0083

COPY

Canyon Fuel Company, LLC
Skyline Mines
HC 35 Box 380
Helper, Utah 84526
(435) 448-6463 Fax: (435) 448-2632

December 29, 2004

Incoming
C/007/0005

Coal Regulatory Program
Attn.: Pam Grubaugh-Littig
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801

RE: EarthFax Engineering Inc. 2004 Annual Report, Geomorphic Evaluation of Eccles and Mud Creeks, Canyon Fuel Company, LLC Skyline Mine Permit, C/007/005.

Dear Ms. Grubaugh-Littig:

Please find enclosed with this letter 2 copies of the EarthFax Engineering, Inc. (EarthFax) report titled "2004 Annual Report, Geomorphic Evaluation of Eccles and Mud Creeks". I received the final copies of the report in my office last week. The report was completed by EarthFax after a review of a draft copy of the document was made earlier in December. The review did not require any changes to the text so EarthFax forwarded two additional copies without changes to me that I am now forwarding on to the Division.

If you have any questions regarding this report, please give me call at (435) 448-2669.

Sincerely:

Chris D. Hansen

Chris D. Hansen
Environmental Coordinator
Arch Western Bituminous Group, LLC

attachments

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For additional information

2004 ANNUAL REPORT
GEOMORPHIC EVALUATION OF
ECCLES AND MUD CREEKS

Prepared for

CANYON FUEL COMPANY
Skyline Mine
Helper, Utah

November 2004

Prepared by

EARTHFAX ENGINEERING, INC.
Engineers/Scientists
Midvale, Utah
www.earthfax.com

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TABLE OF CONTENTS

Section | Page

CHAPTER 1 – INTRODUCTION 1

CHAPTER 2 – FIELD DATA COLLECTION METHODS 2

CHAPTER 3 – RESULTS SUMMARY 4

CHAPTER 4 – REFERENCES 15

LIST OF FIGURES

Figure | Page

2-1. Location of Reference Sites 3

3-1. EC-1 Cross Section and Profiles 6

3-2. EC-2 Cross Section and Profiles 7

3-3. EC-3 Cross Section and Profiles 8

3-4. MC-1 Cross Section and Profiles 9

3-5. MC-2 Cross Section and Profiles 10

3-6. MC-3 Cross Section and Profiles 11

3-7. MC-4 Cross Section and Profiles 12

3-8. MC-5 Cross Section and Profiles 13

3-9. MC-6 Cross Section and Profiles 14

LIST OF APPENDICES

Appendix A – Reference Site Photographs

Appendix B – Copy of Filed Log Book

Appendix C – Spreadsheets of Survey Data

Appendix D – Individual Cross Section and Profile Drawings

2004 ANNUAL REPORT GEOMORPHIC EVALUATION OF ECCLES AND MUD CREEKS

CHAPTER 1

INTRODUCTION

In early August 2001, the advancing face of the Skyline Mine encountered a fractured sandstone within the coal, resulting in a significant inflow of water to the mine. From early September 2001 through July 2003, this water was discharged from the mine to Eccles Creek at rates ranging from about 7,000 and 15,000 gallons per minute ("gpm"), compared with an average discharge for the 18 months prior to August 2001 of about 4,000 gpm. Since July 2003, mine discharge dropped to an average of 2,000 gpm.

Beginning in late 2001, EarthFax Engineering has conducted detailed evaluations of the impact of the mine-water discharge on geomorphic conditions in Eccles Creek and its receiving stream Mud Creek (see EarthFax, 2002). As part of the earlier evaluation, nine reference reaches were established to assist in annual monitoring of the stability of Eccles and Mud Creeks. The purpose of this document is to present the results of the 2004 annual collection of data from the reference reaches and to compare the current results with prior data.

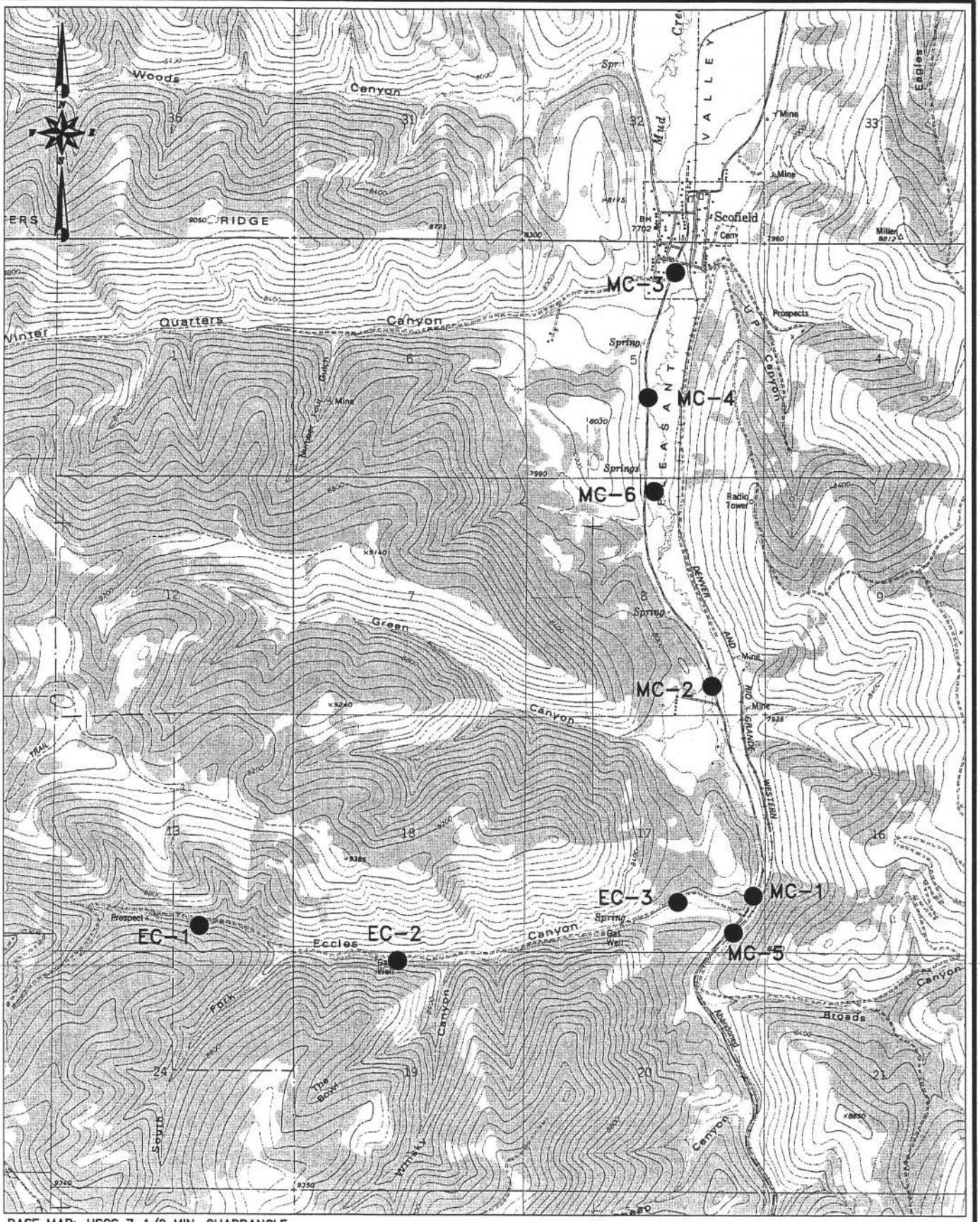
CHAPTER 2

FIELD DATA COLLECTION METHODS

The locations of reference sites previously established on Eccles and Mud Creeks are shown on Figure 2-1. Monitoring of the reference sites was conducted on October 14 and 15, 2004 in general conformance with the recommendations of Harrelson et al. (1994) and included the following:

- Locating previously established benchmarks at each site.
- Photographing each site, as recommended by Harrelson et al. (1994), looking upstream, downstream, and across the channel at each cross section location (see Appendix A).
- Locating previously established cross sections. The endpoints of each cross section were previously marked with 4-foot long, 1/2-inch diameter steel reinforcing bars that were driven approximately 3.5 feet into the ground.
- Surveying the channel cross section at each site. A measuring tape was stretched between the cross section monuments and surveying was performed using a Sokkia survey level and rod. Elevations were shot at each change in elevation (e.g., slope breaks, channel banks, etc.) and 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 extended a distance of approximately 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 at the thalweg, the water surface, indications of bankfull stage, and the top of the stream banks. Measurements were collected on intervals approximately equal to the channel width. Data were collected using a Sokkia 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

CHAPTER 3
RESULTS SUMMARY

Cross section and selected profile spreadsheets and drawings are provided in Appendices C and D, respectively. These data were plotted for 2002 and 2004 to visually assess the effect of the mine discharge on geomorphic conditions within Eccles and Mud Creeks. These plots are presented in Figures 3-1 through 3-9.

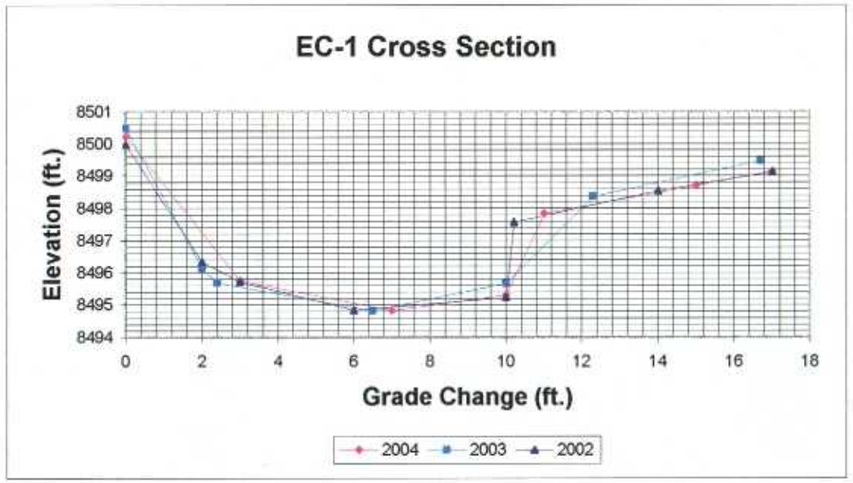
In steep, cobble-bedded streams such as Eccles and Mud Creeks, several of the survey measurements are subjective and difficult to replicate from year to year. If the survey rod is set on top of a cobble one year and to the side of that cobble the next year, the apparent channel bottom may vary by several inches, even though no appreciable change has occurred. Furthermore, although cross section locations are fixed, the profile points are re-established each year, resulting in some variation in location from year to year. Finally, some measurements (particularly the top of bank measurements and, to some degree, the location of bankfull stage) are highly subjective. In Eccles Creek, which is cut into a steep canyon, it is frequently difficult to discern between the top of bank and the adjacent hillside. And although Mud Creek exists in a broader floodplain, down cutting has made it difficult to objectively establish a top of active bank and a bankfull stage in several locations.

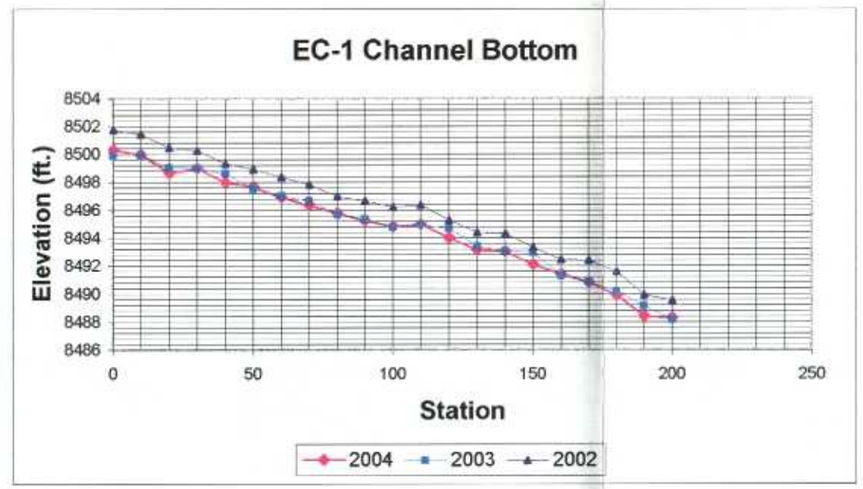
Notwithstanding the survey difficulties noted above, Figures 3-1 through 3-9 indicate that no substantial changes occurred in the reference site profiles and cross-sections between 2002 and 2004, with the exception of stations EC-1 and MC-3. As indicated in the 2003 annual report (EarthFax, 2003), differences at EC-1 are likely due to a longitudinal shift in the profile end points along the channel. To assess this effect, Figure 3-1 includes not only the 2002 and 2004 profile data, but also the 2003 profile data. As indicated, essentially no difference exists between the 2003 and 2004 profiles, indicating that the shift occurred in the 2002 survey.

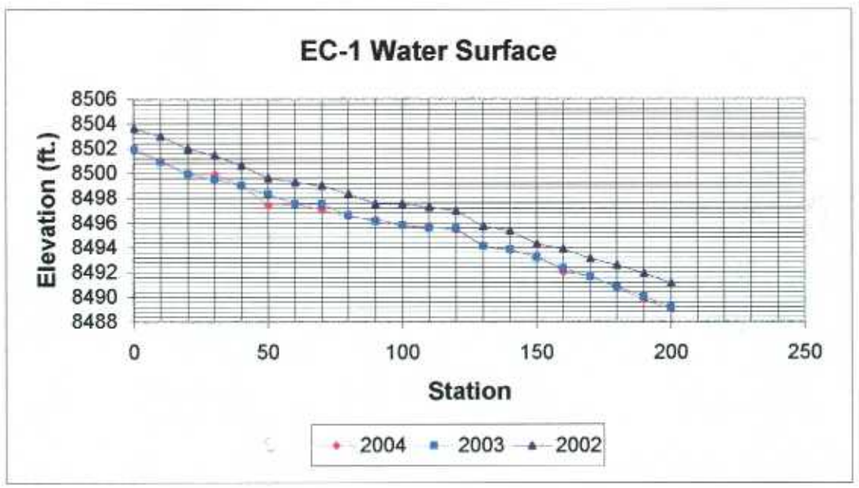
Variations in the conditions at site MC-3 resulted from the 2003 removal of a beaver dam (by local residents) that was located in the area of Stations 0+00 through 0+20 in 2002 (see EarthFax, 2003). Debris from the beaver dam washed downstream and plugged the road

culvert downstream of the channel cross-section location. This material was removed by county crews in 2003 and placed in a large pile on top of the bench mark, obscuring its location. The 2004 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 at the original upstream location as well as a smaller dam downstream of the road crossing. These dams are reflected in the profiles.

In conclusion, based on the 2004 annual monitoring and visual observations of the reference reaches, mine-water discharges do not appear to have substantially impacted geomorphic conditions in Eccles or Mud Creeks.







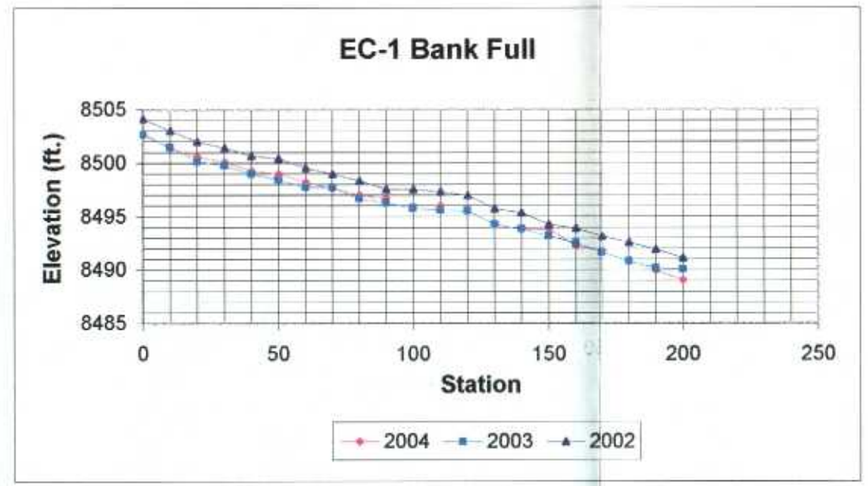


FIGURE 3-1. EC-1 CROSS-SECTION AND PROFILES

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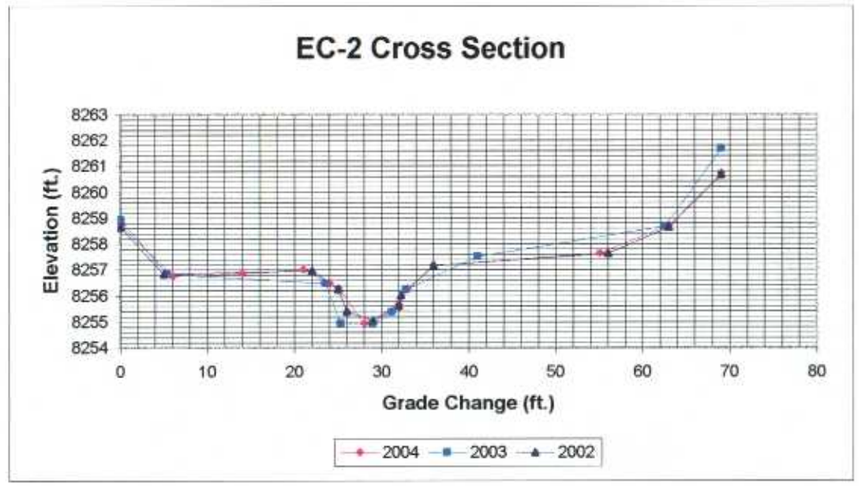

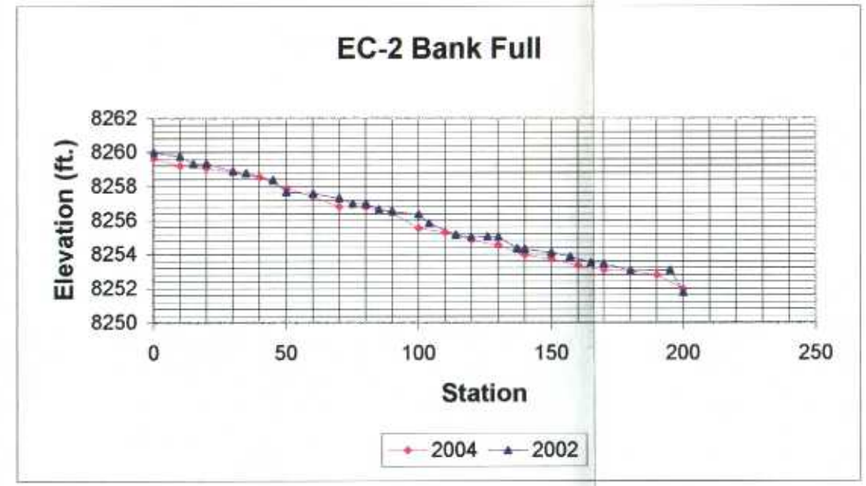

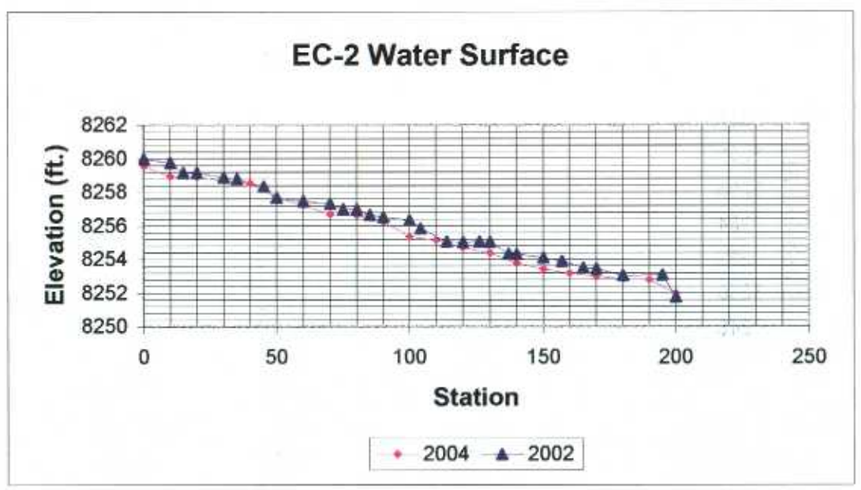

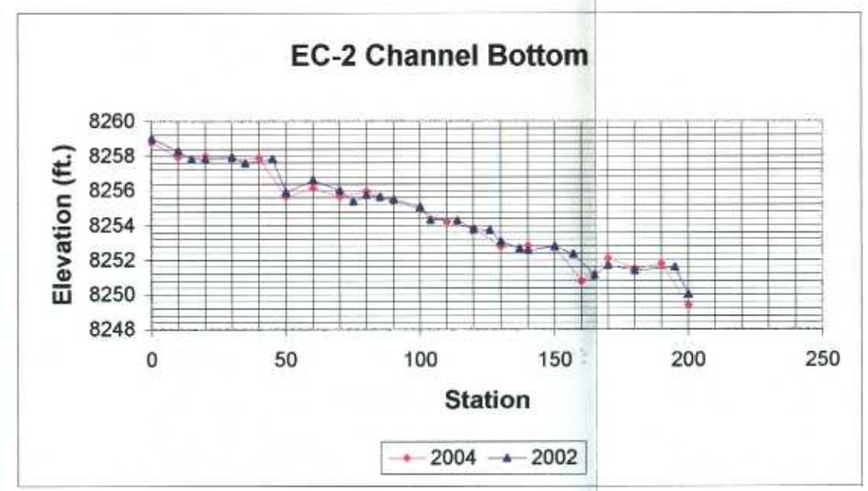

FIGURE 3-2. EC-2 CROSS-SECTION AND PROFILES

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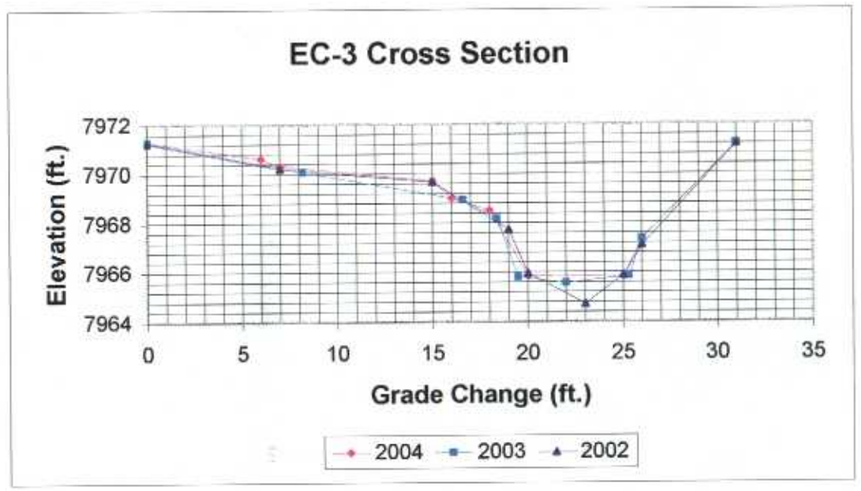

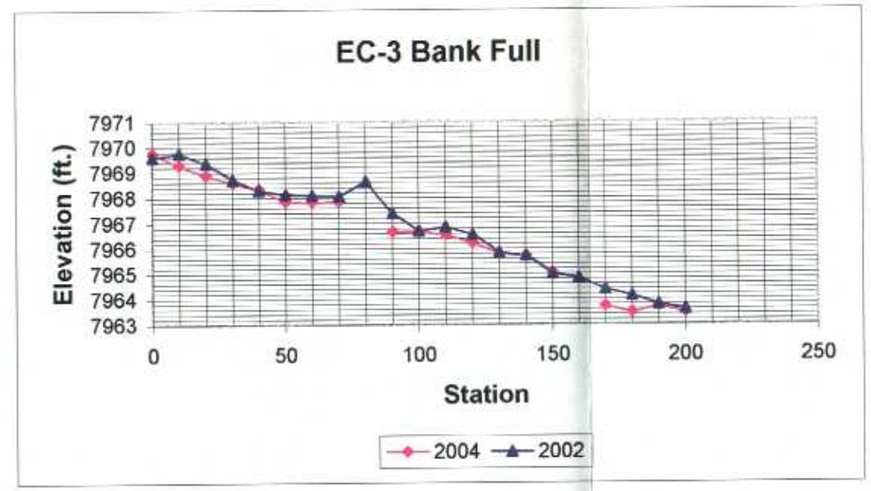

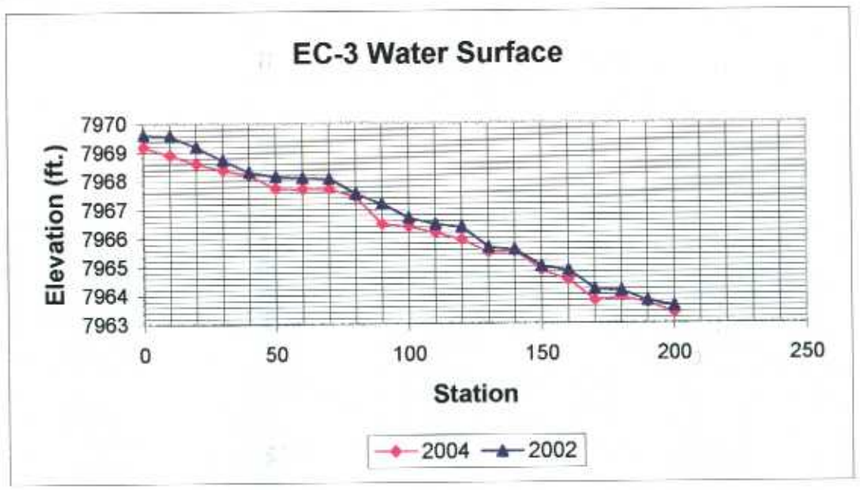

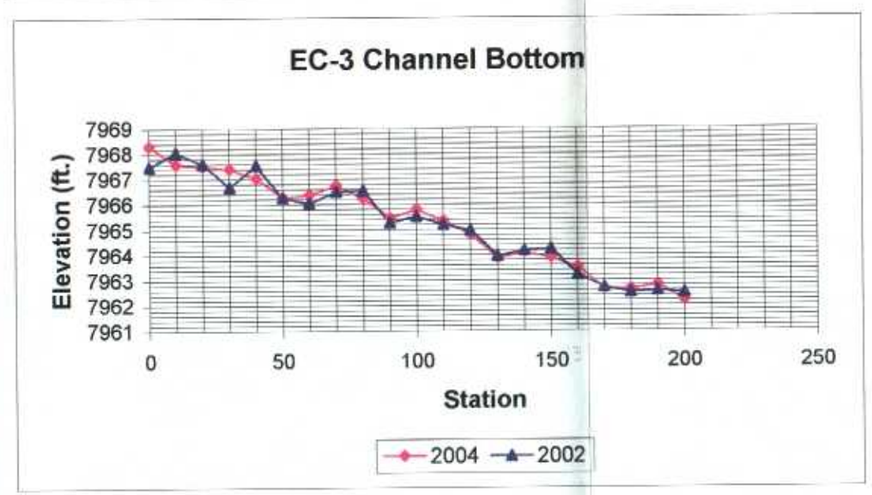

FIGURE 3-3. EC-3 CROSS-SECTION AND PROFILES

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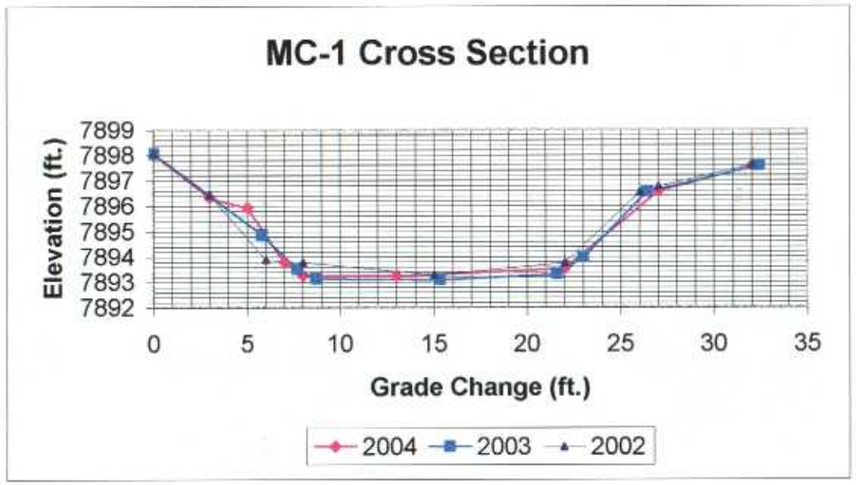

