SANDY RIVER
SEDIMENT TRANSPORT MONITORING PROJECT
Clackamas County, Oregon

WY2008 ANNUAL REPORT

Prepared for:

Sandy River Basin Watershed Council
PO Box 868
Sandy OR 97055

Prepared by:

Smokey Pittman, M.S. - Project Manager
Graham Matthews, M.S. - Principal
of
Graham Matthews & Associates
P.O. Box 1516
Weaverville, CA 96093

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Graham Matthews & Associates
Smokey Pittman - Project Manager, Author
Graham Matthews – Principal Investigator

GMA Staff

Mike Walkinshaw	Streamflow and Sediment Sampling
Logan Cornelius	Streamflow and Sediment Sampling
Cort Pryor	Streamflow and Sediment Transport Computations

Safety Boaters and Field Assistance
Kary Danielson
David Boos

Sandy River Basin Watershed Council
Russ Plaeger

U.S. Geological Survey
Kurt Spicer
Jon Major
Rose Wallick
Jim O'Connor

U.S. Forest Service
Connie Athman

Oregon State University
Gordon Grant
Greg Stewart

Johns Hopkins University and the National Center for Earth-surface Dynamics
Chuck Podolak
Peter Wilcock

Portland General Electric
David Heinzman
John Esler

TABLE OF CONTENTS

LIST OF FIGURES Page

LIST OF TABLES **Page**

EXECUTIVE SUMMARY

The 2007 removal of Marmot Dam on Oregon's Sandy River presented a unique opportunity to study the geomorphic ramifications of introducing a large supply of sediment into an energetic gravel-bed river. Since 1913, Marmot Dam has influenced streamflow and impounded approximately 981,000 cubic yards (750,000 cubic meters) of sediment. In 1999, Portland General Electric (PGE) announced its decision to decommission Marmot Dam and in summer 2007, the concrete structure was removed and nearly all of the reservoir sediment was left in place to be subsequently transported by the river. In October 2007, a carefully planned coffer-dam failure was timed to coincide with the first storm of the year expected to produce roughly a 2,000 cfs flow. Following coffer-dam failure, subsequent storms removed a large percentage of the remaining reservoir deposit.

Studies of the dam removal project included predictive (modeling) approaches and empirical (monitoring) efforts. The two approaches complement one another, as modeled predictions guided empirical studies (e.g. in choosing which locations were likely to show change) and data obtained from empirical geomorphic monitoring studies will help further refine the models (e.g. by providing data for calibration). Geomorphic monitoring parameters relating to sediment transport included: channel geometry; volume and particle size characteristics of bed sediments; and sediment transport rates and annual loads. Monitoring these parameters supports a sediment-budget approach to explaining how Marmot Dam sediments are routed through the river system. The objective of this 2007-2008 study by Graham Matthews and Associates (under contract to Sandy River Basin Watershed Council for the Oregon Watershed Enhancement Board) was to monitor sediment transport at a point approximately 5.6 miles downstream of Marmot Dam, at the first major expansion below a prominent bedrock gorge.

A monitoring site was developed which included a temporary stream gauging station and a cableway from which a cataraft-based sampling platform was deployed during high flows to measure streamflow, suspended sediment concentration and bedload transport rate. These data were utilized to compute a continuous streamflow record, annual bedload and suspended sediment discharges and particle size characteristics of sediment samples. The resulting annual suspended sediment and bedload discharge values were computed at 425,000 tons and 160,000 tons respectively. This total of 585,000 tons represents a volume of approximately 390,000 cubic yards or 300,000 cubic meters. Other researchers will compare this value (1) to the volume of sediment excavated from the reservoir deposit by 2007-2008 winter flows (2) to sediment loads and stored volumes measured at various other points along the river, and (3) to values predicted by models.

Water year 2008 presented a relatively modest maximum annual streamflow of roughly 9,000 cfs, well below the 1.5 year average annual peak of 11,400 cfs. Subsequent years, with higher annual peaks, will provide even more valuable sediment load comparisons. Additionally, much of the coarse gravel from the Marmot Dam impoundment has not reached the sampling site. Future measurements will better track the movement of the Marmot Dam sediment and will continue to guide the development of the next generation of mathematical models, thereby facilitating more accurate predictions of how large sediment pulses are routed through river systems following dam removal.

CHAPTER 1.0 INTRODUCTION

This report describes sediment transport monitoring results obtained by Graham Matthews and Associates (GMA), under contract to the Sandy River Basin Watershed Council (SRBWC) and the Oregon Watershed Enhancement Board (OWEB), for the Sandy River above Revenue Bridge for Water Year (WY) 2008.

1.1 Background and Project Setting

The Sandy River drains 490 mi^2 of the western slopes of Mt. Hood. The former Marmot Dam site, located approximately 30 miles above the confluence with the Columbia River, drains the upper 263 mi^2 of the Sandy watershed (Figure 1-1). Marmot Dam diversion has influenced low-flows since 1913, while peak streamflow is dominated by large Pacific storms typically driving rainfall runoff events between October and March. Less frequently, snowmelt or rain-on-snow peaks occur. Typical summer flows at the Marmot site (USGS #14137002) fall into the 500-1,000 cfs range, while the 1.5 year flood is approximately 11,000 cfs. Sediment supply within the Sandy River basin is strongly influenced by erosional processes generated on Mount Hood and by the re-mobilization of historic depositional features.

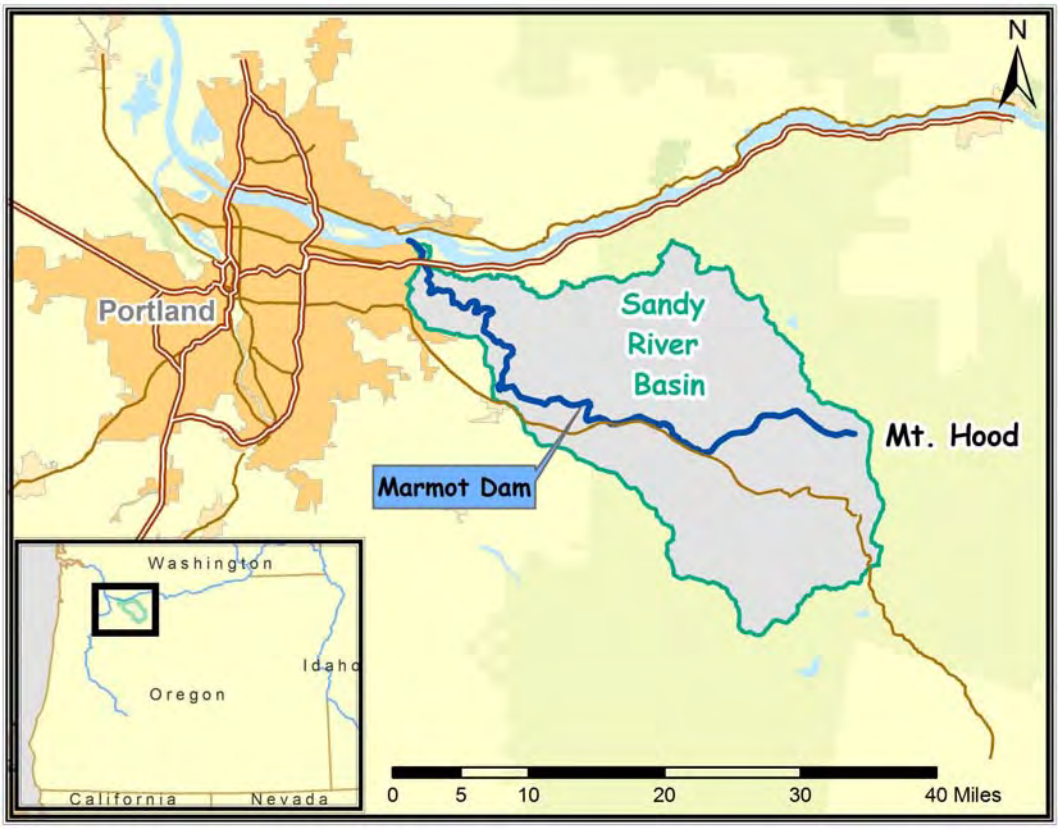


Figure 1-1. Site map for Marmot Dam, Sandy River, Oregon.

For ninety-four years, the longitudinal profile of the Sandy River was punctuated by the 47 foot tall Marmot Dam (Figure 1-2). Following dam completion, the sediment-laden river quickly filled the reservoir pool and some of the low-gradient reach above the dam with 980,000 cubic yards (cy) of sand, gravel and coarser material. The dam (managed for hydroelectric diversion) functioned as a grade control, thus altering sediment transport dynamics above and below the dam. Consequently, the geomorphic setting above the dam evolved into a lower gradient depositional reach and below the dam, sediment starvation and gradual winnowing coarsened and armored the channel. The dam undoubtedly routed some sediment once its reservoir became filled with sediment. However, as evidenced by the relative condition of the channel above and below the dam, the disparity in transport capacity between the reaches above and below seems to have maintained a relative state of dis-continuity in sediment transport, especially for coarser material.

In 1999, Portland General Electric (PGE) announced its decision to decommission Marmot Dam and in summer 2007, the concrete structure was removed and nearly all of the reservoir sediment was left in place to be subsequently transported by the river. In October 2007, a carefully planned coffer-dam failure was timed to coincide with the first storm of the year expected to produce roughly a 2,000 cfs flow. Following coffer-dam failure, subsequent storms removed a large percentage of the remaining reservoir deposit (Figure 1-3). Exactly how the Sandy River and the Marmot Dam sediment would respond to high flows remained unknown, as such an event had never been documented (Stewart 2005). Questions naturally arose over how dam removal and sediment delivery would affect instream habitat conditions, water quality and aesthetic values.

Figure 1-2. Marmot Dam full to the top with sediment, prior to removal, summer 2007.

Figure 1-3. Former Marmot Dam site as it appeared in January 2008.

1.2 Related Work

In order to make informed decisions regarding the future of the Marmot Dam and the deconstruction methods, predictions of geomorphic change were required. Questions included:

- How will channel geometry evolve with respect to changes in: slope, planform, longitudinal profile and cross section?
- How will the caliber and quantity of sediment stored in the channel change?
- What rates of delivery will occur at various locations including: upstream of the dam, at the dam, and at several key locations downstream of the dam?

The questions listed above can be addressed from: a theoretical/mathematical modeling approach (prediction); a program that measures rates of change in various geomorphic parameters (monitoring); and a combination of both that utilizes observed phenomena to tailor and improve models (calibration).

In 2002, Stillwater Sciences produced two reports on the proposed dam removal. One report detailed the results of numerical modeling of various dam removal options (Stillwater Sciences, 2000a) and the second report analyzed the predicted results with regard to the impacts on the anadromous salmonids in the Sandy River (Stillwater Sciences, 2000b). In the process of producing the model and the report Stillwater Sciences collected some field data, however the one-dimensional model only had the ability to look at reaches in an average sense and could not resolve details in key reaches. A 2005 study by Oregon State University (OSU) and the US Forest Service (USFS) built upon the 2000 Stillwater Science analysis (Stewart and Grant, 2005). Stewart and Grant collected additional field data in the course of their study. Neither of the two studies collected actual sediment transport data either above or below the dam. To the best of this author's knowledge, there has been no work to date collecting bedload transport data on the Sandy River. Therefore estimates of annual sediment loads on the Sandy remain educated guesses, some of which are based on measurements in similar catchments. Nonetheless, the pre-removal analyses done on the Marmot Dam sediment represented the current state-of-the-art in terms of reach-scale sediment transport and morphological modeling.

The Marmot Dam removal provided an excellent opportunity to test predictions and then modify the modeling and prediction methods for future river management decisions. A key step in the predict/observe/modify/learn process is accurate measurement of the actual sediment transport events. Many agencies, institutions, and companies collaborated, including Johns Hopkins University (JHU), OSU, the National Center for Earth-surface Dynamics (NCED), the US Geological Survey (USGS), the USFS, the US Bureau of Reclamation (USBR), GMA, and PGE.

Guided by Stillwater Science's predictions, initial monitoring efforts focused on the area where change was expected to be greatest (from the upstream end of the reservior – river mile (RM) 32 downstream to just above the Bull Run confluence – RM 18.5). Water and sediment fluxes were generally sampled at bridges because access to the river is limited by

land ownership and steep canyon walls. The river was naturally divided into reaches bounded by these measurement points (Figure 1-4). The upstream reach was defined between the USGS gauge near Brightwood (#14136599) at RM 36.4, and the dam site at RM 30.0. This reach included the entire reservoir reach and the additional 5 miles upstream to the gauging station. The next reach was defined between the dam site and Revenue Bridge at RM 23.9. This included the area immediately downstream of the dam site as well as a long bedrock gorge which was difficult to access. The final reach was defined between Revenue Bridge and the Lusted Road Bridge at Dodge Park (RM 18.5).

The division of work between the groups participating in monitoring included dividing the measurement of the river morphology (sediment at rest) and sediment transport (sediment in motion). Detailed topographic surveys of the reservoir reach, and the 1.5 miles of river below the dam were conducted by both the USGS and PGE-contracted surveyors. The same PGE-contracted surveyors conducted repeat detailed surveys of a small reach below the bedrock gorge and above Revenue Bridge. A group from JHU and NCED, along with GMA, performed repeat detailed surveys in a 1 mile reach below Revenue Bridge, and another over a 2 mile reach in Oxbow Park (below Dodge Park). These detailed local surveys were supplemented by a long profile survey by the US Bureau of Reclamation and repeat LIDAR flights over the entire river.

A second group of researchers were involved in measuring the actual sediment transport during the winter of 2007-2008. The USGS made measurements of both suspended and bedload transport at Brightwood Bridge, Marmot Dam, and Dodge Park. Revenue Bridge proved to be an unsuitable location for bedload monitoring, leaving a gap in the flux measurements between the 2nd and 3rd reach. To fill this gap GMA was contracted by OWEB, through the SRBWC, to conduct sediment transport monitoring from a fixed cataraft just above Revenue Bridge.

With a multi-year monitoring plan in place, measurements of river topography, water discharge, and sediment flux at key locations on the Sandy River create a comprehensive dataset documenting the response of a river to dam removal and a large input of sediment. This data will support the development of the next generation in morphological modeling.

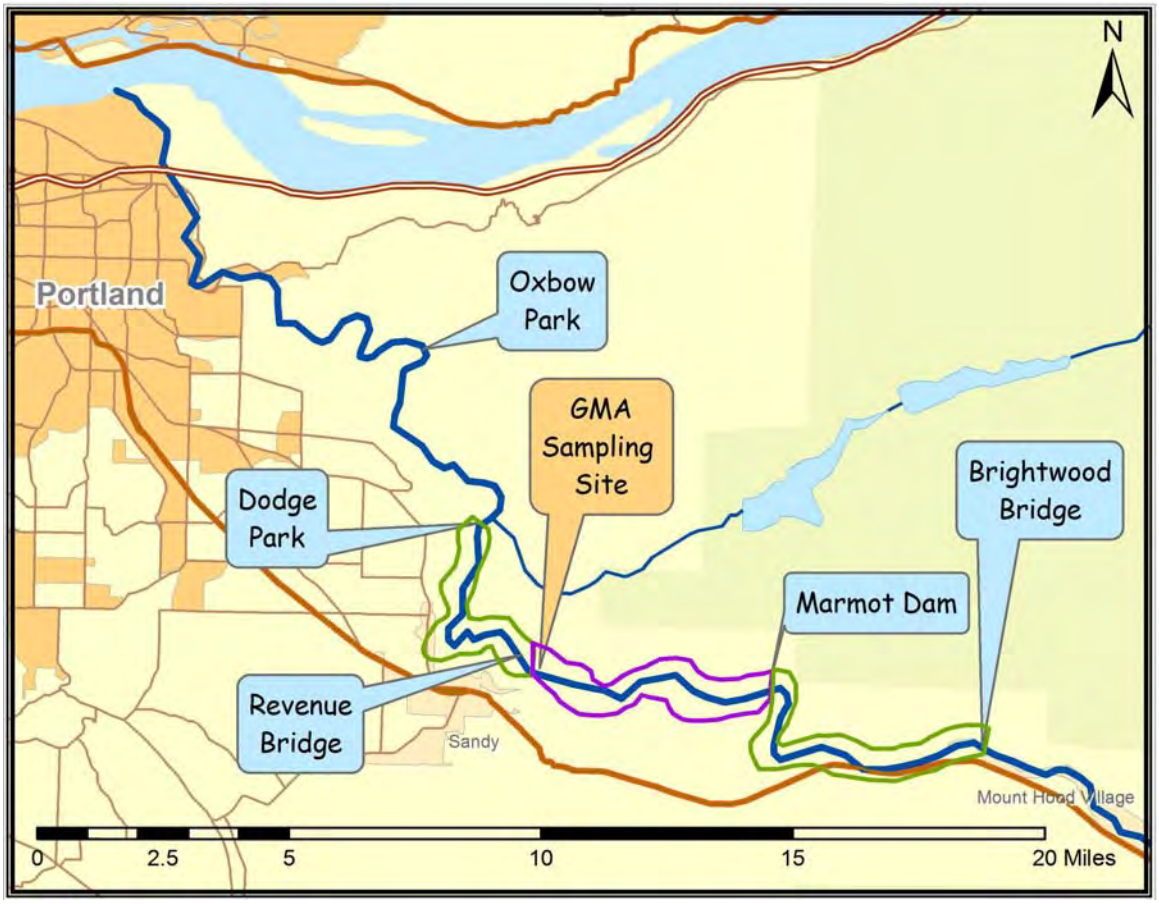


Figure 1-4. Reach map showing sampling locations.

1.3 Approach

GMA was contracted by SRWBC (under contract to the OWEB) to provide sediment transport monitoring services at the one location where bridge or cableway sampling was not possible: the expansion below the gorge. The objective for this project was to contribute to the overall Marmot Dam removal monitoring project by measuring the quantity and particle-size characteristics of sediment exiting the gorge during the winter of 2007-2008. Most equipment was hiked in to the sampling location in October, 2007. Remaining equipment was stored at the Mt. Hood National Forest Headquarters in Sandy, where GMA personnel were allowed 24 hour access to facilitate quick response to storms. A temporary cableway was established across the 240 foot wide channel to support sediment sampling from a cataraft-based platform. A temporary stream gaging station was constructed to provide sampling-period streamflow data and, if necessary, a gaging record from which to compute an annual discharge record. The annual discharge record (hydrograph) is required to compute the annual sediment load, in which equations developed from sample data are integrated over the hydrograph.

The sampling program was designed to cover 5 storms, including the initial coffer-dam failure. Due to individual storm characteristics, sampling trips typically lasted one to two days longer than planned, so four sampling trips were completed between October 2007 and May 2008. Suspended sediment samples, bedload samples and discharge measurements were collected from the cataraft-on-cableway. Numerous site photographs were obtained and water surface slope was measured at several different stages. Sediment samples were lab-analyzed for concentration, turbidity, particle size and total mass and these samples were used to develop the equations from which the annual sediment discharges (loads) could be computed.

CHAPTER 2.0 METHODS

2.1 Introduction

The purpose of this section is to provide a succinct overview of field and office methodologies employed for streamflow and sediment data collection and analysis.

All field notes and data collection forms for this project were regularly photocopied and organized into notebooks. All computer files and digital photographs are organized into a project file that is backed up to disks stored both on and off-site. All digital data was regularly downloaded and backed up to disk. A variety of data have been obtained from assisting agencies and consulting firms and are stored in a project file with the GMA data. Quality Assurance Plans are available to interested parties for: Suspended Sediment Laboratory, Coarse Sediment Laboratory, Surface Water Data Collection and Geomorphic Data Collection (info@gmahydrology.com).

2.2 Streamflow

2.2.1 Stage Height

A temporary stream gaging station was constructed near the sampling site to support sediment transport monitoring efforts. A Global Water Level Loggers series #WL-15-15 datalogger was encased in flexible armored conduit and a locked steel box, secured to the stream bank. Global Water Level Loggers are of a pressure transducer type, utilizing a silicon diaphragm, and have a 15 foot range. Recording interval was set to 15 minutes and the gage was serviced and downloaded every 1-2 months. A local stage reference was established and surveyed to existing elevation control. Gage height records were checked against observed stage heights and adjusted to compensate for drift as necessary. Any error was distributed over the period of record between known (observed) gage heights. All stage references were surveyed to locally established benchmarks using an auto level. If sites were disturbed (by vandalism or high flows), the original gage datum could be re-established.

2.2.2 Discharge Measurements

All discharge measurements were performed during high flow sampling events, therefore no wading measurements were collected. High flow measurements were taken from a cataraft attached to a cableway, which has been specially modified for sediment and discharge data collection (Figure 2-1). A platform is securely affixed to very stiff, inflatable plastic tubes, a tower and modified USGS roller system connects the raft to the ¼ inch cable, and a crane assembly facilitates the use of various reels, winches and power drive assists. Standard USGS methods were used when making discharge measurements. During periods of rapidly changing river stage fewer verticals were used in order to improve the accuracy of the measurement. Measurements typically contained at least 20 verticals at 0.6 depth. All measurements were performed with the magnetic head version of the Price AA (Figure 2-2).

High flow measurements from the cable-deployed cataraft were made using a crane, an E-reel, a Price AA meter, an AquaCalc 5000 and a Columbus 100 lb. sounding weight.

Figure 2-1. GMA 20 foot cataraft on a cableway on the Sandy River, May 2008.

2.2.3 Continuous Discharge Computations

All discharge measurements were entered and catalogued using a modified USGS-type 9-207 discharge measurement summary form. Stage/discharge relationships (rating curves) were developed and applied to the adjusted continuous-stage record to generate a 15 minute discharge record. The 15 minute record was computed in the WISKI software suite. The WISKI Suite is a comprehensive hydrologic time-series database management system developed by Kisters AG. The suite consists of three parts: WISKI, BIBER and SKED. WISKI manages and computes all time-series data, BIBER is used to evaluate and catalogue discharge measurements, and SKED is used to develop and manage rating curves. The WISKI Suite incorporates complete USGS standards for surface water streamflow computations which utilize methods according to Water Supply Paper 2175 (Rantz, 1982), multiple ratings with log offsets, shifts and stage adjustments, gage height and datum correction, and standard printouts such as primary computation sheets, mean daily value summaries, rating tables, and shift tables.

Figure 2-2. Price AA current meter on a 100 lb sounding weight deployed from a cataraft.

Provisional data from the USGS gage near Brightwood (#14136500) 11.9 miles upstream, provided a baseline data set from which to compare: observed peak discharges, individual discharge measurements, lag time and accretion from Brightwood to our site.

2.3 Sediment Transport Monitoring

2.3.1 Suspended Sediment Sampling

Depth-integrated suspended sediment sampling (DIS) was performed using either a US DH-59 Depth-Integrating Suspended Sediment Sampler (rope-deployed from the cataraft) or a US D-74 Depth-Integrating Suspended Sediment Sampler (cable-deployed from the cataraft). Standard methods, as developed by the USGS and described in Edwards and Glysson (1998), were generally used for sampling. For each sample, the location, time, stage, number and duration of verticals, distance between verticals, bottle #, and whether a field replicate was taken, were recorded. On one occasion, safety concerns prevented acquisition of a true depth-integrated sample and a partial-pass depth-integrated sample was taken and this information was recorded. All sample data are stored together in a project notebook. Single-vertical, depth-integrated SSC samples were collected with each full cross section sample as

a type of "box sample." The single point-sample correlations with full cross section samples can be very strong and can provide a viable alternative (USGS 2005) to sampling off of a cableway during a winter storm, as a single person can quickly and safely collect samples.

Samples were kept chilled after collection and stored in ice chests. Turbidity values were computed within 48 hours using a LaMotte 2020 turbidimeter. Suspended sediment concentrations were computed in the GMA sediment lab in Weaverville, California following USGS and ASTM D-3977 protocols.

Figure 2-3. Loading the D-74 suspended sediment sampler with a quart sample bottle.

2.3.2 Bedload Sampling

The sampling section was located near the hydraulic control for the gage. Occasionally, the cable-vector (to the current) had to be adjusted to facilitate crossing the river under human power, therefore not all samples were collected along exactly the same cross section orientation. An initial point (I.P.) was initially established on the right bank and used to anchor the tape for all measurements, however due to the changing vector of the cableway, the cable was ultimately marked at 10 foot intervals relative to the I.P. A 20 foot cataraft was deployed from the cableway and a 6 x 12 inch TR-2 bedload sampler (Figure 2-4) was lowered from the same crane assembly described in the methods for discharge

measurements. Standard methods, as developed by the USGS and described in Edwards and Glysson (1998), were used. Beginning and end stations, sample interval, sample duration, start time and end time, beginning and end gage height, and pass number were recorded. All bedload sample data are stored together in a project notebook. Bedload samples were processed at the GMA coarse sediment lab in Arcata, California. Processing involves sieving and computing the percent retained in each sieve class as determined by weight. These data are entered into Excel spreadsheets for subsequent conversion to the cumulative percentage finer (by weight) than the corresponding sieve size. All bedload sample data are stored together in a project notebook.

Figure 2-4. The TR-2 (left) versus the 6 inch Helley –Smith bedload sampler.

2.3.3 Continuous Sediment Discharge Computation

Utilizing the annual hydrograph developed from the temporary gaging station data and the sample data, partial annual loads were computed for suspended sediment and bedload. Suspended sediment loads were compared using continuous discharge (Q, cfs) as an index of continuous suspended sediment concentration (SSC). Equations were developed utilizing discharge as the independent variable, and concentration (in two size classes: greater and less than 0.063 mm) as the dependent variable. Continuous SSC (mg/l) was computed using the gaging record (Q, cfs) and the appropriate equation for each 15 minute period. The corresponding discharge for each period was used to compute the 15 minute loads (SSC x Q x 0.0027, in tons/day) which were then summed for the entire period of record.

Bedload discharge is computed in similar fashion as is suspended sediment discharge. Loads were computed for the Sandy River corresponding to the following size classes: < 2mm, 2-8mm and < 8mm). Bedload transport is spatially and temporally much more variable than suspended sediment transport and at present discharge is the most practical surrogate available to estimate loads continuously. Bedload sampling is far more labor, equipment and time intensive than suspended sediment sampling. Consequently bedload transport relationships are usually based on far fewer observations than are suspended sediment transport relationships. Therefore, since (1) fewer samples typically describe the bedload-discharge relationship and (2) bedload is computed using discharge as a surrogate and (3) bedload transport is poorly described by discharge (due to the aforementioned temporal and spatial variability in bedload transport in both sampling and seasonal time-scales), bedload transport estimates have greater uncertainty associated than do suspended sediment load estimates.

CHAPTER 3.0 RESULTS

3.1 Introduction

The purpose of this section is to present the results of WY2008 sediment transport monitoring on the Sandy River above Revenue Bridge. A summary of work performed for WY2008 is provided in Table 3-1. Detailed descriptions of some results and much of the raw data are provided in the Appendix as follows:

1. Discharge Station Analysis
2. Sediment Station Analysis
3. Discharge vs SSC Regression Equations
4. Discharge vs Bedload Regression Equations
5. Bedload Sample Data
6. Particle Size Analyses for Bedload Samples.

TABLE 3-1. TASK SUMMARY FOR SANDY RIVER ABOVE REVENUE BRIDGE WY2008 SEDIMENT SAMPLING

Task	Number
Field	
Depth Integrated Measurements	21
Bedload Measurements	23
Water Surface Slope Measurements	7
Discharge Measurements	9
Box Sample Measurements	53
Site Surveys	1
Gage Installation/Removal	2
Downloads	5
Site Photographs	167
Office	
Discharge Record Computations	1
Suspended Sediment Record Computations	2
Bedload Discharge Record Computations	3
Meetings and Presentations	4
Lab	
SSC Analyses (bottles)	212
Turbidity Analyses (bottles)	84
Bedload Sample Particle Size Analyses (passes)	37

3.1.1 Study Site

The study site was located approximately 5.6 miles downstream of Marmot Dam, roughly 200 yards below the first major expansion below the gorge, ½ mile upstream from Revenue Bridge (Figure 3-1). The hydraulic control below the sampling/gaging section consisted of a coarse riffle which split around a mid channel island (Figure 3-2). The thalweg was located approximately 50 feet from the right bank. At low to medium flows, flow lines were fairly smooth and parallel Figure 3-3). At high flows, however (> 6,500 cfs), standing waves began to develop, surface velocities exceeded 12 fps and the divergent pattern of the flow lines became more strongly developed. While sand was present along the streambed, the dominant matrix is composed primarily of gravel, cobbles and boulders with some very large boulders which complicated sampling efforts (Figure 3-2). An ephemeral sandbar (building several feet high during large storms and eroding on the recession), sometimes changed flow and transport characteristics for up to a day at a time by dramatically reducing cross sectional area.

Since PGE has many cross sections throughout the reach, no cross section surveys were performed by GMA. Figure 3-4 is from the PGE 2007 survey (by Dave Evans and Associates) and is roughly aligned with the GMA sampling section. Three stage references were surveyed by GMA for water surface slope observations. Slope observations spanned 290 feet and the downstream-most stage reference was the gaging station. The cableway was located between the downstream two stage references and the values presented describe the apparent water surface slope through the sampling section (Figure 3-5, Table 3-2.).

TABLE 3-2. WY2008 Water Surface Slope Observations

Date	Flow (cfs)	Slope
05/16/2008	5,070	0.0007
12/03/2007	5,810	0.0003
11/17/2007	3,090	0.0003
10/21/2007	2,450	0.0001
11/19/2007	2,160	0.0006
11/20/2007	2,100	0.0002
	Mean	**0.0004**

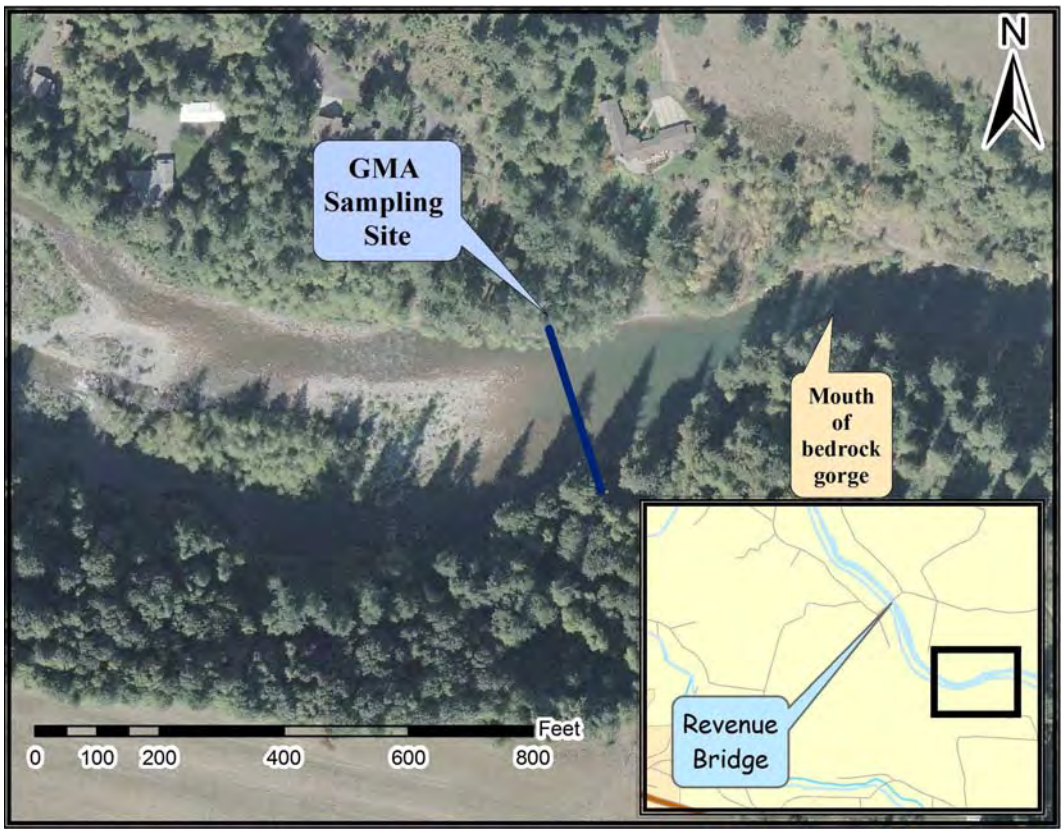


Figure 3-1. GMA sediment transport monitoring site above Revenue Bridge.

Figure 3-2. Panoramic view of hydraulic control downstream of sampling location.

Figure 3-3. View upstream from cableway, along the thalweg at approximately 3,800 cfs.

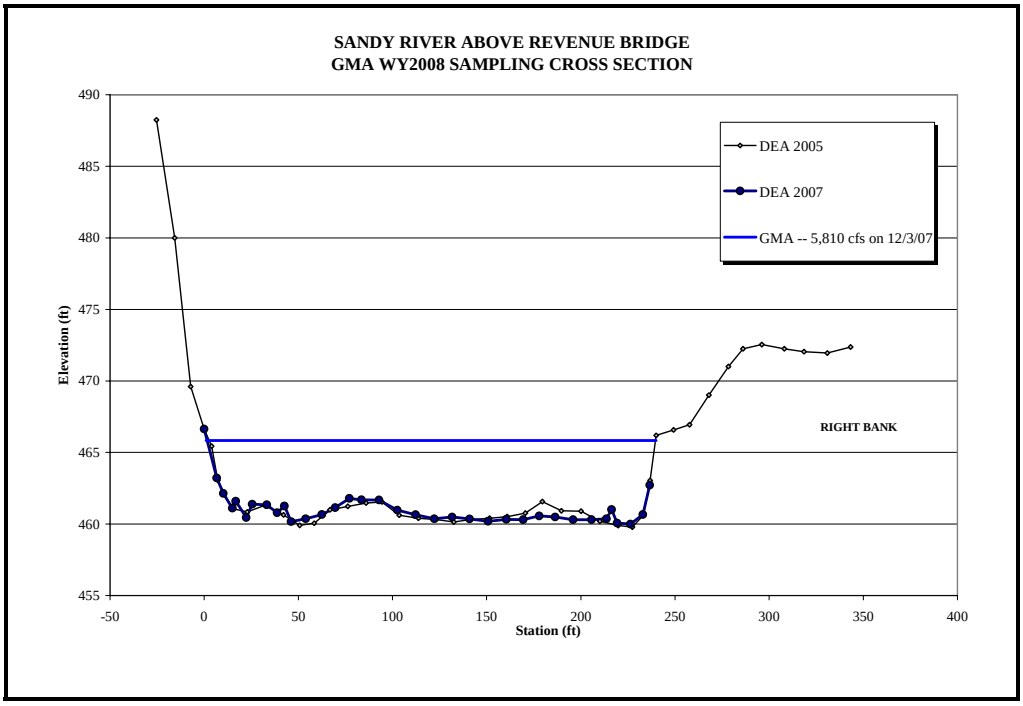


Figure 3-4. Cross section of the sampling location (Dave Evans and Associates, 2007).

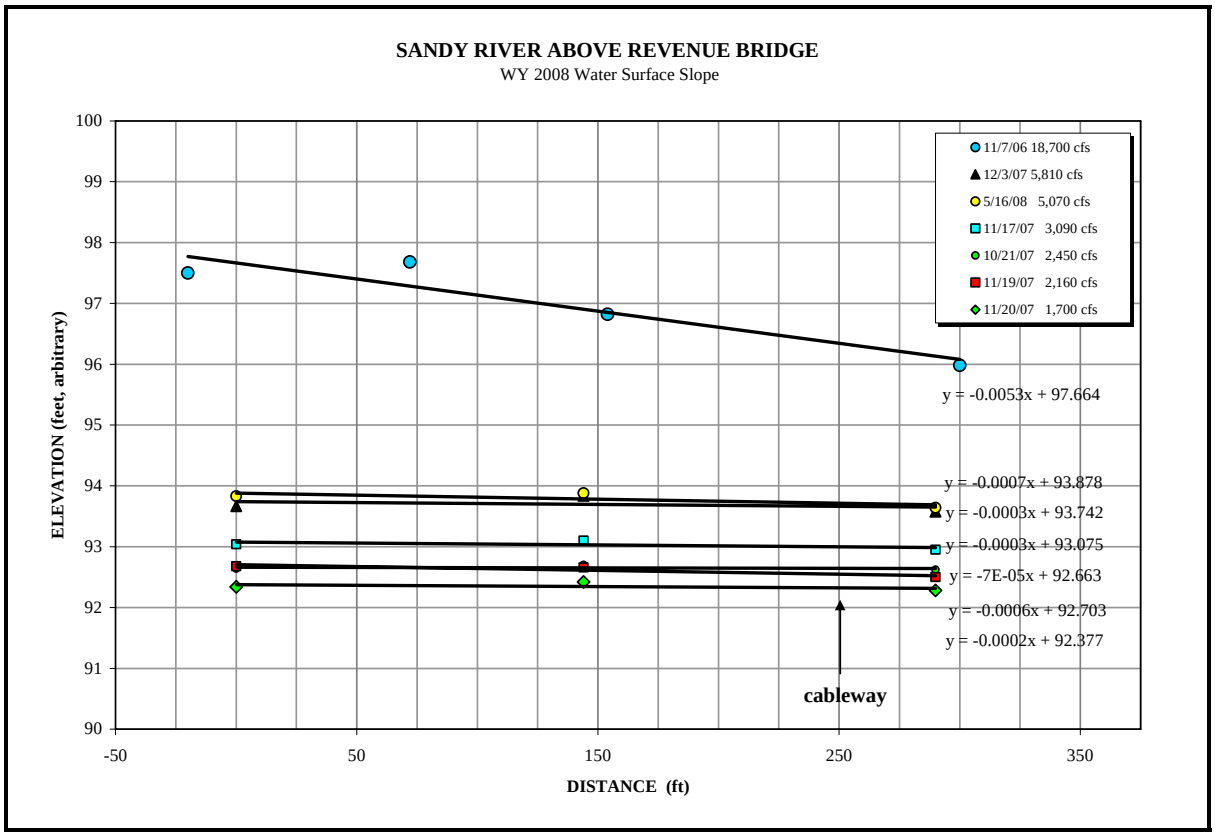


Figure 3-5. Water surface slope through the sampling section.

3.2 Streamflow

3.2.1 Stage Height

Nearly 100 stage height observations were collected over the study period (October 1 to July 10), including data obtained from: gage download visits, sediment samples, discharge measurements and box sample measurements. Since data collection efforts were limited to storm periods (except for gage download visits), intervening periods of low flow were not closely monitored. Gage height records were checked against observed stage heights and adjusted to compensate for drift as necessary. Any error was distributed over the period of record between known (observed) gage heights.

3.2.2 Discharge Measurements

Nine measurements were collected between November 16, 2007 and May 17, 2008 (Table 3-3). Measured flows ranged from 1,910 cfs to 6,060 cfs. The hydraulic geometry (comparisons of width, average depth and average velocity versus discharge) of the site cannot be accurately assessed due to:

- cross sectional area variation due to the temporal formation of depositional features;
- not all measurements were collected along the same section; and

- the hydraulic control appeared to aggrade substantially, as evidenced by the shift in the rating (Figure 3-6).

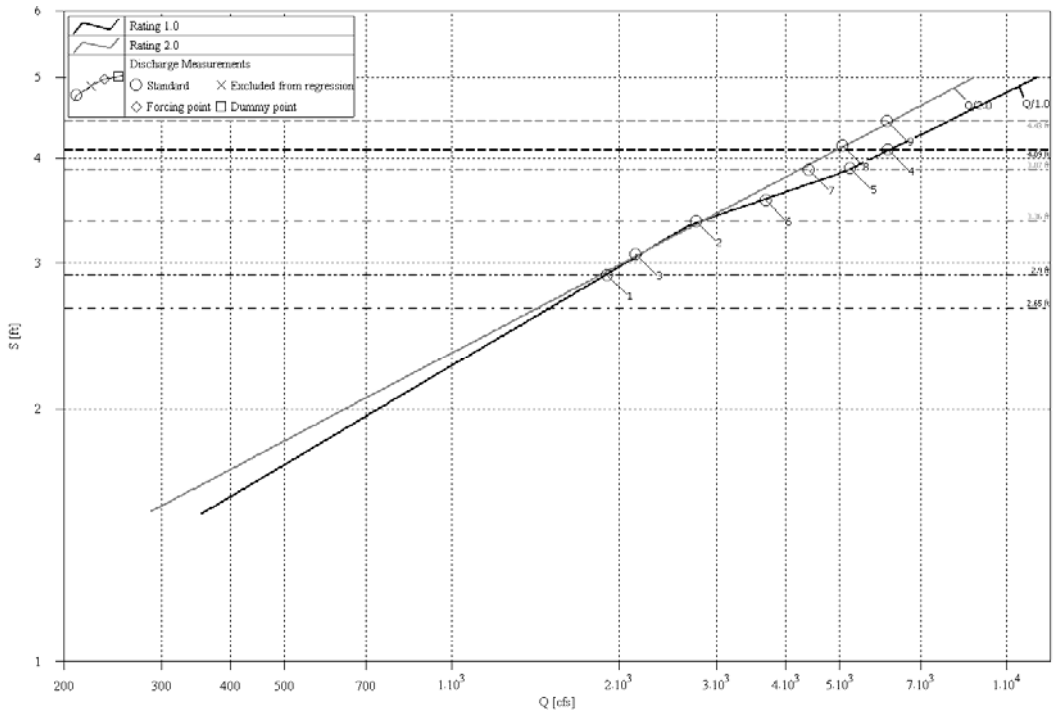


Figure 3-6. Rating #1 and #2 for Sandy River above Revenue Bridge (GMA #14137003).

