ACLCs, the farmers submitted their sediment plans to the ICFB. The ACLCs were withdrawn when the Regional Board received the farmers' Sediment Control Plans via the ICFB Group Watershed Program.

The Regional Board also issued an ACLC against IID on December 16, 2004 for failing to submit a QAPP required by Section 13267 of the CWC to satisfy Siltation/Sedimentation TMDL requirements for the New and Alamo Rivers. The report was due on November 14, 2004. The ACLC was withdrawn when the Regional Board received the report from IID in January, 2005.

Farmers are required to update their Sediment Control Plans on an annual basis. Farmers who submitted plans through the ICFB's Group Watershed Program are required to complete annual updates to those plans via the ICFB website. ICFB staff does an excellent job of reminding farmers to update their plans through radio and newspaper announcements and at public meetings. If a farmer does not update his plan with ICFB by the annual due date, the Regional Board Enforcement Unit will send an informal letter before taking official action. To date, all farmers updated their farm plans without formal enforcement action. The enforcement actions have served as a deterant and contributed to the remarkable participation rate in the ICFB Program.

5. WATER QUALITY MONITORING

Regional Board staff collects water quality data on the Alamo and New Rivers (Appendix B). TSS yearly averages (average of all data collected during the year) for sampling locations on both the Alamo and New Rivers are represented in Tables 5.1a, 5.1b, and Figures 1-4, below.

Table 5.1a: Alamo River yearly averages of TSS (mg/l) for the years 2003-2006

YEAR	TSS (mg/l)						
	UPSTREAM → DOWNSTREAM						
	Border	Drop 10	Drop 8	Drop 6A	Drop 6	Drop 3	Outlet
2003	14	209	241	236	260	267	262
2004	14	215	221	212	231	244	237
2005	23	136	195	173	226	232	234
2006	61	175	192	208	253	273	273

Table 5.1b: New River yearly averages of TSS (mg/l) for the years 2003-2006

YEAR	TSS (mg/l)			
	UPSTREAM → DOWNSTREAM			
	Border	Even Hewes	Drop 2	Outlet
2003	30	95	228	179
2004	40	90	201	215
2005	51	88	227	184
2006	40	80	148	179

Regional Water Quality Control Board
Alamo River and New River Silt TMDL Sampling Location Map

Imperial Irrigation District Drain Water Quality Improvement Plan Drain Map

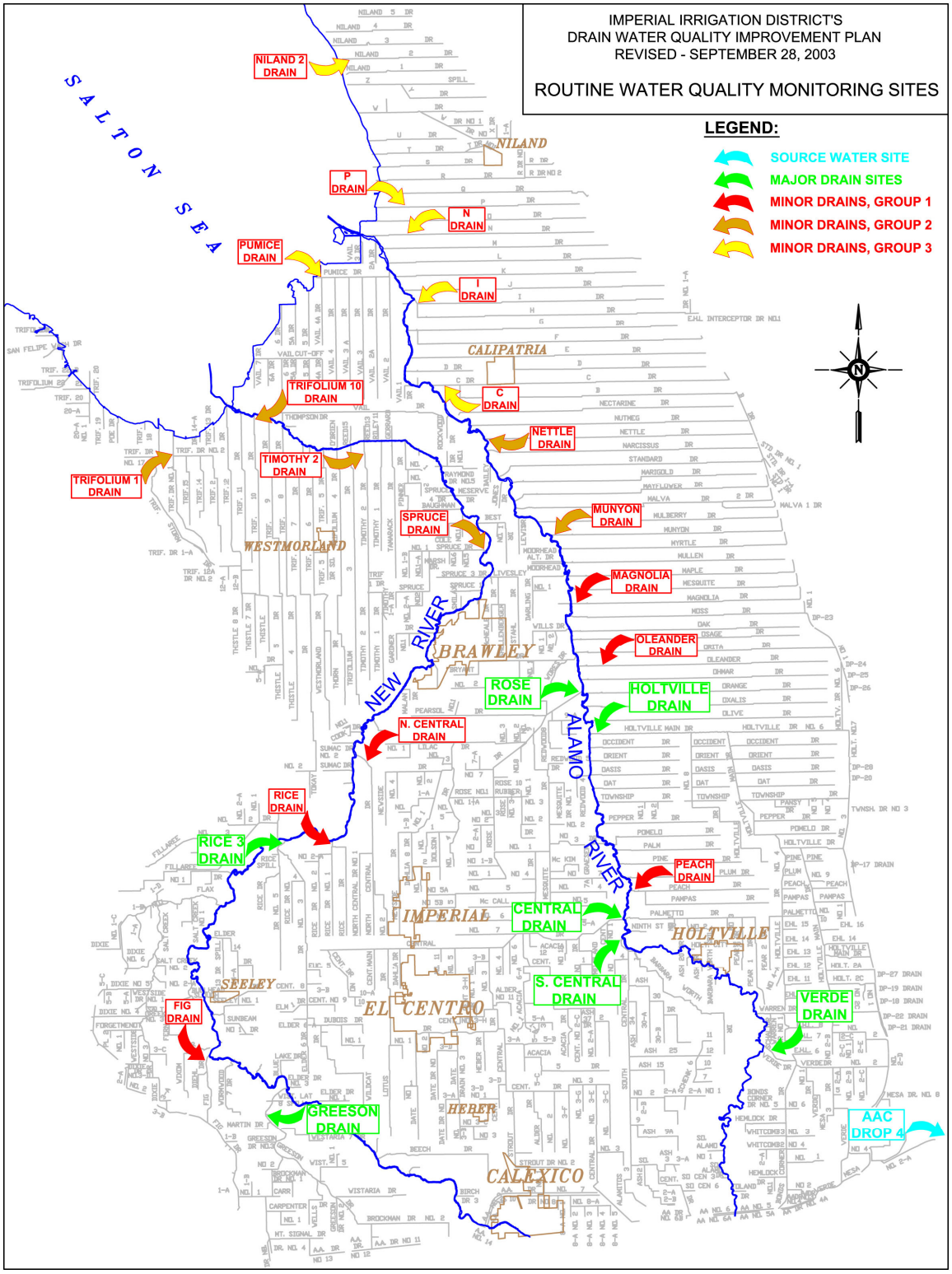


Figure 1: Alamo River Annual Average TSS Concentrations by Sample Location

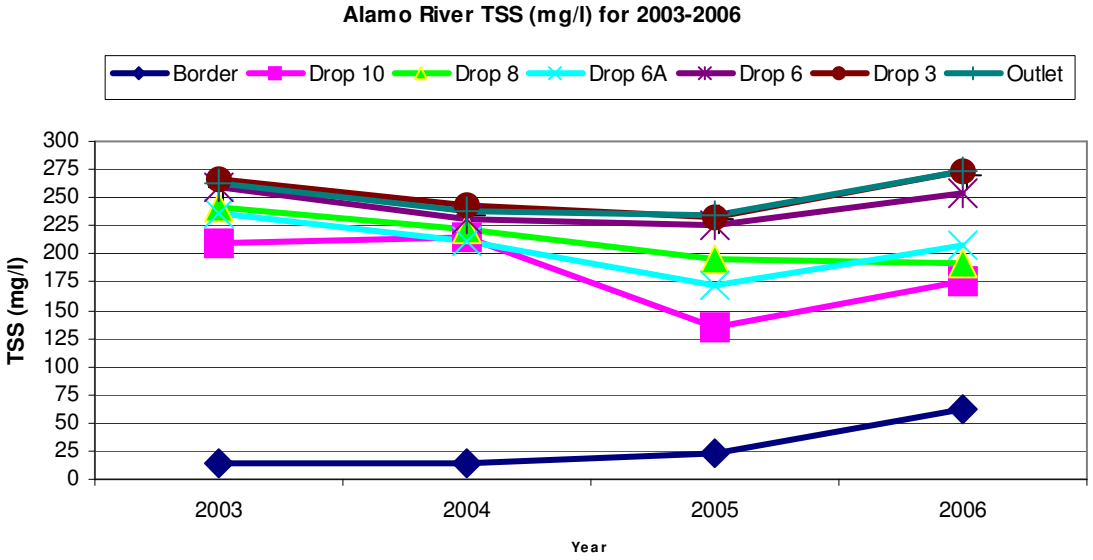


Figure 2: Alamo River Annual Average TSS Concentrations by Year

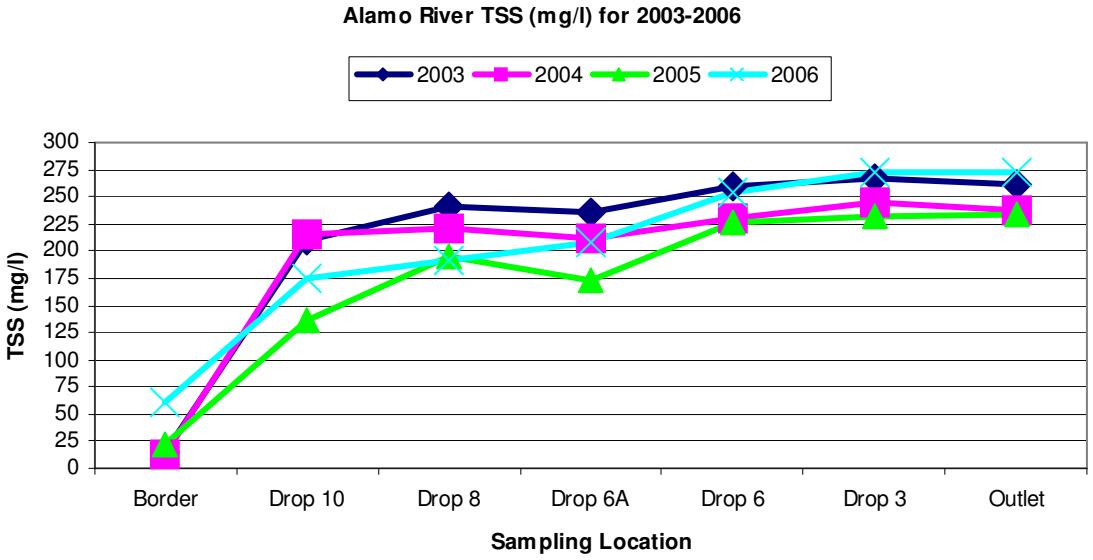


Figure 3: New River Annual Average TSS Concentrations by Sample Location

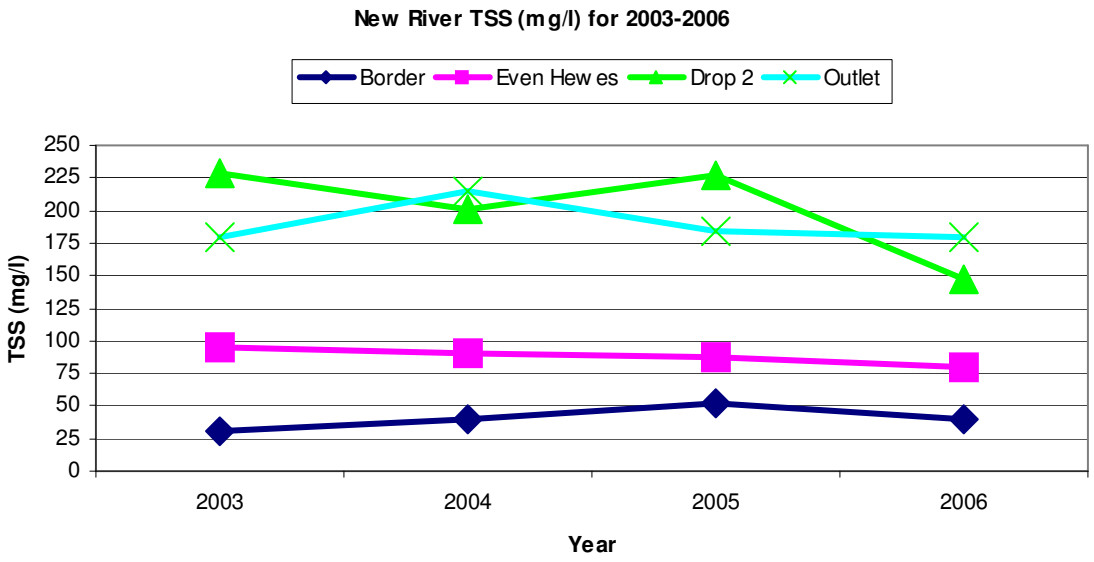
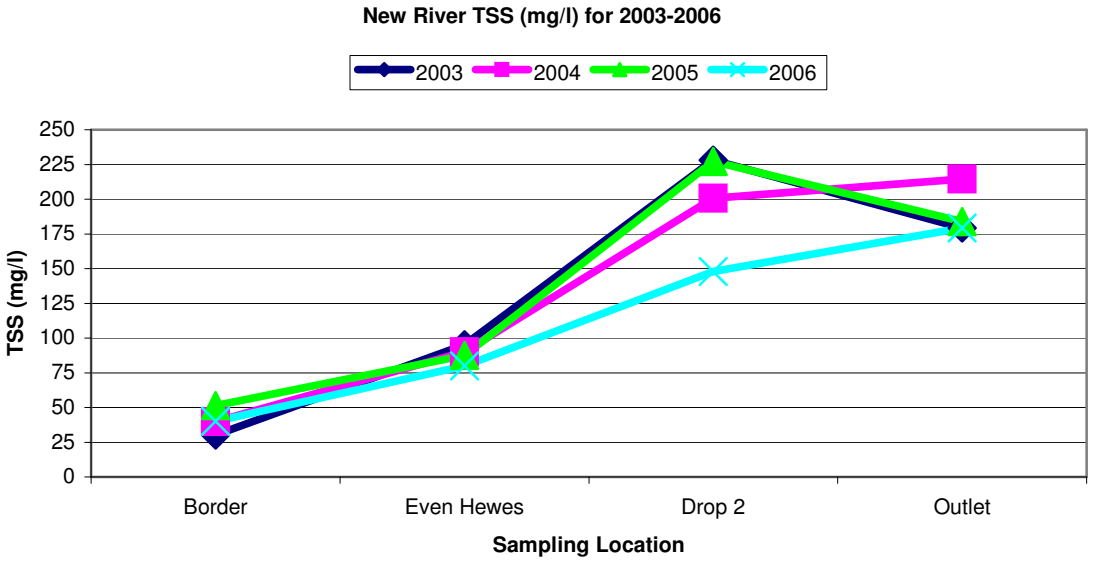


Figure 4: New River Annual Average TSS Concentrations by Year



IID collects water quality data from the Imperial Valley Drains (Appendix B). In order to determine pollutant loading, both the concentration and stream flow are required. Flow data is not available for all sampling locations. It should be noted that interpretation of the data is restricted based on quality control issues. General trends are used to interpret data until more data are available.

Reduction of sediment loading to the New and Alamo Rivers, and ultimately the Salton Sea, is the goal of TMDL Implementation. Water quality data is collected to determine progress towards reaching TMDL goals.

Table 5.2: Alamo and New Rivers Sediment Loading

Annual Sediment Loading (tons)				
Sampling Site	**2003**	**2004**	**2005**	**2006**
Alamo River Outlet	224061.0	196962.3	205827.6	272716.4
Alamo River Drop 3	188389.4	172171.4	167197.9	n/a
Alamo River Drop 6A	25982.8	22283.4	18230.1	n/a
Alamo River Drop 10	7360.8	7528.2	4652.6	n/a
New River Outlet	101739.5	94399.3	109760.8	118838.6
New River Evan Hewes	1294.3	1082.9	1338.2	n/a
New River IB	4329.7	4549.4	10795.6	n/a

*2006 New River data are provisional.

Table 5.3: Niland 2, P, and Pumice Drains Sediment Loading

Annual Sediment Loading (tons)			
Sampling Site	**2004**	**2005**	**2006**
Niland 2 Drain	122.0	47.0	86.2
P Drain	478.0	302.4	321.8
Pumice Drain	no flow data	no flow data	no flow data

Table 5.4: Alamo and New Rivers Sediment Load Reductions

Sampling Site	Percent Load Reduction				
	2003	2004	2005	2006	Cumulative Reduction*
Alamo River Outlet	32.0%	12.1%	-4.5%	-32.5%	17.2%
New River Outlet	34.1%	7.2%	-16.3%	-8.3%	23.1%

*Cumulative Reduction compares pre-TMDL loads to 2006 loads

*2006 New River data are provisional (no specific quality control samples were taken).

Table 5.5: Niland 2, P, and Pumice Drains Load Reductions

Sampling Site	Percent Load Reduction			
	2004	2005	2006	Cumulative Reduction*
Niland 2 Drain	82.7%	61.5%	-83.4%	87.8%
P Drain	44.4%	36.8%	-6.4%	62.5%
Pumice Drain	no data	no data	no data	no data

*Cumulative Reduction compares pre-TMDL loads to 2006 loads

The negative load reduction values in 2005 and 2006 indicate an increase in sediment load from the previous year. An increase in sediment load from one year to the next may result from increases in agriculture runoff volumes, increases of drain maintenance activities, increases in rainfall that causes more runoff, etc. The cumulative reduction is the important value in terms of reaching TMDL targets.

5.1 TMDL TARGETS

The silt TMDL numeric targets are measured using total suspended solids (TSS) as an indicator of silt. The final numeric target, defined in the Basin Plan, is 200 mg/l TSS, with interim numeric targets as detailed in Section 2, above.

The TMDLs are currently in Phase 2 of implementation. Phase 2 has interim targets of 240 mg/l TSS for the Alamo River, 213 mg/l TSS for the New River, and 282 mg/l TSS for the Imperial Valley Drains. Phase 2 requires reductions totaling 40%, 12%, and 35% respectively.

Overall, most sampling locations on the New River, Alamo River, and major drains are already in compliance with the Phase 2 numeric targets and are on schedule for attaining the final TMDL numeric target. Regional Board staff is pleased with the overall success of the ICFB's TMDL Program at reducing

sediment in the Alamo River, New River, and Imperial Valley Drains. Cumulative percent load reductions show progress towards TMDL targets. We remain concerned about IID's maintenance operations.

Table 5.6 compares pre-TMDL TSS measurements at the river outlets with the numeric target for the Silt TMDLs.

TABLE 5.6: Comparison of Pre-TMDL Conditions to Numeric Target

Location:	*Pre - TMDL TSS (mg/L)	*Pre-TMDL Load (tons/year)	Reduction Needed	Target TSS (mg/L)	Approximate Loading Needed (tons/year)
Alamo River at Garst Road Bridge	377	329,399	47%	200	175,000
New River at Lack Road Bridge	241	154,452	17%	200	128,195
Niland 2 Drain	410	705	51%	200	344
P Drain	235	859	15%	200	731
Pumice Drian	610	13640	67%	200	4472

Source: Colorado River Basin Region, 2001, 2002, and 2005

Suspended sediment concentrations tend to increase in the downstream direction (Huston et al. 2000). Therefore, the outlets of the Alamo River and the New River to the Salton Sea are the locations with the greatest need of reduction in TSS and turbidity. At this time, Regional Board staff use the outlets of the Alamo and New Rivers to the Salton Sea to measure compliance with TMDL numeric targets. These locations correspond to New River at Garst Road and Alamo River at Lack Road sampling locations. The Imperial Valley Drains TMDL measures compliance at the outlets of each drain to the Salton Sea.

The selected sample location graphs below show data from the beginning of the Regional Board monitoring program in 2003 through 2006. Graphs of all sampling location data are attached in Appendix C.

Figure 5: Alamo River Silt TMDL Targets vs. TSS concentrations over time

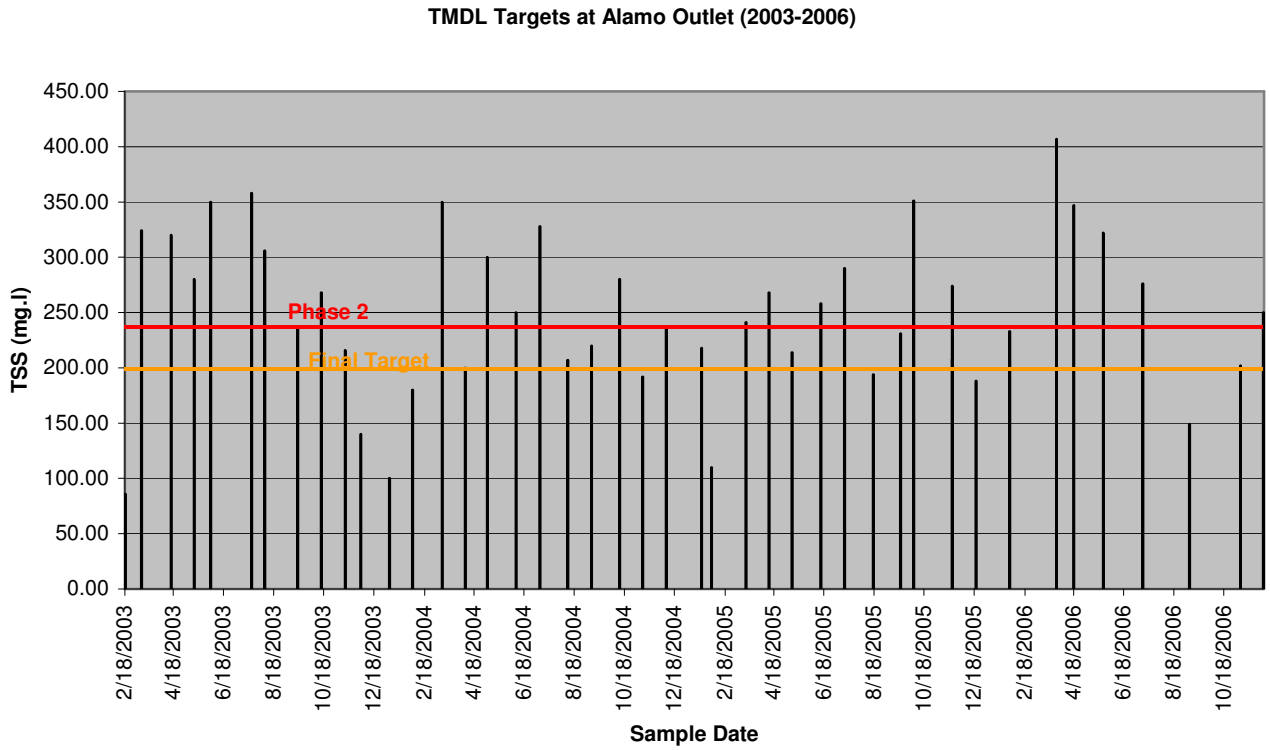
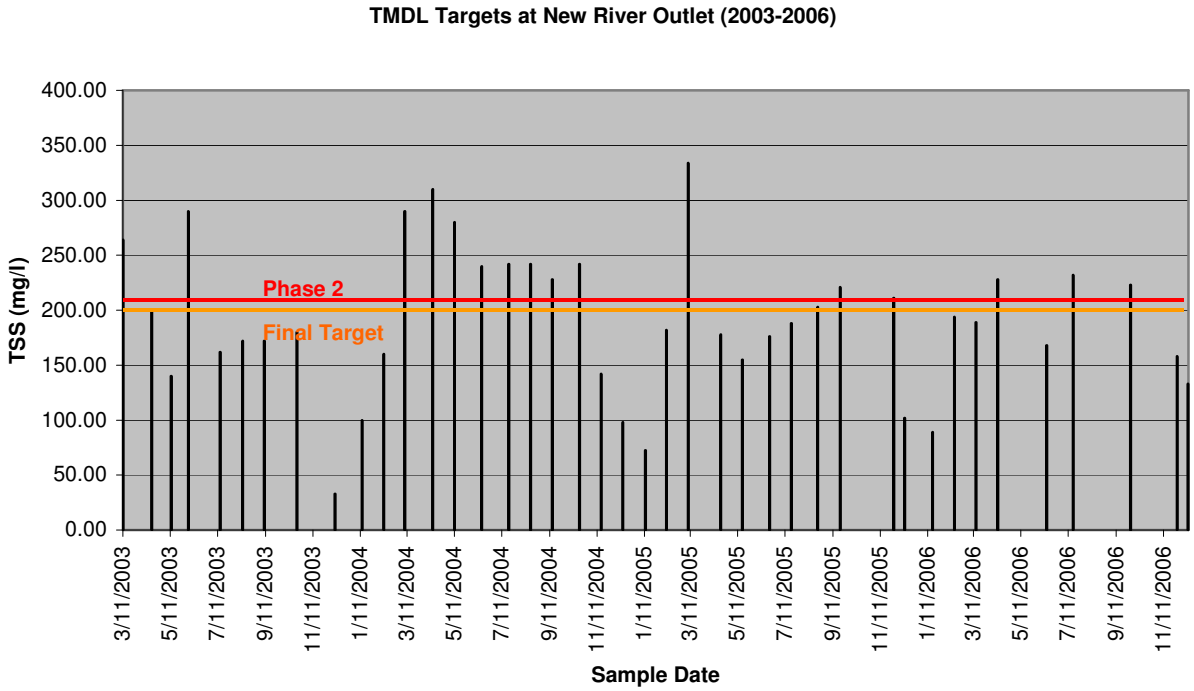


