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Data Summary Report on Short-Term Turbidity Monitoring of Pipeline River Crossings in the Moyie River, Boundary County, Idaho: PGT-PG&E Pipeline Expansion Project

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Abstract

A water-quality monitoring program was implemented for Bechtel Corporation to measure the short-term increases in turbidity in the Moyie River caused by construction activities of the Pacific Gas Transmission-Pacific Gas & Electric Pipeline Expansion Project. Construction of the buried, 42-in.-diameter, steel pipeline, during the summer of 1992, involved eight wet crossings of the Moyie River along the 13-mi section of pipeline immediately south of the Canadian-United States border in Boundary County, Idaho. This report summarizes the sampling and analysis protocol used and gives the results and observations for each of the eight crossings. The data obtained from this monitoring program, in addition to satisfying regulatory requirements for the Pipeline Expansion Project, will contribute to an ongoing long-term study of the Moyie River crossings being performed for the Gas Research Institute by Argonne National Laboratory. The purpose of this document is strictly limited to reporting the results of the monitoring program. Interpretation of the data is not within the scope of this report.

1 Introduction

1.1 Background

Pacific Gas Transmission (PGT) and Pacific Gas & Electric (PG&E) are expanding the existing natural gas pipeline system that runs from the Canadian-United States border near Eastport, Idaho, to the Central Valley of California. The construction manager is Bechtel Corporation. The Pipeline Expansion Project (referred to as the Project) involved installing a new, buried, 36-in.- or 42-in.-diameter steel pipeline alongside an existing 36-in.-diameter, buried pipeline, generally in the same right of way. This study focused on a 13-mi segment of pipeline construction that crossed the Moyie River eight times near the Canadian border in Boundary County, Idaho. In general, the construction of the pipeline river crossings involved excavating a 12-ft-deep trench across the flowing river, floating a section of pipe across the trench, lowering the pipe section into the trench, and backfilling. As part of the U.S. Army Corps of Engineers

Section 404 permit issued to PGT-PG&E on March 4, 1992, for crossing the Moyie River, the Idaho Division of Environmental Quality (IDEQ) established water-quality monitoring requirements and exceedance standards for increases in turbidity caused by all such "instream" construction activities. These requirements were expressed in IDEQ's Section 401 Water Quality Certification, issued by IDEQ in their letter of January 14, 1992. Argonne National Laboratory (ANL) was contracted by Bechtel to carry out this monitoring program and to document the results.

The ANL monitoring program for Bechtel, in addition to satisfying the Corps and IDEQ monitoring requirements, provided supplementary data to an ongoing Gas Research Institute (GRI) study also being performed by ANL. As a part of the Project, PGT-PG&E installed permanent rock flow-control structures downstream of each pipeline crossing, to diversify channel water velocities over the width of the stream, and at additional locations in the river segment, to create low-energy zones near the shore (PGT and PG&E 1992). These flow-control structures were designed to

- Enhance and create new fish habitat in the Moyie River to reduce and mitigate the potential effects of pipeline construction at the stream crossing;
- Provide erosion control by controlling flow velocities and minimizing long-term bank scour;
- Maintain cover over the pipeline trench; and
- Catch sediment and decrease flow velocities during instream construction activities.

The GRI study is analyzing the effectiveness of these flow-control structures with regard to the objectives. The data collected for the Bechtel monitoring program will augment the data collected for the GRI study and provide a more detailed characterization of the actual short-term increases in turbidity caused by construction activities.

1.2 Objective

The objective of ANL's work was to implement the turbidity-monitoring program required by the IDEQ Water Quality Certification and to document the results. This report summarizes specifically the results of the work performed by ANL for Bechtel to comply with IDEQ monitoring requirements. The information collected by ANL for the Bechtel monitoring program also provided the GRI study with supplementary data characterizing the turbidity caused by construction activities.

2 Approach and Methods

The crossings were numbered sequentially downstream between crossings #1 and #8. Pipeline river crossing #1 was the northernmost crossing, located near Eastport, Idaho, and crossing #8 was 16 river miles downstream from crossing #1, near the confluence of Meadow Creek and Moyie River. The eight crossings were constructed in the following order: #8, #6, #4, #5, #7, #2, #1, and #3. The first two crossings (#8 and #6) were monitored according to conditions outlined by IDEQ in the original Water Quality Certification in January 1992. However, after very high turbidity levels and uneven mixing over the stream cross section were observed, a revised monitoring scheme was adopted in August 1992 for the remaining crossings.

2.1 Original Sampling Plan

2.1.1 IDEQ Requirements

The short-term water-quality-monitoring requirements of the permit were outlined by IDEQ in Section 1a of their letter dated January 14, 1992. A copy of this letter is reprinted in Appendix A for reference. The items listed below applied directly to the monitoring program being implemented by ANL:

- Turbidity will be the water-quality parameter measured.
- Measurements will be taken immediately upstream and 600 ft downstream of the trenching activity. The upstream location will be far enough upstream to be unaffected by construction and will allow background turbidity to be measured. A best professional judgment of 600 ft downstream was determined by IDEQ as the distance required for dissipation on the basis of the permit for what the IDEQ considered to be an analogous river crossing in California (the upper Sacramento River crossing permit issued by the Army Corps of Engineers, Sacramento).
- The downstream turbidity is not to exceed background turbidity by more than 50 nephelometric turbidity units (NTU) instantaneously or 25 NTU averaged over a 10-day period.
- Sampling frequency will be high enough to detect an error of 0.5 NTU (10%) at the downstream station with a 95% confidence level.

All other monitoring tasks described in the letter (e.g., long-term monitoring for embeddedness) were outside the scope of the ANL contract with Bechtel and are being reported to the IDEQ directly by Bechtel.

2.1.2 Sampling and Analytical Methods

Battery-powered ISCO model 2900 and model 3700 portable samplers were used to pump approximately 500 mL of sample out of the river at regular time intervals. The ISCO samplers internally stored 24 samples that were retrieved every 12-24 hours, depending on the sampling frequency, and brought back to the field laboratory for analysis.

Each sample was analyzed for turbidity according to the protocol outlined in Part 2130 of *Standard Methods for the Analysis of Water and Wastewater* (Clesceri, Greenberg, and Trussell 1989). The instrument used in the analysis was an Orbeco-Hellige Digital Turbidimeter model 96510. This instrument is a side-scatter-type nephelometer that measures light scattered by suspended particles at right angles to the incident light source. The instrument converts the measured light scatter to a turbidity reading given in nephelometric turbidity units (NTU). Each time the instrument was turned on and warmed up, or after every 100 samples, it was calibrated with a stock turbidity suspension of hydrazine sulfate (formazine). This instrument had a range from 0 to 1,000 NTU in three range spans: 0-9.99 NTU, 0-99.9 NTU, and 0-999 NTU. The instrument sensitivity was 0.01 NTU, or ± 1 digit; instrument linearity was $\pm 0.75\%$ of full scale; instrument repeatability was $\pm 0.2\%$, or ± 1 digit.

Each sample retrieved from the ISCO samplers was agitated to resuspend any particles that settled out during storage, and approximately 20 mL of each sample was transferred to its own clean, clear, glass sample tube. The samples were screened visually as a first approximation of turbidity. For samples with turbidity less than 40 NTU, the sample tube was agitated again, wiped clean, and, after air bubbles were allowed to dissipate, analyzed with the nephelometer. Even though the nephelometer had a range of up to 1,000 NTU, *Standard Methods* suggests a dilution technique for samples with turbidity higher than 40 NTU. These high-turbidity samples were diluted with turbidity-free water (commercial demineralized water) until the turbidity fell to between 20 and 40 NTU. Turbidity of the original sample was then calculated from the turbidity of the diluted sample and the dilution factor. Measurements were taken on the 0 to 99.9 NTU range setting of the nephelometer and reported to the nearest 1 NTU.

2.1.3 Sampling Locations

On the basis of the best professional judgment of IDEQ, the downstream samplers were located 600 ft from the centerline of each trench. Simultaneously with taking the downstream samples, background samples were taken at locations far enough upstream (usually about 100-200 ft) to be unaffected by construction activities. The net downstream turbidity was calculated by subtracting the measured background (upstream) turbidity from the simultaneous downstream turbidity measurement. In this way, the effects of naturally occurring turbidity or any upstream activities were removed. The net turbidity was the turbidity resulting from the activities at that particular crossing only.

At each sampling location, the inlet of the sampler hose was positioned in the main channel or thalweg. Where the flow allowed safe wading into the river, velocity and depth measurements were taken to help locate the thalweg. In cases where the flow was too fast and the channel was too deep for measurement, professional judgment was used to locate the thalweg. The inlet of the sampler was vertically positioned at a depth below the river surface that was 60% of the total depth at that sampling location. In all cases, the location of the thalweg and placement of the sampler inlet were subjective determinations. Figure B.1 in Appendix B is a schematic diagram showing the locations of the water samplers.

2.1.4 Sampling Frequency

The specifications from the IDEQ special conditions required that measurements be taken frequently enough to detect an error of 0.5 NTU with a 95% confidence level at the downstream monitoring station of each crossing. ANL applied this requirement to the measurement and computation of the 10-day average turbidity. It was impractical, however, to apply this confidence interval to the instantaneous measurements, as approximately 90 simultaneous measurements would have been required. Practically, the accuracy of the instantaneous measurements is considered to be equal to the precision of the analytical methods used (as summarized in Section 2.1.2).

Acknowledging the fact that turbidity would be highest and most variable during excavation, sampling downstream was conducted at shorter time intervals during periods of excavation than during periods when downstream turbidity was at background levels. Samples were drawn every 30 min for 24 hours per day while excavation and backfilling were in progress. Beginning 24 hours after instream construction activities were completed, and after downstream turbidity levels had returned to background levels, samples were drawn once every 60 min, 24 hours per day, for the remainder of the 10-day period or until the running average dropped below the 25-NTU requirement. For each of the crossings, the running average of turbidity was plotted versus time to track how quickly the running average approached the 10-day level. Also, the 95% confidence interval of the running average was calculated and plotted on the same graphs. The plots for all river crossings appear in Appendix B.

2.2 Revised Sampling Plan

2.2.1 Revised IDEQ Requirements

The turbidity plumes that were generated by construction of the first two crossings (crossings #8 and #6) did not behave as anticipated by IDEQ, and revisions to the sampling protocol were needed to better characterize the sediment plumes. The following observations from crossings #8 and #6 led the Corps and IDEQ to reevaluate the sampling protocol:

- The plume was more persistent than expected, distinguishable as far as the confluence with the Kootenai River, 9-23 mi downstream from the crossing activities (depending on the crossing location).
- Poor mixing 600 ft downstream precluded representative sampling of the plume at that location.
- Turbidity levels were much higher than the IDEQ 50-NTU instantaneous standard.

In response to these observations, IDEQ changed the sampling requirements as follows (IDEQ 1992):

- Turbidity will be monitored while any instream activity is taking place at a crossing, not only when the trenching is occurring.
- Turbidity monitoring will continue downstream of each crossing until the Project is complete.
- Three samplers will be located 600 ft downstream (at the thalweg and between the thalweg and the edge of the water on each side of the river).
- Downstream movement of the plume will be documented and reported to IDEQ.
- Water temperature and dissolved-oxygen monitoring will be added to the sampling plan.

A copy of this letter appears in Appendix A for reference. The requirements of the amended 401 certification were incorporated into the Corps permit. Although many other concerns were covered in the IDEQ letter, this report will only discuss those affecting the water-quality monitoring requirements.

In addition to monitoring turbidity during trenching and backfilling, crossings will now be monitored during the other instream activities, specifically during installation and removal of the rock/flume bridges and best management practice structures (BMPs) (except for crossings #8 and #6, where work was already completed). Monitoring specific to the installation of the flow-control/fishery-enhancement structures near any of the crossings was not included in the scope of this work. In order to assist in capturing bed-load sediment, the flow-control structures were installed before pipeline construction began.

2.2.2 Modifications to the Sampling Plan

In response to the IDEQ revisions, three major changes were made to the ANL sampling plan. First, to better characterize the cross-sectional distribution of the turbidity, three samplers were set up across the river 600 ft downstream: one at the center and the other two at the quarter points, as shown schematically in Figure B.2.

Second, after completion of the excavation and backfilling operations, and after downstream turbidity had returned to the background level, the center sampler at each crossing was left in place to monitor at 60-min intervals until the completion of all instream activity at crossings upstream of that crossing. These additional measurements provided extensive data on the downstream extent and dissipation rates of the turbidity plumes.

Third, temperature and dissolved oxygen in the water were measured upstream and 600 ft downstream during instream activities. The instrument used to measure these parameters was a Horiba model U-7, Water Quality Checker. Dissolved oxygen was measured by means of this instrument using a membrane-type galvanic cell with an accuracy of ± 1.0 ppm; temperature was measured using a thermistor with an accuracy of ± 0.5 C°. Sampling frequency was conducted in accordance with verbal direction from the IDEQ representatives.

2.2.3 Best Management Practice Structures

In response to levels of turbidity in excess of the 50-NTU standard, BMPs were developed by Bechtel and the federal and state agencies and submitted to the Corps for their review and approval before the start of each of the remaining crossings. The approved BMPs provided for the use of inlet covers over the flume pipes to reduce water velocity in the working zone; concrete highway (Jersey) barriers to divert, as much as possible, the flow of water around the active excavation equipment and the instream spoil piles; baffles or curtains to contain sediment released from bank cutting; selective pumping to remove some of the highly turbid water to upland application areas; and nighttime construction to minimize turbidity effects on waterfowl feeding (IDEQ 1992). Documenting the progress of construction activities was not within the scope of the ANL project; therefore, a detailed description of the BMPs is not included in this report. However, on the basis of documentation provided to ANL by Bechtel and of field observations made by ANL personnel, the general characteristics of the BMPs, as they affected downstream turbidity, will be discussed. A brief discussion of the BMPs employed at each crossing is presented in Bechtel's embeddedness monitoring report, submitted under separate cover.

Depending on the location of the rock/flume bridge relative to the trench, the configuration, number, and types of the BMPs applied to each crossing varied; as each crossing was completed, new information was gained. Thus, each set of BMPs was specific to a crossing. At the remaining even-numbered crossings (#2 and #4), the rock/flume bridge was immediately downstream of the pipe trench. At the remaining odd-numbered crossings (#1, #3, #5, and #7), the rock/flume bridge was located immediately upstream of the pipe trench.

Because a number of variables were unknown at each crossing, the effectiveness of the BMPs in reducing turbidity levels is difficult to determine. In general, the jersey barriers provided adequate containment of the spoil pile during the excavation process. Also, the inlet covers over the flume pipes were effective in reducing the water velocity around the spoil pile and excavation equipment. Each crossing appeared to have different subsurface conditions, ranging from coarser grained, low-plasticity material at crossing #1 to very fine-grained, clayey material at crossing #7. Subsurface borings were not taken prior to construction, so it was not possible to characterize the differing subsurface conditions at the crossings. Therefore, any observations on the characteristics of the subsurface soil at a particular crossing are subjective. Also, the amount of material removed from each trench, the duration of instream activity, the river flow rate, and BMP configuration varied from crossing to crossing. These variables made it impossible to quantitatively compare the crossings before and after the application of the BMPs to determine how the BMPs may have lowered the turbidity levels. Any qualitative discussion of how the BMPs affected the downstream turbidity at each crossing is included in the section on that crossing.

2.2.4 Flow-Weighted Averaging

ANL developed a flow-weighted method to average the turbidity values. A flow-weighted turbidity was calculated by weighting the turbidity reading at each of the three downstream sampler locations by the amount of flow attributable to that sampler. The amount of flow attributable to a sampler was calculated by dividing the river into three sections and calculating the flow in each section from velocity and depth measurements taken at 5-ft intervals across the river. These velocity and depth measurements and the flow calculations were performed according to standard U.S. Geological Survey procedures (Buchanan and Somers 1969). For the purpose of checking compliance with the 10-day, 25-NTU standard set by IDEQ, the running average of flow-weighted turbidity was plotted versus time for each of the remaining crossings. These plots, showing the 95% confidence interval of the running average (as previously described in Section 2.1.4), are included in Appendix B. Turbidity data for all the crossings are listed in Appendix C. Dissolved-oxygen and temperature data for the water are shown in Appendix D.

3 Results and Observations

3.1 Crossing #8

Construction activities started instream at crossing #8 at 2:00 A.M., July 27, 1992. ISCO automatic samplers were set up 350 ft upstream of the pipeline crossing and 600 ft downstream of the crossing. The velocity of the river at these locations was swift (2 ft/s), and running intake hose along the river bottom, from the inlet strainer in the river to the sampler on the bank, was not possible. Ropes were extended over the river at these locations to support the sampler intake hose above the water. Near the inlet location, the hose end dropped down to the strainer, which was secured to a concrete block in the river.

The plot of net turbidity versus time (Figure B.3) shows elevated turbidity corresponding to the excavation and backfilling operations. Turbidity approached background levels within one to two hours after instream construction activity ceased. The first peak associated with the excavation of the pipe trench, at 214 NTU, occurred approximately five hours after the start of excavation. A second peak, at 155 NTU, occurred 32 hours after the start of excavation and was associated with backfilling operations. Between the two peaks was a period of nine hours when downstream turbidity was equal to background levels. This area of the plot corresponded to the period when backfilling operations were halted overnight, before resuming again on the morning of July 28. Figure B.3 shows how quickly the suspended sediment was flushed out of the excavation area once instream activity ceased. The plume of turbidity, however, was persistent as it moved further downstream. Bechtel field workers reported that the plume passed through the reservoir and over the spillway at Moyie Springs, 7.7 river miles downstream of crossing #8, and continued to the confluence with the Kootenai River, another 1.7 river miles past the spillway. In Figure B.4 the running-time-weighted average turbidity is plotted versus time. This plot shows that compliance with the 10-day, 25-NTU average turbidity requirement was attained on the third day (fourth day for the 95% confidence interval) after instream activities began. For all crossings, gaps in the turbidity data due to sampler malfunctions were filled with interpolations, as shown in the data tables in Appendix C. Interpolating the data is more accurate than simply applying the last previous turbidity measurement over the period of missed samples, as would happen if time-weighted averages were calculated.

A detailed description of the actual trenching operation is not within the scope of this report; however, one aspect of the operation and its apparent impact on turbidity levels warrants discussion. Spoil from trenching the near-shore portions of each crossing was stockpiled on the banks of the river in predesignated spoil-storage areas. In order to avoid double-handling the material and to minimize the length of time that equipment was working in the river, Bechtel field workers decided to temporarily store spoil from excavating the midstream section of the trench in the river, along the upstream side of the pipe trench at the right bank (Luttrell 1993). (By convention, right and left banks are determined as the observer looks upstream.) The amount of spoil stored this way was approximately one-third of the 1,000 yd³ excavated at the crossing (Luttrell 1993). As long as this instream spoil pile was in the river, fine-grained soil material off the pile made a visible contribution to the overall turbidity being generated by the operation.

Table C.1, located in Appendix C, lists the higher turbidity readings on the right-hand side of the river and indicates the unequal mixing of the water and sediment downstream. These data were measured between excavation and backfill, when little or no instream activity was occurring, yet turbidity levels remained high on the right side of the river.

The accuracy of the turbidity versus time characterization of the plume generated by crossing #8 activities was decreased by the poor mixing in the river in the area between the crossing activities and the sampler located 600 ft downstream. The flow regime in this section of the river was complex and very turbulent, making it difficult to identify a main thalweg. During most of the instream activity, the turbidity plume was observed to be concentrated along the right-hand bank of the river in a secondary thalweg. Because the sampler inlet was located in the approximate center of the river, most of the samples taken during the instream activities at crossing #8 were not representative of the maximum turbidity in the plume.

3.2 Crossing #6

The background sampler for crossing #6 was set up approximately 150 ft upstream of the pipe trench in a relatively shallow and slow-moving reach of the river. There was difficulty setting up a monitor downstream at 600 ft as the river at this location was divided into two channels around an island. As an alternative, ANL moved the sampler to a position 650 ft downstream, where the two channels had converged again and a county-road bridge was available for use in hanging the intake hose. The country-road bridge was located 50 ft upstream from and parallel to a railroad bridge. The river was deep, narrow, and fast moving at this sampling location. The main channel, or thalweg, was not in the center of the river, but closer to the right bank.

In spite of adjusting the intake location to account for an off-center thalweg, the sediment plume was again channeled around the sampler intake, preventing representative samples of the highest turbidity from being obtained. Similar to the situation at crossing #8, the sediment was not mixed evenly across the river by the time it reached 650 ft downstream, and the plume was channeled very strongly through the thalweg. This observation and the similar experience at crossing #8 caused the permitting agencies, particularly IDEQ, to revise the downstream sampling scheme for the remainder of the crossings.

Similar to observations at crossing #8, the plot in Figure B.5 of turbidity versus time for crossing #6 shows two peaks, the first associated with excavation and the second with backfill. The first peak reached a maximum of 743 NTU above background and occurred 4.5 hours after the start of instream activities, at 2:00 A.M. on July 31, 1992. The second (backfill) peak reached a maximum of 225 NTU above background 36 hours after the beginning of instream activities. Within five hours of completing the backfill, peak readings at 650 ft downstream had returned to near background levels. Furthermore, as shown in Figure B.6, these turbidity pulses were observed downstream at crossing #8. The samplers at crossing #8 gathered samples with a maximum turbidity of 175 NTU and 166 NTU from the excavation and backfilling operations at crossing #6. In both cases, the pulses traveled the 4.8 river miles from crossing #6 to

crossing #8 in approximately six hours. In Figure B.7, the running-time-weighted average turbidity is plotted versus time, and this plot shows that compliance with the 10-day, 25-NTU average turbidity requirement was attained three days after instream activities began (five days for the 95% confidence interval).

Similar to the operation at crossing #8, a portion of the trench spoil was stored in the river during trenching. Turbidity was observed bleeding off the pile during periods of little or no instream activity; the spoil pile was on the same side of the river as the channelization of the sediment plume, so some sediment losses off the spoil pile may not have been picked up at the sampler. Due to constrictions caused by the instream spoil pile and the flume bridge, the level of the river upstream was observed to rise approximately 8 in.

3.3 Crossing #4

Crossing #4 was the first river crossing constructed while implementing the revised IDEQ requirements. At 600 ft downstream, the river was deeper and slower than at the two previous crossings. The depth profile of the river was flat and shallow, with the thalweg located at the approximate center of the cross section. The velocity profile showed the highest values at the thalweg. The river was 85 ft across, 1.9 ft deep at the thalweg, with a maximum current velocity of 0.6 ft/s. The three sampler intakes were set up at 20, 45, and 70 ft from the right bank.

Activities at crossing #4 began at 7:00 P.M. on August 13, 1992. The turbidity associated with excavation lasted about 10 hours, with a peak occurring at 1,060 NTU. The turbidity associated with backfilling also lasted about 10 hours, with a peak turbidity of 660 NTU. As shown in Figure B.8, both of these turbidity pulses were traceable downstream at sampling locations for crossings #6 and #8, 4.5 and 9.3 river miles downstream from crossing #4.

As shown in Figure B.9, the turbidity varied across the downstream monitors with time; however, the center sampler consistently collected samples with the highest turbidity. A flow-weighted average turbidity for the three downstream monitors was calculated and plotted versus time in Figure B.10. For the purpose of checking against the 10-day, 25-NTU standard, the running average of flow-weighted turbidity was plotted versus time in Figure B.11; this plot shows that compliance with the 25-NTU standard was not attained after 10 days.

Beginning with crossing #4, the revised IDEQ conditions required the measurement of dissolved-oxygen concentrations and temperature of the water during instream construction. Dissolved oxygen was measured both upstream and 600 ft downstream at regular intervals during the excavation and backfilling activities. No significant differences between upstream and downstream measurements were seen. Figure B.12 shows plots of dissolved oxygen versus time. On this figure, the upstream and downstream data points are superimposed and appear to be one line. Due to an equipment malfunction, no temperature data were taken at crossing #4.

Appendix D contains the dissolved oxygen and temperature data for crossing #4 and the remaining five crossings.

3.4 Crossing #5

For crossing #5, the flow regime in the river 600 ft downstream was complex. A submerged mound of cobbles immediately upstream of the sampling location had separated the flow into two thalwegs. The three sampler intakes were located at 17, 37, and 68 ft from the left bank, where the river was 98 ft across. The right and left sampler inlets were located in the two thalwegs; the right and left thalwegs were 0.9 and 0.8 ft deep, with current velocities of 2.5- and 2.1-ft/s.

Monitoring at crossing #5 began at 2:00 A.M. on August 19, 1992. As expected from previous experience, the divided flow regime led to higher turbidity at the samplers located in the thalwegs. As shown in Figure B.13, turbidity at the right and left samplers was generally higher, and turbidity measured at the center sampler was lower. The flow-weighted average turbidity was plotted versus time in Figure B.14. The time-weighted average of the flow-weighted average turbidity was plotted in Figure B.15; this plot shows that compliance with the 25-NTU standard was attained six days after the beginning of instream activities (eight days for the 95% confidence interval).

The turbidity associated with excavation activities was elevated for about 15 hours, with a peak turbidity of 683 NTU. The turbidity associated with the backfilling lasted about 10 hours, with a peak turbidity of 398 NTU. As shown in Figure B.16, both of these turbidity plumes were traceable downstream at sampling locations for crossings #6 and #8, 2.4 and 7.2 river miles downstream from crossing #5. Both the dissolved oxygen and temperature in the river were marginally higher 600 ft downstream of the construction activity than they were upstream. Dissolved oxygen and temperature are plotted versus time in Figures B.17 and B.18.

3.5 Crossing #7

At crossing #7, the depth profile of the river was relatively flat from the pipe crossing to the 600 ft downstream sampling location, with the thalweg at the approximate center of the river. As the bottom was relatively free of large boulders or other obstructions, the flow was not very turbulent, but the river was moving quickly. At the 600 ft downstream location, the depth of the thalweg was 1.5 ft, with a current velocity of 2.0 ft/s. The downstream sampling locations were 23, 43, and 68 ft from the right bank. The river was 92 ft across at this location.

Monitoring at crossing #7 began at 2:00 A.M. on August 21, 1992. The turbidity associated with excavation lasted for about 18 hours, with a peak occurring at 858 NTU. The turbidity associated with backfilling lasted about 15 hours, with a peak turbidity of 3,567 NTU.

As shown in Figure B.19, both turbidity pulses reached the sampling location at crossing #8, 4.0 river miles downstream, in approximately six hours.

Figure B.20 shows the turbidity measured at each of the three downstream sampling locations and indicates that turbidity was more evenly distributed across the river. This result is consistent with expectations in a monolithic flow regime. The only substantial exception to this observation occurs at hour 39, when the removal of the BMP flow barriers sent a turbidity pulse downstream that registered higher values at the left monitor. The turbidity measurements at this sampler during this event were the highest observed in the entire Project, reaching over 3,500 NTU. The flow-weighted average turbidity was plotted versus time in Figure B.21; the time-weighted average of the flow-weighted average turbidity, plotted in Figure B.22, shows that compliance with the 25-NTU standard was not attained after 10 days. The dissolved oxygen and temperature measurements taken during instream construction activities are shown in Figures B.23 and B.24. The data show no tendency for either parameter to be higher or lower downstream than upstream.

3.6 Crossing #2

At the transect 600 ft downstream from crossing #2, the river was wide and shallow, with two main thalwegs. These two thalwegs were caused by channeling around an island in the river another 20 ft downstream of the sampling transect. The river was 160 ft across and 1.2 ft deep at the left thalweg and 1.1 ft deep at the right thalweg. The right, center, and left samplers at the 600 ft downstream location were 25, 65, and 120 ft from the right bank.

