

STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

Steve Cowper, *Governor*

Judith M. Brady, *Commissioner*

Robert B. Forbes, *Director and State Geologist*

April 1988

This report is a preliminary publication of DGGS.  
The author is solely responsible for its content and  
will appreciate candid comments on the accuracy of  
the data as well as suggestions to improve the report.

Report of Investigations 88-7  
HYDROLOGIC INVESTIGATIONS OF  
WATER QUALITY IN SELECTED PLACER  
MINING AREAS IN INTERIOR  
ALASKA, SUMMER 1986  
by  
Stephen F. Mack  
and  
Mary Moorman

STATE OF ALASKA  
Department of Natural Resources  
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

According to Alaska Statute 41, the Alaska Division of Geological and Geophysical Surveys is charged with conducting 'geological and geophysical surveys to determine the potential of Alaskan land for production of metals, minerals, fuels, and geothermal resources; the locations and supplies of ground water and construction materials; the potential geologic hazards to buildings, roads, bridges, and other installations and structures; and shall conduct such other surveys and investigations as will advance knowledge of the geology of Alaska.'

In addition, the Division of Geological and Geophysical Surveys shall collect, record, evaluate, and distribute data on the quantity, quality, and location of underground, surface, and coastal water of the state; publish or have published data on the water of the state and require that the results and findings of surveys of water quality, quantity, and location be filed; require that water-well contractors file basic water and aquifer data, including but not limited to well location, estimated elevation, well-driller's logs, pumping tests, flow measurements, and water-quality determinations; accept and spend funds for the purposes of this section, AS 41.08.017 and 41.08.035, and enter into agreements with individuals, public or private agencies, communities, private industry, and state and federal agencies; collect, record, evaluate, archive, and distribute data on seismic events and engineering geology of the state; and identify and inform public officials and industry about potential seismic hazards that might affect development in the state.

Administrative functions are performed under the direction of the Director, who maintains his office in Fairbanks. The locations of DGGs offices are listed below:

.794 University Avenue  
(Suite 200)  
Fairbanks, Alaska 99709  
(907)474-7147

.400 Willoughby Avenue  
(3rd floor)  
Juneau, Alaska 99801  
(907)465-2533

.18225 Fish Hatchery Road  
P.O. Box 772116  
Eagle River, Alaska 99577  
(907)696-0070

This report is for sale by DGGs for \$5.00. DGGs publications may be inspected at the following locations. Mail orders should be addressed to the Fairbanks office.

.794 University Avenue  
(Suite 200)  
Fairbanks, Alaska 99709

.400 Willoughby Avenue  
(3rd floor)  
Juneau, Alaska 99801

.U.S. Geological Survey  
Public Information Office  
701 C Street  
Anchorage, Alaska 99513

.Information Specialist  
U.S. Geological Survey  
4230 University Drive, Room 101  
Anchorage, Alaska 99508

## CONTENTS

|                                                                                        | <u>Page</u> |
|----------------------------------------------------------------------------------------|-------------|
| Summary.....                                                                           | 1           |
| Introduction.....                                                                      | 2           |
| Methods.....                                                                           | 5           |
| Turbidity, total suspended solids, and settleable solids.....                          | 5           |
| Discharge.....                                                                         | 6           |
| Sediment load and turbidity index load.....                                            | 7           |
| Mammoth Creek Intensive Study.....                                                     | 7           |
| Results and discussion.....                                                            | 7           |
| Turbidity, TSS, and settleable solids in Birch Creek drainage<br>streams.....          | 7           |
| Discharge.....                                                                         | 12          |
| Sediment loads and turbidity index loads.....                                          | 12          |
| Mammoth Creek Intensive Study.....                                                     | 16          |
| Supplementary data.....                                                                | 20          |
| Acknowledgements.....                                                                  | 20          |
| References cited.....                                                                  | 20          |
| Appendix A - Data from automatic samplers in Birch Creek drainage.....                 | 22          |
| Appendix B - Data from non-automated monitoring sites, Birch<br>Creek drainage.....    | 33          |
| Appendix C - Settleable solids data from all sources by site.....                      | 37          |
| Appendix D - Discharge data from automated sites, 1986.....                            | 47          |
| Appendix E - Data from Mammoth Creek Intensive Study, July 29-<br>August 3, 1986.....  | 52          |
| Appendix F - Data collected by ADF&G.....                                              | 58          |
| Appendix G - Miscellaneous data.....                                                   | 66          |
| Appendix H - Description of mining operations in Mammoth Creek<br>Intensive Study..... | 69          |
| Appendix I - Specific locations of study sites.....                                    | 72          |

## FIGURES

|        |                                                                            |    |
|--------|----------------------------------------------------------------------------|----|
| Figure | 1. Map showing location of sites for 1986 placer mining<br>studies.....    | 3  |
|        | 2. Map showing location of sites for Mammoth Creek<br>Intensive Study..... | 4  |
|        | 3. Bar chart of turbidity-settleable solids relationship..                 | 11 |
|        | 4. Bar chart of velocity-settleable solids relationship...                 | 12 |
|        | 5. Schematic diagram of Mammoth Creek Intensive Study<br>results.....      | 17 |

## TABLES

|       |                                                                       |    |
|-------|-----------------------------------------------------------------------|----|
| Table | 1. Summary of turbidity values collected in Birch<br>Creek Basin..... | 8  |
|       | 2. Z score results.....                                               | 10 |
|       | 3. Multiple regression results using 1986 data.....                   | 11 |
|       | 4. Summary of discharge values.....                                   | 13 |
|       | 5. Sediment loads associated with placer mining.....                  | 14 |

## CONTENTS (con.)

|                                                                                                                               | <u>Page</u> |
|-------------------------------------------------------------------------------------------------------------------------------|-------------|
| 6. Turbidity index loads for Birch Creek drainage,<br>June-Sept. 1984-86, in KNTU-cfs.....                                    | 15          |
| 7. Average discharge, turbidity, TSS, and sediment<br>load from Mammoth Creek Intensive Study,<br>July 30-August 1, 1986..... | 18          |

HYDROLOGIC INVESTIGATIONS OF WATER QUALITY IN SELECTED PLACER MINING AREAS  
IN INTERIOR ALASKA, SUMMER 1986

by  
Stephen F. Mack<sup>1</sup> and Mary Moorman<sup>1</sup>

ABSTRACT

This report presents and discusses turbidity, total suspended solids (TSS), settleable solids, and stream discharge data collected and analyzed as part of the interagency placer mining research project during the 1986 field season.

Twelve sites in the Birch Creek drainage and one site on Faith Creek (in cooperation with the Alaska Department of Fish and Game) were monitored throughout the summer of 1986. At six sites automatic samplers and continuous water level recorders enabled estimation of daily averages for turbidity, TSS, discharge, and sediment load--the product of TSS and discharge.

During a seven-day period in late July-early August, a short reach of Mammoth Creek was intensively monitored to examine the sediment contributions from individual mines and from channel resuspension.

Results are presented from a limited number of samples collected outside the Birch Creek drainage and Faith Creek at state waysides, villages participating in the Village Water Quality Monitoring program, and from the Tolovana above mining sites.

Season-long monitoring showed sediment and discharge levels at important locations in the Birch Creek drainage and at Faith Creek. Use of automated equipment enabled sampling and monitoring during infrequent storm events and allowed estimation of daily averages throughout the field season. Results indicated decreased turbidity and sediment loads since monitoring began in 1984, but mined streams still had turbidity concentrations and sediment loads far larger than unmined streams.

Paired TSS and turbidity data from 1986 indicated that equations developed from data collected in 1985 and earlier do not predict well. Multiple regressions, using turbidity and discharge to predict TSS, did improve the coefficient of determination ( $r^2$ ) and equation standard error of estimate over a simple regression, using only turbidity to predict TSS, but the improvement was not sufficient to abandon collection of TSS.

The Mammoth Creek Intensive Study illustrated the advantage of control of water use. Mining operations that discharged less water had less of an impact on the stream sediment load.

<sup>1</sup>Division of Geological and Geophysical Surveys, 794 University Avenue, Suite 200, Fairbanks, Alaska 99709 (Mr. Mack's current address is Regional Water Board, 431 Prater Way, P.O. Box 857, Sparks, NV 89432).

## INTRODUCTION

Data presented and discussed here were collected and analyzed by Alaska Division of Geological and Geophysical Surveys (DGGs) and assisting agencies during the 1986 field season as part of the interagency Placer Mining Research Project. The work done in 1986 was a continuation of the water quality monitoring of placer-mined streams, principally small streams in the Birch Creek drainage, during 1984 and 1985, reported in Mack and Moorman (1986). That report contains a more detailed description of the study area.

The goal of the 1986 season was to continue the monitoring done in the previous two years, using automated sampling equipment and water level recorders as available. DGGs monitored in 1986 the same sites in the Birch Creek drainage that were monitored in previous years, excepting that sites on Porcupine Creek at the road crossing and Bonanza Creek below mining were dropped and the site on Birch Creek above Twelvemile Creek was added. Automatic samplers and continuous water level recorders were placed at Birch Creek at the Steese Highway Bridge, Crooked Creek above mouth, Mammoth Creek at Steese Highway, and Birch Creek above Twelvemile Creek. An automatic water sampler was also placed at Boulder Creek at the U.S. Geological Survey (USGS) gage to supplement readings from the USGS water level recorder already in place at this site. Monitoring was not continued at two discharge sites at mining operations from 1984-85, because the miners had moved their operations. Locations of sampling sites in the Birch Creek drainage are shown in figure 1.

Samples from the automated samplers were analyzed for turbidity and total suspended solids; those from non-automated sites, for turbidity only. At each visit to both automated and non-automated sites, samples were collected for settleable solids determination.

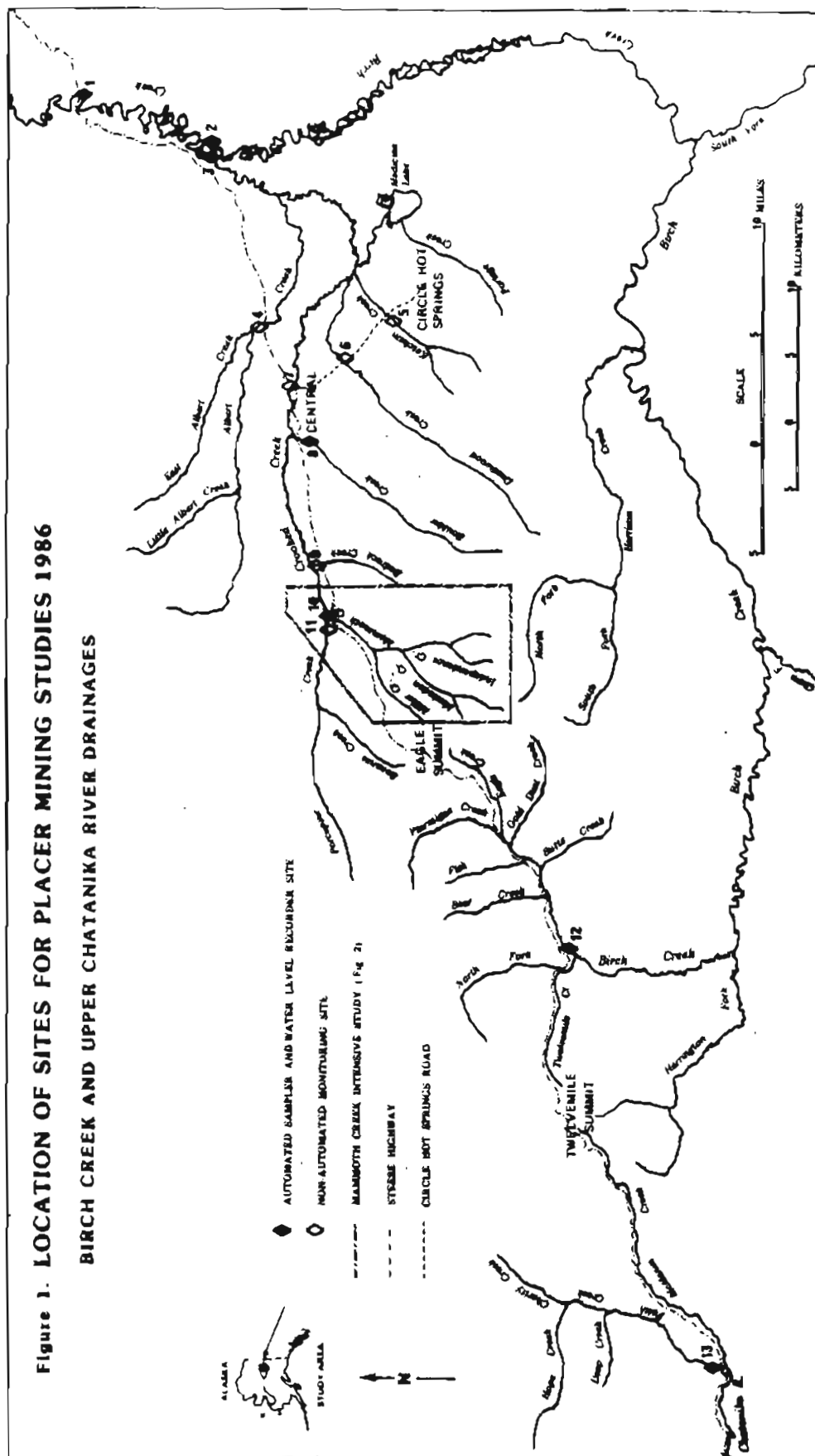
The large number of paired TSS-turbidity observations from the automatic samplers afforded a good opportunity to test equations for predicting TSS from turbidity which were developed from data collected in 1985 and earlier (Mack, 1986). These data also were used to develop multiple regression equations using turbidity and discharge to predict TSS as suggested in Mack (1986).

The 1984-85 monitoring raised the question of how much turbidity, TSS and settleable solids in mined streams was directly attributable to mining effluent discharge and how much to resuspension of sediment on the channel bottom. To address this question, more intensive monitoring of mined streams, including sampling above and below individual mining operations, was needed. With the assistance of the Alaska Division of Mining, intensive sampling of a five-mile reach of upper Mammoth Creek and its tributaries was conducted during a seven-day period from July 29 through August 3, 1986 (referred to herein as the Mammoth Creek Intensive Study). Study sites are identified in figure 2.

Outside the Birch Creek and Faith Creek drainages, work was more limited in 1986 than in 1984-85. Results are reported from samples collected by the Alaska Division of Parks and Outdoor Recreation at sites in Alaska state

Figure 1. LOCATION OF SITES FOR PLACER MINING STUDIES 1986

BIRCH CREEK AND UPPER CHATANIKA RIVER DRAINAGES



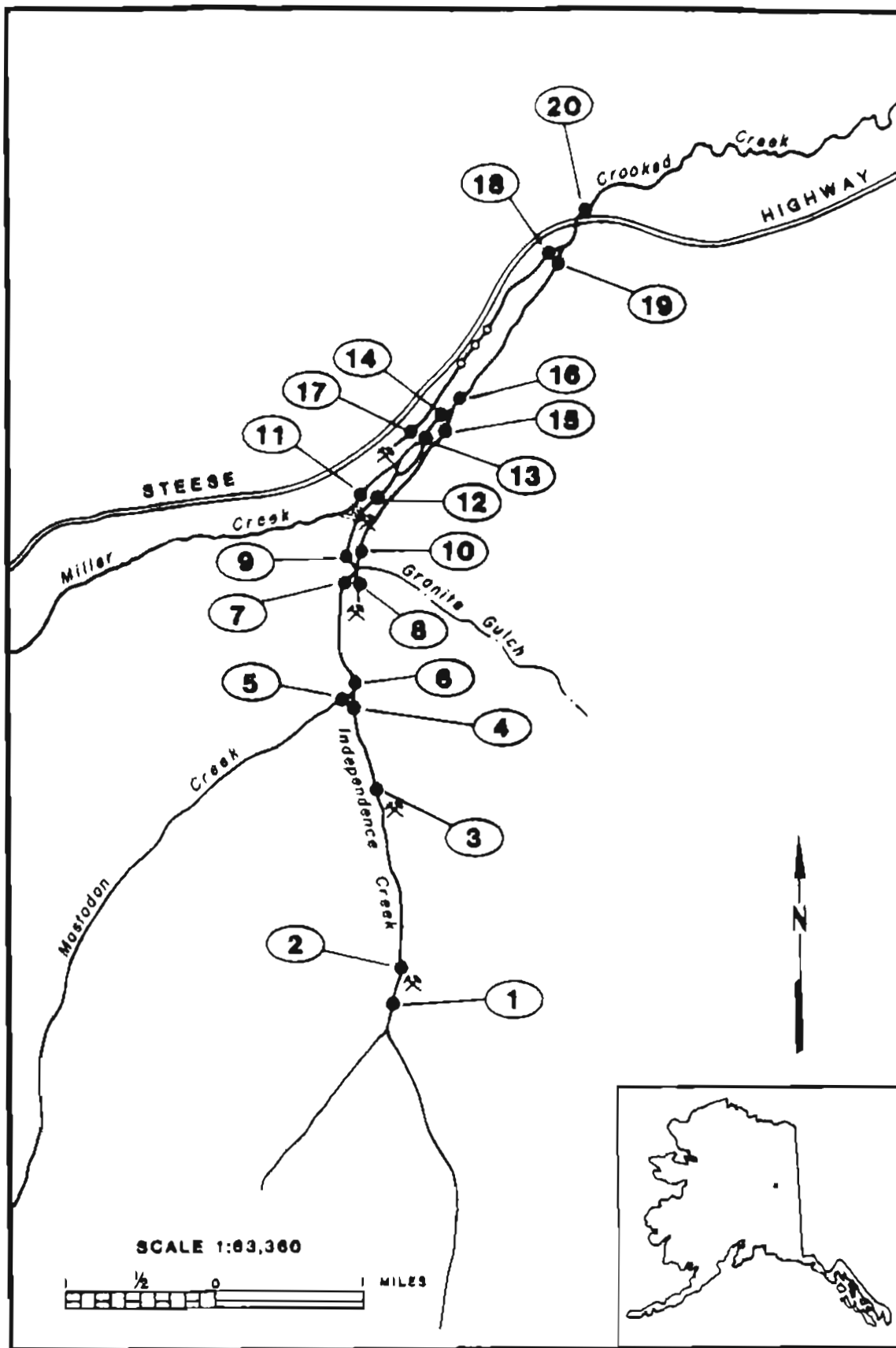


Figure 2. Location of sites for Mammoth Creek Intensive Study.



parks and from rural villages under the Village Water Quality Monitoring program.

## METHODS

### Turbidity, Total Suspended Solids, and Settleable Solids

Analyses of turbidity, TSS, and settleable solids were conducted in the field and in the DGGs hydrology lab located in the Water Research Center on the University of Alaska-Fairbanks campus. Methods used were from American Public Health Association (APHA)-American Water Works Association (AWWA)-Water Pollution Control Federation (WPCF) "Standard Methods for the Examination of Water and Wastewater," and procedures outlined in user manuals of certain instrumentation (APHA, 1985). The lab is a participant in U.S. Environmental Protection Agency (EPA) analytical quality assurance studies.

Samples for these analyses were collected from automated samplers or by grab methods in well-mixed reaches at sampling sites. When automated samplers were employed, the intake hose for the sampler was installed at a well-mixed location in the stream at mid-depth with the hose nozzle pointing upstream. At Birch Creek above Twelvemile Creek, Birch Creek at the Steese Highway Bridge, Crooked Creek above its confluence with Birch Creek, and Mammoth Creek at the Steese Highway, the automated samplers were programmed to composite into one bottle four samples taken six hours apart each day. At Faith Creek the automated sampler was programmed to take discrete samples every six hours. Samples from the Village Water Quality Monitoring project were collected by village residents and mailed to the DGGs lab in styrofoam mailers.

Most turbidity determinations were done in the lab, because it served as a receiving point for samples coming in from more than one collecting agency, and because some of the more turbid samples required several serial dilutions to bring their turbidity down to readable levels. A Turner Designs Model 40 laboratory turbidimeter and a Hach model 16800 portable turbidimeter were used.

Total suspended solids samples were filtered through prewashed, dried and weighed glass fiber filters, according to EPA specifications. The size of the aliquot was dependent upon the amount of material suspended, but ranged from 25 ml to several liters.

Settleable solids were measured in the field by using Imhoff cones with a detection limit of 0.1 ml/L and following standard procedures (APHA, 1985).

Statistical techniques used in the development of linear regression models for predicting TSS from turbidity and multiple regression models for predicting TSS from turbidity and discharge were performed on the University of Alaska-Fairbanks VAX computer using the GLM (general linear model) procedure of the SAS statistical package (SAS, 1985a, 1985b). Turbidity, TSS and discharge data were transformed into base-10 logarithms with all analyses done on transformed data. The procedures used are explained in more detail

in Mack (1986) and standard statistical texts (for example, Neter, Wasserman, and Kutner, 1985).

To establish predictive value of the models based on 1985 data (reported in Mack, 1986) as well as models developed in the present report (from 1986 data), the 1986 data were applied to the equations from Mack (1986). Z scores were then developed by subtracting the predicted TSS from the reported TSS and dividing by the equation's standard error of estimate (as reported in Mack, 1986). The Z score gives a relative measure, in multiples of the standard error of estimate, of the difference between predicted value and reported value.

### Discharge

Velocities used to calculate discharge in most cases were measured with a Marsh McBirney Model 201 Flowmeter. At Birch Creek at the Steese Highway Bridge, velocities were measured from the bridge using a Price AA meter suspended from a hand line. Where depth was greater than 2.5 ft, velocities were measured at 0.2 and at 0.8 of depth from the surface. At depths less than 2.5 ft, velocities were measured at 0.6 of depth from the surface. Discharges were calculated using the standard midpoint method (USDOI, 1981) from at least 20 velocity measurements taken across the stream cross section where width permitted (most cases).

Staff gage locations were chosen on the basis of easy access, that is, close to Steese Highway, Circle Hot Springs Road, or other road access. Turbidity monitoring sites also were chosen sufficiently downstream of any mining site or tributary so that the stream was well mixed at the sampling site. At each location the specific site was chosen by looking for a cross section that would provide the most change in stage for change in stream discharge and the least turbulence around the staff gage. Water surface levels were recorded by staff gage whenever agency personnel were in the vicinity.

At Birch Creek above Twelvemile Creek, Birch Creek at the Steese Highway Bridge, Crooked Creek above its confluence with Birch Creek, Mammoth Creek at the Steese Highway, and Faith Creek at the Steese Highway, continuous water surface levels were recorded with Omnidata DP320 Stream Stage Recorders. The DP320 is a small, battery-operated device with a submersible pressure transducer which measures and records water levels between 0 and 10 ft, to the nearest .01 ft. Water level data are stored in a solid-state memory, called a data storage module. At all sites, the water level recorders monitored water levels at 30-minute intervals.

Rating curves were developed for each site by taking at least four discharge measurements each field season at different water levels throughout the season. The rating curves were then used to estimate discharge from observed or recorded staff gage water levels.

## Sediment Load and Turbidity Index Load

Sediment load is calculated by multiplying discharge (in cfs) by TSS (in mg/L) and a constant (0.0027) to put the units into tons per day. Turbidity index load is calculated by multiplying discharge (in cfs) by turbidity, in nephelometric turbidity units (NTU). In this report, the product is divided by 1000 to show results at the same order of magnitude as sediment load. The units for turbidity index load (TIL) are KNTU-cfs, where 'K' represents 1000.

### Mammoth Creek Intensive Study

Mammoth Creek was chosen as a study area because of its road access and proximity to placer operations, and also because it has a relatively compact stream reach. Twenty sampling sites were set, at locations above and below all mine sites, and at all important surface water inflow points. Travel times between sampling points were estimated from distances between map points and average measured stream velocities. A sampling schedule, based on these travel times, was established to attempt to monitor a slug of water as it passed through the system. Four samples were collected each day at each site, one sample every four hours during the day. At three sites, automated samplers were used to collect backup samples and to collect samples through the night.

Discharge was monitored by observing staff gages set at each site and taking discharge measurements at 1-2 day intervals; 2-3 measurements were taken at each site over the total study time. Because observed water levels and measured discharges at each site varied little, the discharges reported in the results section are averages of the measured discharges.

## RESULTS AND DISCUSSION

### Turbidity, TSS, and Settleable Solids in Birch Creek Drainage Streams

Results from the season-long monitoring of turbidity, TSS, and settleable solids from sites in the Birch Creek drainage are presented in appendix A (automated sites) and appendix B (non-automated sites).

Comparisons of monthly average turbidity at all sites monitored this year to averages from previous years are presented in table 1. Two cautions should be observed when viewing this table. First, all non-automated site values are averages of a limited number of discrete samples. Second, at the 1986 automated sites, 1985 values are from averages of discrete samples, while the 1986 results are averages of composited samples and include daily variation as well as a sampling of a wider range of flows. At sites far downstream from mining, such as Birch Creek at the Steese Highway Bridge, or on unmined streams, daily variation may not be important; however, at sites close to mining, it may.

Average turbidity at monitoring sites on mined streams was generally less in 1986 than in previous years, although average turbidity monitored at unmined streams was much higher in 1986, reflecting the higher flows observed, and average turbidity was also higher at Birch Creek at the Steese

Table 1. Summary of turbidity values from samples collected in Birch Creek Basin.

| Location                     | Year | Jun<br>(NTU) | Jul<br>(NTU) | Aug<br>(NTU) | Sep<br>(NTU) | Avg chng from<br>previous years<br>(%) |
|------------------------------|------|--------------|--------------|--------------|--------------|----------------------------------------|
| Data from grab samples       |      |              |              |              |              |                                        |
| Albert at Steese             | 86   | 20.9         | 22.5         | 0.60         | 2.3          |                                        |
| Bedrock at Steese            | 84   |              |              | 1.4          | 0.5          |                                        |
|                              | 85   | 1.10         | 0.30         | 0.90         | 0.4          | -31.6                                  |
|                              | 86   | 1.65         | 2.96         | 0.77         | 1.2          | 143.5                                  |
| Crooked at Central           | 84   |              |              | 880          |              | 696                                    |
|                              | 85   | 236          | 658          | 390          | 181          | -63.8                                  |
|                              | 86   | 113          | 151          | 70.4         | 297          | -56.9                                  |
| Deadwood at CHSR             | 84   |              |              | 1400         | 640          |                                        |
|                              | 85   | 999          | 676          | 495          | 253          | -63.3                                  |
|                              | 86   | 39.3         | 53.8         | 37.9         | 141          | -88.8                                  |
| Ketchem at CHSR              | 84   |              |              | 3210         | 152          |                                        |
|                              | 85   | 160          | 1070         | 989          | 1190         | -35.2                                  |
|                              | 86   | 115          | 122          | 140          | 786          | -65.9                                  |
| Porcupine above<br>mouth     | 85   |              | 95           | 410          | 370          |                                        |
|                              | 86   | 59.4         | 123          | 40.7         | 515          | -22.4                                  |
| Data from automatic samplers |      |              |              |              |              |                                        |
| Birch above 12Mile           | 86   | 255          | 201          | 237          | 251          |                                        |
| Birch at Bridge              | 85   | 47           | 23           | 35           | 18           |                                        |
|                              | 86   | 79           | 110          | 6.3          | 19.1         | 74.3                                   |
| Crooked above<br>mouth       | 85   | 105          | 88           | 172          | 59           |                                        |
|                              | 86   | 118          | 65           | 36.3         | 84.4         | -28.4                                  |
| Boulder near Steese          | 85   |              | 0.8          | 0.8          | 0.6          |                                        |
|                              | 86   | 3.93         | 4.02         | 1.75         | 1.4          | 225.9                                  |
| Mammoth at Steese            | 84   |              |              | 585          | 986          |                                        |
|                              | 85   | 285          | 340          | 401          | 370          | -50.9                                  |
|                              | 86   | 240          | 195          | 265          | 518          | -12.8                                  |

Highway Bridge, the furthestmost downstream sampling site in the Birch Creek drainage. These results should be interpreted keeping in mind that 1986 data are from an automatic sampler which collected samples during flood events as well as normal flows, whereas 1985 data are from discrete grab samples, and high flow events were missed during 1985. The Birch Creek at Steese Highway sampling site is far enough downstream from active mining that discharge has a relatively greater effect on turbidity levels there than it does at the sites farther upstream.

Total suspended solids (TSS) analyses of samples from the automated samplers at Birch Creek above Twelvemile Creek, Birch Creek at the Steese Highway Bridge, Crooked Creek above mouth, Mammoth Creek at the Steese Highway, and Boulder Creek above the USGS gage are presented in appendix A. TSS and turbidity analyses measure different aspects of the same physical characteristic: suspended material in water. Turbidity, as measured by nephelometric techniques, describes the reflective characteristics of particles, and TSS measures the physical mass of the particles. Turbidity is a state enforcement standard and is an important measure, because high turbidity levels, as well as being aesthetically displeasing, have been associated with fish mortality. High TSS levels also have been associated with damage to fish. Measurement of TSS is useful to management because, when combined with discharge data, it translates into physical sediment loads. Measuring TSS is a more complicated, time-consuming, and expensive procedure than measuring turbidity. If turbidity measurements could be used to predict TSS levels, a great deal of effort and expense could be saved.

During the winter of 1985-86, all TSS and turbidity data reported to date by researchers working with placer mining topics in Alaska were collected to see if one regression equation could be used to predict TSS from turbidity in streams affected by mining (Mack, 1986). That investigation determined that the regression equations from different basins and streams, and from different sites on a single stream, were often statistically different; therefore, all data should not be forced into one equation. The paired turbidity-TSS data collected in 1986 in the Birch Creek drainage were used to test the equations from Mack (1986), which had been developed from data collected in 1985 and earlier at the same sample sites.

Using turbidity data from appendix A, and the appropriate equation derived from the 1985 data, TSS values were predicted, and then compared to reported TSS values. Table 2 presents the mean Z score and Z score standard deviation at each site. Ideally the mean should be near zero and the standard deviation should be less than one. Only at Birch Creek above Twelvemile is the mean close to zero, and nowhere is the standard deviation below one, demonstrating that the equations developed with data collected in 1985 and earlier do not predict well with 1986 data.