Figure 6: New River Silt TMDL Targets vs. TSS concentrations over time



*2006 New River data are provisional

Figure 7: Niland 2 Drain Silt TMDL Targets vs. TSS concentrations over time

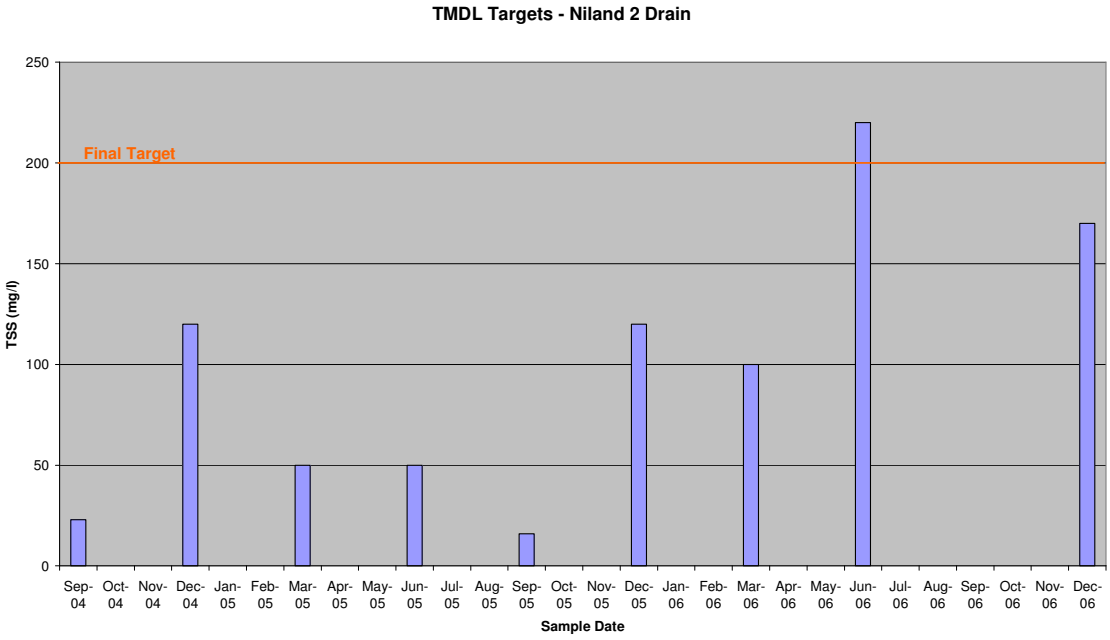


Figure 8: P Drain Silt TMDL Targets vs. TSS concentrations over time

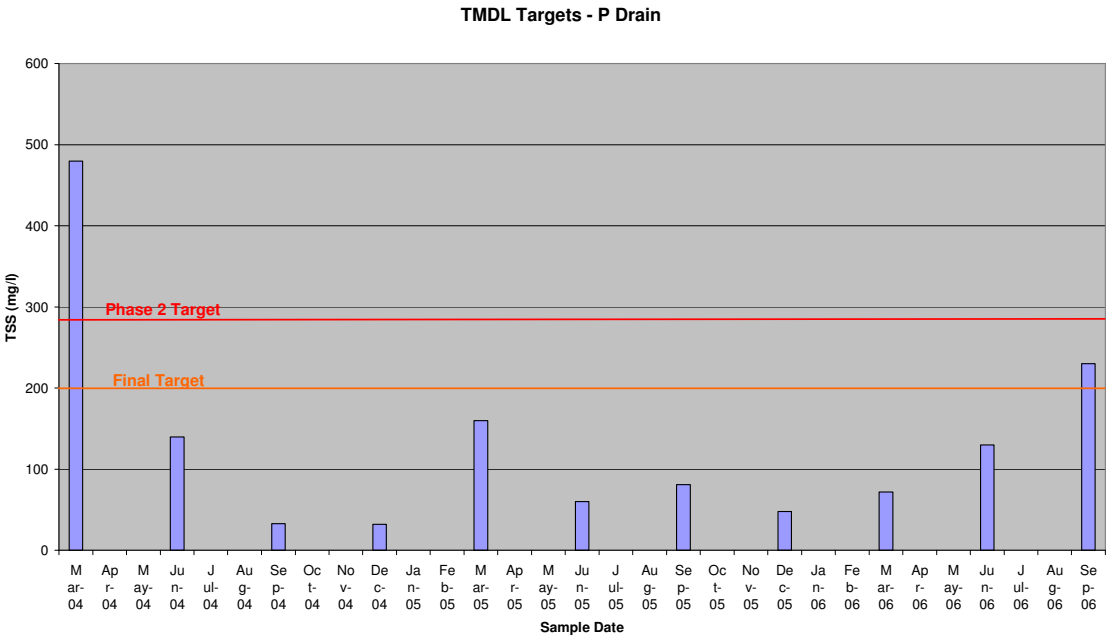
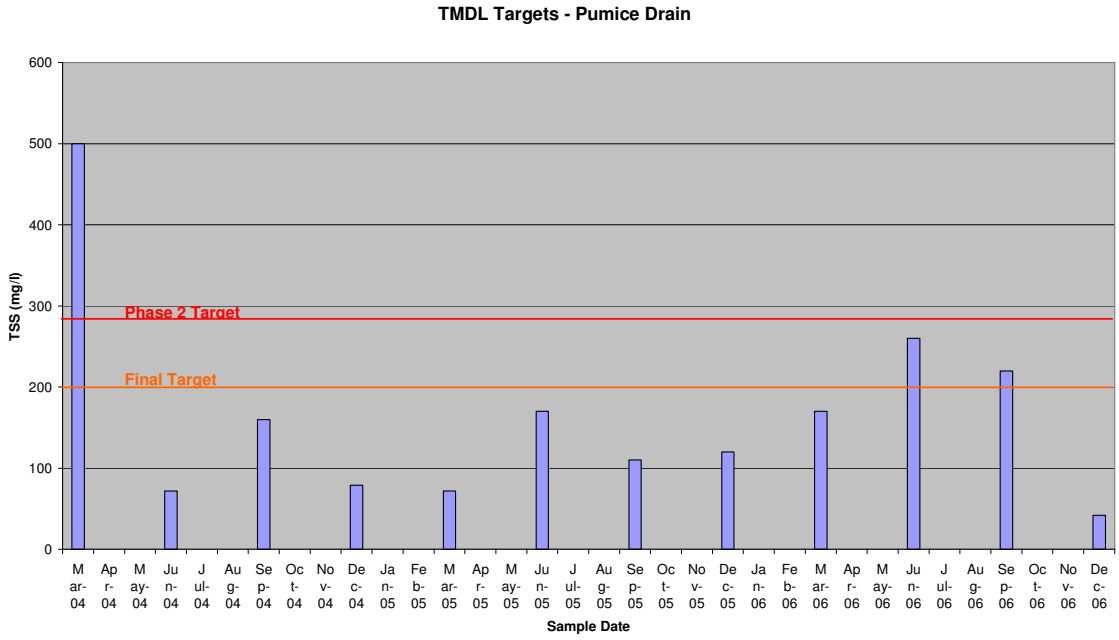


Figure 9: Pumice Drain Silt TMDL Targets vs. TSS concentrations over time



5.2 DATA TRENDS

A seasonal trend in TSS concentrations is evident in the New and Alamo Rivers and Imperial Valley Drains. The seasonal trend is a result of seasonal irrigation practices that have a direct effect on the amount of agricultural runoff to the drains and rivers. Evident from the graphs below, a significant annual decrease in TSS concentrations occurs during the winter months. Highest TSS concentrations are found during the spring and summer months. This corresponds to a similar trend in IID water deliveries.

Figure 10: Alamo River TSS concentrations at the outlet to the Salton Sea (2003-2006)

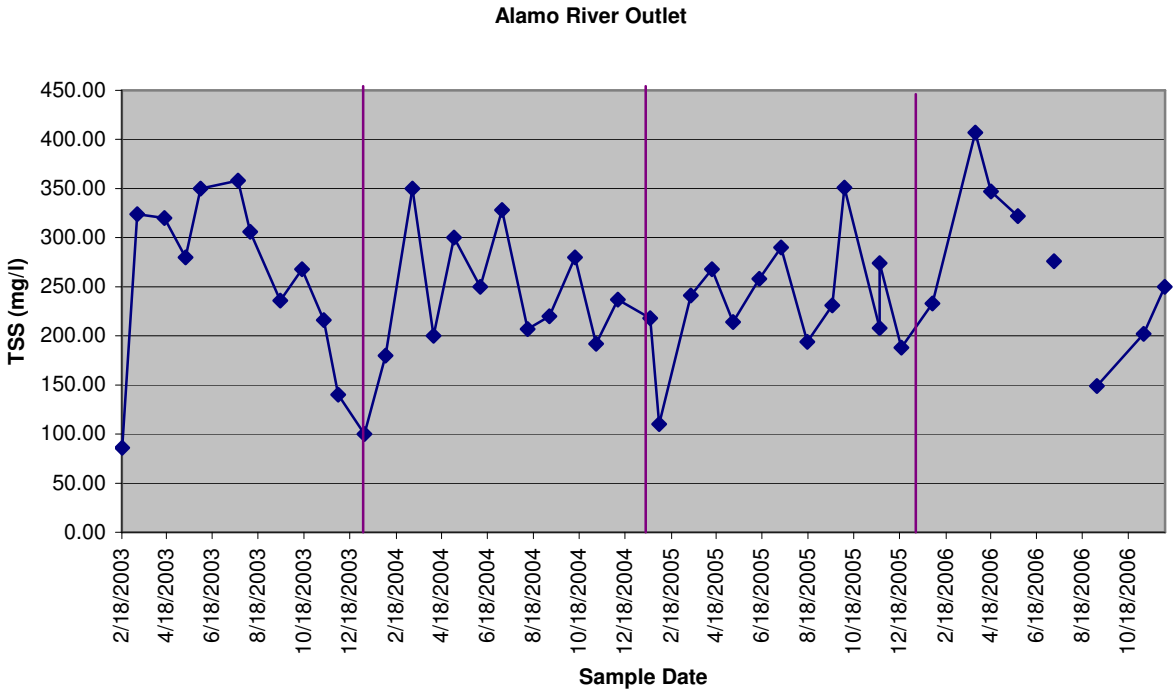
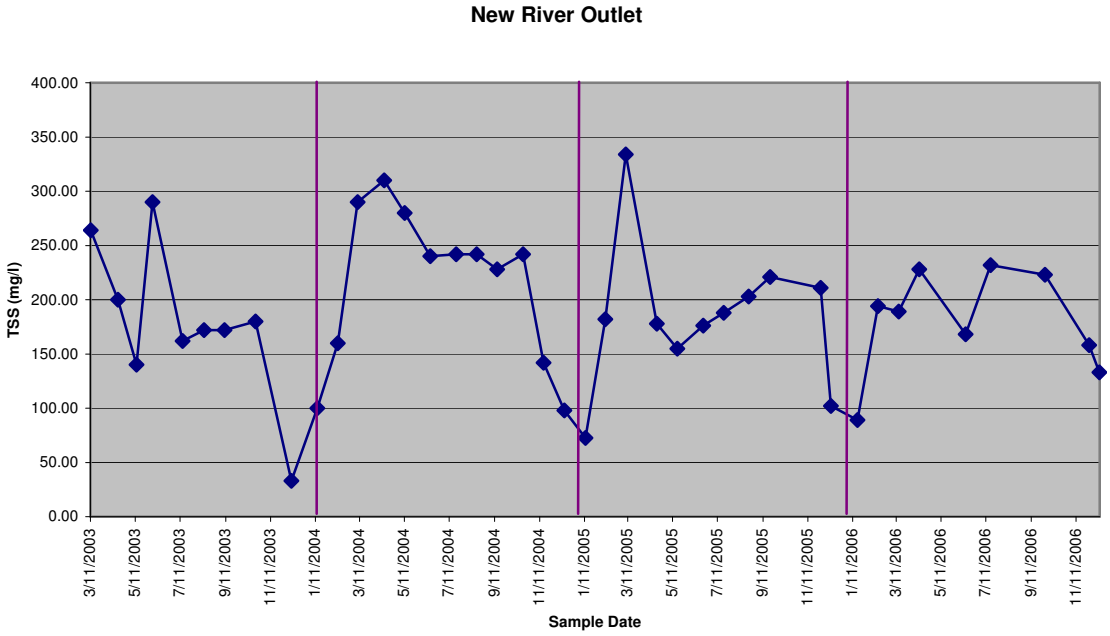
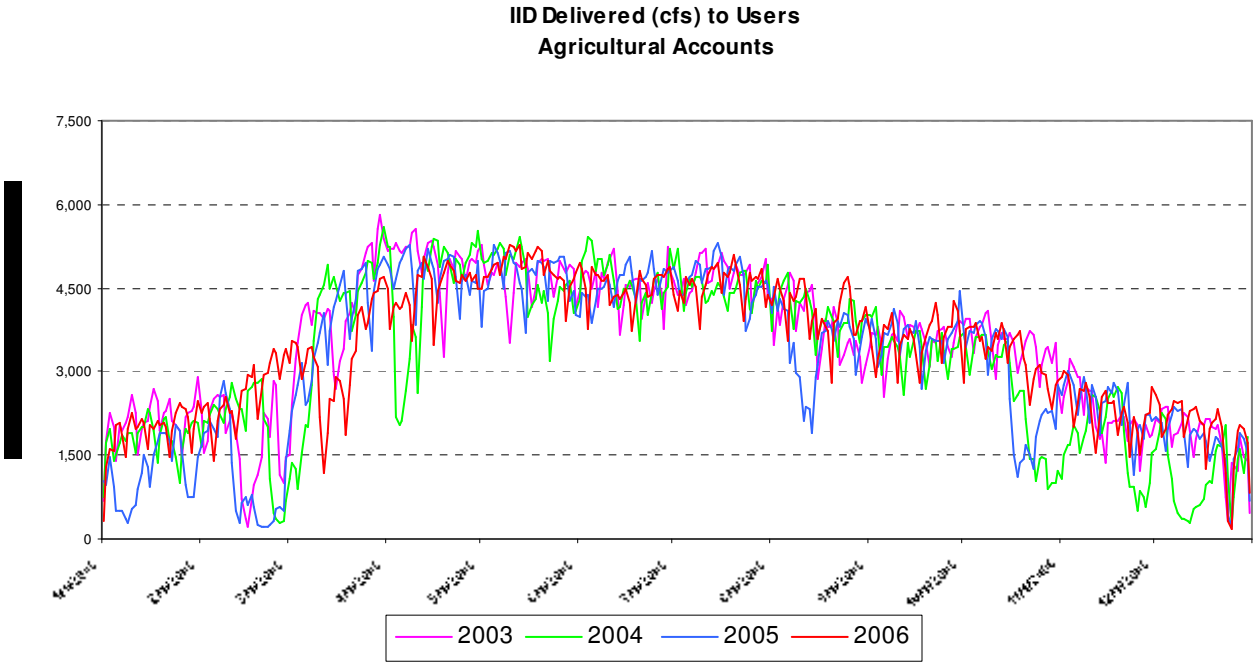


Figure 11: New River TSS concentrations at the outlet to Salton Sea (2003-2006)



*New River 2006 data are estimated

Figure 12: Imperial Irrigation District Canal Deliveries Annual Trend (2003-2006)



If the seasonal trend is eliminated from the data set, and we compare monthly data rather than annual data, the change in TSS concentrations over time will be seen at each sampling location. For example, during the month of March during the period of the data set, fluctuations in TSS concentrations are seen at each Alamo River sample location. Most of the 2005 concentrations at the Alamo River sample locations during the month of March are less than the 2003 concentrations. In 2006, the concentrations increase to greater than 2003 concentrations. See Figure 13, below, that illustrates the month of March on the Alamo River. Please see Appendix C for all monthly graphs.

Figure 13: Alamo River TSS concentrations at all sampling locations in the month of March (2003-2004)

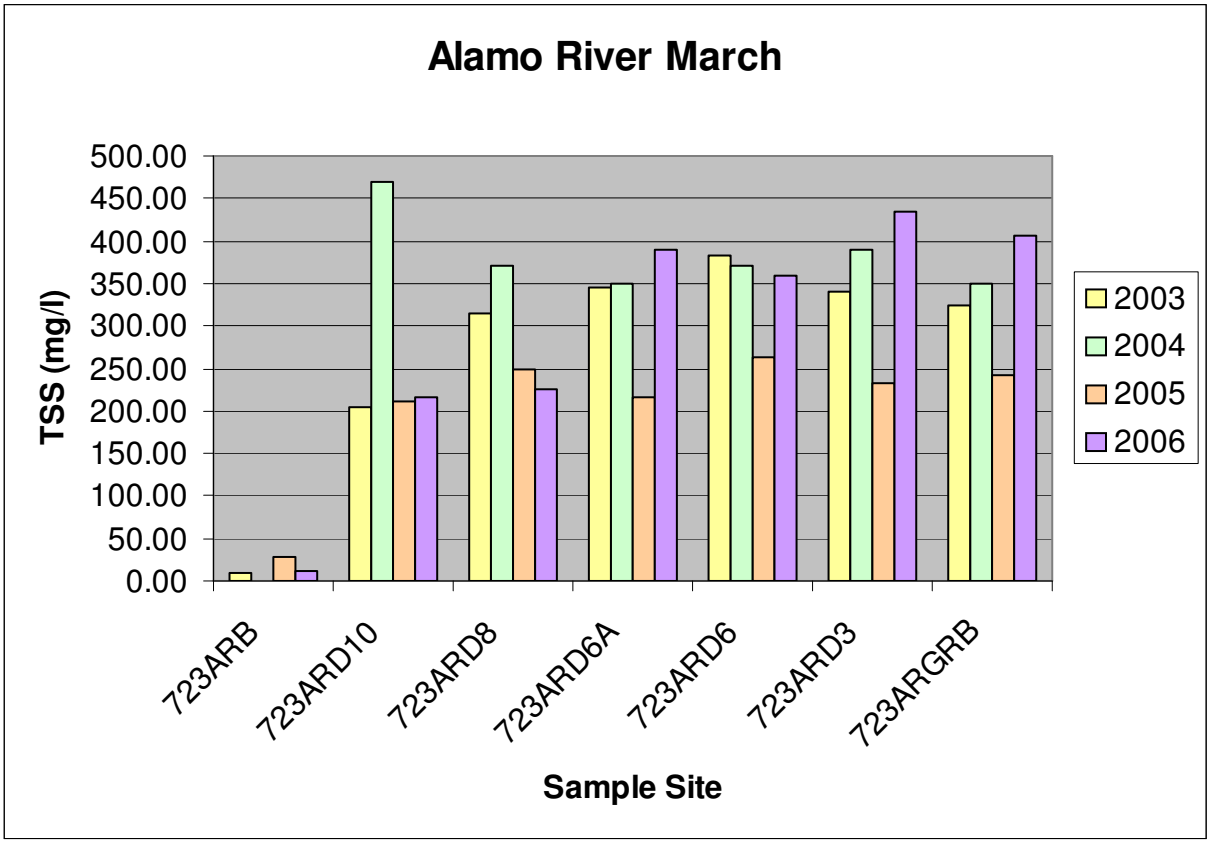
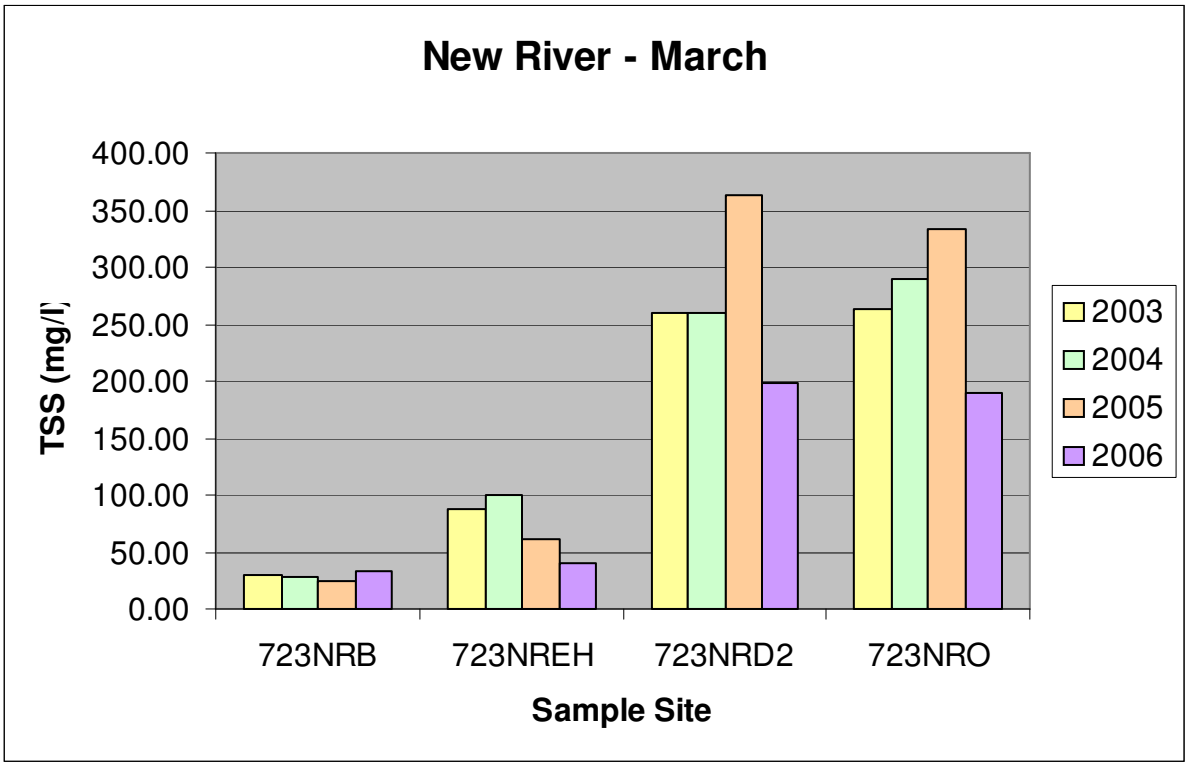


Figure 14: New River TSS concentrations at all sampling locations in the month of March (2003-2004)



*New River 2006 data are provisional

The New River during the month of March, Figure 14, shows 2005 concentrations increase from the 2003 concentrations at the Drop 2 and Outlet sample locations. The 2006 concentrations at Drop 2 and the Outlet are below 2003 concentrations.

The Imperial Valley agriculture drains that feed the New and Alamo Rivers create a system dominated by anthropogenic variables. Each year of water quality data is influenced by the practices of responsible parties (farmers, IID, USEPA). Each year of TSS data will be different based on variables such as cropping patterns, water deliveries, BMP implementation, drain maintenance activities, and fluctuating stream flows related to QSA mitigation. The up and down trend from year to year is evident at all sample locations. All monthly graphs are attached in Appendix C.

6. TMDL COMPLIANCE

In general, annual averages and monthly trends at the points of compliance show decreases in TSS concentrations from pre-TMDL concentrations.

Table 6.1: Annual Average TSS Concentrations (mg/L) at the River Outlets

Sample Location	TMDL Target	Pre-TMDL	2003	2004	2005	2006
Alamo River Outlet	200	377	262	237	236	327
New River Outlet	200	271	179	215	184	207
Niland 2 Drain	200	410	N/A	72	59	123
P Drain	200	235	N/A	171	87	144
Pumice Drain	200	610	N/A	203	118	173

The outlets of the rivers and drains to the Salton Sea are the Regional Board staff's points of compliance with TMDL numeric targets. Alamo River and New River Phase 2 targets, to be met in 2007 and 2008, (240 mg/l Alamo River, 213 mg/l New River) were met in 2004 and 2005. Increases in 2006 annual averages resulted in Alamo River exceeding the Phase 2 target in 2006. Nevertheless, progress towards attaining TMDL targets is apparent.

7. CONCLUSIONS

Progress is being made towards reaching TMDL milestones. However, continued efforts are necessary to achieve final targets by 2014. At this time, Regional Board staff does not recommend de-listing the Alamo River, New River, or Imperial Valley Drains from the 303(d) list for impairment by sediment.

Problem areas, such as the lower Alamo River watershed, seem to produce more sediment in runoff than other areas. Possible reasons include soil type, cropping patterns, slope, or drain maintenance activities. IID identified “problem drains” via their Drain Water Quality Improvement Plan Monitoring Program. These problem drains include Munyon Drain, Oleander Drain, and Magnolia Drain

Regional Board staff is concerned about the effects IID dredging operations have on sediment concentrations. During a May, 2007 IID Board Meeting, Regional Board staff learned that IID drain maintenance and dredging continue to cause increases in sediment loads in the Alamo River, New River, and Imperial Valley Drains. Regional Board staff will be working with IID and ICFB to address this issue.

Imperial County Farm Bureau continues to educate farmers, including new farmers to Imperial Valley and Imperial Valley seasonal growers, and conducts TMDL outreach events to the farming community. It is diligently managing and implementing its 319(h) grants.

Regional Board staff recommends watershed groups be organized in problem areas throughout the watershed. Problem areas include the middle and lower Alamo River and the lower New River. Watershed groups comprised of local farmers/growers should work together with the IID to focus on controlling sediment discharges. Regional Board staff will coordinate with watershed groups to facilitate effective working groups and to provide technical assistance.