The equipment removed from crossing #7 was set up at crossing #2, and sampling began along with excavation at 7:00 P.M. on August 25, 1992. Excavation stopped for the night at 12:00 A.M. August 26 and resumed again at 7:00 A.M., continuing until midafternoon that same day. The peak turbidity level observed was 1,181 NTU. The pipe section was pulled across the river and backfilling began at about 5:00 P.M. Backfilling, with turbidity levels peaking at 1,783 NTU, was completed late in the evening of August 26. The plume from this crossing was observed with a peak of 91 NTU at crossing #8, 15.5 river miles downstream, about 34 hours after it was generated. In Figure B.25, a plot of turbidity versus time for all of the samplers downstream of crossing #2 show the progression of the plume as it moved downstream.

As shown in Figure B.26, the highest level of turbidity across the stream was not always in the same location. The plume generated by the excavation phase had its highest levels measured at the right sampling location, while the plume generated by the backfilling phase had its highest levels measured at the left sampling location. Flow-weighted average turbidity is plotted versus time in Figure B.27; the time-weighted average of the flow-weighted turbidity, plotted in Figure B.28, shows that compliance with the 25-NTU standard was not attained after 10 days. Dissolved oxygen and temperature were only measured on two occasions during instream activities at crossing #2. Both plots, in Figures B.29 and B.30, show little difference between upstream and downstream measurements for either parameter.

3.7 Crossing #1

At the transect 600 ft downstream from crossing #1, the river was wide and shallow, 115 ft across and 0.7 ft deep near the left bank. There was no apparent thalweg, so the samplers were evenly spaced at 30, 60, and 90 ft from the right bank.

The equipment removed from crossing #2 was set up at crossing #1, where sampling began on August 28, 1992, at 7:00 A.M. The morning was spent preparing the flume bridge, and actual excavation was started at 11:00 A.M. Peak turbidity levels reached 2,652 NTU during excavation, which was completed by midafternoon the same day. The pipe was pulled across the river, and the trench was partially backfilled before the crews stopped working at 7:00 P.M. In spite of the fact that the trench was open all night, the turbidity levels measured downstream returned to and stayed at background levels within one hour of the cessation of instream activities. Backfilling operations resumed at 8:00 A.M. the next morning and were completed by 5:00 P.M. that same day. Peak turbidity during backfilling operations was measured at 424 NTU. As shown in Figure B.31, the plume from this crossing dissipated relatively quickly as it moved downstream. The plume was observed with a peak of 31 NTU at crossing #8, 16.4 river miles downstream, about 40 hours later.

As shown in Figure B.32, for both excavation and backfill, the turbidity levels were higher at the left-hand sampler 600 ft downstream of the crossing than at the right-hand or center samplers. The flow-weighted average turbidity was plotted versus time in Figure B.33; the time-weighted average of the flow-weighted average turbidity, plotted in Figure B.34, shows that compliance with the 25-NTU standard was attained five days after the beginning of instream activities (eight days for the 95% confidence interval). Plots of dissolved oxygen and temperature are shown in Figures B.35 and B.36. Dissolved-oxygen concentrations did not change significantly and water temperatures varied naturally, i.e., warm during daylight hours, then cooling at night.

3.8 Crossing #3

An island in the river immediately upstream of crossing #3 divided the river into two channels, and it was determined that each of these channels would require monitoring. At 600 ft downstream, the river was only 75 ft wide and 1.5 ft deep, with current velocity of 1.5 ft/s at the thalweg. The three samplers were set up at 25, 40, and 55 ft from the right bank. As the thalweg was off-center to the right, the right sampler was located further towards the center of the river than normal, in order to obtain samples more representative of the thalweg. Figure B.37 shows that for the majority of the construction activity, the center sampler received the highest turbidity.

Excavation at crossing #3 began at 5:00 P.M. on August 31, 1992, continued until around midnight, and resumed again at about 6:00 A.M. on September 1. A peak of 1,200 NTU was measured during this phase. Because construction crews experienced difficulty with the trench walls caving in, and because storage space for these excavation spoils was limited,

excavation was not completed until late afternoon on September 1, at which time the pipe was pulled across the river. Due to the limited space, the bulk of the spoils could not be returned to the trench until all the pipe connections on land were completed and backfilled. Thus, the trench remained open for the next 36 hours, before backfilling was able to begin briefly on the afternoon of September 3. The crew worked only until 8:00 P.M. on September 3 and resumed backfilling operations on the afternoon of September 4, working until nightfall. A peak of 1,400 NTU was measured during this phase. On the morning of September 5, crews returned one final time to remove the flow diversion structures. A spike of 315 NTU was measured when the suspended sediment held back by these diversion structures was released into the river. All samplers were removed on September 6 except for the center monitor 600 ft downstream of the crossing, which was to remain until the rock bridge upstream was removed.

As shown in Figure B.38, the plume from the excavation at crossing #3 reached a peak level of 211 NTU at crossing #8, 10.3 river miles downstream, about 24 hours after it was generated. The flow-weighted average turbidity was plotted versus time in Figure B.39; the time-weighted average of the flow-weighted average turbidity, plotted in Figure B.40, shows that compliance with the 25-NTU standard was not attained after 10 days.

Figures B.41 and B.42 show that there were no significant differences between upstream and downstream dissolved oxygen and temperature measurements.

A total of five samplers were operated at 30-min intervals for the five-day duration of construction activities at crossing #3. In addition, automatic samplers remained in operation downstream at each of the previous seven crossings, sampling at 60-min intervals. With these 13 samplers in operation, nearly 2,100 turbidity samples, about one-third of all the turbidity samples processed for the whole Project, were collected and analyzed during this period.

3.9 Rock/Bridge Removal

Argonne did not document the dates and times of the rock/flume bridge removals; however, sampling equipment was kept in operation until all instream activity upstream of a sampler was completed. In this way, if a distinguishable plume were generated by a rock/flume bridge removal, it would have been detected. As described below, the rock/flume bridge removals at crossings #1 and #2 were the only removals that generated distinguishable plumes. The following is a summary by crossing of our measurements and observations of turbidity associated with the rock/flume bridge removal operations.

Crossings #1 and #2. Rock/flume bridge removals at each of these crossings generated a brief spike (lasting one to two hours), with a peak of about 200 NTU at the sampling location 600 ft downstream. The pulses dissipated quickly, and levels of about 20 NTU were detected at the upstream monitors still in operation at crossing #3, which were 6.2 and 5.3 river miles from crossings #1 and #2.

Crossing #3. The rock/flume bridge was removed at the same time the BMPs were removed. Therefore, the turbidity contribution from the rock/flume bridge removal was coincided with the turbidity generated by the other instream activities. All these activities were monitored and documented as part of the previous discussion of crossing #3 (Section 3.8).

Crossing #4. The rock/flume bridge removal did not generate a turbidity plume that was distinguishable from the turbidity plumes being generated at that same time by activities at crossing #3.

Crossing #5. Turbidity caused by the rock/flume bridge removal was missed due to a sampling-equipment malfunction.

Crossings #6, #7, and #8. Although samplers were operating downstream of the rock/flume bridges during removal operations, these removals did not generate plumes that were distinguishable from other plumes that could be attributed to instream activities taking place at crossing #3.

Also, as background turbidity levels by the end of the Project were ranging between 5 and 10 NTU, it is possible that the rock/flume bridge removal plumes at crossings #4, #6, #7, and #8 were indistinguishable from background turbidity. This amount of turbidity is insignificant relative to the turbidity levels during construction activities.

3.10 Correlation of Total-Suspended-Sediment Data with Turbidity

Correlations between total suspended-sediment (TSS) concentrations and associated turbidity (measured in nephelometric turbidity units) were developed from data collected for the GRI study. In the GRI study, water was sampled at crossings #1, #3, #5, and #8 using Manning water samplers. These samplers, which operate in a manner similar to the ISCO water samplers used for the Bechtel monitoring program, were set up at four to five transect locations at each crossing and were operated for the duration of the construction activities at that crossing. The frequency of the sample collection varied from 30 min during peak activity to 60 min during less active periods. The first sampler was placed upstream of the crossing to measure background levels of turbidity. The second sampler was placed immediately upstream of the rock structure. The third sampler was placed directly downstream from the rock structure. The fourth sampler was placed 600 ft downstream from the crossing. At some crossings, a fifth sampler was set up to sample at downstream or upstream locations. Grab samples were also taken during periods of peak construction activity. Data from these grab samples are also included in the TSS/NTU correlations. Crossing #8 data are not included in the correlation analysis because interest in correlating TSS concentration and turbidity did not arise until after the crossing #8 TSS analysis was completed for the GRI project. A total of 1,446 data points from crossings #1, #3, and #5 were used for correlation purposes.

The samples taken with the Manning water samplers and the manual grab samples were shipped to ANL and analyzed in the laboratory for both TSS concentration and turbidity. The procedures used to measure turbidity were identical to those used for the Bechtel study. A 20-mL aliquot was removed from the agitated sample container, diluted if necessary, and analyzed in the nephelometer. The test procedure for determining TSS concentration consisted of filtering the entire sample for suspended solids, measuring the amount of water in the sample bottle, drying and weighing the suspended solids, and calculating the total suspended solids. Separate TSS/NTU correlations for crossings #1, #3, and #5 are presented in Figures B.43, B.44, and B.45. Figure B.46 shows a plot of the TSS data versus turbidity for all three crossings combined.

The slope and regression coefficient values were calculated using the "least-squares" method for a best fit of the data to produce a straight line. The equation for a straight line can be used with the least-squares method and statistically tested to prove if a straight line is an appropriate model. The equation is written as

$$Y = \beta_0 + \beta_1 X \quad (1)$$

where

β_0 = Y-intercept,

β_1 = slope,

Y = Y-axis value (TSS), and

X = X-axis value (turbidity).

The values of β_0 and β_1 must be estimated such that they have the smallest possible sum of the squares of deviations, S. The quantities β_0 and β_1 are replaced in the equation with b_0 and b_1 , which are statistical estimates of the slope and Y-intercept. The equation is rewritten as

$$\hat{Y} = b_0 + b_1 X \quad (2)$$

where

b_0 = estimated Y-intercept,

b_1 = estimated slope,

$\hat{Y}$ = predicted value of Y (TSS) for a given X, and

X = X-axis value (turbidity).

Using the following statistical formulas for b_0 and b_1 , an estimated regression equation can be written (Draper and Smith, 1966) to correlate TSS and turbidity for each crossing.

$$b_1 = \frac{[\sum X_i Y_i - (\sum X_i)(\sum Y_i)/n]}{[\sum X_i^2 - (\sum X_i)^2/n]} \quad (3)$$

$$b_0 = Y_{avg} - b_1 X_{avg} \quad (4)$$

where

i = individual sampling point,

n = total number of samples,

Y_{avg} = average value of TSS, and

X_{avg} = average value of turbidity.

The numeric value equations calculated are shown in Figures B.43-B.46. Table 1 shows the range of values for the crossings. The data and further analysis of the TSS/NTU correlations are included in the GRI report. This preliminary information is being provided for reference courtesy of the Gas Research Institute.

TABLE 1 Range of TSS Values Calculated Using the Least-Squares Regression Equations

Crossing	TSS at the Given Turbidity (mg/L)			
	250 NTU	500 NTU	750 NTU	1,000 NTU
# 1	262.8	513.1	763.4	1,013.6
# 3	315.6	630.3	944.9	1,256.0
# 5	380.9	778.1	1,175.4	1,572.7
#1, #3, #5 combined	310.5	612.2	914.0	1,215.7

4 Conclusions and Recommendations

The primary goals of (1) monitoring turbidity levels downstream of the pipeline crossings in accordance with the IDEQ Section 401 water-quality certification and (2) providing decision-makers with field data characterizing the short-term increases in turbidity appear to have been achieved. No interpretation of the data beyond that necessary to meet the requirements of IDEQ is within the scope of this report. The following general observations, however, deserve to be summarized:

- Mixing of suspended sediments across the river cross section was not complete 600 ft downstream of the crossing. Even in a river as turbulent as the Moyie, enough channelized flow existed to prevent complete mixing and homogeneity across the stream section. At distances up to 0.5 mi downstream of the crossing, uneven turbidity across the river was still observed. This uneven mixing presents a problem when trying to take samples representative of the overall turbidity.
- The turbidity plumes observed were extremely persistent. The plumes generated at the northern crossings (#1, #2, #3, and #4) had turbidity levels far above the IDEQ standards, even after they had traveled several river miles downstream. Less is known quantitatively about the persistence of the plumes generated by the southern crossings (#5, #6, #7, and #8), but visual observations suggest that they were as persistent as the other plumes.
- Dissolved-oxygen concentration and temperature of the water downstream of the crossing construction were not affected by instream construction activities.
- The ability to make qualitative judgments and comparisons about the effectiveness of the BMPs in reducing turbidity downstream of construction activities is hindered by the variability of such factors as subsurface information, types of BMPs utilized, amount of material removed, duration of construction activity in the river, and river flow rates between crossings. However, several BMPs appeared to be ineffectual when field-tested (notably, dewatering) and were, by consensus, discarded at later crossings (Bechtel 1993). Future decisions regarding the use of BMPs on similar projects should take into consideration the anticipated effectiveness of the structure and whether the extra time and instream activity associated with BMP installation and removal yields a net decrease in the mass of sediment released downstream. Such a decision-making process would be aided by performing a subsurface investigation prior to the start of construction.

The data collected for the GRI study, when combined with the data obtained from this study, will provide more insight into the behavior of the sediment plume as it moved downstream. The extensive sampling performed as part of the GRI study, at the three transects between a

crossing and 600 ft downstream of that crossing, yields information into how quickly sediment dropped out immediately downstream of the crossing, while the data obtained for the Bechtel study provides information on the sediment plume further downstream. General estimates of the total mass of sediment deposited on the river bottom by all the crossing activities may also be calculated from the resulting correlations.

5 References

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Appendix A:
IDEQ Monitoring Requirements

Appendix A:**IDEQ Monitoring Requirements**

Attached are the two letters from IDEQ outlining the water-quality monitoring requirements for the Pipeline Expansion Project. The first letter, dated January 14, 1992, outlines the original requirements that were applied to Crossings #8 and #6. The second letter, dated August 7, 1992, outlines the revised monitoring requirements that were applied to the remainder of the crossings.

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

3112 Fremont Parkway, Coeur d'Alene, ID 83814-2944, (208) 847-3524

Carol D. Andrus, Director Richard R. Gorman, Deputy

January 14, 1992

PGT-PG&E Pipeline Expansion Project
45 Fremont Street, 3/D33
San Francisco, CA 94119

REFERENCE TO: Department of the Army proposed permit No.: 071-OYC-2-003819 (Various streams and wetlands in Boundary, Bonner, and Kootenai Counties, Idaho)

Gentlemen:

We have considered water quality certification of your proposal to discharge approximately 26,033 cubic yards of backfill and bedding material in several north Idaho waters in association with the construction of a 42 inch natural gas transmission line as described in public notice number 071-OYC-2-003819.

The project will cross the Moyie River eight times, and will cross Cocolalla Creek once. The Moyie River is a special resource water that is aesthetically valuable, however the use of the stream by cold water biota is limited, and few riparian residents draw domestic water from the river.

Cocolalla Creek is tributary to Cocolalla Lake. This office is completing a Phase I EPA Clean Lakes investigation on Cocolalla Lake in which nutrients and sediments have been identified as major contributors to lake degradation. Phase II money will implement ways to reduce these discharges. It would be inappropriate to certify a process (direct sediment discharge via wet trenching) that has been identified as contributing to lake degradation.

To insure protection of water quality, the following conditions should be included in the Department of the Army Permit for the project:

For the Moyie River crossings:

- 1) The Moyie River is assigned the beneficial uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary contact recreation, secondary contact recreation, as well as the general use designations of industrial water supply, wildlife habitat, and aesthetics. The applicant is supplying the domestic water consumers with drinking water during the crossing phases of the project, hence domestic water supply concerns will be addressed. Discussions with the Idaho Department of Fish and Game indicate that the salmonid fishery of the reach is primarily a tributary spawning fishery, thus salmonid spawning criteria may

not be appropriate. The beneficial use most jeopardized by the project is that of cold water biota. The applicant shall monitor for and meet the sediment criteria derived in Technical Review of Sediment Criteria (Harvey, 1939) as benchmarks to protect the beneficial use of cold water biota at each crossing. Specifically:

a) The immediate effects of the potential sediment discharge shall be evaluated via turbidity. Turbidity immediately below a mixing zone of 600 feet, as the result of the project, shall not exceed background turbidity, measured at comparable discharge by 50 NTU instantaneously or 25 NTU for 10 days.

Background shall be defined for the purposes of this project as an area immediately upstream of each crossing that is not influenced by crossing activity.

Monitoring by the applicant shall be sufficiently frequent to detect an error of 5 NTU (10%) turbidity at the downstream station with a .95 confidence level. The number of samples will depend on the variability of the turbidity. The applicant is expected to determine the variability, and to modify the sampling frequency accordingly.

The distance of 600 feet is a Best Professional Judgement of the distance needed for dissipation based on reports of other crossings supplied by the applicant and limits applied by the California Regional Water Quality Control Board for a crossing of the Sacramento River by this project. The Sacramento has a muddier bottom and supports spawning habitat for salmon, an endangered species.

Should the turbidity criteria be exceeded during the project, the applicant must employ additional or different BMP techniques to reduce the discharge.

b) Long term effects on the cold water biota shall be evaluated by the applicant using the percent embeddedness criterion that: no statistically demonstrable increase, at the 95% confidence interval, in natural baseline percent embeddedness as the result of the project shall be permitted. Impacts of sedimentation on interstitial space habitats important to salmonid rearing will be assessed by measurement of cobble and rubble embeddedness. Change in percent embeddedness will be determined by a quantitative technique in stream reaches immediately below crossings before crossing activity and in the same reach 1 year after crossing completion. A percent embeddedness value will consist of a mean at the 95% precision level of the t statistic.

Baseline shall be that condition in the reaches immediately below the crossing locations before crossing activity is initiated. No minimum distance below crossings shall apply,

however, sample locations should be located so as to reasonably detect changes due to the project.

2) In addition to the above, and documenting the effects of the project on beneficial uses via a contract study with the Gas Research Institute, the applicant shall determine the following:

a) What, if any, predictive relationship exists between the composition of the trench substrate and the amount of sediment and turbidity generated by wet trench stream crossing.

b) The applicant shall evaluate the effectiveness of the BMP technique of disturbance time minimization. Proposed use of this technique has been pivotal in the selection of the wet crossing technique as the method with the least water quality impact. Assuming all eight crossings will not take exactly the same amount of time, a theoretical relationship should exist between time of disturbance and amount of turbidity generated.

3) Copies of the above turbidity data shall be made available to this office after each crossing. Exceedence of the criteria shall be immediately reported. Copies of the embeddedness data, Gas Research Institute report and items 2a and 2b, above shall be submitted to this office upon completion.

4) This office shall be notified of the start and completion of each crossing. This office shall be allowed access to each site for the purpose of monitoring.

5) The applicant shall supply potable grade water during the crossing phases of the project to those domestic water users that ordinarily draw Moyie River water in the area from immediately above the most upstream crossing to the Moyie Reservoir.

For the Cocolalla Creek crossing:

6) A flume or other diversion device is to be used to divert creek water such that excavation and backfilling can be performed in the dry. Additional turbidity controls may be needed to prevent sediment discharge.

For all aspects of the project:

7) Any appropriate BMPs, either structural or operational, shall be employed and maintained during upland activities to effectively prevent sediment laden discharge to area water bodies as result of the project. BMPs shall be monitored for performance and modified if unsatisfactory.

8) No more than one mile of continuous trench shall be open at a given time.

9) Equipment shall be operated in the water only for the purpose of installing fish structures, trenching for the pipe, pipe laying, and back-filling. Casual or convenience operation of equipment in any water body shall not be permitted. Absorbent booms and pads shall be on site in the event of a discharge of petroleum products. This office is to be notified of said discharges.

10) No discharge of hydrostatic test water is authorized by this certification.

11) Trench pump water shall not be directly or indirectly discharged to wetlands or streams.

12) Re-vegetation of disturbed riparian and wetland areas shall be accomplished with native vegetation.

If construction is completed in accordance with the described work plan and above conditions, we can certify under Section 401 that this construction will comply with applicable requirements of Sections 301, 302, 303, 306, and 307 of PL 92-500, as amended, and will not violate Idaho Water Quality Standards and Wastewater Treatment Requirements.

This certification does not imply approval of the activity by other agencies of the State of Idaho.

Sincerely,

Gwen Burr

Gwen Burr
Regional Administrator
Community Programs
North Idaho Regional Office

GB:bc

cc: IDWR-Northern Region-Haynes, Knoblock
DEQ-P&E-Yoder
DEQ-NIRO-Cochrane, Tulloch
CORPS-Walla Walla-Erkel
CORPS-Coeur d'Alene-Boherty
EPA-Boise-McFall
IDFG-Coeur d'Alene-Corsi
USFWS-Coeur d'Alene-Halleck

IDAHO DEPARTMENT
OF HEALTH AND WELFARE
DIVISION OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway, Coeur d'Alene, ID 83814-2948, (208) 667-3424

Carl D. Anderson, Governor Richard A. Denison, Director

August 7, 1992

Mr. Mike Doherty
U.S. Army Corps of Engineers
Walla Walla District
1201 Ironwood Drive
Coeur d'Alene, ID 83814

Pacific Gas Transmission c/o
Mark Luttrell
Bechtel
P.O. Box 5606
Bend, OR 97708

Re: PGZ/PGT Pipeline project; NPW 071-OYC-4-003819
Response to applicant revisions request of August 4, 1992 and
modification of certification conditions

Gentlemen:

We have reviewed the applicant's request to modify the subject permit and approve proposed Best Management Practices (BMPs) for turbidity control so they may continue work on the remaining six gas pipeline crossings of the Moyie River. As discussed in the meeting Tuesday morning (8/4/'92) with the applicant, we have additional concerns about domestic water supplies below the Moyie Reservoir. We also have some concerns that additional monitoring is required to fully describe the impacts associated with pipeline construction. The following sections of this letter address these three topic areas: proposed BMPs, domestic water supply, and monitoring needs. DEQ's original certification conditions require amendment given the requested permit modifications and events related to construction. Certification conditions to ensure water quality protection and compliance with Idaho Water Quality Standards are included in a summary.

Proposed BMPs.

The purpose of the non-point source BMP feedback loop in the Idaho Water Quality Standards is to manage non-point source (NPS) discharges in a reasonable, preventative, and cost-effective manner. BMPs for traditional non-point sources have been refined to the point that once site conditions are known, they can be prescribed to a level that adequately controls the discharge. During the development of certification for this permit, the site conditions were unknown, as was the BMP effectiveness and practicality. The applicant maintained that any pollutant (including sediment) has two components with

respect to toxicity to aquatic biota: duration and concentration. Their proposal was to reduce the duration aspect of the equation to the minimum. DEQ essentially agrees with this strategy, however, if concentrations (in this case turbidity) are great enough, then impacts to the biota may occur no matter how short a time they are exposed to the pollutant. For this reason, 50 NTU was set as a certification condition and BMP modification was required if turbidity exceeded that level. The 50 NTU value was derived by many technical specialists from industry, academia, and agencies as the point at which deleterious effects to salmonids occur. The document describing the analysis is titled *Technical Review of Sediment Criteria* (Harvey, 1989) and is enclosed.

Strategy used to select BMPs for controlling NPS pollution is somewhat akin to buying insurance. The idea is to select the correct amount of protection, given knowledge of existing conditions and the estimated risk that a discharge event will occur. Applying minimal BMPs in a high risk situation does not provide adequate protection for the resource. At the same time, one does not wish to pay for coverage that may not be needed.

Traditional NPS sediment control strategy also employs the concepts of disturbance minimization, source control, exclusion of transport mechanism, filtration, and collection in that sequence. For example, in an erosion control situation, one would first minimize the amount of soil disturbed, then try to establish vegetation while excluding rainfall and runoff using drainage control and some temporary soil cover, filter the runoff as close to the source as possible using silt fences or the like, then, as a last resort, settle the sediment out of the runoff. The idea is to keep the material at it's source or remove it from the aquatic ecosystem.

DEQ submits that the proposed BMPs underinsure the project. We now know material under the river bottom is easily suspended, therefore, a high level of sediment control effort is required to achieve resource protection. By virtue of the constraints placed on sediment control by construction techniques in a flowing channel, the most desirable control strategies; disturbance minimization (the trench must be dug), and source control (exposure of the source is not the problem, exposing it is) are eliminated from use. BMP strategy used by the project must therefore place great emphasis on the remaining three concepts available: exclusion of water (transport mechanism), filtration, and collection.

The proposed two or three BMPs, given the high turbidity levels that have resulted from the project, cannot reasonably be expected to achieve the 50 NTU condition of certification if used singly. If the proposed BMPs are used in concert, reductions in turbidity from the next crossing may be observed. Partial exclusion of water from the areas of active trench digging will likely serve to somewhat retain the colloidal material that is contributing to the turbidity, however, this material will migrate downstream via a venturi effect from the

water diverted around the equipment or when the flow is returned to the sheltered area. Filtration using gravel trench plugs or filter fabric may also temporarily contain turbidity, but again, when the filter is removed, turbid water will be discharged. Collection of the turbid water needs to be an essential component of this plan to remove the turbidity from the system.

The following additional BMPs or crossing methods attempt to maximize the remaining three available concepts discussed above. They are presented in no particular order, however, we recognize that each has a different effectiveness, logistical considerations and cost. Some of the ideas may be combined with the proposed BMPs for greater turbidity control.

a) Pumping the areas of extreme turbidity has been suggested in recent meetings and noted above. If the pollutant is removed from the system at its source, it will not impact resources downstream. Care will have to be taken to ensure that adequate flow remains in the stream channel and that pump operation does not create additional turbidity via leakage.

b) Complete isolation of the work area may be possible by extending the ideas in the proposal submitted by the applicant. Using highway barriers and silt curtain material all the way around the work area would allow greater containment, provide a structure for attaching filter fabric, and may effectively control turbidity from the digging operation. Sequential placement of work areas, similar to the technique in the applicant's proposal, would allow the river to flow around isolated activity. Essentially, a rectangle (or any other shape) of highway barriers could be placed around an excavator, the trench and spoil area; filter fabric could be attached to the barriers; and the center portion of the trench dug. The bodies of the excavators could be outside the enclosure. Once the center of the trench is completed, flow could be gradually re-routed through the center, the sides of the channel could be similarly isolated, and the trench completed. The joints between the center and sides may have to be broken without benefit of containment, or some filter medium could be employed similar to the applicant's BMP #3. Combined with pumping, turbidity from the trenching activity should be greatly reduced.

c) A flume crossing was discarded during the application phase due to flow considerations and is still not favored by the applicant due to time considerations. We still have not heard that a flume is technically unachievable. River flows are extremely low this year, making a flume crossing a possibility. The advantages from a turbidity reduction standpoint of working in the dry are many-fold. No water flows across the trench area or spoil pile, therefore no transport mechanism exists. Duration of excavation or material encountered does not become an issue (from a turbidity impact perspective). The trench can be made essentially any size to accommodate installation of the pipe and risers. Backfill can be

accomplished without additional impact or stress to the resource and biota. This concept should not be discarded lightly since entire crossings can be constructed without turbidity impacts other than those associated with placement and removal of the flume.

d) Spoil removal to an upland location along with placement of clean material as backfill may also help reduce turbidity discharges. Certainly the "second slug" effect observed during the first two crossings will be greatly reduced or eliminated. Additional turbidity associated with disturbance of the spoils by excavation activity would also be eliminated since spoil material would not be placed instream.

e) A final suggestion takes the idea of time reduction a step further. Rather than complete each crossing all at once, excavation could be divided into shorter events. Magnitude of turbidity might be reduced, and duration of exposure could be changed from eight hours into (for example) four, two hour, exposures. Consultation with fishery experts, aquatic biologists, and the literature is needed to determine if several short small exposures with recovery periods inbetween is better than one longer, intense exposure.

Domestic Water Supply.

