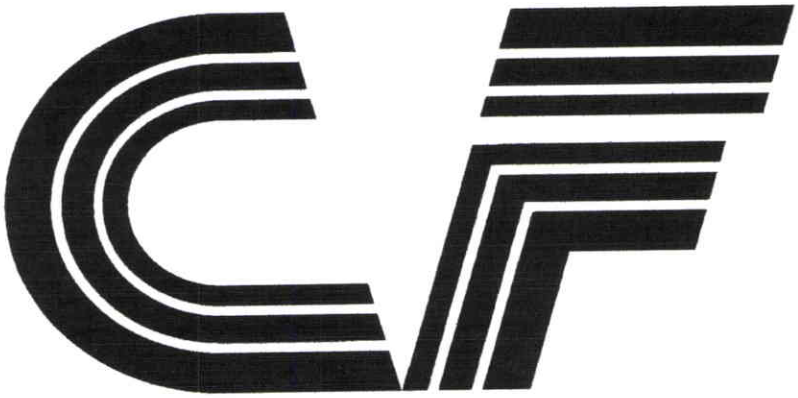
Canyon Fuel Company, LLC

Skyline Mines

A Subsidiary of Arch Western Bituminous Group, LLC

C/007/005

2005 Annual Report



File in:
- ❑ Confidential
- ❑ Shelf
- X Expandable 2005 Annual Report

Refer to Record No 0025 Date 03312006
In C/007/005 Incoming
For additional information See Confidential

*To enter text, click in the box and type your response. If a box already contains an entry select the entry and type the replacement. You can use the **tab** key to move from one field to the next. To select a check box, click in the box or type an x.*

GENERAL INFORMATION

Permitte Name	Canyon Fuel Company, LLC
Mine Name	Skyline Mines
Operator Name (If other then permittee)	
Permit Expiration Date	April 30, 2007
Permit Number	C/007/005
Authorized Representative Title	Wess Sorensen, Mine Manager
Phone Number	(435)448-2619
Fax Number	(435)448-2636
E-mail Address	wsorensen@archcoal.com
Mailing Address	Skyline Mine HCR 35 Box 380 Helper, Utah 84526
Designated Representative	Gregg Galecki
Resident Agent	Corporation Trust Company
Resident Agent Mailing Address	Corporation Trust Company 1209 Orange Street Wilmington, DE
Number of Binders Submitted	2

IDENTIFICATION OF OTHER PERMITS

Identify other permits that are required in conjunction with mining and reclamation activities.

Permit Type	ID Number	Description	Expiration Date
MSHA Mine ID(s)	1211-UT-09-01566-01	Skyline Mine	N/A
	1211-UT-09-01566-02	Skyline Mine Waste Rock Disposal Site	N/A
MSHA Impoundment(s)	None		N/A
NPDES/UPDES Permit(s)	UT 0023540-01, 02, 03	UPDES Permit for Skyline Mine, Rail Loadout, Waste Rock Disposal Site	11/30/09
PSD Permit(s) (Air)	147-98	Approval Order	N/A

Other

MSHA Mine ID(s)	1211-UT-09-01566-03	Skyline Mine Temporary Waste Rock Disposal Site	N/A
Storm Water Permit	UTR000578	Storm Water Discharge Permit	12/01/06

CERTIFIED REPORTS

List the certified inspection reports as required by the rules and udder the approved plan that must be periodically submitted t the Division. Specify whether the information is included as Appendix A to this report or currently on file with the Division.

Certified Reports:	Required		Included or on file with DOGM		Comments
	Yes	No	Included	On File	
Excess Spoil Piles	☐	☒	☐	☐	
Refuse Piles	☒	☐	☒	☐	Appendix A
Impoundments	☒	☐	☒	☐	Appendix A
Other					
	☐	☐	☐	☐	
	☐	☐	☐	☐	

REPORTING OF OTHER TECHNICAL DATA

List other technical data and information as required under the approved plan, which must be periodically submitted to the Division. Specify whether the information is included as Appendix B to this report or currently on file with the Division.