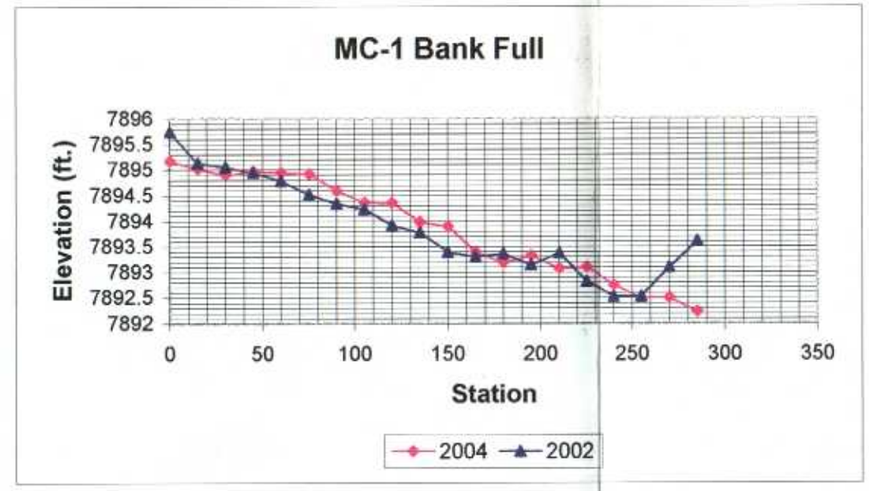

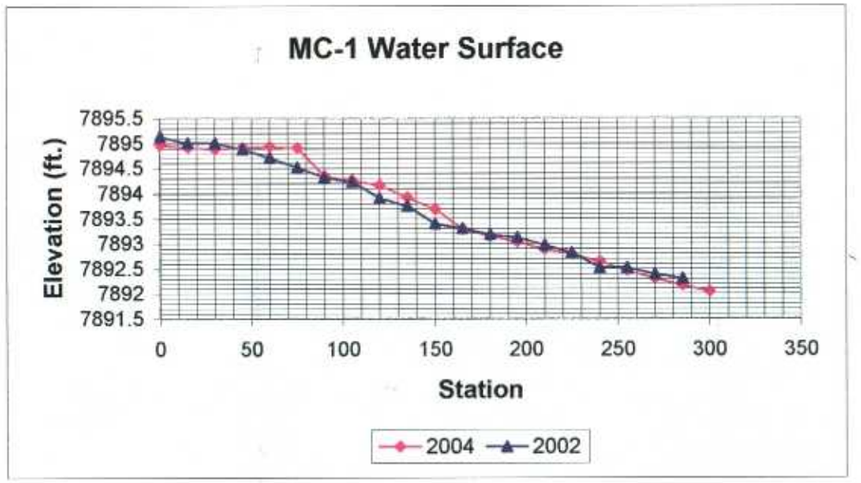

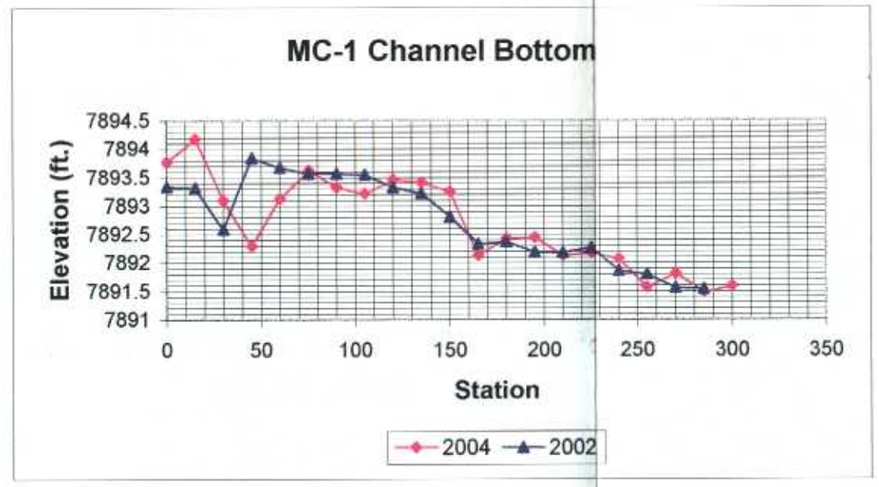

FIGURE 3-4. MC-1 CROSS-SECTION AND PROFILES

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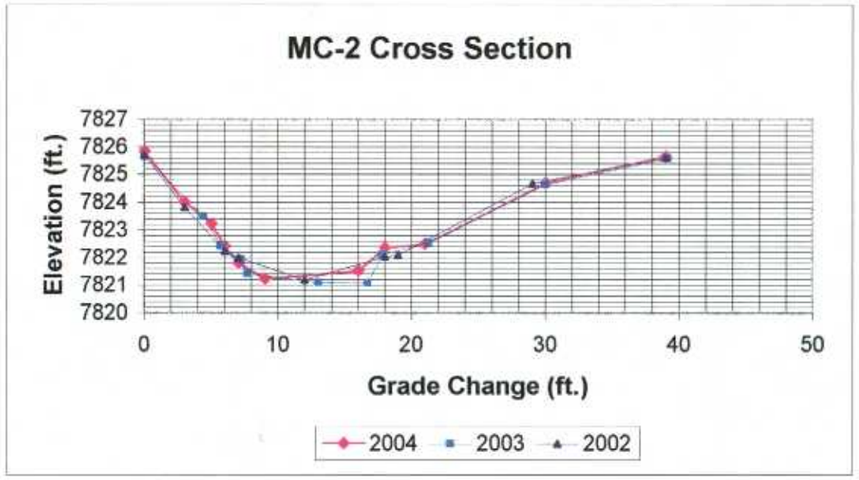

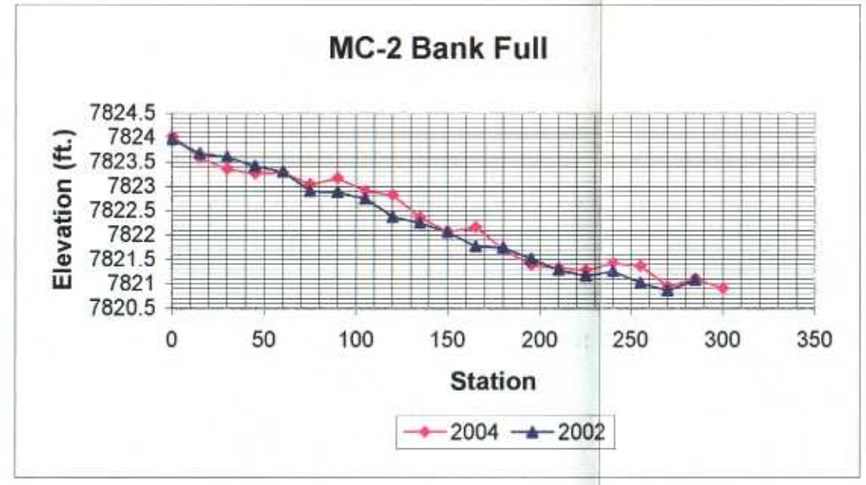

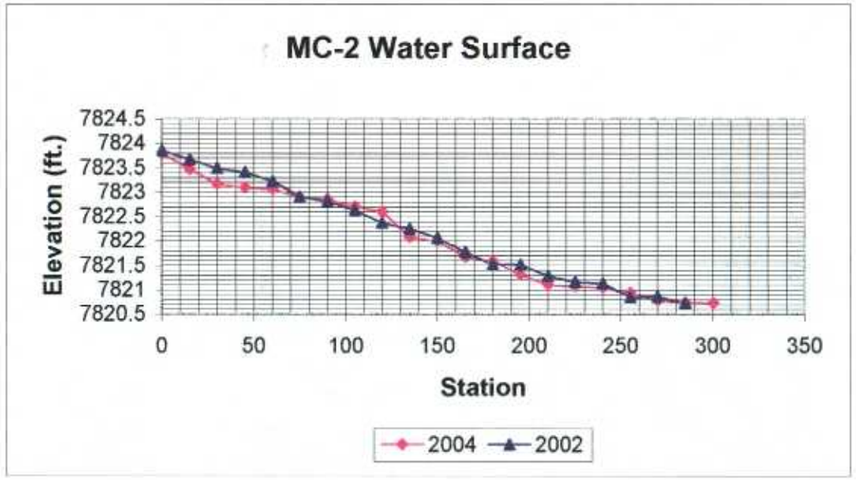

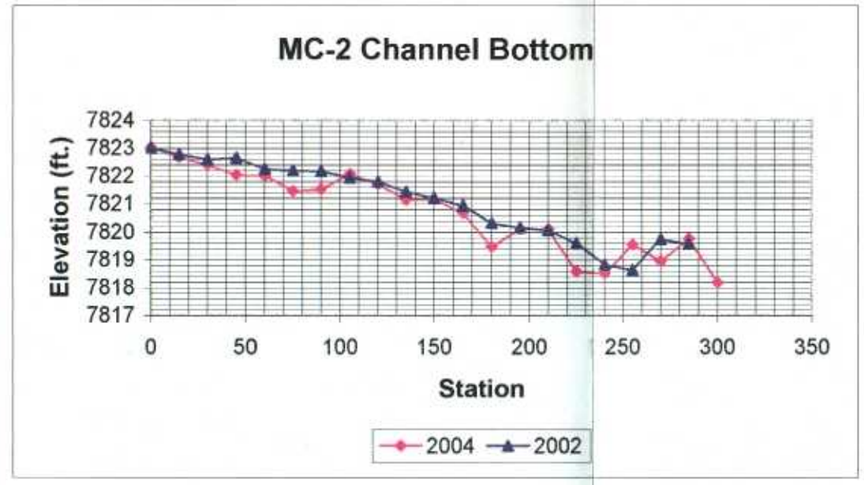

FIGURE 3-5. MC-2 CROSS-SECTION AND PROFILES

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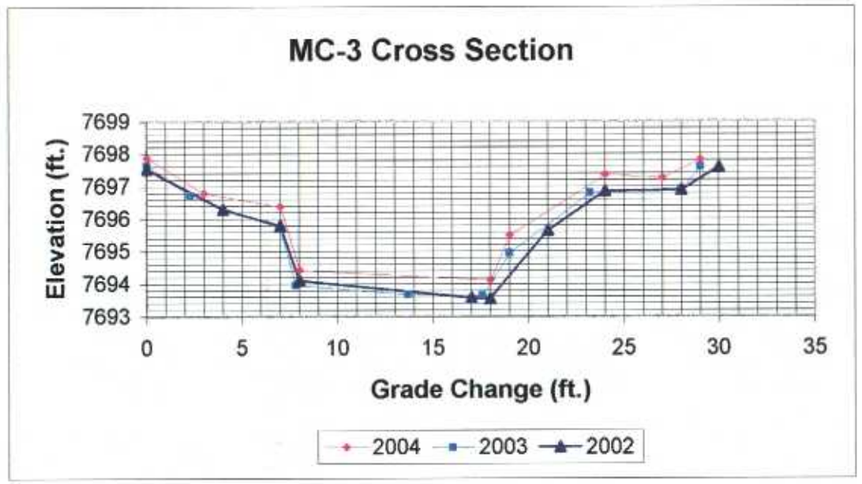

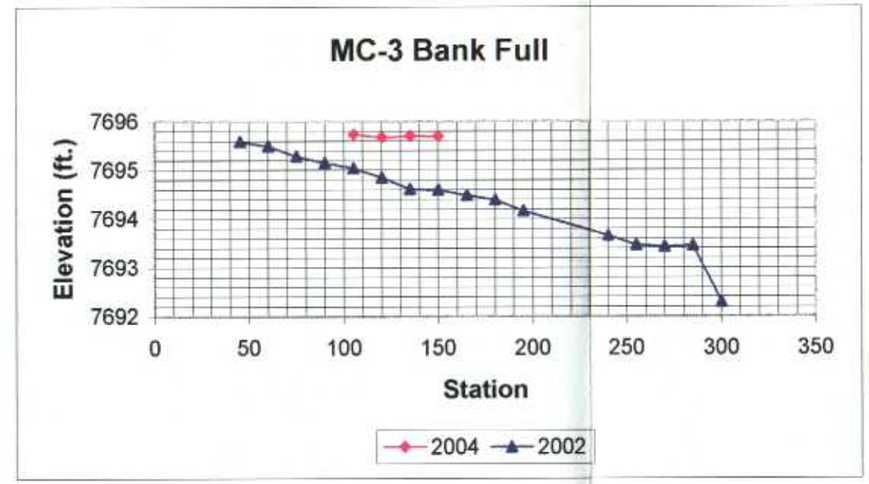

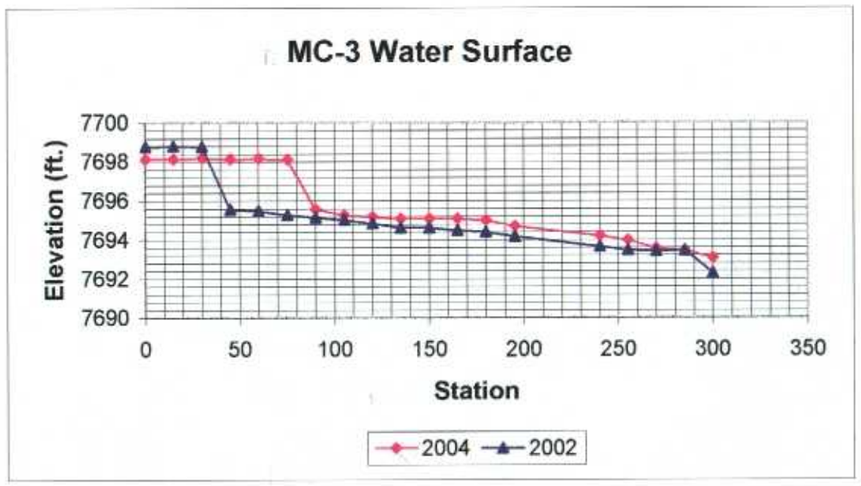

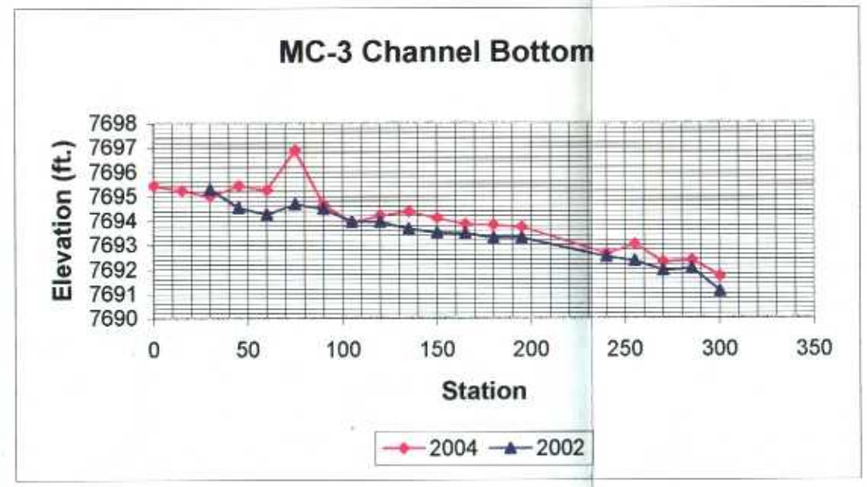

FIGURE 3-6. MC-3 CROSS-SECTION AND PROFILES

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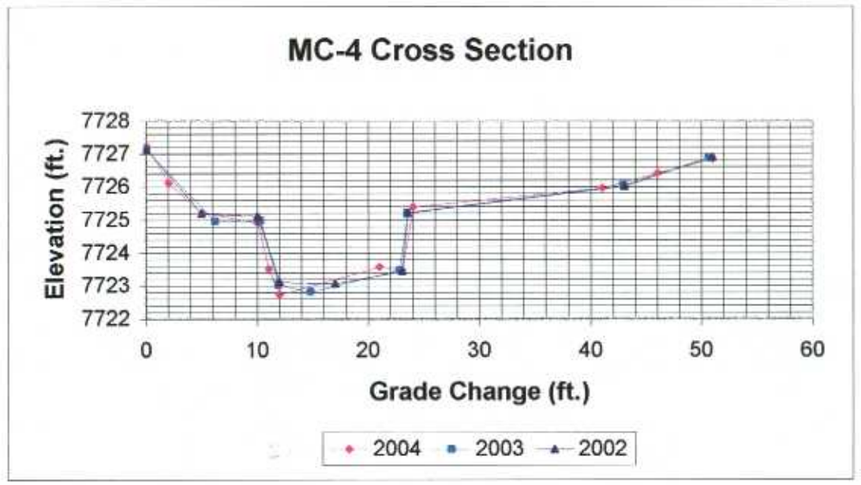

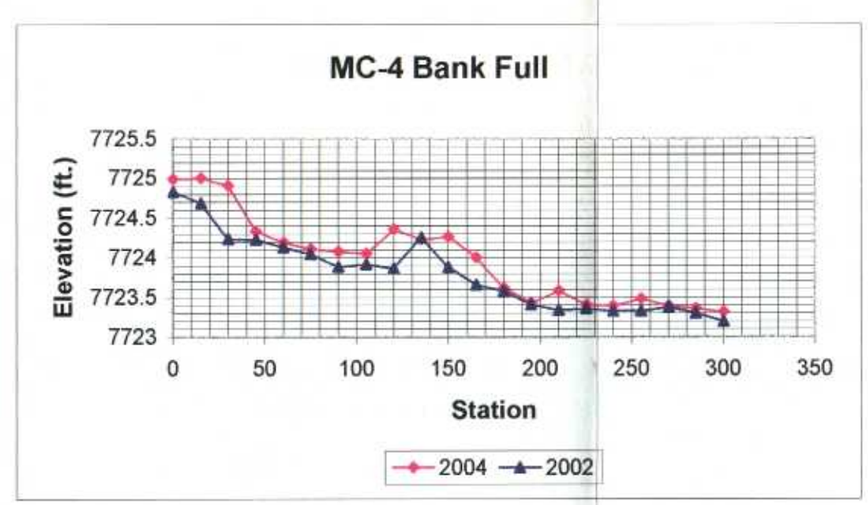

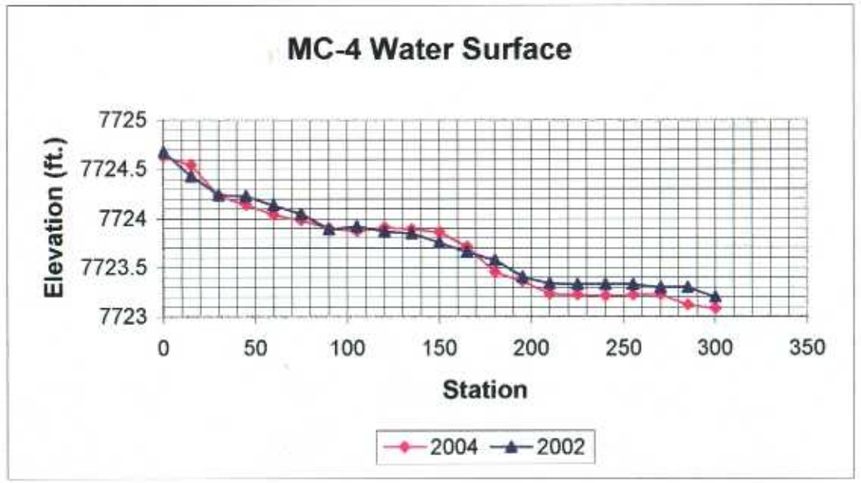

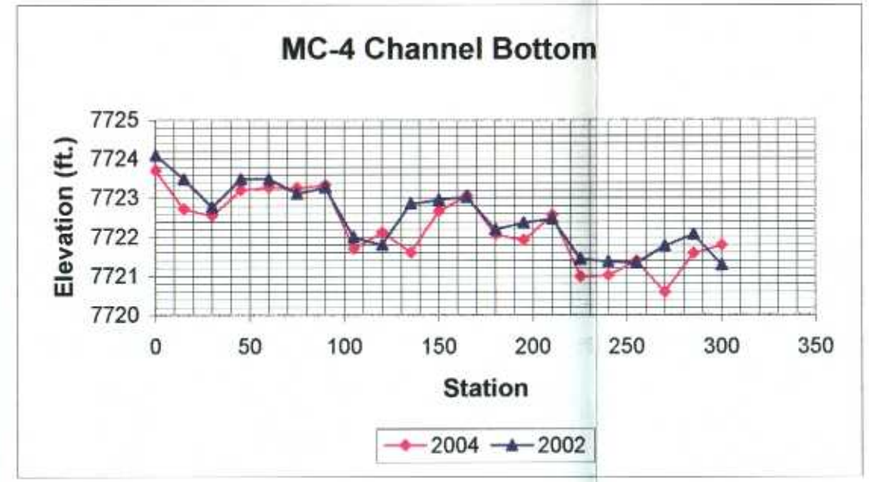

FIGURE 3-7. MC-4 CROSS-SECTION AND PROFILES

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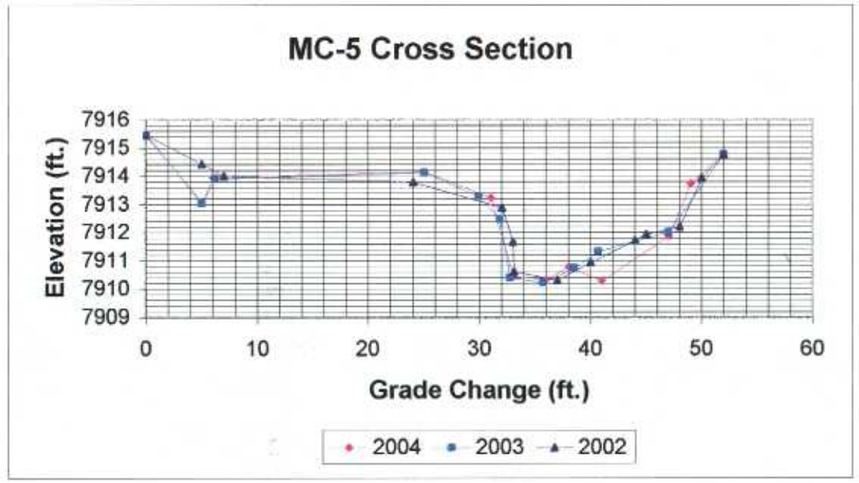