The project has impacted the domestic water supply treatment plant for the City of Moyie Springs. During the application phase of the project, turbidity discharges past the Moyie Reservoir were not anticipated. After reviewing the City's finished water turbidity treatment records, it is evident that the City may violate the 30 day maximum turbidity average of the drinking water regulations. More importantly, the fact that much higher levels of turbidity are passing through the plant indicates that pathogens such as giardia cysts may also be passing through the plant. Turbidity interferes with the disinfection process, thereby increasing the risk of waterborn illness. The pipeline project must address the potential public health threat caused by their activity before approval for continued crossing activity can be granted.

The Moyie Springs Water System serves a population of approximately 400 people. The intake in the Moyie River consists of a wetwell on shore with an intake pipe in the middle of the river. The intake is approximately 1/4 mi. down stream of the dam for the Moyie Reservoir. The water is pumped up a hill approximately 300' elevation to a packaged direct filtration plant. The maximum plant capacity is rated at 300 gpm at a filtration rate of 5 gpm/ft² under optimum water quality conditions. The plant has chemical pretreatment (coagulation) without rapid mixing, hydraulic flocculation, gravity dual media filtration and disinfection.

This type of filtration plant is only designed to filter water where turbidity levels are <7-14 NTU and where rapid fluctuations in turbidity does not occur. The plant is currently operating at peak capacity and filtration rate. It is not able to effectively filter

the water from the Moyie river at this time to provide safe drinking water to it's users. This is documented by the turbidity levels seen in the operators daily turbidity log.

The most appropriate and protective measure to pursue would be to install a pump in the City's infiltration well and to supplement any additional water from the Three Mile Water District. Modifications to the well will require DEQ approval prior to placing the water supply in service. The company is proceeding with this option.

Monitoring needs.

Several weaknesses in the monitoring plan prescribed by the original certification conditions are now apparent. DEQ requests that monitoring be adjusted to better document the water quality impacts associated with the project.

Turbidity plumes moving as discreet slugs downriver were not anticipated at the time the certification letter was written. Now that we know high levels of turbidity are moving to the Kootenai River confluence (at least), a more complete description of these events is warranted. Documentation of travel time, duration, magnitude and distance moved is needed.

Behavior of turbidity plumes immediately below the crossings was also not known at the time the monitoring requirements were drafted. It is apparent that the river is not well mixed at the required monitoring location 600' downstream of each crossing and that turbidity is related to the location of the excavation. Due to this lack of mixing, duration and magnitude of turbidity events may be under-reported since a single sample location in the center of the stream may miss high turbidity values associated with trenching at the sides of the river.

Activity other than trenching may be contributing to turbidity in the river. DEQ would like monitoring to be occurring whenever any instream activity is taking place at a crossing, not just when trenching is occurring. This includes equipment crossing the river, installation, modification, and removal of flume bridges, BMP installation, fish structure placement, etc. Complete documentation of turbidity associated with pipeline crossings will aid understanding of cumulative impacts.

Aquatic biota may be experiencing other stress at this time of year which may be compounded by the high turbidity levels from the project. Since river flow is extremely low this year, temperature may be higher than usual. Increased turbidity increases the heat retention capacity of water. Colloidal material discharged from the project may exert an oxygen demand in addition. The combination of any one factor alone may not pose any threat to the fishery, however, two or three stresses may combine and impact the population. DEQ therefore requests that temperature and oxygen monitoring be added to the existing plan.

Lastly, we request that monitoring be performed to determine what impacts the turbidity is having on a harlequin duck brood observed in the area by the USFS. The monitoring plan should be to the satisfaction of the Forest Service. Wildlife use is considered a beneficial use of state waters. Sensitive species merit extra consideration, given the unexpected high turbidity encountered. Trenching should occur at night to reduce turbidity impacts to sight feeding organisms.

Certification amendment conditions.

To insure protection of water quality, the following conditions should be included in the Department of the Army Permit modification for the project:

- 1) The applicant has stated that crossing 5 will be constructed next. For that crossing, all BMPs proposed in the subject request letter shall be employed at the same time, in combination. Additionally, The proposed BMPs shall be used in a similar manner during backfilling to reduce turbidity associated with that activity.
- 2) In addition to the proposed BMPs, pumping of highly turbid water from isolated areas near operating equipment, behind flow deflectors, or other areas of high turbidity shall occur to remove turbid water from the system. The pumped water shall be land applied via sprinklers in a manner that it will not re-enter waters of the State. Pumps shall be operated in a contained area so leakage or spray associated with pump operation does not contribute to erosion and turbidity. Pumping of water may not appreciably reduce to majority of flow in the river. The objective of pumping is to remove only turbid water.
- 3) Additional BMPs, such as those suggested above, are required at future crossings (after Number 5) if the proposed BMPs do not reduce turbidity below the 50 NTU certification condition previously issued.
- 4) If other sources of turbidity are identified during trenching activity, action shall be taken to eliminate or reduce that source.
- 5) Activity that results in high turbidity discharge, specifically crossing excavation and backfill, shall occur at night to reduce the impact on sight feeding biota.
- 6) No excavation or other crossing activity shall occur until the City of Moyie Springs is provided with an alternate water supply. Infiltration well improvements are currently being pursued. Approval of the alternate water system must be obtained from Steve Tanner of this office. The following

items are required before approval can be obtained:

- a. A Professional Engineer (PE) registered in Idaho must supply plans and specifications for pump and piping modifications to DEQ. Detailed as-built plans must follow within one month of installation.
 - b. The well must be test pumped for capacity and recovery and results provided to DEQ.
 - c. The well water must be tested for Total and Fecal Coliform bacteria, inorganic compounds, organic compounds, and radiological elements. The water must meet state drinking water standards.
 - d. A PE must oversee all work and coordinate with DEQ.
 - e. An additional well, pump, or water supply may be needed to meet the volume demands of the City of Moyie Springs.
- 7) Turbidity monitoring samplers located below each crossing shall continuously collect turbidity data for the duration of project, regardless of activity occurring at the immediate crossing.
 - 8) During crossing activity, three samplers shall collect turbidity below the crossing. Sampler intakes shall be located at the existing location on the thalweg and at locations between the thalweg location and water's edge on each side. The permittee shall report all raw turbidity data to DEQ following completion of each crossing.
 - 9) A turbidity monitoring plan shall be developed and implemented that addresses the long term effects on cold water biota and domestic water supplies. Approval of the monitoring plan must be obtained from DEQ before instream activity is completed.
 - 10) Turbidity plumes and "slugs" shall be documented and described in a report to DEQ. The results may be incorporated in the report required by original certification condition number 2. The description shall include size of the plume, duration, time of travel, and how far downstream the plume is detectable.
 - 11) Temperature and dissolved oxygen shall be monitored 500' below each crossing immediately before, during, and shortly after trenching work is performed at that crossing. The statistical requirements of the original certification condition Number 1a shall apply.

12) A macroinvertebrate monitoring plan shall be developed and implemented that adequately describes the effect of turbidity from the project on feeding by Harlequin ducks observed downstream of the project crossings. Approval of the monitoring plan must be obtained from Bob Klarich of the Bonners Ferry Ranger District before crossing activity can resume. A separate report shall be developed and submitted to Mr. Klarich. Data shall be submitted after each crossing is completed.

13) All final reports and monitoring data required by this and the original certification shall be submitted to this office no later than eighteen months after completion of the last Moyie River crossing.

This amendment to our original certification does not release the applicant from meeting any of the original conditions.

If construction is completed in accordance with the described work plan and above conditions, we can certify under Section 401 that this construction will comply with applicable requirements of Sections 301, 302, 303, 306, and 307 of PL 92-500, as amended, and will not violate Idaho Water Quality Standards and Wastewater Treatment Requirements. This certification does not cover future modifications to the project.

Any person aggrieved by an action or inaction of the Division shall be afforded an opportunity for a fair hearing upon request therefor in writing pursuant to chapter 52, title 67, Idaho Code and the rules and regulations promulgated thereunder.

This certification does not imply approval of the activity by other agencies of the State of Idaho.

Sincerely,

Gwen P. Burr

Gwen P. Burr
Regional Administrator
North Idaho Regional Office

Enclosure

GB:bc

cc: IDWR-Northern Region-Haynes, Knoblock
DEQ-CF-Poola
DEQ-AGS Office-Beaton
DEQ-NIRO-Cochrane, Tinkey
CORPS-Coeur d'Alene-Doherty, Rayner
EPA-Boise-Olson
IDFG-Coeur d'Alene-Corsi
USFWS-Coeur d'Alene-Halleck, Donaldson

Appendix B:

Figures

LEGEND

- I - ISCO Automatic Water Sampler
- - Sampler Inlet / Strainer

NOT TO SCALE

FIGURE B.1 Schematic Diagram of Sampling Locations

LEGEND

- I - ISCO Automatic Water Sampler
- - Sampler Inlet / Strainer

NOT TO SCALE

FIGURE B.2 Schematic Diagram Indicating Revised Sampler Locations

FIGURE B.3 Crossing #8: Net Turbidity versus Time as Measured 600 ft Downstream

FIGURE B.4 Crossing #8: Running Average of Net Turbidity versus Time as Measured 600 ft Downstream

FIGURE B.5 Crossing #6: Net Turbidity versus Time as Measured 600 ft Downstream

FIGURE B.6 Turbidity Generated by Crossing #6 as Measured Downstream at the Crossing #8 Sampling Location

FIGURE B.7 Crossing #6: Running Average of Net Turbidity versus Time as Measured 600 ft Downstream

FIGURE B.8 Turbidity Generated by Crossing #4 as Measured Downstream at Sampling Locations Crossings #6 and #8

FIGURE B.9 Crossing #4: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.10 Crossing #4: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.11 Crossing #4: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.12 Crossing #4: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.13 Crossing #5: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.14 Crossing #5: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.15 Crossing #5: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.16 Turbidity Generated by Crossing #5 as Measured Downstream at Sampling Locations at Crossings #6 and #8

FIGURE B.17 Crossing #5: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.18 Crossing #5: Temperature Measured Upstream and 600 ft Downstream versus Time

FIGURE B.19 Turbidity Generated by Crossing #7 as Measured Downstream at the Crossing #8 Sampling Location

FIGURE B.20 Crossing #7: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.21 Crossing #7: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.22 Crossing #7: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.23 Crossing #7: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.24 Crossing #7: Temperature Measured Upstream and 600 ft Downstream versus Time

FIGURE B.25 Turbidity Generated by Crossing #2 as Measured Downstream at the Sampling Locations at Crossings #4, #5, #6, #7, and #8

FIGURE B.26 Crossing #2: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.27 Crossing #2: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.28 Crossing #2: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.29 Crossing #2: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.30 Crossing #2: Temperature Measured Upstream and 600 ft Downstream versus Time

FIGURE B.31 Turbidity Generated by Crossing #1 as Measured Downstream at Sampling Locations at Crossings #2, #4, #5, #6, #7, and #8

FIGURE B.32 Crossing #1: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.33 Crossing #1: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.34 Crossing #1: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.35 Crossing #1: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.36 Crossing #1: Temperature Measured Upstream and 600 ft Downstream versus Time

FIGURE B.37 Crossing #3: Net Turbidity versus Time as Measured by Three Samplers 600 ft Downstream

FIGURE B.38 Turbidity Generated by Crossing #3 as Measured Downstream at Sampling Locations at Crossings #3, #4, #5, #6, #7, and #8

FIGURE B.39 Crossing #3: Flow-Weighted Average of Net Turbidity Measured by Three Samplers 600 ft Downstream versus Time

FIGURE B.40 Crossing #3: Running Average of Flow-Weighted Net Turbidity as Measured 600 ft Downstream versus Time

FIGURE B.41 Crossing #3: Dissolved Oxygen Measured Upstream and 600 ft Downstream versus Time

FIGURE B.42 Crossing #3: Temperature Measured Upstream and 600 ft Downstream versus Time

FIGURE B.43 Total Suspended Solids versus Turbidity for Crossing #1

FIGURE B.44 Total Suspended Solids versus Turbidity for Crossing #3

FIGURE B.45 Total Suspended Solids versus Turbidity for Crossing #5

FIGURE B.46 Total Suspended Solids versus Turbidity for Crossings #1, #3, and #5

Appendix C:
Turbidity Data

TABLE C.1 Turbidity Generated by Crossing #8

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)		Net (b) (NTU)
				Background (NTU)	600 ft Downstream (NTU)	
27-Jul	1:30	0	0.0	1	2	1
27-Jul	2:00	30	0.5	1	2 e	1 e
27-Jul	2:30	30	1.0	2	72	70
27-Jul	3:00	30	1.5	2	72 e	70 e
27-Jul	3:30	30	2.0	2	184	182
27-Jul	4:00	30	2.5	2	184 e	182 e
27-Jul	4:30	30	3.0	1	88	87
27-Jul	5:00	30	3.5	1	88 e	87 e
27-Jul	5:30	30	4.0	1	186	185
27-Jul	6:00	30	4.5	1	186 e	185 e
27-Jul	6:30	30	5.0	2	216	214
27-Jul	7:00	30	5.5	2	216 e	214 e
27-Jul	7:30	30	6.0	1	162	161
27-Jul	8:00	30	6.5	1	162 e	161 e
27-Jul	8:30	30	7.0	2	152	150
27-Jul	9:00	30	7.5	1	90	89
27-Jul	9:30	30	8.0	1	111	110
27-Jul	10:00	30	8.5	2	128	126
27-Jul	10:30	30	9.0	1	49	48
27-Jul	11:00	30	9.5	1	36	35
27-Jul	11:30	30	10.0	1	46	45
27-Jul	12:00	30	10.5	1	48	47
27-Jul	12:30	30	11.0	1	20	19
27-Jul	13:00	30	11.5	2	8	6
27-Jul	13:30	30	12.0	2	15	13
27-Jul	14:00	30	12.5	2	41	39
27-Jul	14:30	30	13.0	1	32	31
27-Jul	15:00	30	13.5	1	30	29
27-Jul	15:30	30	14.0	1	34	33
27-Jul	16:00	30	14.5	1	40	39
27-Jul	16:30	30	15.0	1	45	44
27-Jul	17:00	30	15.5	2	68	66
27-Jul	17:30	30	16.0	2	46	44
27-Jul	18:00	30	16.5	1	36	35
27-Jul	18:30	30	17.0	1	27	26
27-Jul	19:00	30	17.5	1	28	27
27-Jul	19:30	30	18.0	1	15	14
27-Jul	20:00	30	18.5	1 m	8	7
27-Jul	20:30	30	19.0	1 m	5	4
27-Jul	21:00	30	19.5	1	4	3
27-Jul	21:30	30	20.0	1 m	3	2

TABLE C.1 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)		Net (b) (NTU)
				Background (NTU)	600 ft Downstream (NTU)	
27-Jul	22:00	30	20.5	1 m	3	2
27-Jul	22:30	30	21.0	1 m	3	2
27-Jul	23:00	30	21.5	1	3	2
27-Jul	23:30	30	22.0	1 m	3	2
28-Jul	0:00	30	22.5	1 m	3	2
28-Jul	0:30	30	23.0	1 m	3	2
28-Jul	1:00	30	23.5	2	3	1
28-Jul	1:30	30	24.0	2 m	2	0
28-Jul	2:00	30	24.5	2 m	2	0
28-Jul	2:30	30	25.0	2 m	4	2
28-Jul	3:00	30	25.5	2	2	0
28-Jul	3:30	30	26.0	2 m	3	1
28-Jul	4:00	30	26.5	2 m	2	0
28-Jul	4:30	30	27.0	3 m	1	0
28-Jul	5:00	30	27.5	3	1	0
28-Jul	5:30	30	28.0	3 m	2	0
28-Jul	6:00	30	28.5	2 m	1	0
28-Jul	6:30	30	29.0	2 m	2	0
28-Jul	7:00	30	29.5	2 m	2 e	0 e
28-Jul	7:30	30	30.0	1.5	23	21.5
28-Jul	8:00	30	30.5	1.5 m	20	18.5
28-Jul	8:30	30	31.0	2 m	36	34
28-Jul	9:00	30	31.5	2	35	33
28-Jul	9:30	30	32.0	2 m	156	154
28-Jul	10:00	30	32.5	2 m	144	142
28-Jul	10:30	30	33.0	3 m	23	20
28-Jul	11:00	30	33.5	3	9	6
28-Jul	11:30	30	34.0	3 m	5	2
28-Jul	12:00	30	34.5	3 m	3	0
28-Jul	12:30	30	35.0	3 m	3	0
28-Jul	13:00	30	35.5	3	5	2
28-Jul	13:30	30	36.0	3 m	2	0
28-Jul	14:00	30	36.5	4 m	1	0
28-Jul	14:30	30	37.0	4 m	1	0
28-Jul	15:00	30	37.5	4	3	0
28-Jul	15:30	30	38.0	4 m	3	0
28-Jul	16:00	30	38.5	4 m	1	0
28-Jul	16:30	30	39.0	3 m	2	0
28-Jul	17:00	30	39.5	3 m	2	0
28-Jul	17:30	30	40.0	3 m	1	0
28-Jul	18:00	30	40.5	3 m	2	0

TABLE C.1 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)		Net (b) (NTU)
				Background (NTU)	600 ft Downstream (NTU)	
28-Jul	18:30	30	41.0	2 m	2	0
28-Jul	19:00	30	41.5	2 m	2	0
28-Jul	19:30	30	42.0	2 m	1	0
28-Jul	20:00	30	42.5	2	1	0
28-Jul	20:30	30	43.0	2	2	0
28-Jul	21:00	30	43.5	2	2	0
28-Jul	21:30	30	44.0	2	1	0
28-Jul	22:00	30	44.5	2	1	0
28-Jul	22:30	30	45.0	2	1	0
28-Jul	23:00	30	45.5	2	1	0
28-Jul	23:30	30	46.0	1	2	1
29-Jul	0:00	30	46.5	1	1	0
29-Jul	0:30	30	47.0	1	1	0
29-Jul	1:00	30	47.5	1	1	0
29-Jul	1:30	30	48.0	2	2	0
29-Jul	2:00	30	48.5	2	1	0
29-Jul	2:30	30	49.0	2	1	0
29-Jul	3:00	30	49.5	1	1	0
29-Jul	3:30	30	50.0	1 e	1 e	0 e
29-Jul	4:00	30	50.5	2 e	1 e	0 e
29-Jul	4:30	30	51.0	2	1	0
29-Jul	5:00	30	51.5	2	1	0
29-Jul	5:30	30	52.0	2	1	0
29-Jul	6:00	30	52.5	1	1	0
29-Jul	6:30	30	53.0	2	1	0
29-Jul	7:00	30	53.5	1	1	0
29-Jul	7:30	30	54.0	1 e	1 e	0 e
29-Jul	8:00	30	54.5	1 e	1 e	0 e
29-Jul	8:30	30	55.0	1 e	1 e	0 e
29-Jul	9:00	30	55.5	1	1	0
29-Jul	9:30	30	56.0	2 m	1	0
29-Jul	10:00	30	56.5	2	1	0
29-Jul	10:30	30	57.0	2 m	1	0
29-Jul	11:00	30	57.5	2	1	0
29-Jul	11:30	30	58.0	1 m	1	0
29-Jul	12:00	30	58.5	1	1	0
29-Jul	12:30	30	59.0	1 m	1	0
29-Jul	13:00	30	59.5	1	1 m	0
29-Jul	13:30	30	60.0	1	1 m	0
29-Jul	14:00	30	60.5	1	1 m	0
29-Jul	14:30	30	61.0	1	1 m	0

TABLE C.1 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)		
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)
29-Jul	15:00	30	61.5	1	1 m	0
29-Jul	15:30	30	62.0	1	1 m	0
29-Jul	16:00	30	62.5	2	2 m	0
29-Jul	16:30	30	63.0	2	2 m	0
29-Jul	17:00	30	63.5	2	2 m	0
29-Jul	17:30	30	64.0	2	2 m	0
29-Jul	18:00	30	64.5	3	3 m	0
29-Jul	18:30	30	65.0	3	3 m	0
29-Jul	19:00	30	65.5	5	5 m	0
29-Jul	19:30	30	66.0	5	5 m	0
29-Jul	20:00	30	66.5	5	5 m	0
29-Jul	20:30	30	67.0	5	5 m	0
29-Jul	21:00	30	67.5	3	3 m	0
29-Jul	21:30	30	68.0	3	3 m	0
29-Jul	22:00	30	68.5	3	3 m	0
29-Jul	22:30	30	69.0	3	3 m	0
29-Jul	23:00	30	69.5	1	1 m	0
29-Jul	23:30	30	70.0	1	1 m	0
30-Jul	0:00	30	70.5	2	2 m	0
30-Jul	0:30	30	71.0	2	2 m	0
30-Jul	1:00	30	71.5	2	2 m	0
30-Jul	1:30	30	72.0	2	2 m	0
30-Jul	2:00	30	72.5	2	2 m	0
30-Jul	2:30	30	73.0	2	2 m	0
30-Jul	3:00	30	73.5	1	1 m	0
30-Jul	3:30	30	74.0	1	1 m	0
30-Jul	4:00	30	74.5	2	2 m	0
30-Jul	4:30	30	75.0	2	2 m	0
30-Jul	5:00	30	75.5	1	1 m	0
30-Jul	5:30	30	76.0	1	1 m	0
30-Jul	6:00	30	76.5	1	1 m	0
30-Jul	6:30	30	77.0	1	1 m	0
30-Jul	7:00	30	77.5	1	1 m	0
30-Jul	7:30	30	78.0	1	1 m	0
30-Jul	8:00	30	78.5	1 m	1 m	0
30-Jul	8:30	30	79.0	1 m	1 m	0
30-Jul	9:00	30	79.5	1 m	1 m	0
30-Jul	9:30	30	80.0	1 m	1 m	0
30-Jul	10:00	30	80.5	1 m	1	0
30-Jul	10:30	30	81.0	1 m	1 e	0 e
30-Jul	11:00	30	81.5	1	2	1

TABLE C.1 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)		Net (b) (NTU)
				Background (NTU)	600 ft Downstream (NTU)	
30-Jul	11:30	30	82.0	1 e	2 e	1 e
30-Jul	12:00	30	82.5	1	2	1
30-Jul	12:30	30	83.0	1 e	2 e	1 e
30-Jul	13:00	30	83.5	1	1	0
30-Jul	13:30	30	84.0	1 e	1 e	0 e
30-Jul	14:00	30	84.5	1	1	0
30-Jul	14:30	30	85.0	1 e	1 e	0 e
30-Jul	15:00	30	85.5	1	1	0
30-Jul	15:30	30	86.0	1 e	1 e	0 e
30-Jul	16:00	30	86.5	1	8	7
30-Jul	16:30	30	87.0	1 e	8 e	7 e
30-Jul	17:00	30	87.5	1	2	1
30-Jul	17:30	30	88.0	1 e	2 e	1 e
30-Jul	18:00	30	88.5	1	1	0
30-Jul	18:30	30	89.0	1 e	1 e	0 e
30-Jul	19:00	30	89.5	2	2	0
30-Jul	19:30	30	90.0	2 e	2 e	0 e
30-Jul	20:00	30	90.5	2	1	0
30-Jul	20:30	30	91.0	2 e	1 e	0 e
30-Jul	21:00	30	91.5	1	2	1
30-Jul	21:30	30	92.0	1 e	2 e	1 e
30-Jul	22:00	30	92.5	2	2	0
30-Jul	22:30	30	93.0	2 e	2 e	0 e
30-Jul	23:00	30	93.5	2	2	0
30-Jul	23:30	30	94.0	2 e	2 e	0 e
31-Jul	0:00	30	94.5	2	2	0
31-Jul	0:30	30	95.0	2 e	2 e	0 e
31-Jul	1:00	30	95.5	2	2	0
31-Jul	1:30	30	96.0	2 e	2 e	0 e

(a) m= sample missed/value is extrapolated;

e = measurements from previous samples are extrapolated for graphing purposes only

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity was equal to 0. Also, after the upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow-Weighted NTU*hours = 1702

TABLE C.2 Turbidity Measured in the Grab Samples at Crossing #8

Date	Time	Turbidity					
		600 ft Downstream			1200 ft Downstream		
		Left	Center (NTU)	Right	Left	Center (NTU)	Right
27-Jul	1200	3.7	6.5	23.6	-	-	-
27-Jul	1300	30.5	42.0	114.4	-	-	-
27-Jul	1400	-	-	-	66.0	148.0	260.0
27-Jul	1500	35.0	44.0	106.0	-	-	-
27-Jul	1600	-	-	-	72.0	146.0	232.0
27-Jul	1700	46.0	52.5	134.0	-	-	-
27-Jul	1800	-	-	-	91.0	128.0	248.0