Technical Data:	Required		Included or on file with DOGM		Comments
	Yes	No	Included	On file	
Climatological	☐	☒	☐	☐	
Subsidence Monitoring	☒	☐	☒	☐	Appendix B
Vegetation Monitoring	☒	☐	☒	☐	Appendix B
Raptor Survey	☒	☐	☒	☒	Confidential File
Soils Monitoring	☐	☐	☐	☐	
Water Monitoring	☒	☐	☐	☒	
First quarter	☒	☐	☐	☒	
Second quarter	☒	☐	☐	☒	
Third quarter	☒	☐	☐	☒	
Fourth quarter	☒	☐	☐	☒	
Geological / Geophysical	☐	☒	☐	☐	
Engineering	☐	☒	☐	☐	
Non Coal Waste / Abandoned Underground Equipment*	☒	☐	☐	☒	
Other Data					
1)Goshawk and Woodpecker Survey	☒	☐	☒	☐	Confidential File
2)Amphibian survey – WQ / Woods	☒	☐	☒	☐	Appendix B
3)Electrofishing – Eccles	☒	☐	☒	☐	Confidential File
4)Macro –Sept.2003	☒	☐	☒	☐	Appendix B
5)EarthFax – Eccles/Mud Creeks					Appendix B

*Reminder: If equipment has been abandoned during 2005, an amendment must be submitted that includes a map showing its location, a description of what was abandoned, whether there were any hazardous or toxic materials and any revision to the PHC as necessary.

LEGAL, FINANCIAL, COMPLIANCE AND RELATED INFORMATION

Change in administration or corporate structure can often bring about necessary changes to information found in the mining and reclamation plan. The Division is Requesting that each permittee review and update the legal, financial, compliance and related information in the plan as part of the annual report. Please provide the Department of Commerce, Annual Report of Officers, or other equivalent information as necessary to ensure that the information provided in the plan is current. Provide any other change as necessary regarding land ownership, lease acquisitions, legal results from appeals of violations, or other changes as necessary to update information required in the mining and reclamation plan. Include certified financial statements, audits or worksheets, which may be required to meet bonding requirements. Specify whether the information is currently on file with the Division or included as Appendix C to the report.

Legal / Financial Update	**Required**		**Included or on File with DOGM**		**Comments**
	Yes	No	Included	On file	
Department of Commerce, Annual Report Officers	☐	☒	☐	☐	
Other					
Officers and Directors – General Chapter 1	☒	☐	☐	☒	General Chapter 1
	☐	☐	☐	☐	
	☐	☐	☐	☐	

MINE MAPS

Copies of mine maps, current and up-to-date through at least December 31, 2005, are to be provided to the Division as Appendix D to this report in accordance with the requirements of R 645-301-525.240. These map copies shall be made in accordance with 30 CFR 75.1200 as required by MSHA. Upon request, the Division shall keep mine maps confidential. Please provide a CD.

Map Number(s)	**Map Title/ Description**	**Confidential** Yes	No
	Skyline Mines, Mine 3 Levels 2 and 3 2005 As-Mined	☒	☐
	Skyline Mines Projected Mining 2006 - 2010	☒	☐
	Cumulative Subsidence 1982 - 2005	☐	☒
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

OTHER INFORMATION

Please provide any comments of further information to be included as part of the Annual Report. Any other attachments are to be provided as Appendix E to this report. If information is submitted as a group rather then by individual mine, please identify each of the mine's data in the list below.

Additional attachment to this report? **Yes** ☐ **No** ☒

APPENDIX A

Certified Reports

Excess Spoil Piles
Refuse Piles
Impoundments

As required under R645-301-514

CONTENTS

Waste Rock Inspections
Sediment Pond Quarterly Inspections
Waste Rock Analysis

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	March 17, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company, LLC		
Excess Spoil Pile or Refuse Pile Identification	**Pile Name**	Skyline Waste Rock Site	
	Pile Number	NA	
	MSHA ID Number	42-01566	
Inspection Date	March 17, 2005, Site was inaccessible		
Inspected By	Carl Winters		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly		
	Attachments to Report? ✗ **No** □ **Yes**		

Field Evaluation

The site was inaccessible due to the depth of snow cover. No significant problems with the waste site were observed during the 3rd quarter 2004, the last time the site was accessible. The last time material was placed at the site was during the 2nd quarter 2003. It seems unlikely there has been any significant changes to the site since it was last inspected.

1. **Foundation preparation, including the removal of all organic material and topsoil.**

Topsoil removal and foundation preparation was completed several years prior to the most recent placement of material.