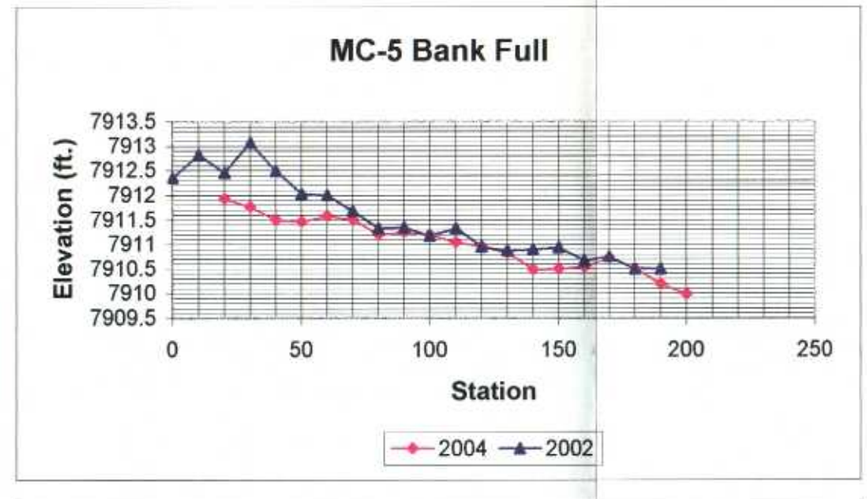

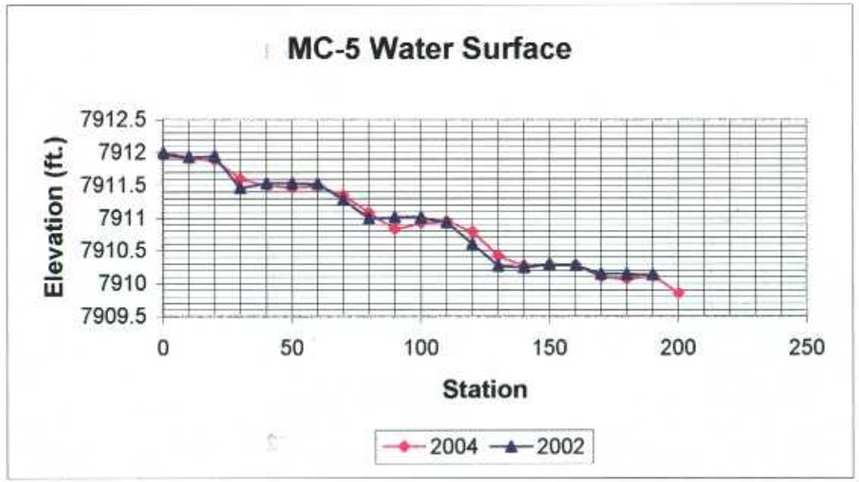

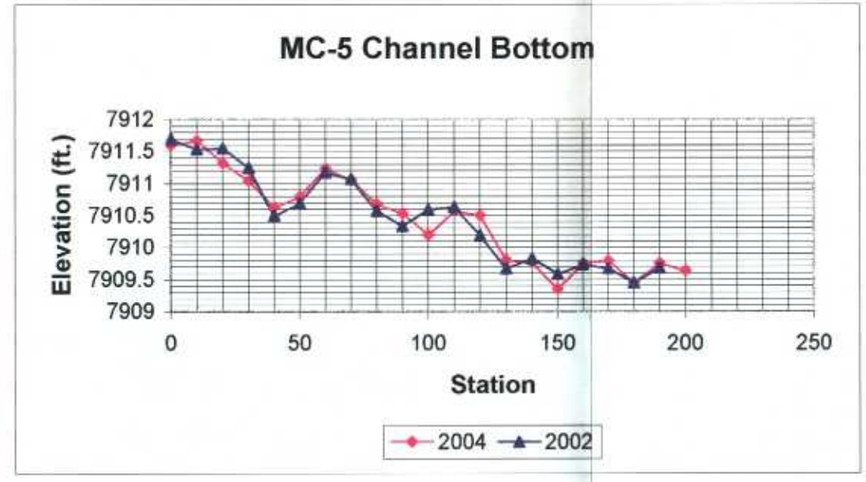

FIGURE 3-8. MC-5 CROSS-SECTION AND PROFILES

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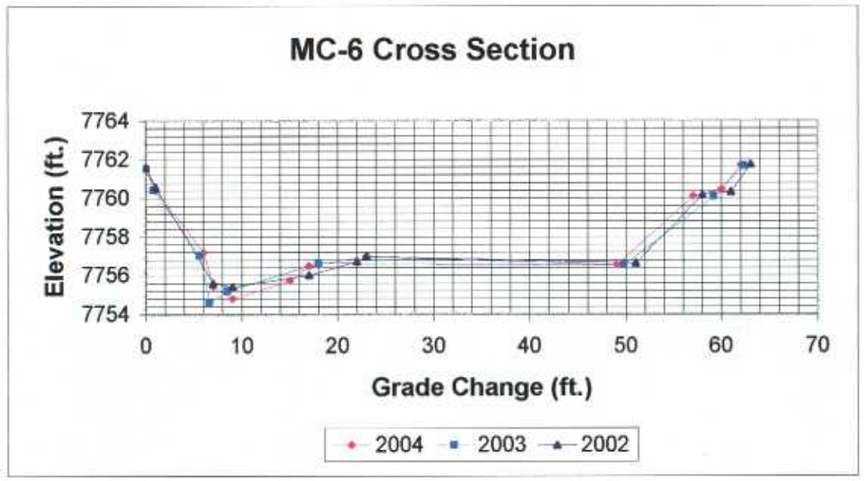
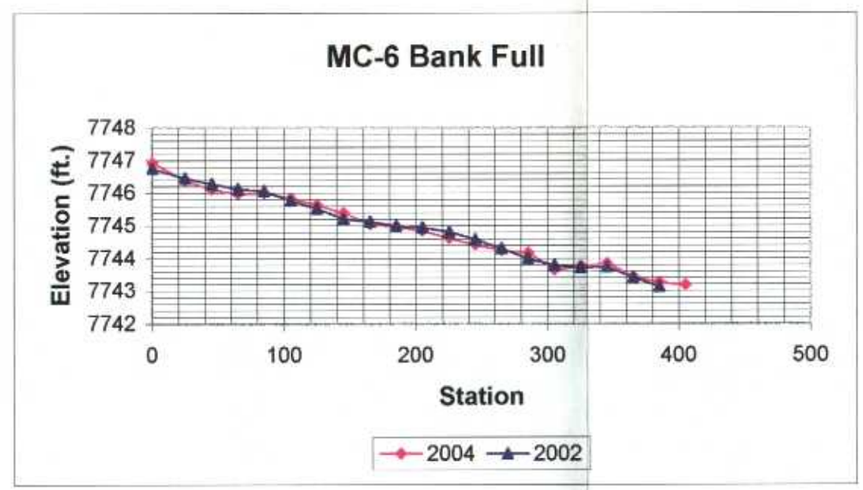
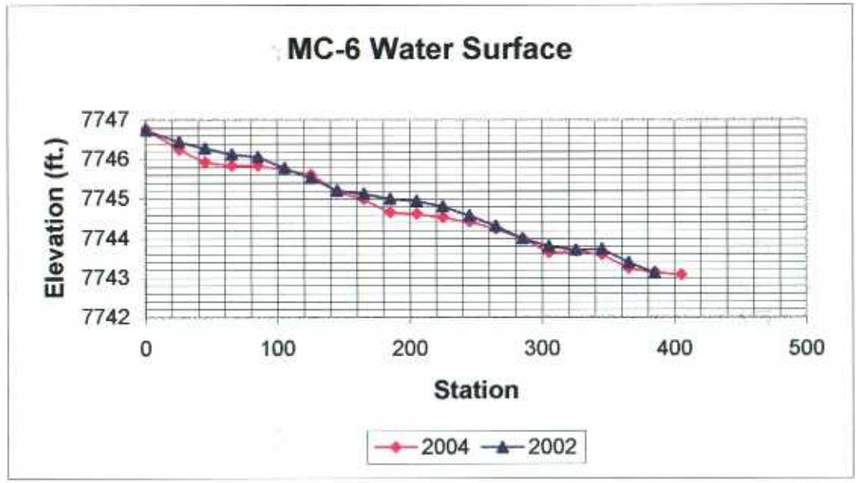






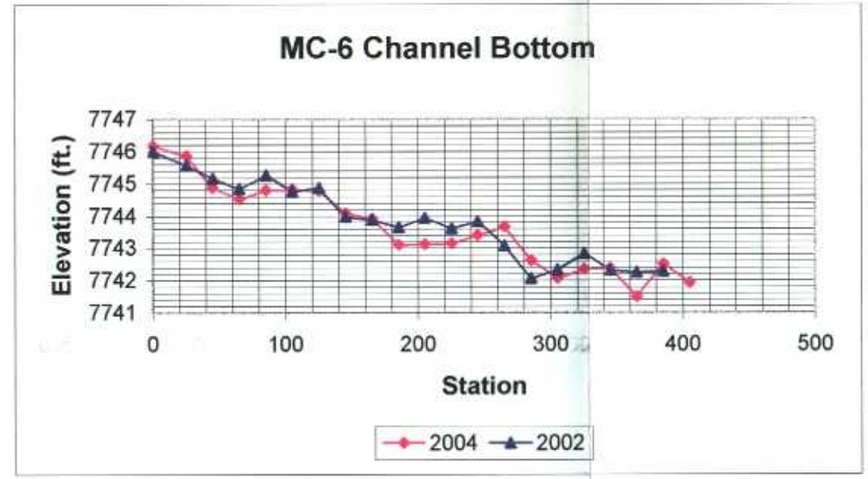


FIGURE 3-9. MC-6 CROSS-SECTION AND PROFILES

EarthFax

CHAPTER 4

REFERENCES

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

EarthFax Engineering, Inc. 2003. Annual Monitoring Evaluation of Mine-Water Discharge Impacts in Eccles Creek and Mud Creek. Project 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.

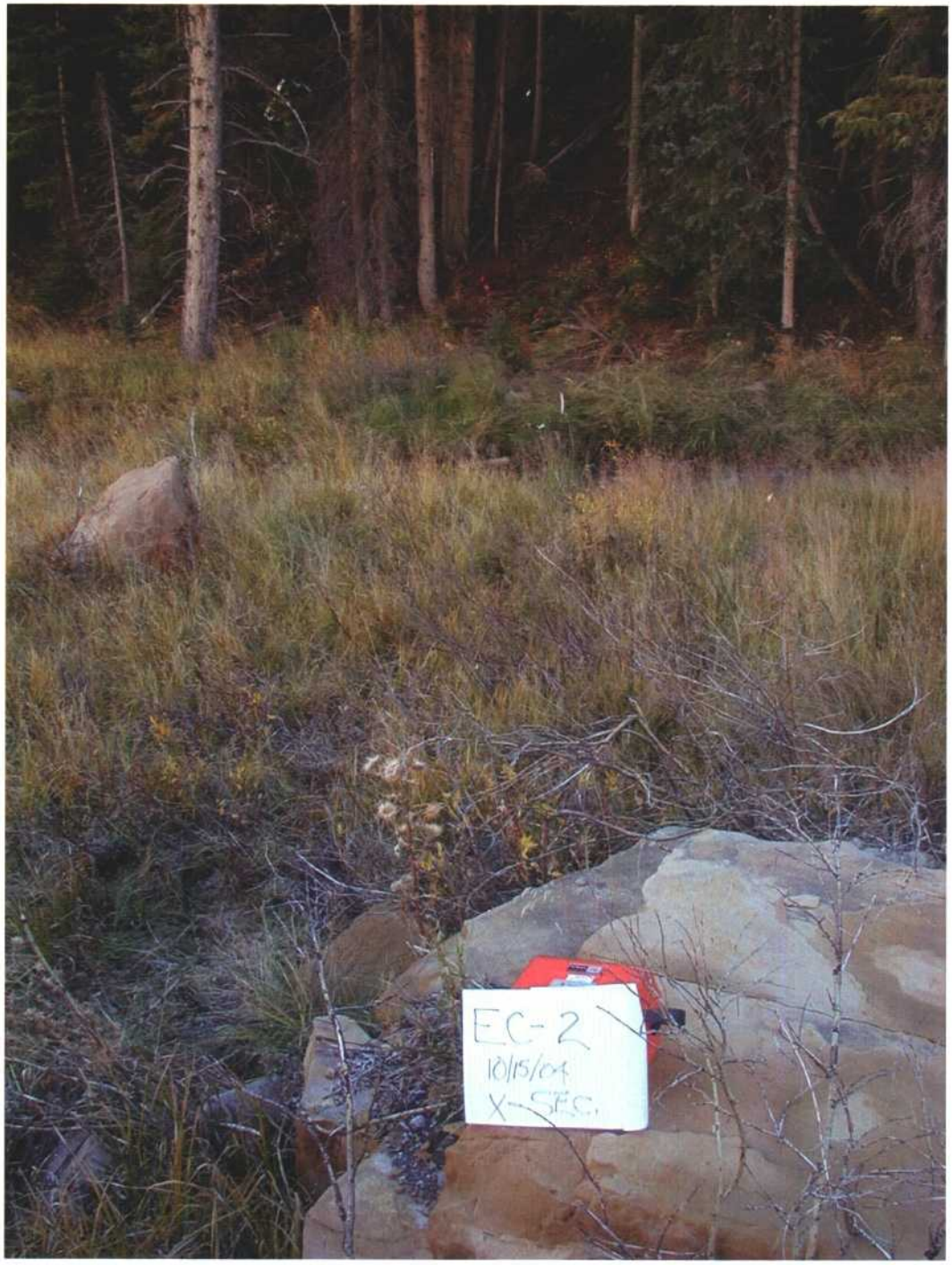
APPENDIX A

Reference Site Photographs

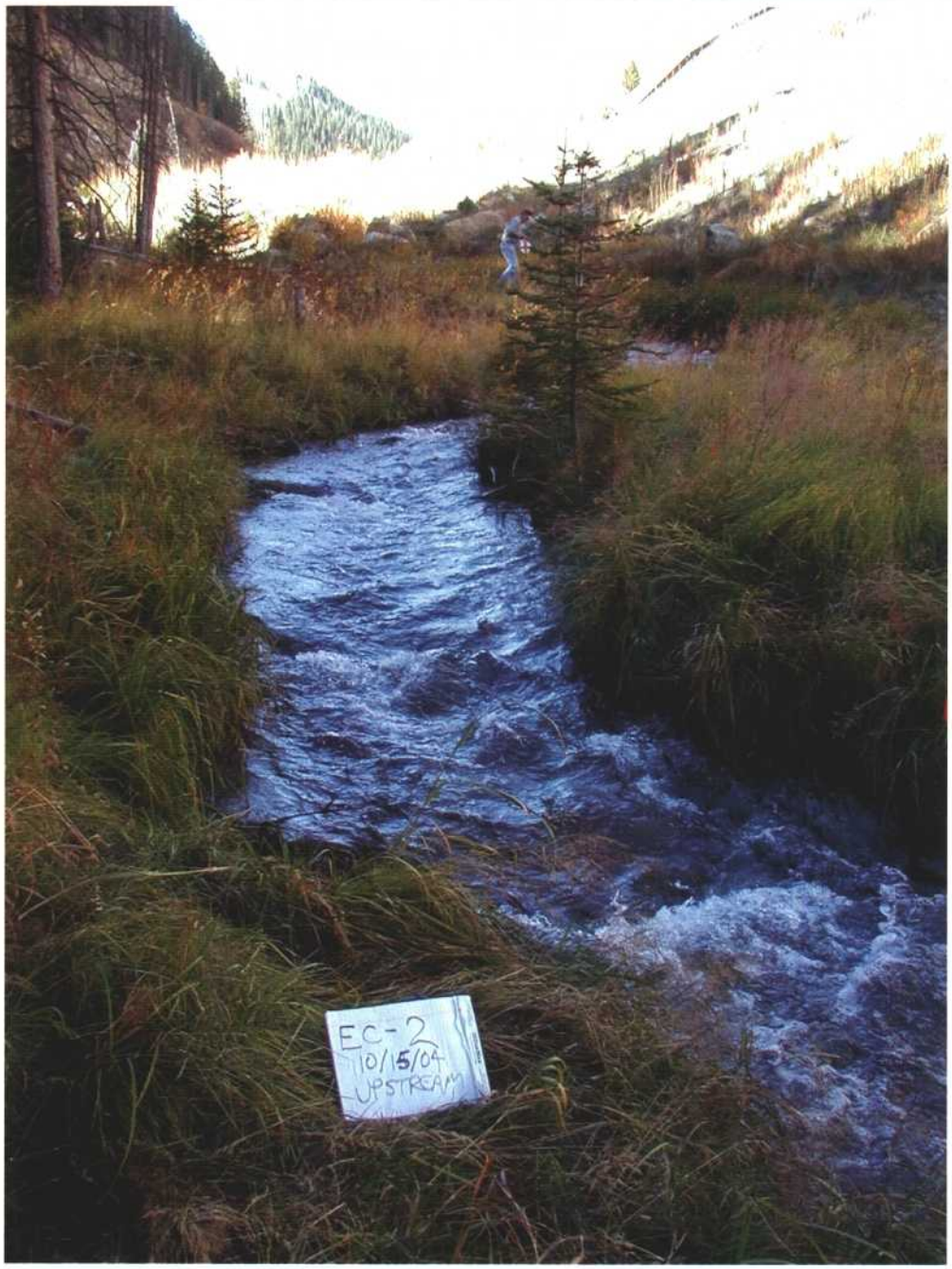
EC-1 cross section

EC-1 upstream view

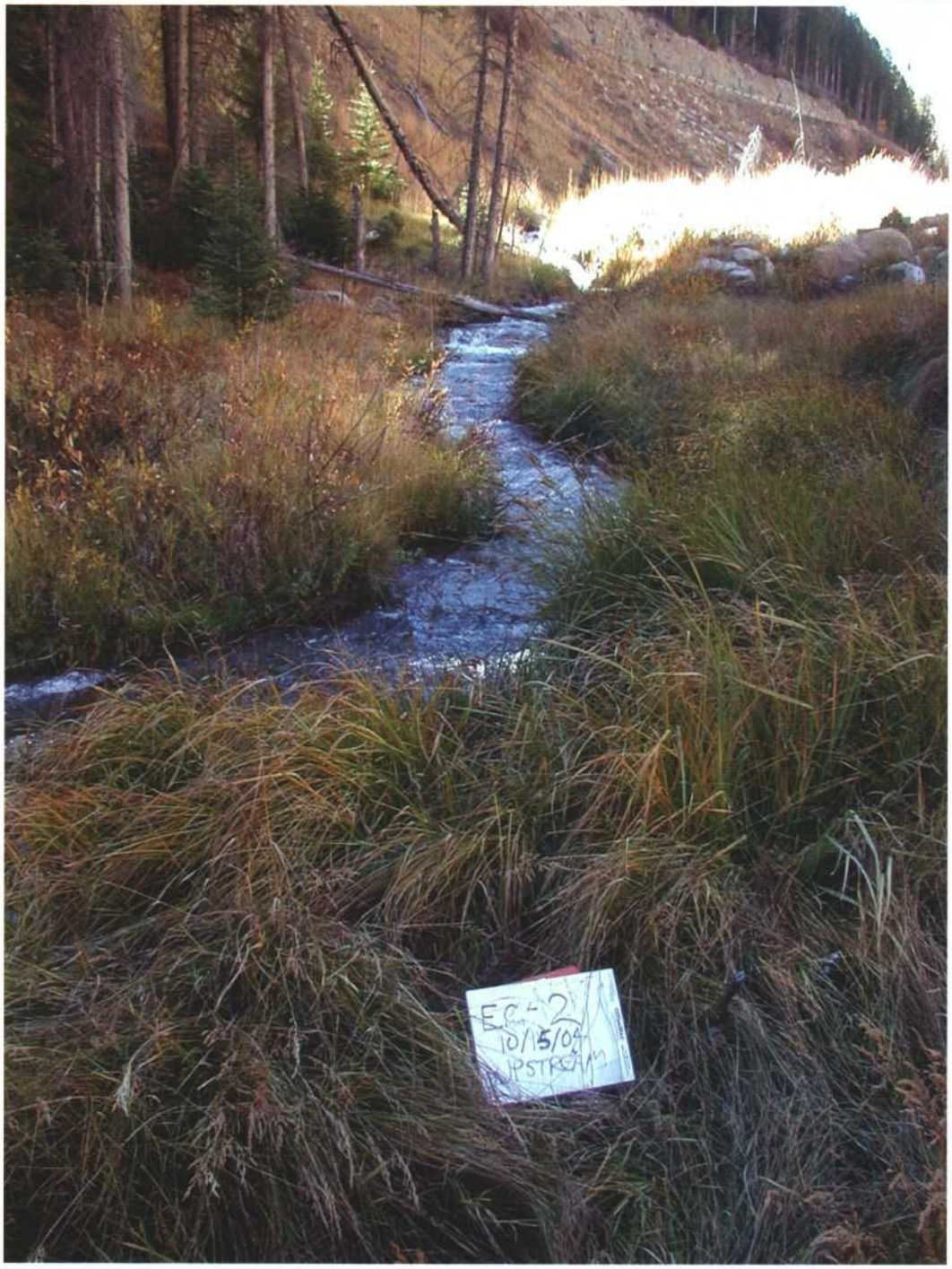
EC-1 downstream view



EC-2 cross section

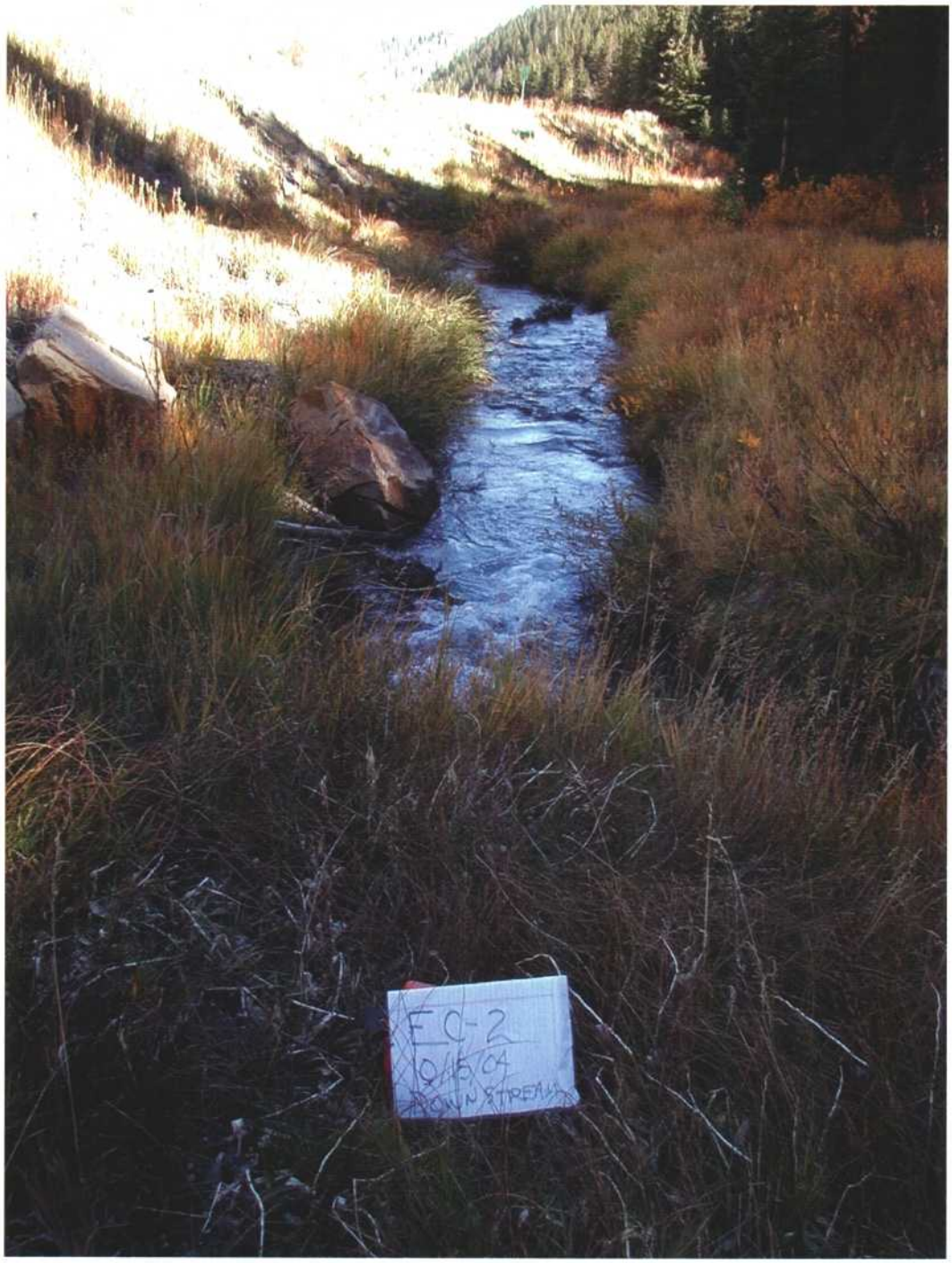


EC-2 upstream view (lower portion)



EC-2 upstream view (upper portion)

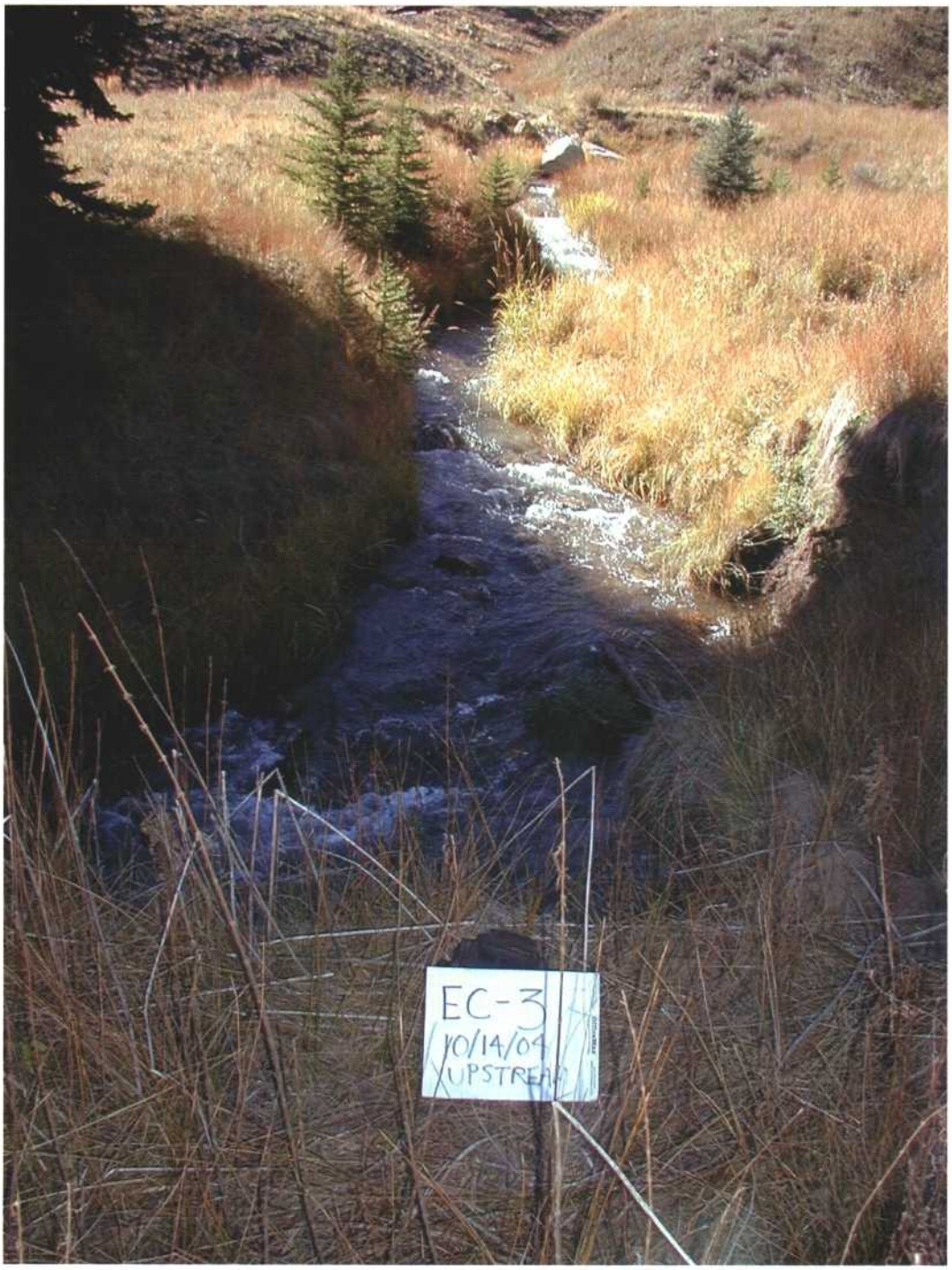
EC-2 downstream view (upper portion)



EC-2 downstream view (lower portion)