TABLE 3-3. DICHARGE MEASUREMENT SUMMARY FOR SANDY RIVER ABOVE REVENUE BRIDGE

GRAHAM MATTHEWS & ASSOCIATES

Hydrology -- Geomorphology -- Stream Restoration

5435 Ericson Way Suite 1, Arcata, CA 95521 Phone: (707) 825-6681; Fax (707) 825-6698; email: cort@gmahydrology.com

DISCHARGE SUMMARY SHEET

STATION: Sandy River above Revenue Bridge **WATER YEAR:** 2008

STATION NUMBER: 14137003

Measurement Number	WY Msmt #	Date	Made By	Width (feet)	Mean Depth (feet)	Area (ft2)	Mean Velocity (ft/sec)	Staff Height (feet)	Gage Height (feet)	Discharge (cfs)	Rating 1.0 Comp. Shift (feet)	Rating 1.0 Used Shift (feet)	Rating 1.0 % Diff.	Method	Begin Time (hours)	End Time (hours)	Msmt Rating	GZF (feet)	Water Temp (F)	Comments
1	**2008-01**	11/16/2007	S. Pittman	232	3.23	749	2.55	2.90	2.90	1,910	---	---	---	Boat/Cable	16:30	17:30	Poor	NA	46	Quick msmt on rising limb -- 10 verticals
2	**2008-02**	11/17/2007	S. Pittman	234	3.83	896	3.09	3.36	3.36	2,760	---	---	---	Boat/Cable	10:00	11:00	Fair	NA	45	AQA file corrupted, 18 verticals
3	**2008-03**	11/19/2007	S. Pittman	234	3.15	738	2.91	3.07	3.07	2,150	0.02	0.00	-2	Boat/Cable	13:00	13:54	Fair	NA	44	AQA file corrupted, 20 verticals
4	**2008-04**	12/04/2007	S. Pittman	237	3.12	739	8.29	4.07	4.09	6,130	0.00	0.00	0	Boat/Cable	16:18	17:27	Fair	NA	44	SH = MGH from 1 min gage record; 20 verticals
5	**2008-05**	12/05/2007	S. Pittman	237	3.31	784	6.62	3.95	3.89	5,190	0.00	0.00	0	Boat/Cable	9:50	10:55	Fair	NA	43	20 verticals
6	**2008-06**	12/06/2007	S. Pittman	236	3.28	775	4.68	3.58	3.56	3,260	-0.02	0.00	2	Boat/Cable	11:30	12:45	Fair	NA	44	section has scoured along LB, 22 verticals
											Rating 2.0									
7	**2008-07**	05/15/2008	S. Pittman	240	4.46	1070	3.95	3.89	3.87	4,230	-0.06	0.00	4	Boat/Cable	18:10	19:16	Fair	NA	NA	estimated last velocity on LB, 22 verticals
8	**2008-08**	05/16/2008	S. Pittman	240	4.58	1100	4.58	4.17	4.14	5,040	0.01	0.00	-1	Boat/Cable	15:00	15:50	Fair	NA	NA	estimated last velocity and depth on LB, 23 verticals
9	**2008-09**	05/17/2008	S. Pittman	240	4.63	1110	5.46	4.43	4.43	6,060	0.02	0.00	-2	Boat/Cable	10:50	11:42	Good	NA	NA	estimated last velocity and depth on LB, 23 verticals

3.2.3 Continuous Discharge Computations

The corrected continuous gage height record was used with Ratings 1 and 2 to generate an annual discharge record for the study site. Periods of missing data were filled with provisional discharge values from USGS #14136500, Sandy River near Brightwood and the final record was compared to the Brightwood record (Figure 3-7). Rating periods and computational details are provided in the Discharge Station Analysis in Appendix 1.

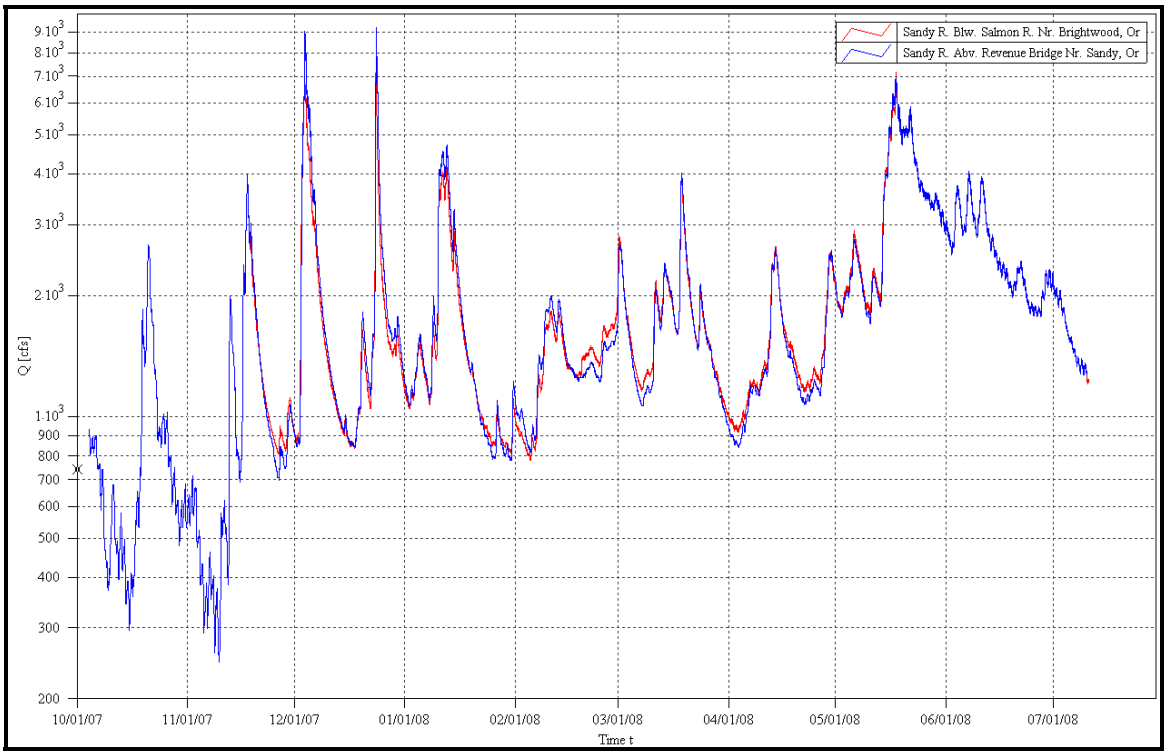


Figure 3-7. Hydrographic Comparison of GMA gaging station to USGS #14136500.

3.3 Sediment Transport Monitoring

3.3.1 Suspended Sediment Data

Twenty-one suspended sediment samples were collected in WY2008 (Table 3-4, Figure 3-9). Turbidity analyses were performed on all winter samples; values ranged from 12-92 NTU and revealed a strong relationship with SSC ($r^2 = 0.96$, Figure 3-10). Concentration was not correlated with either discharge or turbidity during the initial dam breach sampling period. The highest observed turbidity was only 94 NTU and the highest measured concentration was 2270 mg/l (Table 3-4).

Since two different samplers were used during the monitoring effort, a comparison was performed between the US DH-59 and the US D-74 (Figure 3-11). Composited values differed by 16%; if bottle #2 were omitted, the difference is only 3%. The disparity in bottle

#2 was likely due to the D-74 striking the riverbed. The DH-59 was deployed from the side of the boat and rope-deployment allows a finer touch at low velocities than does the D-74, which is deployed from a B-reel from the end of the boat. We conclude that concentration values obtained from the two samplers are comparable.

Box samples (single-vertical DIS near right bank) were collected with each DIS pass (Table 3-4). The paired SSC values present a reasonable relationship ($r^2 = 0.84$) (Figure 3-12) which could be used to predict cross-sectional concentration without deploying a cataraft.

TABLE 3-4. SANDY RIVER ABOVE REVENUE BRIDGE (#14137003)
WY2008 SUSPENDED SEDIMENT SAMPLE SUMMARY[1,2]

Sample #	Date and Mean Time	Pass #	SSC (mg/l)			Discharge (cfs)	SS Discharge (tons/day)	Box SSC (mg/l)	Turbidity (NTU)
			<0.0623mm	>0.0623mm	TOTAL				
2008-01	10/20/07 14:55	1	364	345	709	1,870	3,580	410	73
	10/20/07 15:16	2	389	344	733	1,890	3,740	1,020	73
2008-02	10/20/07 17:12	1	394	354	748	2,090	4,220	554	87
2008-03	10/20/07 18:10	1	389	407	796	2,160	4,640	527	94
2008-04	10/21/07 9:32	1	363	348	711	2,470	4,740	474	68
2008-05	10/21/07 10:38	1	339	345	684	2,440	4,500	500	85
2008-06	10/21/07 11:29	1	378	388	766	2,360	4,880	534	85
	10/21/07 11:51	2	353	344	697	2,290	4,300	507	89
2008-07	11/16/07 17:00	1	146	491	637	2,230	3,830	221	19
2008-08	11/17/07 10:35	1	200	977	1177	2,900	9,210	621	27
2008-09	11/17/07 17:12	1	537	1736	2273	3,770	23,100	1,330	84
2008-10	11/18/07 15:03	1	127	815	942	2,670	6,780	578	28
2008-11	11/18/07 16:45	1	133	936	1069	2,870	8,270	478	27
2008-12	11/19/07 12:14	1	47	355	401	2,220	2,400	221	12
	11/19/07 12:14	2	51	430	481	2,220	2,880	232	12
2008-13	12/3/07 17:07	1	413	1512	1925	6,170	32,000	1,930	NA
2008-14	12/4/07 12:47	1	330	1857	2188	6,450	38,100	2,190	90
2008-15	12/5/07 10:30	1	221	1352	1574	5,290	22,500	1,570	52
2008-16	12/5/07 16:20	1	163	1043	1206	4,680	15,200	1,200	40
2008-17	12/6/07 12:07	1	82	791	873	3,560	8,380	873	22
2008-18	5/15/08 17:02	1	31	129	160	4,090	1,760	55	
	5/15/08 17:22	2	32	321	353	4,120	3,920	60	NA
2008-19	5/16/08 11:45	1	77	1188	1265	5,040	17,200	164	
	5/16/08 12:09	2	78	540	618	5,040	8,400	223	NA
2008-20	5/16/08 16:16	1	67	285	352	5,180	4,920	197	
	5/16/08 16:16	2	66	340	405	5,180	5,660	194	NA
2008-21	5/17/08 10:02	1	126	677	803	6,080	13,200	268	
	5/17/08 10:02	2	128	438	566	6,080	9,280	242	NA

[1]lab reported values of DIS concentration are not rounded here

[2]final suspended sediment discarge values rounded as per Porterfield, 1972

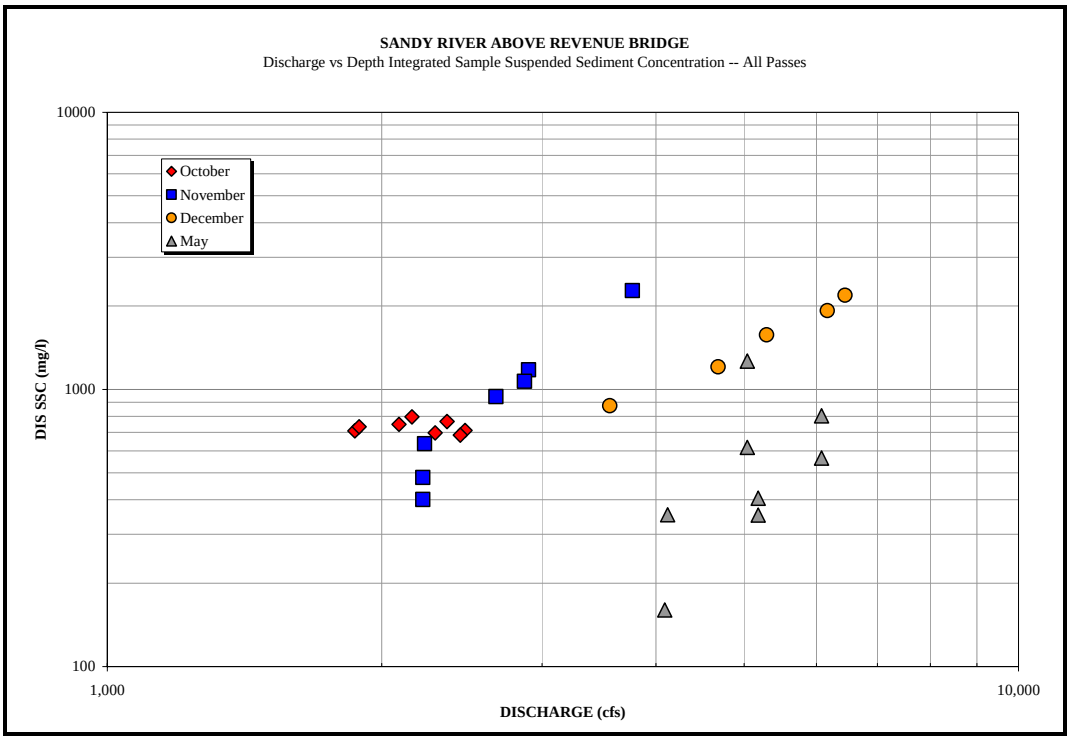


Figure 3-9. Suspended sediment sample concentrations for four time periods in WY2008.

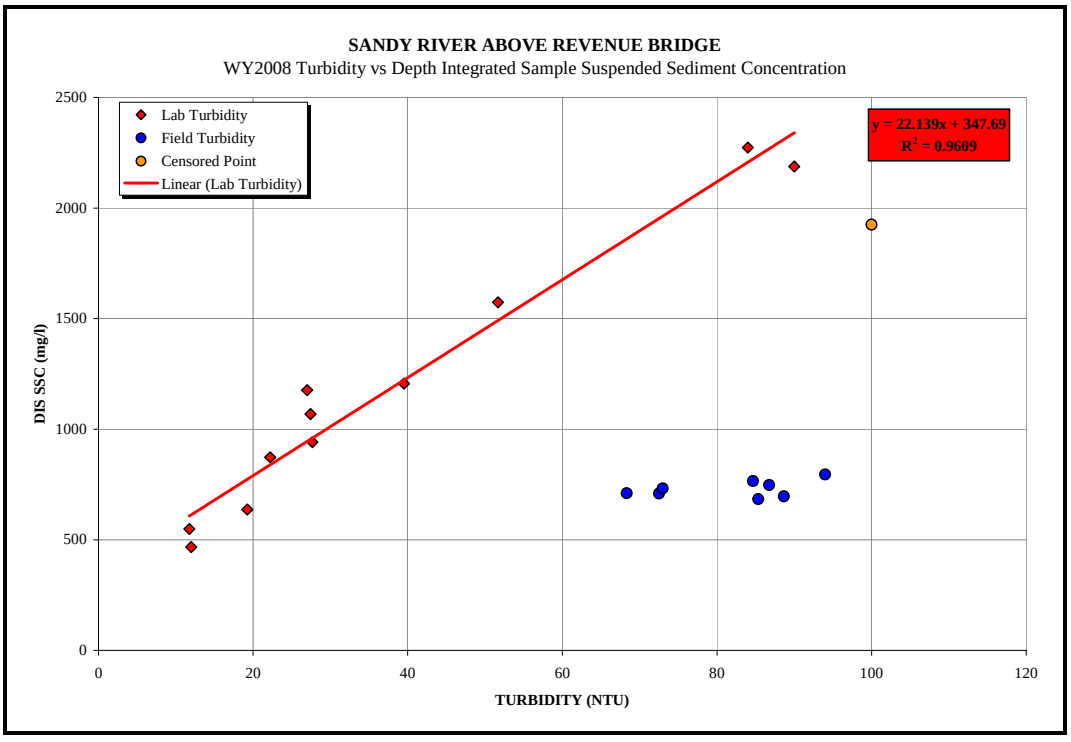


Figure 3-10. WY2008 Turbidity vs SSC.

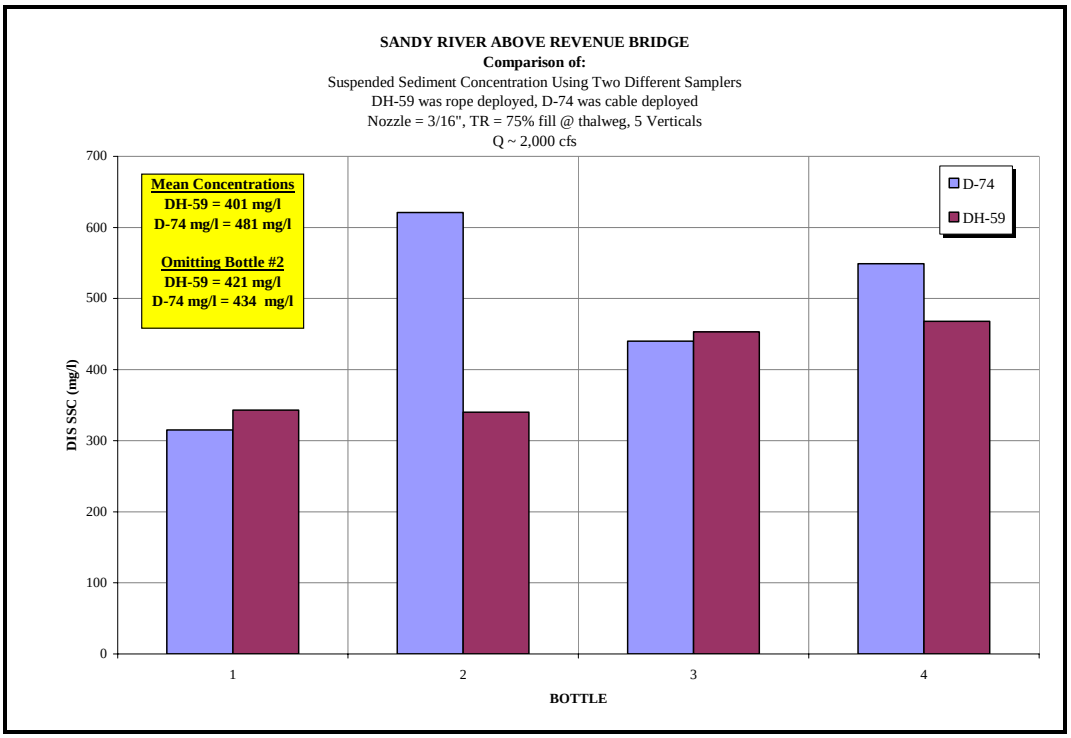


Figure 3-11. A side by side comparison of the US DH-59 and the US D-74

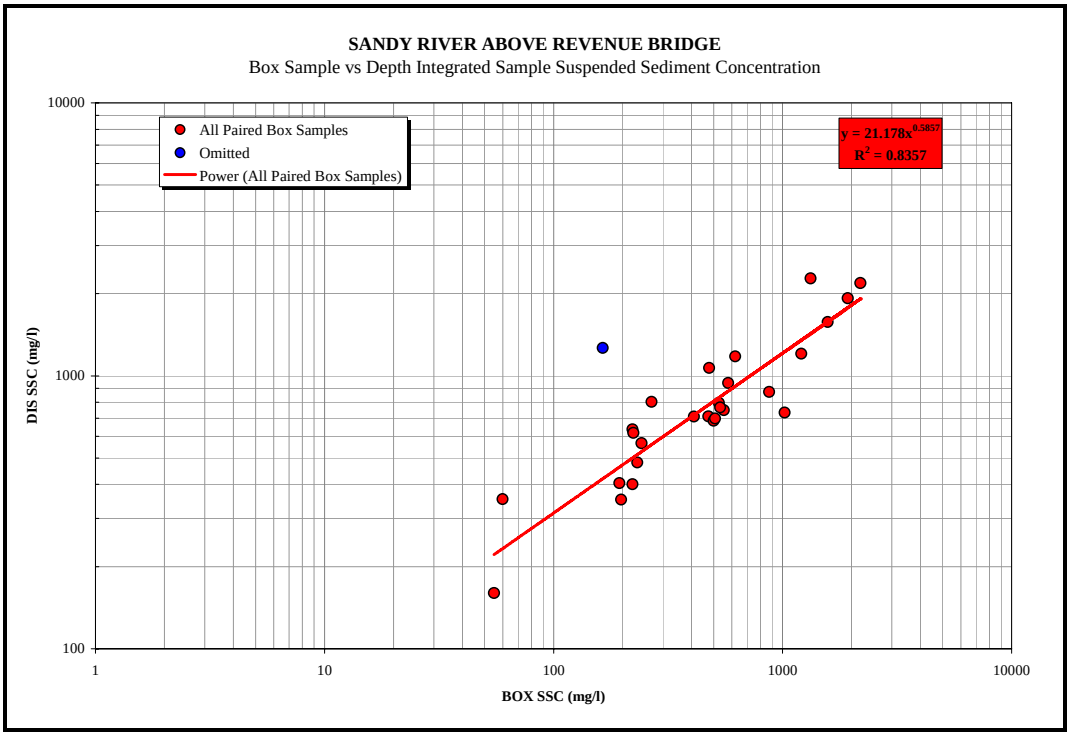


Figure 3-12. Paired Box Sample vs DIS concentrations.

3.3.2 Bedload Data

Twenty-three bedload samples were collected in WY2008, fourteen of which were two-pass samples (Table 3-5). Samples were composed primarily of sand (Table 3-6). Since transport rates and surface debris loads were often extremely high, sampler downtimes were sometimes as short as 5 seconds, though most were 15 seconds or longer (Figure 3-13). Figures 3-14 and 3-15 describe a typical sample: 88% of the sample in the photo is comprised of material less than 2mm (collected during the May 2008 melt event at 5,000 cfs). All particle size analyses are presented in Appendix 5 and Appendix 6. While the D_{50} of bedload samples shows little variation over the sampling season (Figure 3-16), large particles were regularly encountered (Figure 3-17). The final column in Table 3-6 describes the largest sieve which retained sediment for each sample, indicating that nine samples contained particles >32mm.

TABLE 3-5. SANDY RIVER ABOVE REVENUE BRIDGE (#14137003)
BEDLOAD SAMPLING SUMMARY -- WY2008

Sample Number	Date & Mean Time	Streamflow	Bedload Discharge				
		Average Discharge (cfs)	Total Pre-sieve (tons/day)	> 8mm (tons/day)	2-8 mm (tons/day)	≤ 2 mm (tons/day)	TOTAL[1] Sum of Partials (tons/day)
SRRB-BLM2008-01	10/20/07 16:17	1,990	71.41	0.16	5.47	65.46	71.1
SRRB-BLM2008-02	10/20/07 17:37	2,100	37.59	0.08	5.24	32.06	37.4
SRRB-BLM2008-03	10/20/07 18:31	2,180	127.71	0.68	18.32	108.70	128
SRRB-BLM2008-04	10/21/07 9:57	2,430	376.11	1.32	44.08	330.64	376
SRRB-BLM2008-05	10/21/07 11:13	2,360	132.46	0.44	6.88	125.20	133
SRRB-BLM2008-06	11/17/07 13:20	3,200	1167.04	7.07	85.45	1072.75	1,170
SRRB-BLM2008-07	11/17/07 15:57	3,490	1399.95	8.46	53.46	1341.22	1,400
SRRB-BLM2008-08	11/18/07 13:06	2,663	1239.97	22.05	100.38	1116.04	1,240
SRRB-BLM2008-09	11/18/07 15:52	2,800	1611.07	21.76	98.21	1492.74	1,610
SRRB-BLM2008-10	11/19/07 10:30	2,260	670.70	5.06	26.11	638.12	669
SRRB-BLM2008-11	12/3/07 16:50	5,870	25578.47	1781.73	7377.70	16356.80	25,500
SRRB-BLM2008-12	12/4/07 10:57	7,150	21998.58	1367.81	2302.80	18300.66	22,000
SRRB-BLM2008-13	12/4/07 15:21	6,350	26675.62	653.07	1459.96	24523.49	26,600
SRRB-BLM2008-14	12/5/07 11:37	5,230	4839.30	38.10	114.87	4662.54	4,820
SRRB-BLM2008-15	12/5/07 13:54	4,980	5277.25	149.32	419.90	4702.88	5,270
SRRB-BLM2008-16	12/5/07 15:55	4,700	14709.42	307.08	1362.90	12979.88	14,600
SRRB-BLM2008-17	12/6/07 10:50	3,560	8852.10	88.64	229.23	8515.93	8,830
SRRB-BLM2008-18	5/15/08 15:29	4,000	975.33	30.16	85.29	854.18	970
SRRB-BLM2008-19	5/15/08 19:35	4,450	951.90	43.14	99.50	806.91	950
SRRB-BLM2008-20	5/16/08 10:45	5,000	1481.05	46.82	133.46	1297.07	1,480
SRRB-BLM2008-21	5/16/08 13:41	5,070	2122.62	212.32	425.54	1481.85	2,120
SRRB-BLM2008-22	5/16/08 17:08	5,270	1335.70	30.70	53.65	1247.58	1,330
SRRB-BLM2008-23	5/17/08 8:09	6,080	2850.00	139.86	240.39	2465.21	2,850

[1] final values rounded as per Porterfield, 1972

TABLE 3-6. SANDY RIVER ABOVE REVENUE BRIDGE (#14137003)
PARTICLE SIZE ANALYSIS SUMMARY -- WY2008

Sample Number	Date & Mean Time	Streamflow Average Discharge (cfs)	Size Fraction of Sample (mm)									Largest Size Class in Sample
			D5	D16	D25	D35	D50	D65	D75	D84	D90	Sieve (mm)
SRRB-BLM2008-01	10/20/07 16:17	1,990	0.1	0.4	0.6	0.7	0.8	1.1	1.3	1.7	1.9	8
SRRB-BLM2008-02	10/20/07 17:37	2,100	0.1	0.5	0.6	0.8	1.0	1.3	1.6	1.9	2.4	8
SRRB-BLM2008-03	10/20/07 18:31	2,180	0.2	0.5	0.6	0.8	1.0	1.3	1.6	2.0	2.5	8
SRRB-BLM2008-04	10/21/07 9:57	2,430	0.3	0.5	0.6	0.7	1.0	1.3	1.6	1.9	2.2	11.2
SRRB-BLM2008-05	10/21/07 11:13	2,360	0.2	0.4	0.5	0.6	0.7	0.8	1.0	1.4	1.7	11.2
SRRB-BLM2008-06	11/17/07 13:20	3,200	0.1	0.3	0.3	0.4	0.6	0.9	1.2	1.5	1.9	22.4
SRRB-BLM2008-07	11/17/07 15:57	3,490	0.1	0.3	0.3	0.4	0.5	0.7	0.8	1.0	1.4	22.4
SRRB-BLM2008-08	11/18/07 13:06	2,663	0.2	0.3	0.3	0.4	0.6	0.7	1.0	1.5	2.0	22.4
SRRB-BLM2008-09	11/18/07 15:52	2,800	0.2	0.3	0.3	0.4	0.6	0.7	0.9	1.3	1.8	22.4
SRRB-BLM2008-10	11/19/07 10:30	2,260	0.2	0.3	0.3	0.4	0.5	0.7	0.8	0.9	1.3	16
SRRB-BLM2008-11	12/3/07 16:50	5,870	0.4	0.6	0.8	1.1	1.5	2.0	2.7	3.9	6.0	22.4
SRRB-BLM2008-12	12/4/07 10:57	7,150	0.3	0.4	0.6	0.7	0.9	1.2	1.6	2.1	3.8	90
SRRB-BLM2008-13	12/4/07 15:21	6,350	0.2	0.4	0.5	0.6	0.7	0.9	1.2	1.6	1.9	45
SRRB-BLM2008-14	12/5/07 11:37	5,230	0.2	0.3	0.3	0.4	0.5	0.7	0.8	0.9	1.3	22.4
SRRB-BLM2008-15	12/5/07 13:54	4,980	0.3	0.5	0.6	0.7	0.8	1.1	1.4	1.8	2.1	45
SRRB-BLM2008-16	12/5/07 15:55	4,700	0.3	0.5	0.6	0.7	0.9	1.2	1.5	1.8	2.1	31.5
SRRB-BLM2008-17	12/6/07 10:50	3,560	0.3	0.4	0.4	0.5	0.6	0.8	0.8	1.0	1.4	31.5
SRRB-BLM2008-18	5/15/08 15:29	4,000	0.3	0.5	0.6	0.7	0.9	1.1	1.4	1.8	2.4	22.4
SRRB-BLM2008-19	5/15/08 19:35	4,450	0.3	0.6	0.6	0.8	1.0	1.3	1.6	2.0	2.7	22.4
SRRB-BLM2008-20	5/16/08 10:45	5,000	0.3	0.5	0.6	0.7	0.8	1.1	1.4	1.8	2.3	31.5
SRRB-BLM2008-21	5/16/08 13:41	5,070	0.3	0.6	0.8	1.0	1.4	2.0	3.1	5.7	10.1	45
SRRB-BLM2008-22	5/16/08 17:08	5,270	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.4	1.8	31.5
SRRB-BLM2008-23	5/17/08 8:09	6,080	0.2	0.4	0.5	0.6	0.7	1.0	1.3	1.8	2.7	64

[1]final values rounded as per Porterfield, 1972

Figure 3-13. TR-2 bedload sampler nearly filled with sand after two verticals at 5 seconds.

Figure 3-14. Bedload sample collected at 5,000 cfs on May 15, 2008 (#2008-20).

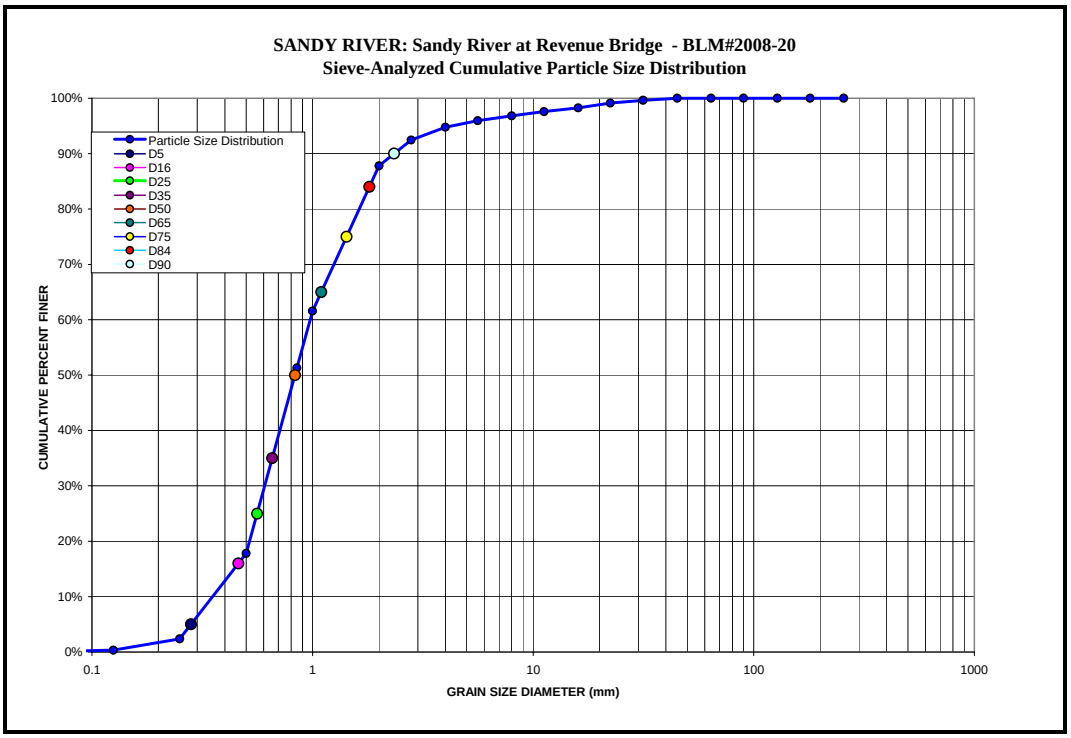


Figure 3-15. Particle size distribution of bedload sample collected at 5,000 cfs.

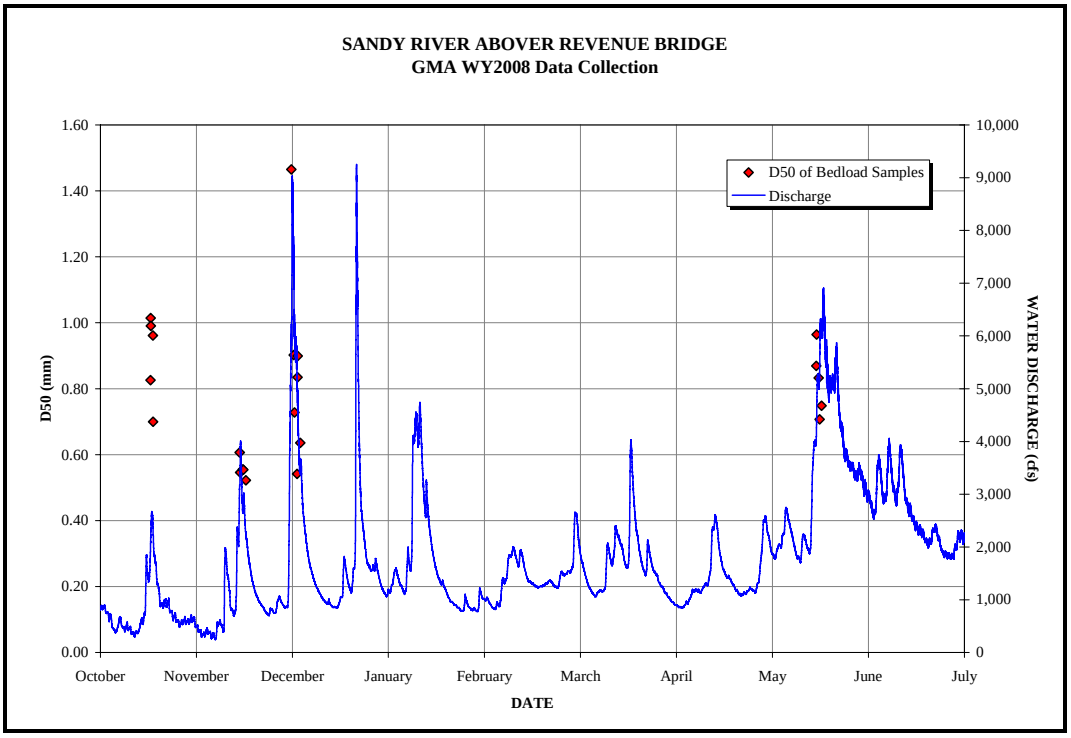


Figure 3-16. The D50 of bedload samples over the sampling season.

Figure 3-17. Sample #2008-21 (May) contained particles > 45mm (flow = 5,000 cfs).

3.3.3 Continuous Sediment Discharge Computation

Suspended Sediment Discharge

Equations used, time periods to which they are applied, relevant assumptions and methods for the load computation are detailed in the Sediment Station Analysis (Appendix 2). Six discharge regressions were developed from the sample data: for three distinct time periods for each of two size classes (greater and less than 0.063mm) (Appendix 3). The sedigraph method was utilized to compute the October period (dam breach), during which SSC showed no correlation with discharge. Figure 3-18 shows all sample passes and illustrates how the Q vs SSC relationship varies between sampling events. Regressions in Figure 3-18 are illustrative and are not the equations actually used in computations. An example Q vs SSC relationship is provided in Figure 3-19. These equations were used to compute continuous concentration (Figure 3-20), thence continuous suspended sediment discharge, which was summed to provide the annual load of 425,000 tons. Loads for all size classes are provided in Table 3-5.

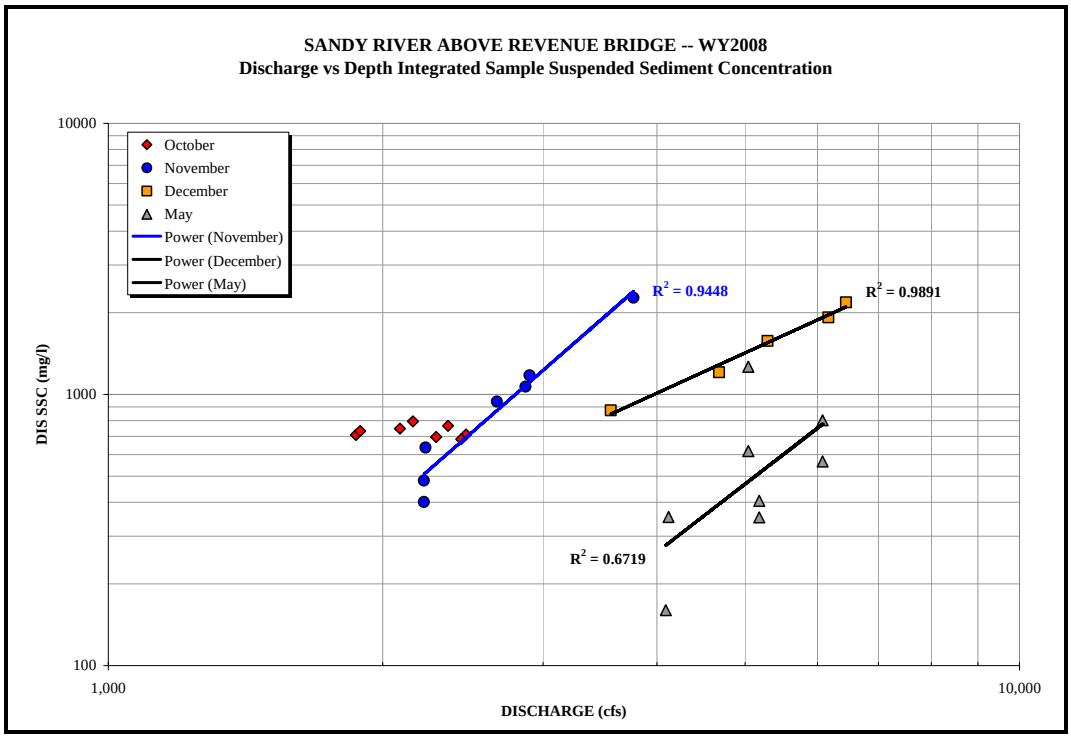


Figure 3-18. SSC data for all passes showing temporal shifts in the Q vs SSC relationship.

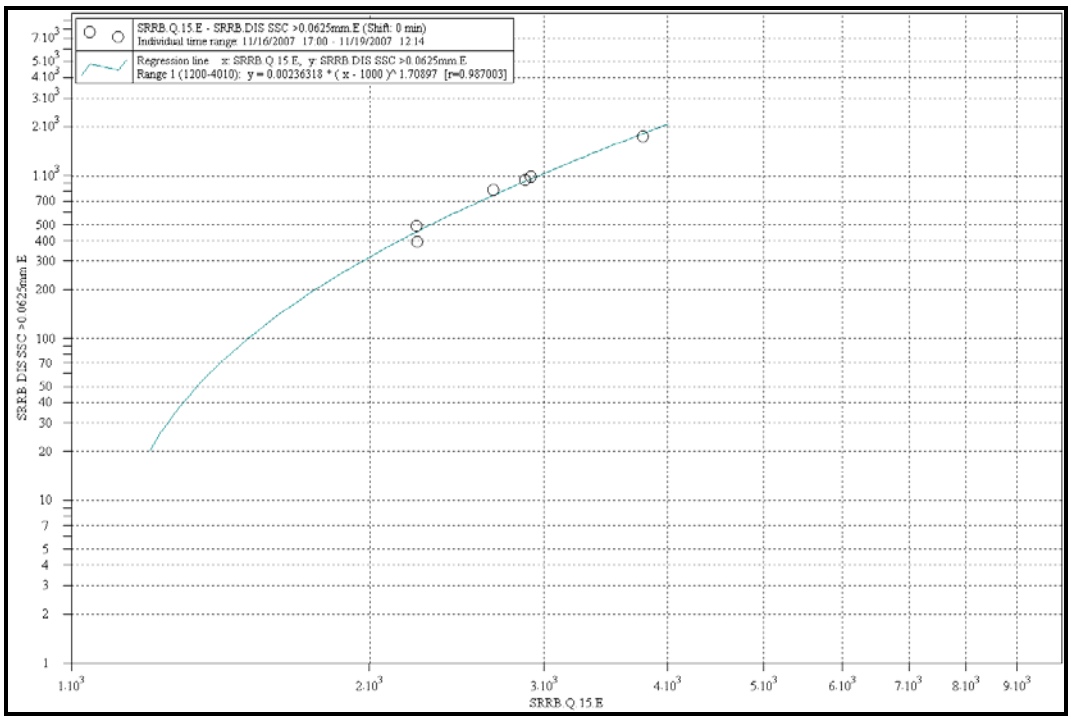


Figure 3-19. The Q vs SSC relationship for the > 0.063mm size class developed from the November storm period.

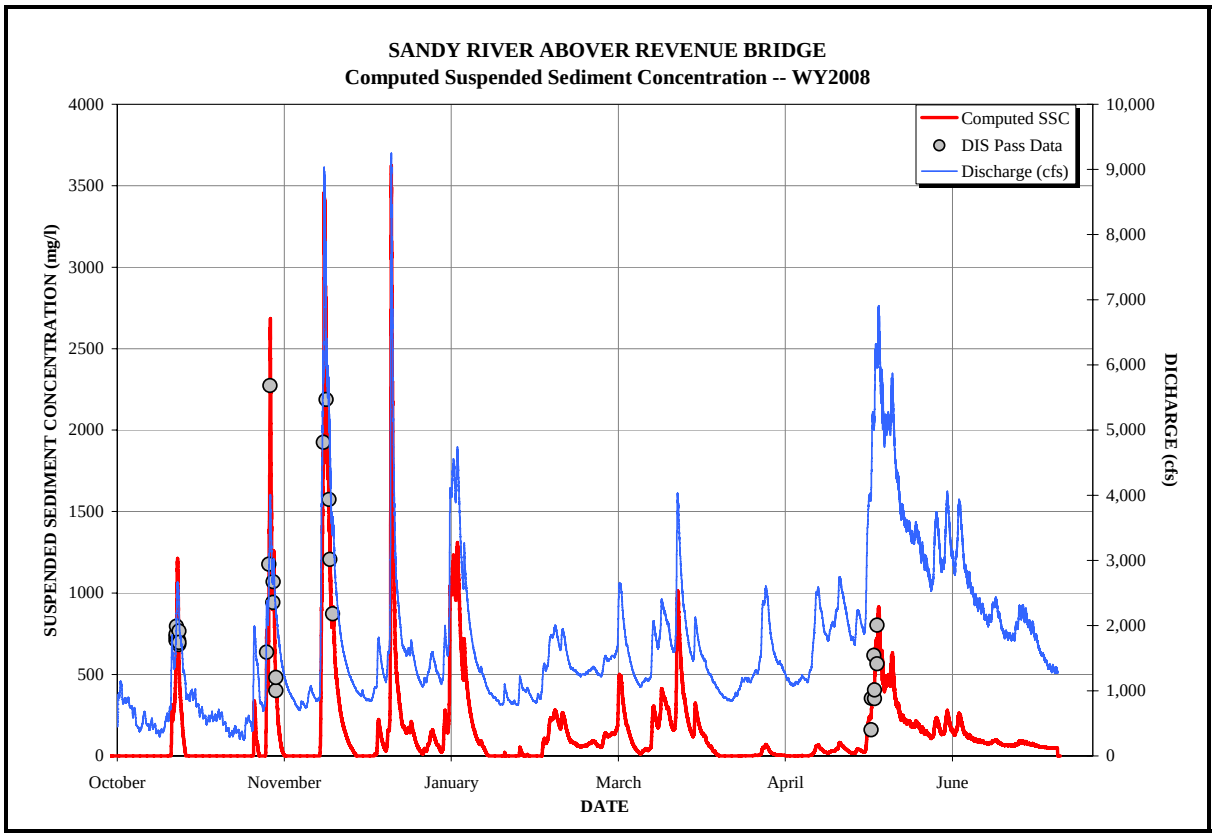


Figure 3-20. Continuous concentration sedigraph computed from WY2006 sample data.