TABLE C.3 Turbidity Generated by Crossing #6

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
31-Jul	2:00	0	0.0	1	2	1	1
31-Jul	2:30	30	0.5	1	2	1	1 e
31-Jul	3:00	30	1.0	1	1	0	7
31-Jul	3:30	30	1.5	1	5	4	7 e
31-Jul	4:00	30	2.0	1	2	1	4
31-Jul	4:30	30	2.5	1	2	1	4 e
31-Jul	5:00	30	3.0	1	6	5	9
31-Jul	5:30	30	3.5	1	196	195	9 e
31-Jul	6:00	30	4.0	1	345	344	1
31-Jul	6:30	30	4.5	1	744	743	1 e
31-Jul	7:00	30	5.0	1	504	503	3
31-Jul	7:30	30	5.5	1	435	434	3 e
31-Jul	8:00	30	6.0	1	163	162	1
31-Jul	8:30	30	6.5	1	146	145	1 e
31-Jul	9:00	30	7.0	1	103	102	1
31-Jul	9:30	30	7.5	1	57	56	1 e
31-Jul	10:00	30	8.0	1	69	68	33
31-Jul	10:30	30	8.5	1	53	52	33 e
31-Jul	11:00	30	9.0	1	54	53	117
31-Jul	11:30	30	9.5	1	45	44	117 e
31-Jul	12:00	30	10.0	1	20	19	175
31-Jul	12:30	30	10.5	1	24	23	175 e
31-Jul	13:00	30	11.0	2	15	13	177
31-Jul	13:30	30	11.5	2	30	28	177 e
31-Jul	14:00	30	12.0	2	9	7	154
31-Jul	14:30	30	12.5	3	10	7	154 e
31-Jul	15:00	30	13.0	2	8	6	129
31-Jul	15:30	30	13.5	1	7	6	129 e
31-Jul	16:00	30	14.0	2	8	6	170
31-Jul	16:30	30	14.5	2	7	5	170 e
31-Jul	17:00	30	15.0	3	9	6	163
31-Jul	17:30	30	15.5	2	10	8	163 e
31-Jul	18:00	30	16.0	1	10	9	131
31-Jul	18:30	30	16.5	2	7	5	131 e
31-Jul	19:00	30	17.0	2	7	5	104
31-Jul	19:30	30	17.5	2	3	1	104 e
31-Jul	20:00	30	18.0	3	2	0	120
31-Jul	20:30	30	18.5	4	2	0	120 e
31-Jul	21:00	30	19.0	1	2	1	78
31-Jul	21:30	30	19.5	2	10	8	78 e
31-Jul	22:00	30	20.0	1	2	1	53
31-Jul	22:30	30	20.5	2	2	0	53 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
31-Jul	23:00	30	21.0	2	2	0	82
31-Jul	23:30	30	21.5	2	10	8	82 e
1-Aug	0:00	30	22.0	2	2	0	56
1-Aug	0:30	30	22.5	1	2	1	56 e
1-Aug	1:00	30	23.0	1	1	0	37
1-Aug	1:30	30	23.5	2	1	0	37 e
1-Aug	2:00	30	24.0	1	1	0	21
1-Aug	2:30	30	24.5	1	1	0	21 e
1-Aug	3:00	30	25.0	1	1	0	20
1-Aug	3:30	30	25.5	1	1	0	20 e
1-Aug	4:00	30	26.0	2	2	0	11
1-Aug	4:30	30	26.5	1	1	0	11 e
1-Aug	5:00	30	27.0	1	2	1	10
1-Aug	5:30	30	27.5	1	1	0	10 e
1-Aug	6:00	30	28.0	1	1	0	5
1-Aug	6:30	30	28.5	2	2	0	5 e
1-Aug	7:00	30	29.0	1	2	1	5
1-Aug	7:30	30	29.5	1	2	1	5 e
1-Aug	8:00	30	30.0	1	1	0	4
1-Aug	8:30	30	30.5	2	2	0	4 e
1-Aug	9:00	30	31.0	2 e	2	0	3
1-Aug	9:30	30	31.5	2 e	1	0	3 e
1-Aug	10:00	30	32.0	2 e	7	5	4
1-Aug	10:30	30	32.5	2 e	13	11	4 e
1-Aug	11:00	30	33.0	2 e	28	26	3
1-Aug	11:30	30	33.5	2 e	7	5	3 e
1-Aug	12:00	30	34.0	2 e	73	71	5
1-Aug	12:30	30	34.5	2 e	23	21	5 e
1-Aug	13:00	30	35.0	2 e	173	171	7
1-Aug	13:30	30	35.5	2 e	227	225	7 e
1-Aug	14:00	30	36.0	2 e	130	128	7
1-Aug	14:30	30	36.5	2 e	84	82	7 e
1-Aug	15:00	30	37.0	2 e	55	53	16
1-Aug	15:30	30	37.5	2 e	12	10	16 e
1-Aug	16:00	30	38.0	2 e	5	3	49
1-Aug	16:30	30	38.5	2 e	6	4	49 e
1-Aug	17:00	30	39.0	2 e	11	9	66
1-Aug	17:30	30	39.5	2 e	5	3	66 e
1-Aug	18:00	30	40.0	2 e	3	1	75
1-Aug	18:30	30	40.5	2 e	1	0	75 e
1-Aug	19:00	30	41.0	2 e	2	0	166
1-Aug	19:30	30	41.5	2 e	2	0	166 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
1-Aug	20:00	30	42.0	2 e	1	0	141
1-Aug	20:30	30	42.5	2 e	6	4	141 e
1-Aug	21:00	30	43.0	2	2	0	89
1-Aug	21:30	30	43.5	2	3	1	89 e
1-Aug	22:00	30	44.0	2	2	0	38
1-Aug	22:30	30	44.5	2	1	0	38 e
1-Aug	23:00	30	45.0	2	2	0	14
1-Aug	23:30	30	45.5	1	1	0	14 e
2-Aug	0:00	30	46.0	1	2	1	9
2-Aug	0:30	30	46.5	1	1	0	9 e
2-Aug	1:00	30	47.0	1	3	2	5
2-Aug	1:30	30	47.5	1	3	2	5 e
2-Aug	2:00	30	48.0	2	1	0	8
2-Aug	2:30	30	48.5	2	2	0	8 e
2-Aug	3:00	30	49.0	1	4	3	3
2-Aug	3:30	30	49.5	4	2	0	3 e
2-Aug	4:00	30	50.0	2	1	0	8
2-Aug	4:30	30	50.5	3	3	0	8 e
2-Aug	5:00	30	51.0	1	3	2	3
2-Aug	5:30	30	51.5	1	2	1	3 e
2-Aug	6:00	30	52.0	1	2	1	6
2-Aug	6:30	30	52.5	1	2	1	6 e
2-Aug	7:00	30	53.0	1	2	1	3
2-Aug	7:30	30	53.5	1	1	0	3 e
2-Aug	8:00	30	54.0	1	2	1	2
2-Aug	8:30	30	54.5	1	1	0	2 e
2-Aug	9:00	30	55.0	1	1	0	2
2-Aug	9:30	30	55.5	1	1	0	2 e
2-Aug	10:00	30	56.0	1	1	0	2
2-Aug	10:30	30	56.5	1 e	1 e	0 e	2 e
2-Aug	11:00	30	57.0	1	5	4	4
2-Aug	11:30	30	57.5	1 e	5 e	4 e	4 e
2-Aug	12:00	30	58.0	1	3	2	2
2-Aug	12:30	30	58.5	1 e	3 e	2 e	2 e
2-Aug	13:00	30	59.0	1	1	0	3
2-Aug	13:30	30	59.5	1 e	1 e	0 e	3 e
2-Aug	14:00	30	60.0	1	1	0	3
2-Aug	14:30	30	60.5	1 e	1 e	0 e	3 e
2-Aug	15:00	30	61.0	1	1	0	2
2-Aug	15:30	30	61.5	1 e	1 e	0 e	2 e
2-Aug	16:00	30	62.0	1	1	0	2
2-Aug	16:30	30	62.5	1 e	1 e	0 e	2 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
2-Aug	17:00	30	63.0	1	2	1	3
2-Aug	17:30	30	63.5	1 e	2 e	1 e	3 e
2-Aug	18:00	30	64.0	1	2	1	2
2-Aug	18:30	30	64.5	1 e	2 e	1 e	2 e
2-Aug	19:00	30	65.0	1	1	0	2
2-Aug	19:30	30	65.5	1 e	1 e	0 e	2 e
2-Aug	20:00	30	66.0	1	1	0	3
2-Aug	20:30	30	66.5	1 e	1 e	0 e	3 e
2-Aug	21:00	30	67.0	1	1	0	2
2-Aug	21:30	30	67.5	1 e	1 e	0 e	2 e
2-Aug	22:00	30	68.0	1	1	0	2
2-Aug	22:30	30	68.5	1 e	1 e	0 e	2 e
2-Aug	23:00	30	69.0	1	1	0	3
2-Aug	23:30	30	69.5	1 e	1 e	0 e	3 e
3-Aug	0:00	30	70.0	1	1	0	3
3-Aug	0:30	30	70.5	1 e	1 e	0 e	3 e
3-Aug	1:00	30	71.0	1	1	0	2
3-Aug	1:30	30	71.5	1 e	1 e	0 e	2 e
3-Aug	2:00	30	72.0	1	1	0	2
3-Aug	2:30	30	72.5	1 e	1 e	0 e	2 e
3-Aug	3:00	30	73.0	1	2	1	2
3-Aug	3:30	30	73.5	1 e	2 e	1 e	2 e
3-Aug	4:00	30	74.0	1	1	0	2
3-Aug	4:30	30	74.5	1 e	1 e	0 e	2 e
3-Aug	5:00	30	75.0	1	1	0	2
3-Aug	5:30	30	75.5	1 e	1 e	0 e	2 e
3-Aug	6:00	30	76.0	1	2	1	2
3-Aug	6:30	30	76.5	1 e	2 e	1 e	2 e
3-Aug	7:00	30	77.0	1	1	0	2
3-Aug	7:30	30	77.5	1 e	1 e	0 e	2 e
3-Aug	8:00	30	78.0	1	1	0	2
3-Aug	8:30	30	78.5	1	1	0	2 e
3-Aug	9:00	30	79.0	1	1	0	2
3-Aug	9:30	30	79.5	1	1	0	2 e
3-Aug	10:00	30	80.0	1	1	0	1
3-Aug	10:30	30	80.5	1	1	0	1 e
3-Aug	11:00	30	81.0	1	1	0	1
3-Aug	11:30	30	81.5	1	2	1	1 e
3-Aug	12:00	30	82.0	2	2	0	1
3-Aug	12:30	30	82.5	1	2	1	1 e
3-Aug	13:00	30	83.0	1	1	0	1
3-Aug	13:30	30	83.5	1	1	0	1 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
3-Aug	14:00	30	84.0	1	2	1	3
3-Aug	14:30	30	84.5	1	1	0	3 e
3-Aug	15:00	30	85.0	1	2	1	2
3-Aug	15:30	30	85.5	47	1	0	2 e
3-Aug	16:00	30	86.0	18	1	0	1
3-Aug	16:30	30	86.5	9	1	0	1 e
3-Aug	17:00	30	87.0	4	2	0	3
3-Aug	17:30	30	87.5	3	1	0	3 e
3-Aug	18:00	30	88.0	4	1	0	4
3-Aug	18:30	30	88.5	3	1	0	4 e
3-Aug	19:00	30	89.0	3	1	0	3
3-Aug	19:30	30	89.5	2	3	1	3 e
3-Aug	20:00	30	90.0	2	3	1	2
3-Aug	20:30	30	90.5	3	3	0	2 e
3-Aug	21:00	30	91.0	2	3	1	4
3-Aug	21:30	30	91.5	3	3	0	4 e
3-Aug	22:00	30	92.0	3	3	0	6
3-Aug	22:30	30	92.5	3	3	0	6 e
3-Aug	23:00	30	93.0	4	3	0	5
3-Aug	23:30	30	93.5	2	3	1	5 e
4-Aug	0:00	30	94.0	3	2	0	4
4-Aug	0:30	30	94.5	2	2	0	4 e
4-Aug	1:00	30	95.0	2	2	0	3
4-Aug	1:30	30	95.5	3	2	0	3 e
4-Aug	2:00	30	96.0	2	2	0	3
4-Aug	2:30	30	96.5	2	2	0	3 e
4-Aug	3:00	30	97.0	1	2	1	3
4-Aug	3:30	30	97.5	3	1	0	3 e
4-Aug	4:00	30	98.0	1	1	0	3
4-Aug	4:30	30	98.5	1	2	1	3 e
4-Aug	5:00	30	99.0	1	2	1	3
4-Aug	5:30	30	99.5	1	2	1	3 e
4-Aug	6:00	30	100.0	2	1	0	2
4-Aug	6:30	30	100.5	1	2	1	2 e
4-Aug	7:00	30	101.0	1	3	2	2
4-Aug	7:30	30	101.5	1	3	2	2 e
4-Aug	8:00	30	102.0	1 m	3 m	2 e	3
4-Aug	8:30	30	102.5	1 m	2 m	1 e	3 e
4-Aug	9:00	30	103.0	1	2	1	2
4-Aug	9:30	30	103.5	1 e	2 e	1 e	2 e
4-Aug	10:00	30	104.0	3	1	0	2
4-Aug	10:30	30	104.5	3 e	1 e	0 e	2 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
4-Aug	11:00	30	105.0	2	1	0	2
4-Aug	11:30	30	105.5	2 e	1 e	0 e	2 e
4-Aug	12:00	30	106.0	1	1	0	2
4-Aug	12:30	30	106.5	1 e	1 e	0 e	2 e
4-Aug	13:00	30	107.0	1	1	0	2
4-Aug	13:30	30	107.5	1 e	1 e	0 e	2 e
4-Aug	14:00	30	108.0	1	1	0	2
4-Aug	14:30	30	108.5	1 e	1 e	0 e	2 e
4-Aug	15:00	30	109.0	1	1	0	3
4-Aug	15:30	30	109.5	1 e	1 e	0 e	3 e
4-Aug	16:00	30	110.0	1	2	1	3
4-Aug	16:30	30	110.5	1 e	2 e	1 e	3 e
4-Aug	17:00	30	111.0	1	1	0	3
4-Aug	17:30	30	111.5	1 e	1 e	0 e	3 e
4-Aug	18:00	30	112.0	1	1	0	3
4-Aug	18:30	30	112.5	1 e	1 e	0 e	3 e
4-Aug	19:00	30	113.0	1	7	6	2
4-Aug	19:30	30	113.5	1 e	7 e	6 e	2 e
4-Aug	20:00	30	114.0	1	3	2	2
4-Aug	20:30	30	114.5	1 e	3 e	2 e	2 e
4-Aug	21:00	30	115.0	1	1	0	1
4-Aug	21:30	30	115.5	1 e	1 e	0 e	1 e
4-Aug	22:00	30	116.0	1	1	0	1
4-Aug	22:30	30	116.5	1 e	1 e	0 e	1 e
4-Aug	23:00	30	117.0	1	1	0	2
4-Aug	23:30	30	117.5	1 e	1 e	0 e	2 e
5-Aug	0:00	30	118.0	1	1	0	2
5-Aug	0:30	30	118.5	1 e	1 e	0 e	2 e
5-Aug	1:00	30	119.0	1	1	0	4
5-Aug	1:30	30	119.5	1 e	1 e	0 e	4 e
5-Aug	2:00	30	120.0	1	1	0	3
5-Aug	2:30	30	120.5	1 e	1 e	0 e	3 e
5-Aug	3:00	30	121.0	4	1	0	2
5-Aug	3:30	30	121.5	4 e	1 e	0 e	2 e
5-Aug	4:00	30	122.0	1	1	0	2
5-Aug	4:30	30	122.5	1 e	1 e	0 e	2 e
5-Aug	5:00	30	123.0	1	1	0	1
5-Aug	5:30	30	123.5	1 e	1 e	0 e	1 e
5-Aug	6:00	30	124.0	1	1	0	1
5-Aug	6:30	30	124.5	1 e	1 e	0 e	1 e
5-Aug	7:00	30	125.0	1	1	0	1
5-Aug	7:30	30	125.5	1 e	1 e	0 e	1 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
5-Aug	8:00	30	126.0	1	2	1	1
5-Aug	8:30	30	126.5	1 e	2 e	1 e	1 e
5-Aug	9:00	30	127.0	1	1	0	1
5-Aug	9:30	30	127.5	1 e	1 e	0 e	1 e
5-Aug	10:00	30	128.0	1	2	1	2
5-Aug	10:30	30	128.5	1 e	2 e	1 e	2 e
5-Aug	11:00	30	129.0	1	1	0	1
5-Aug	11:30	30	129.5	1 e	1 e	0 e	1 e
5-Aug	12:00	30	130.0	2	2	0	2
5-Aug	12:30	30	130.5	2 e	2 e	0 e	2 e
5-Aug	13:00	30	131.0	1	1	0	1
5-Aug	13:30	30	131.5	1 e	1 e	0 e	1 e
5-Aug	14:00	30	132.0	1	1	0	1
5-Aug	14:30	30	132.5	1 e	1 e	0 e	1 e
5-Aug	15:00	30	133.0	1	1	0	3
5-Aug	15:30	30	133.5	1 e	1 e	0 e	3 e
5-Aug	16:00	30	134.0	1	2	1	1
5-Aug	16:30	30	134.5	1 e	2 e	1 e	1 e
5-Aug	17:00	30	135.0	1	1	0	1
5-Aug	17:30	30	135.5	1 e	1 e	0 e	1 e
5-Aug	18:00	30	136.0	1	1	0	1
5-Aug	18:30	30	136.5	1 e	1 e	0 e	1 e
5-Aug	19:00	30	137.0	1	2	1	1
5-Aug	19:30	30	137.5	1 e	2 e	1 e	1 e
5-Aug	20:00	30	138.0	1	1	0	2
5-Aug	20:30	30	138.5	1 e	1 e	0 e	2 e
5-Aug	21:00	30	139.0	1	2	1	2
5-Aug	21:30	30	139.5	1 e	2 e	1 e	2 e
5-Aug	22:00	30	140.0	1	1	0	1
5-Aug	22:30	30	140.5	1 e	1 e	0 e	1 e
5-Aug	23:00	30	141.0	1	2	1	1
5-Aug	23:30	30	141.5	1 e	2 e	1 e	1 e
6-Aug	0:00	30	142.0	1	1	0	1
6-Aug	0:30	30	142.5	1 e	1 e	0 e	1 e
6-Aug	1:00	30	143.0	1	1	0	2
6-Aug	1:30	30	143.5	1 e	1 e	0 e	2 e
6-Aug	2:00	30	144.0	1	1	0	1
6-Aug	2:30	30	144.5	1 e	1 e	0 e	1 e
6-Aug	3:00	30	145.0	1	1	0	1
6-Aug	3:30	30	145.5	1 e	1 e	0 e	1 e
6-Aug	4:00	30	146.0	1	1	0	2
6-Aug	4:30	30	146.5	1 e	1 e	0 e	2 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
6-Aug	5:00	30	147.0	1	1	0	2
6-Aug	5:30	30	147.5	1 e	1 e	0 e	2 e
6-Aug	6:00	30	148.0	1	1	0	1
6-Aug	6:30	30	148.5	1 e	1 e	0 e	1 e
6-Aug	7:00	30	149.0	1	2	1	2
6-Aug	7:30	30	149.5	1 e	2 e	1 e	2 e
6-Aug	8:00	30	150.0	1	1	0	1
6-Aug	8:30	30	150.5	1 e	1 e	0 e	1 e
6-Aug	9:00	30	151.0	1	1	0	1
6-Aug	9:30	30	151.5	1 e	1 e	0 e	1 e
6-Aug	10:00	30	152.0	1	1	0	1
6-Aug	10:30	30	152.5	1 e	1 e	0 e	1 e
6-Aug	11:00	30	153.0	1	1	0	1
6-Aug	11:30	30	153.5	1 e	1 e	0 e	1 e
6-Aug	12:00	30	154.0	1	1	0	2
6-Aug	12:30	30	154.5	1 e	1 e	0 e	2 e
6-Aug	13:00	30	155.0	1	1	0	2
6-Aug	13:30	30	155.5	1 e	1 e	0 e	2 e
6-Aug	14:00	30	156.0	1	1	0	1
6-Aug	14:30	30	156.5	1 e	1 e	0 e	1 e
6-Aug	15:00	30	157.0	1	1	0	1
6-Aug	15:30	30	157.5	1 e	1 e	0 e	1 e
6-Aug	16:00	30	158.0	1	1	0	1
6-Aug	16:30	30	158.5	1 e	1 e	0 e	1 e
6-Aug	17:00	30	159.0	1	1	0	1
6-Aug	17:30	30	159.5	1 e	1 e	0 e	1 e
6-Aug	18:00	30	160.0	1	1	0	1
6-Aug	18:30	30	160.5	1 e	1 e	0 e	1 e
6-Aug	19:00	30	161.0	1	1	0	2
6-Aug	19:30	30	161.5	1 e	1 e	0 e	2 e
6-Aug	20:00	30	162.0	1	1	0	2
6-Aug	20:30	30	162.5	1 e	1 e	0 e	2 e
6-Aug	21:00	30	163.0	1	1	0	1
6-Aug	21:30	30	163.5	1 e	1 e	0 e	1 e
6-Aug	22:00	30	164.0	1	1	0	2
6-Aug	22:30	30	164.5	1 e	1 e	0 e	2 e
6-Aug	23:00	30	165.0	1	1	0	1
6-Aug	23:30	30	165.5	1 e	1 e	0 e	1 e
7-Aug	0:00	30	166.0	1	1	0	2
7-Aug	0:30	30	166.5	1 e	1 e	0 e	2 e
7-Aug	1:00	30	167.0	1	1	0	1
7-Aug	1:30	30	167.5	1 e	1 e	0 e	1 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
7-Aug	2:00	30	168.0	1	1	0	1
7-Aug	2:30	30	168.5	1 e	1 e	0 e	1 e
7-Aug	3:00	30	169.0	1	1	0	1
7-Aug	3:30	30	169.5	1 e	1 e	0 e	1 e
7-Aug	4:00	30	170.0	1	1	0	2
7-Aug	4:30	30	170.5	1 e	1 e	0 e	2 e
7-Aug	5:00	30	171.0	1	1	0	1
7-Aug	5:30	30	171.5	1 e	1 e	0 e	1 e
7-Aug	6:00	30	172.0	1	1	0	1
7-Aug	6:30	30	172.5	1 e	1 e	0 e	1 e
7-Aug	7:00	30	173.0	1	1	0	1
7-Aug	7:30	30	173.5	1 e	1 e	0 e	1 e
7-Aug	8:00	30	174.0	1 m	1 m	0 e	1
7-Aug	8:30	30	174.5	1 m	1 m	0 e	1 e
7-Aug	9:00	30	175.0	1	1	0	1
7-Aug	9:30	30	175.5	1 e	1 e	0 e	1 e
7-Aug	10:00	30	176.0	1	2	1	1
7-Aug	10:30	30	176.5	1 e	2 e	1 e	1 e
7-Aug	11:00	30	177.0	1	1	0	1
7-Aug	11:30	30	177.5	1 e	1 e	0 e	1 e
7-Aug	12:00	30	178.0	1	1	0	1
7-Aug	12:30	30	178.5	1 e	1 e	0 e	1 e
7-Aug	13:00	30	179.0	1	2	1	1
7-Aug	13:30	30	179.5	1 e	2 e	1 e	1 e
7-Aug	14:00	30	180.0	1	2	1	1
7-Aug	14:30	30	180.5	1 e	2 e	1 e	1 e
7-Aug	15:00	30	181.0	1	1	0	1
7-Aug	15:30	30	181.5	1 e	1 e	0 e	1 e
7-Aug	16:00	30	182.0	1	1	0	1
7-Aug	16:30	30	182.5	1 e	1 e	0 e	1 e
7-Aug	17:00	30	183.0	1	1	0	1
7-Aug	17:30	30	183.5	1 e	1 e	0 e	1 e
7-Aug	18:00	30	184.0	1	1	0	1
7-Aug	18:30	30	184.5	1 e	1 e	0 e	1 e
7-Aug	19:00	30	185.0	1	1	0	1
7-Aug	19:30	30	185.5	1 e	1 e	0 e	1 e
7-Aug	20:00	30	186.0	1	1	0	1
7-Aug	20:30	30	186.5	1 e	1 e	0 e	1 e
7-Aug	21:00	30	187.0	1	1	0	1
7-Aug	21:30	30	187.5	1 e	1 e	0 e	1 e
7-Aug	22:00	30	188.0	1	1	0	1
7-Aug	22:30	30	188.5	1 e	1 e	0 e	1 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
7-Aug	23:00	30	189.0	1	1	0	1
7-Aug	23:30	30	189.5	1 e	1 e	0 e	1 e
8-Aug	0:00	30	190.0	1	1	0	1
8-Aug	0:30	30	190.5	1 e	1 e	0 e	1 e
8-Aug	1:00	30	191.0	1	1	0	1
8-Aug	1:30	30	191.5	1 e	1 e	0 e	1 e
8-Aug	2:00	30	192.0	1	1	0	1
8-Aug	2:30	30	192.5	1 e	1 e	0 e	1 e
8-Aug	3:00	30	193.0	1	1	0	1
8-Aug	3:30	30	193.5	1 e	1 e	0 e	1 e
8-Aug	4:00	30	194.0	1	1	0	1
8-Aug	4:30	30	194.5	1 e	1 e	0 e	1 e
8-Aug	5:00	30	195.0	1	1	0	1
8-Aug	5:30	30	195.5	1 e	1 e	0 e	1 e
8-Aug	6:00	30	196.0	1	1	0	1
8-Aug	6:30	30	196.5	1 e	1 e	0 e	1 e
8-Aug	7:00	30	197.0	1	1	0	1
8-Aug	7:30	30	197.5	1 e	1 e	0 e	1 e
8-Aug	8:00	30	198.0	1	1	0	1
8-Aug	8:30	30	198.5	1 e	1 e	0 e	1 e
8-Aug	9:00	30	199.0	1	1	0	1
8-Aug	9:30	30	199.5	1 e	1 e	0 e	1 e
8-Aug	10:00	30	200.0	1	1	0	1
8-Aug	10:30	30	200.5	1 e	1 e	0 e	1 e
8-Aug	11:00	30	201.0	1	1	0	1
8-Aug	11:30	30	201.5	1 e	1 e	0 e	1 e
8-Aug	12:00	30	202.0	1	1	0	1
8-Aug	12:30	30	202.5	1 e	1 e	0 e	1 e
8-Aug	13:00	30	203.0	1	1	0	1
8-Aug	13:30	30	203.5	1 e	1 e	0 e	1 e
8-Aug	14:00	30	204.0	1	1	0	1
8-Aug	14:30	30	204.5	1 e	1 e	0 e	1 e
8-Aug	15:00	30	205.0	1	1	0	1
8-Aug	15:30	30	205.5	1 e	1 e	0 e	1 e
8-Aug	16:00	30	206.0	1	1	0	1
8-Aug	16:30	30	206.5	1 e	1 e	0 e	1 e
8-Aug	17:00	30	207.0	1	1	0	1
8-Aug	17:30	30	207.5	1 e	1 e	0 e	1 e
8-Aug	18:00	30	208.0	1	1	0	1
8-Aug	18:30	30	208.5	1 e	1 e	0 e	1 e
8-Aug	19:00	30	209.0	1	1	0	1
8-Aug	19:30	30	209.5	1 e	1 e	0 e	1 e

TABLE C.3 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)			
				Background (NTU)	600 ft Downstream (NTU)	Net (b) (NTU)	At Crossing #8 (NTU)
8-Aug	20:00	30	210.0	1	1	0	1
8-Aug	20:30	30	210.5	1 e	1 e	0 e	1 e
8-Aug	21:00	30	211.0	1	1	0	1
8-Aug	21:30	30	211.5	e	1 e	0 e	1 e
8-Aug	22:00	30	212.0	1	1	0	1
8-Aug	22:30	30	212.5	1 e	1 e	0 e	1 e
8-Aug	23:00	30	213.0	1	1	0	1
8-Aug	23:30	30	213.5	1 e	1 e	0 e	1 e
9-Aug	0:00	30	214.0	1	1	0	1
9-Aug	0:30	30	214.5	1 e	1 e	0 e	1 e
9-Aug	1:00	30	215.0	1	1	0	1
9-Aug	1:30	30	215.5	1 e	1 e	0 e	1 e
9-Aug	2:00	30	216.0	1	1	0	1
9-Aug	2:30	30	216.5	1 e	1 e	0 e	1 e
9-Aug	3:00	30	217.0	1	1	0	1
9-Aug	3:30	30	217.5	1 e	1 e	0 e	1 e
9-Aug	4:00	30	218.0	1	1	0	1
9-Aug	4:30	30	218.5	1 e	1 e	0 e	1 e
9-Aug	5:00	30	219.0	1	1	0	1
9-Aug	5:30	30	219.5	1 e	1 e	0 e	1 e
9-Aug	6:00	30	220.0	1	1	0	1
9-Aug	6:30	30	220.5	1 e	1 e	0 e	1 e
9-Aug	7:00	30	221.0	1	1	0	1
9-Aug	7:30	30	221.5	1 e	1 e	0 e	1 e
9-Aug	8:00	30	222.0	1	1	0	1

(a) m = sample missed/value is extrapolated;

e = measurements from previous samples are extrapolated for graphing purposes only

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity was equal to 0. Also, after upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow-Weighted NTU*hours = 1969

TABLE C.4 Turbidity Generated by Crossing #4

Date	Time Since		Elapsed Time (hours)	Turbidity (a)						
	Time	Last Sample (min.)		Crossing #4 Upstream	Crossing #4 600 ft - Left	Crossing #4 600 ft - Center	Crossing #4 600 ft - Right	NET Flow Weighted (b)	At Crossing #6	At Crossing #8
13-Aug	19:00	30	0.0	1	1 m	1	1	0	1	1
13-Aug	19:30	30	0.5	1	1 m	2	1	0	1 e	1 e
13-Aug	20:00	30	1.0	1	180 m	285	180	224	1	1
13-Aug	20:30	30	1.5	1	140 m	296	140	206	1 e	1 e
13-Aug	21:00	30	2.0	1	220 m	328	220	26 e	1	1
13-Aug	21:30	30	2.5	1	58 m	58 m	58	57	1 e	1 e
13-Aug	22:00	30	3.0	1	145 m	145 m	145	144	1	1
13-Aug	22:30	30	3.5	1	270 m	270 m	270	269	1 e	1 e
13-Aug	23:00	30	4.0	1	60 m	60 m	60	59	1	1
13-Aug	23:30	30	4.5	1	260 m	260 m	260	259	1 e	1 e
14-Aug	0:00	30	5.0	2	390	960	200	573	1	1
14-Aug	0:30	30	5.5	1	672	1060	530	793	1 e	1 e
14-Aug	1:00	30	6.0	1	675	680	400	587	2	1
14-Aug	1:30	30	6.5	1	555	861	500	668	2 e	1 e
14-Aug	2:00	30	7.0	1	510	693	530	595	7	1
14-Aug	2:30	30	7.5	1	630	777	470	641	7 e	1 e
14-Aug	3:00	30	8.0	1	525	504	330	452	28	1
14-Aug	3:30	30	8.5	1	51	945	470	572	28 e	1 e
14-Aug	4:00	30	9.0	1	465	840	500	637	70	1
14-Aug	4:30	30	9.5	1	525	609	370	510	70 e	1 e
14-Aug	5:00	30	10.0	1	390	588	370	468	50	1
14-Aug	5:30	30	10.5	1	384	562	320	439	50 e	1 e
14-Aug	6:00	30	11.0	1	490	546	360	471	85	1
14-Aug	6:30	30	11.5	1	450	504	360	443	85 e	1 e
14-Aug	7:00	30	12.0	1	450	483	350	431	180	1
14-Aug	7:30	30	12.5	1	490	420	360	417	180 e	1 e
14-Aug	8:00	30	13.0	1	304	420	330	362	180	1
14-Aug	8:30	30	13.5	1	360	378	300	347	180 e	1 e
14-Aug	9:00	30	14.0	1	260	400	280	326	220	1
14-Aug	9:30	30	14.5	1	370	315	200	290	220 e	1 e
14-Aug	10:00	30	15.0	1	210	300	240	258	240	7
14-Aug	10:30	30	15.5	1	260	252	185	231	240 e	7 e
14-Aug	11:00	30	16.0	1	190	252	170	209	200	20
14-Aug	11:30	30	16.5	1	176	273	145	207	200 e	20 e
14-Aug	12:00	30	17.0	2	140	195	108	151	200	38
14-Aug	12:30	30	17.5	2	88	136	26	87	200 e	38 e
14-Aug	13:00	30	18.0	2	5	70	15	34	180	55
14-Aug	13:30	30	18.5	3	30	45	9	27	180 e	55 e

TABLE C.4 (Cont.)

