ANNUAL MONITORING EVALUATION OF MINE-WATER DISCHARGE IMPACTS IN ECCLES CREEK AND MUD CREEK

CANYON FUEL COMPANY
Skyline Mine
Scofield, Utah

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EarthFax

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ANNUAL REPORT EVALUATION OF MINE-WATER DISCHARGE IMPACTS IN ECCLES CREEK AND MUD CREEK

1.0 INTRODUCTION

This report represents the 2003 annual report for the evaluation of mine-water discharge impacts in Eccles and Mud Creeks. Since early August 2001, water encountered in the Skyline Mine has been pumped to the surface to allow continued operation of the mine. Since early September 2001 through July 2003 discharges from the mine to Eccles Creek ranged between about 7,000 and 10,000 gallons per minute("gpm"), compared with an average discharge for the prior 18 months of about 4,000 gpm. Since July 2003, mine discharge dropped to an average of 2,000 gpm. EarthFax (2002) conducted evaluations of the impact of the mine-water discharge on the stability of Eccles and Mud Creeks, which details the establishment of the nine monitoring sites.

The purpose of this document is to present the results of the annual collection of data and to compare the results to prior data.

2.0 FIELD DATA COLLECTION METHODS

2.1 Establish and Characterize Reference Sites

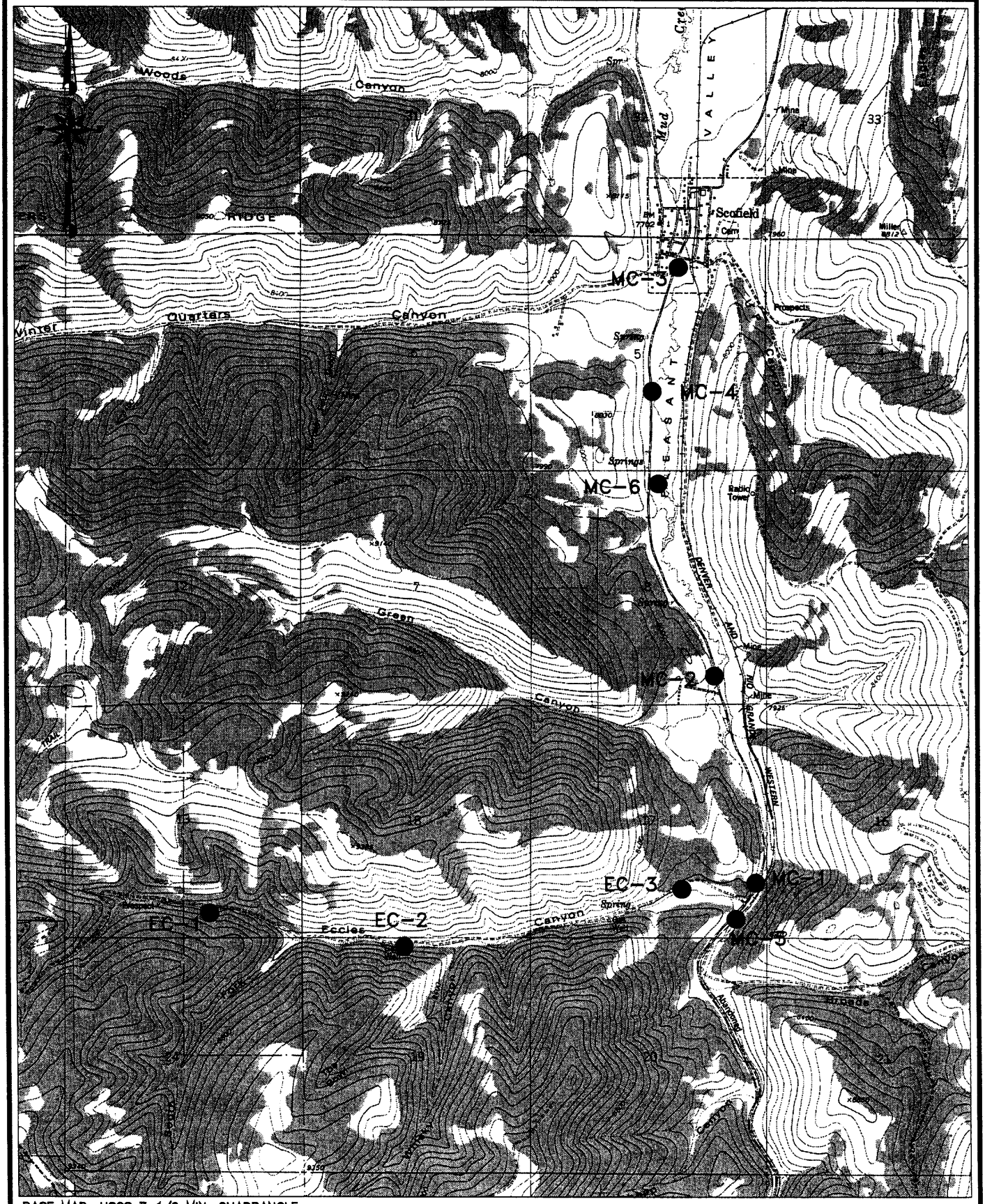
The locations of reference sites established on Eccles and Mud Creeks are shown on Figure 2-1. Sites EC-1, 2, and 3 are located on Eccles Creek, while MC-1, 2, 3, 4 and 6 are located on Mud Creek below the confluence with Eccles Creek.. Site MC-5 was established on Mud Creek above the confluence of Eccles Creek to evaluate conditions with out mine water discharges.

Annual monitoring at all reference sites was conducted in general conformance to the recommendations of Harrelson et al. (1994) and included the following:

- Locating previously established benchmarks at each site.
- Photos, as recommended by Harrelson et al. (1994), looking upstream, downstream, and across the channel at each cross section location (see Appendix A).
- Locating established monumented cross sections. The endpoints of cross sections were previously marked with 4 foot long, 1/2-inch diameter steel reinforcing bars that were driven approximately 3.5 feet into the ground. The bars were capped with plastic survey end caps marked with the cross-section number.
- Surveying the channel cross section at each site. A measuring tape was attached to one of the cross section monuments and stretched tight and level across the stream to the other monument. Surveying was performed using a Sokkia survey level and rod. Elevations were shot at each important feature or change in elevation (e.g., slope breaks, channel banks, bankfull stages, etc.). The survey was closed by re-shooting the station benchmark. The readings were recorded in the field log book (see Appendix B).

- Surveying the longitudinal profile at each site. The profiles extend a distance of at least 20 times the channel width (half upstream and half downstream from the cross section location). Data were collected to indicate the elevation of the channel bottom, the water surface, indications of bankfull stage, and the top of the stream bank. Measurements were collected on intervals approximately equal to the channel width. Data were collected using a survey level and rod, with the location of the starting and endpoints being measured as noted above. Data readings were recorded in the field log book (see Appendix B).

G:\UC794\03\FIG-2-1.DWG\12-02



BASE MAP: USGS 7-1/2 MIN. QUADRANGLE
SCOFIELD, UTAH (1979)

0' 3000'

FIGURE 2-1. LOCATION OF REFERENCE SITES

EarthFax

3.0 RESULTS SUMMARY

3.1 Characterize Reference Sites

As described in Section 2.1, the annual monitoring of reference sites was conducted on Eccles and Mud Creeks at the locations shown on Figure 2-1. Photographs were taken of the nine sites and are presented in Appendix A.

Surveys of the channel cross section and longitudinal profile were conducted at each site. Data collected from the channel cross sections and profiles of the channel bottom, the water surface, indications of bankfull stage, and the top of the stream bank are presented in copies of the field book in Appendix B and in cross section and profile calculations in Appendix C.

To evaluate the long-term effect of the mine discharge, the cross-section and profiles for 2002 and 2003 are presented to allow comparison over time. Figure 3-1 through 3-9 present the profiles and cross-sections for each site. As can be seen there is no substantial change in the profiles and cross-sections between 2002 and 2003. Only stations EC-1 and MC-3 show any noticable change.

At Station EC-1, the differences are likely due to the steep slope of the channel and a longitudinal shift along the channel of the measurement points. With the steep slope, any change in the location of a profile station will result in a substantial change in the apparent elevation that is measured. Due to the brush and the un-even terrain along the channel, the exact stationing between the profiles from year to year may not be exact. If the station measurement point is off by 10 feet upstream or downstream of the measurement point for last year, then the elevation of the corresponding station could be off by as much as 1.25 ft (10 x slope of channel).

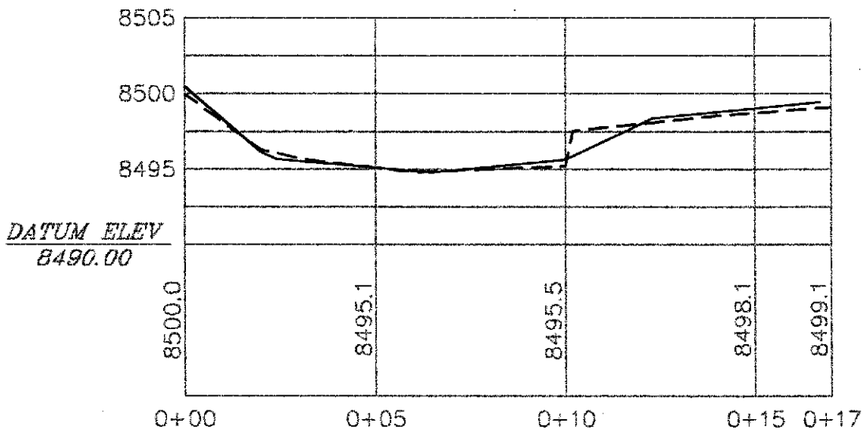
In review of the EC-1 data, the cross-section does not show any significant difference. However, the profiles for the water surface, channel bottom, and bank full all show a drop of approximately 1.4 to 2 feet. The error is obvious due to the fact that at Station 100 in the profiles, the channel bottom values for both years should match as indicated in the cross-section, yet they do not. Therefore, a longitudinal shift has occurred. If the profiles are adjusted so the cross-section points do match, then the profiles do not show a substantial difference (see Figure 1a).

Site MC-3 also shows some differences with the prior year. These are structural differences in the stream channel. At the upstream end of the profile, the beaver dam that was located in the area of Stations 0+00 through 0+20 in 2002 had either failed or been removed prior to the 2003 survey. Debris from the beaver dam washed downstream and plugged the road culvert downstream of the channel cross-section location. This material was removed by county crews and placed in a large pile on top of the bench mark location, making it unuseable. The survey was conducted using the elevation of the cross-section pin of the left bank. The calculations were completed by assuming that the difference in elevation between the pin and the benchmark was the same from the prior year. Also, a new beaver dam had been constructed downstream of the road crossing and is reflected in the profiles at Station 2+75 through 3+00.

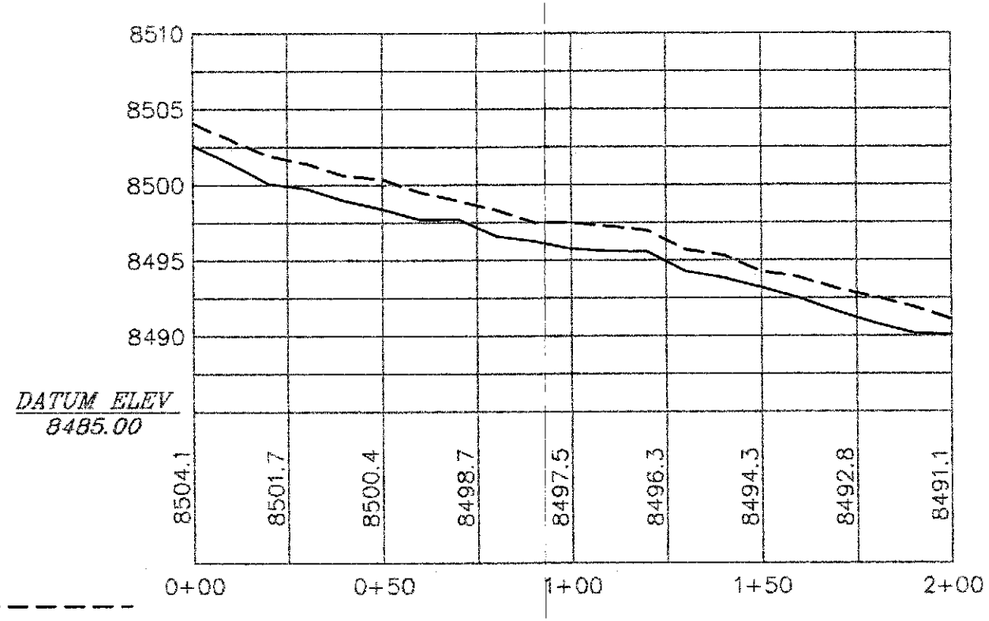
There are no indications in the field indicating that the loss of the beaver dam was due to any action on the part of Canyon Fuel Company. In fact, tire marks adjacent to the former dam location suggest that the dam was purposefully removed by others. Hence, changes in the profile at MC-3 were due to forces beyond the control of Canyon Fuel Company.

In conclusion, based on these cross-sections and profiles, there does not appear to be any significant impact on the stream channel as a result of the mine discharges.

EC-1 – Cross-Section



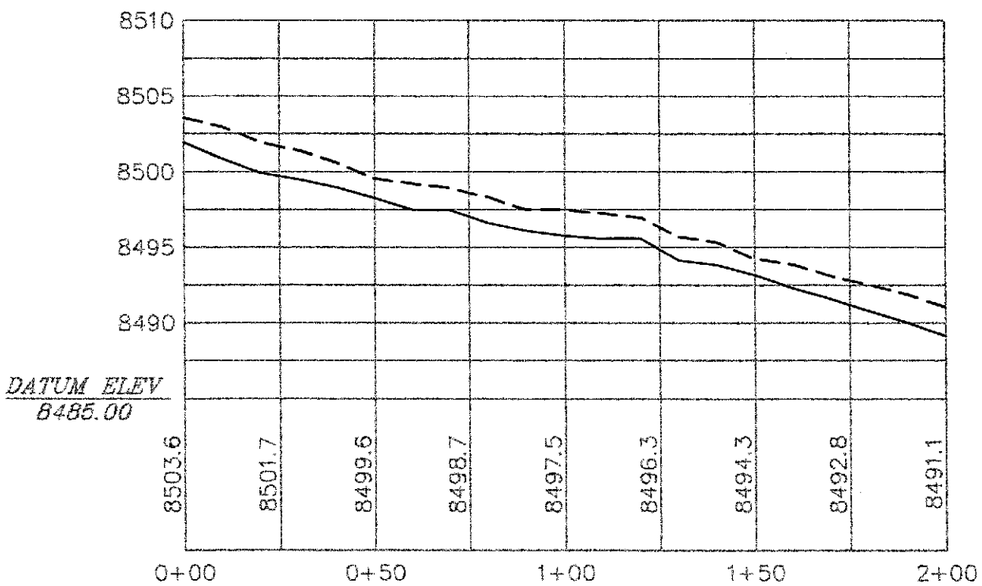
EC-1 – Bank Full



NOTE: Differences in profiles are due to longitudinal shift. General slope of profiles remains similar. Cross-section at fixed point shows no significant erosion.

LEGEND
2002 Data - - - - - - - - -
2003 Data ————————

EC-1 – Water Surface



EC-1 – Channel Bottom

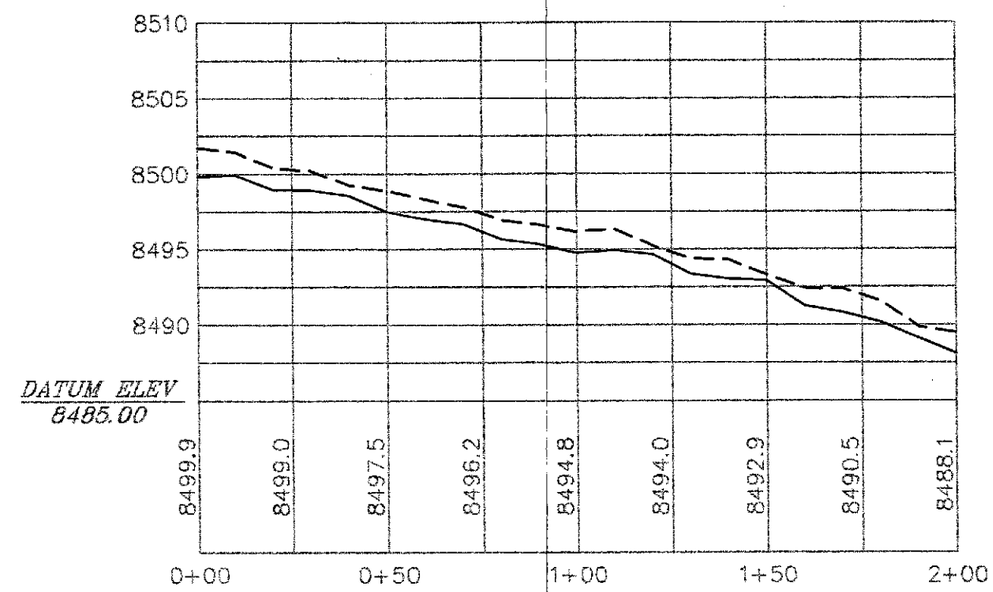
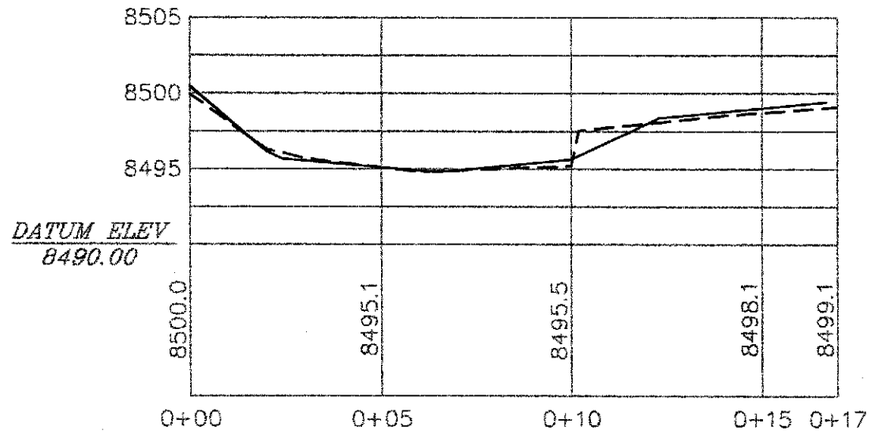