8. REFERENCES

Colorado River Basin Regional Water Quality Control Board. *Colorado River Basin Region Water Quality Control Plan*. Palm Desert, CA. Updated October 2005.

Colorado River Basin Regional Water Quality Control Board. *Alamo River Sedimentation/Siltation TMDL and Implementation Plan*. Palm Desert, CA. 2001.

Colorado River Basin Regional Water Quality Control Board. *Sedimentation/Siltation TMDL for the Imperaial Valley Drains: Niland 2, P, and Pumice and Implementation Plan*. Palm Desert, CA. 2005.

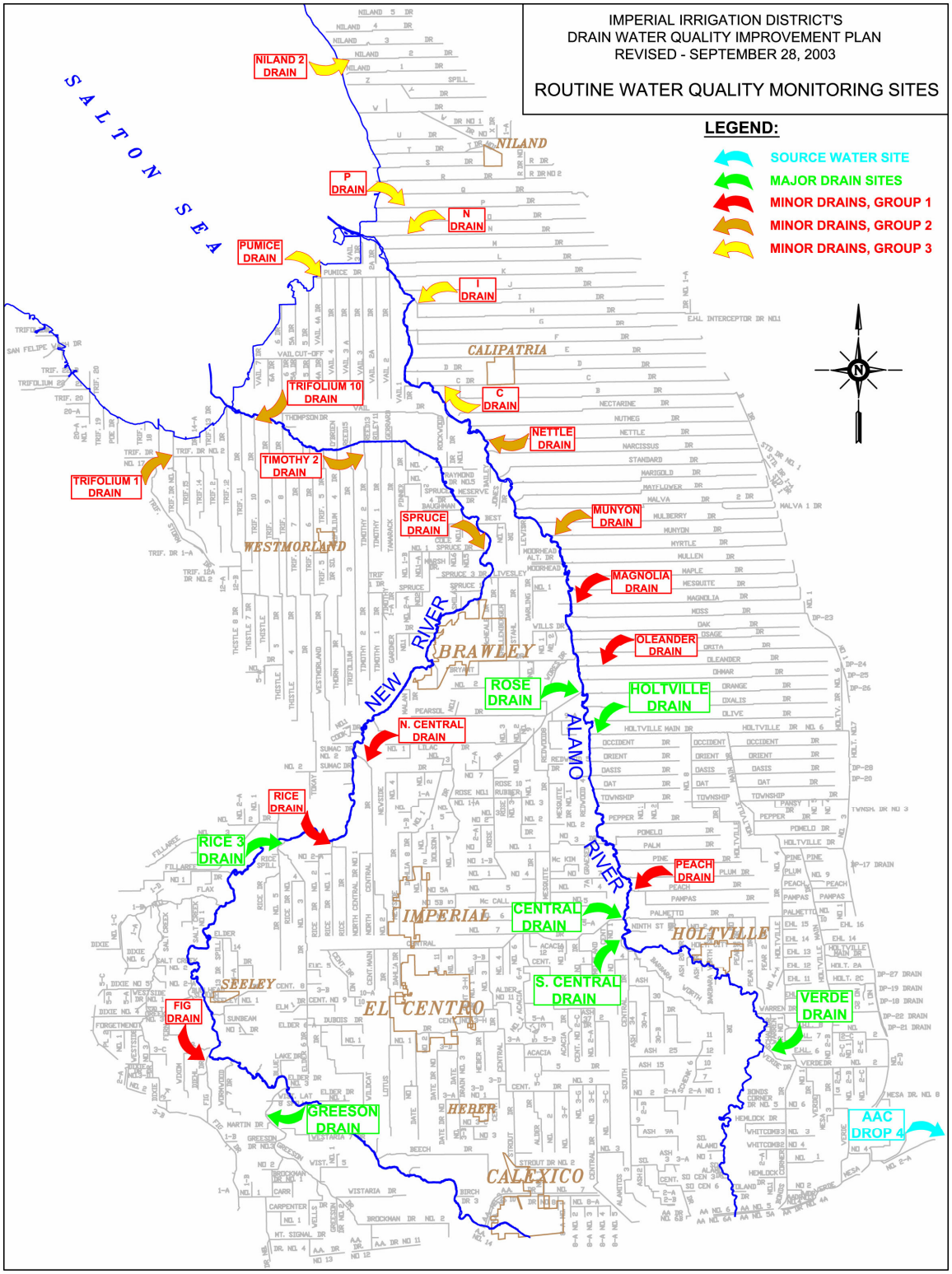
Colorado River Basin Regional Water Quality Control Board. *New River Sedimentation/Siltation TMDL and Implementation Plan*. Palm Desert, CA. 2002.

Huston et al. *New and Alamo Rivers Project. Preliminary Data Collection and Analysis for Development of Hydrodynamic and Water Quality River Models*. Prepared for Salton Sea Authority and State Water Resources Control Board. January 2000.

Imperial County Farm Bureau. *Total Suspended Solids Concentration Reduction and Sediment Load Reduction Report for the Imperial County Farm Bureau – TMDL Program*. SWRCB Grant No. 04-294-557-1. El Centro, CA. May 2007.

APPENDIX A - MAPS

Imperial Irrigation District Drain Water Quality Improvement Plan Drain Map



Regional Water Quality Control Board Alamo River and New River Silt TMDL Sampling Location Map

APPENDIX B - WATER QUALITY DATA TABLES

Table 1: RB7 Alamo River TSS (mg/l) Data

Date	SAMPLING LOCATIONS						
	Border	Drop 10	Drop 8	Drop 6A	Drop 6	Drop 3	Outlet
Jan 03							
Feb 03	6	284	260	164	184	90	86
Mar 03	9	204	314	344	382	340	324
Apr 03	13	210	280	310	290	320	320
May 03	23	260	280	170	250	240	280
Jun 03	20	340	370	380	370	350	350
Jul 03		306	332	368	326	380	358
Aug 03		126	224	228	288	292	306
Sep 03		172	170	188	240	302	236
Oct 03		226	258	280	256	284	268
Nov 03		120	122	124	152	252	216
Dec 03		51	37	45	120	86	140
AVERAGE	14	209	241	236	260	267	262
Jan 04		25	55	68	82	120	100
Feb 04	21	210	220	190	250	230	180
Mar 04		470	370	350	370	390	350
Apr 04		300	310	270	240	230	200
May 04		290	380	350	350	280	300
Jun 04		210	290	230	230	250	250
Jul 04		276	196	208	336	288	328
Aug 04	6	152	148	227	235	255	207
Sep 04		246	196	176	160	240	220
Oct 04		144	169	162	200	258	280
Nov 04		150	102	174	138	176	192
Dec 04		107		135	178	210	237
AVERAGE	**14**	**215**	**221**	**212**	**231**	**244**	**237**
Jan 05	20	107	201	229	211	233	218
Feb 05		130	106	95	112	172	110
Mar 05	28	211	250	216	262	233	241
Apr 05	42	157	243	200	272	311	268
May 05	32	116	148	162	153	189	214
Jun 05	27	140	266	225	203	219	258
Jul 05	16	184	418	294	342	266	290
Aug 05		127	169	126	208	222	194
Sep 05	10	131	126	89	253	256	231
Oct 05	33	149	162	186	340	349	351

Nov 05	1	95	122	145	171	208	241
Dec 05	20	82	131	109	180	129	188
AVERAGE	**23**	**136**	**195**	**173**	**226**	**232**	**234**
Jan 06	12	107	112	126	218	184	233
Feb 06							
Mar 06	13	217	225	389	360	435	407
Apr 06	39	237	308	274	320	377	347
May 06		236	188	313	268	383	322
Jun 06	34	246	299	226	282	250	
Jul 06	208	228	202		250	292	276
Aug 06							
Sep 06		190	172	160	336	154	148
Oct 06							
Nov 06	96	87	115	78	132	196	202
Dec 06	29	28	105	94	113	187	250
AVERAGE	**61**	**175**	**192**	**208**	**253**	**273**	**273**

Table 1: RB7 New River TSS (mg/l) Data

Date	SAMPLING LOCATIONS			
	Border	Even Hewes	Drop 2	Outlet
Jan 03				
Feb 03				
Mar 03	30	88	260	264
Apr 03	33	120	220	200
May 03	40	100	220	140
Jun 03	56	150	330	290
Jul 03	35	108	254	162
Aug 03	20	78	278	172
Sep 03	22	92	236	172
Oct 03	24	102	200	180
Nov 03				
Dec 03	12	18	55	33
AVERAGE	**30**	**95**	**228**	**179**
Jan 04	34	110	48	100
Feb 04	33	85	160	160
Mar 04	28	100	260	290
Apr 04	23	72	260	310
May 04	33	140	290	280
Jun 04	59	130	250	240
Jul 04	48	84	274	242
Aug 04	48	84	274	242
Sep 04	42	80	224	228
Oct 04	46	110	204	242
Nov 04	60	56	111	142
Dec 04	25	29	53	98
AVERAGE	**40**	**90**	**201**	**215**
Jan 05	15	26		73
Feb 05	18	67	147	182
Mar 05	25	61	364	334
Apr 05	40	143	204	178
May 05	32	121	153	155
Jun 05	105	122	119	176
Jul 05	42	108	162	188
Aug 05	47	120	190	203
Sep 05	173	80	155	221
Oct 05				
Nov 05	39	80	247	211
Dec 05	31	34	532	102
AVERAGE	**51**	**88**	**227**	**184**

Jan 06	28	25	58	89
Feb 06	29	37	112	194
Mar 06	34	41	199	189
Apr 06	18	68	184	228
May 06	47	146		
Jun 06	49	172	220	168
Jul 06		120	194	232
Aug 06				
Sep 06	45	60	178	223
Oct 06	60	94	220	
Nov 06	44	58	64	158
Dec 06	48	58	51	133
AVERAGE	**40**	**80**	**148**	**179**

IID TSS data from major drains draining into the Alamo River

Verde Drain		South Central Drain		Central Drain		Holtville Main Drain		Rose Drain	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
2/24/04 14:10	190	2/24/04 13:47	170	2/24/04 13:36	270	2/24/04 13:13	250	2/24/04 12:55	550
3/23/04 11:36	220	3/23/04 11:15	450	3/23/04 11:05	380	3/23/04 10:43	240	3/23/04 10:25	400
4/20/04 11:10	150	4/20/04 10:47	210	4/20/04 10:35	300	4/20/04 9:58	230	4/20/04 9:17	380
5/18/04 12:50	130	5/18/04 12:18	360	5/18/04 12:05	280	5/18/04 11:27	280	5/18/04 11:43	420
6/15/04 11:04	120	6/15/04 10:36	260	6/15/04 10:24	270	6/15/04 9:45	250	6/15/04 10:03	350
7/20/04 10:07	210	7/20/04 9:46	500	7/20/04 9:33	260	7/20/04 9:00	370	7/20/04 8:11	160
8/17/04 13:03	73	8/17/04 12:32	71	8/17/04 12:19	240	8/17/04 11:48	380	8/17/04 11:29	240
9/21/04 9:15	110	9/21/04 9:45	120	9/21/04 10:00	210	9/21/04 10:47	350	9/21/04 10:30	300
10/20/04 11:45	140	10/20/04 12:11	210	10/20/04 12:33	150	10/20/04 13:26	370	10/20/04 13:12	160
11/17/04 9:43	82	11/17/04 10:10	270	11/17/04 10:22	130	11/17/04 11:03	370	11/17/04 10:48	210
12/15/04 11:56	80	12/15/04 11:35	160	12/15/04 11:26	96	12/15/04 10:54	180	12/15/04 11:06	180
1/12/05 12:00	44	1/12/05 12:33	96	1/12/05 12:45	130	1/12/05 13:33	170	1/12/05 13:20	160
2/9/05 10:40	100	2/9/05 11:05	410	2/9/05 11:20	170	2/9/05 11:55	340	2/9/05 11:40	280
3/21/05 14:03	150	3/21/05 13:42	260	3/21/05 13:24	320	3/21/05 12:30	170	3/21/05 13:00	150
4/13/05 11:15	140	4/13/05 11:45	250	4/13/05 12:05	300	4/13/05 13:20	280	4/13/05 13:02	340
5/17/05 9:25	160	5/17/05 9:55	220	5/17/05 10:05	340	5/17/05 10:50	260	5/17/05 10:30	430
6/2/05 12:10	180	6/2/05 11:35	290	6/2/05 11:25	320	6/2/05 10:55	210	6/2/05 11:05	280
7/12/05 11:20	95	7/12/05 11:40	370	7/12/05 11:50	230	7/12/05 12:40	290	7/12/05 12:25	320
8/2/05 9:45	70	8/2/05 10:30	270	8/2/05 10:45	200	8/2/05 11:30	340	8/2/05 11:20	250
9/12/05 10:00	25	9/12/05 10:26	380	9/12/05 10:46	180	9/12/05 11:23	150	9/12/05 11:07	390
10/5/05 10:50	56	10/5/05 11:15	140	10/5/05 11:26	240	10/5/05 12:24	190	10/5/05 12:07	310
11/16/05 10:17	83	11/16/05 10:47	300	11/16/05 11:00	150	11/16/05 11:46	220	11/16/05 11:25	220
12/7/05 14:05	44	12/7/05 13:42	350	12/7/05 13:31	180	12/7/05 12:52	170	12/7/05 13:06	170
1/11/06 10:40	46	1/11/06 11:05	290	1/11/06 11:17	280	1/11/06 12:20	250	1/11/06 12:00	330
2/7/06 13:48	220	2/7/06 13:23	340	2/7/06 13:06	260	2/7/06 11:50	280	2/7/06 12:12	200
3/14/06 9:54	130	3/14/06	300	3/14/06	370	3/14/06	260	3/14/06	190

		10:20		10:35		11:45		11:20	
4/6/06 10:35	150	4/6/06 11:00	470	4/6/06 11:15	430	4/6/06 12:30	310	4/6/06 12:00	260
5/4/06 10:30	160	5/4/06 10:53	330	5/4/06 11:00	310	5/4/06 11:50	220	5/4/06 11:30	180
6/6/06 13:21		6/6/06 13:00	310	6/6/06 12:47	250	6/6/06 11:54	280	6/6/06 12:12	270
7/25/06 11:33	140	7/25/06 12:21	160	7/25/06 12:32	200	7/25/06 13:20	250	7/25/06 13:00	120
8/23/06 12:57	88	8/23/06 12:20	48	8/23/06 12:06	78	8/23/06 11:12	180	8/23/06 11:30	200
9/13/06 13:31	55	9/13/06 13:16	380	9/13/06 13:03	140	9/13/06 12:38	160	9/13/06 12:22	190
10/25/06 11:50	54	10/25/06 12:15	220	10/25/06 12:24	140	10/25/06 13:28	85	10/25/06 13:10	120
11/14/06 9:37	56	11/14/06 9:56	420	11/14/06 10:10	170	11/14/06 11:30	120	11/14/06 11:10	450
12/12/06 13:15	83	12/12/06 12:50	220	12/12/06 12:45	150	12/12/06 12:05	110	12/12/06 12:20	270
AVERAGE	**113**	**AVERAGE**	**274**	**AVERAGE**	**232**	**AVERAGE**	**245**	**AVERAGE**	**269**

IID TSS data from major drains draining into the New River

Greeson Drain		Rice 3 Drain	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
2/24/04 8:57	170	2/24/04 9:35	230
3/23/04 7:25	210	3/23/04 7:54	380
4/20/04 7:40	120	4/20/04 8:28	310
5/18/04 7:03	180	5/18/04 7:32	350
6/15/04 6:19	200	6/15/04 6:45	330
7/20/04 6:05	120	7/20/04 6:55	300
8/17/04 7:16	270	8/17/04 7:55	500
9/21/04 7:53	140	9/21/04 13:17	60
10/20/04 9:56	360	10/20/04 9:05	29
11/17/04 7:54	190	11/17/04 7:15	67
12/15/04 7:18	73	12/15/04 7:51	49
1/12/05 10:30	74	1/12/05 8:50	91
2/9/05 9:10	97	2/9/05 14:25	490
3/21/05 8:28	140	3/21/05 9:20	250
4/13/05 9:45	70	4/13/05 9:00	190
5/17/05 8:05	170	5/17/05 14:10	150
6/2/05 14:45		6/2/05 8:05	280
7/12/05 9:00	200	7/12/05 8:10	110
8/2/05 8:25	57	8/2/05 7:55	66
9/12/05 8:35	160	9/12/05 8:05	170
10/5/05 8:50	200	10/5/05 8:00	210
11/16/05 8:20	68	11/16/05 7:45	52
12/7/05 9:10	120	12/7/05 9:48	63
1/11/06 10:00	150	1/11/06 8:40	250
2/7/06 8:11	140	2/7/06 9:16	120

3/14/06 8:25	110	3/14/06 14:25	250
4/6/06 8:30	130	4/6/06 7:55	140
5/4/06 8:17	250	5/4/06 7:46	420
6/6/06 8:11	230	6/6/06 8:50	380
7/25/06 10:20	130	7/25/06 8:56	92
8/23/06 14:07	98	8/23/06 7:35	82
9/13/06 8:11	290	9/13/06 8:51	140
10/25/06 9:35	130	10/25/06 8:50	24
11/14/06 8:32	52	11/14/06 8:00	33
12/12/06 8:15	50	12/12/06 9:00	18
AVERAGE	**151**	**AVERAGE**	**191**

IID TSS data from minor drains draining into the Alamo River

Peach Drain		**Oleander Drain**		**Magnolia Drain**		**Munyon Drain**		**Nettle Drain**	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
4/20/04 10:21	370	4/20/04 9:47	210	4/20/04 9:33		2/24/04 12:25	160	5/17/05 11:45	390
7/20/04 9:20	39	7/20/04 8:49	69	7/20/04 8:36	180	5/18/04 11:08	180	8/2/05 12:10	67
10/20/04 12:53	430	10/20/04 13:40	280	10/20/04 13:53	1100	8/17/04 11:08	310	11/16/05 13:05	54
1/12/05 13:00	69	1/12/05 13:46	710	1/12/05 14:00	840	11/17/04 11:23	750	2/7/06 11:00	1000
4/13/05 12:35	150	4/13/05 13:30	330	4/13/05 13:45	92	2/9/05 12:15	160	5/4/06 12:25	270
7/12/05 12:00	30	7/12/05 12:55	370	7/12/05 13:05	110	5/17/05 11:10	360	8/23/06 9:20	200
10/5/05 11:40	84	10/5/05 12:36	960	10/5/05 12:48	20	8/2/05 11:55	200	11/14/06 12:30	340
1/11/06 11:30	260	1/11/06 12:30	610	1/11/06 12:45	67	11/16/05 12:09	87		
4/6/06 11:30	880	4/6/06 12:45	140	4/6/06 13:00	170	2/7/06 11:31	540		
7/25/06 12:42	16	7/25/06 13:30	180	7/25/06 13:40	140	5/4/06 12:10	250		
10/25/06 12:40	38	10/25/06 13:36	290	10/25/06 13:50	85	8/23/06 9:51	77		
						11/14/06 11:48	250		
AVERAGE	**215**	**AVERAGE**	**377**	**AVERAGE**	**280**	**AVERAGE**	**277**	**AVERAGE**	**332**

C Drain		**I Drain**		**N Drain**	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
3/23/04 9:57	470	3/23/04 9:43	640	3/23/04 8:55	20
6/15/04 8:54	380	6/15/04 8:37	92	6/29/04 10:00	430
9/21/04 11:20	300	9/21/04 11:35	31	9/21/04 11:50	170
12/15/04 10:28	44	12/15/04 10:14	96	12/15/04 9:24	230
3/21/05 11:57	76	3/21/05 11:40	130	3/21/05 10:36	350
6/2/05 10:20	180	6/2/05 10:05	240	6/2/05 9:10	430
9/12/05 12:00	120	9/12/05 12:16	470	9/12/05 12:30	24
12/7/05 12:06	20	12/7/05 11:45	120	12/7/05 10:56	76
3/14/06 12:13	58	3/14/06 12:30	36	3/14/06 13:15	81
6/6/06 11:15	240	6/6/06 11:00	240	6/6/06 10:04	330
9/13/06 11:24	490	9/13/06 11:10	140	9/13/06 10:18	250
12/12/06 11:35	670	12/12/06 11:25	350	12/12/06 10:15	1000

AVERAGE	**254**	**AVERAGE**	**215**	**AVERAGE**	**283**

IID TSS data from minor drains draining into the New River

Fig Drain		Rice Drain		North Central Drain		Spruce Drain		Timothy 2 Drain	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
4/20/04 8:00	94	4/20/04 8:38	66	4/20/04 8:52	110	2/24/04 11:35	120	2/24/04 11:15	200
7/20/04 6:27	130	7/20/04 7:06	110	7/20/04 7:20	0	5/18/04 10:30	42	5/18/04 9:33	150
10/20/04 9:39	330	10/20/04 8:48	16	10/20/04 14:23	31	8/17/04 10:17	13	8/17/04 9:57	12
1/12/05 10:10	36	1/12/05 8:35	73	1/12/05 14:30	82	11/17/04 12:00	210	11/17/04 12:40	50
4/13/05 9:25	210	4/13/05 8:35	67	4/13/05 14:10	240	2/9/05 12:55	480	2/9/05 13:16	490
7/12/05 8:45	100	7/12/05 7:55	360	7/12/05 13:30	25	5/17/05 11:25	38	5/17/05 13:40	78
10/5/05 8:30	88	10/5/05 7:45	130	10/5/05 13:11	59	8/2/05 12:20	38	8/2/05 12:50	56
1/11/06 9:25	54	1/11/06 8:23	32	1/11/06 14:45	120	11/16/05 12:51	85	11/16/05 13:28	100
4/6/06 8:15	58	4/6/06 7:40	65	4/6/06 7:20	NR	2/7/06 11:16	230	2/7/06 10:40	120
7/25/06 10:00	130	7/25/06 8:33	300	7/25/06 8:11	17	5/4/06 12:36	150	5/4/06 12:55	110
10/25/06 9:14	72	10/25/06 8:29	76	10/25/06 8:20	22	8/23/06 9:35	14	8/23/06 8:57	170
						11/14/06 12:16	35	11/14/06 12:45	50
								5/18/04 9:09	160
AVERAGE	**118**	**AVERAGE**	**118**	**AVERAGE**	**71**	**AVERAGE**	**121**	**AVERAGE**	**134**

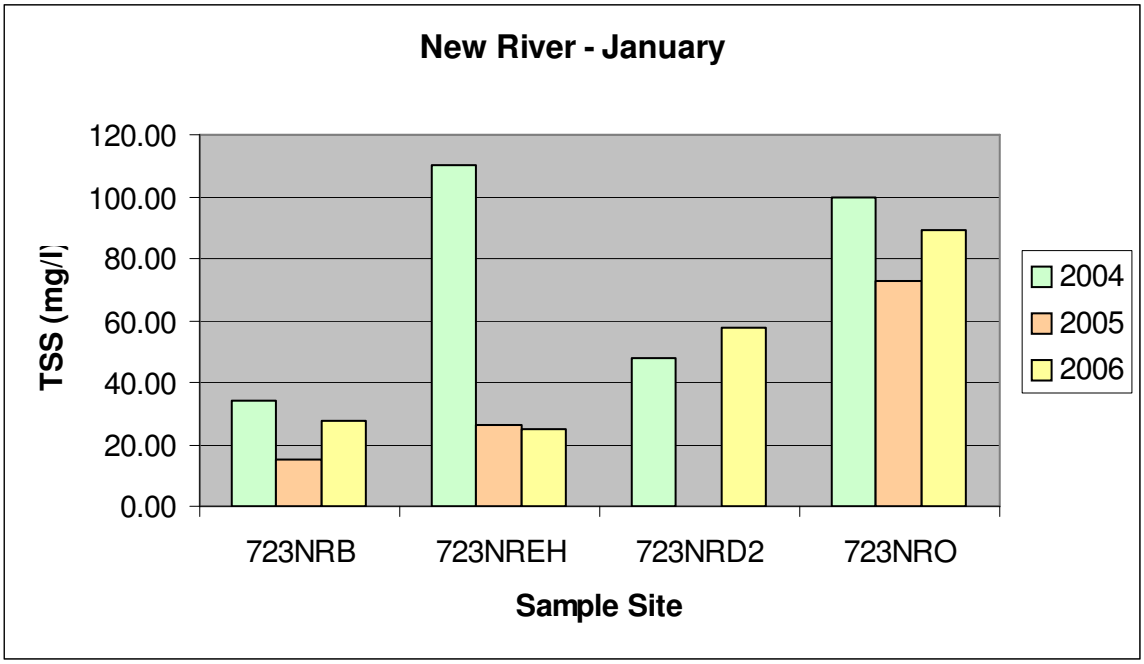
Trifolium 10 Drain	
DateTime	TSS (mg/l)
8/17/04 9:39	170
11/17/04 12:30	150
2/9/05 13:34	490
5/17/05 13:00	92
8/2/05 13:05	50
11/16/05 13:46	46
2/7/06 10:26	460
5/4/06 13:10	420
8/23/06 8:39	86
11/14/06 13:06	500
AVERAGE	**246**