EC-3 cross section

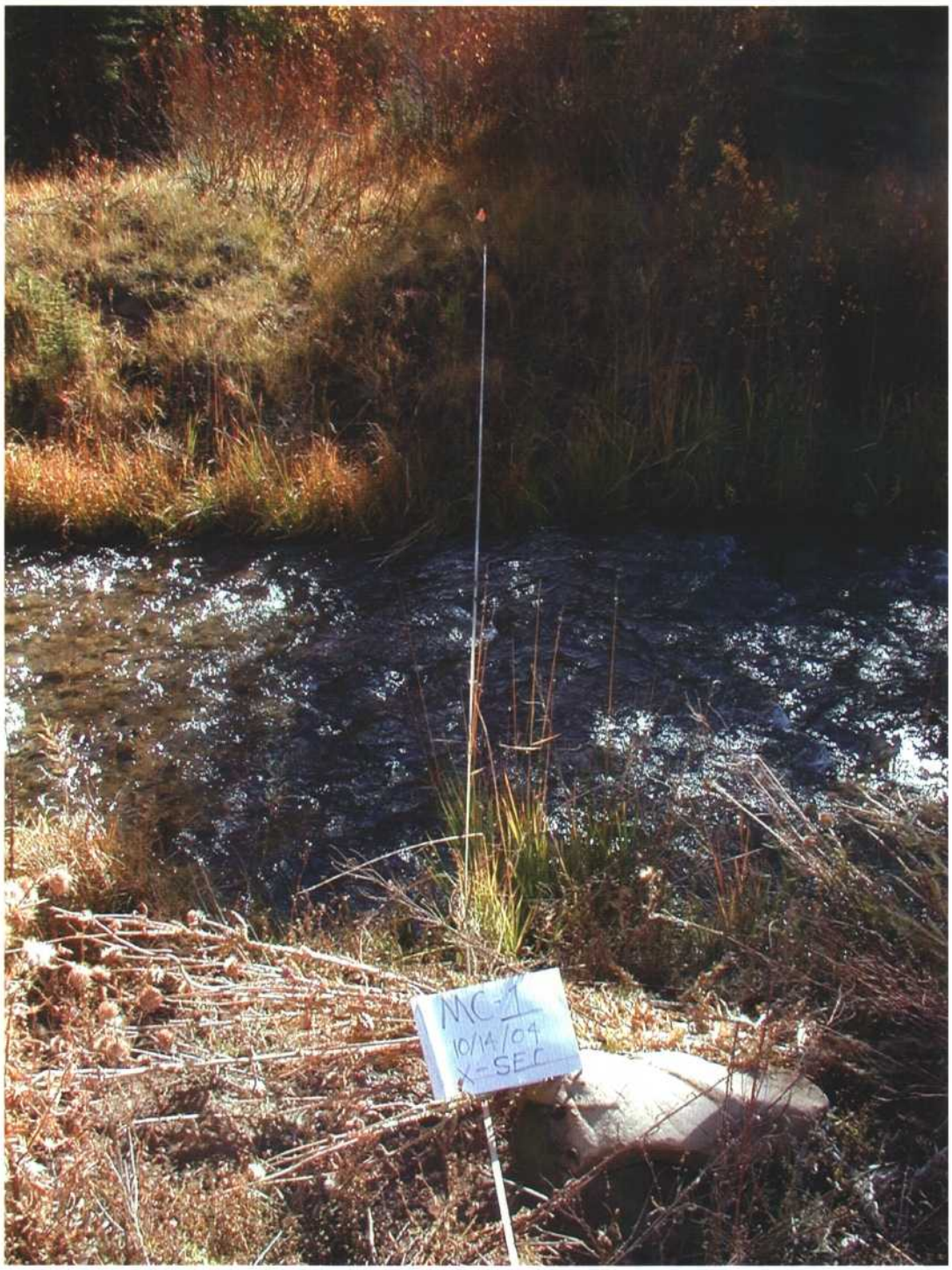
EC-3 upstream view (lower portion)



EC-3 upstream view (upper portion)

EC-3 downstream view (upper portion)

EC-3 downstream view (lower portion)



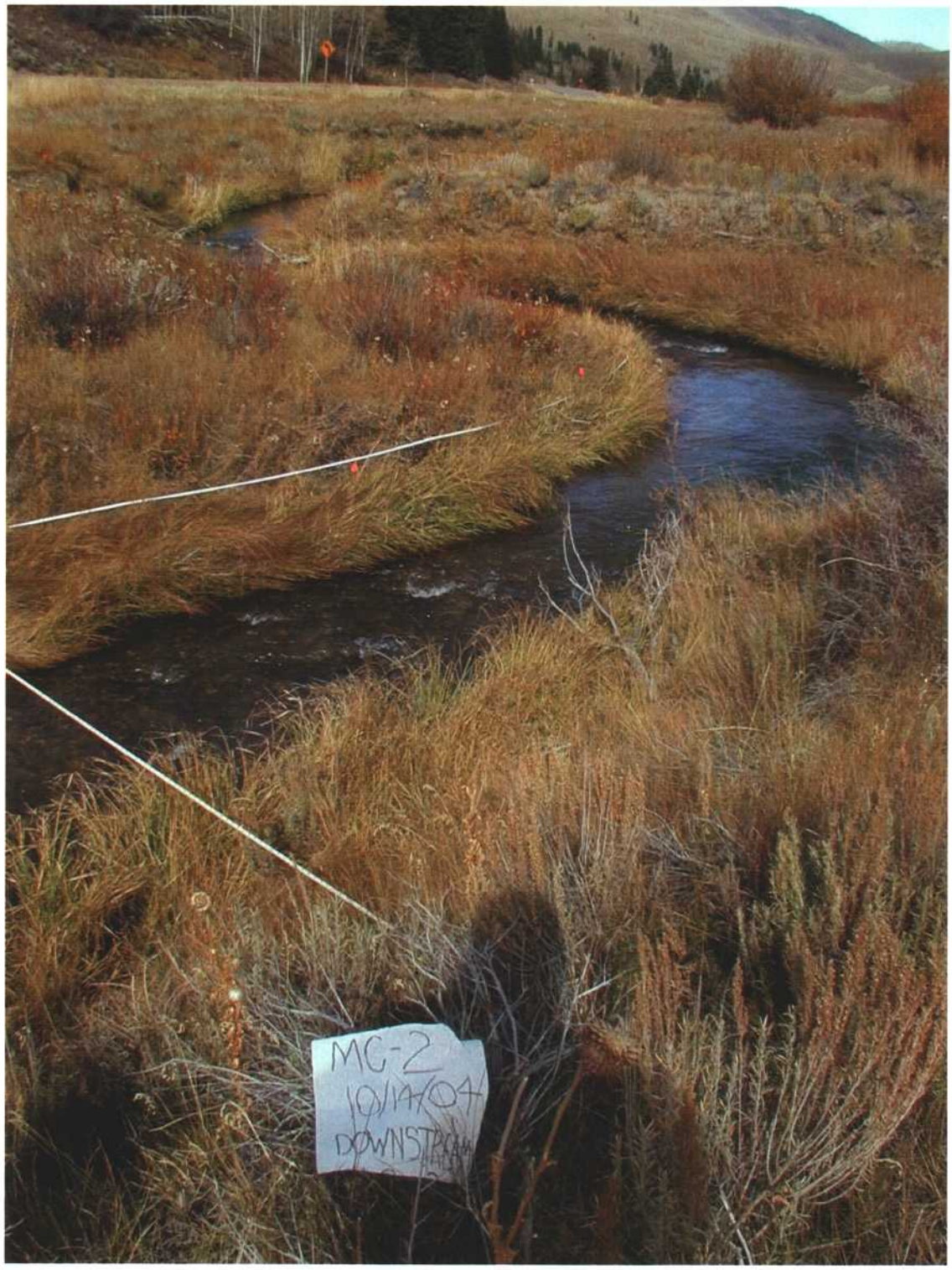
MC-1 cross section

MC-1 upstream view

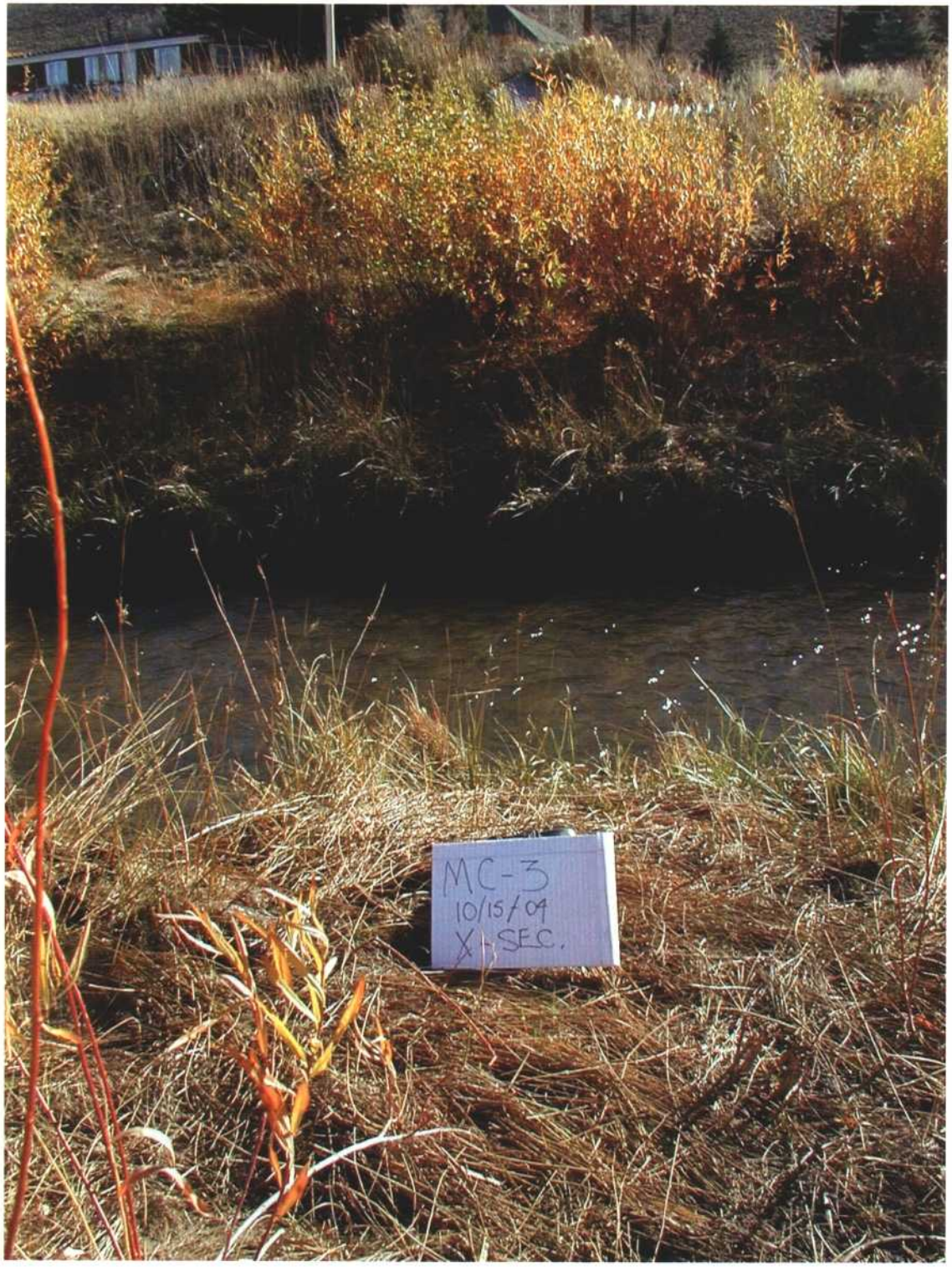
MC-1 downstream view

MC-2 cross section

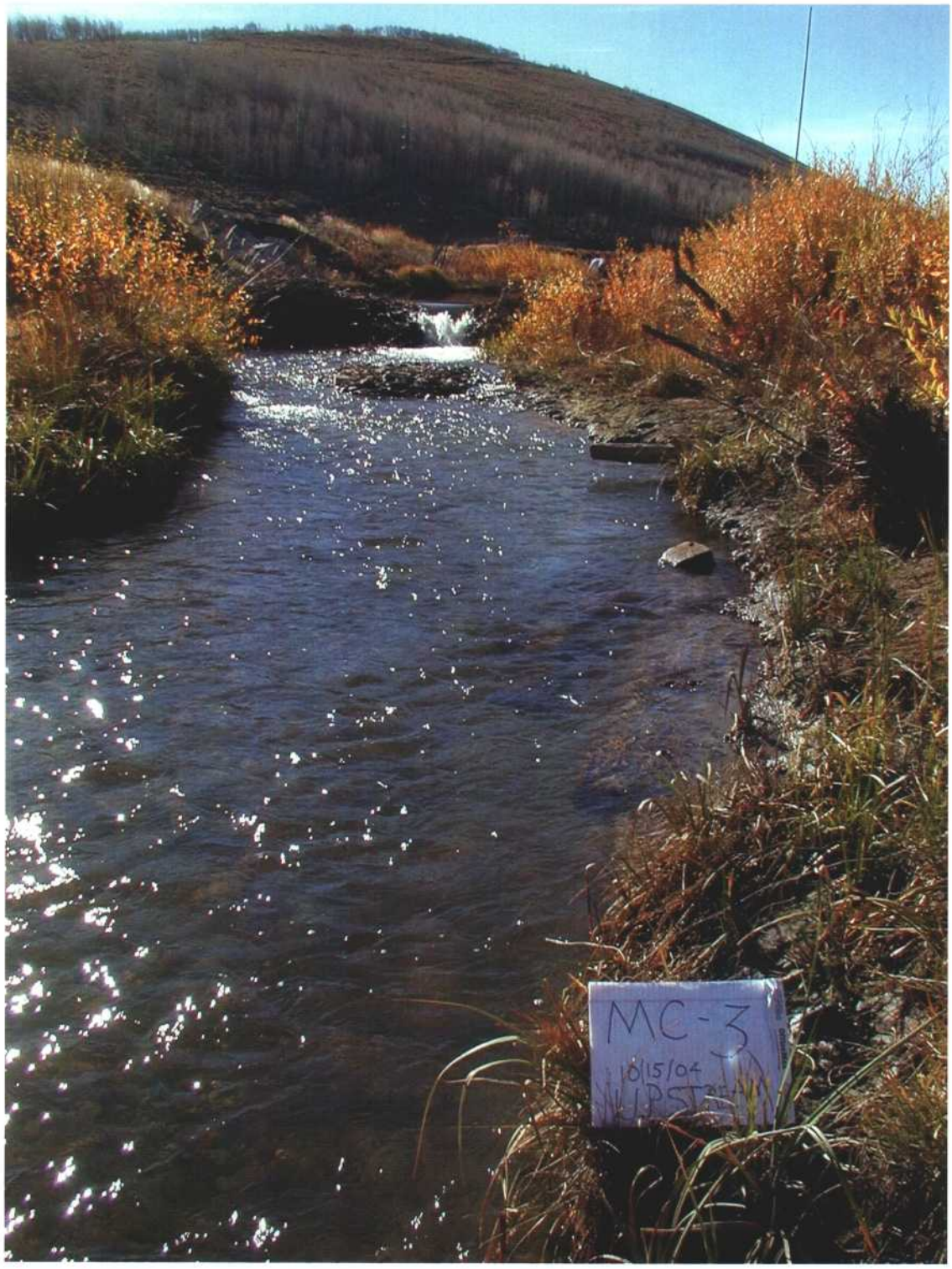
MC-2 upstream view



MC-2 downstream view



MC-3 cross section

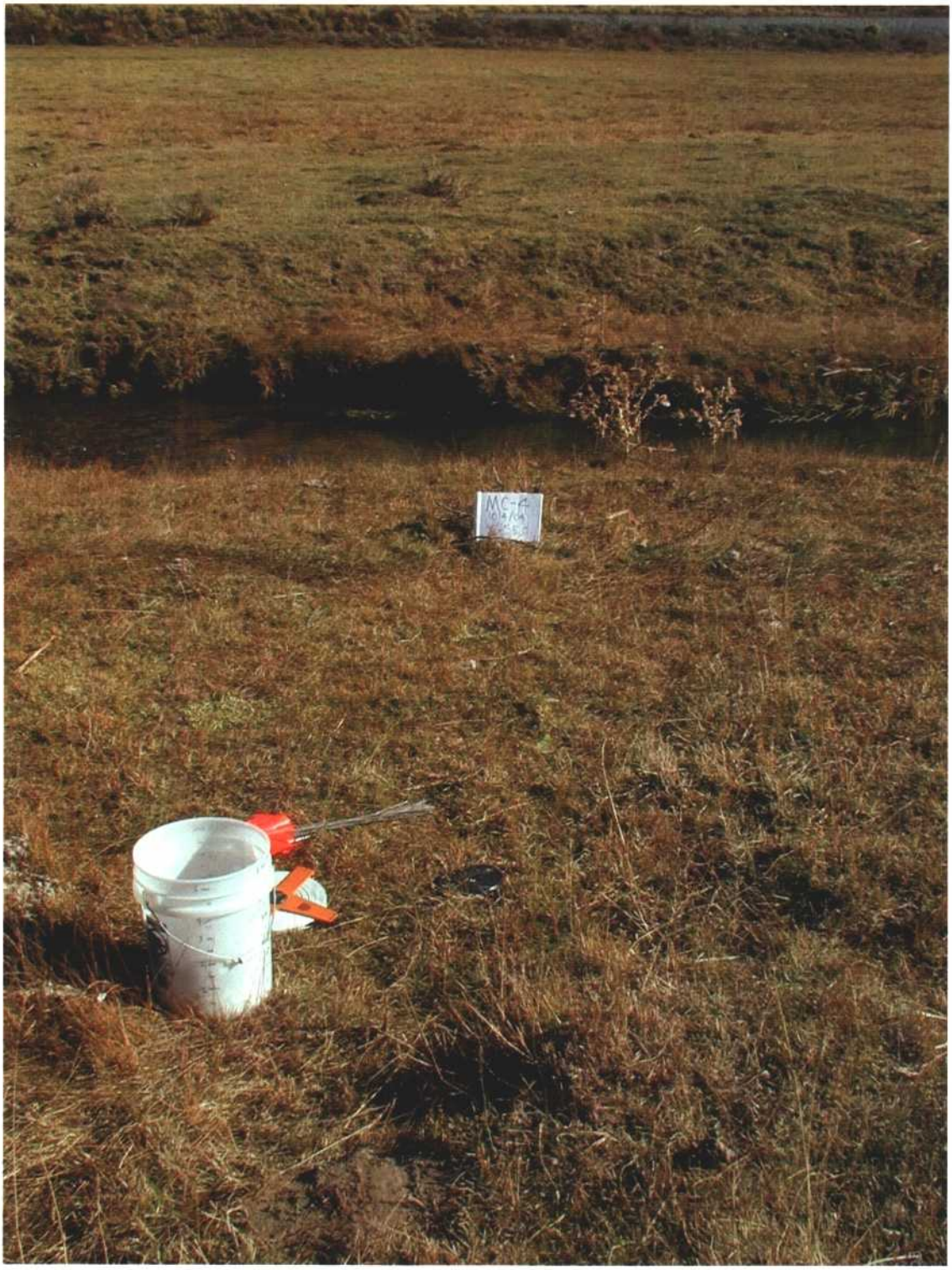


MC-3 upstream view

MC-3 downstream view (upper portion)

MC-3 downstream view (lower portion)

MC-3 debris on benchmark from
beaver dam removal

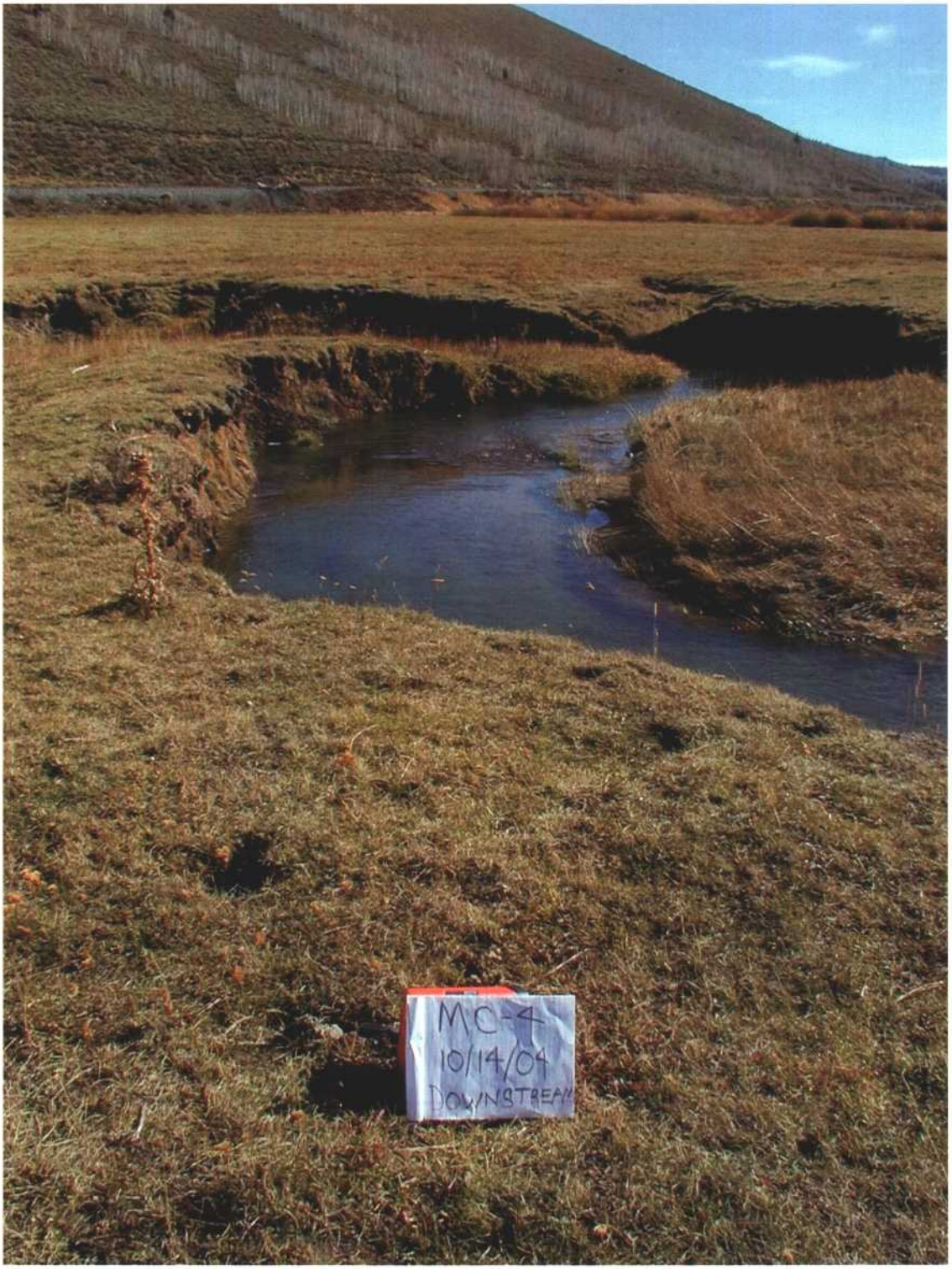


MC-4 cross section

MC-4 upstream view (lower portion)

MC-4 upstream view (upper portion)

MC-4 downstream view (upper portion)



MC-4 downstream view (lower portion)

MC-5 cross section

MC-5 upstream view

MC-5 downstream view

MC-6 cross section

MC-6 upstream view

MC-6 downstream view

APPENDIX B

Copy of Field Log Book

Projects (continued) . . . . . .

UC-794-09

Skyline Mine
Eccles/Mud Creek Survey
2004

Profile MC-5 14 Oct 2004

station	Top Bank Left	Bankful Left	Water Surf	Bottom	Top Bank Rt
BM = 4.75					
0+00	—	—	8.15	8.50	7.97
0+10	—	—	8.19	8.43	7.94
0+20	5.50	8.17	8.22	8.79	7.72
0+30	5.96	8.34	8.51	9.06	8.09
0+40	8.17	8.60	8.60	9.47	5.26
0+50	7.96	8.64	8.64	9.31	7.82
0+60	7.74	8.52	8.61	8.87	6.55
0+70	6.04	8.59	8.76	9.05	7.93
0+80	6.20	8.90	9.02	9.43	8.46
0+90	6.49	8.85	9.27	9.57	8.75
1+00	6.84	8.90	9.18	9.91	8.83
1+10	8.62	9.06	9.15	9.53	6.19
1+20	8.71	9.14	9.31	9.60	5.52
1+30	8.90	9.27	9.68	10.30	5.72
1+40	9.24	9.61	9.83	10.34	5.84
1+50	9.26	9.60	9.82	10.75	6.72
1+60	9.26	9.56	9.82	10.35	7.35
1+70	7.26	9.38	10.00	10.31	9.05
1+80	8.36	9.60	10.04	10.66	9.38
1+90	9.08	9.91	9.98	10.35	9.73
2+00	9.44	10.12	10.25	10.47	9.01
BM close = 4.75					

MC-5 cross section

Sta	Elev
0+00	4.68
0+05	7.04
0+06	6.16
0+25	5.96
0+31	6.88
0+33	9.66
0+36	9.78
0+38	9.33
0+41	9.83
0+47	8.24
0+49	6.38
0+52	5.71
BM close =	4.76

MC-1 profile BM = 5.11

Station	Top Left	Bankfull Left	Water Surf.	Bottom	Top Rt
0+00	6.61	8.47	8.67	9.87	8.07
0+15	6.79	8.63	8.72	9.47	7.72
0+30	8.35	8.75	8.75	10.54	3.10
0+45	8.35	8.68	8.72	11.35	3.38
0+60	8.37	8.70	8.70	10.52	4.04
0+75	8.52	8.73	8.73	10.02	4.24
0+90	8.76	9.05	9.30	10.32	8.97
1+05	9.15	9.28	9.38	10.43	5.80
1+20	8.66	9.29	9.48	10.18	6.49
1+35	6.55	9.66	9.72	10.23	7.15
1+50	7.76	9.74	9.95	10.39	7.10
1+65	9.94	10.25	10.36	11.51	9.95
1+80	10.10	10.45	10.49	11.21	10.16
1+95	9.06	10.32	10.61	11.20	10.29
2+10	8.65	10.57	10.75	11.51	10.00
2+25	7.80	10.54	10.85	11.47	10.50
2+40	10.58	10.90	11.00	11.57	9.26
2+55	10.50	11.15	11.18	12.07	9.25
2+70	9.96	11.15	11.33	11.83	8.72
2+85	11.03	11.41	11.47	12.16	9.20
3+00	—	—	11.60	12.05	9.73

BM close = 5.11

MC-1 cross section

Sta	Elev.
0+00	5.61
0+03	7.31
0+05	7.72
0+07	9.86
0+08	10.40
0+13	10.40
0+22	10.11
0+27	7.06
0+32	6.10

BM close = 5.11

MC-6 profile

BM = 2.50 (UDOT marker)

Sta	Top Left	Bankfull Left	Water Surf	Bottom	Top Rt
0+00	5.53	7.72	7.87	8.47	5.71
0+25	7.54	8.26	8.40	8.79	6.62
0+45	8.09	8.52	8.71	9.77	4.23
0+65	8.25	8.67	8.81	10.12	3.57
0+85	8.36	8.64	8.80	9.85	7.73
1+05	8.33	8.81	8.89	9.82	8.07
1+25	8.16	9.01	9.04	9.86	8.23
1+45	7.09	9.25	9.46	10.56	8.13
1+65	8.80	9.59	9.65	10.73	6.01
1+85	9.22	9.67	9.98	11.54	9.04
2+05	9.38	9.79	10.02	11.53	9.30
2+25	4.75	10.02	10.11	11.50	9.59
2+45	9.86	10.22	10.22	11.24	9.26
2+65	5.67	10.40	10.40	10.97	10.10
2+85	6.47	10.47	10.65	12.03	10.40
3+05	7.08	11.00	11.00	12.58	10.36
3+25	9.79	10.89	10.97	12.29	9.88
3+45	10.46	10.80	11.06	12.26	5.68
3+65	10.57	11.22	11.40	13.15	5.39
3+85	10.79	11.39	11.50	12.13	5.46
4+05	10.90	11.47	11.56	12.72	5.65
4+25	10.85	11.50	11.64	12.82	10.59
4+50	11.15	11.46	11.46	12.77	6.06

Deep pool between these stations

BM close = 2.50

MC-6 cross section

Sta	Elev.
0+00	4.76
0+01	5.94
0+06	9.15
0+07	10.92
0+09	11.56
0+15	10.61
0+17	9.85
0+23	9.36
0+49	9.82
0+57	6.26
0+60	5.93
0+62	4.67

