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16. Abstract

Storm water pollution prevention plan solids controls were evaluated in three field investigations and one laboratory study. Two different construction sites were monitored to determine the effectiveness of selected solids controls devices within the site and leaving the site. A receiving stream was monitored using bioassessment techniques to determine if impact could be detected.

There was no detectable effect of the use of the temporary sediment controls for reduction of nutrients and metals. There was no detectable effect of construction runoff on in-stream biological health and water quality. In one of the field studies, there was a tenfold increase in total solids leaving the construction site during construction, as compared to preconstruction values.

Construction activity had an effect on the distribution of particles in suspension leaving the construction site with the fraction of smaller particles in the storm water increased. The principal solids control device, a rock-filter dam, had a detectable effect on the particle size distribution of suspended particles, but did not have a statistically significant effect on measured total solids leaving the site.

A bare-soil erosion study indicated that for the soils used in this study, roller compaction and similar treatments are expected to reduce erosion volume by 15-30%. The RUSLE methods currently employed underpredict erosion and could lead to undersized temporary sediment controls.

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Storm Water Pollution Prevention Plan Solids Controls in Highway Construction Activities: Three Field Investigations and a Laboratory Study

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Report 1425-8
Project Number 0-1425,

"Evaluation of the Impacts, Performance, and Costs of Storm Water Pollution Prevention Plans as Applied to Highway Construction Activities"

Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration.

March 2000

Disclaimers

NOTICE

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ABSTRACT

In order to help justify the costs involved in installing and maintaining storm water pollution prevention plans in road construction activities, three field investigations were conducted along with a laboratory study of erosion.

Two different construction sites were monitored along with one receiving stream. The sites were monitored to determine the effectiveness of selected solids controls devices within the site and leaving the site. Selected water quality parameters were monitored along with solids specific parameters. The receiving stream was monitored to determine if impact could be detected using bioassessment techniques, and if the impact could be attributed to the storm water from the construction site.

Based on these studies there was no detectable effect of the use of the temporary sediment controls for reduction of nutrients, and metals using the methods employed. There was no detectable effect of construction runoff on in-stream biological health and water quality. In one of the field studies, there was a tenfold increase in total solids leaving the construction site during construction, as compared to preconstruction values.

Construction activity had a detectable effect on the distribution of particles in suspension leaving the construction site, in this study the fraction of smaller particles in the storm water is increased. The principal solids control device, a rock-filter dam, had a detectable effect on the particle size distribution of suspended particles. This effect is similar to distribution shifts that have been observed in engineered storm water treatment systems. The rock-filter dam did not have a statistically significant effect on measured total solids leaving the site, although the solids parameters were smaller downstream of the dam.

A bare-soil erosion study indicated that for a given soil and a given rainfall intensity if the rainfall intensity is doubled, the erosion volume increases by 50%. In contrast, if the shear strength is doubled, the erosion volume is reduced by 37%, while if the compressive strength is doubled, the erosion volume is reduced by 16%. For the soils used in this study roller compaction and similar treatments are expected to reduce erosion volume by 15-30%. The RUSLE methods currently employed will tend to underpredict erosion and lead to undersized temporary sediment controls.

Future efforts should focus on better methods to quantify solids loss from a construction site and to quantify the performance in-situ of temporary sediment controls. For rock-filter dams and similar controls, future research should measure the volume of soil captured upstream of the dam after a storm event and compare this volume to an estimate of the solids volume passed through the TSC based on the measured suspended solids and estimates of the flow rate.

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INTRODUCTION

The Clean Water Act (CWA) prohibits storm water discharge from construction sites that disturb 1 or more acres, unless authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Permittees must provide a site description, identify sources of contaminants that will affect storm water, identify appropriate measures to reduce pollutants in stormwater discharges, and implement these measures. The appropriate measures are further divided into four classes: erosion and sediment control, stabilization practices, structural practices, and storm water management. Collectively the site description and accompanying measures are known as the facility's Storm Water Pollution Prevention Plan (SW3P).

The permit contains no specific performance measures for construction activities, but states that "EPA anticipates that storm water management will be able to provide for the removal of at least 80% of the total suspended solids (TSS)." The rules also note "TSS can be used as an indicator parameter to characterize the control of other pollutants, including heavy metals, oxygen demanding pollutants, and nutrients commonly found in stormwater discharges"; therefore, solids control is critical to the success of any SW3P.

There is evidence that storm-water-suspended solids do serve as a transport mechanism for pollutants that pose a real or suspected threat to health or the environment. High lead and cadmium concentrations are associated with fine-grained soils of 20 to 50 microns, and polycyclic aromatic hydrocarbons (PAHs) are associated with particulates in the 6 to 60 micron range (Xanthopoulous et. al., 1992). Many studies have reported that PAHs, heavy metals, and pesticides are common constituents of storm water runoff and are associated with the particulate portion of the runoff. In these studies, most of the pollutants are associated with particle sizes in the range of 6-60 microns.

Typically more than half of the TSS in storm water falls in this size range. A sedimentation study of Barker Reservoir (Winslow Associates, et. al., 1985) in Houston reported that more than 60% of the particles in sediment was smaller than 60 microns in size. A storm water study using 89 samples from the Dallas-Fort Worth Metroplex reported that more than 85% of the particulates were smaller that 30 microns (Pechacek, 1993). These two studies in different geological provinces of Texas indicate that the potential for pollutant transport by storm water solids is significant. An important finding of the later study was that the physical characteristics (particle size distribution) were identical regardless of the contributing land use, thus one cannot infer the contributing land use from the particle size distribution (the mass loadings were different, however).

The EPA's Sediment Management Strategy (USEPA, 1994) defines contaminated sediments as "... contaminated sediments are those which contain *chemical substances* at concentrations that pose a known of suspected *threat* to aquatic life, wildlife, or human health (emphasis added)." The document also states that ecological impacts including the impairment of reproductive capacity and change in structure and health of benthic and other aquatic communities were often observed at contaminated sites. The EPA's approach with contaminated sediments is to control *sources* of sediment *contamination* and not necessarily the sources of sediment! In fact, the Sediment Management Strategy in the remediation section states " ... limited capping of contaminated sediment with clean material may be done in anticipation of further natural deposition of clean sediment." This statement is significant in that it accepts that sediments themselves are not necessarily undesirable, just the contaminants associated with them.

Work on measuring performance of structural controls was conducted by the city of Austin (1990). They concluded that sand filtration, and wet pond detention were effective controls for their regional conditions. These results are consistent with findings of other researchers (Urbonas and Stahre, 1993; Shaver, 1993). Recently Urbonas published a set of recommended parameters to report with Best Management Practices (BMP) for relating the performance of different structural approaches (Urbonas, 1995). However these BMPs are primarily intended for permanent facilities (an operating highway) and not for the short-term disturbances caused by construction.

Although the NPDES permit requires SW3Ps to be in-place, it specifically excludes any performance measures as to the effectiveness of the controls with respect to construction activities. The reason for the exclusion was to reduce costs associated with monitoring storm water discharges, but unfortunately the exclusion also makes it difficult for a permittee to assess the effectiveness of the controls implemented at their site.

While many agencies are working on various aspects of sediment management as related to storm water runoff, there appears to little data regarding sediment transfer rates, associated pollutants, and effects of sedimentation as related to highway (or any other) construction activity.

PURPOSE AND SCOPE

The purpose of this research was to monitor actual construction sites to determine how highway construction activities affect overall rate of solids transport to receiving waters, and evaluate the performance of storm water pollution prevention devices associated with the monitored construction site. Specifically the sites were monitored to determine the construction site's effect on the levels of selected water quality measures in water within and leaving the site to determine the impact in the receiving stream, and to determine the overall effectiveness of currently used solids controls.

DESIGN OF THE FIELD AND LABORATORY EXPERIMENTS

This research consisted of a field monitoring program, a laboratory experiment, and supporting data analysis. Two different construction sites were monitored that were geographically close but had different drainage patterns. The laboratory experiment focused on erosion characteristics of bare soil. . Figure 1 is a schematic of the field studies various sampling locations and their geometric relationship to a construction site.

Two field studies focused upstream of a receiving water while one field study focused on the receiving water.

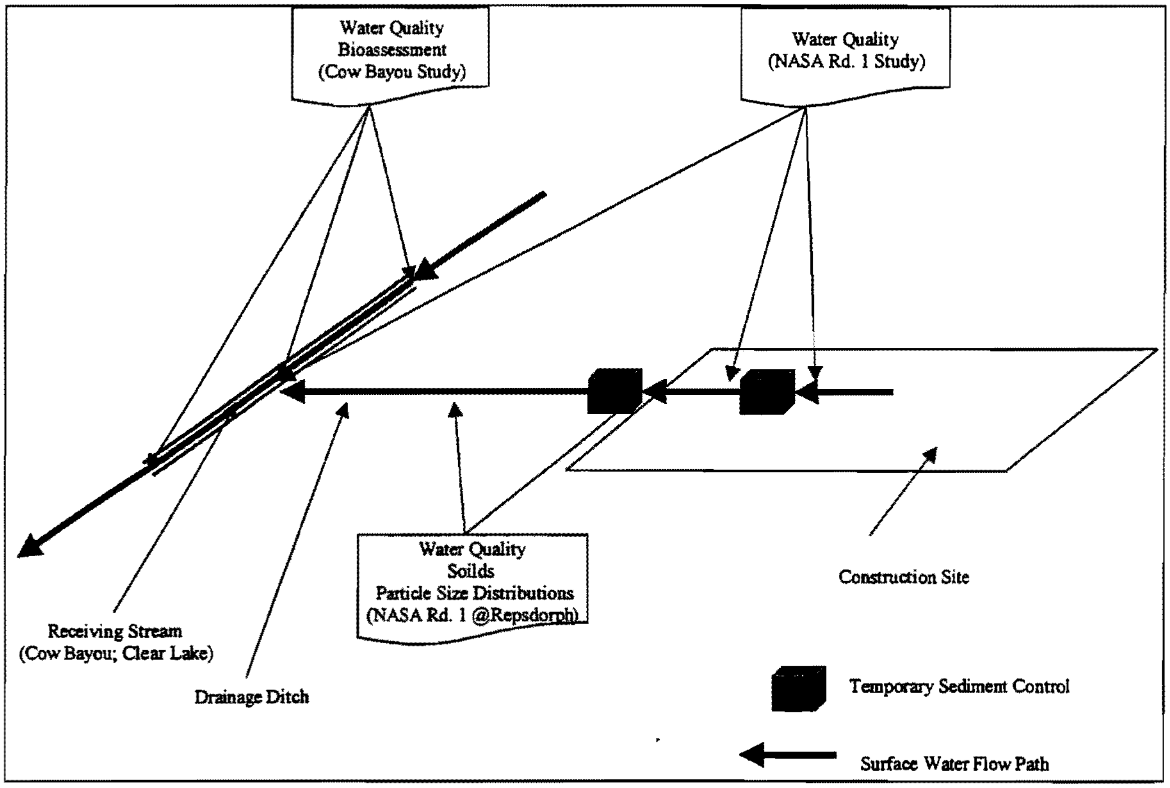

Figure 1: Schematic of Field Study Sampling Design

The schematic shows the receiving stream to the left of the figure. One study monitored upstream and downstream of an outfall that collected storm water from a construction site. The receiving stream was monitored using biological assessment tools to determine if storm water impacts could be detected and quantified.

The boxes represent various temporary sediment controls located on the construction site. One study monitored upstream and downstream of these devices within a construction site. The water quality leaving this site was also monitored. A second study monitored a temporary sediment control protecting a drainage ditch that drained to a receiving water body. Collectively these studies comprise the field program conducted during this project.

To supplement the field results a laboratory experiment to study bare soil erosion was conducted. This study was to evaluate compaction effects on soil and to determine the feasibility of using volume measurements instead of mass measurements for quantifying soil loss.

The three separate field studies are the NASA Rd. 1 Study, the Cow Bayou Study, and the NASA Rd. 1 @ Repsdorph Dr. Study.

NASA Rd. 1 Study

The NASA Rd. 1 study monitored a highway construction site to determine its effect on the levels of selected water quality measures in water leaving the site. The performance of two types of temporary sediment controls (TSCs) used within the site was also monitored to determine the effectiveness, in practice, of the TSCs. The two types of TSCs examined are in common use at highway construction sites.

Figure 2 is a photograph of a rock-filter dam and Figure 3 is a photograph of a sediment-control fence. Both types of TSCs are based on the same principles: interception of solids laden stormwater from disturbed areas, coincident reduction of flow speed, sedimentation and capture of the solids, and release of the water in a sheet flow.

Figure 2: Rock-filter Dam

Figure 3: Sediment-control fence

The field-monitoring program monitored the water quality measures listed in Table 1 at selected discharge locations leaving the site and at a selected un-impacted location nearby. These measures were analyzed to determine if ambient and storm-influenced values were different and if just downstream of the discharge any changes in water quality could be detected during storm-influenced flow.

This monitoring program also monitored these same water quality measures listed in both upstream and downstream of these devices. These measures were analyzed to test if the devices produced meaningful changes in the water quality measures during storm-influenced flow.

Table 1: Water-quality constituents analyzed for NASA Rd. 1 Study

Parameter	Symbol	Range (mg/L)	Method[1]
Chloride	Cl^-	0 - 20	8113
Conductivity	cond	0 - 20 mS/cm	8160
Iron, Total	Fe	0 - 3.00	8008
Nickel	Ni	0 - 1.8	8037
Nitrate, MR	NO_3^--N	0 - 4.5	8171
Nitrite, LR	NO_2^--N	0 - 0.300	8507
Nitrogen, Ammonia	NH_3-N	0 - 2.50	8038
pH	pH	0 - 14	8156
Phosphorus, Reactive	P	0 - 2.50	8048
Suspended Solids[2]		0 - 750	8006
Sulfate	SO_4^{2-}	0 - 70	8051
Turbidity[3]	FTU	0 - 450 FTU	8237
Zinc	Zn	0 - 2.00	8009

[1] Hach Company (1992). "Water Analysis Handbook." Hach Company, Loveland, CO.
[2]Compared to Total Solids, Gravimetric, EPA Approved
[3]FTU equal to NTU using the Formazin turbidity standard.

Cow Bayou Study

This field experiment monitored Cow Bayou, a stream that received storm water from the highway construction site, to identify whether any impact from storm water runoff can be detected in receiving aquatic ecosystems, and to examine the utility of two different approaches to quantify this impact. This experiment was fundamentally different from the previous effort in that biological assessment tools were used in addition to selected water quality measures.

The biological assessment effort monitored the bayou upstream, downstream, and at the discharge point from the construction site. Table 2 is a list of the water quality and biological assessment measures collected during this experiment.

Table 2: Water-quality and biological assay constituents analyzed for Cow Bayou study.

Parameter	Symbol	Range (mg/L)	Method
Bethic macroinvertbrate number			
Conductivity		0 - 20 mS/cm	8160[1]
Dissolved Oxygen	DO	0-10	8157[1]
Light penetration depth	ft		Secci disk
pH	pH	0 - 14	8156[1]
Suspended Solids[2]		0 - 750	8006[1]
Temperature	^{0}C	0-40 ^{0}C	
Turbidity[3]	FTU	0 - 450 FTU	8237[1]
Toxicity	EC-50		Microtox™ Solid Phase

[1] Hach Company (1992). "Water Analysis Handbook." Hach Company, Loveland, CO.
[2]Compared to Total Solids, Gravimetric, EPA Approved
[3]FTU equal to NTU using the Formazin turbidity standard.

NASA Rd. 1 @ Repsdorph Dr. Study

This experiment monitored a second field site before, during, and after nearby highway construction. Two locations on the site were monitored, a downstream location (the outfall) and a location that was upstream of a temporary sediment control that was placed to protect the outfall.

This particular monitoring focused on solids behavior and Table 3 is a list of the solids and water quality measures collected during this experiment. The data were analyzed to determine if there were statistically significant changes in ambient conditions at the outfall during and after construction and if there were statistically significant changes in storm flow conditions during and after construction.

Bare-Soil Erosion Resistance Study

This experiment studied the relationship between the soil erosion volume and field measurable data including rainfall intensity, slope, antecedent soil shear strength, and soil compressive strength. The relationship was studied to infer the effectiveness of compaction as a pollution prevention technique and to develop volumetric based measurement concepts for potential field application. The utility of the Universal Soil Loss Equation for nearly flat terrain was also evaluated.

Table 3: Constituents analyzed for NASA Rd. 1 @ Repsdorph Dr. Study

Parameter	Symbol	Range (mg/L)	Method
10th percentile particle size	D_{10}	0-900μm	Mastersizer™
50th percentile particle size	D_{50}	0-900μm	Mastersizer™
90th percentile particle size	D_{90}	0-900μm	Mastersizer™
Clay fraction (75 μm)	%<75μ	0-100%	Mastersizer™
Nitrate, MR	NO_3^--N	0 - 4.5	8171[1]
Nitrite, LR	NO_2^--N	0 - 0.300	8507[1]
Nitrogen, Ammonia	NH_3-N	0 - 2.50	8038[1]
Phosphorus, Reactive	P	0 - 2.50	8048[1]
Suspended Solids[2]	SS	0 - 750	8006[1]
Total Solids	TS		Standard Methods
Total Suspended Solids	TSS		Standard Methods
Cumulative rainfall	inches	0-9.99 inches (before reset)	Tipping bucket raingage with cumulative datalogger

[1] Hach Company (1992). "Water Analysis Handbook." Hach Company, Loveland, CO.
[2]Compared to Total Solids, Gravimetric, EPA Approved

FIELD SITE DESCRIPTION(S)

The test site for the first two field experiments was a 2.368 mile construction site along NASA Rd. 1 in southern Harris County, Texas. The western end of the project was 0.36 mile east of FM 270, its eastern end was 0.63 mile east of Space Center Blvd., and the total project area was 52 acres, with 35 acres disturbed.

The construction activities planned centered on widening the road and thus the work at the site consisted of grading, structures, utility relocation, storm sewers, base, concrete pavement, traffic signals, signing and pavement markings. The soil-disturbing activities included preparing the "right-of-way," grading, excavation and embankment for roadway erosion control, storm sewers, utility adjustments, and topsoil work for sodding.

The western end of the project drains into Cow Bayou, while the section of the project between 3rd Street and the HL&P Co. cooling canal drains into Clear Lake via a TxDOT drainage outfall. The area of the project between the cooling canal and the Clear Lake bridge west of Clear Lake Park drains into Clear Lake via another TxDOT outfall adjacent to Space Center Blvd.

The eastern end of the project drains into Clear Lake by a TxDOT drainage ditch. Figure 4 shows the locations of NASA Rd. 1, the receiving-water bodies, and the sampling locations used in the first field experiment.

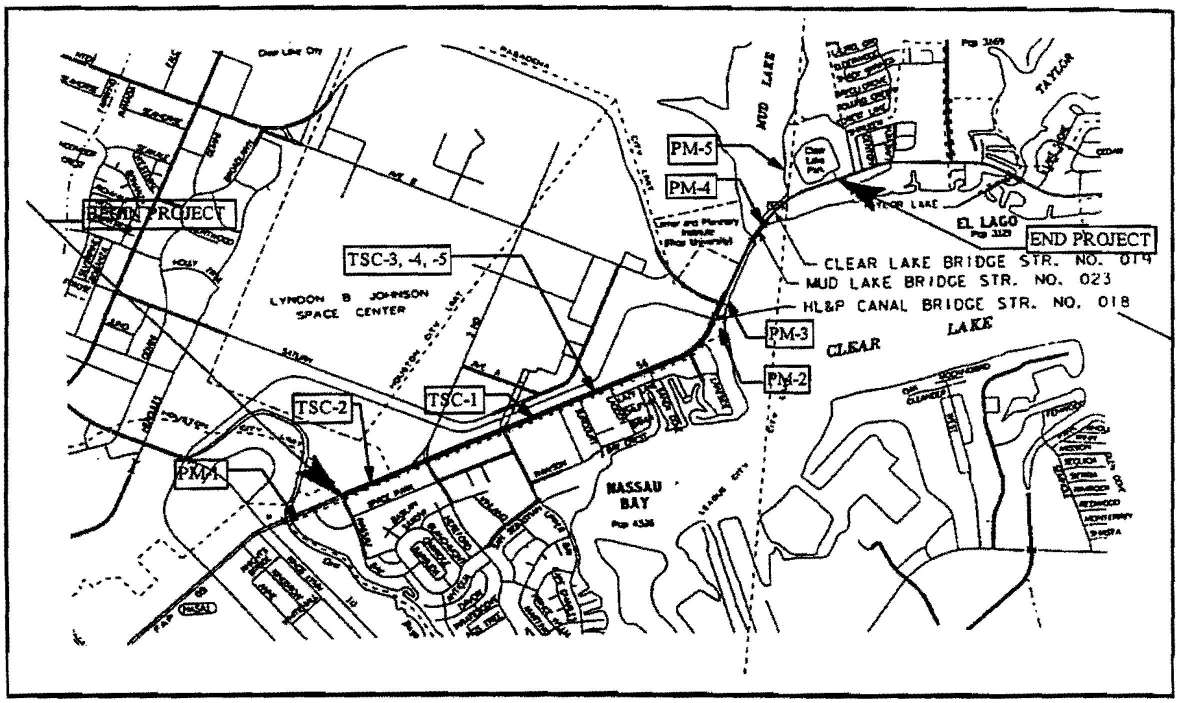

Figure 4: NASA Rd. 1 Test Site with Sampling Points for TSC Field Experiment

The final receptors of the drainage from this project were two water bodies; Clear Lake and Cow Bayou. The second experiment monitored Cow Bayou because it had a single drainage input from the entire western end of the construction project and because there were no other localized construction alterations present. Figure 5 shows the locations monitored on Cow Bayou.

The test site for the third field experiment was located 1.5 miles east of the first site. The construction activities were similar in scope to the first project. This experiment monitored a drainage ditch that discharged into Clear Lake from preconstruction to post-construction. Figures 6 and 7 show the location of the field site and the drainage areas involved, respectively

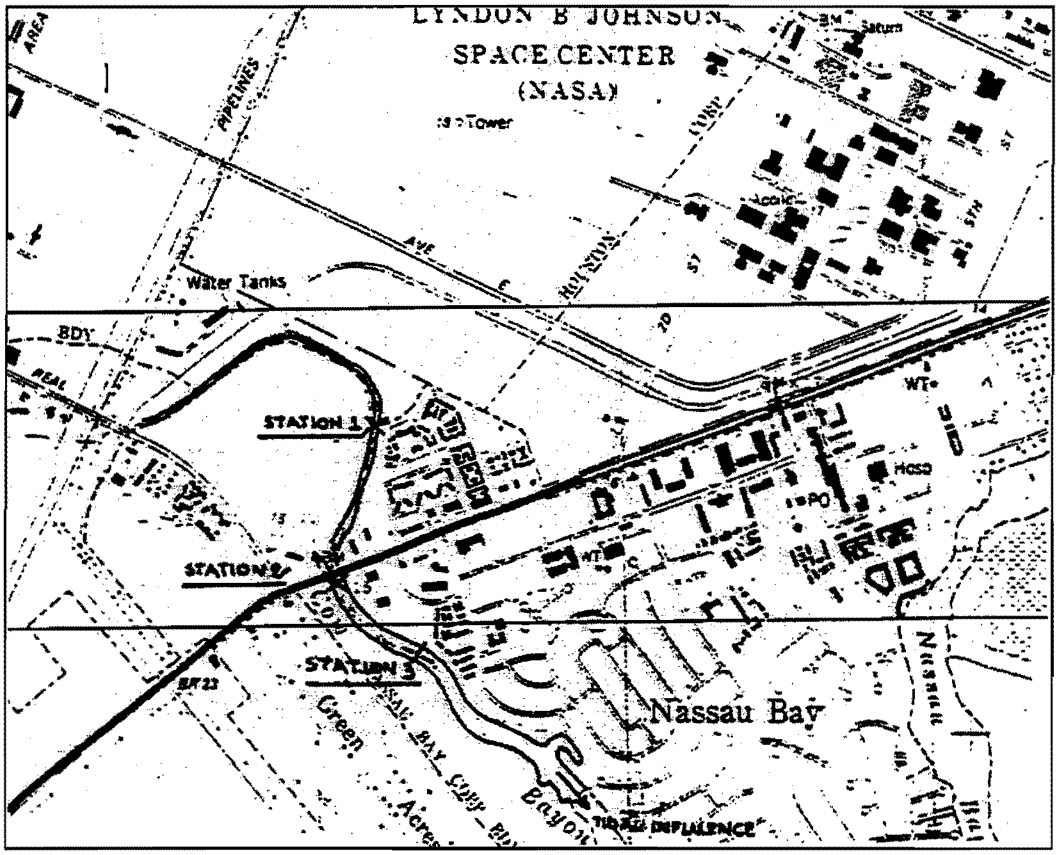

Figure 5: NASA Rd. 1 Test Site Cow Bayou Portion

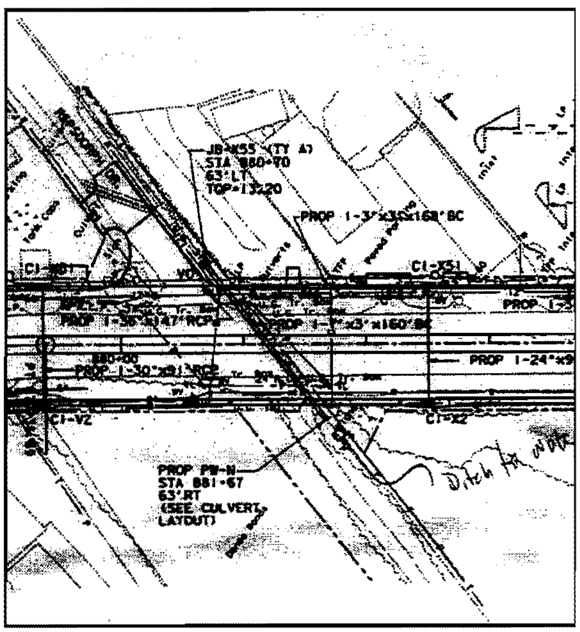

Figure 6: NASA Rd.1 @ Repsdorph

(Ref: Project NH97(81); Control No. 0918,Section No. 01, Job No. 082,Sheet No.229)

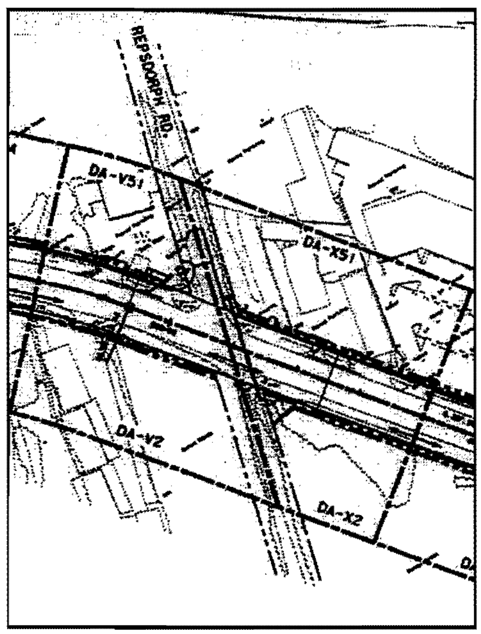

Figure 7: NASA Rd. 1 @ Repsdorph Drainage area

(Ref: Project NH97(81); Control No. 0918,Section No. 01,Job No. 082,Sheet No. 252)

SAMPLING DESIGN

NASA Rd. 1 Study

The evaluation of selected TSCs in the NASA Rd. 1 Study was based on the results of chemical analyses of 22 sample sets collected from the period of April 10, 1996, to October 2, 1996. Of these, 13 were ambient, three were post-storm-influenced, and six were time-based storm samples. Because there was only one set of time-based storm event samples, each of these individual samples was treated as a separate storm-influenced sample.