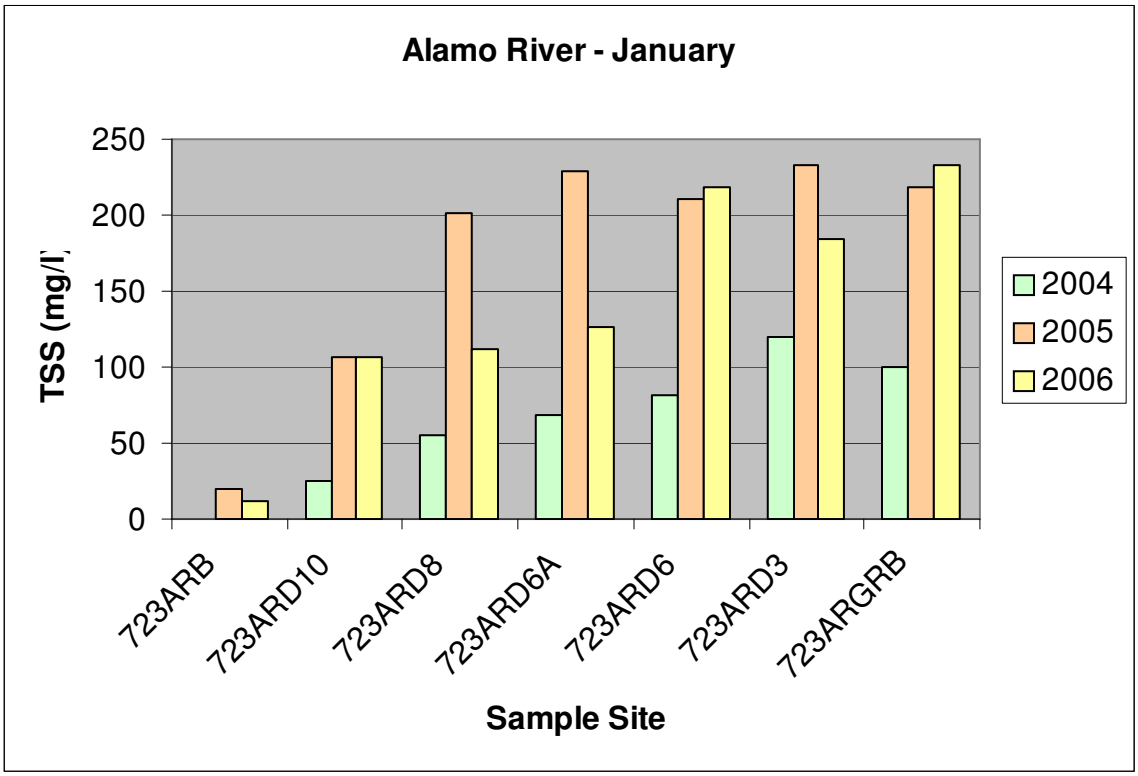
IID TSS data from minor drains draining into the Salton Sea

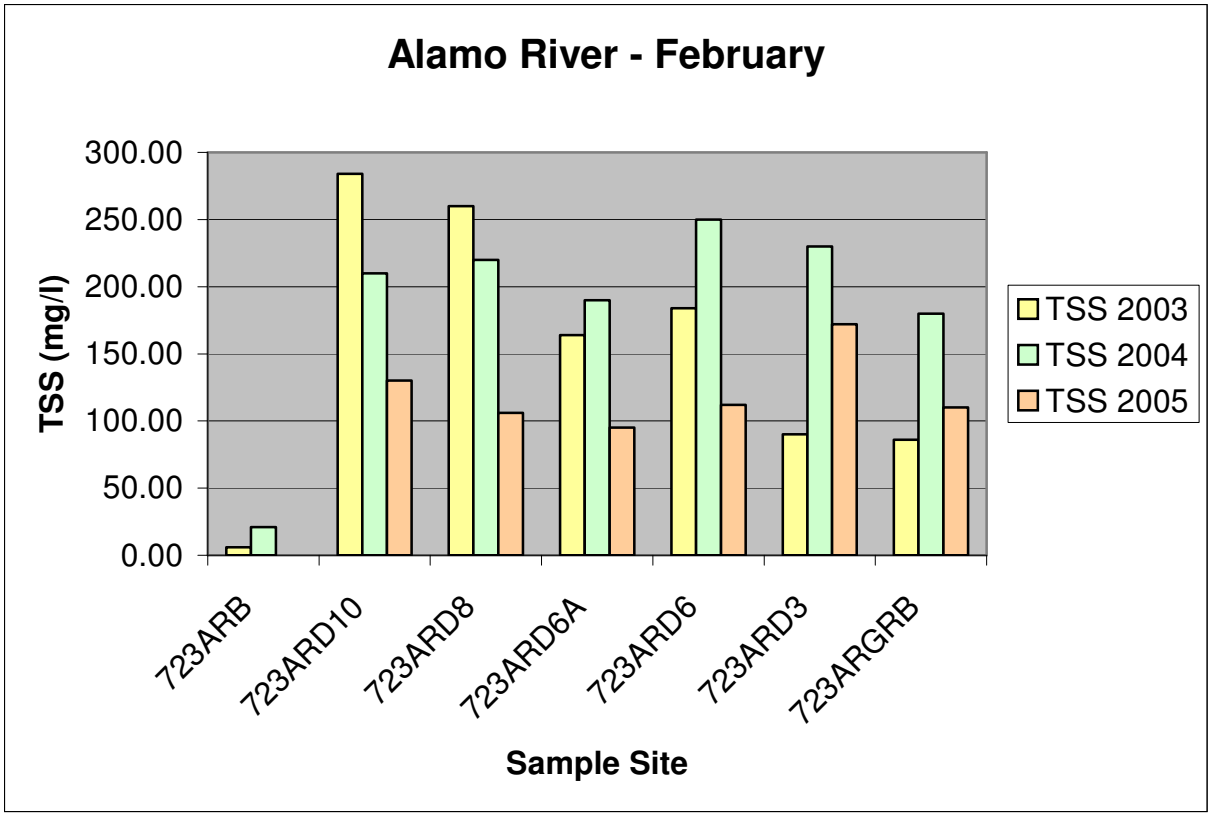
Pumice Drain		**P Drain**		**Trifolium 1 Drain**		**Niland 2 Drain**	
DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)	DateTime	TSS (mg/l)
3/23/04 8:38	500	3/23/04 9:07	480	2/24/04 10:25	43	3/23/04 9:23	80
6/15/04 7:30	72	6/15/04 7:53	140	5/18/04 8:46	140	6/15/04 8:14	120
9/21/04 12:42	160	9/21/04 12:02	33	8/17/04 9:16	130	9/21/2004 12:20	23
12/15/04 9:02	79	12/15/04 9:37	32	11/17/04 12:57	36	12/15/2004 9:56	120
3/21/05 10:10	72	3/21/05 10:55	160	2/9/05 13:48	52	3/21/05 11:15	50
6/2/05 8:55	170	6/2/05 9:30	60	5/17/05 13:20	240	6/2/05 9:45	50
9/12/05 13:26	110	9/12/05 12:45	81	8/2/05 13:20	0	9/12/05 13:00	16
12/7/05 10:34	120	12/7/05 11:09	48	11/16/05 14:04	30	12/7/05 11:26	120
3/14/06 13:30	170	3/14/06 13:05	72	2/7/06 10:02	62	3/14/06 12:48	100
6/6/06 9:42	260	6/6/06 10:20	130	5/4/06 13:26	130	6/6/06 10:42	220
9/13/06 10:00	220	9/13/06 10:30	230	8/23/06 8:20	63	9/13/06 10:49	0
12/12/06 9:45	42	12/12/06 10:30	30	11/14/06 13:25	54	12/12/06 11:00	170
AVERAGE	**165**	**AVERAGE**	**125**	**AVERAGE**	**82**	**AVERAGE**	**89**

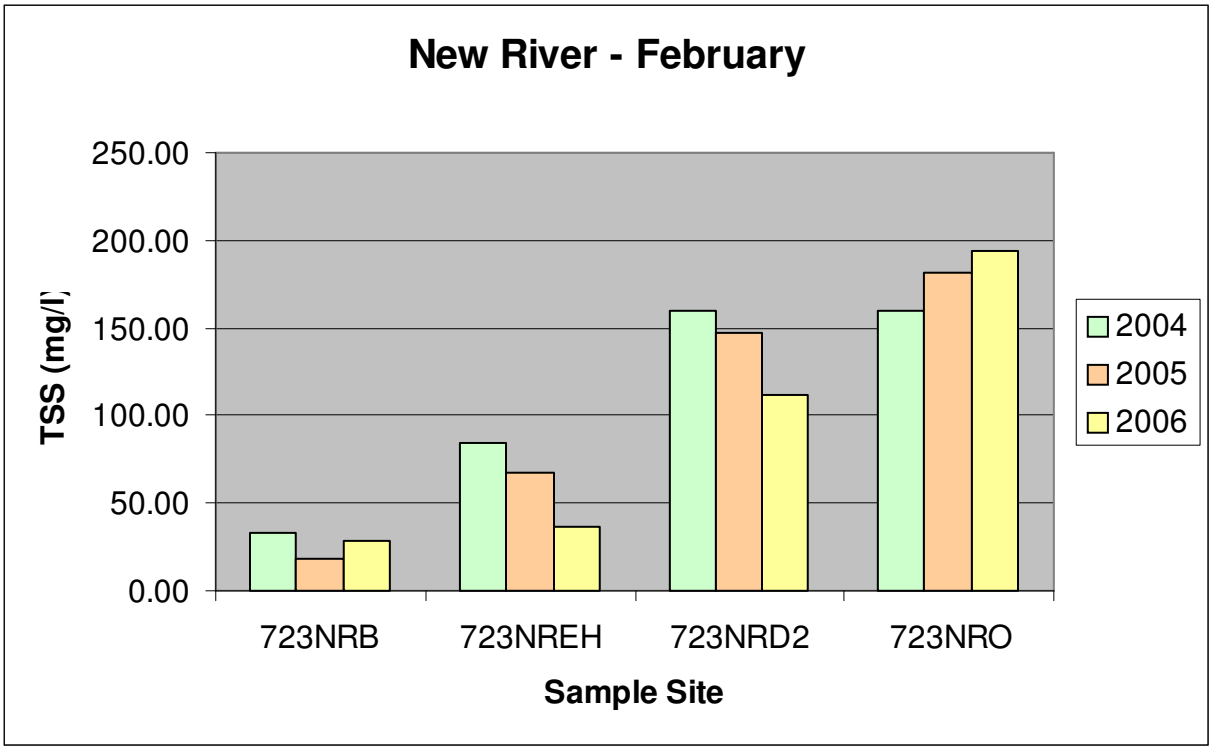
APPENDIX C - DATA GRAPHS AND CHARTS

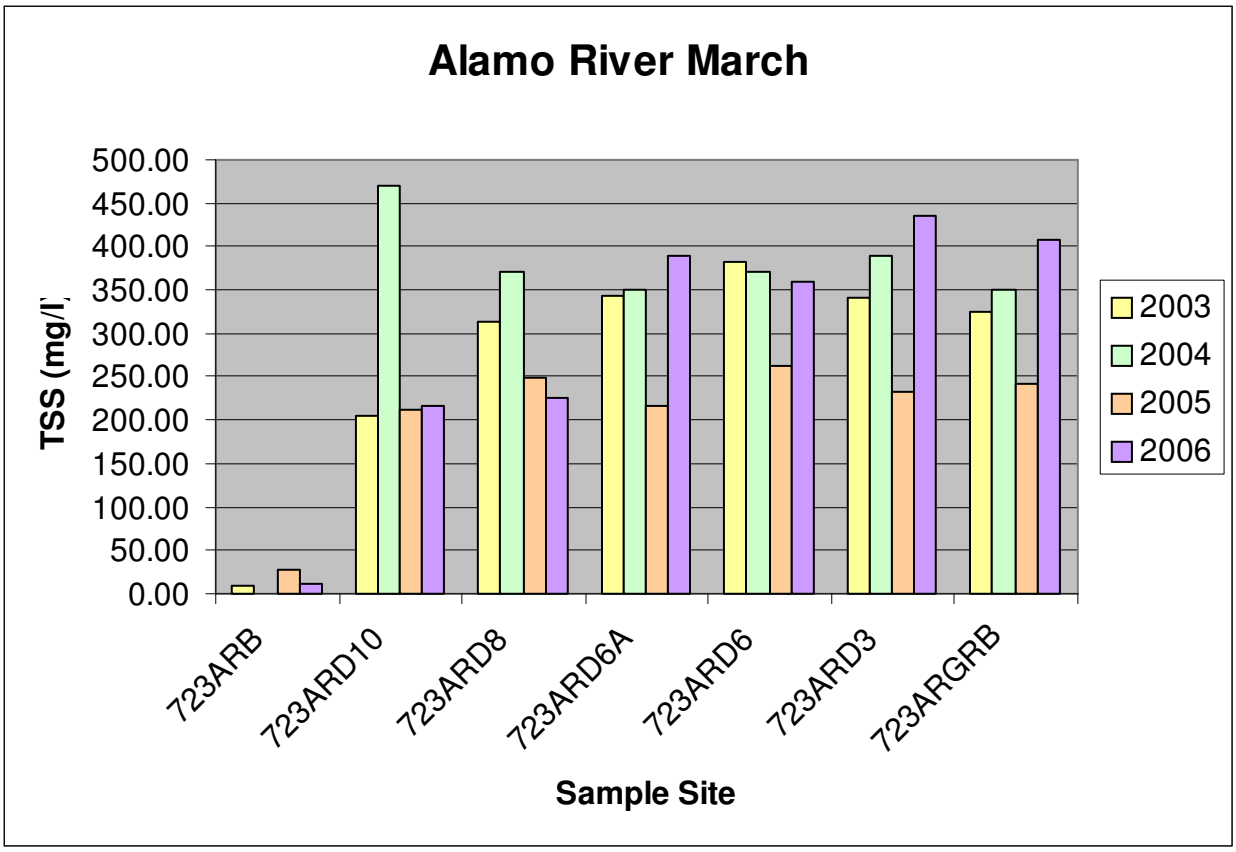
Please note, all 2006 New River data are preliminary and should be considered estimates.

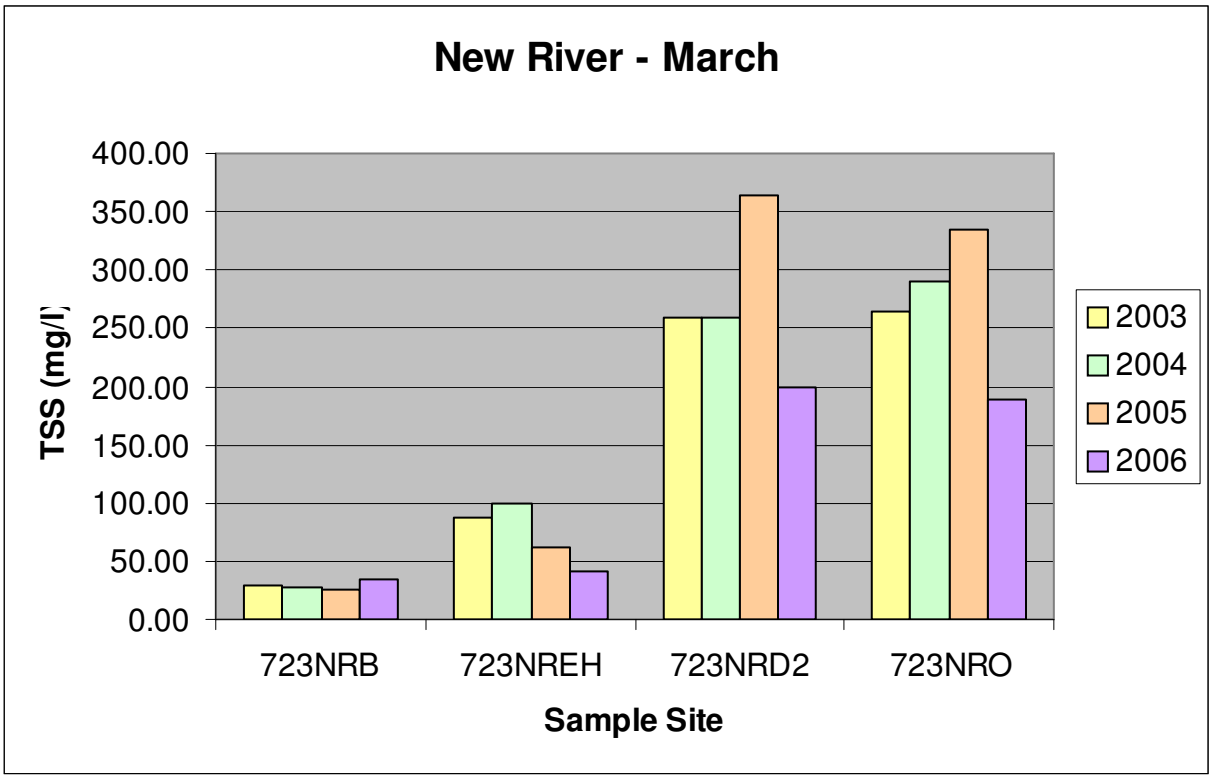


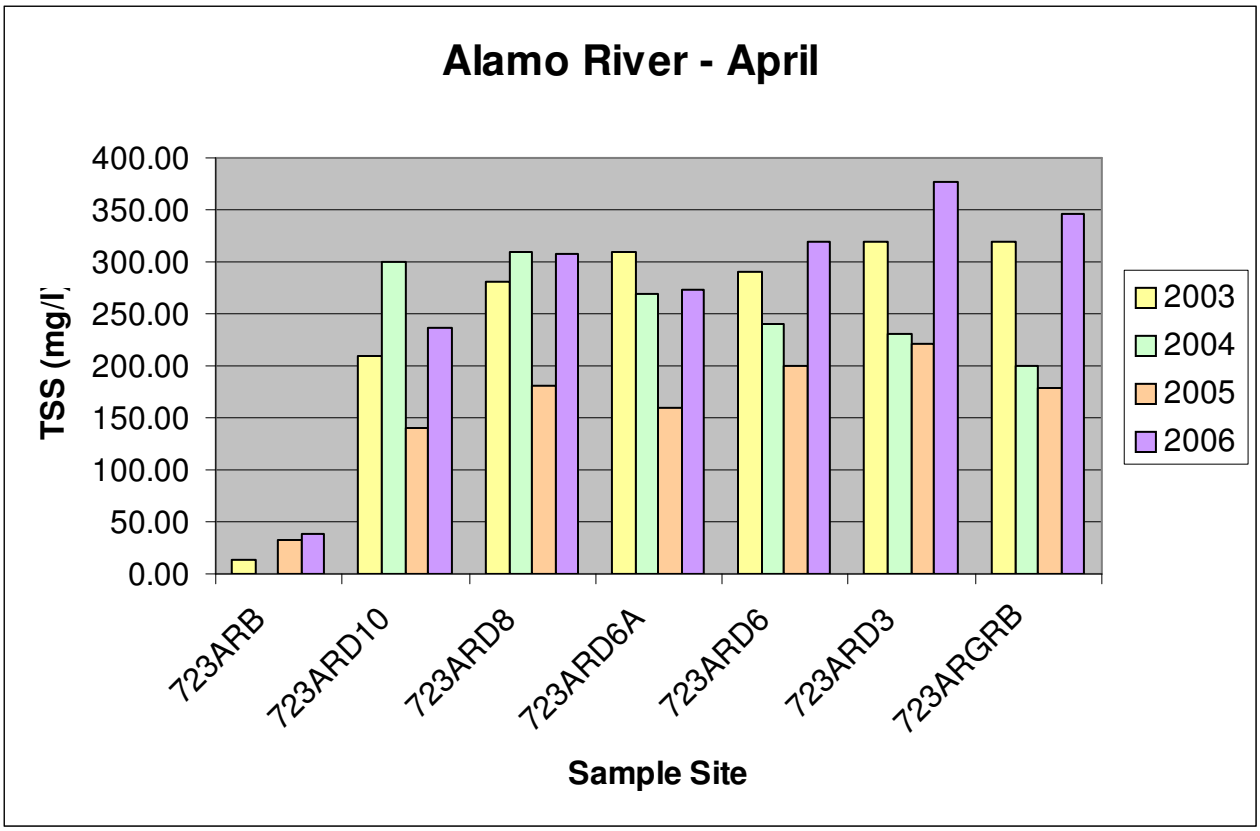


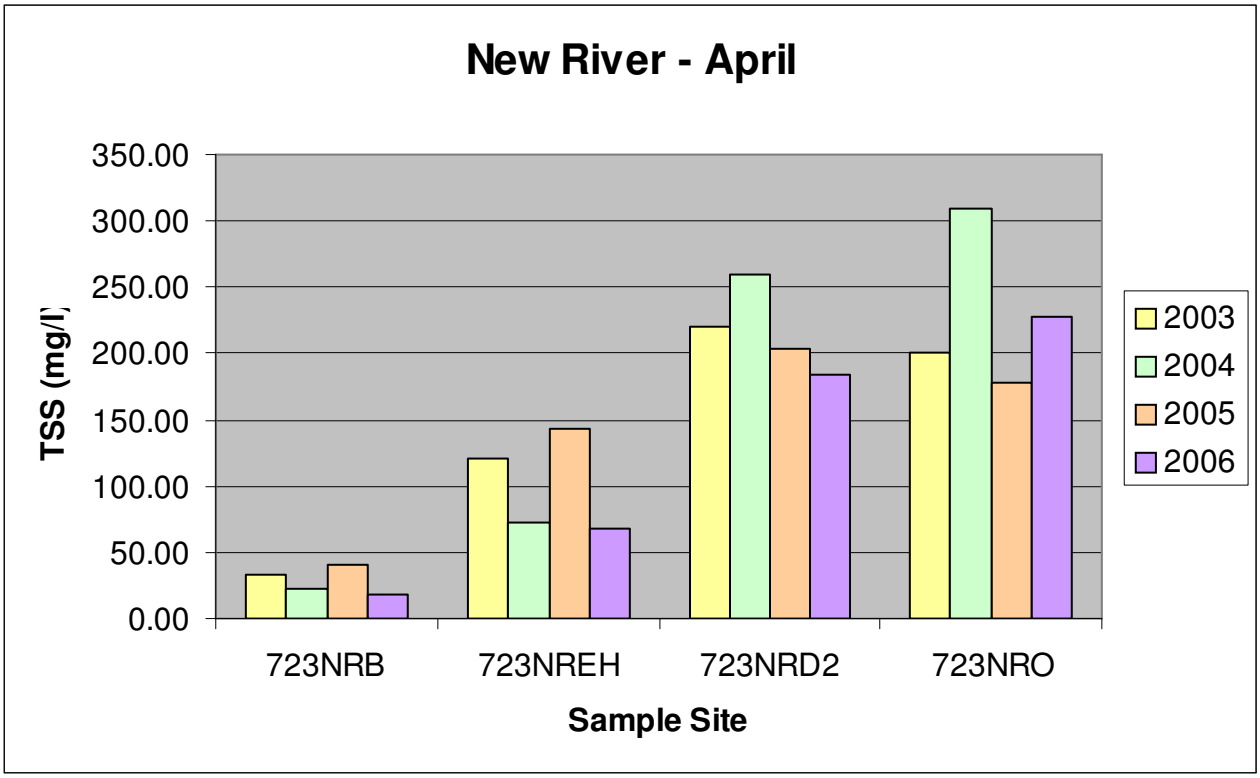

Alamo River - February
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
TSS 2003
TSS 2004
TSS 2005

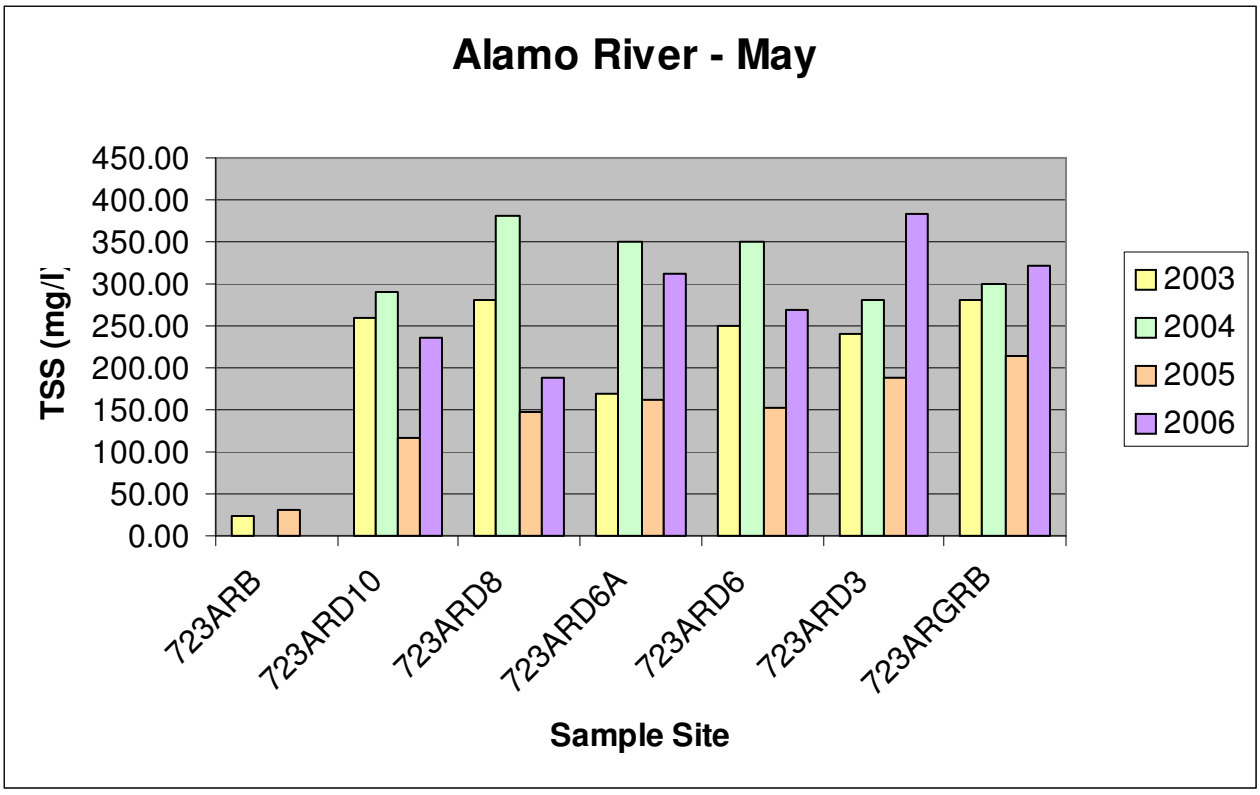

New River - February
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2004
2005
2006