BM close = 2.50

MC-2 profile BM = 3.72

Station	Top Left	Bankful Left	Wat Surf	Bottom	Top Rt
0+00	5.81	6.74	6.96	7.72	6.69
0+15	6.60	7.18	7.30	8.09	6.55
0+30	6.81	7.41	7.60	8.35	7.16
0+45	7.11	7.50	7.67	8.72	7.20
0+60	6.55	7.48	7.70	8.76	7.31
0+75	7.06	7.72	7.86	9.30	6.82
0+90	6.60	7.60	7.91	9.22	7.63
1+05	7.35	7.86	8.05	8.69	5.76
1+20	6.85	7.94	8.16	9.07	7.60
1+35	7.69	8.40	8.69	9.60	8.15
1+50	4.83	8.68	8.77	9.58	8.50
1+65	8.39	8.60	9.09	10.07	8.51
1+80	8.69	9.06	9.17	11.29	6.80
1+95	8.46	9.38	9.45	10.64	8.41
2+10	9.01	9.43	9.66	10.65	9.15
2+25	8.76	9.48	9.69	12.19	4.40
2+40	8.64	9.34	9.72	12.25	4.78
2+55	7.32	9.40	9.82	11.23	4.94
2+70	7.95	9.81	9.98	11.82	5.82
2+85	8.32	9.66	10.02	11.00	7.73
3+00	9.25	9.86	10.03	12.58	8.86

BM close = 3.72

MC-2 cross section

Sta	Elev
0+00	4.92
0+03	6.75
0+05	7.55
0+06	8.35
0+07	8.96
0+09	9.53
0+16	9.24
0+18	8.40
0+21	8.27
0+30	6.07
0+39	5.12

BM close = 3.72

MC-4 profile BM = 4.06

Station	Left Bank	Bankfull Left	Wet Surf	Bottom	Top Rt
0+00	6.99	7.71	8.07	9.00	5.30
0+15	6.65	7.70	8.16	8.98	5.80
0+30	4.96	7.79	8.47	10.15	5.56
0+45	7.75	8.37	8.56	9.50	6.47
0+60	7.25	8.51	8.66	9.43	6.87
0+75	7.91	8.59	8.72	9.45	8.45
0+90	8.11	8.62	8.80	9.37	7.60
1+05	8.21	8.65	8.83	11.00	7.15
1+20	8.09	8.34	8.79	10.59	5.50
1+35	7.28	8.47	8.81	11.11	7.06
1+50	7.73	8.44	8.84	10.03	7.30
1+65	5.58	8.70	8.99	9.64	7.54
1+80	6.80	9.09	9.25	10.64	8.03
1+95	7.82	9.27	9.34	10.78	7.75
2+10	8.56	9.12	9.47	10.13	8.25
2+25	8.70	9.30	9.48	11.72	5.82
2+40	8.65	9.31	9.49	11.69	5.88
2+55	8.63	9.22	9.48	11.31	6.20
2+70	8.71	9.31	9.48	12.12	6.18
2+85	8.62	9.34	9.58	11.12	6.46
3+00	8.63	9.39	9.62	10.91	6.18

BM close = 4.06

MC-4 cross section

Sta	Elev
0+00	5.46
0+02	6.58
0+05	7.47
0+10	7.80
0+11	9.20
0+12	9.98
0+21	9.13
0+23	9.22
0+24	7.71
0+41	6.74
0+46	6.30
0+51	5.87

BM close = 4.06

MC-3 profile | BM covered by debris pile from culvert cleanout. Use rt bank x sec marker for BM. Shoot bottom of NE corner of siding on adjacent bldg for alternate BM. | 15 Oct 2004

BM (top of stk) = 7.75 BM (grnd) = 8.05 Alt BM = 2.15

(Main BM for this survey)

Sta	Top Bank Left	Bankful Left	Wat Surf	Bottom	Top Bank Rt
0+00	—	—	7.84	10.55	6.85
0+15	—	—	7.84	10.75	6.70
0+30	—	—	7.80	10.98	6.45
0+45	—	—	7.85	10.56	6.33
0+60	—	—	7.82	10.73	6.31
0+75	—	—	7.87	9.09	6.70
0+90	8.45	—	10.40	11.33	9.21
1+05	9.75	10.25	10.73	12.05	9.89
1+20	9.13	10.31	10.80	11.28	10.10
1+35	9.54	10.28	10.90	11.60	9.02
1+50	9.40	10.29	10.91	11.88	9.32
1+65	9.44	—	10.90	12.12	8.90
1+80	9.55		10.97	12.17	10.20
1+95	Debris	—	11.28	12.25	Debris
Culvert					
2+40	Debris		11.78	13.35	Debris
2+55	11.20	—	12.02	12.98	11.61
2+70	12.09	—	12.43	13.71	10.96
2+85	11.92	—	12.53	13.61	12.07
3+00	12.30	—	12.92	14.28	—

In beaver pond

RR embankment

Beaver dam

Just upstream of culvert inlet

Just downstream of culvert exit

BM close (top of rt x sec marker) = 7.74

MC-3 cross section

Sta	Elev.
0+00	8.10
0+03	9.20
0+07	9.59
0+08	11.55
0+18	11.86
0+19	10.48
0+24	8.64
0+27	8.73
0+29	8.17

BM close = 7.74

EC-3 profile

BM = 5.66

Sta	Top Left	Bank Left	Wet Surf	Bottom	Top Rt
0+00	6.48	7.48	8.06	8.95	6.57
0+10	4.18	7.97	8.34	9.66	7.25
0+20	7.91	8.37	8.65	9.74	7.90
0+30	8.00	8.66	8.88	9.84	—
0+40	8.82	8.90	9.04	10.22	—
0+50	9.05	9.40	9.53	10.98	—
0+60	9.00	9.42	9.54	10.88	—
0+70	8.79	9.41	9.55	10.80	—
0+80	7.19	—	9.80	11.02	8.11
0+90	8.05	10.59	10.77	11.79	9.51
1+00	8.68	10.57	10.86	11.46	9.80
1+10	8.32	10.72	11.07	11.90	9.62
1+20	8.64	11.04	11.32	12.46	10.02
1+30	8.96	11.45	11.76	13.39	10.93
1+40	9.12	11.55	11.73	13.15	9.85
1+50	9.39	12.22	12.39	13.37	9.70
Move gun. BM close = 5.66. New BM = 0.31					
1+60	6.67	7.21	7.41	8.41	7.17
1+70	6.04	7.80	8.10	9.25	7.18
1+80	5.52	—	8.00	9.26	7.60
1+90	7.62	8.20	8.20	9.11	—
2+00	6.20	8.45	8.54	9.73	8.15
BM close = 0.31					

EC-3 cross section

Sta	Elev
0+00	0.62
0+06	1.30
0+07	1.59
0+15	2.19
0+16	2.90
0+18	3.40
0+20	6.06
0+25	6.09
0+26	4.52
0+31	0.75

BM close = 0.30

EC-2 profile BM = 7.25

Station	Left Top	Bank left Left	Wat Surf	Bottom	Top Rt
0+00	5.10	5.34	5.44	6.19	5.06
0+10	4.72	5.80	6.05	7.07	5.37
0+20	5.70	5.92	6.07	6.99	5.74
0+30	5.94	6.17	6.27	7.22	5.99
0+40	6.43	6.46	6.46	7.11	5.99
0+50	6.55	7.11	7.31	9.35	6.39
0+60	6.20	7.57	7.76	8.84	7.00
0+70	7.33	8.18	8.30	9.35	7.51
0+80	7.90	8.20	8.36	9.01	7.34
0+90	8.00	8.54	8.73	9.56	8.50
1+00	8.45	9.44	9.61	10.07	8.75
1+10	9.04	9.67	9.84	10.80	8.29
1+20	9.55	10.13	10.27	11.14	9.41
1+30	9.73	10.45	10.62	12.22	9.44
1+40	10.10	11.02	11.21	12.17	9.85
1+50	9.89	11.25	11.57	12.26	9.05
1+60	10.45	11.64	11.80	14.20	10.96
1+70	10.01	11.90	11.99	12.90	9.97
1+80	11.38	11.98	12.15	13.47	10.80
1+90	11.93	12.20	12.20	13.21	11.89
2+00	11.97	13.03	13.03	15.60	12.65

BM close = 7.26

EC-2 cross section

Sta	Elev
0+00	6.26
0+06	8.23
0+14	8.12
0+21	7.98
0+24	8.52
0+25	8.69
0+28	10.05
0+32	9.33
0+33	8.72
0+36	7.82
0+55	7.34
0+63	6.28
0+69	4.26

BM close = 7.25

EC-1 profile BM = 11.19

Sta	Top Left	Bankfull Left	Wet Surf	Bottom	Top Rt.
0+00	5.11	7.55	8.32	10.03	5.73
0+10	7.85	8.97	9.30	10.37	4.70
0+20	8.77	9.78	10.40	11.67	8.44
0+30	9.68	10.25	10.40	11.34	8.58
0+40	8.69	11.09	11.32	12.37	9.76
0+50	9.04	11.36	12.93	12.64	10.85
0+60	10.62	12.12	12.79	13.41	8.95
0+70	11.43	12.74	13.28	14.00	11.54
0+80	11.12	13.37	13.80	14.55	9.27
Move gun. Old bench = 11.17			New	BM = 0.47	
0+90	2.42	2.92	3.30	4.35	2.76
1+00	—	—	3.75	4.78	1.08
1+10	—	3.62	3.94	4.61	3.20
1+20	—	—	4.23	5.60	4.15
1+30	4.68	5.35	5.52	6.46	5.03
1+40	5.38	5.81	5.90	6.56	4.25
1+50	5.38	5.81	6.20	7.52	4.88
1+60	6.59	7.40	7.65	8.21	7.17
1+70	7.51	7.84	7.90	8.77	7.15
1+80	8.44	—	8.88	9.74	7.52
1+90	9.23	9.70	9.86	11.20	7.16
2+00	7.83	10.60	10.64	11.33	9.82
BM	close =	0.46			

EC-1 cross section

Set gun up in new location

BM = 3.62

Sta	Elev
0+00	2.53
0+03	7.00
0+07	7.94
0+10	7.44
0+11	4.92
0+15	4.05
0+17	3.62

BM close = 3.62

APPENDIX C

Spreadsheets of Survey Data

Cross Section: EC-1

Benchmark elevation: 8499.13 Survey Date: 10/15/2004
BenchMark Rod Reading: 3.62

Station	Rod Reading	Elevation
0	2.53	8500.22
3	7.00	8495.75
7	7.94	8494.81
10	7.44	8495.31
11	4.92	8497.83
15	4.05	8498.70
17	3.62	8499.13

Profile: EC-1

Benchmark elevation (ft): 8499.13 Survey Date: 10\15\04
Rod reading at Benchmark (I 11.19 Move Gun at Sta. 90 0.47

	Top of Bank Left		Bankfull		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	5.11	8505.21	7.55	8502.77	8.32	8502.00	10.03	8500.29	5.73	8504.59
10	7.85	8502.47	8.97	8501.35	9.30	8501.02	10.37	8499.95	4.70	8505.62
20	8.77	8501.55	9.78	8500.54	10.40	8499.92	11.67	8498.65	8.44	8501.88
30	9.68	8500.64	10.25	8500.07	10.40	8499.92	11.34	8498.98	8.58	8501.74
40	8.69	8501.63	11.09	8499.23	11.32	8499.00	12.37	8497.95	9.76	8500.56
50	9.04	8501.28	11.36	8498.96	12.93	8497.39	12.64	8497.68	10.83	8499.49
60	10.62	8499.70	12.12	8498.20	12.79	8497.53	13.41	8496.91	8.95	8501.37
70	11.43	8498.89	12.74	8497.58	13.28	8497.04	14.00	8496.32	11.54	8498.78
80	11.12	8499.20	13.37	8496.95	13.80	8496.52	14.55	8495.77	9.27	8501.05
90	2.42	8497.18	2.92	8496.68	3.30	8496.30	4.35	8495.25	2.76	8496.84
100					3.75	8495.85	4.78	8494.82	1.08	8498.52
110			3.62	8495.98	3.94	8495.66	4.61	8494.99	3.20	8496.40
120					4.23	8495.37	5.60	8494.00	4.15	8495.45
130	4.68	8494.92	5.35	8494.25	5.52	8494.08	6.46	8493.14	5.03	8494.57
140	5.38	8494.22	5.81	8493.79	5.90	8493.70	6.56	8493.04	4.25	8495.35
150	5.38	8494.22	5.81	8493.79	6.20	8493.40	7.52	8492.08	4.88	8494.72
160	6.59	8493.01	7.40	8492.20	7.65	8491.95	8.21	8491.39	7.17	8492.43
170	7.51	8492.09	7.84	8491.76	7.90	8491.70	8.77	8490.83	7.15	8492.45
180	8.44	8491.16			8.88	8490.72	9.74	8489.86	7.52	8492.08
190	9.23	8490.37	9.70	8489.90	9.86	8489.74	11.20	8488.40	7.16	8492.44
200	7.83	8491.77	10.60	8489.00	10.64	8488.96	11.33	8488.27	9.82	8489.78

Max. Water Surface Slope (fraction): 0.161
Min. Water Surface Slope (fraction): -0.014
Avg. Water Surface Slope (fraction): 0.065

Cross Section: EC-2

Benchmark elevation: 8257.72 Survey Date: 10/15/2004
BenchMark Rod Reading: 7.26

Station	Rod Reading	Elevation
0	6.26	8258.72
6	8.23	8256.75
14	8.12	8256.86
21	7.98	8257.00
24	8.52	8256.46
25	8.69	8256.29
28	10.05	8254.93
32	9.33	8255.65
33	8.72	8256.26
36	7.82	8257.16
55	7.34	8257.64
63	6.28	8258.70
69	4.26	8260.72

Profile: EC-2

Benchmark elevation (ft): 8257.72 Survey Date: 10\15\04
Rod reading at Benchmark (f 7.25

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	5.10	8259.87	5.34	8259.63	5.44	8259.53	6.19	8258.78	5.06	8259.91
10	4.72	8260.25	5.80	8259.17	6.05	8258.92	7.07	8257.90	5.37	8259.60
20	5.70	8259.27	5.92	8259.05	6.07	8258.90	6.99	8257.98	5.74	8259.23
30	5.94	8259.03	6.17	8258.80	6.27	8258.70	7.22	8257.75	5.99	8258.98
40	6.43	8258.54	6.46	8258.51	6.46	8258.51	7.11	8257.86	5.99	8258.98
50	6.55	8258.42	7.11	8257.86	7.31	8257.66	9.35	8255.62	6.39	8258.58
60	6.20	8258.77	7.57	8257.40	7.76	8257.21	8.84	8256.13	7.00	8257.97
70	7.33	8257.64	8.18	8256.79	8.30	8256.67	9.35	8255.62	7.51	8257.46
80	7.90	8257.07	8.20	8256.77	8.36	8256.61	9.01	8255.96	7.34	8257.63
90	8.00	8256.97	8.54	8256.43	8.73	8256.24	9.56	8255.41	8.50	8256.47
100	8.45	8256.52	9.44	8255.53	9.61	8255.36	10.07	8254.90	8.75	8256.22
110	9.04	8255.93	9.67	8255.30	9.84	8255.13	10.80	8254.17	8.29	8256.68
120	9.55	8255.42	10.13	8254.84	10.27	8254.70	11.14	8253.83	9.41	8255.56
130	9.73	8255.24	10.45	8254.52	10.62	8254.35	12.22	8252.75	9.44	8255.53
140	10.10	8254.87	11.02	8253.95	11.21	8253.76	12.17	8252.80	9.85	8255.12
150	9.89	8255.08	11.25	8253.72	11.57	8253.40	12.26	8252.71	9.05	8255.92
160	10.45	8254.52	11.64	8253.33	11.80	8253.17	14.20	8250.77	10.96	8254.01
170	10.01	8254.96	11.90	8253.07	11.99	8252.98	12.90	8252.07	9.97	8255.00
180	11.38	8253.59	11.98	8252.99	12.15	8252.82	13.47	8251.50	10.80	8254.17
190	11.93	8253.04	12.20	8252.77	12.20	8252.77	13.21	8251.76	11.89	8253.08
200	11.97	8253.00	13.03	8251.94	13.03	8251.94	15.60	8249.37	12.65	8252.32

Max. Water Surface Slope (fraction): 0.088
Min. Water Surface Slope (fraction): 0.002
Avg. Water Surface Slope (fraction): 0.038

Cross Section: EC-3

Benchmark elevation: 7971.59 Survey Date: 10/15/2004
BenchMark Rod Reading: 0.31

Station	Rod Reading	Elevation
0	0.62	7971.28
6	1.30	7970.60
7	1.59	7970.31
15	2.19	7969.71
16	2.90	7969.00
18	3.40	7968.50
20	6.06	7965.84
25	6.09	7965.81
26	4.52	7967.38
31	0.75	7971.15

Profile: EC-3

Benchmark elevation (ft): 7971.59 Survey Date: 10\15\04
Rod reading at Benchmark (f 5.66 Move Gun at Sta.160: 0.31

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	6.48	7970.77	7.48	7969.77	8.06	7969.19	8.95	7968.30	6.57	7970.68
10	4.18	7973.07	7.97	7969.28	8.34	7968.91	9.66	7967.59	7.75	7969.50
20	7.91	7969.34	8.37	7968.88	8.65	7968.60	9.74	7967.51	7.90	7969.35
30	8.00	7969.25	8.66	7968.59	8.88	7968.37	9.84	7967.41		
40	8.82	7968.43	8.90	7968.35	9.04	7968.21	10.22	7967.03		
50	9.05	7968.20	9.40	7967.85	9.53	7967.72	10.98	7966.27		
60	9.00	7968.25	9.42	7967.83	9.54	7967.71	10.88	7966.37		
70	8.79	7968.46	9.41	7967.84	9.55	7967.70	10.50	7966.75		
80	7.19	7970.06			9.80	7967.45	11.02	7966.23	8.11	7969.14
90	8.05	7970.06	10.59	7966.66	10.77	7966.48	11.79	7965.46	9.51	7967.74
100	8.68	7969.20	10.57	7966.68	10.86	7966.39	11.46	7965.79	9.80	7967.45
110	8.32	7968.57	10.72	7966.53	11.07	7966.18	11.90	7965.35	9.62	7967.63
120	8.64	7968.93	11.04	7966.21	11.32	7965.93	12.46	7964.79	10.02	7967.23
130	8.96	7968.61	11.45	7965.80	11.76	7965.49	13.39	7963.86	10.93	7966.32
140	9.12	7968.29	11.55	7965.70	11.73	7965.52	13.15	7964.10	9.85	7967.40
150	9.39	7968.13	12.22	7965.03	12.39	7964.86	13.37	7963.88	9.70	7967.55
160	6.67	7962.51	7.21	7964.69	7.41	7964.49	8.41	7963.49	7.17	7970.08
170	6.04	7965.23	7.80	7964.10	8.10	7963.80	9.25	7962.65	7.18	7964.73
180	5.52	7966.38			8.00	7963.90	9.26	7962.64	7.60	7964.72
190	7.62	7964.28	8.20	7963.70	8.20	7963.70	9.11	7962.79		
200	6.20	7965.70	8.45	7963.45	8.54	7963.36	9.73	7962.17	8.15	7963.75

Max. Water Surface Slope (fraction): 0.097
Min. Water Surface Slope (fraction): -0.003
Avg. Water Surface Slope (fraction): 0.029

Cross Section: MC-1

Benchmark elevation: 7898.53 Survey Date: 10/14/2004
BenchMark Rod Reading: 5.11

Station	Rod Reading	Elevation
0	5.61	7898.03
3	7.31	7896.33
5	7.72	7895.92
7	9.86	7893.78
8	10.40	7893.24
13	10.40	7893.24
22	10.11	7893.53
27	7.06	7896.58
32	6.10	7897.54

Profile: MC-1

Benchmark elevation (ft): 7898.53 Survey Date: 10\14\04
Rod reading at Benchmark (f 5.11

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	6.61	7897.03	8.47	7895.17	8.67	7894.97	9.87	7893.77	8.07	7895.57
15	6.79	7896.85	8.63	7895.01	8.72	7894.92	9.47	7894.17	7.72	7895.92
30	8.35	7895.29	8.75	7894.89	8.75	7894.89	10.54	7893.10	3.10	7900.54
45	8.35	7895.29	8.68	7894.96	8.72	7894.92	11.35	7892.29	3.38	7900.26
60	8.37	7895.27	8.70	7894.94	8.70	7894.94	10.52	7893.12	4.06	7899.58
75	8.52	7895.12	8.73	7894.91	8.73	7894.91	10.02	7893.62	4.24	7899.40
90	8.76	7894.88	9.05	7894.59	9.30	7894.34	10.32	7893.32	8.97	7894.67
105	9.15	7894.49	9.28	7894.36	9.38	7894.26	10.43	7893.21	5.80	7897.84
120	8.66	7894.98	9.29	7894.35	9.48	7894.16	10.18	7893.46	6.49	7897.15
135	6.55	7897.09	9.66	7893.98	9.72	7893.92	10.23	7893.41	7.15	7896.49
150	7.76	7895.88	9.74	7893.90	9.95	7893.69	10.39	7893.25	7.10	7896.54
165	9.94	7893.70	10.25	7893.39	10.36	7893.28	11.51	7892.13	9.95	7893.69
180	10.10	7893.54	10.45	7893.19	10.49	7893.15	11.21	7892.43	10.16	7893.48
195	9.06	7894.58	10.32	7893.32	10.61	7893.03	11.20	7892.44	10.29	7893.35
210	8.65	7894.99	10.57	7893.07	10.75	7892.89	11.51	7892.13	10.00	7893.64
225	7.80	7895.84	10.54	7893.10	10.85	7892.79	11.47	7892.17	10.50	7893.14
240	10.58	7893.06	10.90	7892.74	11.00	7892.64	11.57	7892.07	9.26	7894.38
255	10.50	7893.14	11.15	7892.49	11.18	7892.46	12.07	7891.57	9.25	7894.39
270	9.96	7893.68	11.15	7892.49	11.33	7892.31	11.83	7891.81	8.72	7894.92
285	11.03	7892.61	11.41	7892.23	11.47	7892.17	12.16	7891.48	9.20	7894.44
300					11.60	7892.04	12.05	7891.59	9.73	7893.91

Max. Water Surface Slope (fraction): 0.038
Min. Water Surface Slope (fraction): -0.002
Avg. Water Surface Slope (fraction): 0.010

Cross Section: MC-2

Benchmark elevation: 7827.04 Survey Date: 10/14/2004
BenchMark Rod Reading: 3.72

Station	Rod Reading	Elevation
0	4.92	7825.84
3	6.75	7824.01
5	7.55	7823.21
6	8.35	7822.41
7	8.96	7821.80
9	9.53	7821.23
16	9.24	7821.52
18	8.40	7822.36
21	8.27	7822.49
30	6.07	7824.69
39	5.12	7825.64

Profile: MC-2

Benchmark elevation (ft): 7827.04 Survey Date: 10\14\04
Rod reading at Benchmark (f 3.72

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	5.81	7824.95	6.74	7824.02	6.96	7823.80	7.72	7823.04	6.69	7824.07
15	6.60	7824.16	7.18	7823.58	7.30	7823.46	8.09	7822.67	6.55	7824.21
30	6.81	7823.95	7.41	7823.35	7.60	7823.16	8.35	7822.41	7.16	7823.60
45	7.11	7823.65	7.50	7823.26	7.67	7823.09	8.72	7822.04	7.20	7823.56
60	6.55	7824.21	7.48	7823.28	7.70	7823.06	8.76	7822.00	7.31	7823.45
75	7.06	7823.70	7.72	7823.04	7.86	7822.90	9.30	7821.46	6.82	7823.94
90	6.60	7824.16	7.60	7823.16	7.91	7822.85	9.22	7821.54	7.63	7823.13
105	7.35	7823.41	7.86	7822.90	8.05	7822.71	8.69	7822.07	5.76	7825.00
120	6.85	7823.91	7.94	7822.82	8.16	7822.60	9.07	7821.69	7.62	7823.14
135	7.69	7823.07	8.40	7822.36	8.69	7822.07	9.60	7821.16	8.15	7822.61
150	4.83	7825.93	8.68	7822.08	8.77	7821.99	9.58	7821.18	8.50	7822.26
165	8.39	7822.37	8.60	7822.16	9.09	7821.67	10.07	7820.69	8.51	7822.25
180	8.69	7822.07	9.06	7821.70	9.17	7821.59	11.29	7819.47	6.80	7823.96
195	8.46	7822.30	9.38	7821.38	9.45	7821.31	10.64	7820.12	8.41	7822.35
210	9.01	7821.75	9.43	7821.33	9.66	7821.10	10.65	7820.11	9.15	7821.61
225	8.76	7822.00	9.48	7821.28	9.69	7821.07	12.19	7818.57	4.40	7826.36
240	8.64	7822.12	9.34	7821.42	9.72	7821.04	12.25	7818.51	4.78	7825.98
255	7.32	7823.44	9.40	7821.36	9.82	7820.94	11.23	7819.53	4.94	7825.82
270	7.95	7822.81	9.81	7820.95	9.98	7820.78	11.82	7818.94	5.82	7824.94
285	8.32	7822.44	9.66	7821.10	10.02	7820.74	11.00	7819.76	7.73	7823.03
300	9.25	7821.51	9.86	7820.90	10.03	7820.73	12.58	7818.18	8.86	7821.90

Max. Water Surface Slope (fraction): 0.035
Min. Water Surface Slope (fraction): 0.001
Avg. Water Surface Slope (fraction): 0.010

Cross Section: MC-3

Benchmark elevation: 7698.23 Survey Date: 10/15/2004
BenchMark Rod Reading: 7.74

Station	Rod Reading	Elevation
0	8.10	7697.87
3	9.20	7696.77
7	9.59	7696.38
8	11.55	7694.42
18	11.86	7694.11
19	10.48	7695.49
24	8.64	7697.33
27	8.73	7697.24
29	8.17	7697.80

Profile: MC-3

Benchmark elevation (ft): 7698.23 Survey Date: 10\15\04
Rod reading at Benchmark (f 7.75

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0					7.84	7698.14	10.55	7695.43	6.85	7699.13
15					7.84	7698.14	10.75	7695.23	6.70	7699.28
30					7.80	7698.18	10.98	7695.00	6.45	7699.53
45					7.85	7698.13	10.56	7695.42	6.33	7699.65
60					7.82	7698.16	10.73	7695.25	6.31	7699.67
75					7.87	7698.11	9.09	7696.89	6.70	7699.28
90	8.45	7697.53			10.40	7695.58	11.33	7694.65	9.21	7696.77
105	9.75	7696.23	10.25	7695.73	10.73	7695.25	12.05	7693.93	9.89	7696.09
120	9.13	7696.85	10.31	7695.67	10.80	7695.18	11.78	7694.20	10.10	7695.88
135	9.54	7696.44	10.28	7695.70	10.90	7695.08	11.60	7694.38	9.02	7696.96
150	9.40	7696.58	10.29	7695.69	10.91	7695.07	11.88	7694.10	9.32	7696.66
165	9.44	7696.54			10.90	7695.08	12.12	7693.86	8.92	7697.06
180	9.55	7696.43			10.97	7695.01	12.17	7693.81	10.20	7695.78
195					11.28	7694.70	12.25	7693.73		
240					11.78	7694.20	13.35	7692.63		
255	11.20	7694.78			12.02	7693.96	12.98	7693.00	11.61	7694.37
270	12.09	7693.89			12.43	7693.55	13.71	7692.27	10.96	7695.02
285	11.92	7694.06			12.53	7693.45	13.61	7692.37	12.07	7693.91
300	12.30	7693.68			12.92	7693.06	14.28	7691.70		