2. **Placement of underdrains and protective filter systems.**

No underdrains are present or required at this site.

3. **Installation of final surface drainage systems.**

Existing surface is not at final contour. Therefore, final surface drainages have not yet been constructed. All surface runoff from the refuse pile is treated by the sediment pond. Runoff from the main access road below the sediment pond is treated by straw bale dikes. The sediment pond was cleaned of sediment in July 2004. The sediment was placed in the waste rock pile and the area of placement re-shaped to preclude ponding of runoff water.

4. **Placement and compaction of fill materials.**

No gob was hauled to the site during this quarter.

5. **Final grading and revegetation of fill.**

Contemporaneous reclamation of the waste rock pile is taking place as the site is backfilled with waste rock. The backfill slopes are built to 1 1/2h:1v or less and seeded as described in the final reclamation plan. The seed mix specified in the Reclamation Plan is planted after the placement of topsoil.

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		

Appearances of instability, structural weakness, and other hazardous conditions.

No instability or structural weakness was noted during the 3rd quarter 2004 inspection. The site was inaccessible at the time of this quarter's inspection.

7. **Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.**

The pile has a remaining storage capacity of approximately 25,402 tons. The current total storage capacity as designed is 334,125.

Certification Statement

REGISTERED PROFESSIONAL ENGINEER
CARL
[Cert. Stamp]
WINTERS
NO 22 157958-2202
3-17
STATE OF UTAH

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.

By: Carl W. Winters, Engineering Manager

(Full Name and Title)

Signature: Carl W. Winters Date: March 17, 2005

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	July 5, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company, LLC		
Excess Spoil Pile or Refuse Pile Identification	**Pile Name**	Skyline Waste Rock Site	
	Pile Number	1211-UT-09-01566-01	
	MSHA Mine ID Number	42-01566	
Inspection Date	June 23, 2005		
Inspected By	Carl Winters		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly		
	Attachments to Report? ✗ **No** □ **Yes**		

Field Evaluation

No significant problems with the waste site were observed during the 2nd quarter 2005. Approximately 6,310 tons of material was hauled to the site during June 2005. The last time material was placed at the site prior to June 2005, was during the 2nd quarter 2003.

1. Foundation preparation, including the removal of all organic material and topsoil.

Topsoil removal and foundation preparation was completed several years prior to the most recent placement of material.

2. Placement of underdrains and protective filter systems.

No underdrains are present or required at this site.

3. Installation of final surface drainage systems.

Existing surface is not at final contour. Therefore, final surface drainages have not yet been constructed. All surface runoff from the refuse pile is treated by the sediment pond. Runoff from the main access road below the sediment pond is treated by straw bale dikes. The sediment pond was cleaned of sediment in July 2004.

4. Placement and compaction of fill materials.

Approximately 6,310 tons of gob were hauled to the waste rock site in the 2nd quarter of 2005.
Gob was placed in lifts of 12-inches or less and compacted in place using rubber tired equipment and a tracked dozer. The majority of the material was placed in the southeastern portion of the waste rock site.

5. Final grading and revegetation of fill.

Contemporaneous reclamation of the waste rock pile is taking place as the site is backfilled with waste rock. The backfill slopes are built to 1 1/2h:1v or less and seeded as described in the final reclamation plan. The seed mix specified in the Reclamation Plan is planted after the placement of topsoil.

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		

6. Appearances of instability, structural weakness, and other hazardous conditions.

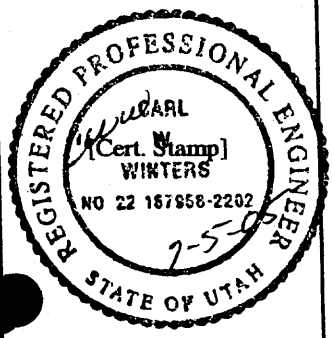
No instability or structural weakness was noted during the 2nd quarter 2005 inspection. The sedimentation pond did not contain significant water at the time of the inspection.

No hazardous conditions were observed at the time of the inspection.

7. Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.

The pile has a remaining storage capacity of approximately 19,092 tons. The current total storage capacity as designed is 334,125.

Certification Statement



I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.