The ambient samples were compared with storm-influenced samples for all four permanent monitoring sites, and, for PM-1, PM-3, and PM-4, storm-influenced upstream versus downstream samples are compared to study dilution effects. Samples taken upstream of temporary sediment controls are compared with samples taken downstream to evaluate the effectiveness of the TSCs. The samples were collected by grab sampling at each location. All computations and statistical analyses for this field experiment was done with the statistical functions supplied in Microsoft Excel™. The details of the methods in this study are reported in the work of Muscara (1997).

Cow Bayou Study

The evaluation of stormwater impact on the receiving stream in the Cow Bayou Study was based on results of chemical and biological analyses of samples collected from 16 sampling visits during the period August 30, 1996, through December 5, 1997. Each visit, researchers collected samples from upstream, downstream, and at a stormwater outfall. The upstream location was defined as un-impacted so that any incremental changes in measured values moving downstream could be attributed to runoff from the construction site. The samples were collected by grab sampling at each location.

Microtox toxicity solid phase screening was performed on all the Cow Bayou study samples. This procedure uses a marine bioluminescence bacteria (*Vibrio fisheri*); samples having greater toxicity are indicated by less light output. All computations and statistical analyses for this field experiment was done with the statistical functions supplied in Microsoft Excel™. Further details of this study are reported in the work of Theodoridis (1998).

NASA Rd. 1 @ Repsdorph Dr. Study

The evaluation of solids transport in the NASA Rd. 1. @ Repsdorph Dr. Study was based on results of chemical and physical analyses from 142 sampling visits, from March 25, 1997, through July 9, 1998. Of these visits, 33 were during the preconstruction period, 10 were post-construction, and the remainder were during construction. The samples were collected by a mechanical sampling box that could collect water during inundation (storm) then shut itself using a float valve. Ambient samples were collected by grab sampling adjacent to the mechanical sampling box.

Particle-size analyses were performed on samples collected during the NASA Rd. 1. @ Repsdorph study using a Malvern Mastersizer™ laser-diffraction analyzer. All computations and statistical analyses for this field experiment were done with the statistical functions supplied in Microsoft Excel™.

Bare-Soil Erosion Resistance Study

Rainfall intensity, soil bed slope, antecedent soil shear strength, and compressive strength were selected as the physical variables for the experimental study of the soil erosion. These variables can be measured easily and quickly on a highway construction site.

A nozzle-type rainfall simulator generated rainfall. The rainfall simulator was suspended from the ceiling of the laboratory, covered an area of 0.81 square meters, and could produce rainfall with intensities as high as 250 mm/h. Rainfall intensities between 12 and 120 mm/h are usually of the greatest importance in natural rainfalls (Meyer, 1988). Therefore, five different rainfall intensities, 13, 25, 51, 76, and 102 mm/h, were selected to represent the ranges of rainfall for the current study.

A flume was used to hold the soil and direct the runoff. The flume is 4.8 m long and 1.2 m wide. Soils were placed into a smaller square box in the top end of flume, which is 0.66 m^2 in area. The soil bed was fully covered by the rainfall from the simulator. The flume was mounted on three adjustable supports, allowing the slope to be adjusted within the range of 0-1.3%. Typically highway slope grades range from 0.2 to 2%. These values are based on a highway grade survey conducted by the author for the southern US. Steeper grades exist, but represent less than 1% of highway miles. Therefore, the flume was operated at three slopes: 0.1%, 0.5% and 1.0%, which are typical slopes found at highway construction sites. The surface of the soil was kept parallel to the bottom of the flume for each test.

Table 4 lists the texture and the classifications of six different soils used in the laboratory experiments. Soil 1 is a 20-40 sieve washed pure sand, Soil 2 is a bentonite clay, Soil 3 is a 30% bentonite and 70% sand mixture (dry volume ratio), Soil 4 is a soil collected from a highway construction site at NASA Road 1 in Houston, Texas, Soil 5 is from the National Geotechnical Test Site at the University of Houston, Houston, Texas, and Soil 6 is from a highway construction site at the intersection of Highway 59 South and Beltway 8, Houston, Texas.

Soil erosion simulations were conducted in two different phases. Loosely packed soil was used in the first phase. In the second phase, soils were compacted while other conditions were intentionally kept the same to study the impact of increased shear strength and compressive strength.

Table 4: Textural Properties of Soils Used for Bare-Soil Erosion Study

Soil	Gravel	Sand	Silt	Clay	Classification	
	>2 mm	2 mm<s<50 um	50 um<s<2 um	<2 um	USDA[1]	USGS[2]
Soil 1	0.00%	100.00%	0.00%	0.00%	Sand	Sand
Soil 2	0.00%	22.22%	73.37%	4.40%	Silty loam	Sandy-Silt
Soil 3	0.00%	83.21%	15.84%	0.95%	Loamy sand	Sand
Soil 4	7.44%	19.43%	53.70%	19.43%	Silty Loam with gravel	Sandy-Silt
Soil 5	1.16%	57.64%	28.38%	12.82%	Sandy loam	Silty-Sand
Soil 6	17.63%	48.41%	26.47%	7.49%	Gravelly sandy loam	Silty-Sand

[1] USDA, 1951. Soil Survey Manual, U.S. Dept. Agriculture Handbook. No. 18, 503p.
[2] USGS, 1967. U.S. Geological Survey, Water-Supply Paper 1662-D.

Before each rainfall simulation, the antecedent shear strength was measured at several locations on the soil surface using a vane type shear stress meter. The arithmetic mean of these measurements was recorded as the shear strength of the soil sample. Following a similar procedure, the antecedent compressive strength was measured by a pocket penetrometer on the soil surface.

The initial soil level relative to a datum was measured at sixty-four points covering the soil surface. A selected intensity of rainfall was applied for thirty minutes. After the applied rainfall event, the soil level at each reference point was remeasured. Erosion volume was then determined from the difference of soil level before and after the rainfall event (a traditional cut-and-fill calculation).

This cut-and-fill approach to determine soil erosion was used because the flume is long relative to the soil block and not all of the soil reached the end of the flume during an experiment. In addition to this reason, soil collection in field trials is not practical as a matter of routine, while the measurements to make cut-and-fill type calculations can be made quickly using global positioning system (GPS) elevations, especially for a large construction site with multiple drainages. The dry density of the soil was used to convert the volume change to mass loss for comparison with other methods of erosion prediction.

The 200+ laboratory experiments were analyzed using the SAS statistical software. Further details of the bare soil erosion study are reported in the work by Liu (1999).

EVALUATION OF SELECTED SW3P PERFORMANCE

NASA Rd. 1 Study

Table 5 is a summary list of the mean values for the water quality parameters measured during the NASA Rd. 1 Study. PM-1 drains into Cow Bayou, tidally influenced, but sufficiently upstream that the chloride content is an order of magnitude smaller than at the other sites. Only at this location are some of the parameter value differences statistically significant. Of these differences, two are solids measures (suspended solids and turbidity) and one is a nutrient measure (ammonia). All the other parameters and all the other locations have insignificant differences implying that ambient and storm influenced water is indistinguishable using the methods employed in this study.

Table 5 : Mean Values for NASA Rd. 1 PM Locations, Ambient versus Storm

	PM-1		PM-3		PM-4		PM-5	
Parameter	Ambient	Storm	Ambient	Storm	Ambient	Storm	Ambient	Storm
SS (mg/L)	**13**	**183.5**	44.38	50.67	40.46	29.67	42.31	53.33
Turbidity (FTU)	**13.6**	**104**	43.54	38	43.31	32.25	48.69	55
Iron (mg/L)	0.23	0.28	0.106	0.093	0.085	0.065	0.092	0.128
Zinc (mg/L)	0.017	0.225	0.015	0.01	0.01	0.03	0.005	0.01
Nickel (mg/L)	**0.024**	**0.078**	0.139	0.05	**0.146**	**0.065**	0.128	0.035
Sulfate (mg/L)	90.09	6.78	1200	1075	1102	1075	1129	802
Chloride (mg/L)	297.73	30.87	5718	10500	6227	8267	5036	6614
Phosphorous (mg/L)	0.085	0.058	0.148	0.158	0.146	0.118	0.134	0.168
Nitrate (mg/L -N)	0.354	0.333	.423	.325	0.431	0.3	0.508	0.5
Nitrite (mg/L-N)	0.0047	0.016	0.007	0.01	0.0069	0.01	0.0067	0.023
Ammonia (mg/L-N)	**0.219**	**0.806**	1.153	1.24	1.055	1.303	0.795	1.443

[1] **Bold** entry differences are statistically significant at p=5%

Table 6 is a summary list of the mean values for the water quality parameters at the TSC locations measured during the NASA Rd. 1 Study. None of the parameter value differences at a location in Table 5 are statistically significant implying there was no detectable effect of TSCs on storm water quality. The entire data collected in this study is reported in Muscara (1997).

Based on these summary statistics there was no detectable effect of the NASA Rd. 1 highway construction project upon the receiving waters at the test site using the methods employed by the study. The downstream ambient versus storm-influenced samples at the permanent monitoring sites showed little or no differences.

Even those seen at PM-1, which had the most construction activity in the area, did not appear to be long term changes nor highly toxic with suspended solids and turbidity being among the most marked changes observed. Other research has shown these parameters to increase during a construction period and then return to normal levels after construction has ceased (Barrett et al. 1995a).

Table 6 : Mean Values for NASA Rd. 1 TSC Locations, Upstream vs. Downstream

	TSC-1		TSC-2		TSC-3		TSC-4		TSC-5	
Parameter	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream	Upstream	Downstream
SS (mg/L)	288	226	540	647	396	394	328	371	286	329
Turbidity (FTU)	192	129	315	596	305	303	205	235	201	199
Iron (mg/L)	0.164	0.056	0.485	0.480	0.55	0.50	0.28	0.44	0.34	0.27
Zinc (mg/L)	0.064	0.057	0.01	0.010	0.02	0.00	0.04	0.01	0.02	0.09
Nickel (mg/L)	0.123	0.088	0.06	0.085	0.04	0.00	0.00	0.01	0.02	0.02
Sulfate (mg/L)	-----	-----	19	33	----	----	13	0	16	20
Chloride (mg/L)	16.6	13.6	30	40	50	30	40	50	50	50
Phosphorous (mg/L)	0.043	0.075	----	----	----	----	0.04	0.00	----	----
Nitrate (mg/L -N)	0.612	0.625	2.8	2.8	1.2	1.0	0.80	0.80	0.7	0.7
Nitrite (mg/L-N)	0.062	0.071	0.163	0.154	0.050	0.043	0.170	0.071	0.122	0.183
Ammonia (mg/L-N)	1.80	1.36	2.11	1.59	1.85	1.71	1.66	1.69	1.38	1.50

Comparison of the upstream versus downstream samples at the permanent monitoring sites suggested that the storm water flowing into the receiving-water body was indiscernible from the water of the water body in the immediate area. Coupled with the fact that in the majority of cases, the ambient versus storm influenced (downstream) samples were statistically the same, these results suggest that the storm water runoff into the receiving-water bodies should have little or no effect upon the water bodies.

There was no detectable effect of the use of the temporary sediment controls for pollution reduction using the methods employed in this study, although the water quality of the receiving-water bodies where storm water drained into them did not seem to be affected by the construction activity.

Cow Bayou Study

The Cow Bayou study used biological assessment techniques adapted from the US EPA Rapid Bioassessment Protocols (Plafkin et. al., 1989). In addition, the Microtox^{TM} toxicity analysis was used. The purpose of this component of the research was to determine if impact could be detected in already impacted receiving water.

Microtox-assay results, reported as EC-50 values, are computed as the amount of light lost from exposed fluorescent bacteria (as compared to a laboratory control) divided by the amount of light remaining. The larger the value of EC-50, the greater detrimental effect the sample has on the test microbes.

Biological assessment measures are reported as total counts and as various indices. The total taxa count increases with increasing water quality, therefore a decline in total taxa could be interpreted as a decline (impact) in water quality. The Shanon-Weiner index is a measure of health that also should increase with increasing water quality. The index has a theoritical maximum when all the species are distributed evenly and this situation is thought to be biologically desirable (Norris and Georges, 1993).

Table 7 is a summary list of the mean values for the water quality parameters and the biological assessment measures at the sampling locations measured during the Cow Bayou Study. The entire data generated in this study is reported in the work by Theodoridis (1998). None of the parameter value differences in the table are statistically significant implying there was no detectable effect of construction runoff on in-stream biological health and water quality.

Table 7 : Mean Values of Biological and Water Quality Parameters for Cow Bayou

Parameter	Units	Upstream	Outfall	Downstream	Remarks
Total taxa		8.3	7.9	8.1	Max. observed =12
Total polychaete taxa		1.41	1.625	1.8	Max. observed=3
Shanon-Weiner Index		1.27	1.26	1.39	Ideal =2.48
Sheldon's Evenness Index		0.46	0.47	0.54	
Conductivity	ms/cm	2.44	2.45	2.85	
Dissolved Oxygen	mg/L	7.09	7.45	7.78	
Light penetration depth	ft	1.47	1.36	1.36	
pH		7.04	7.07	7.45	
Suspended Solids[2]	mg/L	27.8	30.41	36.81	
Temperature	°C	22.54	22.55	23.63	
Toxicity (EC-50)	mg/L	1.20	1.13	1.08	

NASA Rd. 1 @ Repsdorph Dr. Study

Table 8 is a summary list of the mean values for the water quality parameters and the solids measures at the downstream sampling location measured during the NASA Rd. 1 @Repsdorph Dr. Study.

Table 8 : Mean Water Quality Values for NASA Rd. 1@ Repsdorph

	PreConstruction		During-Construction		Post-Construction	
Parameter	Ambient	Storm	Ambient	Storm	Ambient	Storm
Turbidity (FTU)	**105.88**	**154.88**	*55.56*	*335.56*	*69.57*	***182.75***
TS (mg/L)	***258.24***	***485.97***	***279.82***	***4835.94***	***190.15***	***2908.75***
TSS(mg/L)	***80.27***	*341.27*	***56.41***	*3874.72*	*61.29*	***1867.25***
NH_3(mg/L)	**1.01**	1.94	***0.68***	*2.47*	1.36	1.67
NO_3(mg/L)	***0.37***	*0.57*	***0.41***	*0.61*	0.39	0.50
NO_2(mg/L)	*0.00*	*0.02*	0.02	0.04	0.02	0.00
PO_4(mg/L)	**0.06**	0.33	0.21	**0.24**	**0.19**	**0.58**
D_{10} (μ)	**4.26**	2.94	*5.94*	*3.33*	**5.69**	4.42
D_{50} (μ)	18.99	18.71	37.71	22.80	24.74	26.51
D_{90} (μ)	100.06	88.19	*146.60*	*86.69*	110.35	75.92
%<75μ	84.42	88.52	87.50	85.00	82.74	89.24
Cum. Rainfall (in)		43.37		42.2		4.16

Italic differences are statistically siginficant at p=0.05 within a group.
Bold differences are statistically significant at p=0.05 between groups.

In this study, the solids measures exhibited differences that were statistically significant between groups (phases of construction) and within groups (storm versus ambient). In particular the total solids in the runoff water leaving the site increased tenfold during construction.

Table 9 is a summary list of the mean values for the water quality parameters and the solids measures at the upstream and downstream sampling locations during construction activities for the NASA Rd. 1@Repsdorph Dr. Study. In this table, the upstream location is immediately upstream of a rock-filter dam placed in the drainage ditch about 150 feet upstream of the downstream sampling location.

The solids measures did not exhibit differences that were statistically significant within the groups (upstream versus downstream), but are different between groups (storm versus ambient). The solids in the runoff water leaving the site increased at least tenfold during a storm during construction. It is remarkable that such an increase is not observed in the preconstruction data clearly indicating that construction indeed has an impact on the solids available for storm water mobilization.

The significant particle-size data are summarized as ambient and storm upstream and downstream cumulative distributions of the data collected during the NASA RD. 1 @ Repsdorph Study. Each trace on the plot represents the volume fraction of particles less than the given size for each measured particle-size fraction. The traces are based on a log-normal fit of the measured D_{10},D_{50}, and D_{90} and the fraction smaller than 75 μm.

Table 9: Upstream versus Downstream Values During Construction

	Ambient		Storm	
Parameter	Upstream	Downstream	Upstream	Downstream
Turbidity (FTU)	**68.33**	**55.66**	**258.50**	**573.50**
TS (mg/L)	**393.00**	**279.82**	**5430.80**	**4835.94**
TSS(mg/L)	**84.80**	**56.41**	**4143.60**	**3874.72**
NH_3(mg/L)	0.70	0.68	*1.14*	*2.47*
NO_3(mg/L)	0.44	0.41	0.44	0.61
NO_2(mg/L)	0.04	0.02	0.04	0.04
PO_4(mg/L)	0.29	0.21	0.33	0.24
D_{10} (μ)	8.18	5.94	*0.99*	*3.33*
D_{50} (μ)	38.97	37.71	*11.93*	*22.80*
D_{90} (μ)	128.40	146.60	*40.96*	*86.69*
%<75μ	76.73	87.5	96.28	85.00

Italic differences are statistically significant at p=0.05 within a group.
Bold differences are statistically significant at p=0.05 between groups.

Figure 8 is a plot of the ambient versus storm PSDs at the downstream location. The two traces are the same indicating that prior to construction the observed particle size distribution was the same during storm flows as during ambient conditions. This unexpected result is interpreted as indication that the drainage area is stable with regards to natural and man-made cover. Figure 9 is a plot of the ambient versus storm PSDs during the construction period. The two traces are different and the difference is statistically significant. The shift in PSD is attributed to increased exposed soil caused by the construction activities immediately upstream of the sampling location.

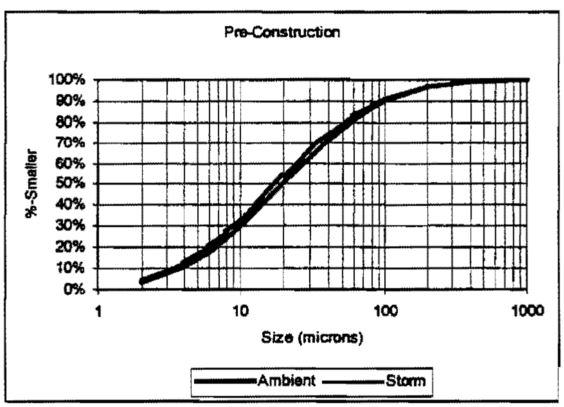

Figure 8: PSD Preconstruction downstream of TSC

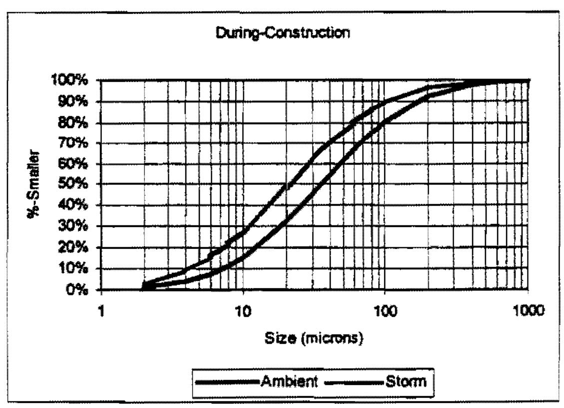

Figure 9: PSD During construction downstream of TSC

The direction of the shift is diagnostic. If the source distribution is unchanged and storm flows only increase velocity, then one would expect the distribution to shift to the right (towards larger particles remaining in suspension). However, in this study the shift was to the left indicating a change in the source distribution (disturbed earth with more exposed small particles) or resuspension of previously deposited smaller particles. Because the preconstruction storm flows have no shift, the resuspension hypothesis is unlikely, and this study concludes that the bare earth disturbance changes the nature of the particles available for transport off-site.

An upstream-downstream analysis also displayed a statistically significant shift in the distribution during storm flows. In Figure 10 the ambient conditions are plotted while in Figure 11 the storm conditions are plotted.

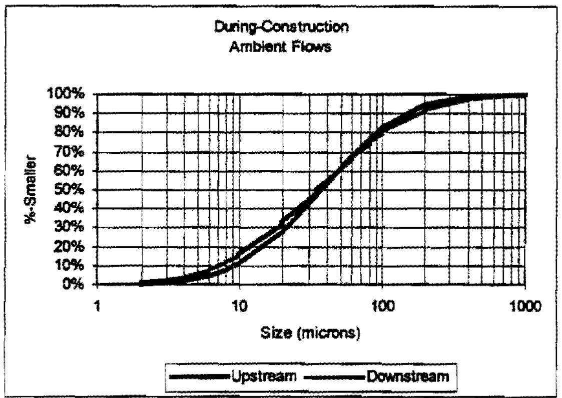

Figure 10: PSD During construction upstream versus downstream (ambient)

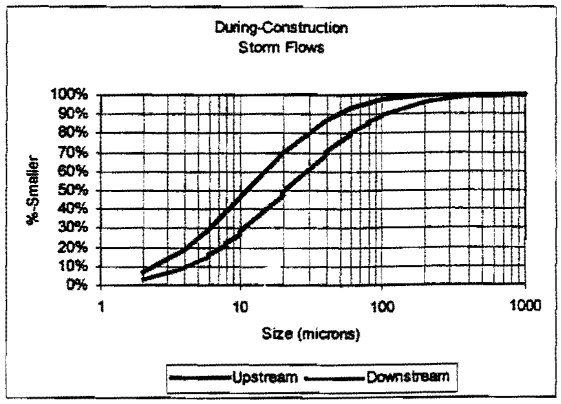

Figure 11: PSD During construction, upstream versus downstream (storm)

The storm conditions display an increased fraction of smaller particle sizes as compared to the ambient conditions, indicating that the storm water has mobilized a significant amount of smaller particles.

The downstream storm distribution is shifted to the right of the upstream distribution. One would expect the upstream distribution to be shifted to the left of the downstream distribution because the TSC is designed to reduce flow velocity and capture particles. The right shift could be indicative of resuspension of larger particles already deposited in the ditch when the water accelerated downstream of the TSC. This shifting to the right in particle size distributions has been observed in studies of engineered storm water treatment systems (Pitt et. al., 1997) where solids mass removal was quite effective, but the distributions of the particles passing through the system were unchanged.

Bare-Soil Erosion Resistance Study

The unit soil volume loss was defined as the soil loss volume per unit area. The experiments confirmed the established relationship that higher rainfall intensities generate higher erosion volumes on both compacted and uncompacted soil. The experiments also demonstrated that soils with high shear strength, on the average, exhibited lower erosion volumes than low strength soils. It is known that the soil shear strength is related to the interparticle attractive forces in the soil. The higher the shear strength, the greater the traction stress required to dislodge the particles, thus higher rainfall intensities are required to produce more soil volume loss for a given soil strength. An inverse linear correlation between soil volume loss and compressive strength was also observed, except for sand because when sand is compacted, a high compressive strength results, but being noncohesive, high loss occurs under high rainfall intensities.

A multiple-variable regression analysis performed to study the relationships of the various variables and the erosion volume. A product model was used

$$U = \beta_0 (S_0)^{b_1} (\tau)^{b_2} (\sigma)^{b_3} (I)^{b_4} \quad (1)$$

where U is a 30-minute soil mass loss with units of g/m^2. (The unit soil volume loss was converted to mass loss by using the dry density of soils, so that the estimated unit soil losses could be compared with losses predicted other methods). S_0 is percent slope of the soil bed; τ is shear strength and σ is compressive strength, they both have units of N/cm^2; I is the rainfall intensity, in mm/h; β_0, b_1, b_2, b_3 and b_4 are regression parameters.

The SAS computer program was used to analyze the data and determine the values of the regression parameters with and without Soil 1 included. Soil 1 was washed sand and behaved differently than all the other soils. The regression parameters are summarized in Table 10.

Table 10: Regression Parameters for Bare-Soil Erosion Model

Models	b_0	b_1	b_2	b_3	b_4	R^2
Product model for all soils,	124.4	0.04	-0.28	-0.57	0.72	0.5554
Product model for soils except sand	581.2	0.08	-0.67	-0.25	0.59	0.6206

The significance of the regression coefficients is illustrated by the following example. Suppose some unit soil loss is determined for a soil of a particular shear strength and compressive strength for particular rainfall intensity. The regression parameters imply that if the rainfall intensity is doubled, the erosion volume increases by 50%. Likewise, if the compressive strength is doubled, the erosion volume is reduced by 16%. Finally if the shear strength is doubled, the erosion volume is reduced by 37%.

For the real soils used in this study, the shear strength and compressive strength of one soil was doubled by compaction, while the other two soils experienced only an increase in compressive strength. Thus, roller compaction and similar treatments are expected to reduce erosion volume by 15-30%.

This product model is similar to USLE (Universal Soil Loss Equation) and its derivatives, in that it predicts loss as the product of various factors. Unlike USLE methods, the factors are field measurable, geotechnical and other properties. The product model was selected because it is consistent in formulation with earlier models, and, at zero rainfall, it predicts zero erosion. The RUSLE (Revised-USLE) is the soil erosion prediction tool used by the USDA. It is also used to estimate the soil erosion caused by single rainfall events, despite warnings against this type of application. The Texas Department of Transportation uses a USLE-based soil erosion estimation tool (TXDOT, 1993) that shares the same origins as RUSLE and thus the same limitations. The RUSLE was applied in this research to compare its ability to estimate soil loss during single rainfall events with the product model.

Figure 12 is a plot of the unit soil mass loss predicted by the product model. The predicted loss calculated by the RUSLE is also plotted in this figure. Both the RUSLE and the product model use the measured data as the x-coordinate, and the predicted loss as the y-coordinate. A perfect prediction would plot all the calculated values along the 45° line shown on the plot, which means that the predicted values are equal to the measured values. In most cases the RUSLE underestimated the unit soil loss. Therefore, based on these results, if one were to use the RUSLE to predict event-based losses, then integrate the losses over time to design temporary sediment controls, one would tend to undersize the controls.

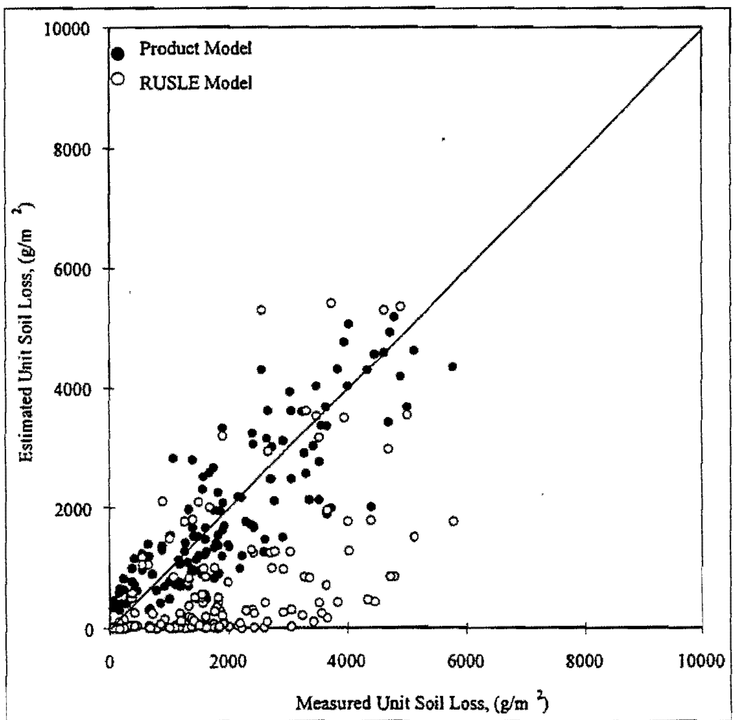

Figure 12: Predicted versus measured soil loss

SUMMARY

Three field studies and one laboratory study were conducted to evaluate the effectiveness of selected temporary sediment controls. There was no detectable effect of the use of the temporary sediment controls for reduction of nutrients and metals using the methods employed in this study. There was no detectable effect of construction runoff on in-stream biological health and water quality.

There was a detectable increase in the solids in runoff water during construction in the third field study. In this study, there was a tenfold increase in total solids leaving the construction site during construction, during storm flow, as compared to preconstruction values.

Construction activity had a detectable effect on the distribution of particles in suspension leaving the construction site, in this study the fraction of smaller particles in the storm water is increased. The author speculates that bare-earth exposure changes the nature of the source of particles by making a greater number of small particles available for transport.