Mack (1986) suggested a multiple regression equation using turbidity and a flow component--either velocity or discharge--to predict TSS, as an improvement over the simple turbidity-TSS regression. To test this, multiple regression equations using turbidity and discharge to predict TSS were developed from the data collected in 1986. The resulting equations were compared to simple regression equations developed from the same data and

Table 2. Z Score Results.  $Z \text{ scores} = (\text{reported TSS} - \text{predicted TSS}) / \text{standard error of estimate}.$

|                                                                                                       | Mean  | S.D. |
|-------------------------------------------------------------------------------------------------------|-------|------|
| 1985 simple regression equations (using turbidity to predict TSS) tested on 1986 data                 |       |      |
| Birch above 12Mile                                                                                    | -0.12 | 3.42 |
| Birch at Bridge                                                                                       | 1.69  | 1.25 |
| Crooked above mouth                                                                                   | 1.56  | 1.92 |
| Mammoth at Steese                                                                                     | 3.37  | 5.32 |
| 1986 multiple regression equations (using turbidity and discharge to predict TSS) tested on 1985 data |       |      |
| Birch at Bridge                                                                                       | -2.16 | 0.68 |
| Crooked above mouth                                                                                   | -1.90 | 1.21 |
| Mammoth at Steese                                                                                     | -0.68 | 0.36 |

tested on 1985 data, using Z scores as described above. The equations are presented in table 3, and the Z score results are presented in table 2.

The results suggest that multiple regression equations using turbidity and discharge to predict TSS are not reliable enough to abandon collection of TSS data. The multiple regression equations improve the coefficient of determination and standard error of estimate (SEE) in two of three instances, but when tested against each groups of data (as in table 2), may not accurately or precisely predict TSS.

The settleable solids data collected in 1986 are presented in appendix C. Approximately twenty percent of the samples collected in streams affected by mining and tested for settleable solid levels registered 0.2 ml/L or greater. High settleable solids appear to be more a result of high flows than effluent discharges from individual mining operations. Figure 3 shows the relationship of settleable solids levels to average and median turbidity values. No strong pattern exists between turbidity and settleable solids at our sampling sites.

Settleable solids are larger particles that settle out in an Imhoff cone in one hour; velocities associated with high flow events cause more such particles to be suspended in the water column. Figure 4 shows the relationship of settleable solids to stream velocity. Higher average and median velocities are associated with higher settleable solids levels. The high correlation with velocity and the low correlation with turbidity demonstrate that high levels of settleable solids at our sampling sites are attributable more to non-point sources of sediment than to discharges from individual mining operations.

Table 3. Multiple regression results using 1986 data fitted to the following equation:

$$Y = a * X_1^b * X_2^c$$

where  $Y$  = TSS,  $X_1$  = turbidity,  $X_2$  = discharge,  $a$  is a constant, and  $b$  and  $c$  are exponents;  $n$  is the number of observations.

| Location             | <u>n</u> | <u>a</u> | <u>b</u> | <u>c</u> | $r^2$ | SEE   |
|----------------------|----------|----------|----------|----------|-------|-------|
| Birch above 12Mile   | 111      | 2.51     | 0.833    |          | 0.386 | 0.237 |
|                      | 111      | 0.212    | 0.812    | 0.565    | 0.630 | 0.184 |
| Birch at Bridge      | 17       | 1.79     | 1.351    |          | 0.787 | 0.286 |
|                      | 17       | 0.009    |          | 1.26     | 0.630 | 0.377 |
|                      | 17       | 0.82     | 1.22     | 0.155    | 0.789 | 0.294 |
| Crooked above mouth  | 44       | 2.54     | 1.03     |          | 0.577 | 0.270 |
|                      | 44       | 0.29     | 0.710    | 0.570    | 0.703 | 0.229 |
| Mammoth above Steese | 118      | 2.08     | 0.790    |          | 0.356 | 0.309 |
|                      | 118      | 0.23     | 0.927    | 0.656    | 0.564 | 0.255 |

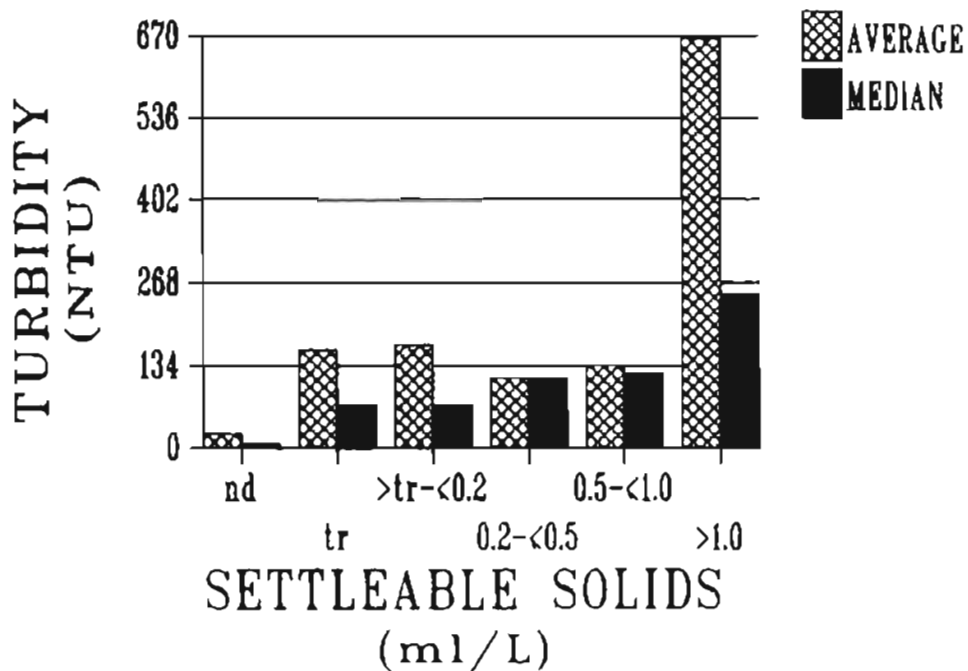


Figure 3. Turbidity-settleable solids relationship.

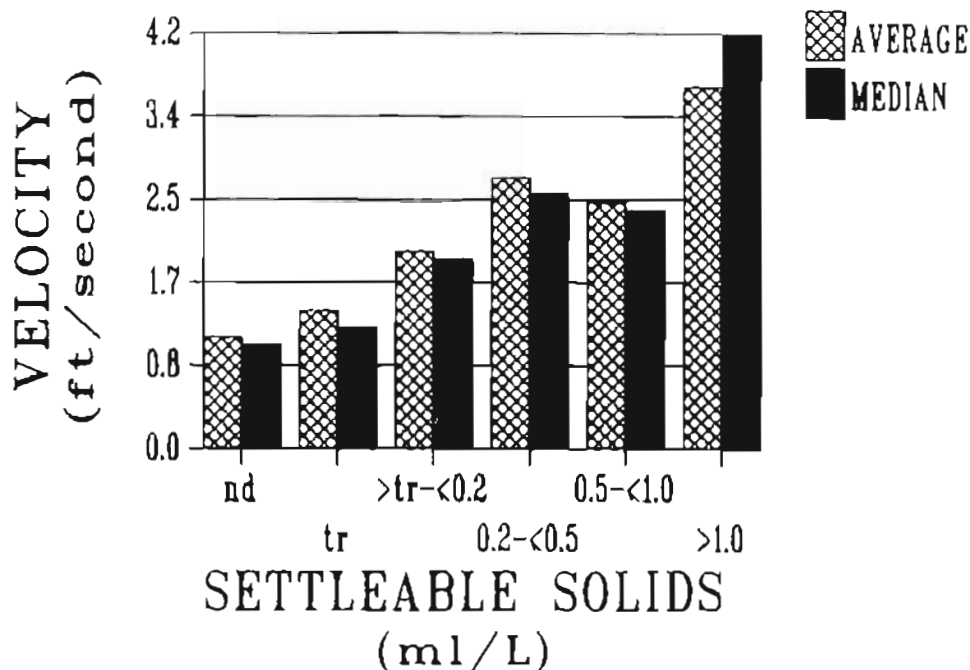


Figure 4. Velocity-settleable solids relationship.

#### Discharge

Discharge estimates at the sampling sites are presented with water quality data in appendices A and B, and in tabular form for the automated sites in appendix D. Summaries of monthly averages of the past three years appear in table 4. In general, 1986 was a drier year than 1985. At Boulder Creek, a site gaged by the U.S. Geological Survey, discharge averaged 47 percent less in 1986 than 1985; the 1986 average at Boulder Creek was 15 percent lower than the 19-year average. The automated sites show less of a difference. However, at Mammoth Creek the 1985 record was not continuous in June and early July, and two large flow events were missed. Recorders at Birch Creek at the Bridge and Crooked Creek above the mouth were inoperable during August and September of 1986; data from those months are therefore not included in the percentage of change calculations for those locations in table 4.

#### Sediment Loads and Turbidity Index Loads

Sediment loads indicate the total amount of sediment carried by a stream. Table 5 shows monthly averages at sites where samples for TSS were taken in 1986. Birch Creek at Steese Highway Bridge is the farthest downstream site and is below all mining activity. It has the largest monthly sediment load averages. In the Birch Creek basin most mining takes place either above the mouth of Crooked Creek or on Birch Creek above Twelvemile Creek. The combined average sediment loads from those two sites should approximate the load at the Birch Creek at the Bridge site. However, the load at that site is much greater than the sum of the upper two sites, which



Table 4. Summary of discharge values: monthly averages of daily discharge in cfs.

| Location                            | Year      | June              | July              | Aug               | Sep               | Avg change<br>from previous<br>year (%) |
|-------------------------------------|-----------|-------------------|-------------------|-------------------|-------------------|-----------------------------------------|
| Averages of discrete observations   |           |                   |                   |                   |                   |                                         |
| Albert at Steese                    | 86        | 170               | 52.6              | 3.6               | 32.1              |                                         |
| Bedrock at Steese                   | 84        |                   |                   | 1.5               | 3.1               |                                         |
|                                     | 85        | 22.6              | 2.4               | 8.1               | 13.2              | 363                                     |
|                                     | 86        | 9.9               | 22.7              | 1.5               | 4.5               | -16.6                                   |
| Crooked at Central                  | 84        |                   |                   | 40.0              | 52.7              |                                         |
|                                     | 85        | 246               | 65.9              | 88.8              | 162               | 171                                     |
|                                     | 86        | 251               | 147               | 37.2              | 65.1              | -11.1                                   |
| Deadwood at CHSR                    | 84        |                   |                   | 8.6               | 11.7              |                                         |
|                                     | 85        | 53.7              | 16.3              | 18.1              | 33.0              | 152                                     |
|                                     | 86        | 35.2              | 17.4              | 5.1               | 6.7               | -46.8                                   |
| Ketchem at CHSR                     | 84        |                   |                   | 2.7               | 4.5               |                                         |
|                                     | 85        | 19.4              | 6.0               | 9.8               | 18.1              | 288                                     |
|                                     | 86        | 15.9              | 5.2               | 1.6               | 2.6               | -52.5                                   |
| Porcupine above<br>mouth            | 85        | 140               | 17.5              | 40.1              | 64.7              |                                         |
|                                     | 86        | 61.7              | 22.6              | 11.7              | 22.4              | -53.6                                   |
| Averages of continuous observations |           |                   |                   |                   |                   |                                         |
| Birch above 12Mile                  | 86        | 207               | 125               | 71.2              | 76.5              |                                         |
| Birch at Bridge                     | 85        | 4600 <sup>a</sup> | 1710 <sup>a</sup> | 1930 <sup>a</sup> | 3790 <sup>a</sup> |                                         |
|                                     | 86        | 3730              | 2370              | 700 <sup>a</sup>  | 828 <sup>a</sup>  | -3.3                                    |
| Crooked above<br>mouth              | 85        | 703               | 505               | 267               | 524               |                                         |
|                                     | 86        | 809               | 436               | 71.7 <sup>a</sup> | 115 <sup>a</sup>  | 3.1                                     |
| Boulder near Steese                 | 84        | 76.4              | 23.9              | 5.5               | 3.6               |                                         |
|                                     | 85        | 70.2              | 36.5              | 11.0              | 25.1              | 30.5                                    |
|                                     | 86        | 33.3              | 24.8              | 7.9               | 9.3               | -47.3                                   |
|                                     | 19-yr avg | 42.6              | 17.5              | 15.3              | 11.4              | 15.3                                    |
| Mammoth at Steese                   | 84        |                   |                   | 20.2 <sup>a</sup> | 19.8 <sup>a</sup> |                                         |
|                                     | 85        | 93.6 <sup>a</sup> | 23.3 <sup>a</sup> | 25.4              | 46.4              | 79.5                                    |
|                                     | 86        | 82.1              | 42.7              | 21.9              | 27.2              | -7.8                                    |
| Faith at Steese                     | 86        | 107               | 80.4              | 294               | 149               |                                         |

<sup>a</sup>Continuous record interrupted by minor discontinuities.

Table 5. Sediment loads associated with placer mining (monthly averages in tons per day).

| <u>Location</u>     | <u>June</u> | <u>July</u> | <u>Aug</u>        | <u>Sep</u>       |
|---------------------|-------------|-------------|-------------------|------------------|
| Birch above 12Mile  | 420         | 79.2        | 40.2              | 48.3             |
| Birch at Bridge     | 7270        | 1450        | nd <sup>a</sup>   | 567 <sup>b</sup> |
| Crooked above Mouth | 1600        | 268         | 47.9 <sup>b</sup> | 101 <sup>b</sup> |
| Boulder near Steese | 2.65        | 1.89        | 0.30              | 0.14             |
| Mammoth at Steese   | 171         | 27.3        | 36.2              | 65.8             |
| Faith at Steese     | 57.2        | 31.3        | 548               | 57.9             |

<sup>a</sup>No data--equipment not working.

<sup>b</sup>Averages of discrete samples and observations.

indicates that much of the lower Birch Creek sediment load last summer was picked up from the channel bottom. Measurements indicate that, of the two main placer mining areas in the Birch Creek drainage--Crooked Creek and Birch Creek above Twelvemile Creek, mining in the Crooked Creek drainage contributed approximately twice as much total sediment load to Birch Creek in 1986 as did mining in the Birch Creek drainage above Twelvemile Creek.

The impact of mining on streams in the Birch Creek drainage can be judged by comparing the sediment loads of Mammoth and Boulder Creeks, two neighboring creeks of similar size. Mammoth Creek is mined and has an area of ~42 mi<sup>2</sup>. Boulder Creek (33 mi<sup>2</sup>) is presently unmined (although mining has historically occurred there), and has 78 percent of the area of the Mammoth Creek, but only two percent of the sediment load.

Data from Faith Creek demonstrate the effect flood events can have on sediment loads. The largest flood of the summer in Faith Creek occurred August 21-22, 1986. The average sediment load for that month was 548 tons per day. However, if the load estimates from August 21-22, (15,700 tons) are subtracted, the average drops to 44.8 tons per day for the month of August, similar to the averages of the other months. At the other sites, flood events did not have as dramatic an effect on the averages.

Sediment load is a good measure for determining if mining pollution has decreased during the past three years of data collection, because it measures the total amount of sediment moved by a stream against the typical amount of sediment in a standard volume of stream water. The extensive TSS data needed to accurately calculate sediment load can only be collected by automated sampler; therefore, the automatic sampler sites were our sole source of data during the 1986 summer.

Table 6 shows monthly average turbidity index loads (TIL) at the sites monitored over the past three years. At most sites affected by mining, TIL has decreased each year. The extent of the decrease is more apparent when

Table 6. Turbidity index loads for Birch Creek drainage, June-Sept. 1984-86, in KNTU-cfs.

| <u>Location</u>                     | <u>Year</u> | <u>June</u>       | <u>July</u>        | <u>Aug</u>         | <u>Sep</u>         | <u>Avg change<br/>from previous<br/>year (%)</u> |
|-------------------------------------|-------------|-------------------|--------------------|--------------------|--------------------|--------------------------------------------------|
| Averages of discrete observations   |             |                   |                    |                    |                    |                                                  |
| Albert at Steese                    | 86          | 3.6               | 0.60               | 0.002              | 0.074              |                                                  |
| Bedrock at Steese                   | 84          |                   |                    | 0.002              | 0.002              |                                                  |
|                                     | 85          | 0.025             | 0.001              | 0.007              | 0.005              | 244                                              |
|                                     | 86          | 0.016             | 0.090              | 0.001              | 0.005              | 196                                              |
| Crooked at Central                  | 84          |                   |                    | 35.2               | 36.7               |                                                  |
|                                     | 85          | 58.1              | 43.4               | 34.6               | 29.3               | -11.0                                            |
|                                     | 86          | 28.4              | 22.2               | 2.6                | 193                | 49.1                                             |
| Deadwood at CHSR                    | 84          |                   |                    | 12.0               | 7.5                |                                                  |
|                                     | 85          | 53.6              | 11.0               | 9.0                | 8.3                | -11.4                                            |
|                                     | 86          | 1.4               | 0.9                | 0.2                | 0.9                | -95.8                                            |
| Ketchem at CHSR                     | 84          |                   |                    | 8.7                | 0.7                |                                                  |
|                                     | 85          | 3.1               | 6.4                | 9.7                | 21.5               | 234                                              |
|                                     | 86          | 1.8               | 0.6                | 0.2                | 2.0                | -88.4                                            |
| Porcupine above<br>Mouth            | 85          |                   | 1.7                | 16.4               | 23.9               |                                                  |
|                                     | 86          | 3.7               | 2.8                | 0.5                | 11.5               | -64.8                                            |
| Averages of continuous observations |             |                   |                    |                    |                    |                                                  |
| Birch above 12Mile                  | 86          | 52.8              | 25.1               | 16.9               | 19.2               |                                                  |
| Birch at Bridge                     | 85          | 216 <sup>a</sup>  | 39.3 <sup>a</sup>  | 67.6 <sup>a</sup>  | 68.2 <sup>a</sup>  |                                                  |
|                                     | 86          | 295               | 261                |                    | 15.8 <sup>a</sup>  | 13.0                                             |
| Crooked above<br>Mouth              | 85          | 73.8 <sup>a</sup> | 44.4 <sup>a</sup>  | 45.9 <sup>a</sup>  | 30.9 <sup>a</sup>  |                                                  |
|                                     | 86          | 95.5              | 28.3               | 2.6                | 9.7 <sup>a</sup>   | -30.2                                            |
| Boulder near Steese                 | 85          |                   | 0.029 <sup>a</sup> | 0.009 <sup>a</sup> | 0.015 <sup>a</sup> |                                                  |
|                                     | 86          | 0.13              | 0.10               | 0.014              | 0.013              | 138                                              |
| Mammoth at Steese                   | 84          |                   |                    | 11.8 <sup>a</sup>  | 19.6 <sup>a</sup>  |                                                  |
|                                     | 85          | 26.7 <sup>a</sup> | 7.9 <sup>a</sup>   | 10.2 <sup>a</sup>  | 17.2 <sup>a</sup>  | -12.9                                            |
|                                     | 86          | 19.7              | 8.3                | 5.8                | 14.1               | -22.6                                            |

<sup>a</sup>Continuous record interrupted by minor discontinuities.

compared to results at sites unaffected by mining (Bedrock and Boulder Creeks), which show substantial increases. One explanation for this phenomenon is that increases in non-point source sedimentation (evidenced from the unmined streams) seem to mask the decrease in point source sedimentation (mine effluent). Thus, turbidity from point sources may be decreasing more than is indicated by the monitoring, although the TIL for unmined streams is so small that only a small fluctuation in turbidity results in a large percentage change. Data in table 6 support the assumption that large decreases in TIL for streams affected by mining will be necessary before they fall within the TIL ranges of unmined streams.

The value of automated samplers and water level recorders was demonstrated during the 1986 monitoring. Use of automated equipment allowed sampling during extreme events and development of a continuous record throughout the summer, which was a significant advance from the techniques of previous years. The equipment is not foolproof: beavers chewed through several transducer lines and intake hoses, a bear attacked a sampler at one location, transducers and batteries failed, and at times the correct buttons were not pushed. However, without the automatic equipment the record would be much less complete, and the flood data from 1986 would not have been collected.

#### Mammoth Creek Intensive Study

Results of individual sampling during the Mammoth Creek Intensive Study are presented in appendix F, and appendix H describes the specifics of each mining operation within the study reach. The study period can be characterized by fairly stable conditions. No precipitation fell immediately before or during the sampling period, and creek water levels remained relatively unchanged. Mining operations were constant except for one mine site where the operator moved in during the sampling period. Because of these relatively stable conditions, it was possible to combine data in appendix E to accurately reflect average conditions during the study period (fig. 5 and table 7).

Independence Creek, one of the headwater tributaries of Mammoth Creek, starts as a small, crystal-clear stream with low TSS values (site 1 in table 7 and fig. 5). After the first mine site (GAM), where recycling methods with low effluent discharge were used, TSS rose noticeably (site 2). The creek was still a fairly clear stream at this point. Below the second mine site (May), the TSS and sediment load almost doubled (site 3). The May operation moved in during the sampling period and was never in a production mode during the sampling period. Independence stayed near the TSS and load levels of site 3 until it met Mastodon Creek (site 5) to form Mammoth Creek. The clear water of Mastodon Creek diluted Independence Creek, and TSS concentration dropped appreciably (from 360 mg/L to 120 mg/L) at site 6.

Mammoth Creek next passed by the third mine site (Loud), where the operator used recycling methods. During the sampling period, little effluent from the Loud operation entered Mammoth Creek (site 8). Below the Loud operation, Mammoth Creek was diverted into two channels of about equal size.

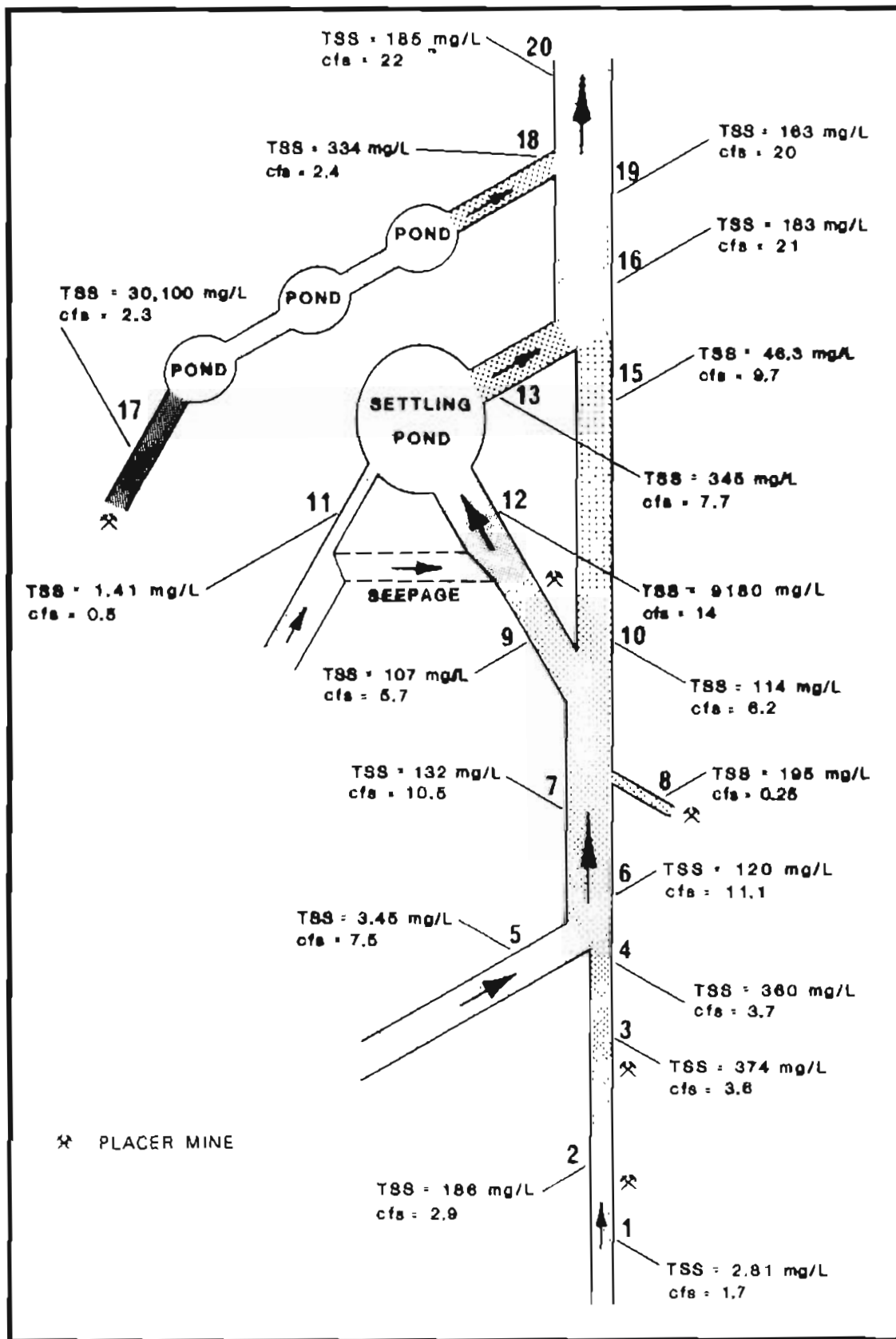


Figure 5. Schematic diagram of intensive study results, Mammoth Creek, Alaska, 7/30-8/1/86.

Table 7. Average discharge, turbidity, TSS, and sediment load from Mammoth Creek Intensive Study, July 30-August 1, 1986.

| Site                  | Turbidity<br>(NTU) | TSS<br>(mg/l) | Discharge<br>(cfs) | Load<br>tons/day | TIL <sup>a</sup><br>(KNTU-cfs) |
|-----------------------|--------------------|---------------|--------------------|------------------|--------------------------------|
| 1 Independence ab GAM | 0.5                | 2.81          | 1.7                | 0.013            | 0.001                          |
| 2 Independence b GAM  | 151                | 186           | 2.9                | 1.46             | 0.44                           |
| 3 Independence b May  | 279                | 374           | 3.6                | 3.64             | 1.00                           |
| 4 Independence ab mth | 248                | 360           | 3.7                | 3.60             | 0.92                           |
| 5 Mastodon ab mth     | 2.2                | 3.45          | 7.5                | 0.070            | 0.02                           |
| 6 Mammoth at head     | 111                | 120           | 11.1               | 3.60             | 1.23                           |
| 7 Mammoth ab L eff    | 124                | 132           | 10.5               | 3.74             | 1.30                           |
| 8 Loud Effluent       | 432                | 195           | 0.25               | 0.13             | 0.11                           |
| 9 AV Diversion        | 69                 | 107           | 5.7                | 1.65             | 0.39                           |
| 10 Mammoth b AVdiv    | 106                | 114           | 6.2                | 1.91             | 0.66                           |
| 11 Miller ab Rd       | 0.51               | 1.41          | 0.5                | 0.002            | 0.000                          |
| 12 AV eff ab Rd       | 3525               | 9180          | 14 <sup>b</sup>    | 347              | 49.4                           |
| 13 AV eff b pond      | 433                | 345           | 7.7                | 7.17             | 3.33                           |
| 14 AV eff ab Mammoth  | 388                | 284           | 7.7                | 5.90             | 2.99                           |
| 15 Mammoth ab AV eff  | 75                 | 46.3          | 9.7                | 1.21             | 0.73                           |
| 16 Mammoth b AV eff   | 255                | 183           | 21                 | 10.4             | 5.36                           |
| 17 Dugas b sluice     | 14000              | 30100         | 2.3                | 187              | 32.2                           |
| 18 Dugas ab Mammoth   | 527                | 334           | 2.4                | 2.16             | 1.26                           |
| 19 Mammoth ab Dugas   | 230                | 163           | 20                 | 8.8              | 4.60                           |
| 20 Mammoth at Steese  | 260                | 185           | 22                 | 11.0             | 5.72                           |

<sup>a</sup>TIL (turbidity index load): product of turbidity and discharge divided by 1000.

<sup>b</sup>Approximately 7 cfs is seepage from Miller Creek through tailings.

The left channel (site 9) was used for process water at the fourth mine site (Alaska Ventures), and the right channel (site 10) was a bypass.

Below Alaska Ventures the left channel of Mammoth Creek became a tail race leading into the Alaska Ventures settling pond. Above the sampling site (12), ~7 cfs from Miller Creek seeped through tailings piles into the tail race channel, effectively doubling the flow. The portion of Miller Creek that did not seep into the tail race was diverted into the settling pond to bypass the fifth mine site (Dugas). Even though the settling pond removes most of the load of the tail race, the load below the settling pond (site 13) was much larger than above the Alaska Ventures mining operation (site 9).

The right, bypass channel (site 15) of Mammoth Creek lost some of its load above its confluence with the Alaska Ventures settling pond effluent (deposition?) and increased its flow by over 50 percent. Below its confluence with the settling pond effluent (site 16), Mammoth Creek is more than the sum of its parts: near this area inflow was occurring from several overland, and, perhaps, ground-water sources. Fourteen cfs were entering the Alaska Ventures settling pond; only 10 cfs were measured leaving by surface outlets--the settling pond effluent, 7.7 cfs, and Dugas mine operation, 2.3 cfs. Assuming the settling pond was at a steady state, four cfs must be lost to ground-water outflow which probably finds its way to the Mammoth Creek main channel.

The Dugas mine operation obtains water from seepage through the Alaska Ventures settling pond. Effluent travels via a long channel through three small settling ponds, and from there to Mammoth Creek just above the Steese Highway bridge. The downstream point of the Study was Mammoth Creek at the Steese Highway Bridge (site 20), where the TSS concentration was 185 mg/L and the average sediment load was 11 tpd. Of this, approximately 0.12 tpd came from the measured clear-water tributaries (Independence, Mastodon and Miller Creeks) that make up most of the flow in Mammoth Creek, 3.6 tpd from the first three mine operations, 5.2 tpd from Alaska Ventures, and 2.2 tpd from Dugas. During the study period, deposition in the channel averaged 2 tpd.