Date	Time	Time Since		Turbidity (a)						
		Last Sample	Elapsed Time	Crossing #4	Crossing #4	Crossing #4	Crossing #4	NET Flow	At	At
		(min.)	(hours)	Upstream	600 ft - Left	600 ft - Center	600 ft - Right	Weighted (b)	Crossing #6	Crossing #8
14-Aug	14:00	30	19.0	2	28	45	13	28	160	93
14-Aug	14:30	30	19.5	4	25	30	13	19	160 e	93 e
14-Aug	15:00	30	20.0	3	23	35	12	22	162	122
14-Aug	15:30	30	20.5	2	65	15	10	24	162 e	122 e
14-Aug	16:00	30	21.0	2	13	10	6	7	135	145
14-Aug	16:30	30	21.5	2	13	9	4	6	135 e	145 e
14-Aug	17:00	30	22.0	3	10	5	6	4	103	140
14-Aug	17:30	30	22.5	4	11	6	5	3	103 e	140 e
14-Aug	18:00	30	23.0	4	200	235 m	180	205	78	150
14-Aug	18:30	30	23.5	3	260	235	140	207	78 e	150 e
14-Aug	19:00	30	24.0	2	460	540	440	486	53	138
14-Aug	19:30	30	24.5	2	400	650	300	474	53 e	138 e
14-Aug	20:00	30	25.0	2	260	400	200	299	31	127
14-Aug	20:30	30	25.5	3	260 m	150	200 m	190	31 e	127 e
14-Aug	21:00	30	26.0	1	330	300	190	271	17 e	137
14-Aug	21:30	30	26.5	1	400	180	120	213	17 e	137 e
14-Aug	22:00	30	27.0	1	260	270	200	244	14	97
14-Aug	22:30	30	27.5	1	260	380	300	324	14 e	97 e
14-Aug	23:00	30	28.0	1	430	400	235	353	12	86
14-Aug	23:30	30	28.5	1	540	460	460	479	12 e	86 e
15-Aug	0:00	30	29.0	1	500	640	320	501	22	70
15-Aug	0:30	30	29.5	2	430	560	260	429	22 e	70 e
15-Aug	1:00	30	30.0	1	250	180	125	178	77	60
15-Aug	1:30	30	30.5	1	81	66	47	63	77 e	60 e
15-Aug	2:00	30	31.0	1	46	30	20	30	115	45
15-Aug	2:30	30	31.5	1	33	12	5	14	115 e	45 e
15-Aug	3:00	30	32.0	1	14	6	4	6	136	34
15-Aug	3:30	30	32.5	1	19	12	4	10	136 e	34 e
15-Aug	4:00	30	33.0	1	8	12	3	7	100	17
15-Aug	4:30	30	33.5	1	13	12	6	9	100 e	17 e
15-Aug	5:00	30	34.0	1	12	4	4	5	109	15
15-Aug	5:30	30	34.5	1	9	3	3	3	109 e	15 e
15-Aug	6:00	30	35.0	1	4	3	3	2	150	13
15-Aug	6:30	30	35.5	1	6	3	3	3	150 e	13 e
15-Aug	7:00	30	36.0	1	6	2	2	2	120	20
15-Aug	7:30	30	36.5	1	4	4	3	3	120 e	20 e
15-Aug	8:00	30	37.0	1	4	2	2	1	65	42
15-Aug	8:30	30	37.5	2	2	3	4	1	65 e	42 e

TABLE C.4 (Cont.)

Date	Time	Time Since		Turbidity (a)						
		Last Sample (min.)	Elapsed Time (hours)	Crossing #4 Upstream	Crossing #4 600 ft - Left	Crossing #4 600 ft - Center	Crossing #4 600 ft - Right	NET Flow Weighted (b)	At Crossing #6	At Crossing #8
15-Aug	9:00	30	38.0	4	16	7	6	5	20 e	60
15-Aug	9:30	30	38.5	3	11	4	4	3	20 e	60 e
15-Aug	10:00	30	39.0	4	8	5	4	1	20 e	63
15-Aug	10:30	30	39.5	3	10	4	4	2	20 e	63 e
15-Aug	11:00	30	40.0	3	12	4	4	3	20 e	72
15-Aug	11:30	30	40.5	2	10	3	2	2	20 e	72 e
15-Aug	12:00	30	41.0	1	5	3	2	2	10	77
15-Aug	12:30	30	41.5	1	4	2	1	1	10 e	77 e
15-Aug	13:00	30	42.0	1	4	2	2	1	8	88
15-Aug	13:30	30	42.5	1	4	2	2	1	8 e	88 e
15-Aug	14:00	30	43.0	1	2	2	1	1	9	52
15-Aug	14:30	30	43.5	1	2	1	1	0	9 e	52 e
15-Aug	15:00	30	44.0	1	2	1	1	0	20	38
15-Aug	15:30	30	44.5	2	2	1	1	0	20 e	38 e
15-Aug	16:00	30	45.0	1	2	2 m	1	1	2	27
15-Aug	16:30	30	45.5	2	2	1 m	1	0	2 e	27 e
15-Aug	17:00	30	46.0			2 m		0 f	6	14
15-Aug	17:30	30	46.5			1 m		0 f	6 e	14 e
15-Aug	18:00	30	47.0			1 m		0 f	10	10
15-Aug	18:30	30	47.5			1 m		0 f	10 e	e
15-Aug	19:00	30	48.0			2 m		0 f	7	7
15-Aug	20:00	60	49.0			1 m		0 f	7	7
15-Aug	21:00	60	50.0			1 m		0 f	4	6
15-Aug	22:00	60	51.0			2 m		0 f	8	5
15-Aug	23:00	60	52.0			1 m		0 f	5	5
16-Aug	0:00	60	53.0			1 m		0 f	7	5
16-Aug	1:00	60	54.0			2 m		0 f	4	5
16-Aug	2:00	60	55.0			1 m		0 f	3	11
16-Aug	3:00	60	56.0			2 m		0 f	9	6
16-Aug	4:00	60	57.0			2 m		0 f	3	6
16-Aug	5:00	60	58.0			2 m		0 f	3	6
16-Aug	6:00	60	59.0			1 m		0 f	3	5
16-Aug	7:00	60	60.0			1 m		0 f	2	5
16-Aug	8:00	60	61.0			1 m		0 f	2	5
16-Aug	9:00	60	62.0			1 m		0 f	3	4
16-Aug	10:00	60	63.0			7		0 f	2	4
16-Aug	11:00	60	64.0			6		0 f	2	4
16-Aug	12:00	60	65.0			2		0 f	2 m	5

TABLE C.4 (Cont.)

Date	Time	Time Since		Turbidity (a)				NET Flow Weighted (b)	At Crossing #6	At Crossing #8
		Last Sample (min.)	Elapsed Time (hours)	Crossing #4 Upstream	Crossing #4 600 ft - Left	Crossing #4 600 ft - Center	Crossing #4 600 ft - Right			
16-Aug	13:00	60	66.0			3		0 f	3	4
16-Aug	14:00	60	67.0			3		0 f	3	4
16-Aug	15:00	60	68.0			3		0 f	2	3
16-Aug	16:00	60	69.0			3		0 f	4	4
16-Aug	17:00	60	70.0			3		0 f	3	3
16-Aug	18:00	60	71.0			1		0 f	4	2
16-Aug	19:00	60	72.0			1		0 f	6	2
16-Aug	20:00	60	73.0			2		0 f	6	3
16-Aug	21:00	60	74.0			2		0 f	6	3
16-Aug	22:00	60	75.0			5		0 f	3	2
16-Aug	23:00	60	76.0			3		0 f	3	2
17-Aug	0:00	60	77.0			2		0 f	4	3
17-Aug	1:00	60	78.0			2		0 f	4	2
17-Aug	2:00	60	79.0			2		0 f	7	2
17-Aug	3:00	60	80.0			2		0 f	7	3
17-Aug	4:00	60	81.0			2		0 f	11	2
17-Aug	5:00	60	82.0			3		0 f	4	3
17-Aug	6:00	60	83.0			1		0 f	3	2
17-Aug	7:00	60	84.0			1		0 f	2	2
17-Aug	8:00	60	85.0			2		0 f	3	2
17-Aug	9:00	60	86.0			1		0 f	2	4
17-Aug	10:00	60	87.0			2		0 f	3	3
17-Aug	11:00	60	88.0			2		0 f	2	2
17-Aug	12:00	60	89.0			6		0 f	3	12
17-Aug	13:00	60	90.0			21		0 f	2	3
17-Aug	14:00	60	91.0			22		0 f	2	3
17-Aug	15:00	60	92.0			17		0 f	2	2
17-Aug	16:00	60	93.0			9		0 f	2	2
17-Aug	17:00	60	94.0			6		0 f	2	6
17-Aug	18:00	60	95.0			10		0 f	2	5
17-Aug	19:00	60	96.0			3		0 f	4	10
17-Aug	20:00	60	97.0			2		0 f	9	7
17-Aug	21:00	60	98.0			3		0 f	9	3
17-Aug	22:00	60	99.0			4		0 f	7	3
17-Aug	23:00	60	100.0			1		0 f	6	5
18-Aug	0:00	60	101.0			1		0 f	5	3
18-Aug	1:00	60	102.0			7		0 f	5	2
18-Aug	2:00	60	103.0			3		0 f	3	3

TABLE C.4 (Cont.)

Date	Time	Time Since		Turbidity (a)				NET Flow Weighted (b)	At Crossing #6	At Crossing #8
		Last Sample (min.)	Elapsed Time (hours)	Crossing #4 Upstream	Crossing #4 600 ft - Left	Crossing #4 600 ft - Center	Crossing #4 600 ft - Right			
18-Aug	3:00	60	104.0			1		0 f	2	5
18-Aug	4:00	60	105.0			3		0 f	2	5
18-Aug	5:00	60	106.0			5		0 f	3	6
18-Aug	6:00	60	107.0			5		0 f	2	6
18-Aug	7:00	60	108.0			3		0 f	2	5
18-Aug	8:00	60	109.0			2		0 f	2	4
18-Aug	9:00	60	110.0			3		0 f	2	3
18-Aug	10:00	60	111.0			1		0 f	1	3
18-Aug	11:00	60	112.0			2		0 f	2	2
18-Aug	12:00	60	113.0			1		0 f	2	2
18-Aug	13:00	60	114.0			2		0 f	3	13
18-Aug	14:00	60	115.0			1		0 f	3	10
18-Aug	15:00	60	116.0			1		0 f	4	15
18-Aug	16:00	60	117.0			2		0 f	3	19
18-Aug	17:00	60	118.0			2		0 f	2	4
18-Aug	18:00	60	119.0			2		0 f	2	3
18-Aug	19:00	60	120.0			1		0 f	2	18
18-Aug	20:00	60	121.0			3		0 f	2	15
18-Aug	21:00	60	122.0			5		0 f	2	3
18-Aug	22:00	60	123.0			5		0 f	2	4
18-Aug	23:00	60	124.0			4		0 f	2	10
19-Aug	0:00	60	125.0			6		0 f	2	18
19-Aug	1:00	60	126.0			3		0 f	2	11.5

(a) m = sample missed/value is interpolated;

e = measurements from previous samples are extrapolated for graphing purposes only

f = after the upstream sampler is removed, the NET flow weighted turbidity is assumed to be zero
(for the purposes of calculating the 10 day running average of NET flow weighted turbidity only)

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity was equal to 0.
Also, after upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow Weighted NTU*hrs = 8931

AIM

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Silver Spring, Maryland 20910
301/587-8202

Centimeter

Inches

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TABLE C.5 (Cont.)

Date	Time	Time Since		Turbidity (a)							
		Last Sample	Elapsed Time	Crossing #5	Crossing #5	Crossing #5	Crossing #5	NET Flow	At	At	At
		(min.)	(hours)	Upstream	600 ft - Left	600 ft - Center	600 ft - Right	Weighted (b)	Crossing #4	Crossing #6	Crossing #8
19-Aug	21:00	30	19.0	1	167	310	299	272	2 e	79	74
19-Aug	21:30	30	19.5	5	145	398	342	308	2 e	79 e	74 e
19-Aug	22:00	30	20.0	4	285	254	238	248	2	52	73
19-Aug	22:30	30	20.5	2	231	266	231	238	2 e	52 e	73 e
19-Aug	23:00	30	21.0	3	186	209	182	187	2	306	69
19-Aug	23:30	30	21.5	3	119	58	68	74	2 e	306 e	69 e
20-Aug	0:00	30	22.0	3	72	21	16	27	2	63	72
20-Aug	0:30	30	22.5	3	46	17	16	20	2 e	63 e	72 e
20-Aug	1:00	30	23.0	2	56	11	12	19	2	97	84
20-Aug	1:30	30	23.5	1	34	8	5	11	2 e	97 e	84 e
20-Aug	2:00	30	24.0	3	26	7	4	7	1	100	78
20-Aug	2:30	30	24.5	3	25	8	2	6	1 e	100 e	78 e
20-Aug	3:00	30	25.0	2	23	7	6	8	1	68	73
20-Aug	3:30	30	25.5	3	39	6	3	9	1 e	68 e	73 e
20-Aug	4:00	30	26.0	3	18	16	3	7	1	31	68
20-Aug	4:30	30	26.5	3	15	5	3	3	1 e	31 e	68 e
20-Aug	5:00	30	27.0	2	23	5	4	6	1	18	53
20-Aug	5:30	30	27.5	2	23	4	3	6	1 e	18 e	53 e
20-Aug	6:00	30	28.0	2	17	4	5	5	3	10	36
20-Aug	6:30	30	28.5	2	23	4	3	6	3 e	10 e	36 e
20-Aug	7:00	30	29.0	1	4	2	2	1	2	7	35
20-Aug	7:30	30	29.5	1	2	2	2	1	2 e	7 e	35 e
20-Aug	8:00	30	30.0	2	3	3	2	0	2	9	48
20-Aug	8:30	30	30.5	1	4	2	2	1	2 e	9 e	48 e
20-Aug	9:00	30	31.0	1	6	2	3	2	2	8	67
20-Aug	9:30	30	31.5	2	3	2	4	1	2 e	8 e	67 e
20-Aug	10:00	30	32.0	1	4	3	2	2	1 e	6	54
20-Aug	10:30	30	32.5	3	3	2	3	0	1 e	6 e	54 e
20-Aug	11:00	30	33.0	1	4	2	2	1	1 e	5	69
20-Aug	11:30	30	33.5	2	4	2	5	2	1 e	5 e	69 e
20-Aug	12:00	30	34.0	2	13	2	3	3	1	4	78
20-Aug	12:30	30	34.5	1	5	2	2	2	1 e	4 e	78 e
20-Aug	13:00	30	35.0	3	5	2	2	0	2	6	62
20-Aug	13:30	30	35.5	1	5	2	4	3	2 e	6 e	62 e
20-Aug	14:00	30	36.0	1	2	1	8	4	1	8	31
20-Aug	14:30	30	36.5	2 m	4	1	5	2	1 e	8 e	31 e
20-Aug	15:00	30	37.0	2 m	3	3	1	0	1	5	21
20-Aug	15:30	30	37.5	2 m	2	2	2	0	1 e	5 e	21 e

TABLE C.5 (Cont.)

Date	Time	Time Since		Turbidity (a)							
		Last Sample (min.)	Elapsed Time (hours)	Crossing #5 Upstream	Crossing #5 600 ft - Left	Crossing #5 600 ft - Center	Crossing #5 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #6	At Crossing #8
20-Aug	16:00	30	38.0	2 m	3	2	3	1	1	6	12
20-Aug	16:30	30	38.5			1		0 f	1 e	6 e	12 e
20-Aug	17:00	30	39.0			1		0 f	1	4	10
20-Aug	17:30	30	39.5			1 e		0 f	1 e	4 e	10 e
20-Aug	18:00	30	40.0			2		0 f	1	3	23
20-Aug	18:30	30	40.5			2 e		0 f	1 e	3 e	23 e
20-Aug	19:00	30	41.0			3		0 f	1	3	17
20-Aug	19:30	30	41.5			3 e		0 f	1 e	3 e	17 e
20-Aug	20:00	30	42.0			4		0 f	1	2	10
20-Aug	20:30	30	42.5			4 e		0 f	1 e	2 e	10 e
20-Aug	21:00	30	43.0			3		0 f	1	4	10
20-Aug	21:30	30	43.5			3 e		0 f	1 e	4 e	10 e
20-Aug	22:00	30	44.0			2		0 f	1	3	10
20-Aug	22:30	30	44.5			2 e		0 f	1 e	3 e	10 e
20-Aug	23:00	30	45.0			4		0 f	1	4	8
20-Aug	23:30	30	45.5			4 e		0 f	1 e	4 e	8 e
21-Aug	0:00	30	46.0			2		0 f	1	5	8
21-Aug	0:30	30	46.5			2 e		0 f	1 e	5 e	8 e
21-Aug	1:00	30	47.0			5		0 f	1	5	5

(a) m = sample missed/value is extrapolated;

e = measurement from previous samples are extrapolated for graphing purposes only

f = after the upstream sampler is removed, the NET flow weighted turbidity is assumed to be zero

(for the purposes of calculating the 10 day running average of NET flow weighted turbidity only)

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity

was equal to 0. Also, after the upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow-Weighted NTU*hours = 3663

TABLE C.6 Turbidity Generated by Crossing #7

Date	Time	Time Since		Turbidity (a)									
		Last Sample (min.)	Elapsed Time (hours)	Crossing #7 Upstream	Crossing #7 600 ft - Left	Crossing #7 600 ft - Center	Crossing #7 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #8	
21-Aug	2:00	30	0.0	4 s	4	3	2	0	1	4	4	7	
21-Aug	2:30	30	0.5	4 s	4	2	3	0	1 e	4 e	4 e	7 e	
21-Aug	3:00	30	1.0	3 s	3	2	4	0	1	2	3	5	
21-Aug	3:30	30	1.5	3 s	18	5	5	8	2 e	2 e	3 e	5 e	
21-Aug	4:00	30	2.0	3 s	9	3	3	3	2	3	3	5	
21-Aug	4:30	30	2.5	3 s	9	6	4	4	6 e	3 e	3 e	5 e	
21-Aug	5:00	30	3.0	3 s	7	5	3	3	6	2	3	4	
21-Aug	5:30	30	3.5	3 s	6	3	7	2	1 e	2 e	3 e	4 e	
21-Aug	6:00	30	4.0	3 s	440	26	7	217	1	2	3	6	
21-Aug	6:30	30	4.5	3 s	847	68	4	427	1 e	2 e	3 e	6 e	
21-Aug	7:00	30	5.0	3 s	683	138	9	380	1	1	3	4	
21-Aug	7:30	30	5.5	3 s	858	209	17	493	1 e	1 e	3 e	4 e	
21-Aug	8:00	30	6.0	3 s	819	182	12	463	1	3	3	3	
21-Aug	8:30	30	6.5	3 s	609	160	9	354	1 e	3 e	3 e	3 e	
21-Aug	9:00	30	7.0	2 s	165	94	37	120	1	1	2	5	
21-Aug	9:30	30	7.5	2 s	80	66	38	68	1 e	1 e	2 e	5 e	
21-Aug	10:00	30	8.0	3 s	259	264	179	250	1	1	3	3	
21-Aug	10:30	30	8.5	3 s	441	483	519	464	1 e	1 e	3 e	3 e	
21-Aug	11:00	30	9.0	2 s	420	588	643	512	1	2	2	2	
21-Aug	11:30	30	9.5	2 s	630	651	599	634	1 e	2 e	2 e	2 e	
21-Aug	12:00	30	10.0	1 s	546	767	609	645	1	1	1	24	
21-Aug	12:30	30	10.5	1 s	672	798	672	724	1 e	1 e	1 e	24 e	
21-Aug	13:00	30	11.0	2 s	546	557	630	558	1	1	2	55	
21-Aug	13:30	30	11.5	2 s	441	672	651	558	1 e	1 e	2 e	55 e	
21-Aug	14:00	30	12.0	1 s	536	725	620	623	1	1	1	70	
21-Aug	14:30	30	12.5	1 s	611	685	683	649	1 e	1 e	1 e	70 e	
21-Aug	15:00	30	13.0	1	529	693	523	596	1	1	1	79	
21-Aug	15:30	30	13.5	2	538	628	571	577	1 e	1 e	1 e	79 e	
21-Aug	16:00	30	14.0	1	210	386	402	303	1	1	2	58	
21-Aug	16:30	30	14.5	2	251	266	290	259	1 e	1 e	2 e	58 e	
21-Aug	17:00	30	15.0	1	166	228	288	204	1	1	2	97	
21-Aug	17:30	30	15.5	1	172	174	193	174	1 e	1 e	2 e	97 e	
21-Aug	18:00	30	16.0	1	122	108	116	114	1	1	2	389	
21-Aug	18:30	30	16.5	2	107	73	79	88	1 e	1 e	2 e	389 e	
21-Aug	19:00	30	17.0	2	72	79	31	69	1	1	1	142	
21-Aug	19:30	30	17.5	1	88	79	27	77	1 e	1 e	1 e	142 e	
21-Aug	20:00	30	18.0	2	92	59	29	69	1	1	2	139	
21-Aug	20:30	30	18.5	1	85	28	21	53	1 e	1 e	2 e	139 e	
21-Aug	21:00	30	19.0	1	67	24	18	43	1	1	2	162	
21-Aug	21:30	30	19.5	3	57	22	18	35	1 e	1 e	2 e	162 e	
21-Aug	22:00	30	20.0	1	39	26	15	30	1	2	2	134	
21-Aug	22:30	30	20.5	2	39	18	14	26	1 e	2 e	2 e	134 e	
21-Aug	23:00	30	21.0	1	39	16	12	25	1	1	2	106	
21-Aug	23:30	30	21.5	3	37	14	9	21	1 e	1 e	2 e	106 e	
22-Aug	0:00	30	22.0	2	24	12	8	15	1	2	2	78	

TABLE C.6 (Cont.)

Date	Time	Time Since		Turbidity (a)								
		Last Sample (min.)	Elapsed Time (hours)	Crossing #7 Upstream	Crossing #7 600 ft - Left	Crossing #7 600 ft - Center	Crossing #7 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #8
22-Aug	0:30	30	22.5	2	30	13	9	19	1 e	2 e	2 e	78 e
22-Aug	1:00	30	23.0	1	16	9	8	11	1		2	57
22-Aug	1:30	30	23.5	1	11	9	5	9	1 e	2 e	2 e	57 e
22-Aug	2:00	30	24.0	1	16	5	4	9	1	1	1	45
22-Aug	2:30	30	24.5	1	9	4	2	5	1 e	1 e	1 e	45 e
22-Aug	3:00	30	25.0	1	18	3	2	9	1	1	2	33
22-Aug	3:30	30	25.5	1	14	5	2	8	1 e	1 e	2 e	33 e
22-Aug	4:00	30	26.0	2	28	3	2	13	1	2	2	56
22-Aug	4:30	30	26.5	1	15	4	2	8	1 e	2 e	2 e	56 e
22-Aug	5:00	30	27.0	1	8	3	2	4	1	1	2	29
22-Aug	5:30	30	27.5	1	8	3	1	4	1 e	1 e	2 e	29 e
22-Aug	6:00	30	28.0	2	5	2	2	1	1	1	1	32
22-Aug	6:30	30	28.5	1	9	2	2	4	1 e	1 e	1 e	32 e
22-Aug	7:00	30	29.0	1	5	1	2	2	1	1	1	22
22-Aug	7:30	30	29.5	2	4	2	1	1	1 e	1 e	1 e	22 e
22-Aug	8:00	30	30.0	11 s	4	5	2	0	1	1	1	11
22-Aug	8:30	30	30.5	11 s	26	34	12	17	1 e	1 e	1 e	11 e
22-Aug	9:00	30	31.0	17 s	138	62	31	78	1	2	1	17
22-Aug	9:30	30	31.5	17 s	155	55	34	83	1 e	2 e	1 e	17 e
22-Aug	10:00	30	32.0	12 s	231	48	33	121	1	1	1	12
22-Aug	10:30	30	32.5	12 s	209	132 m	54	148	1 e	1 e	1 e	12 e
22-Aug	11:00	30	33.0	7 s	174	109 m	44	126	1	1	2	7
22-Aug	11:30	30	33.5	7 s	121	77 m	32	86	1 e	1 e	2 e	7 e
22-Aug	12:00	30	34.0	8 s	99	64 m	28	69	1	1	3	8
22-Aug	12:30	30	34.5	8 s	176	110 m	44	126	1 e	1 e	3 e	8 e
22-Aug	13:00	30	35.0	8 s	175	135 m	94	141	2	3	3	8
22-Aug	13:30	30	35.5	8 s	85	74 m	62	70	2 e	3 e	3 e	8 e
22-Aug	14:00	30	36.0	6 s	21	36 m	50	24	1	2	3	6
22-Aug	14:30	30	36.5	6 s	308	177 m	46	219	1 e	2 e	3 e	6 e
22-Aug	15:00	30	37.0	14 s	40	38 m	36	25	1	3	2	14
22-Aug	15:30	30	37.5	14 s	22	24 m	26	9	1 e	3 e	2 e	14 e
22-Aug	16:00	30	38.0	20 s	15	16 m	17	0	1	2	1	20
22-Aug	16:30	30	38.5	20 s	13	10 m	7	0	1 e	2 e	1 e	20 e
22-Aug	17:00	30	39.0	25 s	1189	643 m	97	819	1	2	3	25
22-Aug	17:30	30	39.5	25 s	2452	1438 m	424	1786	1 e	2 e	3 e	25 e
22-Aug	18:00	30	40.0	29 s	3264	2044 m	823	2464	2	1	1	29
22-Aug	18:30	30	40.5	29 s	3078	1917 m	756	2315	2 e	1 e	1 e	29 e
22-Aug	19:00	30	41.0	38 s	3567	2000 m	433	2539	1	1	3	38
22-Aug	19:30	30	41.5	22	1863 m	1632	2093	1768	1 e	1 e	3 e	38 e
22-Aug	20:00	30	42.0	6	839 m	779	899	814	2	3	3	27
22-Aug	20:30	30	42.5	10	450 m	655	244	504	2 e	3 e	3 e	27 e
22-Aug	21:00	30	43.0	12	104 m	126	81	99	1	2	2	18
22-Aug	21:30	30	43.5	51	35 m	35	35	0	1 e	2 e	2 e	18 e
22-Aug	22:00	30	44.0	8	25 m	33	17	20	2	3	2	25
22-Aug	22:30	30	44.5	5	16 m	22	10	13	2 e	3 e	2 e	25 e

TABLE C.6 (Cont.)