By: Carl W. Winters, Engineering Manager

(Full Name and Title)

Signature: Carl W. Winters Date: July 5, 2005

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	October 6, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company, LLC		
Excess Spoil Pile or Refuse Pile Identification	**Pile Name**	Skyline Waste Rock Site	
	Pile Number	1211-UT-09-01566-01	
	MSHA Mine ID Number	42-01566	
Inspection Date	September 20, 2005		
Inspected By	Carl Winters		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly		
	Attachments to Report? ✗ No ☐ Yes		

Field Evaluation

No significant problems with the waste site were observed during the 3rd quarter 2005. Approximately 3,487 tons of material was hauled to the site during the 3rd quarter 2005. The last time material was placed at the site was June 2005.

1. Foundation preparation, including the removal of all organic material and topsoil.

Topsoil removal and foundation preparation was completed several years prior to the most recent placement of material.

Placement of underdrains and protective filter systems.

No underdrains are present or required at this site.

3. Installation of final surface drainage systems.

Existing surface is not at final contour. Therefore, final surface drainages have not yet been constructed. All surface runoff from the refuse pile is treated by the sediment pond. Runoff from the main access road below the sediment pond is treated by straw bale dikes. The sediment pond was cleaned of sediment in July 2004.

4. Placement and compaction of fill materials.

Approximately 3,487 tons of gob were hauled to the waste rock site in the 3rd quarter of 2005.
Gob was placed in lifts of 12-inches or less and compacted in place using rubber tired equipment and a tracked dozer. The majority of the material was placed in the southeastern portion of the waste rock site.

5. Final grading and revegetation of fill.

Contemporaneous reclamation of the waste rock pile is taking place as the site is backfilled with waste rock. The backfill slopes are built to 1 1/2h:1v or less and seeded as described in the final reclamation plan. The seed mix specified in the Reclamation Plan is planted after the placement of topsoil.

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		

No instability or structural weakness was noted during the 3rd quarter 2005 inspection. A temporary berm outlining a road used to [redacted] the waste rock was built higher as a safety precaution. The sedimentation pond did not contain significant water at the time of the [redacted]tion.

No hazardous conditions were observed at the time of the inspection.

7. Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.

The current total storage capacity as designed is 334,125. The Waste Rock area was re-surveyed with a total station during September 2005. Based on the survey, it is estimated approximately 71,700 tons of storage capacity remains within the currently permitted Waste Rock site.

Certification Statement

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.

[Cert. Stamp]

REGISTERED PROFESSIONAL ENGINEER
CARL W WINTERS
NO 22 157958-2202
10-6
STATE OF UTAH

By: Carl W. Winters, Engineering Manager

(Full Name and Title)

Signature: [signature] Date: October 6, 2005

[redacted]

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	November 29, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company, LLC		
Excess Spoil Pile or Refuse Pile Identification	**Pile Name**	Skyline Waste Rock Site	
	Pile Number	1211-UT-09-01566-01	
	MSHA Mine ID Number	42-01566	
Inspection Date	November 7, 2005		
Inspected By	Carl Winters		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly		
	Attachments to Report? ✗ **No** □ **Yes**		

Field Evaluation

No significant problems with the waste site were observed during the 3rd quarter 2005. Approximately 4,590 tons of material were hauled to the site during the 4th quarter 2005. The last time material was placed at the site was November 2005.

1. Foundation preparation, including the removal of all organic material and topsoil.

Topsoil removal and foundation preparation was completed several years prior to the most recent placement of material.

2. Placement of underdrains and protective filter systems.

No underdrains are present or required at this site.

3. Installation of final surface drainage systems.

Existing surface is not at final contour. Therefore, final surface drainages have not yet been constructed. All surface runoff from the refuse pile is treated by the sediment pond. Runoff from the main access road below the sediment pond is treated by straw bale dikes. The sediment pond was cleaned of sediment in July 2004.

4. Placement and compaction of fill materials.

Approximately 4,590 tons of gob were hauled to the waste rock site in the 4th quarter of 2005.
Gob was placed in lifts of 12-inches or less and compacted in place using a tracked dozer and sheeps-foot roller. The majority of the material was placed in the southeastern portion of the waste rock site.

5. Final grading and revegetation of fill.

Contemporaneous reclamation of the waste rock pile is taking place as the site is backfilled with waste rock. The backfill slopes are built to 1 1/2h:1v or less and seeded as described in the final reclamation plan. The seed mix specified in the Reclamation Plan is pl[redacted] after the placement of topsoil.