TABLE 3-7. SANDY RIVER ABOVE REVENUE BRIDGE (#14137003)
WY2008 ANNUAL SEDIMENT LOADS

WY2008 Annual Load	Suspended Load		Bedload			Total[1]
	< 0.063mm	> 0.063mm	< 2mm	2-8mm	>8mm	
Suspended Sediment (tons)	60,553	364,354				**425,000**
Bedload (tons)			138,707	15,729	5,531	**160,000**
TOTAL						**585,000**
Conversion to cubic yards[2]:						**390,000**
Conversion to cubic meters:						**298,000**

[1] final values rounded as per Porterfield, 1972
[2] conversion factor used = 1.5 ton/CY

Bedload Discharge Computation

All bedload sample passes, when plotted together, span roughly an order of magnitude in total bedload discharge (Figure 3-21). Data is also provided from the Trinity River near Douglas City, California (below the sediment-starved reach, GMA 2004-2006) a well known and much-sampled location, to provide some context for the values observed on the Sandy: the Sandy river transports an order of magnitude more bedload sediment for a given discharge than does the Trinity River.

When passes are composited as single samples and the data is broken out into temporal relationships, variability is reduced and recognizable patterns begin to appear (Figure 3-22): other than the May sampling period, the data seem to fit a general curve. Equations were developed for two time periods (winter storms and spring melt) for each of the three size classes. An example equation is provided in Figure 3-23. All equations are presented in Appendix 4. The three computations were summed to generate total bedload discharge: 160,000 tons (Figure 3-24). A detailed explanation of equations, time periods to which they were applied, assumptions and methods is provided in the Sediment Station Analysis in Appendix 2.

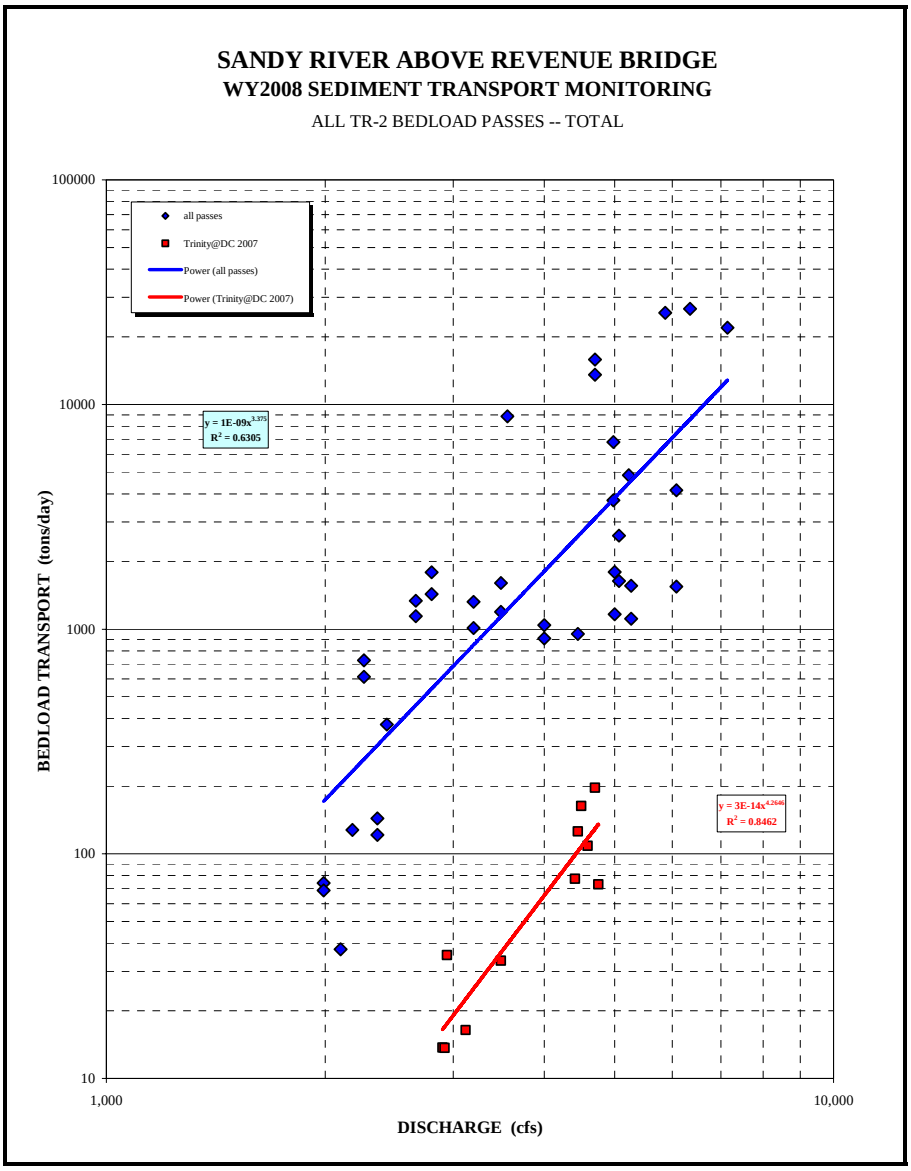


Figure 3-21. All Sandy River WY2008 bedload passes.

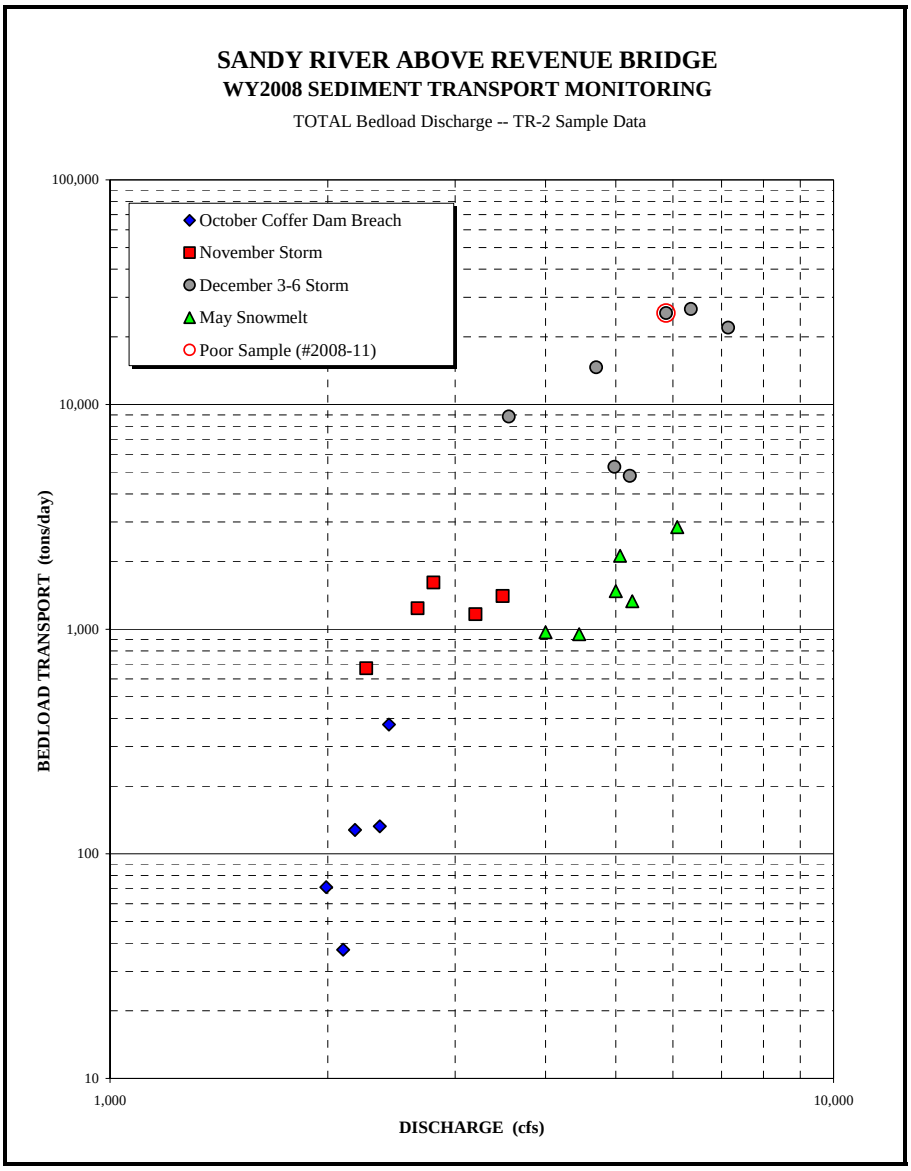


Figure 3-22. Composited bedload samples presented by sampling period.

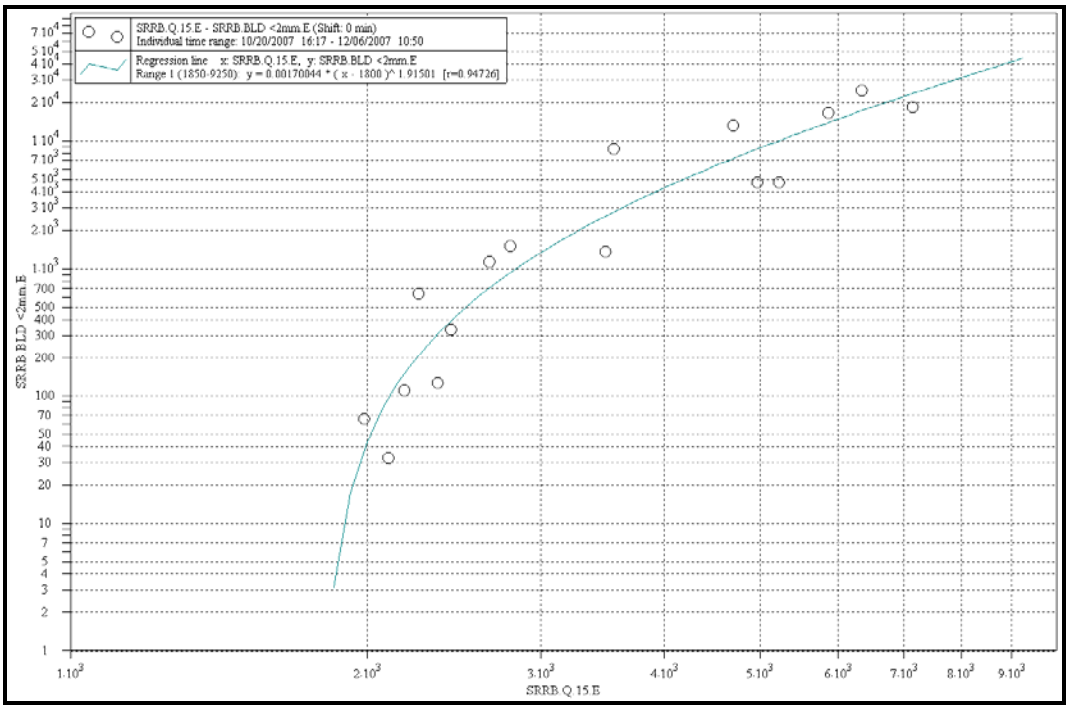
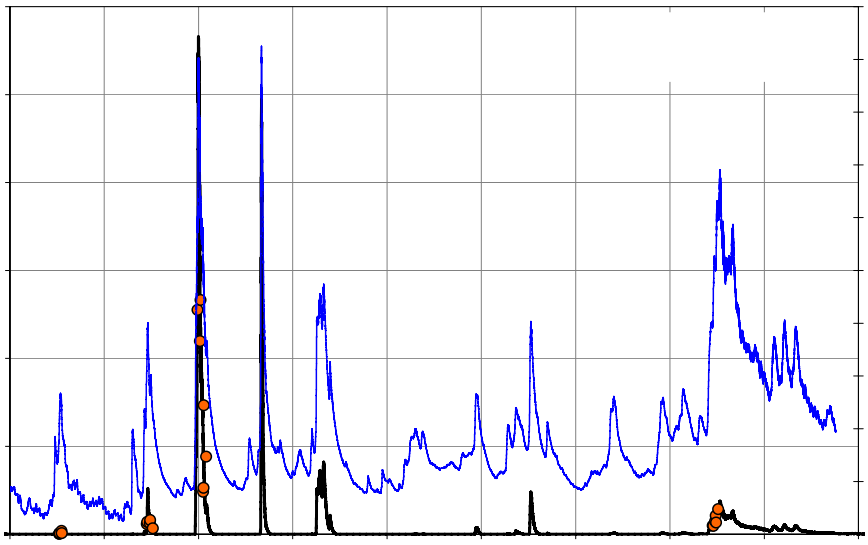


Figure 3-23. Example bedload equation for < 2mm fraction, October-December period.



CHAPTER 4.0 DISCUSSION

The primary purpose for collecting discharge data for the site above Revenue Bridge was to provide temporal ratings to support sediment discharge computation (e.g. to generate discharge versus concentration relationships). We originally intended to use USGS discharge data for the sediment computations. The Marmot (#14137002) discharge data became un-usable after the section began to aggrade, and since:

- the Brightwood (#14136500) gage comparisons with the GMA gage (for peak flows) showed variable rates of accretion (-6 to 28 percent, average 7 percent), and
- variable lag times (0 to 2 hours, average 1:06), and since
- only provisional data would be available at the time of computation,

we computed our own discharge record based on nine measurements and a 15 minute stage recorder (GMA gage #14137003). While the record contains periods of uncertainty (between storms, when no measurements were made), hydrographic comparison with Brightwood reveals an acceptable record. The discharge record is estimated for low flows, but for the purpose of computing sediment loads, the low flow periods are of little consequence.

WY2008 was dominated by the two December storms that peaked around 9,000 cfs, well below the 1.5 year average annual peak of 11,400 cfs. November, February and April each produced modest peaks in the 4,000 cfs range and the May melt event lasted nearly 9 days above 4,000 cfs, peaking at nearly 7,000 cfs. Both the magnitude and the duration of high flow events are important from a sediment transport perspective: higher flows generate greater instantaneous rates of sediment transport and long lasting hydrologic events move relatively more sediment over time. Table 4-1 shows sediment loads by period – here, we refer to the computational period (October 1, 2007 to July 10, 2008) as the "annual" period. While the December storms peaked at nearly the same magnitude, the first storm (December 3) moved more than twice the sediment as the first. While the initial dam breach moved less than 2% of the total load for the year, the spring melt period transported roughly ¼ of the entire annual load.

Figure 4-1 describes data collection efforts by flow event for WY2008. Periods during which no data were collected are less certain with respect to sediment load computation as discharge and sediment relationships may change from one high flow event to another. The December 24 storm remains a source of uncertainty; this poorly forecasted event moved through too quickly for our crews to respond, therefore we assume the relationships measured during the December 3 event held for the second storm.

Since both the US D-74 and the US DH-59 suspended sediment samplers overlap with the zone sampled by the TR2 (which samples to 6 inches above the river bed), suspended sediment load estimates may be lower than predicted by our methodology. However, since all other monitoring efforts employed the TR2, any bias should be systematic and relative load values remain comparable.

TABLE 4-1. SANDY RIVER WY2008 SEDIMENT LOADS BY PERIOD

TOTAL LOAD (Bedload + Suspended Load, tons)	584,875

Bedload

Period	Load (tons)	% of Bedload	% of TOTAL LOAD
Oct. 20 to Oct. 22	382	0.2%	0.1%
Nov. 16 to Nov. 20	4,382	2.7%	0.7%
Dec. 2 to Dec. 9	67,319	42.1%	11.5%
Dec. 23 to Dec. 27	25,836	16.2%	4.4%
Jan. 9 to Apr. 3	26,083	16.3%	4.5%
Apr. 3 to Jul. 10	35,960	22.5%	6.1%
Complete	**159,968**	**100%**	**27.3%**

Suspended Sediment Load

Period	Load (tons)	% of SS Load	% of TOTAL LOAD
Oct. 20 to Oct. 22	8,501	2%	1.5%
Nov. 16 to Nov. 20	27,411	6%	4.7%
Dec. 2 to Dec. 9	109,811	26%	18.8%
Dec. 23 to Dec. 27	53,414	13%	9.1%
Jan. 9 to Apr. 3	103,756	24%	17.7%
Apr. 3 to Jul. 10	113,220	27%	19.4%
Complete	**424,907**	**98%**	**71%**

*loads intentionally un-rounded for comparison by % and by period

The maximum observed turbidity was 94 NTU during the initial dam breach, though field crews believed the water to be more turbid than implied by the lab analyses. Eighty-six percent of the suspended load was >0.063 mm, and the sampling section was poorly-mixed (Figure 4-2): turbulent bursting eddies of a sandy appearance continually cycled to the surface during sampling events. Coarser suspended sediment may produce lower turbidity and still appear "muddy," which may partially explain the low turbidity values measured at our site. We have no explanation for the asymptotic SSC values obtained during the dam breach; concentration hovered in the 700-800 mg/l range despite fluctuations in discharge between 1,870 and 2,470 cfs.

These and other questions can be investigated when the USGS WY2008 sample data is available for comparison. Of particular interest will be answers to the following:

- How do transport rates and load totals compare at the four locations sampled?
- How do measured loads compare to changes in volume, namely the changes in volume in the reservoir deposit and in the reach below the dam?
- How to particle size compositions vary among the samples at different locations?
- How do the loads measured below the dam compare to the "ambient" sediment load (e.g. that measured at Brightwood)?

At the GMA sampling location, we could not have sampled flows much higher than we did, which (if we had encountered higher flows) would have meant more extrapolation from known relationships and more uncertainty in load estimates. Water Year 2008 presented a modest hydrograph for sediment transport, but given the extremely high transport rates encountered by GMA and other groups, the water year was nearly ideal for implementing a challenging and ambitious monitoring program. The data collected above Revenue Bridge will provide a vital component in the sediment budget approach to answering how the Sandy River responds to dam removal. Subsequent years, with higher annual peaks, will provide even more valuable sediment load comparisons. These comparisons will guide the development of the next generation of mathematical models which will in turn facilitate more accurate predictions of how large sediment pulses are routed through river systems following dam removal.

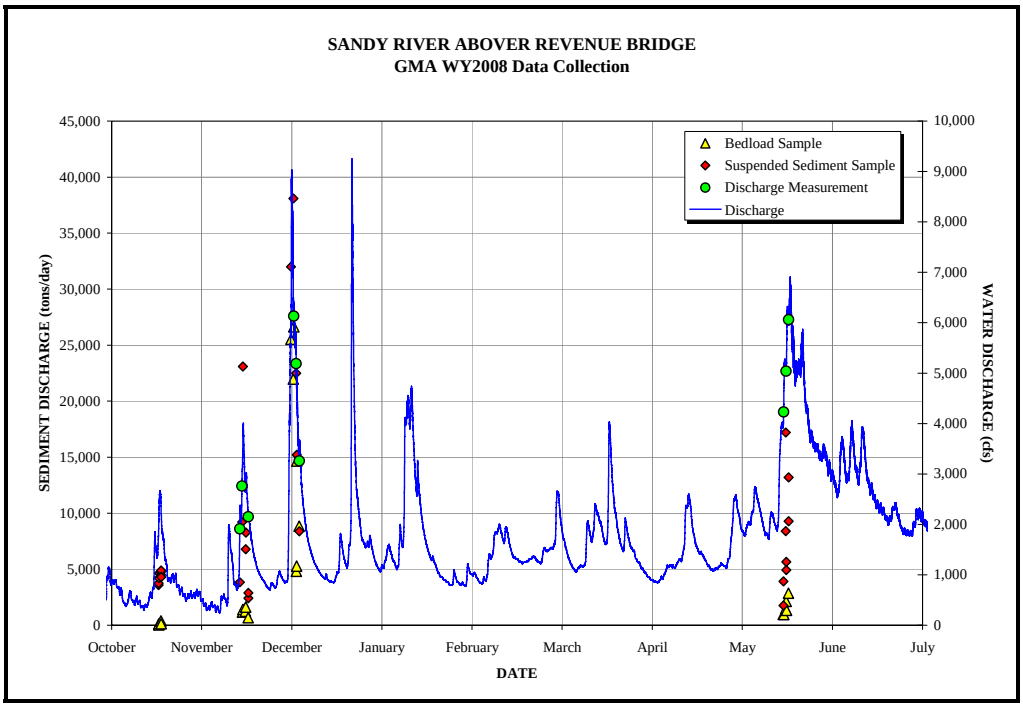


Figure 4-1. Data collection during four Sandy River high flow events in WY2008.

Figure 4-2. View toward right bank of GMA sampling section (November). Turbulent eddies of darker water can be seen bursting on the surface.

CHAPTER 5.0 REFERENCES CITED

David Evans and Associates, 2007. Survey data provided to Portland General Electric.

Edwards, T.K., and Glysson, G.D., 1998, Field methods for measurement of fluvial sediment: U.S. Geological Survey Open-File Report 86-531, 118 p.

Graham Matthews and Associates, 2004-2006. Trinity River Sediment Transport Monitoring annual reports to US Bureau of Reclamation, Trinity River Restoration Program, Weaverville, CA.

Rantz, S.E., and others, 1982, Measurements and computation of streamflow, volumes 1 and 2: U.S. Geological Survey Water-Supply Paper 2175, 631 p.

Stewart, G. and Grant, G.E., 2005, Potential Geomorphic and Ecological Impacts of Marmot Dam Removal, Sandy River, OR. Prepared for Portland General Electric, June 2005.

Stillwater Sciences. 2000a. Numerical Modeling of Sediment Transport in the Sandy River, OR Following Removal of Marmot Dam. Prepared for Portland General Electric, March 2000.

Stillwater Sciences. 2000b. Evaluation of Geomorphic Effects of Removal of Marmot and Little Sandy Dams and Potential Impacts on Anadromous Salmonids. Prepared for Portland General Electric, March 2000.

United States Geologic Survey, 2005. Training Course – *SW1091TC: Sediment Data Collection Techniques*, March 14-18, 2005, Castle Rock and Vancouver, WA. J.R. Gray, Course Coordinator.

United States Geologic Survey, 2007. Water resources information: Oregon surface water data retrieval. Accessed January, 2006 to September 2007. http://waterdata.usgs.gov/or/nwis/uv/?site_no=14136500; http://waterdata.usgs.gov/or/nwis/uv/?site_no=14137002.

14137003 Sandy River above Revenue Bridge near Sandy

STATION ANALYSIS FOR DISCHARGE RECORD

Partial WY 2008: (October 1 to July 10)

RECORDS – Graham Matthews & Associates established this site in October of Water Year 2008. A Global Water WL-15 pressure transducer was installed on the right bank 20 feet downstream from the temporary sampling cableway on November 18, 2008. The purpose for collecting streamflow data at this site is to sopport sediment transport data collection for this portion of the Sandy River. This effort is part of an empirical sediment budget approach for quantifying the sediment pulse resulting from Marmot Dam removal in the summer of 2008. This station analysis describes (1) discharge data collection efforts during and (2) records computed for WY 2008 by GMA, under contract to the Sandy River Watershed Basin Council.

EQUIPMENT – A Global Water WL-15 (0-15 psi) pressure transducer is installed at the site. The pressure transducer is located on the right bank 20 feet downstream from the temporary sampling cableway. The stage reference is steel pull-down reference bolt fixed on the right bank, surveyed to a local rebar monument. No wading discharge measurements were made. High flow discharge measurements were collected from a cataraft based platform that is attached to a cable that spans the river. High flow discharge measurement equipment includes a USGS style B-Reel, 100 lb sounding weight, AquaCalc streamflow computer and a Price AA current meter.

Inside recording gage: $\pm$ 0.1% of the full scale output (FSO) at constant temperature. $\pm$ 0.2% of the full scale output between 32° and 70° F range.

Outside staff gage: The stage reference is steel pull-down reference bolt fixed on the right bank, surveyed to a local rebar monument. The stage-correction value used is + 7 feet.

GAGE HEIGHT RECORDS – The gage height record is incomplete for the computational period. The gage was installed on November 18, 2007 and became active at 11:30 hours that same day. No gage height data is available for the time period between October 1, 2007 and November 18, 2007 at 11:15. The gage height record ends on May 17, 2008 at 16:15 hours. The station was decommissioned in July 2008. No gage height data is available for the time period between May 17, 2008 at 16:30 hours and the end of the computational period on July 10, 2008. Maximum gage height for the computational period was 4.68 ft and occurred on December 24, 2007 at 00:45 hours. Minimum gage height for the period was 1.96 ft and occurred on November 26, 2007 at 17:00 hours.

DATUM CORRECTIONS – The stage reference and reference marks were surveyed on November 19, 2008.

CONTROL – The hydraulic control at the site is a coarse riffle which splits around an island downstream of the gaging section. The wet channel is approximately 230 feet wide during winter base flow and small increases in stage result in relatively latge increases in discharge.

RATING – Nine discharge measurements were made during the computational period. Measured discharge for the period ranged between 1,910 cfs and 6,130 cfs. Computed instantaneous discharge ranged from 698 to 9,250 cfs. Two ratings, Rating 1.0 and Rating 2.0, were developed for use during the computational period. Measurements 1-6 were used to develop Rating 1.0 and measurements 2 and 7-9 were used to develop Rating 2.0. Rating 1.0 has a validated range between 2.90 and 4.09 ft. The limits of extrapolation for Rating 1.0 are between 2.65 ft and 2.89 ft on the low end of the rating. Rating 2.0 has a validated range between 3.87 ft and 4.43 ft. The limits of the extrapolation for Rating 2.0 are between 3.36 ft and 3.86 ft on the low end of the rating. Due to the short duration of the study and the limited opportunity for streamflow data collection (streamflow measurements were collected during high-flow sediment sampling efforts), it was necessary to compute flows outside of the validated and extrapolated ranges of the ratings. All discharge values calculated beyond the limits of extrapolation are flagged as estimated.

Rating 1.0 is used to compute flows from November 18, 2007 at 11:30 to December 24, 2007 at 00:45. A transition between Rating 1.0 and Rating 2.0 takes place from December 24, 2007 at 00:45 and December 25, 2007 at 10:45. Rating 2.0 is in full effect on December 25, 2007 at 10:45 and is used for the remainder of the computational period.

The transition between Rating 1.0 and Rating 2.0, given the timing of the field visits (storms), was determined as follows. Discharge measurements were collected in November and December; however the next set of measurements was not collected until May. Discharge measurements collected in May indicated that the control had aggraded and that a new rating or a shift was necessary. It was determined that creation of a new rating was justified based on the large changes that had occurred at the sampling section. Hydrographic comparison, using provisional data from the Sandy River below Salmon River near Brightwood gage (Station #: 14136500), indicated that deposition to the control likely occurred on the falling limb of the December 23- 25 storm event.

Hydrographic comparison, using provisional data from station #: 14136500, indicates that discharge values are reasonable for the time period between December 6, 2007 and May 17, 2008.

DISCHARGE – Rating 1.0 and Rating 2.0 were used during the computational period as follows:

Nov. 18 to Dec. 24 (00:45)	Rating 1.0
Dec. 24 to Dec. 25 (10:45)	Transition between Rating 1.0 and Rating 2.0
Dec. 25 to May 17 (16:15)	Rating 2.0

SPECIAL COMPUTATIONS – Discharge was estimated using hydrographic comparison and the provisional discharge records for station #: 14136500 for the following time periods:

Oct. 1 (00:00) to Nov. 18 (11:15)
May 17 (16:30) to July 10 (11:30)

REMARKS – For the time period where Rating 1.0 is valid, discharge values below 1,500 cfs and above 6,130 cfs should be considered estimated. For the time period Where Rating 2.0 is valid, discharge values below 2,810 cfs and above 6,200 cfs should be considered estimated.

Record Worked by: C. Pryor July 2008
Discharge Checked by: C. Pryor August 2008/S. Pittman August 2008

14137003 Sandy River above Revenue Bridge near Sandy, Oregon

TOTAL LOAD SEDIMENT-DISCHARGE RECORD

Partial WY 2008: (October 1 to July 10)

Records collected at station.— Graham Matthews & Associates established this site in October of Water Year 2008. The purpose for collecting streamflow and sediment data at this site is to quantify sediment discharge delivered from this portion of the Sandy River. This effort is part of an empirical sediment budget approach for quantifying the sediment pulse resulting from Marmot Dam removal in the summer of 2008. This station analysis describes (1) sampling efforts during and (2) records computed from the WY 2008 winter and spring flows sampled by GMA, under contract to the Sandy River Watershed Basin Council.

Equipment.-- Sampling equipment consists of a D-74 and DH-59 for suspended-sediment sampling, and a cable-deployed 12-inch x 6-inch Toutle River 2 bedload sampler (TR-2) with a 0.5mm mesh collection bag. The suspended-sediment samplers and the TR-2 bedload sampler were deployed from a crane-mounted B-reel. Sediment sampling was performed from a cataraft-based platform attached to a temporary cableway. Stage references were installed near cableway at the streamflow gaging station. Photographs were taken with a digital camera.

Sampling program.—Partial load season for this site is from October 1 to July 10. The program consisted of 12 sampling days. With the exception of November 16, a minimum of 1 bedload-discharge and 1 suspended sediment concentration sample was collected on each sampling day. The sampling days and samples collected are as follows:

October 20	3 bedload discharge	3 suspended sediment concentration
October 21	2 bedload discharge	3 suspended sediment concentration
November 16	0 bedload discharge	1 suspended sediment concentration
November 17	2 bedload discharge	2 suspended sediment concentration
November 18	2 bedload discharge	2 suspended sediment concentration
November 19	1 bedload discharge	1 suspended sediment concentration
December 3	1 bedload discharge	1 suspended sediment concentration
December 4	2 bedload discharge	1 suspended sediment concentration
December 5	3 bedload discharge	2 suspended sediment concentration
December 6	1 bedload discharge	1 suspended sediment concentration
May 15	2 bedload discharge	1 suspended sediment concentration
May 16	3 bedload discharge	2 suspended sediment concentration
May 17	1 bedload discharge	1 suspended sediment concentration

Sampling crews consisted of a safety kayaker/bank observer (data management and communication) and two on-river personnel specifically trained in cataraft-based sediment data collection techniques. All samples were reviewed by the site technicians and individual analyses were standardized for suspended sediment (concentration, 0.0625mm size break analysis) and bedload samples (total dry mass, full particle size analysis). Sediment data were generally collected according to USGS protocols with the following exceptions: test-velocity ratings for sampler nozzles were occasionally exceeded and not all passes were replicated due to time or safety constraints. Suspended-sediment samples were sent to the GMA Suspended Sediment Lab in Weaverville and bedload samples were sent to the GMA Coarse Sediment Lab in Arcata for analysis.

USGS Field Review. – Prior to the sampling period, Kurt Spicer (USGS Cascades Volcano Obervatory, Vancouver, WA) reviewed sampling site and protocols.

Data summary for WY 2008--

Total number of samples:	
Suspended sediment sets	7
Single pass suspended sediment samples	14
Single box samples	53
Bedload sets	14
Single pass bedload samples	9
Three pass bedload samples	0
Number of turbidity measurements	26
Number of suspended sediment size analysis samples:	
Particle size analysis	0
0.0625mm break	34
Number of bedload sediment size analysis samples:	
Particle size analysis	37
Number of depth-integrated suspended sediment concentration measurements	21
Number of bedload discharge measurements	23
Number of visits by USGS Office	1
Peak flow sampled by:	
GMA technicians, ft^3/s	7,150
Range of concentrations sampled by:	
GMA technicians, mg/l	160-2,270
GMA technicians, ton/d	1,760-38,100
Peak flow during computation period, ft^3/s	9,250
Periods of faulty record	None

Coefficients.-- None used.

Total suspended sediment-discharge computations. -- Total suspended-sediment discharge was computed by summing the partial suspended-sediment discharges.

Size analysis. – Twenty one cross-sectional, depth-integrated samples were analyzed using a split at 0.0625mm. Samples 2008-01, 2008-06, 2008-12, 2008-18, 2008-19, 2008-20, and 2008-21 were two pass samples; the remaining samples were single pass samples.

Partial suspended sediment-discharge computations. -- Discharge versus SSC transport curves, for each size class, were developed. Transport curves were developed for three distinct time periods, November, December, and May. The samples collected in October had no correlation with discharge. Suspended sediment discharge computations for this period were developed using the standard sedigraph technique. Equations were developed using an eye-fit approach, therefore y-intercept values were estimated through visual interpretation of the data. In addition, points were excluded from the analysis if they were visually identified as outliers. All data points are shown on the transport curves even if they were not used in the analysis. For the <0.0625mm size class, the discharge versus SSC transport equations developed for each of the time periods is shown in Eqn. (1), Eqn. (2), and Eqn. (3) respectively

$$y = 4.69011e^{-9}\left(x-845\right)^{3.18879},\ r^2 = 0.99 \quad (1)$$

$$y = 2.37202e^{-6}\left(x-845\right)^{2.18927},\ r^2 = 0.98 \quad (2)$$

$$y = 1.52675e^{-9}\left(x-845\right)^{2.93814},\ r^2 = 0.98 \quad (3)$$

Eqn. (1) was developed using all samples collected during the November data collection effort with the exception of sample 2008-07, which was identified as an outlier. Eqn.(1) is used from October 1, 2008 at 00:00 hours until December 1, 2008, at 20:30 hours. Eqn. (2) was developed using all samples collected during the December data collection effort. Eqn. (2) is used from December 1, 2008 at 20:45 hours until April 3, 2008 at 20:00 hours. Eqn. (3) was developed using all samples collected during the May data collection effort. Eqn. (3) is used from April, 3, 2008 and 20:15 hours until the end of the computational period on July 10, 2008.

For the >0.0625mm size class, the discharge versus SSC transport equations developed for each of the time periods is shown in Eqn. (4), Eqn. (5), and Eqn. (6) respectively.

$$y = 2.36318e^{-3}(x-1000)^{1.70897}, \qquad r^2 = 0.99 \tag{4}$$

$$y = 1.4359e^{-1}(x-1000)^{1.09114}, \qquad r^2 = 0.98 \tag{5}$$

$$y = 1.12054e^{-4}(x-1000)^{1.79734}, \qquad r^2 = 0.96 \tag{6}$$

Eqn. (4) was developed using all samples collected during the November data collection effort.. Eqn. (4) is used from October 1, 2008, at 00:00 hours until December 1, 2008, at 20:30 hours. Eqn. (5) was developed using all samples collected during the December data collection effort. Eqn. (5) is used from December 1, 2008 at 20:45 hours until April 3, 2008 at 20:00 hours. Eqn. (6) was developed using all samples colelcted during the May data collection effort with the exception of sample 2008-19, which was identified as an outlier. Eqn. (6) is used from April, 3, 2008 and 20:15 hours until the end of the computational period on July 10, 2008.

Once continuous concentration curves weren developed for the <0.0625mm and >0.0625mm size classes, the sample data were used to adjust the curves by using fitting and proportional fitting techniques. Proportional fitting calculates the ratio between two values and then scales the appropriate time series by this ratio. When applied between sequential pairs of data, the ratio is decayed or increased linearly to match the end-points. Proportional fitting recognizes short-term correlations using subsets of data.

Suspended-sediment discharge was computed directly from the continuous concentration once the continuous concentration data had been checked and its accuracy verified.

Bed material.-- None.

Bedload measurement. -- Twenty Three bedload samples were collected during the Computational period. Samples 2008-01, 2008-05 through 2008-09, 2008-10, 2008-15, 2008-16, 2008-18, 2008-20, 2008-21, 2008-22, and 2008-23 were two pass samples; the remainder of the samples were single pass samples. Sample 2008-03 and 2008-04 were damaged in the lab and should be considered estimated.

Bedload-discharge computations. -- Total bedload discharge was computed by summing the partial bedload discharges.

Partial bedload-discharge computations -- Partial bedload discharges were computed for the <2mm, 2mm-8mm and >8mm size classes. Transport curves were developed for two distinct time periods: October through December and May. Equations were developed from an eye-fit perspective, therefore y-intercept values were estimated through visual interpretation of the data. In addition, points were excluded from the analysis if they were visually identified as outliers. All data points are shown on the transport curves even if they were not used in the analysis.

Due to the inherent high variability in bedload sampling, sample values were occasionally averaged to produce smooth sedigraphs. An average transport value was computed for samples 2008-14 through 2008-

16. Sample 2008-21 was not included in sedigraph development as it appeared to be an outlier when compared to surrounding data points.

For the <2mm size class, the discharge versus bedload transport equations developed for each of the time periods is shown in Eqn. (7) and Eqn. (8) respectively.

$$y = 1.70044e^{-3}(x-1800)^{1.91501}, \qquad r^2 = 0.95 \tag{7}$$

$$y = 2.60905e^{-3}(x-1800)^{1.62766}, \qquad r^2 = 0.92 \tag{8}$$

Eqn. (7) was developed using all samples collected during the October through December data collection efforts. Eqn. (7) is used from October 1, 2008 at 00:00 hours to April 3, 2008 at 20:00 hours. Eqn. (8) was developed using all samples collected during the May data collection effort. Eqn. (8) is used from April 3, 2008 at 20:15 hours through the end of the computational period on July 10, 2008.

For the 2mm-8mm size class, the discharge versus bedload transport equations developed for each of the time periods is shown in Eqn. (9) and Eqn. (10) respectively.

$$y = 1.66025e^{-4}(x-1800)^{1.88425}, \qquad r^2 = 0.91 \tag{9}$$

$$y = 3.96088e^{-4}(x-1800)^{1.58566}, \qquad r^2 = 0.98 \tag{10}$$

Eqn. (9) was developed using all samples collected during the October through December data collection efforts. Eqn. (9) is used from October 1, 2008 at 00:00 hours to April 3, 2008 at 20:00 hours. Eqn. (10) was developed using all samples collected during the May data collection effort with the exception of samples 2008-21 and 2008-22, which were identified as outliers. Eqn. (10) is used from April 3, 2008 at 20:15 hours through the end of the computational period on July 10, 2008.

For the >8mm size class, the discharge versus bedload transport equations developed for each of the time periods is shown in Eqn. (11) and Eqn. (12) respectively.

$$y = 4.79371*10^{-8}(x-1800)^{2.75315}, \qquad r^2 = 0.93 \tag{11}$$

$$y = 3.91531*10^{-8}(x-1800)^{2.68858}, \qquad r^2 = 0.63 \tag{12}$$

Eqn. (11) was developed using all samples collected during the October through December data collection efforts. Eqn. (11) is used from October 1, 2008 at 00:00 hours to April 3, 2008 at 20:00 hours. Eqn. (12) was developed using all samples collected during the May data collection effort with the exception of samples 2008-21 and 2008-22, which were identified as outliers. Eqn. (12) is used from April 3, 2008 at 20:15 hours through the end of the computational period on July 10, 2008.

Once the continuous bedload-discharge curves were developed using the above transport curves, they were adjusted using the sample values. The same fitting techniques described under the suspended sediment discharge portion of this station analysis were used.