The rock-filter dam had a detectable, but unanticipated, effect on the particle size distribution of suspended particles. This effect is similar to distribution shifts that have been observed in engineered storm water treatment systems. The rock-filter did not have a statistically significant effect on measured total solids leaving the site, but the solids parameters were smaller downstream of the dam.

A bare-soil erosion study indicated that for a given soil and a given rainfall intensity if the rainfall intensity is doubled, the erosion volume increases by 50%. In contrast, if the shear strength is doubled, the erosion volume is reduced by 37%, while if the compressive strength is doubled, the erosion volume is reduced by 16%. For the real soils used in this study, the shear strength and compressive strength of one soil was doubled by compaction, while the other two soils experienced only an increase in compressive strength. Thus, roller compaction and similar treatments are expected to reduce erosion volume by 15-30%.

The RUSLE methods currently employed will tend to underpredict erosion and lead to undersized temporary sediment controls.

CONCLUSIONS

Future efforts should focus on better methods to quantify solids loss from a construction site and to quantify the performance in-situ of temporary sediment controls.

For rock-filter dams and similar controls, future research should measure the volume of soil captured upstream of the dam after a storm event, and compare this volume to an estimate of the solids volume passed through the TSC based on the measured suspended solids and estimates of the flow rate.

Although the temporary sediment controls in the three field studies had a debatable effect upon runoff water quality, the water quality of the receiving-water bodies where storm water drained into them did not seem to be affected by the construction activity.

IMPLEMENTATION RECOMMENDATIONS

The RUSLE currently in use by TxDOT should be used with the understanding that it probably underpredicts soil loss in flat terrain and will underestimate the impact of various TSCs.

Roller compaction and similar treatments are recommended for inclusion in storm water pollution plans where bare soil will be exposed because the laboratory experiments indicate that this treatment can have a marked effect in reducing the volumetric loss of soil during rainfall.

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APPENDIX I: SAMPLE WATER QUALITY DATA: NASA RD. 1 STUDY

Appendix I: Sample Water Quality Data: NASA Rd. 1 Study

Sample Number	Collection Date	Site	Type	Temp (C)	pH	TDS (g/L)	Cond (mS/cm)	SS	Turb (FTU)	NO_3^--N	NO_2^--N	SO_4^{2-}	P	Fe	Zn	Cl^-	NH_3-N	Ni
1	4/10/96	PM-1	Ambient		7.46	0.90	1.79	0	0	0.1	0.006		0.17	0.04				
2	4/10/96	PM-2	Ambient	21.6	8.03	14.14		1	7	0.2	0.013		0.14	0.10				
3	4/10/96	PM-3	Ambient	21.8	8.50	14.14		9	15	0.2	0.003		0.15	0.05				
4	4/10/96	PM-4	Ambient	21.9	8.45	14.80		14	19	0.3	0.003		0.16	0.03				
5	4/10/96	PM-5	Ambient	21.8	8.24	14.87		16	19	0.4	0.004		0.13	0.05				
6	4/22/96	PM-1	Ambient	22.3	7.55	8.87	4.43	14	16	0.2	0.005		0.10	0.06				
7	4/22/96	PM-2	Ambient	23.1	7.99	15.38		7	13	0.4	0.009	2050	0.08	0.05				
8	4/22/96	PM-3	Ambient	23.6	8.18	15.76		14	16	0.4	0.005	1650	0.13	0.05				
9	4/22/96	PM-4	Ambient	23.8	8.45	12.71		16	22	0.4	0.003	2100	0.12	0.07				
10	4/22/96	PM-5	Ambient	23.7	8.52	15.57		15	22	0.2	0.006	1650	0.05	0.04				
11	4/22/96	DI Blank	Ambient					0	0	0.0	0.011	0	0.01	0.01				
12	4/29/96	PM-1	Storm Influenced	20.0	9.15	0.21	0.43	21	24	0.4	0.013	22	0.11	0.22				
13	4/29/96	PM-2	Storm Influenced	19.6	8.27	0.39	0.80	12	45	0.8	0.005	90	0.13	0.04				
14	4/29/96	PM-3	Storm Influenced	22.2	8.12	13.07		21	28	0.4	0.004	1350	0.20	0.09				
15	4/29/96	PM-4	Storm Influenced	22.3	8.54	10.26		30	44	0.6	0.004	1250	0.13	0.09				
16	4/29/96	PM-5	Storm Influenced	22.4	8.78	15.94		58	64	0.7	0.022	700	0.32	0.13				
17	4/29/96	DI Blank	Storm Influenced					0	0	0.0	0.004	0	0.02	0.01				
18	5/15/96	PM-1	Ambient	23.5	7.59	0.47	0.96	38	10	0.4	0.013	56	0.07	0.03	0.06	67	0.15	
19	5/15/96	PM-2	Ambient	26.8	7.69	10.17		43	54	0.7	0.015	950	0.22	0.58	0.01	7500	2.03	
20	5/15/96	PM-3	Ambient	27.6	8.39	11.70		70	56	0.6	0.000	950	0.12	0.22	0.00	7800	2.74	
21	5/15/96	PM-4	Ambient	27.1	8.57	11.01		55	52	0.6	0.004	1100	0.13	0.09	0.00	5600	2.59	
22	5/15/96	PM-5	Ambient	27.4	8.53	11.53		58	66	1.0	0.000	1100	0.13	0.19	0.01	6700	1.26	
23	5/15/96	DI Blank	Ambient					6	0	0.0	0.002	0	0.14	0.01	0.04	0.1	0.00	
24	5/21/96	PM-1	Ambient	24.1	7.13	0.66	1.32	6	5	0.3	0.004	56	0.13	0.03	0.02	94	0.05	
25	5/21/96	PM-2	Ambient	27.9	7.85	12.73		20	20	0.5	0.017	1200	0.13	0.08	0.00	6100	1.94	
26	5/21/96	PM-3	Ambient	29.7	8.15	13.71		36	35	0.4	0.005	1200	0.22	0.08	0.00	6900	1.16	
27	5/21/96	PM-4	Ambient	29.3	8.53	11.72		37	45	0.5	0.001	1050	0.22	0.09	0.00	6400	1.28	
28	5/21/96	PM-5	Ambient	29.4	8.31	13.24		55	64	0.8	0.001	1450	0.31	0.12	0.00	6600	0.62	
29	5/21/96	DI Blank	Ambient	21.9	9.04	0.02	0.03	1	0	0.0	0.009	0	0.04	0.02	0.02	2.4	0.02	

Appendix I: Continued

Sample Number	Collection Date	Site	Type	Temp (C)	pH	TDS (g/L)	Cond (mS/cm)	SS	Turb (FTU)	NO_3^--N	NO_2^--N	SO_4^{2-}	P	Fe	Zn	Cl^-	NH_3-N	Ni
30	6/4/96	PM-1	Ambient	24.8	7.27	0.70	1.41	3	4	2.0	0.005	82	0.04	0.03	0.08	110	0.08	0.01
31	6/4/96	PM-2	Ambient															
32	6/4/96	PM-3	Ambient	30.1	8.70	13.97		38	40	0.6	0.004	1400	0.22	0.06	0.02	4100	1.38	0.11
33	6/4/96	PM-4	Ambient	29.6	8.90	15.16		70	52	0.5	0.004	1450	0.21	0.00	0.00	8100	1.42	0.15
34	6/4/96	PM-5	Ambient	29.5	8.67	14.00		60	47	0.6	0.002	1750	0.24	0.11	0.00	7100	1.22	0.07
35	6/4/96	DI Blank	Ambient					2	1	0.0	0.004	0	0.01	0.01	0.02	1	0.01	0.01
36	6/18/96	PM-1	Ambient	25.4	8.00	0.75	1.50	5	5	0.1	0.005	71	0.04	0.03		4	0.07	0.01
37	6/18/96	PM-2	Ambient															
38	6/18/96	PM-3	Ambient	31.7	8.85	14.44		90	55	0.6	0.005	1350	0.23	0.00	0.05	5500	1.6	0.09
39	6/18/96	PM-4	Ambient	31.2	9.21	18.90		46	45	0.6	0.003	950	0.18	0.07	0.01	8000	1.2	0.16
40	6/18/96	PM-5	Ambient	31.3	9.61	14.20		61	64	0.7	0.002	1250	0.28	0.05	0.00	5500	0.7	0.14
41	6/18/96	DI Blank	Ambient	16.7	10.62	0.01		7	1	0.0	0.005	0	0.03	0.00	0.01	0.7	0	0.00
42	6/25/96 10:30	PM-1 Up	Storm Influenced	18.3	7.28	0.04	0.09	360	194	0.3	0.000	0.00	0.10	0.47	0.05	15.3	1.42	0.09
43	6/25/96 11:00	PM-1 Up	Storm Influenced	21	7.5	0.04	0.09	204	149	0.3	0.000	0.00	0.07	0.41	0.04	15.6	0.88	0.05
44	6/25/96 11:15	PM-1 Up	Storm Influenced	20.9	8.2	0.04	0.1	140	105	0.3	0.008	0.00	0.11	0.32	0.06	13.2	0.82	0.04
45	6/25/96 11:30	PM-1 Up	Storm Influenced	21.6	8.43	0.04	0.1	140	106	0.2	0.018	0.00	0.11	0.25	0.01	13.2	0.73	0.03
46	6/25/96 11:45	PM-1 Up	Storm Influenced	21.2	8.54	0.04	0.09	185	99	0.4	0.011	4.00	0.00	0.27	0.04	12.2	0.87	0.08
47	6/25/96 12:00	PM-1 Up	Storm Influenced	20.2	8.03	0.04	0.09	260	133	0.3	0.007	0.00	0.07	0.45	0.05	16.5	0.79	0.1
48	6/25/96 10:30	PM-1	Storm Influenced	20.9	7.84	0.05	0.12	310	186	0.3	0.004	0.00	0.08	0.49	0.05	15.3	1.29	0.1
49	6/25/96 11:00	PM-1	Storm Influenced	21.2	8.13	0.04	0.08	220	138	0.3	0.000	0.00	0.08	0.46	0.04	15.3	0.90	0.09
50	6/25/96 11:15	PM-1	Storm Influenced	21.2	8.38	0.05	0.11	214	83	0.3	0.003	0.00	0.10	0.38	0.01	14.0	0.84	0.05
51	6/25/96 11:30	PM-1	Storm Influenced	21.3	8.63	0.05	0.12	160	98	0.3	0.010	0.00	0.06	0.22	0.02	13.8	0.70	0.04
52	6/25/96 11:45	PM-1	Storm Influenced	21.9	8.56	0.04	0.09	204	104	0.2	0.008	3.00	0.01	0.27	0.01	10.9	0.95	0.08
53	6/25/96 12:00	PM-1	Storm Influenced	21.7	8.44	0.04	0.08	310	176	0.2	0.006	0.00	0.03	0.40	0.00	16.7	0.86	0.15

Appendix I: Continued

Sample Number	Collection Date	Site	Type	Temp (C)	pH	TDS (g/L)	Cond (mS/cm)	SS	Turb (FTU)	NO_3^--N	NO_2^--N	SO_4^{2-}	P	Fe	Zn	Cl^-	NH_3-N	Ni
54	6/25/96 10:30	TSC 1 Up	Storm Influenced	21.8	9.01	0.08	0.16	440	263	0.7	0.051	0.00	0.00	0.30	0.10	17.2	1.92	0.14
55	6/25/96 11:00	TSC 1 Up	Storm Influenced	22.1	9.57	0.12	0.25	310	198	0.7	0.074	0.00	0.01	0.15	0.04	20.7	1.80	0.02
56	6/25/96 11:15	TSC 1 Up	Storm Influenced	21.4	9.86	0.15	0.31	366	205	0.8	0.096		0.04	0.05	0.09	23.9	2.27	0.15
57	6/25/96 11:30	TSC 1 Up	Storm Influenced	21.1	9.71	0.13	0.27	430	184	0.7	0.093		0.10	0.08	0.08	22.1	1.52	0.13
58	6/25/96 11:45	TSC 1 Up	Storm Influenced	20.2	8.89	0.04	0.1	1320	450	0.4	0.003		0.10	0.60	0.06	16.6	4.46	0.3
59	6/25/96 12:00	TSC 1 Up	Storm Influenced	20.1	9.83	0.12	0.25	380	168	0.4	0.045		0.00	0.06	0.04	8.2	1.81	0.09
60	6/25/96 10:30	TSC 1 Dn	Storm Influenced	19.4	9.01	0.08	0.16	400	203	0.6	0.050	0.00	0.00	0.08	0.20	23.0	1.73	0.02
61	6/25/96 11:00	TSC 1 Dn	Storm Influenced	19.4	9.66	0.11	0.22	283	174	0.8	0.078	0.00	0.19	0.16	0.01	19.3	1.84	0.13
62	6/25/96 11:15	TSC 1 Dn	Storm Influenced	20	9.75	0.12	0.25	270	155	0.7	0.091		0.00	0.08	0.05	15.4	1.78	0.11
63	6/25/96 11:30	TSC 1 Dn	Storm Influenced	20.2	9.72	0.13	0.26	225	137	0.7	0.085		0.08	0.00	0.01	14.6	1.83	0.12
64	6/25/96 11:45	TSC 1 Dn	Storm Influenced	21.1	9.58	0.12	0.25		154	0.8	0.081		0.11	0.03	0.08	19.1	1.75	0.13
65	6/25/96 12:00	TSC 1 Dn	Storm Influenced	21	9.76	0.13	0.27	280	144	0.6	0.065		0.12	0.05	0.05	10.8	1.50	0.12
66	6/25/96	PM-3 Up	Storm Influenced	23.5	8.06	0.14	0.3	27	23	0.4	0.008	0	0.06	0.02		7	0.37	
67	6/25/96	PM-3	Storm Influenced	23.3	7.26	5.9	11.82	35	42	0.3	0.007	750	0.11	0.07		o/r	0.66	
68	6/25/96	PM-4 Up	Storm Influenced	23.8	7.15	0.31	0.63	12	18	0.2	0.006	200	0.12	0.03		80	0.23	
69	6/25/96	PM-4	Storm Influenced	24.2	6.98	2.76	5.53	35	34	0.2	0.021	700	0.09	0.1		1600	0.6	
70	6/25/96	PM-5	Storm Influenced	24.2	6.91	1.03	2.07	78	78	0.6	0.055	58	0.09	0.31		542.5	1.08	
71	7/9/96	PM-1	Ambient	27	6.80	0.66	1.32	35	28	0.1	0.003	50	0.12	0.24	0.00	160	0.21	0.00
72	7/9/96	PM-2	Ambient															
73	7/9/96	PM-3	Ambient	33.4	8.21	6.35	12.68	31	37	0.4	0.006	1200	0.12	0.08	0.01	5000	1.42	0.11
74	7/9/96	PM-4	Ambient	33.1	8.45	9.43	18.86	35	39	0.3	0.007	900	0.10	0.08	0.01	5500	0.58	0.16
75	7/9/96	PM-5	Ambient	33	8.89	9.76	19.54	42	48	0.4	0.006	850	0.11	0.07	0.00	3300	0.84	0.18
76	7/9/96	DI Blank	Ambient	22	3.07	0.02	0.05	0	0	0.0	0.006	0	0.12	0.02	0.08	0.1	0.02	
77	7/23/96	PM-1	Ambient	28.5	6.10	0.49	0.98	8	11	0.1	0.002	45	0.10	0.64	0.00	140	0.3	0.02
78	7/23/96	PM-2	Ambient															
79	7/23/96	PM-3	Ambient	31.6	7.11	11.84		115	90	0.5	0.013	1950	0.06	0.20	0.00	9300	0.92	0.02
80	7/23/96	PM-4	Ambient	32.1	7.70	8.25	16.50	56	55	0.5	0.005	1100	0.09	0.11	0.01	6600	0.62	0.10
81	7/23/96	PM-5	Ambient	31.7	8.17	8.94	17.89	77	77	0.8	0.005	700	0.10	0.08	0.00	4500	0.76	0.11
82	7/23/96	DI Blank	Ambient	22.1	8.80	0.49	0.0086	2	1	0.0	0.006	0	0.01	0.01	0.06	0.1	0.01	0.02

Appendix I: Continued

Sample Number	Collection Date	Site	Type	Temp (C)	pH	TDS (g/L)	Cond (mS/cm)	SS	Turb (FTU)	NO_3^--N	NO_2^--N	SO_4^{2-}	P	Fe	Zn	Cl^-	NH_3-N	Ni
83	8/5/96	PM-1	Ambient	28	7.01	2.85	5.72	27	28	0.2	0.005	550	0.12	0.28	0.00	2000	0.37	0.09
84	8/5/96	PM-2	Ambient															
85	8/5/96	PM-3	Ambient	31.4	7.70	11.18		33	40	0.4	0.007	1200	0.11	0.16	0.01	9700	0.66	0.16
86	8/5/96	PM-4	Ambient	29.8	8.28	7.23	14.50	60	50	0.3	0.010	1050	0.06	0.12	0.03	10700	0.84	0.27
87	8/5/96	PM-5	Ambient	31.4	8.34	12.40		38	43	0.4	0.005	1950	0.07	0.08	0.01	10200	0.72	0.26
88	8/5/96	DI Blank	Ambient	21.5	8.90	0.09	0.19	3	2	0.0	0.005	0	0.12	0.05	0.01	1.8	0.01	0.00
89	8/9/96	TSC 1 Up	Storm Influenced	22.2	6.82	0.03	0.07	36	25	0.6	0.017	0	0.10	0.06	0.06	1.5	0.28	0.11
90	8/9/96	TSC 1 Dn	Storm Influenced	22.3	6.36	0.03	0.06	30	23	0.3	0.014	0	0.10	0.04	0.04	1.6	0.23	0.03
91	8/9/96	TSC 2 Up	Storm Influenced	22.3	8.91	0.08	0.08	685	366	1.6	0.066	13	0.00	0.60	0.01		2.5	0.08
92	8/9/96	TSC 2 Dn	Storm Influenced	22.3		0.09	0.20	960		2.4	0.026	23	0.00	0.70	0.01		1.68	0.12
93	8/9/96	PM-1 Up	Storm Influenced	22.3		0.10	0.21	70	60	0.8	0.071	0	0.06	0.02	0.04	9.1	0.63	0.06
94	8/9/96	PM-1	Storm Influenced	22.3		0.11	0.23			0.8	0.067	0	0.04	0.04	0.01	11	0.63	0.05
95	8/9/96	PM-3 Up	Storm Influenced	22.3		2.59	5.18		52	0.7	0.090		0.00	0.05	0.03	1070	0.62	0.03
96	8/9/96	PM-3	Storm Influenced	22.3		9.50	19.04		34	0.3	0.012	1350	0.10	0.05	0.01	5900	1.4	0.03
97	8/9/96	PM-4 Up	Storm Influenced	22.3		3.42	6.85		23	0.3	0.010	750	0.02	0.02	0.02	3100	0.36	0.04
98	8/9/96	PM-4	Storm Influenced	22.3		10.23			29	0.3	0.005	1450	0.12	0.02	0.02	6100	1.55	0.05
99	8/9/96	PM-5	Storm Influenced	22.3		9.93	19.91				0.007	1500	0.03	0.03	0.00	400	1.53	0.07
100	8/20/96	PM-1	Ambient	27.2	6.43	0.39	0.79	5	9	0.1	0.004	24	0.08	0.51	0.00	90	0.13	0.02
101	8/20/96	PM-2	Ambient															
102	8/20/96	PM-3	Ambient	30.2	7.70	6.57	13.12	24	30	0.2	0.006	1250	0.24	0.06	0.01	8500	0.5	0.50
103	8/20/96	PM-4	Ambient	31.3	7.94	6.45	12.93	36	39	0.4	0.005	1250	0.23	0.07	0.00	6800	0.46	0.24
104	8/20/96	PM-5	Ambient	30.7	8.37	7.68	15.34	29	41	0.3	0.005	900	0.23	0.03	0.00	4800	0.56	0.18
105	8/20/96	DI Blank	Ambient	22.7	8.53	0.00	0.00	3	11	0.0	0.004	0	0.00	0.29	0.05	0	0.01	0.00

Appendix I: Continued

Sample Number	Collection Date	Site	Type	Temp (C)	pH	TDS (g/L)	Cond (mS/cm)	SS	Turb (FTU)	NO_3^--N	NO_2^--N	SO_4^{2-}	P	Fe	Zn	Cl^-	NH_3-N	Ni
106	8/22/96	TSC 1 Up	Storm Influenced	24.2		0.08	0.18	55	47	0.6	0.122	0	0.00	0.01	0.04	23.1	0.37	0.05
107	8/22/96	TSC 1 Dn	Storm Influenced	24.3		0.06	0.12	99	43	0.5	0.108	0	0.00	0.01	0.02	5.4	0.28	0.05
108	8/22/96	TSC 2 Up	Storm Influenced	24.6		0.16	0.33	396	264	4.1	0.261	25	0.00	0.37	0.01	30	1.72	0.04
109	8/22/96	TSC 2 Dn	Storm Influenced	24.7		0.16	0.33	334	232	4.3	0.283	43	0.00	0.26	0.01	40	1.50	0.05
110	8/22/96	TSC 3 Up	Storm Influenced	24.7		0.09	0.19	396	305	1.2	0.050	0	0.00	0.55	0.02	50	1.85	0.04
111	8/22/96	TSC 3 Dn	Storm Influenced	24.6		0.10	0.20	394	303	1	0.043	0	0.00	0.50	0.00	30	1.71	0.00
112	8/22/96	TSC 4 Up	Storm Influenced	24.7		0.11	0.22	328	205	0.8	0.170	13	0.04	0.28	0.04	40	1.66	0.00
113	8/22/96	TSC 4 Dn	Storm Influenced	24.5		0.10	0.21	371	235	0.8	0.071	0	0.00	0.44	0.01	50	1.69	0.01
114	8/22/96	TSC 5 Up	Storm Influenced	24.5		0.13	0.26	286	201	0.7	0.122	16	0.00	0.34	0.02	50	1.38	0.02
115	8/22/96	TSC 5 Dn	Storm Influenced	24.5		0.11	0.22	329	199	0.7	0.183	20	0.00	0.27	0.09	50	1.50	0.02
116	8/22/96	PM-1 Up	Storm Influenced	24.6		0.09	0.17	17	24	0.2	0.037	4	0.02	0.05	0.03	8	0.27	0.03
117	8/22/96	PM-1	Storm Influenced	24.7		0.30	0.60	29	23	0.2	0.032	36	0.01	0.03	0.04	150	0.28	0.07
118	8/22/96	PM-3 Up	Storm Influenced	25		6.49	13.00	306	148	0.4	0.033	600	0.01	0.29	0.02	9100	0.54	0.10
119	8/22/96	PM-3	Storm Influenced	25.4		10.02		96	48	0.3	0.018	850	0.22	0.16	0.01	15100	1.66	0.07
120	8/22/96	PM-4 Up	Storm Influenced	25.3		6.27	12.55	27	20	0.2	0.009	650	0.14	0.02	0.02	9300	0.35	0.08
121	8/22/96	PM-4	Storm Influenced	25.9		10.03		24	22	0.1	0.011	900	0.13	0.05	0.04	17100	1.76	0.08
122	8/22/96	PM-5	Storm Influenced	25.6		10.41		24	23	0.2	0.008	950	0.23	0.04	0.02	18900	1.72	0.00
123	8/22/96	DI Blank	Storm Influenced	23.4		0.01	0.03	1	0	0	0.006	0	0.00			0.6	0.00	
124	9/3/96	PM-1	Ambient	24.6	6.70	0.28	0.51	5	30	0.6	0.002	0	0.03	0.34	0.01	10	0.53	0.00
126	9/3/96	PM-3	Ambient	27	7.06	2.78	4.18	44	72	0.6	0.033	200	0.02	0.27	0.04	1200	0.86	0.01
127	9/3/96	PM-4	Ambient	28	6.94	4.29	6.48	42	63	0.5	0.039	220	0.21	0.24	0.04	1900	0.88	0.07
128	9/3/96	PM-5	Ambient	27.7	7.10	3.25	4.60	40	61	0.5	0.044	150	0.01	0.20	0.03	1000	0.74	0.00
129	9/3/96	DI Blank	Ambient	21.6	8.86	0.00	0.00	0	0	0.0	0.007	0	0.01	0.01	0.02	0.4	0.02	0.00
130	9/16/96	PM-1	Ambient	25	7.16	0.47	0.94	12	14	0.2	0.004	37	0.02	0.51	0.00	120	0.24	0.00
132	9/16/96	PM-3	Ambient	27	8.08	7.58	15.15	41	40	0.3	0.009	1050	0.08	0.08	0.01	2300	0.99	0.07
133	9/16/96	PM-4	Ambient	28	8.16	7.15	14.28	27	42	0.4	0.005	1200	0.17	0.07	0.01	2800	1.12	0.05
134	9/16/96	PM-5	Ambient	28	8.23	6.97	13.93	32	40	0.3	0.005	950	0.08	0.10	0.01	2400	0.86	0.03
135	9/16/96	DI Blank	Ambient	21.5	6.48	0.00	0.00	0	0	0.0	0.005	1	0.01	0.10	0.01	0	0	0.00
136	10/2/96	PM-1	Ambient	23.1	7.08	1.09	2.19	11	17	0.2	0.003	20	0.08	0.28	0.00	480	0.28	0.07
138	10/2/96	PM-3	Ambient	23.8	8.45	5.55	11.09	32	40	0.3	0.003	1000	0.23	0.07	0.01	2600	0.45	0.18
139	10/2/96	PM-4	Ambient	24.2	8.32	7.21	14.41	32	40	0.3	0.001	850	0.02	0.07	0.00	6100	0.61	0.11
140	10/2/96	PM-5	Ambient	24.1	8.45	5.69	11.38	27	41	0.2	0.002	850	0.00	0.07	0.00	3300	0.46	0.18
141	10/2/96	DI Blank	Ambient	21.7	6.03	0.00	0.00	1	0	0.0	0.002	0	0.00	0.01	0.01	0.7	0.01	0.01

APPENDIX II : WATER QUALITY DATA FOR COW BAYOU

Appendix II : Water Quality Data for Cow Bayou

Field Trip Date	Station	Light Penetration (ft)	pH	DO (mg/L)	Conductivity (ms/cm)	TDS (g/L)	SS (mg/L)	Temperature °C
Aug. 30, 1996	1	1.1	6.6	4.36	0.32	0.15	33	26.2
	2	1.1	6.6	3.8	0.31	0.15	32	26.1
	3	0.75	5	4.26	0.29	0.14	74	25.8
Sept. 10, 1996	1	1.8	7.29	3.12	0.32	0.16	7	30.4
	2	1.7	7.25	3.03	0.3	0.14	24	28.8
	3	1.6	7.35	3.34	0.33	0.16	25	27.9
Oct. 4, 1996	1	1.75	8.05	5	5.62	2.8	18	24.4
	2	1.75	8.26	5.63	5.91	2.95	17	25.5
	3	1.75	8.35	6.22	5.88	2.98	10	24.8
Nov. 8, 1996	1	1.6	5.3	6.34			23	19
	2	1.6	7.43	6.5			21	19.3
	3	1.6	7.65	7.98			30	19.1
Dec. 18, 1996	1		7.56	9.36	4.79	2.83	42	8
	2		8.86	11.1	2.67	1.61	37	9.1
	3							
Jan. 24, 1997	1	1.2	6.2		0.52	0.24	45	21.2
	2	1.2	6.33		0.63	0.33	40	21.5
	3	1.1	6.6		4.73	2.3	40	20.6
Febr. 14, 1997	1	1.1	6.49	11.04			52	12
	2	0.9	6.36	11.03			46	11.5
	3	1	6.25	11.1			56	11.5
March 7, 1997	1	1.5	7.5	13.22	0.76	0.38	12	20
	2	1.25	7.85	13.31	0.75	0.37	40	19.4
	3	1.2	8.07	13.16	0.77	0.38	48	18.9
March 19, 1997	1	1.25	5.74	7.62	0.21	0.1	51	18.8
	2	0.83	5.86	7.4	0.19	0.09	49	18.6
	3	1.2	6.03	7.3	0.18	0.08	45	17.9
April 18, 1997	1	1.25	7.66	10.5			32	21.4
	2	1.67	7.55	9.93			41	21.1
	3	1.83	8	10.15			63	21
May 13, 1997	1	1.58	7.05	6.56	0.31	0.15	32	27.4
	2	1.58	8.15	8.25	0.41	0.2	36	27.4
	3	1.58	8.34	9.8	0.49	0.24	34	27.8
June 6, 1997	1	1.83	8.28	8.22	0.55	0.27	22	28.1
	2	1.67	8.6	9.17	0.8	0.4	29	26
	3	1.42	8.71	9.75	0.8	0.4	39	29.6
July 10, 1997	1	1.67	6.9	4.9	0.18	0.09	35	29.6
	2	1.25	7.83	5.5	0.37	0.18	36	30.5
	3	1.25	8.28	6.91	0.92	0.46	40	31.45
July 31, 1997	1	1.92	7.1	2.71			16	30.8
	2	1.67	7.08	3.46			13	31.1
	3	1.75	7.4	4.33			20	31.7
Sept. 5, 1997	1	1.67	8.19	7.36	17.25	9.11	8	31
	2	1.25	8.43	8.55	18.49	9.25	6	31
	3	1.417	8.65	9.57	18.66	9.33	10	31.6
Oct. 16, 1997	1	1.58	7.27	4.7	0.36	0.18	14	19.8
	2	1.58	7.7	4.26	0.36	0.18	14	20.1
	3	1.5	7.7	4.64	0.33	0.16	18	20.8
Dec. 5, 1997	1	0.75	6.55	8.35	0.56	0.28	31	15
	2	0.75	6.79	8.2	0.62	0.31	36	16.4
	3	0.75	6.88	8.2	0.82	0.4	37	17.6

APPENDIX III: BENTHIC SPECIES COLLECTED IN COW BAYOU FOR INDICATED FIELD SAMPLING VISITS.