Max. Water Surface Slope (fraction): 0.169
Min. Water Surface Slope (fraction): -0.003
Avg. Water Surface Slope (fraction): 0.018

Cross Section: MC-4

Benchmark elevation: 7728.64 Survey Date: 10/14/2004
BenchMark Rod Reading: 4.06

Station	Rod Reading	Elevation
0	5.46	7727.24
2	6.58	7726.12
5	7.47	7725.23
10	7.80	7724.90
11	9.20	7723.50
12	9.98	7722.72
21	9.13	7723.57
23	9.22	7723.48
24	7.31	7725.39
41	6.74	7725.96
46	6.30	7726.40
51	5.87	7726.83

Profile: MC-4

Benchmark elevation (ft): 7728.64 Survey Date: 10\14\04
Rod reading at Benchmark (f 4.06

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	6.99	7725.71	7.71	7724.99	8.07	7724.63	9.00	7723.70	5.30	7727.40
15	6.65	7726.05	7.70	7725.00	8.16	7724.54	9.98	7722.72	5.80	7726.90
30	4.96	7727.74	7.79	7724.91	8.47	7724.23	10.15	7722.55	5.56	7727.14
45	7.75	7724.95	8.37	7724.33	8.56	7724.14	9.50	7723.20	6.47	7726.23
60	7.25	7725.45	8.51	7724.19	8.66	7724.04	9.43	7723.27	6.87	7725.83
75	7.91	7724.79	8.59	7724.11	8.72	7723.98	9.45	7723.25	8.45	7724.25
90	8.11	7724.59	8.62	7724.08	8.80	7723.90	9.37	7723.33	7.60	7725.10
105	8.21	7724.49	8.65	7724.05	8.83	7723.87	11.00	7721.70	7.15	7725.55
120	8.09	7724.61	8.34	7724.36	8.79	7723.91	10.59	7722.11	5.50	7727.20
135	7.28	7725.42	8.47	7724.23	8.81	7723.89	11.11	7721.59	7.06	7725.64
150	7.73	7724.97	8.44	7724.26	8.84	7723.86	10.03	7722.67	7.30	7725.40
165	5.58	7727.12	8.70	7724.00	8.99	7723.71	9.64	7723.06	7.54	7725.16
180	6.80	7725.90	9.09	7723.61	9.25	7723.45	10.64	7722.06	8.03	7724.67
195	7.82	7724.88	9.27	7723.43	9.34	7723.36	10.78	7721.92	7.75	7724.95
210	8.56	7724.14	9.12	7723.58	9.47	7723.23	10.13	7722.57	8.25	7724.45
225	8.70	7724.00	9.30	7723.40	9.48	7723.22	11.72	7720.98	5.82	7726.88
240	8.65	7724.05	9.31	7723.39	9.49	7723.21	11.69	7721.01	5.88	7726.82
255	8.63	7724.07	9.22	7723.48	9.48	7723.22	11.31	7721.39	6.20	7726.50
270	8.71	7723.99	9.31	7723.39	9.48	7723.22	12.12	7720.58	6.18	7726.52
285	8.62	7724.08	9.34	7723.36	9.58	7723.12	11.12	7721.58	6.46	7726.24
300	8.63	7724.07	9.39	7723.31	9.62	7723.08	10.91	7721.79	6.18	7726.52

Max. Water Surface Slope (fraction): 0.021
Min. Water Surface Slope (fraction): -0.003
Avg. Water Surface Slope (fraction): 0.005

Cross Section: MC-5

Benchmark elevation: 7915.35 Survey Date: 10/14/2004
BenchMark Rod Reading: 4.75

Station	Rod Reading	Elevation
0	4.68	7915.42
5	7.04	7913.06
6	6.16	7913.94
25	5.96	7914.14
31	6.88	7913.22
33	9.66	7910.44
36	9.78	7910.32
38	9.33	7910.77
41	9.83	7910.27
47	8.24	7911.86
49	6.38	7913.72
52	5.31	7914.79

Profile: MC-5

Benchmark elevation (ft): 7915.35 Survey Date: 10\14\04
Rod reading at Benchmark (f 4.75

	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0					8.15	7911.95	8.50	7911.60	7.97	7912.13
10					8.19	7911.91	8.43	7911.67	7.94	7912.16
20	5.50	7914.60	8.17	7911.93	8.22	7911.88	8.79	7911.31	7.72	7912.38
30	5.96	7914.14	8.34	7911.76	8.51	7911.59	9.06	7911.04	8.09	7912.01
40	8.17	7911.93	8.60	7911.50	8.60	7911.50	9.47	7910.63	5.26	7914.84
50	7.96	7912.14	8.64	7911.46	8.64	7911.46	9.31	7910.79	7.82	7912.28
60	7.74	7912.36	8.52	7911.58	8.61	7911.49	8.87	7911.23	6.55	7913.55
70	6.04	7914.06	8.59	7911.51	8.76	7911.34	9.05	7911.05	7.93	7912.17
80	6.20	7913.90	8.90	7911.20	9.02	7911.08	9.43	7910.67	8.46	7911.64
90	6.49	7913.61	8.85	7911.25	9.27	7910.83	9.57	7910.53	8.75	7911.35
100	6.84	7913.26	8.90	7911.20	9.18	7910.92	9.91	7910.19	8.83	7911.27
110	8.62	7911.48	9.06	7911.04	9.15	7910.95	9.53	7910.57	6.19	7913.91
120	8.71	7911.39	9.14	7910.96	9.31	7910.79	9.60	7910.50	5.52	7914.58
130	8.90	7911.20	9.27	7910.83	9.68	7910.42	10.30	7909.80	5.72	7914.38
140	9.24	7910.86	9.61	7910.49	9.83	7910.27	10.34	7909.76	5.84	7914.26
150	9.26	7910.84	9.60	7910.50	9.82	7910.28	10.75	7909.35	6.72	7913.38
160	9.26	7910.84	9.56	7910.54	9.82	7910.28	10.35	7909.75	7.35	7912.75
170	7.26	7912.84	9.38	7910.72	10.00	7910.10	10.31	7909.79	9.05	7911.05
180	8.36	7911.74	9.60	7910.50	10.04	7910.06	10.66	7909.44	9.38	7910.72
190	9.08	7911.02	9.91	7910.19	9.98	7910.12	10.35	7909.75	9.73	7910.37
200	9.44	7910.66	10.12	7909.98	10.25	7909.85	10.47	7909.63	9.01	7911.09

Max. Water Surface Slope (fraction): 0.037
Min. Water Surface Slope (fraction): -0.009
Avg. Water Surface Slope (fraction): 0.011

Cross Section: MC-6

Benchmark elevation: 7763.84 Survey Date: 10/14/2004
BenchMark Rod Reading: 2.50

Station	Rod Reading	Elevation
0	4.76	7761.58
1	5.94	7760.40
6	9.15	7757.19
7	10.92	7755.42
9	11.56	7754.78
15	10.61	7755.73
17	9.85	7756.49
23	9.36	7756.98
49	9.82	7756.52
57	6.26	7760.08
60	5.93	7760.41
62	4.67	7761.67

Profile: MC-6

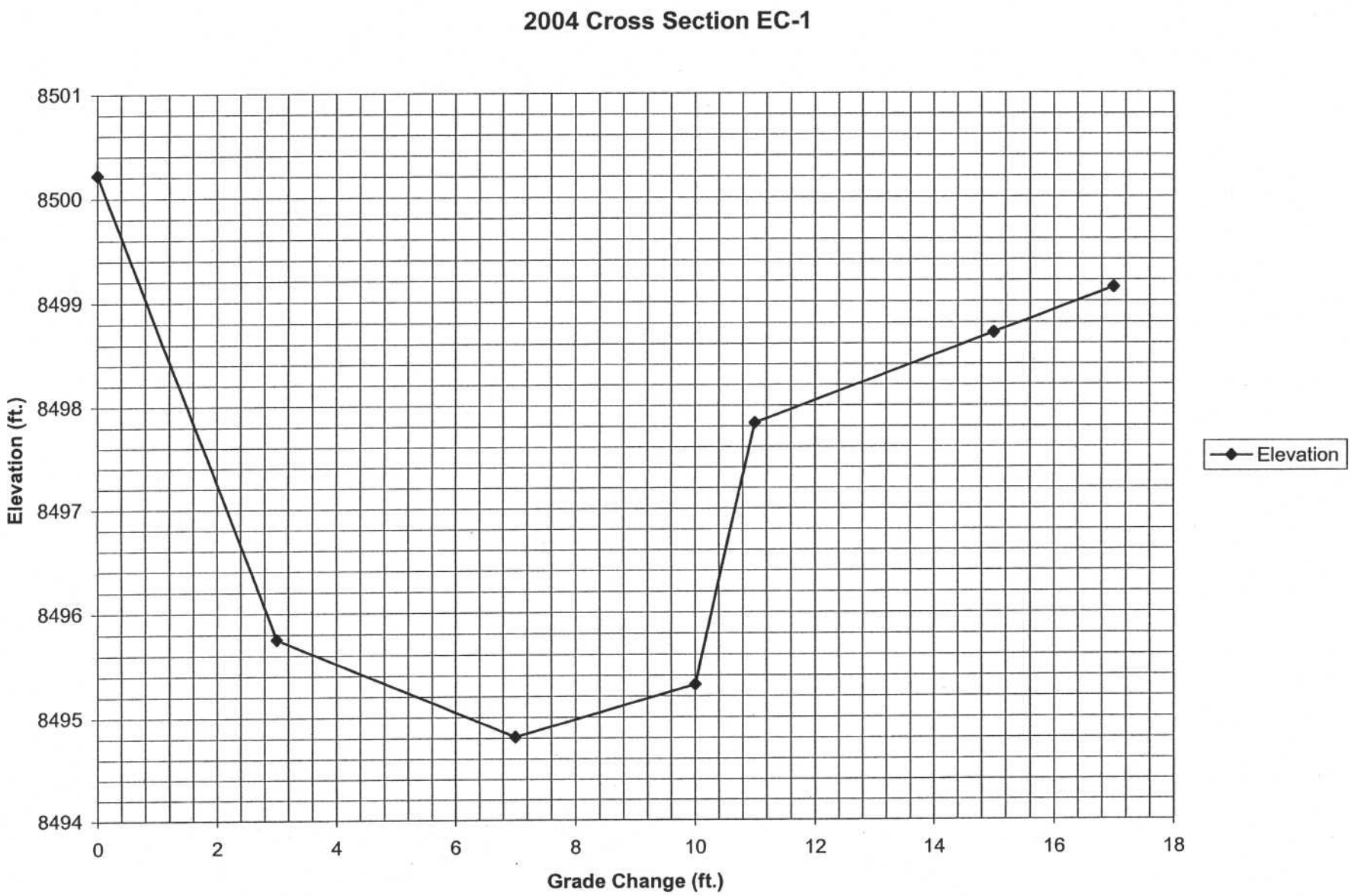
Benchmark elevation (ft): 7752.14 Survey Date: 10\14\04
Rod reading at Benchmark (f 2.5

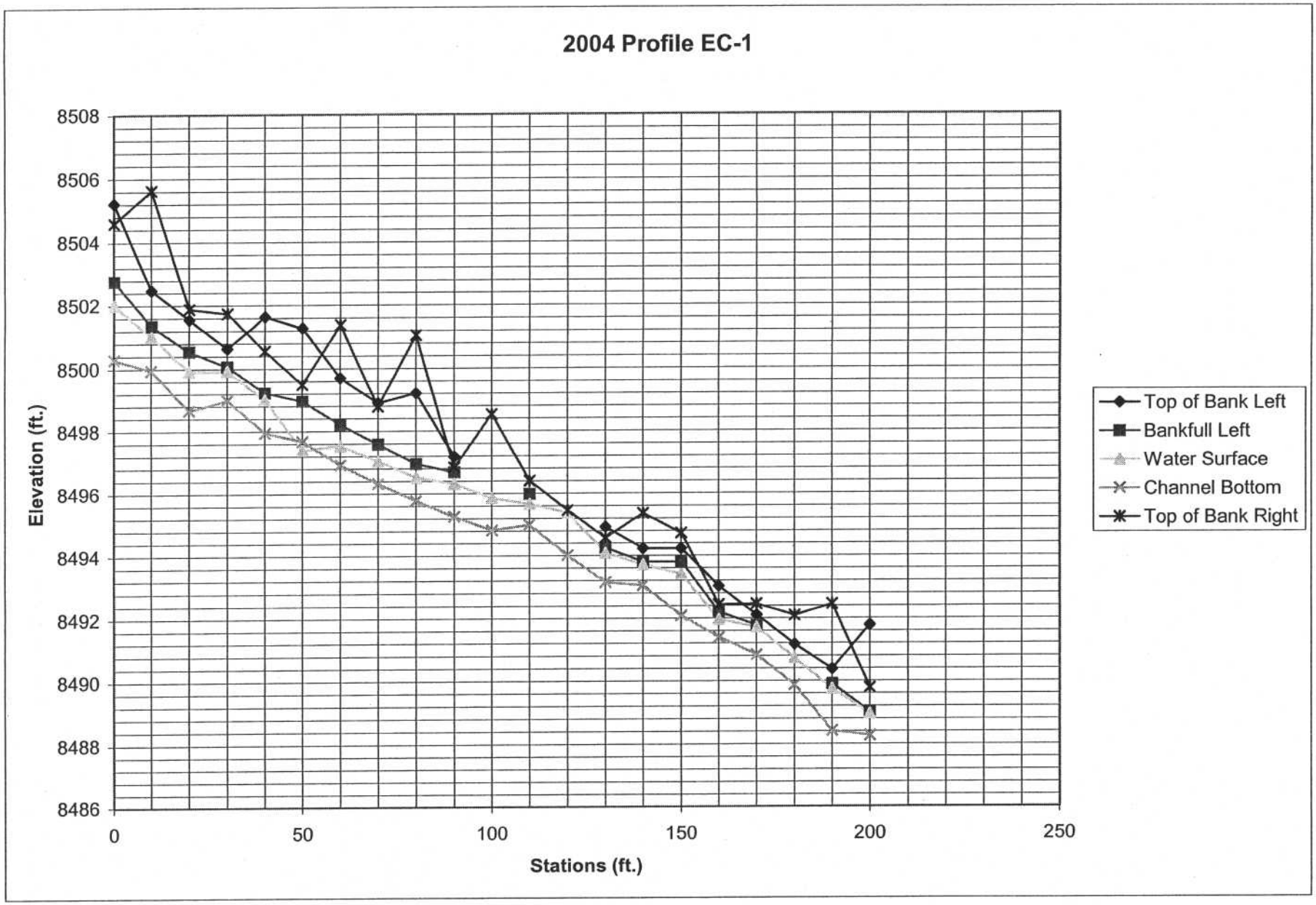
	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	5.53	7749.11	7.72	7746.92	7.87	7746.77	8.47	7746.17	5.71	7748.93
25	7.54	7747.10	8.26	7746.38	8.40	7746.24	8.79	7745.85	6.62	7748.02
45	8.09	7746.55	8.52	7746.12	8.71	7745.93	9.77	7744.87	4.23	7750.41
65	8.25	7746.39	8.67	7745.97	8.81	7745.83	10.12	7744.52	3.53	7751.11
85	8.36	7746.28	8.64	7746.00	8.80	7745.84	9.85	7744.79	7.73	7746.91
105	8.33	7746.31	8.81	7745.83	8.89	7745.75	9.82	7744.82	8.07	7746.57
125	8.16	7746.48	9.01	7745.63	9.04	7745.60	9.86	7744.78	8.23	7746.41
145	7.09	7747.55	9.25	7745.39	9.46	7745.18	10.56	7744.08	8.13	7746.51
165	8.80	7745.84	9.59	7745.05	9.65	7744.99	10.73	7743.91	6.01	7748.63
185	9.22	7745.42	9.67	7744.97	9.98	7744.66	11.54	7743.10	9.04	7745.60
205	9.38	7745.26	9.79	7744.85	10.02	7744.62	11.53	7743.11	9.30	7745.34
225	4.75	7749.89	10.02	7744.62	10.11	7744.53	11.50	7743.14	9.59	7745.05
245	9.86	7744.78	10.22	7744.42	10.22	7744.42	11.24	7743.40	9.76	7744.88
265	5.67	7748.97	10.40	7744.24	10.40	7744.24	10.97	7743.67	10.10	7744.54
285	6.47	7748.17	10.47	7744.17	10.65	7743.99	12.03	7742.61	10.40	7744.24
305	7.08	7747.56	11.00	7743.64	11.00	7743.64	12.58	7742.06	10.38	7744.26
325	9.79	7744.85	10.89	7743.75	10.97	7743.67	12.29	7742.35	9.88	7744.76
345	10.46	7744.18	10.80	7743.84	11.06	7743.58	12.26	7742.38	5.68	7748.96
365	10.57	7744.07	11.22	7743.42	11.40	7743.24	13.15	7741.49	5.39	7749.25
385	10.79	7743.85	11.39	7743.25	11.50	7743.14	12.13	7742.51	5.46	7749.18
405	10.90	7743.74	11.47	7743.17	11.56	7743.08	12.72	7741.92	5.65	7748.99
425	10.85	7743.79	11.5	7743.14	11.64	7743.00	12.82	7741.82	10.59	7744.05
450	11.15	7743.49	11.46	7743.18	11.46	7743.18	12.77	7741.87	6.06	7748.58

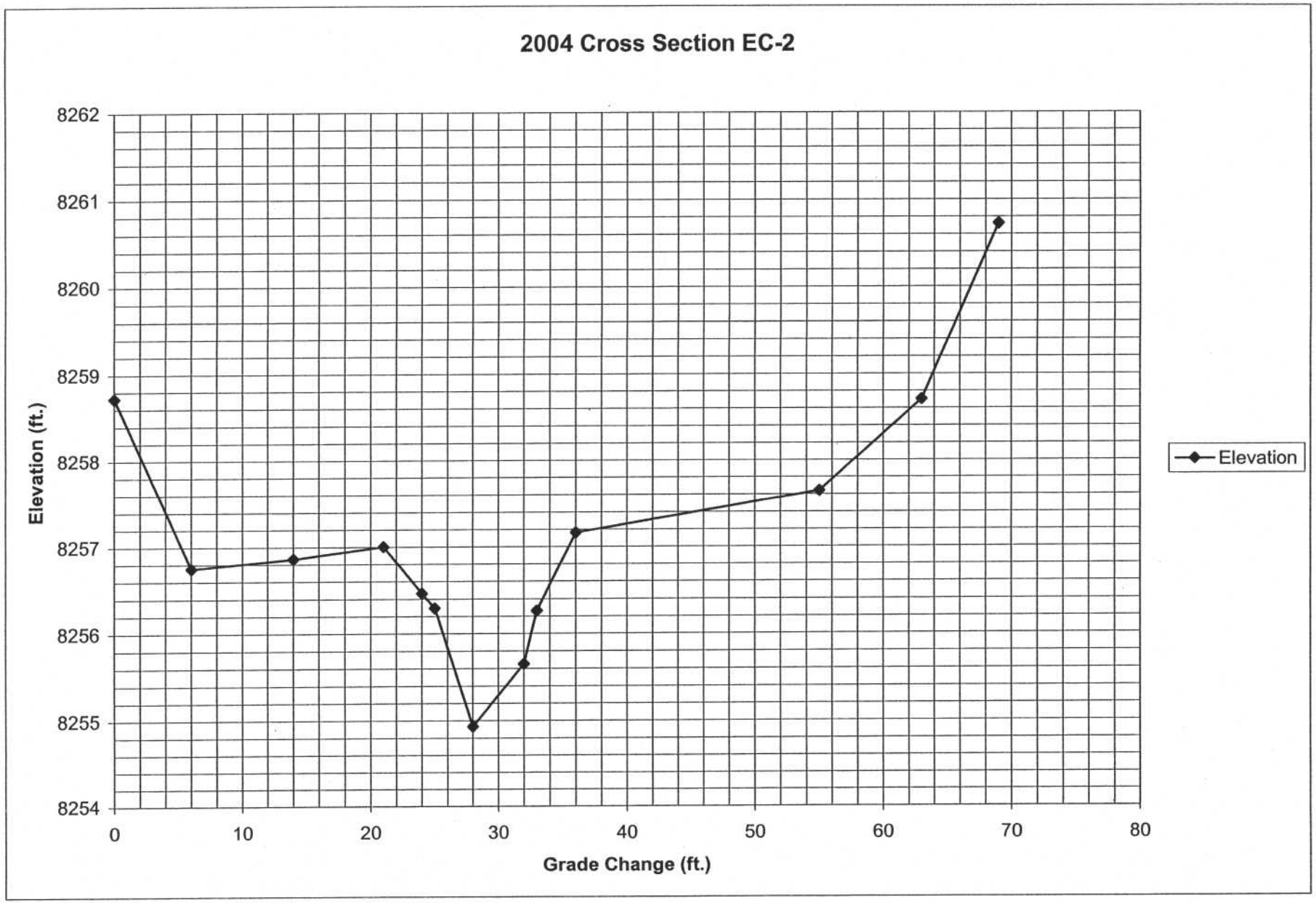
Max. Water Surface Slope (fraction): 0.021
Min. Water Surface Slope (fraction): -0.001
Avg. Water Surface Slope (fraction): 0.009

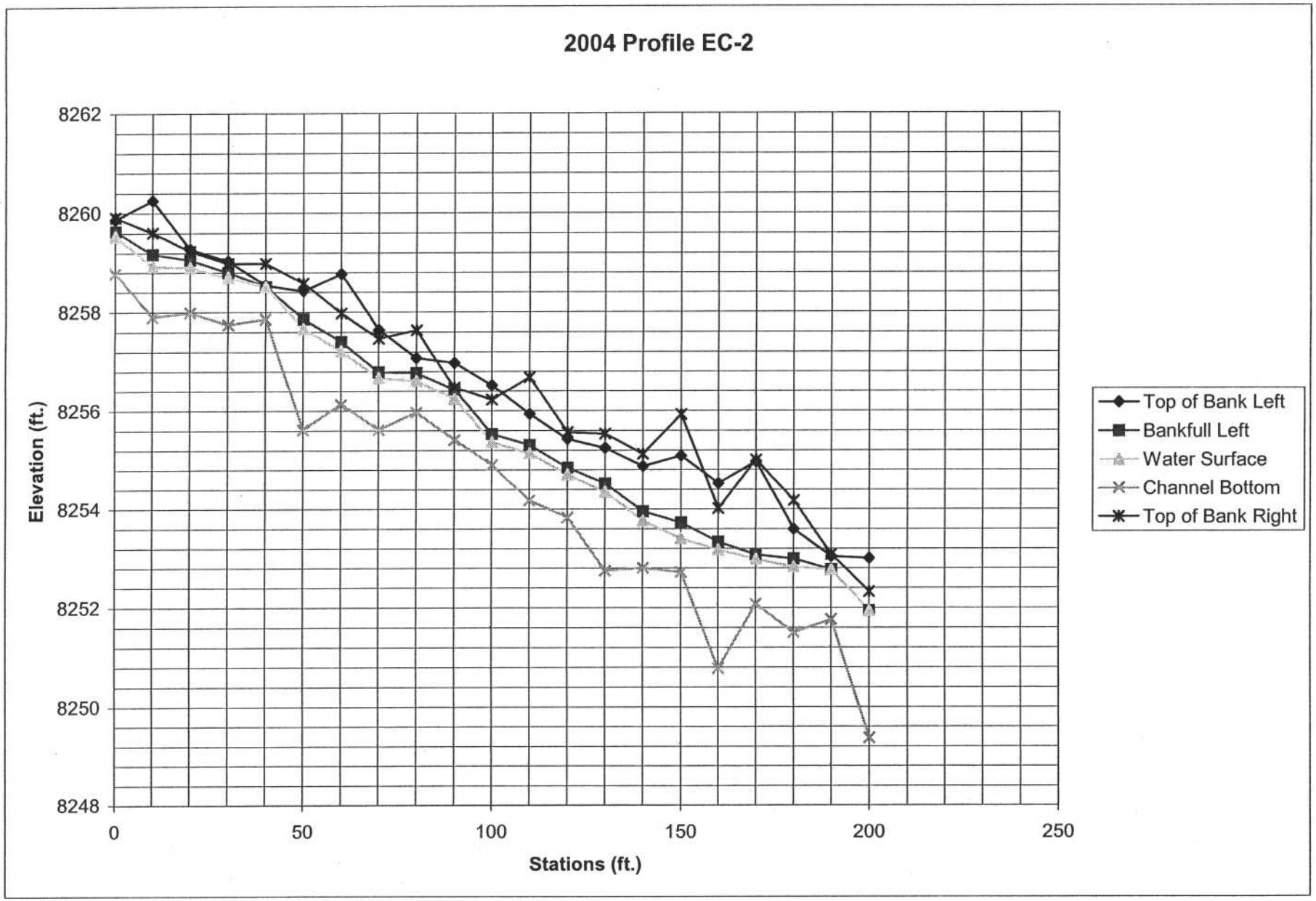
APPENDIX D

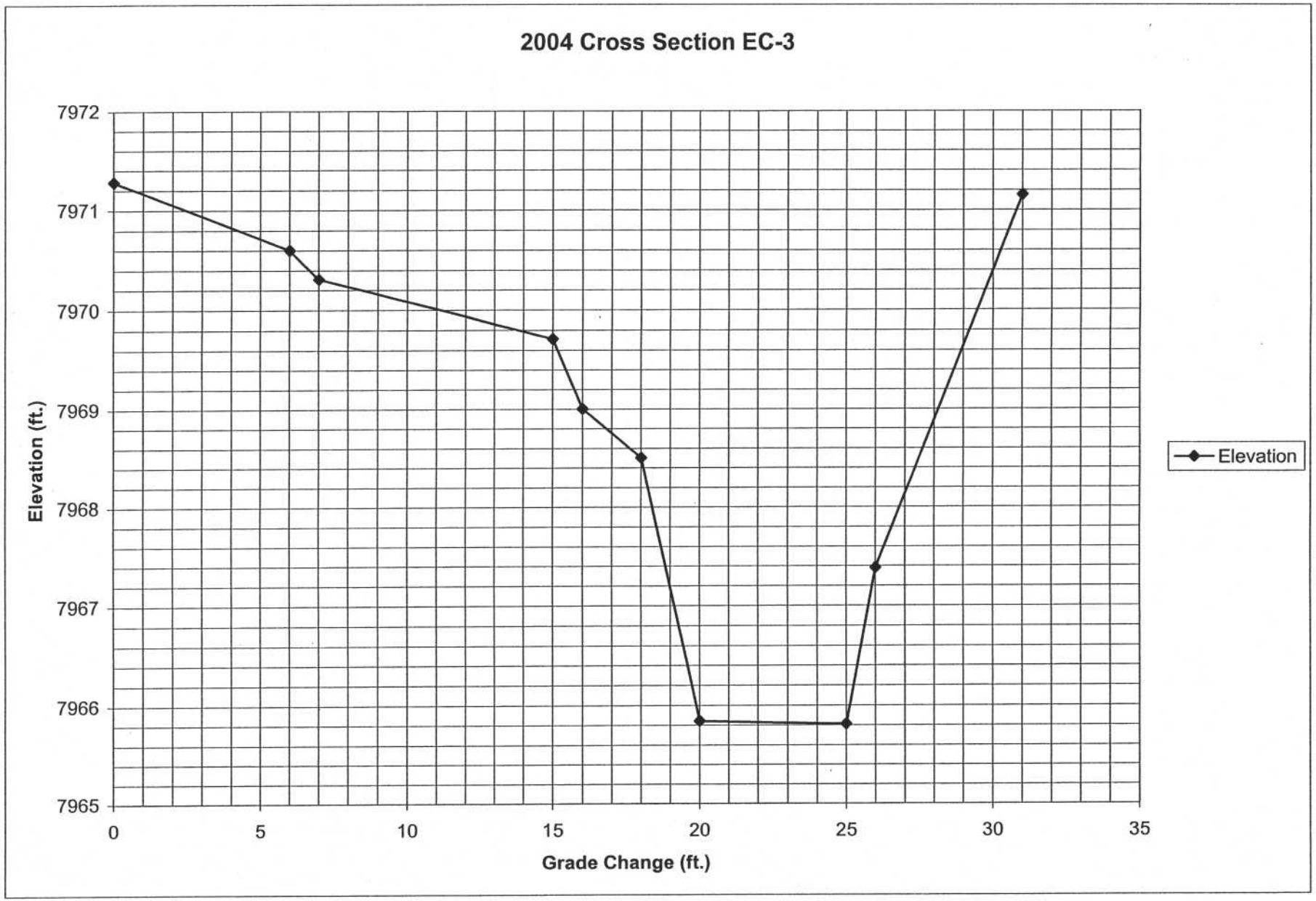
Individual Cross Section and Profile Drawings