The above description used sediment loads--the product of TSS and discharge--in the discussion of the sediment balance. Turbidity index loads (the product of turbidity and discharge) used in the same manner would have achieved the same result.

One of the objectives of the study was to examine changes in settleable solids among the study reach. Because of the normal-to-low flows in Mammoth Creek and the treatment efforts of the miners, settleable solids levels at all locations, except directly below sluicing, were mostly in the trace range, below the lower detection limit of an Imhoff cone (see appendix E). This illustrates a problem with using settleable solids as a guideline for managing sediment-laden effluent discharges: samples below the lower detection limit can still contain significant and varying amounts of sediment.

The most obvious lesson from the data is that lower total water use results in lower loads added to the stream. For example, if Miller Creek could have been routed away from the Alaska Ventures settling pond, sediment levels in Mammoth Creek would have been measurably lower. The increased flow through the pond decreased the settling efficiency of the pond and resulted in higher settling pond effluent discharges. The operators who released less water had less impact on the stream.

It should be noted that mine effluent was not the only impact on stream sediment loads during the study period. No sluicing was occurring at the second mine site, yet turbidity and TSS values were elevated, most likely from dirt work involved in setting up the mining operation.

The average sediment load at the Steese Highway site for the study period (11 tpd) was low compared to the average for the summer (75 tpd). Much of this difference can be attributed to high flows in June. However, in September, when no large storms occurred and flows were normal and steady through the month, sediment load at the Steese Highway bridge site averaged 66 tpd.

An increase of this magnitude indicates a change in mining practices in late summer from those observed during the study period.

#### Supplementary Data

Appendix F lists data from samples collected by ADF&G during 1985 and 1986 and analyzed in the DGGS laboratory. These data are mostly from samples collected at an automated sampler located on Faith Creek and other sites in the upper Chatanika drainage, Goldstream Creek, as well as from spring breakup. ADF&G has used these data for interpretive reports published elsewhere and for internal reports and memorandum. The data are published here to ensure availability to the public.

Appendix G lists data from two short term, multi-agency, multi-site samplings in the Birch Creek drainage, and data from samples collected outside the Birch Creek drainage.

Fewer samples were collected in 1986 by the Alaska Division of Parks and Outdoor Recreation than in previous years. The results for the three sites sampled show low turbidity levels in most instances.

The lack of response from the Village Water Quality Monitoring program was disappointing. Sample bottles and mailers had been provided for Evansville, Tanana, Birch Creek Village, and Minto. Only Evansville sent back more than one sample. If this program is to provide useful information, samples must be sent in at least weekly during the summer. Results from the Koyukuk River at Evansville showed some high turbidity readings; most of the samples were from early in the summer and may reflect high flows from spring breakup.

#### ACKNOWLEDGMENTS

The authors wish to acknowledge the assistance of Shirley Liss who helped with sample collection and analysis, discharge measurements, and other field and laboratory work.

#### REFERENCES CITED

- Alaska Department of Environmental Conservation, 1979, Water quality standards: Alaska Water Quality Pollution Control Program, Juneau, Alaska, 34 p.
- American Public Health Association (APHA), 1985, Standard methods for the examination of water and wastewater, Sixteenth Edition, Washington, D.C., 1268 p.



- Mack, Stephen F., 1986, Using turbidity to predict total suspended solids in mined streams in interior Alaska: Alaska Division of Geological and Geophysical Surveys, Public-data File 86-84.
- Mack, Stephen F. and Mary A. Moorman, 1986, Hydrologic and water-quality investigations related to the occurrence of placer mining in interior Alaska, Summers 1984-85: Alaska Division of Geological and Geophysical Surveys, Public-data File 86-16.
- Neter, John, Wasserman, William, and Michael H. Kutner, 1985, Applied linear statistical models (2d ed.): Homewood, Illinois, Richard D. Irwin, Inc., 1127 p.
- SAS Institute, Inc., 1985a, SAS users's guide--basics (1985 ed.): SAS Institute, Cary, North Carolina, 921 p.
- SAS Institute, Inc., 1985b, SAS users's guide--statistics (1985 ed.): SAS Institute, Cary, North Carolina, 584 p.

Appendix A. Data from automatic samplers in Birch Creek drainage.

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Birch ab 12mile | 060586      | 1630        | 310                        |                       | 208                        |                                |
| Birch ab 12mile | 060686      |             | 350                        | 1030                  | 164                        | 457                            |
| Birch ab 12mile | 060786      |             | 320                        | 559                   | 150                        | 226                            |
| Birch ab 12mile | 060886      |             | 320                        | 476                   | 130                        | 167                            |
| Birch ab 12mile | 060986      |             | 240                        | 348                   | 176                        | 166                            |
| Birch ab 12mile | 061086      |             | 600                        | 1080                  | 229                        | 668                            |
| Birch ab 12mile | 061186      |             | 130                        | 337                   | 211                        | 192                            |
| Birch ab 12mile | 061286      |             | 340                        | 852                   | 436                        | 1003                           |
| Birch ab 12mile | 061386      |             | 160                        | 552                   | 269                        | 401                            |
| Birch ab 12mile | 061486      |             | 150                        | 340                   | 143                        | 131                            |
| Birch ab 12mile | 061586      |             | 260                        | 359                   | 95.8                       | 92.9                           |
| Birch ab 12mile | 061686      |             | 190                        | 277                   | 55.0                       | 41.1                           |
| Birch ab 12mile | 061686      | 1448        | 160                        | 211                   |                            |                                |
| Birch ab 12mile | 061786      |             | 110                        | 491                   | 43.7                       | 57.9                           |
| Birch ab 12mile | 061886      |             | 210                        | 275                   | 59.7                       | 44.4                           |
| Birch ab 12mile | 061986      |             | 390                        | 1390                  | 354                        | 1330                           |
| Birch ab 12mile | 062086      |             | 320                        | 1280                  | 286                        | 989                            |
| Birch ab 12mile | 062186      |             | 210                        | 833                   | 290                        | 651                            |
| Birch ab 12mile | 062286      |             | 190                        | 577                   | 286                        | 446                            |
| Birch ab 12mile | 062386      |             | 260                        | 1210                  | 460                        | 1503                           |
| Birch ab 12mile | 062486      |             | 330                        | 987                   | 440                        | 1173                           |
| Birch ab 12mile | 062586      |             | 180                        | 545                   | 245                        | 361                            |
| Birch ab 12mile | 062586      | 1520        | 200                        | 390                   |                            |                                |
| Birch ab 12mile | 062686      |             | 100                        | 308                   | 177                        | 147                            |
| Birch ab 12mile | 062786      |             | 150                        | 190                   | 145                        | 74.5                           |
| Birch ab 12mile | 062886      |             | 330                        | 294                   | 126                        | 100                            |
| Birch ab 12mile | 062986      |             | 180                        | 125                   | 106                        | 35.6                           |
| Birch ab 12mile | 063086      |             | 400                        | 164                   | 101                        | 44.6                           |
| Birch ab 12mile | 070186      |             | 500                        | 506                   | 161                        | 220                            |
| Birch ab 12mile | 070286      |             | 150                        | 147                   | 135                        | 53.7                           |
| Birch ab 12mile | 070386      |             | 160                        | 122                   | 113                        | 37.3                           |
| Birch ab 12mile | 070486      |             | 160                        | 92.2                  | 110                        | 27.4                           |
| Birch ab 12mile | 070586      |             | 230                        | 139                   | 98.7                       | 37.0                           |
| Birch ab 12mile | 070686      |             | 150                        | 57                    | 81.2                       | 12.5                           |
| Birch ab 12mile | 070786      |             | 190                        | 106                   | 70.1                       | 20.1                           |
| Birch ab 12mile | 070886      |             | 220                        | 129                   | 63.1                       | 22.0                           |
| Birch ab 12mile | 070886      | 1250        | 240                        | 137                   |                            |                                |
| Birch ab 12mile | 070986      |             | 250                        | 178                   | 72.9                       | 35.1                           |
| Birch ab 12mile | 071086      |             | 290                        | 181                   | 70.8                       | 34.6                           |
| Birch ab 12mile | 071186      |             | 260                        | 223                   | 90.3                       | 54.3                           |
| Birch ab 12mile | 071286      |             | 230                        | 128                   | 141                        | 48.7                           |
| Birch ab 12mile | 071386      |             | 200                        | 269                   | 115                        | 83.7                           |
| Birch ab 12mile | 071486      |             | 340                        | 199                   | 102                        | 55.0                           |
| Birch ab 12mile | 071586      |             | 450                        | 260                   | 86.4                       | 60.7                           |
| Birch ab 12mile | 071686      |             | 500                        | 208                   | 74.0                       | 41.5                           |
| Birch ab 12mile | 071786      |             | 550                        | 331                   | 67.0                       | 59.9                           |

## Appendix A (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Birch ab 12mile | 071886      |             | 600                        | 404                   | 62.9                       | 68.7                           |
| Birch ab 12mile | 071986      |             | 550                        | 326                   | 69.8                       | 61.4                           |
| Birch ab 12mile | 072086      |             | 550                        | 876                   | 255                        | 603                            |
| Birch ab 12mile | 072186      |             | 200                        | 282                   | 251                        | 191                            |
| Birch ab 12mile | 072286      |             | 150                        | 172                   | 216                        | 100                            |
| Birch ab 12mile | 072386      |             | 60                         | 61.8                  | 142                        | 23.6                           |
| Birch ab 12mile | 072386      | 1250        | 40                         | 38.2                  |                            |                                |
| Birch ab 12mile | 072486      |             | 75                         | 86.7                  | 118                        | 27.7                           |
| Birch ab 12mile | 072586      |             | 170                        | 133                   | 106                        | 37.9                           |
| Birch ab 12mile | 072686      |             | 220                        | 215                   | 136                        | 79.1                           |
| Birch ab 12mile | 072786      |             | 140                        | 234                   | 235                        | 149                            |
| Birch ab 12mile | 072886      |             | 95                         | 118                   | 235                        | 74.9                           |
| Birch ab 12mile | 072986      |             | 180                        | 141                   | 148                        | 56.3                           |
| Birch ab 12mile | 073086      |             | 160                        | 122                   | 122                        | 40.1                           |
| Birch ab 12mile | 073186      |             | 170                        | 138                   | 112                        | 41.6                           |
| Birch ab 12mile | 080186      |             | 330                        | 309                   | 110                        | 92.0                           |
| Birch ab 12mile | 080286      |             | 290                        | 259                   | 104                        | 72.4                           |
| Birch ab 12mile | 080386      |             | 260                        | 209                   | 89.2                       | 50.3                           |
| Birch ab 12mile | 080486      |             | 230                        | 191                   | 78.1                       | 40.3                           |
| Birch ab 12mile | 080586      |             | 360                        | 298                   | 71.5                       | 57.5                           |
| Birch ab 12mile | 080686      |             | 400                        | 311                   | 65.4                       | 54.9                           |
| Birch ab 12mile | 080786      |             | 450                        | 401                   | 58.0                       | 62.8                           |
| Birch ab 12mile | 080886      |             | 230                        | 94                    | 53.8                       | 13.6                           |
| Birch ab 12mile | 080986      |             | 150                        | 73.3                  | 50.1                       | 9.9                            |
| Birch ab 12mile | 081086      |             | 100                        | 73.3                  | 43.0                       | 8.5                            |
| Birch ab 12mile | 081186      |             | 190                        | 121                   | 42.9                       | 14.0                           |
| Birch ab 12mile | 081286      |             | 140                        | 85.7                  | 38.6                       | 8.9                            |
| Birch ab 12mile | 081386      |             | 230                        | 150                   | 36.7                       | 14.9                           |
| Birch ab 12mile | 081486      |             | 400                        | 392                   | 35.2                       | 37.2                           |
| Birch ab 12mile | 081586      |             | 200                        | 126                   | 31.9                       | 10.9                           |
| Birch ab 12mile | 081686      |             | 260                        | 181                   | 31.9                       | 15.6                           |
| Birch ab 12mile | 081786      |             | 170                        | 97.2                  | 31.5                       | 8.3                            |
| Birch ab 12mile | 081886      |             | 130                        | 78.7                  | 30.7                       | 6.5                            |
| Birch ab 12mile | 081986      |             | 160                        | 163                   | 28.7                       | 12.6                           |
| Birch ab 12mile | 082086      |             | 290                        | 214                   | 30.9                       | 17.9                           |
| Birch ab 12mile | 082086      | 1245        | 290                        | 214                   |                            |                                |
| Birch ab 12mile | 082186      |             | 200                        | 180                   | 74.0                       | 36.0                           |
| Birch ab 12mile | 082286      |             | 340                        | 355                   | 130                        | 125                            |
| Birch ab 12mile | 082386      |             | 340                        | 343                   | 111                        | 103                            |
| Birch ab 12mile | 082486      |             | 290                        | 285                   | 95.9                       | 73.8                           |
| Birch ab 12mile | 082586      |             | 230                        | 170                   | 82.3                       | 37.8                           |
| Birch ab 12mile | 082686      |             | 290                        | 214                   | 75.5                       | 43.6                           |
| Birch ab 12mile | 082786      |             | 290                        | 232                   | 72.1                       | 45.2                           |
| Birch ab 12mile | 082886      |             | 200                        | 206                   | 125                        | 69.4                           |
| Birch ab 12mile | 082986      |             | 95                         | 84.1                  | 142                        | 32.3                           |
| Birch ab 12mile | 083086      |             | 100                        | 73.8                  | 123                        | 24.6                           |
| Birch ab 12mile | 083186      |             | 230                        | 150                   | 114                        | 46.0                           |

Appendix A (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Birch ab 12mile | 090186      |             | 240                        | 151                   | 102                        | 41.6                           |
| Birch ab 12mile | 090286      |             | 260                        | 174                   | 94.8                       | 44.5                           |
| Birch ab 12mile | 090386      |             | 210                        | 164                   | 87.1                       | 38.6                           |
| Birch ab 12mile | 090486      |             | 380                        | 301                   | 76.1                       | 61.9                           |
| Birch ab 12mile | 090586      |             | 450                        | 331                   | 70.6                       | 63.1                           |
| Birch ab 12mile | 090686      |             | 280                        | 222                   | 65.6                       | 39.3                           |
| Birch ab 12mile | 090786      |             | 400                        | 260                   | 59.8                       | 42.0                           |
| Birch ab 12mile | 090886      |             | 380                        | 275                   | 64.2                       | 47.6                           |
| Birch ab 12mile | 090986      |             | 350                        | 268                   | 98.3                       | 71.1                           |
| Birch ab 12mile | 091086      |             | 450                        | 364                   | 91.5                       | 90.0                           |
| Birch ab 12mile | 091086      | 1215        | 330                        | 291                   |                            |                                |
| Birch ab 12mile | 091186      |             | 450                        | 399                   | 86.0                       | 92.7                           |
| Birch ab 12mile | 091286      |             | 340                        | 325                   | 78.5                       | 68.9                           |
| Birch ab 12mile | 091386      |             | 290                        | 286                   | 72.6                       | 56.0                           |
| Birch ab 12mile | 091486      |             | 320                        | 344                   | 63.2                       | 58.7                           |
| Birch ab 12mile | 091586      |             | 320                        | 354                   | 63.0                       | 60.2                           |
| Birch ab 12mile | 091686      |             | 230                        | 181                   | 65.5                       | 32.0                           |
| Birch ab 12mile | 091786      |             | 300                        | 224                   | 68.4                       | 41.4                           |
| Birch ab 12mile | 091886      |             | 190                        | 164                   | 98.0                       | 43.4                           |
| Birch ab 12mile | 091986      |             | 180                        | 199                   | 80.0                       | 43.0                           |
| Birch ab 12mile | 092086      |             | 170                        | 175                   | 81.6                       | 38.6                           |
| Birch ab 12mile | 092186      |             | 39                         | 58                    | 77.6                       | 12.1                           |
| Birch ab 12mile | 092286      |             | 110                        | 153                   | 72.8                       | 30.1                           |
| Birch ab 12mile | 092386      |             | 150                        | 206                   | 66.8                       | 37.1                           |
| Birch ab 12mile | 092486      |             | 140                        | 190                   | 60.7                       | 31.1                           |
| Birch ab 12mile | 092586      |             | 55                         | 121                   | 67.5                       | 22.1                           |
| Birch ab 12mile | 092586      | 1800        | 60                         | 145                   |                            |                                |
|                 |             |             |                            |                       |                            |                                |
| Birch at bridge | 052386      |             | 18                         | 160                   | 1380                       | 596                            |
| Birch at bridge | 052386      | 1500        | 14                         |                       |                            |                                |
| Birch at bridge | 052486      |             | 18                         | 143                   |                            |                                |
| Birch at bridge | 052586      |             | 14                         | 86.3                  |                            |                                |
| Birch at bridge | 052686      |             | 23                         | 176                   |                            |                                |
| Birch at bridge | 052786      |             | 37                         | 290                   |                            |                                |
| Birch at bridge | 052886      |             | 23                         | 162                   |                            |                                |
| Birch at bridge | 052986      |             | 9.8                        | 48.8                  |                            |                                |
| Birch at bridge | 053086      |             | 9.7                        | 32.6                  |                            |                                |
| Birch at bridge | 053186      |             | 23                         | 99.2                  |                            |                                |
| Birch at bridge | 060186      |             | 40                         | 305                   |                            |                                |
| Birch at bridge | 060286      |             | 110                        | 806                   |                            |                                |
| Birch at bridge | 060386      |             | 110                        | 696                   |                            |                                |
| Birch at bridge | 060686      | 1040        | 20                         |                       | 1880                       |                                |
| Birch at bridge | 061786      | 1555        | 14                         |                       | 1220                       |                                |
| Birch at bridge | 062086      |             | 160                        | 1220                  | 9030                       | 29745                          |
| Birch at bridge | 062186      |             | 180                        | 840                   | 8860                       | 20094                          |
| Birch at bridge | 062286      |             | 65                         | 318                   | 5270                       | 4525                           |
| Birch at bridge | 062386      |             | 45                         | 343                   | 5080                       | 4705                           |

## Appendix A (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Birch at bridge | 062486      |             | 80                         | 587                   | 10700                      | 16958                          |
| Birch at bridge | 062486      | 1300        | 130                        | 1060                  |                            |                                |
| Birch at bridge | 062586      | 1045        | 80                         | 584                   | 11100                      | 17502                          |
| Birch at bridge | 062686      |             | 40                         | 415                   | 4830                       | 5412                           |
| Birch at bridge | 062786      |             | 28                         | 250                   | 2800                       | 1890                           |
| Birch at bridge | 062886      |             | 18                         | 182                   | 1940                       | 953                            |
| Birch at bridge | 070286      |             | 90                         | 660                   | 4640                       | 8268                           |
| Birch at bridge | 070386      |             | 60                         | 600                   | 2390                       | 3872                           |
| Birch at bridge | 070986      | 1350        | 9.1                        | 23                    | 785                        | 48.8                           |
| Birch at bridge | 071186      |             | 28                         | 381                   | 1570                       | 1615                           |
| Birch at bridge | 071286      |             | 55                         | 424                   | 6830                       | 7819                           |
| Birch at bridge | 071386      |             | 27                         | 176                   | 6190                       | 2941                           |
| Birch at bridge | 072186      |             | 110                        | 749                   |                            |                                |
| Birch at bridge | 072286      |             | 80                         | 325                   |                            |                                |
| Birch at bridge | 072386      |             | 24                         | 280                   |                            |                                |
| Birch at bridge | 072386      | 1710        | 23                         | 272                   | 2820                       | 2071                           |
| Birch at bridge | 072486      |             | 13                         | 76.4                  |                            |                                |
| Birch at bridge | 072886      |             | 13                         | 80.3                  |                            |                                |
| Birch at bridge | 072986      |             | 34                         | 448                   |                            |                                |
| Birch at bridge | 073086      |             | 18                         | 141                   |                            |                                |
| Birch at bridge | 073186      |             | 8.0                        | 58.6                  |                            |                                |
| Birch at bridge | 082186      | 1015        | 6.3                        | 3.78                  | 700                        | 7.1                            |
| Birch at bridge | 090986      | 1115        |                            |                       | 804                        |                                |
| Birch at bridge | 091086      |             | 19                         | 33.7                  |                            |                                |
| Birch at bridge | 091186      |             | 24                         | 54.2                  |                            |                                |
| Birch at bridge | 091286      |             | 23                         | 25.1                  |                            |                                |
| Birch at bridge | 091386      |             | 23                         | 23.3                  |                            |                                |
| Birch at bridge | 091486      |             | 20                         | 43.8                  |                            |                                |
| Birch at bridge | 091586      |             | 18                         | 55.4                  |                            |                                |
| Birch at bridge | 091686      |             | 17                         |                       |                            |                                |
| Birch at bridge | 091786      |             | 10                         | 26.1                  |                            |                                |
| Birch at bridge | 091886      |             | 15                         | 27.8                  |                            |                                |
| Birch at bridge | 091986      |             | 14                         | 64.8                  |                            |                                |
| Birch at bridge | 092086      |             | 12                         | 4.00                  |                            |                                |
| Birch at bridge | 092186      |             | 16                         | 17.0                  |                            |                                |
| Birch at bridge | 092286      |             | 19                         | 144                   |                            |                                |
| Birch at bridge | 092386      |             | 28                         | 170                   |                            |                                |
| Birch at bridge | 092486      |             | 15                         | 57.3                  |                            |                                |
| Birch at bridge | 092586      |             | 33                         | 84.6                  |                            |                                |
| Birch at bridge | 092586      | 1305        | 17                         | 67.3                  | 853                        | 155                            |
| Boulder at gage | 052386      | 1745        | 3.7                        |                       |                            |                                |
| Boulder at gage | 060586      | 1927        | 3.4                        |                       |                            |                                |
| Boulder at gage | 061886      | 1200        |                            |                       |                            |                                |
| Boulder at gage | 061986      |             | 16                         | 140                   |                            |                                |
| Boulder at gage | 062086      |             | 10                         | 78.3                  |                            |                                |
| Boulder at gage | 062186      |             | 3.7                        | 38.2                  |                            |                                |

## Appendix A (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Boulder at gage | 062286      |             | 3.2                        | 14.4                  |                            |                                |
| Boulder at gage | 062486      |             | 2.6                        | 27.8                  |                            |                                |
| Boulder at gage | 062486      | 1755        | 3.3                        | 13.2                  |                            |                                |
| Boulder at gage | 062586      |             | 2.1                        | 18.0                  |                            |                                |
| Boulder at gage | 062686      |             | 1.9                        | 10.5                  |                            |                                |
| Boulder at gage | 062786      |             | 1.0                        | 5.0                   |                            |                                |
| Boulder at gage | 062886      |             | 0.9                        | 4.3                   |                            |                                |
| Boulder at gage | 062986      |             | 0.8                        | 1.6                   |                            |                                |
| Boulder at gage | 063086      |             | 0.7                        | 2.1                   |                            |                                |
| Boulder at gage | 070186      |             | 32                         | 291                   |                            |                                |
| Boulder at gage | 070286      |             | 8.7                        | 66.4                  |                            |                                |
| Boulder at gage | 070386      |             | 2.9                        | 37.8                  |                            |                                |
| Boulder at gage | 070486      |             | 3.4                        | 20.2                  |                            |                                |
| Boulder at gage | 070586      |             | 1.9                        | 9.3                   |                            |                                |
| Boulder at gage | 070686      |             | 2.1                        | 6.0                   |                            |                                |
| Boulder at gage | 070786      |             | 1.7                        | 5.5                   |                            |                                |
| Boulder at gage | 070886      | 1555        | 0.7                        | 2.0                   |                            |                                |
| Boulder at gage | 070986      |             | 20                         | 90.9                  |                            |                                |
| Boulder at gage | 070986      | 0950        | 4.9                        |                       |                            |                                |
| Boulder at gage | 070986      | 1750        | 16                         |                       |                            |                                |
| Boulder at gage | 071086      |             | 6.5                        | 44.8                  |                            |                                |
| Boulder at gage | 071086      | 1030        | 2.3                        |                       |                            |                                |
| Boulder at gage | 071186      |             | 9.6                        | 85.1                  |                            |                                |
| Boulder at gage | 071286      |             | 5.9                        | 49.0                  |                            |                                |
| Boulder at gage | 071386      |             | 2.6                        | 14.7                  |                            |                                |
| Boulder at gage | 071486      |             | 1.5                        | 9.4                   |                            |                                |
| Boulder at gage | 071586      |             | 1.2                        | 6.4                   |                            |                                |
| Boulder at gage | 071686      |             | 1.1                        | 1.2                   |                            |                                |
| Boulder at gage | 071786      |             | 0.8                        | 1.2                   |                            |                                |
| Boulder at gage | 071886      |             | 1.0                        | 1.9                   |                            |                                |
| Boulder at gage | 071986      |             | 0.6                        |                       |                            |                                |
| Boulder at gage | 072086      |             | 0.7                        | 1.6                   |                            |                                |
| Boulder at gage | 072186      |             | 2.7                        | 13.1                  |                            |                                |
| Boulder at gage | 072286      |             | 1.0                        | 4.4                   |                            |                                |
| Boulder at gage | 072386      |             | 0.8                        | 2.8                   |                            |                                |
| Boulder at gage | 072386      | 1530        | 1.4                        | 5.4                   |                            |                                |
| Boulder at gage | 072486      |             | 2.1                        |                       |                            |                                |
| Boulder at gage | 072586      |             | 1.7                        | 10.0                  |                            |                                |
| Boulder at gage | 072686      |             | 1.3                        | 5.6                   |                            |                                |
| Boulder at gage | 072786      |             | 1.2                        | 13.9                  |                            |                                |
| Boulder at gage | 072886      |             | 1.8                        | 10.1                  |                            |                                |
| Boulder at gage | 072986      |             | 2.2                        | 5.6                   |                            |                                |
| Boulder at gage | 073086      |             | 0.8                        | 3.3                   |                            |                                |
| Boulder at gage | 073186      |             | 4.2                        | 26.9                  |                            |                                |
| Boulder at gage | 080186      |             | 2.2                        | 9.9                   |                            |                                |
| Boulder at gage | 080286      |             | 2.4                        | 11.2                  |                            |                                |
| Boulder at gage | 080386      |             | 1.1                        | 3.2                   |                            |                                |

Appendix A (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Boulder at gage  | 080486      |             | 0.7                        | 3.4                   |                            |                                |
| Boulder at gage  | 080586      |             | 1.4                        | 5.5                   |                            |                                |
| Boulder at gage  | 080686      |             | 0.6                        | 3.5                   |                            |                                |
| Boulder at gage  | 080786      |             | 2.0                        | 16.7                  |                            |                                |
| Boulder at gage  | 080886      |             | 1.1                        | 2.6                   |                            |                                |
| Boulder at gage  | 080986      |             | 0.6                        | 2.8                   |                            |                                |
| Boulder at gage  | 081086      |             | 0.8                        | 2.0                   |                            |                                |
| Boulder at gage  | 081186      |             | 0.7                        | 2.0                   |                            |                                |
| Boulder at gage  | 081286      |             | 1.0                        | 6.2                   |                            |                                |
| Boulder at gage  | 081386      |             | 0.6                        | 6.9                   |                            |                                |
| Boulder at gage  | 081486      |             | 0.7                        | 9.6                   |                            |                                |
| Boulder at gage  | 081586      |             | 0.6                        | 4.9                   |                            |                                |
| Boulder at gage  | 081686      |             | 0.9                        | 7.2                   |                            |                                |
| Boulder at gage  | 081786      |             | 1.0                        | 2.3                   |                            |                                |
| Boulder at gage  | 081886      |             | 0.8                        | 24.6                  |                            |                                |
| Boulder at gage  | 081986      |             | 0.6                        | 3.6                   |                            |                                |
| Boulder at gage  | 082086      |             | 0.9                        | 19.0                  |                            |                                |
| Boulder at gage  | 082086      | 1600        | 0.6                        | 0.8                   |                            |                                |
| Boulder at gage  | 082186      |             | 2.8                        | 11.3                  |                            |                                |
| Boulder at gage  | 082286      |             | 0.6                        | 5.3                   |                            |                                |
| Boulder at gage  | 082386      |             | 2.1                        | 13.4                  |                            |                                |
| Boulder at gage  | 082486      |             | 0.7                        | 3.0                   |                            |                                |
| Boulder at gage  | 082586      |             | 0.8                        | 4.3                   |                            |                                |
| Boulder at gage  | 082686      |             | 0.8                        | 3.5                   |                            |                                |
| Boulder at gage  | 082786      |             | 0.7                        | 1.9                   |                            |                                |
| Boulder at gage  | 082886      |             | 2.4                        | 21.2                  |                            |                                |
| Boulder at gage  | 082986      |             | 12                         | 115                   |                            |                                |
| Boulder at gage  | 083086      |             | 9.3                        | 88.4                  |                            |                                |
| Boulder at gage  | 083186      |             | 4.2                        | 36.5                  |                            |                                |
| Boulder at gage  | 090186      |             | 2.0                        | 15.1                  |                            |                                |
| Boulder at gage  | 090286      |             | 1.3                        | 8.9                   |                            |                                |
| Boulder at gage  | 090386      |             | 0.9                        | 6.9                   |                            |                                |
| Boulder at gage  | 090486      |             | 1.0                        | 4.7                   |                            |                                |
| Boulder at gage  | 090586      |             | 0.5                        | 3.1                   |                            |                                |
| Boulder at gage  | 090686      |             | 0.7                        | 3.7                   |                            |                                |
| Boulder at gage  | 090786      |             | 1.0                        | 4.6                   |                            |                                |
| Boulder at gage  | 090886      |             | 1.3                        | 4.9                   |                            |                                |
| Boulder at gage  | 090986      |             | 1.1                        | 4.3                   |                            |                                |
| Boulder at gage  | 090986      | 1820        | 1.0                        | 1.3                   |                            |                                |
| Boulder at gage  | 092586      | 1555        | 4.6                        | 64.6                  |                            |                                |
| Crooked ab mouth | 052386      | 1650        | 25                         |                       |                            |                                |
| Crooked ab mouth | 060686      | 1250        | 75                         |                       |                            |                                |
| Crooked ab mouth | 061786      | 1045        | 34                         |                       | 235                        |                                |
| Crooked ab mouth | 061886      |             | 56                         | 311                   | 635                        | 533                            |
| Crooked ab mouth | 061986      |             | 170                        | 669                   | 1590                       | 2872                           |
| Crooked ab mouth | 062086      |             | 270                        | 1380                  | 1290                       | 4807                           |