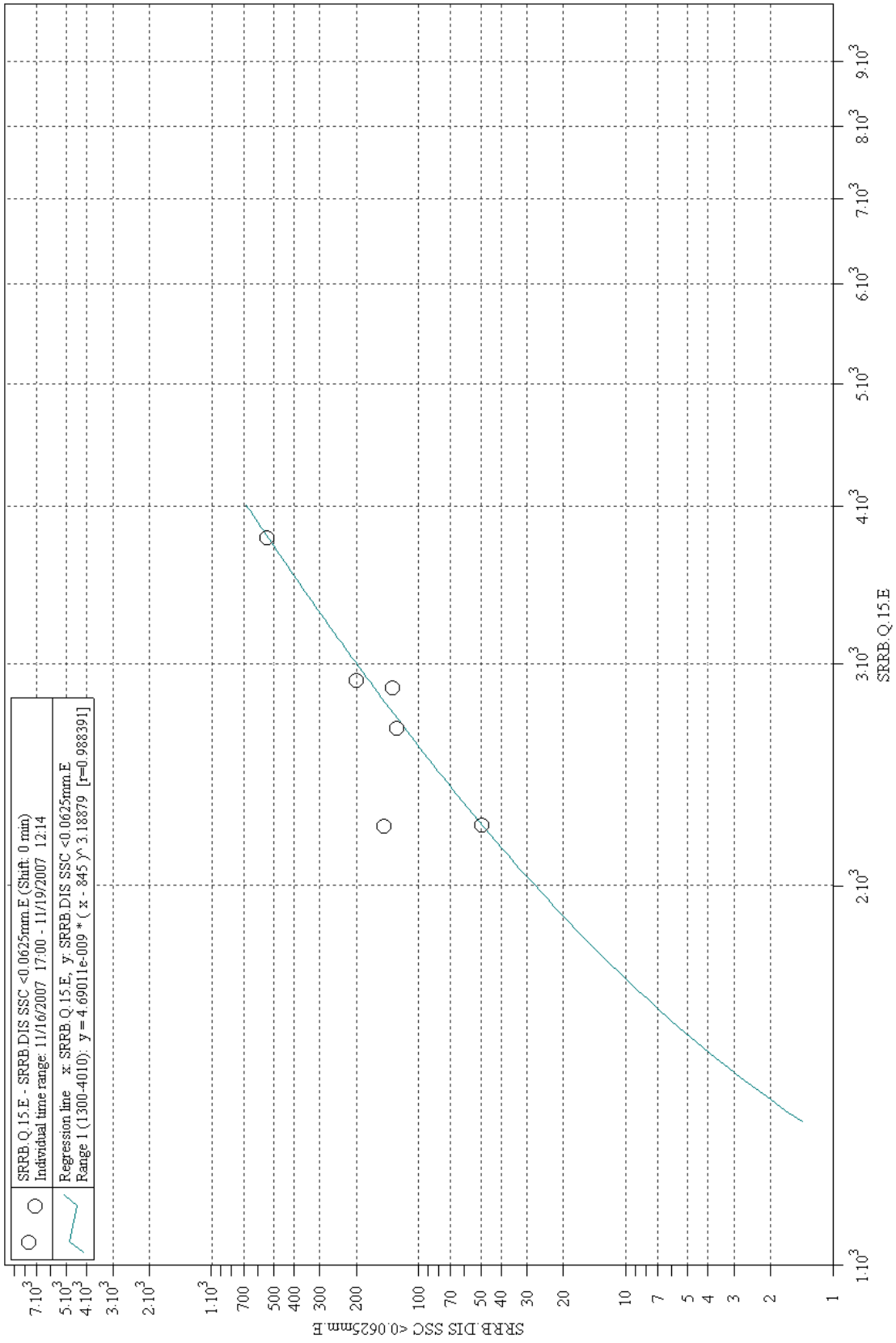
Remarks The suspended-sediment discharge and bedload discharge records are rated as follows:

October 01 (00:00) to October 19 (23:45)	Estimated
October 20 (00:00) to October 21 (23:45)	Good
October 22 (00:00) to November 16 (23:45)	Estimated
Novermber 17 (00:00) to November 19 (23:45)	Good
Novermber 20 (00:00) to December 02 (23:45)	Estimated

December 03 (00:00) to December 06 (23:45)	Good
December 07 (00:00) to May 14 (23:45)	Estimated
May 15 (00:00) to May 17 (23:45)	Good
May 17 (00:00) to July 10 (23:45)	Estimated

Computed by: C. Pryor -- July, 2008

Reviewed by: S. Pittman – August, 2008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Regression line x: SRRB.Q.15.E, y: SRRB.DIS SSC <0.0625mm.E
Range 1 (1300-4010): y = 4.69011e-009 * (x - 845)^ 3.18879 [r=0.988391]
SRRB.DIS SSC <0.0625mm.E
SRRB.Q.15.E
7·10^3
5·10^3
4·10^3
3·10^3
2·10^3
1·10^3
700
500
400
300
200
100
70
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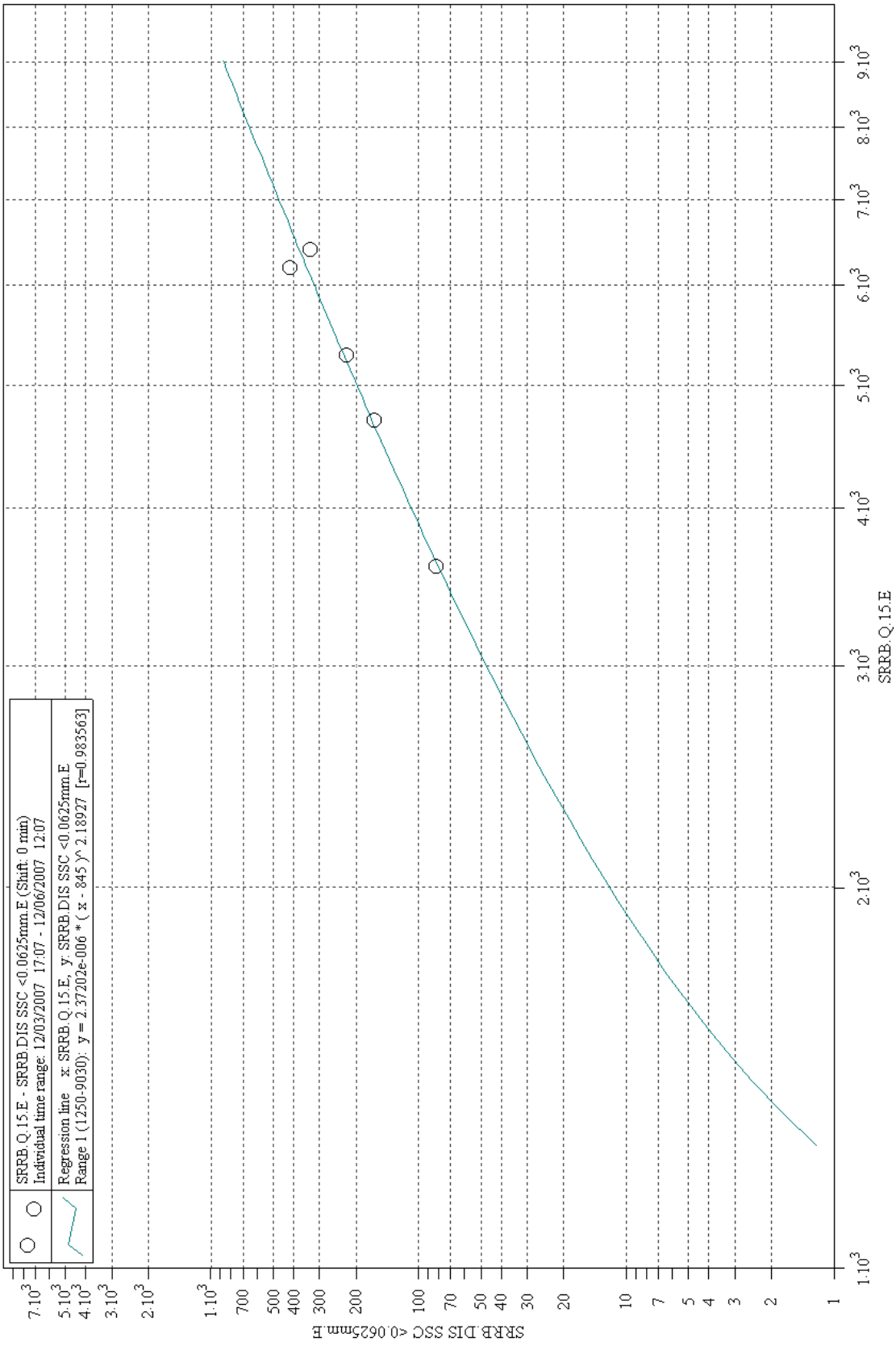
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Individual time range: 12/03/2007 17:07 - 12/06/2007 12:07
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Range 1 (1250-9030): y = 2.37202e-006 * (x - 845)^ 2.18927 [r=0.983563]
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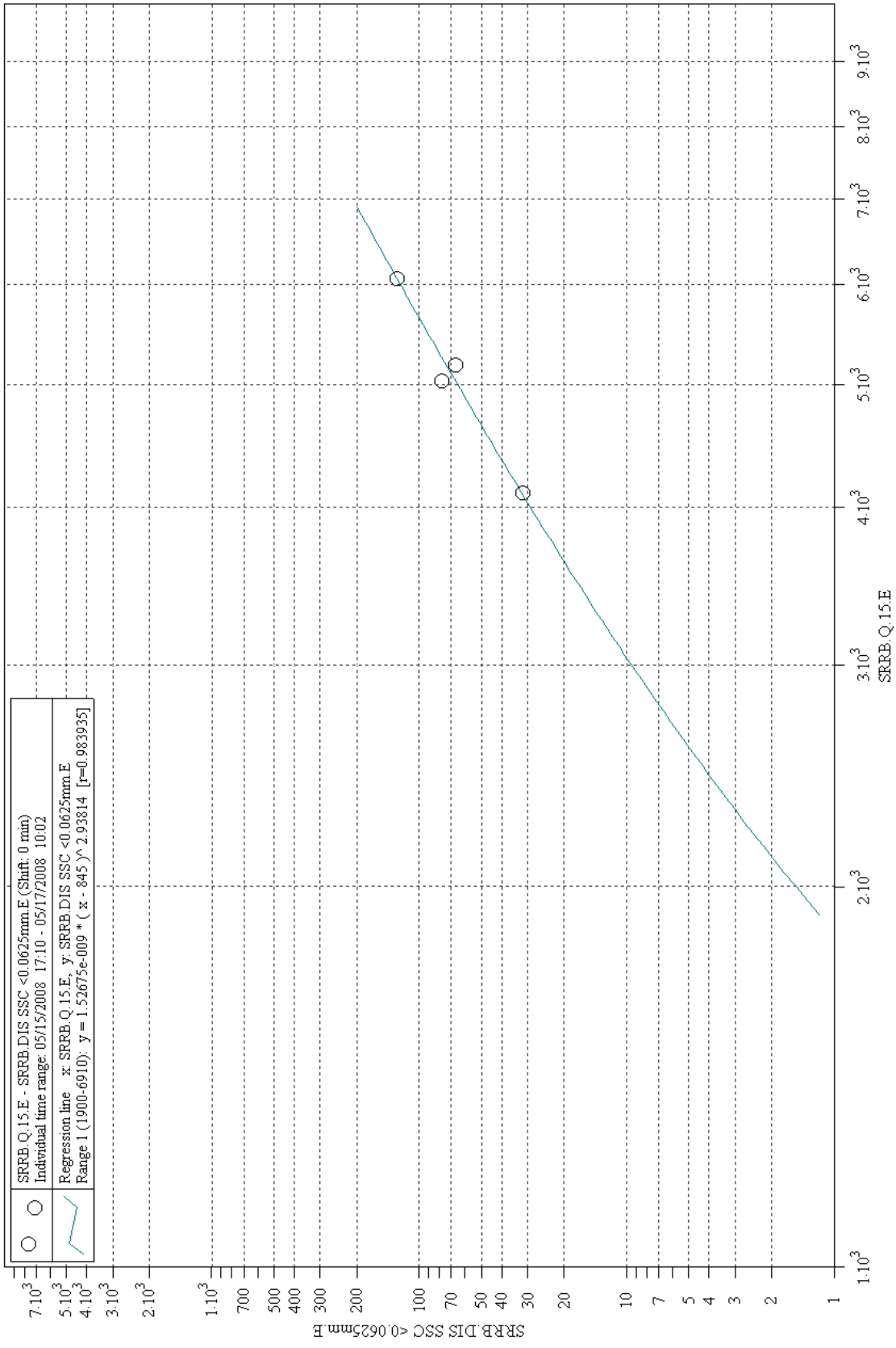
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Individual time range: 05/15/2008 17:10 - 05/17/2008 10:02
Regression line x: SRRB.Q.15.E, y: SRRB.DIS SSC <0.0625mm.E
Range 1 (1900-6910): y = 1.52675e-009 * (x - 845)^ 2.93814 [r=0.983935]
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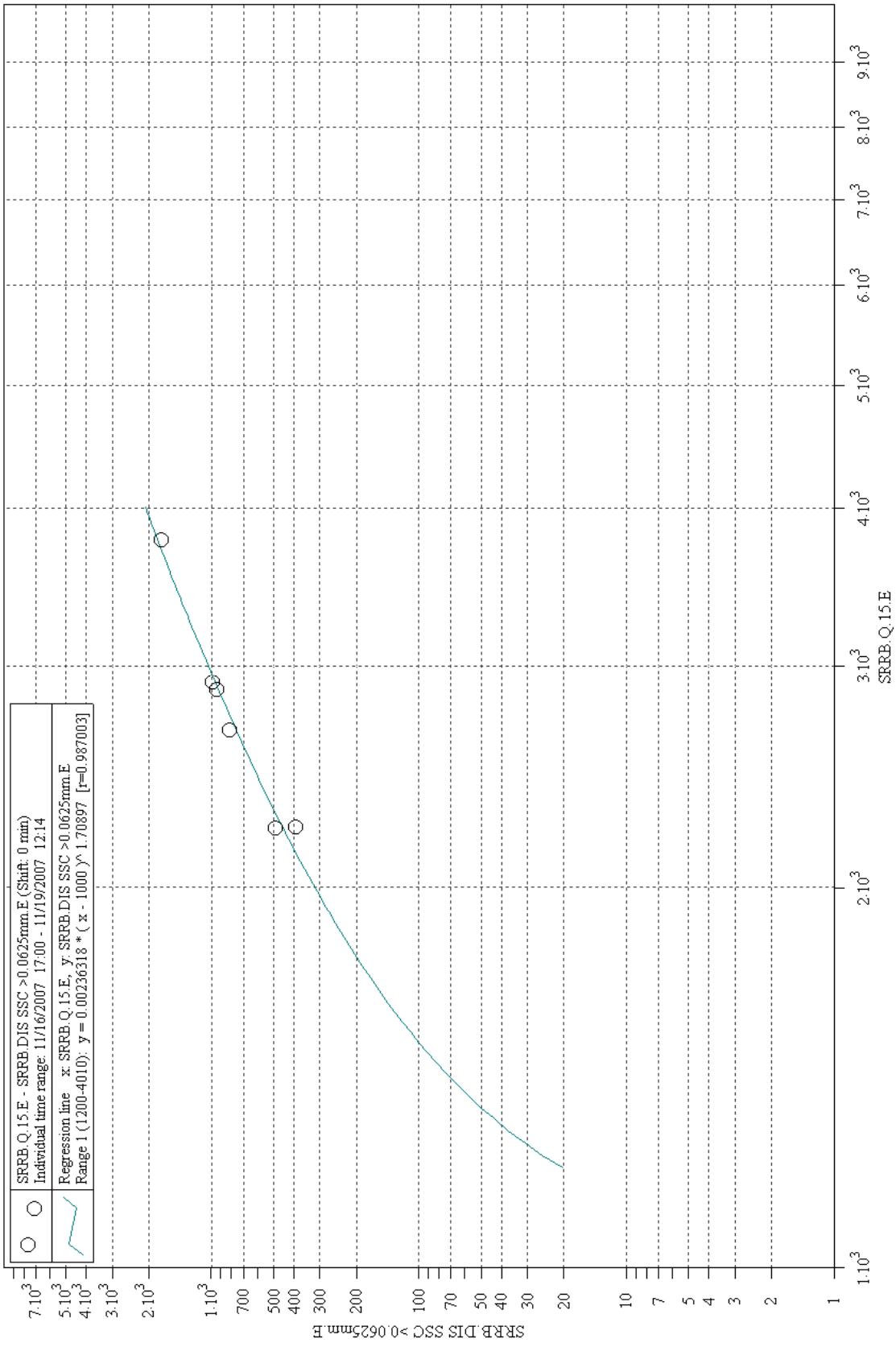
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.DIS SSC >0.0625mm.E (Shift: 0 min)
Individual time range: 11/16/2007 17:00 - 11/19/2007 12:14
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Range 1 (1200-4010): y = 0.00236318 * (x - 1000)^ 1.70897 [r=0.987003]
SRRB.DIS SSC >0.0625mm.E
SRRB.Q.15.E
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4.10^3
3.10^3
2.10^3
1.10^3
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500
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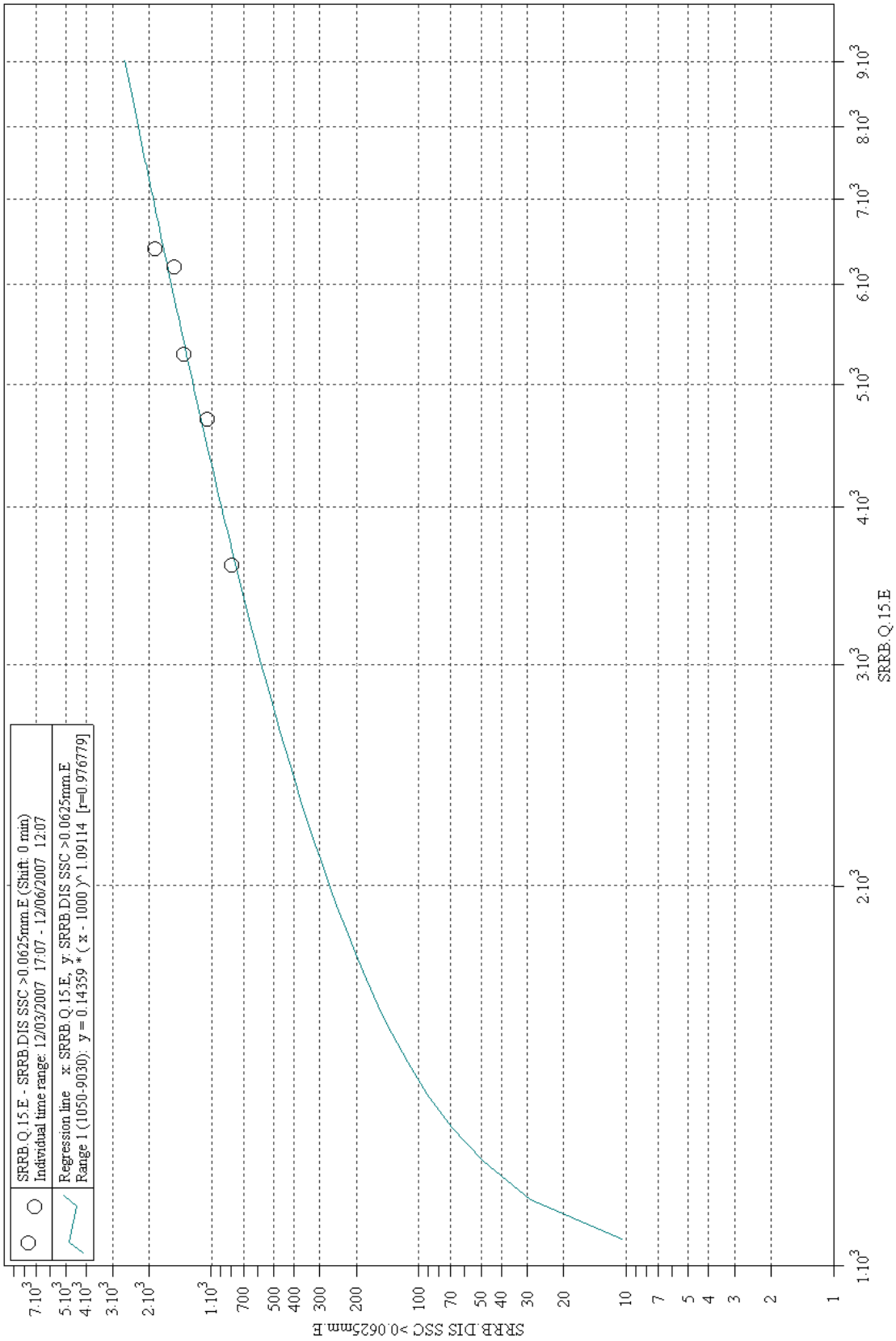
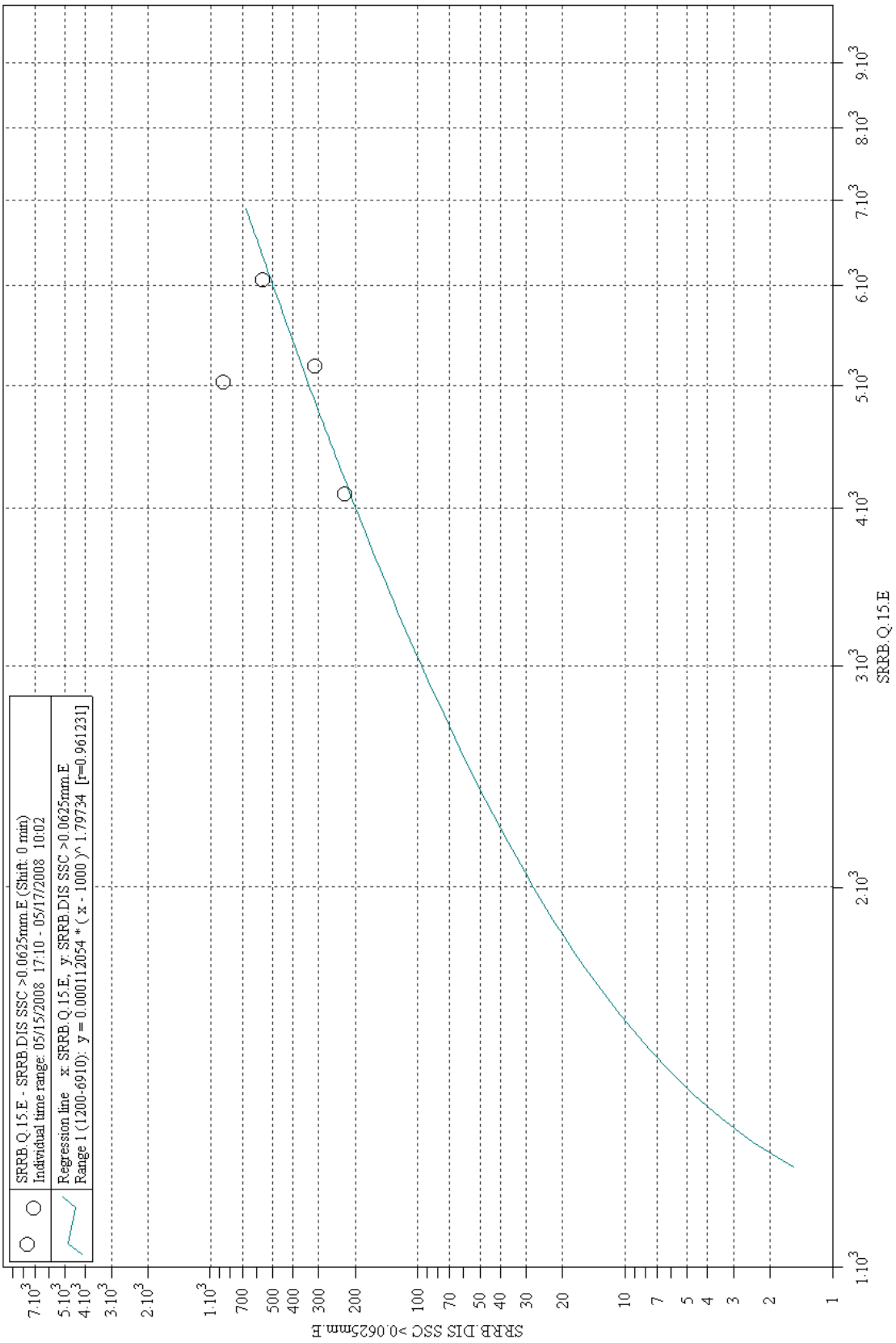
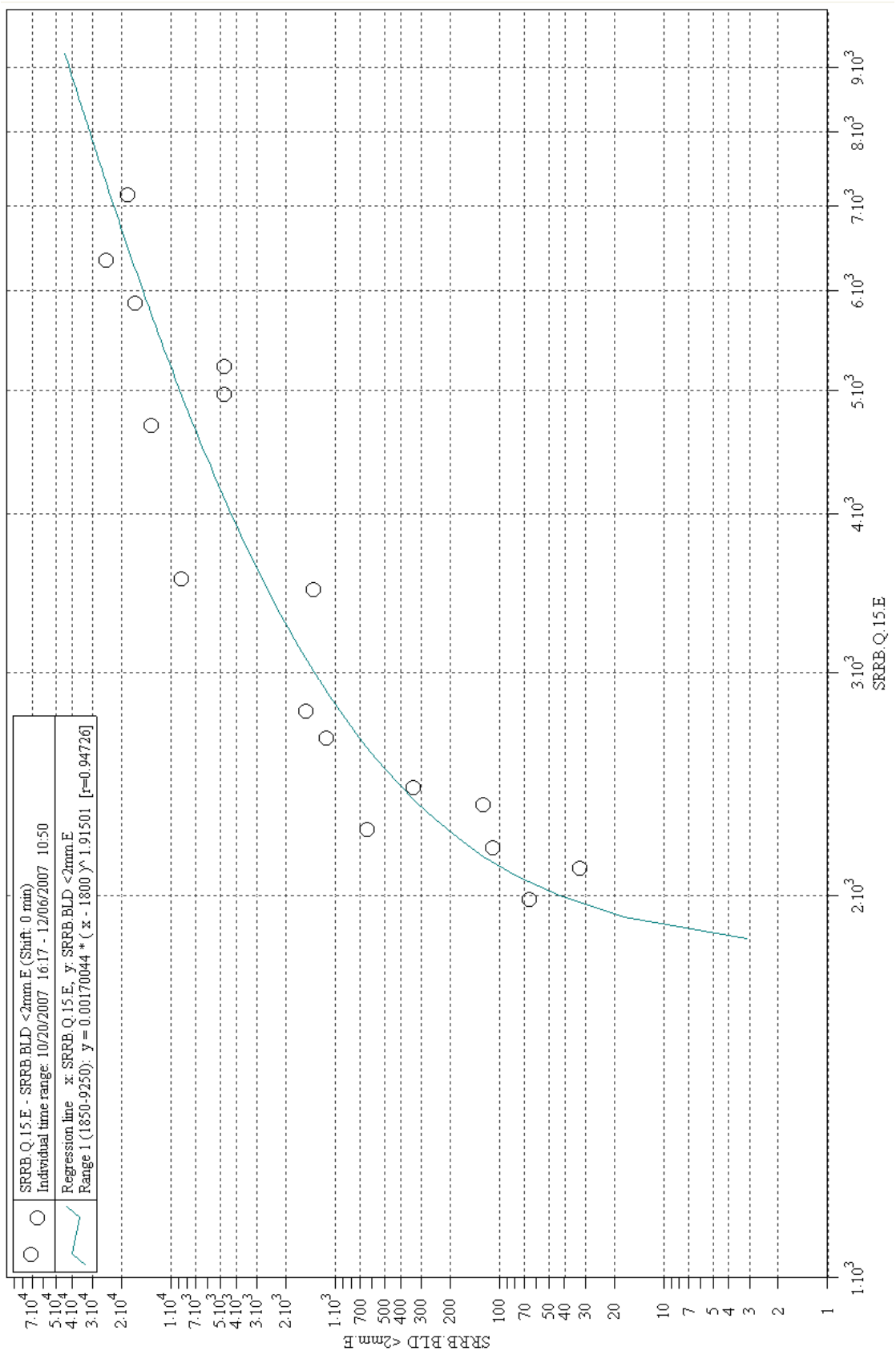
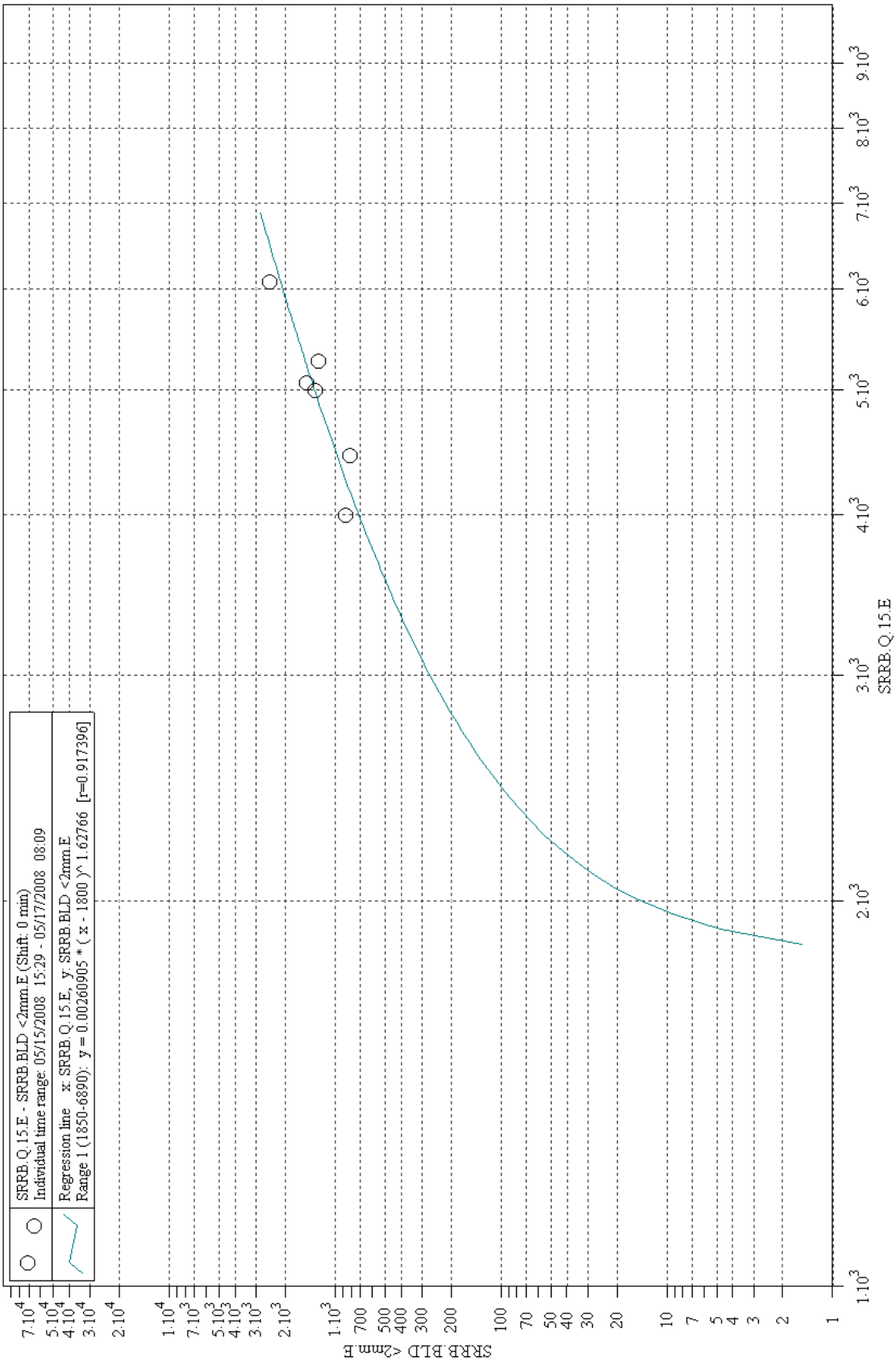
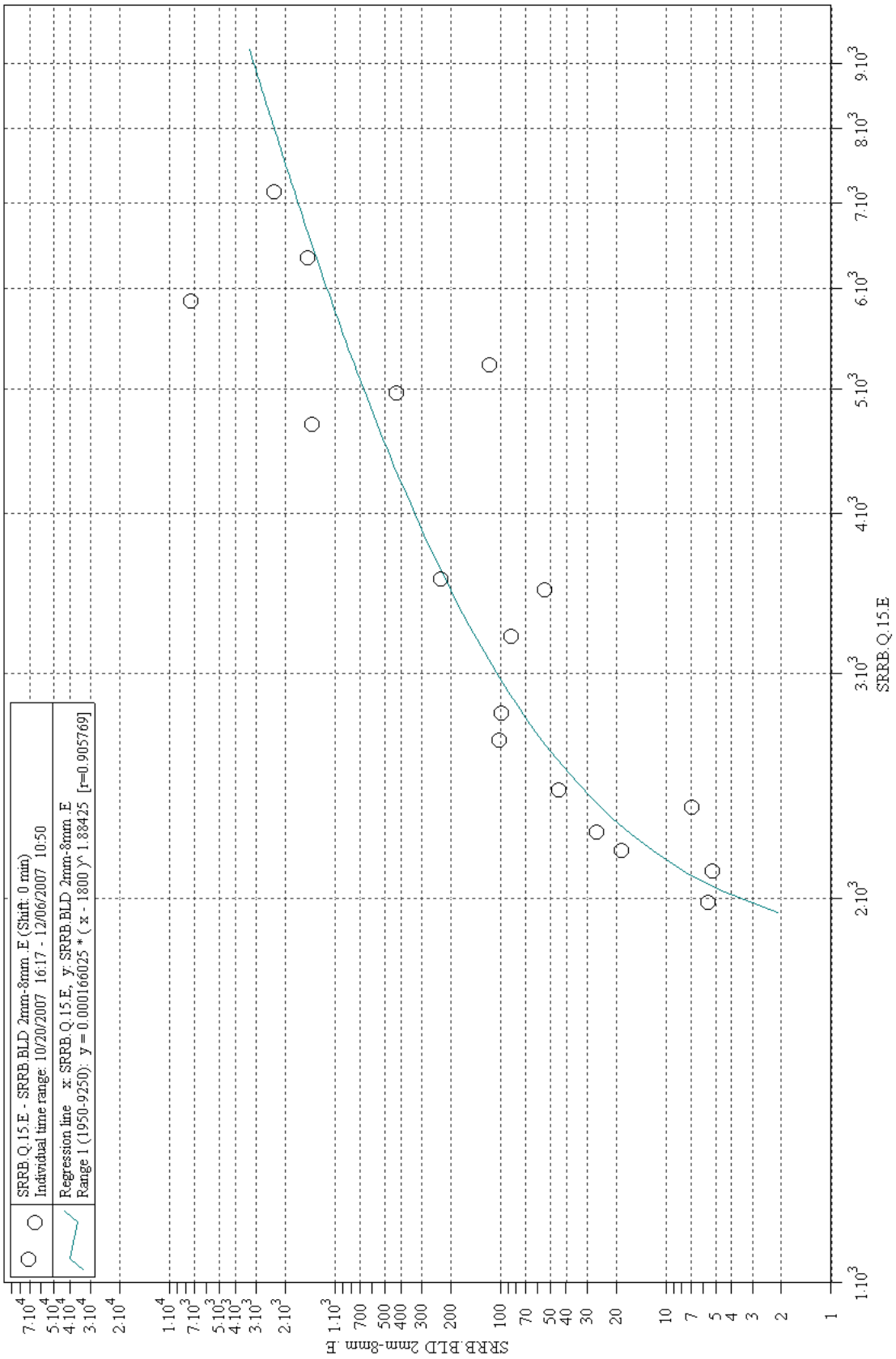
8.10^3
9.10^3

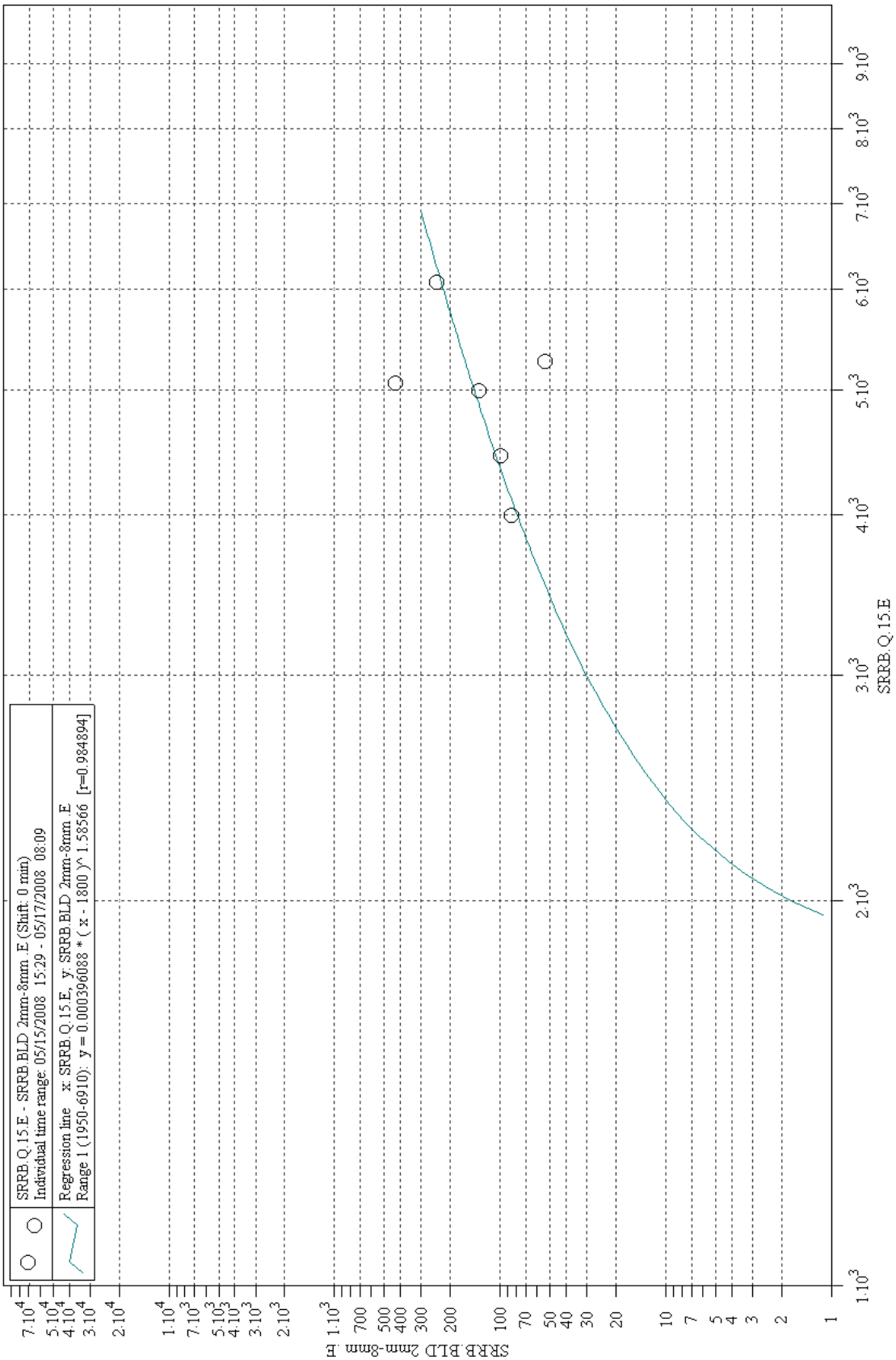

SRRB.Q.15.E - SRRB.DIS SSC >0.0625mm.E (Shift: 0 min)
Individual time range: 12/03/2007 17:07 - 12/06/2007 12:07
Regression line x: SRRB.Q.15.E, y: SRRB.DIS SSC >0.0625mm.E
Range 1 (1050-9030): y = 0.14359 * (x - 1000)^ 1.09114 [r=0.976779]
SRRB.DIS SSC >0.0625mm.E
SRRB.Q.15.E

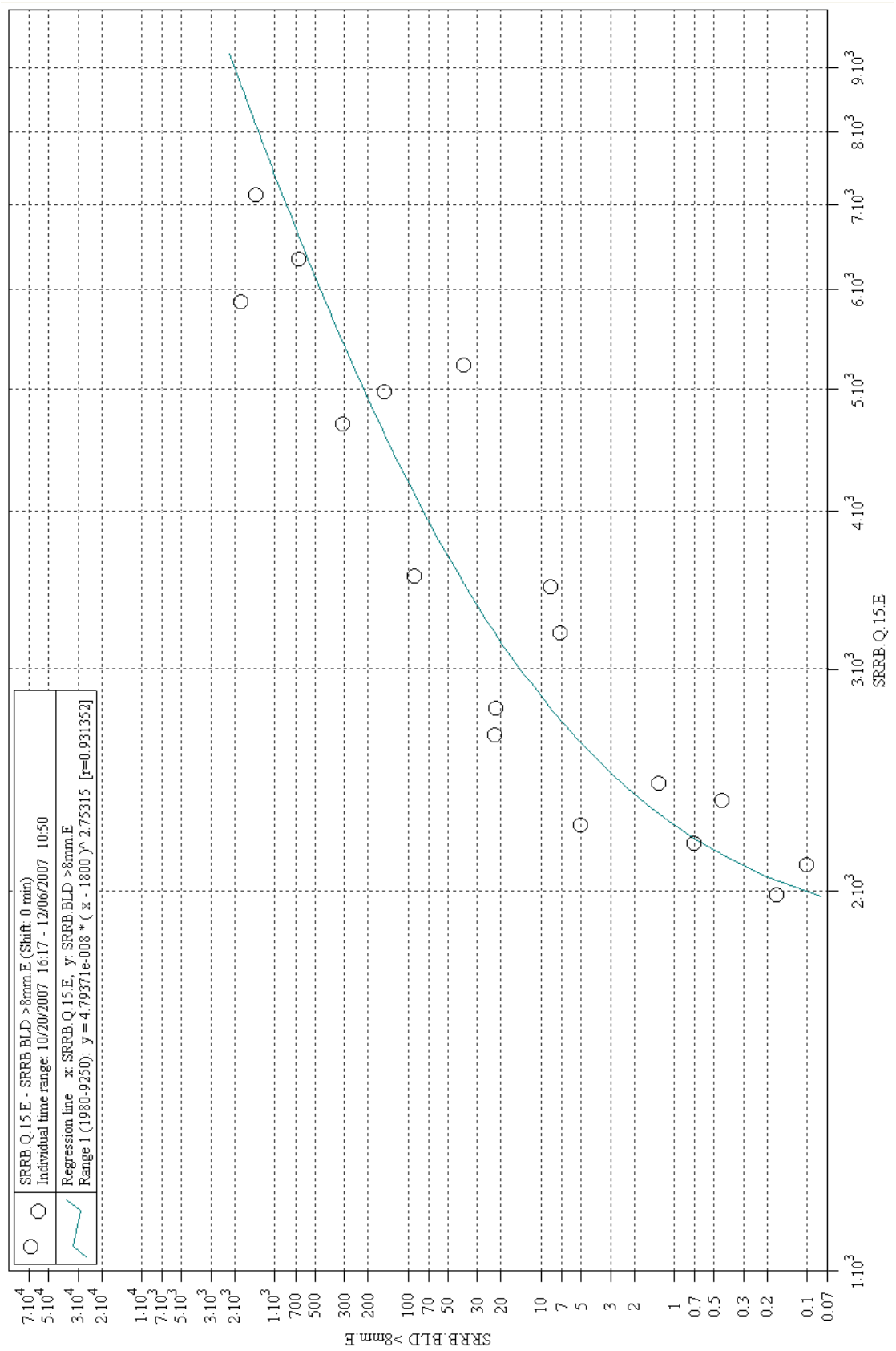

SRRB.Q.15.E - SRRB.DIS SSC >0.0625mm.E (Shift: 0 min)
Individual time range: 05/15/2008 17:10 - 05/17/2008 10:02
Regression line x: SRRB.Q.15.E, y: SRRB.DIS SSC >0.0625mm.E
Range 1 (1200-6910): y = 0.000112054 * (x - 1000)^ 1.79734 [r=0.961231]
SRRB.DIS SSC >0.0625mm.E
SRRB.Q.15.E