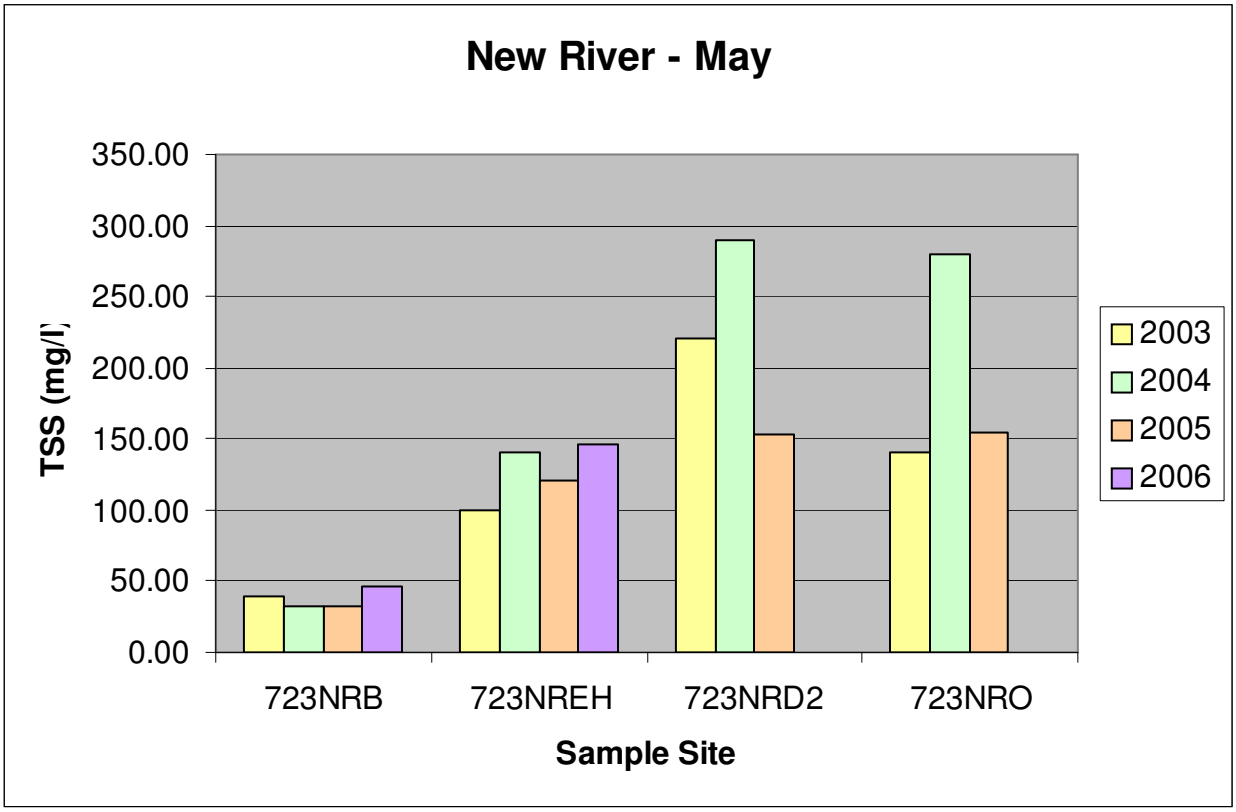

Alamo River March
500.00
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

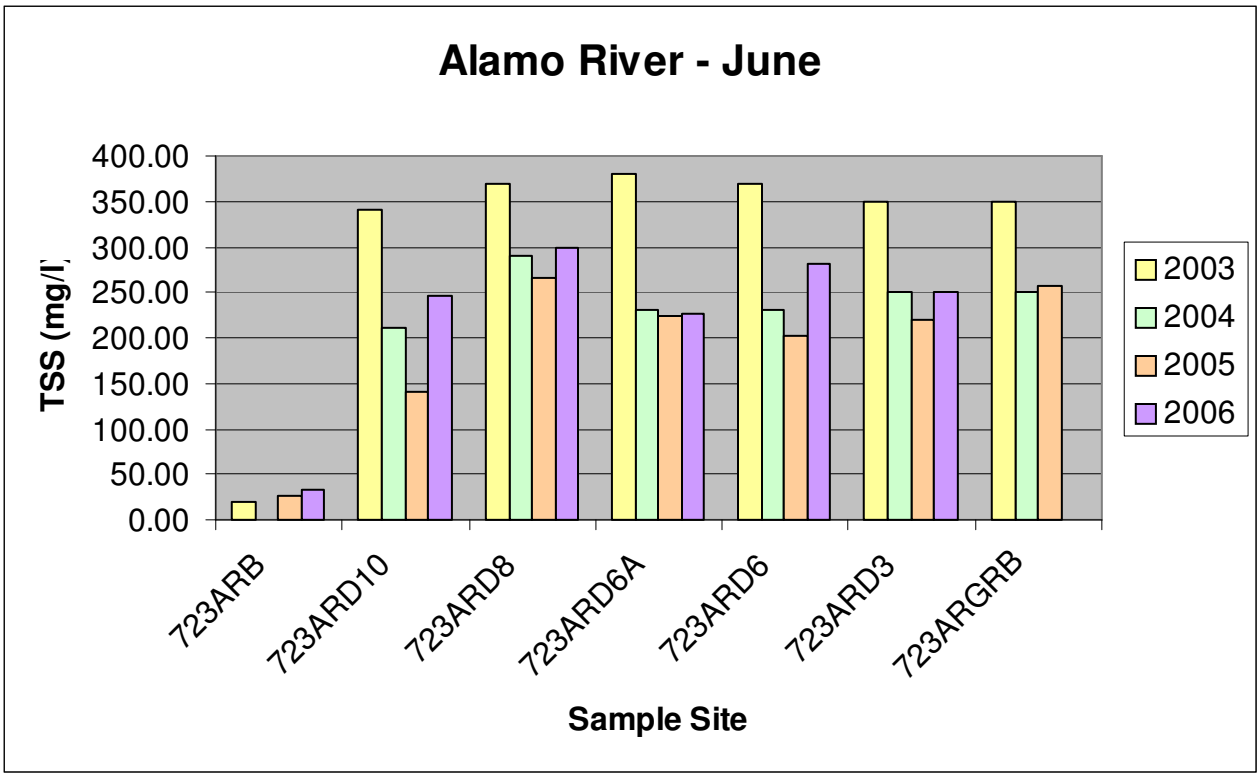

New River - March
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

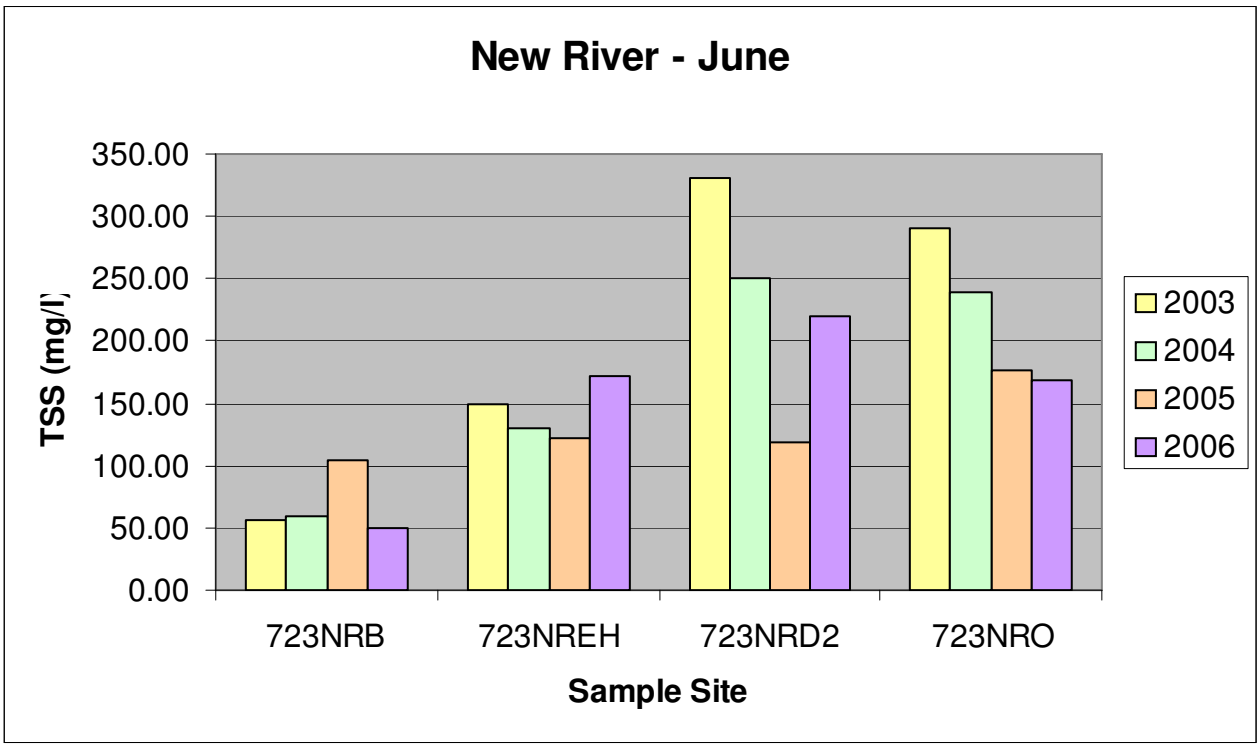

Alamo River - April
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

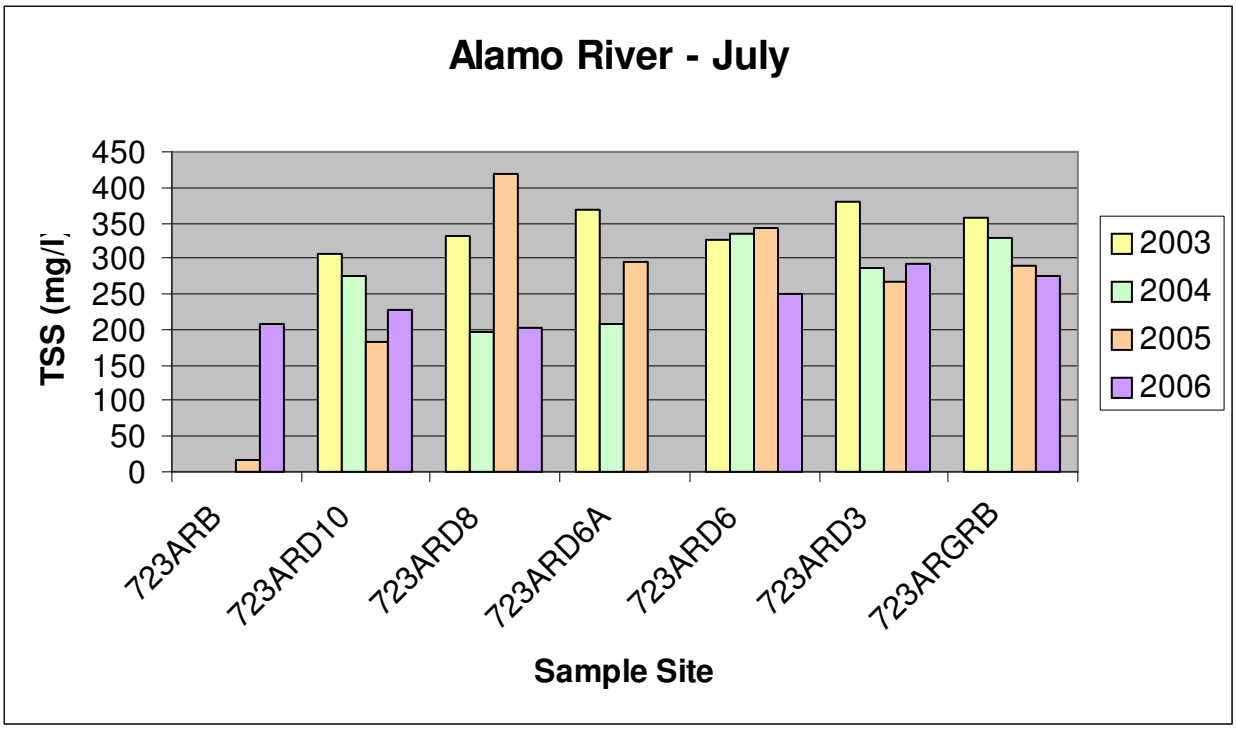

New River - April
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

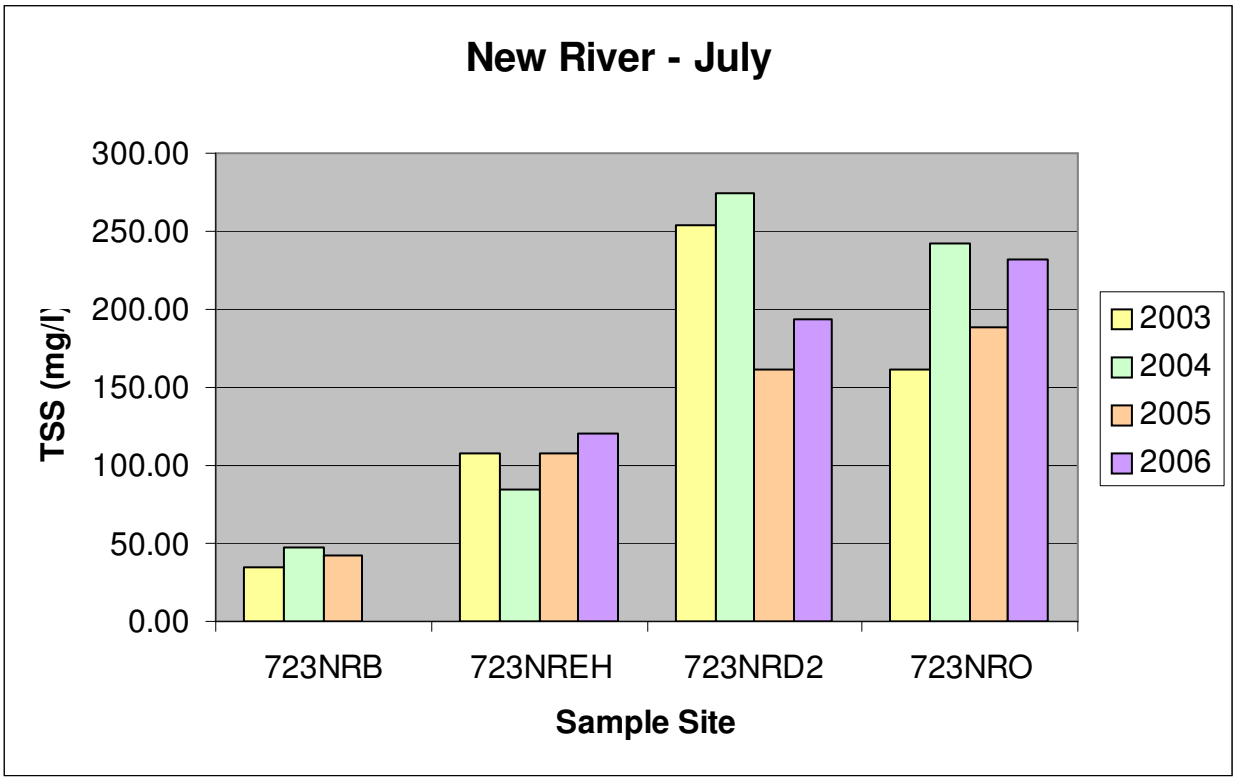

Alamo River - May
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

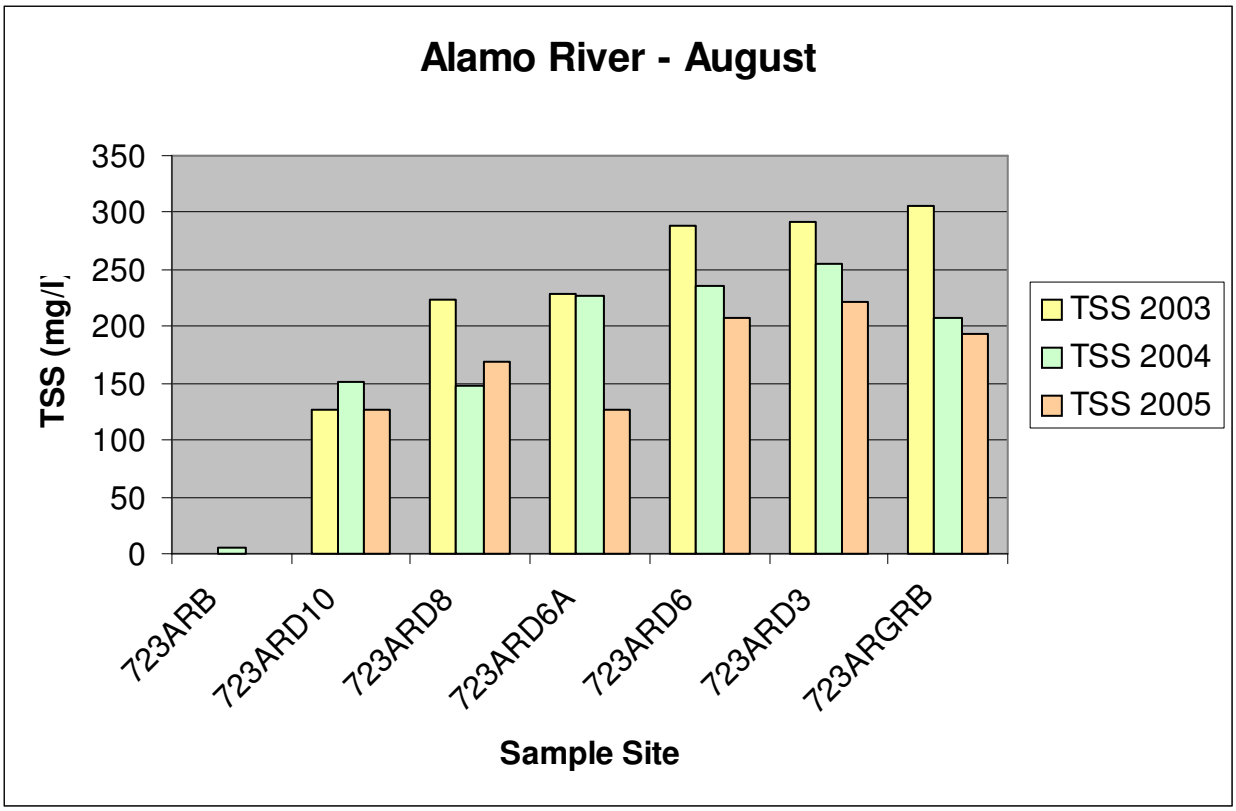

New River - May
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

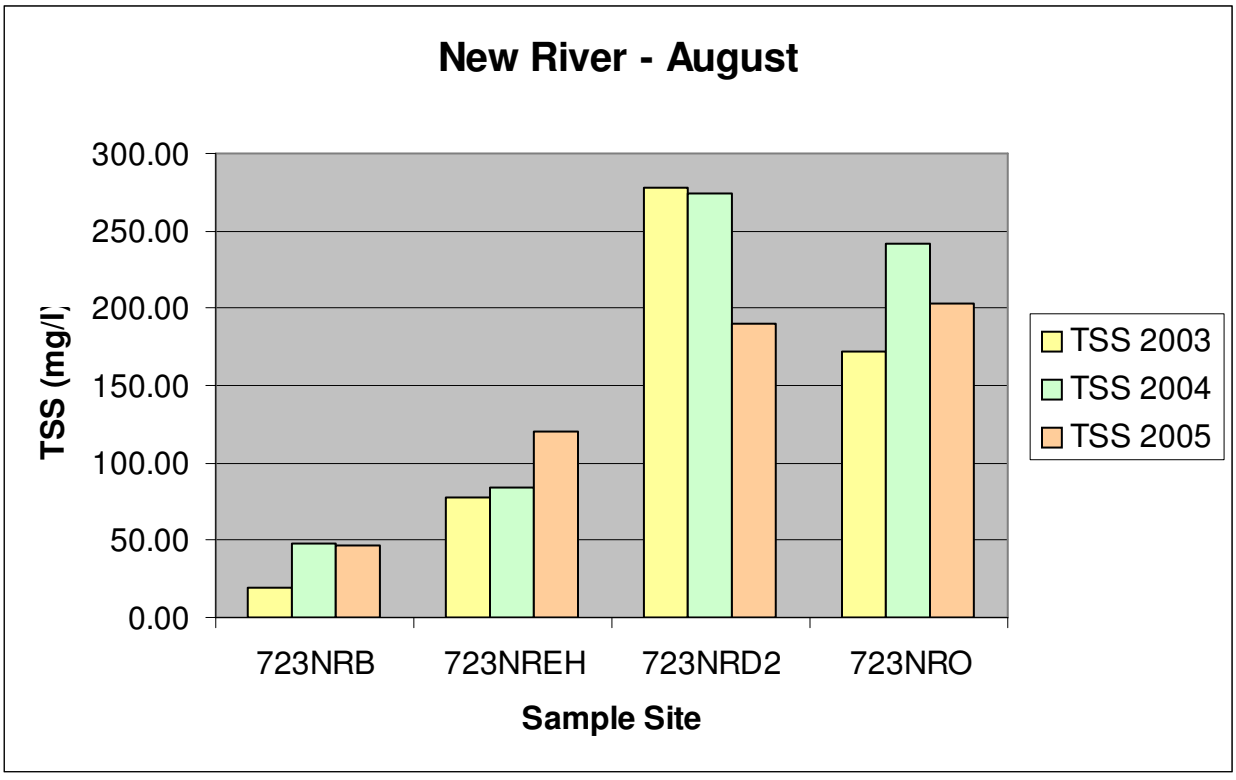

Alamo River - June
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

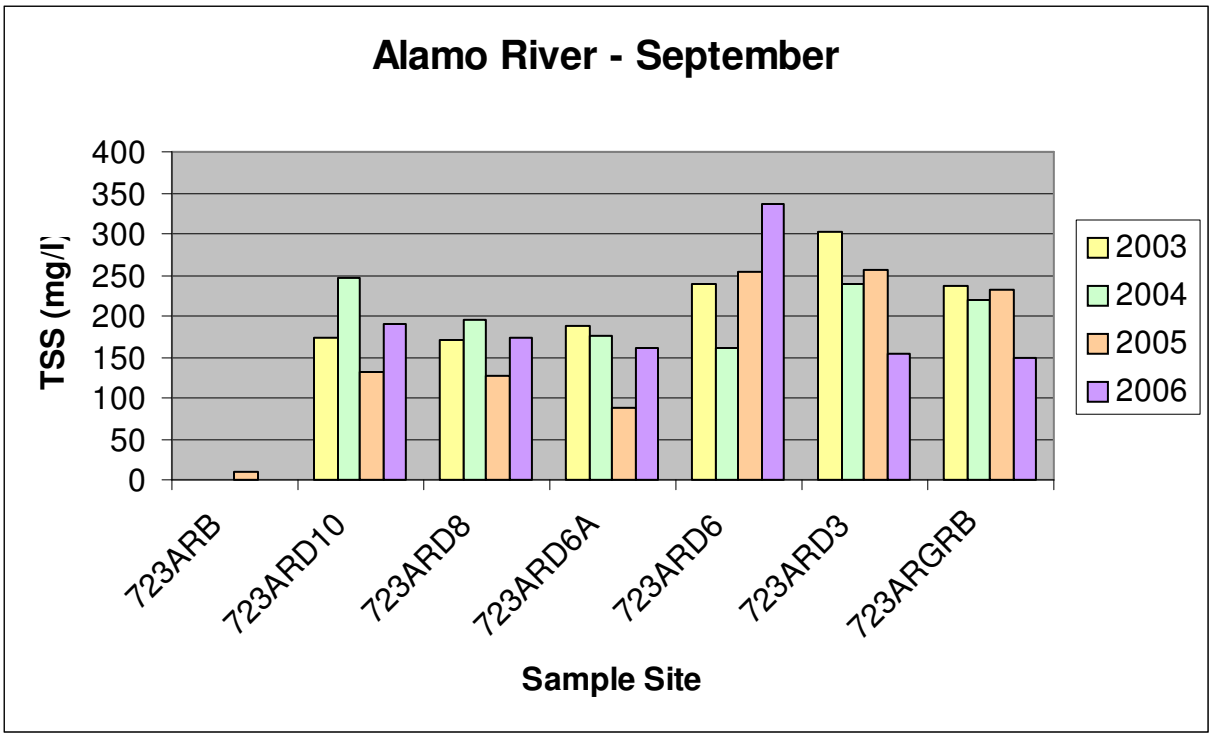

New River - June
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

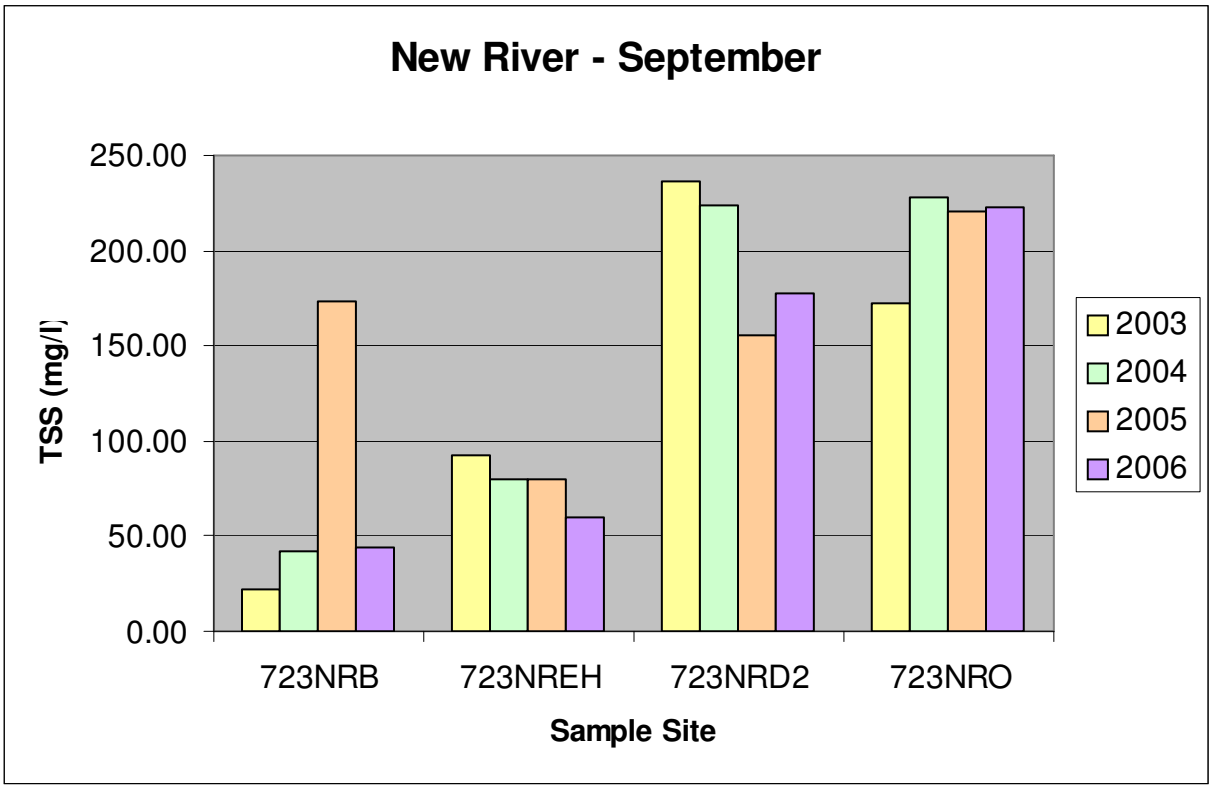

Alamo River - July
450
400
350
300
250
200
150
100
50
0