Appendix A (con.)

| Location         | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Discharge<br>(cfs) | Sediment<br>load (tpd) |
|------------------|--------|------|--------------------|---------------|--------------------|------------------------|
| Crooked ab mouth | 062186 |      | 220                | 893           | 899                | 2167                   |
| Crooked ab mouth | 062286 |      | 130                | 660           | 895                | 1595                   |
| Crooked ab mouth | 062386 |      | 120                | 651           | 1860               | 3269                   |
| Crooked ab mouth | 062486 |      | 100                | 514           | 1380               | 1915                   |
| Crooked ab mouth | 062586 |      | 230                | 576           | 793                | 1234                   |
| Crooked ab mouth | 062586 | 1135 | 120                | 590           |                    |                        |
| Crooked ab mouth | 062686 |      | 35                 | 330           | 578                | 515                    |
| Crooked ab mouth | 062886 |      | 31                 | 126           | 384                | 131                    |
| Crooked ab mouth | 062986 |      | 25                 | 100           | 332                | 90                     |
| Crooked ab mouth | 063086 |      | 22                 | 73            | 523                | 103                    |
| Crooked ab mouth | 070186 |      | 19                 | 72.4          | 726                | 142                    |
| Crooked ab mouth | 070286 |      | 55                 | 376           | 504                | 512                    |
| Crooked ab mouth | 070386 |      | 50                 | 333           | 390                | 351                    |
| Crooked ab mouth | 070486 |      | 40                 | 143           | 343                | 132                    |
| Crooked ab mouth | 070586 |      | 33                 | 103           | 289                | 80                     |
| Crooked ab mouth | 070686 |      | 38                 | 95.1          | 236                | 61                     |
| Crooked ab mouth | 070786 |      | 35                 | 85.7          | 200                | 46                     |
| Crooked ab mouth | 070886 |      | 28                 | 94.7          | 239                | 61                     |
| Crooked ab mouth | 070986 |      | 40                 | 158           | 467                | 199                    |
| Crooked ab mouth | 070986 | 1100 | 36                 | 87.5          |                    |                        |
| Crooked ab mouth | 071086 |      | 200                | 504           | 600                | 817                    |
| Crooked ab mouth | 071186 |      | 130                | 714           | 755                | 1455                   |
| Crooked ab mouth | 071286 |      | 130                | 804           | 632                | 1372                   |
| Crooked ab mouth | 071386 |      | 75                 | 326           | 503                | 443                    |
| Crooked ab mouth | 071486 |      | 40                 | 184           | 413                | 205                    |
| Crooked ab mouth | 071586 |      | 45                 | 135           | 343                | 125                    |
| Crooked ab mouth | 071686 |      | 38                 | 85.1          | 295                | 67.8                   |
| Crooked ab mouth | 071786 |      | 24                 | 66.1          | 237                | 42.4                   |
| Crooked ab mouth | 071886 |      | 33                 | 77.7          | 196                | 41.2                   |
| Crooked ab mouth | 071986 |      | 40                 | 78.5          | 242                | 51.2                   |
| Crooked ab mouth | 072086 |      | 75                 | 124           | 1218               | 408                    |
| Crooked ab mouth | 072186 |      | 90                 | 201           | 769                | 417                    |
| Crooked ab mouth | 072286 |      | 110                | 149           | 495                | 199                    |
| Crooked ab mouth | 072386 |      | 85                 | 102           | 336                | 92.5                   |
| Crooked ab mouth | 072386 | 1800 | 65                 | 80.6          |                    |                        |
| Crooked ab mouth | 072486 |      | 75                 | 234           | 251                | 159                    |
| Crooked ab mouth | 072586 |      | 75                 | 95.4          | 209                | 53.7                   |
| Crooked ab mouth | 072686 |      | 90                 | 102           | 472                | 130                    |
| Crooked ab mouth | 072786 |      | 90                 | 82.3          | 660                | 147                    |
| Crooked ab mouth | 072886 |      | 100                | 85.7          | 479                | 111                    |
| Crooked ab mouth | 072986 |      | 55                 | 88.7          | 339                | 81.2                   |
| Crooked ab mouth | 073086 |      | 25                 | 56            | 255                | 38.6                   |
| Crooked ab mouth | 073186 |      | 25                 | 50.9          |                    |                        |
| Crooked ab mouth | 080186 |      | 34                 | 46            |                    |                        |
| Crooked ab mouth | 080286 |      | 33                 | 45.8          |                    |                        |
| Crooked ab mouth | 080386 |      | 55                 | 64.5          |                    |                        |
| Crooked ab mouth | 080486 |      | 55                 | 123           |                    |                        |



Appendix A (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Crooked ab mouth  | 080586      |             | 32                         | 59.5                  |                            |                                |
| Crooked ab mouth  | 082186      | 1400        | 24                         | 16.5                  | 71.7                       | 3.2                            |
| Crooked ab mouth  | 082286      |             | 32                         | 88.8                  |                            |                                |
| Crooked ab mouth  | 082386      |             | 39                         | 104                   |                            |                                |
| Crooked ab mouth  | 082486      |             | 23                         | 50.0                  |                            |                                |
| Crooked ab mouth  | 090986      | 1310        | 120                        | 255                   | 114                        | 78.5                           |
| Crooked ab mouth  | 091086      |             | 90                         | 69.6                  |                            |                                |
| Crooked ab mouth  | 091186      |             | 95                         | 69.2                  |                            |                                |
| Crooked ab mouth  | 091286      |             | 85                         | 72                    |                            |                                |
| Crooked ab mouth  | 091386      |             | 75                         | 46.7                  |                            |                                |
| Crooked ab mouth  | 091486      |             | 85                         | 68.5                  |                            |                                |
| Crooked ab mouth  | 091586      |             | 90                         | 60.8                  |                            |                                |
| Crooked ab mouth  | 091686      |             | 85                         | 50.6                  |                            |                                |
| Crooked ab mouth  | 091786      |             | 110                        | 66.2                  |                            |                                |
| Crooked ab mouth  | 091886      |             | 70                         | 43.3                  |                            |                                |
| Crooked ab mouth  | 091986      |             | 65                         | 35.8                  |                            |                                |
| Crooked ab mouth  | 092086      |             | 75                         | 43.4                  |                            |                                |
| Crooked ab mouth  | 092186      |             | 95                         | 69.4                  |                            |                                |
| Crooked ab mouth  | 092286      |             | 90                         | 70.1                  |                            |                                |
| Crooked ab mouth  | 092386      |             | 90                         | 60.9                  |                            |                                |
| Crooked ab mouth  | 092486      |             | 100                        | 70.6                  |                            |                                |
| Crooked ab mouth  | 092586      | 1400        | 65                         | 66.5                  | 115                        | 20.6                           |
| Mammoth at Steese | 052386      |             | 65                         | 438                   | 39.9                       | 47.2                           |
| Mammoth at Steese | 052386      | 1135        | 40                         |                       |                            |                                |
| Mammoth at Steese | 052486      |             | 70                         | 551                   | 31.4                       | 46.7                           |
| Mammoth at Steese | 052586      |             | 110                        | 886                   | 35.8                       | 85.6                           |
| Mammoth at Steese | 052686      |             | 95                         | 649                   | 39.8                       | 69.7                           |
| Mammoth at Steese | 052786      |             | 120                        | 898                   | 37.0                       | 89.7                           |
| Mammoth at Steese | 052886      |             | 120                        | 765                   | 29.0                       | 59.8                           |
| Mammoth at Steese | 052986      |             | 170                        | 1001                  | 28.7                       | 77.7                           |
| Mammoth at Steese | 053086      |             | 190                        | 1228                  | 43.6                       | 144.6                          |
| Mammoth at Steese | 060186      |             | 450                        | 2397                  | 95.2                       | 616.3                          |
| Mammoth at Steese | 060286      |             | 350                        | 1443                  | 106.8                      | 416.1                          |
| Mammoth at Steese | 060386      |             | 280                        | 720                   | 94.5                       | 183.7                          |
| Mammoth at Steese | 060486      |             | 330                        | 939                   | 81.7                       | 207.0                          |
| Mammoth at Steese | 060586      |             | 600                        | 2400                  | 94.2                       | 610.3                          |
| Mammoth at Steese | 060586      | 1750        | 950                        | 3180                  |                            |                                |
| Mammoth at Steese | 060686      |             | 55                         | 215                   | 108.1                      | 62.7                           |
| Mammoth at Steese | 060786      |             | 120                        | 560                   | 85.9                       | 129.8                          |
| Mammoth at Steese | 060886      |             | 140                        | 598                   | 87.9                       | 142.0                          |
| Mammoth at Steese | 060986      |             | 170                        | 500                   | 109.5                      | 147.9                          |
| Mammoth at Steese | 061086      |             | 370                        | 1320                  | 83.1                       | 296.3                          |
| Mammoth at Steese | 061186      |             | 370                        | 787                   | 58.4                       | 124.1                          |
| Mammoth at Steese | 061286      |             | 270                        | 1090                  | 130.4                      | 383.9                          |
| Mammoth at Steese | 061386      |             | 250                        | 577                   | 91.1                       | 141.9                          |
| Mammoth at Steese | 061486      |             | 290                        | 479                   | 55.9                       | 72.2                           |

## Appendix A (con.)

| Location          | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Discharge<br>(cfs) | Sediment<br>load (tpd) |
|-------------------|--------|------|--------------------|---------------|--------------------|------------------------|
| Mammoth at Steese | 061586 |      | 200                | 346           | 36.8               | 34.4                   |
| Mammoth at Steese | 061686 |      | 550                | 955           | 24.2               | 62.5                   |
| Mammoth at Steese | 061686 | 1730 | 180                | 207           |                    |                        |
| Mammoth at Steese | 061786 |      | 180                | 238           | 15.9               | 10.2                   |
| Mammoth at Steese | 061886 |      | 270                | 204           | 15.9               | 8.8                    |
| Mammoth at Steese | 061986 |      | 340                | 750           | 94.4               | 191                    |
| Mammoth at Steese | 062086 |      | 110                | 426           | 134.4              | 155                    |
| Mammoth at Steese | 062186 |      | 450                | 1200          | 135.3              | 438                    |
| Mammoth at Steese | 062286 |      | 110                | 314           | 97.5               | 82.7                   |
| Mammoth at Steese | 062386 |      | 100                | 519           | 142.2              | 199                    |
| Mammoth at Steese | 062386 | 1305 | 150                | 620           |                    |                        |
| Mammoth at Steese | 062486 |      | 85                 | 628           | 156.2              | 265                    |
| Mammoth at Steese | 062586 |      | 50                 | 160           | 93.8               | 40.5                   |
| Mammoth at Steese | 062586 | 1400 | 70                 |               |                    |                        |
| Mammoth at Steese | 062686 |      | 110                | 114           | 62.4               | 24.3                   |
| Mammoth at Steese | 062786 |      | 140                | 150           | 52.8               | 21.4                   |
| Mammoth at Steese | 062886 |      | 130                | 159           | 45.0               | 19.3                   |
| Mammoth at Steese | 062986 |      | 75                 | 82.8          | 36.1               | 8.1                    |
| Mammoth at Steese | 063086 |      | 280                | 233           | 36.1               | 22.7                   |
| Mammoth at Steese | 070186 |      | 230                | 449           | 118.5              | 144                    |
| Mammoth at Steese | 070286 |      | 130                | 201           | 91.0               | 49.4                   |
| Mammoth at Steese | 070386 |      | 230                | 245           | 60.9               | 40.3                   |
| Mammoth at Steese | 070486 |      | 300                | 329           | 44.1               | 39.2                   |
| Mammoth at Steese | 070586 |      | 270                | 205           | 38.9               | 21.5                   |
| Mammoth at Steese | 070686 |      | 280                | 192           | 35.3               | 18.3                   |
| Mammoth at Steese | 070786 |      | 270                | 169           | 30.8               | 14.1                   |
| Mammoth at Steese | 070886 |      | 220                | 143           | 62.1               | 24.0                   |
| Mammoth at Steese | 070886 | 1445 | 180                | 89            |                    |                        |
| Mammoth at Steese | 070986 |      | 160                | 478           | 70.6               | 91.1                   |
| Mammoth at Steese | 070986 | 0930 | 140                |               |                    |                        |
| Mammoth at Steese | 070986 | 1730 | 150                |               |                    |                        |
| Mammoth at Steese | 071086 |      | 150                | 314           | 50.5               | 42.8                   |
| Mammoth at Steese | 071086 | 1045 | 110                |               |                    |                        |
| Mammoth at Steese | 071186 |      | 140                | 244           | 41.6               | 27.4                   |
| Mammoth at Steese | 071286 |      | 100                | 298           | 44.5               | 35.8                   |
| Mammoth at Steese | 071386 |      | 75                 | 116           | 39.0               | 12.2                   |
| Mammoth at Steese | 071486 |      | 40                 | 61            | 33.9               | 5.6                    |
| Mammoth at Steese | 071586 |      | 130                | 84.9          | 32.6               | 7.5                    |
| Mammoth at Steese | 071686 |      | 210                | 128           | 29.3               | 10.1                   |
| Mammoth at Steese | 071786 |      | 260                | 159           | 27.3               | 11.7                   |
| Mammoth at Steese | 071886 |      | 250                | 142           | 23.9               | 9.2                    |
| Mammoth at Steese | 071986 |      | 130                | 64.5          | 22.6               | 3.9                    |
| Mammoth at Steese | 072086 |      | 100                | 104           | 29.6               | 8.3                    |
| Mammoth at Steese | 072186 |      | 190                | 281           | 47.8               | 36.3                   |
| Mammoth at Steese | 072286 |      | 280                | 357           | 43.8               | 42.2                   |
| Mammoth at Steese | 072386 |      | 310                | 247           | 37.9               | 25.3                   |
| Mammoth at Steese | 072386 | 1420 | 250                | 196           |                    |                        |

Appendix A (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Mammoth at Steese | 072486      |             | 290                        | 243                   | 31.1                       | 20.4                           |
| Mammoth at Steese | 072586      |             | 250                        | 174                   | 29.3                       | 13.8                           |
| Mammoth at Steese | 072686      |             | 110                        | 107                   | 32.7                       | 9.4                            |
| Mammoth at Steese | 072786      |             | 90                         | 179                   | 38.5                       | 18.6                           |
| Mammoth at Steese | 072886      |             | 110                        | 126                   | 39.3                       | 13.4                           |
| Mammoth at Steese | 072986      |             | 240                        | 208                   | 35.0                       | 19.7                           |
| Mammoth at Steese | 073086      |             | 310                        | 217                   | 31.0                       | 18.2                           |
| Mammoth at Steese | 073186      |             | 250                        | 185                   | 28.9                       | 14.4                           |
| Mammoth at Steese | 080186      |             | 210                        | 152                   | 25.5                       | 10.5                           |
| Mammoth at Steese | 080286      |             | 150                        | 110                   | 24.6                       | 7.3                            |
| Mammoth at Steese | 080386      |             | 140                        | 83.4                  | 24.7                       | 5.6                            |
| Mammoth at Steese | 080486      |             | 180                        | 173                   | 23.8                       | 11.1                           |
| Mammoth at Steese | 080586      |             | 200                        | 193                   | 20.7                       | 10.8                           |
| Mammoth at Steese | 080686      |             | 220                        | 197                   | 20.4                       | 10.8                           |
| Mammoth at Steese | 080786      |             | 220                        | 187                   | 19.7                       | 9.9                            |
| Mammoth at Steese | 080886      |             | 220                        | 192                   | 18.9                       | 9.8                            |
| Mammoth at Steese | 080986      |             | 240                        | 187                   | 19.2                       | 9.7                            |
| Mammoth at Steese | 081086      |             | 260                        | 221                   | 18.4                       | 11.0                           |
| Mammoth at Steese | 081186      |             | 250                        | 169                   | 18.1                       | 8.3                            |
| Mammoth at Steese | 081286      |             | 320                        | 234                   | 16.4                       | 10.3                           |
| Mammoth at Steese | 081386      |             | 310                        | 240                   | 14.8                       | 9.6                            |
| Mammoth at Steese | 081486      |             | 320                        | 264                   | 16.5                       | 11.7                           |
| Mammoth at Steese | 081586      |             | 220                        | 175                   | 12.3                       | 5.8                            |
| Mammoth at Steese | 081686      |             | 180                        | 131                   | 10.5                       | 3.7                            |
| Mammoth at Steese | 081786      |             | 160                        | 115                   | 11.9                       | 3.7                            |
| Mammoth at Steese | 081886      |             | 240                        | 186                   | 11.7                       | 5.9                            |
| Mammoth at Steese | 081986      |             | 250                        | 185                   | 10.4                       | 5.2                            |
| Mammoth at Steese | 082086      |             | 210                        | 164                   | 10.9                       | 4.8                            |
| Mammoth at Steese | 082086      | 1430        | 180                        | 143                   |                            |                                |
| Mammoth at Steese | 082186      |             | 250                        | 203                   | 14.2                       | 7.8                            |
| Mammoth at Steese | 082286      |             | 250                        | 207                   | 19.5                       | 10.9                           |
| Mammoth at Steese | 082386      |             | 310                        | 295                   | 25.3                       | 20.2                           |
| Mammoth at Steese | 082486      |             | 310                        | 314                   | 25.1                       | 21.3                           |
| Mammoth at Steese | 082586      |             | 320                        | 289                   | 24.2                       | 18.9                           |
| Mammoth at Steese | 082686      |             | 400                        | 348                   | 23.2                       | 21.8                           |
| Mammoth at Steese | 082786      |             | 380                        | 308                   | 22.7                       | 18.9                           |
| Mammoth at Steese | 082886      |             | 340                        | 262                   | 26.4                       | 18.7                           |
| Mammoth at Steese | 082986      |             | 450                        | 457                   | 54.0                       | 66.6                           |
| Mammoth at Steese | 083086      |             | 500                        | 4360                  | 53.0                       | 624                            |
| Mammoth at Steese | 083186      |             | 230                        | 1160                  | 41.1                       | 129                            |
| Mammoth at Steese | 090186      |             | 260                        | 641                   | 34.9                       | 60.4                           |
| Mammoth at Steese | 090286      |             | 280                        | 551                   | 29.0                       | 43.2                           |
| Mammoth at Steese | 090386      |             | 190                        | 439                   | 29.5                       | 35.0                           |
| Mammoth at Steese | 090486      |             | 160                        | 372                   | 23.1                       | 23.2                           |
| Mammoth at Steese | 090586      |             | 310                        | 695                   | 22.0                       | 41.4                           |
| Mammoth at Steese | 090686      |             | 400                        | 563                   | 21.0                       | 32.0                           |
| Mammoth at Steese | 090786      |             | 650                        | 795                   | 21.6                       | 46.3                           |

## Appendix A (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Discharge<br/>(cfs)</u> | <u>Sediment<br/>load (tpd)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|----------------------------|--------------------------------|
| Mammoth at Steese | 090886      |             | 550                        | 591                   | 24.4                       | 38.9                           |
| Mammoth at Steese | 090886      |             | 270                        | 296                   |                            |                                |
| Mammoth at Steese | 090886      | 1600        | 240                        | 241                   |                            |                                |
| Mammoth at Steese | 090986      |             | 550                        | 955                   | 26.0                       | 67.0                           |
| Mammoth at Steese | 091086      |             | 340                        | 465                   | 25.3                       | 31.7                           |
| Mammoth at Steese | 091086      | 1035        | 270                        |                       |                            |                                |
| Mammoth at Steese | 091186      |             | 550                        | 989                   | 26.3                       | 70.3                           |
| Mammoth at Steese | 091286      |             | 700                        | 825                   | 26.5                       | 59.0                           |
| Mammoth at Steese | 091386      |             | 600                        | 891                   | 20.6                       | 49.6                           |
| Mammoth at Steese | 091486      |             | 650                        | 580                   | 21.0                       | 32.9                           |
| Mammoth at Steese | 091586      |             | 400                        | 796                   | 25.0                       | 53.7                           |
| Mammoth at Steese | 091686      |             | 160                        | 205                   | 29.5                       | 16.3                           |
| Mammoth at Steese | 091786      |             | 85                         | 131                   | 32.0                       | 11.3                           |
| Mammoth at Steese | 091886      |             | 110                        | 164                   | 33.4                       | 14.8                           |
| Mammoth at Steese | 091986      |             | 330                        | 753                   | 35.5                       | 72.2                           |
| Mammoth at Steese | 092086      |             | 350                        | 802                   | 36.4                       | 78.9                           |
| Mammoth at Steese | 092186      |             | 550                        | 934                   | 29.8                       | 75.3                           |
| Mammoth at Steese | 092286      |             | 650                        | 1090                  | 29.8                       | 87.6                           |
| Mammoth at Steese | 092386      |             | 750                        | 1630                  | 27.6                       | 121                            |
| Mammoth at Steese | 092486      |             | 1300                       | 3360                  | 26.5                       | 240                            |
| Mammoth at Steese | 092586      | 1650        | 2300                       | 4070                  | 22.1                       | 243                            |

Appendix B. Data from non-automatic monitoring sites, Birch Creek drainage.

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>Discharge<br/>(cfs)</u> |
|------------------|-------------|-------------|----------------------------|----------------------------|
| Birch ab CC      | 062586      | 1215        | 50                         |                            |
| Birch ab CC      | 070986      | 1300        | 4.6                        |                            |
| Birch ab CC      | 082186      | 1455        | 2.3                        |                            |
| Birch ab CC      | 090986      | 1640        | 4.5                        |                            |
| Birch ab CC      | 092586      | 1420        | 50                         |                            |
| Albert at Steese | 060686      | 1335        | 1.3                        | 21.7                       |
| Albert at Steese | 061786      | 1650        | 2.6                        | 42.7                       |
| Albert at Steese | 062386      | 1647        | 65                         | 336                        |
| Albert at Steese | 062486      | 1215        | 50                         | 237                        |
| Albert at Steese | 062486      | 1735        |                            | 213                        |
| Albert at Steese | 062586      | 0945        | 5.2                        | 168                        |
| Albert at Steese | 070886      | 1720        | 1.5                        | 9.07                       |
| Albert at Steese | 070986      | 1035        | 16                         | 47.7                       |
| Albert at Steese | 070986      | 1625        | 110                        | 112                        |
| Albert at Steese | 071086      | 0910        | 24                         | 154                        |
| Albert at Steese | 072386      | 1855        | 2.0                        | 14.6                       |
| Albert at Steese | 072886      | 1955        | 0.7                        | 22.4                       |
| Albert at Steese | 073186      | 0847        | 0.7                        | 9.07                       |
| Albert at Steese | 080186      | 0850        | 0.6                        | 7.19                       |
| Albert at Steese | 082086      | 1644        |                            | no flow                    |
| Albert at Steese | 090886      | 1715        | 1.3                        | 17.4                       |
| Albert at Steese | 090986      | 0910        | 25                         | 52.9                       |
| Albert at Steese | 091086      | 0940        | 6.2                        | 47.7                       |
| Albert at Steese | 092586      | 1500        | 1.7                        | 10.3                       |
| Bedrock at cg    | 052386      | 1330        | 1.1                        | 1ce                        |
| Bedrock at cg    | 060586      | 1820        | 2.3                        | 16.4                       |
| Bedrock at cg    | 060686      | 1408        | 3.1                        | 8.75                       |
| Bedrock at cg    | 061686      | 1818        | 2.4                        | 2.10                       |
| Bedrock at cg    | 061886      | 1300        | 0.6                        | 1.89                       |
| Bedrock at cg    | 062386      | 1630        | 1.8                        | 22.3                       |
| Bedrock at cg    | 062586      | 1355        | 0.9                        | 7.77                       |
| Bedrock at cg    | 070886      | 1520        | 1.5                        | 2.21                       |
| Bedrock at cg    | 070986      | 0935        | 7.1                        | 45.5                       |
| Bedrock at cg    | 070986      | 1740        | 8.3                        | 63.8                       |
| Bedrock at cg    | 071086      | 1040        | 2.3                        | 33.8                       |
| Bedrock at cg    | 072386      | 1915        | 0.5                        | 3.58                       |
| Bedrock at cg    | 072886      | 1755        | 0.5                        | 6.33                       |
| Bedrock at cg    | 073186      | 0936        | 0.5                        | 3.42                       |
| Bedrock at cg    | 080186      | 0921        | 0.3                        | 2.83                       |
| Bedrock at cg    | 082086      | 1530        | 1.0                        | 0.72                       |
| Bedrock at cg    | 082186      | 1630        | 1.0                        | 0.87                       |
| Bedrock at cg    | 090886      | 1650        | 0.4                        | 4.11                       |
| Bedrock at cg    | 091086      | 1025        | 2.1                        | 6.33                       |
| Bedrock at cg    | 092586      | 1210        | 1.1                        | 2.97                       |

## Appendix B (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>Discharge<br/>(cfs)</u> |
|------------------|-------------|-------------|----------------------------|----------------------------|
| Crooked at Cen   | 052386      | 1430        | 55                         | 114                        |
| Crooked at Cen   | 060586      | 1933        | 65                         | 186                        |
| Crooked at Cen   | 060686      | 0955        | 220                        | 249                        |
| Crooked at Cen   | 060686      | 1345        |                            | 221                        |
| Crooked at Cen   | 061686      | 1910        | 80                         | 83.6                       |
| Crooked at Cen   | 061786      | 0830        | 37                         | 54.8                       |
| Crooked at Cen   | 061786      | 1810        |                            | 61.0                       |
| Crooked at Cen   | 061886      | 0920        | 100                        | 57.2                       |
| Crooked at Cen   | 062386      | 1640        | 190                        | 514                        |
| Crooked at Cen   | 062486      | 1025        | 190                        | 536                        |
| Crooked at Cen   | 062486      | 1740        |                            | 433                        |
| Crooked at Cen   | 062586      | 0935        | 55                         | 293                        |
| Crooked at Cen   | 070886      | 1710        | 230                        | 61.0                       |
| Crooked at Cen   | 070986      | 1025        | 130                        | 325                        |
| Crooked at Cen   | 070986      | 1704        | 160                        | 433                        |
| Crooked at Cen   | 071086      | 0900        | 140                        | 278                        |
| Crooked at Cen   | 072386      | 1903        | 300                        | 85.2                       |
| Crooked at Cen   | 072886      | 1810        | 27                         | 119                        |
| Crooked at Cen   | 072986      | 0858        | 70                         | 101                        |
| Crooked at Cen   | 073086      | 0850        | 150                        | 85.2                       |
| Crooked at Cen   | 073186      | 0855        | 150                        | 63.6                       |
| Crooked at Cen   | 080186      | 0855        | 70                         | 63.3                       |
| Crooked at Cen   | 080386      | 1500        |                            | 46.6                       |
| Crooked at Cen   | 082086      | 1655        | 95                         | 17.2                       |
| Crooked at Cen   | 082186      | 1546        | 120                        | 21.3                       |
| Crooked at Cen   | 090886      | 1705        | 150                        | 50.0                       |
| Crooked at Cen   | 090986      | 1725        | 220                        | 80.6                       |
| Crooked at Cen   | 091086      | 0950        | 140                        | 85.2                       |
| Crooked at Cen   | 092586      | 1510        | 650                        | 44.5                       |
|                  |             |             |                            |                            |
| Deadwood at CHSR | 052386      | 1410        | 180                        | 169                        |
| Deadwood at CHSR | 060586      | 1940        | 110                        | 44.0                       |
| Deadwood at CHSR | 060686      | 0945        | 40                         | 38.7                       |
| Deadwood at CHSR | 061686      | 1900        | 9.0                        | 11.9                       |
| Deadwood at CHSR | 061786      | 1840        | 14                         | 9.69                       |
| Deadwood at CHSR | 061886      | 0930        | 7.8                        | 7.81                       |
| Deadwood at CHSR | 062386      | 1700        | 70                         | 60.8                       |
| Deadwood at CHSR | 062486      | 1000        | 27                         | 71.5                       |
| Deadwood at CHSR | 062586      | 0930        | 25                         | 37.5                       |
| Deadwood at CHSR | 070886      | 1700        | 3.6                        | 6.96                       |
| Deadwood at CHSR | 070986      | 1010        | 6.8                        | 10.7                       |
| Deadwood at CHSR | 070986      | 1815        | 80                         | 12.4                       |
| Deadwood at CHSR | 071086      | 0950        | 14                         | 24.6                       |
| Deadwood at CHSR | 072386      | 1622        | 100                        | 20.2                       |
| Deadwood at CHSR | 072886      | 1815        | 20                         | 23.6                       |
| Deadwood at CHSR | 072986      | 0850        | 70                         | 20.2                       |
| Deadwood at CHSR | 073086      | 0840        | 80                         | 13.0                       |

## Appendix B (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>Discharge<br/>(cfs)</u> |
|------------------|-------------|-------------|----------------------------|----------------------------|
| Deadwood at CHSR | 073186      | 0836        | 110                        | 19.4                       |
| Deadwood at CHSR | 080186      | 0838        | 90                         | 9.69                       |
| Deadwood at CHSR | 080386      | 1455        | 8.8                        | 3.90                       |
| Deadwood at CHSR | 082086      | 1740        | 31                         | 2.89                       |
| Deadwood at CHSR | 082186      | 1600        | 24                         | 3.90                       |
| Deadwood at CHSR | 090886      | 1750        | 21                         | 3.90                       |
| Deadwood at CHSR | 090986      | 1745        | 55                         | 8.72                       |
| Deadwood at CHSR | 091086      | 1005        | 95                         | 7.38                       |
| Deadwood at CHSR | 092586      | 1530        | 390                        | 6.96                       |
| Ketchem at CHSR  | 052386      | 1400        | 160                        | 3.90                       |
| Ketchem at CHSR  | 060586      | 1947        | 160                        | 8.14                       |
| Ketchem at CHSR  | 060686      | 0940        | 120                        | 12.0                       |
| Ketchem at CHSR  | 061686      | 1855        | 140                        | 0.95                       |
| Ketchem at CHSR  | 061786      | 1835        | 80                         | 1.32                       |
| Ketchem at CHSR  | 061886      | 0955        | 140                        | 0.51                       |
| Ketchem at CHSR  | 062386      | 1705        | 90                         | 46.8                       |
| Ketchem at CHSR  | 062486      | 0955        | 100                        | 36.6                       |
| Ketchem at CHSR  | 062586      | 0920        | 130                        | 21.1                       |
| Ketchem at CHSR  | 070886      | 1655        | 160                        | 2.25                       |
| Ketchem at CHSR  | 070986      | 1005        | 140                        | 3.41                       |
| Ketchem at CHSR  | 070986      | 1810        | 130                        | 4.43                       |
| Ketchem at CHSR  | 071086      | 0930        | 90                         | 3.41                       |
| Ketchem at CHSR  | 072386      | 1615        | 95                         | 4.43                       |
| Ketchem at CHSR  | 072886      | 1820        | 110                        | 8.62                       |
| Ketchem at CHSR  | 072986      | 0845        | 100                        | 9.12                       |
| Ketchem at CHSR  | 073086      | 0830        | 150                        | 5.70                       |
| Ketchem at CHSR  | 073186      | 0830        | 130                        | 4.43                       |
| Ketchem at CHSR  | 080186      | 0830        | 170                        | 2.98                       |
| Ketchem at CHSR  | 080386      | 1450        |                            | 1.32                       |
| Ketchem at CHSR  | 082086      | 1730        | 200                        | 0.88                       |
| Ketchem at CHSR  | 082186      | 1555        | 200                        | 1.32                       |
| Ketchem at CHSR  | 090886      | 1730        | 1000                       | 1.22                       |
| Ketchem at CHSR  | 090986      | 1740        | 1200                       | 3.90                       |
| Ketchem at CHSR  | 091086      | 1000        | 800                        | 2.98                       |
| Ketchem at CHSR  | 092586      | 1525        | 160                        | 2.25                       |
| Porcupine ab mth | 052386      | 1320        | 55                         | 40.0                       |
| Porcupine ab mth | 060586      | 1740        | 65                         | 79.0                       |
| Porcupine ab mth | 061886      | 1310        | 28                         | 24.2                       |
| Porcupine ab mth | 062586      | 1405        | 50                         | 82.0                       |
| Porcupine ab mth | 070886      | 1425        | 26                         | 12.6                       |
| Porcupine ab mth | 070986      | 0920        | 190                        | 22.9                       |
| Porcupine ab mth | 070986      | 1725        | 70                         | 44.0                       |
| Porcupine ab mth | 071086      | 1052        | 90                         | 38.1                       |
| Porcupine ab mth | 072386      | 1930        | 500                        | 19.0                       |
| Porcupine ab mth | 072886      | 1710        | 14                         | 51.5                       |

Appendix B (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>Discharge<br/>(cfs)</u> |
|------------------|-------------|-------------|----------------------------|----------------------------|
| Porcupine ab mth | 073086      | 1435        | 12                         | 21.5                       |
| Porcupine ab mth | 073186      |             | 65                         | 4.15                       |
| Porcupine ab mth | 080186      | 1205        | 100                        | 17.8                       |
| Porcupine ab mth | 082086      | 1500        | 5.6                        | 7.49                       |
| Porcupine ab mth | 082186      | 1645        | 13                         | 9.66                       |
| Porcupine ab mth | 090886      | 1635        | 60                         | 16.2                       |
| Porcupine ab mth | 091086      | 1115        | 120                        | 45.0                       |
| Porcupine ab mth | 092586      | 1715        | 1400                       | 20.9                       |



Appendix C. Settleable solids data from all sources by site.