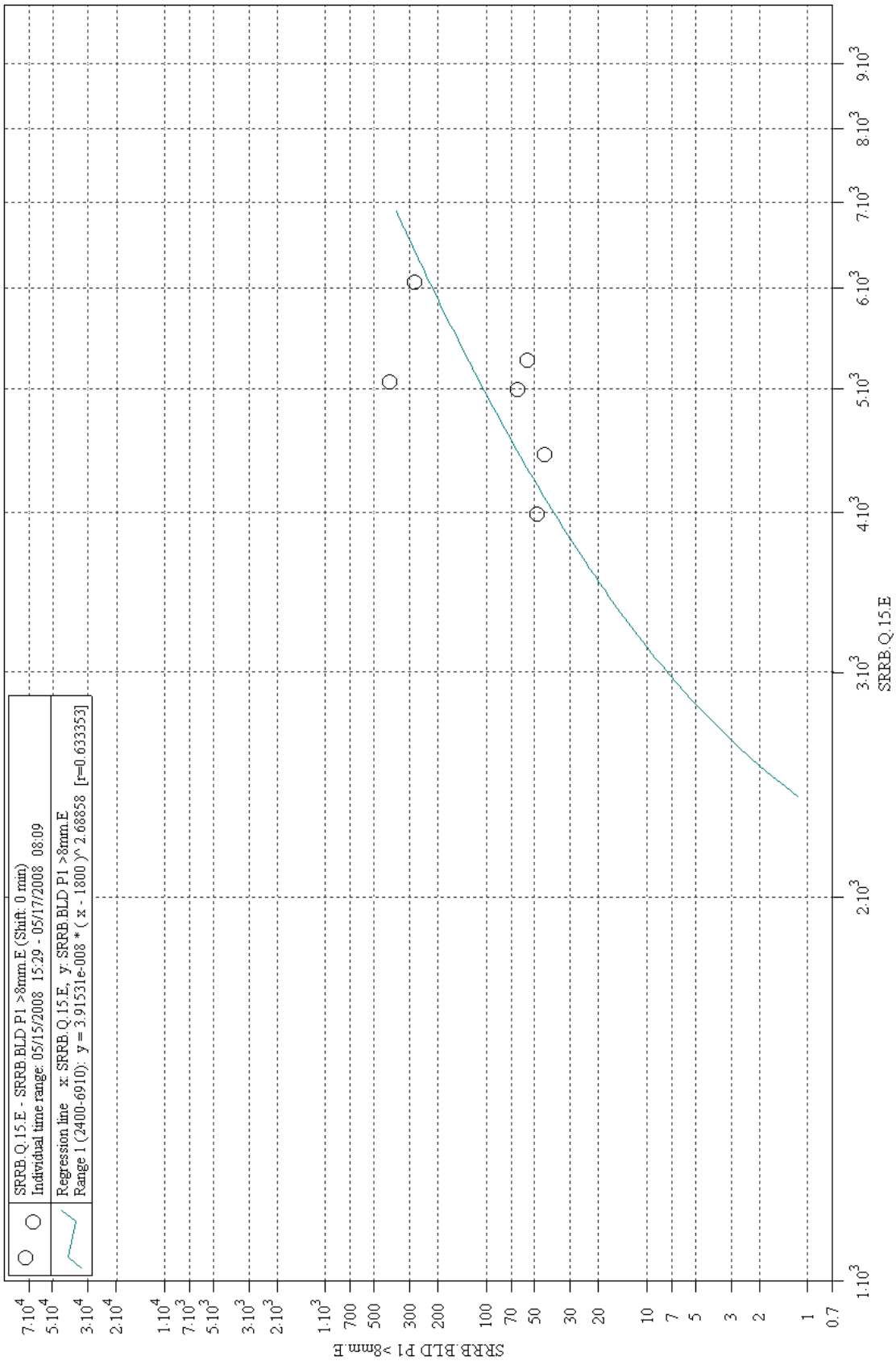

SRRB.Q.15.E - SRRB.BLD <2mm.E (Shift: 0 min)
Individual time range: 10/20/2007 16:17 - 12/06/2007 10:50
Regression line x: SRRB.Q.15.E, y: SRRB.BLD <2mm.E
Range 1 (1850-9250): y = 0.00170044 * (x - 1800)^ 1.91501 [r=0.94726]
SRRB.BLD <2mm.E
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.BLD <2mm.E (Shift: 0 min)
Individual time range: 05/15/2008 15:29 - 05/17/2008 08:09
Regression line x: SRRB.Q.15.E, y: SRRB.BLD <2mm.E
Range 1 (1850-6890): y = 0.00260905 * (x - 1800)^1.62766 [r=0.917396]
SRRB.BLD <2mm.E
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.BLD 2mm-8mm .E (Shift: 0 min)
Individual time range: 10/20/2007 16:17 - 12/06/2007 10:50
Regression line x: SRRB.Q.15.E, y: SRRB.BLD 2mm-8mm .E
Range 1 (1950-9250): y = 0.000166025 * (x - 1800)^ 1.88425 [r=0.905769]
SRRB.BLD 2mm-8mm .E
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.BLD 2mm-8mm .E (Shift: 0 min)
Individual time range: 05/15/2008 15:29 - 05/17/2008 08:09
Regression line x: SRRB.Q.15.E, y: SRRB.BLD 2mm-8mm .E
Range 1 (1950-6910): y = 0.0003960883 * (x - 1800)^ 1.58566 [r=0.984894]
SRRB.BLD 2mm-8mm .E
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.BLD >8mm.E (Shift: 0 min)
Individual time range: 10/20/2007 16:17 - 12/06/2007 10:50
Regression line x: SRRB.Q.15.E, y: SRRB.BLD >8mm.E
Range 1 (1980-9250): y = 4.79371e-008 * (x - 1800)^ 2.75315 [r=0.931352]
SRRB.BLD >8mm.E
SRRB.Q.15.E


SRRB.Q.15.E - SRRB.BLD P1 >8mm.E (Shift: 0 min)
Individual time range: 05/15/2008 15:29 - 05/17/2008 08:09
Regression line x: SRRB.Q.15.E, y: SRRB.BLD P1 >8mm.E
Range 1 (2400-6910): y = 3.91531e-008 * (x - 1800)^ 2.68858 [r=0.633353]
SRRB.BLD P1 >8mm.E
SRRB.Q.15.E

GMA Version: March 2008

Hydrology | Geomorphology | Stream Restoration

PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	1
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/20/2007
Crew:	SP, LC	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	03:40 PM	**Start station (ft):**	40.0
End time (hh:mm):	04:15 PM	**End station (ft):**	240.0
Begin SH (ft):	-4.11	**Interval (ft):**	20
End SH (ft):		**Duration (sec):**	60
Sampled width (ft)	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed: 02/01/2008
Processed and Entered by: BC
Checked by: BC
Units: grams

---------- WEIGHT ----------

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	2336.39	0.0%	100.0%
180	256						0.00	2336.39	0.0%	100.0%
128	180						0.00	2336.39	0.0%	100.0%
90	128						0.00	2336.39	0.0%	100.0%
64	90						0.00	2336.39	0.0%	100.0%
45	64						0.00	2336.39	0.0%	100.0%
31.5	45						0.00	2336.39	0.0%	100.0%
22.4	31.5						0.00	2336.39	0.0%	100.0%
16	22.4						0.00	2336.39	0.0%	100.0%
11.2	16						0.00	2336.39	0.0%	100.0%
8	11.2						2.50	2336.39	0.1%	100.0%
5.6	8						8.00	2333.89	0.3%	99.9%
4	5.6				2.70	7.21	19.47	2325.89	0.8%	99.6%
2.8	4				6.00	7.21	43.27	2306.42	1.9%	98.7%
2	2.8				13.70	7.21	98.81	2263.15	4.2%	96.9%
1	2				114.50	7.21	825.78	2164.34	35.3%	92.6%
0.85	1				40.10	7.21	289.20	1338.56	12.4%	57.3%
0.5	0.85				101.80	7.21	734.19	1049.36	31.4%	44.9%
0.25	0.5				20.30	7.21	146.41	315.17	6.3%	13.5%
0.125	0.25				10.30	7.21	74.28	168.76	3.2%	7.2%
0.063	0.125				8.60	7.21	62.02	94.48	2.7%	4.0%
Pan	0.063				4.50	7.21	32.45	32.45	1.4%	1.4%
	TOTAL:				323		2,336.39	2,336.39	100.00%	100.00%

Sample Dry Wt 2,340 Total Processed Wt 2,336 = Net Loss: 3.606
% of Sample: 0.15%

Splitting: Gross Split _____ - Tare _____ = Net Split 2329.5

Split at _____ mm Split Wt. = 323

Split/Net = 0.139

Multiplier (inverse Split/Net) = 7.212

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
315.17	1,849.18	169.55	2,018.73	2.50	2,336.39

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	1
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/20/2007
Crew:	SP, LC	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	04:20 PM	**Start station (ft):**	20.0
End time (hh:mm):	04:55 PM	**End station (ft):**	240.0
Begin SH (ft):		**Interval (ft):**	20
End SH (ft):	-4.07	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed: 02/01/2008
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	2153.51	0.0%	100.0%
180	256						0.00	2153.51	0.0%	100.0%
128	180						0.00	2153.51	0.0%	100.0%
90	128						0.00	2153.51	0.0%	100.0%
64	90						0.00	2153.51	0.0%	100.0%
45	64						0.00	2153.51	0.0%	100.0%
31.5	45						0.00	2153.51	0.0%	100.0%
22.4	31.5						0.00	2153.51	0.0%	100.0%
16	22.4						0.00	2153.51	0.0%	100.0%
11.2	16						0.00	2153.51	0.0%	100.0%
8	11.2						7.50	2153.51	0.3%	100.0%
5.6	8						12.00	2146.01	0.6%	99.7%
4	5.6				3.00	7.99	23.98	2134.01	1.1%	99.1%
2.8	4				6.00	7.99	47.96	2110.04	2.2%	98.0%
2	2.8				11.50	7.99	91.91	2062.08	4.3%	95.8%
1	2				63.50	7.99	507.53	1970.17	23.6%	91.5%
0.85	1				23.50	7.99	187.83	1462.64	8.7%	67.9%
0.5	0.85				94.50	7.99	755.30	1274.81	35.1%	59.2%
0.25	0.5				27.00	7.99	215.80	519.52	10.0%	24.1%
0.125	0.25				21.50	7.99	171.84	303.72	8.0%	14.1%
0.063	0.125				12.00	7.99	95.91	131.88	4.5%	6.1%
Pan	0.063				4.50	7.99	35.97	35.97	1.7%	1.7%
TOTAL:					267		2,153.51	2,153.51	100.00%	100.00%

Sample Dry Wt: 2,170 — Total Processed Wt: 2,153.51 — = — Net Loss: 15.985 — % of Sample: 0.74%

Splitting: Gross Split _____ - Tare _____ = Net Split 2150

Split at _____ mm — Split Wt. = 269

Split/Net = 0.125

Multiplier (inverse Split/Net) = 7.993

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
519.52	1,450.65	175.85	1,626.50	7.50	2,153.51

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	2
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/20/2007
Crew:	SP, LC	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	05:25 PM	**Start station (ft):**	40.0
End time (hh:mm):	05:50 PM	**End station (ft):**	240.0
Begin SH (ft):	-4.02	**Interval (ft):**	20
End SH (ft):	-4.00	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	1	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	1180.31	0.0%	100.0%
180	256						0.00	1180.31	0.0%	100.0%
128	180						0.00	1180.31	0.0%	100.0%
90	128						0.00	1180.31	0.0%	100.0%
64	90						0.00	1180.31	0.0%	100.0%
45	64						0.00	1180.31	0.0%	100.0%
31.5	45						0.00	1180.31	0.0%	100.0%
22.4	31.5						0.00	1180.31	0.0%	100.0%
16	22.4						0.00	1180.31	0.0%	100.0%
11.2	16						0.00	1180.31	0.0%	100.0%
8	11.2						2.40	1180.31	0.2%	100.0%
5.6	8						5.70	1177.91	0.5%	99.8%
4	5.6				3.50	3.52	12.32	1172.21	1.0%	99.3%
2.8	4				13.90	3.52	48.92	1159.90	4.1%	98.3%
2	2.8				28.00	3.52	98.53	1110.98	8.3%	94.1%
1	2				122.50	3.52	431.09	1012.45	36.5%	85.8%
0.85	1				28.30	3.52	99.59	581.36	8.4%	49.3%
0.5	0.85				83.70	3.52	294.55	481.77	25.0%	40.8%
0.25	0.5				21.00	3.52	73.90	187.22	6.3%	15.9%
0.125	0.25				19.20	3.52	67.57	113.32	5.7%	9.6%
0.063	0.125				10.90	3.52	38.36	45.75	3.2%	3.9%
Pan	0.063				2.10	3.52	7.39	7.39	0.6%	0.6%
TOTAL:					333		1,180.31	1,180.31	100.00%	100.00%

Sample Dry Wt: 1,187 Total Processed Wt: 1,180 = Net Loss: 6.686 (% of Sample: 0.56%)

Splitting: Gross Split _____ - Tare _____ = Net Split 1178.9

Split at _____ mm Split Wt. = 335

Split/Net = 0.284

Multiplier (inverse Split/Net) = 3.519

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
187.22	825.23	165.47	990.70	2.40	1,180.31

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	3
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/20/2007
Crew:	SP, LC	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	06:20 PM	**Start station (ft):**	40.0
End time (hh:mm):	06:43 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.98	**Interval (ft):**	20
End SH (ft):	-3.96	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	1	**Total bags:**	2

Notes

Sample contaminated during sediment laboratory processing. Used the distribution of the uncontaminated portion of the sample and added the weight of the contaminated material to that distribution.

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

---------- WEIGHT ----------

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	4032.70	0.0%	100.0%
180	256						0.00	4032.70	0.0%	100.0%
128	180						0.00	4032.70	0.0%	100.0%
90	128						0.00	4032.70	0.0%	100.0%
64	90						0.00	4032.70	0.0%	100.0%
45	64						0.00	4032.70	0.0%	100.0%
31.5	45						0.00	4032.70	0.0%	100.0%
22.4	31.5						0.00	4032.70	0.0%	100.0%
16	22.4						0.00	4032.70	0.0%	100.0%
11.2	16						0.00	4032.70	0.0%	100.0%
8	11.2						21.54	4032.70	0.5%	100.0%
5.6	8						43.09	4011.16	1.1%	99.5%
4	5.6						80.02	3968.07	2.0%	98.4%
2.8	4						152.85	3888.05	3.8%	96.4%
2	2.8						302.63	3735.20	7.5%	92.6%
1	2						1391.08	3432.57	34.5%	85.1%
0.85	1						439.07	2041.48	10.9%	50.6%
0.5	0.85						1148.98	1602.41	28.5%	39.7%
0.25	0.5						240.05	453.44	6.0%	11.2%
0.125	0.25						106.69	213.38	2.6%	5.3%
0.063	0.125						69.76	106.69	1.7%	2.6%
Pan	0.063						36.93	36.93	0.9%	0.9%
	TOTAL:				0		4,032.70	4,032.70	100.00%	100.00%

Sample Dry Wt: 4,033 — Total Processed Wt: 4,033 — = — Net Loss: 0.000 — % of Sample: 0.00%

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm — Split Wt. = _____

Split/Net = _____

Multiplier (inverse Split/Net) = _____

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
453.44	2,979.13	578.59	3,557.72	21.54	4,032.70

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	4
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/21/2007
Crew:	SP, LC	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	09:44 AM	**Start station (ft):**	40.0
End time (hh:mm):	10:10 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.86	**Interval (ft):**	20
End SH (ft):	-3.93	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1, 2
Total passes:	1	**Total bags:**	2

Notes

Sample contaminated during sediment laboratory processing. Used the distribution of the uncontaminated portion of the sample and added the weight of the contaminated material to that distribution.

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

---------- WEIGHT ----------

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	11874.87	0.0%	100.0%
180	256						0.00	11874.87	0.0%	100.0%
128	180						0.00	11874.87	0.0%	100.0%
90	128						0.00	11874.87	0.0%	100.0%
64	90						0.00	11874.87	0.0%	100.0%
45	64						0.00	11874.87	0.0%	100.0%
31.5	45						0.00	11874.87	0.0%	100.0%
22.4	31.5						0.00	11874.87	0.0%	100.0%
16	22.4						0.00	11874.87	0.0%	100.0%
11.2	16						17.83	11874.87	0.2%	100.0%
8	11.2						23.78	11857.04	0.2%	99.8%
5.6	8						65.53	11833.26	0.6%	99.6%
4	5.6						155.48	11767.73	1.3%	99.1%
2.8	4						325.53	11612.25	2.7%	97.8%
2	2.8						845.41	11286.72	7.1%	95.0%
1	2						4222.20	10441.31	35.6%	87.9%
0.85	1						1158.80	6219.11	9.8%	52.4%
0.5	0.85						3461.81	5060.32	29.2%	42.6%
0.25	0.5						1185.52	1598.51	10.0%	13.5%
0.125	0.25						315.81	412.99	2.7%	3.5%
0.063	0.125						70.45	97.17	0.6%	0.8%
Pan	0.063						26.72	26.72	0.2%	0.2%
	TOTAL:				0		11,874.87	11,874.87	100.00%	100.00%

Sample Dry Wt: 11,877 — Total Processed Wt: 11,875 — = — Net Loss: 2.429 — % of Sample: 0.02%

Splitting: Gross Split _____ - Tare _____ = Net Split 8514

Split at _____ mm — Split Wt. = 484.5

Split/Net = 0.057

Multiplier (inverse Split/Net) = 17.573

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
1,598.51	8,842.80	1,391.95	10,234.75	41.61	11,874.87

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	5
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/21/2007
Crew:	SP, LC, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:43 AM	**Start station (ft):**	40.0
End time (hh:mm):	11:12 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.90	**Interval (ft):**	20
End SH (ft):	-3.91	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	3837.44	0.0%	100.0%
180	256						0.00	3837.44	0.0%	100.0%
128	180						0.00	3837.44	0.0%	100.0%
90	128						0.00	3837.44	0.0%	100.0%
64	90						0.00	3837.44	0.0%	100.0%
45	64						0.00	3837.44	0.0%	100.0%
31.5	45						0.00	3837.44	0.0%	100.0%
22.4	31.5						0.00	3837.44	0.0%	100.0%
16	22.4						0.00	3837.44	0.0%	100.0%
11.2	16						9.30	3837.44	0.2%	100.0%
8	11.2						10.40	3828.14	0.3%	99.8%
5.6	8						10.00	3817.74	0.3%	99.5%
4	5.6				2.20	13.69	30.11	3807.74	0.8%	99.2%
2.8	4				2.10	13.69	28.74	3777.63	0.7%	98.4%
2	2.8				4.60	13.69	62.96	3748.88	1.6%	97.7%
1	2				39.50	13.69	540.64	3685.92	14.1%	96.1%
0.85	1				25.10	13.69	343.54	3145.28	9.0%	82.0%
0.5	0.85				132.50	13.69	1813.53	2801.74	47.3%	73.0%
0.25	0.5				53.90	13.69	737.73	988.21	19.2%	25.8%
0.125	0.25				14.20	13.69	194.36	250.47	5.1%	6.5%
0.063	0.125				3.10	13.69	42.43	56.12	1.1%	1.5%
Pan	0.063				1.00	13.69	13.69	13.69	0.4%	0.4%
	TOTAL:				278		3,837.44	3,837.44	100.00%	100.00%

Sample Dry Wt 3,830 Total Processed Wt 3,837 = Net Loss: -7.437
% of Sample: -0.19%

Splitting: Gross Split _____ - Tare _____ = Net Split 3805

Split at _____ mm Split Wt. = 278

Split/Net = 0.073

Multiplier (inverse Split/Net) = 13.687

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
988.21	2,697.72	131.81	2,829.53	19.70	3,837.44

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	5
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	10/21/2007
Crew:	LC, SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	11:14 AM	**Start station (ft):**	40.0
End time (hh:mm):	11:45 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.91	**Interval (ft):**	20
End SH (ft):	-3.93	**Duration (sec):**	60
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	4532.31	0.0%	100.0%
180	256						0.00	4532.31	0.0%	100.0%
128	180						0.00	4532.31	0.0%	100.0%
90	128						0.00	4532.31	0.0%	100.0%
64	90						0.00	4532.31	0.0%	100.0%
45	64						0.00	4532.31	0.0%	100.0%
31.5	45						0.00	4532.31	0.0%	100.0%
22.4	31.5						0.00	4532.31	0.0%	100.0%
16	22.4						0.00	4532.31	0.0%	100.0%
11.2	16						0.00	4532.31	0.0%	100.0%
8	11.2						8.30	4532.31	0.2%	100.0%
5.6	8						17.70	4524.01	0.4%	99.8%
4	5.6				5.90	7.39	43.59	4506.31	1.0%	99.4%
2.8	4				13.00	7.39	96.04	4462.72	2.1%	98.5%
2	2.8				19.70	7.39	145.53	4366.68	3.2%	96.3%
1	2				137.20	7.39	1013.55	4221.15	22.4%	93.1%
0.85	1				65.40	7.39	483.14	3207.60	10.7%	70.8%
0.5	0.85				250.00	7.39	1846.85	2724.47	40.7%	60.1%
0.25	0.5				80.20	7.39	592.47	877.62	13.1%	19.4%
0.125	0.25				29.40	7.39	217.19	285.15	4.8%	6.3%
0.063	0.125				6.90	7.39	50.97	67.96	1.1%	1.5%
Pan	0.063				2.30	7.39	16.99	16.99	0.4%	0.4%
	TOTAL:				610		4,532.31	4,532.31	100.00%	100.00%

Sample Dry Wt: 4,536 — Total Processed Wt: 4,532 — = Net Loss: 3.694 — % of Sample: 0.08%

Splitting: Gross Split _____ - Tare _____ = Net Split 4510

Split at _____ mm — Split Wt. = 610.5

Split/Net = 0.135

Multiplier (inverse Split/Net) = 7.387

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
877.62	3,343.53	302.85	3,646.38	8.30	4,532.31

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	6
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/17/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	12:35 PM	**Start station (ft):**	40.0
End time (hh:mm):	01:18 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.50	**Interval (ft):**	20
End SH (ft):	-3.40	**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	20852.24	0.0%	100.0%
180	256						0.00	20852.24	0.0%	100.0%
128	180						0.00	20852.24	0.0%	100.0%
90	128						0.00	20852.24	0.0%	100.0%
64	90						0.00	20852.24	0.0%	100.0%
45	64						0.00	20852.24	0.0%	100.0%
31.5	45						0.00	20852.24	0.0%	100.0%
22.4	31.5						16.50	20852.24	0.1%	100.0%
16	22.4						11.90	20835.74	0.1%	99.9%
11.2	16						33.20	20823.84	0.2%	99.9%
8	11.2						48.80	20790.64	0.2%	99.7%
5.6	8						58.30	20741.84	0.3%	99.5%
4	5.6						223.04	20683.54	1.1%	99.2%
2.8	4						413.35	20460.50	2.0%	98.1%
2	2.8						1063.50	20047.15	5.1%	96.1%
1	2						6249.16	18983.65	30.0%	91.0%
0.85	1						1699.20	12734.49	8.1%	61.1%
0.5	0.85						4554.39	11035.29	21.8%	52.9%
0.25	0.5						3641.32	6480.89	17.5%	31.1%
0.125	0.25						2270.26	2839.57	10.9%	13.6%
0.063	0.125						455.21	569.31	2.2%	2.7%
Pan	0.063						114.10	114.10	0.5%	0.5%
	TOTAL:				0		20,852.24	20,852.24	100.00%	100.00%

Sample Dry Wt: 20,884 Total Processed Wt: 20,852 = Net Loss: 31.462 (% of Sample: 0.15%)

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
6,480.89	12,502.76	1,758.19	14,260.95	110.40	20,852.24

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	6
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/17/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	01:25 PM	**Start station (ft):**	40.0
End time (hh:mm):	02:02 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.50	**Interval (ft):**	20
End SH (ft):	-3.40	**Duration (sec):**	30
Mvg. bed width (ft):		**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by:
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	15945.90	0.0%	100.0%
180	256						0.00	15945.90	0.0%	100.0%
128	180						0.00	15945.90	0.0%	100.0%
90	128						0.00	15945.90	0.0%	100.0%
64	90						0.00	15945.90	0.0%	100.0%
45	64						0.00	15945.90	0.0%	100.0%
31.5	45						0.00	15945.90	0.0%	100.0%
22.4	31.5						0.00	15945.90	0.0%	100.0%
16	22.4						21.30	15945.90	0.1%	100.0%
11.2	16						39.50	15924.60	0.2%	99.9%
8	11.2						52.00	15885.10	0.3%	99.6%
5.6	8						90.90	15833.10	0.6%	99.3%
4	5.6						127.07	15742.20	0.8%	98.7%
2.8	4						282.82	15615.13	1.8%	97.9%
2	2.8						439.60	15332.31	2.8%	96.2%
1	2						1727.42	14892.71	10.8%	93.4%
0.85	1						616.04	13165.29	3.9%	82.6%
0.5	0.85						3604.20	12549.24	22.6%	78.7%
0.25	0.5						6084.11	8945.04	38.2%	56.1%
0.125	0.25						2498.89	2860.93	15.7%	17.9%
0.063	0.125						301.31	362.04	1.9%	2.3%
Pan	0.063						60.73	60.73	0.4%	0.4%
	TOTAL:				0		15,945.90	15,945.90	100.00%	100.00%

Sample Dry Wt: 15,970 | Total Processed Wt: 15,946 | = | Net Loss: 24.100 | % of Sample: 0.15%

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm | Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
8,945.04	5,947.67	940.39	6,888.06	112.80	15,945.90

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	7
Location:	Sandy River at Revenue Bridge - SRRB	**Date collected:**	11/17/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	03:18 PM	**Start station (ft):**	40.0
End time (hh:mm):	03:55 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.36	**Interval (ft):**	20
End SH (ft):		**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	25430.49	0.0%	100.0%
180	256						0.00	25430.49	0.0%	100.0%
128	180						0.00	25430.49	0.0%	100.0%
90	128						0.00	25430.49	0.0%	100.0%
64	90						0.00	25430.49	0.0%	100.0%
45	64						0.00	25430.49	0.0%	100.0%
31.5	45						0.00	25430.49	0.0%	100.0%
22.4	31.5						21.00	25430.49	0.1%	100.0%
16	22.4						17.20	25409.49	0.1%	99.9%
11.2	16						45.20	25392.29	0.2%	99.8%
8	11.2						95.00	25347.09	0.4%	99.7%
5.6	8						163.00	25252.09	0.6%	99.3%
4	5.6						179.50	25089.09	0.7%	98.7%
2.8	4						298.00	24909.59	1.2%	98.0%
2	2.8						509.00	24611.59	2.0%	96.8%
1	2				59.70	46.15	2754.98	24102.59	10.8%	94.8%
0.85	1				37.80	46.15	1744.36	21347.61	6.9%	83.9%
0.5	0.85				198.70	46.15	9169.41	19603.26	36.1%	77.1%
0.25	0.5				154.60	46.15	7134.33	10433.84	28.1%	41.0%
0.125	0.25				57.10	46.15	2635.00	3299.51	10.4%	13.0%
0.063	0.125				11.70	46.15	539.92	664.52	2.1%	2.6%
Pan	0.063				2.70	46.15	124.60	124.60	0.5%	0.5%
TOTAL:					522		25,430.49	25,430.49	100.00%	100.00%

Sample Dry Wt: 25,370 | Total Processed Wt: 25,430 | = | Net Loss: -60.491 | % of Sample: -0.24%

Splitting: Gross Split ____ - Tare ____ = Net Split: 24042.6

Split at ____ mm | Split Wt. = 521 | Split/Net = 0.022 | Multiplier (inverse Split/Net) = 46.147

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
10,433.84	13,668.75	1,149.50	14,818.25	178.40	25,430.49

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	7
Location:	Sandy River at Revenue Bridge - SRRB	**Date collected:**	11/17/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	04:00 PM	**Start station (ft):**	40.0
End time (hh:mm):	04:35 PM	**End station (ft):**	240.0
Begin SH (ft):		**Interval (ft):**	20
End SH (ft):	-3.32	**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	18879.14	0.0%	100.0%
180	256						0.00	18879.14	0.0%	100.0%
128	180						0.00	18879.14	0.0%	100.0%
90	128						0.00	18879.14	0.0%	100.0%
64	90						0.00	18879.14	0.0%	100.0%
45	64						0.00	18879.14	0.0%	100.0%
31.5	45						0.00	18879.14	0.0%	100.0%
22.4	31.5						0.00	18879.14	0.0%	100.0%
16	22.4						19.10	18879.14	0.1%	100.0%
11.2	16						10.20	18860.04	0.1%	99.9%
8	11.2						59.50	18849.84	0.3%	99.8%
5.6	8				3.60	33.45	120.43	18790.34	0.6%	99.5%
4	5.6				1.50	33.45	50.18	18669.91	0.3%	98.9%
2.8	4				4.20	33.45	140.50	18619.73	0.7%	98.6%
2	2.8				6.80	33.45	227.48	18479.23	1.2%	97.9%
1	2				53.10	33.45	1776.33	18251.76	9.4%	96.7%
0.85	1				33.20	33.45	1110.63	16475.42	5.9%	87.3%
0.5	0.85				186.00	33.45	6222.19	15364.79	33.0%	81.4%
0.25	0.5				185.00	33.45	6188.74	9142.60	32.8%	48.4%
0.125	0.25				72.90	33.45	2438.70	2953.87	12.9%	15.6%
0.063	0.125				12.70	33.45	424.85	515.17	2.3%	2.7%
Pan	0.063				2.70	33.45	90.32	90.32	0.5%	0.5%
TOTAL:					562		18,879.14	18,879.14	100.00%	100.00%

Sample Dry Wt 18,839 Total Processed Wt 18,879 = Net Loss: -40.143
% of Sample: -0.21%

Splitting: Gross Split _____ - Tare _____ = Net Split 18750.2

Split at _____ mm Split Wt. = 560.5

Split/Net = 0.030

Multiplier (inverse Split/Net) = 33.453

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
9,142.60	9,109.15	538.59	9,647.74	88.80	18,879.14

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	8
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/18/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	12:30 PM	**Start station (ft):**	40.0
End time (hh:mm):	01:05 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.68	**Interval (ft):**	20
End SH (ft):	-3.69	**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	18045.50	0.0%	100.0%
180	256						0.00	18045.50	0.0%	100.0%
128	180						0.00	18045.50	0.0%	100.0%
90	128						0.00	18045.50	0.0%	100.0%
64	90						0.00	18045.50	0.0%	100.0%
45	64						0.00	18045.50	0.0%	100.0%
31.5	45						0.00	18045.50	0.0%	100.0%
22.4	31.5						47.80	18045.50	0.3%	100.0%
16	22.4						51.30	17997.70	0.3%	99.7%
11.2	16						66.40	17946.40	0.4%	99.5%
8	11.2						90.00	17880.00	0.5%	99.1%
5.6	8						130.00	17790.00	0.7%	98.6%
4	5.6						150.00	17660.00	0.8%	97.9%
2.8	4						290.00	17510.00	1.6%	97.0%
2	2.8						500.00	17220.00	2.8%	95.4%
1	2				52.00	42.28	2198.33	16720.00	12.2%	92.7%
0.85	1				19.60	42.28	828.60	14521.67	4.6%	80.5%
0.5	0.85				114.40	42.28	4836.33	13693.07	26.8%	75.9%
0.25	0.5				159.30	42.28	6734.50	8856.74	37.3%	49.1%
0.125	0.25				43.90	42.28	1855.90	2122.24	10.3%	11.8%
0.063	0.125				5.40	42.28	228.29	266.34	1.3%	1.5%
Pan	0.063				0.90	42.28	38.05	38.05	0.2%	0.2%
TOTAL:					396		18,045.50	18,045.50	100.00%	100.00%

Sample Dry Wt 18,026 Total Processed Wt 18,046 = Net Loss: -20.000
% of Sample: -0.11%

Splitting: Gross Split _____ - Tare _____ = Net Split 16720

Split at _____ mm Split Wt. = 395.5

Split/Net = 0.024

Multiplier (inverse Split/Net) = 42.276

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
8,856.74	7,863.26	1,070.00	8,933.26	255.50	18,045.50

GMA Version: March 2008

Hydrology | Geomorphology | Stream Restoration

PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	8
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/18/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	01:10 PM	**Start station (ft):**	40.0
End time (hh:mm):	01:40 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.68	**Interval (ft):**	20
End SH (ft):	-3.69	**Duration (sec):**	30
Mvg. bed width (ft):		**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	21064.16	0.0%	100.0%
180	256						0.00	21064.16	0.0%	100.0%
128	180						0.00	21064.16	0.0%	100.0%
90	128						0.00	21064.16	0.0%	100.0%
64	90						0.00	21064.16	0.0%	100.0%
45	64						0.00	21064.16	0.0%	100.0%
31.5	45						0.00	21064.16	0.0%	100.0%
22.4	31.5						22.10	21064.16	0.1%	100.0%
16	22.4						56.50	21042.06	0.3%	99.9%
11.2	16						162.30	20985.56	0.8%	99.6%
8	11.2						200.00	20823.26	0.9%	98.9%
5.6	8						300.00	20623.26	1.4%	97.9%
4	5.6						340.00	20323.26	1.6%	96.5%
2.8	4						570.00	19983.26	2.7%	94.9%
2	2.8						890.00	19413.26	4.2%	92.2%
1	2				100.00	32.63	3263.44	18523.26	15.5%	87.9%
0.85	1				32.30	32.63	1054.09	15259.83	5.0%	72.4%
0.5	0.85				170.20	32.63	5554.37	14205.74	26.4%	67.4%
0.25	0.5				211.00	32.63	6885.85	8651.37	32.7%	41.1%
0.125	0.25				47.80	32.63	1559.92	1765.52	7.4%	8.4%
0.063	0.125				5.00	32.63	163.17	205.60	0.8%	1.0%
Pan	0.063				1.30	32.63	42.42	42.42	0.2%	0.2%
	TOTAL:				568		21,064.16	21,064.16	100.00%	100.00%

Sample Dry Wt: 21,131 | Total Processed Wt: 21,064 | = | Net Loss: 66.337 | % of Sample: 0.31%

Splitting: Gross Split _____ - Tare _____ = Net Split: 18520

Split at _____ mm | Split Wt. = 567.5

Split/Net = 0.031

Multiplier (inverse Split/Net) = 32.634

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
8,651.37	9,871.89	2,100.00	11,971.89	440.90	21,064.16

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	9
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/18/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	03:15 PM	**Start station (ft):**	40.0
End time (hh:mm):	03:41 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.69	**Interval (ft):**	20
End SH (ft):		**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	28241.53	0.0%	100.0%
180	256						0.00	28241.53	0.0%	100.0%
128	180						0.00	28241.53	0.0%	100.0%
90	128						0.00	28241.53	0.0%	100.0%
64	90						0.00	28241.53	0.0%	100.0%
45	64						0.00	28241.53	0.0%	100.0%
31.5	45						0.00	28241.53	0.0%	100.0%
22.4	31.5						29.50	28241.53	0.1%	100.0%
16	22.4						148.30	28212.03	0.5%	99.9%
11.2	16						153.50	28063.73	0.5%	99.4%
8	11.2						210.00	27910.23	0.7%	98.8%
5.6	8						270.00	27700.23	1.0%	98.1%
4	5.6						330.00	27430.23	1.2%	97.1%
2.8	4						530.00	27100.23	1.9%	96.0%
2	2.8						890.00	26570.23	3.2%	94.1%
1	2				85.40	51.14	4366.97	25680.23	15.5%	90.9%
0.85	1				27.80	51.14	1421.57	21313.26	5.0%	75.5%
0.5	0.85				163.50	51.14	8360.65	19891.69	29.6%	70.4%
0.25	0.5				185.70	51.14	9495.85	11531.05	33.6%	40.8%
0.125	0.25				37.20	51.14	1902.24	2035.19	6.7%	7.2%
0.063	0.125				2.00	51.14	102.27	132.95	0.4%	0.5%
Pan	0.063				0.60	51.14	30.68	30.68	0.1%	0.1%
TOTAL:					502		28,241.53	28,241.53	100.00%	100.00%

Sample Dry Wt: 28,278 | Total Processed Wt: 28,242 | = | Net Loss: 35.973 | % of Sample: 0.13%

Splitting: Gross Split _____ - Tare _____ = Net Split 25670

Split at _____ mm | Split Wt. = 502

Split/Net = 0.020

Multiplier (inverse Split/Net) = 51.135

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
11,531.05	14,149.18	2,020.00	16,169.18	541.30	28,241.53

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	9
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/18/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	04:02 PM	**Start station (ft):**	40.0
End time (hh:mm):	04:30 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.66	**Interval (ft):**	20
End SH (ft):	-3.64	**Duration (sec):**	30
Mvg. bed width (ft):		**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1-2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	22686.54	0.0%	100.0%
180	256						0.00	22686.54	0.0%	100.0%
128	180						0.00	22686.54	0.0%	100.0%
90	128						0.00	22686.54	0.0%	100.0%
64	90						0.00	22686.54	0.0%	100.0%
45	64						0.00	22686.54	0.0%	100.0%
31.5	45						0.00	22686.54	0.0%	100.0%
22.4	31.5						0.00	22686.54	0.0%	100.0%
16	22.4						19.50	22686.54	0.1%	100.0%
11.2	16						46.00	22667.04	0.2%	99.9%
8	11.2						80.50	22621.04	0.4%	99.7%
5.6	8						123.50	22540.54	0.5%	99.4%
4	5.6						161.50	22417.04	0.7%	98.8%
2.8	4						284.50	22255.54	1.3%	98.1%
2	2.8						512.00	21971.04	2.3%	96.8%
1	2				46.40	59.36	2754.36	21459.04	12.1%	94.6%
0.85	1				18.70	59.36	1110.05	18704.69	4.9%	82.4%
0.5	0.85				110.50	59.36	6559.40	17594.63	28.9%	77.6%
0.25	0.5				147.50	59.36	8755.76	11035.23	38.6%	48.6%
0.125	0.25				35.50	59.36	2107.32	2279.47	9.3%	10.0%
0.063	0.125				2.40	59.36	142.47	172.15	0.6%	0.8%
Pan	0.063				0.50	59.36	29.68	29.68	0.1%	0.1%
TOTAL:					362		22,686.54	22,686.54	100.00%	100.00%

Sample Dry Wt 22,598 Total Processed Wt 22,687 = Net Loss: -89.042
% of Sample: -0.39%

Splitting: Gross Split _____ - Tare _____ = Net Split 21370

Split at _____ mm Split Wt. = 360

Split/Net = 0.017

Multiplier (inverse Split/Net) = 59.361

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
11,035.23	10,423.81	1,081.50	11,505.31	146.00	22,686.54

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	10
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/19/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:05 AM	**Start station (ft):**	40.0
End time (hh:mm):	10:28 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.90	**Interval (ft):**	20
End SH (ft):		**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	11502.78	0.0%	100.0%
180	256						0.00	11502.78	0.0%	100.0%
128	180						0.00	11502.78	0.0%	100.0%
90	128						0.00	11502.78	0.0%	100.0%
64	90						0.00	11502.78	0.0%	100.0%
45	64						0.00	11502.78	0.0%	100.0%
31.5	45						0.00	11502.78	0.0%	100.0%
22.4	31.5						0.00	11502.78	0.0%	100.0%
16	22.4						13.10	11502.78	0.1%	100.0%
11.2	16						31.20	11489.68	0.3%	99.9%
8	11.2						49.50	11458.48	0.4%	99.6%
5.6	8						70.50	11408.98	0.6%	99.2%
4	5.6						89.00	11338.48	0.8%	98.6%
2.8	4						146.50	11249.48	1.3%	97.8%
2	2.8						238.50	11102.98	2.1%	96.5%
1	2				46.80	27.20	1273.05	10864.48	11.1%	94.5%
0.85	1				19.60	27.20	533.16	9591.43	4.6%	83.4%
0.5	0.85				149.60	27.20	4069.42	9058.27	35.4%	78.7%
0.25	0.5				159.70	27.20	4344.16	4988.85	37.8%	43.4%
0.125	0.25				21.80	27.20	593.00	644.69	5.2%	5.6%
0.063	0.125				1.50	27.20	40.80	51.68	0.4%	0.4%
Pan	0.063				0.40	27.20	10.88	10.88	0.1%	0.1%
TOTAL:					399		11,502.78	11,502.78	100.00%	100.00%

Sample Dry Wt 11,484 Total Processed Wt 11,503 = Net Loss: -18.482
% of Sample: -0.16%

Splitting: Gross Split _____ - Tare _____ = Net Split 10840

Split at _____ mm Split Wt. = 398.5

Split/Net = 0.037

Multiplier (inverse Split/Net) = 27.202

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
4,988.85	5,875.63	544.50	6,420.13	93.80	11,502.78