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

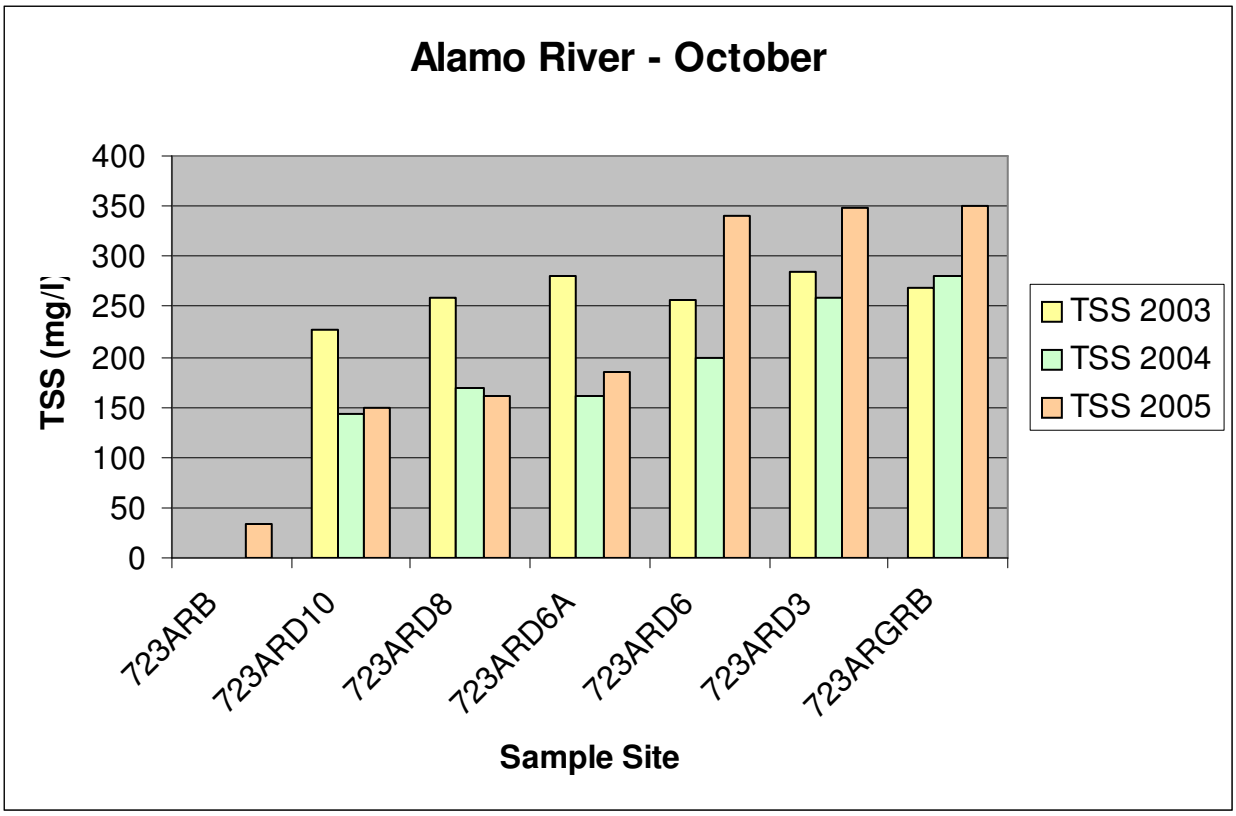

New River - July
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

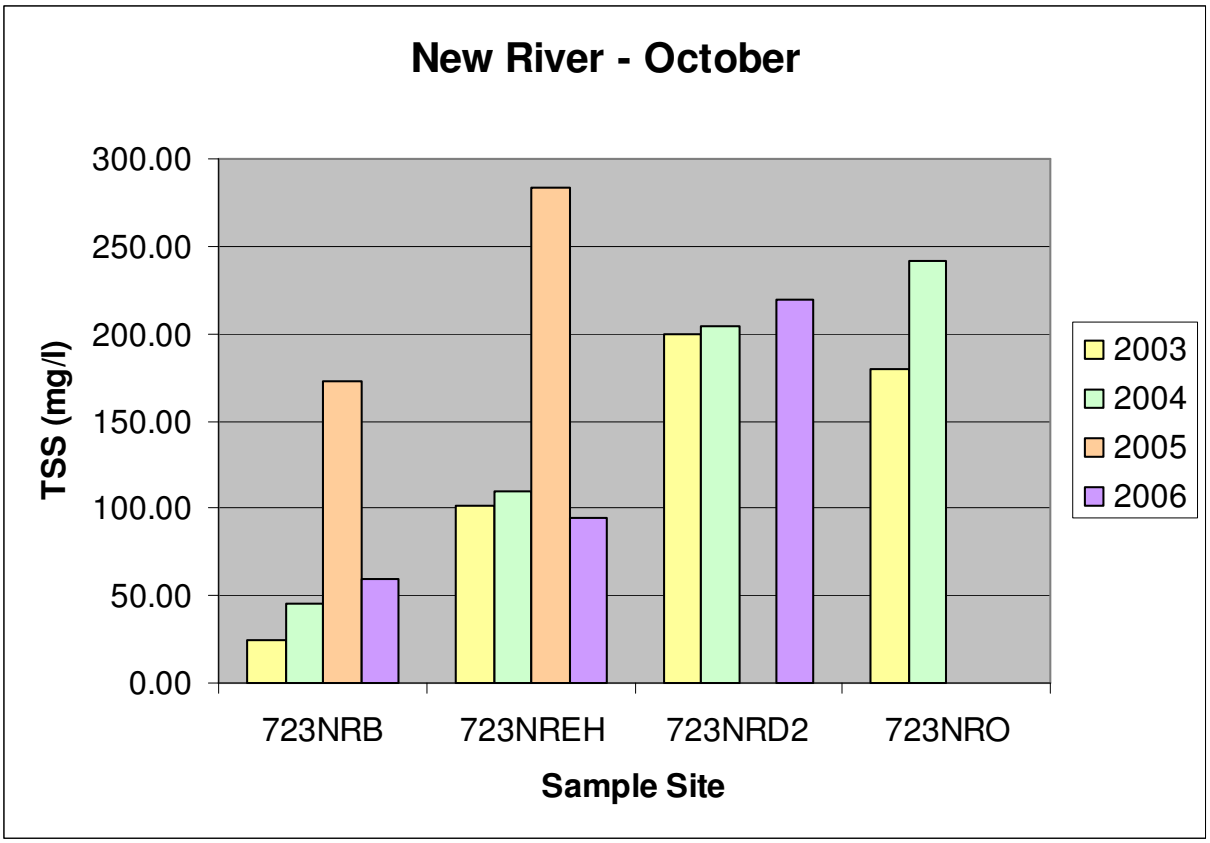

Alamo River - August
350
300
250
200
150
100
50
0
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
TSS 2003
TSS 2004
TSS 2005

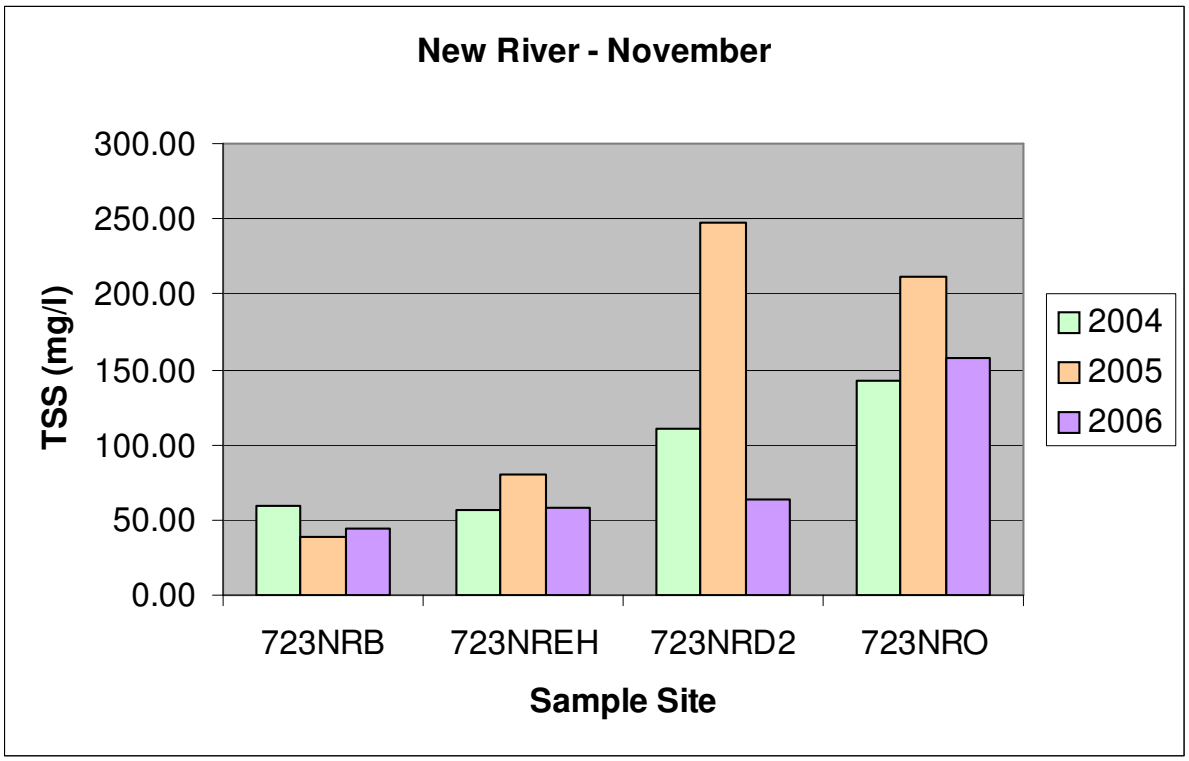

New River - August
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
TSS 2003
TSS 2004
TSS 2005

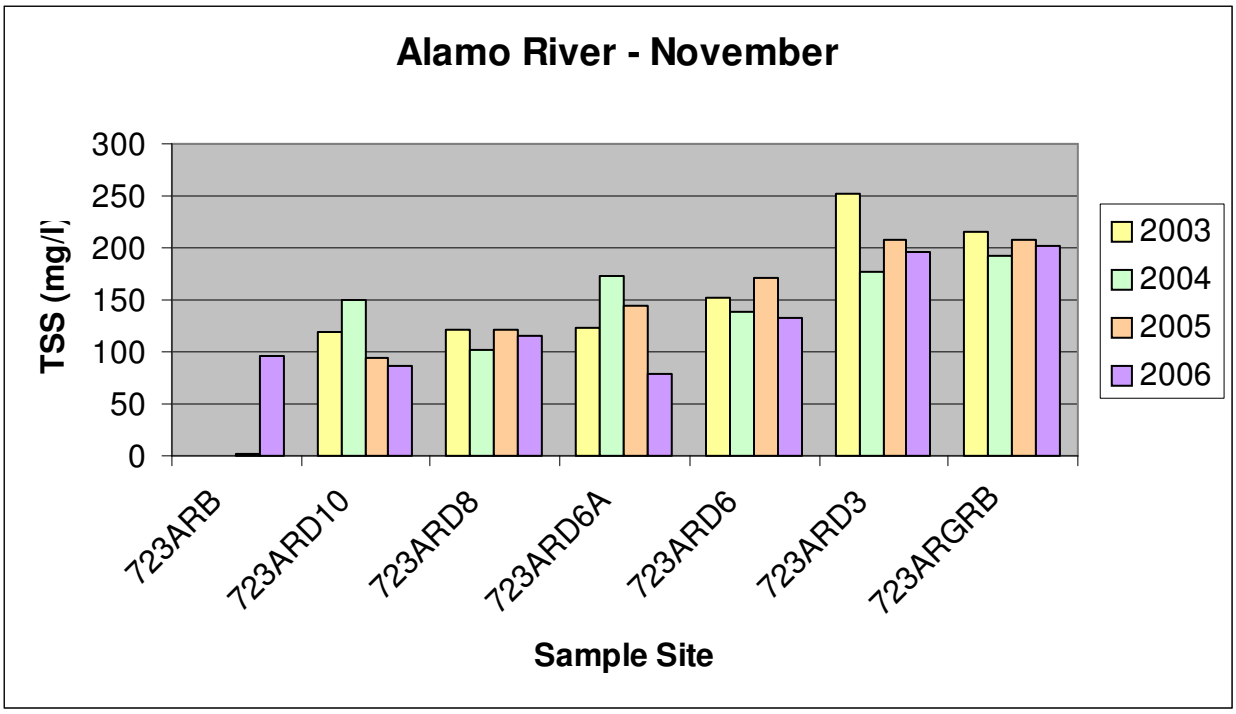

Alamo River - September
TSS (mg/l)
400
350
300
250
200
150
100
50
0
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
2003
2004
2005
2006

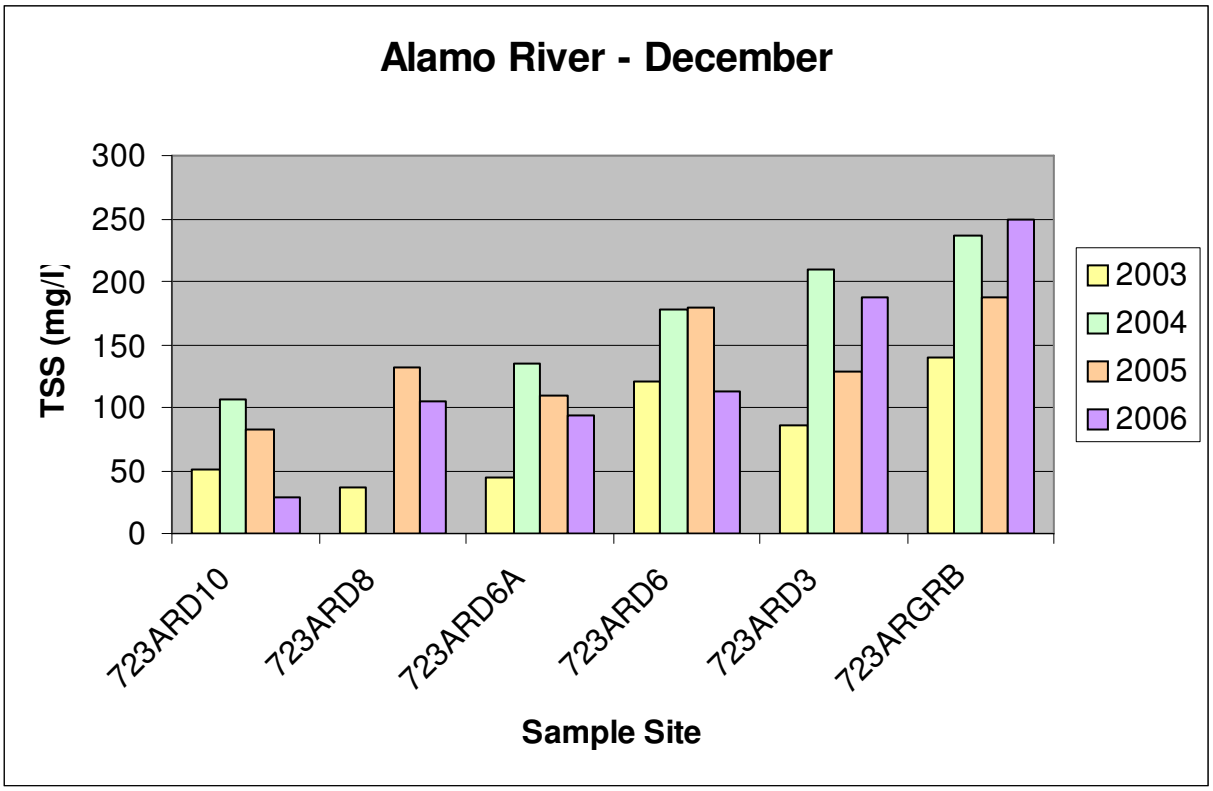

New River - September
TSS (mg/l)
250.00
200.00
150.00
100.00
50.00
0.00
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

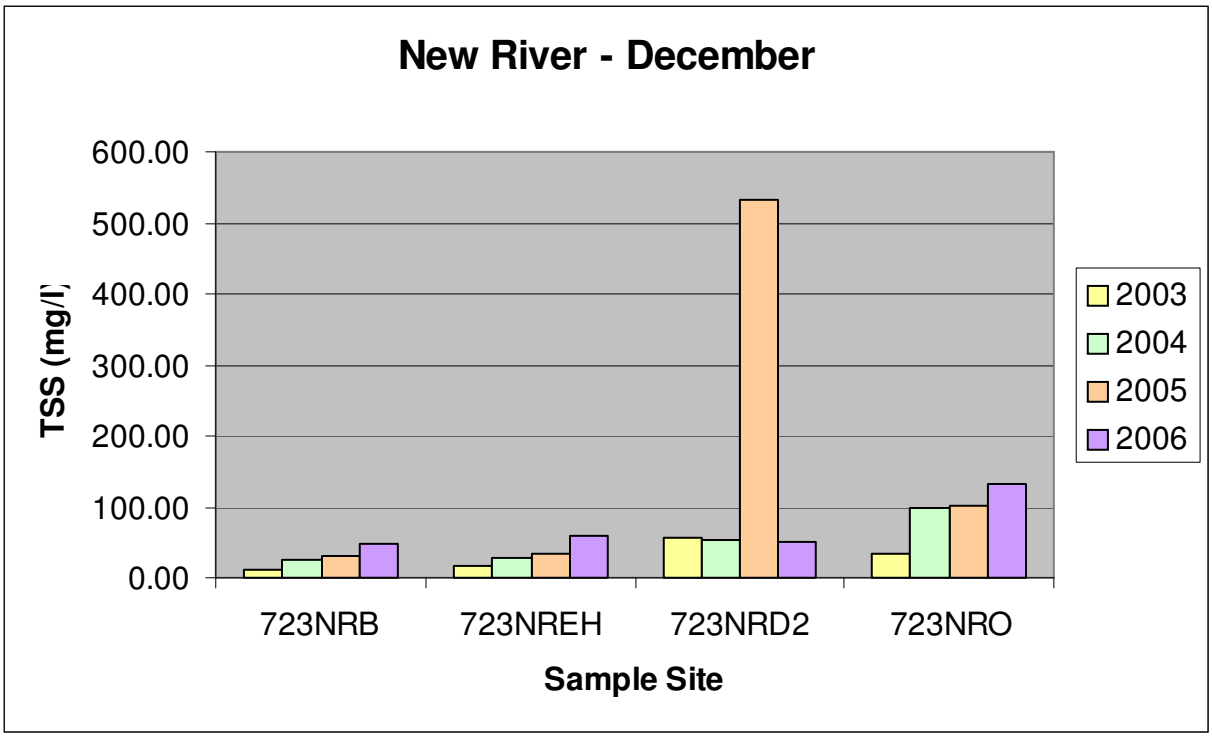

Alamo River - October
400
350
300
250
200
150
100
50
0
TSS (mg/l)
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site
TSS 2003
TSS 2004
TSS 2005