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Birch ab 12mile  | 060586      | 1630        | 310                        |                       | 1.1                           |
| Birch ab 12mile  | 061686      | 1448        | 160                        | 211                   | tr                            |
| Birch ab 12mile  | 062586      | 1520        | 200                        | 390                   | 0.22                          |
| Birch ab 12mile  | 070886      | 1250        | 240                        | 137                   | tr                            |
| Birch ab 12mile  | 072386      | 1250        | 40                         | 38.2                  | tr                            |
| Birch ab 12mile  | 082086      | 1245        | 290                        | 214                   | tr                            |
| Birch ab 12mile  | 091086      | 1215        | 330                        | 291                   | tr                            |
| Birch ab 12mile  | 092586      | 1800        | 60                         | 145                   | 0.05                          |
| Birch ab CC      | 062586      | 1215        | 50                         |                       | 0.4                           |
| Birch ab CC      | 070986      | 1300        | 4.6                        |                       | nd                            |
| Birch ab CC      | 082186      | 1455        | 2.3                        |                       | nd                            |
| Birch ab CC      | 090986      | 1640        | 4.5                        |                       | nd                            |
| Birch at bridge  | 052386      | 1500        | 14                         |                       | nd                            |
| Birch at bridge  | 060386      |             | 90                         | 264                   | 0.55                          |
| Birch at bridge  | 060386      |             | 85                         | 235                   | 0.6                           |
| Birch at bridge  | 060686      | 1040        | 20                         |                       | 0.05                          |
| Birch at bridge  | 061786      | 1555        | 14                         |                       | tr                            |
| Birch at bridge  | 062486      | 1300        | 130                        | 1060                  | 2.0                           |
| Birch at bridge  | 062586      | 1045        | 80                         | 584                   | 0.8                           |
| Birch at bridge  | 070986      | 1350        | 9.1                        | 23                    | tr                            |
| Birch at bridge  | 072386      | 1710        | 23                         | 272                   | tr                            |
| Birch at bridge  | 082186      | 1015        | 6.3                        | 3.78                  | nd                            |
| Birch at bridge  | 090986      | 1115        |                            |                       | nd                            |
| Birch ab clums f | 062486      | 1500        | 95                         | 311                   | 0.35                          |
| Birch ab harriss | 062486      | 1500        | 95                         | 310                   | 0.2                           |
| Birch at butte   | 062486      | 1300        | 350                        | 889                   | 0.7                           |
| Birch at harring | 062486      | 1345        | 140                        | 392                   | 0.4                           |
| Butte ab mth     | 062486      | 1300        | 270                        | 1570                  | 2.0                           |
| Eagle at glddust | 062486      | 1300        | 450                        | 962                   | 0.7                           |
| Gold Dust ab mth | 062486      | 1300        | 140                        | 472                   | 0.4                           |
| Harrison ab mth  | 062486      | 1500        | 50                         | 251                   | 0.3                           |
| Indepndnce a GAM | 072986      | 1255        | 0.8                        | 3.44                  | nd                            |
| Indepndnce a GAM | 073086      | 0915        | 0.9                        | 12.6                  | tr                            |
| Indepndnce a GAM | 073086      | 1258        | 0.4                        | 0.85                  | tr                            |
| Indepndnce a GAM | 073186      | 0908        | 0.4                        | 0.9                   | nd                            |

Appendix C (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Indepndnce a GAM | 073186      | 1300        | 0.3                        | 1.05                  | tr                            |
| Indepndnce a GAM | 073186      | 1700        | 0.5                        | 0.63                  | tr                            |
| Indepndnce a GAM | 080186      | 0900        | 0.3                        | 0.75                  | nd                            |
| Indepndnce a GAM | 080186      | 1300        | 0.7                        | 1.79                  | nd                            |
| Indepndnce a GAM | 080386      | 1540        | 0.7                        | 4.45                  |                               |
| Indepndnce b GAM | 073086      | 0935        | 50                         | 41                    | tr                            |
| Indepndnce b GAM | 073086      | 1307        | 37                         | 32.1                  | tr                            |
| Indepndnce b GAM | 073086      | 1713        | 370                        | 469                   | tr                            |
| Indepndnce b GAM | 073186      | 0916        | 65                         | 46                    | tr                            |
| Indepndnce b GAM | 073186      | 1307        | 70                         | 71.7                  | tr                            |
| Indepndnce b GAM | 073186      | 1709        | 420                        | 480                   | tr                            |
| Indepndnce b GAM | 080186      | 0907        | 90                         | 66.1                  | tr                            |
| Indepndnce b may | 073186      | 1105        | 55                         | 89.1                  | tr                            |
| Indepndnce b may | 073186      | 1346        | 33                         | 29.3                  | tr                            |
| Indepndnce b may | 073186      | 1745        | 55                         | 70                    | tr                            |
| Indepndnce b may | 080186      | 0945        | 37                         | 27.3                  | tr                            |
| Indepndnce b may | 080186      | 1345        | 900                        | 1610                  |                               |
| Indepndnce a mth | 072986      | 1548        | 3.7                        | 5.94                  | tr                            |
| Indepndnce a mth | 073086      | 1124        | 31                         | 14.3                  | nd                            |
| Indepndnce a mth | 073086      | 1502        | 380                        | 397                   | 0.1                           |
| Indepndnce a mth | 073086      | 1859        | 45                         | 43.4                  | tr                            |
| Indepndnce a mth | 073186      | 1102        | 130                        | 160                   | 0.08                          |
| Indepndnce a mth | 073186      | 1502        | 20                         | 20                    | nd                            |
| Indepndnce a mth | 073186      | 1902        | 55                         | 57.5                  | tr                            |
| Indepndnce a mth | 080186      | 1100        | 33                         | 29.6                  | tr                            |
| Indepndnce a mth | 080186      | 1503        | 1000                       | 1590                  | 2.0                           |
| Mastodon a mth   | 072986      | 1548        | 2.1                        | 5                     | tr                            |
| Mastodon a mth   | 073086      | 1127        | 2.1                        | 4.69                  | tr                            |
| Mastodon a mth   | 073086      | 1500        | 2.7                        | 5.11                  | nd                            |
| Mastodon a mth   | 073086      | 1903        | 2.7                        | 2.25                  | nd                            |
| Mastodon a mth   | 073186      | 1104        | 2.1                        | 2.46                  | nd                            |
| Mastodon a mth   | 073186      | 1525        | 2.4                        | 2.08                  | tr                            |
| Mastodon a mth   | 073186      | 1903        | 2.2                        | 4.39                  | tr                            |
| Mastodon a mth   | 080186      | 1102        | 2.4                        | 4.16                  | nd                            |
| Mastodon a mth   | 080186      | 1504        | 2.1                        | 2.08                  | tr                            |
| Mammoth at head  | 072986      | 1548        | 3.2                        | 9.01                  | tr                            |
| Mammoth at head  | 073086      | 1125        | 14                         | 18.3                  | tr                            |
| Mammoth at head  | 073086      | 1459        | 210                        | 245                   | tr                            |
| Mammoth at head  | 073086      | 1900        | 34                         | 31.8                  | tr                            |
| Mammoth at head  | 073186      | 1102        | 80                         | 124                   | tr                            |
| Mammoth at head  | 073186      | 1500        | 19                         | 24.8                  | tr                            |
| Mammoth at head  | 073186      | 1901        | 33                         | 32.8                  | tr                            |

## Appendix C (con.)

| Location         | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|--------|------|--------------------|---------------|-----------------------|
| Mammoth at head  | 080186 | 1100 | 25                 | 20.6          | tr                    |
| Mammoth at head  | 080186 | 1507 | 700                | 926           | 1.0                   |
| Mammoth ab l eff | 072986 | 1750 | 9.1                | 7.73          | 0.05                  |
| Mammoth ab l eff | 073086 | 1203 | 9.0                | 18            | tr                    |
| Mammoth ab l eff | 073086 | 1538 | 150                | 194           | 0.05                  |
| Mammoth ab l eff | 073086 | 1945 | 10                 | 10.2          | tr                    |
| Mammoth ab l eff | 073186 | 1538 | 45                 | 103           | 0.05                  |
| Mammoth ab l eff | 073186 | 1936 | 110                | 418           | 0.4                   |
| Mammoth ab l eff | 080186 | 1136 | 11                 | 14            | tr                    |
| Mammoth ab l eff | 080186 | 1520 | 310                | 57.6          | .55                   |
| Loud effluent    | 073086 | 1202 | 450                | 261           | tr                    |
| Loud effluent    | 073086 | 1534 | 500                | 171           | tr                    |
| Loud effluent    | 073086 | 1941 | 450                | 153           | nd                    |
| Loud effluent    | 073186 | 1130 | 330                | 102           | tr                    |
| Loud effluent    | 073186 | 1534 | 310                | 81.9          | nd                    |
| Loud effluent    | 073186 | 1932 | 260                | 63.8          | tr                    |
| Loud effluent    | 080186 | 1139 | 190                | 52.9          | tr                    |
| Loud effluent    | 080186 | 1523 | 190                | 52.2          | tr                    |
| AV diversion     | 072986 | 1548 | 13                 | 14.7          | tr                    |
| AV diversion     | 073086 | 1208 | 9.5                | 7.06          | tr                    |
| AV diversion     | 073086 | 1537 | 170                | 151           | tr                    |
| AV diversion     | 073086 | 1945 | 17                 | 12.4          | tr                    |
| AV diversion     | 073186 | 1135 | 35                 | 40.1          | tr                    |
| AV diversion     | 073186 | 1538 | 36                 | 72.5          | 0.05                  |
| AV diversion     | 073186 | 1936 | 37                 | 91.6          | 0.05                  |
| AV diversion     | 080186 | 1141 | 16                 | 15.8          | tr                    |
| AV diversion     | 080186 | 1520 | 290                | 556           | 0.6                   |
| Mammoth b AV div | 073086 | 1208 | 26                 | 24.1          | tr                    |
| Mammoth b AV div | 073086 | 1534 | 120                | 142           | tr                    |
| Mammoth b AV div | 073086 | 1943 | 23                 | 21            | tr                    |
| Mammoth b AV div | 073186 | 1132 | 38                 | 46.5          | tr                    |
| Mammoth b AV div | 073186 | 1536 | 40                 | 116           | 0.05                  |
| Mammoth b AV div | 073186 | 1932 | 26                 | 57.1          | 0.05                  |
| Mammoth b AV div | 080186 | 1136 | 21                 | 18.1          | tr                    |
| Mammoth b AV div | 080186 | 1518 | 280                | 498           | 0.5                   |
| AV eff ab rd     | 073086 | 1300 | 2500               | 8640          | 13                    |
| AV eff ab rd     | 073086 | 1800 | 3800               | 14100         | 27                    |
| AV eff ab rd     | 073186 | 0900 |                    |               | 4.2                   |
| AV eff ab rd     | 073186 | 1220 | 7380               | 18500         | 49                    |
| AV eff ab rd     | 073186 | 1620 | 3590               | 9680          | 28                    |
| AV eff ab rd     | 080186 | 1230 | 6980               | 19500         | 41                    |

## Appendix C (con.)

| Location         | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|--------|------|--------------------|---------------|-----------------------|
| Miller ab rd     | 073086 | 1230 | 0.6                | 2.7           | nd                    |
| Miller ab rd     | 073086 | 1800 | 0.5                | 1.21          | nd                    |
| Miller ab rd     | 073186 | 0855 | 0.4                | 0.86          | tr                    |
| Miller ab rd     | 073186 | 1620 | 0.5                | 0.32          | nd                    |
| Miller ab rd     | 080186 | 0850 | 0.6                | 0.36          | nd                    |
| Miller ab rd     | 080186 | 1230 | 0.5                | 0.45          | nd                    |
| Miller #2        | 062486 |      | 39                 | 148           | 0.05                  |
| AV eff b pond    | 073086 | 0940 | 450                | 337           | 0.05                  |
| AV eff b pond    | 073086 | 1330 | 500                | 386           | tr                    |
| AV eff b pond    | 073086 | 1805 | 600                | 526           | tr                    |
| AV eff b pond    | 073186 | 0915 | 360                | 276           | tr                    |
| AV eff b pond    | 073186 | 1245 | 420                | 334           | tr                    |
| AV eff b pond    | 073186 | 1630 | 550                | 477           | tr                    |
| AV eff b pond    | 080186 | 0912 | 290                | 212           | tr                    |
| AV eff b pond    | 080186 | 1255 | 260                | 215           | tr                    |
| AV eff a Mammoth | 073086 | 1030 | 430                | 309           | tr                    |
| AV eff a Mammoth | 073086 | 1350 | 500                | 375           | 0.05                  |
| AV eff a Mammoth | 073086 | 1825 | 550                | 430           | tr                    |
| AV eff a Mammoth | 073186 | 0945 | 350                | 235           | tr                    |
| AV eff a Mammoth | 073186 | 1320 | 390                | 277           | tr                    |
| AV eff a Mammoth | 073186 | 1705 | 390                | 287           | tr                    |
| AV eff a Mammoth | 080186 | 0935 | 230                | 163           | tr                    |
| Mammoth ab AVeff | 073086 | 1045 | 85                 | 48.5          | tr                    |
| Mammoth ab AVeff | 073086 | 1350 | 70                 | 36.8          | tr                    |
| Mammoth ab AVeff | 073086 | 1825 | 150                | 108           | tr                    |
| Mammoth ab AVeff | 073186 | 0945 | 75                 | 40.1          | tr                    |
| Mammoth ab AVeff | 073186 | 1310 | 70                 | 46.5          | tr                    |
| Mammoth ab AVeff | 073186 | 1705 | 50                 | 38.9          | tr                    |
| Mammoth ab AVeff | 080186 | 1005 | 55                 | 27.3          | tr                    |
| Mammoth ab AVeff | 080186 | 1315 | 45                 | 24.6          | tr                    |
| Mammoth b AV eff | 073086 | 1115 | 300                | 197           | tr                    |
| Mammoth b AV eff | 073086 | 1400 | 330                | 220           | tr                    |
| Mammoth b AV eff | 073086 | 1830 | 410                | 296           | tr                    |
| Mammoth b AV eff | 073186 | 0950 | 240                | 152           | tr                    |
| Mammoth b AV eff | 073186 | 1340 | 230                | 170           | tr                    |
| Mammoth b AV eff | 073186 | 1700 | 250                | 203           | tr                    |
| Mammoth b AV eff | 080186 | 0940 | 140                | 112           | tr                    |
| Mammoth b AV eff | 080186 | 1325 | 140                | 112           | tr                    |
| dugas b sluice   | 073086 | 0950 | 950                | 3900          | 3.5                   |
| dugas b sluice   | 073086 | 1330 | 18900              | 36400         | 82                    |
| dugas b sluice   | 073086 | 1805 | 14600              | 34000         | 97                    |

Appendix C (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| dugas b sluice    | 073186      | 0910        | 17100                      | 33600                 | 92                            |
| dugas b sluice    | 073186      | 1245        | 17900                      | 35400                 | 98                            |
| dugas b sluice    | 073186      | 1635        | 16800                      | 33000                 | 120                           |
| dugas b sluice    | 080186      | 0915        | 12900                      | 27000                 | 69                            |
| dugas b sluice    | 080186      | 1355        | 13100                      | 37500                 | 80                            |
| Dugas eff ab mam  | 073086      | 1350        | 550                        | 319                   | tr                            |
| Dugas eff ab mam  | 073086      | 1805        | 600                        | 422                   | tr                            |
| Dugas eff ab mam  | 073186      | 1025        | 550                        | 308                   | tr                            |
| Dugas eff ab mam  | 073186      | 1400        | 650                        | 458                   | tr                            |
| Dugas eff ab mam  | 080186      | 1005        | 550                        | 247                   | tr                            |
| Dugas eff ab mam  | 080186      | 1400        | 400                        | 256                   | tr                            |
| Mammoth ab Dugas  | 073086      | 1335        | 210                        | 136                   | tr                            |
| Mammoth ab Dugas  | 073086      | 1805        | 290                        | 273                   | 0.05                          |
| Mammoth ab Dugas  | 073186      | 1800        | 220                        | 177                   | tr                            |
| Mammoth at Steese | 052386      | 1135        | 40                         |                       | 0.1                           |
| Mammoth at Steese | 060386      |             | 200                        |                       | 1.1                           |
| Mammoth at Steese | 060386      |             | 250                        | 777                   | 1.0                           |
| Mammoth at Steese | 060586      | 1750        | 950                        | 3180                  | 3.5                           |
| Mammoth at Steese | 061686      | 1730        | 180                        | 207                   | 0.1                           |
| Mammoth at Steese | 062386      | 1305        | 150                        | 620                   | 0.8                           |
| Mammoth at Steese | 062586      | 1400        | 70                         |                       | 0.05                          |
| Mammoth at Steese | 070886      | 1445        | 180                        | 89                    | tr                            |
| Mammoth at Steese | 070986      | 0930        | 140                        |                       | tr                            |
| Mammoth at Steese | 070986      | 1730        | 150                        |                       | 0.1                           |
| Mammoth at Steese | 071086      | 1045        | 110                        |                       | 0.2                           |
| Mammoth at Steese | 072386      | 1420        | 250                        | 196                   | tr                            |
| Mammoth at Steese | 073086      | 1430        | 300                        | 204                   | tr                            |
| Mammoth at Steese | 073086      | 1830        | 310                        | 213                   | tr                            |
| Mammoth at Steese | 073186      | 1030        | 240                        | 152                   | tr                            |
| Mammoth at Steese | 073186      | 1430        | 240                        | 162                   | tr                            |
| Mammoth at Steese | 073186      | 2230        | 240                        | 235                   | tr                            |
| Mammoth at Steese | 080186      | 0230        | 240                        | 166                   | tr                            |
| Mammoth at Steese | 080186      | 0630        | 210                        | 149                   | tr                            |
| Mammoth at Steese | 080186      | 1030        | 170                        | 118                   | tr                            |
| Mammoth at Steese | 082086      | 1430        | 180                        | 143                   | tr                            |
| Mammoth at Steese | 090886      | 1600        | 240                        | 241                   | tr                            |
| Mammoth at Steese | 091086      | 1035        | 270                        |                       | 0.05                          |
| Mammoth at Steese | 092586      | 1650        | 2300                       | 4070                  | 6.7                           |
| Mammoth #3        | 062486      | 1438        | 38                         | 208                   | 0.1                           |
| Mammoth #5        | 062486      | 1438        | 40                         | 134                   | 0.1                           |

Appendix C (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Porcupine ab mth | 052386      | 1320        | 55                         |                       | 0.1                           |
| Porcupine ab mth | 060386      |             | 70                         | 191                   | 0.3                           |
| Porcupine ab mth | 060386      |             | 80                         | 206                   | 0.4                           |
| Porcupine ab mth | 060586      | 1740        | 65                         |                       | 0.3                           |
| Porcupine ab mth | 060686      | 1540        | 120                        |                       | 0.3                           |
| Porcupine ab mth | 061786      | 0830        | 70                         | 134                   | tr                            |
| Porcupine ab mth | 062586      | 1405        | 50                         |                       |                               |
| Porcupine ab mth | 070886      | 1425        | 26                         |                       | nd                            |
| Porcupine ab mth | 070986      | 0920        | 190                        |                       | tr                            |
| Porcupine ab mth | 070986      | 1725        | 70                         |                       | 0.1                           |
| Porcupine ab mth | 071086      | 1052        | 90                         |                       | tr                            |
| Porcupine ab mth | 072386      | 1930        | 500                        |                       | 0.10                          |
| Porcupine ab mth | 082086      | 1500        | 5.6                        |                       | nd                            |
| Porcupine ab mth | 082186      | 1645        | 13                         |                       | tr                            |
| Porcupine ab mth | 090886      | 1635        | 60                         |                       | tr                            |
| Porcupine ab mth | 091086      | 1115        | 120                        |                       | 0.5                           |
| Porcupine ab mth | 092586      | 1715        | 1400                       |                       | 0.1                           |
|                  |             |             |                            |                       |                               |
| Bedrock at cg    | 060386      |             | 0.6                        | 3.6                   | nd                            |
| Bedrock at cg    | 060386      |             | 1.5                        | 0.8                   | nd                            |
| Bedrock at cg    | 052386      | 1330        | 1.1                        |                       | nd                            |
| Bedrock at cg    | 060586      | 1820        | 2.3                        |                       | tr                            |
| Bedrock at cg    | 061686      | 1818        | 2.4                        |                       | nd                            |
| Bedrock at cg    | 061886      | 1300        | 0.6                        |                       | nd                            |
| Bedrock at cg    | 070886      | 1520        | 1.5                        |                       | nd                            |
| Bedrock at cg    | 070986      | 0935        | 7.1                        |                       | tr                            |
| Bedrock at cg    | 070986      | 1740        | 8.3                        |                       | .05                           |
| Bedrock at cg    | 071086      | 1040        | 2.3                        |                       | tr                            |
| Bedrock at cg    | 072386      | 1915        | 0.5                        |                       | nd                            |
| Bedrock at cg    | 082086      | 1530        | 1.0                        |                       | nd                            |
| Bedrock at cg    | 082186      | 1630        | 1.0                        |                       | tr                            |
| Bedrock at cg    | 090886      | 1650        | 0.4                        |                       | nd                            |
| Bedrock at cg    | 091086      | 1025        | 2.1                        |                       | nd                            |
|                  |             |             |                            |                       |                               |
| Boulder at gage  | 060386      |             | 3.6                        | 11.2                  | nd                            |
| Boulder at gage  | 060386      |             | 3.6                        | 9.9                   | nd                            |
| Boulder at gage  | 060586      | 1927        | 3.4                        |                       | tr                            |
| Boulder at gage  | 062486      | 1755        | 3.3                        | 13.2                  | tr                            |
| Boulder at gage  | 070886      | 1555        | 0.7                        | 1.95                  | nd                            |
| Boulder at gage  | 070986      | 0950        | 4.9                        |                       | nd                            |
| Boulder at gage  | 070986      | 1750        | 16                         |                       | 0.15                          |
| Boulder at gage  | 071086      | 1030        | 2.3                        |                       | tr                            |
| Boulder at gage  | 072386      | 1530        | 1.4                        | 5.44                  | tr                            |
| Boulder at gage  | 082086      | 1600        | 0.6                        | 0.81                  | nd                            |
| Boulder at gage  | 090986      | 1820        | 1.0                        | 1.28                  | nd                            |

Appendix C (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Crooked at Cen   | 052386      | 1430        | 55                         |                       | nd                            |
| Crooked at Cen   | 060386      |             | 85                         | 151                   | 0.2                           |
| Crooked at Cen   | 060386      |             | 110                        | 165                   | 0.1                           |
| Crooked at Cen   | 060586      | 1933        | 65                         |                       | tr                            |
| Crooked at Cen   | 060686      | 0955        | 220                        |                       | 0.45                          |
| Crooked at Cen   | 061686      | 1910        | 80                         |                       | tr                            |
| Crooked at Cen   | 061786      | 0830        | 37                         |                       | tr                            |
| Crooked at Cen   | 061886      | 0920        | 100                        |                       | tr                            |
| Crooked at Cen   | 062386      | 1640        | 190                        |                       | 1.5                           |
| Crooked at Cen   | 062486      | 1025        | 190                        |                       | 1.3                           |
| Crooked at Cen   | 062586      | 0935        | 55                         |                       | 0.3                           |
| Crooked at Cen   | 070886      | 1710        | 230                        |                       | tr                            |
| Crooked at Cen   | 070986      | 1025        | 130                        |                       | 0.3                           |
| Crooked at Cen   | 070986      | 1704        | 160                        |                       | 0.4                           |
| Crooked at Cen   | 071086      | 0900        | 140                        |                       | 0.15                          |
| Crooked at Cen   | 072386      | 1903        | 300                        |                       | tr                            |
| Crooked at Cen   | 082086      | 1655        | 95                         |                       | nd                            |
| Crooked at Cen   | 082186      | 1546        | 120                        |                       | tr                            |
| Crooked at Cen   | 090886      | 1705        | 150                        |                       | tr                            |
| Crooked at Cen   | 090986      | 1725        | 220                        |                       | 0.1                           |
| Crooked at Cen   | 091086      | 0950        | 140                        |                       | 0.05                          |
| Crooked at Cen   | 092586      | 1510        | 650                        |                       | 0.05                          |
| Deadwood at CHSR | 052386      | 1410        | 180                        |                       | 0.8                           |
| Deadwood at CHSR | 060386      |             | 65                         | 190                   | 0.6                           |
| Deadwood at CHSR | 060386      |             | 60                         | 391                   | 0.65                          |
| Deadwood at CHSR | 060586      | 1940        | 110                        |                       | 0.5                           |
| Deadwood at CHSR | 060686      | 0945        | 40                         |                       | 0.15                          |
| Deadwood at CHSR | 061686      | 1900        | 9.0                        |                       | tr                            |
| Deadwood at CHSR | 061786      | 1840        | 14                         |                       | tr                            |
| Deadwood at CHSR | 062386      | 1700        | 70                         |                       | 0.4                           |
| Deadwood at CHSR | 062486      | 1000        | 27                         |                       | 0.1                           |
| Deadwood at CHSR | 062586      | 0930        | 25                         |                       | 0.1                           |
| Deadwood at CHSR | 070886      | 1700        | 3.6                        |                       | tr                            |
| Deadwood at CHSR | 070986      | 1010        | 6.8                        |                       | nd                            |
| Deadwood at CHSR | 070986      | 1815        | 80                         |                       | .05                           |
| Deadwood at CHSR | 071086      | 0950        | 14                         |                       | 0.05                          |
| Deadwood at CHSR | 072386      | 1622        | 100                        |                       | tr                            |
| Deadwood at CHSR | 082086      | 1740        | 31                         |                       | tr                            |
| Deadwood at CHSR | 082186      | 1600        | 24                         |                       | nd                            |
| Deadwood at CHSR | 090886      | 1750        | 21                         |                       | nd                            |
| Deadwood at CHSR | 090986      | 1745        | 55                         |                       | tr                            |
| Deadwood at CHSR | 091086      | 1005        | 95                         |                       | tr                            |
| Deadwood at CHSR | 092586      | 1530        | 390                        |                       | tr                            |
| Deadwood ab mine | 060386      |             | 60                         | 301                   | 0.75                          |
| Deadwood ab mine | 060386      |             | 60                         | 376                   | 0.8                           |