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	10
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	11/19/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:30 AM	**Start station (ft):**	40.0
End time (hh:mm):	10:56 AM	**End station (ft):**	240.0
Begin SH (ft):		**Interval (ft):**	20
End SH (ft):	-3.92	**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	9632.77	0.0%	100.0%
180	256						0.00	9632.77	0.0%	100.0%
128	180						0.00	9632.77	0.0%	100.0%
90	128						0.00	9632.77	0.0%	100.0%
64	90						0.00	9632.77	0.0%	100.0%
45	64						0.00	9632.77	0.0%	100.0%
31.5	45						0.00	9632.77	0.0%	100.0%
22.4	31.5						0.00	9632.77	0.0%	100.0%
16	22.4						18.00	9632.77	0.2%	100.0%
11.2	16						18.00	9614.77	0.2%	99.8%
8	11.2						30.00	9596.77	0.3%	99.6%
5.6	8						40.00	9566.77	0.4%	99.3%
4	5.6						50.00	9526.77	0.5%	98.9%
2.8	4						70.00	9476.77	0.7%	98.4%
2	2.8						120.00	9406.77	1.2%	97.7%
1	2				23.30	23.95	558.12	9286.77	5.8%	96.4%
0.85	1				13.10	23.95	313.79	8728.65	3.3%	90.6%
0.5	0.85				144.00	23.95	3449.30	8414.86	35.8%	87.4%
0.25	0.5				180.40	23.95	4321.21	4965.56	44.9%	51.5%
0.125	0.25				24.70	23.95	591.65	644.35	6.1%	6.7%
0.063	0.125				1.90	23.95	45.51	52.70	0.5%	0.5%
Pan	0.063				0.30	23.95	7.19	7.19	0.1%	0.1%
TOTAL:					388		9,632.77	9,632.77	100.00%	100.00%

Sample Dry Wt 9,696 Total Processed Wt 9,633 = Net Loss: 63.233
% of Sample: 0.65%

Splitting: Gross Split _____ - Tare _____ = Net Split 9270

Split at _____ mm Split Wt. = 387

Split/Net = 0.042

Multiplier (inverse Split/Net) = 23.953

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
4,965.56	4,321.21	280.00	4,601.21	66.00	9,632.77

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	11
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/03/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	04:35 PM	**Start station (ft):**	200.0
End time (hh:mm):	05:05 PM	**End station (ft):**	220.0
Begin SH (ft):	-2.94	**Interval (ft):**	20
End SH (ft):	-2.90	**Duration (sec):**	10
Mvg. bed width (ft):		**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-2
Total passes:	1	**Total bags:**	2

Notes

Partial Pass after dark-- debris load too high -- two stations -- assume 10% sample loss

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	24417.44	0.0%	100.0%
180	256						0.00	24417.44	0.0%	100.0%
128	180						0.00	24417.44	0.0%	100.0%
90	128						0.00	24417.44	0.0%	100.0%
64	90						0.00	24417.44	0.0%	100.0%
45	64						0.00	24417.44	0.0%	100.0%
31.5	45						0.00	24417.44	0.0%	100.0%
22.4	31.5						450.50	24417.44	1.8%	100.0%
16	22.4						441.00	23966.94	1.8%	98.2%
11.2	16						343.50	23525.94	1.4%	96.3%
8	11.2						470.00	23182.44	1.9%	94.9%
5.6	8						900.00	22712.44	3.7%	93.0%
4	5.6						1150.00	21812.44	4.7%	89.3%
2.8	4						1970.00	20662.44	8.1%	84.6%
2	2.8						3040.00	18692.44	12.5%	76.6%
1	2				246.50	31.09	7664.53	15652.44	31.4%	64.1%
0.85	1				54.60	31.09	1697.70	7987.90	7.0%	32.7%
0.5	0.85				138.50	31.09	4306.44	6290.20	17.6%	25.8%
0.25	0.5				51.00	31.09	1585.77	1983.76	6.5%	8.1%
0.125	0.25				10.00	31.09	310.93	398.00	1.3%	1.6%
0.063	0.125				2.10	31.09	65.30	87.06	0.3%	0.4%
Pan	0.063				0.70	31.09	21.77	21.77	0.1%	0.1%
	TOTAL:				503		24,417.44	24,417.44	100.00%	100.00%

Sample Dry Wt: 24,477 Total Processed Wt: 24,417 = Net Loss: 59.563 (% of Sample: 0.24%)

Splitting: Gross Split _____ - Tare _____ = Net Split: 15640

Split at _____ mm Split Wt. = 503

Split/Net = 0.032

Multiplier (inverse Split/Net) = 31.093

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
1,983.76	13,668.68	7,060.00	20,728.68	1,705.00	24,417.44

GMA Version: March 2008

Hydrology | Geomorphology | Stream Restoration

PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	12
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/04/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:25 AM	**Start station (ft):**	40.0
End time (hh:mm):	11:30 AM	**End station (ft):**	240.0
Begin SH (ft):	-2.60	**Interval (ft):**	20
End SH (ft):	-2.70	**Duration (sec):**	5
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-4
Total passes:	1	**Total bags:**	4

Notes

Assume 25% sample loss -- no Pass #2, cataraft vectored out mid-channel

Date Processed:	02/09/2008
Processed and Entered by:	DM, BC
Checked by:	BC
Units:	grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	57819.13	0.0%	100.0%
180	256						0.00	57819.13	0.0%	100.0%
128	180						0.00	57819.13	0.0%	100.0%
90	128						514.50	57819.13	0.9%	100.0%
64	90						0.00	57304.63	0.0%	99.1%
45	64						0.00	57304.63	0.0%	99.1%
31.5	45						323.50	57304.63	0.6%	99.1%
22.4	31.5						507.50	56981.13	0.9%	98.6%
16	22.4						619.50	56473.63	1.1%	97.7%
11.2	16						752.50	55854.13	1.3%	96.6%
8	11.2						882.00	55101.63	1.5%	95.3%
5.6	8						931.50	54219.63	1.6%	93.8%
4	5.6						1008.50	53288.13	1.7%	92.2%
2.8	4						1550.00	52279.63	2.7%	90.4%
2	2.8						2570.00	50729.63	4.4%	87.7%
1	2						15463.74	48159.63	26.7%	83.3%
0.85	1						5988.02	32695.89	10.4%	56.5%
0.5	0.85						16128.59	26707.87	27.9%	46.2%
0.25	0.5						8070.82	10579.27	14.0%	18.3%
0.125	0.25						2095.21	2508.45	3.6%	4.3%
0.063	0.125						330.36	413.24	0.6%	0.7%
Pan	0.063						82.89	82.89	0.1%	0.1%
	TOTAL:				0		57,819.13	57,819.13	100.00%	100.00%

Sample Dry Wt: 57,891 Total Processed Wt: 57,819 = Net Loss: 71.870 (% of Sample: 0.12%)

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
10,579.27	37,580.36	6,060.00	43,640.36	3,599.50	57,819.13

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	13
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/04/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	02:52 PM	**Start station (ft):**	40.0
End time (hh:mm):	03:51 PM	**End station (ft):**	240.0
Begin SH (ft):	-2.87	**Interval (ft):**	20
End SH (ft):	-2.88	**Duration (sec):**	5
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-4
Total passes:	1	**Total bags:**	4

Notes

new alignment for cableway

Date Processed:	02/11/2008
Processed and Entered by:	DM, BC
Checked by:	BC
Units:	grams

---------- WEIGHT ----------

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	70096.10	0.0%	100.0%
180	256						0.00	70096.10	0.0%	100.0%
128	180						0.00	70096.10	0.0%	100.0%
90	128						0.00	70096.10	0.0%	100.0%
64	90						0.00	70096.10	0.0%	100.0%
45	64						843.50	70096.10	1.2%	100.0%
31.5	45						41.50	69252.60	0.1%	98.8%
22.4	31.5						95.50	69211.10	0.1%	98.7%
16	22.4						185.30	69115.60	0.3%	98.6%
11.2	16						230.80	68930.30	0.3%	98.3%
8	11.2						322.00	68699.50	0.5%	98.0%
5.6	8						425.00	68377.50	0.6%	97.5%
4	5.6						486.50	67952.50	0.7%	96.9%
2.8	4						900.50	67466.00	1.3%	96.2%
2	2.8						2030.00	66565.50	2.9%	95.0%
1	2						16046.84	64535.50	22.9%	92.1%
0.85	1						6433.67	48488.66	9.2%	69.2%
0.5	0.85						24045.57	42054.99	34.3%	60.0%
0.25	0.5						14408.17	18009.42	20.6%	25.7%
0.125	0.25						3096.89	3601.25	4.4%	5.1%
0.063	0.125						415.39	504.37	0.6%	0.7%
Pan	0.063						88.98	88.98	0.1%	0.1%
	TOTAL:				0		70,096.10	70,096.10	100.00%	100.00%

Sample Dry Wt: 70,199 | Total Processed Wt: 70,096 | = | Net Loss: 102.902 | % of Sample: 0.15%

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm | Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
18,009.42	46,526.08	3,842.00	50,368.08	1,718.60	70,096.10

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	14
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/05/2007
Crew:	SP, MW, KD	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	11:20 AM	**Start station (ft):**	40.0
End time (hh:mm):	11:55 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.07	**Interval (ft):**	20
End SH (ft):	-3.09	**Duration (sec):**	10
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1-2
Total passes:	1	**Total bags:**	2

Notes

Date Processed: 04/01/2008
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	25344.77	0.0%	100.0%
180	256						0.00	25344.77	0.0%	100.0%
128	180						0.00	25344.77	0.0%	100.0%
90	128						0.00	25344.77	0.0%	100.0%
64	90						0.00	25344.77	0.0%	100.0%
45	64						0.00	25344.77	0.0%	100.0%
31.5	45						0.00	25344.77	0.0%	100.0%
22.4	31.5						57.00	25344.77	0.2%	100.0%
16	22.4						47.00	25287.77	0.2%	99.8%
11.2	16						58.00	25240.77	0.2%	99.6%
8	11.2						38.50	25182.77	0.2%	99.4%
5.6	8				2.30	42.88	98.62	25144.27	0.4%	99.2%
4	5.6				2.00	42.88	85.76	25045.65	0.3%	98.8%
2.8	4				2.70	42.88	115.77	24959.89	0.5%	98.5%
2	2.8				7.10	42.88	304.44	24844.12	1.2%	98.0%
1	2				64.10	42.88	2748.55	24539.68	10.8%	96.8%
0.85	1				36.10	42.88	1547.93	21791.13	6.1%	86.0%
0.5	0.85				207.90	42.88	8914.55	20243.20	35.2%	79.9%
0.25	0.5				212.50	42.88	9111.80	11328.64	36.0%	44.7%
0.125	0.25				45.60	42.88	1955.28	2216.85	7.7%	8.7%
0.063	0.125				5.00	42.88	214.40	261.56	0.8%	1.0%
Pan	0.063				1.10	42.88	47.17	47.17	0.2%	0.2%
TOTAL:					586		25,344.77	25,344.77	100.00%	100.00%

Sample Dry Wt: 25,470 | Total Processed Wt: 25,345 | = | Net Loss: 125.227 | % of Sample: 0.49%

Splitting: Gross Split _____ - Tare _____ = Net Split 25170

Split at _____ mm | Split Wt. = 587

Split/Net = 0.023

Multiplier (inverse Split/Net) = 42.879

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
11,328.64	13,211.03	604.59	13,815.63	200.50	25,344.77

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	15
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/05/2007
Crew:	SP	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	01:20 PM	**Start station (ft):**	40.0
End time (hh:mm):	01:50 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.12	**Interval (ft):**	20
End SH (ft):	-3.13	**Duration (sec):**	20
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1,2,3
Total passes:	2	**Total bags:**	3

Notes

Date Processed:
Processed and Entered by: BC
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	39393.48	0.0%	100.0%
180	256						0.00	39393.48	0.0%	100.0%
128	180						0.00	39393.48	0.0%	100.0%
90	128						0.00	39393.48	0.0%	100.0%
64	90						0.00	39393.48	0.0%	100.0%
45	64						134.50	39393.48	0.3%	100.0%
31.5	45						187.50	39258.98	0.5%	99.7%
22.4	31.5						73.00	39071.48	0.2%	99.2%
16	22.4						119.00	38998.48	0.3%	99.0%
11.2	16						117.50	38879.48	0.3%	98.7%
8	11.2						124.00	38761.98	0.3%	98.4%
5.6	8				1.40	69.95	97.92	38637.98	0.2%	98.1%
4	5.6				5.60	69.95	391.70	38540.05	1.0%	97.8%
2.8	4				10.50	69.95	734.43	38148.36	1.9%	96.8%
2	2.8				22.40	69.95	1566.78	37413.93	4.0%	95.0%
1	2				183.50	69.95	12835.03	35847.15	32.6%	91.0%
0.85	1				75.00	69.95	5245.92	23012.12	13.3%	58.4%
0.5	0.85				181.50	69.95	12695.14	17766.20	32.2%	45.1%
0.25	0.5				57.00	69.95	3986.90	5071.06	10.1%	12.9%
0.125	0.25				12.50	69.95	874.32	1084.16	2.2%	2.8%
0.063	0.125				2.00	69.95	139.89	209.84	0.4%	0.5%
Pan	0.063				1.00	69.95	69.95	69.95	0.2%	0.2%
TOTAL:					552		39,393.48	39,393.48	100.00%	100.00%

Sample Dry Wt: 39,450 | Total Processed Wt: 39,393 | = | Net Loss: 56.522 | % of Sample: 0.14%

Splitting: Gross Split _____ - Tare _____ = Net Split 38610

Split at _____ mm | Split Wt. = 552

Split/Net = 0.014

Multiplier (inverse Split/Net) = 69.946

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
5,071.06	30,776.09	2,790.83	33,566.92	755.50	39,393.48

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy River	**Sample number:**	15
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/05/2007
Crew:	SP, MW	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	01:55 PM	**Start station (ft):**	40.0
End time (hh:mm):	02:33 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.13	**Interval (ft):**	20
End SH (ft):	-3.17	**Duration (sec):**	20
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1-5
Total passes:	2	**Total bags:**	5

Notes

Date Processed: 06/09/2008
Processed and Entered by: BC, EO
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	71597.98	0.0%	100.0%
180	256						0.00	71597.98	0.0%	100.0%
128	180						0.00	71597.98	0.0%	100.0%
90	128						0.00	71597.98	0.0%	100.0%
64	90						0.00	71597.98	0.0%	100.0%
45	64						0.00	71597.98	0.0%	100.0%
31.5	45						427.00	71597.98	0.6%	100.0%
22.4	31.5						341.00	71170.98	0.5%	99.4%
16	22.4						556.50	70829.98	0.8%	98.9%
11.2	16						571.50	70273.48	0.8%	98.2%
8	11.2						492.00	69701.98	0.7%	97.4%
5.6	8						667.92	69209.98	0.9%	96.7%
4	5.6						904.27	68542.06	1.3%	95.7%
2.8	4						1544.14	67637.79	2.2%	94.5%
2	2.8						2932.88	66093.65	4.1%	92.3%
1	2						17215.47	63160.77	24.0%	88.2%
0.85	1						6923.52	45945.30	9.7%	64.2%
0.5	0.85						25559.60	39021.78	35.7%	54.5%
0.25	0.5						12179.16	13462.18	17.0%	18.8%
0.125	0.25						1185.09	1283.01	1.7%	1.8%
0.063	0.125						70.65	97.92	0.1%	0.1%
Pan	0.063						27.26	27.26	0.0%	0.0%
	TOTAL:				0		71,597.98	71,597.98	100.00%	100.00%

Sample Dry Wt: 71,650 Total Processed Wt: 71,598 = Net Loss: 52.020
% of Sample: 0.07%

Splitting: Gross Split _____ - Tare _____ = Net Split _____
Split at _____ mm Split Wt. = _____

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	44	B-axis (mm)		B-axis (mm)	
Mass (g)	81	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

Split/Net = #DIV/0!
Multiplier (inverse Split/Net) = #DIV/0!

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
13,462.18	49,698.59	6,049.21	55,747.80	2,388.00	71,597.98

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy	**Sample number:**	16
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/05/2007
Crew:	SP, MW, KD	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	03:15 PM	**Start station (ft):**	40.0
End time (hh:mm):	03:48 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.17	**Interval (ft):**	20
End SH (ft):	-3.16	**Duration (sec):**	10
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	5

Notes

Date Processed: 06/10/2008
Processed and Entered by: EO
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	70981.39	0.0%	100.0%
180	256						0.00	70981.39	0.0%	100.0%
128	180						0.00	70981.39	0.0%	100.0%
90	128						0.00	70981.39	0.0%	100.0%
64	90						0.00	70981.39	0.0%	100.0%
45	64						0.00	70981.39	0.0%	100.0%
31.5	45						126.80	70981.39	0.2%	100.0%
22.4	31.5						263.80	70854.59	0.4%	99.8%
16	22.4						184.70	70590.79	0.3%	99.4%
11.2	16						230.50	70406.09	0.3%	99.2%
8	11.2						301.41	70175.59	0.4%	98.9%
5.6	8						475.50	69874.18	0.7%	98.4%
4	5.6						718.42	69398.68	1.0%	97.8%
2.8	4						1329.33	68680.26	1.9%	96.8%
2	2.8						3007.32	67350.93	4.2%	94.9%
1	2						25289.36	64343.61	35.6%	90.6%
0.85	1						9124.14	39054.25	12.9%	55.0%
0.5	0.85						20649.37	29930.10	29.1%	42.2%
0.25	0.5						8075.97	9280.73	11.4%	13.1%
0.125	0.25						1073.41	1204.77	1.5%	1.7%
0.063	0.125						119.47	131.36	0.2%	0.2%
Pan	0.063						11.89	11.89	0.0%	0.0%
	TOTAL:				0		70,981.39	70,981.39	100.00%	100.00%

Sample Dry Wt: 71,336 | Total Processed Wt: 70,981 | = | Net Loss: 354.612 | % of Sample: 0.50%

Splitting: Gross Split _____ Tare _____ = Net Split _____

Split at _____ mm | Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	44	B-axis (mm)		B-axis (mm)	
Mass (g)	68.8	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
9,280.73	55,062.87	5,530.57	60,593.44	1,107.21	70,981.39

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy	**Sample number:**	16
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	12/05/2007
Crew:	SP	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	03:55 PM	**Start station (ft):**	40.0
End time (hh:mm):	04:45 PM	**End station (ft):**	240.0
Begin SH (ft):	-3.16	**Interval (ft):**	20
End SH (ft):	-3.16	**Duration (sec):**	5
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	2	**Bag #:**	1,2,3
Total passes:	2	**Total bags:**	3

Notes

changed downtime for pass #2

Date Processed:	06/10/2008
Processed and Entered by:	EO
Checked by:	BC
Units:	grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	41613.84	0.0%	100.0%
180	256						0.00	41613.84	0.0%	100.0%
128	180						0.00	41613.84	0.0%	100.0%
90	128						0.00	41613.84	0.0%	100.0%
64	90						0.00	41613.84	0.0%	100.0%
45	64						0.00	41613.84	0.0%	100.0%
31.5	45						180.10	41613.84	0.4%	100.0%
22.4	31.5						283.00	41433.74	0.7%	99.6%
16	22.4						76.40	41150.74	0.2%	98.9%
11.2	16						266.20	41074.34	0.6%	98.7%
8	11.2						256.90	40808.14	0.6%	98.1%
5.6	8						394.85	40551.24	0.9%	97.4%
4	5.6						618.28	40156.39	1.5%	96.5%
2.8	4						1211.29	39538.11	2.9%	95.0%
2	2.8						2183.45	38326.82	5.2%	92.1%
1	2						10579.83	36143.37	25.4%	86.9%
0.85	1						3628.04	25563.53	8.7%	61.4%
0.5	0.85						12068.24	21935.49	29.0%	52.7%
0.25	0.5						8448.10	9867.26	20.3%	23.7%
0.125	0.25						1305.70	1419.16	3.1%	3.4%
0.063	0.125						103.52	113.47	0.2%	0.3%
Pan	0.063						9.94	9.94	0.0%	0.0%
TOTAL:					0		41,613.84	41,613.84	100.00%	100.00%

Sample Dry Wt: 41,750 | Total Processed Wt: 41,614 | = | Net Loss: 136.160 | % of Sample: 0.33%

Splitting: Gross Split _____ - Tare _____ = Net Split _____

Split at _____ mm | Split Wt. = _____

Split/Net = #DIV/0!

Multiplier (inverse Split/Net) = #DIV/0!

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	44	B-axis (mm)		B-axis (mm)	
Mass (g)	76.1	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
9,867.26	26,276.11	4,407.87	30,683.98	1,062.60	41,613.84

GMA Version: March 2008

Hydrology | Geomorphology | Stream Restoration

PARTICLE SIZE ANALYSIS

River:	Sandy	**Sample number:**	17
Location:	Sandy River at Revenue Bridge - SRRB	**Date collected:**	12/06/2007
Crew:	SP	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:30 AM	**Start station (ft):**	40.0
End time (hh:mm):	11:10 AM	**End station (ft):**	240.0
Begin SH (ft):	-3.43	**Interval (ft):**	20
End SH (ft):	-3.43	**Duration (sec):**	10
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1,2,3
Total passes:	1	**Total bags:**	3

Notes

Date Processed: 06/16/2008
Processed and Entered by: EO
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	46493.70	0.0%	100.0%
180	256						0.00	46493.70	0.0%	100.0%
128	180						0.00	46493.70	0.0%	100.0%
90	128						0.00	46493.70	0.0%	100.0%
64	90						0.00	46493.70	0.0%	100.0%
45	64						0.00	46493.70	0.0%	100.0%
31.5	45						61.00	46493.70	0.1%	100.0%
22.4	31.5						96.20	46432.70	0.2%	99.9%
16	22.4						110.10	46336.50	0.2%	99.7%
11.2	16						108.10	46226.40	0.2%	99.4%
8	11.2						91.10	46118.30	0.2%	99.2%
5.6	8				0.40	67.30	60.15	46027.20	0.1%	99.0%
4	5.6				0.40	67.30	126.61	45967.05	0.3%	98.9%
2.8	4				1.30	67.30	320.11	45840.44	0.7%	98.6%
2	2.8				4.10	67.30	699.62	45520.33	1.5%	97.9%
1	2				38.10	67.30	5920.44	44820.71	12.7%	96.4%
0.85	1				26.30	67.30	3979.84	38900.27	8.6%	83.7%
0.5	0.85				146.60	67.30	21347.42	34920.43	45.9%	75.1%
0.25	0.5				92.90	67.30	12233.71	13573.01	26.3%	29.2%
0.125	0.25				11.30	67.30	1275.57	1339.29	2.7%	2.9%
0.063	0.125				0.60	67.30	57.00	63.73	0.1%	0.1%
Pan	0.063				0.10	67.30	6.73	6.73	0.0%	0.0%
TOTAL:					322		46,493.70	46,493.70	100.00%	100.00%

Sample Dry Wt: 46,590 Total Processed Wt: 46,494 = Net Loss: 96.301
% of Sample: 0.21%

Splitting: Gross Split _____ - Tare 0 = Net Split _____
Split at _____ mm Split Wt. = _____

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	39	B-axis (mm)		B-axis (mm)	
Mass (g)	61	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

Split/Net = #DIV/0!
Multiplier (inverse Split/Net) = #DIV/0!

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
13,573.01	31,247.70	1,206.49	32,454.19	466.50	46,493.70

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy	**Sample number:**	18
Location:	Sandy River above Revenue Bridge - SRRB	**Date collected:**	05/15/2008
Crew:	SP, MW, CP	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	02:54 PM	**Start station (ft):**	20.0
End time (hh:mm):	03:32 PM	**End station (ft):**	220.0
Begin SH (ft):	-3.19	**Interval (ft):**	20
End SH (ft):	-3.20	**Duration (sec):**	15
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1
Total passes:	2	**Total bags:**	1

Notes

Date Processed: 06/16/2008
Processed and Entered by: EO
Checked by: BC
Units: grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	7146.94	0.0%	100.0%
180	256						0.00	7146.94	0.0%	100.0%
128	180						0.00	7146.94	0.0%	100.0%
90	128						0.00	7146.94	0.0%	100.0%
64	90						0.00	7146.94	0.0%	100.0%
45	64						0.00	7146.94	0.0%	100.0%
31.5	45						0.00	7146.94	0.0%	100.0%
22.4	31.5						60.00	7146.94	0.8%	100.0%
16	22.4						60.60	7086.94	0.8%	99.2%
11.2	16						136.80	7026.34	1.9%	98.3%
8	11.2						122.10	6889.54	1.7%	96.4%
5.6	8				5.60	33.19	185.86	6767.44	2.6%	94.7%
4	5.6				3.20	33.19	106.21	6581.58	1.5%	92.1%
2.8	4				6.80	33.19	225.69	6475.37	3.2%	90.6%
2	2.8				7.80	33.19	258.88	6249.68	3.6%	87.4%
1	2				58.90	33.19	1954.89	5990.80	27.4%	83.8%
0.85	1				24.10	33.19	799.88	4035.90	11.2%	56.5%
0.5	0.85				71.10	33.19	2359.81	3236.03	33.0%	45.3%
0.25	0.5				24.00	33.19	796.56	876.22	11.1%	12.3%
0.125	0.25				2.10	33.19	69.70	79.66	1.0%	1.1%
0.063	0.125				0.20	33.19	6.64	9.96	0.1%	0.1%
Pan	0.063				0.10	33.19	3.32	3.32	0.0%	0.0%
	TOTAL:				204		7,146.94	7,146.94	100.00%	100.00%

Sample Dry Wt: 7,180 | Total Processed Wt: 7,147 | = | Net Loss: 33.059 | % of Sample: 0.46%

Splitting: Gross Split 12760 - Tare 5990 = Net Split 6770

Split at _____ mm | Split Wt. = 204 | Split/Net = 0.030 | Multiplier (inverse Split/Net) = 33.186

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	28	B-axis (mm)		B-axis (mm)	
Mass (g)	30.4	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
876.22	5,114.58	776.65	5,891.23	379.50	7,146.94

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**18**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/15/2008**
Crew:	**SP, MW, CP**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**03:38 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**03:55 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-3.20**	**Interval (ft):**	**20**
End SH (ft):	**-3.20**	**Duration (sec):**	**15**
Mvg. bed width (ft):		**Sampler:**	**TR-2**
Pass #:	**2**	**Bag #:**	**1**
Total passes:	**2**	**Total bags:**	**1**

Notes

Date Processed:	**06/16/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	8162.98	0.0%	100.0%
180	256						0.00	8162.98	0.0%	100.0%
128	180						0.00	8162.98	0.0%	100.0%
90	128						0.00	8162.98	0.0%	100.0%
64	90						0.00	8162.98	0.0%	100.0%
45	64						0.00	8162.98	0.0%	100.0%
31.5	45						0.00	8162.98	0.0%	100.0%
22.4	31.5						0.00	8162.98	0.0%	100.0%
16	22.4						35.80	8162.98	0.4%	100.0%
11.2	16						27.30	8127.18	0.3%	99.6%
8	11.2						33.60	8099.88	0.4%	99.2%
5.6	8				2.50	33.14	82.85	8066.28	1.0%	98.8%
4	5.6				2.80	33.14	92.79	7983.43	1.1%	97.8%
2.8	4				3.50	33.14	115.99	7890.63	1.4%	96.7%
2	2.8				8.40	33.14	278.38	7774.64	3.4%	95.2%
1	2				69.20	33.14	2293.29	7496.27	28.1%	91.8%
0.85	1				31.20	33.14	1033.97	5202.98	12.7%	63.7%
0.5	0.85				98.40	33.14	3260.98	4169.01	39.9%	51.1%
0.25	0.5				25.80	33.14	855.01	908.04	10.5%	11.1%
0.125	0.25				1.30	33.14	43.08	53.02	0.5%	0.6%
0.063	0.125				0.20	33.14	6.63	9.94	0.1%	0.1%
Pan	0.063				0.10	33.14	3.31	3.31	0.0%	0.0%
	TOTAL:				243		8,162.98	8,162.98	100.00%	100.00%

Sample Dry Wt: 8,220 | Total Processed Wt: 8,163 | = | Net Loss: 57.024 | % of Sample: 0.69%

Splitting: Gross Split 14030 - Tare 5960 = Net Split 8070

Split at _____ mm | Split Wt. = 243.5

Split/Net = 0.030

Multiplier (inverse Split/Net) = 33.142

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	20	B-axis (mm)		B-axis (mm)	
Mass (g)	12.6	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
908.04	6,588.23	570.01	7,158.24	96.70	8,162.98

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**19**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/15/2008**
Crew:	**SP**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**07:25 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**07:45 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-3.08**	**Interval (ft):**	**20**
End SH (ft):	**-3.06**	**Duration (sec):**	**30**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**1**	**Bag #:**	**1**
Total passes:	**1**	**Total bags:**	**1**

Notes

Date Processed:	**06/16/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	14992.92	0.0%	100.0%
180	256						0.00	14992.92	0.0%	100.0%
128	180						0.00	14992.92	0.0%	100.0%
90	128						0.00	14992.92	0.0%	100.0%
64	90						0.00	14992.92	0.0%	100.0%
45	64						0.00	14992.92	0.0%	100.0%
31.5	45						0.00	14992.92	0.0%	100.0%
22.4	31.5						179.90	14992.92	1.2%	100.0%
16	22.4						214.00	14813.02	1.4%	98.8%
11.2	16						135.20	14599.02	0.9%	97.4%
8	11.2						152.00	14463.82	1.0%	96.5%
5.6	8				1.90	81.83	155.47	14311.82	1.0%	95.5%
4	5.6				2.40	81.83	196.39	14156.34	1.3%	94.4%
2.8	4				4.30	81.83	351.86	13959.95	2.3%	93.1%
2	2.8				10.60	81.83	867.38	13608.09	5.8%	90.8%
1	2				59.50	81.83	4868.80	12740.71	32.5%	85.0%
0.85	1				20.40	81.83	1669.30	7871.91	11.1%	52.5%
0.5	0.85				57.30	81.83	4688.78	6202.61	31.3%	41.4%
0.25	0.5				17.00	81.83	1391.09	1513.83	9.3%	10.1%
0.125	0.25				1.40	81.83	114.56	122.74	0.8%	0.8%
0.063	0.125				0.10	81.83	8.18	8.18	0.1%	0.1%
Pan	0.063				0.00	81.83	0.00	0.00	0.0%	0.0%
	TOTAL:				175		14,992.92	14,992.92	100.00%	100.00%

Sample Dry Wt 15,030 Total Processed Wt 14,993 = Net Loss: 37.083

% of Sample: 0.25%

Splitting: Gross Split 20280 - Tare 5960 = Net Split 14320

Split at _____ mm Split Wt. = 175

Split/Net = 0.012

Multiplier (inverse Split/Net) = 81.829

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	31	B-axis (mm)		B-axis (mm)	
Mass (g)	36	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
1,513.83	11,226.88	1,571.11	12,797.99	681.10	14,992.92

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	Sandy	**Sample number:**	20
Location:	Sandy River at Revenue Bridge - SRRB	**Date collected:**	05/16/2008
Crew:	SP, MW, C. Podolak	**Method of collection:**	Cataraft

Bedload Measurements

Begin time (hh:mm):	10:17 AM	**Start station (ft):**	20.0
End time (hh:mm):	10:43 AM	**End station (ft):**	220.0
Begin SH (ft):	-2.84	**Interval (ft):**	20
End SH (ft):	-2.84	**Duration (sec):**	30
Mvg. bed width (ft):	220	**Sampler:**	TR-2
Pass #:	1	**Bag #:**	1,2
Total passes:	2	**Total bags:**	2

Notes

Date Processed:	06/17/2008
Processed and Entered by:	EO
Checked by:	BC
Units:	grams

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	18355.46	0.0%	100.0%
180	256						0.00	18355.46	0.0%	100.0%
128	180						0.00	18355.46	0.0%	100.0%
90	128						0.00	18355.46	0.0%	100.0%
64	90						0.00	18355.46	0.0%	100.0%
45	64						0.00	18355.46	0.0%	100.0%
31.5	45						168.90	18355.46	0.9%	100.0%
22.4	31.5						224.00	18186.56	1.2%	99.1%
16	22.4						248.00	17962.56	1.4%	97.9%
11.2	16						176.50	17714.56	1.0%	96.5%
8	11.2						184.50	17538.06	1.0%	95.5%
5.6	8				2.60	64.42	167.48	17353.56	0.9%	94.5%
4	5.6				4.50	64.42	289.87	17186.08	1.6%	93.6%
2.8	4				8.10	64.42	521.77	16896.21	2.8%	92.1%
2	2.8				16.20	64.42	1043.53	16374.44	5.7%	89.2%
1	2				90.10	64.42	5803.84	15330.91	31.6%	83.5%
0.85	1				29.00	64.42	1868.05	9527.06	10.2%	51.9%
0.5	0.85				75.40	64.42	4856.94	7659.01	26.5%	41.7%
0.25	0.5				36.80	64.42	2370.49	2802.08	12.9%	15.3%
0.125	0.25				6.00	64.42	386.49	431.58	2.1%	2.4%
0.063	0.125				0.60	64.42	38.65	45.09	0.2%	0.2%
Pan	0.063				0.10	64.42	6.44	6.44	0.0%	0.0%
	TOTAL:				269		18,355.46	18,355.46	100.00%	100.00%

Sample Dry Wt 18,400 Total Processed Wt 18,355 = Net Loss: 44.542

% of Sample: 0.24%

Splitting: Gross Split 23350 - Tare 5990 = Net Split 17360

Split at _____ mm Split Wt. = 269.5

Split/Net = 0.016

Multiplier (inverse Split/Net) = 64.416

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	44	B-axis (mm)		B-axis (mm)	
Mass (g)	133.2	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
2,802.08	12,528.83	2,022.65	14,551.48	1,001.90	18,355.46

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**20**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/16/2008**
Crew:	**SP , MW, C. Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**10:50 AM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**11:11 AM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.84**	**Interval (ft):**	**20**
End SH (ft):	**-2.84**	**Duration (sec):**	**30**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**2**	**Bag #:**	**1,2**
Total passes:	**2**	**Total bags:**	**2**

Notes

Date Processed:	**06/17/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	28297.61	0.0%	100.0%
180	256						0.00	28297.61	0.0%	100.0%
128	180						0.00	28297.61	0.0%	100.0%
90	128						0.00	28297.61	0.0%	100.0%
64	90						0.00	28297.61	0.0%	100.0%
45	64						0.00	28297.61	0.0%	100.0%
31.5	45						0.00	28297.61	0.0%	100.0%
22.4	31.5						21.00	28297.61	0.1%	100.0%
16	22.4						144.90	28276.61	0.5%	99.9%
11.2	16						144.70	28131.71	0.5%	99.4%
8	11.2						166.10	27987.01	0.6%	98.9%
5.6	8				2.80	90.95	254.65	27820.91	0.9%	98.3%
4	5.6				2.70	90.95	245.56	27566.25	0.9%	97.4%
2.8	4				6.10	90.95	554.78	27320.69	2.0%	96.5%
2	2.8				12.50	90.95	1136.85	26765.91	4.0%	94.6%
1	2				70.80	90.95	6439.10	25629.07	22.8%	90.6%
0.85	1				32.10	90.95	2919.42	19189.97	10.3%	67.8%
0.5	0.85				118.40	90.95	10768.21	16270.55	38.1%	57.5%
0.25	0.5				53.00	90.95	4820.23	5502.34	17.0%	19.4%
0.125	0.25				6.20	90.95	563.88	682.11	2.0%	2.4%
0.063	0.125				1.10	90.95	100.04	118.23	0.4%	0.4%
Pan	0.063				0.20	90.95	18.19	18.19	0.1%	0.1%
	TOTAL:				306		28,297.61	28,297.61	100.00%	100.00%

Sample Dry Wt 28,370 Total Processed Wt 28,298 = Net Loss: 72.395

% of Sample: 0.26%

Splitting: Gross Split 39780 - Tare 11950 = Net Split 27830

Split at _____ mm Split Wt. = 306

Split/Net = 0.011

Multiplier (inverse Split/Net) = 90.948

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	24	B-axis (mm)		B-axis (mm)	
Mass (g)	21	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
5,502.34	20,126.73	2,191.84	22,318.57	476.70	28,297.61

GMA Version: March 2008

Hydrology | Geomorphology | Stream Restoration

PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**21**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/16/2008**
Crew:	**SP , MW, C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**01:14 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**01:42 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.84**	**Interval (ft):**	**20**
End SH (ft):	**-2.84**	**Duration (sec):**	**30**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**1**	**Bag #:**	**1,2, 3**
Total passes:	**2**	**Total bags:**	**3**

Notes

Date Processed:	**06/17/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	41161.95	0.0%	100.0%
180	256						0.00	41161.95	0.0%	100.0%
128	180						0.00	41161.95	0.0%	100.0%
90	128						0.00	41161.95	0.0%	100.0%
64	90						0.00	41161.95	0.0%	100.0%
45	64						576.50	41161.95	1.4%	100.0%
31.5	45						826.50	40585.45	2.0%	98.6%
22.4	31.5						914.50	39758.95	2.2%	96.6%
16	22.4						1139.50	38844.45	2.8%	94.4%
11.2	16						1260.50	37704.95	3.1%	91.6%
8	11.2						1502.00	36444.45	3.6%	88.5%
5.6	8				18.10	124.53	2253.95	34942.45	5.5%	84.9%
4	5.6				17.30	124.53	2154.33	32688.50	5.2%	79.4%
2.8	4				25.70	124.53	3200.36	30534.17	7.8%	74.2%
2	2.8				36.80	124.53	4582.62	27333.81	11.1%	66.4%
1	2				107.80	124.53	13424.08	22751.20	32.6%	55.3%
0.85	1				18.60	124.53	2316.21	9327.12	5.6%	22.7%
0.5	0.85				35.80	124.53	4458.09	7010.91	10.8%	17.0%
0.25	0.5				16.20	124.53	2017.35	2552.82	4.9%	6.2%
0.125	0.25				3.40	124.53	423.39	535.47	1.0%	1.3%
0.063	0.125				0.70	124.53	87.17	112.07	0.2%	0.3%
Pan	0.063				0.20	124.53	24.91	24.91	0.1%	0.1%
	TOTAL:				281		41,161.95	41,161.95	100.00%	100.00%

Sample Dry Wt 41,210 Total Processed Wt 41,162 = Net Loss: 48.047

% of Sample: 0.12%

Splitting: Gross Split 34930 - Tare 5990 = Net Split 34930

Split at _____ mm Split Wt. = 280.5

Split/Net = 0.008

Multiplier (inverse Split/Net) = 124.528

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	81	B-axis (mm)		B-axis (mm)	
Mass (g)	576.5	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
2,552.82	20,198.38	12,191.25	32,389.64	6,219.50	41,161.95

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**21**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/16/2008**
Crew:	**SP, MW, C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**01:48 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**02:03 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.84**	**Interval (ft):**	**20**
End SH (ft):	**-2.85**	**Duration (sec):**	**15**
Mvg. bed width (ft):		**Sampler:**	**TR-2**
Pass #:	**2**	**Bag #:**	**1**
Total passes:	**2**	**Total bags:**	**1**

Date Processed: 06/17/2008
Processed and Entered by: EO
Checked by: BC
Units: grams

Notes

Changed downtime to 15 sec for Pass 2

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	12888.05	0.0%	100.0%
180	256						0.00	12888.05	0.0%	100.0%
128	180						0.00	12888.05	0.0%	100.0%
90	128						0.00	12888.05	0.0%	100.0%
64	90						0.00	12888.05	0.0%	100.0%
45	64						0.00	12888.05	0.0%	100.0%
31.5	45						0.00	12888.05	0.0%	100.0%
22.4	31.5						49.20	12888.05	0.4%	100.0%
16	22.4						92.10	12838.85	0.7%	99.6%
11.2	16						54.30	12746.75	0.4%	98.9%
8	11.2						47.00	12692.45	0.4%	98.5%
5.6	8				0.00	45.50	0.00	12645.45	0.0%	98.1%
4	5.6				2.50	45.50	113.76	12645.45	0.9%	98.1%
2.8	4				3.80	45.50	172.91	12531.69	1.3%	97.2%
2	2.8				7.40	45.50	336.73	12358.78	2.6%	95.9%
1	2				70.00	45.50	3185.25	12022.05	24.7%	93.3%
0.85	1				30.20	45.50	1374.21	8836.80	10.7%	68.6%
0.5	0.85				108.20	45.50	4923.49	7462.59	38.2%	57.9%
0.25	0.5				48.80	45.50	2220.58	2539.10	17.2%	19.7%
0.125	0.25				6.30	45.50	286.67	318.53	2.2%	2.5%
0.063	0.125				0.60	45.50	27.30	31.85	0.2%	0.2%
Pan	0.063				0.10	45.50	4.55	4.55	0.0%	0.0%
	TOTAL:				278		12,888.05	12,888.05	100.00%	100.00%

Sample Dry Wt: 12,910 Total Processed Wt: 12,888 = Net Loss: 21.950
% of Sample: 0.17%

Splitting: Gross Split 18610 - Tare 5960 = Net Split 12650

Split at _____ mm Split Wt. = 278

Split/Net = 0.022

Multiplier (inverse Split/Net) = 45.504

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	29	B-axis (mm)		B-axis (mm)	
Mass (g)	27.6	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
2,539.10	9,482.95	623.40	10,106.35	242.60	12,888.05

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**22**
Location:	**Sandy River at Revenue Bridge - SRRB**	**Date collected:**	**05/16/2008**
Crew:	**SP, MW, C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**04:50 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**05:07 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.81**	**Interval (ft):**	**20**
End SH (ft):	**-2.80**	**Duration (sec):**	**15**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**1**	**Bag #:**	**1**
Total passes:	**2**	**Total bags:**	**1**

Notes

Date Processed:	**06/19/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	12294.84	0.0%	100.0%
180	256						0.00	12294.84	0.0%	100.0%
128	180						0.00	12294.84	0.0%	100.0%
90	128						0.00	12294.84	0.0%	100.0%
64	90						0.00	12294.84	0.0%	100.0%
45	64						0.00	12294.84	0.0%	100.0%
31.5	45						146.40	12294.84	1.2%	100.0%
22.4	31.5						94.80	12148.44	0.8%	98.8%
16	22.4						47.60	12053.64	0.4%	98.0%
11.2	16						68.10	12006.04	0.6%	97.7%
8	11.2						77.70	11937.94	0.6%	97.1%
5.6	8				1.80	51.19	92.14	11860.24	0.7%	96.5%
4	5.6				2.60	51.19	133.09	11768.10	1.1%	95.7%
2.8	4				2.80	51.19	143.33	11635.01	1.2%	94.6%
2	2.8				6.20	51.19	317.37	11491.68	2.6%	93.5%
1	2				54.60	51.19	2794.86	11174.32	22.7%	90.9%
0.85	1				25.80	51.19	1320.65	8379.46	10.7%	68.2%
0.5	0.85				92.60	51.19	4740.00	7058.81	38.6%	57.4%
0.25	0.5				41.00	51.19	2098.70	2318.81	17.1%	18.9%
0.125	0.25				4.10	51.19	209.87	220.11	1.7%	1.8%
0.063	0.125				0.20	51.19	10.24	10.24	0.1%	0.1%
Pan	0.063				0.00	51.19	0.00	0.00	0.0%	0.0%
	TOTAL:				232		12,294.84	12,294.84	100.00%	100.00%