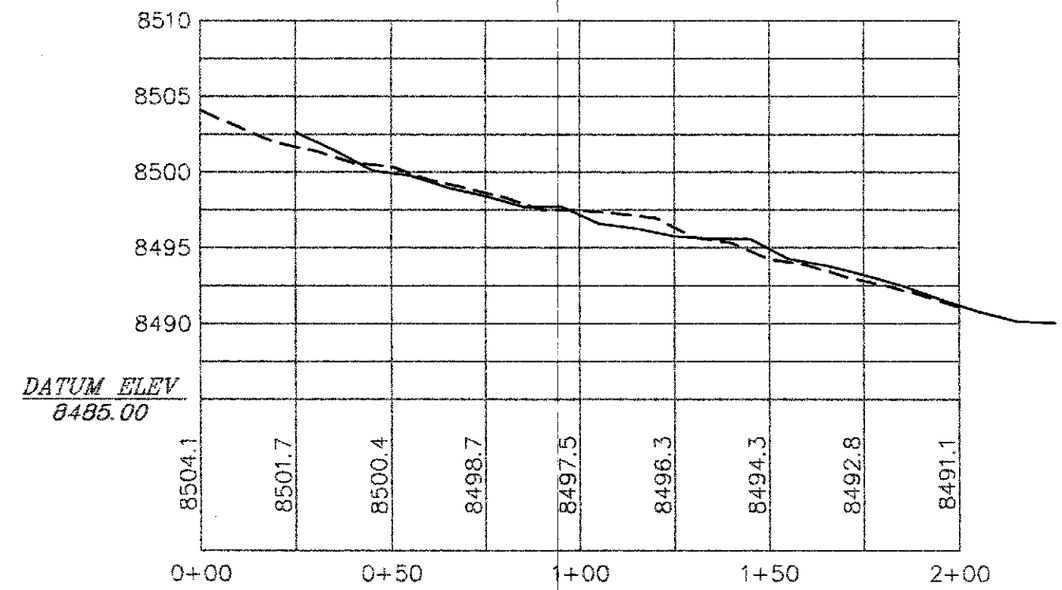
FIGURE 3-1. EC-1 CROSS-SECTION AND PROFILES

EarthFax

EC-1 – Cross-Section



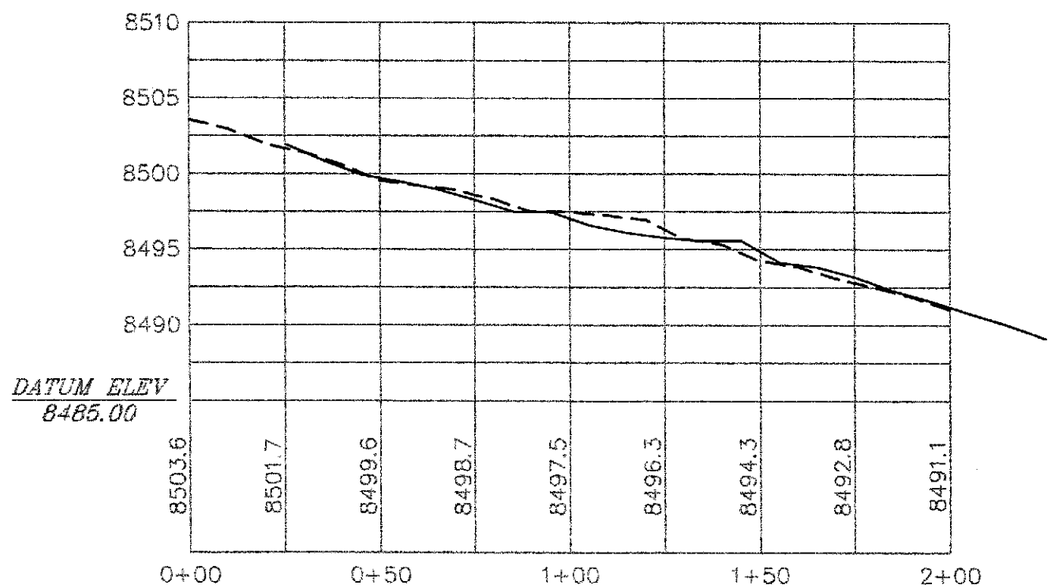
EC-1 – Bank Full



NOTE: Differences in profiles are due to longitudinal shift. General slope of profiles remains similar. Cross-section at fixed point shows no significant erosion.

LEGEND
2002 Data - - - - - - - - -
2003 Data ————————

EC-1 – Water Surface



EC-1 – Channel Bottom

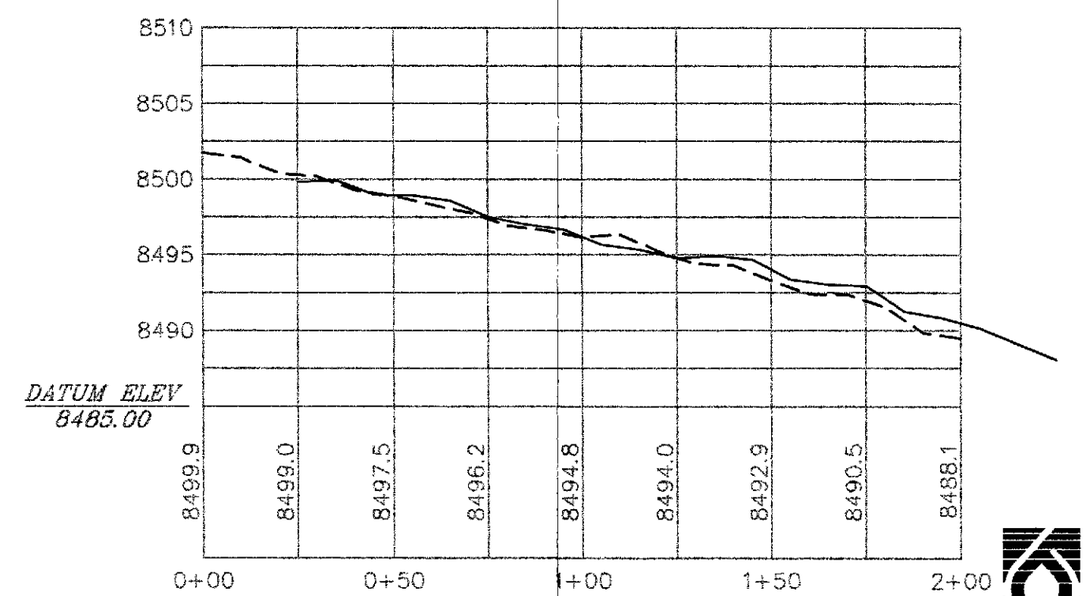
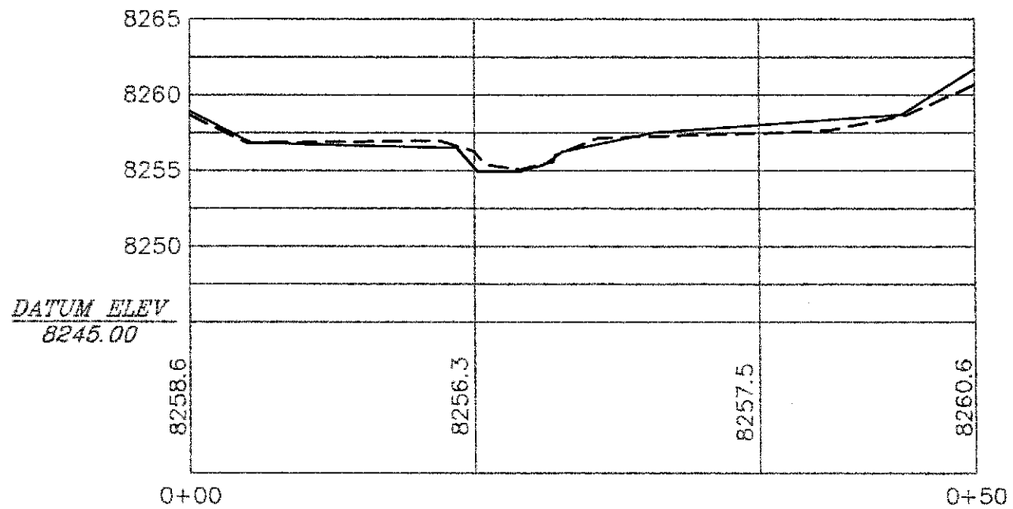


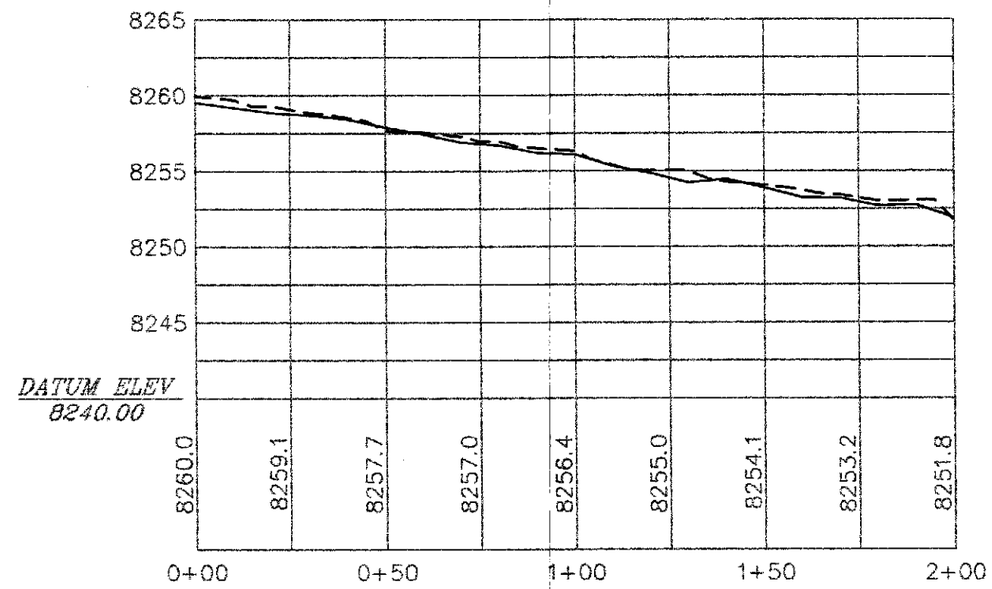
FIGURE 3-1a. REVISED EC-1 CROSS-SECTION AND PROFILES

EarthFax

EC-2 – Cross-Section

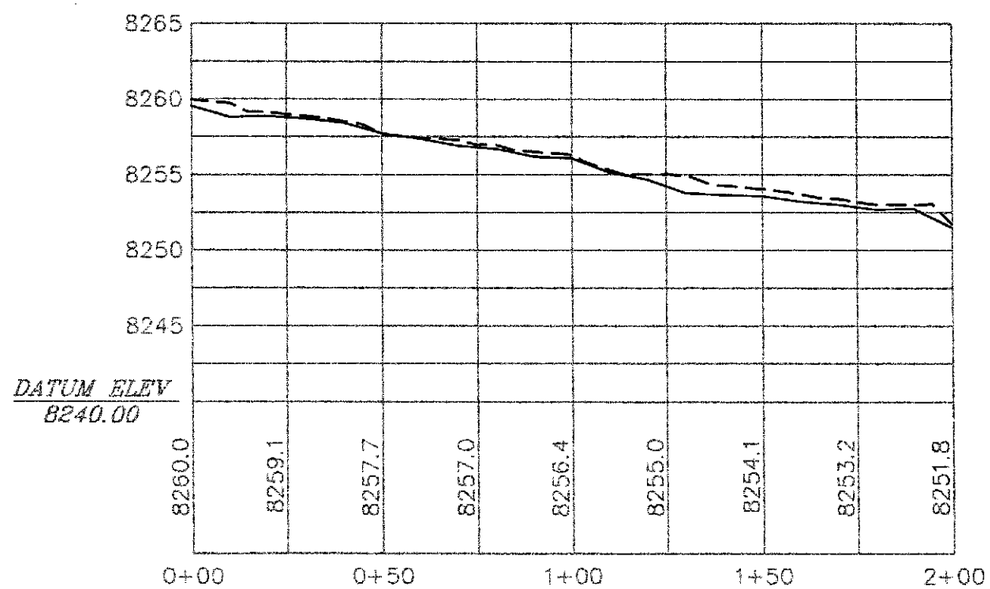


EC-2 – Bank Full



LEGEND
2002 Data - - - - - - - - -
2003 Data ————————

EC-2 – Water Surface



EC-2 – Channel Bottom

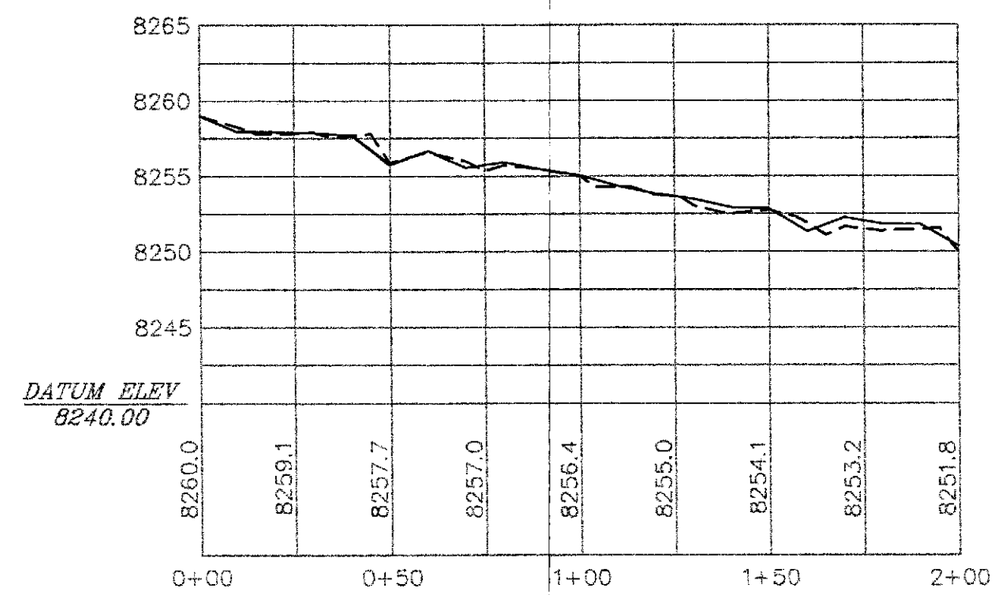
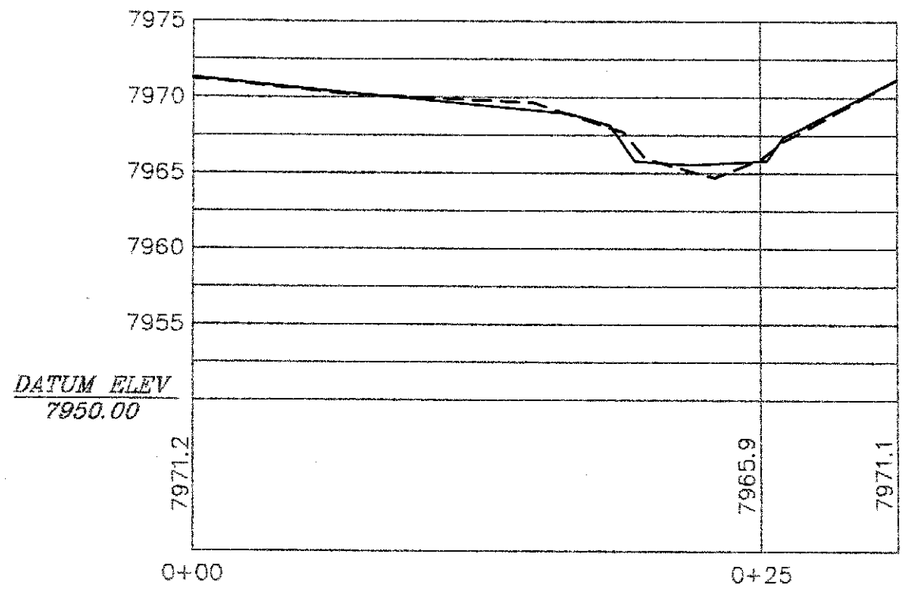