August 30, 1996

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	0
			Laeonereis	*Culveri*	0	1	0
			Mediomastus		0	0	0
			Nereis		0	1	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
.				other	0	0	0
Oligochaeta					0	0	2
Anthropoda							
Crustacea							
	Cirripedia				0	0	0
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	2	4	0
	Ostracoda				0	0	0
Insecta		Chironomidae			10	1	1
Nematoda					100	91	110
Nemertea					7	3	22
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

September 10, 1996

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		1	0	1
Annelida							
Polychaeta							
			Hopsonia		0	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		4	0	1
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	3	4
Anthropoda							
Crustacea							
	Cirripedia				4	0	0
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	0	0
	Ostracoda				0	5	0
Insecta		Chironomidae			12	1	1
Nematoda					84	80	93
Nemertea					1	20	12
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

October 4, 1996 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	1
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		2	0	0
		Spionidae	*Streblopsio*	*Benedicti*	1	0	0
				other	0	0	0
Oligochaeta					1	1	0
Anthropoda							
Crustacea							
	Cirripedia				2	3	2
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	1	2	0
	Ostracoda				0	0	0
Insecta		Chironomidae			5	18	2
Nematoda					82	68	77
Nemertea					9	0	17
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

December 18, 1996 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		11	36	16
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	10	2
Anthropoda							
Crustacea							
	Cirripedia				0	0	1
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	4	3	8
	Ostracoda				0	0	3
Insecta		Chironomidae			4	5	1
Nematoda					21	46	57
Nemertea					0	4	25
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

January 24, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		2	6	8
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	2
				other	0	0	0
Oligochaeta					0	0	1
Anthropoda							
Crustacea							
	Cirripedia				0	0	2
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	4	9	24
	Ostracoda				1	2	11
Insecta		Chironomidae			0	1	1
Nematoda					93	93	70
Nemertea					7	5	8
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	2	0

February 14, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	1	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	0	0
Anthropoda							
Crustacea							
	Cirripedia				1	0	0
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	11	27	9
	Ostracoda				1	0	0
Insecta		Chironomidae			3	2	0
Nematoda					64	93	69
Nemertea					18	1	19
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	1	0
Platyhelminthes							
Turbellaria					0	0	0

March 7, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		3	1	3
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	0	0
Anthropoda							
Crustacea							
	Cirripedia				1	1	1
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	4	32	23
	Ostracoda				0	0	0
Insecta		Chironomidae			3	0	1
Nematoda					61	50	57
Nemertea					73	26	28
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

March 19, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		2	0	2
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	1
				other	0	0	0
Oligochaeta					1	0	0
Anthropoda							
Crustacea							
	Cirripedia				6	2	5
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	21	13	8
	Ostracoda				0	0	0
Insecta		Chironomidae			8	4	11
Nematoda					33	54	62
Nemertea					24	44	17
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					3	1	0

April 18, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		1	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	0	2
Anthropoda							
Crustacea							
	Cirripedia				3	3	7
	Cladocera				0	1	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	2	6	7
	Ostracoda				0	0	0
Insecta		Chironomidae			4	15	28
Nematoda					13	28	30
Nemertea					75	53	36
Mollusca							
Gastropoda					0	0	1
Bivalvia			*Rangia*	*Cuneata*	0	1	1
Platyhelminthes							
Turbellaria					0	0	1

May 13, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		1	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					4	2	0
Anthropoda							
Crustacea							
	Cirripedia				3	6	8
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	1	3
	Ostracoda				1	1	5
Insecta		Chironomidae			38	42	37
Nematoda					19	12	18
Nemertea					54	38	33
Mollusca							
Gastropoda					0	1	0
Bivalvia			*Rangia*	*Cuneata*	0	3	0
Platyhelminthes							
Turbellaria					0	0	3

June 6, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					0	5	6
Anthropoda							
Crustacea							
	Cirripedia				2	14	17
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	2	0
	Ostracoda				0	1	2
Insecta		Chironomidae			15	46	51
Nematoda					26	28	17
Nemertea					58	40	10
Mollusca							
Gastropoda					0	1	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

July 10, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	0
Oligochaeta					2	0	1
Anthropoda							
Crustacea							
	Cirripedia				1	1	10
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	0	0
	Ostracoda				0	0	0
Insecta		Chironomidae			36	23	82
Nematoda					1	4	4
Nemertea					116	70	23
Mollusca							
Gastropoda					1	0	0
Bivalvia			*Rangia*	*Cuneata*	0	3	0
Platyhelminthes							
Turbellaria					0	0	0

July 31, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	0
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		1	0	1
		Spionidae	*Streblopsio*	*Benedicti*	0	0	0
				other	0	0	1
Oligochaeta					47	15	1
Anthropoda							
Crustacea							
	Cirripedia				0	0	3
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	0	7
	Ostracoda				1	0	0
Insecta		Chironomidae			25	10	41
Nematoda					50	20	27
Nemertea					2	56	20
Mollusca							
Gastropoda					0	0	1
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

September 5, 1997

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		10	2	1
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		1	2	1
		Spionidae	*Streblopsio*	*Benedicti*	19	26	61
				other	0	0	0
Oligochaeta					3	0	0
Anthropoda							
Crustacea							
	Cirripedia				0	0	0
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	4	17	1
	Ostracoda				0	0	0
Insecta		Chironomidae			1	1	3
Nematoda					86	44	23
Nemertea					0	6	3
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	1	0
Platyhelminthes							
Turbellaria					0	0	0

October 16, 1997 field trip

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		0	0	1
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		1	1	0
		Spionidae	*Streblopsio*	*Benedicti*	3	2	12
				other	0	0	0
Oligochaeta					0	0	0
Anthropoda							
Crustacea							
	Cirripedia				13	0	0
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	4	1
	Ostracoda				0	0	0
Insecta		Chironomidae			10	0	1
Nematoda					51	62	60
Nemertea					37	14	15
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	0

December 5, 1997

Phylum	Class/SubClass	Order/Family	Genus	Species	Station 1	Station 2	Station 3
			Acari		0	0	0
Annelida							
Polychaeta							
			Hopsonia		2	2	2
			Laeonereis	*Culveri*	0	0	0
			Mediomastus		0	0	0
			Nereis		0	0	0
		Spionidae	*Streblopsio*	*Benedicti*	5	14	12
				other	0	0	1
Oligochaeta					0	1	0
Anthropoda							
Crustacea							
	Cirripedia				15	9	10
	Cladocera				0	0	0
	Copepoda				0	0	0
		Cyclopoida			0	0	0
		Harpacticoida	*Scottolana*	*Canadensis*	0	1	1
	Ostracoda				0	0	0
Insecta		Chironomidae			1	3	3
Nematoda					17	18	22
Nemertea					50	137	37
Mollusca							
Gastropoda					0	0	0
Bivalvia			*Rangia*	*Cuneata*	0	0	0
Platyhelminthes							
Turbellaria					0	0	2

APPENDIX IV: EC50 VALUES FOR ALL SEDIMENT SAMPLES COLLECTED FROM COW BAYOU

Field Trip Date	Replicates	Station 1	Station 2	Station 3
Dec. 18, 1996	1	0.37	0.44	0.70
	2	0.35	0.54	0.67
	3	0.48	0.51	0.69
	Average	0.40	0.50	0.69
Feb. 14, 1997	1	2.87	2.56	3.19
	2	2.06	2.10	2.10
	3	3.05	2.16	2.24
	Average	2.66	2.27	2.51
March 19, 1997	1	1.90	0.59	0.93
	2	1.80	0.47	1.32
	3	1.44	0.45	1.33
	Average	1.71	0.50	1.19
April 18, 1997	1	1.75	0.96	0.53
	2	1.67	1.01	0.80
	3	1.63	1.59	1.13
	Average	1.68	1.18	0.82
May 13, 1997	1	0.89	1.17	0.87
	2	1.19	1.57	0.67
	3	1.33	1.39	0.91
	Average	1.13	1.37	0.82
June 6, 1997	1	0.89	1.56	0.82
	2	1.26	1.78	0.81
	3	0.86	1.39	1.13
	Average	1.00	1.58	0.92
July 10, 1997	1	0.44	0.36	0.21
	2	0.43	0.36	0.17
	3	0.54	0.35	0.18
	Average	0.47	0.36	0.19
July 31, 1997	1	1.70	1.05	0.80
	2	1.27	1.43	0.94
	3	1.48	1.33	1.32
	Average	1.48	1.27	1.02
Sept. 5, 1997	1	0.53	0.67	0.59
	2	0.71	1.02	0.88
	3	1.04	1.32	0.46
	Average	0.76	1.00	0.64
Oct. 16, 1997	1	0.62	1.30	1.40
	2	0.81	0.70	1.41
	3	1.09	1.08	1.68
	Average	0.84	1.03	1.50
Dec. 5, 1997	1	0.71	1.10	2.00
	2	1.43	1.32	1.40
	3	0.95	1.60	0.91
	Average	1.03	1.34	1.44

APPENDIX V: FIELD AND LABORATORY DATA FROM NASA RD. 1 @ REPSDORPH

Preconstruction

Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
Flowmeter	000000	000001	000001	000002	000002	000002	000002	000000	000000	000000	000000
Flow_est. (ft/sec)	0.017	0.017	0.017	0.017	0.017	0.750	0.000	0.000	0.000	0.750	0.017
Flow_depth (ft)	0.5	0.7	0.7	0.5	0.5	1.2	0.7	0.7	0.7	1.0	0.7
Flow_width (ft)	6.00	8.00	8.00	3.00	3.00	5.00	3.00	3.00	3.00	4.00	4.00
Rainfall (100 x in)	1.00	100.00	52.00	95.00	55.00	219.00	20.00	1.00	1.00	376.00	13.00
Remarks							rain gage de	replaced raingage		bottom sampler stolen	
Construction Event									utility flags placed		
	Turbidity (FTU) Hach Method #7800										
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 (FTU)	130	71	86	51	88	73	190	65	73	68	45
BS-1a		72	170	148	83	200	33			92	61
BS-1b		77	134	156	95	200	33			92	63
BS-1c*		73	219	205	235	360	57				99
BS_Mean (FTU)		74.50	152.00	152.00	89.00	200.00	33.00			92.00	62.00
BS_StDev		3.54	25.46	5.66	8.49	0.00	0.00			0.00	1.41
Ratio BS_Mean/GS-1(Turb)		104.93	176.74	298.04	101.14	273.97	17.37			135.29	137.78
	Total Solids (mg/L) Hach Method #8006										
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 (TSS)	108	34	60	26	59	54	180	51	59	40	36
BS-1a		96	231	164	70	255	17			81	52
BS-1b		126	180	190	60	280	15			81	60
BS-1c*		81	380	220	260	520	40				110
BS_Mean (TSS)		111.00	205.50	177.00	65.00	267.50	16.00			81.00	56.00
BS_StDev		21.21	36.06	18.38	7.07	17.68	1.41			0.00	5.66
Ratio BS_Mean/GS-1(TSS)		326.47	342.50	680.77	110.17	495.37	8.89			202.50	155.56
	Total Solids (mg/L) Standard Method 2540 B										
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 (TS)	279	357	320	122	277	98	486	221	125	266	337
BS-1a		471	529	179	434	639	366			588	369
BS-1b		346	520	164	439	615	459			280	410
BS-1c*			1720	433	1144	1523	742				657
BS_Mean (TS)		408.50	524.50	171.50	436.50	627.00	412.50			434.00	389.50
BS_StDev		88.39	6.36	10.61	3.54	16.97	65.76			217.79	28.99
Ratio BS_Mean/GS-1(TS)		114.43	163.91	140.57	157.58	639.80	84.88			163.16	115.58
	Total Suspended Solids (mg/L) Standard Method 2540D										
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 (TSS_SM)				17		28	215	136	62	17	136
BS-1a				251		577	100			324	203
BS-1b				247		444	86			124	171
BS-1c*				350		2348	620				366
BS_Mean (TSS_SM)				249.00		510.50	93.00			224.00	187.00
BS_StDev				2.83		94.05	9.90			141.42	22.63
Ratio BS_Mean/GS-1(TSS_SM)				1464.71		1823.21	43.26			1317.65	137.50

Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.100	0.000	0.000	0.100	0.000	0.000	0.000
Flow_depth (ft)	1.0	0.3	1.0	0.8	0.8	1.1	0.0	0.7	0.8
Flow_width (ft)	3.50	1.00	3.00	2.50	2.80	3.00	0.00	2.00	2.50
Rainfall (100 x in)	1.00	1.00	70.00	1.00	19.00	94.00	1.00	5.00	71.00
Remarks									
Construction Event					clearing brush				removing an
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 (FTU)	61	157	59	89	72	125	172	67	61
BS-1a			60		58	112	41		
BS-1b			64		50	119	55		
BS-1c*			220		95	246	160		
BS_Mean (FTU)			62.00		54.00	115.50	48.00		
BS_StDev			2.83		5.66	4.95	9.90		
Ratio BS_Mean/GS-1(Turb)			105.08		75.00	92.40	27.91		
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 (TSS)	43	145	46	73	60	109	172	53	47
BS-1a			60		55	150	25		
BS-1b			78		60	126	38		
BS-1c*			401		117	345	202		
BS_Mean (TSS)			69.00		57.50	138.00	31.50		
BS_StDev			12.73		3.54	16.97	9.19		
Ratio BS_Mean/GS-1(TSS)			150.00		95.83	126.61	18.31		
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 (TS)	185	381	180	233	229	199	253	191	193
BS-1a			230		117	284	126		
BS-1b			264		209	283	59		
BS-1c*			610		320	1571	352		
BS_Mean (TS)			247.00		163.00	283.50	92.50		
BS_StDev			24.04		65.05	0.71	47.38		
Ratio BS_Mean/GS-1(TS)			137.22		71.18	142.46	36.56		
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 (TSS_SM)	16	195	9	65	48	24	77	25	25
BS-1a			130		90	160	15		
BS-1b			153		84	161	15		
BS-1c*			714		184	1369	268		
BS_Mean (TSS_SM)			141.50		87.00	160.50	15.00		
BS_StDev			16.26		4.24	0.71	0.00		
Ratio BS_Mean/GS-1(TSS_SM)			1572.22		181.25	668.75	19.48		
Date:							5/19/97	5/21/97	5/23/97
GS-1 (NO3)							0.2	0.2	0.6
BS-1a							0.3		
BS-1b							0.3		
BS-1c*							0.2		
BS_Mean (NO3)							0.30		
BS_StDev							0.00		
Ratio BS_Mean/GS-1(NO3)							1.50		
Date:							5/19/97	5/21/97	5/23/97
GS-1 (NO2)							0	0	0.047
BS-1a							0.003		
BS-1b							0		
BS-1c*							0		
BS_Mean (NO2)							0.00		
BS_StDev							0.00		
Ratio BS_Mean/GS-1(NO2)									
Date:							5/19/97	5/21/97	5/23/97
GS-1 (NH3)							1.45	0.64	0.74
BS-1a							0.51		
BS-1b							0.49		
BS-1c*							0.93		
BS_Mean (NH3)							0.50		
BS_StDev							0.01		
Ratio BS_Mean/GS-1(NH3)							0.34		
Date:							5/19/97	5/21/97	5/23/97
GS-1 (PO4)							0.03	0.06	0.08
BS-1a							0.11		
BS-1b							0.26		
BS-1c*							0.2		
BS_Mean (PO4)							0.19		
BS_StDev							0.11		
Ratio BS_Mean/GS-1(PO4)							6.17		

Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.8	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Flow_width (ft)	3.00	2.50	2.00	1.80	2.00	2.00	1.80	1.80	3.00	2.00
Rainfall (100 x in)	99.00	65.00	1.00	1.00	30.00	3.00	1.00	1.00	69.00	2.00
Remarks										
Construction Event							breaking gro	instal signal light footing		trenching
Turbidity (FTU) Hach Method #7800										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (FTU)	65	63	121	160	75	45	461	100	32	59
BS-1a	188	430			257				219	
BS-1b	187	423			245				214	
BS-1c*	341	461			304				285	
BS_Mean (FTU)	187.50	426.50			251.00				216.50	
BS_StDev	0.71	4.95			8.49				3.54	
Ratio BS_Mean/GS-1(Turb)	288.46	676.98			334.67				676.56	
Total Solids (mg/L) Hach Method #8006										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (TSS)	43	45	105	150	60	31	825	83	25	46
BS-1a	184	680			331				261	
BS-1b	212	788			320				282	
BS-1c*	330	825			402				367	
BS_Mean (TSS)	198.00	734.00			325.50				271.50	
BS_StDev	19.80	76.37			7.78				14.85	
Ratio BS_Mean/GS-1(TSS)	460.47	1631.11			542.50				1086.00	
Total Solids (mg/L) Standard Method 2540 B										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (TS)	138	216	269	295	80	220	793	83	123	234
BS-1a	349	1562			467				632	
BS-1b	370	1922			723				598	
BS-1c*	1227	2622			955				474	
BS_Mean (TS)	359.50	1742.00			595.00				615.00	
BS_StDev	14.85	254.56			181.02				24.04	
Ratio BS_Mean/GS-1(TS)	260.51	806.48			743.75				500.00	
Total Suspended Solids (mg/L) Standard Method 2540D										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (TSS_SM)	31	33	70	97	43	24	577	69	24	23
BS-1a	275	1207			497				303	
BS-1b	277	1539			488				321	
BS-1c*	812	1615			710				412	
BS_Mean (TSS_SM)	276.00	1373.00			492.50				312.00	
BS_StDev	1.41	234.76			6.36				12.73	
Ratio BS_Mean/GS-1(TSS_SM)	890.32	4160.61			1145.35				1300.00	
Nitrate-Nitrogen (mg/L) HACH Method #8###										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (NO3)	0.4	0.3	0.3	0.3	0.6	0.4	0.4	0.4	0.5	0.3
BS-1a	0.5	1.1			0.8				0.5	
BS-1b	0.6	1.1			0.7				0.6	
BS-1c*	0.5	1.4			0.9				0.7	
BS_Mean (NO3)	0.55	1.10			0.75				0.55	
BS_StDev	0.07	0.00			0.07				0.07	
Ratio BS_Mean/GS-1(NO3)	1.38	3.67			1.25				1.10	
Nitrite-Nitrogen (mg/L) HACH Method #8###										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (NO2)	0.003	0	0	0	0	0.003	0	0	0.014	0
BS-1a	0.029	0.05			0.019				0.032	
BS-1b	0.027	0.036			0.017				0.028	
BS-1c*	0.014	0.157			0.02				0.026	
BS_Mean (NO2)	0.03	0.04			0.02				0.03	
BS_StDev	0.00	0.01			0.00				0.00	
Ratio BS_Mean/GS-1(NO2)	9.33								2.14	
Ammonia-Nitrogen (mg/L) HACH Method #8###										
Date:	5/29/97	6/2/97	6/4/97	8/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (NH3)	0.71	0.51	1.04	1.31	0.76	0.54	2.75	0.84	0.24	0.45
BS-1a	1.34	2.75			2.75				1.85	
BS-1b	1.44	2.75			2.75				1.8	
BS-1c*	2.68	2.75			2.75				1.91	
BS_Mean (NH3)	1.39	2.75			2.75				1.83	
BS_StDev	0.07	0.00			0.00				0.04	
Ratio BS_Mean/GS-1(NH3)	1.96	5.39			3.62				7.60	
Phosphorous (mg/L) HACH Method #8###										
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 (PO4)	0.12	0.05	0.05	0.06	0.03	0.03	0.02	0.04	0.1	0
BS-1a	0.18	0.31			0.18				0.11	
BS-1b	0.21	0.33			0.19				0.9	
BS-1c*	0.24	0.35			0.17				0.08	
BS_Mean (PO4)	0.20	0.32			0.19				0.51	
BS_StDev	0.02	0.01			0.01				0.56	
Ratio BS_Mean/GS-1(PO4)	1.63	6.40			6.17				5.05	

Date:	6/25/97	6/27/97	6/30/97
Flowmeter	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000
Flow_depth (ft)	0.0	0.6	0.4
Flow_width (ft)	2.00	1.92	1.67
Rainfall (100 x in)	1.00	1.00	1.00
Remarks			
Construction Event			

Turbidity (FTU) Hach Method #7800

Date:	6/25/97	6/27/97	6/30/97
GS-1 (FTU)		88	153
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (FTU)			
BS_StDev			
Ratio BS_Mean/GS-1(Turb)			

Total Solids (mg/L) Hach Method #8006

Date:	6/25/97	6/27/97	6/30/97
GS-1 (TSS)		82	147
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (TSS)			
BS_StDev			
Ratio BS_Mean/GS-1(TSS)			

Total Solids (mg/L) Standard Method 2540 B

Date:	6/25/97	6/27/97	6/30/97
GS-1 (TS)		317	481
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (TS)			
BS_StDev			
Ratio BS_Mean/GS-1(TS)			

Total Suspended Solids (mg/L) Standard Method 2540D

Date:	6/25/97	6/27/97	6/30/97
GS-1 (TSS_SM)		62	17
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (TSS_SM)			
BS_StDev			
Ratio BS_Mean/GS-1(TSS_SM)			

Nitrate-Nitrogen (mg/L) HACH Method #8###

Date:	6/25/97	6/27/97	6/30/97
GS-1 (NO3)		0.2	0.4
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (NO3)			
BS_StDev			
Ratio BS_Mean/GS-1(NO3)			

Nitrite-Nitrogen (mg/L) HACH Method #8###

Date:	6/25/97	6/27/97	6/30/97
GS-1 (NO2)		0	0
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (NO2)			
BS_StDev			
Ratio BS_Mean/GS-1(NO2)			

Ammonia-Nitrogen (mg/L) HACH Method #8###

Date:	6/25/97	6/27/97	6/30/97
GS-1 (NH3)		0.74	1.22
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (NH3)			
BS_StDev			
Ratio BS_Mean/GS-1(NH3)			

Phosphorous (mg/L) HACH Method #8###

Date:	6/25/97	6/27/97	6/30/97
GS-1 (PO4)		0.03	0.04
BS-1a			
BS-1b			
BS-1c*			
BS_Mean (PO4)			
BS_StDev			
Ratio BS_Mean/GS-1(PO4)			

Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
Flowmeter	000000	000001	000001	000002	000002	000002	000002	000000	000000	000000	000000
Flow_est. (ft/sec)	0.017	0.017	0.017	0.017	0.017	0.750	0.000	0.000	0.000	0.750	0.017
Flow_depth (ft)	0.5	0.7	0.7	0.5	0.5	1.2	0.7	0.7	0.7	1.0	0.7
Flow_width (ft)	6.00	8.00	8.00	3.00	3.00	5.00	3.00	3.00	3.00	4.00	4.00
Rainfall (100 x in)	1.00	100.00	52.00	85.00	55.00	219.00	20.00	1.00	1.00	376.00	13.00
Remarks							rain gage de	replaced raingage		bottom sampler stolen	
Construction Event									utility flags placed		
	Mean Particle Size										Mean Particl
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 Mean(mm)											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean Mean(mm)											
BS_StDev											
	Effective Size (D10)										Effective Siz
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 D10(mm)											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean D10(mm)											
BS_StDev											
	90th Percentile (D90)										90th Percenti
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 D90(mm)											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean D90(mm)											
BS_StDev											
	Mass Median Dia. (D50)										Mass Media
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1 D50(mm)											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean D50(mm)											
BS_StDev											
	Uniformity										Uniformity
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean											
BS_StDev											
	Span										Span
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean											
BS_StDev											
	% Vol. Silt & Clay (i.e < 75mm)										% Vol. Silt &
Date:	3/25/97	3/27/97	3/31/97	4/4/97	4/7/97	4/11/97	4/18/97	4/21/97	4/23/97	4/26/97	4/27/97
GS-1S/C											
BS-1a											
BS-1b											
BS-1c*											
BS_Mean S/C											
BS_StDev											

Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.100	0.000	0.000	0.100	0.000	0.000	0.000
Flow_depth (ft)	1.0	0.3	1.0	0.8	0.8	1.1	0.0	0.7	0.8
Flow_width (ft)	3.50	1.00	3.00	2.50	2.80	3.00	0.00	2.00	2.50
Rainfall (100 x in)	1.00	1.00	70.00	1.00	19.00	94.00	1.00	5.00	71.00
Remarks									
Construction Event					clearing brush				removing an
Size									
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 Mean(mm)	17.48	70.62	38.91	35.55	36.66			25.01	43.14
BS-1a			71.32	33.61	19.3				
BS-1b			49.25						
BS-1c*			58.82						
BS_Mean Mean(mm)			59.80	33.61	19.30				
BS_StDev			11.07						
(D10)									
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 D10(mm)	2.24	3.15	3.03	5.1	8.45			5.18	10.73
BS-1a			5.65	6.78	5.82				
BS-1b			5.37						
BS-1c*			4.65						
BS_Mean D10(mm)			5.22	6.78	5.82				
BS_StDev			0.52						
e (D90)									
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1 D90(mm)	30.12	223.47	118.2	87.29	57.01			51.54	85.56
BS-1a			223.11	66.77	35.52				
BS-1b			119.06						
BS-1c*			172.27						
BS_Mean D90(mm)			171.48	66.77	35.52				
BS_StDev			52.03						
Dia. (D50)									
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/18/97	5/19/97	5/21/97	5/23/97
GS-1 D50(mm)	10.09	18.39	13.32	19.8	24.58			19.75	30.76
BS-1a			28.26	27.41	17.35				
BS-1b			25.97						
BS-1c*			24.24						
BS_Mean D50(mm)			26.18	27.41	17.35				
BS_StDev			2.02						
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1	1.206	3.418	2.428	1.284	0.9131			7.35E-01	0.8274
BS-1a			2.062	0.6887	0.5306				
BS-1b			1.419						
BS-1c*			1.96						
BS_Mean			1.81	0.69	0.53				
BS_StDev			0.35						
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1	2.763	11.98	8.646	4.151	1.975			2.347	2.432
BS-1a			7.696	2.189	1.712				
BS-1b			4.377						
BS-1c*			6.914						
BS_Mean			6.33	2.19	1.71				
BS_StDev			1.74						
lay (l.e < 75mm)									
Date:	4/28/97	5/9/97	5/10/97	5/12/97	5/14/97	5/16/97	5/19/97	5/21/97	5/23/97
GS-1S/C	97.19	70.77	79.5	87.24	95.43			90	88
BS-1a			72.17	93	100				
BS-1b			82.73						
BS-1c*			74.26						
BS_Mean S/C			76.39	93.00	100.00				
BS_StDev			5.59						

Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.8	0.8	0.8	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Flow_width (ft)	3.00	2.50	2.00	1.80	2.00	2.00	1.80	1.80	3.00	2.00
Rainfall (100 x in)	99.00	65.00	1.00	1.00	30.00	3.00	1.00	1.00	69.00	2.00
Remarks										
Construction Event							breaking gro	instal signal light footing		trenching
									Mean Particle Size	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 Mean(mm)	26.32	78.68	15.06	29.74	46.96	51.17	11.56	56.31	82.76	59.57
BS-1a	26.45	30.94			62.65				36.66	
BS-1b	40.51	35.19			47.53				35.07	
BS-1c*	37.86	23.64			38.53				56.31	
BS_Mean Mean(mm)	34.94	29.92			49.57				42.68	
BS_StDev	7.47	5.84			12.19				11.83	
									Effective Size (D10)	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 D10(mm)	5.28	6.31	0.87	0.65	7.05	4.77	0.28	4.62	8.31	4.76
BS-1a	3.34	0.46			4.19				1.08	
BS-1b	2.76	0.59			2.08				1.45	
BS-1c*	1.2	0.24			0.75				1.16	
BS_Mean D10(mm)	2.43	0.43			2.34				1.23	
BS_StDev	1.11	0.18			1.73				0.19	
									90th Percentile (D90)	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 D90(mm)	49.4	206.68	47.11	97.56	110.74	147.57	19.63	169.89	192.29	171.26
BS-1a	60.48	80.61			157.72				101.77	
BS-1b	99.89	99.95			124.86				92.94	
BS-1c*	99.27	63			103.52				159.6	
BS_Mean D90(mm)	86.55	81.19			128.70				118.10	
BS_StDev	22.58	18.48			27.30				36.21	
									Mass Median Dia. (D50)	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1 D50(mm)	18.05	30.39	6.73	7.58	30.53	22.4	2.7	24.82	62.12	23.33
BS-1a	18.95	13.16			39.67				14.08	
BS-1b	18.64	13.9			25.44				16.35	
BS-1c*	18.45	8.74			17.73				29.7	
BS_Mean D50(mm)	18.68	11.93			27.61				20.04	
BS_StDev	0.25	2.79			11.13				8.44	
									Uniformity	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1	0.9072	2.15	1.78	3.546	1.049	1.82	3.931	1.812	0.9678	2.111
BS-1a	0.9223	2.008			1.146				2.22	
BS-1b	1.732	2.179			1.466				1.74	
BS-1c*	1.674	2.438			1.838				1.579	
BS_Mean	1.44	2.21			1.48				1.85	
BS_StDev	0.45	0.22			0.35				0.33	
									Span	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1	2.44	6.593	6.868	12.78	3.397	6.376	7.177	6.658	2.962	7.138
BS-1a	3.016	6.09			3.87				7.151	
BS-1b	5.212	7.15			4.826				5.598	
BS-1c*	5.315	7.182			5.797				5.335	
BS_Mean	4.51	6.81			4.83				6.03	
BS_StDev	1.30	0.62			0.96				0.98	
									% Vol. Silt & Clay (I.e < 75	
Date:	5/29/97	6/2/97	6/4/97	6/6/97	6/9/97	6/11/97	6/14/97	6/16/97	6/18/97	6/20/97
GS-1S/C	96	61	97	86	80	75	96	75	55	68
BS-1a	95	88			73				85	
BS-1b	87	87			82				87	
BS-1c*	85	92			84				73	
BS_Mean S/C	89.00	89.00			79.67				81.67	
BS_StDev	5.29	2.65			5.86				7.57	

Date:	6/25/97	6/27/97	6/30/97
Flowmeter	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000
Flow_depth (ft)	0.0	0.6	0.4
Flow_width (ft)	2.00	1.92	1.67
Rainfall (100 x in)	1.00	1.00	1.00
Remarks			
Construction Event			

	Mean Particle Size		
Date:	6/25/97	6/27/97	6/30/97
GS-1 Mean(mm)	25.73	46.69	19.14
BS-1a			
BS-1b			
BS-1c*			
BS_Mean Mean(mm)			
BS_StDev			

	Effective Size (D10)		
Date:	6/25/97	6/27/97	6/30/97
GS-1 D10(mm)	2.89	1.41	0.73
BS-1a			
BS-1b			
BS-1c*			
BS_Mean D10(mm)			
BS_StDev			

	90th Percentile (D90)		
Date:	6/25/97	6/27/97	6/30/97
GS-1 D90(mm)	61.04	173.15	52.66
BS-1a			
BS-1b			
BS-1c*			
BS_Mean D90(mm)			
BS_StDev			

	Mass Median Dia. (D50)		
Date:	6/25/97	6/27/97	6/30/97
GS-1 D50(mm)	13.34	10.42	7.28
BS-1a			
BS-1b			
BS-1c*			
BS_Mean D50(mm)			
BS_StDev			

	Uniformity		
Date:	6/25/97	6/27/97	6/30/97
GS-1	1.432	4.048	2.228
BS-1a			
BS-1b			
BS-1c*			
BS_Mean			
BS_StDev			

	Span		
Date:	6/25/97	6/27/97	6/30/97
GS-1	4.374	16.48	7.134
BS-1a			
BS-1b			
BS-1c*			
BS_Mean			
BS_StDev			

m)	% Vol. Silt & Clay (I.e < 75mm)		
Date:	6/25/97	6/27/97	6/30/97
GS-1S/C	92	78	95
BS-1a			
BS-1b			
BS-1c*			
BS_Mean S/C			
BS_StDev			

During Construction (Station 1)

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.1	0.7	0.6	0.5	0.6	0.5	0.7	0.5	0.3	0.2	0.0
Flow_width (ft)	0.92	2.00	2.00	1.83	2.00	1.83	2.25	2.08	1.00	0.50	0.00
Rainfall (100 x in)	1.00	159.00	1.00	1.00	1.00	1.00	53.00	1.00	1.00	1.00	1.00
Remarks											
Construction Event								mowing;stor	sampler dest	storm drain	culverts up str

										Turbidity (FTU) Hach Meth	
Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (FTU)	182	61	38	39	20	40	34	27	103	115	109
BS-1a		461			36		126				
BS-1b		461			35		120				
BS-1c*		461			148		295				
BS_Mean (FTU)		461.00			35.50		123.00				
BS_StDev		0.00			0.71		4.24				
Ratio BS_Mean/GS-1(Turb)		755.74			177.50		361.76				

										Total Solids (mg/L) Hach	
Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (TSS)	158	45	22	30	16	35	24	15	51	32	45
BS-1a		699			41		203				
BS-1b		825			43		190				
BS-1c*		825			230		360				
BS_Mean (TSS)		762.00			42.00		196.50				
BS_StDev		89.10			1.41		9.19				
Ratio BS_Mean/GS-1(TSS)		1693.33			262.50		818.75				

										Total Solids (mg/L) Standa	
Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (TS_SM)	395	170	233	299	278	318	156	372	377	641	405
BS-1a		2586			473		1099				
BS-1b		3442			473		1175				
BS-1c*		3880			1981		2767				
BS_Mean (TS_SM)		3014.00			473.00		1137.00				
BS_StDev		605.28			0.00		53.74				
Ratio BS_Mean/GS-1(TS_SM)		1772.94			170.14		728.85				

										Total Suspended Solids (	
Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/18/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (TSS_SM)	195	26	15	27	13	35	217	15	71	73	46
BS-1a		2543			213		590				
BS-1b		3200			208		614				
BS-1c*		3728			1692		1140				
BS_Mean (TSS_SM)		2871.50			210.50		602.00				
BS_StDev		464.57			3.54		16.97				
Ratio BS_Mean/GS-1(TSS_SM)		11044.23			1619.23		277.42				

Nitrate-Nitrogen (mg/L) HA

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (NO3)	0.7	0.5	0.2	0.2	0	0.3	0.3	0.1	1	1.4	
BS-1a		0.9			0.3		0.4				
BS-1b		1			0.3		0.3				
BS-1c*		0.9			1.1		0.5				
BS_Mean (NO3)		0.95			0.30		0.35				
BS_StDev		0.07			0.00		0.07				
Ratio BS_Mean/GS-1(NO3)		190.00					116.67				

Nitrite-Nitrogen (mg/L) HA

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (NO2)	0	0.026	0	0.001	0.002	0.004	0	0.001	0	0	0
BS-1a		0			0.035		0				
BS-1b		0			0.035		0				
BS-1c*		0			0.039		0.005				
BS_Mean (NO2)		0.00			0.04		0.00				
BS_StDev		0.00			0.00		0.00				
Ratio BS_Mean/GS-1(NO2)		0.00			1750.00						

Ammonia-Nitrogen (mg/L)

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (NH3)	1.2	0.45	1.04	0.4	0.28	0.37	0.65	0.31	1.32	1.66	1.34
BS-1a		2.75			1.51		2.12				
BS-1b		2.75			1.42		2.15				
BS-1c*		2.75			2.75		2.32				
BS_Mean (NH3)		2.75			1.47		2.14				
BS_StDev		0.00			0.06		0.02				
Ratio BS_Mean/GS-1(NH3)		611.11			523.21		328.46				

Phosphorous (mg/L) HAC

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (PO4)	0.02	0.11	0.9	0.34	0.04	0.5	0.04	0.01	0.07	0.26	0.08
BS-1a		0.28			0.1		0.06				
BS-1b		0.24			0.1		0.05				
BS-1c*		0.22			0.25		0.28				
BS_Mean (PO4)		0.26			0.10		0.06				
BS_StDev		0.03			0.00		0.01				
Ratio BS_Mean/GS-1(PO4)		236.36			250.00		137.50				

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.100	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.1	0.7	0.6	0.5	0.6	0.5	0.7	0.5	0.3	0.2	0.0
Flow_width (ft)	0.92	2.00	2.00	1.83	2.00	1.83	2.25	2.08	1.00	0.50	0.00
Rainfall (100 x in)	1.00	159.00	1.00	1.00	1.00	1.00	53.00	1.00	1.00	1.00	1.00
Remarks											
Construction Event								mowing;stor	sampler dest	storm drain culvarts up str	

Mean Particle Size

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (mm)											53.54
BS-1a											
BS-1b											
BS-1c*											
BS_Mean (mm)											
BS_StDev											

Effective Size (D10)

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (mm)											5.86
BS-1a											
BS-1b											
BS-1c*											
BS_Mean (mm)											
BS_StDev											

90th Percentile (D90)

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (mm)											139.1
BS-1a											
BS-1b											
BS-1c*											
BS_Mean (mm)											
BS_StDev											

Mass Median Dia. (D50)

Date:	7/3/97	7/9/97	7/11/97	7/14/97	7/16/97	7/18/97	7/21/97	7/23/97	7/26/97	7/28/97	7/30/97
GS-1 (mm)											26.61
BS-1a											
BS-1b											
BS-1c*											
BS_Mean (mm)											
BS_StDev											

Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.5	0.6	0.4	0.5	0.5	0.4	0.3	0.0	0.0
Flow_width (ft)	2.42	2.42	2.17	2.42	2.33	2.08	1.25	0.00	0.00
Rainfall (100 x in)	74.00	11.00	1.00	27.00	1.00	1.00	1.00	1.00	1.00
Remarks									
Construction Event	water main connections		Installing pipes across ros		no further w	utility pole in	backfilling pi	very dry site.	site totally dr
d #7800									Turbidity (FT
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (FTU)	38	36	45	26	28	38	36		
BS-1a	461	77		30					
BS-1b	461	77		28					
BS-1c*	461	118		45					
BS_Mean (FTU)	461.00	77.00		29.00					
BS_StDev	0.00	0.00		1.41					
Ratio BS_Mean/GS-1(Turb)	1213.16	213.89		111.54					
ethod #8006									Total Solids (
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (TSS)	26	21	22	13	8	19	22		
BS-1a	825	80		25					
BS-1b	825	78		18					
BS-1c*	825	124		34					
BS_Mean (TSS)	825.00	79.00		21.50					
BS_StDev	0.00	1.41		4.95					
Ratio BS_Mean/GS-1(TSS)	3173.08	376.19		165.38					
d Method 2540 B									Total Solids (
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (TS_SM)	290	186	228	232	254	266	303		
BS-1a	1801	390		278					
BS-1b	2924	401		279					
BS-1c*	3860	530		357					
BS_Mean (TS_SM)	2362.50	395.50		278.50					
BS_StDev	794.08	7.78		0.71					
Ratio BS_Mean/GS-1(TS_SM)	814.66	212.63		120.04					
g/L) Standard Method 2540D									Total Suspen
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (TSS_SM)	30	15	15	20	11	5	38		
BS-1a	2456	118		34					
BS-1b	2574	142		39					
BS-1c*	2060	249		82					
BS_Mean (TSS_SM)	2515.00	130.00		36.50					
BS_StDev	83.44	16.97		3.54					
Ratio BS_Mean/GS-1(TSS_SM)	8383.33	866.67		182.50					
H Method #8###									Nitrate-Nitro
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97 .	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (NO3)						0.4	0.3		
BS-1a									
BS-1b									
BS-1c*									
BS_Mean (NO3)									
BS_StDev									
Ratio BS_Mean/GS-1(NO3)									
H Method #8###									Nitrite-Nitrog
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (NO2)	0	0.003	0	0	0	0	0		
BS-1a		0.154		0.026					
BS-1b		0.162		0.029					
BS-1c*		0.157		0.029					
BS_Mean (NO2)		0.16		0.03					
BS_StDev		0.01		0.00					
Ratio BS_Mean/GS-1(NO2)		5266.67							
ACH Method #8###									Ammonia-Nit
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (NH3)	0.68	0.19	0.56	0.38	0.24	0.43	0.16		
BS-1a	2.75	0.56		0.49					
BS-1b	2.75	0.55		0.47					
BS-1c*	2.75	0.78		0.56					
BS_Mean (NH3)	2.75	0.56		0.48					
BS_StDev	0.00	0.01		0.01					
Ratio BS_Mean/GS-1(NH3)	404.41	292.11		126.32					
Method #8###									Phosphorous
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (PO4)	0.28	0.04	0.05	0.11	0.18	0.08	0.12		
BS-1a	0.44	0.1		0.1					
BS-1b	0.4	0.14		0.11					
BS-1c*	0.47	0.75		0.17					
BS_Mean (PO4)	0.42	0.12		0.11					
BS_StDev	0.03	0.03		0.01					
Retio BS_Mean/GS-1(PO4)	150.00	300.00		95.45					

Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000
Flow_depth (ft)	0.4	0.0	0.0	0.0	0.5	0.3	1.0	0.8	0.5	0.5
Flow_width (ft)	2.08	0.00	0.00	0.00	2.67	2.00	3.50	2.50	2.33	2.08
Rainfall (100 x in)	1.00	1.00	1.00	1.00	106.00	1.00	655.00	83.00	1.00	1.00
Remarks							heavy rain, h	sunny, cool	sunny,humid	warm, sunny
Construction Event	restoring dra	dry: no sam	dry	dry;bs2 stn p	soil build up at tsc		no constructi	drainage cha	Digging accr	None appare
) Hach Method #7800								Turbidity (FTU) Hach Method #7800		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (FTU)	22				26	16	65	25	60	22
BS-1a					461		461	461		
BS-1b					461		461	461		
BS-1c*					461		461	461		
BS_Mean (FTU)					461.00		461.00	461.00		
BS_StDev					0.00		0.00	0.00		
Ratio BS_Mean/GS-1(Turb)					1773.08		709.23	1844.00		
g/L) Hach Method #8006								Total Solids (mg/L) Hach Method #8006		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (TSS)	10				17	8	48	20	55	21
BS-1a					825		825	825		
BS-1b					825		825	825		
BS-1c*					825		825	825		
BS_Mean (TSS)					825.00		825.00	825.00		
BS_StDev					0.00		0.00	0.00		
Ratio BS_Mean/GS-1(TSS)					4852.94		1718.75	4125.00		
g/L) Standard Method 2540 B								Total Solids (mg/L) Standard Method 25		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (TS_SM)	226				251	477	81	326	371	305
BS-1a					3545		22446	2430		
BS-1b					2114		21973	2553		
BS-1c*					9745		57108	6477		
BS_Mean (TS_SM)					2829.50		22209.50	2491.50		
BS_StDev					1011.87		334.46	86.97		
Ratio BS_Mean/GS-1(TS_SM)					1127.29		27419.14	764.26		
ed Solids (mg/L) Standard Method 2540D								Total Suspended Solids (mg/L) Standard		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (TSS_SM)	20				17	19	44	36	54	13
BS-1a					3431		16603	1926		
BS-1b					2712		18246	1937		
BS-1c*					7532		24861	4041		
BS_Mean (TSS_SM)					3071.50		17424.50	1931.50		
BS_StDev					508.41		1161.78	7.78		
Ratio BS_Mean/GS-1(TSS_SM)					18067.65		39601.14	5365.28		
n (mg/L) HACH Method #8###								Nitrate-Nitrogen (mg/L) HACH Method #		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (NO3)	0.2				0.3	0.2	0.5	0.5	0.3	0.2
BS-1a					1.4		0	0.061		
BS-1b					1.4		0.1	0.082		
BS-1c*					1.1		0.2	0.1		
BS_Mean (NO3)					1.40		0.05	0.07		
BS_StDev					0.00		0.07	0.01		
Ratio BS_Mean/GS-1(NO3)					466.67		10.00	14.30		
n (mg/L) HACH Method #8###								Nitrite-Nitrogen (mg/L) HACH Method #8		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (NO2)	0.002				0.016	0.002	0.008	0.01	0.007	0.002
BS-1a					0.032		0.001	0.018		
BS-1b					0.032		0.001	0.027		
BS-1c*					0.099		0.007	0.001		
BS_Mean (NO2)					0.03		0.00	0.02		
BS_StDev					0.00		0.00	0.01		
Ratio BS_Mean/GS-1(NO2)					200.00		12.50	225.00		
ogen (mg/L) HACH Method #8###								Ammonia-Nitrogen (mg/L) HACH Metho		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (NH3)	0.23				0.4	0.05	1.12	0.55	0.79	0.53
BS-1a					2.75		0.25	2.75		
BS-1b					2.75		0.27	2.75		
BS-1c*					2.75		0.32	0.75		
BS_Mean (NH3)					2.75		0.26	2.75		
BS_StDev					0.00		0.01	0.00		
Ratio BS_Mean/GS-1(NH3)					687.50		23.21	500.00		
(mg/L) HACH Method #8###								Phosphorous (mg/L) HACH Method #8#		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (PO4)	0.18				0.11	0.4	0.21	0.08	0.06	0.07
BS-1a					0.1		0.3	0.434		
BS-1b					0.12		0.4	0.177		
BS-1c*					0.09		0.7	0.2		
BS_Mean (PO4)					0.11		0.35	0.31		
BS_StDev					0.01		0.07	0.18		
Ratio BS_Mean/GS-1(PO4)					100.00		166.67	381.88		

Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Flow_depth (ft)	0.9	0.8	0.8	0.6	0.6	0.4	0.7	0.4	0.7	0.7	0.8
Flow_width (ft)	3.00	2.50	2.33	2.25	2.25	2.08	2.67	2.25	2.67	2.83	2.92
Rainfall (100 x in)	106.00	1.00	1.00	1.00	9.00	1.00	31.00	15.00	104.00	51.00	101.00
Remarks	rainy, humid,	sunny, wet g	sunny, cool	sunny, dry gr	sunny humid	Dry no GS/B	Overcast, w	sunny, cool.	Both BS mis	overcast, co	partly cloudy
Construction Event	no activity	no activity	no activity	excavator ac	activity acro	no activity	no activity	water pumpi	digging and	no activity.	storm chann
					Turbidity (FTU) Hach Method #7800						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (FTU)	50	60	202	33	52	140	130	67	82	99	30
BS-1a	340	461					163				
BS-1b	320	461					175				
BS-1c*	322	461					187				
BS_Mean (FTU)	330.00	461.00					169.00				
BS_StDev	14.14	0.00					8.49				
Ratio BS_Mean/GS-1(Turb)	660.00	768.33					130.00				
					Total Solids (mg/L) Hach Method #8006						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (TSS)	42	39	181	24	47	128	119	58	60	87	18
BS-1a	620	825					192				
BS-1b	615	825					210				
BS-1c*	565	825					235				
BS_Mean (TSS)	617.50	825.00					201.00				
BS_StDev	3.54	0.00					12.73				
Ratio BS_Mean/GS-1(TSS)	1470.24	2115.38					168.91				
0 B					Total Solids (mg/L) Standard Method 2540 B						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (TS_SM)	258	265	337	355	266	281	163	435	213	329	228
BS-1a	1401	3651					265				
BS-1b	1456	3651					284				
BS-1c*	1668	7725					376				
BS_Mean (TS_SM)	1428.50	3651.00					274.50				
BS_StDev	38.89	0.00					13.44				
Ratio BS_Mean/GS-1(TS_SM)	553.68	1377.74					168.40				
Method 2540D					Total Suspended Solids (mg/L) Standard Method 2540D						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (TSS_SM)	28	21	89	78	55	71	41	243	57	71	25
BS-1a	1328	3397					187				
BS-1b	1328	3397					200				
BS-1c*	1585	5936					270				
BS_Mean (TSS_SM)	1328.00	3397.00					193.50				
BS_StDev	0.00	0.00					9.19				
Ratio BS_Mean/GS-1(TSS_SM)	4742.86	16176.19					471.95				
###					Nitrate-Nitrogen (mg/L) HACH Method #8###						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (NO3)	0.4	0.6	0.4	0.1	0.3	0.3	0.5	0.017	0.001	0.6	0.3
BS-1a	0.4	0.1					0.4				
BS-1b	0.3	0.1					0.4				
BS-1c*	0.5	0.1					0.6				
BS_Mean (NO3)	0.35	0.10					0.40				
BS_StDev	0.07	0.00					0.00				
Ratio BS_Mean/GS-1(NO3)	87.50	16.67					80.00				
##					Nitrite-Nitrogen (mg/L) HACH Method #8###						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (NO2)	0.021	0.022	0	0.001	0.006	0	0.002	0.3	0.3	0.021	0.012
BS-1a	0.01	0.001					0.012				
BS-1b	0.006	0.001					0.011				
BS-1c*	0.007	0.003					0.008				
BS_Mean (NO2)	0.01	0.00					0.01				
BS_StDev	0.00	0.00					0.00				
Ratio BS_Mean/GS-1(NO2)	38.10	4.55					575.00				
#8###					Ammonia-Nitrogen (mg/L) HACH Method #8###						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (NH3)	0.55	0.75	1.55	0.35	0.95	1.08	1.24	0.05	0.04	1.1	0.41
BS-1a	1.9	0.82					1.8				
BS-1b	2.17	0.62					1.9				
BS-1c*	2.36	1.05					1.95				
BS_Mean (NH3)	2.04	0.62					1.85				
BS_StDev	0.19	0.00					0.07				
Ratio BS_Mean/GS-1(NH3)	370.00	82.67					149.19				
#					Phosphorous (mg/L) HACH Method #8###						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (PO4)	0.16	0.16	0.04	0.03	0.24	0.02	0.08	1.02	0.72	0.06	0.11
BS-1a	0.19	0.01					0.2				
BS-1b	0.2	0.01					0.23				
BS-1c*	0.25	0.05					0.75				
BS_Mean (PO4)	0.20	0.01					0.22				
BS_StDev	0.01	0.00					0.02				
Ratio BS_Mean/GS-1(PO4)	121.88	6.25					268.75				

11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.750	0.000	0.000
0.6	0.7	0.5	0.5	0.8	0.6	0.4	0.3	1.0	0.8	1.1	0.8	0.5
2.58	2.67	2.17	2.33	2.83	2.58	2.42	2.25	3.33	3.17	3.33	2.67	2.50
10.00	13.00	1.00	28.00	355.00	1.00	1.00	1.00	491.00	333.00	100.00	1.00	1.00
wet, cool	overcast, we	No BS/GS2	moist grd. ov	BS1-25:1 dil.	Overcast, co	sunny. Too d	sunny, too dr	sunny, humi	sunny, wind	Wet day. BS	sunny, mudd	overcast, dry
no activity	construction	no activity	no activity, B	No activity. L	Work on sig	no works	no works	no activity	no works	no works. Fl	no works	no works
			Turbidity (FTU) Hach Method #7800									Turbidity (FT
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
23	48	31	62	52	59	36	53	45	45	59	37	23
			461	461				461	211			
			461	461				461	210			
			461	461				461	375			
			461.00	461.00				461.00	210.50			
			0.00	0.00				0.00	0.71			
			743.55	886.54				1024.44	467.78			
			Total Solids (mg/L) Hach Method #8006									Total Solids (
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
12	33	26	40	30	34	33	43	27	24	41	23	41
			825	825				825	245			
			825	825				825	267			
			825	825				825	466			
			825.00	825.00				825.00	256.00			
			0.00	0.00				0.00	15.56			
			2062.50	2750.00				3055.56	1066.67			
			Total Solids (mg/L) Standard Method 2540 B									Total Solids (
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
270	260	294	255	157	198	394	306	162	219	146	225	531
			3174	31861				22494	1817			
			3179	28048				29705	1151			
			3755	64526				93704	2247			
			3176.50	29954.50				26099.50	1484.00			
			3.54	2696.20				5098.95	470.93			
			1245.69	19079.30				16110.80	677.63			
			Total Suspended Solids (mg/L) Standard Method 2540D									Total Suspe
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
22	44	73	29	4	6	28	85	10	14	43	12	20
			2361	24392				14027	1480			
			2441	23901				16881	1056			
			2977	26435				39357	1610			
			2401.00	24146.50				15454.00	1268.00			
			56.57	347.19				2018.08	299.81			
			8279.31	603662.50				154540.00	9057.14			
			Nitrate-Nitrogen (mg/L) HACH Method #8###									Nitrate-Nitro
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
0.2	0.3	0.021	0.4	0.6	0.4	0.3	0.2	0.5	0.5	0.5	0.4	0.4
			0.6	0.2				0.1	0.5			
			0.6	0.2				0.1	0.5			
			0.7	0.4				0.2	0.4			
			0.60	0.20				0.10	0.50			
			0.00	0.00				0.00	0.00			
			150.00	33.33				20.00	100.00			
			Nitrite-Nitrogen (mg/L) HACH Method #8###									Nitrite-Nitrog
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
0.005	0.012	0.1	0	0	0	0.019	0.014	0.005	0.009	0.009	0.001	0.001
			0.017	0.001				0	0.001			
			0.018	0.001				0	0.002			
			0.01	0.002				0	0.031			
			0.02	0.00				0.00	0.00			
			0.00	0.00				0.00	0.00			
								0.00	16.67			
			Ammonia-Nitrogen (mg/L) HACH Method #8###									Ammonia-Nit
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
0.32	0.51	0.91	0.61	0.68	0.6	1.04	0.96	0.61	0.73	0.75	0.79	0.45
			2.75	1.92				1.03	2.11			
			2.68	1.88				1.35	2.02			
			2.75	2.19				2.75	2.71			
			2.72	1.90				1.19	2.07			
			0.05	0.03				0.23	0.06			
			445.08	279.41				195.08	282.88			
			Phosphorous (mg/L) HACH Method #8###									Phosphorous
11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98
0.24	0.06	0.11	0.08	0.15	0.6	0.11	0.11	0.12	0.39	0.13	0.07	0.12
			0.39	0.05				0.07	0.16			
			0.43	0.03				0.02	0.14			
			0.5	0.05				0.04	0.2			
			0.41	0.04				0.05	0.15			
			0.03	0.01				0.04	0.01			
			512.50	26.67				37.50	38.46			