Date	Time	Time Since		Turbidity (a)								
		Last Sample	Elapsed Time	Crossing #7	Crossing #7	Crossing #7	Crossing #7	NET Flow	At	At	At	At
		(min.)	(hours)	Upstream	600 ft - Left	600 ft - Center	600 ft - Right	Weighted (b)	Crossing #4	Crossing #5	Crossing #6	Crossing #8
22-Aug	23:00	30	45.0	2	16 m	17	15	14	1	2	2	191
22-Aug	23:30	30	45.5	10	10 m	16	3	2	1 e	2 e	2 e	191 e
23-Aug	0:00	30	46.0	14	9 m	12	6	0	1	2	3	536
23-Aug	0:30	30	46.5	98	11 m	11	11	0	1 e	2 e	3 e	536 e
23-Aug	1:00	30	47.0	10	10 m	13	6	1	1	2	2	741
23-Aug	1:30	30	47.5	10	10 m	12	7	0	1 e	2 e	2 e	741 e
23-Aug	2:00	30	48.0	14	8 m	10	6	0	1	2	2	779
23-Aug	2:30	30	48.5	16	8 m	9	6	0	1 e	2 e	2 e	779 e
23-Aug	3:00	30	49.0	21	6 m	6	6	0	1	2	2	428
23-Aug	3:30	30	49.5	10	6 m	7	5	0	1 e	2 e	2 e	428 e
23-Aug	4:00	30	50.0	14	6 m	5	6	0	1	1	2	363
23-Aug	4:30	30	50.5	7	6 m	8	3	0	1 e	1 e	2 e	363 e
23-Aug	5:00	30	51.0	12	5 m	6	4	0	1	2	1	111
23-Aug	5:30	30	51.5	8	5 m	6	4	0	1 e	2 e	1 e	111 e
23-Aug	6:00	30	52.0	16	5 m	6	4	0	2	1	4	68
23-Aug	6:30	30	52.5	9	4 m	5	3	0	2 e	1 e	4 e	68 e
23-Aug	7:00	30	53.0	9	4 m	5	3	0	1	1	2	47
23-Aug	8:00	60	54.0	stopped	stopped	4	stopped	0 f	1	1	2	47
23-Aug	9:00	60	55.0			4		0 f	1	1	2	39
23-Aug	10:00	60	56.0			4		0 f	2	1	2	16
23-Aug	11:00	60	57.0			3		0 f	2	1	2	14
23-Aug	12:00	60	58.0			4		0 f	1	1	1	11
23-Aug	13:00	60	59.0			3		0 f	1	1	2	13
23-Aug	14:00	60	60.0			4		0 f	1	1	1	8
23-Aug	15:00	60	61.0			4		0 f	2	2	1	9
23-Aug	16:00	60	62.0			4		0 f	2	1	1	9
23-Aug	17:00	60	63.0			3		0 f	2	1	2	8
23-Aug	18:00	60	64.0			3		0 f	2	3	2	9
23-Aug	19:00	60	65.0			3		0 f	1	1	2	7
23-Aug	20:00	60	66.0			3		0 f	1	2	1	7
23-Aug	21:00	60	67.0			18		0 f	1	2	2	7
23-Aug	22:00	60	68.0			3		0 f	2	2	1	8
23-Aug	23:00	60	69.0			3		0 f	2	2	2	77
24-Aug	0:00	60	70.0			2		0 f	1	1	3	8
24-Aug	1:00	60	71.0			4		0 f	2	2	2	8
24-Aug	2:00	60	72.0			3		0 f	2	1	2	8
24-Aug	3:00	60	73.0			5		0 f	1	1	2	7
24-Aug	4:00	60	74.0			3		0 f	1	2	2	6
24-Aug	5:00	60	75.0			2		0 f	1	1	1	5
24-Aug	6:00	60	76.0			2		0 f	1	1	1	5
24-Aug	7:00	60	77.0			2		0 f	1	2	2	6
24-Aug	8:00	60	78.0			1		0 f	1	1	2	4
24-Aug	9:00	60	79.0			1		0 f	49	2	2	5
24-Aug	10:00	60	80.0			1		0 f	3	2 m	1	3
24-Aug	11:00	60	81.0			1		0 f	1	1	1	2

TABLE C.6 (Cont.)

Date	Time	Time Since		Turbidity (a)								
		Last Sample (min.)	Elapsed Time (hours)	Crossing #7 Upstream	Crossing #7 600 ft - Left	Crossing #7 600 ft - Center	Crossing #7 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #8
24-Aug	12:00	60	82.0			1		0 f	1	4	2	2
24-Aug	13:00	60	83.0			1		0 f	1	4	1	1
24-Aug	14:00	60	84.0			5		0 f	1	2	1	4
24-Aug	15:00	60	85.0			4		0 f	1	3	5	11
24-Aug	16:00	60	86.0			3		0 f	1	8	2	37
24-Aug	17:00	60	87.0			4		0 f	1	11	2	67
24-Aug	18:00	60	88.0			4		0 f	1	10	3	13
24-Aug	19:00	60	89.0			3		0 f	1	9	8	4
24-Aug	20:00	60	90.0			4		0 f	1	5	9	7
24-Aug	21:00	60	91.0			7		0 f	1	3	7	4
24-Aug	22:00	60	92.0			9		0 f	1	2	6	4
24-Aug	23:00	60	93.0			8		0 f	1	3	4	5
25-Aug	0:00	60	94.0			8		0 f	1	2	3	5
25-Aug	1:00	60	95.0			5		0 f	1	2	2	5
25-Aug	2:00	60	96.0			4		0 f	1	1	2	5
25-Aug	3:00	60	97.0			2		0 f	1	1	1	6
25-Aug	4:00	60	98.0			4		0 f	1	1	1	8
25-Aug	5:00	60	99.0			2		0 f	1	1	1	8
25-Aug	6:00	60	100.0			1		0 f	1	1	1	7
25-Aug	7:00	60	101.0			1		0 f	1	1	1	7
25-Aug	8:00	60	102.0			3		0 f	2	1	1	6
25-Aug	9:00	60	103.0			5		0 f	1	2	1	36
25-Aug	10:00	60	104.0			4		0 f	1 m	4	4	29
25-Aug	11:00	60	105.0			4		0 f	1	13	2	4
25-Aug	12:00	60	106.0			3		0 f	1	20	5	3
25-Aug	13:00	60	107.0			4		0 f	1	16	3	2
25-Aug	14:00	60	108.0			4		0 f	1	12	4	3
25-Aug	15:00	60	109.0			6		0 f	2	23	8	3
25-Aug	16:00	60	110.0			8		0 f	1	10	12	2
25-Aug	17:00	60	111.0			11		0 f	1	18	13	3
25-Aug	18:00	60	112.0			12		0 f	1	9	22	2

(a) m = sample missed/value is extrapolated;

e = measurement from previous samples are extrapolated for graphing purposes

s = Sampler upstream at 7 tipped over. Sampler at crossing 6 downstream used for this data.

f = after the upstream sampler is removed the NET flow weighted turbidity is assumed to be zero (for the purposes of calculating the 10 day running average of NET flow weighted turbidity only)

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity was equal to 0. Also, after the upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow-Weighted NTU*hours = 12772

TABLE C.7 Turbidity Generated by Crossing #2

Date	Time	Time Since		Turbidity (a)									
		Last Sample (min.)	Elapsed Time (hours)	Crossing #2 Upstream	Crossing #2 600 ft - Left	Crossing #2 600 ft - Center	Crossing #2 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8
25-Aug	19:00	30	0.0	1	358	353	8	175	1	8	13	12	2
25-Aug	19:30	30	0.5	1	490	433	142	298	1 e	8 e	13 e	12 e	2 e
25-Aug	20:00	30	1.0	1	445	355	221	310	1	5	15	13	2
25-Aug	20:30	30	1.5	1	443	416	95	257	1 e	5 e	15 e	13 e	2 e
25-Aug	21:00	30	2.0	1	389	353	160	262	3	6	8	10	3
25-Aug	21:30	30	2.5	1	202	176	64	124	3 e	6 e	8 e	10 e	3 e
25-Aug	22:00	30	3.0	1	139	89	25	69	2	5	7	8	4
25-Aug	22:30	30	3.5	1	70	62	28	46	2 e	5 e	7 e	8 e	4 e
25-Aug	23:00	30	4.0	1	64	50	17	36	2	6	6	9	6
25-Aug	23:30	30	4.5	1	29	23	11	17	2 e	6 e	6 e	9 e	6 e
26-Aug	0:00	30	5.0	1	24	15	7	12	2	5	5	7	10
26-Aug	0:30	30	5.5	1	18	13	5	9	2 e	5 e	5 e	7 e	10 e
26-Aug	1:00	30	6.0	1	18	12	8	11	2	3	4	5	9
26-Aug	1:30	30	6.5	1	18	10	6	9	2 e	3 e	4 e	5 e	9 e
26-Aug	2:00	30	7.0	1	14	9	6	8	2	9	5	5	11
26-Aug	2:30	30	7.5	1	12	9	5	7	2 e	9 e	5 e	5 e	11 e
26-Aug	3:00	30	8.0	1	11	8	5	6	2	5	5	4 m	9
26-Aug	3:30	30	8.5	1	11	8	4	6	2 e	5 e	5 e	4 e	9 e
26-Aug	4:00	30	9.0	1	8	6	9	7	3	7	5	4 m	7
26-Aug	4:30	30	9.5	1	8	8	6	6	3 e	7 e	5 e	4 e	7 e
26-Aug	5:00	30	10.0	1	7	5	5	5	13	11	5	4 m	6
26-Aug	5:30	30	10.5	1	7	5	6	5	13 e	11 e	5 e	4 e	6 e
26-Aug	6:00	30	11.0	1	9	10	7	7	50	5	4	4 m	5
26-Aug	6:30	30	11.5	1	20	11	5	9	50 e	5 e	4 e	4 e	5 e
26-Aug	7:00	30	12.0	1 m	19 m	37 m	58 m	42	84	3	3	4 m	4
26-Aug	7:30	30	12.5	2 m	18 m	63 m	111 m	73	84 e	3 e	3 e	4 e	4 e
26-Aug	8:00	30	13.0	2 m	17 m	89 m	164 m	105	86	12	3	4 m	4
26-Aug	8:30	30	13.5	3 m	16	116	218	137	86 e	12 e	3 e	4 e	4 e
26-Aug	9:00	30	14.0	4 m	42 m	209	226	166	69	3	4	4 m	4
26-Aug	9:30	30	14.5	4	68 m	298	347	254	69 e	3 e	4 e	4 e	4 e
26-Aug	10:00	30	15.0	1	94 m	414	380	305	53	54	6	4 m	3
26-Aug	10:30	30	15.5	1	120 m	422	387	318	53 e	54 e	6 e	4 e	3 e
26-Aug	11:00	30	16.0	1	146 m	420	363	312	33	86	4	4	6 m
26-Aug	11:30	30	16.5	1	149	424	386	326	33 e	86 e	4 e	4 e	6 e
26-Aug	12:00	30	17.0	1	309	475	395	386	19	78	9	4	10
26-Aug	12:30	30	17.5	1	421	565	468	473	19 e	78 e	9 e	4 e	10 e
26-Aug	13:00	30	18.0	1	408	380	305	348	12	55	19	3	10
26-Aug	13:30	30	18.5	1	491	263	190	289	12 e	55 e	19 e	3 e	10 e
26-Aug	14:00	30	19.0	1	443	620	1181	859	9	40	43	6	3

TABLE C.7 (Cont.)

Date	Time	Last Sample Time (min.)	Elapsed Time (hours)	Turbidity (a)									
				Crossing #2 Upstream	Crossing #2 600 ft - Left	Crossing #2 600 ft - Center	Crossing #2 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #8	At Crossing #7	At Crossing #8
26-Aug	14:30	30	19.5	1	559 m	815	788	727	9 e	40 e	43 e	6 e	3 e
26-Aug	15:00	30	20.0	1	676	550	858	744	6	25	53	14	3
26-Aug	15:30	30	20.5	1	672	487	617	606	6 e	25 e	53 e	14 e	3 e
26-Aug	16:00	30	21.0	1	664	315	336	423	5	17	61	27	4
26-Aug	16:30	30	21.5	1	395	174	190	244	5 e	17 e	61 e	27 e	4 e
26-Aug	17:00	30	22.0	1	265	81	81	132	5	10	66	48	3
26-Aug	17:30	30	22.5	1	143	166	235	194	5 e	10 e	66 e	48 e	3 e
26-Aug	18:00	30	23.0	1	508	424	364	416	6	8	47	72	7
26-Aug	18:30	30	23.5	1	739	523	424	532	6 e	8 e	47 e	72 e	7 e
26-Aug	19:00	30	24.0	1	951	659	464	640	8	7	37	78	4
26-Aug	19:30	30	24.5	2	1717	1301	801	1157	8 e	7 e	37 e	78 e	4 e
26-Aug	20:00	30	25.0	3	1783	1336	862	1214	24	5	22	63	10
26-Aug	20:30	30	25.5	2	826	1013	668	780	24 e	5 e	22 e	63 e	10 e
26-Aug	21:00	30	26.0	2	944	408	233	467	66	7	12	33	14
26-Aug	21:30	30	26.5	3	592	644	533	569	66 e	7 e	12 e	33 e	14 e
26-Aug	22:00	30	27.0	2	296	307	250	272	132	7	10	25 m	22
26-Aug	22:30	30	27.5	2	161	81	41	81	132 e	7 e	10 e	25 e	22 e
26-Aug	23:00	30	28.0	2	59	21	17	28	172	13	7	16	30
26-Aug	23:30	30	28.5	2	34	15	9	16	172 e	13 e	7 e	16 e	30 e
27-Aug	0:00	30	29.0	1	26	9	7	12	151	30	6	12	39
27-Aug	0:30	30	29.5	5	54	7	5	14	151 e	30 e	6 e	12 e	39 e
27-Aug	1:00	30	30.0	2	79	10	8	26	180	63	5	9	36
27-Aug	1:30	30	30.5	1	14	6	4	6	180 e	63 e	5 e	9 e	36 e
27-Aug	2:00	30	31.0	1	8	6	4	5	273	112	5	6	37
27-Aug	2:30	30	31.5	3	8	6	3	2	273 e	112 e	5 e	6 e	37 e
27-Aug	3:00	30	32.0	3	7	5	5	2	223	142	10	6	28
27-Aug	3:30	30	32.5	2	7	6	6	4	223 e	142 e	10 e	6 e	28 e
27-Aug	4:00	30	33.0	1	6	4	2	3	193	149	26	6	20
27-Aug	4:30	30	33.5	3	8	4	9	5	193 e	149 e	26 e	6 e	20 e
27-Aug	5:00	30	34.0	1	9	4	3	4	150	185	45	10	16
27-Aug	5:30	30	34.5	1	5	2	3	2	150 e	185 e	45 e	10 e	16 e
27-Aug	6:00	30	35.0	4	9	3	2	0	189	232	65	19	10
27-Aug	6:30	30	35.5	1	6	3	2	2	189 e	232 e	65 e	19 e	10 e
27-Aug	7:00	30	36.0	1	10	3	6	5	230	151	117	33	8
27-Aug	7:30	30	36.5			3 e		0	230 e	151 e	117 e	33 e	8 e
27-Aug	8:00	30	37.0			2 m		0	238	172	152	67	5
27-Aug	8:30	30	37.5			2 e		0	238 e	172 e	152 e	67 e	5 e
27-Aug	9:00	30	38.0			2 m		0	197	172	151	91	6
27-Aug	9:30	30	38.5			2 e		0	197 e	172 e	151 e	91 e	6 e

TABLE C.7 (Cont.)

Date	Time	Time Since		Turbidity (a)										
		Last Sample	Elapsed Time	Crossing #2	Crossing #2	Crossing #2	Crossing #2	NET Flow	At	At	At	At	At	At
		(min.)	(hours)	Upstream	600 ft - Left	600 ft - Center	600 ft - Right	Weighted (b)	Crossing #4	Crossing #5	Crossing #6	Crossing #7	Crossing #8	
27-Aug	10:00	30	39.0			1		0 f	103	174	112	122	7	
27-Aug	10:30	30	39.5			1 e		0 f	103 e	174 e	112 e	122 e	7 e	
27-Aug	11:00	30	40.0			1		0 f	70	143	110	96	10	
27-Aug	11:30	30	40.5			1 e		0 f	70 e	143 e	110 e	96 e	10 e	
27-Aug	12:00	30	41.0			1		0 f	39	120	101	98	18	
27-Aug	12:30	30	41.5			1 e		0 f	39 e	120 e	101 e	98 e	18 e	
27-Aug	13:00	30	42.0			11		0 f	20	95	91	108	32	
27-Aug	13:30	30	42.5			11 e		0 f	20 e	95 e	91 e	108 e	32 e	
27-Aug	14:00	30	43.0			20		0 f	11	86	102	100	45	
27-Aug	14:30	30	43.5			20 e		0 f	11 e	86 e	102 e	100 e	45 e	
27-Aug	15:00	30	44.0			12		0 f	9	54	109	120	61	
27-Aug	15:30	30	44.5			12 e		0 f	9 e	54 e	109 e	120 e	61 e	
27-Aug	16:00	30	45.0			5		0 f	6	29	112	110	68	
27-Aug	16:30	30	45.5			5 e		0 f	6 e	29 e	112 e	110 e	68 e	
27-Aug	17:00	30	46.0			3		0 f	5	20	100	114	78	
27-Aug	17:30	30	46.5			3 e		0 f	5 e	20 e	100 e	114 e	78 e	
27-Aug	18:00	30	47.0			3		0 f	5	11	69	93	89	
27-Aug	18:30	30	47.5			3 e		0 f	5 e	11 e	69 e	93 e	89 e	
27-Aug	19:00	30	48.0			2		0 f	4	8	68	101	91	
27-Aug	19:30	30	48.5			2 e		0 f	4 e	8 e	68 e	101 e	91 e	
27-Aug	20:00	30	49.0			5		0 f	4	7	51	72	83	
27-Aug	20:30	30	49.5			5 e		0 f	4 e	7 e	51 e	72 e	83 e	
27-Aug	21:00	30	50.0			3		0 f	3	6	24	61	86	
27-Aug	21:30	30	50.5			3 e		0 f	3 e	6 e	24 e	61 e	86 e	
27-Aug	22:00	30	51.0			2		0 f	3	5	14	46	84	
27-Aug	22:30	30	51.5			2 e		0 f	3 e	5 e	14 e	46 e	84 e	
27-Aug	23:00	30	52.0			2		0 f	4	6	10	23	89	
27-Aug	23:30	30	52.5			2 e		0 f	4 e	6 e	10 e	23 e	89 e	
28-Aug	0:00	30	53.0			2		0 f	6	4	7	16	86	
28-Aug	0:30	30	53.5			2 e		0 f	6 e	4 e	7 e	16 e	86 e	
28-Aug	1:00	30	54.0			2		0 f	8	4	5	11	83	
28-Aug	1:30	30	54.5			2 e		0 f	8 e	4 e	5 e	11 e	83 e	
28-Aug	2:00	30	55.0			2		0 f	5	4	4	8	72	
28-Aug	2:30	30	55.5			2 e		0 f	5 e	4 e	4 e	8 e	72 e	
28-Aug	3:00	30	56.0			2		0 f	5	5	4	7	53	
28-Aug	3:30	30	56.5			2 e		0 f	5 e	5 e	4 e	7 e	53 e	
28-Aug	4:00	30	57.0			1		0 f	4	6	3	7	41	
28-Aug	4:30	30	57.5			1 e		0 f	4 e	6 e	3 e	7 e	41 e	
28-Aug	5:00	30	58.0			1		0 f	3	6	4	5	32	

TABLE C.7 (Cont.)

Date	Time	Time Since		Turbidity (a)									
		Last Sample (min.)	Elapsed Time (hours)	Crossing #2 Upstream	Crossing #2 600 ft - Left	Crossing #2 600 ft - Center	Crossing #2 600 ft - Right	NET Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8
28-Aug	5:30	30	58.5			1 e		0 f	3 e	6 e	4 e	5 e	32 e
28-Aug	6:00	30	59.0			1		0 f	3	6	4	5	23
28-Aug	6:30	30	59.5			1 e		0 f	3 e	6 e	4 e	5 e	23 e

(a) m = sample missed /value extrapolated

e = measurements from previous samples are extrapolated for graphing purposes only

f = after the upstream sampler is removed, the NET flow weighted turbidity is assumed to be zero
(for purposes of calculating the 10 day average of NET flow weighted turbidity only)

(b) Note: If the upstream turbidity reading was higher than the simultaneous downstream reading, net turbidity was equal to 0. Also, after the upstream sampler was removed, all subsequent net turbidity values were assumed to be zero.

Total Net Downstream Flow-Weighted NTU*hours = 7715

Date	Time	Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)										
				Crossing #1 Upstream	Crossing #1 600 ft - Left	Crossing #1 600 ft - Center	Crossing #1 600 ft - Right	NET Flow Weighted	At Crossing #2	At Crossing #4	At Crossing #5(b)	At Crossing #6(b)	At Crossing #7	At Crossing #8
28-Aug	7:00	30	0.0	2	5	14	6	7	1	4	6	4	5	8
28-Aug	7:30	30	0.5	2	26	4	3	8	1	4	6	4	5	8
28-Aug	8:00	30	1.0	2	47	1	6	15	1	3	5	4	4	8
28-Aug	8:30	30	1.5	2	27	2	9	10	1	3	5	4	4	8
28-Aug	9:00	30	2.0	2	28	3	6	10	11	3	6	6	4	8
28-Aug	9:30	30	2.5	1	18	4	19	12	11	3	6	6	4	8
28-Aug	10:00	30	3.0	2	18	3	5	6	9	3	3	8	6	9
28-Aug	10:30	30	3.5	3	7	5	7	3	9	3	3	8	6	9
28-Aug	11:00	30	4.0	3	23	34	15	21	7	3	3	23	6	7
28-Aug	11:30	30	4.5	3	122	127	56	99	7	3	3	23	6	7
28-Aug	12:00	30	5.0	3	683	402	279	444	9	5	3	15	14	8
28-Aug	12:30	30	5.5	3	716	359	239	425	9	5	3	15	14	8
28-Aug	13:00	30	6.0	2	1283	1027	312	868	12	4	3	7	19	7
28-Aug	13:30	30	6.5	2	2652	1620	830	1673	12	4	3	7	19	7
28-Aug	14:00	30	7.0	2	750	518	119	456	81	3	3	9	13	8
28-Aug	14:30	30	7.5	2	65	140	47	85	81	3	3	9	13	8
28-Aug	15:00	30	8.0	2	37	37	22	30	223	2	2	13	9	7
28-Aug	15:30	30	8.5	2	18	15	14	14	223	2	2	13	9	7
28-Aug	16:00	30	9.0	2	10	10	5	6	298	2	2	11	10	9
28-Aug	16:30	30	9.5	2	8	8	6	5	298	2	2	11	10	9
28-Aug	17:00	30	10.0	2	7	5	15	7	175	2	2	9	16	7
28-Aug	17:30	30	10.5	2	6	117	207	111	175	2	2	9	16	7
28-Aug	18:00	30	11.0	1	424	320	320	351	69	3	2	5	12	9
28-Aug	18:30	30	11.5	2	191	198	211	198	69	3	2	5	12	9
28-Aug	19:00	30	12.0	1	96	88	262	147	24	2	2	4	6	14
28-Aug	19:30	30	12.5	1	17	29	9	18	24	2	2	4	6	14
28-Aug	20:00	30	13.0	3	3	8	9	4	84	2	2	4	6	14
28-Aug	20:30	30	13.5	2	3	4	5	2	84	2	2	4	6	14
28-Aug	21:00	30	14.0	2	2	3	3	1	98	2	2	4	6	14
28-Aug	21:30	30	14.5	2	2	4	5	2	98	2	2	4	6	14
28-Aug	22:00	30	15.0	1	2	3	3	2	43	2	2	4	5	11
28-Aug	22:30	30	15.5	3	2	4	3	0	43	2	2	4	5	11
28-Aug	23:00	30	16.0	1	2	2	3	1	14	3	3	3	4	12
28-Aug	23:30	30	16.5	2	2	4	3	1	14	3	3	3	4	12
29-Aug	0:00	30	17.0	1	3	4	5	3	7	4	2	2	3	11
29-Aug	0:30	30	17.5	3	4	4	5	1	7	4	2	2	3	11
29-Aug	1:00	30	18.0	1	2	3	3	2	4	4	2	2	4	10
29-Aug	1:30	30	18.5	2	4	3	3	1	4	4	2	2	4	10
29-Aug	2:00	30	19.0	2	3	2	4	1	6	5	3	4	5	10
29-Aug	2:30	30	19.5	1	4	2	2	2	6	5	3	4	5	10
29-Aug	3:00	30	20.0	1	4	2	3	2	6	5	3	4	5	10
29-Aug	3:30	30	20.5	1	3	3	2	2	2	5	3	2	3	7
29-Aug	4:00	30	21.0	3	1	2	3	0	2	9	3	3	3	6
29-Aug	4:30	30	21.5	1	1	2	2	1	2	9	3	3	3	6
29-Aug	5:00	30	22.0	1	2	3	3	2	2	23	3	2	3	6

TABLE C.8 (Cont.)

Date	Time	Time Since		Turbidity (a)											
		Last Sample (min.)	Elapsed Time (hours)	Crossing #1 Upstream	Crossing #1 600 ft - Left	Crossing #1 600 ft - Center	Crossing #1 600 ft - Right	NET Flow Weighted	At Crossing #2	At Crossing #4	At Crossing #5(b)	At Crossing #6(b)	At Crossing #7	At Crossing #8	
29-Aug	5:30	30	22.5	1	1	2	2	1	2	23	3	2	3	6	
29-Aug	6:00	30	23.0	1	1	2	2	1	2	44	3	3	3	5	
29-Aug	6:30	30	23.5	2	1	2	1	0	2	44	3	3	3	5	
29-Aug	7:00	30	24.0	1	2	2	4	2	1	57	4	2	4	5	
29-Aug	7:30	30	24.5	1	2	2	3	1	1	57	4	2	4	5	
29-Aug	8:00	30	25.0	1	3	1	1	1	3	58	7	3	3	5	
29-Aug	8:30	30	25.5	1	1	4	4	2	3	58	7	3	3	5	
29-Aug	9:00	30	26.0	1	60	72	61	64	2	56	14	3	47	4	
29-Aug	9:30	30	26.5	1	57	59	24	46	2	56	14	3	47	4	
29-Aug	10:00	30	27.0	1	52	39	19	35	2	40	26	4	11	4	
29-Aug	10:30	30	27.5	2	121	191	78	131	2	40	26	4	11	4	
29-Aug	11:00	30	28.0	1	78	97	27	67	13	221	41	4	8	3	
29-Aug	11:30	30	28.5	1	45	65	40	50	13	221	41	4	8	3	
29-Aug	12:00	30	29.0	1	67	45	32	46	18	166	47	5	5	4	
29-Aug	12:30	30	29.5	1	9	15	6	9	18	166	47	5	5	4	
29-Aug	13:00	30	30.0	1	1	4	5	2	24	116	63	11	5	4	
29-Aug	13:30	30	30.5	1	4	6	8	5	24	116	63	11	5	4	
29-Aug	14:00	30	31.0	2	2	4	7	2	34	41	40	23	10	4	
29-Aug	14:30	30	31.5	1	5	30	58	31	34	41	40	23	10	4	
29-Aug	15:00	30	32.0	2	31	11	11	15	13	23	44	20	8	6	
29-Aug	15:30	30	32.5	2	87	11	76	53	13	23	44	20	8	6	
29-Aug	16:00	30	33.0	1	134	35	222	126	6	21	66	29	18	6	
29-Aug	16:30	30	33.5	2	31	35	172	77	6	21	66	29	18	6	
29-Aug	17:00	30	34.0	2	25	30	29	26	10	20	60	27	21	8	
29-Aug	17:30	30	34.5	1	5	30	5	13	10	20	60	27	21	8	
29-Aug	18:00	30	35.0	1	3	11	7	6	37	12	56	38	27	9	
29-Aug	18:30	30	35.5	1	1	11	9	6	37	12	56	38	27	9	
29-Aug	19:00	30	36.0			5		0 f	31	10	57	39	33	6	
29-Aug	19:30	30	36.5			5		0 f	31	10	57	39	33	6	
29-Aug	20:00	30	37.0			4		0 f	22	4	34	32	30	7	
29-Aug	20:30	30	37.5			4		0 f	22	4	34	32	30	7	
29-Aug	21:00	30	38.0			4		0 f	12	5	18	33	23	6	
29-Aug	21:30	30	38.5			4		0 f	12	5	18	33	23	6	
29-Aug	22:00	30	39.0			3		0 f	6	3	15	25	37	11	
29-Aug	22:30	30	39.5			3		0 f	6	3	15	25	37	11	
29-Aug	23:00	30	40.0			4		0 f	6	3	8	32	36	15	
29-Aug	23:30	30	40.5			4		0 f	6	3	8	32	36	15	
30-Aug	0:00	30	41.0			4		0 f	4	4	7	30	35	20	
30-Aug	0:30	30	41.5			4		0 f	4	4	7	30	35	20	
30-Aug	1:00	30	42.0			3		0 f	2	5	4	28	32	20	
30-Aug	1:30	30	42.5			3		0 f	2	5	4	28	32	20	
30-Aug	2:00	30	43.0			3		0 f	1	9	6	19	31	20	
30-Aug	2:30	30	43.5			3		0 f	1	9	6	19	31	20	
30-Aug	3:00	30	44.0			2		0 f	2	9	5	11	18	24	
30-Aug	3:30	30	44.5			2		0 f	2	9	5	11	18	24	

TABLE C.8 (Cont.)