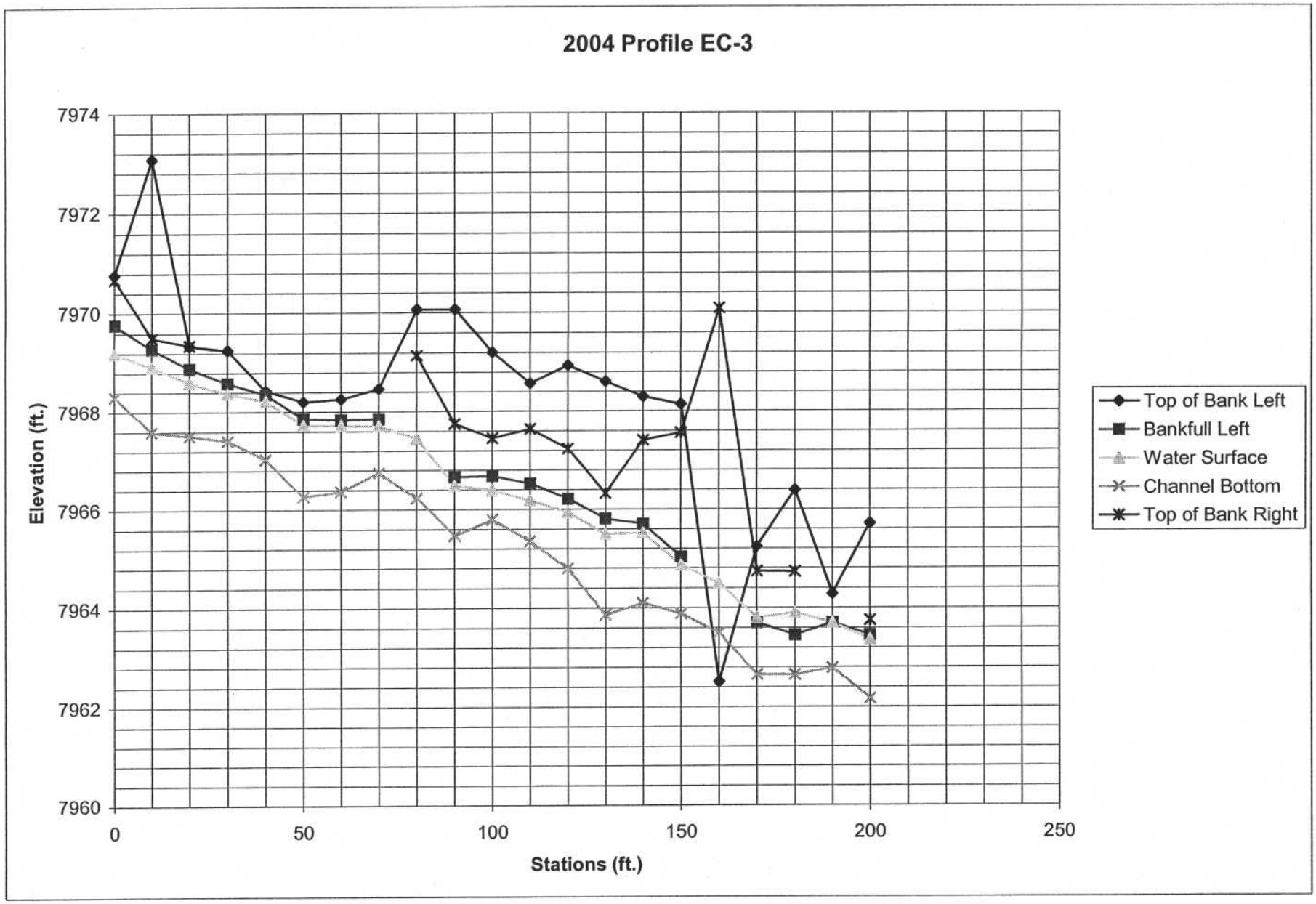

2004 Cross Section EC-1
8501
8500
8499
8498
8497
8496
8495
8494
Elevation (ft.)
0
2
4
6
8
10
12
14
16
18
Grade Change (ft.)
Elevation

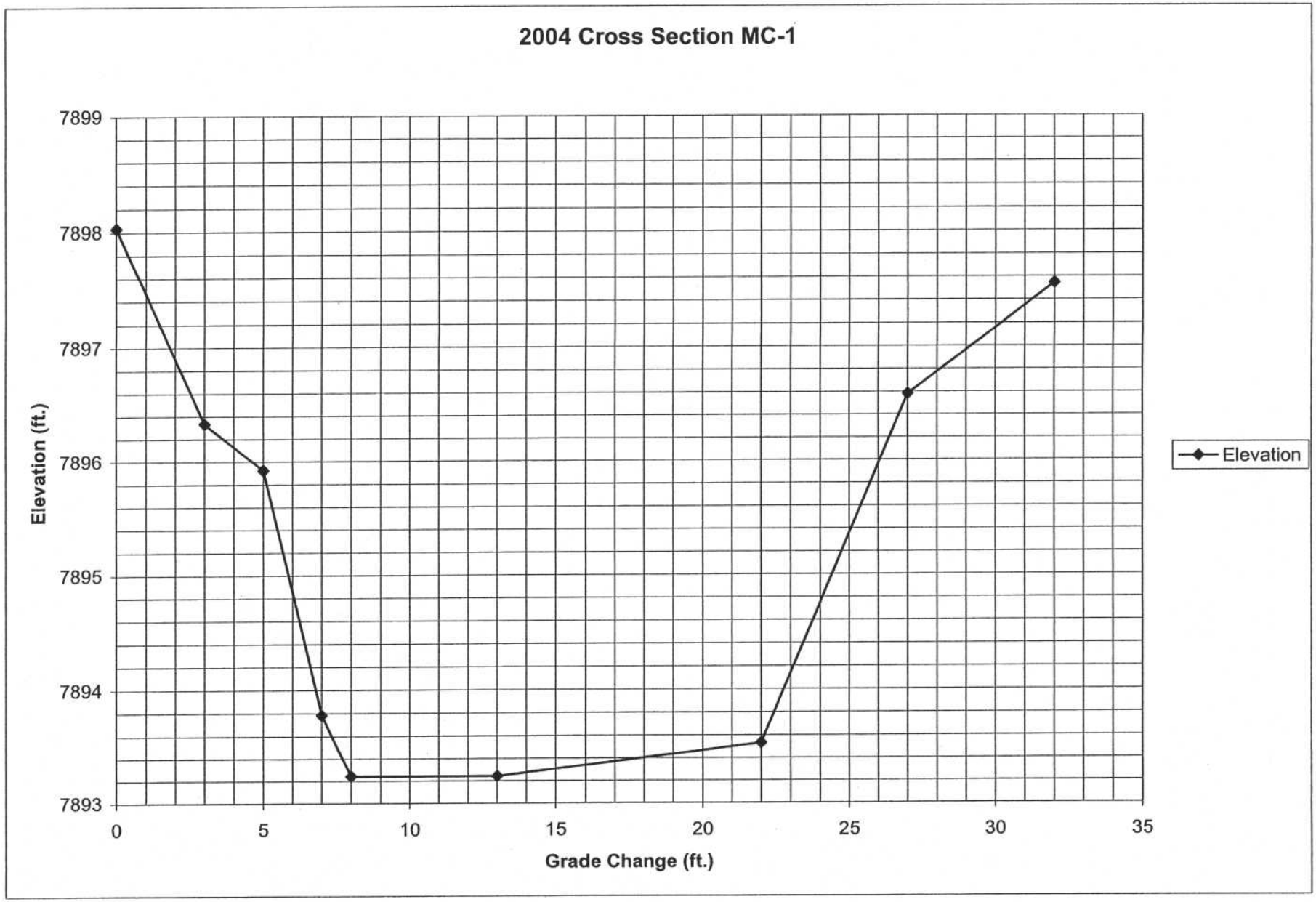

2004 Profile EC-1
8508
8506
8504
8502
8500
8498
8496
8494
8492
8490
8488
8486
Elevation (ft.)
0
50
100
150
200
250
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

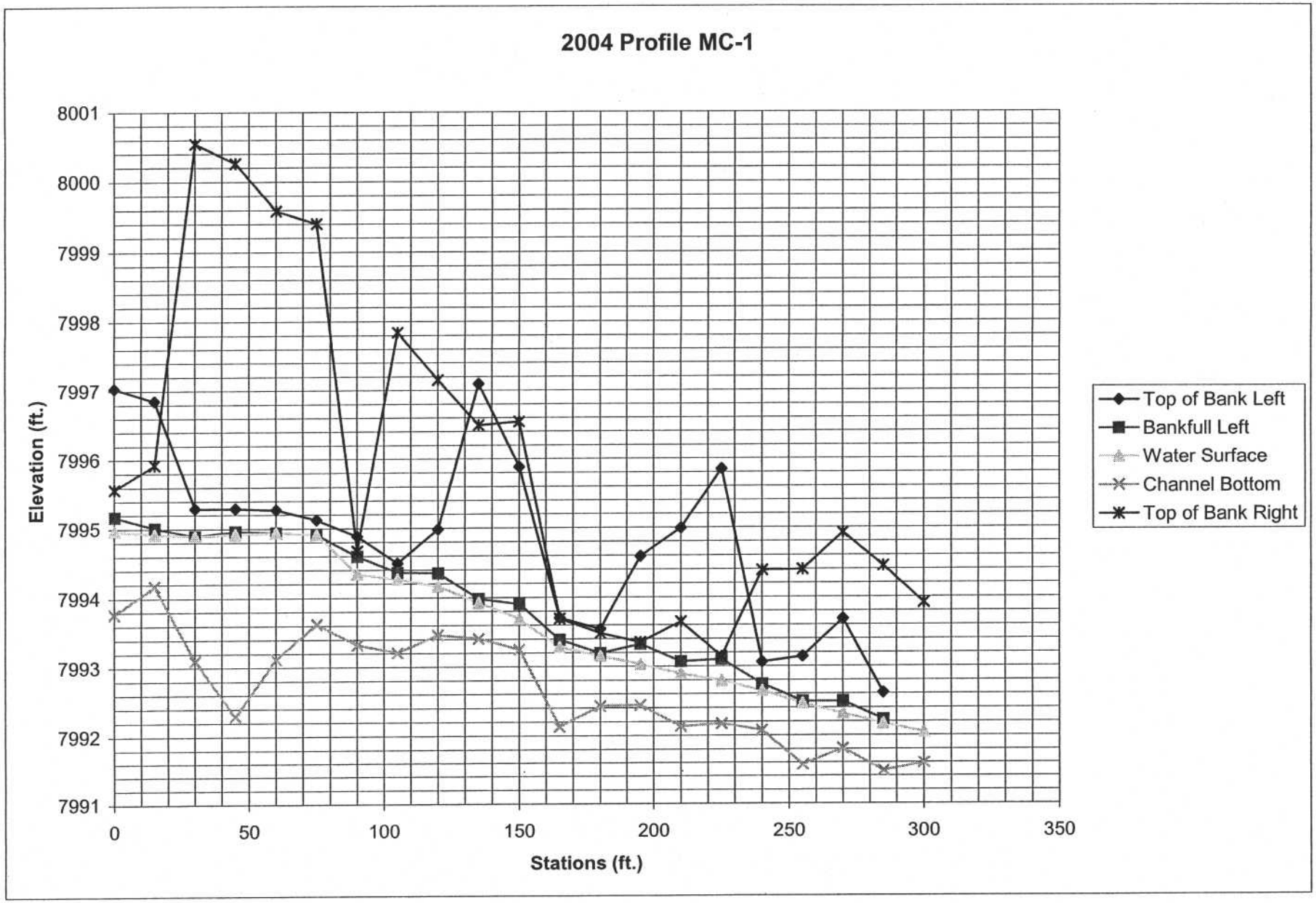

2004 Cross Section EC-2
Elevation (ft.)
8262
8261
8260
8259
8258
8257
8256
8255
8254
0
10
20
30
40
50
60
70
80
Grade Change (ft.)
Elevation

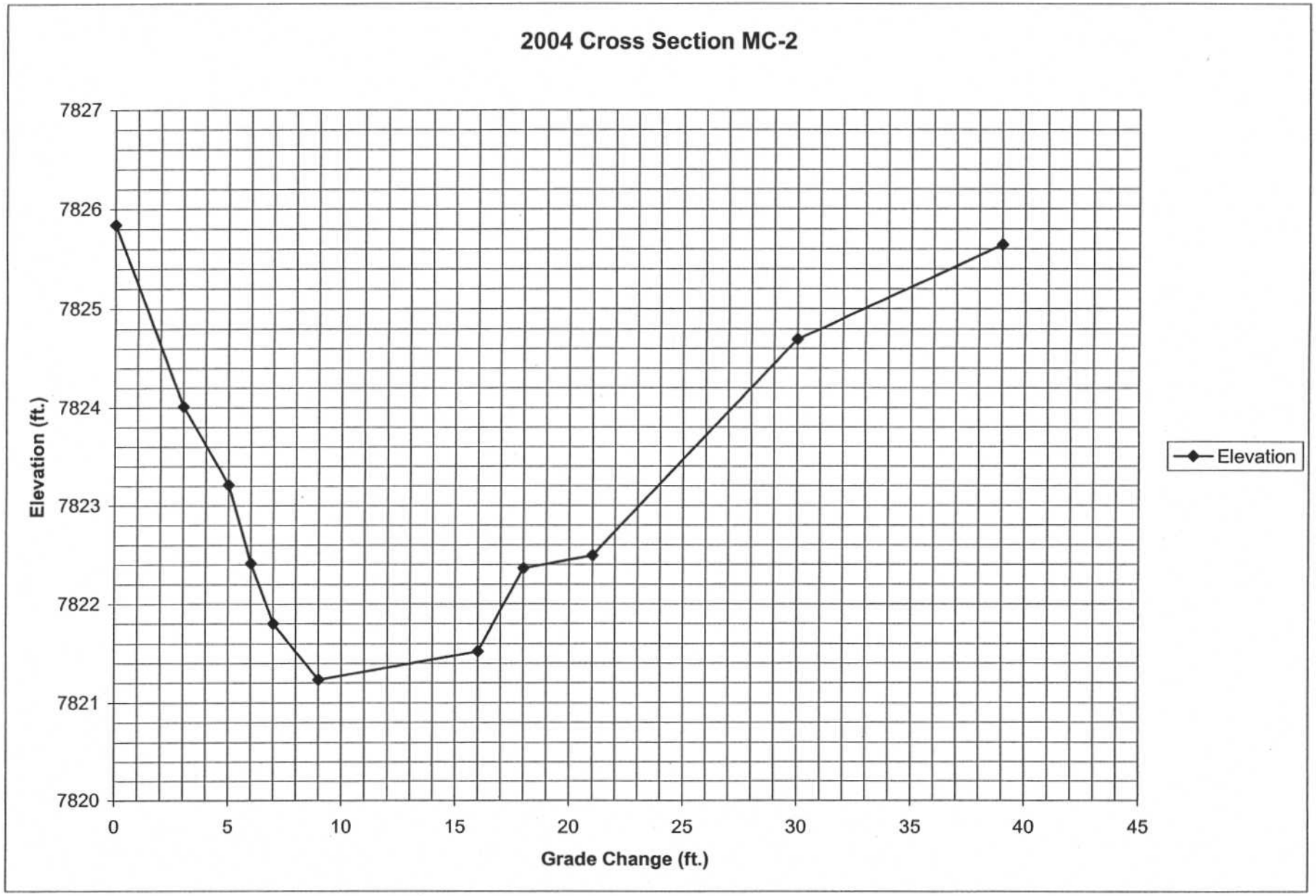

2004 Profile EC-2
8262
8260
8258
8256
8254
8252
8250
8248
Elevation (ft.)
0
50
100
150
200
250
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

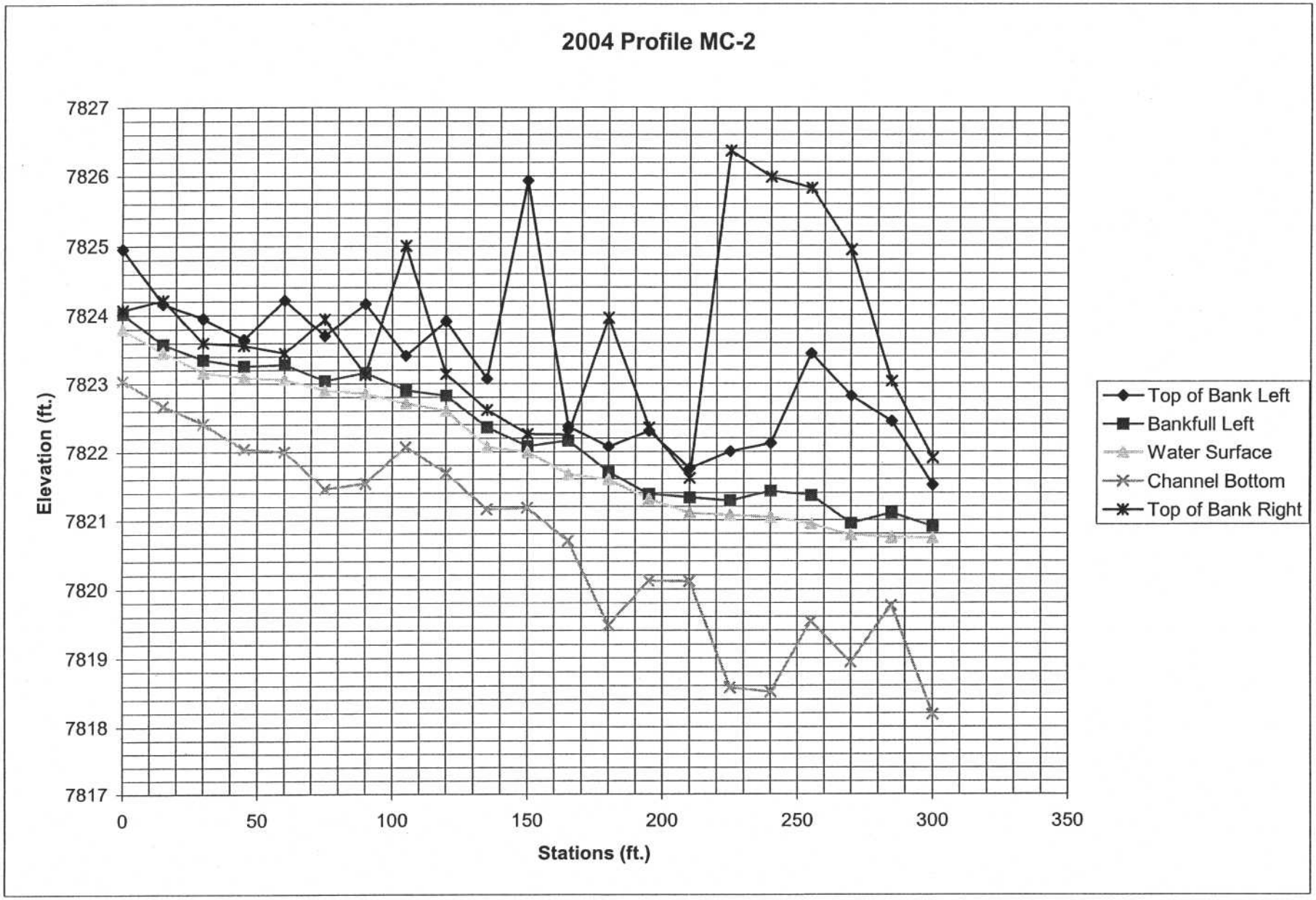

2004 Cross Section EC-3
7972
7971
7970
7969
7968
7967
7966
7965
Elevation (ft.)
0
5
10
15
20
25
30
35
Grade Change (ft.)
Elevation

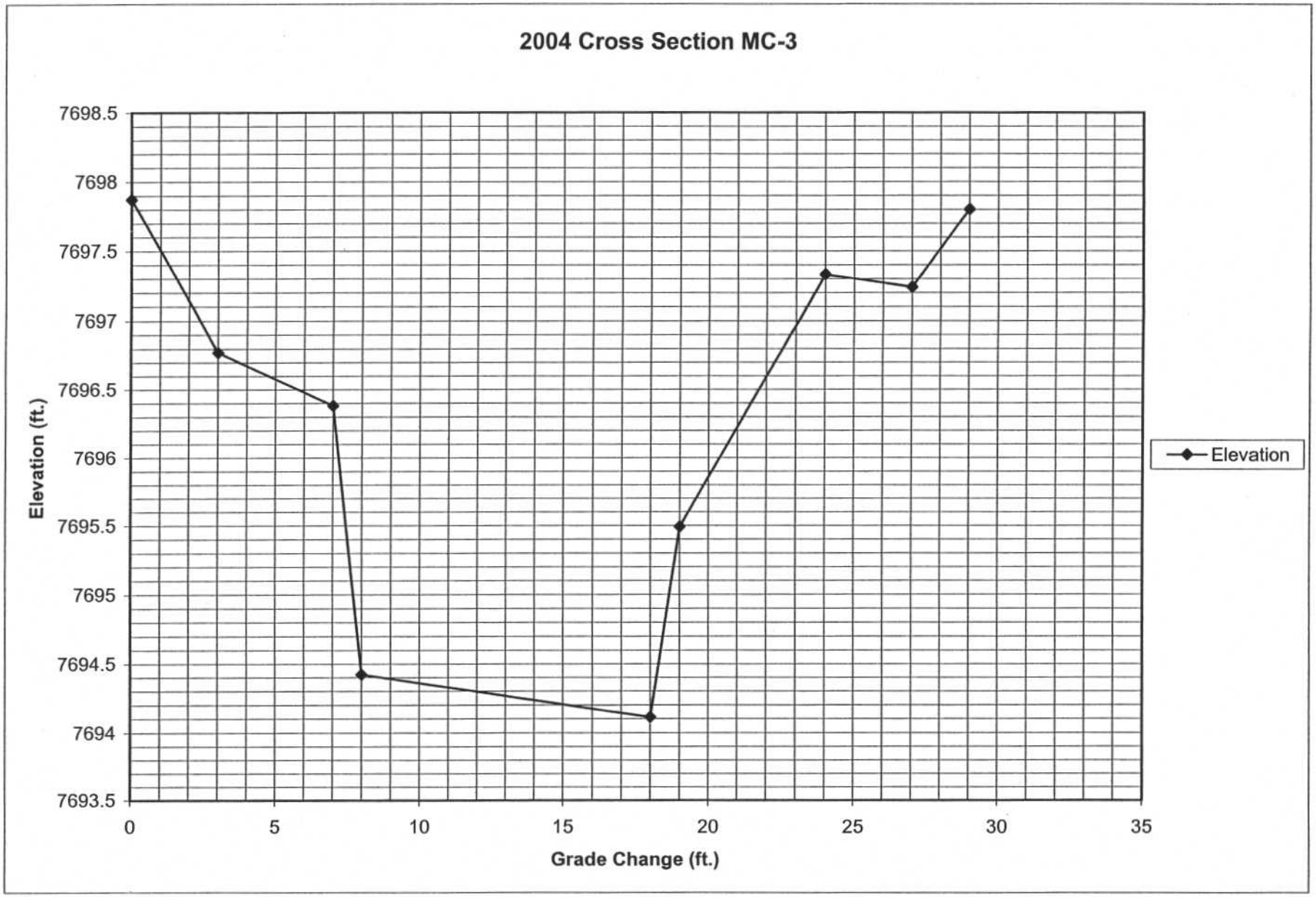

2004 Profile EC-3
7974
7972
7970
7968
7966
7964
7962
7960
Elevation (ft.)
0
50
100
150
200
250
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