Sample Dry Wt 12,310 Total Processed Wt 12,295 = Net Loss: 15.162

% of Sample: 0.12%

Splitting: Gross Split 17840 - Tare 5990 = Net Split 11850

Split at _____ mm Split Wt. = 231.5

Split/Net = 0.020

Multiplier (inverse Split/Net) = 51.188

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	44	B-axis (mm)		B-axis (mm)	
Mass (g)	96.3	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
2,318.81	8,855.51	685.92	9,541.43	434.60	12,294.84

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**22**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/16/2008**
Crew:	**SP, MW, C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**05:10 PM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**05:26 PM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.80**	**Interval (ft):**	**20**
End SH (ft):	**-2.80**	**Duration (sec):**	**15**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**2**	**Bag #:**	**1**
Total passes:	**2**	**Total bags:**	**1**

Notes

Date Processed:	**06/19/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	8735.57	0.0%	100.0%
180	256						0.00	8735.57	0.0%	100.0%
128	180						0.00	8735.57	0.0%	100.0%
90	128						0.00	8735.57	0.0%	100.0%
64	90						0.00	8735.57	0.0%	100.0%
45	64						0.00	8735.57	0.0%	100.0%
31.5	45						0.00	8735.57	0.0%	100.0%
22.4	31.5						0.00	8735.57	0.0%	100.0%
16	22.4						18.20	8735.57	0.2%	100.0%
11.2	16						21.20	8717.37	0.2%	99.8%
8	11.2						10.70	8696.17	0.1%	99.5%
5.6	8				0.60	57.56	34.53	8685.47	0.4%	99.4%
4	5.6				0.00	57.56	0.00	8650.93	0.0%	99.0%
2.8	4				0.60	57.56	34.53	8650.93	0.4%	99.0%
2	2.8				1.60	57.56	92.09	8616.40	1.1%	98.6%
1	2				21.60	57.56	1243.25	8524.30	14.2%	97.6%
0.85	1				14.00	57.56	805.81	7281.06	9.2%	83.3%
0.5	0.85				69.40	57.56	3994.51	6475.25	45.7%	74.1%
0.25	0.5				38.30	57.56	2204.46	2480.74	25.2%	28.4%
0.125	0.25				4.20	57.56	241.74	276.28	2.8%	3.2%
0.063	0.125				0.40	57.56	23.02	34.53	0.3%	0.4%
Pan	0.063				0.20	57.56	11.51	11.51	0.1%	0.1%
	TOTAL:				151		8,735.57	8,735.57	100.00%	100.00%

Sample Dry Wt: 8,780 | Total Processed Wt: 8,736 | = | Net Loss: 44.435 | % of Sample: 0.51%

Splitting: Gross Split 8720 - Tare 5960 = Net Split 8720

Split at _____ mm | Split Wt. = 151.5

Split/Net = 0.017

Multiplier (inverse Split/Net) = 57.558

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	20	B-axis (mm)		B-axis (mm)	
Mass (g)	11.7	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
2,480.74	6,043.56	161.16	6,204.73	50.10	8,735.57

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**23**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/17/2008**
Crew:	**SP , MW, C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**07:50 AM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**08:08 AM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.55**	**Interval (ft):**	**20**
End SH (ft):	**-2.55**	**Duration (sec):**	**10**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**1**	**Bag #:**	**1,2**
Total passes:	**2**	**Total bags:**	**1**

Notes

Date Processed:	**06/19/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

WEIGHT

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
256							0.00	21842.20	0.0%	100.0%
180	256						0.00	21842.20	0.0%	100.0%
128	180						0.00	21842.20	0.0%	100.0%
90	128						0.00	21842.20	0.0%	100.0%
64	90						788.50	21842.20	3.6%	100.0%
45	64						0.00	21053.70	0.0%	96.4%
31.5	45						35.00	21053.70	0.2%	96.4%
22.4	31.5						127.90	21018.70	0.6%	96.2%
16	22.4						164.70	20890.80	0.8%	95.6%
11.2	16						150.60	20726.10	0.7%	94.9%
8	11.2						205.50	20575.50	0.9%	94.2%
5.6	8				3.10	108.93	337.68	20370.00	1.5%	93.3%
4	5.6				2.50	108.93	272.33	20032.32	1.2%	91.7%
2.8	4				7.40	108.93	806.09	19759.99	3.7%	90.5%
2	2.8				10.00	108.93	1089.30	18953.90	5.0%	86.8%
1	2				48.50	108.93	5283.13	17864.60	24.2%	81.8%
0.85	1				18.60	108.93	2026.11	12581.47	9.3%	57.6%
0.5	0.85				63.80	108.93	6949.76	10555.36	31.8%	48.3%
0.25	0.5				28.00	108.93	3050.05	3605.60	14.0%	16.5%
0.125	0.25				4.40	108.93	479.29	555.55	2.2%	2.5%
0.063	0.125				0.60	108.93	65.36	76.25	0.3%	0.3%
Pan	0.063				0.10	108.93	10.89	10.89	0.0%	0.0%
	TOTAL:				187		21,842.20	21,842.20	100.00%	100.00%

Sample Dry Wt 21,870 Total Processed Wt 21,842 = Net Loss: 27.800

% of Sample: 0.13%

Splitting: Gross Split 26330 - Tare 5960 = Net Split 20370

Split at _____ mm Split Wt. = 187

Split/Net = 0.009

Multiplier (inverse Split/Net) = 108.930

Largest Particles Collected in Sample (D_{max}) *Optional*

B-axis (mm)	84	B-axis (mm)		B-axis (mm)	
Mass (g)	788.5	Mass (g)		Mass (g)	
B-axis (mm)		B-axis (mm)		B-axis (mm)	
Mass (g)		Mass (g)		Mass (g)	

PARTIAL TRANSPORT

≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
3,605.60	14,259.00	2,505.40	16,764.40	1,472.20	21,842.20

GMA Version: March 2008

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PARTICLE SIZE ANALYSIS

River:	**Sandy**	**Sample number:**	**23**
Location:	**Sandy River above Revenue Bridge - SRRB**	**Date collected:**	**05/17/2008**
Crew:	**SP , MW , C Podolak**	**Method of collection:**	**Cataraft**

Bedload Measurements

Begin time (hh:mm):	**08:13 AM**	**Start station (ft):**	**20.0**
End time (hh:mm):	**08:28 AM**	**End station (ft):**	**220.0**
Begin SH (ft):	**-2.55**	**Interval (ft):**	**20**
End SH (ft):	**-2.56**	**Duration (sec):**	**10**
Mvg. bed width (ft):	**220**	**Sampler:**	**TR-2**
Pass #:	**2**	**Bag #:**	**1**
Total passes:	**2**	**Total bags:**	**1**

Notes

Date Processed:	**06/19/2008**
Processed and Entered by:	**EO**
Checked by:	**BC**
Units:	**grams**

Sieve	Finer than	Scale	Gross	Tare	Net 1	(x Multiplier)	Final Net	Cum Weight	%	Cum%<
		---------- WEIGHT ----------								
256							0.00	8110.00	0.0%	100.0%
180	256						0.00	8110.00	0.0%	100.0%
128	180						0.00	8110.00	0.0%	100.0%
90	128						0.00	8110.00	0.0%	100.0%
64	90						0.00	8110.00	0.0%	100.0%
45	64						0.00	8110.00	0.0%	100.0%
31.5	45						0.00	8110.00	0.0%	100.0%
22.4	31.5						0.00	8110.00	0.0%	100.0%
16	22.4						0.00	8110.00	0.0%	100.0%
11.2	16						0.00	8110.00	0.0%	100.0%
8	11.2						0.00	8110.00	0.0%	100.0%
5.6	8				0.00	31.25	0.00	8110.00	0.0%	100.0%
4	5.6				0.00	31.25	0.00	8110.00	0.0%	100.0%
2.8	4				0.20	31.25	6.25	8110.00	0.1%	100.0%
2	2.8				0.60	31.25	18.75	8103.75	0.2%	99.9%
1	2				20.70	31.25	646.92	8085.00	8.0%	99.7%
0.85	1				18.30	31.25	571.92	7438.07	7.1%	91.7%
0.5	0.85				103.30	31.25	3228.37	6866.15	39.8%	84.7%
0.25	0.5				85.80	31.25	2681.46	3637.78	33.1%	44.9%
0.125	0.25				24.80	31.25	775.06	956.32	9.6%	11.8%
0.063	0.125				4.70	31.25	146.89	181.26	1.8%	2.2%
Pan	0.063				1.10	31.25	34.38	34.38	0.4%	0.4%
	TOTAL:				260		8,110.00	8,110.00	100.00%	100.00%

Sample Dry Wt: 8,130 | Total Processed Wt: 8,110 | = | Net Loss: 20.000 | % of Sample: 0.25%

Splitting: Gross Split 14100 - Tare 5990 = Net Split 8110

Split at _____ mm | Split Wt. = 259.5

Split/Net = 0.032

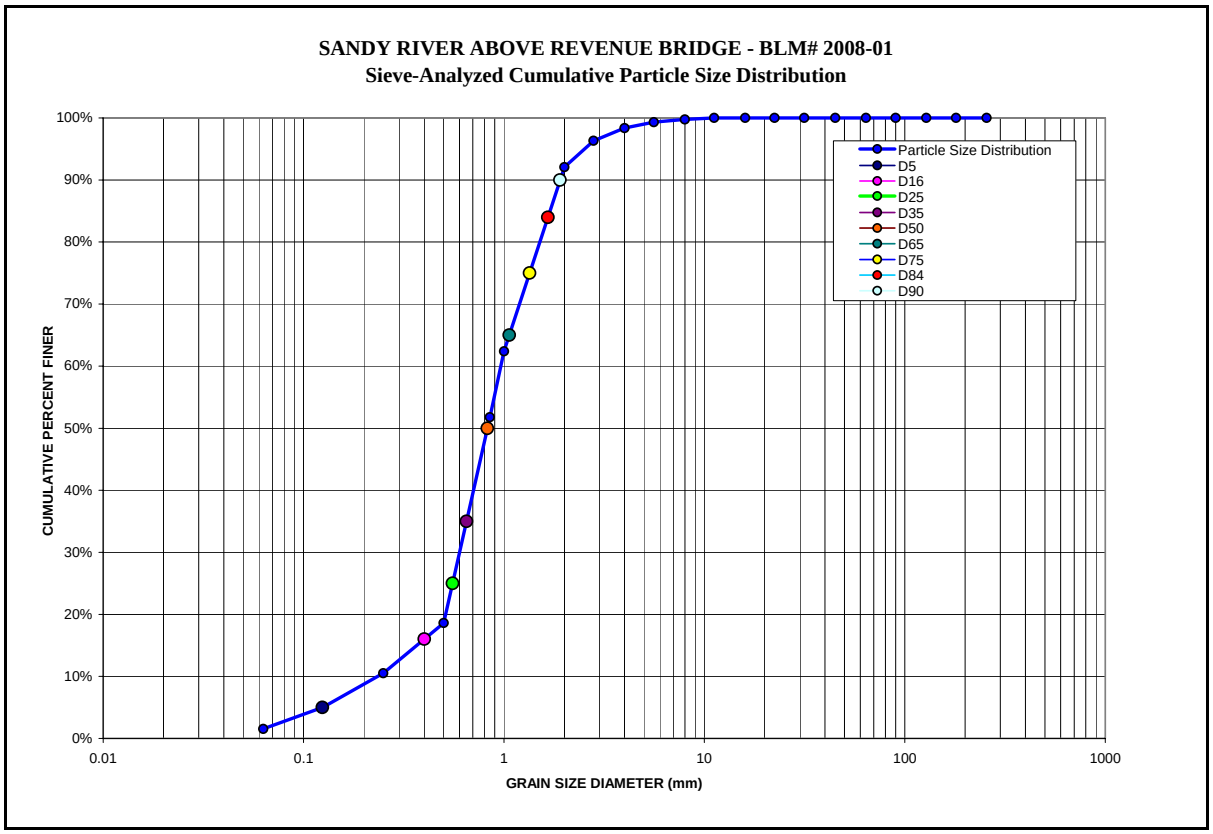
Multiplier (inverse Split/Net) = 31.252

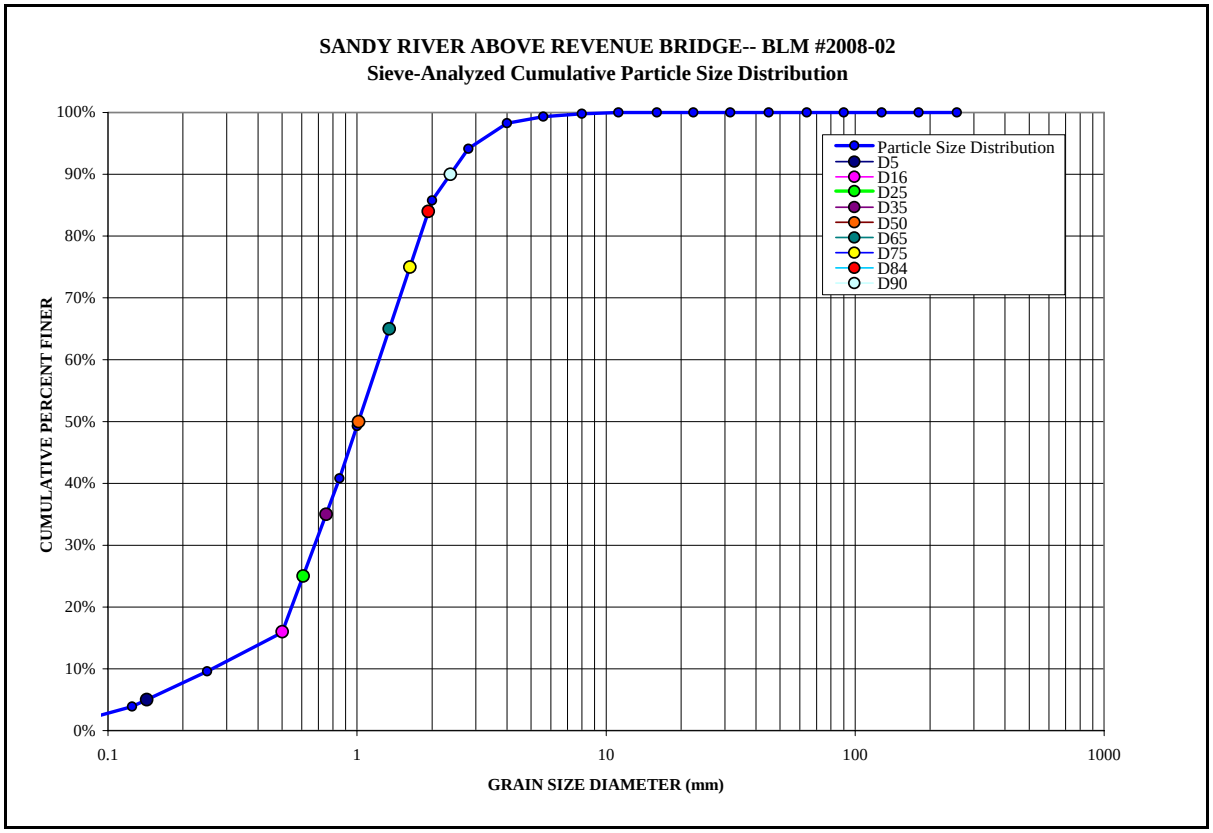
Largest Particles Collected in Sample (D_{max}) *Optional*

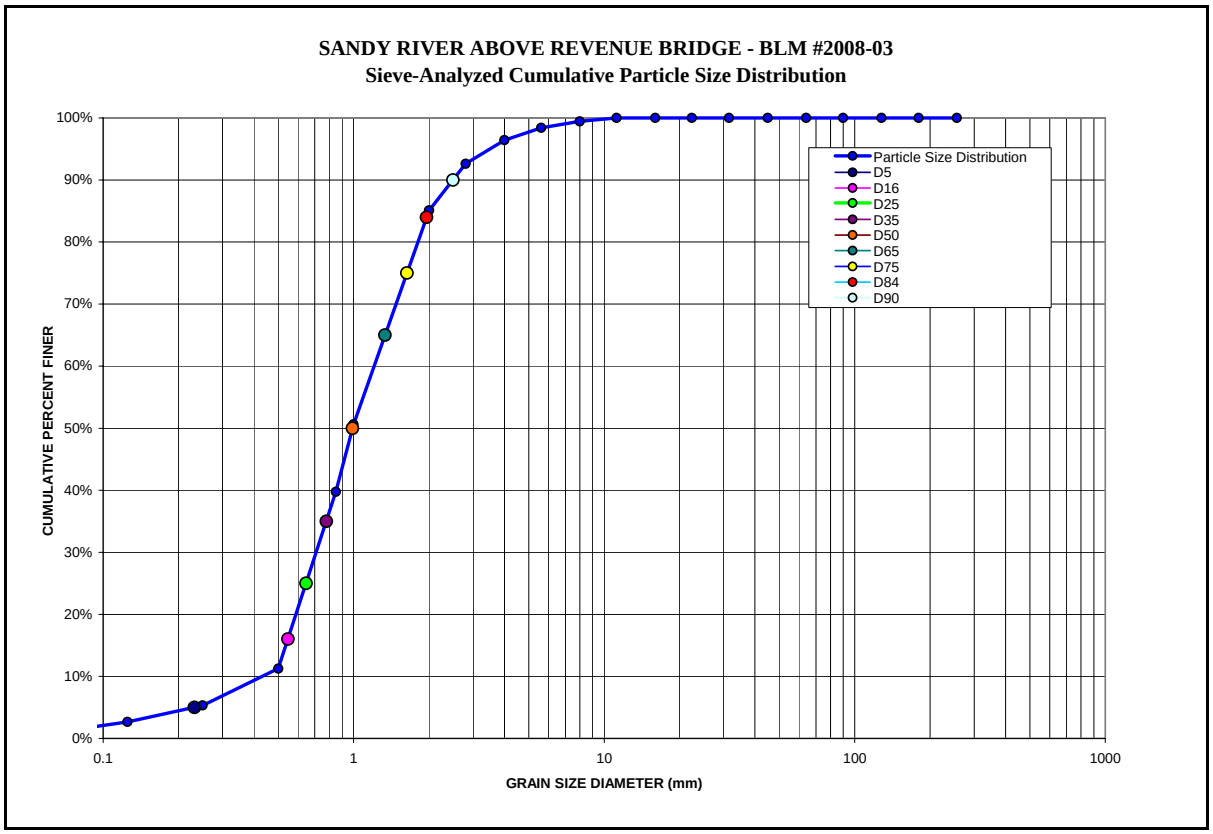
B-axis (mm)		B-axis (mm)		B-axis (mm)			
Mass (g)		Mass (g)		Mass (g)			
B-axis (mm)		B-axis (mm)		B-axis (mm)			
Mass (g)		Mass (g)		Mass (g)			

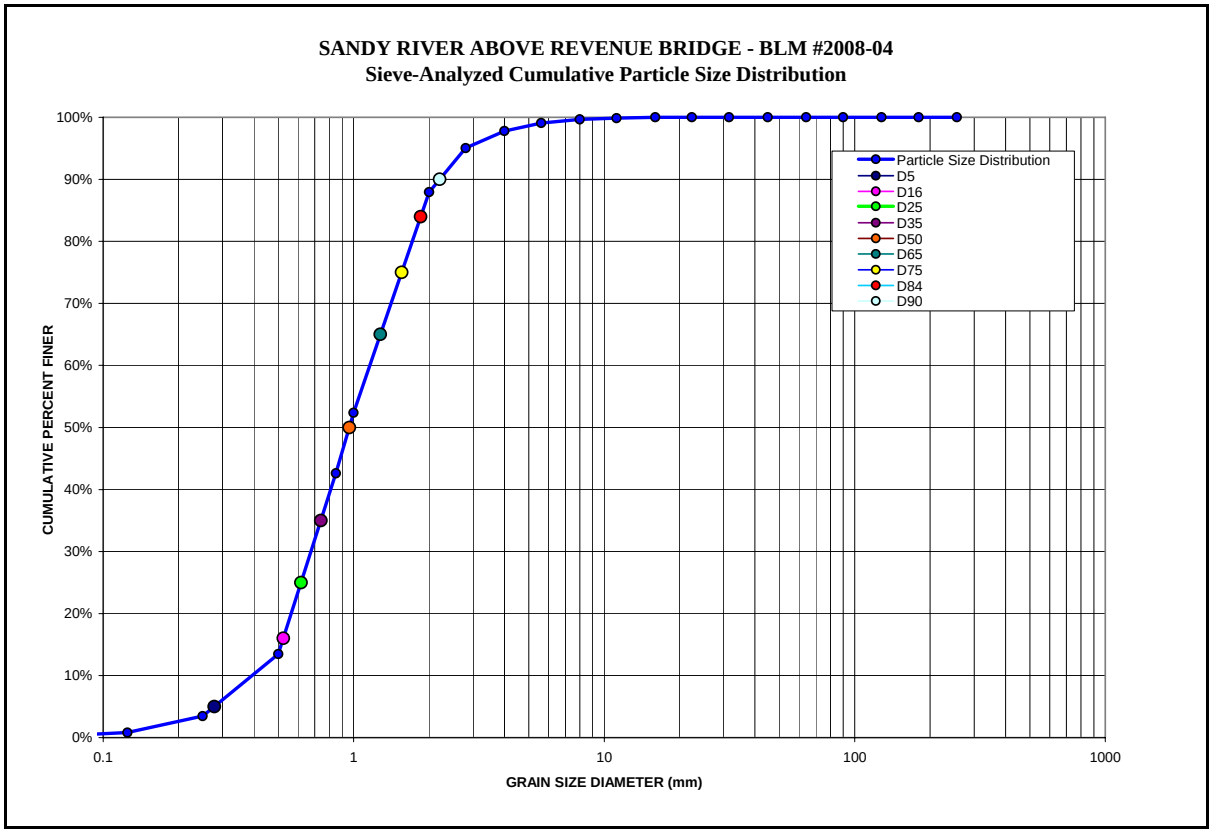
PARTIAL TRANSPORT

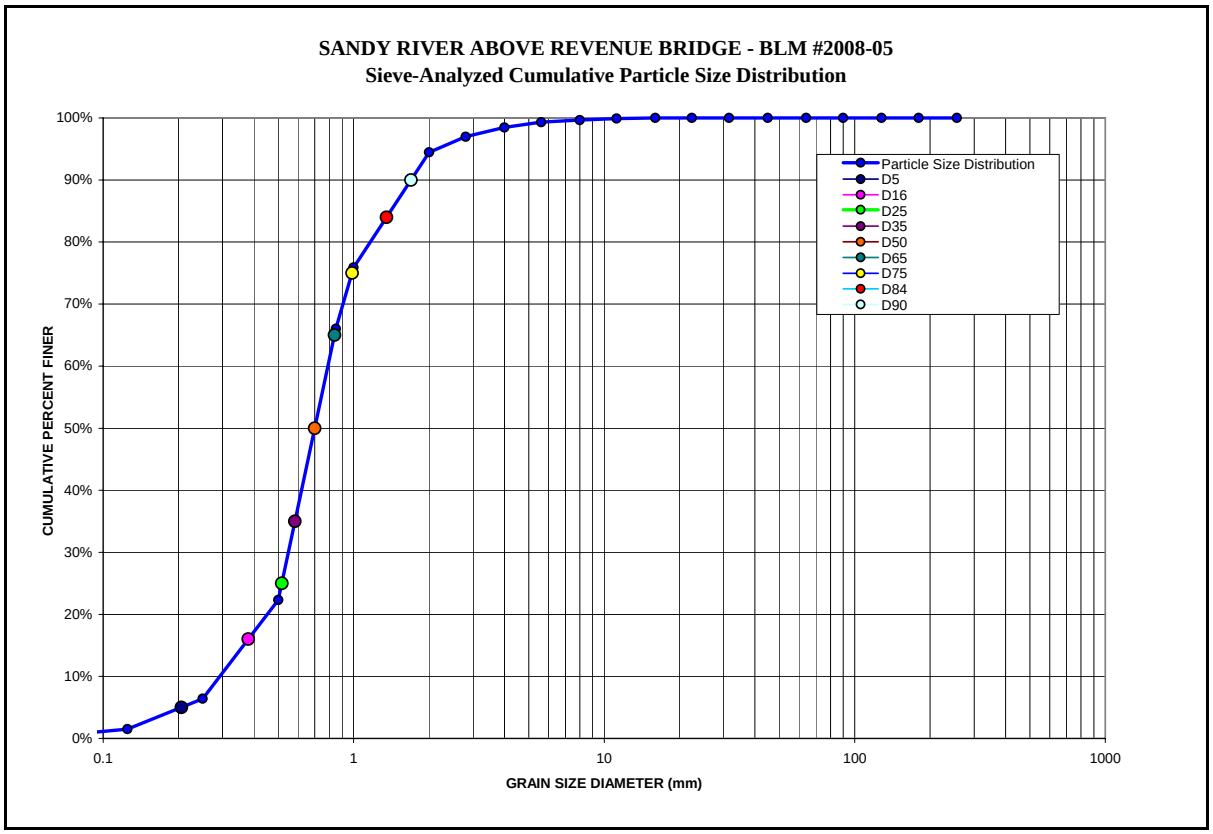
≤0.5 mm	0.5-2 mm	2-8 mm	0.5-8mm	> 8 mm	Sum
3,637.78	4,447.22	25.00	4,472.22	0.00	8,110.00

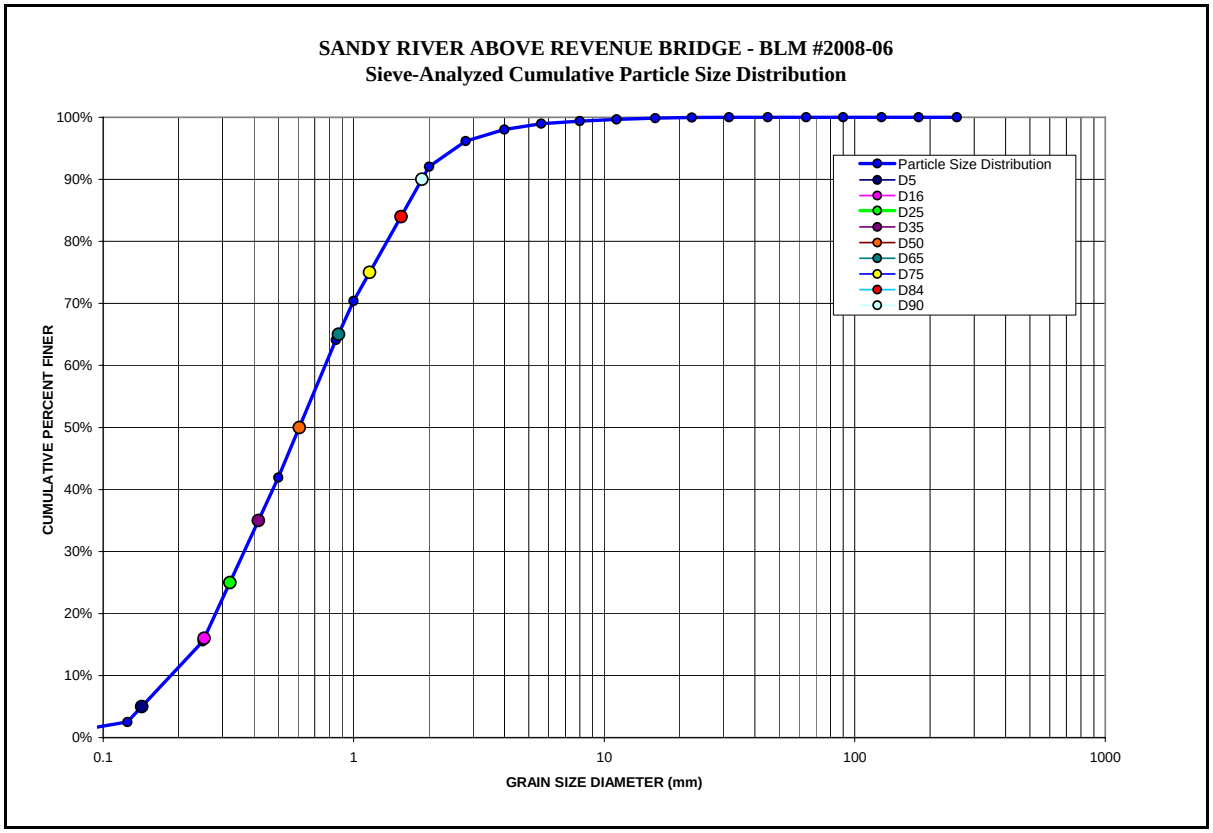

SANDY RIVER ABOVE REVENUE BRIDGE - BLM# 2008-01
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

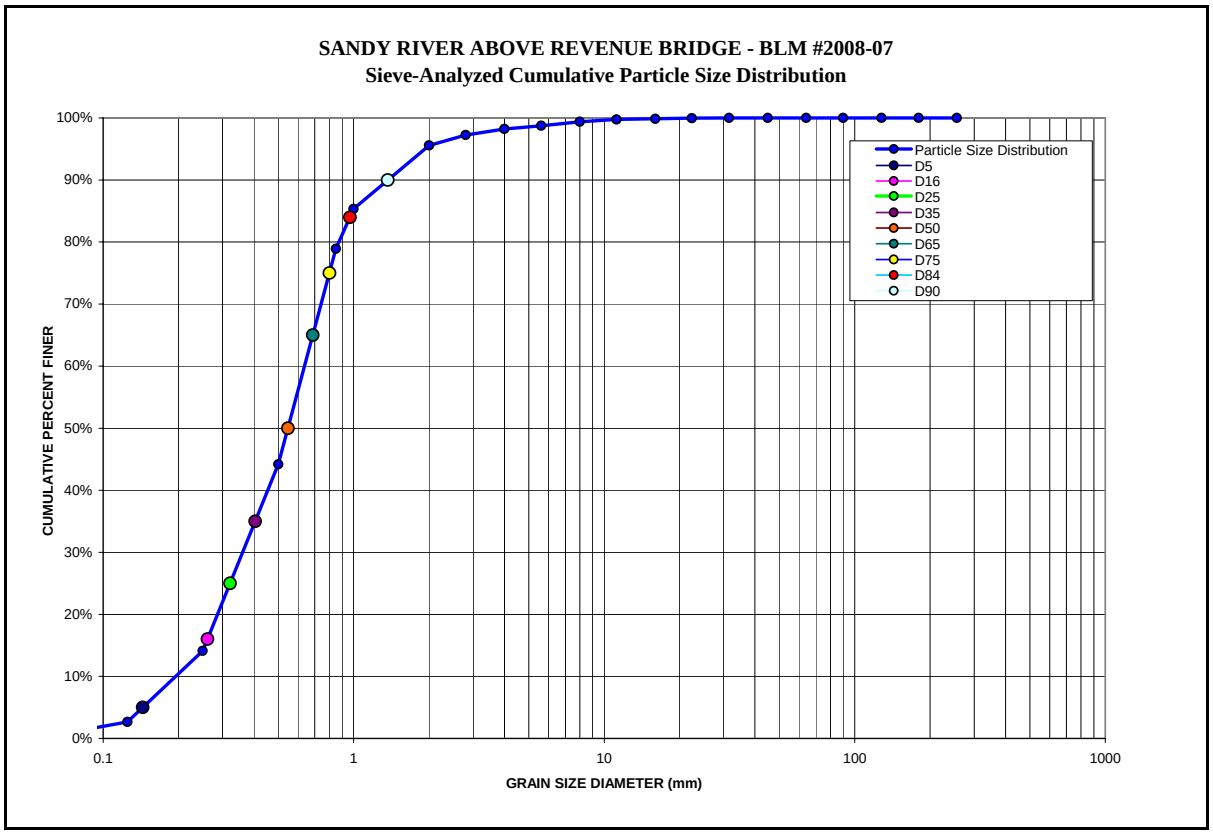

SANDY RIVER ABOVE REVENUE BRIDGE-- BLM #2008-02
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

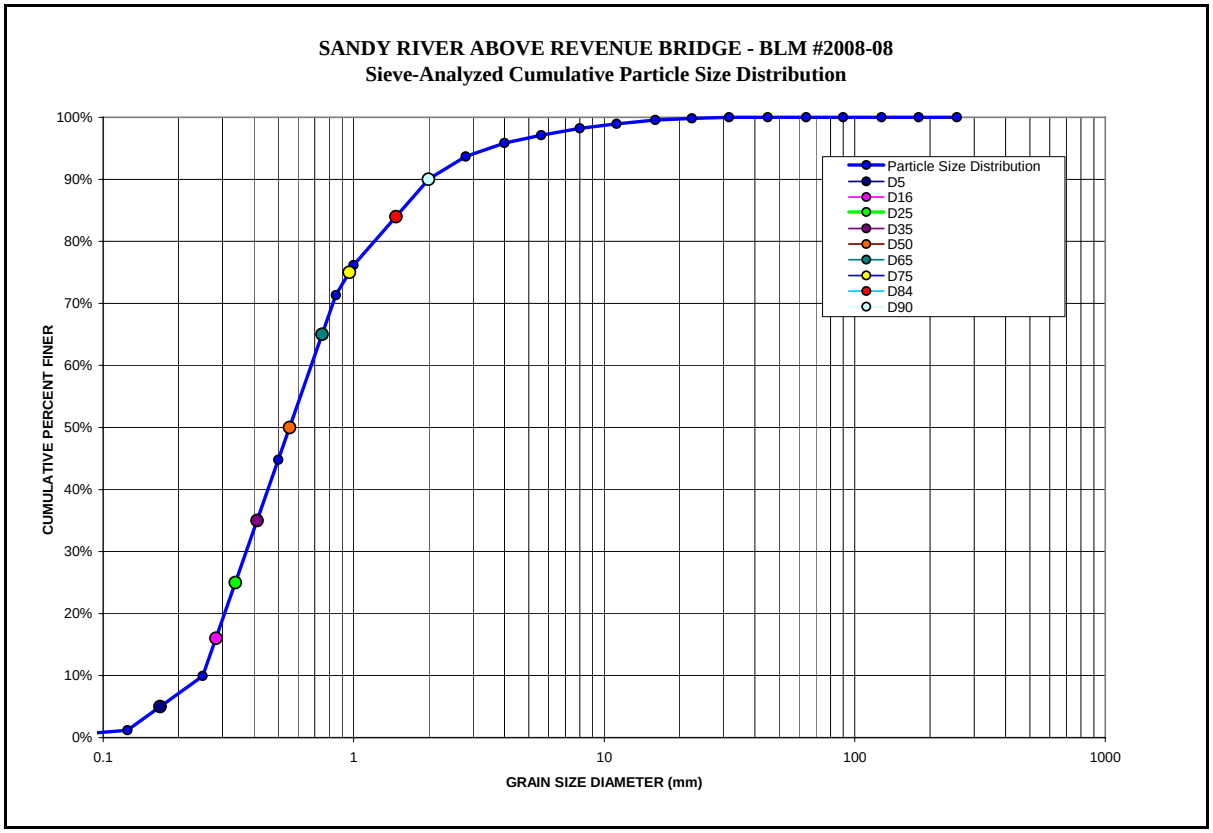

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-03
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

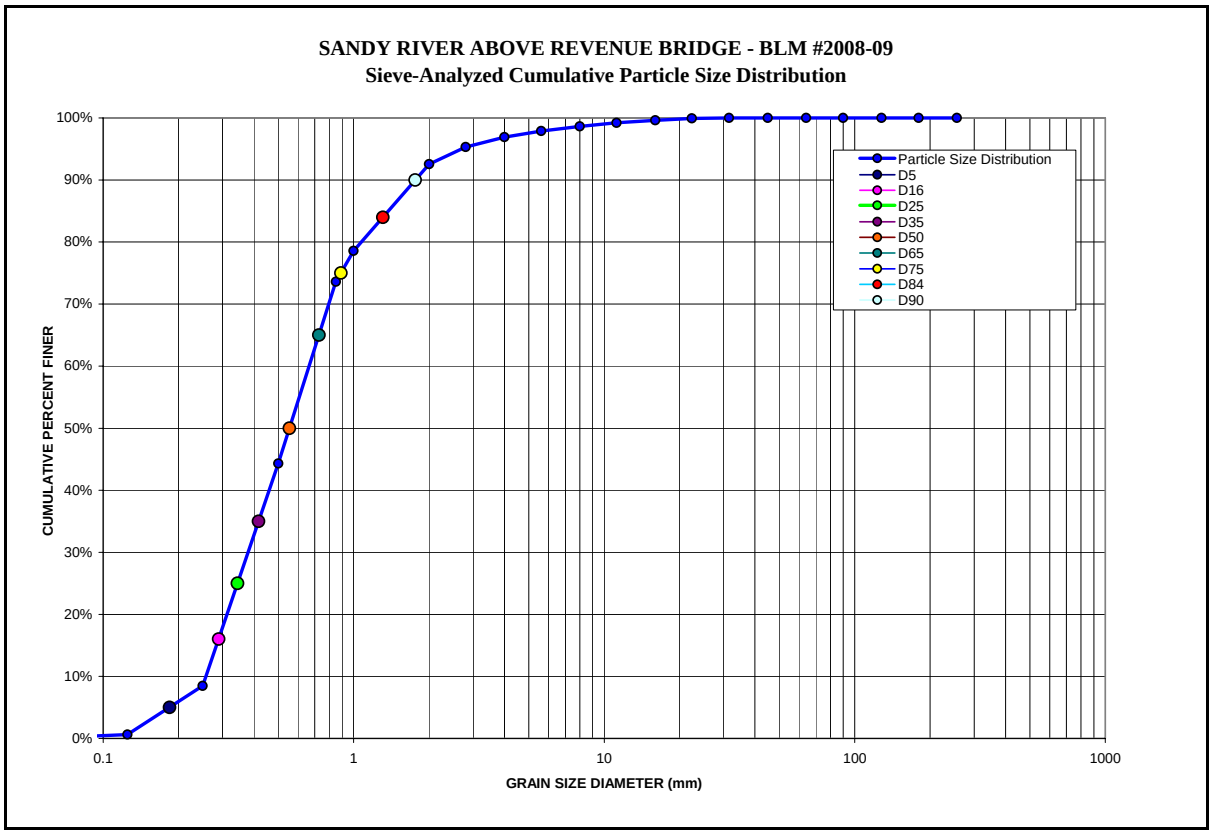

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-04
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

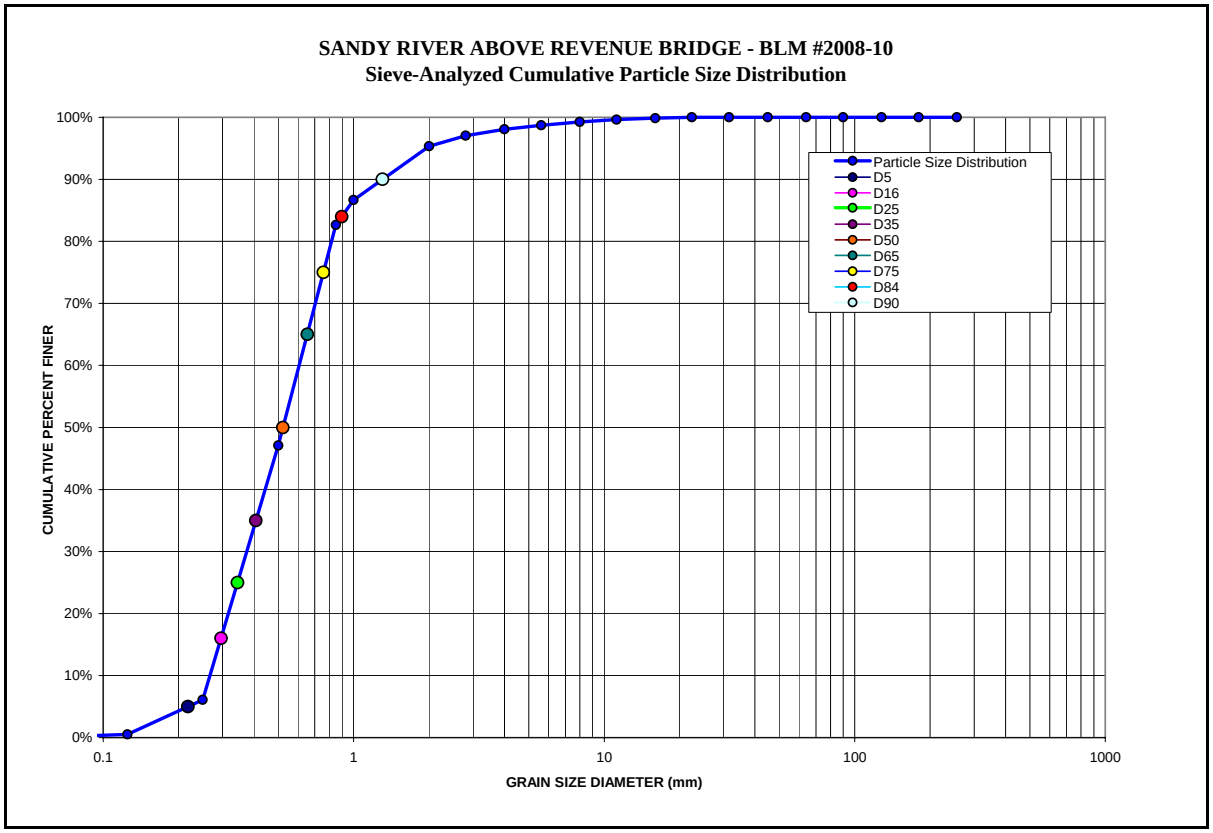

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-05
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