1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.000	0.000
0.8	0.7	0.7	0.8	0.7	0.8	0.6	0.8	1.1	0.5	0.8	0.5	0.5
2.67	2.42	2.67	2.58	2.58	2.67	2.58	2.63	3.50	2.33	2.63	2.42	2.42
51.00	14.00	1.00	50.00	1.00	75.00	10.00	80.00	48.00	68.00	10.00	10.00	1.00
overcast, we	sunny, dry w	overcast; mo	cool; large p	misty; moist	sunny,cool;	sunny; moist	cool; small p	clear; moist,	windy, warm	Clear, warm;	dry, clear	Warm, dry
traffic flow m	nothing new			none	none	none	none	"Water in channel may be		none	surveying w	Surveying ro
) Hach Method #7800									Turbidity (FTU) Hach Method #7800			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
57	32	33	54	30	131	55	68	12	105	69	83	40
461			461		461		322	128	461	461		
461			461		461		419	134	461	461		
461			461		461		441	152	461	461		
461.00			461.00		461.00		370.50	131.00	461.00	461.00		
0.00			0.00		0.00		68.59	4.24	0.00	0.00		
808.77			853.70		351.91		544.85	1091.67	439.05	668.12		
g/L) Hach Method #8006									Total Solids (mg/L) Hach Method #8006			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
37	19	20	35	14	98	37	43	11	825	52	52	84
803			825		825		470	160	825	825		
815			825		825		613	164	825	825		
825			825		825		825	190	825	825		
809.00			825.00		825.00		541.50	162.00	825.00	825.00		
8.49			0.00		0.00		101.12	2.83	0.00	0.00		
2166.49			2357.14		841.84		1259.30	1472.73	100.00	1586.54		
g/L) Standard Method 2540 B									Total Solids (mg/L) Standard Method 2540 B			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
192	242	287	344	129	455	214	151	405	321	223	259	386
1069			5785		2413		922	280	4729	2552		
1069			4835		2930		1194	359	4999	2742		
1192			9166		3024		1799	444	7857	3882		
1069.00			5310.00		2671.50		1058.00	319.50	4864.00	2647.00		
0.00			671.75		365.57		192.33	55.86	190.82	134.35		
556.77			1543.60		587.14		700.66	78.89	1515.26	1187.00		
ed Solids (mg/L) Standard Method 2540D									Total Suspended Solids (mg/L) Standard Method 2540			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
11	38	46	356	14	225	29	16	18	25	36	14	146
905			6523		2932		706	274	4669	2495		
877			5683		2542		847	252	5061	2451		
1042			11647		2865		1428	393	6786	4184		
891.00			6103.00		2737.00		776.50	263.00	4865.00	2473.00		
19.80			593.97		275.77		99.70	15.56	277.19	31.11		
8100.00			1714.33		1216.44		4853.13	1461.11	19460.00	8869.44		
n (mg/L) HACH Method #8###									Nitrate-Nitrogen (mg/L) HACH Method #8###			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
0.6	0.3	0.3	0.5	0.3	0.7	0.5	0.5	0.8	1	0.4	0.4	0.3
0.6			0.1		0.16		0.6	0.4	0.8	0.5		
0.8			0.1		0.16		0.6	0.4	0.8	0.5		
1			0.1		0.16		0.7	0.5	0.8	0.5		
0.70			0.10		0.16		0.60	0.40	0.80	0.50		
0.14			0.00		0.00		0.00	0.00	0.00	0.00		
116.67			20.00		22.86		120.00	50.00	80.00	125.00		
n (mg/L) HACH Method #8###									Nitrite-Nitrogen (mg/L) HACH Method #8###			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
0.008	0.003	0.008	0.003	0.001	0.016	0.004	0.001	0.008	0.004	0.016	0.002	0.005
0.028			0.002		0.001		0.002	0.028	0.001	0.04		
0.032			0.002		0.001		0.003	0.018	0.006	0.01		
0.032			0.003		0.004		0.003	0.021	0.001	0.075		
0.03			0.00		0.00		0.00	0.02	0.00	0.03		
0.00			0.00		0.00		0.00	0.01	0.00	0.02		
375.00			66.67		6.25		250.00	287.50	87.50	156.25		
ogen (mg/L) HACH Method #8###									Ammonia-Nitrogen (mg/L) HACH Method #8###			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
0.71	0.43	0.46	0.61	0.43	1.18	0.55	0.76	0.15	2.24	0.7	0.78	1.05
3.66			0.42		6.68		2.16	1.28	3.7	2.46		
3.7			0.43		6.88		2.47	1.31	3.56	2.48		
4.04			0.58		7.72		2.7	1.38	4.32	2.74		
3.68			0.43		6.78		2.32	1.30	3.63	2.47		
0.03			0.01		0.14		0.22	0.02	0.10	0.01		
518.31			69.67		574.58		304.61	863.33	162.05	352.86		
(mg/L) HACH Method #8###									Phosphorous (mg/L) HACH Method #8###			
1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98	3/5/98
0.17	0.1	0.05	0.05	0.21	0.12	0.06	0.08	0.11	0.02	0.12	0.08	0.09
0.48			0.02		0.08		0.61	0.1	0.2	0.17		
0.32			0.03		0.32		0.18	0.11	0.56	0.19		
0.22			0.09		0.04		0.65	0.1	0.24	0.17		
0.40			0.03		0.20		0.40	0.11	0.38	0.18		
0.11			0.01		0.17		0.30	0.01	0.25	0.01		
235.29			50.00		166.67		493.75	95.45	1900.00	150.00		

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.3	1.0	0.9	0.5	0.5	0.4	0.7	0.5	0.3	0.0	0.0	0.0	0.6
2.33	2.83	2.71	2.17	2.17	1.92	2.33	2.17	2.00	0.00	0.00	0.00	2.33
5.00	28.00	177.00	4.00	1.00	1.00	19.00	1.00	1.00	1.00	1.00	1.00	55.00
Mild, dry	Wet, Rainy	Nice & Sunn	Dry, warm	Warm, Dry	Warm, wet -	Mild, mostly	Mild; Dry	Overcast	Totally Dry;	Overcast, dr	Dry channel	Dry/Moist so
No Construc	Rock dam r	Work continues	at culvert	same activit	ongoing wor	Ditch constr.	w/bound side	being dug fo	Ongoing	Construction	w/bound side	Construction

Turbidity (FTU) Hach Method #7800

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
40	65	84	40	23	27	47	10	52				36
		461										85
		461										95
		461										172
		461.00										90.00
		0.00										7.07
		548.81										250.00

Total Solids (mg/L) Hach Method #8006

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
24	68	59	44	15	41	51	6	53				21
		825										89
		825										104
		825										204
		825.00										96.50
		0.00										10.61
		1398.31										459.52

Total Solids (mg/L) Standard Method 2540 B

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
348	124	218	449	214	269	159	368	369				217
		10217										568
		7812										578
		33098										699
		9014.50										573.00
		1700.59										7.07
		4135.09										264.06

Total Suspended Solids (mg/L) Standard Method 2540D

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
32	45	42	78	50	97	80	85	103				25
		9093										407
		6268										388
		34294										594
		7680.50										397.50
		1997.58										13.44
		18286.90										1590.00

Nitrate-Nitrogen (mg/L) HACH Method #8###

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
0.3	0.7	0.6	0.3	0.4	0.3	0.5	0.2	0.5				0.5
		2.4										0.5
		2.4										0.4
		6										0.5
		2.40										0.45
		0.00										0.07
		400.00										90.00

Nitrite-Nitrogen (mg/L) HACH Method #8###

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
0.001	0.074	0.007	0.008	0.007	0.003	0.008	0.003	0.006				0.01
		0.012										0.016
		0.024										0.003
		0.024										0.001
		0.02										0.01
		0.01										0.01
		257.14										95.00

Ammonia-Nitrogen (mg/L) HACH Method #8###

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
0.69	0.97	0.87	0.83	0.4	0.76	0.59	0.42	0.61				0.51
		12.84										1.49
		12.72										1.63
		24.24										2.01
		12.78										1.56
		0.08										0.10
		1468.97										305.88

Phosphorous (mg/L) HACH Method #8###

3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98	4/17/98	4/21/98
0.02	0.16	0.11	0.9	0.1	0.9	0.9	0.2	0.08				0.19
		1.32										0.21
		0.96										0.07
		1.08										0.36
		1.14										0.14
		0.25										0.10
		1036.36										73.68

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
000000	000000	000000	000000	000000	000000	000000	000000	000000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.17	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1.00	11.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
e areas	Moist, Dew	Dry, lots of vegetation		Dry	Dry		Dry, hot	Raingage repl.
along lake si	Ongoing con	No Construction		No constr.	Channel along lake side d		Pipe laying	

Turbidity (FTU) Hach Method #7800

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
41	45							

Total Solids (mg/L) Hach Method #8006

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
28	40							

Total Solids (mg/L) Standard Method 2540 B

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
325	428							

Total Suspended Solids (mg/L) Standard Method 2540D

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
42	275							

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
0.4	0.4							

Nitrite-Nitrogen (mg/L) HACH Method #8###

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
0.007	0.017							

Ammonia-Nitrogen (mg/L) HACH Method #8###

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
0.44	0.84							

Phosphorous (mg/L) HACH Method #8###

4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
0.9	0.9							

Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.5	0.6	0.4	0.5	0.5	0.4	0.3	0.0	0.0
Flow_width (ft)	2.42	2.42	2.17	2.42	2.33	2.08	1.25	0.00	0.00
Rainfall (100 x in)	74.00	11.00	1.00	27.00	1.00	1.00	1.00	1.00	1.00
Remarks									
Construction Event	water main connections		Installing pipes across roa		no further w	utility pole in	backfilling pi	very dry site.	site totally dr
									Mean Particl
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (mm)	59.83	75.44	41.43	102.29	66.92	61.29	109.34		
BS-1a	28.24	56.32		80.27					
BS-1b	21.21	36.94		80.64					
BS-1c*	24.46	49.96		61.21					
BS_Mean (mm)	24.64	47.74		74.04					
BS_StDev	3.52	9.88		11.11					
									Effective Siz
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (mm)	16.15	12.94	10.35	16.89	11.89	9.41	10.8		
BS-1a	0.27	5.66		12.63					
BS-1b	0.2	4.93		13.13					
BS-1c*	0.15	5.53		7.62					
BS_Mean (mm)	0.21	5.37		11.13					
BS_StDev	0.06	0.39		3.05					
									90th Percenti
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (mm)	113.15	163.35	69.48	202.21	134.37	149.98	310.45		
BS-1a	74.9	142.71		178.69					
BS-1b	56.54	77.54		196.85					
BS-1c*	71.04	114.84		156.15					
BS_Mean (mm)	67.49	111.70		177.23					
BS_StDev	9.68	32.70		20.39					
									Mass Media
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1 (mm)	47.12	58.95	31.33	83.4	56.45	39.91	54.22		
BS-1a	11.82	34.62		61.77					
BS-1b	7.61	24.81		53.91					
BS-1c*	5.89	32.98		37.74					
BS_Mean (mm)	8.44	30.60		51.14					
BS_StDev	3.05	5.25		12.25					
									Uniformity
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1	0.6887	0.7892	0.7462	0.7489	0.6747	1.046	1.556		
BS-1a	2.107	1.184		0.8107					
BS-1b	2.529	1.002		0.9878					
BS-1c*	3.945	1.054		1.142					
BS_Mean	2.86	1.08		0.98					
BS_StDev	0.96	0.09		0.17					
									Span
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1	2.058	2.551	1.688	2.222	2.17	3.522	5.526		
BS-1a	6.314	3.959		2.688					
BS-1b	7.404	2.927		3.408					
BS-1c*	12.04	3.314		3.936					
BS_Mean	6.59	3.40		3.34					
BS_StDev	3.04	0.52		0.63					
m)									% Vol. Silt &
Date:	8/1/97	8/4/97	8/6/97	8/9/97	8/11/97	8/13/97	8/15/97	8/19/97	8/21/97
GS-1	75.56	59.32	91.7	45.35	64.58	71.23	59.18		
BS-1a	89.81	74.38		57.77					
BS-1b	93.59	89.09		62.44					
BS-1c*	90.54	79.65		72.55					
BS_Mean	91.31	81.04		64.25					
BS_StDev	2.01	7.45		7.56					

Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.375	0.000	0.000	0.000
Flow_depth (ft)	0.4	0.0	0.0	0.0	0.5	0.3	1.0	0.8	0.5	0.5
Flow_width (ft)	2.08	0.00	0.00	0.00	2.67	2.00	3.50	2.50	2.33	2.08
Rainfall (100 x in)	1.00	1.00	1.00	1.00	106.00	1.00	655.00	83.00	1.00	1.00
Remarks							heavy rain, h	sunny, cool	sunny,humid	warm, sunny
Construction Event	restoring dra	dry: no sam	dry	dry;bs2 stn p	soil build up at tsc		no constructi	drainage cha	Digging accr	None appare
Size								Mean Particle Size		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (mm)	49.68				32.98					
BS-1a										
BS-1b										
BS-1c*					28.35			42.88		
BS_Mean (mm)					28.35			42.88		
BS_StDev										
(D10)								Effective Size (D10)		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (mm)	10.69				6.03					
BS-1a										
BS-1b										
BS-1c*					2.33			7.02		
BS_Mean (mm)					2.33			7.02		
BS_StDev										
e (D90)								90th Percentile (D90)		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (mm)	102.27				72.8					
BS-1a										
BS-1b										
BS-1c*					61.13			88.46		
BS_Mean (mm)					61.13			88.46		
BS_StDev										
Dia. (D50)								Mass Median Dia. (D50)		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1 (mm)	40.85				24.78					
BS-1a										
BS-1b										
BS-1c*					20.29			34.32		
BS_Mean (mm)					20.29			34.32		
BS_StDev										
								Uniformity		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1	0.6885				0.8298					
BS-1a										
BS-1b										
BS-1c*					0.9704			0.7499		
BS_Mean					0.97			0.75		
BS_StDev										
								Span		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1	2.242				2.694					
BS-1a										
BS-1b										
BS-1c*					2.898			2.373		
BS_Mean					2.90			2.37		
BS_StDev										
lay (l.e < 75mm)								% Vol. Silt & Clay (l.e < 75mm)		
Date:	8/27/97	9/2/97	9/4/97	9/9/97	9/11/97	9/16/97	9/23/97	9/26/97	9/30/97	10/2/97
GS-1	78.11				90.44					
BS-1a										
BS-1b										
BS-1c*					93.79			84.67		
BS_Mean					93.79			84.67		
BS_StDev										

Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Flow_depth (ft)	0.9	0.8	0.6	0.6	0.6	0.4	0.7	0.4	0.7	0.7	0.8
Flow_width (ft)	3.00	2.50	2.33	2.25	2.25	2.08	2.67	2.25	2.67	2.83	2.92
Rainfall (100 x in)	106.00	1.00	1.00	1.00	9.00	1.00	31.00	15.00	104.00	51.00	101.00
Remarks	rainy, humid,	sunny, wet g	sunny, cool	sunny, dry gr	sunny humid	Dry no GS/B	Overcast, w	sunny, cool.	Both BS mis	overcast, co	partly cloudy
Construction Event	no activity	no activity	no activity	excavator ac	activity acro	no activity	no activity	water pumpi	digging and	no activity.	storm chann
Mean Particle Size											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	30.04	29.9	19.41	39.33	26.76	22.97	8.12	18.67	21.67	17.57	57.03
BS-1a	17.52	57.5					34.87				
BS-1b	16.95						34.79				
BS-1c*	19.35	7.82					40.75				
BS_Mean (mm)	17.94	32.66					36.80				
BS_StDev	1.25	35.13					3.42				
Effective Size (D10)											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	8.48	6.79	2	9.45	5.78	1.81	0.33	3.84	1.8	0.62	11.7
BS-1a	1.56	5.55					3.42				
BS-1b	1.53						3.13				
BS-1c*	1.72	1.75					3.54				
BS_Mean (mm)	1.60	3.65					3.36				
BS_StDev	0.10	2.69					0.21				
90th Percentile (D90)											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	87.85	62.38	37.47	79.88	52.77	57.08	19.89	40.32	61.16	60.38	113.77
BS-1a	39	170.76					75.14				
BS-1b	39.17						76.04				
BS-1c*	44.73	15.42					89.32				
BS_Mean (mm)	40.97	93.09					80.17				
BS_StDev	3.26	109.84					7.94				
Mass Median Dia. (D50)											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	26.06	23.54	13.36	32.08	19	14.56	2.57	13.53	11.36	6.53	49.45
BS-1a	11.8	28.3					26.38				
BS-1b	11.8						25.73				
BS-1c*	13.36	6.08					28.15				
BS_Mean (mm)	12.32	17.19					26.75				
BS_StDev	0.90	15.71					1.25				
Uniformity											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	0.5833	0.7261	0.9497	0.6782	0.8544	1.104	2.751	0.8398	1.43	2.276	0.6274
BS-1a	1.049	1.568					0.8617				
BS-1b	1.007						0.9003				
BS-1c*	1.016	0.7426					0.9917				
BS_Mean	1.02	1.16					0.92				
BS_StDev	0.02	0.58					0.07				
Span											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	1.895	2.361	2.654	2.195	2.473	3.797	7.524	2.698	5.223	9.155	2.064
BS-1a	3.174	5.838					2.719				
BS-1b	3.189						2.834				
BS-1c*	3.219	2.247					3.047				
BS_Mean	3.19	4.04					2.87				
BS_StDev	0.02	2.54					0.17				
% Vol. Silt & Clay (i.e < 75mm)											
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	96.51	93.94	96.93	87.68	94.37	94.34	98.52	98.34	93.36	93.88	71.47
BS-1a	98.17	76.47					89.64				
BS-1b	98.75						89.37				
BS-1c*	97.63	99.89					85.96				
BS_Mean	98.18	88.18					88.32				
BS_StDev	0.56	16.56					2.05				

Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010
Flow_depth (ft)	0.9	0.8	0.6	0.6	0.6	0.4	0.7	0.4	0.7	0.7	0.8
Flow_width (ft)	3.00	2.50	2.33	2.25	2.25	2.08	2.67	2.25	2.67	2.83	2.92
Rainfall (100 x in)	106.00	1.00	1.00	1.00	9.00	1.00	31.00	15.00	104.00	51.00	101.00
Remarks	rainy, humid,	sunny, wet g	sunny, cool	sunny, dry gr	sunny humid	Dry no GS/B	Overcast, w	sunny, cool.	Both BS mis	overcast, co	partly cloudy
Construction Event	no activity	no activity	no activity	excavator ac	activity acro	no activity	no activity	water pumpi	digging and	no activity.	storm chann
					Mean Particle Size						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	30.04	29.9	19.41	39.33	26.76	22.97	8.12	18.67	21.67	17.57	57.03
BS-1a	17.52	57.5					34.87				
BS-1b	16.95						34.79				
BS-1c*	19.35	7.82					40.75				
BS_Mean (mm)	17.94	32.66					36.80				
BS_StDev	1.25	35.13					3.42				
					Effective Size (D10)						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	6.48	6.79	2	9.45	5.78	1.81	0.33	3.84	1.8	0.62	11.7
BS-1a	1.56	5.55					3.42				
BS-1b	1.53						3.13				
BS-1c*	1.72	1.75					3.54				
BS_Mean (mm)	1.60	3.65					3.36				
BS_StDev	0.10	2.69					0.21				
					90th Percentile (D90)						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	87.85	62.38	37.47	79.88	52.77	57.08	19.69	40.32	61.16	60.38	113.77
BS-1a	39	170.76					75.14				
BS-1b	39.17						76.04				
BS-1c*	44.73	15.42					89.32				
BS_Mean (mm)	40.97	93.09					80.17				
BS_StDev	3.26	109.84					7.94				
					Mass Median Dia. (D50)						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1 (mm)	26.06	23.54	13.36	32.08	19	14.56	2.57	13.53	11.36	6.53	49.45
BS-1a	11.8	28.3					26.38				
BS-1b	11.8						25.73				
BS-1c*	13.36	6.08					28.15				
BS_Mean (mm)	12.32	17.19					26.75				
BS_StDev	0.90	15.71					1.25				
					Uniformity						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	0.5833	0.7261	0.9497	0.6782	0.8544	1.104	2.751	0.8396	1.43	2.278	0.6274
BS-1a	1.049	1.568					0.8617				
BS-1b	1.007						0.9003				
BS-1c*	1.016	0.7426					0.9917				
BS_Mean	1.02	1.16					0.92				
BS_StDev	0.02	0.58					0.07				
					Span						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	1.895	2.361	2.654	2.195	2.473	3.797	7.524	2.696	5.223	9.155	2.064
BS-1a	3.174	5.838					2.719				
BS-1b	3.189						2.834				
BS-1c*	3.219	2.247					3.047				
BS_Mean	3.19	4.04					2.87				
BS_StDev	0.02	2.54					0.17				
					% Vol. Silt & Clay (i.e < 75mm)						
Date:	10/10/97	10/14/97	10/16/97	10/21/97	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97
GS-1	96.51	93.94	96.93	87.68	94.37	94.34	98.52	98.34	93.36	93.88	71.47
BS-1a	98.17	76.47					89.64				
BS-1b	98.75						89.37				
BS-1c*	97.63	99.89					85.96				
BS_Mean	98.18	88.18					88.32				
BS_StDev	0.56	16.56					2.05				

Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200	0.000	0.750	0.000
Flow_depth	0.6	0.7	0.5	0.5	0.8	0.6	0.4	0.3	1.0	0.8	1.1	0.8
Flow_width (	2.58	2.67	2.17	2.33	2.83	2.58	2.42	2.25	3.33	3.17	3.33	2.67
Rainfall (100	10.00	13.00	1.00	28.00	355.00	1.00	1.00	1.00	491.00	333.00	100.00	1.00
Remarks	wet, cool	overcast, we	No BS/GS2	moist grd. o	BS1-25:1 dil.	Overcast, co	sunny. Too d	sunny, too dr	sunny, humi	sunny, windy	Wet day. BS	sunny, mudd
Construction	no activity	construction	no activity	no activity, B	No activity. L	Work on sig	no works	no works	no activity	no works	no works. Fl	no works
				Mean Particle Size								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1 (mm)	87.68	34.05	22.8	21.94	3.78	3.25	80.77	20.7	22.58	139.73	21.42	46.43
BS-1a				30.81	25.16				36.01	47.56		
BS-1b				30.17	40.8				43.89	30.81		
BS-1c*				34.81	62.29				51.14	30.42		
BS_Mean (mm)				31.93	42.75				43.68	36.26		
BS_StDev				2.51	18.64				7.57	9.79		
				Effective Size (D10)								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1 (mm)	6.44	1.44	5.15	3.3	0.28	0.24	11.59	2.62	5.02	14.16	1.77	6.64
BS-1a				1.84	1.69				2.34	4.96		
BS-1b				1.65	2.47				3.87	2.46		
BS-1c*				1.89	4.25				2.1	2.05		
BS_Mean (mm)				1.79	2.80				2.77	3.16		
BS_StDev				0.13	1.31				0.96	1.58		
				90th Percentile (D90)								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1 (mm)	275.85	95.02	47.86	48.53	8.54	8.4	197.36	47.71	54.67	315.45	60.14	122.42
BS-1a				77.87	59.12				80.45	110.23		
BS-1b				85.62	88.95				99.08	72.04		
BS-1c*				93.15	142.2				142.41	74.61		
BS_Mean (mm)				85.55	96.76				107.31	85.63		
BS_StDev				7.64	42.09				31.79	21.35		
				Mass Median Dia. (D50)								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1 (mm)	33.89	12.47	17.17	13.78	3.17	1.88	53.83	11.36	15.06	105.53	11.76	25.02
BS-1a				13.96	17.6				24.48	34.65		
BS-1b				13.87	30.04				34.35	22.08		
BS-1c*				18.01	46.11				25.85	19.51		
BS_Mean (mm)				15.28	31.25				28.23	25.41		
BS_StDev				2.36	14.29				5.35	8.10		
				Uniformity								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1	2.157	2.31	0.7775	1.081	0.8525	1.381	1.017	1.319	0.9308	0.8914	1.345	1.349
BS-1a				1.79	1.05				1.087	0.949		
BS-1b				1.771	0.9679				0.8677	0.9753		
BS-1c*				1.551	0.919				1.64	1.175		
BS_Mean				1.70	0.98				1.20	1.03		
BS_StDev				0.13	0.07				0.40	0.12		
				Span								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1	7.949	7.505	2.488	3.282	2.608	4.329	3.451	3.968	3.297	2.855	4.964	4.627
BS-1a				5.447	3.263				3.192	3.039		
BS-1b				6.052	2.879				2.772	3.151		
BS-1c*				5.066	2.992				5.428	3.72		
BS_Mean				5.52	3.04				3.80	3.30		
BS_StDev				0.50	0.20				1.43	0.37		
				% Vol. Silt & Clay (Le < 75mm)								
Date:	11/18/97	11/20/97	11/25/97	12/2/97	12/9/97	12/11/97	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98
GS-1	67.47	81.18	96.9	95.59	100	100	61.41	95.47	96.2	38.47	93.37	78.36
BS-1a				89.31	94.43				87.85	77.47		
BS-1b				87.76	85.24				80.34	90.66		
BS-1c*				84.48	70.84				75.89	89.8		
BS_Mean				87.18	83.50				81.29	85.98		
BS_StDev				2.47	11.89				6.14	7.38		

Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/	0.000	0.000	0.000	0.000	0.400	0.000	0.000	0.000	0.000	1.250	0.000	0.000
Flow_depth	0.5	0.8	0.7	0.7	0.8	0.7	0.8	0.6	0.8	1.1	0.5	0.8
Flow_width (	2.50	2.67	2.42	2.67	2.58	2.58	2.67	2.58	2.63	3.50	2.33	2.63
Rainfall (100	1.00	51.00	14.00	1.00	50.00	1.00	75.00	10.00	80.00	48.00	68.00	10.00
Remarks	overcast, dry	overcast, we	sunny, dry w	overcast; mo	cool; large p	misty; moist	sunny,cool;	sunny; moist	cool; small p	clear, moist,	windy, warm	Clear, warm;
Construction	no works	traffic flow m	nothing new			none	none	none	none	*Water in channel may be		none
	Mean Particle Size										Mean Particle Size	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1 (mm)	67.94	29.95	118.59	64.41	62.95	450.84	55.14	90.42	200.57	110.02	52.33	37.21
BS-1a		21.83			38.07		30.79		30.02	37.41		31.86
BS-1b		24.94			33.2		36.68		20.15	32.67	38.59	15.31
BS-1c*		26.79			40.51		38.09		32.97	32.71	25.28	28.38
BS_Mean (mm)		24.52			37.26		35.19		27.71	34.26	31.94	25.18
BS_StDev		2.51			3.72		3.87		6.71	2.73	9.41	8.73
	Effective Size (D10)										Effective Size (D10)	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1 (mm)	8.72	2.25	3.95	11.56	3.24	7.49	2.33	0.22	6.11	6.8	1.08	5.45
BS-1a		2.17			3.26		1.72		2.77	5.43		3.04
BS-1b		2.2			2.96		1.82		2.03	4	3.43	1.32
BS-1c*		2.26			5.04		2.15		2.81	3.78	2.46	2.94
BS_Mean (mm)		2.21			3.75		1.90		2.54	4.40	2.95	2.43
BS_StDev		0.05			1.12		0.23		0.44	0.90	0.69	0.97
	90th Percentile (D90)										90th Percentile (D90)	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1 (mm)	173.54	51.27	579.62	142.38	180.7	779.78	113.68	289.56	586.12	265.35	115.28	85.07
BS-1a		50.83			87.36		75.29		71.93	99.39		74.71
BS-1b		56.72			73.28		86.55		46.44	70.56	88.36	35.43
BS-1c*		63.35			91.26		90.85		74.74	74.5	58.39	65.25
BS_Mean (mm)		56.97			83.97		84.23		64.37	81.48	73.38	58.46
BS_StDev		6.26			9.46		8.04		15.59	15.83	21.19	20.50
	Mass Median Dia. (D50)										Mass Median Dia. (D50)	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1 (mm)	43.49	13.1	17.61	47.35	30.52	581.22	50.63	5.28	26.31	69.53	11.4	21.83
BS-1a		14.55			23.94		18.91		19.5	22.14		20.73
BS-1b		15.02			21.46		21.2		14.45	19.4	26.69	10.94
BS-1c*		15.93			29.47		25.32		18.01	20.1	16.59	19.8
BS_Mean (mm)		15.17			24.96		21.81		17.32	20.55	21.64	17.16
BS_StDev		0.70			4.10		3.25		2.59	1.42	7.14	5.40
	Uniformity										Uniformity	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1	1.08	1.796	6.27	0.8492	1.717	0.4381	0.6716	16.93	7.169	1.293	4.149	1.194
BS-1a		1.049			1.156		1.254		1.103	1.177		1.095
BS-1b		1.211			1.109		1.359		0.9425	1.19	1.021	0.9579
BS-1c*		1.241			0.9197		1.135		1.38	1.156	1.075	0.9888
BS_Mean		1.17			1.06		1.25		1.14	1.17	1.05	1.01
BS_StDev		0.10			0.13		0.11		0.22	0.02	0.04	0.07
	Span										Span	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1	3.79	3.742	3.268	2.763	5.814	16.38	2.199	54.79	22.05	3.719	10.02	3.647
BS-1a		3.343			3.514		3.89		3.547	4.244		3.457
BS-1b		3.63			3.277		3.998		3.073	3.431	3.183	3.116
BS-1c*		3.834			2.926		3.503		3.995	3.518	3.371	3.147
BS_Mean		3.60			3.24		3.80		3.54	3.73	3.28	3.24
BS_StDev		0.25			0.30		0.26		0.46	0.45	0.13	0.19
	% Vol. Silt & Clay (i.e < 75mm)										% Vol. Silt & Clay (i.e < 75	
Date:	1/20/98	1/22/98	1/28/98	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98
GS-1	70.63	92.74	71.54	69.36	62.95	450.84	69.49	64.04	62	50.59	85.78	88.04
BS-1a		96			38.07		89.64		90.61	84.97		89.8
BS-1b		94.19			33.2		86.92		97.68	90.52	85.59	99.63
BS-1c*		92.36			40.51		84.69		89.85	89.87	94.28	92.71
BS_Mean		94.18			37.26		87.08		92.71	88.45	89.94	94.05
BS_StDev		1.82			3.72		2.48		4.32	3.03	6.14	5.05