FIGURE 3-2. EC-2 CROSS-SECTION AND PROFILES

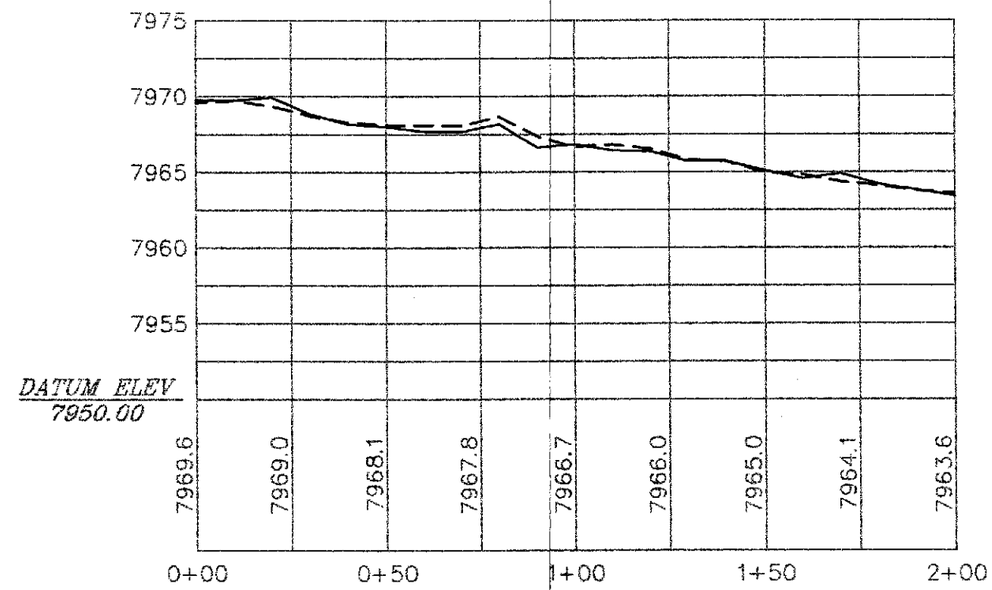
EarthFax

EC-3.DWG UC794-06 10/2003

EC-3 – Cross-Section

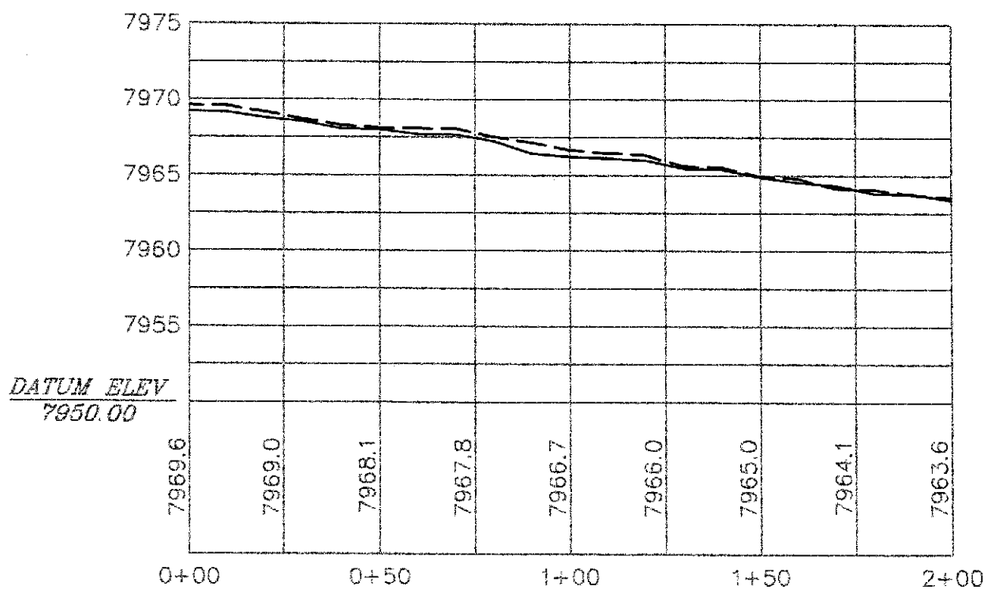


EC-3 – Bank Full



LEGEND
2002 Data ---------
2003 Data ————————

EC-3 – Water Surface



EC-3 – Channel Bottom

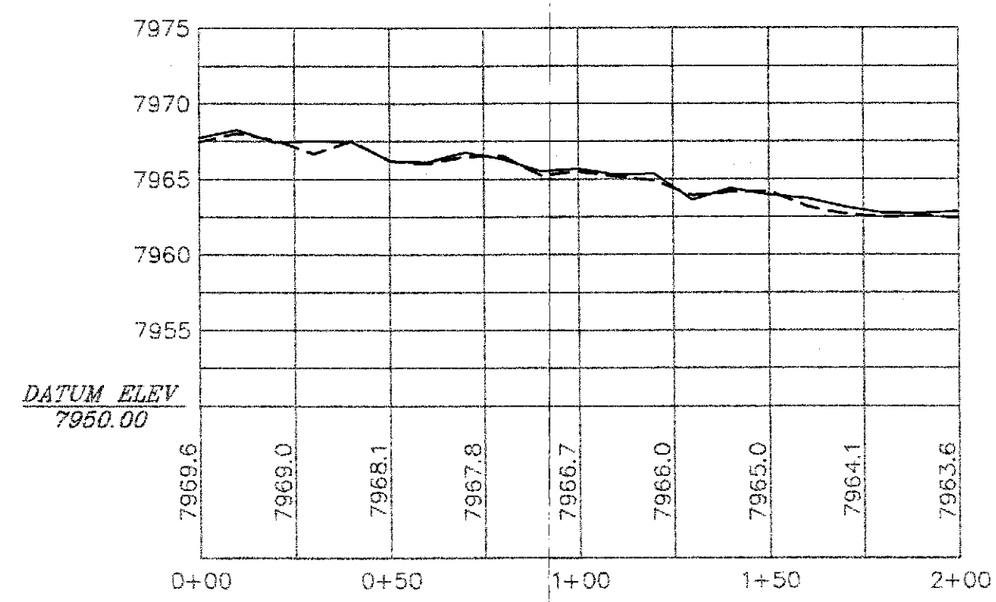
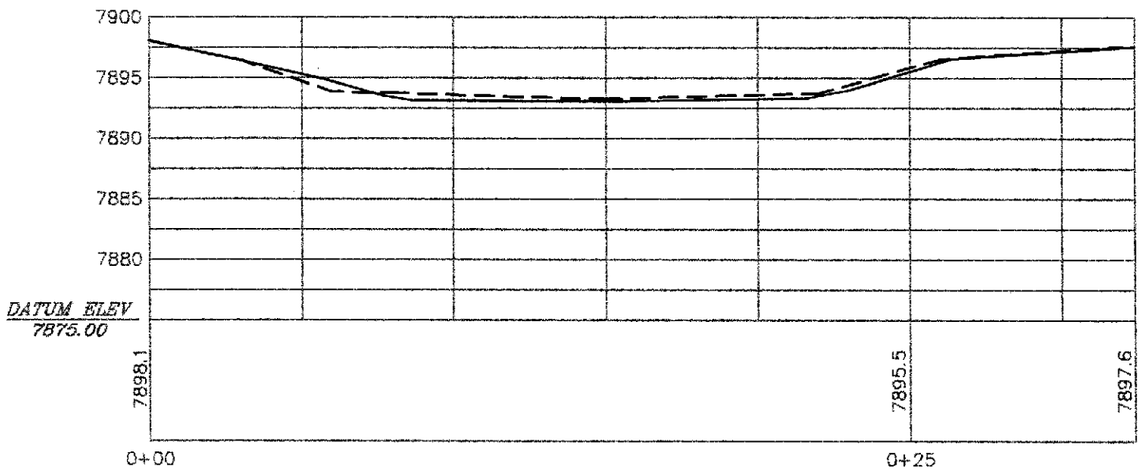


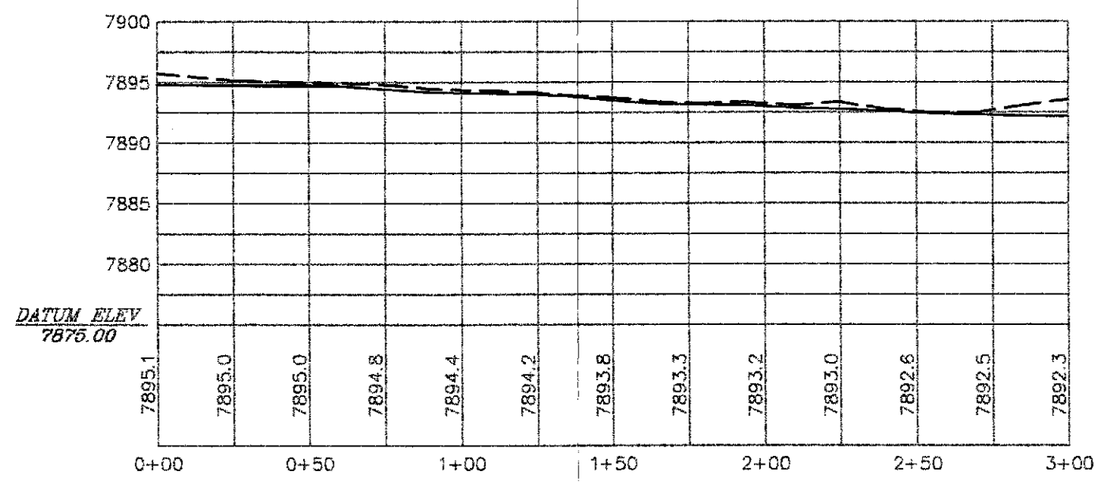
FIGURE 3-3. EC-3 CROSS-SECTION AND PROFILES

EarthFax

MC-1 – Cross-Section

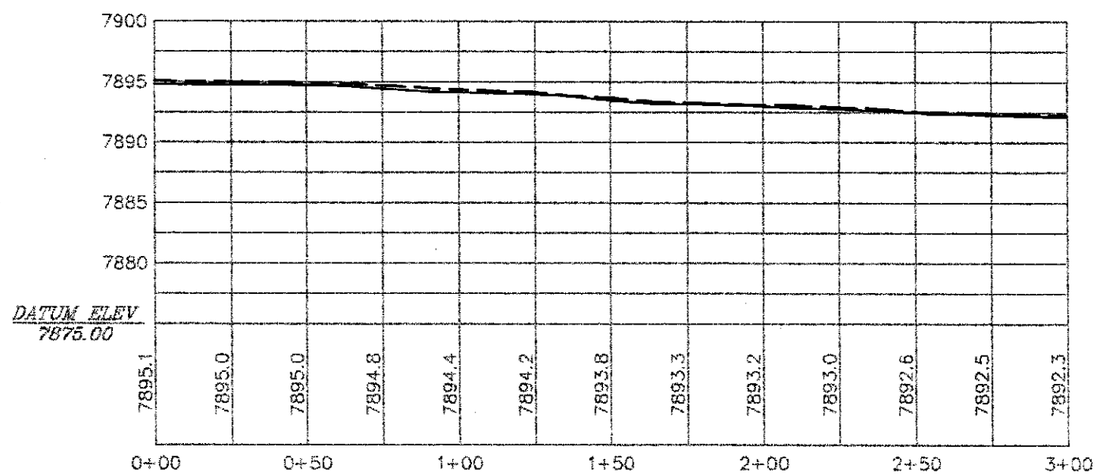


MC-1 – Bank Full



LEGEND
2002 Data - - - - - - -
2003 Data ————————

MC-1 – Water Surface



MC-1 – Channel Bottom

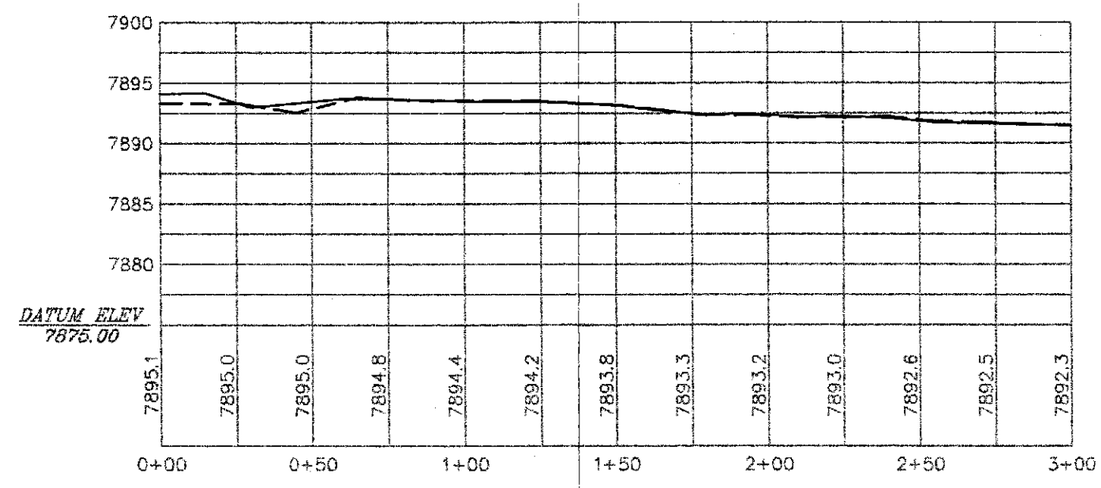
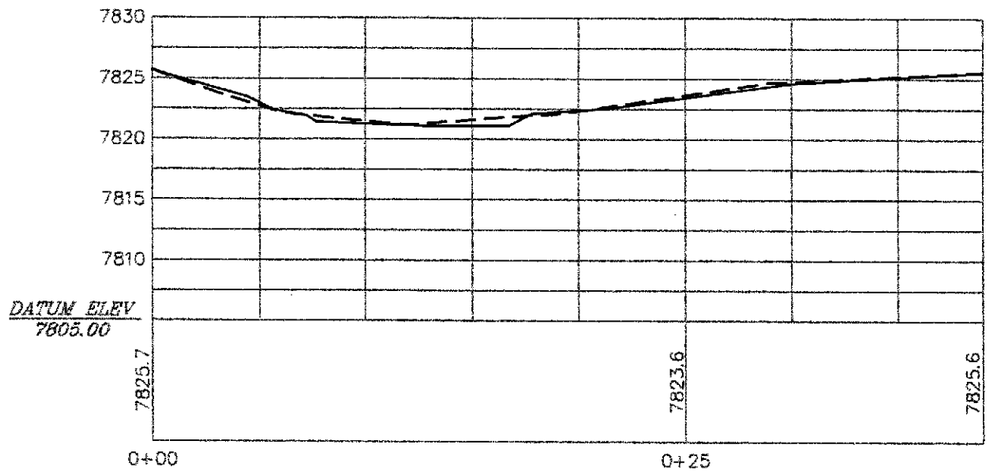


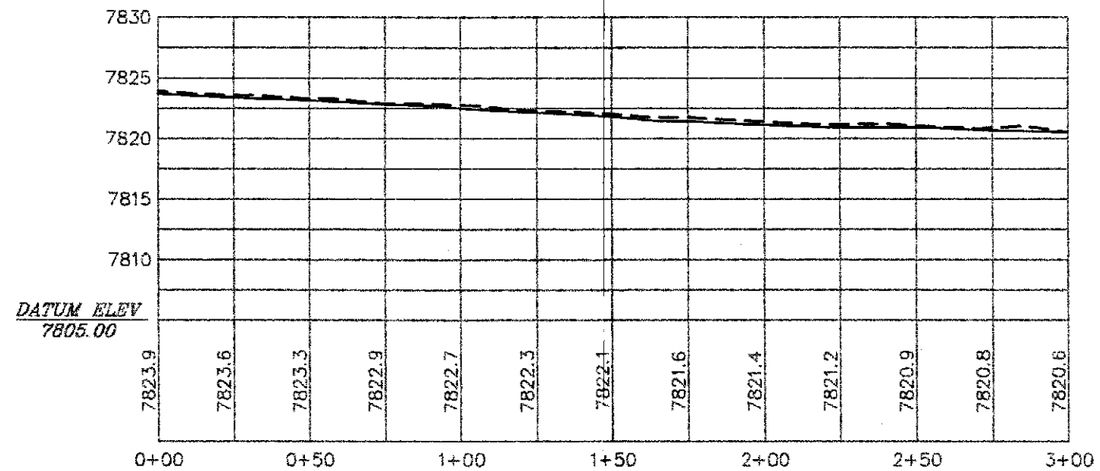
FIGURE 3-4. MC-1 CROSS-SECTION AND PROFILES

EarthFax

MC-2 – Cross-Section

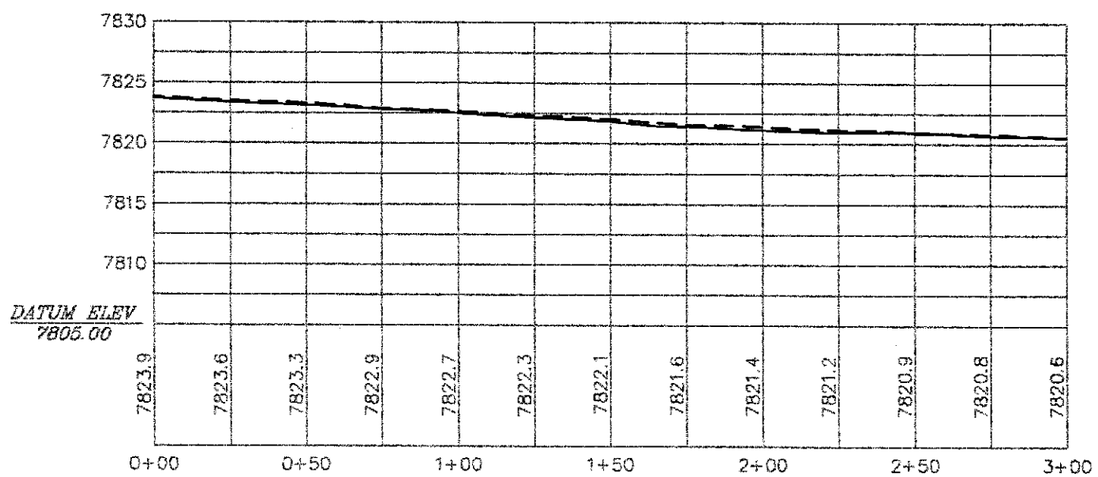


MC-2 – Bank Full



LEGEND
2002 Data - - - - - - -
2003 Data ————————

MC-2 – Water Surface



MC-2 – Channel Bottom

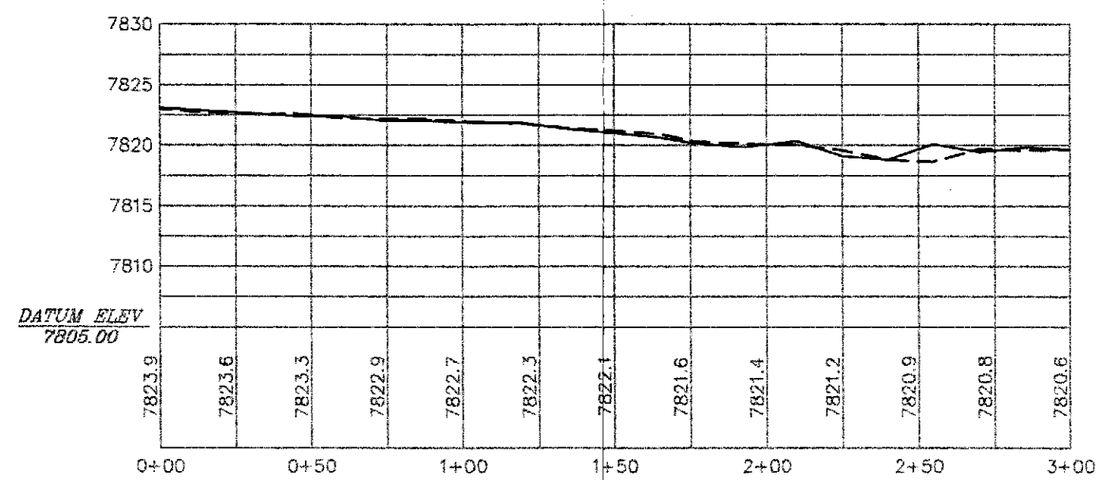
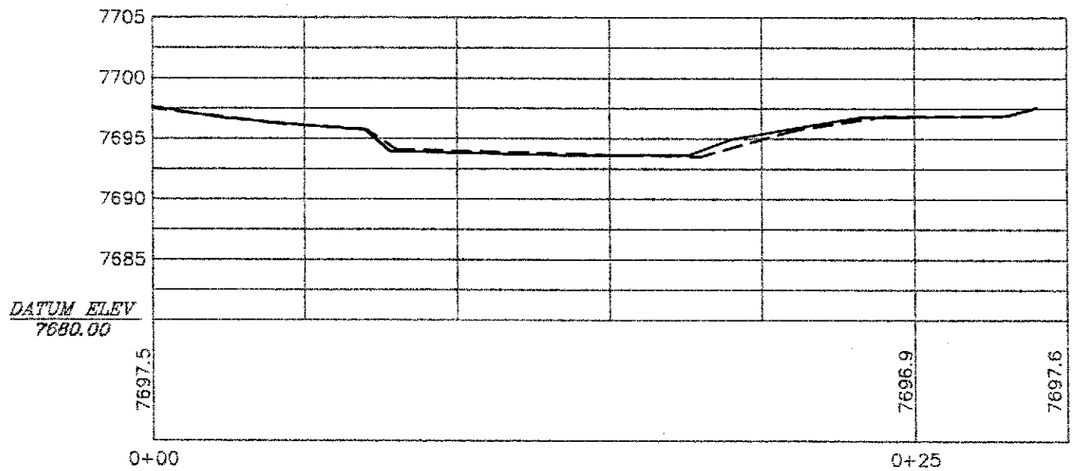