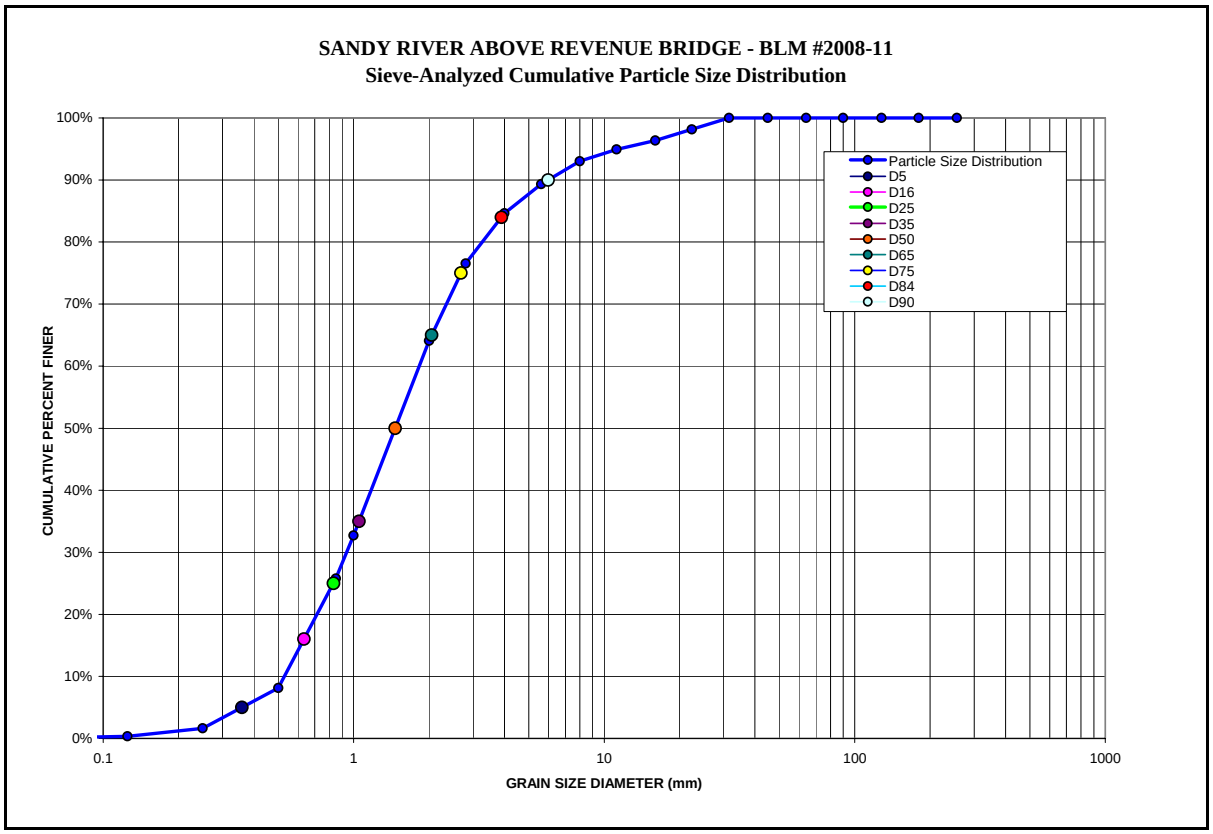

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-06
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

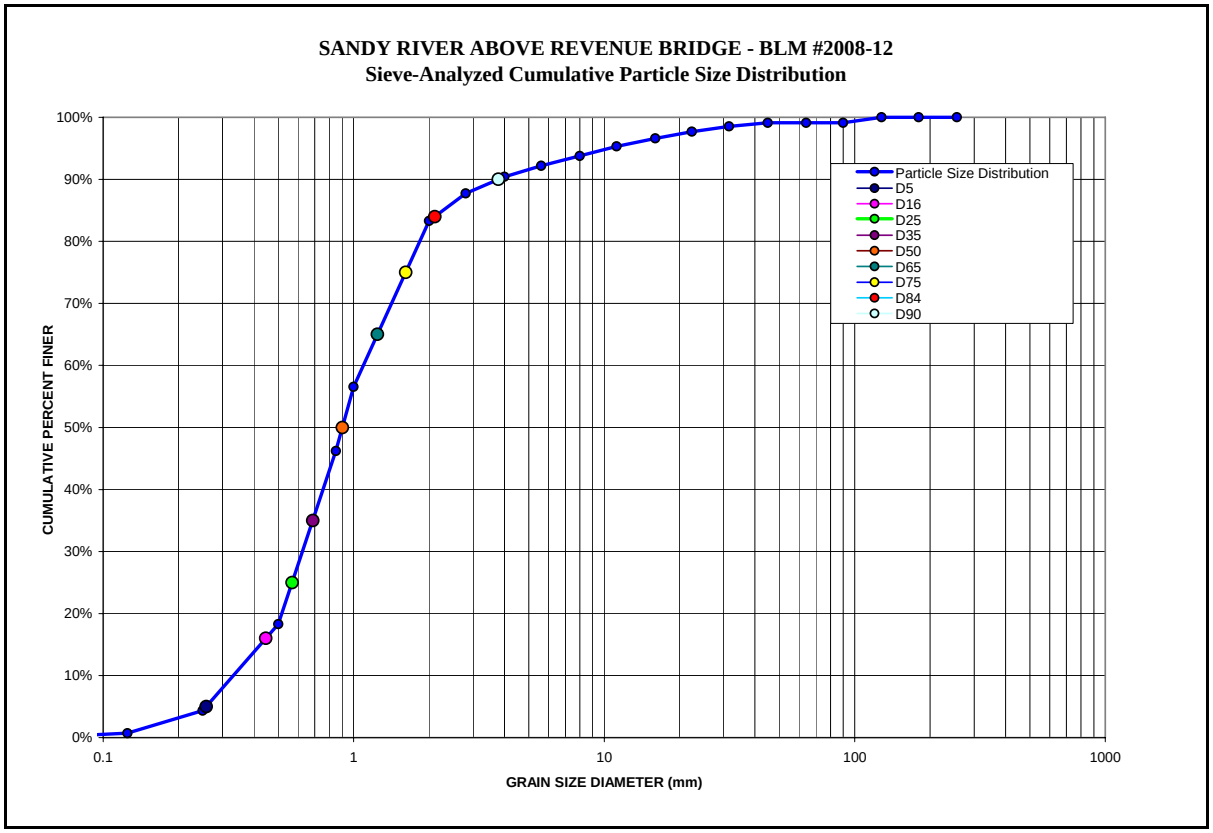

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-07
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-08
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-09
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-10
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-11
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-12
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
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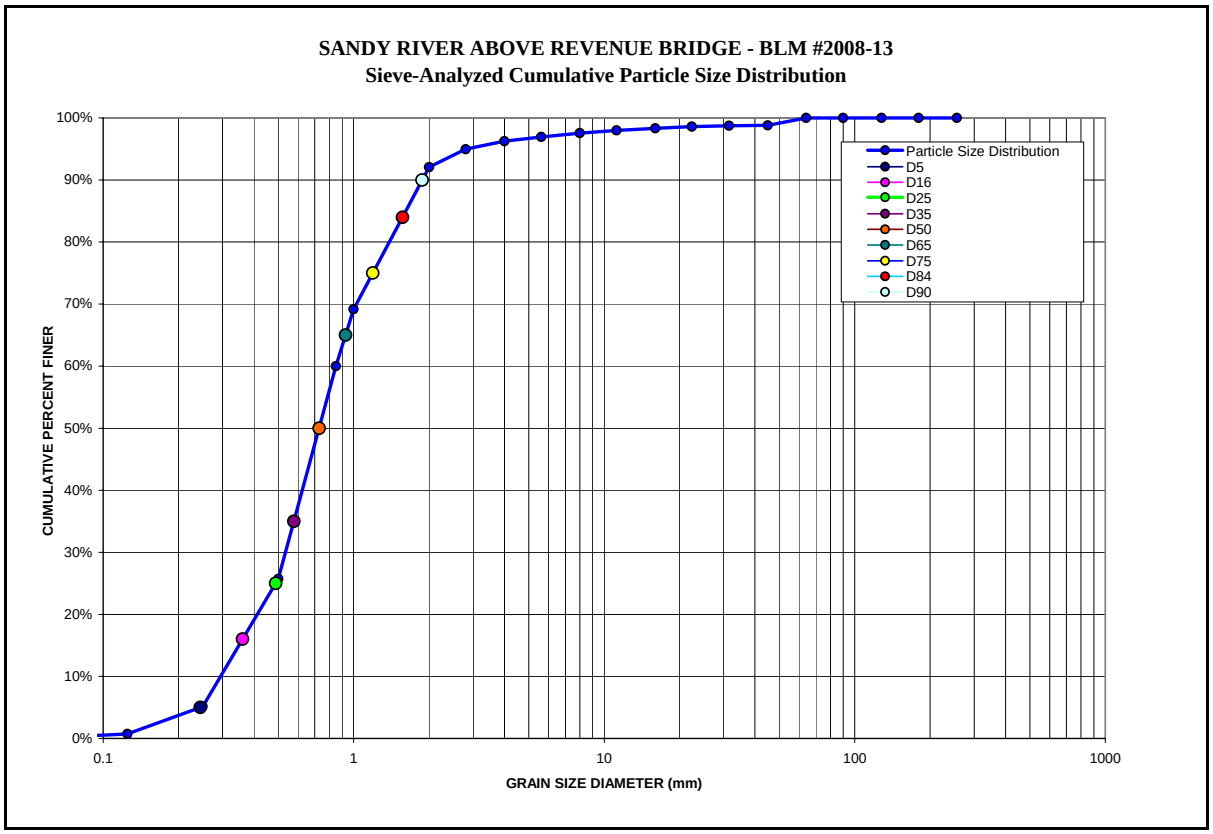
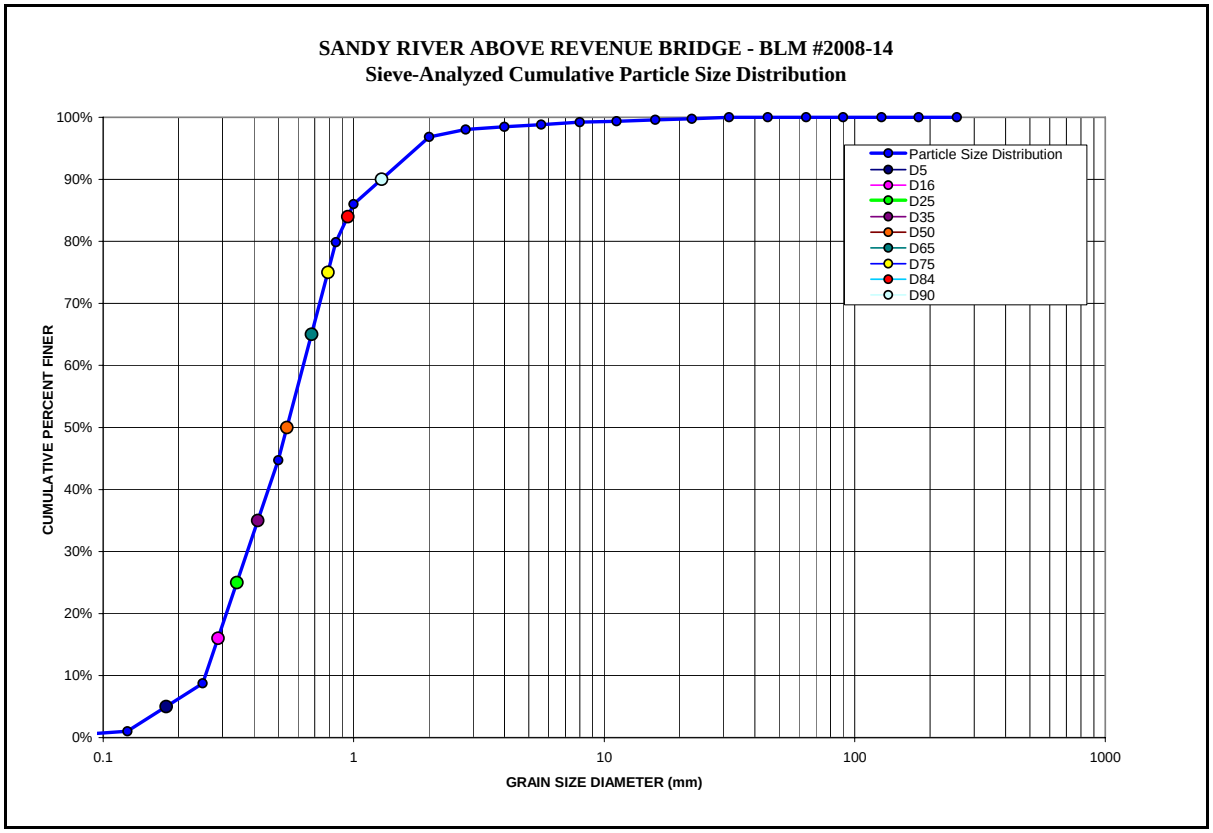
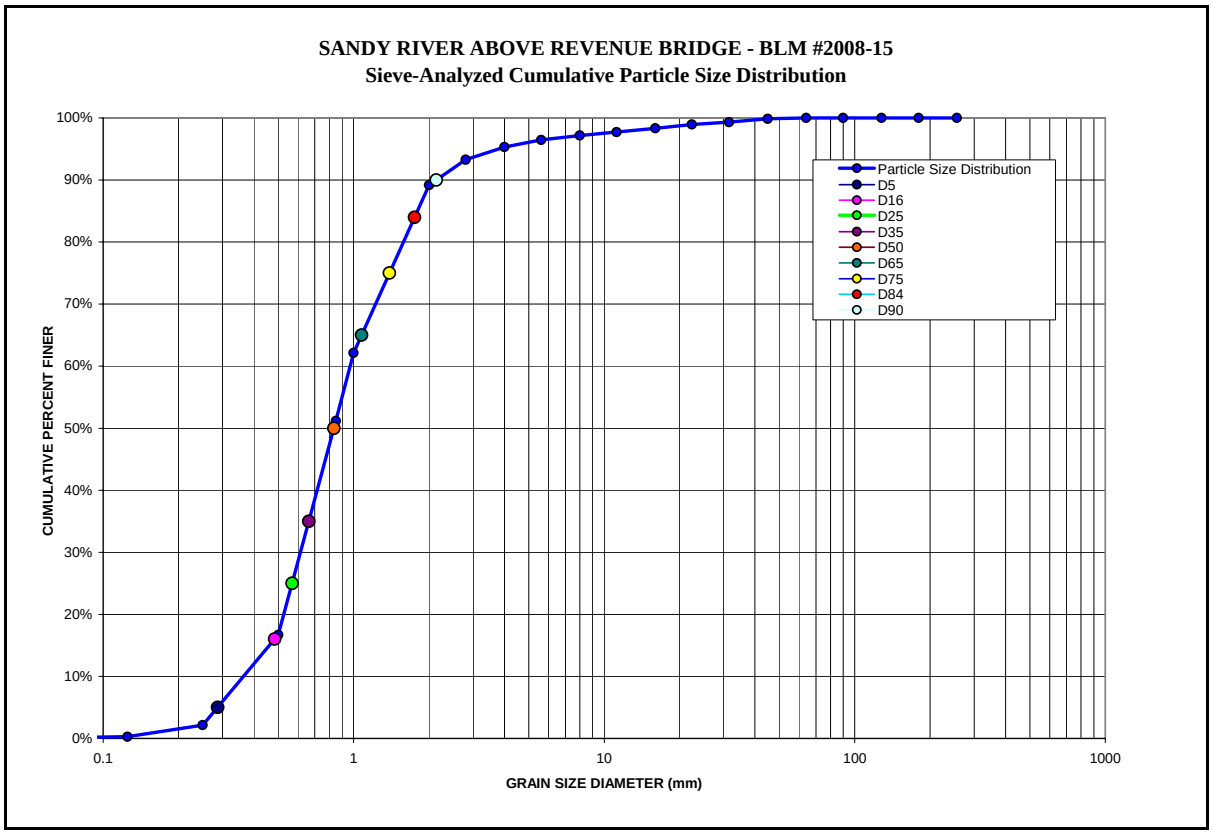
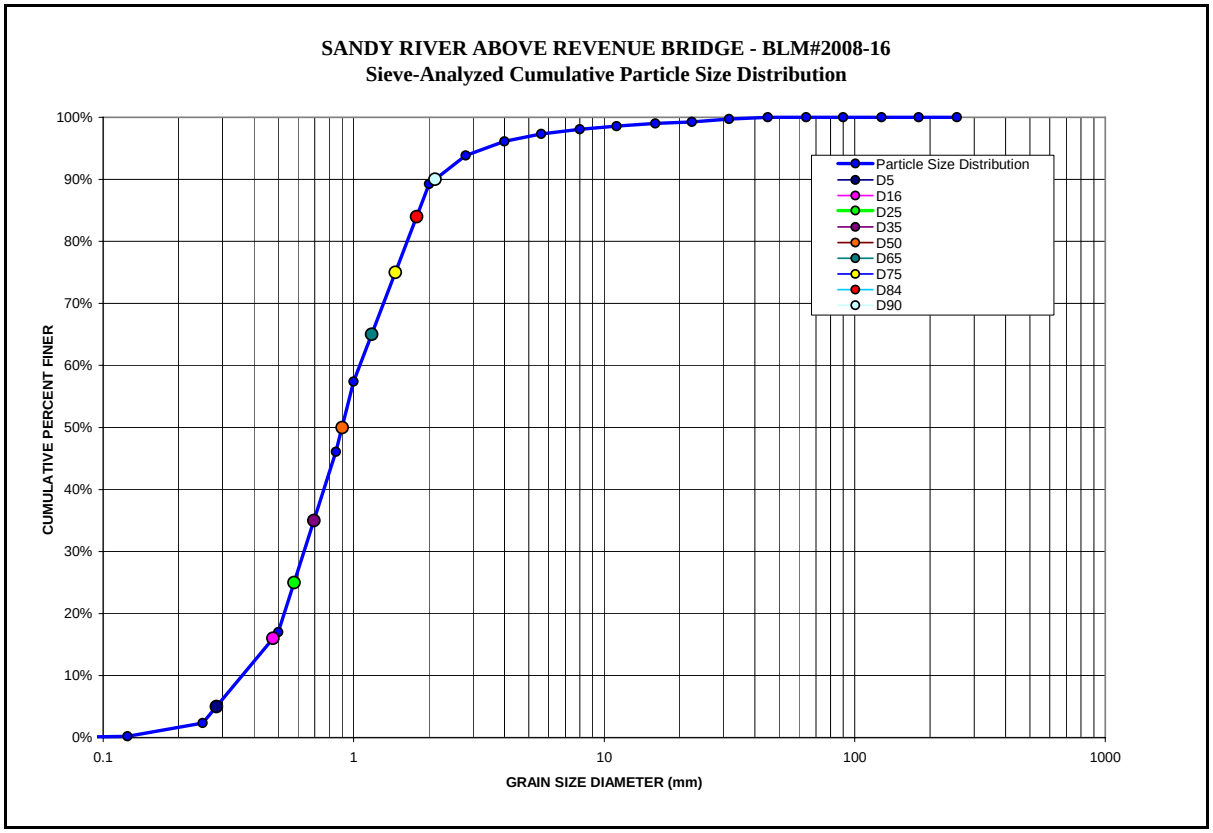
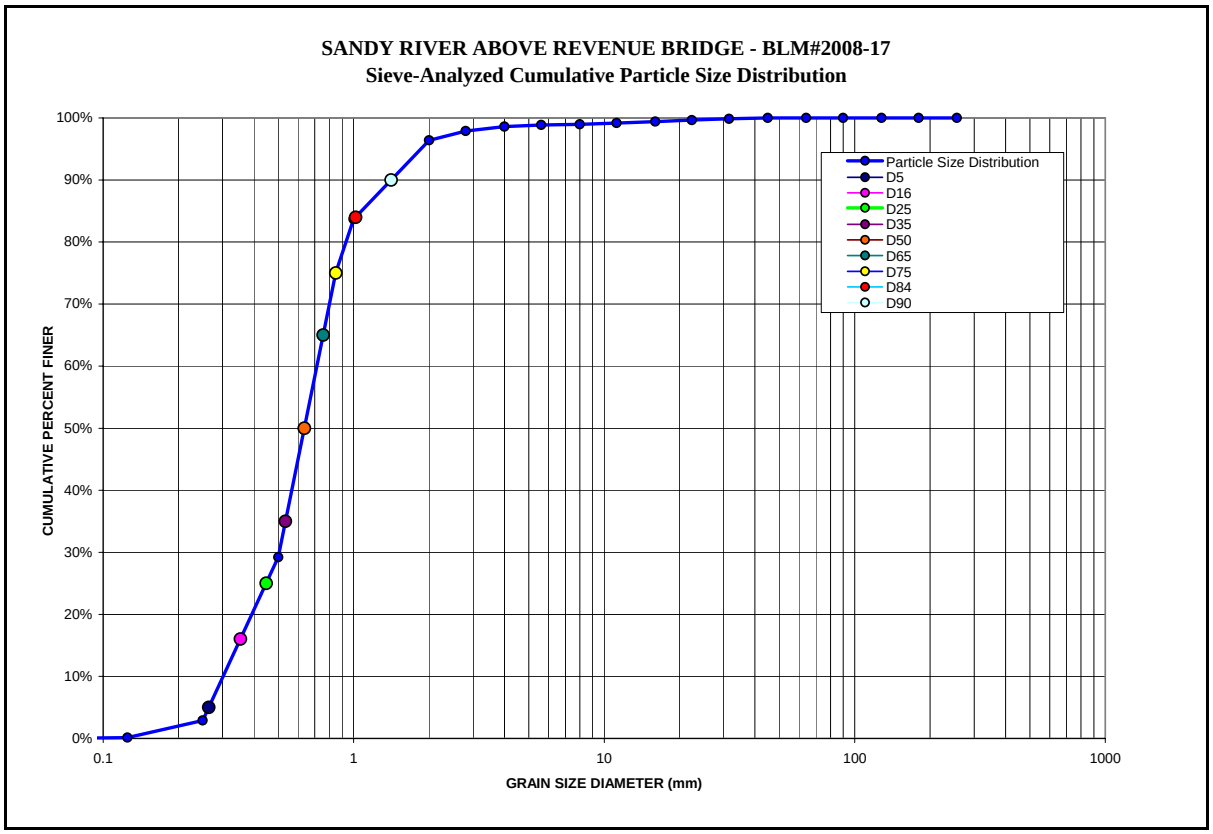
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

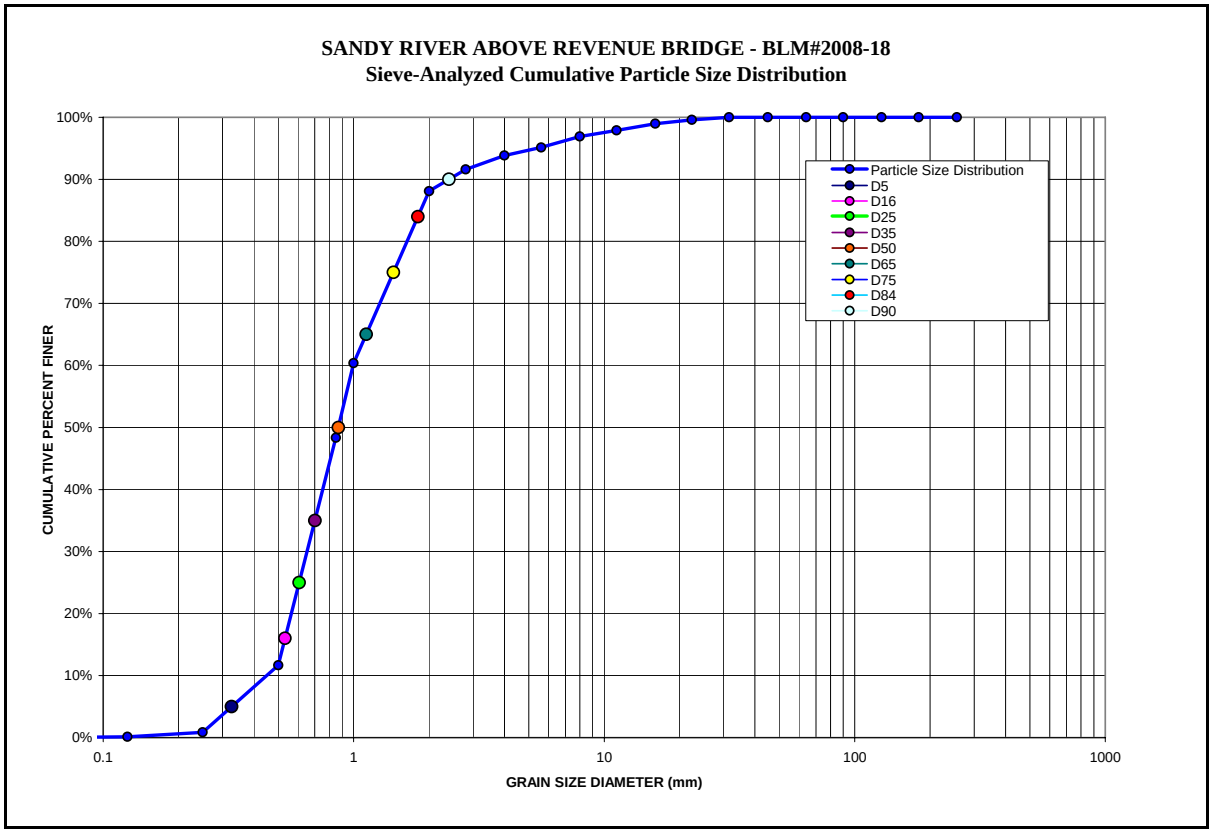

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-13
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

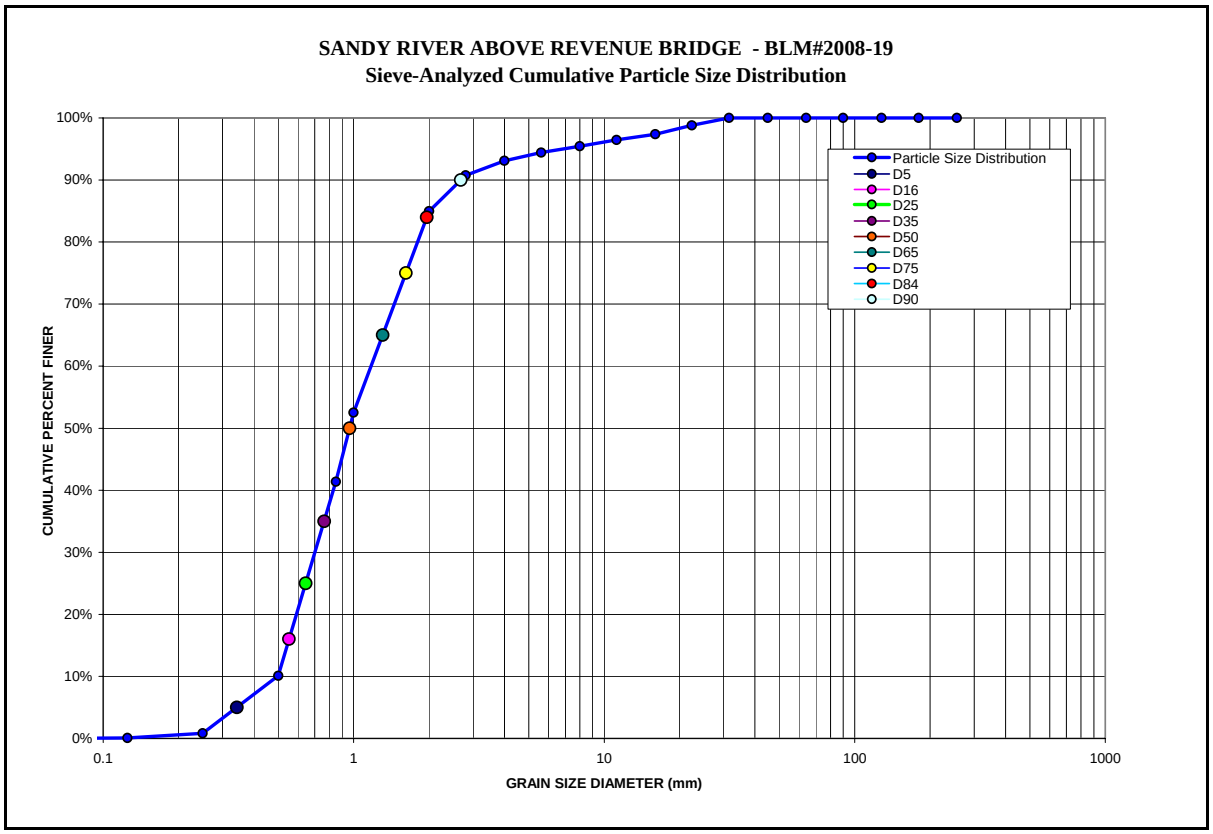

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-14
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

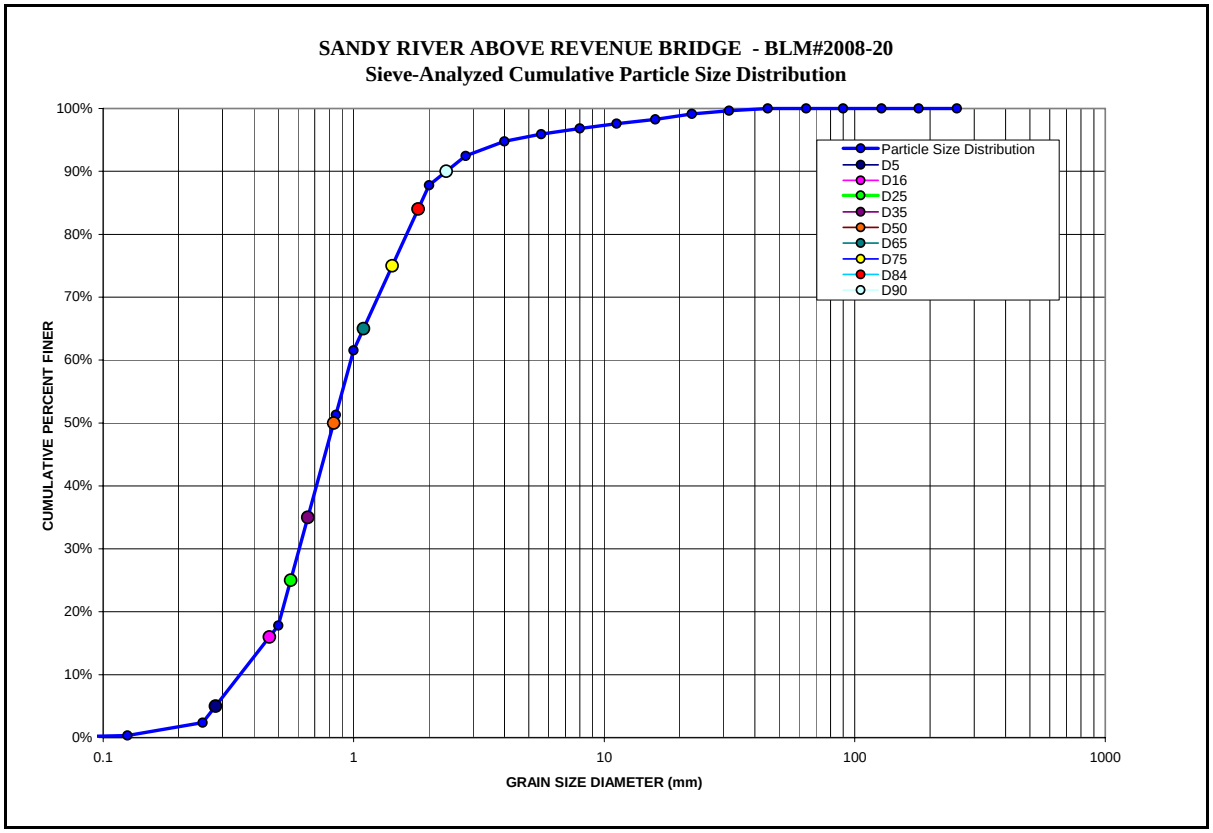

SANDY RIVER ABOVE REVENUE BRIDGE - BLM #2008-15
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

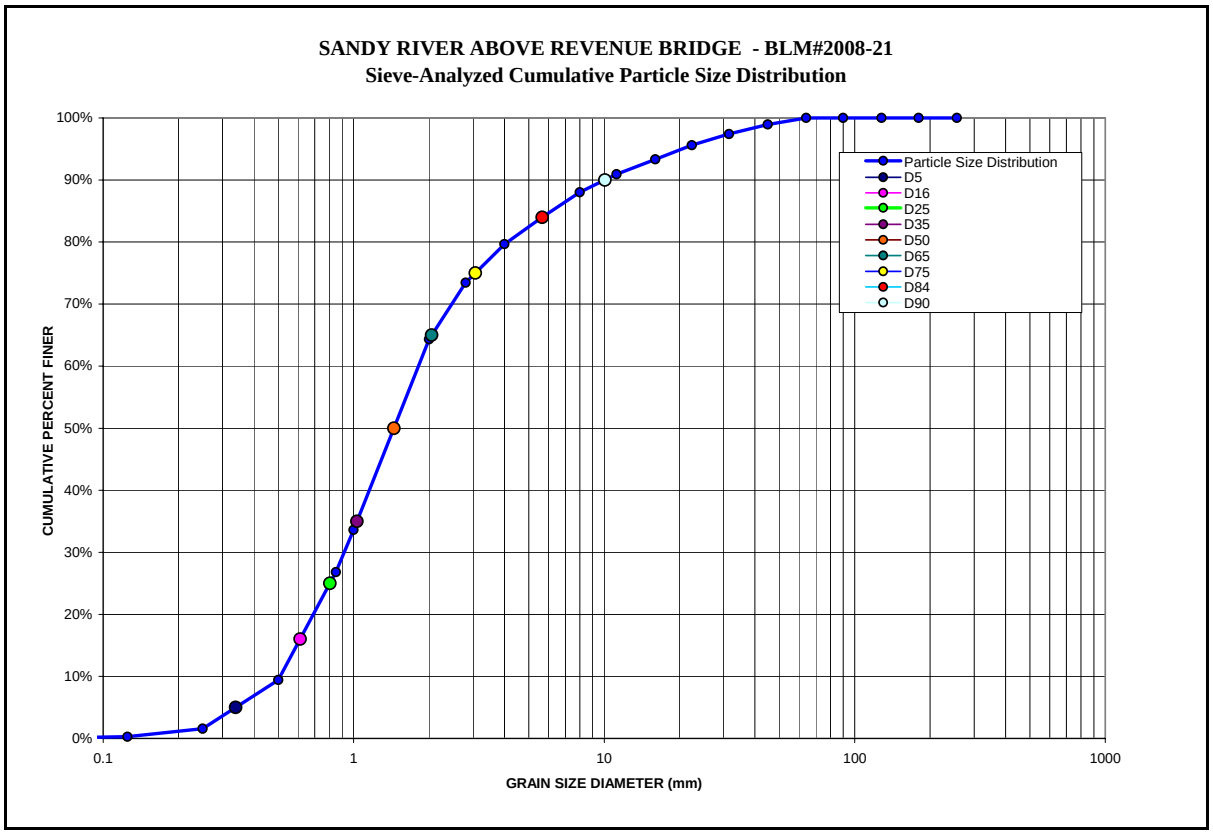

SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-16
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

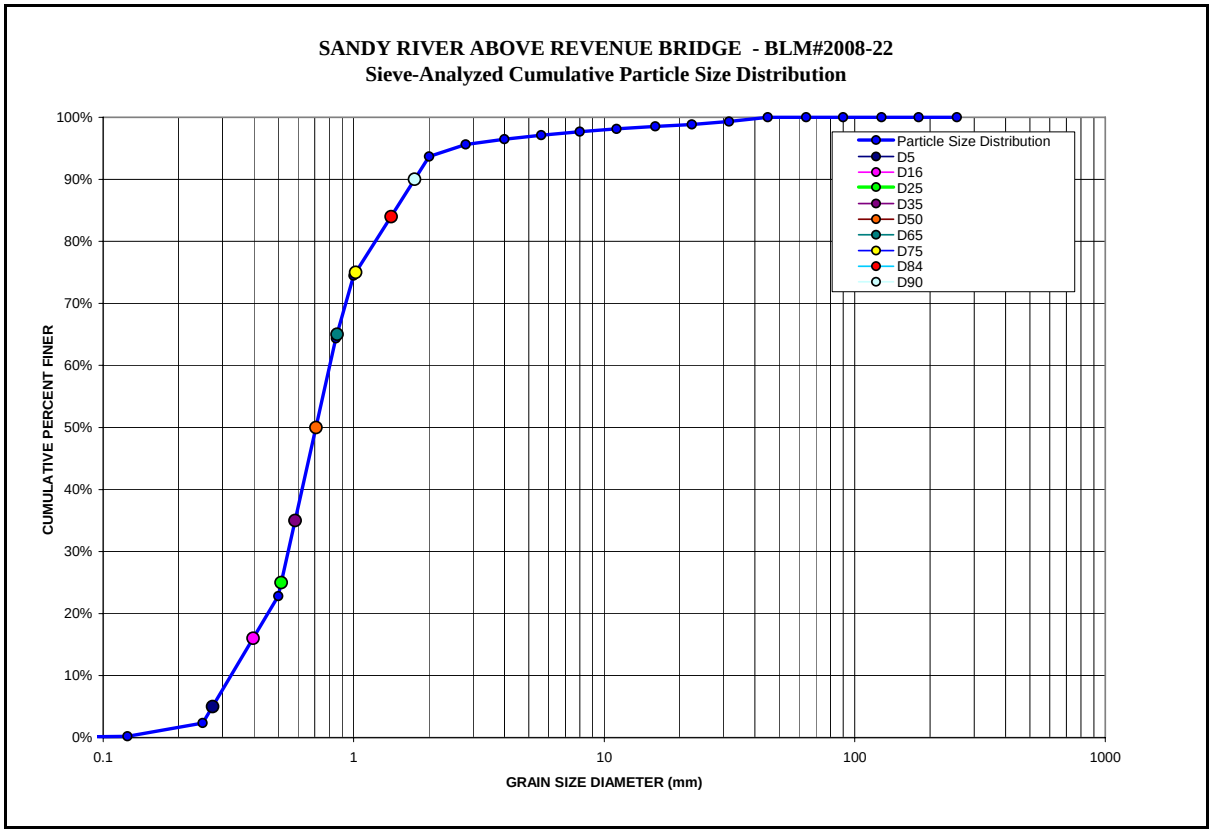

SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-17
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90

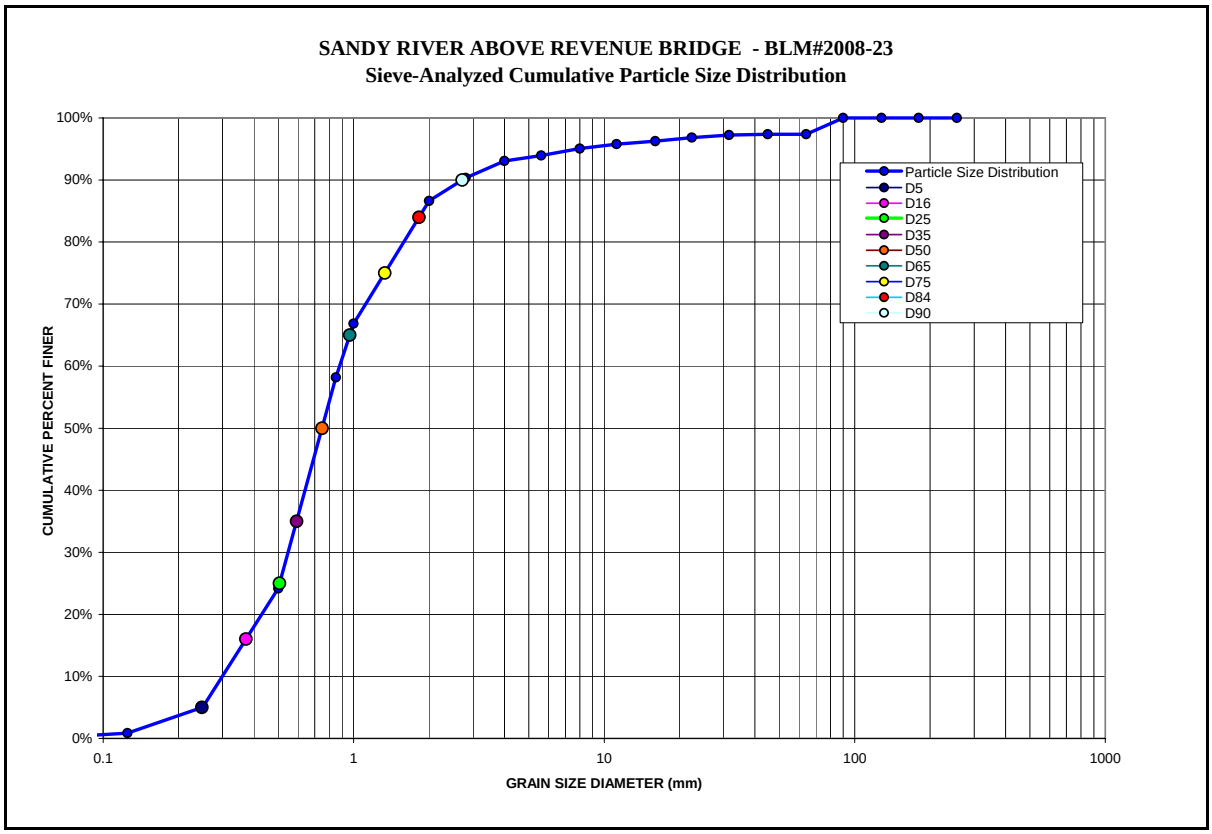

SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-18
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-19
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-20
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-21
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-22
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90


SANDY RIVER ABOVE REVENUE BRIDGE - BLM#2008-23
Sieve-Analyzed Cumulative Particle Size Distribution
CUMULATIVE PERCENT FINER
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0.1
1
10
100
1000
GRAIN SIZE DIAMETER (mm)
Particle Size Distribution
D5
D16
D25
D35
D50
D65
D75
D84
D90