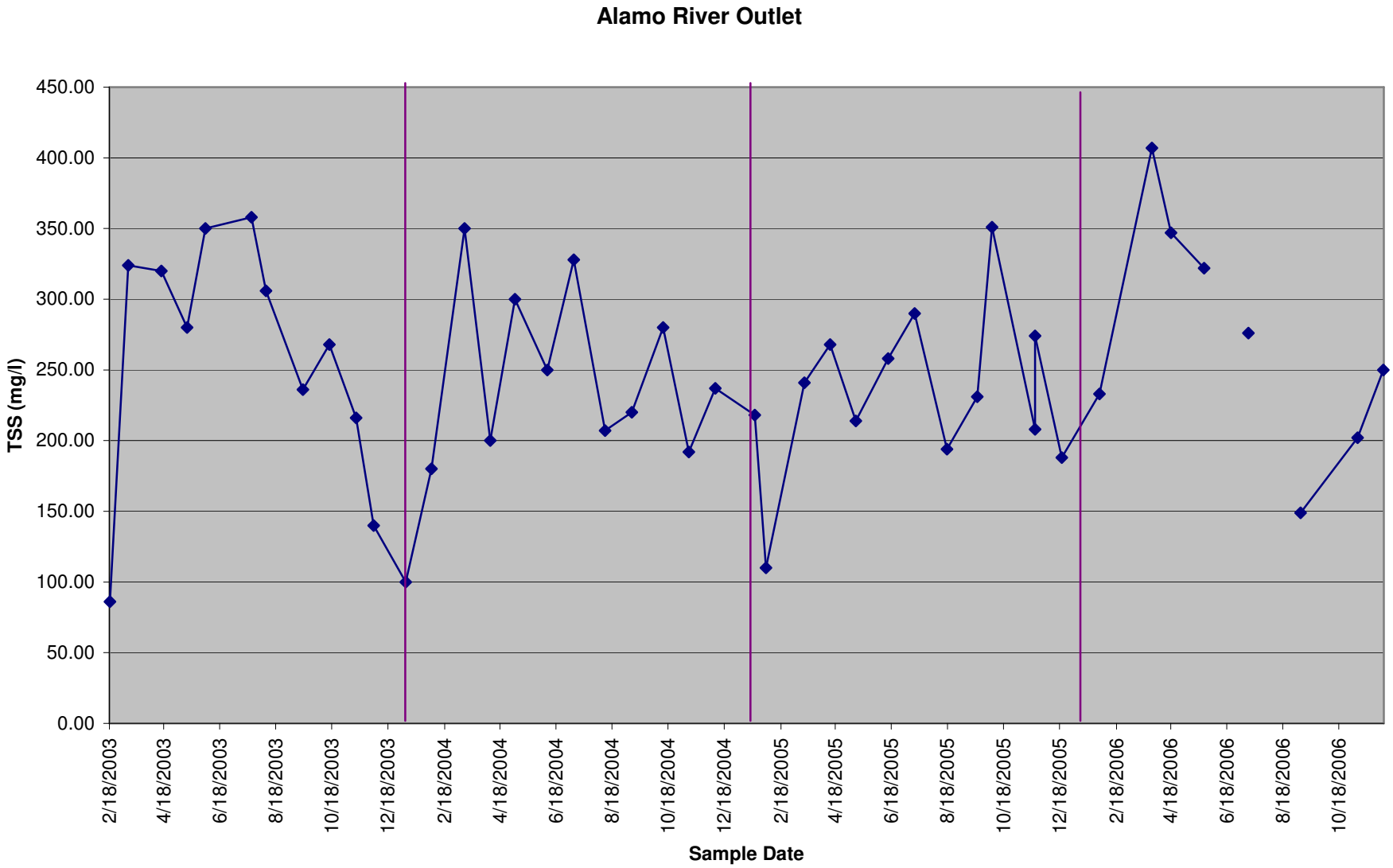

New River - October
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

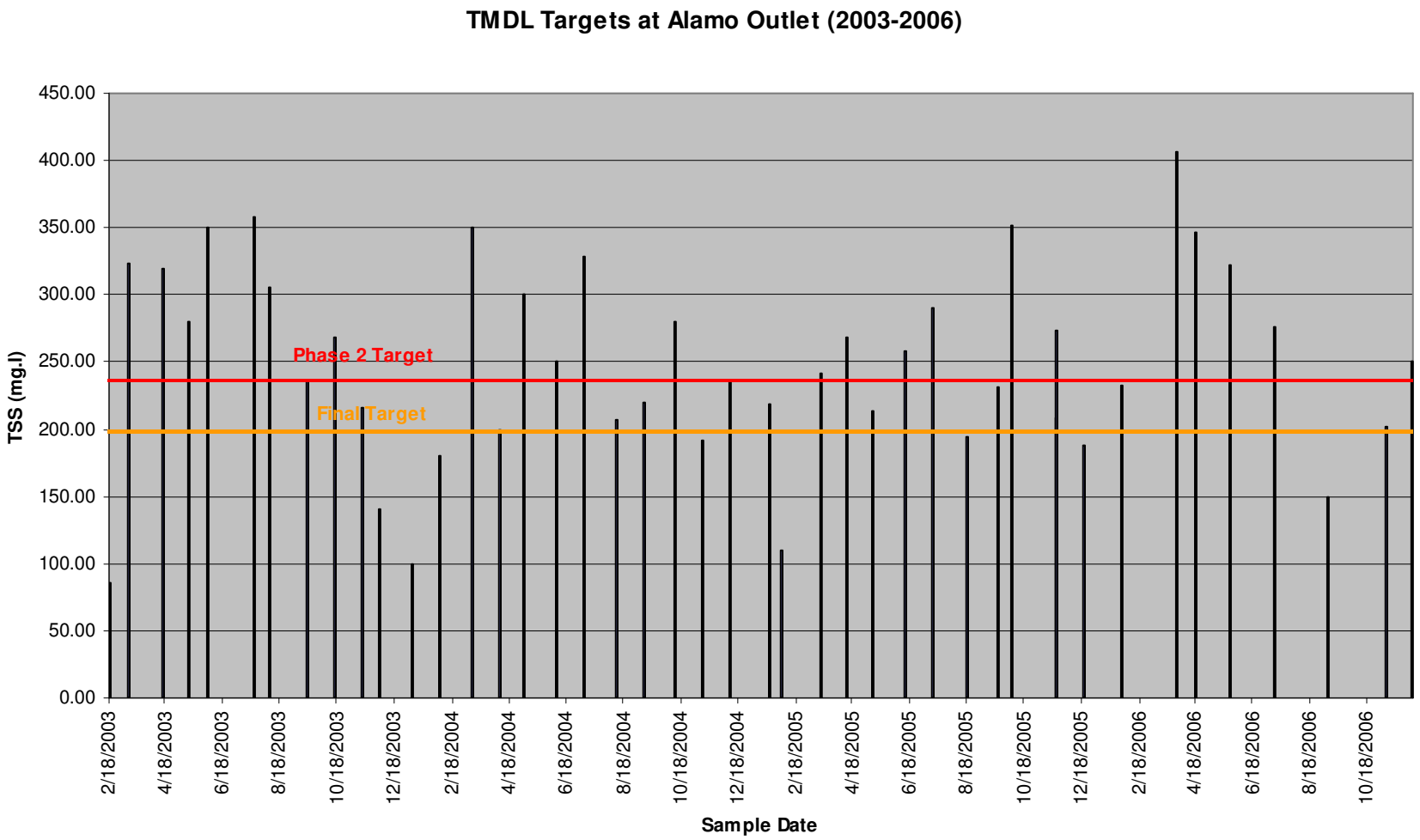

New River - November
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2004
2005
2006

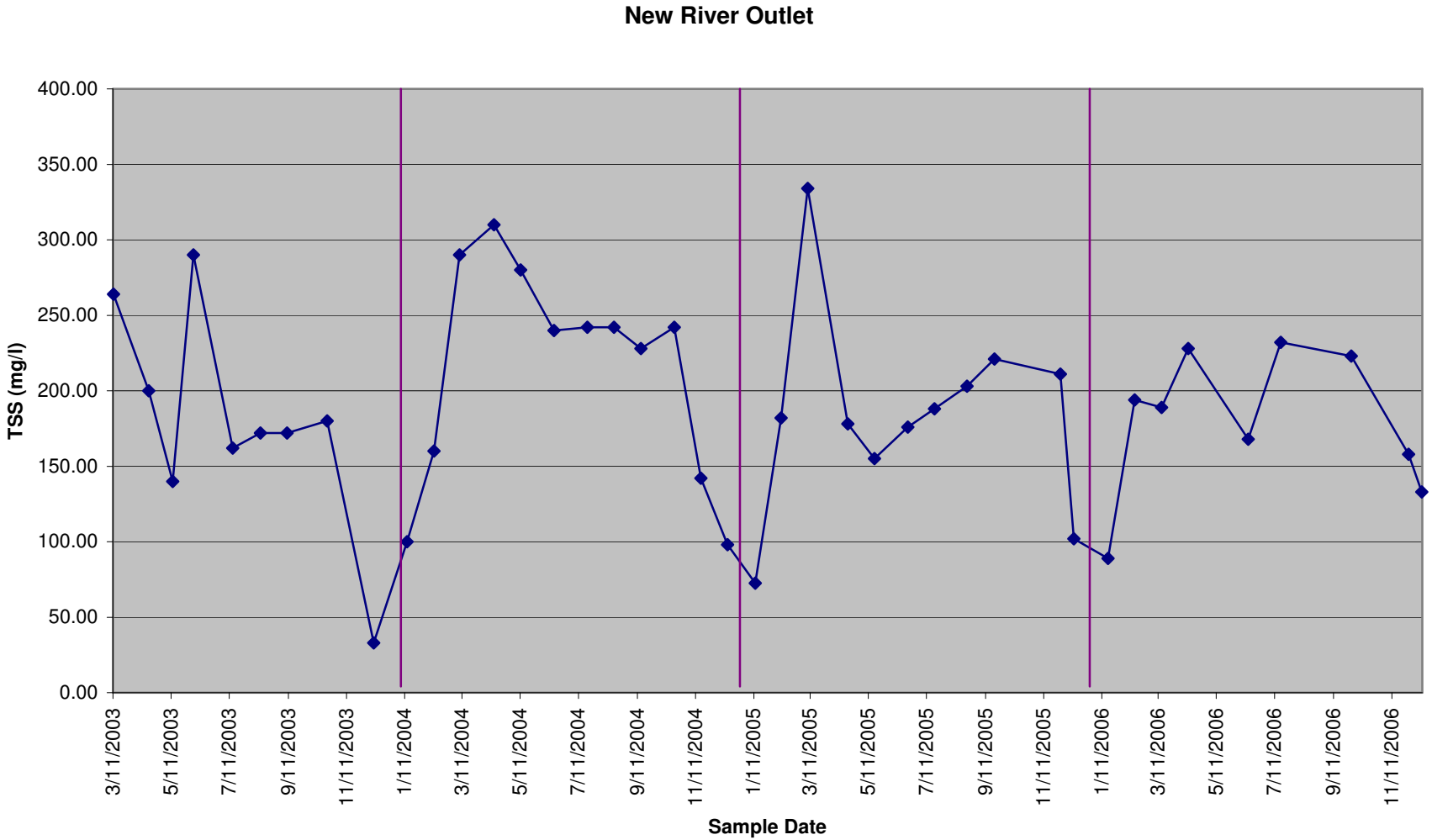

Alamo River - November
300
250
200
150
100
50
0
TSS (mg/l)
2003
2004
2005
2006
723ARB
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site

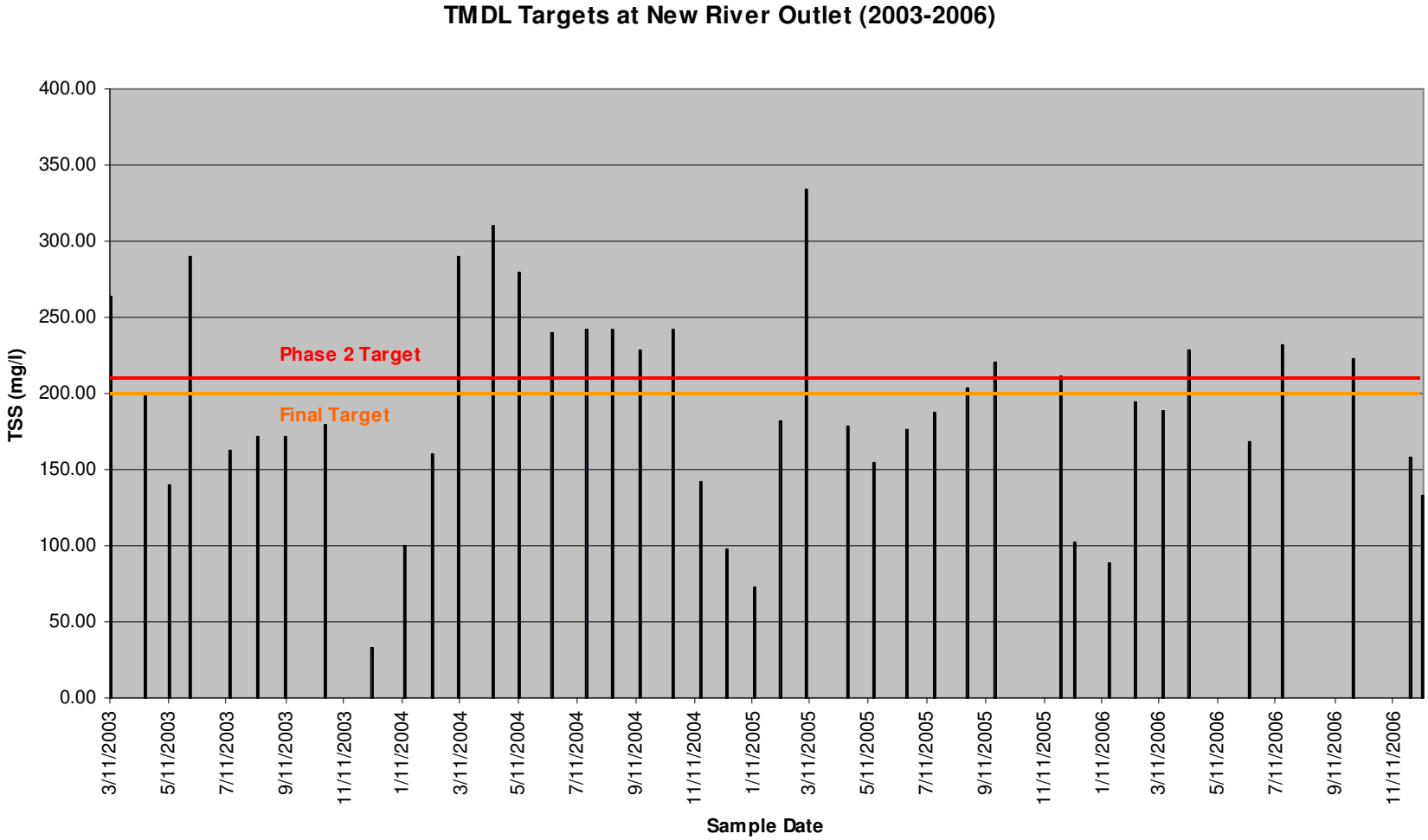

Alamo River - December
300
250
200
150
100
50
0
TSS (mg/l)
2003
2004
2005
2006
723ARD10
723ARD8
723ARD6A
723ARD6
723ARD3
723ARGRB
Sample Site

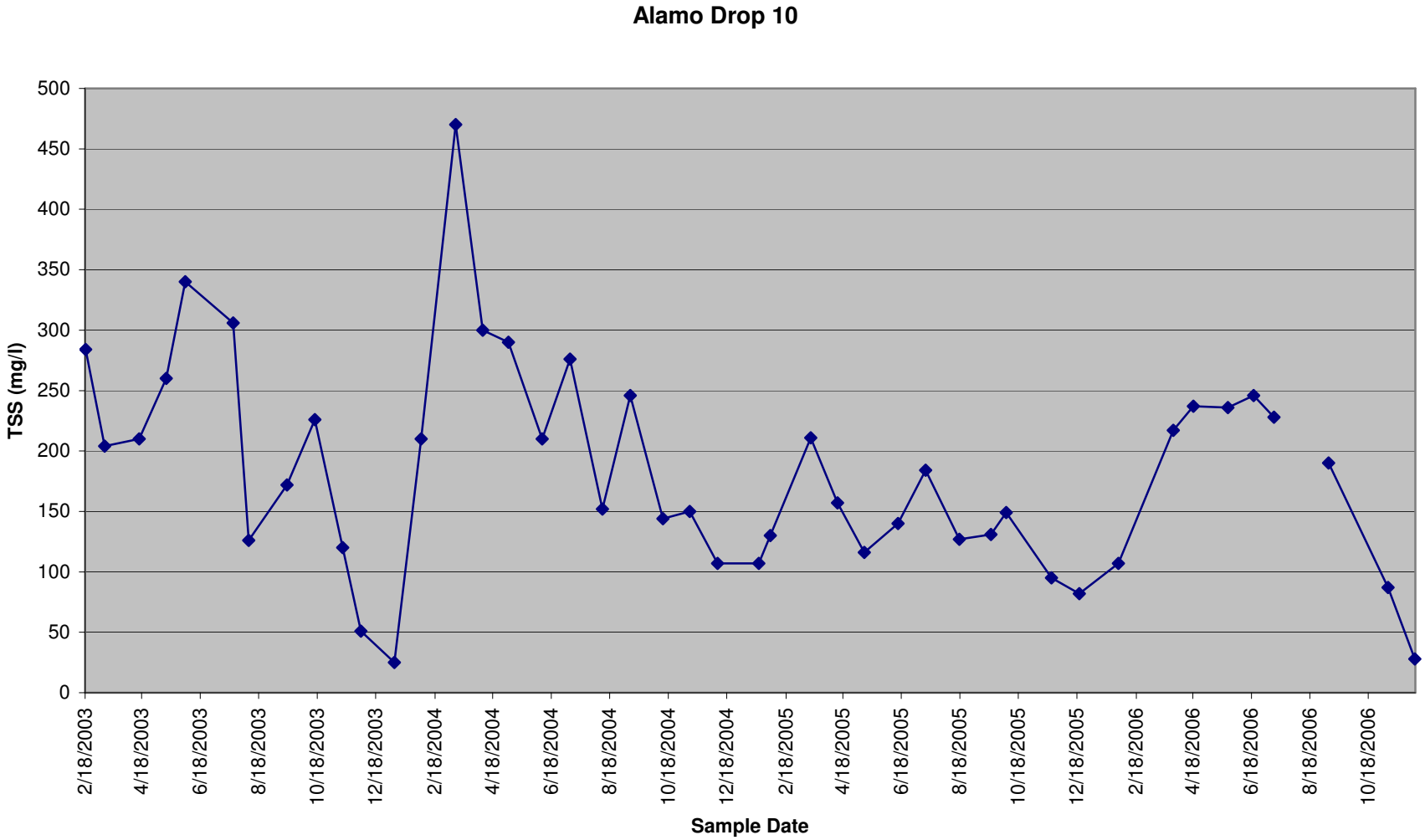

New River - December
600.00
500.00
400.00
300.00
200.00
100.00
0.00
TSS (mg/l)
723NRB
723NREH
723NRD2
723NRO
Sample Site
2003
2004
2005
2006

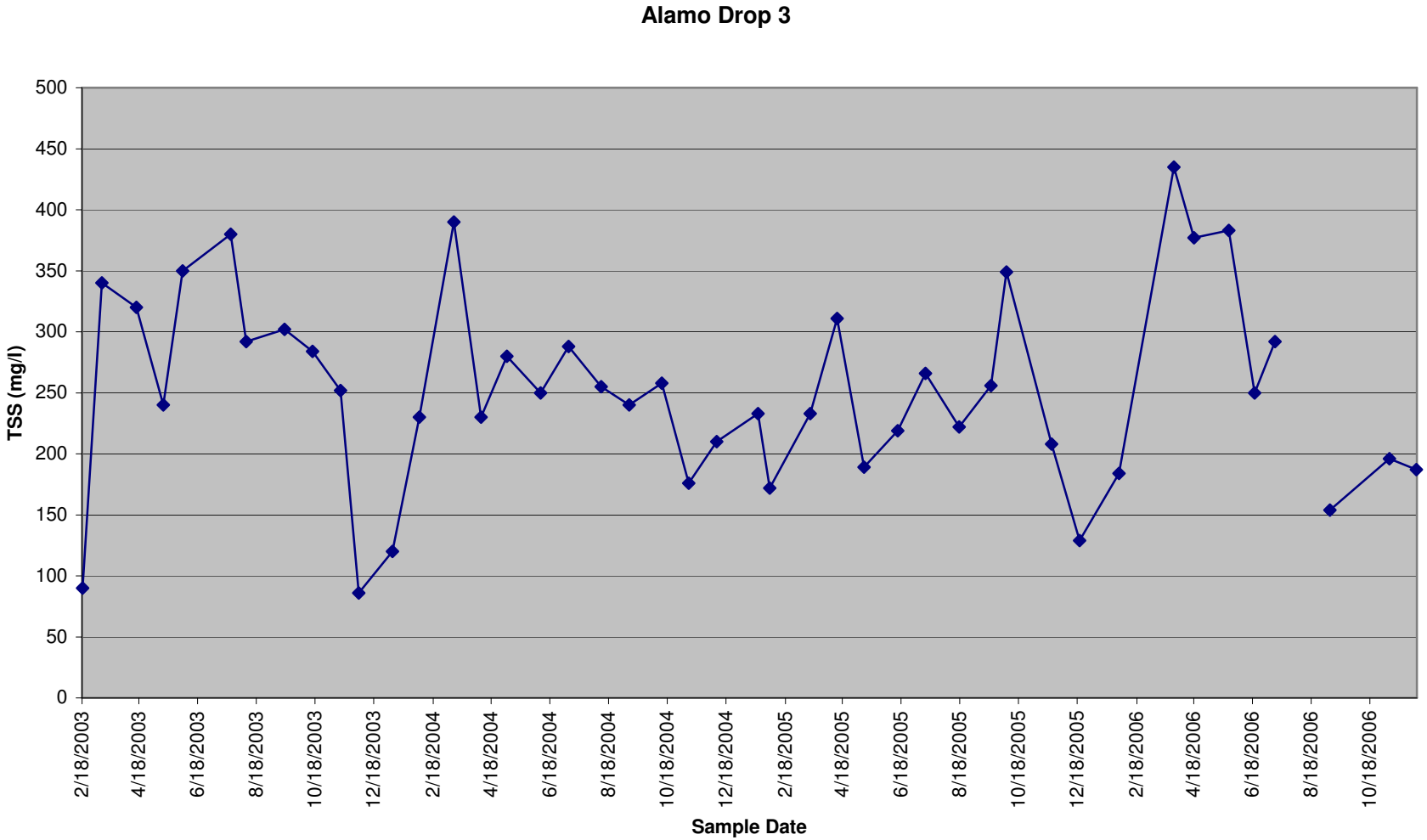

Alamo River Outlet
TSS (mg/l)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date

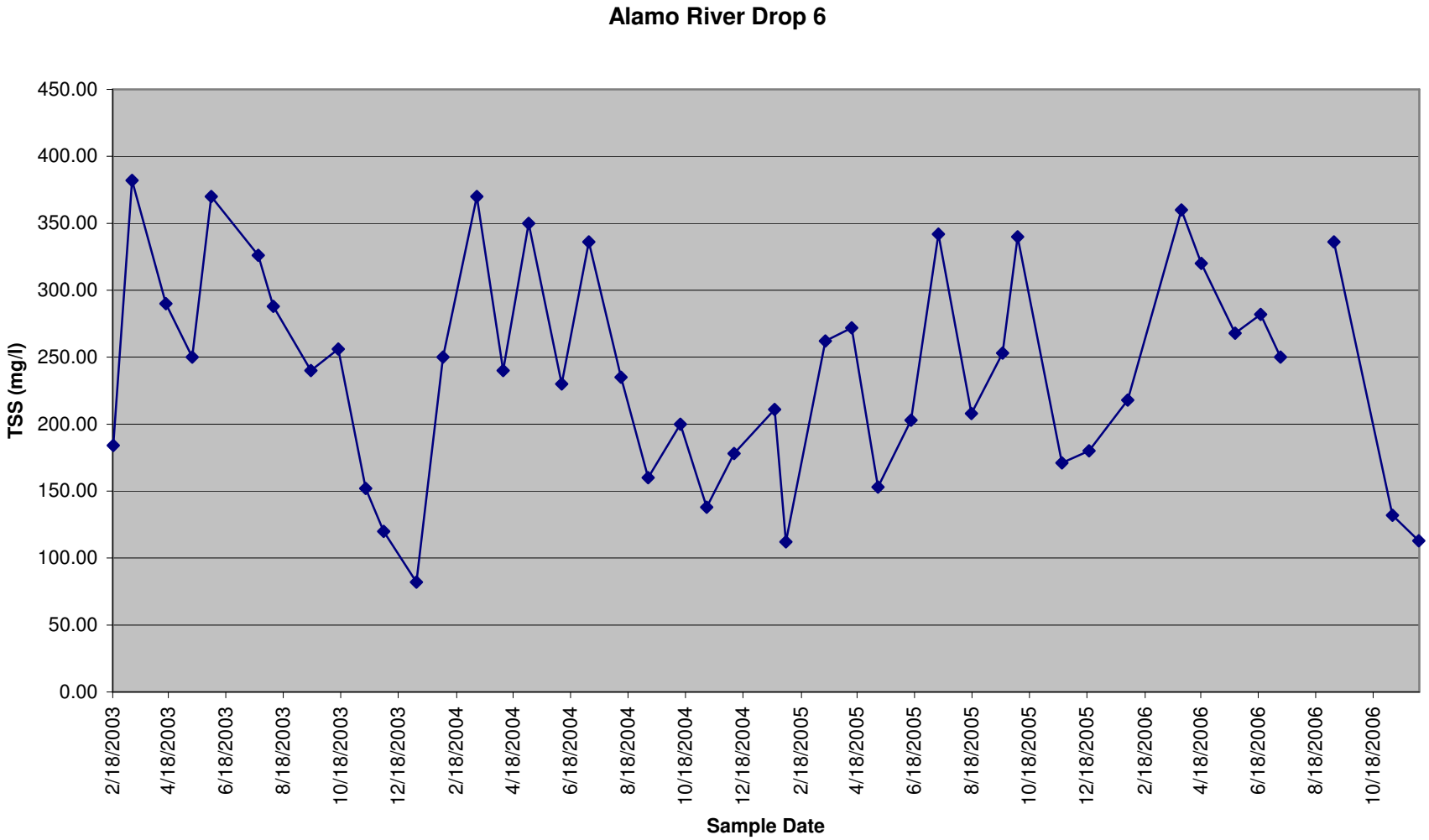

TMDL Targets at Alamo Outlet (2003-2006)
TSS (mg.l)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Phase 2 Target
Final Target
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date