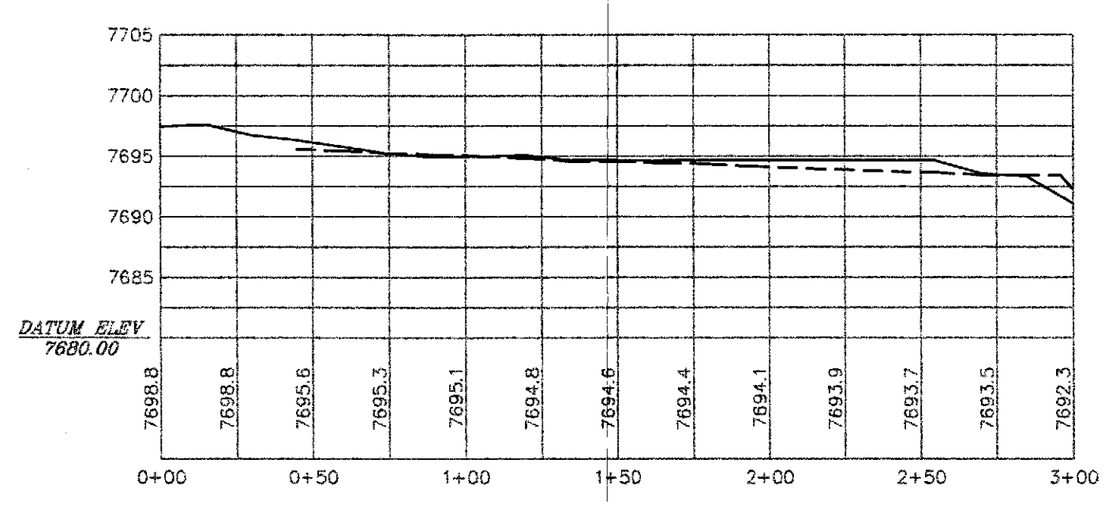
FIGURE 3-5. MC-2 CROSS-SECTION AND PROFILES

EarthFax

MC-3 – Cross-Section

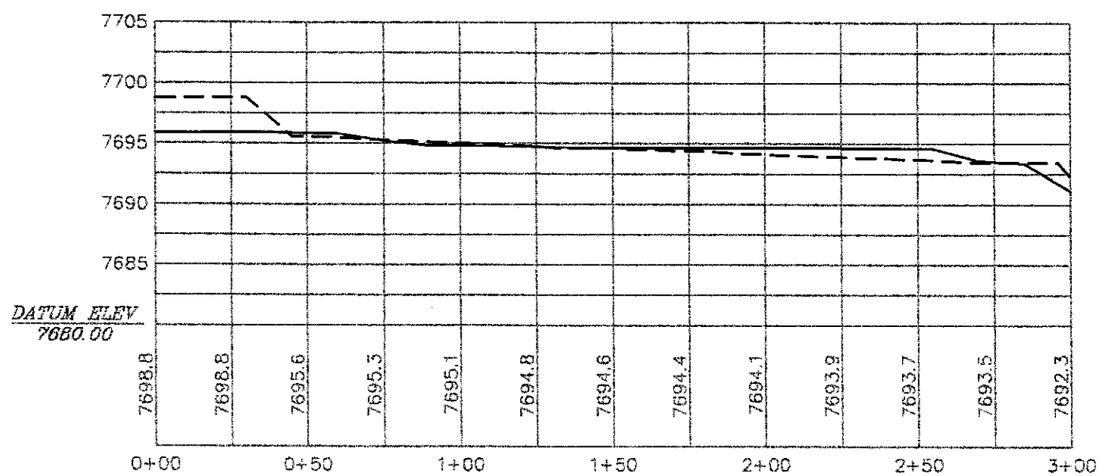


MC-3 – Bank Full



LEGEND
2002 Data - - - - - - -
2003 Data ————

MC-3 – Water Surface



MC-3 – Channel Bottom

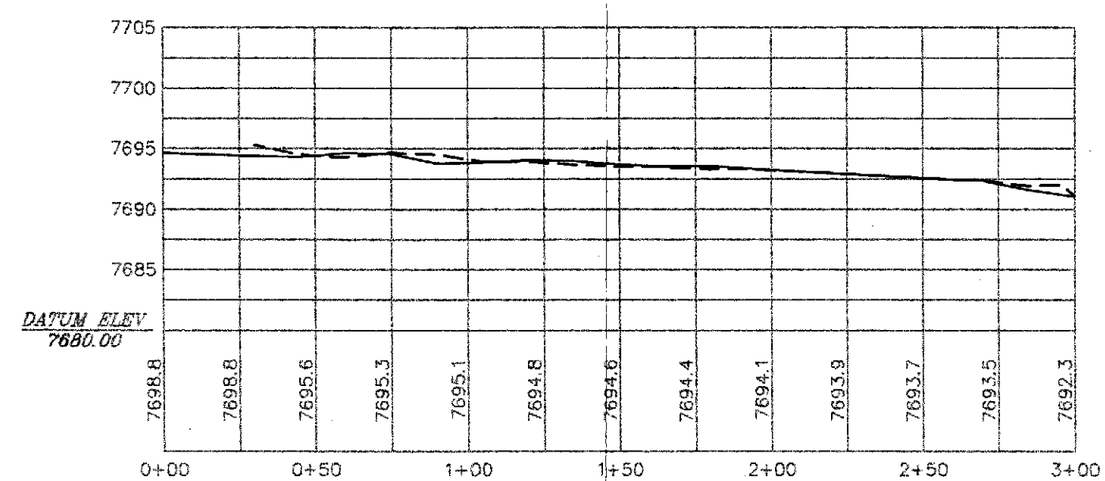
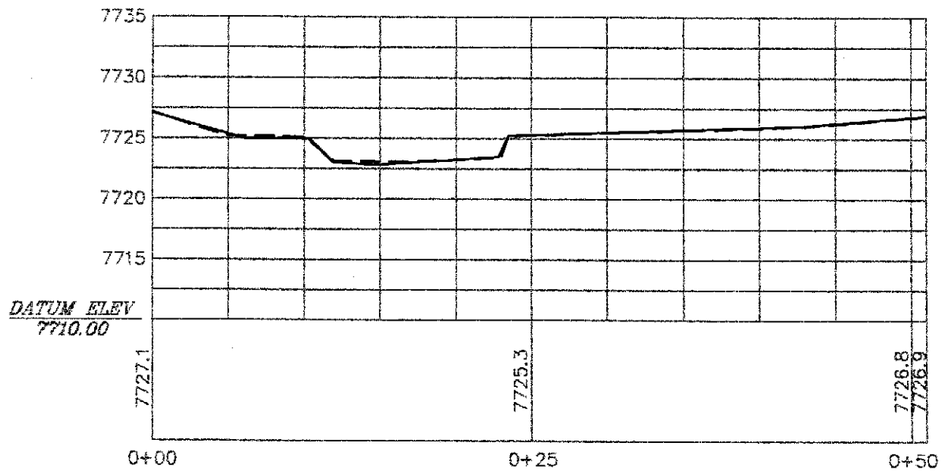


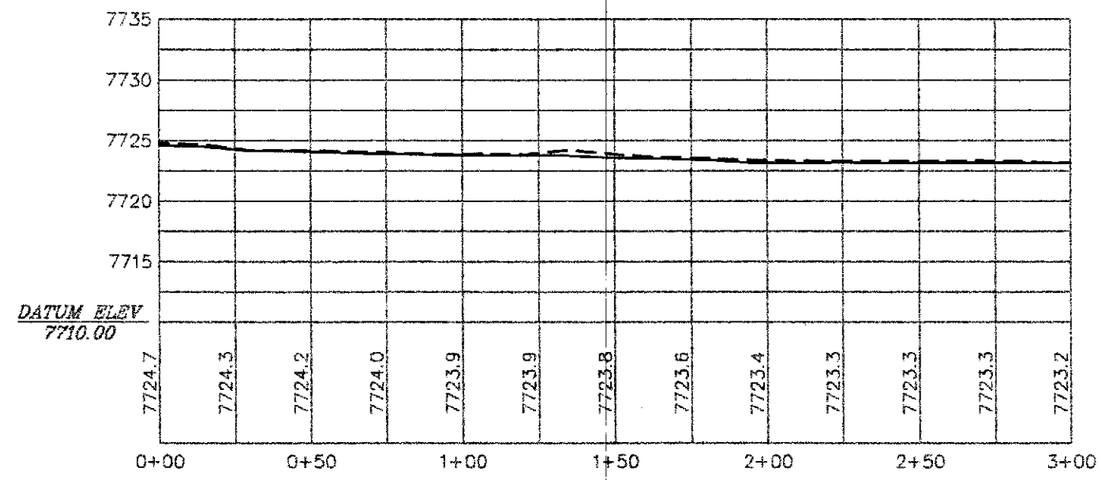
FIGURE 3-6. MC-3 CROSS-SECTION AND PROFILES

EarthFax

MC-4 – Cross-Section

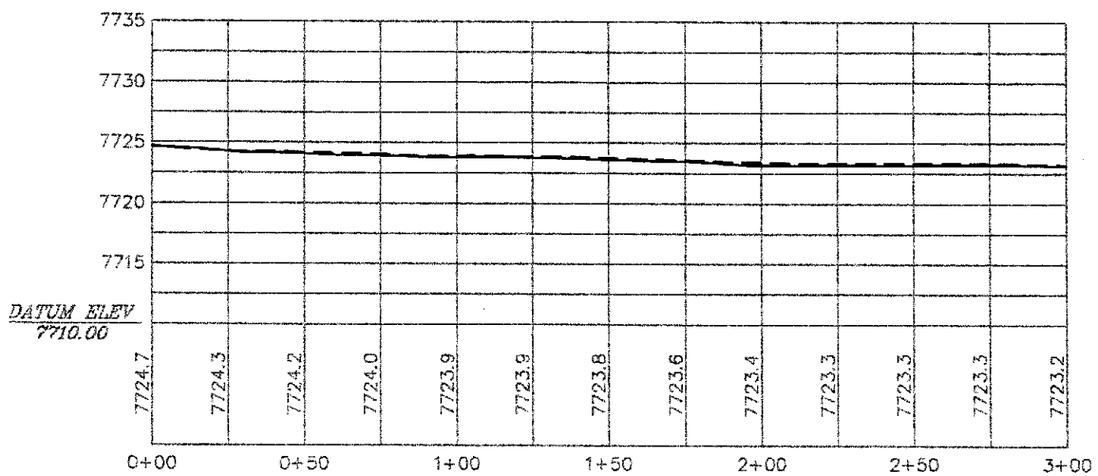


MC-4 – Bank Full



LEGEND
2002 Data - - - - - - -
2003 Data ————————

MC-4 – Water Surface



MC-4 – Channel Bottom

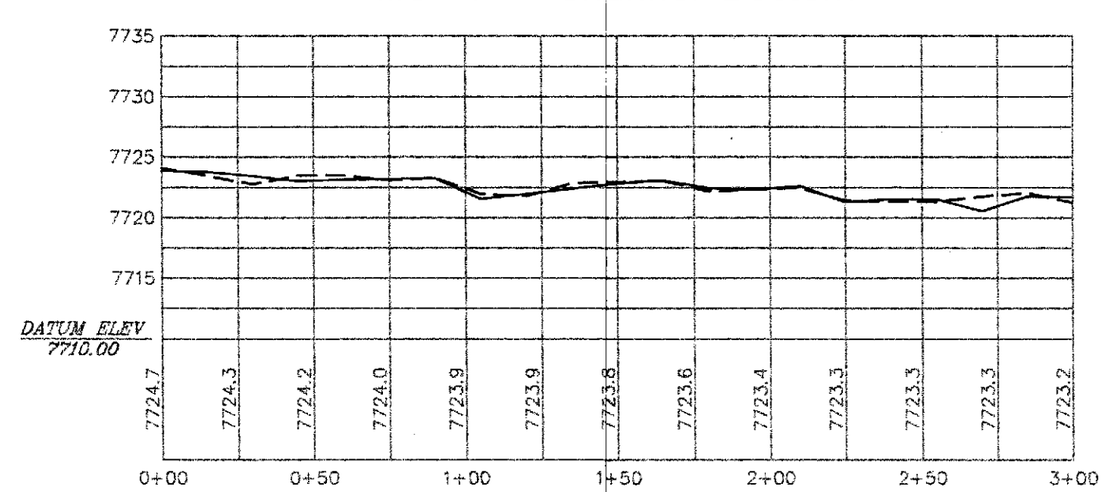
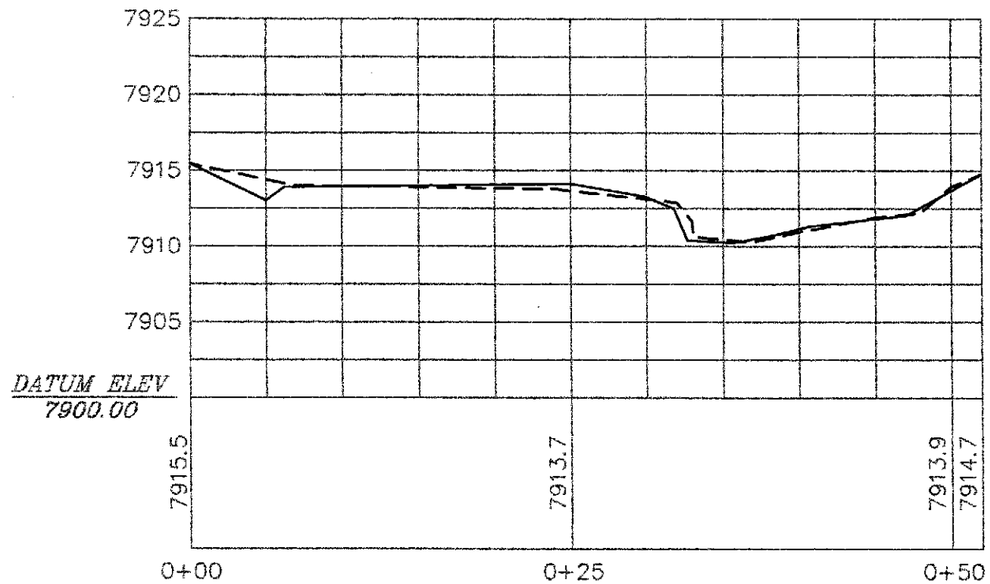