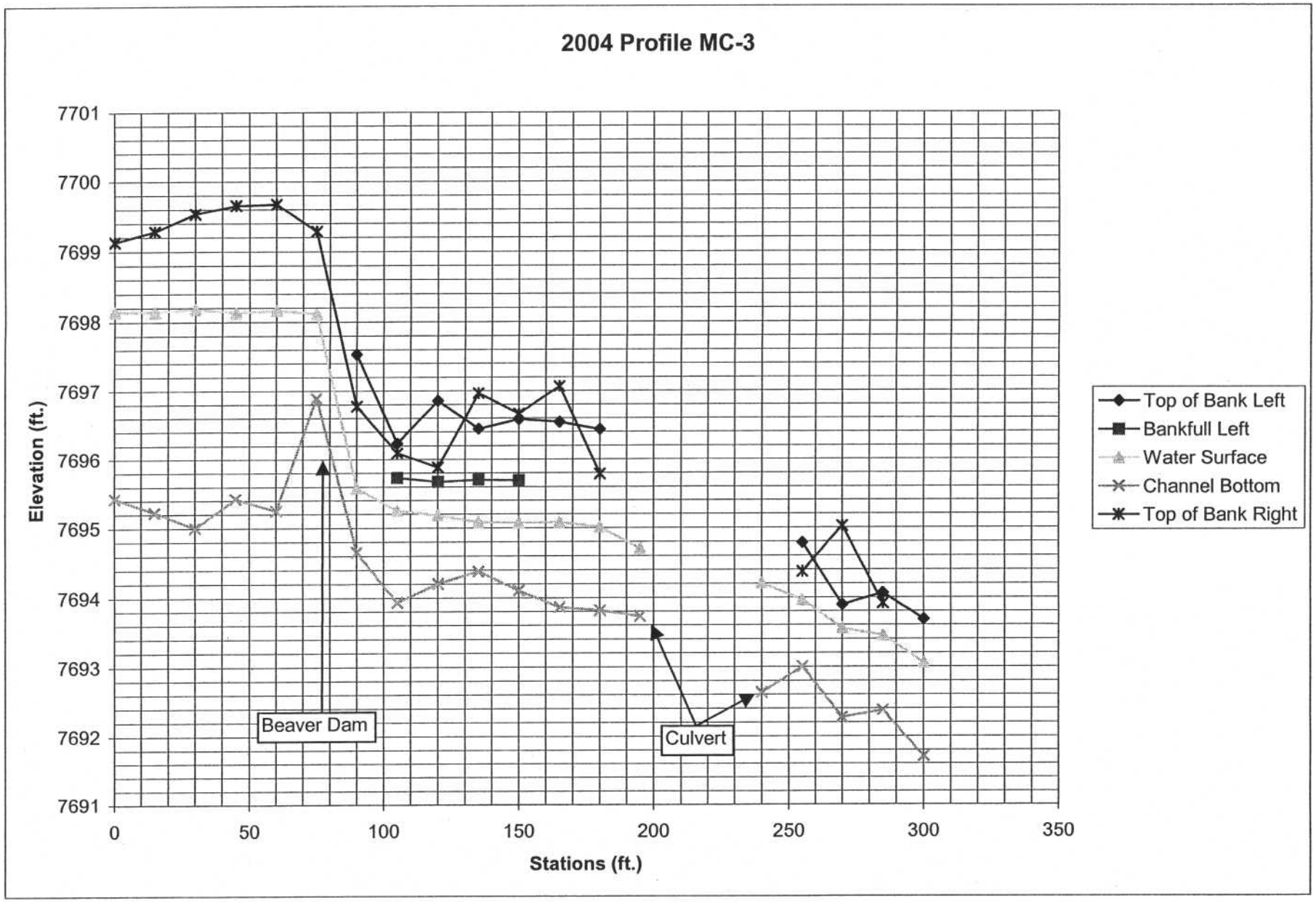

2004 Cross Section MC-1
7899
7898
7897
7896
7895
7894
7893
Elevation (ft.)
0
5
10
15
20
25
30
35
Grade Change (ft.)
Elevation

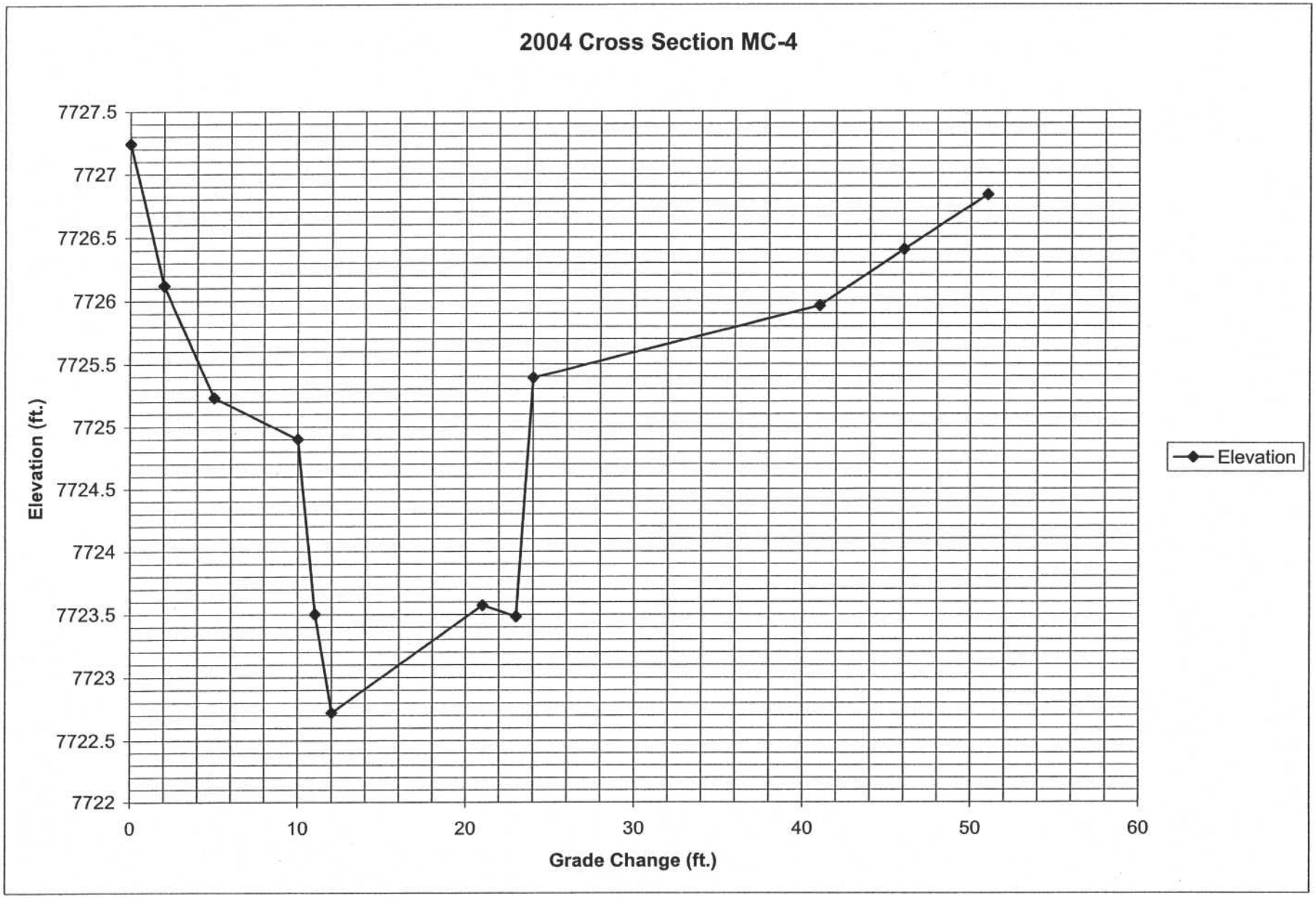

2004 Profile MC-1
Elevation (ft.)
8001
8000
7999
7998
7997
7996
7995
7994
7993
7992
7991
0
50
100
150
200
250
300
350
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

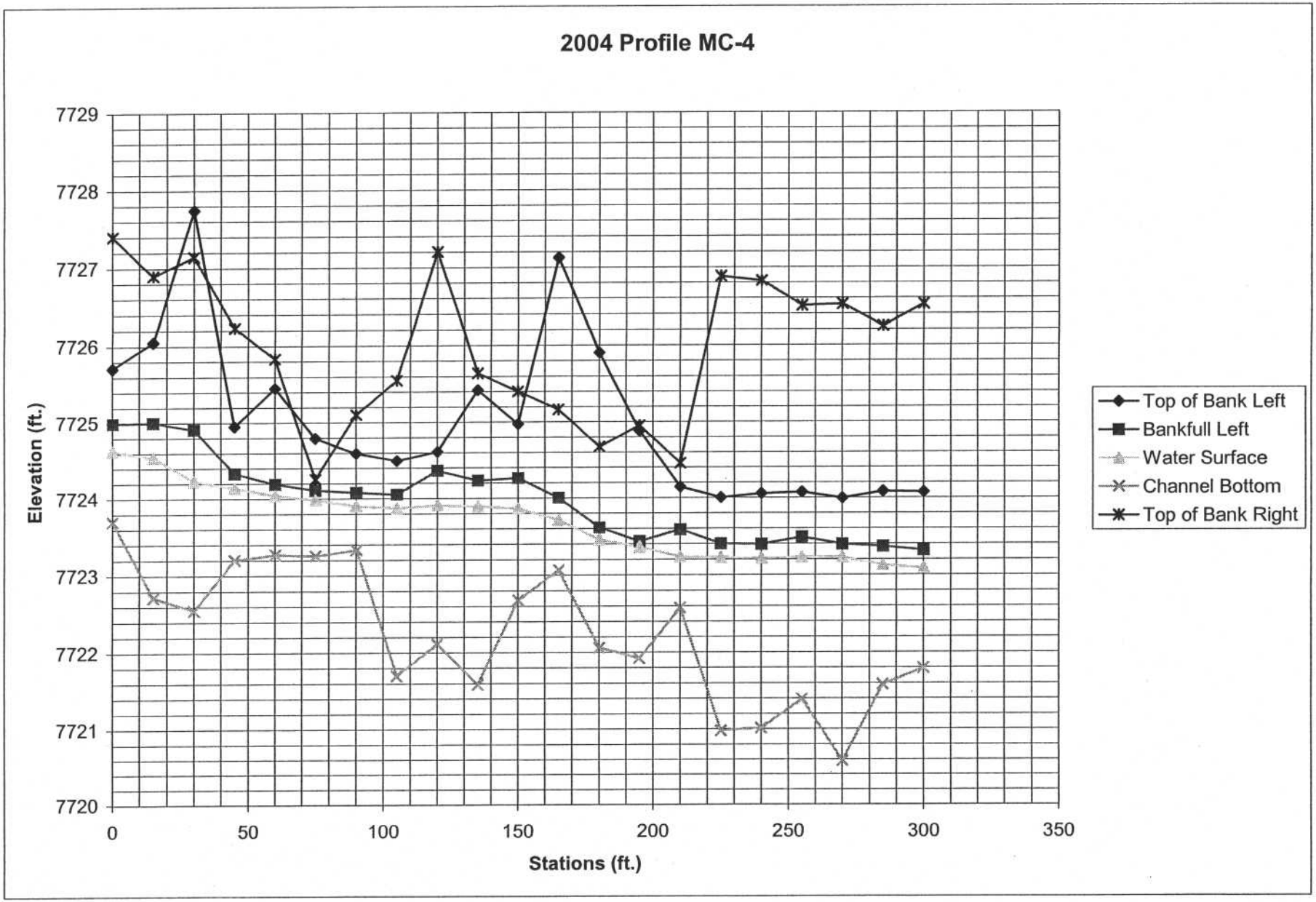

2004 Cross Section MC-2
7827
7826
7825
7824
7823
7822
7821
7820
Elevation (ft.)
0
5
10
15
20
25
30
35
40
45
Grade Change (ft.)
Elevation

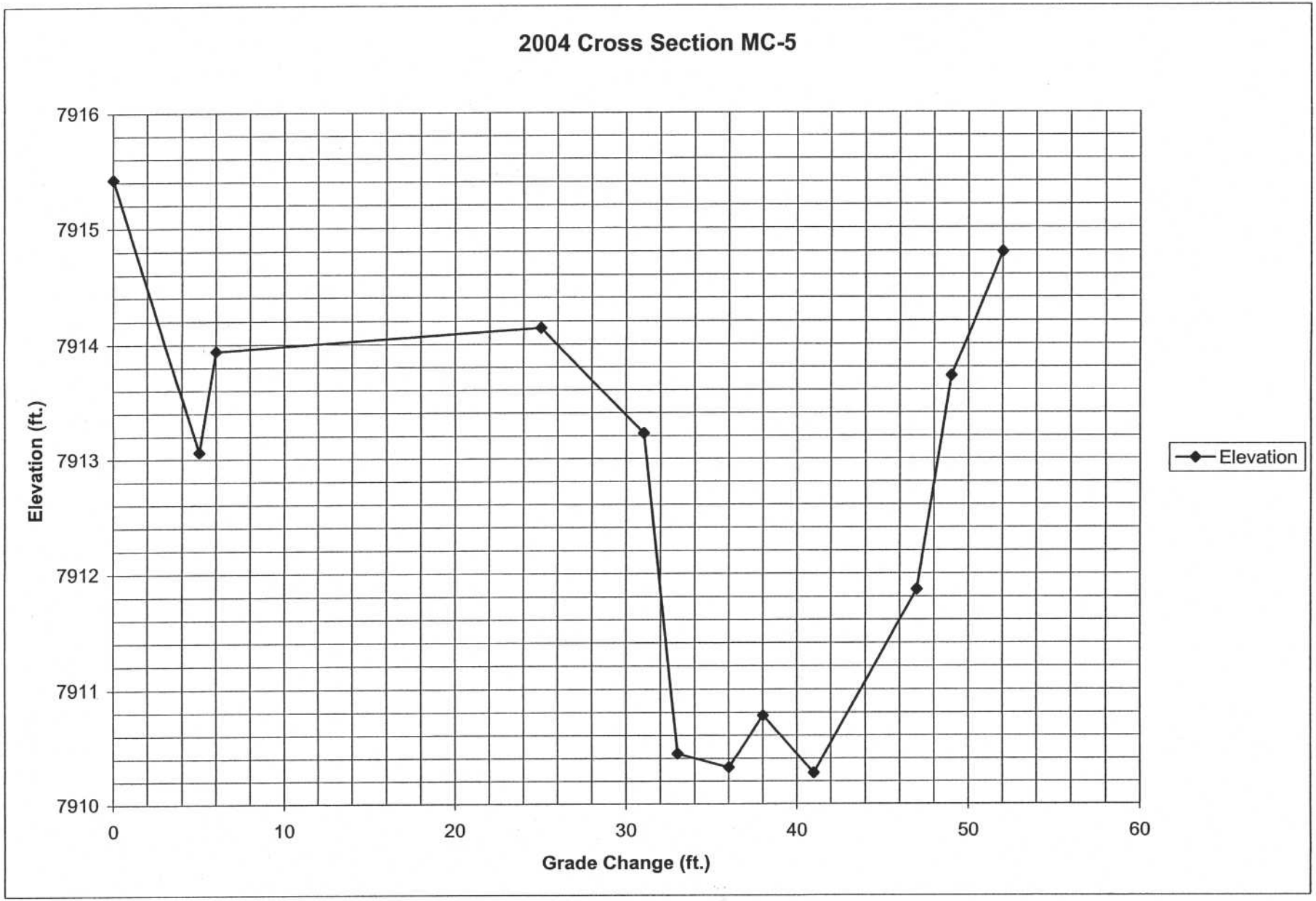

2004 Profile MC-2
Elevation (ft.)
7827
7826
7825
7824
7823
7822
7821
7820
7819
7818
7817
0
50
100
150
200
250
300
350
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

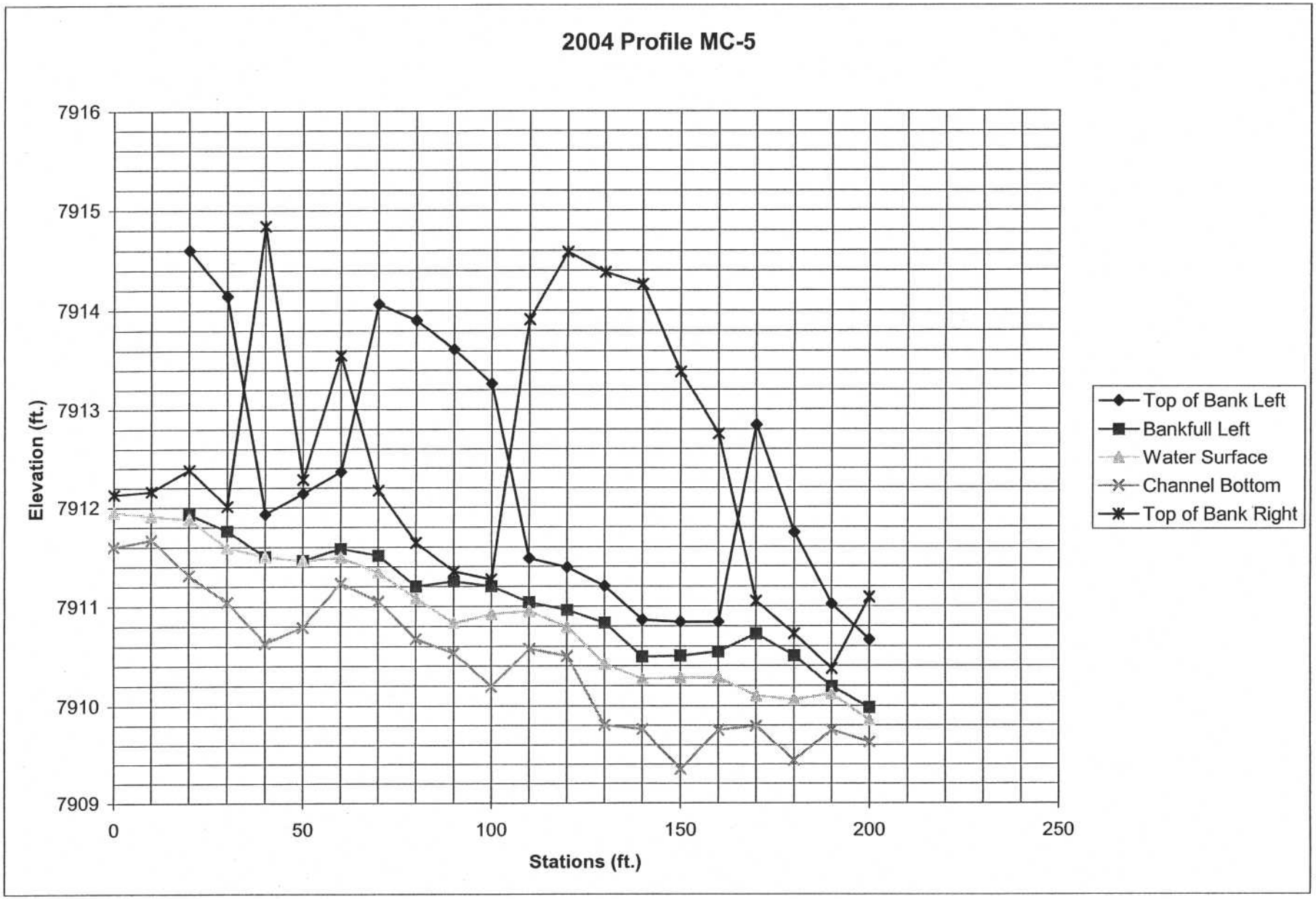

2004 Cross Section MC-3
7698.5
7698
7697.5
7697
7696.5
7696
7695.5
7695
7694.5
7694
7693.5
Elevation (ft.)
0
5
10
15
20
25
30
35
Grade Change (ft.)
Elevation

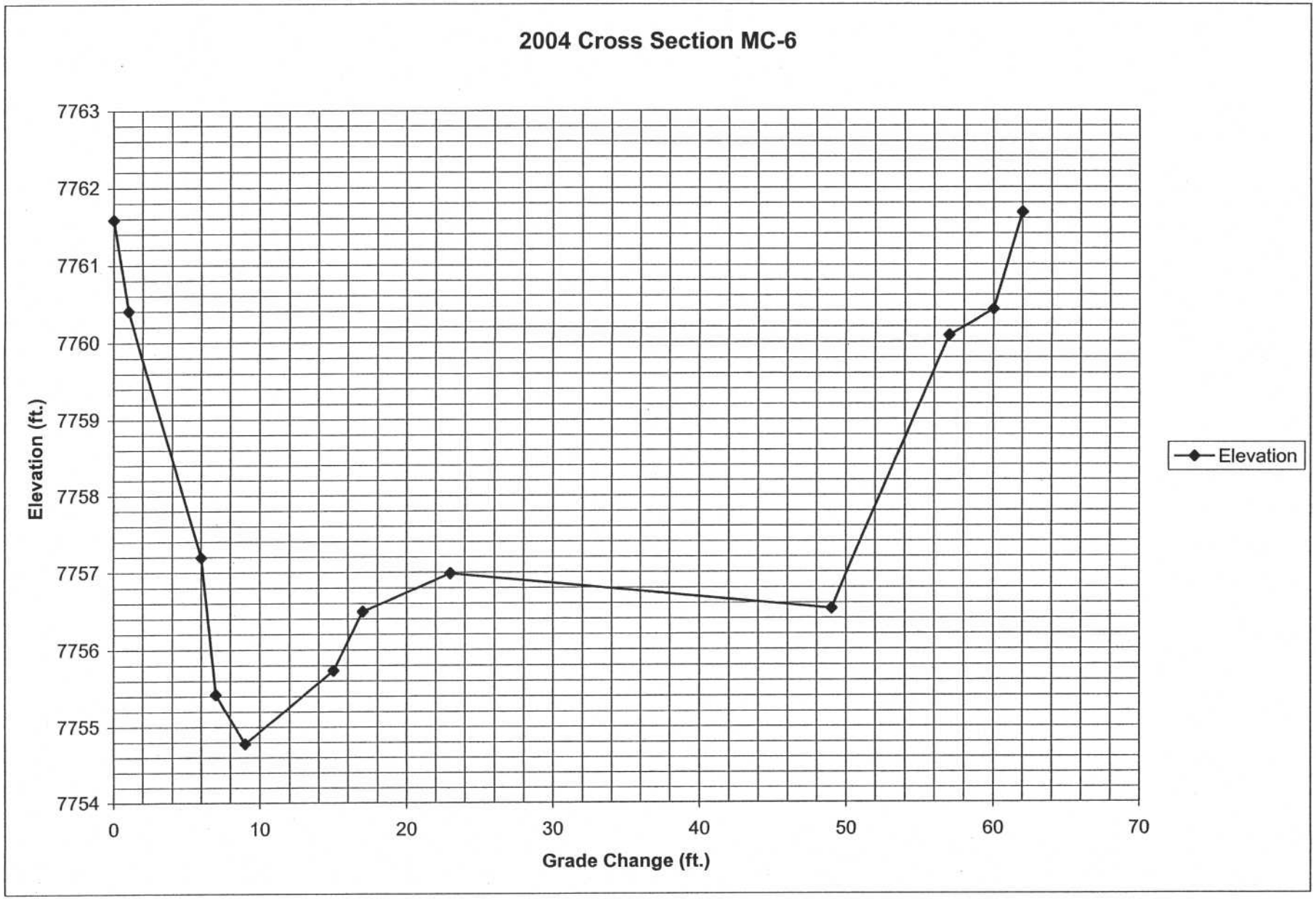

2004 Profile MC-3
Elevation (ft.)
7701
7700
7699
7698
7697
7696
7695
7694
7693
7692
7691
0
50
100
150
200
250
300
350
Stations (ft.)
Beaver Dam
Culvert
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right

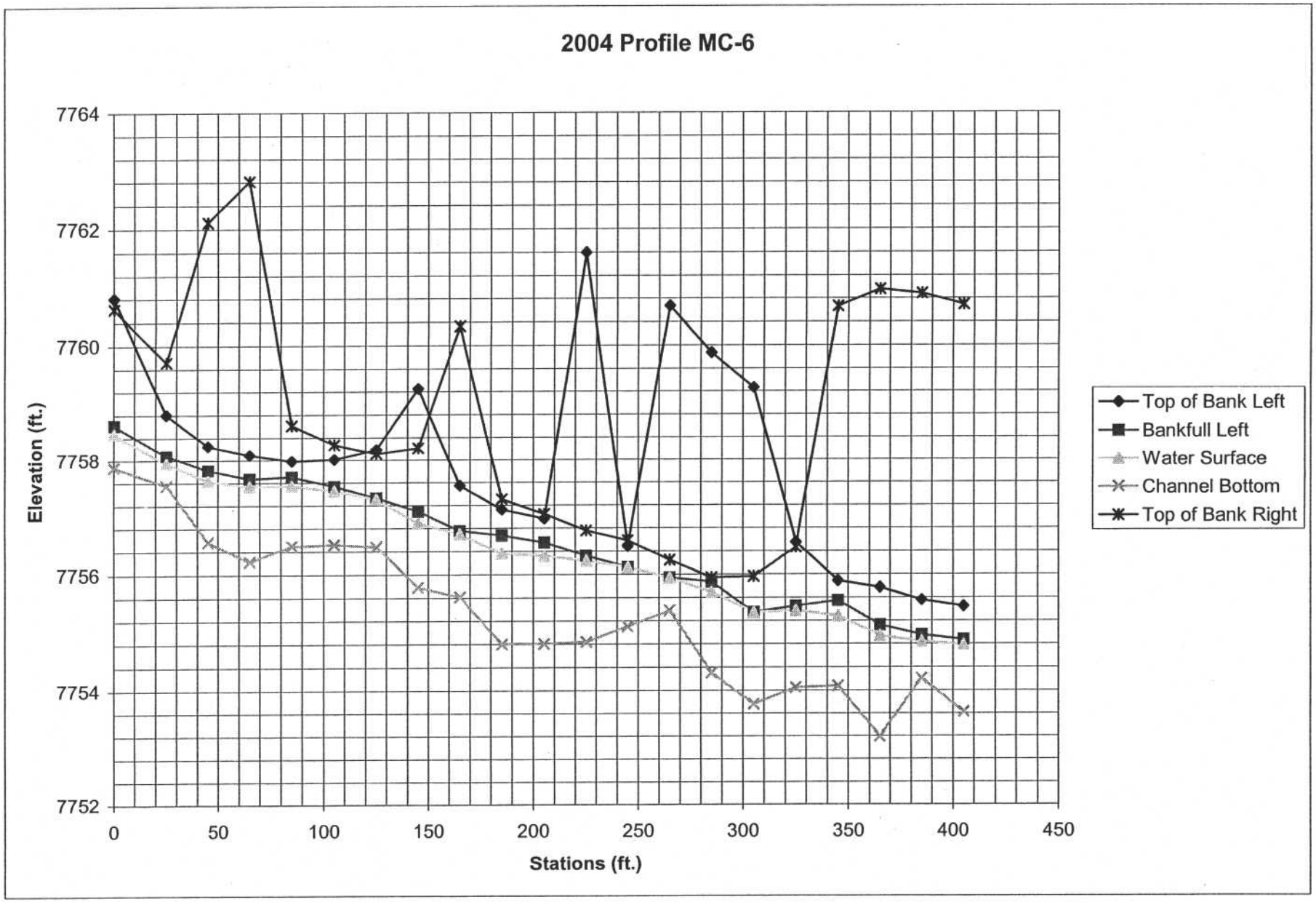

2004 Cross Section MC-4
7727.5
7727
7726.5
7726
7725.5
7725
7724.5
7724
7723.5
7723
7722.5
7722
Elevation (ft.)
0
10
20
30
40
50
60
Grade Change (ft.)
Elevation


2004 Profile MC-4
Elevation (ft.)
7729
7728
7727
7726
7725
7724
7723
7722
7721
7720
0
50
100
150
200
250
300
350
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right


2004 Cross Section MC-5
7916
7915
7914
7913
7912
7911
7910
Elevation (ft.)
0
10
20
30
40
50
60
Grade Change (ft.)
Elevation


2004 Profile MC-5
Elevation (ft.)
7916
7915
7914
7913
7912
7911
7910
7909
0
50
100
150
200
250
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right


2004 Cross Section MC-6
Elevation (ft.)
7763
7762
7761
7760
7759
7758
7757
7756
7755
7754
0
10
20
30
40
50
60
70
Grade Change (ft.)
Elevation


2004 Profile MC-6
Elevation (ft.)
7764
7762
7760
7758
7756
7754
7752
0
50
100
150
200
250
300
350
400
450
Stations (ft.)
Top of Bank Left
Bankfull Left
Water Surface
Channel Bottom
Top of Bank Right