Date	Time	Time Since		Elapsed Time (hours)	Turbidity (a)										
		Last Sample (min.)			Crossing #1 Upstream	Crossing #1 600 ft - Left	Crossing #1 600 ft - Center	Crossing #1 600 ft - Right	NET Flow Weighted	At Crossing #2	At Crossing #4	At Crossing #5(b)	At Crossing #6(b)	At Crossing #7	At Crossing #8
30-Aug	4:00	30		45.0			2		0 f	2	7	7	8	14	22
30-Aug	4:30	30		45.5			2 e		0 f	2 e	7 e	7 e	8 e	14 e	22 e
30-Aug	5:00	30		46.0			2 m		0 f	1	6	6	7	10	26
30-Aug	5:30	30		46.5			2 e		0 f	1 e	6 e	6 e	7 e	10 e	26 e
30-Aug	6:00	30		47.0			2 m		0 f	3	7	8	5	7	27
30-Aug	6:30	30		47.5			2 e		0 f	3 e	7 e	8 e	5 e	7 e	27 e
30-Aug	7:00	30		48.0			2 m		0 f	3	11	6	4	5	31
30-Aug	7:30	30		48.5			2 e		0 f	3 e	11 e	6 e	4 e	5 e	31 e
30-Aug	8:00	30		49.0			2 m		0 f	2	12	7	4	4	28
30-Aug	8:30	30		49.5			2 e		0 f	2 e	12 e	7 e	4 e	4 e	28 e
30-Aug	9:00	30		50.0			4		0 f	1	11	6	4	4	22
30-Aug	9:30	30		50.5			4 e		0 f	1 e	11 e	6 e	4 e	4 e	22 e
30-Aug	10:00	30		51.0			8		0 f	1	10	8	5	4	18
30-Aug	10:30	30		51.5			8 e		0 f	1 e	10 e	8 e	5 e	4 e	18 e
30-Aug	11:00	30		52.0			13		0 f	1	7	8	5	5	13
30-Aug	11:30	30		52.5			13 e		0 f	1 e	7 e	8 e	5 e	5 e	13 e
30-Aug	12:00	30		53.0			1		0 f	4	8	7	7	5	11
30-Aug	12:30	30		53.5			1 e		0 f	4 e	8 e	7 e	7 e	5 e	11 e
30-Aug	13:00	30		54.0			1		0 f	6	6	7	5	4	10
30-Aug	13:30	30		54.5			1 e		0 f	6 e	6 e	7 e	5 e	4 e	10 e
30-Aug	14:00	30		55.0			12		0 f	1	3	7	7	5	7
30-Aug	14:30	30		55.5			12 e		0 f	1 e	3 e	7 e	7 e	5 e	7 e
30-Aug	15:00	30		56.0			1		0 f	1	3	6	7	5	7
30-Aug	15:30	30		56.5			1 e		0 f	1 e	3 e	6 e	7 e	5 e	7 e
30-Aug	16:00	30		57.0			1		0 f	2	3	4	9	5	6
30-Aug	16:30	30		57.5			1 e		0 f	2 e	3 e	4 e	9 e	5 e	6 e
30-Aug	17:00	30		58.0			1		0 f	1	3	3	9	5	5
30-Aug	17:30	30		58.5			1 e		0 f	1 e	3 e	3 e	9 e	5 e	5 e
30-Aug	18:00	30		59.0			1 m		0 f	4	3	3	6	4	4
30-Aug	18:30	30		59.5			1 e		0 f	4 e	3 e	3 e	6 e	6 e	4 e
30-Aug	19:00	30		60.0			1 m		0 f	2	2	3	7	6	5
30-Aug	19:30	30		60.5			1 e		0 f	2 e	2 e	3 e	7 e	6 e	5 e
30-Aug	20:00	30		61.0			1 m		0 f	3	2	4	6	6	5
30-Aug	20:30	30		61.5			1 e		0 f	3 e	2 e	4 e	6 e	6 e	5 e
30-Aug	21:00	30		62.0			1 m		0 f	3	2	3	5	5	5
30-Aug	21:30	30		62.5			1 e		0 f	3 e	2 e	3 e	5 e	5 e	5 e
30-Aug	22:00	30		63.0			1 m		0 f	4	3	4	3	6	6
30-Aug	22:30	30		63.5			1 e		0 f	4 e	3 e	4 e	3 e	6 e	6 e
30-Aug	23:00	30		64.0			1 m		0 f	2	2	4	6	4	5
30-Aug	23:30	30		64.5			1 e		0 f	2 e	2 e	4 e	6 e	4 e	5 e
31-Aug	0:00	30		65.0			1 m		0 f	3	2	3	3	5	5
31-Aug	0:30	30		65.5			1 e		0 f	3 e	2 e	3 e	3 e	5 e	5 e
31-Aug	1:00	30		66.0			1 m		0 f	3	2	2	3	3	6
31-Aug	1:30	30		66.5			1 e		0 f	3 e	2 e	2 e	3 e	3 e	6 e
31-Aug	2:00	30		67.0			1 m		0 f	2	2	3	3	3	7

TABLE C.8 (Cont.)

Date	Time	Time Since		Elapsed Time (hours)	Turbidity (a)									
		Crossing #1 Upstream	Crossing #1 600 ft - Left		Crossing #1 600 ft - Center	Crossing #1 600 ft - Right	NET Flow Weighted	At Crossing #2	At Crossing #4	At Crossing #5(b)	At Crossing #6(b)	At Crossing #7	At Crossing #8	
31-Aug	2:30	30	67.5			1 e		0 f	2 e	2 e	3 e	3 e	3 e	7 e
31-Aug	3:00	30	68.0			1 m		0 f	3	2	4	5	3	5
31-Aug	3:30	30	68.5			1 e		0 f	3 e	2 e	4 e	5 e	3 e	5 e
31-Aug	4:00	30	69.0			1 m		0 f	3	4	2	4	3	5
31-Aug	4:30	30	69.5			1 e		0 f	3 e	4 e	2 e	4 e	3 e	5 e
31-Aug	5:00	30	70.0			1 m		0 f	3	2	2	5	3	8
31-Aug	5:30	30	70.5			1 e		0 f	3 e	2 e	2 e	5 e	3 e	8 e
31-Aug	6:00	30	71.0			1 m		0 f	2	2	3	2	2	6
31-Aug	6:30	30	71.5			1 e		0 f	2 e	2 e	3 e	2 e	2 e	6 e
31-Aug	7:00	30	72.0			1 m		0 f	1	2	2	4	2	7
31-Aug	7:30	30	72.5			1 e		0 f	1 e	2 e	2 e	4 e	2 e	7 e
31-Aug	8:00	30	73.0			1 m		0 f	2	1	3	3	3	7
31-Aug	8:30	30	73.5			1 e		0 f	2 e	1 e	3 e	3 e	3 e	7 e
31-Aug	9:00	30	74.0			1 m		0 f	11	2	2	10	2	8
31-Aug	9:30	30	74.5			1 e		0 f	11 e	2 e	2 e	10 e	2 e	8 e
31-Aug	10:00	30	75.0			1 m		0 f	6	2	2	14	7	5
31-Aug	10:30	30	75.5			1 e		0 f	6 e	2 e	2 e	14 e	7	5 e
31-Aug	11:00	30	76.0			1 m		0 f	4	3	1	9	26	4
31-Aug	11:30	30	76.5			1 e		0 f	4 e	3 e	1 e	9 e	26	4 e
31-Aug	12:00	30	77.0			1 m		0 f	2	15	2	13	20	3
31-Aug	12:30	30	77.5			1 e		0 f	2 e	15 e	2 e	13 e	20	3 e
31-Aug	13:00	30	78.0			1 m		0 f	2	13	2	23	14	3
31-Aug	13:30	30	78.5			1 e		0 f	2 e	13 e	2 e	23 e	14	3 e
31-Aug	14:00	30	79.0			1 m		0 f	2	4	2	9	22	3
31-Aug	14:30	30	79.5			1 e		0 f	2 e	4 e	2 e	9 e	22	3 e
31-Aug	15:00	30	80.0			1 m		0 f	2	3	2	7	26	4
31-Aug	15:30	30	80.5			1 e		0 f	2 e	3 e	2 e	7 e	26	4 e
31-Aug	16:00	30	81.0			1 m		0 f	2	3	7	5	26	4
31-Aug	16:30	30	81.5			1 e		0 f	2 e	3 e	7 e	5 e	26	4 e

(a) m = sample missed/value extrapolated;

e = measurements from previous samples are extrapolated for graphing purposes only

f = after the upstream sampler is removed, the NET flow weighted turbidity is assumed to be zero

(for the purposes of calculating the 10 day running average of NET flow weighted turbidity only)

(b) NOTE: a pulse from something between 5 & 6 was removed for analysis of plume from crossing #1. Values moved to "e" column.

Total Net Downstream Flow-Weighted NTU*hours = 2938

TABLE C.9 Turbidity Generated by Crossing #3

Time Since			Turbidity (a)											
Date	Time	Elapsed Time (hours)	Crossing #3		Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right	Net Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8	
			US-Left	US-Right										
31-Aug	17:00	30	0.0	3	m	101	182	19	108	3	4	5	17	7
31-Aug	17:30	30	0.5	2	2	433	704	161	464	3	4	5	17	7
31-Aug	18:00	30	1.0	2	2	773	1408	138	850	3	3	5	13	10
31-Aug	18:30	30	1.5	2	2	707	1267	146	775	3	3	5	13	10
31-Aug	19:00	30	2.0	1	1	565	1017	113	621	99	2	4	8	10
31-Aug	19:30	30	2.5	2	2	279	512	45	306	99	2	4	8	10
31-Aug	20:00	30	3.0	3	3	87	146	28	91	243	2	4	6	11
31-Aug	20:30	30	3.5	3	3	235	304	165	240	243	2	4	6	11
31-Aug	21:00	30	4.0	2	2	212	249	174	214	151	3	5	7	12
31-Aug	21:30	30	4.5	2	2	196	224	167	197	151	3	5	7	12
31-Aug	22:00	30	5.0	2	2	282	347	176	270	127	38	6	6	12
31-Aug	22:30	30	5.5	2	2	108	133	83	109	127	38	6	6	12
31-Aug	23:00	30	6.0	3	3	77	112	41	78	163	107	4	6	12
31-Aug	23:30	30	6.5	2	2	52	70	33	52	163	107	4	6	12
1-Sep	0:00	30	7.0	2	2	37	51	22	38	186	97	4	4	13
1-Sep	0:30	30	7.5	2	2	32	46	17	31	186	97	4	4	13
1-Sep	1:00	30	8.0	2	2	28	34	21	26	73	67	3	5	11
1-Sep	1:30	30	8.5	5	5	28	27	29	23	73	67	3	5	11
1-Sep	2:00	30	9.0	2	2	17	21	13	16	41	88	3	4	10
1-Sep	2:30	30	9.5	2	2	12	5	18	9	41	88	3	4	10
1-Sep	3:00	30	10.0	2	2	9	8	9	6	23	89	14	3	9
1-Sep	3:30	30	10.5	2	2	6	5	6	3	23	89	14	3	9
1-Sep	4:00	30	11.0	4	4	4	3	4	0	12	72	44	7	6
1-Sep	4:30	30	11.5	2	2	3	3	3	1	12	72	44	7	6
1-Sep	5:00	30	12.0	2	2	3	3	3	1	6	46	54	27	5
1-Sep	5:30	30	12.5	2	2	3	3	3	1	6	46	54	27	5
1-Sep	6:00	30	13.0	2	2	3	3	3	1	4	25	56	46	8
1-Sep	6:30	30	13.5	2	2	55	5	16	21	4	25	56	46	8
1-Sep	7:00	30	14.0	2	2	57	33	64	47	4	15	68	62	5
1-Sep	7:30	30	14.5	2	2	95	64	69	72	4	15	68	62	5
1-Sep	8:00	30	15.0	1	2	97	133	68	102	7	9	52	61	5
1-Sep	8:30	30	15.5	2	2	269	307	127	241	7	9	52	61	5
1-Sep	9:00	30	16.0	1	2	571	294	464	422	73	9	233	66	3
1-Sep	9:30	30	16.5	2	2	903	326	720	605	73	9	233	66	3
1-Sep	10:00	30	17.0	1	2	1019	643	703	767	110	42	40	103	3
1-Sep	10:30	30	17.5	2	1	1037	653	494	715	110	42	40	103	3
1-Sep	11:00	30	18.0	1	1	810	1226	211	807	445	23	27	44	11
1-Sep	11:30	30	18.5	1	4	731	1200	147	753	445	23	27	44	11
1-Sep	12:00	30	19.0	1	1	479	342	90	306	626	15	18	26	13
1-Sep	12:30	30	19.5	1	2	877	403	76	442	626	15	18	26	13
1-Sep	13:00	30	20.0	2	2	912	445	65	465	399	10	10	19	21
1-Sep	13:30	30	20.5	1	2	947	494	91	504	399	10	10	19	21
1-Sep	14:00	30	21.0	1	1	987	498	89	517	326	7	7	12	33
1-Sep	14:30	30	21.5	1	2	902	418	100	462	326	7	7	12	33
1-Sep	15:00	30	22.0	1	1	665	294	98	342	393	4	5	8	30

TABLE C.9 (Cont.)

Date	Time	Time Since		Elapsed Time (hours)	Turbidity (a)					Net Flow Weighted (b)	At				
		Test Sample (min.)			Crossing #3 US-Left	Crossing #3 US-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right		Crossing #4	Crossing #5	Crossing #6	Crossing #7	Crossing #8
1-Sep	15:30	30		22.5	1	1	578	380	79	347	393 e	4 e	5 e	8 e	30 e
1-Sep	16:00	30		23.0	1	1	1051	1148	878	1040	317	4	6	6	34
1-Sep	16:30	30		23.5	1	1	891	968	1086	980	317 e	4 e	6 e	6 e	34 e
1-Sep	17:00	30		24.0	1	1	663	683	580	646	318	6	16	6	33
1-Sep	17:30	30		24.5	1	1	440	563	418	484	318 e	6 e	16 e	6 e	33 e
1-Sep	18:00	30		25.0	1	1	390	340	117	288	859	11	34	8	30
1-Sep	18:30	30		25.5	1	2	118	91	37	81	859 e	11 e	34 e	8 e	30 e
1-Sep	19:00	30		26.0	2	1	74	50	26	48	708	30	90	14	23
1-Sep	19:30	30		26.5	1	2	163	122	23	103	708 e	30 e	90 e	14 e	23 e
1-Sep	20:00	30		27.0	1	1	143	119	26	98	311	289	136	34	16
1-Sep	20:30	30		27.5	1	1	214	149	23	130	311 e	289 e	136 e	34 e	16 e
1-Sep	21:00	30		28.0	1	1	242	238	33	178	146	246	195	77	13
1-Sep	21:30	30		28.5	1	1	158	102	27	95	146 e	246 e	195 e	77 e	13 e
1-Sep	22:00	30		29.0	1	1	98	64	26	62	125	253	182	169	10
1-Sep	22:30	30		29.5	1	1	61	49	25	44	125 e	253 e	182 e	169 e	10 e
1-Sep	23:00	30		30.0	2	2	61	39	24	39	118	398	173	172	7
1-Sep	23:30	30		30.5	1	2	54	39	22	37	118 e	398 e	173 e	172 e	7 e
2-Sep	0:00	30		31.0	2	1	51	35	22	34	70	263	165	151	5
2-Sep	0:30	30		31.5	1	2	56	48	20	41	70 e	263 e	165 e	151 e	5 e
2-Sep	1:00	30		32.0	1	1	38	32	20	29	56	196	171	206	6
2-Sep	1:30	30		32.5	1	1	35	28	16	25	56 e	196 e	171 e	206 e	6 e
2-Sep	2:00	30		33.0	2	2	54	24	20	29	48	111	235	197	9
2-Sep	2:30	30		33.5	2	1	45	29	20	29	48 e	111 e	235 e	197 e	9 e
2-Sep	3:00	30		34.0	2	1	40	21	14	23	33	117	249	261	18
2-Sep	3:30	30		34.5	1	2	31	19	16	20	33 e	117 e	249 e	261 e	18 e
2-Sep	4:00	30		35.0	2	1	32	20	17	21	26	61	211	298	43
2-Sep	4:30	30		35.5	2	2	32	18	14	19	26 e	61 e	211 e	298 e	43 e
2-Sep	5:00	30		36.0	1	1	27	19	12	18	33	49	134	293	63
2-Sep	5:30	30		36.5	1	2	27	18	11	17	33 e	49 e	134 e	283 e	63 e
2-Sep	6:00	30		37.0	1	1	23	13	17	16	24	39	94	221	91
2-Sep	6:30	30		37.5	1 m	1 m	20 m	11 m	15 m	14	24 e	39 e	94 e	221 e	91 e
2-Sep	7:00	30		38.0	1	1 m	17 m	10 m	13 m	12	29	30	79	29	99
2-Sep	7:30	30		38.5	1	1 m	15	9	12	11	29 e	30 e	79 e	29 e	99 e
2-Sep	8:00	30		39.0	1	1 m	11	8	11	9	19	28	29	90	100
2-Sep	8:30	30		39.5	1	1 m	11	7	12	9	19 e	28 e	29 e	90 e	100 e
2-Sep	9:00	30		40.0	1	1 m	17	23	10	16	14 m	25	42	65	110
2-Sep	9:30	30		40.5	2	1 m	51	49	15	38	14 e	25 e	42 e	65 e	110 e
2-Sep	10:00	30		41.0	1	1 m	80	62	23	55	9	21	34	50	184
2-Sep	10:30	30		41.5	1	1 m	81	67	28	59	9 e	21 e	34 e	50 e	184 e
2-Sep	11:00	30		42.0	1	1 m	71	79	30	61	16	22	28	47	177
2-Sep	11:30	30		42.5	2	1 m	73	58	35	54	16 e	22 e	28 e	47 e	177 e
2-Sep	12:00	30		43.0	2	1 m	74	83	37	65	45	21	22	59	211
2-Sep	12:30	30		43.5	1	1 m	84	52	38	56	45 e	21 e	22 e	59 e	211 e
2-Sep	13:00	30		44.0	1	1 m	62	50	31	47	58	12	19	27	188
2-Sep	13:30	30		44.5	1	1 m	63	48	34	47	58 e	12 e	19 e	27 e	188 e

TABLE C.9 (Cont.)

Date	Time	Time Since		Elapsed Time (hours)	Turbidity (a)					Net Flow Weighted (b)	At				
		Last Sample (min.)			Crossing #3 US.-Left	Crossing #3 US.-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right		Crossing #4	Crossing #5	Crossing #6	Crossing #7	Crossing #8
2-Sep	14:00	30		45.0	2	1 m	56	48	33	44	52	14	17	22	121
2-Sep	14:30	30		45.5	2	1 m	40	40	32	36	52 e	14 e	17 e	22 e	121 e
2-Sep	15:00	30		46.0	2	1 m	179	254	186	211	48	27	16	28	89
2-Sep	15:30	30		46.5	1	1 m	95	228	117	156	48 e	27 e	16 e	28 e	89 e
2-Sep	16:00	30		47.0	2	1 m	67	155	118	117	45	27	14	18	67
2-Sep	16:30	30		47.5	1	1 m	45	99	99	82	45 e	27 e	14 e	18 e	67 e
2-Sep	17:00	30		48.0	1	1 m	78	65	74	70	296	34	11	17	49
2-Sep	17:30	30		48.5	1	1 m	17	28	57	32	296 e	34 e	11 e	17 e	49 e
2-Sep	18:00	30		49.0	1	1 m	12	28	45	27	206	46	11	13	42
2-Sep	18:30	30		49.5	2	1 m	11	22	26	19	206 e	46 e	11 e	13 e	42 e
2-Sep	19:00	30		50.0	1	2	9	352	38	160	415	36	12	14	33
2-Sep	19:30	30		50.5	2	1	9	76	35	43	415 e	36 e	12 e	14 e	33 e
2-Sep	20:00	30		51.0	2	1	8	28	25	19	50	56	15	15	27
2-Sep	20:30	30		51.5	1	1	7	112	12	54	50 e	56 e	15 e	15 e	27 e
2-Sep	21:00	30		52.0	2	3	7	53	21	28	31	110	19	15	26
2-Sep	21:30	30		52.5	1	2	7	56	22	30	31 e	110 e	19 e	15 e	26 e
2-Sep	22:00	30		53.0	1	1	4	104	16	48	24	108	22	20	18
2-Sep	22:30	30		53.5	1	2	6	15	18	12	24 e	108 e	22 e	20 e	18 e
2-Sep	23:00	30		54.0	1	2	5	26	14	15	16	77	26	25	31
2-Sep	23:30	30		54.5	1	2	5	7	12	6	16 e	7 e	26 e	25 e	31 e
3-Sep	0:00	30		55.0	1	2	4	34	12	17	15	51	30	33	14
3-Sep	0:30	30		55.5	1	2	5	7	10	6	15 e	51 e	30 e	33 e	14 e
3-Sep	1:00	30		56.0	2	2	4	110	8	48	14	38	50	38	16
3-Sep	1:30	30		56.5	2	2	5	100	7	43	14 e	38 e	50 e	38 e	16 e
3-Sep	2:00	30		57.0	1	2	4	39	9	19	7	25	49	40	14
3-Sep	2:30	30		57.5	2	2	4	39	8	18	7 e	25 e	49 e	40 e	14 e
3-Sep	3:00	30		58.0	2	2	4	11	7	6	12	18	44	55	11
3-Sep	3:30	30		58.5	2	2	4	21	9	11	12 e	18 e	44 e	55 e	11 e
3-Sep	4:00	30		59.0	1	2	3	25	7	12	12	17	37	60	15
3-Sep	4:30	30		59.5	2	2	4	26	6	12	12 e	17 e	37 e	60 e	15 e
3-Sep	5:00	30		60.0	2	2	4	47	7	21	11	18	29	78	17
3-Sep	5:30	30		60.5	4	3	5	24	7	10	11 e	18 e	29 e	78 e	17 e
3-Sep	6:00	30		61.0	5	5	5	77	7	31	4	16	19	41	38
3-Sep	6:30	30		61.5	6	6	6 m	76	7	30	4 e	16 e	19 e	41 e	38 e
3-Sep	7:00	30		62.0	7	6 m	7 m	35 m	8 m	13	6	15	28		23
3-Sep	7:30	30		62.5	7	7	8	8	10 m	2	6 e	12 e	15 e	28 e	23 e
3-Sep	8:00	30		63.0	7	5	9	9	11	4	5	7	12	19	25
3-Sep	8:30	30		63.5	6	5	8	10	20	7	5 e	7 e	12 e	19 e	25 e
3-Sep	9:00	30		64.0	4	7	13	37	78	37	7	6	13	18	24
3-Sep	9:30	30		64.5	4	6	25	49	81	47	7 e	6 e	13 e	18 e	24 e
3-Sep	10:00	30		65.0	4	6	25	37	62	36	8	7	10	14	27
3-Sep	10:30	30		65.5	3	3	18	29	38	25	8 e	7 e	10 e	14 e	27 e
3-Sep	11:00	30		66.0	3	5	15	32	63	32	36	5	15	12	30
3-Sep	11:30	30		66.5	2	3	18	36	59	35	36 e	5 e	15 e	12 e	30 e
3-Sep	12:00	30		67.0	2	3	20	51	60	42	42	6	7	9	27

TABLE C.9 (Cont.)