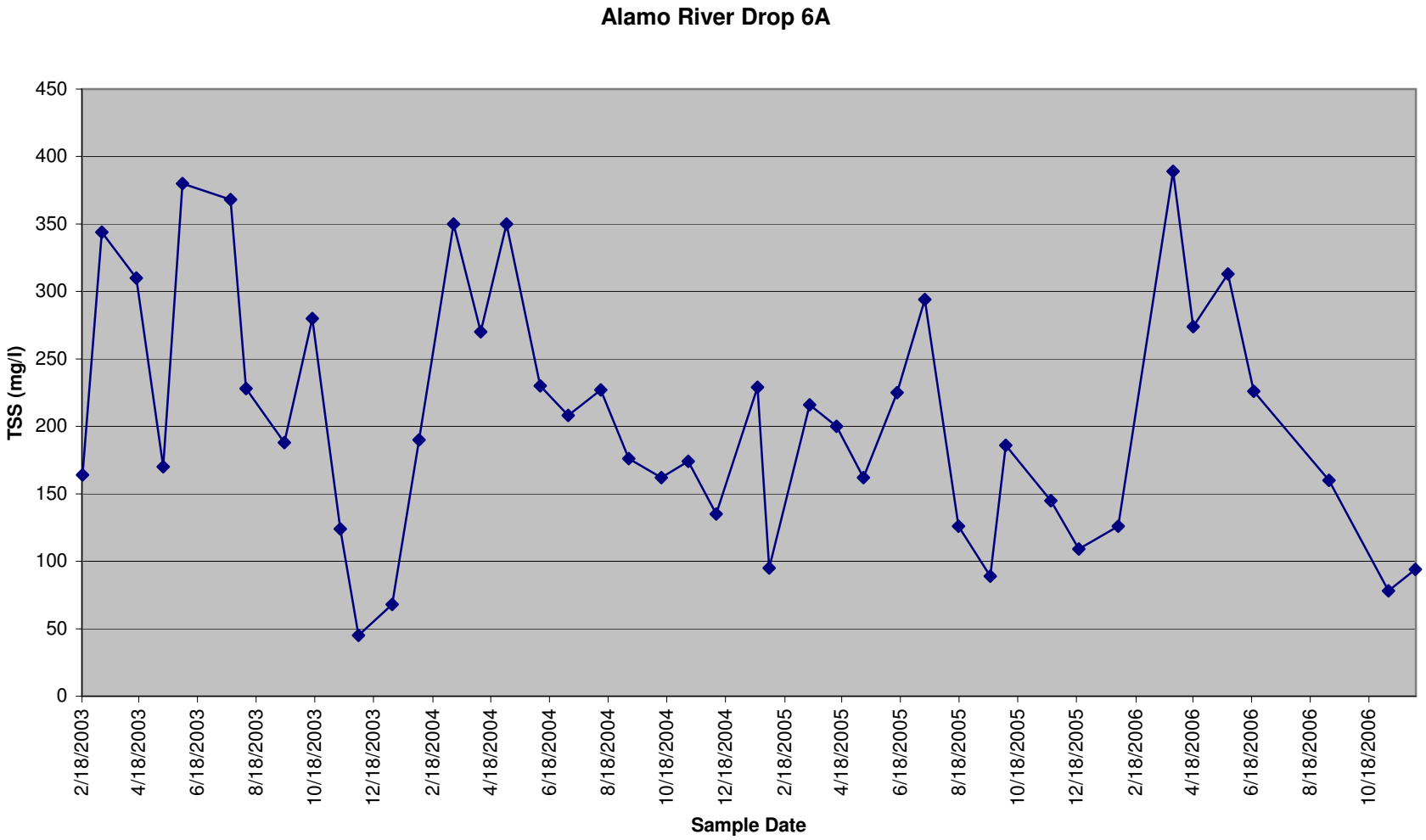

New River Outlet
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
3/11/2003
5/11/2003
7/11/2003
9/11/2003
11/11/2003
1/11/2004
3/11/2004
5/11/2004
7/11/2004
9/11/2004
11/11/2004
1/11/2005
3/11/2005
5/11/2005
7/11/2005
9/11/2005
11/11/2005
1/11/2006
3/11/2006
5/11/2006
7/11/2006
9/11/2006
11/11/2006
Sample Date

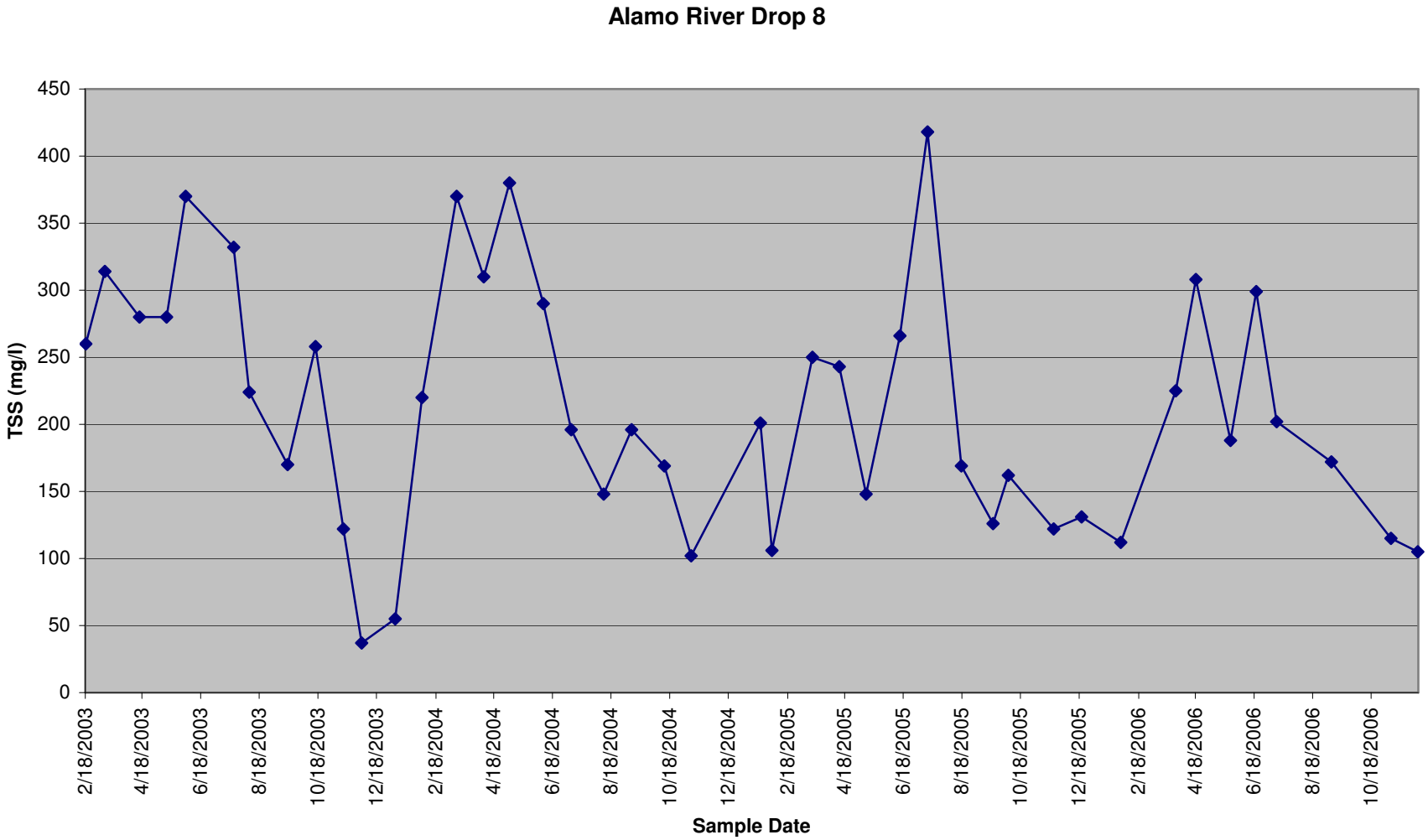

TMDL Targets at New River Outlet (2003-2006)
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
Phase 2 Target
Final Target
3/11/2003
5/11/2003
7/11/2003
9/11/2003
11/11/2003
1/11/2004
3/11/2004
5/11/2004
7/11/2004
9/11/2004
11/11/2004
1/11/2005
3/11/2005
5/11/2005
7/11/2005
9/11/2005
11/11/2005
1/11/2006
3/11/2006
5/11/2006
7/11/2006
9/11/2006
11/11/2006
Sample Date

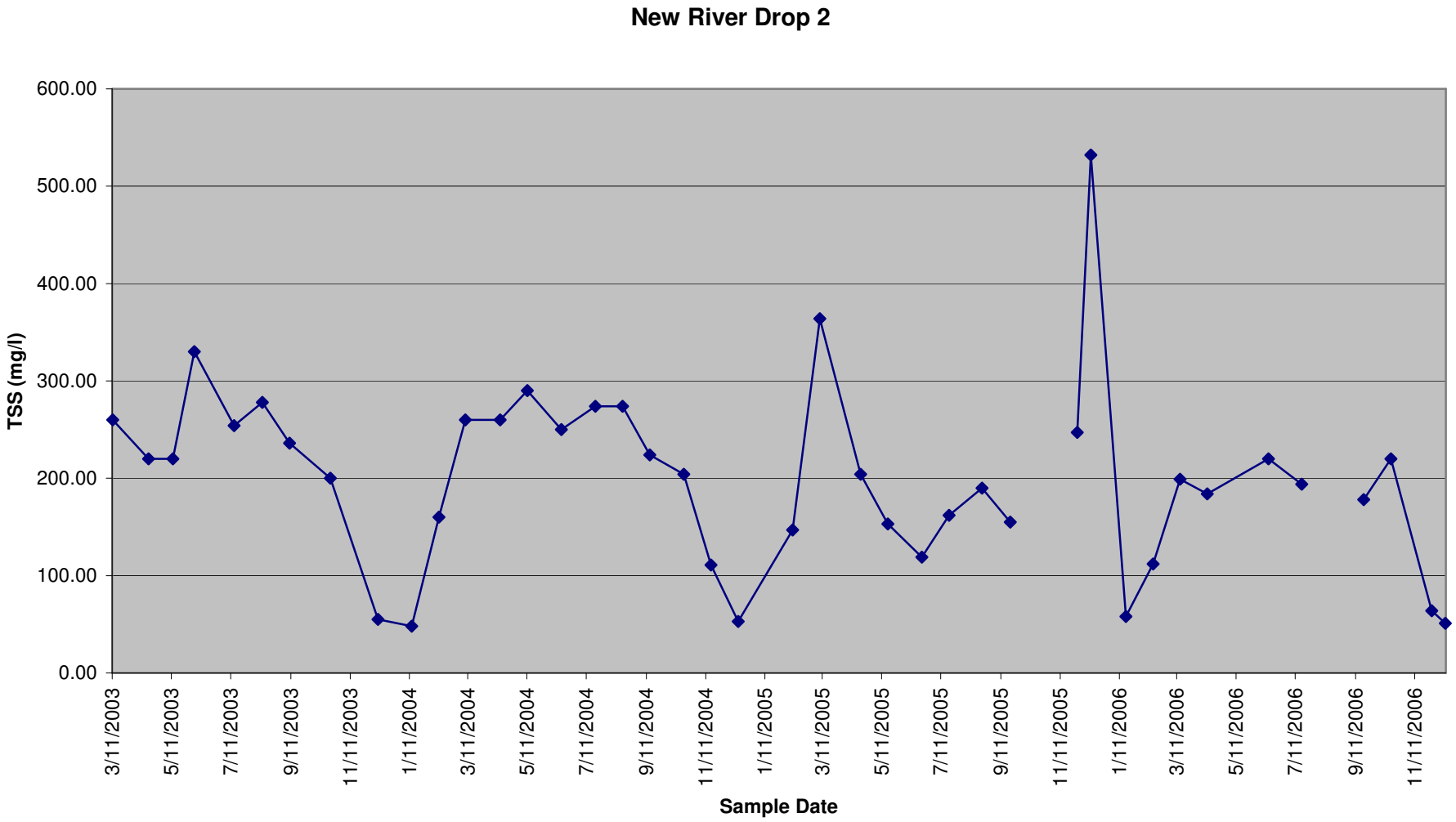

Alamo Drop 10
TSS (mg/l)
500
450
400
350
300
250
200
150
100
50
0
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date

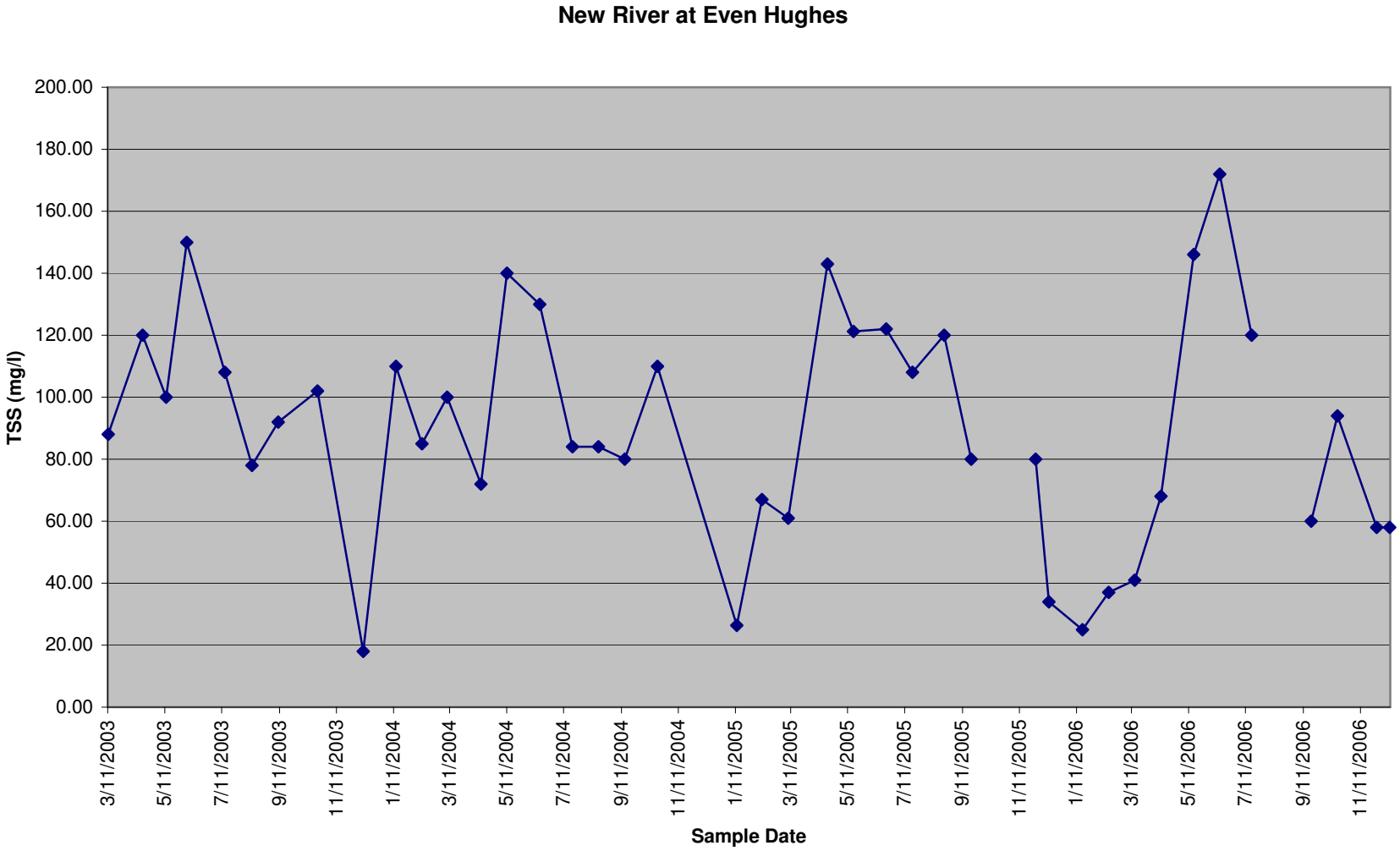

Alamo Drop 3
TSS (mg/l)
500
450
400
350
300
250
200
150
100
50
0
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date

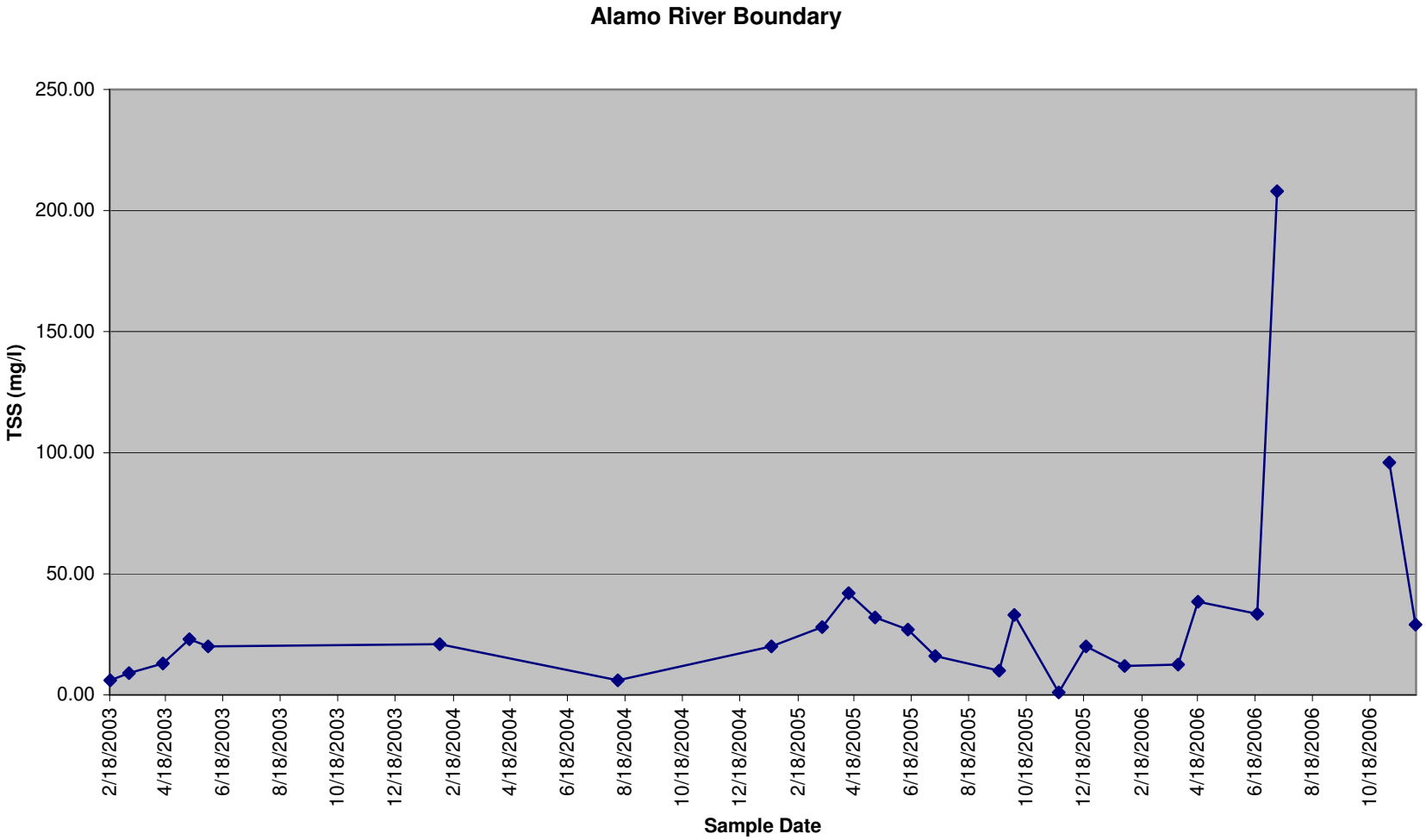

Alamo River Drop 6
TSS (mg/l)
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date

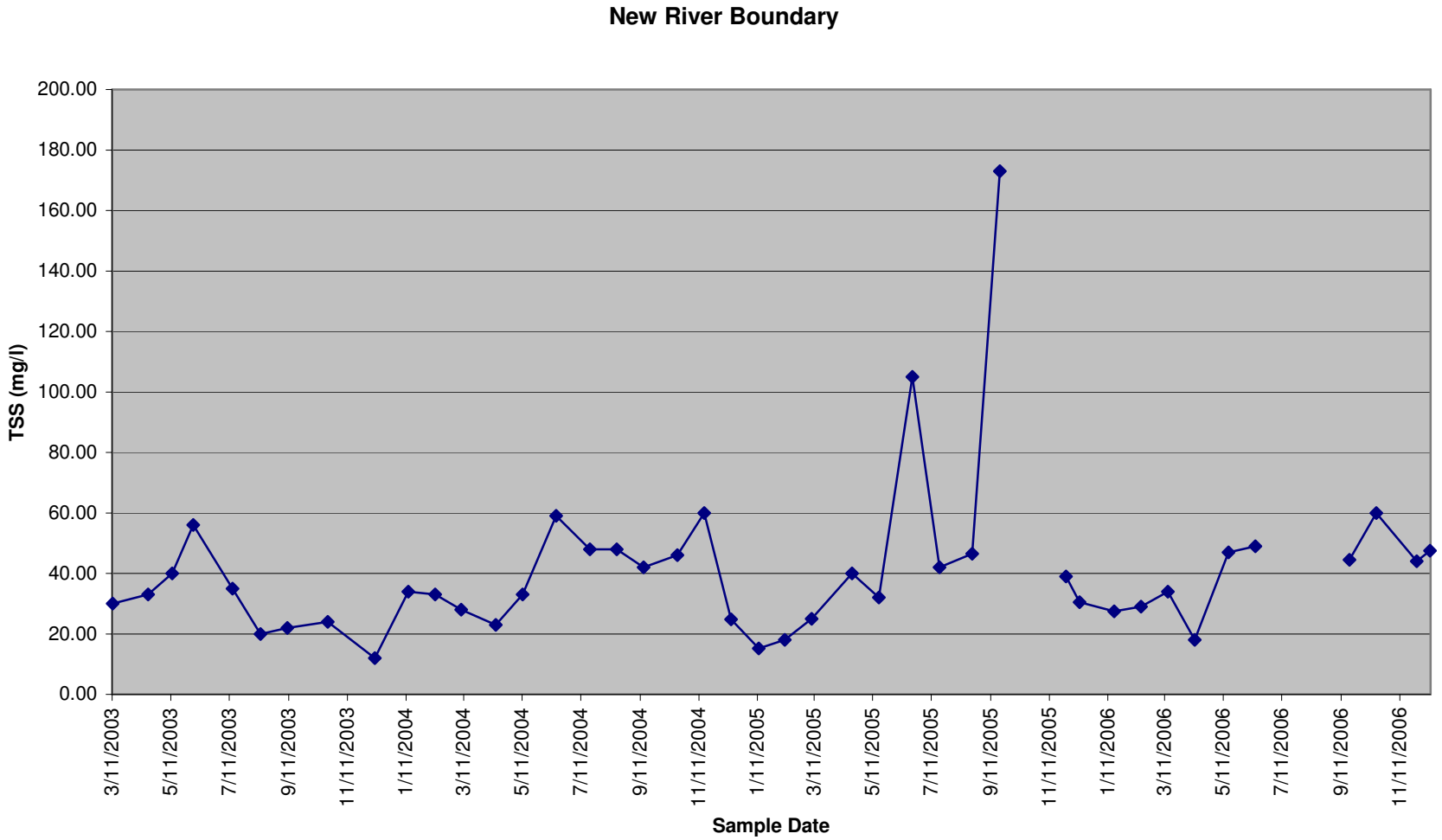

Alamo River Drop 6A
TSS (mg/l)
450
400
350
300
250
200
150
100
50
0
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date


Alamo River Drop 8
TSS (mg/l)
450
400
350
300
250
200
150
100
50
0
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date


New River Drop 2
600.00
500.00
400.00
300.00
200.00
100.00
0.00
TSS (mg/l)
3/11/2003
5/11/2003
7/11/2003
9/11/2003
11/11/2003
1/11/2004
3/11/2004
5/11/2004
7/11/2004
9/11/2004
11/11/2004
1/11/2005
3/11/2005
5/11/2005
7/11/2005
9/11/2005
11/11/2005
1/11/2006
3/11/2006
5/11/2006
7/11/2006
9/11/2006
11/11/2006
Sample Date


New River at Even Hughes
TSS (mg/l)
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
3/11/2003
5/11/2003
7/11/2003
9/11/2003
11/11/2003
1/11/2004
3/11/2004
5/11/2004
7/11/2004
9/11/2004
11/11/2004
1/11/2005
3/11/2005
5/11/2005
7/11/2005
9/11/2005
11/11/2005
1/11/2006
3/11/2006
5/11/2006
7/11/2006
9/11/2006
11/11/2006
Sample Date


Alamo River Boundary
250.00
200.00
150.00
100.00
50.00
0.00
TSS (mg/l)
2/18/2003
4/18/2003
6/18/2003
8/18/2003
10/18/2003
12/18/2003
2/18/2004
4/18/2004
6/18/2004
8/18/2004
10/18/2004
12/18/2004
2/18/2005
4/18/2005
6/18/2005
8/18/2005
10/18/2005
12/18/2005
2/18/2006
4/18/2006
6/18/2006
8/18/2006
10/18/2006
Sample Date


New River Boundary
TSS (mg/l)
200.00
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
3/11/2003
5/11/2003
7/11/2003
9/11/2003
11/11/2003
1/11/2004
3/11/2004
5/11/2004
7/11/2004
9/11/2004
11/11/2004
1/11/2005
3/11/2005
5/11/2005
7/11/2005
9/11/2005
11/11/2005
1/11/2006
3/11/2006
5/11/2006
7/11/2006
9/11/2006
11/11/2006
Sample Date