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/	0.000	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth	0.5	0.3	1.0	0.9	0.5	0.5	0.4	0.7	0.5	0.3	0.0	0.0
Flow_width (	2.42	2.33	2.83	2.71	2.17	2.17	1.92	2.33	2.17	2.00	0.00	0.00
Rainfall (100	1.00	5.00	28.00	177.00	4.00	1.00	1.00	19.00	1.00	1.00	1.00	1.00
Remarks	Warm, dry	Mild, dry	Wet, Rainy	Nice & Sunn	Dry, warm	Warm, Dry	Warm, wet -	Mild, mostly	Mild; Dry	Overcast	Totally Dry;	Overcast, dr
Construction	Surveying ro	No Construc	Rock dam r	Work continues at culvert		same activit	ongoing wor	Ditch constr.	w/bound side	being dug fo	Ongoing	Construction

Mean Particle Size

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1 (mm)	15.64	50.49	22.57		14.6	40.12	25.99	58.94	90.07	67.74		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean (mm)												
BS_StDev												

Effective Size (D10)

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1 (mm)	2.67	5.9	2.94		2.7	6.69	4.41	6.85	11.42	7.22		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean (mm)												
BS_StDev												

90th Percentile (D90)

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1 (mm)	33.66	127.11	47.58		31.18	88.59	58.57	145.19	205.83	180.36		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean (mm)												
BS_StDev												

Mass Median Dia. (D50)

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1 (mm)	11.98	25.75	14.22		11.12	24.45	17.93	38.08	67.57	40.78		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean (mm)												
BS_StDev												

Uniformity

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1	0.7921	1.491	1.087		0.7906	1.112	0.9348	1.098	205.83	1.231		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean												
BS_StDev												

Span

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1	2.588	4.707	3.14		2.562	3.349	3.021	3.633	2.877	4.246		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean												
BS_StDev												
m)												

% Vol. Silt & Clay (Le < 75mm)

Date:	3/5/98	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98	4/14/98
GS-1	99.88	83.11	95.57		99.95	87.23	93.98	72.55	53.35	68.32		
BS-1a												
BS-1b												
BS-1c*												
BS_Mean												
BS_StDev												

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth	0.6	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow_width (	2.33	2.17	5.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rainfall (100	55.00	1.00	11.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Remarks	Dry/Moist some areas		Moist, Dew	Dry, lots of vegetation		Dry	Dry		Dry, hot	Raingage repl.
Construction	Construction along lake si		Ongoing con	No Construction		No constr.	Channel along lake side d		Pipe laying	

Mean Particle Size

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1 (mm)	103.65	90.33	28.25							
BS-1a	28.49									
BS-1b	31.51									
BS-1c*	54.87									
BS_Mean (	38.29									
BS_StDev	14.44									

Effective Size (D10)

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1 (mm)	5.63	3.88	3.46							
BS-1a	3.56									
BS-1b	2.58									
BS-1c*	5.07									
BS_Mean (	3.74									
BS_StDev	1.25									

90th Percentile (D90)

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1 (mm)	405.92	441.76	69.52							
BS-1a	65.08									
BS-1b	70.53									
BS-1c*	104.42									
BS_Mean (	80.01									
BS_StDev	21.31									

Mass Median Dia. (D50)

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1 (mm)	28.42	14.23	16.2							
BS-1a	17.16									
BS-1b	13.6									
BS-1c*	25.8									
BS_Mean (	18.85									
BS_StDev	6.27									

Uniformity

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1	3.214	5.824	1.271							
BS-1a	1.178									
BS-1b	1.846									
BS-1c*	1.652									
BS_Mean	1.56									
BS_StDev	0.34									

Span

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1	14.08	30.78	4.077							
BS-1a	3.585									
BS-1b	4.996									
BS-1c*	3.851									
BS_Mean	4.14									
BS_StDev	0.75									

% Vol. Silt & Clay (i.e < 75mm)

Date:	4/21/98	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98	5/28/98
GS-1	70.23	84.08	91.14							
BS-1a	92.18									
BS-1b	90.6									
BS-1c*	83.9									
BS_Mean	88.89									
BS_StDev	4.40									

During Construction (Station 2)

Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.375	0.000	0.000	0.500	0.200	0.000	0.000
Flow_depth (ft)	0.5	0.3	0.0	1.0	0.5	0.8	1.2	0.9	0.8	0.6
Flow_width (ft)	2.66666667	2	0	3.5	2.5	2.33333	4.666667	3	2.5	2.333333
Rainfall x100 (in)	106.00	1.00	1.00	655.00	83.00	1.00	91.00	106.00	1.00	1.00
Remarks			dry channel	heavy rain, h	cool, sunny.	sunny, humi	overcast & r	rainy, humid,	sunny, wet g	sunny, cool
Construction Activity				no constructi	drainage cha	some diggin	some diggin	no activity	no activity	no activity
	Turbidity (FTU) Hach Method #7800									Turbidity (FT
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	28	19	20	153	55	440	143	51	238	78
BS-2a	461				461			63	223	
BS-2b	461				461			66	247	
BS-2c*	461				461			68	238	
BS_Mean	461.00				461.00			64.50	235.00	
BS_StDev	0.00				0.00			2.12	16.97	
Ratio BS_Mean/GS-2(Turb)	1646.43				838.18			126.47	98.74	
	Total Solids (mg/L) Hach Method #8006									Total Solids (
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	25	13	12	154	46	439	185	44	228	90
BS-2a	825				825			80	229	
BS-2b	825				825			84	330	
BS-2c*	825				825			83	331	
BS_Mean	825.00				825.00			82.00	279.50	
BS_StDev	0.00				0.00			2.83	71.42	
	Total Solids (mg/L) Standard Method 2540 B									Total Solids (
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	311	395	225	247	306	778	266	3980	407	444
BS-2a	7541				14501			4049	1133	
BS-2b	7541				13584			4222	1194	
BS-2c*	263				20276			5512	1278	
BS_Mean	7541.00				14042.50			4135.50	1163.50	
BS_StDev	0.00				648.42			122.33	43.13	
Ratio BS_Mean/GS-2(TS_SM)	2424.76				4589.05			103.91	285.87	
	Total Suspended Solids (mg/L) Standard Method 2540D									Total Suspen
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	22	9	36	106	34	364	88	202	74	195
BS-2a	5866				7813			3694	912	
BS-2b	5866				12209			3880	994	
BS-2c*	8055				12549			4996	999	
BS_Mean	5866.00				10011.00			3787.00	953.00	
BS_StDev	0.00				3108.44			131.52	57.98	
Ratio BS_Mean/GS-2(TSS_SM)	26663.64				29444.12			1874.75	1287.84	
	Nitrate-Nitrogen (mg/L) HACH Method #8###									Nitrate-Nitro
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	0.3	0.3	0.4	0.7	0.7	0.2	0.7	0.5	0.6	0.5
BS-2a	1.5				0.1			0.1	0.1	
BS-2b	1.5				0.1			0.1	0.1	
BS-2c*	1.3				0.1			0.1	0.1	
BS_Mean	1.50				0.10			0.10	0.10	
BS_StDev	0.00				0.00			0.00	0.00	
Ratio BS_Mean/GS-2(NO3)	500.00				14.29			20.00	16.67	
	Nitrite-Nitrogen (mg/L) HACH Method #8###									Nitrite-Nitrog
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2	0.063	0.006	0.01	0.069	0.021	0.027	0.016	0.027	0.021	0.005
BS-2a	0.166				0.001			0.001	0	
BS-2b	0.166				0.001			0.001	0	
BS-2c*					0.003			0.002	0	
BS_Mean	0.17				0.00			0.00	0.00	
BS_StDev	0.00				0.00			0.00	0.00	
Ratio BS_Mean/GS-2(NO2)	263.49				4.76			3.70	0.00	

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
Flow_depth (ft)	0.6	0.4	0.7	0.4	0.7	0.7	0.8	0.6	0.7	0.5
Flow_width (ft)	2.25	2.083333	2.6667	2.25	2.66666667	2.833333	2.9166667	2.5833333	2.866667	2.16666667
Rainfall x100 (in)	9.00	1.00	31.00	15.00	104.00	51.00	101.00	10.00	13.00	1.00
Remarks	sunny humid	Dry no GS/B	Overcast, w	sunny, cool.	Both BS mis	overcast, co	partly cloudy	wet, cool	overcast, we	No BS/GS2
Construction Activity	activity acros	no activity	no activity	water pumpi	digging and	no activity.	storm chann	no activity	construction	no activity
) Hach Method #7800									Turbidity (FTU) Hach Meth	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	26		57	203	71	22	38	50	23	
BS-2a			72							
BS-2b			70							
BS-2c*			78							
BS_Mean			71.00							
BS_StDev			1.41							
Ratio BS_Mean/GS-2(Turb)			124.56							
g/L) Hach Method #8006									Total Solids (mg/L) Hach	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	25		65	277	54	12	15	50	15	
BS-2a			72							
BS-2b			73							
BS-2c*			88							
BS_Mean			72.50							
BS_StDev			0.71							
g/L) Standard Method 2540 B									Total Solids (mg/L) Standa	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	282		381	903	261	287	252	227	263	
BS-2a			275							
BS-2b			268							
BS-2c*			391							
BS_Mean			271.50							
BS_StDev			4.95							
Ratio BS_Mean/GS-2(TS_SM)			71.26							
ed Solids (mg/L) Standard Method 2540D									Total Suspended Solids (	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	33		128	662	29	73	38	23	65	
BS-2a			105							
BS-2b			97							
BS-2c*			165							
BS_Mean			101.00							
BS_StDev			5.66							
Ratio BS_Mean/GS-2(TSS_SM)			78.91							
n (mg/L) HACH Method #8###									Nitrate-Nitrogen (mg/L) HA	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	0.3		0.5	0.032	0.022	0.4	0.6	0.2	0.4	
BS-2a			0.4							
BS-2b			0.4							
BS-2c*			0.4							
BS_Mean			0.40							
BS_StDev			0.00							
Ratio BS_Mean/GS-2(NO3)			80.00							
n (mg/L) HACH Method #8###									Nitrite-Nitrogen (mg/L) HA	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	0.009		0.049	0.4	0.3	0.015	0.013	0.01	0.075	
BS-2a			0.01							
BS-2b			0.011							
BS-2c*			0.008							
BS_Mean			0.01							
BS_StDev			0.00							
Ratio BS_Mean/GS-2(NO2)			21.43							
ogen (mg/L) HACH Method #8###									Ammonia-Nitrogen (mg/L)	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	0.54		1	0.09	0.14	0.49	0.58	0.01	0.35	
BS-2a			0.61							
BS-2b			0.67							
BS-2c*			0.7							
BS_Mean			0.64							
BS_StDev			0.04							
Ratio BS_Mean/GS-2(NH3)			64.00							
(mg/L) HACH Method #8###									Phosphorous (mg/L) HAC	
Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2	0.48		0.8	2.75	0.76	0.16	0.37	0.15	0.11	
BS-2a			0.41							
BS-2b			0.25							
BS-2c*			0.32							
BS_Mean			0.33							
BS_StDev			0.11							
Ratio BS_Mean/GS-2(PO4)			41.25							

12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
000000	000000	Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000
0.000	0.000	Flow_est. (ft/sec)	0.000	0.000	0.200	0.000	0.750	0.000	0.000	0.000
0.5	0.8	Flow_depth (ft)	0.4	0.3	1.0	0.8	1.1	0.8	0.5	0.8
2.33333	2.833333	Flow_width (ft)	2.41666667	2.25	3.33333333	3.16666667	3.33333333	2.66666667	2.5	2.66666667
28.00	355.00	Rainfall x100 (in)	1.00	1.00	491.00	333.00	100.00	1.00	1.00	51.00
moist grd. ov	BS1-25:1 dil.	Remarks	sunny. Too d	sunny, too dr	sunny, humi	sunny, windy	Wet day. BS	sunny, mudd	overcast, dry	overcast, we
no activity, B	No activity. L	Construction Activity	no works	no works	no activity	no works	no works. Fi	no works	no works	traffic flow
d #7800							Turbidity (FTU) Hach Method #7800			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
49	44	GS-2			43	30	58	30	40	37
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(Turb)								
ethod #8006							Total Solids (mg/L) Hach Method #8006			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
34	18	GS-2			24	20	42	20	85	22
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
d Method 2540 B							Total Solids (mg/L) Standard Method 2540 B			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
492	146	GS-2			153	224	192	228	432	236
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(TS_SM)								
g/L) Standard Method 2540D							Total Suspended Solids (mg/L) Standard Method 2540			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
103	10	GS-2			16	39	37	44	62	61
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(TSS_SM)								
H Method #8###							Nitrate-Nitrogen (mg/L) HACH Method #8###			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
0.5	0.5	GS-2			0.5	0.5	0.5	0.4	0.9	0.5
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(NO3)								
H Method #8###							Nitrite-Nitrogen (mg/L) HACH Method #8###			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
0.008	0.004	GS-2			0.008	0.023	0.009	0.003	0.002	0.012
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(NO2)								
ACH Method #8###							Ammonia-Nitrogen (mg/L) HACH Method #8###			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
0.73	0.54	GS-2			0.58	0.51	0.78	0.5	1.07	0.64
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(NH3)								
Method #8###							Phosphorous (mg/L) HACH Method #8###			
12/2/97	12/9/97	Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
0.11	0.12	GS-2			0.1	0.09	0.08	0.15	0.19	0.16
		BS-2a								
		BS-2b								
		BS-2c*								
		BS_Mean								
		BS_StDev								
		Ratio BS_Mean/GS-2(PO4)								

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.400	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.000
Flow_depth (ft)	0.7	0.8	0.7	0.8	0.6	0.8	1.1	0.5	0.8	0.5
Flow_width (ft)	2.66666667	2.58333333	2.58333333	2.66666667	2.58333333	2.625	3.5	2.33333333	2.625	2.41666667
Rainfall x100 (in)	1.00	50.00	1.00	75.00	10.00	80.00	48.00	68.00	10.00	10.00
Remarks	overcast; mo	cool; large p	misty; moist	sunny,cool;	sunny; moist	cool; small p	clear; moist,	windy, warm	Clear, warm;	dry, clear
Construction Activity	0	0	none	none	none	none	*Water in channel may be		none	surveying w

Turbidity (FTU) Hach Method #7800

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	25	31	18	95	21	40	14	29	115	86
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(Turb)										

Total Solids (mg/L) Hach Method #8006

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	13	17	11	79	8	31	10	19	96	49
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										

Total Solids (mg/L) Standard Method 2540 B

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	65	63	64	282	236	235	466	248	153	284
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(TS_SM)										

Total Suspended Solids (mg/L) Standard Method 2540D

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	52	19	9	98	9	37	12	28	84	96
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(TSS_SM)										

Nitrate-Nitrogen (mg/L) HACH Method #8###

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	0.3	0.4	0.3	0.4	0.2	0.4	0.8	0.3	0.6	0.6
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NO3)										

Nitrite-Nitrogen (mg/L) HACH Method #8###

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	0.001	0.005	0.04	0.003	0.001	0.006	0.007	0.003	0.045	0.017
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NO2)										

Ammonia-Nitrogen (mg/L) HACH Method #8###

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	0.5	0.42	0.3	0.83	0.27	0.51	0.23	0.56	1.58	1.05
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NH3)										

Phosphorous (mg/L) HACH Method #8###

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2	0.26	0.07	0.2	0.15	0.18	0.07	0.1	0.1	0.08	0.07
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(PO4)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.3	1.0	0.9	0.5	0.5	0.4	0.7	0.5	0.3	0.0
Flow_width (ft)	2.33333333	2.83333333	2.70833333	2.16666667	2.16666667	1.91666667	2.33333333	2.16666667	2	0
Rainfall x100 (in)	5.00	28.00	177.00	4.00	1.00	1.00	19.00	1.00	1.00	1.00
Remarks	Mild, dry	Wet, Rainy	Nice & Sunn	Dry, warm	Warm, Dry	Warm, wet -	Mild, mostly	Mild; Dry	Overcast	Totally Dry;
Construction Activity	No Construc	Rock dam re	Work contin	0	same activit	ongoing wor	Ditch constr.	w/bound sid	0	Ongoing

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(Turb)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(TS_SM)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(TSS_SM)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NO3)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NO2)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(NH3)										

Date:	3/11/98	3/14/98	3/17/98	3/22/98	3/25/98	3/27/98	4/1/98	4/3/98	4/7/98	4/12/98
GS-2										
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										
Ratio BS_Mean/GS-2(PO4)										

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Flow_width (ft)	2.16666667	5.5	0	0	0	0	0	0
Rainfall x100 (in)	1.00	11.00	1.00	1.00	1.00	1.00	1.00	1.00
Remarks	0	Moist, Dew	Dry, lots of v	0	Dry	Dry	0	Dry, hot
Construction Activity	0	Ongoing con	No Construc	0	No constr.	Channel alo	0	Pipe laying

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(Turb)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(TS_SM)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(TSS_SM)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(NO3)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(NO2)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(NH3)								

Date:	4/23/98	4/29/98	5/1/98	5/5/98	5/8/98	5/12/98	5/20/98	5/27/98
GS-2								
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
Ratio BS_Mean/GS-2(PO4)								

Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.375	0.000	0.000	0.500	0.200	0.000	0.000
Flow_depth (ft)	0.5	0.3	0.0	1.0	0.5	0.8	1.2	0.9	0.8	0.6
Flow_width (ft)	2.66666667	2	0	3.5	2.5	2.33333	4.666667	3	2.5	2.333333
Rainfall x100 (in)	106.00	1.00	1.00	655.00	83.00	1.00	91.00	106.00	1.00	1.00
Remarks			dry channel	heavy rain, h	cool, sunny.	sunny, humi	overcast & r	rainy, humid,	sunny, wet g	sunny, cool
Construction Activity				no constructi	drainage cha	some diggin	some diggin	no activity	no activity	no activity
	Mean Particle Size									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							12.27	20.86	8.11	52.99
BS-2a					6.06			8.1	10.71	
BS-2b					7.54			11.59	11.17	
BS-2c*					16.09			15.63	10.27	
BS_Mean					9.90			11.77	10.72	
BS_StDev					5.41			3.77	0.45	
	Effective Size (D10)									
Date:	9/11/97	9/16/97	9/16/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							0.88	2.29	0.53	9.89
BS-2a					0.54			0.69	0.94	
BS-2b					0.79			0.62	0.91	
BS-2c*					1.2			0.88	0.93	
BS_Mean (mm)					0.84			0.73	0.93	
BS_StDev					0.33			0.13	0.02	
	90th Percentile (D90)									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							27.82	44.67	17.13	114.43
BS-2a					14.04			19.52	25.9	
BS-2b					17.87			31.77	28.55	
BS-2c*					36.53			40.29	25.6	
BS_Mean (mm)					22.81			30.53	26.68	
BS_StDev					12.03			10.44	1.62	
	Mass Median Dia. (D50)									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							8.73	15.44	5.99	38.56
BS-2a					4.13			4.62	6.53	
BS-2b					17.87			4.92	6.32	
BS-2c*					12.36			7.31	6.05	
BS_Mean (mm)					11.45			5.62	6.30	
BS_StDev					6.91			1.47	0.24	
	Uniformity									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							0.9792	0.8777	0.9373	0.85
BS-2a					1.01			1.291	1.198	
BS-2b					1.076			1.918	1.328	
BS-2c*					0.8912			1.725	1.247	
BS_Mean (mm)					0.99			1.64	1.26	
BS_StDev					0.09			0.32	0.07	
	Span									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							3.088	2.745	2.77	2.711
BS-2a					3.265			4.072	3.822	
BS-2b					3.49			6.323	4.373	
BS-2c*					2.858			5.393	4.075	
BS_Mean (mm)					3.20			5.26	4.09	
BS_StDev					0.32			1.13	0.28	
	% Vol. Silt & Clay (I.e < 75mm)									
Date:	9/11/97	9/16/97	9/18/97	9/23/97	9/26/97	9/30/97	10/7/97	10/10/97	10/14/97	10/16/97
GS-2 (mm)							99.78	97.7	99.94	78.16
BS-2a					100			99.87	99.73	
BS-2b					100			98.07	99.95	
BS-2c*					99.97			96.91	99.98	
BS_Mean (mm)					99.99			98.28	99.89	
BS_StDev					0.02			1.49	0.14	

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.000	0.000
Flow_depth (ft)	0.6	0.4	0.7	0.4	0.7	0.7	0.8	0.6	0.7	0.5
Flow_width (ft)	2.25	2.083333	2.6667	2.25	2.66666667	2.833333	2.9166667	2.5833333	2.666667	2.16666667
Rainfall x100 (in)	9.00	1.00	31.00	15.00	104.00	51.00	101.00	10.00	13.00	1.00
Remarks	sunny humid	Dry no GS/B	Overcast, w	sunny, cool.	Both BS mis	overcast, co	partly cloudy	wet, cool	overcast, we	No BS/GS2
Construction Activity	activity acros	no activity	no activity	water pumpi	digging and	no activity.	storm chann	no activity	construction	no activity

Mean Particl

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	51.83		28.9	8.79	53.25	45.45	27.14	99.16	27.85	
BS-2a			35.62							
BS-2b			30.11							
BS-2c*			40.59							
BS_Mean			35.44							
BS_StDev			5.24							

Effective Siz

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	14.42		0.7	1.11	1.98	6.73	2.5	9.93	5.6	
BS-2a			1.28							
BS-2b			1.27							
BS-2c*			1.8							
BS_Mean (mm)			1.45							
BS_StDev			0.30							

90th Percenti

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	93.31		70.28	20.33	118.22	102.76	70.86	223.22	60.46	
BS-2a			85.31							
BS-2b			71.45							
BS-2c*			94.7							
BS_Mean (mm)			83.82							
BS_StDev			11.70							

Mass Media

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	48.72		15.99	5.44	48.32	33.4	15.18	77.74	21.12	
BS-2a			20.98							
BS-2b			22.23							
BS-2c*			29.94							
BS_Mean (mm)			24.38							
BS_StDev			4.85							

Uniformity

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	0.493		1.403	1.14	0.8043	0.9301	1.325	0.839	0.8075	
BS-2a			1.332							
BS-2b			0.9878							
BS-2c*			0.9814							
BS_Mean (mm)			1.10							
BS_StDev			0.20							

Span

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	1.819		4.351	3.536	2.406	2.875	4.503	2.744	2.598	
BS-2a			4.006							
BS-2b			3.157							
BS-2c*			3.103							
BS_Mean (mm)			3.42							
BS_StDev			0.51							

% Vol. Silt &

Date:	10/24/97	10/28/97	10/30/97	11/4/97	11/7/97	11/11/97	11/13/97	11/18/97	11/20/97	11/25/97
GS-2 (mm)	77.98		90.89	99.98	68.11	77.62	90.86	48.26	95.13	
BS-2a			87.43							
BS-2b			90.93							
BS-2c*			62.52							
BS_Mean (mm)			85.96							
BS_StDev			4.22							

Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.200	0.000	0.750	0.000	0.000	0.000
Flow_depth (ft)	0.4	0.3	1.0	0.8	1.1	0.8	0.5	0.8
Flow_width (ft)	2.41666667	2.25	3.33333333	3.16666667	3.33333333	2.86666667	2.5	2.66666667
Rainfall x100 (in)	1.00	1.00	491.00	333.00	100.00	1.00	1.00	51.00
Remarks	sunny. Too d	sunny, too dr	sunny, humi	sunny, windy	Wet day. BS	sunny, mudd	overcast, dry	overcast, we
Construction Activity	no works	no works	no activity	no works	no works. Fl	no works	no works	traffic flow
Size								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			25.81	54.94	33.1	39.82	154.16	30.29
BS-2a								
BS-2b								
BS-2c*								
BS_Mean								
BS_StDev								
(D10)								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			5.21	9.51	1.71	7.3	25.54	4.47
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								
e (D90)								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			58.22	130.52	94.99	93.21	322.65	71.98
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								
Dia. (D50)								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			17.51	37.11	12.36	26.57	128.19	19.34
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			0.926	0.961	2.227	0.9857	0.7152	1.062
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			3.027	3.261	7.545	3.233	2.318	3.49
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								
lay (i.e < 75mm)								
Date:	12/16/97	12/18/97	1/5/98	1/8/98	1/13/98	1/15/98	1/20/98	1/22/98
GS-2 (mm)			93.64	76.67	86.28	83.21	30.05	90.49
BS-2a								
BS-2b								
BS-2c*								
BS_Mean (mm)								
BS_StDev								

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.400	0.000	0.000	0.000	0.000	1.250	0.000	0.000	0.000
Flow_depth (ft)	0.7	0.8	0.7	0.8	0.6	0.8	1.1	0.5	0.8	0.5
Flow_width (ft)	2.66666667	2.58333333	2.58333333	2.66666667	2.58333333	2.825	3.5	2.33333333	2.625	2.41666667
Rainfall x100 (in)	1.00	50.00	1.00	75.00	10.00	80.00	48.00	68.00	10.00	10.00
Remarks	overcast; mo	cool; large p	misty; moist	sunny,cool;	sunny; moist	cool; small p	clear; moist,	windy, warm	Clear, warm;	dry, clear
Construction Activity	0	0	none	none	none	none	*Water in channel may be		none	surveying w

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	95.12	55.91	34.25	31.27	124.23	168.17	117.07	35.92	12.98	24.95
BS-2a										
BS-2b										
BS-2c*										
BS_Mean										
BS_StDev										

Effective Size (D10)

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	12.67	7.77	6.71	1.71	69.38	6.32	7.09	8.41	0.83	3.75
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

90th Percentile (D90)

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	225.16	110.54	72.53	80.2	188.42	412.19	289.94	72.46	28.43	52.99
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

Mass Median Dia. (D50)

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	67.95	53.43	27.48	18.64	118.54	138.23	55.71	29.27	7.71	15.98
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