Appendix C (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Ketchem a CHSR    | 052386      | 1400        | 160                        |                       | 0.6                           |
| Ketchem a CHSR    | 060386      |             | 95                         | 335                   | 0.6                           |
| Ketchem a CHSR    | 060386      |             | 90                         | 333                   | 0.5                           |
| Ketchem a CHSR    | 060586      | 1947        | 160                        |                       | 0.1                           |
| Ketchem a CHSR    | 060686      | 0940        | 120                        |                       | 0.2                           |
| Ketchem a CHSR    | 061686      | 1855        | 140                        |                       | tr                            |
| Ketchem a CHSR    | 061786      | 1835        | 80                         |                       | nd                            |
| Ketchem a CHSR    | 061886      | 0955        | 140                        |                       | nd                            |
| Ketchem a CHSR    | 062386      | 1705        | 90                         |                       | 0.3                           |
| Ketchem a CHSR    | 062486      | 0955        | 100                        |                       | 0.25                          |
| Ketchem a CHSR    | 062586      | 0920        | 130                        |                       | 0.2                           |
| Ketchem a CHSR    | 070886      | 1655        | 160                        |                       | tr                            |
| Ketchem a CHSR    | 070986      | 1005        | 140                        |                       | tr                            |
| Ketchem a CHSR    | 070986      | 1810        | 130                        |                       | tr                            |
| Ketchem a CHSR    | 071086      | 0930        | 90                         |                       | 0.05                          |
| Ketchem a CHSR    | 072386      | 1615        | 95                         |                       | tr                            |
| Ketchem a CHSR    | 082086      | 1730        | 200                        |                       | tr                            |
| Ketchem a CHSR    | 082186      | 1555        | 200                        |                       | tr                            |
| Ketchem a CHSR    | 090886      | 1730        | 1000                       |                       | tr                            |
| Ketchem a CHSR    | 090986      | 1740        | 1200                       |                       | tr                            |
| Ketchem a CHSR    | 091086      | 1000        | 800                        |                       | tr                            |
| Ketchem a CHSR    | 092586      | 1525        | 160                        |                       | tr                            |
| Portage a Mdcn Lk | 062486      | 1000        | 65                         | 119                   | tr                            |
| Albert at Steese  | 060686      | 1335        | 1.3                        |                       | nd                            |
| Albert at Steese  | 061786      | 1650        | 2.6                        |                       | nd                            |
| Albert at Steese  | 062386      | 1647        | 65                         |                       | 0.15                          |
| Albert at Steese  | 062486      | 1215        | 50                         |                       | 0.1                           |
| Albert at Steese  | 062586      | 0945        | 5.2                        |                       | 0.15                          |
| Albert at Steese  | 070886      | 1720        | 1.5                        |                       | nd                            |
| Albert at Steese  | 070986      | 1035        | 16                         |                       | tr                            |
| Albert at Steese  | 070986      | 1625        | 110                        |                       | 0.5                           |
| Albert at Steese  | 071086      | 0910        | 24                         |                       | 0.3                           |
| Albert at Steese  | 072386      | 1855        | 2.0                        |                       | nd                            |
| Albert at Steese  | 090886      | 1715        | 1.3                        |                       | tr                            |
| Albert at Steese  | 090986      | 0910        | 25                         |                       | 0.1                           |
| Albert at Steese  | 091086      | 0940        | 6.2                        |                       | tr                            |
| Crooked ab mouth  | 052386      | 1650        | 25                         |                       | nd                            |
| Crooked ab mouth  | 060686      | 1250        | 75                         |                       | tr                            |
| Crooked ab mouth  | 061786      | 1045        | 34                         |                       | tr                            |
| Crooked ab mouth  | 062586      | 1135        | 120                        | 590                   | 0.65                          |
| Crooked ab mouth  | 070986      | 1100        | 36                         | 87.5                  | 0.1                           |
| Crooked ab mouth  | 072386      | 1800        | 65                         | 80.6                  | tr                            |
| Crooked ab mouth  | 082186      | 1400        | 24                         | 16.5                  | nd                            |
| Crooked ab mouth  | 090986      | 1310        | 120                        | 255                   | tr                            |



## Appendix C (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Chena river 1    | 052086      | 1417        | 8.8                        | 114                   | 0.3                           |
| Chena river 2    | 052086      | 1510        | 5.7                        | 17.5                  | 0.05                          |
| Cripple Creek    | 052086      | 1516        | 50                         | 233                   | 0.5                           |
| Little Chena     | 052086      | 1415        | 14                         | 64.9                  | 0.2                           |
| Livengood Creek  | 052086      | 1125        | 170                        | 524                   | 0.55                          |
| Tatalina river   | 052086      | 1205        | 1.4                        | 3.6                   | tr                            |
| Tolovana river   | 052086      | 1145        | 1.9                        | 9.8                   | tr                            |
| Tolovana river2  | 052086      | 1035        | 9.3                        | 24.8                  | 0.05                          |
| WF Tolovana r.   | 052086      | 1002        | 1.6                        | 6                     | tr                            |
| First Chance     | 090586      |             | 7.3                        | 6.8                   | tr                            |
| Flume a steese   | 090586      |             | 2.5                        | 2.38                  | nd                            |
| Gilmore a trk st | 090586      |             | 1100                       | 722                   | tr                            |
| Gilmore Creek    | 052086      | 1345        | 75                         | 98.8                  | 0.15                          |
| Goldstream a br  | 090586      |             | 180                        | 129                   | 0.05                          |
| Goldstream a gsr | 090586      |             | 330                        | 261                   | 0.1                           |
| Goldstream a scr | 090586      |             | 31                         | 36.2                  | tr                            |
| Goldstream a she | 090586      |             | 120                        | 64                    | tr                            |
| Goldstream Creek | 052086      | 1350        | 210                        | 524                   | 1.1                           |
| Pedro a 1st chnc | 090586      |             | 330                        | 201                   | tr                            |
| Pedro a gld pan  | 090586      |             | 110                        | 84                    | nd                            |
| Steamboat a stee | 090586      |             | 26                         | 282                   | 0.3                           |
| McManus Cr       | 060686      |             | 1.4                        | 11.4                  | tr                            |
| Deep ab Dale     | 060686      |             | 1.7                        | 2.63                  | nd                            |
| Deep at Faith    | 060686      |             | 120                        | 351                   | 0.25                          |

Appendix C (con.)

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>Set. solids<br/>(ml/L)</u> |
|-------------------|-------------|-------------|----------------------------|-----------------------|-------------------------------|
| Deep lml us       | 060686      |             | 100                        | 613                   | 0.8                           |
| Deep at fcr       | 060686      |             | 140                        | 832                   | 1.1                           |
| Faith a low rd    | 060686      |             | 18                         | 88.6                  | 0.05                          |
| Faith ab deep cr  | 060686      |             | 18                         | 85.4                  | 0.05                          |
| Faith b deep cr   | 060686      |             | 13                         | 90.7                  | tr                            |
| Faith at rd cross | 060286      |             | 40                         | 151                   | 0.25                          |
| Faith at rd cross | 060286      |             | 35                         | 147                   | 0.1                           |
| Faith at Steese   | 052386      | 1930        | 110                        |                       | 1.0                           |
| Faith at Steese   | 060286      |             | 70                         | 306                   | 0.5                           |
| Faith at Steese   | 070886      | 1123        | 26                         |                       | tr                            |
| Faith at Steese   | 072386      | 2031        | 60                         |                       | 0.05                          |
| Faith at Steese   | 082186      | 1940        |                            |                       | 2.75                          |
| Faith at Steese   | 090886      | 1210        | 5.6                        |                       | tr                            |
| Faith at Steese   | 091086      | 1535        |                            |                       | tr                            |
| Faith at Steese   | 092586      | 1925        | 22                         | 11.7                  | tr                            |
| Chatanika a 39m   | 052086      | 1320        | 5.1                        | 32                    | 0.1                           |
| Chatanika a 39m   | 060686      |             | 14                         | 11.4                  | tr                            |
| Chatanika a 55m   | 060686      |             | 10                         | 42.2                  | tr                            |

Appendix D. Discharge data from automated sites, 1986.

Faith Creek above the Steese Highway

Discharge in cubic feet per second

Drainage area: 61.0

Extremes: maximum = 1580    minimum = 30.9

Average: 143

| <u>Day</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|-------------|-------------|---------------|------------------|
| 1          |             | 59.8        |               | 165              |
| 2          |             | 51.1        |               | 159              |
| 3          |             | 58.2        |               | 159              |
| 4          |             | 49.8        |               | 154              |
| 5          |             | 44.5        |               | 144              |
| 6          |             | 45.2        |               | 133              |
| 7          |             | 39.6        |               |                  |
| 8          |             | 39.6        |               | 138              |
| 9          |             | 40.0        |               | 154              |
| 10         |             | 40.9        |               | 148              |
| 11         |             | 41.8        |               | 143              |
| 12         |             | 53.2        |               | 138              |
| 13         |             | 42.6        |               | 134              |
| 14         |             | 40.8        |               | 127              |
| 15         |             | 39.4        |               | 124              |
| 16         | 97.3        | 36.0        |               | 124              |
| 17         | 85.7        | 35.4        |               | 125              |
| 18         | 87.5        | 58.9        |               | 170              |
| 19         | 118         | 76.2        |               | 164              |
| 20         | 86.4        | 358         | 50            | 166              |
| 21         | 91.9        | 253         | 750           | 194              |
| 22         | 132         | 152         | 662           | 170              |
| 23         | 123         | 193         | 352           | 157              |
| 24         | 304         |             | 273           | 146              |
| 25         | 136         |             | 242           | 136              |
| 26         | 93.3        |             | 215           |                  |
| 27         | 76.1        |             | 199           |                  |
| 28         | 67.0        |             | 208           |                  |
| 29         | 57.2        |             | 205           |                  |
| 30         | 53.5        |             | 192           |                  |
| 31         |             |             | 176           |                  |
| Month Avg  | 107         | 80.4        | 294           | 149              |

# Appendix D (con.)

## Mammoth Creek at the Steese Highway

Discharge in cubic feet per second

Drainage area: 41.5 mi<sup>2</sup>

Extremes: maximum = 423 minimum = 9.19

Average: 43.6

| <u>Day</u> | <u>May</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|------------|-------------|-------------|---------------|------------------|
| 1          |            | 95.2        | 118         | 25.5          | 34.9             |
| 2          |            | 107         | 91.0        | 24.6          | 29.0             |
| 3          |            | 94.5        | 60.9        | 24.7          | 29.5             |
| 4          |            | 81.7        | 44.1        | 23.8          | 23.1             |
| 5          |            | 94.2        | 38.9        | 20.7          | 22.0             |
| 6          |            | 108         | 35.3        | 20.4          | 21.0             |
| 7          |            | 85.9        | 30.8        | 19.7          | 21.6             |
| 8          |            | 87.9        | 62.1        | 18.9          | 24.4             |
| 9          |            | 110         | 70.6        | 19.2          | 26.0             |
| 10         |            | 83.1        | 50.5        | 18.4          | 25.3             |
| 11         |            | 58.4        | 41.6        | 18.1          | 26.3             |
| 12         |            | 130         | 44.5        | 16.4          | 26.5             |
| 13         |            | 91.1        | 39.0        | 14.8          | 20.6             |
| 14         |            | 55.9        | 33.9        | 16.5          | 21.0             |
| 15         |            | 36.8        | 32.6        | 12.3          | 25.0             |
| 16         |            | 24.2        | 29.3        | 10.5          | 29.5             |
| 17         |            | 15.9        | 27.3        | 11.9          | 32.0             |
| 18         |            | 15.9        | 23.9        | 11.7          | 33.4             |
| 19         |            | 94.4        | 22.6        | 10.4          | 35.5             |
| 20         |            | 134         | 29.6        | 10.9          | 36.4             |
| 21         |            | 135         | 47.8        | 14.2          | 29.8             |
| 22         |            | 97.5        | 43.8        | 19.5          | 29.8             |
| 23         | 39.9       | 142         | 37.9        | 25.3          | 27.6             |
| 24         | 31.4       | 156         | 31.1        | 25.1          | 26.5             |
| 25         | 35.8       | 93.8        | 29.3        | 24.2          | 22.1             |
| 26         | 39.8       | 62.4        | 32.7        | 23.2          |                  |
| 27         | 37.0       | 52.8        | 38.5        | 22.7          |                  |
| 28         | 29.0       | 45.0        | 39.3        | 26.4          |                  |
| 29         | 28.7       | 36.1        | 35.0        | 54.0          |                  |
| 30         | 43.6       | 36.1        | 31.0        | 53.0          |                  |
| 31         | 69.8       |             | 28.9        | 41.1          |                  |
| Month Avg  | 39.4       | 82.1        | 42.7        | 21.9          | 27.2             |

# Appendix D (con.)

Birch Creek above Twelvemile Creek

Discharge in cubic feet per second

Drainage area: 85.4 mi<sup>2</sup>

Extremes: maximum = 645    minimum = 24.3

Average: 118

| <u>Day</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|-------------|-------------|---------------|------------------|
| 1          |             | 161         | 110           | 102              |
| 2          |             | 135         | 104           | 94.8             |
| 3          |             | 113         | 89.2          | 87.1             |
| 4          |             | 110         | 78.1          | 76.1             |
| 5          | 208         | 98.7        | 71.5          | 70.6             |
| 6          | 164         | 81.2        | 65.4          | 65.6             |
| 7          | 150         | 70.1        | 58.0          | 59.8             |
| 8          | 130         | 63.1        | 53.8          | 64.2             |
| 9          | 176         | 72.9        | 50.1          | 98.3             |
| 10         | 229         | 70.8        | 43.0          | 91.5             |
| 11         | 211         | 90.3        | 42.9          | 86.0             |
| 12         | 436         | 141         | 38.6          | 78.5             |
| 13         | 269         | 115         | 36.7          | 72.6             |
| 14         | 143         | 102         | 35.2          | 63.2             |
| 15         | 95.8        | 86.4        | 31.9          | 63.0             |
| 16         | 55.0        | 74.0        | 31.9          | 65.5             |
| 17         | 43.7        | 67.0        | 31.5          | 68.4             |
| 18         | 59.7        | 62.9        | 30.7          | 98.0             |
| 19         | 354         | 69.8        | 28.7          | 80.0             |
| 20         | 286         | 255         | 30.9          | 81.6             |
| 21         | 290         | 251         | 74.0          | 77.6             |
| 22         | 286         | 216         | 130           | 72.8             |
| 23         | 460         | 142         | 111           | 66.8             |
| 24         | 440         | 118         | 95.9          | 60.7             |
| 25         | 245         | 106         | 82.3          | 67.5             |
| 26         | 177         | 136         | 75.5          |                  |
| 27         | 145         | 235         | 72.1          |                  |
| 28         | 126         | 235         | 125           |                  |
| 29         | 106         | 148         | 142           |                  |
| 30         | 101         | 122         | 123           |                  |
| 31         |             | 112         | 114           |                  |
| Month Avg  | 207         | 125         | 71.2          | 76.5             |

# Appendix D (con.)

## Crooked Creek above mouth

Discharge in cubic feet per second

Drainage area: 510 mi<sup>2</sup>

Extremes: maximum = 2200 minimum = 71.5

Average: 561 - does not include flows observed in August and September

| <u>Day</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|-------------|-------------|---------------|------------------|
| 1          |             | 726         |               |                  |
| 2          |             | 504         |               |                  |
| 3          |             | 390         |               |                  |
| 4          |             | 343         |               |                  |
| 5          |             | 289         |               |                  |
| 6          |             | 236         |               |                  |
| 7          |             | 200         |               |                  |
| 8          |             | 239         |               |                  |
| 9          |             | 467         |               | 114              |
| 10         |             | 600         |               |                  |
| 11         |             | 755         |               |                  |
| 12         |             | 632         |               |                  |
| 13         |             | 503         |               |                  |
| 14         |             | 413         |               |                  |
| 15         |             | 343         |               |                  |
| 16         | 279         | 295         |               |                  |
| 17         | 235         | 237         |               |                  |
| 18         | 635         | 196         |               |                  |
| 19         | 1590        | 242         |               |                  |
| 20         | 1290        | 1220        |               |                  |
| 21         | 899         | 769         | 71.7          |                  |
| 22         | 895         | 495         |               |                  |
| 23         | 1860        | 336         |               |                  |
| 24         | 1380        | 251         |               |                  |
| 25         | 793         | 209         |               | 115              |
| 26         | 578         | 472         |               |                  |
| 27         | 462         | 660         |               |                  |
| 28         | 384         | 479         |               |                  |
| 29         | 332         | 339         |               |                  |
| 30         | 523         | 255         |               |                  |
| 31         |             |             |               |                  |
| Month Avg  | 809         | 436         |               |                  |

# Appendix D (con.)

## Birch Creek above Bridge

Discharge in cubic feet per second

Drainage area: 2150 mi<sup>2</sup>

Extremes: maximum = 11100 minimum = 700

Average: 3125 - does not include flows observed in August and September

| <u>Day</u> | <u>June</u> | <u>July</u> | <u>August</u> | <u>September</u> |
|------------|-------------|-------------|---------------|------------------|
| 1          |             | 1810        |               |                  |
| 2          |             | 4640        |               |                  |
| 3          |             | 2390        |               |                  |
| 4          |             | 1580        |               |                  |
| 5          |             | 1280        |               |                  |
| 6          | 1880        | 1060        |               |                  |
| 7          | 1870        | 904         |               |                  |
| 8          | 1640        | 809         |               |                  |
| 9          | 1500        | 785         |               | 804              |
| 10         | 1440        | 1040        |               |                  |
| 11         | 2460        | 1570        |               |                  |
| 12         | 3640        | 6830        |               |                  |
| 13         | 5120        | 6190        |               |                  |
| 14         | 3600        | 5740        |               |                  |
| 15         | 2200        | 2490        |               |                  |
| 16         | 1570        | 1130        |               |                  |
| 17         | 1220        | 1670        |               |                  |
| 18         | 1000        | 1780        |               |                  |
| 19         | 1720        | 1890        |               |                  |
| 20         | 9030        | 1840        |               |                  |
| 21         | 8860        |             | 700           |                  |
| 22         | 5270        |             |               |                  |
| 23         | 5080        |             |               |                  |
| 24         | 10700       |             |               |                  |
| 25         | 11100       |             |               | 853              |
| 26         | 4830        |             |               |                  |
| 27         | 2800        |             |               |                  |
| 28         | 1940        |             |               |                  |
| 29         | 1490        |             |               |                  |
| 30         | 1220        |             |               |                  |
| 31         |             |             |               |                  |
| Month Avg  | 3730        | 2370        |               |                  |

Appendix E. Data from Mammoth Creek intensive study, July 29-August 3, 1986.

| Location         | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|---------|--------|------|--------------------|---------------|-----------------------|
| Indepndnce a GAM | 1       | 072986 | 1255 | 0.8                | 3.44          | nd                    |
| Indepndnce a GAM | 1       | 072986 | 1843 | 0.8                | 3.55          |                       |
| Indepndnce a GAM | 1       | 073086 | 0915 | 0.9                | 12.6          | tr                    |
| Indepndnce a GAM | 1       | 073086 | 1258 | 0.4                | 0.85          | tr                    |
| Indepndnce a GAM | 1       | 073086 | 1700 | 0.4                | 0.86          | nd                    |
| Indepndnce a GAM | 1       | 073186 | 0908 | 0.4                | 0.9           | nd                    |
| Indepndnce a GAM | 1       | 073186 | 1300 | 0.3                | 1.05          | tr                    |
| Indepndnce a GAM | 1       | 073186 | 1700 | 0.5                | 0.63          | tr                    |
| Indepndnce a GAM | 1       | 080186 | 0900 | 0.3                | 0.75          | nd                    |
| Indepndnce a GAM | 1       | 080186 | 1300 | 0.7                | 1.79          | nd                    |
| Indepndnce a GAM | 1       | 080386 | 1540 | 0.7                | 4.45          |                       |
|                  |         |        |      |                    |               |                       |
| Indepndnce b GAM | 2       | 072986 | 1340 | 20                 | 65            |                       |
| Indepndnce b GAM | 2       | 072986 | 1850 | 420                | 696           |                       |
| Indepndnce b GAM | 2       | 073086 | 0935 | 50                 | 41            | tr                    |
| Indepndnce b GAM | 2       | 073086 | 1307 | 37                 | 32.1          | tr                    |
| Indepndnce b GAM | 2       | 073086 | 1713 | 370                | 469           | tr                    |
| Indepndnce b GAM | 2       | 073186 | 0916 | 65                 | 46            | tr                    |
| Indepndnce b GAM | 2       | 073186 | 1307 | 70                 | 71.7          | tr                    |
| Indepndnce b GAM | 2       | 073186 | 1709 | 400                | 480           | tr                    |
| Indepndnce b GAM | 2       | 080186 | 0907 | 90                 | 66.1          | tr                    |
| Indepndnce b GAM | 2       | 080186 | 1308 | 110                | 74.1          |                       |
| Indepndnce b GAM | 2       | 080386 | 1600 | 17                 | 10.5          |                       |
|                  |         |        |      |                    |               |                       |
| Indepndnce b may | 3       | 073186 | 1105 | 55                 | 89.1          | tr                    |
| Indepndnce b may | 3       | 073186 | 1346 | 33                 | 29.3          | tr                    |
| Indepndnce b may | 3       | 073186 | 1745 | 55                 | 70            | tr                    |
| Indepndnce b may | 3       | 080186 | 0945 | 37                 | 27.3          | tr                    |
| Indepndnce b may | 3       | 080186 | 1345 | 900                | 1610          |                       |
| Indepndnce b may | 3       | 080386 | 1850 | 600                | 421           |                       |
|                  |         |        |      |                    |               |                       |
| Indepndnce a mth | 4       | 072986 | 1548 | 3.7                | 5.94          | tr                    |
| Indepndnce a mth | 4       | 073086 | 1124 | 31                 | 14.3          | nd                    |
| Indepndnce a mth | 4       | 073086 | 1502 | 380                | 397           | 0.1                   |
| Indepndnce a mth | 4       | 073086 | 1859 | 40                 | 43.4          | 0.02                  |
| Indepndnce a mth | 4       | 073186 | 1102 | 130                | 160           | 0.08                  |
| Indepndnce a mth | 4       | 073186 | 1502 | 20                 | 20            | nd                    |
| Indepndnce a mth | 4       | 073186 | 1902 | 55                 | 57.5          | tr                    |
| Indepndnce a mth | 4       | 080186 | 1100 | 33                 | 29.6          | tr                    |
| Indepndnce a mth | 4       | 080186 | 1420 | 800                | 2020          |                       |
| Indepndnce a mth | 4       | 080186 | 1500 | 1000               | 1640          |                       |
| Indepndnce a mth | 4       | 080186 | 1503 | 1000               | 1590          | 2.0                   |
| Indepndnce a mth | 4       | 080186 | 1900 | 300                | 281           |                       |
| Indepndnce a mth | 4       | 080186 | 2300 | 300                | 235           |                       |
| Indepndnce a mth | 4       | 080286 | 0300 | 160                | 131           |                       |
| Indepndnce a mth | 4       | 080286 | 0700 | 95                 | 77.5          |                       |
| Indepndnce a mth | 4       | 080286 | 1100 | 70                 | 72.7          |                       |



## Appendix E (con.)

| Location          | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|-------------------|---------|--------|------|--------------------|---------------|-----------------------|
| Indepndnce a mth  | 4       | 080286 | 1500 | 350                | 252           |                       |
| Indepndnce a mth  | 4       | 080286 | 1900 | 750                | 451           |                       |
| Indepndnce a mth  | 4       | 080286 | 2300 | 450                | 292           |                       |
| Indepndnce a mth  | 4       | 080386 | 0300 | 650                | 263           |                       |
| Indepndnce a mth  | 4       | 080386 | 0700 | 800                | 599           |                       |
| Indepndnce a mth  | 4       | 080386 | 1100 | 1000               | 731           |                       |
| Indepndnce a mth  | 4       | 080386 | 1500 | 1300               | 924           |                       |
| Indepndnce a mth  | 4       | 080386 | 1640 | 1000               | 688           | 3.1                   |
| Mastodon a mth    | 5       | 072986 | 1548 | 2.1                | 5             | tr                    |
| Mastodon a mth    | 5       | 073086 | 1127 | 2.1                | 4.69          | tr                    |
| Mastodon a mth    | 5       | 073086 | 1500 | 2.7                | 5.11          | nd                    |
| Mastodon a mth    | 5       | 073086 | 1903 | 2.7                | 2.25          | nd                    |
| Mastodon a mth    | 5       | 073186 | 1104 | 2.1                | 2.46          | nd                    |
| Mastodon a mth    | 5       | 073186 | 1525 | 2.4                | 2.08          | tr                    |
| Mastodon a mth    | 5       | 073186 | 1903 | 2.2                | 4.39          | tr                    |
| Mastodon a mth    | 5       | 080186 | 1102 | 2.4                | 4.16          | nd                    |
| Mastodon a mth    | 5       | 080186 | 1504 | 2.1                | 2.08          | tr                    |
| Mastodon a mth    | 5       | 080386 | 1640 | 1.6                | 2.27          |                       |
| Mammoth at head   | 6       | 072986 | 1548 | 3.2                | 9.01          | tr                    |
| Mammoth at head   | 6       | 073086 | 1125 | 14                 | 18.3          | tr                    |
| Mammoth at head   | 6       | 073086 | 1459 | 201                | 245           | tr                    |
| Mammoth at head   | 6       | 073086 | 1900 | 34                 | 31.8          | tr                    |
| Mammoth at head   | 6       | 073186 | 1102 | 80                 | 124           | tr                    |
| Mammoth at head   | 6       | 073186 | 1500 | 19                 | 24.8          | tr                    |
| Mammoth at head   | 6       | 073186 | 1901 | 33                 | 32.8          | tr                    |
| Mammoth at head   | 6       | 080186 | 1100 | 25                 | 20.6          | tr                    |
| Mammoth at head   | 6       | 080186 | 1507 | 700                | 926           | 1.0                   |
| Mammoth at head   | 6       | 080386 | 1640 | 340                | 241           |                       |
| Mammoth at head1* | 6       | 073086 | 0330 | 25                 | 27.9          |                       |
| Mammoth at head   | 6       | 073086 | 1530 | 450                | 480           |                       |
| Mammoth at head   | 6       | 073086 | 1900 | 26                 | 28.3          | tr                    |
| Mammoth at head   | 6       | 073086 | 2300 | 85                 | 127           | tr                    |
| Mammoth at head   | 6       | 073186 | 0300 | 140                | 143           | tr                    |
| Mammoth at head   | 6       | 073186 | 0700 | 15                 | 13            | tr                    |
| Mammoth at head   | 6       | 073186 | 1100 | 65                 | 82.5          | tr                    |
| Mammoth at head   | 6       | 073186 | 1500 | 8.5                | 7.54          | tr                    |
| Mammoth at head   | 6       | 073186 | 1900 | 23                 | 28.2          | tr                    |
| Mammoth at head   | 6       | 073186 | 2300 | 36                 | 40            | tr                    |
| Mammoth at head   | 6       | 080186 | 0300 | 75                 | 55.2          | tr                    |
| Mammoth at head   | 6       | 080186 | 0700 | 20                 | 12.5          | tr                    |
| Mammoth ab 1 eff  | 7       | 072986 | 1750 | 9.1                | 7.73          | 0.05                  |

\*'1' indicates samples collected in automated sampler.

Appendix E (con.)

| Location          | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|-------------------|---------|--------|------|--------------------|---------------|-----------------------|
| Mammoth ab 1 eff  | 7       | 073086 | 1203 | 9.0                | 18            | tr                    |
| Mammoth ab 1 eff  | 7       | 073086 | 1538 | 150                | 194           | 0.05                  |
| Mammoth ab 1 eff  | 7       | 073086 | 1945 | 10                 | 10.2          | tr                    |
| Mammoth ab 1 eff  | 7       | 073186 | 1135 | 30                 | 67.5          |                       |
| Mammoth ab 1 eff  | 7       | 073186 | 1538 | 45                 | 103           | 0.05                  |
| Mammoth ab 1 eff  | 7       | 073186 | 1936 | 110                | 418           | 0.4                   |
| Mammoth ab 1 eff  | 7       | 080186 | 1136 | 11                 | 14            | tr                    |
| Mammoth ab 1 eff  | 7       | 080186 | 1520 | 310                | 57.6          | .55                   |
| Mammoth ab 1 eff  | 7       | 080386 | 1530 | 550                | 433           |                       |
| Loud effluent     | 8       | 072986 | 1615 | 1100               | 736           |                       |
| Loud effluent     | 8       | 073086 | 1202 | 450                | 261           | tr                    |
| Loud effluent     | 8       | 073086 | 1534 | 500                | 171           | tr                    |
| Loud effluent     | 8       | 073086 | 1941 | 450                | 153           | nd                    |
| Loud effluent     | 8       | 073186 | 1130 | 330                | 102           | tr                    |
| Loud effluent     | 8       | 073186 | 1534 | 310                | 81.9          | nd                    |
| Loud effluent     | 8       | 073186 | 1932 | 260                | 63.8          | tr                    |
| Loud effluent     | 8       | 080186 | 1139 | 190                | 52.9          | tr                    |
| Loud effluent     | 8       | 080186 | 1523 | 190                | 52.2          | tr                    |
| Loud effluent     | 8       | 080386 | 1530 | 500                | 279           |                       |
| AV diversion      | 9       | 072986 | 1548 | 13                 | 14.7          | tr                    |
| AV diversion      | 9       | 073086 | 1208 | 9.5                | 7.06          | tr                    |
| AV diversion      | 9       | 073086 | 1537 | 170                | 151           | tr                    |
| AV diversion      | 9       | 073086 | 1945 | 17                 | 12.4          | tr                    |
| AV diversion      | 9       | 073186 | 1135 | 35                 | 40.1          | tr                    |
| AV diversion      | 9       | 073186 | 1538 | 36                 | 72.5          | 0.05                  |
| AV diversion      | 9       | 073186 | 1936 | 37                 | 91.6          | 0.05                  |
| AV diversion      | 9       | 080186 | 1141 | 16                 | 15.8          | tr                    |
| AV diversion      | 9       | 080186 | 1520 | 290                | 556           | 0.6                   |
| Mammoth b AV div  | 10      | 072986 | 1610 | 95                 | 88.2          |                       |
| Mammoth b AV div  | 10      | 073086 | 1208 | 26                 | 24.1          | tr                    |
| Mammoth b AV div  | 10      | 073086 | 1534 | 120                | 142           | tr                    |
| Mammoth b AV div  | 10      | 073086 | 1943 | 23                 | 21            | tr                    |
| Mammoth b AV div  | 10      | 073186 | 1132 | 38                 | 46.5          | tr                    |
| Mammoth b AV div  | 10      | 073186 | 1536 | 40                 | 116           | 0.05                  |
| Mammoth b AV div  | 10      | 073186 | 1932 | 27                 | 57.1          | 0.05                  |
| Mammoth b AV div  | 10      | 080186 | 1136 | 21                 | 18.1          | tr                    |
| Mammoth b AV div  | 10      | 080186 | 1518 | 280                | 498           | 0.5                   |
| Mammoth b AVdivi* | 10      | 072986 | 2030 | 85                 | 85.7          |                       |
| Mammoth b AVdivi  | 10      | 073086 | 0430 | 37                 | 30.3          |                       |
| Mammoth b AVdivi  | 10      | 073086 | 1030 | 32                 | 31.4          |                       |
| Mammoth b AVdivi  | 10      | 073086 | 1630 | 150                | 191           |                       |

\*'i' indicates samples collected by automated sampler.