Date	Time	Time Since		Turbidity (a)					Net Flow Weighted (b)	At				
		Last Sample (min.)	Elapsed Time (hours)	Crossing #3 US.-Left	Crossing #3 US.-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right		Crossing #4	Crossing #5	Crossing #6	Crossing #7	Crossing #8
3-Sep	12:30	30	67.5	2	2	23	46	40	36	42 e	6 e	7 e	9 e	27 e
3-Sep	13:00	30	68.0	1	2	28	65	39	45	43	7	10	9	22
3-Sep	13:30	30	68.5	1	2	31	42	26	33	43 e	7 e	10 e	9 e	22 e
3-Sep	14:00	30	69.0	1	2	25	35	11	24	45	20	8	7	26
3-Sep	14:30	30	69.5	1	3	48	77	16	49	45 e	20 e	8 e	7 e	26 e
3-Sep	15:00	30	70.0	1	4	66	149	11	82	33	25	8	7	20
3-Sep	15:30	30	70.5	2	1	59	107	67	80	33 e	25 e	8 e	7 e	20 e
3-Sep	16:00	30	71.0	1	4	56	265	370	233	31	28	15	6	18
3-Sep	16:30	30	71.5	1	2	102	292	361	256	31 e	28 e	15 e	6 e	18 e
3-Sep	17:00	30	72.0	1	4	139	389	347	302	50	30	7	7	10
3-Sep	17:30	30	72.5	1	1	193	275	62	188	50 e	30 e	7 e	7 e	10 e
3-Sep	18:00	30	73.0	1	1	187	170	42	136	292	32	8	7	16
3-Sep	18:30	30	73.5	1	1	149	141	29	109	292 e	32 e	8 e	7 e	16 e
3-Sep	19:00	30	74.0	2	3	0 m	81	21	79 c	223	30	11	7	12
3-Sep	19:30	30	74.5	2 e	3 e	0 m	81 e	0 m	79 c	223 e	30 e	11 e	7 e	12 e
3-Sep	20:00	30	75.0	3	3	0 m	28	0 m	25 c	110	23	15	11	9
3-Sep	20:30	30	75.5	3 e	3 e	0 m	28 e	0 m	25 c	110 e	23 e	15 e	11 e	9 e
3-Sep	21:00	30	76.0	2	3	0 m	21	0 m	19 c	48	51	19	14	4
3-Sep	21:30	30	76.5	2 e	3 e	0 m	21 e	0 m	19 c	48 e	51 e	19 e	14 e	4 e
3-Sep	22:00	30	77.0	3	3	0 m	17	0 m	14 c	32	160	19	18	5
3-Sep	22:30	30	77.5	3 e	3 e	0 m	17 e	0 m	14 c	32 e	160 e	19 e	18 e	5 e
3-Sep	23:00	30	78.0	4	4	0 m	13	0 m	9 c	23	174	23	22	6
3-Sep	23:30	30	78.5	4 e	4 e	0 m	13 e	0 m	9 c	23 e	174 e	23 e	22 e	6 e
4-Sep	0:00	30	79.0	7	7	0 m	12	0 m	5 c	22	132	19	22	5
4-Sep	0:30	30	79.5	7 e	7 e	0 m	12 e	0 m	5 c	22 e	132 e	19 e	22 e	5 e
4-Sep	1:00	30	80.0	10	11	0 m	18	0 m	8 c	20	55	24	21	6
4-Sep	1:30	30	80.5	10 e	11 e	0 m	18 e	0 m	8 c	20 e	55 e	24 e	21 e	6 e
4-Sep	2:00	30	81.0	14	16	0 m	15	0 m	0 c	18	36	55	22	9
4-Sep	2:30	30	81.5	14 e	16 e	0 m	15 e	0 m	0 c	18 e	36 e	55 e	22 e	9 e
4-Sep	3:00	30	82.0	21	21	0 m	20	0 m	0 c	19	26	56	34	6
4-Sep	3:30	30	82.5	21 e	21 e	0 m	20 e	0 m	0 c	19 e	26 e	56 e	34 e	6 e
4-Sep	4:00	30	83.0	13	23	0 m	23	0 m	5 c	19	19	62	55	9
4-Sep	4:30	30	83.5	13 e	23 e	0 m	23 e	0 m	5 c	19 e	19 e	62 e	55 e	9 e
4-Sep	5:00	30	84.0	14	19	0 m	22	0 m	6 c	24	15	24	71	12
4-Sep	5:30	30	84.5	14 e	19 e	0 m	22 e	0 m	6 c	24 e	15 e	24 e	71 e	12 e
4-Sep	6:00	30	85.0	10	12	0 m	13	0 m	2 c	22	15	30	56	13
4-Sep	6:30	30	85.5	10 e	12 e	0 m	13 e	0 m	2 c	22 e	15 e	30 e	56 e	13 e
4-Sep	7:00	30	86.0	5	8	0 m	10	0 m	4 c	21	14	22	39	18
4-Sep	7:30	30	86.5	5 e	8 e	0 m	10 e	0 m	4 c	21 e	14 e	22 e	39 e	18 e
4-Sep	8:00	30	87.0	4	8	0 m	7	0 m	1 c	14	13	17	29	11
4-Sep	8:30	30	87.5	4 e	8 e	0 m	7 e	0 m	1 c	14 e	13 e	17 e	29 e	11 e
4-Sep	9:00	30	88.0	3	5	0 m	5	0 m	1 c	9	19	14 m	20	11
4-Sep	9:30	30	88.5	3 e	5 e	0 m	5 e	0 m	1 c	9 e	19 e	14 e	20 e	11 e
4-Sep	10:00	30	89.0	2	5	0 m	12	0 m	9 c	16	19	10	14	31
4-Sep	10:30	30	89.5	2 e	5 e	0 m	12 e	0 m	9 c	16 e	19 e	10 e	14 e	31 e

TABLE C.9 (Cont.)

Date	Time	Time Since		Turbidity (a)					Net Flow Weighted (b)	At				
		Last Sample (min.)	Elapsed Time (hours)	Crossing #3 US.-Left	Crossing #3 US.-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right		Crossing #4	Crossing #5	Crossing #6	Crossing #7	Crossing #8
4-Sep	11:00	30	90.0	2	3	0 m	12	0 m	10 c	10	19	15	11	28
4-Sep	11:30	30	90.5	2 e	3 e	0 m	12 e	0 m	10 c	10 e	19 e	15 e	11 e	28 e
4-Sep	12:00	30	91.0	2	3	0 m	10	0 m	8 c	13	13	11	10	31
4-Sep	12:30	30	91.5	2 e	3 e	0 m	10 e	0 m	8 c	13 e	13 e	11 e	10 e	31 e
4-Sep	13:00	30	92.0	2	3	0 m	39	0 m	37 c	12	13	10	10	30
4-Sep	13:30	30	92.5	2 e	3 e	0 m	39 e	0 m	37 c	12 e	13 e	10 e	10 e	30 e
4-Sep	14:00	30	93.0	3	4	0 m	21	0 m	18 c	12	10	19	11	35
4-Sep	14:30	30	93.5	3 e	4 e	0 m	21 e	0 m	18 c	12 e	10 e	19 e	11 e	35 e
4-Sep	15:00	30	94.0	3	3	514	1392	611	907	21	9	17	13	27
4-Sep	15:30	30	94.5	3 e	3 e	514 e	1043	384	694	21 e	9 e	17 e	13 e	27 e
4-Sep	16:00	30	95.0	2	3	536	642	347	522	286	11	15	13	23
4-Sep	16:30	30	95.5	2 e	3 e	536 e	359	250	375	286 e	11 e	15 e	13 e	23 e
4-Sep	17:00	30	96.0	2	4	319	210	94	204	785	8	9	14	20
4-Sep	17:30	30	96.5	2 e	4 e	319 e	118	80	162	785 e	8 e	9 e	14 e	20 e
4-Sep	18:00	30	97.0	4	4	140	54	67	79	479	13	10	10	18
4-Sep	18:30	30	97.5	4 e	4 e	140 e	42	59	71	479 e	13 e	10 e	10 e	18 e
4-Sep	19:00	30	98.0	4 m	4 m	40	26	44	31	150	28	9	12	14
4-Sep	19:30	30	98.5	4 m	4 m	25	15 m	49	24	150 e	28 e	9 e	12 e	14 e
4-Sep	20:00	30	99.0	4 m	4 m	14	9	38	15	70	222	6	11	11
4-Sep	20:30	30	99.5	4 m	4 m	14	9	34	14	70 e	222 e	6 e	11 e	11 e
4-Sep	21:00	30	100.0	4 m	4 m	12	7	31	11	34	422	9	7	12
4-Sep	21:30	30	100.5	4 m	4 m	14	8	27	11	34 e	422 e	9 e	7 e	12 e
4-Sep	22:00	30	101.0	3 m	4 m	10	6	27	10	21	330	11	9	11
4-Sep	22:30	30	101.5	3 m	4 m	8	4	23	7	21 e	330 e	11 e	9 e	11 e
4-Sep	23:00	30	102.0	3 m	4 m	6	4	22	6	14	197	28	8	14
4-Sep	23:30	30	102.5	3 m	4 m	6	4	20	6	14 e	197 e	28 e	8 e	14 e
5-Sep	0:00	30	103.0	3 m	4 m	7	3	20	6	16	74	110	18	14
5-Sep	0:30	30	103.5	3 m	4 m	9	2	11	3	16 e	74 e	110 e	18 e	14 e
5-Sep	1:00	30	104.0	3 m	4 m	5	4	17	5	15	42	173	58	11
5-Sep	1:30	30	104.5	3 m	4 m	6	2	17	4	15 e	42 e	173 e	58 e	11 e
5-Sep	2:00	30	105.0	3 m	4 m	6	4	15	4	16 m	24	185	123	11
5-Sep	2:30	30	105.5	3 m	4 m	5	3	12	3	16 e	24 e	185 e	123 e	11 e
5-Sep	3:00	30	106.0	3 m	4 m	5	3	9	2	18 m	19	138	146	8
5-Sep	3:30	30	106.5	3 m	4 m	6	3	5	1	18 e	19 e	138 e	146 e	8 e
5-Sep	4:00	30	107.0	3 m	4 m	2	2	10	1	20 m	13	67	116	7
5-Sep	4:30	30	107.5	3 m	4 m	6	3	8	2	20 e	13 e	67 e	116 e	7 e
5-Sep	5:00	30	108.0	3 m	4 m	6	3	10	2	22 m	13	41	80	9
5-Sep	5:30	30	108.5	2 m	4 m	5	1	9	2	22 e	13 e	41 e	80 e	9 e
5-Sep	6:00	30	109.0	2 m	4 m	4	2	8	1	24 m	10	27	50	10
5-Sep	6:30	30	109.5	2 m	4 m	2	3	9	1	24 e	10 e	27 e	50 e	10 e
5-Sep	7:00	30	110.0	2 m	4 m	6	2	9	2	26 m	8	16	34	18
5-Sep	7:30	30	110.5	2 m	4 m	18	4	18 m	9	26 e	8 e	16 e	34 e	18 e
5-Sep	8:00	30	111.0	2	12	41	13	41 m	22	28 m	7	13	22	42
5-Sep	8:30	30	111.5	2	15	61	20	61 m	35	28 e	7 e	13 e	22 e	42 e
5-Sep	9:00	30	112.0	11	10	151	265	151 m	188	30 m	6	12	17	91

TABLE C.9 (Cont.)

Time Since Last Sample			Turbidity (a)											
Date	Time	Last Sample (min.)	Elapsed Time (hours)	Crossing #3 US-Left	Crossing #3 US-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right	Net Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8
5-Sep	9:30	30	112.5	3	10	155	315	155 m	216	30 e	6 e	12 e	17 e	91 e
5-Sep	10:00	30	113.0	2	7	62	296	62 m	156	32	5	10	13	71
5-Sep	10:30	30	113.5	3	6	23	35	23 m	24	32 e	5 e	10 e	13 e	71 e
5-Sep	11:00	30	114.0	4	7	11	20	11 m	9	72	4	9	72	77
5-Sep	11:30	30	114.5	3	5	9	21	9 m	10	72 e	4 e	9 e	10 e	77 e
5-Sep	12:00	30	115.0	1	12	8	14	8 m	4	218	5	7	9	55
5-Sep	12:30	30	115.5	4	6	5	11	5 m	3	218 e	5 e	7 e	9 e	55 e
5-Sep	13:00	30	116.0	3	10	5	13	5 m	2	26	5	7	8	46
5-Sep	13:30	30	116.5	3	4	4	9	4 m	3	26 e	5 e	7 e	8 e	46 e
5-Sep	14:00	30	117.0	2	2	4	8	4 m	4	14	12	7	8	33
5-Sep	14:30	30	117.5	3	6	5	9	5 m	2	14 e	12 e	7 e	8 e	33 e
5-Sep	15:00	30	118.0	3	7	6	7	6 m	1	7	25	5	6	25
5-Sep	15:30	30	118.5	3	5	5	7	5 m	2	7 e	25 e	5 e	6 e	25 e
5-Sep	16:00	30	119.0	3	5	6	6	6 m	2	7	34	5	6	16
5-Sep	16:30	30	119.5	4	7	3	7	3 m	0	7 e	34 e	5 e	6 e	16 e
5-Sep	17:00	30	120.0	5	5	2	4	2 m	0	8	16	5	8	13
5-Sep	17:30	30	120.5	2	3	4	4	4 m	2	8 e	16 e	5 e	6 e	13 e
5-Sep	18:00	30	121.0	5	10	5	4	5 m	0	7	10	11	6	10
5-Sep	18:30	30	121.5	stopped	stopped	stopped	4	e stopped	0 f	7 e	10 e	11 e	6 e	10 e
5-Sep	19:00	30	122.0				5	e	0 f	4	7	16	5	11
5-Sep	19:30	30	122.5				5	e	0 f	4 e	7 e	16 e	5 e	11 e
5-Sep	20:00	30	123.0				5	e	0 f	6	6	19	11	8
5-Sep	20:30	30	123.5				5	e	0 f	6 e	6 e	19 e	11 e	8 e
5-Sep	21:00	30	124.0				5	e	0 f	5	5	15	12	7
5-Sep	21:30	30	124.5				5	e	0 f	5 e	5 e	15 e	12 e	7 e
5-Sep	22:00	30	125.0				5	e	0 f	5 m	5	10	15 m	5
5-Sep	22:30	30	125.5				5	e	0 f	5 e	5 e	10 e	15 e	5 e
5-Sep	23:00	30	126.0				3	e	0 f	5 m	7	11	10 m	7
5-Sep	23:30	30	126.5				3	e	0 f	5 e	7 e	11 e	10 e	7 e
6-Sep	0:00	30	127.0				5	e	0 f	5 m	6	7	11 m	6
6-Sep	0:30	30	127.5				5	e	0 f	5 e	6 e	7 e	11 e	6 e
6-Sep	1:00	30	128.0				5	e	0 f	5 m	3	6	6 m	7
6-Sep	1:30	30	128.5				5	e	0 f	5 e	3 e	6 e	6 e	7 e
6-Sep	2:00	30	129.0				4	e	0 f	5 m	7	7	6 m	7
6-Sep	2:30	30	129.5				4	e	0 f	5 e	7 e	7 e	6 e	7 e
6-Sep	3:00	30	130.0				4	e	0 f	5 m	4	7	6 m	12
6-Sep	3:30	30	130.5				4	e	0 f	5 e	4 e	7 e	6 e	12 e
6-Sep	4:00	30	131.0				4	e	0 f	5 m	4	5	6 m	11
6-Sep	4:30	30	131.5				4	e	0 f	5 e	4 e	5 e	6 e	11 e
6-Sep	5:00	30	132.0				4	e	0 f	5 m	3	6	6 m	10
6-Sep	5:30	30	132.5				4	e	0 f	5 e	3 e	6 e	6 e	10 e
6-Sep	6:00	30	133.0				5	e	0 f	5 m	5	5	6 m	10
6-Sep	6:30	30	133.5				3	e	0 f	5 e	5 e	5 e	6 e	10 e
6-Sep	7:00	30	134.0				3	e	0 f	5 m	4	6	6 m	7
6-Sep	7:30	30	134.5				3	e	0 f	5 e	4 e	6 e	6 e	7 e

TABLE C.9 (Cont.)

Date	Time	Time Since		Elapsed Time (hours)	Turbidity (a)										
		Last Sample (min.)			Crossing #3 US.-Left	Crossing #3 US.-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right	Net Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8
6-Sep	8:00	30		135.0				7		0 f	5 m	4	5	6 m	7
6-Sep	8:30	30		135.5				7 e		0 f	5 e	4 e	5 e	6 e	7 e
6-Sep	9:00	30		136.0				4		0 f	5 m	5	5	6 m	7
6-Sep	9:30	30		136.5				4 e		0 f	5 e	5 e	5 e	6 e	7 e
6-Sep	10:00	30		137.0				6		0 f	5 m	4	8	6	5
6-Sep	10:30	30		137.5				6 e		0 f	5 e	4 e	8 e	6 e	5 e
6-Sep	11:00	30		138.0				5 m		0 f	4	1	4	5	4
6-Sep	11:30	30		138.5				5 m/e		0 f	4 e	1 e	4 e	5 e	4 e
6-Sep	12:00	30		139.0				4		0 f	2	2	5	4	3
6-Sep	12:30	30		139.5				4 e		0 f	2 e	2 e	5 e	4 e	3 e
6-Sep	13:00	30		140.0				4		0 f	3	2	5	4	4
6-Sep	13:30	30		140.5				4 e		0 f	3 e	2 e	5 e	4 e	4 e
6-Sep	14:00	30		141.0				4		0 f	3	1	7	5	3
6-Sep	14:30	30		141.5				4 e		0 f	3 e	1 e	7 e	5 e	3 e
6-Sep	15:00	30		142.0				1		0 f	4	4	4	4	2
6-Sep	15:30	30		142.5				1 e		0 f	4 e	4 e	4 e	4 e	2 e
6-Sep	16:00	30		143.0				1		0 f	3	3	27	4	5
6-Sep	16:30	30		143.5				1 e		0 f	3 e	3 e	27 e	4 e	5 e
6-Sep	17:00	30		144.0				3		0 f	5	3	6	3	2
6-Sep	17:30	30		144.5				3 e		0 f	5 e	3 e	6 e	3 e	2 e
6-Sep	18:00	30		145.0				3		0 f	3	2	4	4	3
6-Sep	18:30	30		145.5				3 e		0 f	3 e	2 e	4 e	4 e	3 e
6-Sep	19:00	30		146.0				3		0 f	3	1	4	3	3
6-Sep	19:30	30		146.5				3 e		0 f	3 e	1 e	4 e	3 e	3 e
6-Sep	20:00	30		147.0				3		0 f	2	2	4	3	4
6-Sep	20:30	30		147.5				3 e		0 f	2 e	2 e	4 e	3 e	4 e
6-Sep	21:00	30		148.0				3		0 f	3	2	3	4	4
6-Sep	21:30	30		148.5				3 e		0 f	3 e	2 e	3 e	4 e	4 e
6-Sep	22:00	30		149.0				2		0 f	2	4	4	4	2
6-Sep	22:30	30		149.5				2 e		0 f	2 e	4 e	4 e	4 e	2 e
6-Sep	23:00	30		150.0				3		0 f	3	3	4	4	3
6-Sep	23:30	30		150.5				3 e		0 f	3 e	3 e	4 e	4 e	3 e
7-Sep	0:00	30		151.0				1		0 f	7	3	18	4	3
7-Sep	0:30	30		151.5				1 e		0 f	7 e	3 e	18 e	4 e	3 e
7-Sep	1:00	30		152.0				2		0 f	6	4	4	3	2
7-Sep	1:30	30		152.5				2 e		0 f	6 e	4 e	4 e	3 e	2 e
7-Sep	2:00	30		153.0				1		0 f	5	3	10	2	5
7-Sep	2:30	30		153.5				1 e		0 f	5 e	3 e	10 e	2 e	5 e
7-Sep	3:00	30		154.0				2		0 f	2	5	8	5	3
7-Sep	3:30	30		154.5				2 e		0 f	2 e	5 e	8 e	5 e	3 e
7-Sep	4:00	30		155.0				3		0 f	3	4	4	4	3
7-Sep	4:30	30		155.5				3 e		0 f	3 e	4 e	4 e	4 e	3 e
7-Sep	5:00	30		156.0				1		0 f	3	3	4	3	2
7-Sep	5:30	30		156.5				1 e		0 f	3 e	3 e	4 e	3 e	2 e
7-Sep	6:00	30		157.0				2		0 f	3	4	13	4	3

TABLE C.9 (Cont.)

Time Since				Turbidity (a)											
Date	Time	Last Sample (min.)	Elapsed Time (hours)	Crossing #3 US-Left	Crossing #3 US-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right	Net Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8	
7-Sep	6:30	30	157.5				2 e		0 f	3 e	4 e	13 e	4 e	3 e	
7-Sep	7:00	30	158.0				3		0 f	2	4	3	4	2	
7-Sep	7:30	30	158.5				3 e		0 f	2 e	4 e	3 e	4 e	2 e	
7-Sep	8:00	30	159.0				4		0 f	3	3	2	5	4	
7-Sep	8:30	30	159.5				4 e		0 f	3 e	3 e	2 e	5 e	4 e	
7-Sep	9:00	30	160.0				3		0 f	3	5	9	6	4	
7-Sep	9:30	30	160.5				3 e		0 f	3 e	5 e	9 e	6 e	4 e	
7-Sep	10:00	30	161.0				3		0 f	5	4	2	5	12	
7-Sep	10:30	30	161.5				3 e		0 f	5 e	4 e	2 e	5 e	12 e	
7-Sep	11:00	30	162.0				3		0 f	6	4	2	3	6	
7-Sep	11:30	30	162.5				3 e		0 f	6 e	4 e	2 e	3 e	6 e	
7-Sep	12:00	30	163.0				7		0 f	5	3	7	5	6	
7-Sep	12:30	30	163.5				7 e		0 f	5 e	3 e	7 e	5 e	6 e	
7-Sep	13:00	30	164.0				3		0 f	3	6	3	5	4	
7-Sep	13:30	30	164.5				3 e		0 f	3 e	6 e	3 e	5 e	4 e	
7-Sep	14:00	30	165.0				4		0 f	3	5	3	7	8	
7-Sep	14:30	30	165.5				4 e		0 f	3 e	5 e	3 e	7 e	8 e	
7-Sep	15:00	30	166.0				3		0 f	4	2	4	8	10	
7-Sep	15:30	30	166.5				3 e		0 f	4 e	2 e	4 e	8 e	10 e	
7-Sep	16:00	30	167.0				5		0 f	5	2	4	9	7	
7-Sep	16:30	30	167.5				5 e		0 f	5 e	2 e	4 e	9 e	7 e	
7-Sep	17:00	30	168.0				4		0 f	3	2	3	5	2	
7-Sep	17:30	30	168.5				4 e		0 f	3 e	2 e	3 e	5 e	2 e	
7-Sep	18:00	30	169.0				4		0 f	3	2	3	5	2	
7-Sep	18:30	30	169.5				4 e		0 f	3 e	2 e	3 e	5 e	2 e	
7-Sep	19:00	30	170.0				3		0 f	4	6	3	8	2	
7-Sep	19:30	30	170.5				3 e		0 f	4 e	6 e	3 e	8 e	2 e	
7-Sep	20:00	30	171.0				3		0 f	3	4	3	4	2	
7-Sep	20:30	30	171.5				3 e		0 f	3 e	4 e	3 e	4 e	2 e	
7-Sep	21:00	30	172.0				3		0 f	4	6	3	4	3	
7-Sep	21:30	30	172.5				3 e		0 f	4 e	6 e	3 e	4 e	3 e	
7-Sep	22:00	30	173.0				2		0 f	5	5	3	4	3	
7-Sep	22:30	30	173.5				2 e		0 f	5 e	5 e	3 e	4 e	3 e	
7-Sep	23:00	30	174.0				2		0 f	4	5	3	5	2	
7-Sep	23:30	30	174.5				2 e		0 f	4 e	5 e	3 e	5 e	2 e	
8-Sep	0:00	30	175.0				4		0 f	5	6	3	6	3	
8-Sep	0:30	30	175.5				4 e		0 f	5 e	6 e	3 e	6 e	3 e	
8-Sep	1:00	30	176.0				3		0 f	4	15	4	5	3	
8-Sep	1:30	30	176.5				3 e		0 f	4 e	15 e	4 e	5 e	3 e	
8-Sep	2:00	30	177.0				3		0 f	4	9	3	6	2	
8-Sep	2:30	30	177.5				3 e		0 f	4 e	9 e	3 e	6 e	2 e	
8-Sep	3:00	30	178.0				4		0 f	4	6	3	4	3	
8-Sep	3:30	30	178.5				4 e		0 f	4 e	6 e	3 e	4 e	3 e	
8-Sep	4:00	30	179.0				3		0 f	5	6	3	5	3	
8-Sep	4:30	30	179.5				3 e		0 f	5 e	6 e	3 e	5 e	3 e	

TABLE C.9 (Cont.)

Date	Time	Time Since Last Sample (min.)	Elapsed Time (hours)	Turbidity (a)										
				Crossing #3 US.-Left	Crossing #3 US.-Right	Crossing #3 600 ft - Left	Crossing #3 600 ft - Center	Crossing #3 600 ft - Right	Net Flow Weighted (b)	At Crossing #4	At Crossing #5	At Crossing #6	At Crossing #7	At Crossing #8
8-Sep	5:00	30	180.0				5		0 f	2	7	4	4	4
8-Sep	5:30	30	180.5				5 e		0 f	2 e	7 e	4 e	4 e	4 e
8-Sep	6:00	30	181.0				3		0 f	3	7	3	3	3
8-Sep	6:30	30	181.5				3 e		0 f	3 e	7 e	3 e	3 e	3 e
8-Sep	7:00	30	182.0				5		0 f	3	5	3	3	4
8-Sep	7:30	30	182.5				5 e		0 f	3 e	5 e	3 e	3 e	4 e
8-Sep	8:00	30	183.0				3		0 f	5	5	3	3	3
8-Sep	8:30	30	183.5				3 e		0 f	5 e	5 e	3 e	3 e	3 e
8-Sep	9:00	30	184.0				26		0 f	4	4	2	3	
8-Sep	9:30	30	184.5				26 e		0 f	4 e	4 e	2 e	3 e	e

(a) m = sample missed /value extrapolated

e = measurements from previous samples are extrapolated for graphing purposes only

f = after the upstream sampler is removed, the NET flow weighted turbidity is assumed to be zero

(for the purposes of calculating the 10 day running average of NET flow weighted turbidity only)

(b) c = flow weighted value taken simply as the center sampler value less the background (if available).

Total Net Downstream Flow-Weighted NTU*hours = 12716

Appendix D:

Dissolved Oxygen and Temperature Measurements

TABLE D.1 Dissolved Oxygen and Temperature Measurements

Date	Crossing	Time	Elapsed Time (hours)	DO Upstream (ug/l)	DO Downstream (ug/l)	Temperature Upstream (C)	Temperature Downstream (C)
14-Aug	4	0:30	0.0	8.4	8.4	a	a
14-Aug	4	5:00	4.5	8.7	8.7	a	a
14-Aug	4	9:00	8.5	8.8	8.8	a	a
14-Aug	4	12:00	11.5	10.1	10.1	a	a
14-Aug	4	21:00	20.5	8.5	8.5	a	a
15-Aug	4	9:00	22.5	10.1	10.1	a	a
19-Aug	5	2:00	0	7.3	8.1	16.9	17.1
19-Aug	5	6:00	4.0	7.1	8.2	15.5	15.6
19-Aug	5	10:00	8.0	9.4	9.1	17.1	17.6
19-Aug	5	14:00	12.0	10.1	10.5	21.1	22.2
19-Aug	5	18:30	16.5	9.5	10.2	22.3	24.8
22-Aug	7	2:00	0	7.8	7.1	16.8	16.5
22-Aug	7	6:00	4.0	8.1	7	14.9	14.7
22-Aug	7	10:00	12.0	7.9	7.1	15.6	16.7
22-Aug	7	14:00	16.5	7	8.7	17.5	17.5
26-Aug	2	14:00	0	9.4	9.6	14.2	14.2
26-Aug	2	18:00	4.0	8.1	9.4	16.2	16.2
27-Aug	1	9:34	0	10.2	-	10.7	-
27-Aug	1	14:30	5	9.3	-	16.2	-
28-Aug	1	9:42	24	10.3	-	11.5	-
28-Aug	1	14:22	29	9.1	-	15.3	-
28-Aug	1	18:30	33	9.4	-	15.8	-
29-Aug	1	9:55	48	10.8	-	9.4	-
29-Aug	1	13:00	51	9.7	-	13.8	-

TABLE D.1 (Cont.)

Date	Crossing	Time	Elapsed Time (hours)	DO Upstream (ug/l)	DO Downstream (ug/l)	Temperature Upstream (C)	Temperature Downstream (C)
27-Aug	1	10:40	0	-	10.1	-	11.9
27-Aug	1	13:45	3	-	9.9	-	15.1
28-Aug	1	10:25	24	-	10.1	-	11.4
28-Aug	1	14:05	27	-	10.2	-	14.5
28-Aug	1	19:16	33	-	9.2	-	14.5
29-Aug	1	9:15	47	-	10.0	-	8.1
29-Aug	1	13:50	51	-	10.0	-	14.7
31-Aug	3	13:05	0	9.7	-	17.1	-
31-Aug	3	17:44	4.6	7.7	-	16.9	-
31-Aug	3	18:42	5.6	9	-	16.1	-
1-Sep	3	8:35	19.5	8.7	-	11.7	-
1-Sep	3	15:20	26.3	8.9	-	17.8	-
2-Sep	3	15:45	50.7	8.8	-	18.5	-
3-Sep	3	9:06	68.0	9.5	-	11.7	-
3-Sep	3	14:00	72.9	8.9	-	16.5	-
31-Aug	3	14:05	0.0	-	9.2	-	15.4
31-Aug	3	16:54	2.8	-	9.4	-	17.5
31-Aug	3	19:05	5.0	-	8.3	-	15.9
1-Sep	3	9:35	19.5	-	9.5	-	12.4
1-Sep	3	14:44	24.7	-	9.5	-	17.1
2-Sep	3	15:00	48.9	-	9.3	-	17.1
3-Sep	3	9:38	67.5	-	9.7	-	11.7
3-Sep	3	13:19	71.2	-	9.7	-	15.1

a = equipment malfunction, no temperature readings were measured.

**DATE
FILMED**

8/3/94

END