Uniformity

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	0.9087	0.6181	0.7458	1.286	0.3088	1.012	1.781	0.6788	1.239	1.058
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

Span

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	3.127	1.923	2.395	4.21	1.004	2.936	5.077	2.188	3.578	3.081
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

% Vol. Silt & Clay (i.e < 75mm)

Date:	1/30/98	2/3/98	2/5/98	2/11/98	2/13/98	2/18/98	2/20/98	2/25/98	2/27/98	3/3/98
GS-2 (mm)	53.57	67.81	90.68	88.09	12.82	42.69	51.91	90.55	97.84	95.42
BS-2a										
BS-2b										
BS-2c*										
BS_Mean (mm)										
BS_StDev										

Postconstruction

Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.3	0.3	0.2	0.0	0.0	0.0	0.8	0.7	0.5	0.5
Flow_width (ft)	2.17	1.25	0.83	0.00	0.00	0.00	2.50	2.17	1.83	1.75
Rainfall (100 x in)	140.00	1.00	4.00	1.00	1.00	1.00	258.00	1.00	1.00	14.00
Remarks		Dry, Hot		Dry, Hot				Dry, Hot		Dry, Hot
Construction Event	No Construction		No Construction		No Construction		No Construction			No Construc
					Turbidity (FTU) Hach Method #7800					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (FTU)	92	143	21				50	39	78	64
BS-1a	186						88			
BS-1b	211						246			
BS-1c*	333						461			
BS_Mean (FTU)	198.50						167.00			
BS_StDev	17.68						111.72			
Ratio BS_Mean/GS-1(Turb)	215.76						334.00			
					Total Solids (mg/L) Hach Method #8006					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (TSS)	56	186	13				31	34	71	53
BS-1a	226						83			
BS-1b	310						283			
BS-1c*	447						825			
BS_Mean (TSS)	268.00						183.00			
BS_StDev	59.40						141.42			
Ratio BS_Mean/GS-1(TSS)	478.57						590.32			
					Total Solids (mg/L) Standard Method 2540 B					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (TS)	407	246	132				106	95	157	188
BS-1a	4637						885			
BS-1b	4616						1497			
BS-1c*	9663						11838			
BS_Mean (TS)	4626.50						1191.00			
BS_StDev	14.85						432.75			
Ratio BS_Mean/GS-1(TS)	1136.73						1123.58			
					Total Suspended Solids (mg/L) Standard Method 2540D					
Date:	6/9/98	6/11/96	6/16/98	6/18/98	6/23/96	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (TSS_SM)	62	64	77				14	86	69	57
BS-1a	2730						292			
BS-1b	3477						970			
BS-1c*	9362						10103			
BS_Mean (TSS_SM)	3103.50						631.00			
BS_StDev	528.21						479.42			
Ratio BS_Mean/GS-1(TSS_SM)	5005.65						4507.14			
					Nitrate-Nitrogen (mg/L) HACH Method #8###					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (NO3)	0.6	0.6	0.2				0.3	0.1	0.4	0.5
BS-1a	0.7						0.3			
BS-1b	0.6						0.4			
BS-1c*	0.7						0.7			
BS_Mean (NO3)	0.65						0.35			
BS_StDev	0.07						0.07			
Ratio BS_Mean/GS-1(NO3)	108.33						116.67			
					Nitrite-Nitrogen (mg/L) HACH Method #8###					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (NO2)	0.003	0.077	0.009				0.031	0.006	0.022	0.008
BS-1a	0.001						0.006			
BS-1b	0						0.005			
BS-1c*	0						0.005			
BS_Mean (NO2)	0.00						0.01			
BS_StDev	0.00						0.00			
Ratio BS_Mean/GS-1(NO2)	16.67						17.74			

Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/96	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
Flowmeter	000000	000000	000000	000000	000000	000000	000000	000000	000000	000000
Flow_est. (ft/sec)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Flow_depth (ft)	0.3	0.3	0.2	0.0	0.0	0.0	0.8	0.7	0.5	0.5
Flow_width (ft)	2.17	1.25	0.83	0.00	0.00	0.00	2.50	2.17	1.83	1.75
Rainfall (100 x in)	140.00	1.00	4.00	1.00	1.00	1.00	258.00	1.00	1.00	14.00
Remarks		Dry, Hot		Dry, Hot				Dry, Hot	1/0/00	Dry, Hot
Construction Event	No Construction		No Construction		No Construction		No Construc	1/0/00	1/0/00	No Construct
					Mean Particle Size					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (μm)	58	31.98	48.77				50.8	49.24	23.17	57.72
BS-1a	36.81						31.46			
BS-1b	36.28						40.75			
BS-1c*	41.72						27.17			
BS_Mean (μm)	38.27						33.13			
BS_StDev	3.00						6.94			
					Effective Size (D10)					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (μm)	5.4	3.39	8.57				3.39	5.98	3.39	9.74
BS-1a	4.63						4.03			
BS-1b	5.73						4.88			
BS-1c*	4.49						2.76			
BS_Mean (μm)	4.95						3.89			
BS_StDev	0.68						1.07			
					90th Percentile (D90)					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (μm)	165.84	81.24	106.05				143.01	96.88	58.65	120.79
BS-1a	77.13						69.96			
BS-1b	71.97						89.18			
BS-1c*	87.36						59.91			
BS_Mean (μm)	78.82						73.02			
BS_StDev	7.83						14.87			
					Mass Madian Dia. (D50)					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1 (μm)	21.65	16.32	35.98				22.18	24.7	13.52	38.81
BS-1a	29.99						20.54			
BS-1b	29.24						27.14			
BS-1c*	33.15						19			
BS_Mean (μm)	30.79						22.23			
BS_StDev	2.08						4.32			
					Uniformity					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1	2.192	1.488	0.8568				1.87	1.482	1.197	0.9745
BS-1a	0.7565						1.058			
BS-1b	0.7381						1.037			
BS-1c*	0.7981						0.9867			
BS_Mean	0.76						1.03			
BS_StDev	0.03						0.04			
					Span					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1	7.411	4.769	2.71				6.295	3.68	4.087	2.861
BS-1a	2.418						3.21			
BS-1b	2.265						3.106			
BS-1c*	2.499						3.008			
BS_Mean	2.39						3.11			
BS_StDev	0.12						0.10			
					% Vol. Silt & Clay (i.e < 75mm)					
Date:	6/9/98	6/11/98	6/16/98	6/18/98	6/23/98	6/25/98	6/30/98	7/2/98	7/7/98	7/9/98
GS-1	79.46	88.4	79.2				75.05	86.51	93.48	77.07
BS-1a	88.8						91.1			
BS-1b	90.74						85.72			
BS-1c*	84.92						94.18			
BS_Mean	88.15						90.33			
BS_StDev	2.96						4.28			

APPENDIX VI: BARE-SOIL EROSION STUDY DATA

Appendix VI: Bare-Soil Erosion Study Data

Soil	Case no.	Slope (%)	Shear strength (N/cm²)	Compressive strength (N/cm²)	Rainfall intensity (mm/h)	Moisture content (%)	Flow depth (mm)	Flow velocity (m/s)	Erosion power (w)	Soil loss (cm³)	Unit Soil loss in 30 min. (cm³/m²)
Soil 1	S1	0.010	0.638	0.678	102.0	17.7	2.5	0.031	1174.0	2229.1	3374.4
	S2	0.010	0.766	0.987	51.0	14.6	1.3	0.004	586.8	818.4	1238.8
	S3	0.010	0.734	0.808	25.8	19.7	1.0	0.003	297.1	570.7	863.9
	S4	0.010	0.681	0.828	12.8	17.5	0.8	0.002	147.5	199.2	301.5
	S5	0.005	0.766	0.934	101.9	18.1	1.9	0.027	1187.1	2192.0	3318.1
	S7	0.005	0.766	0.808	50.6	26.2	1.4	0.007	590.0	612.0	926.4
	S6	0.005	0.723	0.841	25.2	8.8	0.8	0.002	293.4	119.7	181.2
	S8	0.005	0.553	0.904	12.8	18.8	0.8	0.002	149.3	422.3	639.3
	S9	0.001	0.776	0.871	101.9	24.4	2.7	0.037	1198.0	1404.6	2126.2
	S10	0.001	0.500	0.861	50.7	22.1	1.2	0.004	596.8	916.4	1387.2
	S11	0.001	0.627	0.871	25.6	27.6	1.1	0.002	300.8	600.6	909.2
	S12	0.001	0.521	0.788	12.7	24.5	0.7	0.002	149.0	136.2	206.2
	S73	0.010	0.596	1.519	101.3	9.3	2.5	0.031	1166.2	1476.79	2235.5
	S74	0.010	0.627	1.323	76.2	9.1	1.9	0.018	877.0	684.22	1035.7
	S75	0.010	0.755	1.226	50.3	11.9	1.3	0.004	578.9	120.74	182.8
	S76	0.010	0.670	1.246	26.1	11.4	1.0	0.003	300.0	133.13	201.5
	S77	0.010	0.819	1.363	12.7	12.3	0.8	0.002	145.8	33.02	50.0
	S78	0.005	0.627	1.366	102.0	7.5	1.9	0.027	1187.7	1262.14	1910.6
	S79	0.005	0.606	1.399	76.3	16.3	2.0	0.027	889.4	794.64	1202.9
	S80	0.005	0.617	1.240	50.4	10.8	1.4	0.007	587.7	38.18	57.8
	S81	0.005	0.670	1.349	26.0	8.5	0.8	0.002	303.0	26.83	40.6
	S82	0.005	0.617	1.273	12.9	11.3	0.8	0.002	149.9	58.82	89.0
	S83	0.001	0.596	1.319	102.3	9.4	2.7	0.037	1203.7	1672.87	2532.4
	S84	0.001	0.521	1.585	76.3	5.0	1.7	0.020	896.8	1498.46	2268.3
	S85	0.001	0.627	1.419	50.6	10.7	1.2	0.004	595.0	581.02	879.5
	S86	0.001	0.638	1.187	25.8	12.4	1.1	0.002	303.6	173.38	262.5
	S87	0.001	0.691	1.193	12.8	13.3	0.7	0.002	150.8	41.28	62.5
	S163	0.040	0.234	1.153	101.6	5.0	1.6	0.024	1083.8	1684.9	2550.6
	S164	0.040	0.245	0.961	76.4	10.7	1.1	0.024	815.2	812.2	1229.5
	S165	0.040	0.277	0.964	50.8	11.3	0.8	0.004	542.5	225.0	340.6
	S166	0.040	0.425	1.240	25.6	5.6	0.4	0.003	273.4	289.0	437.4
	S167	0.040	0.234	1.067	12.6	11.8	0.0	0.002	134.7	179.6	271.8

Appendix VI: Continued

	S13	0.010	2.712	0.219	101.9	366.8	3.0	0.017	1172.9	1147.3	1736.7
	S14	0.010	2.808	0.206	50.8	388.7	2.1	0.009	584.6	601.7	910.8
	S15	0.010	2.946	0.209	25.6	427.1	2.5	0.006	294.9	434.5	657.7
	S16	0.010	2.787	0.206	13.0	423.1	1.8	0.005	149.2	217.8	329.6
	S17	0.005	2.489	0.186	101.1	440.9	3.0	0.007	1177.5	984.5	1490.4
	S18	0.005	2.872	0.189	51.1	449.0	2.8	0.007	595.6	815.3	1234.2
	S19	0.005	2.818	0.216	25.4	463.5	2.6	0.005	295.6	912.3	1381.0
	S20	0.005	2.670	0.253	13.1	433.4	2.3	0.003	152.2	403.5	610.8
	S21	0.001	2.297	0.199	101.6	474.8	3.7	0.013	1194.5	1437.6	2176.2
	S22	0.001	2.467	0.206	51.0	445.3	3.5	0.007	599.6	879.3	1331.0
	S23	0.001	2.914	0.213	25.6	391.3	3.1	0.004	301.3	471.6	713.9
	S24	0.001	2.382	0.199	12.9	418.6	2.6	0.003	151.9	648.1	981.1
Soil 2	S88	0.010	2.638	0.309	102.0	458.7	3.0	0.017	1173.5	641.90	971.7
	S89	0.010	2.595	0.332	76.3	423.3	2.7	0.013	877.6	664.61	1006.1
	S90	0.010	3.116	0.356	50.8	450.3	2.1	0.009	584.6	675.96	1023.3
	S91	0.010	2.680	0.296	26.1	454.3	2.5	0.006	300.5	461.30	698.3
	S92	0.010	2.808	0.326	12.7	423.2	1.8	0.005	146.4	163.06	246.8
	S93	0.005	2.553	0.352	101.5	474.7	3.0	0.007	1182.6	863.78	1307.6
	S94	0.005	2.744	0.306	76.2	509.1	2.9	0.009	887.7	911.26	1379.4
	S95	0.005	2.457	0.326	51.1	401.6	2.8	0.007	595.1	262.13	396.8
	S96	0.005	2.276	0.336	26.1	442.0	2.6	0.005	303.6	326.11	493.7
	S97	0.005	2.170	0.312	12.6	497.5	2.3	0.003	147.0	499.49	756.1
	S98	0.001	2.297	0.283	101.6	429.2	3.7	0.013	1195.1	994.85	1506.0
	S99	0.001	2.606	0.283	75.8	480.2	3.3	0.011	891.0	727.56	1101.4
	S100	0.001	2.840	0.289	50.7	460.8	3.5	0.007	596.2	383.90	581.1
	S101	0.001	2.553	0.266	25.8	409.8	3.1	0.004	303.6	475.75	720.2
	S102	0.001	2.170	0.302	12.7	384.0	2.6	0.003	149.0	391.13	592.1
	S168	0.040	4.127	0.485	101.2	354.8	2.6	0.037	1079.6	1071.2	1621.6
	S169	0.040	3.201	0.462	75.8	406.7	2.1	0.025	809.0	1036.5	1569.1
	S170	0.040	3.722	0.429	50.9	409.4	2.0	0.013	543.0	480.9	728.0
	S171	0.040	3.340	0.455	25.2	389.8	1.9	0.007	269.2	233.2	353.1
	S172	0.040	3.233	0.412	12.8	396.3	1.6	0.003	136.3	233.2	353.1

Appendix VI: Continued

Soil 3	S25	0.010	3.201	0.259	101.0	70.3	2.9	0.016	1162.8	758.5	1148.2
	S26	0.010	2.265	0.186	51.4	79.8	2.1	0.008	591.9	761.6	1152.9
	S27	0.010	1.872	0.206	25.7	85.6	2.0	0.004	295.5	432.4	654.6
	S28	0.010	2.063	0.193	12.6	87.8	1.8	0.005	144.7	342.6	518.7
	S29	0.005	2.255	0.176	101.7	103.6	2.6	0.022	1184.9	1189.9	1801.2
	S30	0.005	2.170	0.170	51.1	84.4	2.0	0.011	595.1	806.0	1220.1
	S31	0.005	2.010	0.173	25.2	96.7	2.0	0.007	293.4	759.6	1149.8
	S32	0.005	2.414	0.143	12.7	69.1	2.0	0.004	147.6	250.8	379.6
	S33	0.001	2.212	0.186	102.2	92.6	2.9	0.012	1201.4	1110.4	1680.9
	S34	0.001	2.191	0.163	50.7	76.4	2.0	0.009	596.2	659.4	998.3
	S35	0.001	2.053	0.176	25.8	74.0	1.6	0.005	303.1	554.2	838.9
	S36	0.001	2.042	0.183	12.6	85.2	0.9	0.003	147.9	312.7	473.4
	S103	0.010	2.106	0.292	101.6	69.5	2.9	0.016	1169.0	1001.1	1515.5
	S104	0.010	2.648	0.292	76.4	78.9	2.6	0.012	879.3	906.1	1371.6
	S105	0.010	2.180	0.316	50.8	71.8	2.1	0.008	585.1	597.5	904.5
	S106	0.010	2.382	0.309	26.2	75.9	2.0	0.004	301.6	474.7	718.6
	S107	0.010	2.531	0.292	12.8	73.1	1.8	0.005	147.5	433.4	656.1
	S108	0.005	2.042	0.283	101.7	59.0	2.9	0.012	1184.9	1171.3	1773.1
	S109	0.005	1.936	0.286	76.2	58.4	1.6	0.015	887.1	1077.4	1631.0
	S110	0.005	2.031	0.276	50.7	43.0	2.0	0.009	590.5	469.6	710.8
	S111	0.005	2.010	0.316	25.9	50.8	1.6	0.005	301.3	533.5	807.7
	S112	0.005	2.116	0.319	12.6	55.7	0.9	0.003	146.5	450.0	681.1
	S113	0.001	1.999	0.309	101.7	61.0	2.6	0.022	1195.7	952.5	1441.9
	S114	0.001	2.297	0.292	76.3	53.8	1.9	0.019	896.8	885.5	1340.4
	S115	0.001	1.882	0.296	51.0	49.3	2.0	0.011	600.2	854.5	1293.5
	S116	0.001	2.478	0.316	25.8	55.4	2.0	0.007	303.6	605.8	917.0
	S117	0.001	2.319	0.266	12.8	56.8	2.0	0.004	150.8	551.1	834.2
	S173	0.040	3.808	0.479	101.3	36.0	2.2	0.035	1081.2	542.8	821.7
	S174	0.040	3.765	0.459	76.3	46.5	2.1	0.022	814.7	817.2	1237.1
	S175	0.040	3.754	0.505	51.0	45.2	2.2	0.013	544.1	533.5	807.7
	S176	0.040	2.361	0.452	25.3	40.5	2.1	0.005	269.8	669.6	1013.7
	S177	0.040	2.340	0.482	12.6	51.1	1.6	0.002	134.2	344.7	521.8

Appendix VI: Continued

Soil 4	S37	0.010	7.126	0.502	102.3	51.3	2.7	0.032	1177.4	928.8	1406.0
	S38	0.010	5.647	0.329	51.3	56.7	1.9	0.023	590.2	594.4	899.8
	S39	0.010	3.967	0.269	25.3	56.4	1.7	0.023	291.0	729.6	1104.5
	S40	0.010	5.413	0.429	12.8	48.8	1.8	0.005	147.5	271.4	410.9
	S41	0.005	5.520	0.283	102.1	57.8	2.7	0.029	1188.9	823.5	1246.6
	S42	0.005	5.626	0.292	50.8	53.9	2.2	0.012	592.2	398.4	603.0
	S43	0.005	6.286	0.432	25.3	63.6	2.0	0.009	295.1	337.5	510.8
	S44	0.005	4.190	0.283	12.7	47.3	1.7	0.001	147.6	454.1	687.4
	S45	0.001	6.615	0.269	101.5	55.9	3.1	0.021	1193.9	1092.9	1654.4
	S46	0.001	5.892	0.249	50.7	51.0	2.1	0.014	596.8	652.2	987.3
	S47	0.001	4.339	0.535	25.4	53.8	2.0	0.011	299.0	543.9	823.3
	S48	0.001	6.615	0.372	12.7	59.5	1.8	0.005	149.6	394.2	596.8
	S118	0.010	2.776	0.299	101.7	49.1	2.7	0.032	1170.1	1215.7	1840.3
	S119	0.010	2.850	0.322	76.2	46.0	2.1	0.025	876.5	1161.0	1757.5
	S120	0.010	4.680	0.226	50.8	41.3	1.9	0.023	585.1	694.5	1051.4
	S121	0.010	3.020	0.322	26.3	50.5	1.7	0.023	302.8	569.7	862.3
	S122	0.010	3.531	0.292	12.7	48.8	1.8	0.005	145.8	289.0	437.4
	S123	0.005	3.042	0.316	101.1	44.9	2.7	0.029	1177.5	1242.5	1880.9
	S124	0.005	4.275	0.273	76.6	43.9	2.3	0.019	892.8	412.8	624.9
	S125	0.005	3.701	0.322	50.4	52.4	2.2	0.012	587.7	837.0	1267.0
	S126	0.005	3.808	0.269	25.6	45.4	2.0	0.009	297.9	395.3	598.3
	S127	0.005	3.552	0.316	12.8	48.9	1.7	0.001	148.8	339.5	514.0
	S128	0.001	3.999	0.279	101.7	50.3	3.1	0.021	1195.7	343.7	520.2
	S129	0.001	3.871	0.236	76.0	44.7	2.7	0.016	893.9	390.1	590.5
	S130	0.001	5.190	0.306	51.3	46.0	2.1	0.014	603.1	452.0	684.3
	S131	0.001	4.148	0.359	26.0	45.5	2.0	0.011	305.9	360.2	545.2
	S132	0.001	4.509	0.309	12.4	40.0	1.8	0.005	145.6	276.6	418.7
	S178	0.040	7.509	0.831	101.9	40.4	2.5	0.040	1087.5	807.0	1221.7
	S179	0.040	6.796	0.761	76.0	38.1	2.0	0.028	811.1	703.8	1065.4
	S180	0.040	6.254	0.701	50.9	43.9	1.9	0.016	543.5	615.1	931.1
	S181	0.040	4.488	0.641	25.5	38.6	1.7	0.008	271.8	458.2	693.6
	S182	0.040	7.275	0.695	12.7	42.3	1.8	0.005	135.7	349.8	529.6

Appendix VI: Continued

Soil 5	S49	0.010	5.67	0.68	101.7	43.7	2.7	0.030	1170.1	878.2	1329.4
	S50	0.010	6.48	0.52	50.9	45.0	2.1	0.016	586.3	492.3	745.2
	S51	0.010	9.30	0.60	25.4	44.3	1.6	0.013	292.6	226.0	342.1
	S52	0.010	8.53	0.77	13.0	44.6	1.5	0.006	149.2	18.6	28.1
	S53	0.005	11.66	0.81	101.4	39.3	2.7	0.024	1181.5	366.4	554.6
	S54	0.005	9.49	0.84	50.7	41.7	2.2	0.015	591.1	379.8	574.9
	S55	0.005	9.06	0.67	25.7	42.2	2.0	0.006	299.0	43.3	65.6
	S56	0.005	10.17	0.62	13.0	56.8	1.5	0.003	151.6	71.2	107.8
	S57	0.001	8.21	0.66	101.3	43.0	3.1	0.025	1191.6	159.1	240.9
	S58	0.001	8.47	0.68	50.7	45.0	2.4	0.015	596.8	176.5	267.1
	S59	0.001	8.46	0.57	25.6	44.3	2.0	0.010	300.8	113.5	171.8
	S60	0.001	7.30	0.51	12.9	49.2	1.7	0.005	151.9	403.5	610.8
	S133	0.010	10.806	1.230	101.8	36.1	2.7	0.030	1171.8	467.50	707.7
	S134	0.010	8.338	0.967	76.3	45.0	2.3	0.025	877.6	307.54	465.5
	S135	0.010	7.083	1.103	51.1	44.0	2.1	0.016	588.5	324.05	490.5
	S136	0.010	8.445	1.064	25.5	38.7	1.6	0.013	293.8	57.79	87.5
	S137	0.010	9.019	0.974	12.7	42.7	1.5	0.006	146.4	51.60	78.1
	S138	0.005	9.359	1.027	101.7	43.7	2.7	0.024	1184.9	218.16	330.3
	S139	0.005	10.955	1.117	76.4	38.7	2.6	0.027	890.0	135.19	204.7
	S140	0.005	10.636	1.143	50.7	35.7	2.2	0.015	591.1	93.91	142.2
	S141	0.005	9.221	1.014	25.9	41.0	2.0	0.006	301.3	36.12	54.7
	S142	0.005	10.221	0.980	12.8	35.6	1.5	0.003	148.8	24.77	37.5
	S143	0.001	8.189	1.064	101.5	40.9	3.1	0.025	1193.9	135.19	204.7
	S144	0.001	8.615	1.080	76.0	47.1	2.7	0.011	893.9	93.91	142.2
	S145	0.001	10.359	0.937	51.1	43.0	2.4	0.015	600.8	102.17	154.7
	S146	0.001	9.019	1.080	25.5	41.2	2.0	0.010	299.6	83.59	126.5
	S147	0.001	8.466	1.064	12.6	43.9	1.7	0.005	147.9	11.35	17.2
	S183	0.040	15.741	2.014	101.3	33.1	2.2	0.040	1081.2	147.6	223.4
	S184	0.040	13.954	1.991	76.2	31.0	2.3	0.028	813.2	268.3	406.2
	S185	0.040	13.454	1.931	50.8	39.4	2.0	0.025	542.5	177.5	268.7
	S186	0.040	12.763	1.988	25.5	36.6	1.6	0.017	271.9	142.4	215.6
	S187	0.040	12.912	1.815	12.8	39.1	1.2	0.006	136.3	160.0	242.1

Appendix VI: Continued

	S61	0.010	2.90	0.18	102.0	28.1	2.1	0.023	1173.5	1272.5	1926.2
	S62	0.010	5.36	0.78	50.7	27.8	2.0	0.018	583.4	444.8	673.3
	S63	0.010	3.75	0.30	25.6	29.5	1.6	0.007	294.3	365.3	553.0
	S64	0.010	3.06	0.31	12.8	27.9	1.3	0.003	147.0	285.9	432.7
	S65	0.005	3.52	0.48	101.7	28.4	2.3	0.027	1184.3	683.2	1034.2
	S66	0.005	4.56	0.49	50.9	26.4	1.8	0.011	593.4	606.8	918.6
	S67	0.005	4.13	0.56	25.3	23.0	1.3	0.010	295.1	99.1	150.0
	S68	0.005	4.02	0.70	12.7	21.2	1.5	0.005	148.2	266.3	403.1
	S69	0.001	4.14	0.62	101.6	27.8	2.4	0.016	1195.1	452.0	684.3
	S70	0.001	3.75	0.74	50.7	24.1	2.2	0.009	596.8	348.8	528.0
	S71	0.001	5.16	0.69	25.5	29.0	2.0	0.008	300.2	57.8	87.5
	S72	0.001	4.04	0.83	12.8	26.6	1.6	0.003	150.2	193.0	292.1
	S148	0.010	15.666	2.656	101.4	26.3	2.1	0.023	1167.3	246.65	373.4
Soil 6	S149	0.010	12.678	2.144	76.1	24.5	1.7	0.020	875.9	327.14	495.2
	S150	0.010	10.636	2.210	51.3	30.3	2.0	0.018	590.2	327.14	495.2
	S151	0.010	12.699	2.051	25.4	33.3	1.6	0.007	292.1	210.53	318.7
	S152	0.010	10.933	2.247	12.9	28.5	1.3	0.003	148.7	163.06	246.8
	S153	0.005	11.157	1.881	102.2	32.5	2.3	0.027	1190.0	436.54	660.8
	S154	0.005	8.508	2.220	75.6	31.7	2.0	0.019	880.9	378.74	573.3
	S155	0.005	9.295	1.815	51.0	28.1	1.8	0.011	593.9	288.96	437.4
	S156	0.005	10.582	1.469	25.9	32.6	1.3	0.010	301.9	371.52	562.4
	S157	0.005	10.274	1.642	12.8	30.3	1.5	0.005	148.8	168.22	254.6
	S158	0.001	9.668	1.954	101.9	28.9	2.4	0.016	1198.5	352.94	534.3
	S159	0.001	9.551	1.771	76.2	21.6	2.3	0.016	896.2	434.472	657.7
	S160	0.001	8.955	1.698	51.0	29.6	2.2	0.009	599.6	294.12	445.2
	S161	0.001	8.913	1.366	25.6	28.6	2.0	0.008	300.8	247.68	374.9
	S162	0.001	8.998	1.552	12.7	32.7	1.6	0.003	149.0	40.248	60.9
	S188	0.040	15.592	2.220	101.4	21.5	1.7	0.039	1082.2	826.6	1251.3
	S189	0.040	15.443	2.287	76.3	24.1	1.5	0.029	813.7	219.8	332.8
	S190	0.040	9.891	2.031	50.7	23.7	1.6	0.027	541.5	311.7	471.8
	S191	0.040	13.762	1.841	24.8	26.5	1.2	0.014	264.5	223.9	339.0
	S192	0.040	8.828	1.875	12.7	25.7	0.7	0.008	135.7	184.7	279.6