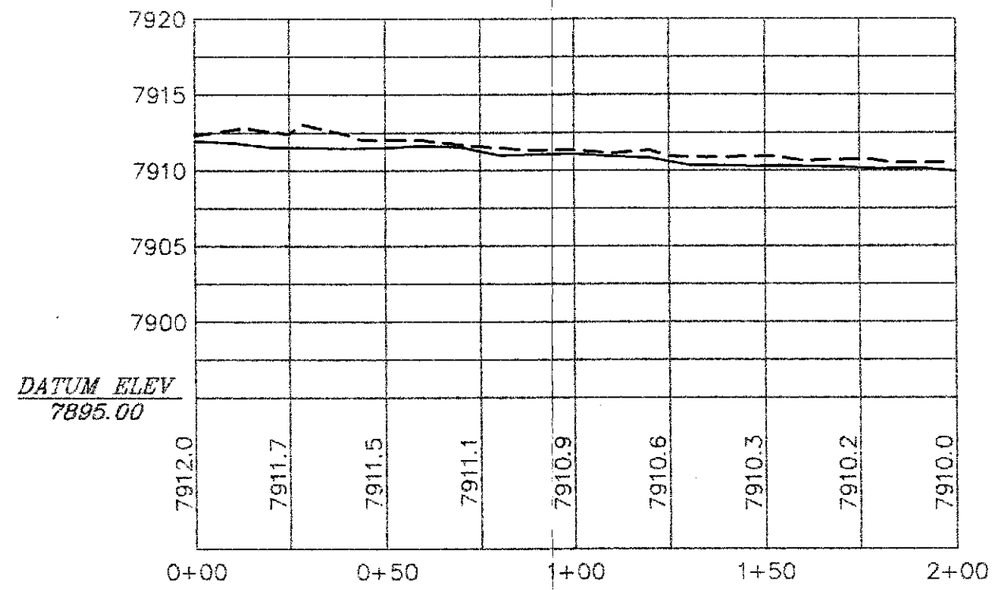
FIGURE 3-7. MC-4 CROSS-SECTION AND PROFILES

EarthFax

MC-5 – Cross-Section

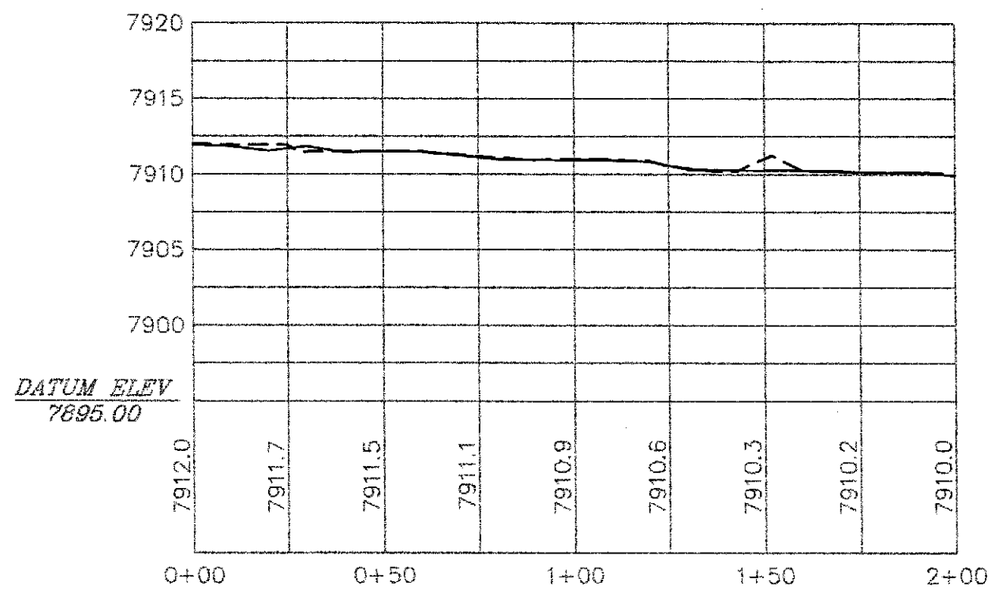


MC-5 – Bank Full



LEGEND
2002 Data ---------
2003 Data ————————

MC-5 – Water Surface



MC-5 – Channel Bottom

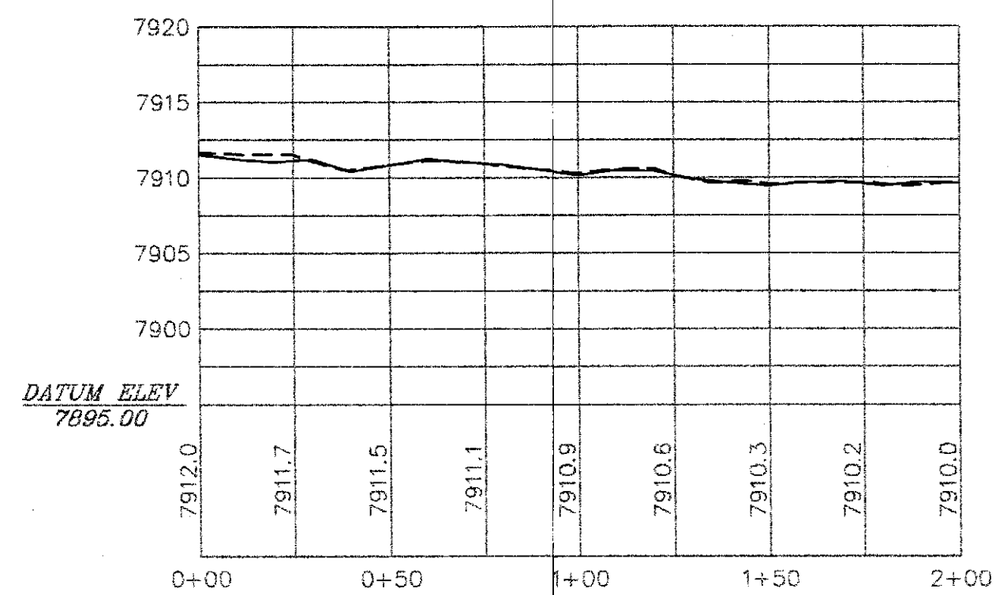
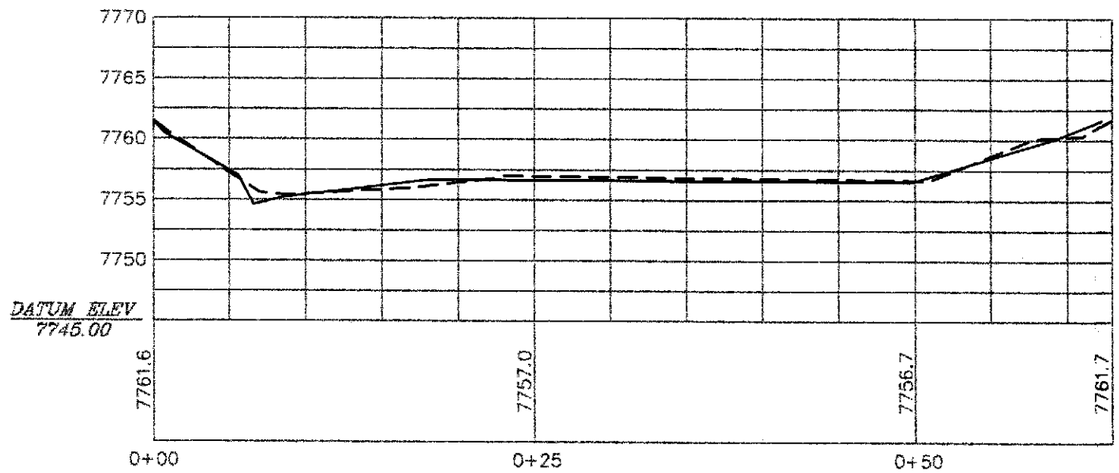


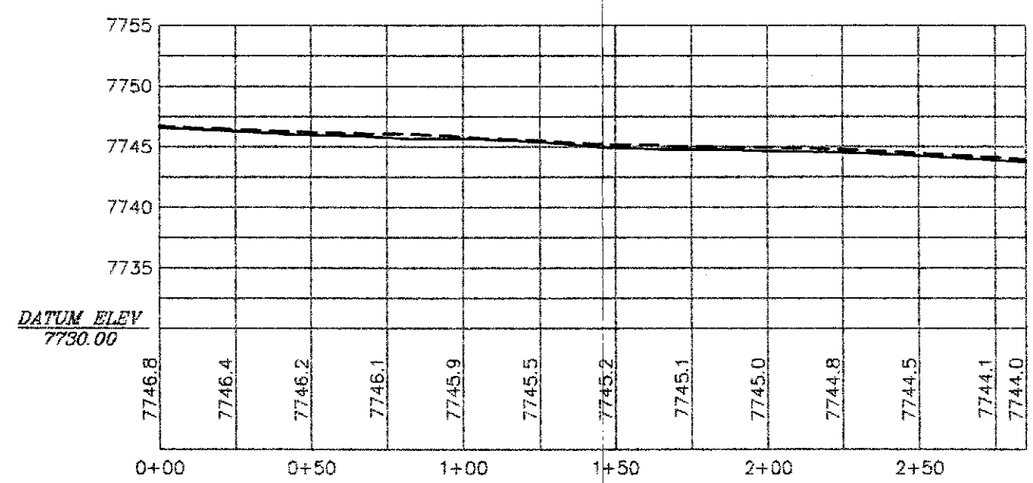
FIGURE 3-8. MC-5 CROSS-SECTION AND PROFILES

EarthFax

MC-6 – Cross-Section

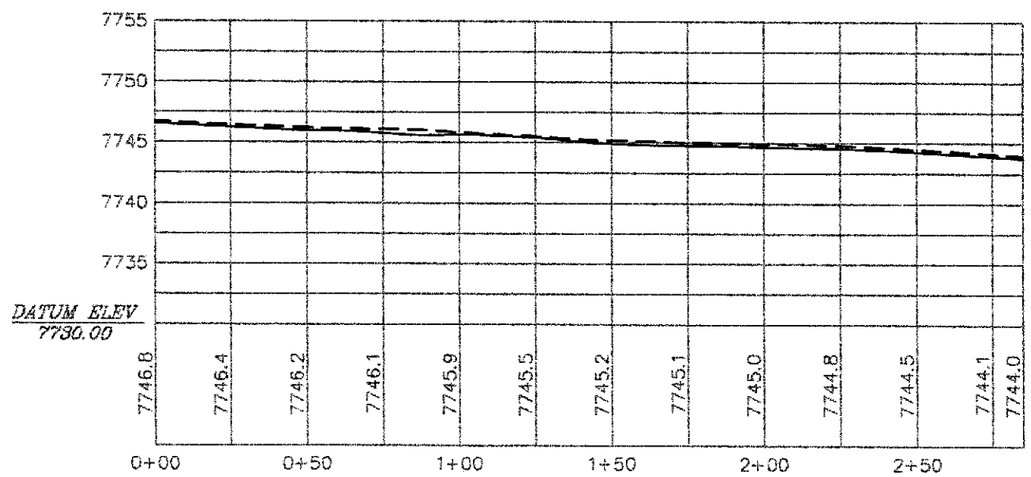


MC-6 – Bank Full



LEGEND
2002 Data - - - - - - -
2003 Data ————

MC-6 – Water Surface



MC-6 – Channel Bottom

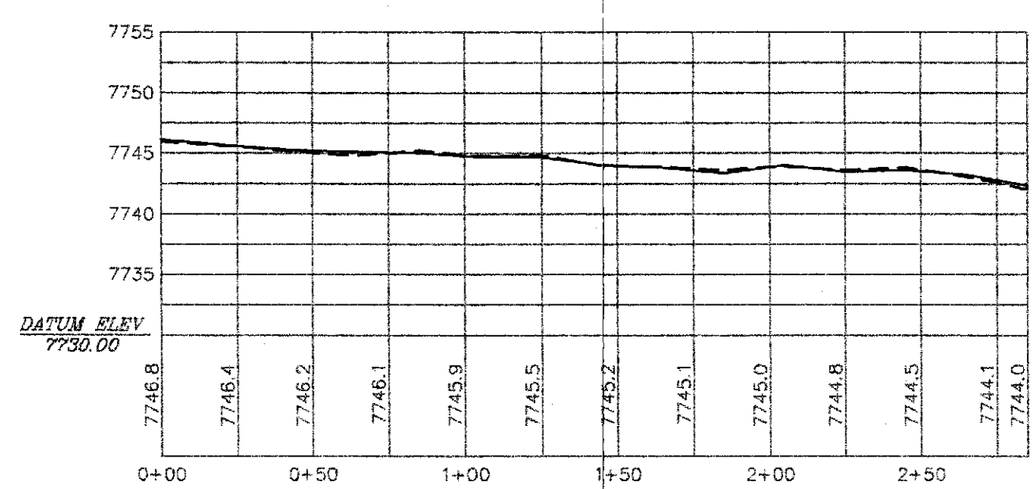


FIGURE 3-9. MC-6 CROSS-SECTION AND PROFILES

EarthFax

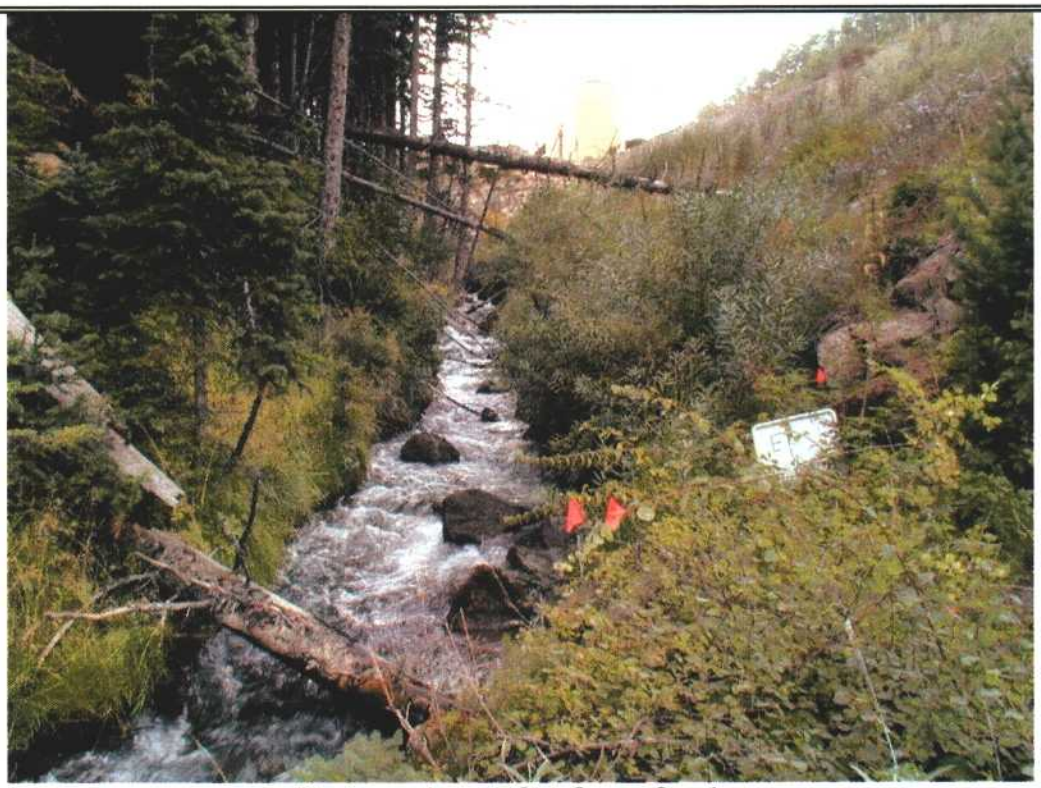
4.0 REFERENCES

EarthFax Engineering, Inc. 2002. Hydrologic and Channel-Stability Evaluation of Eccles and Mud Creeks. Letter report submitted to Canyon Fuel Company. Midvale, Utah.

Harrelson, C.C., C.L. Rawlins, and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. General Technical Report RM-245. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.