Appendix E (con.)

| Location         | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|---------|--------|------|--------------------|---------------|-----------------------|
| Mammoth b AVdivi | 10      | 073086 | 1930 | 31                 | 32.9          |                       |
| Mammoth b AVdivi | 10      | 073086 | 2330 | 38                 | 40            |                       |
| Mammoth b AVdivi | 10      | 073186 | 0330 | 75                 | 80.4          |                       |
| Mammoth b AVdivi | 10      | 073186 | 0730 | 24                 | 27            |                       |
| Mammoth b AVdivi | 10      | 073186 | 1130 | 36                 | 50.2          |                       |
| Mammoth b AVdivi | 10      | 073186 | 1530 | 39                 | 95.7          |                       |
| Mammoth b AVdivi | 10      | 073186 | 1930 | 80                 | 265           | tr                    |
| Mammoth b AVdivi | 10      | 073186 | 2330 | 37                 | 49.8          | tr                    |
| Mammoth b AVdivi | 10      | 080186 | 0330 | 84                 | 51.4          | tr                    |
| Mammoth b AVdivi | 10      | 080186 | 0730 | 23                 | 19.7          | tr                    |
| Mammoth b AVdivi | 10      | 080186 | 1130 | 24                 | 27.8          | tr                    |
| Mammoth b AVdivi | 10      | 080186 | 1530 | 260                | 375           |                       |
| Mammoth b AVdivi | 10      | 080186 | 1930 | 43                 | 55.8          |                       |
| Mammoth b AVdivi | 10      | 080186 | 2330 | 85                 | 78.9          |                       |
| Mammoth b AVdivi | 10      | 080286 | 0330 | 65                 | 56.4          |                       |
| Mammoth b AVdivi | 10      | 080286 | 0730 | 150                | 130           |                       |
| Mammoth b AVdivi | 10      | 080286 | 1530 | 270                | 200           |                       |
| Mammoth b AVdivi | 10      | 080286 | 1930 | 210                | 158           |                       |
| Mammoth b AVdivi | 10      | 080286 | 2330 | 150                | 103           |                       |
| Mammoth b AVdivi | 10      | 080386 | 0330 | 180                | 129           |                       |
| Mammoth b AVdivi | 10      | 080386 | 0730 | 200                | 140           |                       |
| Mammoth b AVdivi | 10      | 080386 | 1130 | 260                | 238           |                       |
| Mammoth b AVdivi | 10      | 080386 | 1530 | 500                | 415           |                       |
|                  |         |        |      |                    |               |                       |
| Miller ab rd     | 11      | 073086 | 1230 | 0.6                | 2.7           | nd                    |
| Miller ab rd     | 11      | 073086 | 1800 | 0.5                | 1.21          | nd                    |
| Miller ab rd     | 11      | 073186 | 0855 | 0.4                | 0.86          | tr                    |
| Miller ab rd     | 11      | 073186 | 1255 | 0.5                | 3.96          |                       |
| Miller ab rd     | 11      | 073186 | 1620 | 0.5                | 0.32          | nd                    |
| Miller ab rd     | 11      | 080186 | 0850 | 0.6                | 0.36          | nd                    |
| Miller ab rd     | 11      | 080186 | 1230 | 0.5                | 0.45          | nd                    |
|                  |         |        |      |                    |               |                       |
| AV eff ab rd     | 12      | 073086 | 0900 | 3400               | 10600         |                       |
| AV eff ab rd     | 12      | 073086 | 1300 | 2500               | 8640          | 13                    |
| AV eff ab rd     | 12      | 073086 | 1800 | 3800               | 14100         | 27                    |
| AV eff ab rd     | 12      | 073086 | 1915 | 85                 | 1410          |                       |
| AV eff ab rd     | 12      | 073186 | 0900 |                    |               | 4.2                   |
| AV eff ab rd     | 12      | 073186 | 1220 | 7400               | 18500         | 49                    |
| AV eff ab rd     | 12      | 073186 | 1620 | 3600               | 9680          | 28                    |
| AV eff ab rd     | 12      | 080186 | 0850 | 550                | 212           |                       |
| AV eff ab rd     | 12      | 080186 | 1230 | 7000               | 19500         | 41                    |
|                  |         |        |      |                    |               |                       |
| AV eff b pond    | 13      | 073086 | 0940 | 450                | 337           | 0.05                  |
| AV eff b pond    | 13      | 073086 | 1330 | 500                | 386           | tr                    |
| AV eff b pond    | 13      | 073086 | 1805 | 600                | 526           | tr                    |
| AV eff b pond    | 13      | 073186 | 0915 | 360                | 276           | tr                    |
| AV eff b pond    | 13      | 073186 | 1245 | 4200               | 334           | tr                    |

## Appendix E (con.)

| Location         | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|---------|--------|------|--------------------|---------------|-----------------------|
| AV eff b pond    | 13      | 073186 | 1630 | 550                | 477           | tr                    |
| AV eff b pond    | 13      | 080186 | 0912 | 290                | 212           | tr                    |
| AV eff b pond    | 13      | 080186 | 1255 | 260                | 215           | tr                    |
| AV eff a Mammoth | 14      | 073086 | 1030 | 450                | 309           | tr                    |
| AV eff a Mammoth | 14      | 073086 | 1350 | 500                | 375           | 0.05                  |
| AV eff a Mammoth | 14      | 073086 | 1825 | 550                | 430           | tr                    |
| AV eff a Mammoth | 14      | 073186 | 0945 | 350                | 235           | tr                    |
| AV eff a Mammoth | 14      | 073186 | 1320 | 390                | 277           | tr                    |
| AV eff a Mammoth | 14      | 073186 | 1705 | 390                | 287           | tr                    |
| AV eff a Mammoth | 14      | 080186 | 0935 | 230                | 163           | tr                    |
| AV eff a Mammoth | 14      | 080186 | 1320 | 250                | 198           |                       |
| Mammoth ab AVEff | 15      | 073086 | 1045 | 85                 | 48.5          | tr                    |
| Mammoth ab AVEff | 15      | 073086 | 1350 | 70                 | 36.8          | tr                    |
| Mammoth ab AVEff | 15      | 073086 | 1825 | 150                | 108           | tr                    |
| Mammoth ab AVEff | 15      | 073186 | 0945 | 75                 | 40.1          | tr                    |
| Mammoth ab AVEff | 15      | 073186 | 1310 | 70                 | 46.5          | tr                    |
| Mammoth ab AVEff | 15      | 073186 | 1705 | 50                 | 38.9          | tr                    |
| Mammoth ab AVEff | 15      | 080186 | 1005 | 55                 | 27.3          | tr                    |
| Mammoth ab AVEff | 15      | 080186 | 1315 | 45                 | 24.6          | tr                    |
| Mammoth b AV eff | 16      | 073086 | 1115 | 300                | 197           | tr                    |
| Mammoth b AV eff | 16      | 073086 | 1400 | 330                | 220           | tr                    |
| Mammoth b AV eff | 16      | 073086 | 1830 | 400                | 296           | tr                    |
| Mammoth b AV eff | 16      | 073186 | 0950 | 240                | 152           | tr                    |
| Mammoth b AV eff | 16      | 073186 | 1340 | 230                | 170           | tr                    |
| Mammoth b AV eff | 16      | 073186 | 1700 | 250                | 203           | tr                    |
| Mammoth b AV eff | 16      | 080186 | 0940 | 140                | 112           | tr                    |
| Mammoth b AV eff | 16      | 080186 | 1325 | 140                | 112           | tr                    |
| Dugas b sluice   | 17      | 073086 | 0950 | 1000               | 3900          | 3.5                   |
| Dugas b sluice   | 17      | 073086 | 1330 | 18900              | 36400         | 82                    |
| Dugas b sluice   | 17      | 073086 | 1805 | 14600              | 34000         | 97                    |
| Dugas b sluice   | 17      | 073186 | 0910 | 17100              | 33600         | 92                    |
| Dugas b sluice   | 17      | 073186 | 1245 | 17900              | 35400         | 98                    |
| Dugas b sluice   | 17      | 073186 | 1635 | 16800              | 33000         | 120                   |
| Dugas b sluice   | 17      | 080186 | 0915 | 12900              | 27000         | 69                    |
| Dugas b sluice   | 17      | 080186 | 1355 | 13100              | 37500         | 80                    |
| Dugas ab 1st pnd | 17      | 073196 | 1230 | 12800              | 33100         |                       |
| Dugas b 1st pnd  | 17      | 073186 | 1250 | 5400               | 7370          |                       |
| Dugas ab 2nd pnd | 17      | 073186 | 1305 | 7300               | 10700         |                       |
| Dugas b 2nd pnd  | 17      | 073186 |      | 1000               | 560           |                       |
| Dugas b 3rd pnd  | 17      | 073186 | 1335 | 800                | 560           |                       |

Appendix E (con.)

| Location         | Loc no. | Date   | Time | Turbidity<br>(NTU) | TSS<br>(mg/L) | Set. solids<br>(ml/L) |
|------------------|---------|--------|------|--------------------|---------------|-----------------------|
| Dugas eff ab mam | 18      | 073086 | 1350 | 550                | 319           | tr                    |
| Dugas eff ab mam | 18      | 073086 | 1805 | 600                | 422           | tr                    |
| Dugas eff ab mam | 18      | 073186 | 1025 | 550                | 308           | tr                    |
| Dugas eff ab mam | 18      | 073186 | 1400 | 650                | 458           | tr                    |
| Dugas eff ab mam | 18      | 073186 | 1800 | 550                | 329           |                       |
| Dugas eff ab mam | 18      | 080186 | 1005 | 400                | 247           | tr                    |
| Dugas eff ab mam | 18      | 080186 | 1400 | 400                | 256           | tr                    |
| Mammoth ab Dugas | 19      | 073086 | 1335 | 210                | 136           | tr                    |
| Mammoth ab Dugas | 19      | 073086 | 1805 | 290                | 273           | 0.05                  |
| Mammoth ab Dugas | 19      | 073186 | 1800 | 220                | 177           | tr                    |
| Mammoth a steese | 20      | 072986 | 2030 | 370                | 257           |                       |
| Mammoth a steese | 20      | 073086 | 0230 | 320                | 233           |                       |
| Mammoth a steese | 20      | 073086 | 0830 | 250                | 179           |                       |
| Mammoth a steese | 20      | 073086 | 1430 | 300                | 204           | tr                    |
| Mammoth a steese | 20      | 073086 | 1830 | 300                | 213           | tr                    |
| Mammoth a steese | 20      | 073086 | 2230 | 350                | 255           |                       |
| Mammoth a steese | 20      | 073186 | 0230 | 300                | 202           |                       |
| Mammoth a steese | 20      | 073186 | 0630 | 280                | 195           |                       |
| Mammoth a steese | 20      | 073186 | 1030 | 240                | 152           | tr                    |
| Mammoth a steese | 20      | 073186 | 1430 | 240                | 162           | tr                    |
| Mammoth a steese | 20      | 073186 | 1830 | 210                | 162           | tr                    |
| Mammoth a steese | 20      | 073186 | 2230 | 240                | 235           | tr                    |
| Mammoth a steese | 20      | 080186 | 0230 | 240                | 166           | tr                    |
| Mammoth a steese | 20      | 080186 | 0630 | 210                | 149           | tr                    |
| Mammoth a steese | 20      | 080186 | 1030 | 170                | 118           | tr                    |
| Mammoth a steese | 20      | 080186 | 1430 | 180                | 124           |                       |
| Mammoth a steese | 20      | 080186 | 1830 | 220                | 187           |                       |
| Mammoth a steese | 20      | 080186 | 2230 | 240                | 168           |                       |
| Mammoth a steese | 20      | 080286 | 0230 | 180                | 142           |                       |
| Mammoth a steese | 20      | 080286 | 0630 | 180                | 117           |                       |
| Mammoth a steese | 20      | 080286 | 1030 | 130                | 84.4          |                       |
| Mammoth a steese | 20      | 080286 | 1430 | 140                | 110           |                       |
| Mammoth a steese | 20      | 080286 | 1830 | 140                | 96.4          |                       |
| Mammoth a steese | 20      | 080286 | 2230 | 140                | 96.4          |                       |
| Mammoth a steese | 20      | 080386 | 0230 | 130                | 81.9          |                       |
| Mammoth a steese | 20      | 080386 | 0630 | 190                | 73.2          |                       |
| Mammoth a steese | 20      | 080386 | 1030 | 110                | 73.6          |                       |
| Mammoth a steese | 20      | 080386 | 1430 | 120                | 88.5          |                       |
| Mammoth a steese | 20      | 080386 | 1555 | 130                | 100           |                       |
| Big G, Deadwood  | 25      | 080386 | 1233 | 400                | 395           |                       |
| Cacy recycle     | 25      | 080286 | 1030 | 12300              | 12700         |                       |
| Loud cyclone     | 25      | 080386 | 1800 | 16700              | 3190          |                       |

Appendix F. Data collected by ADF&G.

| <u>Location</u>          | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|--------------------------|-------------|-------------|----------------------------|-----------------------|
| A. Faith Creek at Steese |             |             |                            |                       |
| Faith at Steese          | 052386      | 1930        | 110                        |                       |
| Faith at Steese          | 060286      | 1100        | 50                         | 319                   |
| Faith at Steese          | 060286      | 1500        | 60                         | 443                   |
| Faith at Steese          | 060286      | 2100        | 95                         | 637                   |
| Faith at Steese          | 060386      | 0300        | 75                         | 490                   |
| Faith at Steese          | 060386      | 0900        | 24                         | 271                   |
| Faith at Steese          | 060386      | 1500        | 40                         | 325                   |
| Faith at Steese          | 060386      | 2100        | 50                         | 297                   |
| Faith at Steese          | 060486      | 0300        | 37                         | 238                   |
| Faith at Steese          | 060486      | 0900        | 21                         | 149                   |
| Faith at Steese          | 060486      | 1500        | 28                         | 174                   |
| Faith at Steese          | 060486      | 2100        | 60                         | 316                   |
| Faith at Steese          | 060586      | 0300        | 34                         | 235                   |
| Faith at Steese          | 060586      | 0900        | 19                         | 145                   |
| Faith at Steese          | 060586      | 1500        | 30                         | 137                   |
| Faith at Steese          | 060586      | 2100        | 65                         | 326                   |
| Faith at Steese          | 060686      | 0300        | 55                         | 339                   |
| Faith at Steese          | 060686      | 0900        | 28                         | 222                   |
| Faith at Steese          | 061686      | 1345        | 7.9                        |                       |
| Faith at Steese          | 061986      | 1200        | 15                         | 111                   |
| Faith at Steese          | 061986      | 1800        | 7.0                        | 32.1                  |
| Faith at Steese          | 062086      | 0000        | 4.7                        | 20.0                  |
| Faith at Steese          | 062086      | 0600        | 4.4                        | 17.6                  |
| Faith at Steese          | 062086      | 1200        | 3.2                        | 13.0                  |
| Faith at Steese          | 062086      | 1800        | 3.4                        | 9.3                   |
| Faith at Steese          | 062186      | 0000        | 4.0                        | 12.5                  |
| Faith at Steese          | 062186      | 0600        | 4.7                        | 12.2                  |
| Faith at Steese          | 062186      | 1200        | 4.2                        | 6.1                   |
| Faith at Steese          | 062186      | 1800        | 7.2                        | 20.2                  |
| Faith at Steese          | 062286      | 0000        | 34                         | 122                   |
| Faith at Steese          | 062286      | 0600        | 23                         | 71.7                  |
| Faith at Steese          | 062286      | 1200        | 17                         | 56.6                  |
| Faith at Steese          | 062286      | 1800        | 10                         | 44.4                  |
| Faith at Steese          | 062386      | 0000        | 8.7                        | 30.7                  |
| Faith at Steese          | 062386      | 0600        | 15                         | 21.7                  |
| Faith at Steese          | 062386      | 1200        | 21                         | 27.4                  |
| Faith at Steese          | 062386      | 1800        | 30                         | 34.2                  |
| Faith at Steese          | 062486      | 0000        | 500                        | 1890                  |
| Faith at Steese          | 062486      | 0600        | 280                        | 1160                  |
| Faith at Steese          | 062486      | 1200        | 180                        | 812                   |
| Faith at Steese          | 062486      | 1800        | 120                        | 345                   |
| Faith at Steese          | 062586      | 0000        | 61                         | 494                   |
| Faith at Steese          | 062586      | 0600        | 58                         | 231                   |
| Faith at Steese          | 062586      | 1200        | 45                         | 195                   |
| Faith at Steese          | 062586      | 1800        | 45                         | 337                   |

Appendix F (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|
| Faith at Steese | 062686      | 0000        | 45                         | 208                   |
| Faith at Steese | 062686      | 0600        | 30                         | 114                   |
| Faith at Steese | 062686      | 1200        | 30                         | 80.2                  |
| Faith at Steese | 062686      | 1800        | 34                         | 90.0                  |
| Faith at Steese | 062786      | 0100        | 40                         | 78.6                  |
| Faith at Steese | 062786      | 0600        | 45                         | 78.2                  |
| Faith at Steese | 062786      | 1200        | 60                         | 91.6                  |
| Faith at Steese | 062786      | 1800        | 50                         | 75.0                  |
| Faith at Steese | 062886      | 0000        | 85                         | 102                   |
| Faith at Steese | 062886      | 0600        | 65                         | 75.2                  |
| Faith at Steese | 062886      | 1200        | 60                         | 80.8                  |
| Faith at Steese | 062886      | 1800        | 26                         | 44.9                  |
| Faith at Steese | 062986      | 0000        | 15                         | 33.0                  |
| Faith at Steese | 062986      | 0600        | 10                         | 19.2                  |
| Faith at Steese | 062986      | 1200        | 8.5                        | 19.8                  |
| Faith at Steese | 062986      | 1800        | 8.3                        | 18.8                  |
| Faith at Steese | 063086      | 0000        | 7.4                        | 12.8                  |
| Faith at Steese | 063086      | 0600        | 5.2                        | 11.8                  |
| Faith at Steese | 063086      | 1200        | 12                         | 16.8                  |
| Faith at Steese | 063086      | 1800        | 14                         | 17.0                  |
| Faith at Steese | 070186      | 0000        | 14                         | 14.4                  |
| Faith at Steese | 070186      | 0600        | 11                         | 12.7                  |
| Faith at Steese | 070186      | 1200        | 18                         | 20.0                  |
| Faith at Steese | 070186      | 1800        | 21                         | 17.5                  |
| Faith at Steese | 070286      | 0000        | 23                         | 25.5                  |
| Faith at Steese | 070286      | 0600        | 23                         | 14.2                  |
| Faith at Steese | 070286      | 1200        | 36                         | 37.4                  |
| Faith at Steese | 070286      | 1800        | 28                         | 37.9                  |
| Faith at Steese | 070386      | 0000        | 28                         | 35.8                  |
| Faith at Steese | 070386      | 0600        | 45                         | 57.0                  |
| Faith at Steese | 070386      | 1200        | 35                         | 40.3                  |
| Faith at Steese | 070386      | 1800        | 27                         | 31.7                  |
| Faith at Steese | 070486      | 0000        | 30                         | 34.4                  |
| Faith at Steese | 070486      | 0600        | 29                         | 38.8                  |
| Faith at Steese | 070486      | 1200        | 45                         | 49.2                  |
| Faith at Steese | 070486      | 1800        | 40                         | 43.6                  |
| Faith at Steese | 070586      | 0000        | 16                         | 67.0                  |
| Faith at Steese | 070586      | 0600        | 9.7                        | 10.5                  |
| Faith at Steese | 070586      | 1200        | 8.9                        | 26.9                  |
| Faith at Steese | 070586      | 1800        | 11                         | 10.0                  |
| Faith at Steese | 070686      | 0000        | 19                         | 18.2                  |
| Faith at Steese | 070686      | 0600        | 19                         | 14.6                  |
| Faith at Steese | 070686      | 1200        | 19                         | 6.0                   |
| Faith at Steese | 070686      | 1800        | 28                         | 15.4                  |
| Faith at Steese | 070886      | 1123        | 26                         |                       |
| Faith at Steese | 071586      | 1800        | 40                         | 30.4                  |
| Faith at Steese | 071686      | 0000        | 45                         | 22.2                  |

## Appendix F (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|
| Faith at Steese | 071686      | 0600        | 50                         | 21.4                  |
| Faith at Steese | 071686      | 1200        | 39                         | 21.8                  |
| Faith at Steese | 071686      | 1800        | 38                         | 14.4                  |
| Faith at Steese | 071786      | 0000        | 260                        | 186                   |
| Faith at Steese | 071786      | 0600        | 450                        | 451                   |
| Faith at Steese | 071786      | 1200        | 60                         | 49.1                  |
| Faith at Steese | 071786      | 1800        | 250                        | 149                   |
| Faith at Steese | 071886      | 0000        | 200                        | 118                   |
| Faith at Steese | 071886      | 0600        | 450                        | 313                   |
| Faith at Steese | 071886      | 1200        | 600                        | 620                   |
| Faith at Steese | 071886      | 1800        | 90                         | 162                   |
| Faith at Steese | 071986      | 0000        | 32                         | 62.6                  |
| Faith at Steese | 071986      | 0600        | 300                        | 301                   |
| Faith at Steese | 071986      | 1200        | 500                        | 423                   |
| Faith at Steese | 071986      | 1800        | 85                         | 124                   |
| Faith at Steese | 072086      | 0000        | 550                        | 1510                  |
| Faith at Steese | 072086      | 0600        | 200                        | 1040                  |
| Faith at Steese | 072086      | 1200        | 260                        | 1300                  |
| Faith at Steese | 072086      | 1800        | 120                        | 671                   |
| Faith at Steese | 072186      | 0000        | 75                         | 438                   |
| Faith at Steese | 072186      | 0600        | 75                         | 343                   |
| Faith at Steese | 072186      | 1200        | 50                         | 333                   |
| Faith at Steese | 072186      | 1800        | 45                         | 340                   |
| Faith at Steese | 072286      | 0000        | 35                         | 261                   |
| Faith at Steese | 072386      | 2031        | 60                         |                       |
| Faith at Steese | 072486      | 1200        | 50                         |                       |
| Faith at Steese | 072586      | 0000        | 38                         | 296                   |
| Faith at Steese | 072586      | 0600        | 34                         | 58.2                  |
| Faith at Steese | 072586      | 1200        | 29                         | 39.9                  |
| Faith at Steese | 072586      | 1800        | 25                         | 34.5                  |
| Faith at Steese | 072686      | 0000        | 23                         | 27.4                  |
| Faith at Steese | 072686      | 0600        | 21                         | 26.6                  |
| Faith at Steese | 072686      | 1200        | 15                         | 21.4                  |
| Faith at Steese | 072686      | 1800        | 15                         | 22.0                  |
| Faith at Steese | 072786      | 0000        | 32                         | 74.8                  |
| Faith at Steese | 072786      | 0600        | 75                         | 122                   |
| Faith at Steese | 072786      | 1200        | 22                         | 81.3                  |
| Faith at Steese | 072786      | 1800        | 13                         | 46.8                  |
| Faith at Steese | 072886      | 0000        | 14                         | 36.9                  |
| Faith at Steese | 072886      | 0600        | 17                         | 70.3                  |
| Faith at Steese | 072886      | 1200        | 13                         | 22.7                  |
| Faith at Steese | 072886      | 1800        | 14                         | 20.0                  |
| Faith at Steese | 072986      | 0000        | 16                         | 21.4                  |
| Faith at Steese | 072986      | 0600        | 24                         | 24.9                  |
| Faith at Steese | 072986      | 1200        | 18                         | 17.6                  |
| Faith at Steese | 072986      | 1800        | 19                         | 17.2                  |
| Faith at Steese | 073086      | 0000        | 20                         | 17.4                  |



Appendix F (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|
| Faith at Steese | 073086      | 0600        | 26                         | 19.8                  |
| Faith at Steese | 073086      | 1200        | 25                         | 17.2                  |
| Faith at Steese | 073086      | 1800        | 23                         | 17.8                  |
| Faith at Steese | 073186      | 0000        | 32                         | 21.2                  |
| Faith at Steese | 073186      | 0600        | 34                         | 31.0                  |
| Faith at Steese | 073186      | 1200        | 32                         | 39.5                  |
| Faith at Steese | 073186      | 1800        | 27                         | 28.2                  |
| Faith at Steese | 080186      | 0000        | 32                         | 60.7                  |
| Faith at Steese | 080186      | 0600        | 50                         | 199                   |
| Faith at Steese | 080186      | 1200        | 34                         | 133                   |
| Faith at Steese | 080186      | 1800        | 50                         | 479                   |
| Faith at Steese | 080286      | 0000        | 60                         | 407                   |
| Faith at Steese | 080286      | 0600        | 60                         | 294                   |
| Faith at Steese | 080286      | 1200        | 70                         | 485                   |
| Faith at Steese | 080286      | 1800        | 65                         | 452                   |
| Faith at Steese | 080386      | 0000        | 45                         | 251                   |
| Faith at Steese | 080386      | 0600        | 31                         | 100                   |
| Faith at Steese | 080686      | 1800        | 7.4                        | 47.4                  |
| Faith at Steese | 080786      | 0000        | 17                         | 110                   |
| Faith at Steese | 080786      | 0600        | 18                         | 84.8                  |
| Faith at Steese | 080786      | 1200        | 13                         | 80.3                  |
| Faith at Steese | 080786      | 1800        | 13                         | 86.3                  |
| Faith at Steese | 080886      | 0000        | 13                         | 72.2                  |
| Faith at Steese | 080886      | 0600        | 13                         | 63.7                  |
| Faith at Steese | 080886      | 1200        | 9.4                        | 52.0                  |
| Faith at Steese | 080886      | 1800        | 12                         | 55.9                  |
| Faith at Steese | 080986      | 0000        | 11                         | 49.8                  |
| Faith at Steese | 080986      | 0600        | 9.5                        | 44.3                  |
| Faith at Steese | 080986      | 1200        | 9.2                        | 31.8                  |
| Faith at Steese | 080986      | 1800        | 9.9                        | 37.8                  |
| Faith at Steese | 081086      | 0000        | 12                         | 38.0                  |
| Faith at Steese | 081086      | 0600        | 9.2                        | 38.2                  |
| Faith at Steese | 081086      | 1200        | 14                         | 27.6                  |
| Faith at Steese | 081086      | 1800        | 14                         | 32.5                  |
| Faith at Steese | 081186      | 0000        | 23                         | 33.7                  |
| Faith at Steese | 081186      | 0600        | 23                         | 36.5                  |
| Faith at Steese | 081186      | 1200        | 35                         | 52.4                  |
| Faith at Steese | 081186      | 1800        | 40                         | 53.4                  |
| Faith at Steese | 081286      | 0000        | 35                         | 45.7                  |
| Faith at Steese | 081286      | 0600        | 24                         | 35.0                  |
| Faith at Steese | 081286      | 1200        | 39                         | 47.1                  |
| Faith at Steese | 081286      | 1800        | 31                         | 41.9                  |
| Faith at Steese | 081386      | 0000        | 55                         | 52.8                  |
| Faith at Steese | 081386      | 0600        | 55                         | 55.4                  |
| Faith at Steese | 081386      | 1200        | 40                         | 40.6                  |
| Faith at Steese | 081486      | 1700        | 50                         | 104                   |
| Faith at Steese | 081586      | 0000        | 50                         | 50.5                  |