APPENDIX A

Photographs of Reference Sites



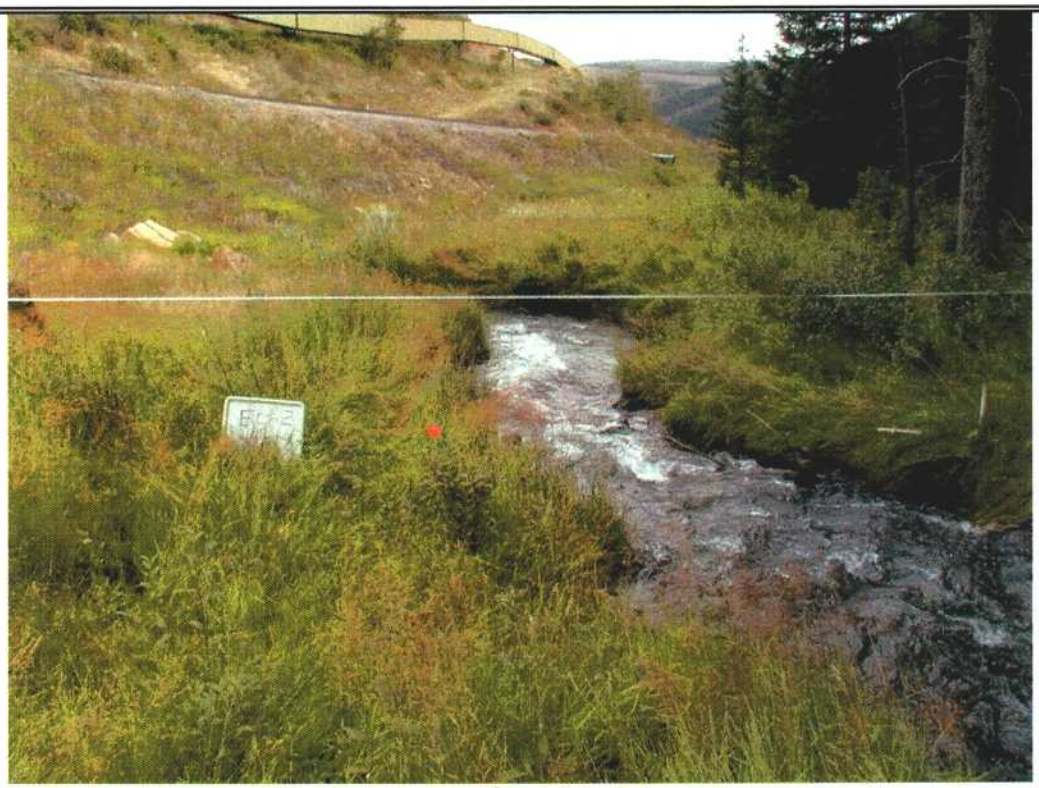
Photograph 1 - EC-1 Cross Section

Photograph 2 - EC-1 View Upstream

Photograph 3 - EC-1 View Downstream

Photograph 4 - EC-2 Cross Section

Photograph 5 - EC-2 View Upstream

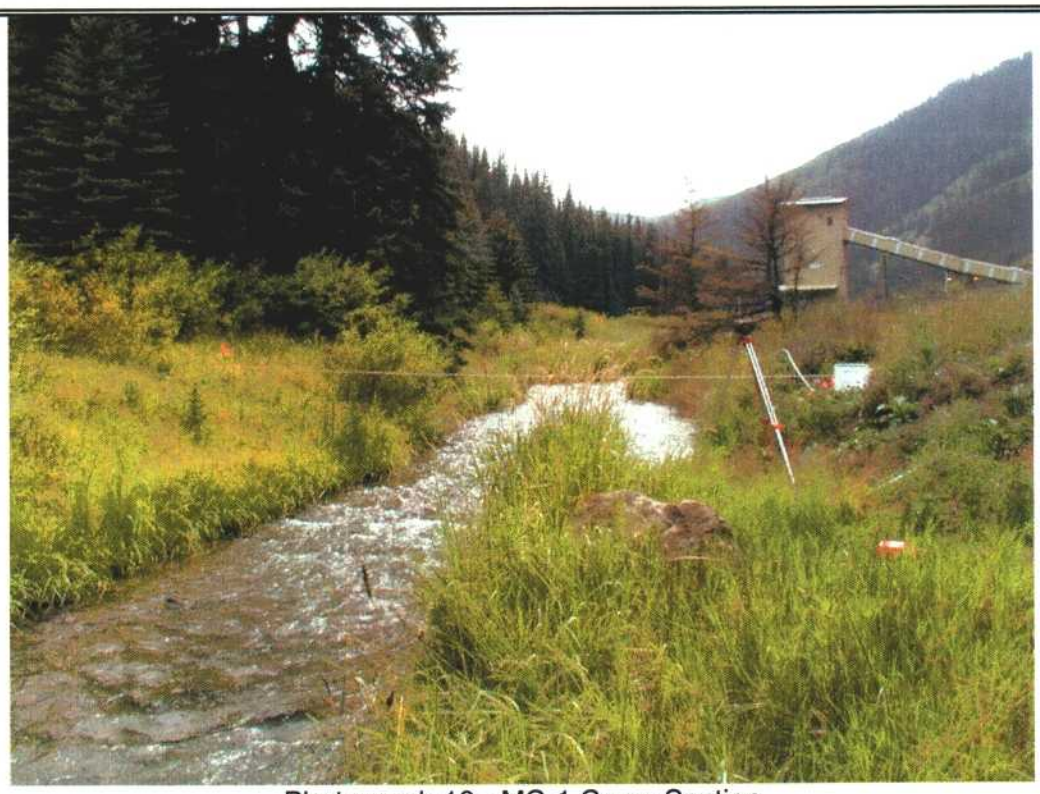


Photograph 6 - EC-2 View Downstream

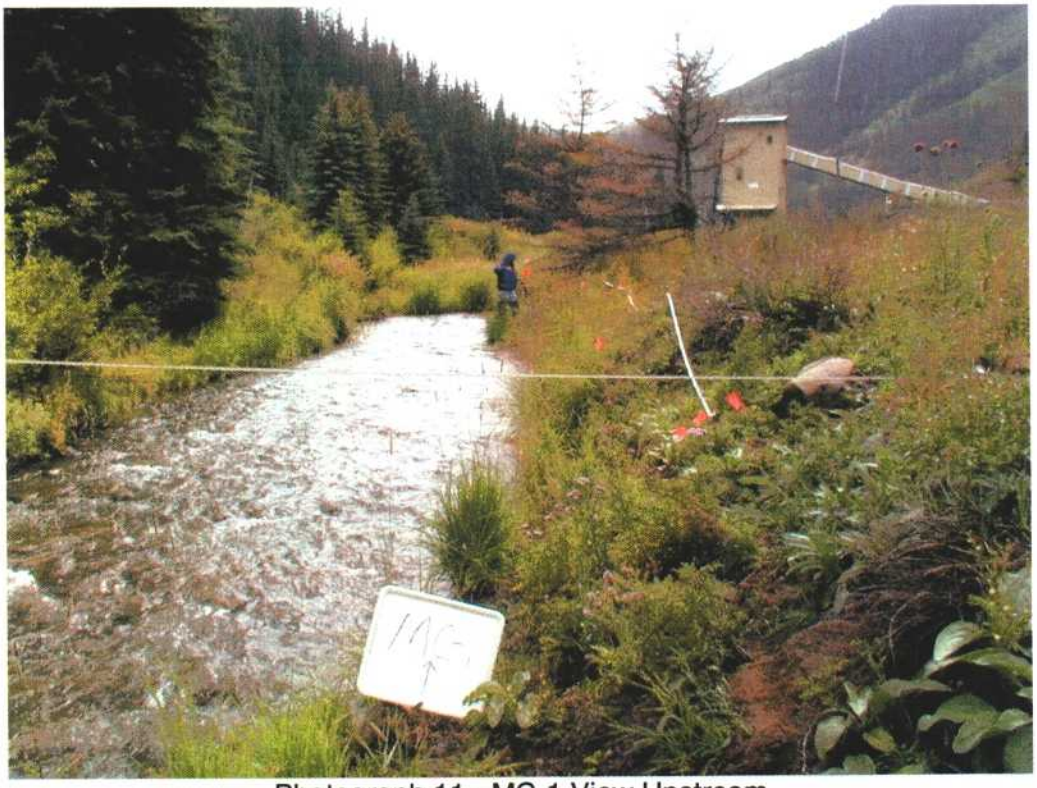
Photograph 7 - EC-3 Cross Section

Photograph 8 - EC-3 View Upstream

Photograph 9 - EC-3 View Downstream



Photograph 10 - MC-1 Cross Section



Photograph 11 - MC-1 View Upstream

Photograph 12 - MC-1 View Downstream

Photograph 13 - MC-2 Cross Section

Photograph 14 - MC-2 View Upstream

Photograph 15 - MC-2 View Downstream

Photograph 16 - MC-3 Cross Section and Upstream View

Photograph 17 - MC-3 View Downstream toward Culvert

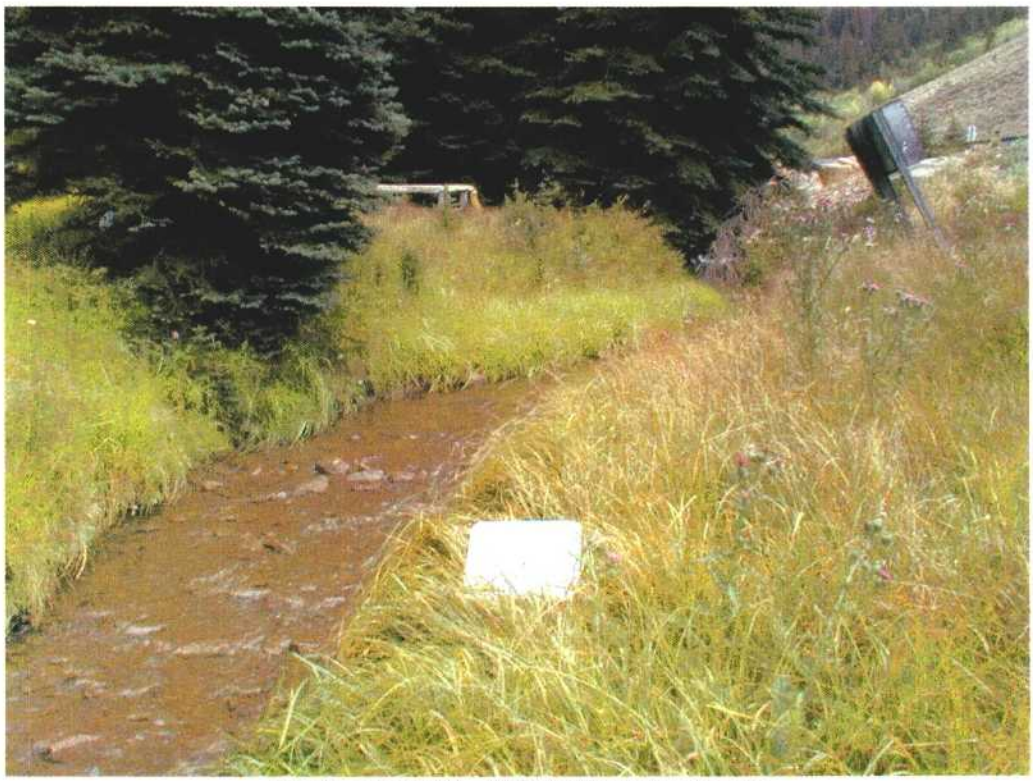
Photograph 18 - MC-3 View Downstream

Photograph 19 - MC-4 Cross Section

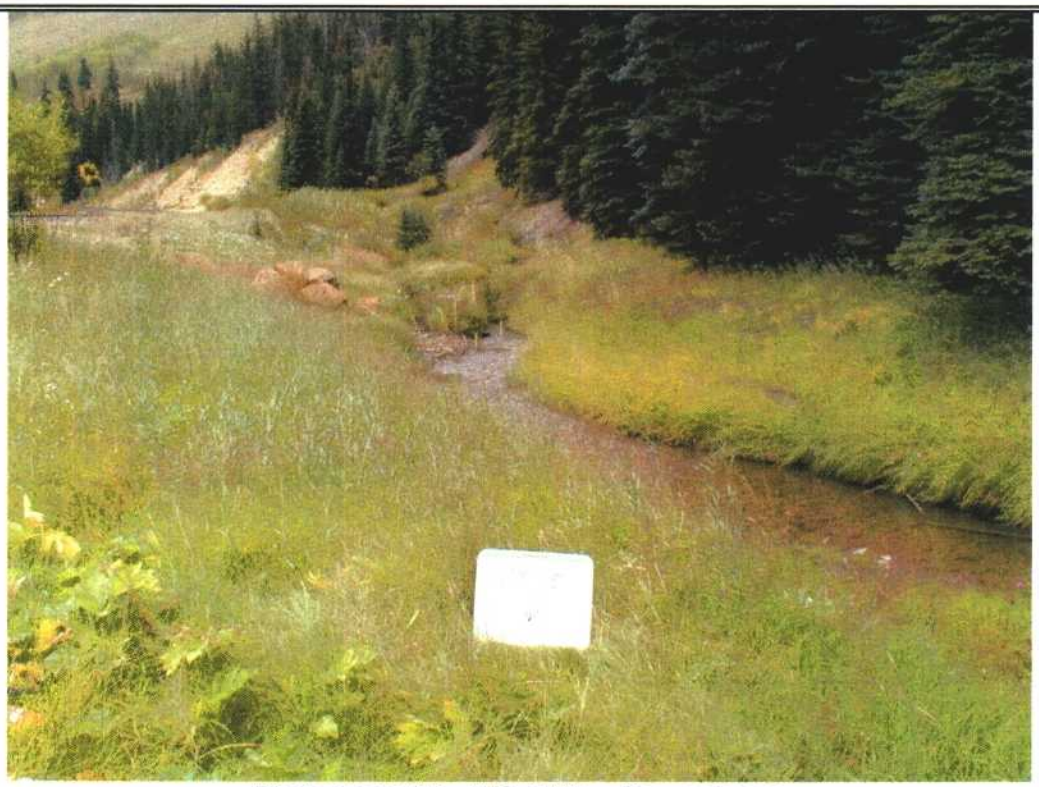
Photograph 20 - MC-4 View Upstream

Photograph 21 - MC-4 View Downstream

Photograph 22 - MC-5 Cross Section



Photograph 23 - MC-5 View Upstream



Photograph 24 - MC-5 View Downstream

Photograph 25 - MC-6 Cross Section

Photograph 26 - MC-6 View Upstream

Photograph 27 - MC-6 View Downstream

APPENDIX B

Reproduction of Field Log Books

EC-1 PROFILE 9/9/03

BM = 6.82'

STA	TBL	BFL	WS	BOTTOM	TBR
0+00	2.21'	3.31	4.01	6.09	2.62'
10+00	3.81	4.51	5.05	6.00	3.04'
20+00	4.13	5.82	6.01	6.96	4.65'
30+00	5.49	6.18	6.44	6.99	5.71
40+00	5.02	6.96	6.96	7.38	6.45
50+00	5.42	7.52	7.67	8.44	6.83
60+00	6.46	8.24	8.44	8.92	7.38
70+00	6.98	8.21	8.45	9.28	8.21
80+00	7.97	9.32	10.26	9.33	7.24
90+00	8.79	9.68	9.83	10.60	9.12
* 100+00	9.20	10.16	10.16	11.17	9.31
110+00	8.73	10.35	10.35	11.01	9.89
120+00	9.74	10.38	10.38	11.26	10.16
130+00	11.36	11.68	11.81	12.56	11.27
140+00	11.58	12.10	12.10	12.89	11.34
150+00	12.24	12.75	12.75	13.00	11.03
160+00	12.82	13.42	13.62	14.67	12.62

MOVED LEVEL OLD BM = 6.88

NEW BM = 5.25

170+00	12.12	12.75	12.75	13.54	12.32
180+00	13.25	13.56	13.56	14.21	12.52
190+00	13.96	14.21	14.32	15.25	13.21
200+00	13.25	14.31	15.22	16.25	14.67

CLOSE ON BM = 5.25

1' DROP

EC-1 Cross-Section BM = 6.30'

STA	ELEV	
0+00	5.05 -0.1	
0+02	9.30	
2.4	9.78	LC
6.5	10.61	Bottom
10.0	9.77	RC
~~11.7~~		~~GC~~
12.3	7.06	GC
16.7	6.17 -0.2	

BM = 6.30'

EC-2 PROFILE 9/9/03

BM = 4.20 10:50

STA	TBL	BFL	WS	BOTTOM	TBR
0+00	1.78	2.37	2.37	2.90	1.71
10+00	2.15	2.72	3.10	3.97	2.23
20+00	2.48	3.05	3.05	3.99	2.65
30+00	2.73	3.22	3.22	4.05	2.81
40+00	3.31	3.49	3.49	4.20	3.08
50+00	3.45	4.00	4.11	6.15	3.32
60+00	4.01	4.43	4.53	5.24	4.09
70+00	4.38	5.01	5.01	6.35	4.72
80+00	4.64	5.21	5.21	5.98	4.31
90+00	5.82	5.71	5.71	6.45	5.44
100+00	5.23	5.81	5.81	6.84	5.68
110+00	6.24	6.58	6.75	7.54	5.56
120+00	6.71	7.03	7.21	8.06	6.00
130+00	6.81	7.68	8.10	8.41	6.49
140+00	6.86	7.44	8.23	8.99	6.63
150+00	6.77	8.00	8.32	9.05	6.11
160+00	7.08	8.69	8.69	10.56	8.96
170+00	7.76	8.71	8.88	9.65	7.66
180+00	8.10	9.20	9.20	10.06	7.37
190+00	8.81	9.15	9.15	10.12	8.80
200+00	9.03	10.02	10.41	11.53	9.29

BM = 4.19

EC-2 Cross-Section 9/9/03

BM = 4.20

STA	Elev.	
0+00	2.99	
5.4	5.09	
23.5	5.44	TB
25.3	6.99	LBC
29.0	7.01	TH
31.2	6.53	RBC
32.8	5.67	TB
41.0	4.40	GC
62.6	3.23	GC
69.0	~~0.42~~ ~~0.19~~	
	0.55 - 0.30	

BM = 4.19

Bench Mark is 235' Down stream of Stake By Large Rock

EC-3 Profile 9/9/03

BM = 8.22

12:35

STA	TBL	BRL	WS	Bottom	TBR
0+00	9.26	10.05	10.59	12.05	8.39
10+00	8.70	10.06	10.66	11.52	8.65
20+00	6.82	9.88	11.02	12.38	10.38
30+00	10.29	10.98	11.27	12.26	6.39
40+00	11.18	11.65	11.74	12.32	5.58
50+00	11.53	11.81	11.81	13.56	6.15
60+00	11.57	12.09	12.09	13.67	6.17
70+00	11.64	12.14	12.14	13.04	5.70
80+00	6.89	11.64	12.56	13.48	6.37
90+00	10.21	13.16	13.36	14.26	7.23
100+00	10.91	12.96	13.55	14.11	8.29
110+00	10.94	13.37	13.68	14.50	10.28
120+00	11.22	13.44	13.81 ~~14.44~~	14.44	11.29

BM = 8.23 Moved BM = 0.83

130+00	4.15	6.73	6.94	8.76	4.74
140+00	4.72	6.71	7.00	8.00	5.53
150+00	4.27	7.33	7.51	8.45	4.35
160+00	7.18	7.85	7.85	8.66	3.80
170+00	5.70	7.50	8.05	9.25	6.23
180+00	6.52	8.23	8.56	9.64	8.08
190+00	5.39	8.62	8.62	9.66	7.55
200+00	5.54	9.02	9.02	9.55	8.64

BM = 0.82

EC-3 CROSS-SECTION 9/9/03

BM = 2.49

STA	ELEV	
0+00	2.80	
8.2	4.00	GC
16.6	5.15	TB
18.4	5.93	SHOULDER
19.5	8.29	BCL
22.0	8.53	BC
25.3	8.25	BCR
26	6.72	TB
31	2.89	

BM = 2.49

MC-5 PROFILE 9/9/03 14:05

BM = 1.55

STA	TBL	BFL	WS	BOTTOM	TBR
0+00	2.42	4.95	4.95 ~~5.00~~	5.34	3.64
10+00	2.42	5.05	5.05	5.64	3.41
20+00	2.59	5.35	5.35	5.83	3.46
30+00	2.34	5.38	5.05	5.64	3.36
40+00	5.17	5.44	5.44	6.44	3.10
50+00	5.19	5.38	5.38	6.05	3.90
60+00	3.06	5.27	5.41	5.63	3.74
70+00	3.34	5.35	5.63	5.84	5.26
80+00	2.58	5.88	5.88	6.02	5.42
90+00	3.08	5.70	5.95	6.51	5.61
100+00	3.48	5.79	5.96	6.71	5.63
110+00	5.31	5.95	5.95	6.39	3.44
120+00	5.50	6.06	6.06	6.45	2.56
130+00	5.99	6.54	6.54	6.94	2.88
140+00	6.16	6.59	6.59	7.22	2.80
150+00	6.01	6.61	6.61	7.43	2.83
160+00	6.03	6.63	6.63	7.20	3.61
170+00	6.12	6.66	6.66	7.11	5.73
180+00	4.80	6.78	6.78	7.42	6.23
190+00	5.79	6.71	6.71	7.14	5.90
200+00	6.01	6.95	6.95	7.24	5.92

BM = 1.56

MC-5 CROSS-SECTION

BM = 1.55

STA	ELEV	
0+00	1.44	
5	3.87	GC
6.2	3.00	TOE
25	2.78	TB
29.9	3.62	
31.8	4.42	
32.7	6.50	BLC
35.7	6.68	BC
38.5	6.16	BRC
40.7	5.58	TB
47	4.88	GC
51.9	2.14	

BM = 1.56

MC-1 PROFILE 9/9/03

BM = 4.53'

STA	TBL	BCL	WS	BOT	TBR
0+00	5.73	8.22	8.22	8.91	7.69
15+00	7.45	8.25	8.25	8.89	7.71
30+00	7.65	8.30	8.30	10.03	2.82
45+00	7.80	8.34	8.34	10.59	2.74
60+00	7.75	8.35	8.35	9.34	3.61
75+00	7.86	8.60	8.60	9.33	3.63
90+00	7.98	8.84	8.84	9.45	8.36
105+00	8.38	8.93	8.93	9.58	6.73
120+00	8.58	9.03	9.03	9.60	5.97
135+00	6.58	9.17	9.17	9.68	5.75
150+00	7.13	9.53	9.53	9.89	6.48
165+00	9.35	9.85	9.85	10.32	9.15
180+00	9.55	9.89	9.89	10.63	9.58
195+00	9.59	9.97	9.97	10.59	9.74
210+00	7.66	10.19	10.19	10.85	9.47
225+00	7.62	10.27	10.27	10.78	9.95
240+00	9.95	10.41	10.41	10.93	10.22
255+00	10.07	10.63	10.63	11.28	8.62
270+00	9.15	10.72	10.72	11.36	7.95
285+00	10.43	10.85	10.85	11.41	8.57
300+00	9.71	10.89	10.89	11.6	9.30

BM = 4.53'

MC-1 X-SECT
BM = 0.93

9/9/03

STA	ELEV.
0	1.39
5.8	4.59
7.7	5.94
8.7	6.32
15.3	6.36
21.6	6.14
23.0	5.48
26.4	2.90
32.4	1.88

BM = 0.93

MC-2 PROFILE
BM = 2.25

9/10/03
7:50 AM

STA	TBL	BFL	WS	BOT	TBR
0+00	5.12	5.55	5.55	6.13	5.31
15+00	5.30	5.76	5.76	6.39	5.23
30+00	5.63	5.94	5.94	6.59	5.52
45+00	5.71	6.05	6.05	6.86	5.63
60+00	5.33	6.22	6.22	6.83	4.95
75+00	5.79	6.45	6.45	7.26	5.13
90+00	5.76	6.57	6.57	7.28	5.81
105+00	5.97	6.87	~~7.17~~ 6.87	7.42	6.59
120+00	5.97	7.06	7.06	7.43	5.90
135+00	6.28	7.24	7.24	7.95	6.70
150+00	6.92	7.43	7.43	8.25	7.00
165+00	6.59	7.80	7.80	8.63	7.25
180+00	7.42	7.87	7.87	9.14	7.41
195+00	7.45	8.06	8.06	9.42	7.75
210+00	7.97	8.22	8.22	8.92	7.79
225+00	7.34	8.34	8.34	10.20	4.60
240+00	7.15	8.35	8.35	10.49	3.67
255+00	7.28	8.36	8.36	9.19	3.01
270+00	6.78	8.57	8.57	9.83	7.82
285+00	7.14	8.64	8.64	9.42	7.94
300+00	8.15	8.72	8.72	9.63	8.63

BM = 2.26

MC-2 X-SECT
BM = 2.25

STA	ELEV	
0.0	3.62	PIN L
4.4	5.80	GC
5.7	6.86	GC
7.2	7.35	TB
7.7	7.86	BCL
13.0	8.19	BC
16.7	8.20	BCR
17.8	7.18	TB
21.3	6.75	GC
30.0	4.65	GC
39.2	3.71	PIN R

BM = 2.25

FINISHED 9:05 AM

MC-6 PROFILE
BM = 2.68

9/10/03
9:20 AM

STA	TBL	BFL	WS	BOT	TBR
0+00	5.85	8.24	8.24	8.68	2.93
25+00	8.22	8.53	8.53	9.21	4.34
45+00	8.50	8.79	8.79	9.55	3.68
65+00	8.54	8.90	8.90	9.68	3.90
85+00	8.71	9.20	9.20	9.75	7.98
105+00	8.70	9.19	9.19	10.12	8.25
125+00	8.91	9.40	9.40	10.13	8.64
145+00	8.07	9.84	9.84	10.80	8.75
165+00	9.24	10.01	10.01	11.01	6.04
185+00	9.78	10.06	10.06	11.46	9.39
205+00	9.91	10.19	10.19	10.81	9.47
225+00	8.91	10.26	10.26	11.35	9.92 *
245+00	10.23	10.48	10.48	11.23	10.14
265+00	9.97	10.76	10.76	11.57	10.38
285+00	8.71	11.05	11.05	12.45	10.92
305+00	10.95	11.23	11.23	12.71	10.74
325+00	10.89	11.28	11.28	12.14	11.13
345+00	11.15	11.32	11.32	12.06	6.30
365+00	11.08	11.59	11.59	13.14	5.9
385+00	11.26	11.74	11.74	12.39	5.59
405+00	11.07	11.83	11.83	12.60	5.80
425+00	10.60	~~12.07~~ 11.91	~~12.07~~ 11.91	14.10	11.50
450+00	11.50	12.08	12.08	12.77	8.26

TREES BOLTED INTO BRACE

BM = 2.69

MC-6 X-SECT 9/10/03

BM = 2.68

STA	ELEV	
0.0	4.99	LP
0.8	6.10	
5.6	9.48	TB
6.6	11.93	BCL
8.5	11.33	BC
18.0	9.88	BCR
49.8	9.99	GC
59.2	6.43	GC
62.3	4.88	RP

BM = 2.69

MC-4 PROFILE 9/10/03 11:10

BM = 1.66

STA	TBL	BFL	WS	BOT	TBR
0+00	4.58	5.65	5.65	6.46	2.30
15+00	4.15	5.79	5.79	6.52	2.96
30+00	2.11	6.10	6.85	6.85	3.54
45+00	4.90	6.17	6.17	7.29	3.85
60+00	5.17	6.30	6.30	7.15	4.41
75+00	5.19	6.35	6.35	7.12	4.96
90+00	6.00	6.47	6.47	7.03	5.29
105+00	6.07	6.51	6.51	8.73	5.58
120+00	5.85	6.53	6.53	8.32	3.33
135+00	5.99	6.55	6.55	7.91	4.20
150+00	5.39	6.68	6.68	7.49	5.12
165+00	4.69	6.77	6.77	7.25	5.24
180+00	4.30	6.87	6.87	7.84	6.47
195+00	5.33	7.13	7.13	7.98	6.35
210+00	6.25	7.14	7.14	7.69	5.90
225+00	6.49	7.09	7.09	8.98	4.41
240+00	6.40	7.14	7.14	8.74	3.46
255+00	6.49	7.11	7.11	8.77	3.86
270+00	6.49	7.12	7.12	9.75	3.62
285+00	6.67	7.13	7.13	8.53	3.94
300+00	6.59	7.16	7.16	8.62	4.21
		BM =	1.66		

MC-4 X-SECT 9/10/03

BM = 1.67

STA	ELEV	
0	3.20	PL
1.9	4.19	GC
6.2	5.35	
10.3	5.33	TBL
11.9	7.28	BLC
14.8	7.50	BL
22.8	6.84	BRC
23.5	5.09	TB
42.9	4.25	GC
50.6	3.44	PR

BM = 1.66

MC-3 PROFILE 9/10/03

BM MISSING USED RIS STAKE 12:30

BM = 7.5

STA	TBL	BFL	WS	BOT	TBR
0+00	6.51	7.52	9.08	10.35	7.20
15+00	6.89	7.35	9.13	10.48	8.63
30+00	7.32	8.23	9.14	10.53	7.52
45+00	6.83	8.63	9.15	10.69	8.09
60+00	7.6	9.17	9.17	10.35	8.85
75+00	7.3	9.75	9.75	10.41	9.24
90+00	8.3	10.08	10.08	11.22	9.78
105+00	6.43	9.96	10.19	11.13	9.26
120+00	9.21	9.90	10.23	10.93	9.23
135+00	9.19	10.31	10.31	11.01	9.21
150+00	9.39	10.33	10.33	11.31	10.17
165+00	9.72	10.35	10.35	11.46	9.50
180+00	9.48	10.35	10.35	11.45	9.71
195+00	9.04	10.35	10.35	11.66	9.55
CULVERT					
2+55	9.95	10.37	10.37	12.52	10.08
270+00	9.58	11.38	11.38	12.64	10.69
285+00	11.22	11.65	11.65	13.40	11.70
300+00	12.35	13.85	13.85	13.94	12.86

BM - 7.5

MC-3 X SECT 9/10/03

Bm = 7.40

STA		
0	7.34	PL
2.3	8.28	GC
7.0	9.27	TB
7.8	11.04	BLC
13.7	11.32	BC
17.6	11.35	BRC
19.0	10.05	TB
23.2	8.20	GC
29.0	7.40	PR

BM = 7.40

BEAVER DAM UPSTREAM FAILED
DEBRIS WASHED DOWN TO
CULVERT - PORTION OF DEBRIS
REMOVED + PLACED ON MONUMENT
APPROX. 4 CY OF MUCK -
NEW BEAVER DAM ON NORTH
SIDE OF ROAD.

APPENDIX C

Cross-section and Profile Calculations

Cross Section: EC-1

Benchmark Elev: 8499.13 ft
BenchMark Rod Reading: 6.30 ft
Survey Date: 9/9/03

Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	4.95	8500.48			
2.0	9.30	8496.13	4.35	2	65
2.4	9.75	8495.68	0.45	0.4	48
6.5	10.61	8494.82	0.86	4.1	12
10.0	9.77	8495.66	-0.84	3.5	-13
12.3	7.06	8498.37	-2.71	2.3	-50
16.7	5.97	8499.46	-1.09	4.4	-14

Cross Section: EC-2

Benchmark Elev: 8257.72 ft
BenchMark Rod Reading: 4.20 ft
Survey Date: 9/9/03

Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	2.99	8258.93			
5.4	5.09	8256.83	2.10	5.4	21
23.5	5.44	8256.48	0.35	18.1	1
25.3	6.99	8254.93	1.55	1.8	41
29.0	7.01	8254.91	0.02	3.7	0
31.2	6.53	8255.39	-0.48	2.2	-12
32.8	5.67	8256.25	-0.86	1.6	-28
41.0	4.40	8257.52	-1.27	8.2	-9
62.6	3.23	8258.69	-1.17	21.6	-3
69.0	0.25	8261.67	-2.98	6.4	-25

Cross Section: EC-3

Benchmark Elev: 7971.59 ft
BenchMark Rod Reading: 2.49 ft
Survey Date: 9/9/03

Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	2.80	7968.79			
8.2	4.00	7967.59	1.20	8.2	8
16.6	5.15	7966.44	1.15	8.4	8
18.4	5.93	7965.66	0.78	1.8	23
19.5	8.29	7963.30	2.36	1.1	65
22.0	8.53	7963.06	0.24	2.5	5
25.3	8.25	7963.34	-0.28	3.3	-5
26.0	6.72	7964.87	-1.53	0.7	-65
31.0	2.89	7968.70	-3.83	5.0	-37

Cross Section: MC-1

Benchmark Elev: 7898.53 ft
BenchMark Rod Reading: 0.93 ft
Survey Date: 9/9/03

Station Ft	Adj. Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	284.70	1.39	7898.07			
5.8	290.50	4.59	7894.87	3.20	5.8	29
7.7	292.40	5.94	7893.52	1.35	1.9	35
8.7	293.40	6.32	7893.14	0.38	1.0	21
15.3	300.00	6.36	7893.10	0.04	6.6	0
21.6	306.30	6.14	7893.32	-0.22	6.3	-2
23.0	307.70	5.48	7893.98	-0.66	1.4	-25
26.4	311.10	2.90	7896.56	-2.58	3.4	-37
32.4	317.10	1.88	7897.58	-1.02	6.0	-10

Cross Section: MC-2

Benchmark Elev: 7827.04 ft
BenchMark Rod Reading: 2.25 ft
Survey Date: 9/10/03

Station Ft	Adj. Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
-65.2	471.8		7830.82			
-14.6	522.4		7829.53	1.29	50.6	1
0.0	537.0	3.62	7825.67	3.86	14.6	15
4.4	541.4	5.80	7823.49	2.18	4.4	26
5.7	542.7	6.86	7822.43	1.06	1.3	39
7.2	544.2	7.35	7821.94	0.49	1.5	18
7.7	544.7	7.86	7821.43	0.51	0.5	46
13.0	550.0	8.19	7821.10	0.84	5.8	8
16.7	553.7	8.20	7821.09	0.01	3.7	0
17.8	554.8	7.18	7822.11	-1.02	1.1	-43
21.3	558.3	6.75	7822.54	-0.43	3.5	-7
30.0	567.0	4.65	7824.64	-2.53	12.2	-12
39.2	576.2	3.71	7825.58	-0.94	9.2	-6

Cross Section: MC-3

Benchmark Elev: 7698.23 ft
BenchMark Rod Reading: 6.76 ft
Survey Date: 9/10/03

Station Ft	Adj. Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	1167.4	7.34	7697.65			
2.3	1169.7	8.28	7696.71	0.94	2.3	22
7.0	1174.4	9.27	7695.72	0.99	4.7	12
7.8	1175.2	11.04	7693.95	1.77	0.8	66
13.7	1181.1	11.32	7693.67	0.28	5.9	3
17.6	1185.0	11.35	7693.64	0.31	9.8	2
19.0	1186.4	10.05	7694.94	-1.30	1.4	-43
23.2	1190.6	8.20	7696.79	-1.85	4.2	-24
28.0	1195.4	8.10	7696.89	-0.10	4.8	-1
29.0	1196.4	7.40	7697.59	-0.70	1.0	-35

Cross Section: MC-4

Benchmark Elev.: 7728.64 ft
BenchMark Rod Reading: 1.67 ft
Survey Date: 9/10/03

Station Ft	Adj. Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
-484.7	0.6		7738.05			
-271.3	213.9		7733.41	4.64	213.4	1
-21.7	463.5		7727.60	5.81	249.6	1
0.0	485.2	3.20	7727.11	0.49	21.7	1
1.9	487.1	4.19	7726.12	0.99	1.9	28
6.2	491.4	5.35	7724.96	1.16	4.3	15
10.3	495.5	5.33	7724.98	-0.02	4.1	0
11.9	497.1	7.28	7723.03	1.95	1.6	51
14.8	500.0	7.50	7722.81	0.22	2.9	4
22.8	508.0	6.84	7723.47	-0.66	8.0	-5
23.5	508.7	5.09	7725.22	-1.75	0.7	-68
42.9	528.1	4.25	7726.06	-0.84	19.4	-2
50.6	535.8	3.44	7726.87	-0.81	7.7	-6
83.9	569.1		7727.86	-0.99	33.3	-2

Cross Section: MC-5

Benchmark Elev.: 7915.35 ft
BenchMark Rod Reading: 1.55 ft
Survey Date: 9/10/03

Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0.0	1.44	7915.46			
5.0	3.87	7913.03	2.43	5.0	26
6.2	3.00	7913.90	-0.87	1.2	-36
25.0	2.78	7914.12	-0.22	18.8	-1
29.9	3.62	7913.28	0.84	4.9	10
31.8	4.42	7912.48	0.80	1.9	23
32.7	6.50	7910.40	2.08	0.9	67
35.7	6.68	7910.22	0.18	3.0	3
38.5	6.16	7910.74	-0.52	2.8	-11
40.7	5.58	7911.32	-0.58	2.2	-15
47.0	4.88	7912.02	-0.70	6.3	-6
52.0	2.14	7914.76	-2.74	5.0	-29

Cross Section: MC-6

Benchmark Elev.: 7763.84 ft
BenchMark Rod Reading 1: 2.89 ft
BenchMark Rod Reading 2: 3.22 ft
Survey Date: 9/10/03

Station Ft	Rod Reading Ft	Elevation Ft	El Change Ft	Distance Ft	Slope Degrees
0	4.23	7762.50			
146	4.92	7761.81	0.69	146	0
191	5.50	7761.56	0.25	45	0
192	6.50	7760.56	1.00	1	45
198	11.46	7755.60	4.96	6	40
200	11.65	7755.41	0.19	2	5
208	11.05	7756.01	-0.60	8	-4
213	10.34	7756.72	-0.71	5	-8
214	10.08	7756.98	-0.26	1	-15
242	10.41	7756.65	0.33	28	1
249	6.90	7760.16	-3.51	7	-27
252	6.75	7760.31	-0.15	3	-3
255	5.33	7761.73	-1.42	3	-25
297	4.88	7761.85	-0.12	42	0
477	2.70	7764.03	-2.18	180	-1

Note: Stations 191 through 297 relocated transit, second rod reading applies.

Profile: EC-1

BenchMark Elev: 8499.13 ft
BenchMark Rod Reading 1: 6.82 ft
BenchMark Rod Reading 2: 5.25 ft
Survey Date: 9/9/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	2.21	8503.74	3.31	8502.64	4.01	8501.94	6.09	8499.86	2.62	8503.33
10	3.61	8502.34	4.51	8501.44	5.05	8500.90	6.00	8499.95	3.04	8502.91
20	4.13	8501.82	5.82	8500.13	6.01	8499.94	6.96	8498.99	4.65	8501.30
30	5.49	8500.46	6.18	8499.77	6.44	8499.51	6.99	8498.96	5.71	8500.24
40	5.02	8500.93	6.96	8498.99	6.96	8498.99	7.38	8498.57	6.45	8499.50
50	5.42	8500.53	7.52	8498.43	7.67	8498.28	8.44	8497.51	6.83	8499.12
60	6.46	8499.49	8.24	8497.71	8.44	8497.51	8.92	8497.03	7.83	8498.12
70	6.98	8498.97	8.21	8497.74	8.45	8497.50	9.28	8496.67	8.21	8497.74
80	7.97	8497.98	9.32	8496.63	9.33	8496.62	10.26	8495.69	7.24	8498.71
90	8.79	8497.16	9.68	8496.27	9.83	8496.12	10.60	8495.35	9.12	8496.83
100	9.20	8496.75	10.16	8495.79	10.16	8495.79	11.17	8494.78	9.31	8496.64
110	8.73	8497.22	10.35	8495.60	10.35	8495.60	11.01	8494.94	9.89	8496.06
120	9.74	8496.21	10.38	8495.57	10.38	8495.57	11.26	8494.69	10.16	8495.79
130	11.36	8494.59	11.68	8494.27	11.81	8494.14	12.56	8493.39	11.27	8494.68
140	11.58	8494.37	12.10	8493.85	12.10	8493.85	12.89	8493.06	11.34	8494.61
150	12.24	8493.71	12.75	8493.20	12.75	8493.20	13.00	8492.95	11.03	8494.92
160	12.82	8493.13	13.42	8492.53	13.62	8492.33	14.67	8491.28	12.62	8493.33
New Bench Mark										
170	12.12	8492.26	12.75	8491.63	12.75	8491.63	13.54	8490.84	12.32	8492.06
180	13.25	8491.13	13.56	8490.82	13.56	8490.82	14.21	8490.17	12.52	8491.86
190	13.96	8490.42	14.21	8490.17	14.32	8490.06	15.25	8489.13	13.21	8491.17
200	13.25	8491.13	14.31	8490.07	15.22	8489.16	16.25	8488.13	14.67	8489.71

Max. Slope: 9.5 degrees
Min. Slope: -0.9 degrees
Ave Slope: 3.3 degrees

Profile: EC-2

BenchMark Elev: 8257.72 ft
BenchMark Rod Reading: 4.20 ft
Survey Date: 9/9/03

Station (ft)	TOB Left Rod Reading (ft)	Elevation (ft)	BF Left Rod Reading (ft)	Elevation (ft)	Water Surface Rod Reading (ft)	Elevation (ft)	Bottom Rod Reading (ft)	Elevation (ft)	TOB Right Rod Reading (ft)	Elevation (ft)
0	1.78	8260.14	2.37	8259.55	2.37	8259.55	2.90	8259.02	1.71	8260.21
10	2.15	8259.77	2.72	8259.20	3.10	8258.82	3.97	8257.95	2.23	8259.69
20	2.48	8259.44	3.05	8258.87	3.05	8258.87	3.99	8257.93	2.65	8259.27
30	2.73	8259.19	3.22	8258.70	3.22	8258.70	4.05	8257.87	2.81	8259.11
40	3.31	8258.61	3.49	8258.43	3.49	8258.43	4.20	8257.72	3.08	8258.84
50	3.45	8258.47	4.00	8257.92	4.19	8257.73	6.15	8255.77	3.32	8258.60
60	4.01	8257.91	4.43	8257.49	4.53	8257.39	5.24	8256.68	4.09	8257.83
70	4.38	8257.54	5.01	8256.91	5.01	8256.91	6.35	8255.57	4.72	8257.20
80	4.64	8257.28	5.21	8256.71	5.21	8256.71	5.98	8255.94	4.31	8257.61
90	5.82	8256.10	5.71	8256.21	5.71	8256.21	6.45	8255.47	5.44	8256.48
100	5.23	8256.69	5.81	8256.11	5.81	8256.11	6.84	8255.08	5.68	8256.24
110	6.24	8255.68	6.58	8255.34	6.75	8255.17	7.54	8254.38	5.56	8256.36
120	6.71	8255.21	7.03	8254.89	7.21	8254.71	8.06	8253.86	6.00	8255.92
130	6.81	8255.11	7.68	8254.24	8.10	8253.82	8.41	8253.51	6.49	8255.43
140	6.86	8255.06	7.44	8254.48	8.23	8253.69	8.99	8252.93	6.63	8255.29
150	6.77	8255.15	8.00	8253.92	8.32	8253.60	9.05	8252.87	6.11	8255.81
160	7.08	8254.84	8.69	8253.23	8.69	8253.23	10.56	8251.36	8.96	8252.96
170	7.76	8254.16	8.71	8253.21	8.88	8253.04	9.65	8252.27	7.66	8254.26
180	8.10	8253.82	9.20	8252.72	9.20	8252.72	10.06	8251.86	7.37	8254.55
190	8.81	8253.11	9.15	8252.77	9.15	8252.77	10.12	8251.80	8.80	8253.12
200	9.03	8252.89	10.02	8251.90	10.41	8251.51	11.53	8250.39	9.29	8252.63