## Appendix F (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|
| Faith at Steese | 081586      | 0600        | 50                         | 49.5                  |
| Faith at Steese | 081586      | 1200        | 45                         | 42.4                  |
| Faith at Steese | 081586      | 1800        | 60                         | 51.2                  |
| Faith at Steese | 081686      | 0000        | 45                         | 36.6                  |
| Faith at Steese | 081686      | 0600        | 15                         | 16.7                  |
| Faith at Steese | 081686      | 1200        | 26                         | 20.7                  |
| Faith at Steese | 081686      | 1800        | 29                         | 32.8                  |
| Faith at Steese | 081786      | 0000        | 50                         | 43.5                  |
| Faith at Steese | 081786      | 0600        | 55                         | 43.5                  |
| Faith at Steese | 081786      | 1800        | 45                         | 42.9                  |
| Faith at Steese | 081886      | 0000        | 26                         | 34.7                  |
| Faith at Steese | 081886      | 0600        | 35                         | 23.1                  |
| Faith at Steese | 081886      | 1200        | 21                         | 31.6                  |
| Faith at Steese | 081886      | 1800        | 11                         | 25.3                  |
| Faith at Steese | 081986      | 0000        | 11                         | 13.3                  |
| Faith at Steese | 081986      | 0600        | 20                         | 19.2                  |
| Faith at Steese | 081986      | 1200        | 33                         | 34.9                  |
| Faith at Steese | 081986      | 1800        | 40                         | 45.0                  |
| Faith at Steese | 082086      | 0000        | 37                         | 35.1                  |
| Faith at Steese | 082086      | 0600        | 25                         | 25.8                  |
| Faith at Steese | 082086      | 1200        | 19                         | 19.6                  |
| Faith at Steese | 082086      | 1800        | 36                         | 80.3                  |
| Faith at Steese | 082186      | 0000        | 220                        | 1360                  |
| Faith at Steese | 082186      | 0600        | 340                        | 3180                  |
| Faith at Steese | 082186      | 1200        | 2900                       | 25300                 |
| Faith at Steese | 082186      | 1815        | 420                        | 2180                  |
| Faith at Steese | 082286      | 0000        | 3000                       | 31600                 |
| Faith at Steese | 082286      | 0600        | 1600                       | 18500                 |
| Faith at Steese | 082286      | 1745        | 2100                       | 21700                 |
| Faith at Steese | 082886      | 1800        | 50                         | 1950                  |
| Faith at Steese | 082986      | 0000        | 36                         | 574                   |
| Faith at Steese | 082986      | 0600        | 19                         | 270                   |
| Faith at Steese | 082986      | 1200        | 15                         | 169                   |
| Faith at Steese | 082986      | 1800        | 15                         | 153                   |
| Faith at Steese | 083086      | 0000        | 21                         | 134                   |
| Faith at Steese | 083086      | 0600        | 22                         | 126                   |
| Faith at Steese | 083086      | 1200        | 22                         | 156                   |
| Faith at Steese | 083086      | 1800        | 31                         | 490                   |
| Faith at Steese | 083186      | 0000        | 40                         | 620                   |
| Faith at Steese | 083186      | 0600        | 32                         | 339                   |
| Faith at Steese | 083186      | 1200        | 40                         | 526                   |
| Faith at Steese | 083186      | 1800        | 50                         | 1030                  |
| Faith at Steese | 090186      | 0000        | 60                         | 1230                  |
| Faith at Steese | 090186      | 0600        | 60                         | 475                   |
| Faith at Steese | 090186      | 1200        | 45                         | 967                   |
| Faith at Steese | 090186      | 1800        | 40                         | 152                   |
| Faith at Steese | 090286      | 0000        | 31                         | 59.1                  |

Appendix F (con.)

| <u>Location</u> | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-----------------|-------------|-------------|----------------------------|-----------------------|
| Faith at Steese | 090286      | 0600        | 24                         | 53.7                  |
| Faith at Steese | 090286      | 1200        | 26                         | 39.1                  |
| Faith at Steese | 090286      | 1800        | 36                         | 147                   |
| Faith at Steese | 090386      | 0000        | 38                         | 556                   |
| Faith at Steese | 090386      | 0600        | 45                         | 818                   |
| Faith at Steese | 090386      | 1200        | 34                         | 552                   |
| Faith at Steese | 090486      | 1800        | 24                         | 337                   |
| Faith at Steese | 090586      | 0000        | 23                         | 107                   |
| Faith at Steese | 090586      | 0600        | 16                         | 30.2                  |
| Faith at Steese | 090586      | 1200        | 10                         | 41.5                  |
| Faith at Steese | 090586      | 1800        | 8.0                        | 43.6                  |
| Faith at Steese | 090686      | 0000        | 10                         | 28.0                  |
| Faith at Steese | 090686      | 0600        | 8.0                        | 28.2                  |
| Faith at Steese | 090686      | 1200        | 7.1                        | 51.9                  |
| Faith at Steese | 090686      | 1800        | 8.9                        | 40.7                  |
| Faith at Steese | 090786      | 0000        | 9.0                        | 12.9                  |
| Faith at Steese | 090786      | 0600        | 7.8                        | 10.4                  |
| Faith at Steese | 090786      | 1200        | 7.4                        | 17.0                  |
| Faith at Steese | 090786      | 1800        | 9.0                        | 19.8                  |
| Faith at Steese | 090886      | 0000        | 9.4                        | 17.0                  |
| Faith at Steese | 090886      | 0600        | 7.7                        | 11.9                  |
| Faith at Steese | 090886      | 1200        | 7.5                        | 11.2                  |
| Faith at Steese | 090886      | 1210        | 5.6                        |                       |
| Faith at Steese | 090886      | 1800        | 13                         | 23.0                  |
| Faith at Steese | 090986      | 0000        | 12                         | 15.7                  |
| Faith at Steese | 090986      | 0600        | 8.8                        | 18.0                  |
| Faith at Steese | 090986      | 1200        | 10                         | 33.5                  |
| Faith at Steese | 090986      | 1800        | 7.1                        | 18.0                  |
| Faith at Steese | 091086      | 0000        | 8.6                        | 11.4                  |
| Faith at Steese | 091086      | 0600        | 8.8                        | 18.1                  |
| Faith at Steese | 091086      | 1800        | 6.2                        | 10.1                  |
| Faith at Steese | 091186      | 0000        | 6.4                        | 10.0                  |
| Faith at Steese | 091186      | 0600        | 6.5                        | 8.1                   |
| Faith at Steese | 091186      | 1200        | 5.4                        | 7.5                   |
| Faith at Steese | 091186      | 1800        | 6.2                        | 9.1                   |
| Faith at Steese | 091286      | 0000        | 8.1                        | 6.9                   |
| Faith at Steese | 091286      | 0600        | 6.8                        | 6.5                   |
| Faith at Steese | 092586      | 1925        | 22                         | 11.7                  |

B. Other Chatanika Creek Drainage Data

|                         |        |      |     |      |
|-------------------------|--------|------|-----|------|
| McManus ab Faith        | 072486 | 1200 | 1.2 | nd   |
| Chatanika Cr at Sourdgh | 072486 | 1300 | 21  | 10.4 |
| Chatanika at 39m        | 072486 | 1330 | 4.9 | 2.92 |
| Faith b final pond      | 090486 |      |     | 15.8 |
| Faith at final seepage  | 090486 |      |     | 49.7 |
| Faith ab Kop pond       | 090486 | 1255 |     | 1280 |

## Appendix F (con.)

| <u>Location</u>                           | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|-------------------------------------------|-------------|-------------|----------------------------|-----------------------|
| Faith at rd crossing                      | 090486      | 1348        |                            | 28.3                  |
| Faith at road                             | 090486      | 1415        |                            | 16.3                  |
| C. Data for Goldstream valley sites, 1986 |             |             |                            |                       |
| First Chance Cr                           | 090586      |             | 7.3                        | 6.8                   |
| Flume a Steese                            | 090586      |             | 2.5                        | 2.38                  |
| Goldstream a Std Cr Rd                    | 090586      |             | 31.3                       | 36.2                  |
| Goldstream a Std Cr Rd                    | 092686      |             | 90                         | 61.8                  |
| Goldstream a Sheep Cr Rd                  | 090586      |             | 120                        | 64                    |
| Goldstream a Sheep Cr Rd                  | 092685      | 1145        | 260                        | 202                   |
| Goldstream a Sheep Cr Rd                  | 092685      | 1800        | 260                        | 175                   |
| Goldstream a Sheep Cr Rd                  | 092686      |             | 230                        | 138                   |
| Goldstream a Sheep Cr Rd                  | 092785      | 0000        | 250                        | 124                   |
| Goldstream a Sheep Cr Rd                  | 092786      | 0600        | 260                        | 174                   |
| Goldstream a Sheep Cr Rd                  | 092786      | 1200        | 270                        | 186                   |
| Goldstream a Sheep Cr Rd                  | 092786      | 1800        | 290                        | 232                   |
| Goldstream a Sheep Cr Rd                  | 092886      | 0000        | 280                        | 202                   |
| Goldstream a Sheep Cr Rd                  | 092886      | 0600        | 250                        | 170                   |
| Goldstream a Sheep Cr Rd                  | 092886      | 1200        | 250                        | 169                   |
| Goldstream a Sheep Cr Rd                  | 092886      | 1800        | 260                        | 161                   |
| Goldstream a Sheep Cr Rd                  | 092986      | 0000        | 250                        | 174                   |
| Goldstream a Sheep Cr Rd                  | 092986      | 0600        | 250                        | 146                   |
| Goldstream a Sheep Cr Rd                  | 092986      | 1200        | 240                        | 166                   |
| Goldstream a Sheep Cr Rd                  | 092986      | 1800        | 240                        | 160                   |
| Goldstream a Sheep Cr Rd                  | 093086      | 0000        | 240                        | 148                   |
| Goldstream a Sheep Cr Rd                  | 093086      | 0600        | 230                        | 144                   |
| Goldstream a Sheep Cr Rd                  | 093086      | 1200        | 230                        | 152                   |
| Goldstream a Sheep Cr Rd                  | 093086      | 1800        | 220                        | 143                   |
| Goldstream a Sheep Cr Rd                  | 100186      | 0000        | 210                        | 130                   |
| Goldstream a Sheep Cr Rd                  | 100186      | 0600        | 210                        | 128                   |
| Goldstream a Sheep Cr Rd                  | 100186      | 1200        | 210                        | 131                   |
| Goldstream a Sheep Cr Rd                  | 100186      | 1800        | 210                        | 135                   |
| Goldstream a Sheep Cr Rd                  | 100286      | 0000        | 220                        | 155                   |
| Goldstream a Sheep Cr Rd                  | 100286      | 0600        | 230                        | 151                   |
| Goldstream a Sheep Cr Rd                  | 100286      | 1200        | 230                        | 167                   |
| Goldstream a Sheep Cr Rd                  | 100286      | 1800        | 240                        | 154                   |
| Goldstream a Sheep Cr Rd                  | 100386      | 0000        | 230                        | 151                   |
| Goldstream a Sheep Cr Rd                  | 100386      | 0600        | 240                        | 215                   |
| Goldstream Creek                          | 052086      | 1350        | 210                        | 524                   |
| Goldstream a Ballaine Rd                  | 090586      |             | 180                        | 129                   |
| Goldstream a Gdstrm Cr R                  | 090586      |             | 330                        | 261                   |

Appendix F (con.)

| <u>Location</u>        | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/l)</u> |
|------------------------|-------------|-------------|----------------------------|-----------------------|
| Pedro a Gld Pan Site   | 090586      |             | 110                        | 84                    |
| Pedro a Gld Pan Site   | 092685      |             | 65                         | 57.1                  |
| Pedro a 1st Chnc Cr    | 090586      |             | 330                        | 201                   |
| Pedro Automatic Sample | 092685      | 1040        | 80                         | 79.6                  |
| Pedro Automatic Sample | 092685      | 1800        | 360                        | 428                   |
| Pedro Automatic Sample | 092785      | 0000        | 800                        | 824                   |
| Gilmore Cr             | 052086      | 1345        | 75                         | 98.8                  |
| Gilmore a trk st       | 090586      |             | 1200                       | 722                   |
| Steamboat Cr a Steese  | 090586      |             | 26                         | 282                   |

D. Break Up Samples

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>SS<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|----------------------|
| WF Tolovana R.   | 052086      | 1002        | 1.6                        | 6                     | tr                   |
| Tolovana River 2 | 052086      | 1035        | 9.3                        | 24.8                  | 0.05                 |
| Livengood Creek  | 052086      | 1125        | 170                        | 524                   | 0.55                 |
| Tolovana River   | 052086      | 1145        | 1.9                        | 9.8                   | tr                   |
| Tatalina River   | 052086      | 1205        | 1.4                        | 3.6                   | tr                   |
| Chatanika River  | 052086      | 1320        | 5.1                        | 32                    | 0.1                  |
| Gilmore Creek    | 052086      | 1345        | 75                         | 98.8                  | 0.15                 |
| Goldstream Creek | 052086      | 1350        | 210                        | 524                   | 1.1                  |
| Little Chena     | 052086      | 1415        | 14                         | 64.9                  | 0.2                  |
| Chena River 1    | 052086      | 1417        | 8.8                        | 114                   | 0.3                  |
| Chena River 2    | 052086      | 1510        | 5.7                        | 17.5                  | 0.05                 |
| Cripple Creek    | 052086      | 1516        | 50                         | 233                   | 0.5                  |
| Chatanika a 39m  | 060686      |             | 14                         | 11.4                  | tr                   |
| Chatanika a 55m  | 060686      |             | 10                         | 42.2                  | tr                   |
| Deep ab Dale     | 060686      |             | 1.7                        | 2.63                  | nd                   |
| Deep at Faith    | 060686      |             | 120                        | 351                   | 0.25                 |
| Faith a low rd   | 060686      |             | 18                         | 88.6                  | 0.05                 |
| Faith ab deep cr | 060686      |             | 18                         | 85.4                  | 0.05                 |
| McManus Cr       | 060686      |             | 1.4                        | 11.4                  | tr                   |
| Deep Cr lmi us   | 060686      |             | 100                        | 613                   | 0.8                  |
| Deep Cr at FCR   | 060686      |             | 140                        | 832                   | 1.1                  |
| Faith b Deep Cr  | 060686      |             | 13                         | 90.7                  | tr                   |

# Appendix G. Miscellaneous data.

## A. Data collected by DEC, June 5-6, 1986

| <u>Location</u>  | <u>Date</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> |
|------------------|-------------|----------------------------|-----------------------|
| Birch at Bridge  | 060386      | 90                         | 264                   |
| Birch at Bridge  | 060386      | 85                         | 235                   |
| Deadwood a Chsr  | 060386      | 65                         | 190                   |
| Deadwood ab Mine | 060386      | 60                         | 376                   |
| Bedrock          | 060386      | 0.6                        | 3.6                   |
| Bedrock          | 060386      | 1.5                        | 0.8                   |
| Boulder at Gage  | 060386      | 3.6                        | 11.2                  |
| Boulder at Gage  | 060386      | 3.6                        | 9.9                   |
| Crooked a Cen    | 060386      | 85                         | 151                   |
| Crooked a Cen    | 060386      | 110                        | 165                   |
| Deadwood a Chsr  | 060386      | 60                         | 391                   |
| Deadwood ab Mine | 060386      | 60                         | 301                   |
| Faith a Steese   | 060286      | 70                         | 306                   |
| Ketchum a Chsr   | 060386      | 95                         | 335                   |
| Ketchum a Chsr   | 060386      | 90                         | 333                   |
| Mammoth a Steese | 060386      | 200                        |                       |
| Mammoth a Steese | 060386      | 250                        | 777                   |
| Porcupine a Mth  | 060386      | 70                         | 191                   |
| Porcupine a Mth  | 060386      | 80                         | 206                   |
| Faith a rd cross | 060286      | 40                         | 151                   |
| Faith a rd cross | 060286      | 35                         | 147                   |

## B. Data from ADF&G and DOM Helicopter flyover of Birch Creek

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> | <u>SS<br/>(ml/L)</u> |
|------------------|-------------|-------------|----------------------------|-----------------------|----------------------|
| Birch ab Clums F | 062486      | 1500        | 95                         | 311                   | 0.35                 |
| Birch ab Harriss | 062486      | 1500        | 95                         | 310                   | 0.2                  |
| Birch at Butte   | 062486      | 1300        | 350                        | 889                   | 0.7                  |
| Birch at Harring | 062486      | 1345        | 140                        | 392                   | 0.4                  |
| Butte a mth      | 062486      | 1300        | 270                        | 1570                  | 2.0                  |
| Clums fk a Birch | 062486      | 1400        | 14                         | 83                    |                      |
| Eagle at Glddust | 062486      | 1300        | 450                        | 962                   | 0.7                  |
| Gold Dust ab mth | 062486      | 1300        | 140                        | 472                   | 0.4                  |
| Harrington fk    | 062486      | 1345        | 11                         | 59                    |                      |
| Harrison a mth   | 062486      | 1500        | 50                         | 251                   | 0.3                  |
| Mammoth #3       | 062486      | 1438        | 38                         | 208                   | 0.1                  |
| Mammoth #5       | 062486      | 1438        | 40                         | 134                   | 0.1                  |
| Miller #2        | 062486      |             | 39                         | 148                   | 0.05                 |
| Portage Cr a ml  | 062486      | 1000        | 65                         | 119                   | tr                   |

Appendix G (con.)

C. Turbidity data from Tolovana River above mining

| <u>Location</u>    | <u>Date</u> | <u>Turbidity<br/>(NTU)</u> | <u>TSS<br/>(mg/L)</u> |
|--------------------|-------------|----------------------------|-----------------------|
| Tolovana ab Wilber | 061386      | 1130                       | 26                    |
| Tolovana ab Wilber | 061486      | 1030                       | 12                    |
| Tolovana ab Wilber | 062086      |                            | 5.9                   |
| Tolovana ab Wilber | 062686      |                            | 49                    |
| Tolovana ab Wilber | 072386      | 1530                       | 3.0                   |
| Tolovana ab Wilber | 072786      | 1650                       | 13                    |
| Tolovana ab Wilber | 072886      | 1715                       | 3.3                   |
| Tolovana ab Wilber | 073086      | 1700                       | 20                    |
| Tolovana ab Wilber | 073186      | 1000                       | 190                   |
| Tolovana ab Wilber | 073186      | 2200                       | 75                    |
| Tolovana ab Wilber | 080186      | 0900                       | 55                    |
| Tolovana ab Wilber | 080286      | 0930                       | 70                    |
| Tolovana ab Wilber | 080386      | 1130                       | 9.8                   |
| Tolovana ab Wilber | 080486      | 1730                       | 5.8                   |
| Tolovana ab Wilber | 080586      | 0900                       | 4.8                   |
| Tolovana ab Wilber | 080686      | 1900                       | 3.1                   |
| Tolovana b Wilber  | 073186      | 1000                       | 210                   |

D. Turbidity data collected by Division of Parks

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> |
|------------------|-------------|-------------|----------------------------|
| Chena a 39m CHSR | 060886      | 2025        | 0.6                        |
| Chena a 39m CHSR | 061186      | 2030        | 3.0                        |
| Chena a 39m CHSR | 061486      | 2125        | 1.8                        |
| Chena a 39m CHSR | 061686      | 2030        | 1                          |
| Chena a 39m CHSR | 061886      | 2100        | 3.5                        |
| Chena a 39m CHSR | 062186      | 1900        | 5.3                        |
| Chena a 39m CHSR | 062286      | 2130        | 1.5                        |
| Chena a 39m CHSR | 062386      | 2045        | 29                         |
| Chena a 39m CHSR | 062486      | 1950        | 23                         |
| Chena a 39m CHSR | 062586      | 1830        | 6.5                        |
| Chena a 39m CHSR | 062886      | 1830        | 1.1                        |
| Chena a 39m CHSR | 062986      | 2030        | 0.7                        |
| Chena a 39m CHSR | 070486      | 1800        | 0.5                        |
| Chena a 39m CHSR | 070586      | 1900        | 0.8                        |
| Chena a 39m CHSR | 071586      | 0905        | 0.5                        |
| Chena a 39m CHSR | 071686      | 1845        | 1.1                        |
| Chena a 39m CHSR | 071986      | 0930        | 5.9                        |
| Chena a 39m CHSR | 072086      | 0900        | 65                         |
| Chatanika at 11m | 060686      | 0830        | 4                          |
| Chatanika at 11m | 060786      | 2100        | 4.3                        |

Appendix G (con.)

| <u>Location</u>  | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> |
|------------------|-------------|-------------|----------------------------|
| Chatanika at 11m | 060886      | 1700        | 12                         |
| Chatanika at 11m | 061086      | 1320        | 8.2                        |
| Chatanika at 11m | 061186      | 1330        | 80                         |
| Chatanika at 11m | 061486      | 2125        | 6.4                        |
| Chatanika at 11m | 061686      | 1300        | 3.1                        |
| Chatanika at 11m | 061886      | 1330        | 3.3                        |
| Chatanika at 11m | 062186      | 1400        | 1.6                        |
| Chatanika at 11m | 062886      | 1500        | 1.6                        |
| Chatanika at 11m | 070686      | 1930        | 1.4                        |
| Chatanika at 11m | 071286      | 0934        | 2.9                        |
| Chatanika at 39m | 060786      | 1445        | 7.1                        |
| Chatanika at 39m | 061386      | 2130        | 6.3                        |
| Chatanika at 39m | 061486      | 1950        | 5.9                        |
| Chatanika at 39m | 062286      | 1300        | 2.1                        |
| Chatanika at 39m | 062586      | 1400        | 18                         |
| Chatanika at 39m | 062786      | 2045        | 1.9                        |
| Chatanika at 39m | 070386      | 1915        | 1.2                        |
| Chatanika at 39m | 070586      | 2205        | 2.2                        |
| Chatanika at 39m | 071186      | 0930        | 1.2                        |
| Chatanika at 39m | 072586      | 0930        | 1.4                        |

E. Turbidity data from rural villages

| <u>Location</u>   | <u>Date</u> | <u>Time</u> | <u>Turbidity<br/>(NTU)</u> |
|-------------------|-------------|-------------|----------------------------|
| Birch at BCV      | 053086      | 1600        | 7.9                        |
| Koyukuk at Evnsvl | 060686      | 0830        | 130                        |
| Koyukuk at Evnsvl | 061086      | 0800        | 230                        |
| Koyukuk at Evnsvl | 061286      | 0800        | 210                        |
| Koyukuk at Evnsvl | 061686      | 0800        | 100                        |
| Koyukuk at Evnsvl | 061786      | 0800        | 65                         |
| Koyukuk at Evnsvl | 061886      | 0800        | 70                         |
| Koyukuk at Evnsvl | 062386      | 0800        | 17                         |
| Koyukuk at Evnsvl | 062486      | 0800        | 27                         |
| Koyukuk at Evnsvl | 062586      | 0800        | 210                        |
| Koyukuk at Evnsvl | 062686      | 0800        | 190                        |
| Koyukuk at Evnsvl | 062686      | 0800        | 50                         |
| Koyukuk at Evnsvl | 070286      | 0800        | 2.8                        |
| Koyukuk at Evnsvl | 070786      | 0700        | 1.3                        |
| Koyukuk at Evnsvl | 071486      | 0800        | 14                         |
| Koyukuk at Evnsvl | 072186      | 0700        | 5.8                        |
| Koyukuk at Evnsvl | 080486      | 0800        | 110                        |
| Koyukuk at Evnsvl | 101486      | 0800        | 5.0                        |
| Tozitna River     | 062486      | 1533        | 4.1                        |



Appendix H. Description of mining operations in Mammoth Creek  
intensive study.

Information in this appendix was prepared by Judd Peterson, Alaska Division of Mining.

1. Great American Mining (GAM)

Location: Independence Creek

Description of operation: Cat pushes to one 3/4 yard drag line which feeds trommel/slucice setup. Tailing and oversize are pushed to tailings piles by cat.

Water useage of wash plant: 2,100-2,200 gallons per minute (gpm)

Hours of operation per day: 10

Cubic yards process per hour: 100

Percent recycle: 100

Treatment system: GAM uses a presettling pond at the start of tails race just below the trommel. From there all effluent goes into one large settling pond with a divider between the inflow and the pump suction line. Sole discharge is seepage into Independence Creek.

2. Don May

Location: Independence Creek

Cubic yards process per hour: Operation did not run while study was being conducted. He started sluicing a few days after the finish of the sampling period.

3. Dick Loud

Location: Mammoth Creek below Mastodon Creek

Description of operation: Two D-9 cats push pay to drag line which feeds double deck vibratory screen and punch plate wash plant. Oversize is fed onto a staking conveyor. Sluice tailings (1/2 inch minus) are fed to a large hopper and sand screw assembly for dewatering.

Water usage of wash plant: 1,840 gpm to plant from pump in recycle pond. In addition, 350 gpm is pumped to wash plant from cyclones. 370 gpm of makeup water is pumped into the recycle pond from Mammoth Creek.

Cubic yards process per hour: 100-150

## Appendix H (con.)

Percent recycle: 100 percent through use of sand screw and cyclones.

Treatment system: He constructed a 100 percent recycle setup that he hoped would put all of the 1/2 inch minus solids on the tailings piles by use of a slurry discharge line from the cyclones. He found out that the cyclones would not separate out minus 200 mesh solids which ended up in his plastic lined recycle pond. The pond silted up completely after processing 40,000 cubic yards of pay and had to be mucked out with a dragline. He discovered that the recycle system needed thirty percent makeup water. The problem became what to do with the thirty percent of the process water he needed to be rid of. He lost some of this through seepage loss into Mammoth Creek. The rest was pumped into a slurry line onto the tailings piles.

### 4. Alaska Ventures

Location: Mammoth Creek above Miller Creek

Description of operation: Operation uses caterpillars to rip and push pay to a three yard backhoe.

Water usage of wash plant: 1,620 gpm

Cubic yards process per hour: 270

Percent recycle: none

Treatment system: One very large pond located approximately 1/2 mile below plant. This pond is approximately 600-800' by 150-200'. The dam at the lower end is approximately 15 feet high. Outflow from this pond is by pipe discharge and seepage. Effluent flows from there in a channel cut through old mine tailings before discharge into Mammoth Creek.

### 5. Dugas

Location: Mammoth Creek below Miller Creek

Description of operation: A rubber tired caterpillar is used to push pay to a hopper which has a conveyor feed to the top of a single deck vibratory screen wash plant and sluice box. Tails and oversize are hauled to tailings piles with a 966 loader.

Water usage of wash plant: unknown

Cubic yards process per hour: 75

Percent recycle: none

#### Appendix H (con.)

Treatment system: From the end of the sluice box, the tails race extends down the left limit of the Mammoth Creek valley for about 3/4 mile to the first pond. This pond is an old cut, approximately 600' by 150' in size. The lower end of the cut is dammed to back up the water. This dam has no surface overflow and all discharge is by seepage at the base of the dam. From there the effluent runs into another old cut about 500' by 150'. This cut has no dam at the lower end but water is impounded by the depression of the cut. From here the effluent flows into a third old cut about 1000 feet downstream. This pond is about 300' by 150'. Outflow from this pond is seepage flow into a long (400'), narrow (10-50') pond with a dam at the end. Overflow from this pond flows into a series of 5 shallow pan ponds 25-50' in diameter spread over a distance of 1500 feet. These ponds are built on old leveled tailings. Discharge from these ponds flows onto the plain of Mammoth Creek. This is a long reach (approximately 2,000 feet) of vegetative filtration and shallow creek flow before the discharge reaches Mammoth Creek. Total length of this treatment system is approximately 2 miles.

Appendix I. Specific locations of study sites.

| Map No. | Site Name        | Full Name                                     | MTRS Description                                                                                                   |
|---------|------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 1       | Birch A brdg     | Birch Creek at Steese Hwy Bridge              | 50 ft above bridge on left bank in SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 1, T10N, R16E, FM                     |
| 2       | Birch ab CC      | Birch Creek above Crooked Creek               | 100 ft above confluence with Crooked Creek in NW $\frac{1}{4}$ , NW $\frac{1}{4}$ , sec 9 T9N, R16E, FM            |
| 3       | Crooked a Mth    | Crooked Creek above mouth                     | 1/4 mile above confluence with Birch Cr on left bank in NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 8, T9N, R16E, FM |
| 4       | Albert           | Albert Creek at Steese Highway                | At the steese Highway Bridge in NW $\frac{1}{4}$ , SW $\frac{1}{4}$ , sec 19, T9N, R15E, FM                        |
| 5       | Ketchem a CHSR   | Ketchem Creek at the Circle Hot Springs Road  | 100 ft above bridge on right bank in SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 20, T8N, R15E, FM                   |
| 6       | Deadwood a CHSR  | Deadwood Creek at the Circle Hot Springs Road | At the bridge on right bank in NE $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 12 T8N, R14E, FM                          |
| 7       | Crooked a Cen    | Crooked Creek at Central                      | Above bridge on left bank in SW $\frac{1}{4}$ , SE $\frac{1}{4}$ , sec 27, T9N, R14E, FM                           |
| 8       | Boulder a gage   | Boulder Creek above the USGS gage             | Above USGS gage in SW $\frac{1}{4}$ , NW $\frac{1}{4}$ , sec 32, T9N, R14E, FM                                     |
| 9       | Bedrock          | Bedrock Creek below BLM Campground            | 200 ft below campground in SW $\frac{1}{4}$ , SW $\frac{1}{4}$ , sec 32, T9N, R13E, FM                             |
| 10      | Mammoth a Steese | Mammoth Creek at the Steese Hwy bridge        | 50 ft below bridge on right bank in SE $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 1, T8N, R13E, FM                     |
| 11      | Porcupine a mth  | Porcupine above confluence with Mammoth Creek | 3/4 mile above confluence on right bank in NW $\frac{1}{4}$ , NE $\frac{1}{4}$ , sec 1, T8N R12E, FM               |

Appendix I (con.)

| <u>Map No.</u> | <u>Site Name</u> | <u>Full Name</u>                      | <u>MTRS Description</u>                                                                        |
|----------------|------------------|---------------------------------------|------------------------------------------------------------------------------------------------|
| 12             | Birch ab 12mile  | Birch Creek above<br>Twelvemile Creek | 1/4 mile above confluence<br>in SW $\frac{1}{4}$ , NW $\frac{1}{4}$ , sec 33, T7N,<br>R10E, FM |
| 13             | Faith a Steese   | Faith Creek at Steese<br>Hwy          | Above bridge in SE $\frac{1}{4}$ , NE $\frac{1}{4}$ ,<br>sec 6, T5N, R7E, FM                   |