Max. Slope: 8.6 degrees
Min. Slope: -5.2 degrees
Ave Slope: 2.3 degrees

Profile: EC-3

BenchMark Elev: 7971.59 ft
BenchMark Rod Reading 1: 8.22 ft
BenchMark Rod Reading 2: 0.83 ft
Survey Date: 9/9/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	9.26	7970.55	10.05	7969.76	10.59	7969.22	12.05	7967.76	8.39	7971.42
10	8.70	7971.11	10.06	7969.75	10.66	7969.15	11.52	7968.29	8.65	7971.16
20	6.82	7972.99	9.88	7969.93	11.02	7968.79	12.38	7967.43	10.38	7969.43
30	10.29	7969.52	10.98	7968.83	11.27	7968.54	12.26	7967.55	6.39	7973.42
40	11.18	7968.63	11.65	7968.16	11.74	7968.07	12.32	7967.49	5.58	7974.23
50	11.53	7968.28	11.81	7968.00	11.81	7968.00	13.56	7966.25	6.15	7973.66
60	11.57	7968.24	12.09	7967.72	12.09	7967.72	13.67	7966.14	6.17	7973.64
70	11.64	7968.17	12.14	7967.67	12.14	7967.67	13.04	7966.77	5.70	7974.11
80	6.89	7972.92	11.64	7968.17	12.56	7967.25	13.48	7966.33	6.37	7973.44
90	10.21	7969.60	13.16	7966.65	13.36	7966.45	14.26	7965.55	7.23	7972.58
100	10.91	7968.90	12.96	7966.85	13.55	7966.26	14.11	7965.70	8.29	7971.52
110	10.94	7968.87	13.37	7966.44	13.68	7966.13	14.50	7965.31	10.28	7969.53
120	11.22	7968.59	13.44	7966.37	13.81	7966.00	14.44	7965.37	11.29	7968.52
New Bench Mark										
130	4.15	7968.27	6.73	7965.69	6.94	7965.48	8.76	7963.66	4.74	7967.68
140	4.72	7967.70	6.71	7965.71	7.00	7965.42	8.00	7964.42	5.53	7966.89
150	4.27	7968.15	7.33	7965.09	7.51	7964.91	8.45	7963.97	4.35	7968.07
160	7.18	7965.24	7.85	7964.57	7.85	7964.57	8.66	7963.76	3.80	7968.62
170	5.70	7966.72	7.50	7964.92	8.05	7964.37	9.25	7963.17	6.23	7966.19
180	6.52	7965.90	8.23	7964.19	8.56	7963.86	9.64	7962.78	8.08	7964.34
190	5.39	7967.03	8.62	7963.80	8.62	7963.80	9.66	7962.76	7.55	7964.87
200	5.54	7966.88	9.02	7963.40	9.02	7963.40	9.55	7962.87	8.64	7963.78

Max. Slope: 9.7 degrees
Min. Slope: -4.3 degrees
Ave Slope: 1.4 degrees

Profile: MC-1

BenchMark Elev: 7898.53 ft
BenchMark: 4.53 ft
Survey Date: 9/9/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	5.73	7897.33	8.22	7894.84	8.22	7894.84	8.91	7894.15	7.69	7895.37
15	7.45	7895.61	8.25	7894.81	8.25	7894.81	8.89	7894.17	7.71	7895.35
30	7.65	7895.41	8.30	7894.76	8.30	7894.76	10.03	7893.03	2.82	7900.24
45	7.80	7895.26	8.34	7894.72	8.34	7894.72	10.59	7892.47	2.74	7900.32
60	7.75	7895.31	8.35	7894.71	8.35	7894.71	9.34	7893.72	3.61	7899.45
75	7.86	7895.20	8.60	7894.46	8.60	7894.46	9.33	7893.73	3.63	7899.43
90	7.78	7895.28	8.84	7894.22	8.84	7894.22	9.45	7893.61	8.36	7894.70
105	8.38	7894.68	8.93	7894.13	8.93	7894.13	9.58	7893.48	6.73	7896.33
125	8.58	7894.48	9.03	7894.03	9.03	7894.03	9.60	7893.46	5.97	7897.09
135	6.58	7896.48	9.17	7893.89	9.17	7893.89	9.68	7893.38	5.75	7897.31
150	7.13	7895.93	9.53	7893.53	9.53	7893.53	9.89	7893.17	6.48	7896.58
165	9.35	7893.71	9.85	7893.21	9.85	7893.21	10.32	7892.74	9.15	7893.91
180	9.55	7893.51	9.89	7893.17	9.89	7893.17	10.63	7892.43	9.55	7893.51
195	9.59	7893.47	9.97	7893.09	9.97	7893.09	10.59	7892.47	9.74	7893.32
210	7.66	7895.40	10.19	7892.87	10.19	7892.87	10.85	7892.21	9.47	7893.59
225	7.62	7895.44	10.27	7892.79	10.27	7892.79	10.78	7892.28	9.95	7893.11
240	9.95	7893.11	10.41	7892.65	10.41	7892.65	10.93	7892.13	10.22	7892.84
255	10.07	7892.99	10.63	7892.43	10.63	7892.43	11.28	7891.78	8.62	7894.44
270	9.15	7893.91	10.72	7892.34	10.72	7892.34	11.36	7891.70	7.95	7895.11
285	10.43	7892.63	10.85	7892.21	10.85	7892.21	11.41	7891.65	8.57	7894.49
300	9.71	7893.35	10.89	7892.17	10.89	7892.17	11.60	7891.46	9.30	7893.76

Max. Slope: 4.3 degrees
Min. Slope: -1.3 degrees
Ave Slope: 0.7 degrees

Profile: MC-2

BenchMark Elev: 7827.04 ft
BenchMark: 2.25 ft
Survey Date: 9/9/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	5.12	7824.17	5.55	7823.74	5.55	7823.74	6.13	7823.16	5.31	7823.98
15	5.30	7823.99	5.76	7823.53	5.76	7823.53	6.39	7822.90	5.23	7824.06
30	5.63	7823.66	5.94	7823.35	5.94	7823.35	6.59	7822.70	5.52	7823.77
45	5.71	7823.58	6.05	7823.24	6.05	7823.24	6.86	7822.43	5.63	7823.66
60	5.33	7823.96	6.22	7823.07	6.22	7823.07	6.83	7822.46	4.95	7824.34
75	5.79	7823.50	6.45	7822.84	6.45	7822.84	7.26	7822.03	5.13	7824.16
90	5.76	7823.53	6.57	7822.72	6.57	7822.72	7.28	7822.01	5.81	7823.48
105	5.97	7823.32	6.87	7822.42	6.87	7822.42	7.42	7821.87	6.59	7822.70
120	5.77	7823.52	7.06	7822.23	7.06	7822.23	7.43	7821.86	5.90	7823.39
135	6.28	7823.01	7.24	7822.05	7.24	7822.05	7.95	7821.34	6.70	7822.59
150	6.92	7822.37	7.43	7821.86	7.43	7821.86	8.25	7821.04	7.00	7822.29
165	6.59	7822.70	7.80	7821.49	7.80	7821.49	8.63	7820.66	7.25	7822.04
177	7.42	7821.87	7.87	7821.42	7.87	7821.42	9.14	7820.15	7.41	7821.88
193	7.45	7821.84	8.06	7821.23	8.06	7821.23	9.42	7819.87	7.75	7821.54
210	7.97	7821.32	8.22	7821.07	8.22	7821.07	8.92	7820.37	7.79	7821.50
225	7.34	7821.95	8.34	7820.95	8.34	7820.95	10.20	7819.09	4.60	7824.69
240	7.15	7822.14	8.35	7820.94	8.35	7820.94	10.49	7818.80	3.67	7825.62
255	7.28	7822.01	8.36	7820.93	8.36	7820.93	9.19	7820.10	3.01	7826.28
270	6.78	7822.51	8.57	7820.72	8.57	7820.72	9.83	7819.46	7.82	7821.47
285	7.14	7822.15	8.64	7820.65	8.64	7820.65	9.42	7819.87	7.94	7821.35
300	8.15	7821.14	8.72	7820.57	8.72	7820.57	9.63	7819.66	8.63	7820.66

Max. Slope: 4.9 degrees
Min. Slope: -5.0 degrees
Ave Slope: 0.7 degrees

Profile: MC-3

BenchMark Elev: 7698.23 ft
BenchMark Rod Reading*: 6.76 ft
Survey Date: 9/10/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	6.51	7698.48	7.52	7697.47	9.08	7695.91	10.35	7694.64	7.20	7697.79
15	6.89	7698.10	7.35	7697.64	9.13	7695.86	10.48	7694.51	8.63	7696.36
30	7.32	7697.67	8.23	7696.76	9.14	7695.85	10.58	7694.41	7.52	7697.47
45	6.83	7698.16	8.63	7696.36	9.15	7695.84	10.69	7694.30	8.09	7696.90
60	7.60	7697.39	9.17	7695.82	9.17	7695.82	10.35	7694.64	8.85	7696.14
75	7.30	7697.69	9.75	7695.24	9.75	7695.24	10.41	7694.58	9.24	7695.75
90	8.30	7696.69	10.08	7694.91	10.18	7694.81	11.22	7693.77	9.78	7695.21
105	6.43	7698.56	9.96	7695.03	10.19	7694.80	11.13	7693.86	9.26	7695.73
120	9.21	7695.78	9.90	7695.09	10.23	7694.76	10.93	7694.06	9.23	7695.76
135	9.19	7695.80	10.31	7694.68	10.31	7694.68	11.01	7693.98	9.21	7695.78
150	9.39	7695.60	10.33	7694.66	10.33	7694.66	11.31	7693.68	10.17	7694.82
165	9.72	7695.27	10.35	7694.64	10.35	7694.64	11.46	7693.53	9.50	7695.49
180	9.48	7695.51	10.35	7694.64	10.35	7694.64	11.45	7693.54	9.71	7695.28
195	9.04	7695.95	10.35	7694.64	10.35	7694.64	11.66	7693.33	9.55	7695.44
255	9.95	7695.04	10.37	7694.62	10.37	7694.62	12.52	7692.47	10.08	7694.91
270	9.58	7695.41	11.38	7693.61	11.38	7693.61	12.64	7692.35	10.69	7694.30
285	11.22	7693.77	11.65	7693.34	11.65	7693.34	13.40	7691.59	11.70	7693.29
300	12.35	7692.64	13.85	7691.14	13.85	7691.14	13.94	7691.05	12.86	7692.13

Max. Slope: 3.1 degrees
Min. Slope: -1.3 degrees
Ave Slope: 0.7 degrees

* Estimated from last year's data. Bench mark removed or buried by culvert repairs.

Profile: MC-4

BenchMark Elev: 7728.64 ft
BenchMark: 1.66 ft
Survey Date: 9/10/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	4.58	7725.72	5.65	7724.65	5.65	7724.65	6.46	7723.84	2.30	7728.00
15	4.15	7726.15	5.79	7724.51	5.79	7724.51	6.52	7723.78	2.96	7727.34
30	2.11	7728.19	6.10	7724.20	6.15	7724.15	6.85	7723.45	3.54	7726.76
45	4.90	7725.40	6.17	7724.13	6.17	7724.13	7.29	7723.01	3.85	7726.45
60	5.17	7725.13	6.30	7724.00	6.30	7724.00	7.15	7723.15	4.41	7725.89
75	5.19	7725.11	6.35	7723.95	6.35	7723.95	7.12	7723.18	4.96	7725.34
90	6.00	7724.30	6.47	7723.83	6.47	7723.83	7.03	7723.27	5.29	7725.01
105	6.07	7724.23	6.51	7723.79	6.51	7723.79	8.73	7721.57	3.58	7726.72
120	5.85	7724.45	6.53	7723.77	6.53	7723.77	8.32	7721.98	3.33	7726.97
135	5.99	7724.31	6.55	7723.75	6.55	7723.75	7.91	7722.39	4.20	7726.10
150	5.39	7724.91	6.68	7723.62	6.68	7723.62	7.49	7722.81	5.12	7725.18
165	4.69	7725.61	6.77	7723.53	6.77	7723.53	7.25	7723.05	5.24	7725.06
180	4.30	7726.00	6.87	7723.43	6.87	7723.43	7.84	7722.46	6.47	7723.83
195	5.33	7724.97	7.13	7723.17	7.13	7723.17	7.98	7722.32	6.35	7723.95
210	6.25	7724.05	7.14	7723.16	7.14	7723.16	7.69	7722.61	5.90	7724.40
225	6.49	7723.81	7.09	7723.21	7.09	7723.21	8.98	7721.32	4.41	7725.89
240	6.40	7723.90	7.14	7723.16	7.14	7723.16	8.74	7721.56	3.46	7726.84
255	6.49	7723.81	7.11	7723.19	7.11	7723.19	8.77	7721.53	3.86	7726.44
270	6.49	7723.81	7.12	7723.18	7.12	7723.18	9.75	7720.55	3.62	7726.68
285	6.67	7723.63	7.13	7723.17	7.13	7723.17	8.53	7721.77	3.94	7726.36
300	6.59	7723.71	7.16	7723.14	7.16	7723.14	8.62	7721.68	4.21	7726.09

Max. Slope: 6.5 degrees
Min. Slope: -4.6 degrees
Ave Slope: 0.4 degrees

Profile: MC-5

BenchMark Elev: 7915.35 ft
BenchMark: 1.55 ft
Survey Date: 9/9/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	2.42	7914.48	4.95	7911.95	4.95	7911.95	5.34	7911.56	3.64	7913.26
10	2.42	7914.48	5.05	7911.85	5.05	7911.85	5.64	7911.26	3.41	7913.49
20	2.59	7914.31	5.35	7911.55	5.35	7911.55	5.83	7911.07	3.46	7913.44
30	2.34	7914.56	5.38	7911.52	5.05	7911.85	5.64	7911.26	3.36	7913.54
40	5.17	7911.73	5.44	7911.46	5.44	7911.46	6.44	7910.46	3.10	7913.80
50	5.19	7911.71	5.38	7911.52	5.38	7911.52	6.05	7910.85	3.90	7913.00
60	3.06	7913.84	5.27	7911.63	5.41	7911.49	5.63	7911.27	3.74	7913.16
70	3.34	7913.56	5.35	7911.55	5.63	7911.27	5.84	7911.06	5.26	7911.64
80	2.58	7914.32	5.88	7911.02	5.88	7911.02	6.02	7910.88	5.42	7911.48
90	3.08	7913.82	5.70	7911.20	5.95	7910.95	6.51	7910.39	5.61	7911.29
100	3.48	7913.42	5.79	7911.11	5.96	7910.94	6.71	7910.19	5.63	7911.27
110	5.31	7911.59	5.95	7910.95	5.95	7910.95	6.39	7910.51	3.44	7913.46
120	5.56	7911.34	6.06	7910.84	6.06	7910.84	6.45	7910.45	2.56	7914.34
130	5.99	7910.91	6.54	7910.36	6.54	7910.36	6.94	7909.96	2.88	7914.02
140	6.16	7910.74	6.59	7910.31	6.59	7910.31	7.22	7909.68	2.50	7914.40
150	6.01	7910.89	6.61	7910.29	6.61	7910.29	7.43	7909.47	2.83	7914.07
160	6.03	7910.87	6.63	7910.27	6.63	7910.27	7.20	7909.70	3.61	7913.29
170	6.12	7910.78	6.66	7910.24	6.66	7910.24	7.11	7909.79	5.73	7911.17
180	4.80	7912.10	6.78	7910.12	6.78	7910.12	7.42	7909.48	6.23	7910.67
190	5.79	7911.11	6.71	7910.19	6.71	7910.19	7.14	7909.76	5.90	7911.00
200	6.01	7910.89	6.95	7909.95	6.95	7909.95	7.24	7909.66	5.92	7910.98

Max. Slope: 4.6 degrees
Min. Slope: -2.4 degrees
Ave Slope: 0.6 degrees

Profile: MC-6

BenchMark Elev: 7752.14 ft
BenchMark Rod Reading: 2.68 ft
Survey Date: 9/10/03

Station	TOB Left		BF Left		Water Surface		Bottom		TOB Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
0	5.85	7748.97	8.24	7746.58	8.24	7746.58	8.68	7746.14	2.93	7751.89
25	8.22	7746.60	8.53	7746.29	8.53	7746.29	9.21	7745.61	4.34	7750.48
45	8.50	7746.32	8.79	7746.03	8.79	7746.03	9.55	7745.27	3.68	7751.14
65	8.54	7746.28	8.90	7745.92	8.90	7745.92	9.68	7745.14	3.90	7750.92
85	8.71	7746.11	9.20	7745.62	9.20	7745.62	9.75	7745.07	7.98	7746.84
105	8.70	7746.12	9.19	7745.63	9.19	7745.63	10.12	7744.70	8.25	7746.57
125	8.91	7745.91	9.40	7745.42	9.40	7745.42	10.13	7744.69	8.64	7746.18
145	8.07	7746.75	9.84	7744.98	9.84	7744.98	10.80	7744.02	8.75	7746.07
165	9.24	7745.58	10.01	7744.81	10.01	7744.81	11.01	7743.81	6.04	7748.78
185	9.78	7745.04	10.06	7744.76	10.06	7744.76	11.46	7743.36	9.39	7745.43
205	9.91	7744.91	10.19	7744.63	10.19	7744.63	10.81	7744.01	9.47	7745.35
225	8.91	7745.91	10.26	7744.56	10.26	7744.56	11.35	7743.47	9.92	7744.90
245	10.23	7744.59	10.48	7744.34	10.48	7744.34	11.23	7743.59	10.14	7744.68
265	9.97	7744.85	10.76	7744.06	10.76	7744.06	11.57	7743.25	10.38	7744.44
285	8.71	7746.11	11.05	7743.77	11.05	7743.77	12.45	7742.37	10.92	7743.90
305	10.95	7743.87	11.23	7743.59	11.23	7743.59	12.71	7742.11	10.74	7744.08
325	10.89	7743.93	11.28	7743.54	11.28	7743.54	12.14	7742.68	11.13	7743.69
345	11.15	7743.67	11.32	7743.50	11.32	7743.50	12.06	7742.76	6.30	7748.52
365	11.08	7743.74	11.59	7743.23	11.59	7743.23	13.14	7741.68	5.90	7748.92
385	11.26	7743.56	11.74	7743.08	11.74	7743.08	12.39	7742.43	5.59	7749.23
405	11.07	7743.75	11.83	7742.99	11.83	7742.99	12.60	7742.22	5.80	7749.02
425	10.60	7744.22	11.91	7742.91	11.91	7742.91	14.10	7740.72	11.50	7743.32
450	11.50	7743.32	12.08	7742.74	12.08	7742.74	12.77	7742.05	8.26	7746.56

Max. Slope: 4.3 degrees
Min. Slope: -3.0 degrees
Ave Slope: 0.5 degrees