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		

No instability or structural weakness was noted during the 4th quarter 2005 inspection. The sedimentation pond did not contain [redacted]icant water at the time of the inspection.

No hazardous conditions were observed at the time of the inspection.

7. **Other Comments. Describe any changes in the geometry of the Excess Spoil/Refuse Pile structure, instrumentation, average and maximum lifts of materials placed in the pile, elevations of active benches, total and remaining storage capacity of the structure, evidence of fires in the pile and abatement of such fires, volumes of materials placed in the structure during the year, and any other aspect of the structure affecting its stability or function which has occurred during the reporting period.**

Records indicate the current total storage capacity is approximately 334,125 tons. The Waste Rock area was re-surveyed with a total station during September 2005. Based on the survey, it is estimated approximately 67,210 tons of storage capacity remains within the currently permitted Waste Rock site after placing the 4,590 tons in November 2005.

Certification Statement

REGISTERED PROFESSIONAL ENGINEER
CARL W. WINTERS
NO. 22 157858-2202
STATE OF UTAH
[Cert. Stamp]
11-29-05

I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.

By: Carl W. Winters, Engineering Manager

(Full Name and Title)

Signature: Carl W. Winters **Date:** November 29, 2005

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report

Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	pH	Saturation	EC @ 25°C	Calcium	Magnesium	Sodium	SAR	Sand	Silt	Clay	Texture
		s.u.	%	dS/m	meq/L	meq/L	meq/L		%	%	%	
105S02661	WR-001	7.6	37.2	0.74	2.45	1.63	4.75	3.33	71.3	13.7	15.0	SANDY LOAM
105S02662	WR-002	7.9	36.1	1.00	2.20	1.46	8.55	6.32	38.0	24.0	38.0	CLAY LOAM
105S02663	WR-003	7.3	48.7	1.51	10.1	5.32	5.09	1.83	92.0	4.0	4.0	SAND
105S02664	WR-004	7.5	50.5	1.89	15.2	7.85	6.59	1.94	88.0	8.0	4.0	SAND
105S02665	WR-005	7.8	42.2	1.31	2.58	1.26	11.7	8.45	87.0	9.0	4.0	LOAMY SAND
105S02666	WR-006	7.9	43.6	0.84	1.36	0.73	7.27	7.10	88.0	8.0	4.0	SAND
105S02667	WR-007	7.6	30.2	1.12	8.98	5.29	2.57	0.96	68.0	20.0	12.0	SANDY LOAM
105S02668	WR-008	7.5	33.5	1.38	6.78	3.27	6.22	2.78	48.0	16.0	36.0	SANDY CLAY
105S02669	WR-009	7.8	34.0	0.27	1.22	0.73	1.09	1.10	73.8	18.7	7.5	SANDY LOAM
105S02670	WR-010	7.7	37.9	0.81	2.93	2.11	3.62	2.28	75.0	13.0	12.0	SANDY LOAM

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By:

Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report

Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	Coarse Fragments %	Field Capacity %	Wilt Point %	Available Sodium meq/100g	Exchangeable Sodium meq/100g	Boron ppm	Nitrogen Nitrate ppm	Selenium ppm	TKN %
105S02661	WR-001	77.7			0.39	0.21	0.72	0.70	0.06	0.58
105S02662	WR-002	64.2	11.7	8.8	276	276	0.66	0.40	0.16	0.17
105S02663	WR-003	57.6	9.8		75.1	74.9	0.86	0.20	0.02	0.11
105S02664	WR-004	56.1	20.4	7.5	92.1	91.8	0.98	0.30	0.02	0.14
105S02665	WR-005	74.2	14.8		159	159	1.02	0.46	0.02	0.35
105S02666	WR-006	74.9			114	114	0.54	0.22	0.02	0.11
105S02667	WR-007	64.3	22.4	10.2	53.2	53.1	0.97	0.20	0.02	0.05
105S02668	WR-008	52.2	23.4	12.2	179	179	0.67	0.90	<0.02	0.13
105S02669	WR-009	39.9			78.2	78.2	1.23	1.44	<0.02	0.10
105S02670	WR-010	60.2	29.4	10.1	86.9	86.8	0.68	0.44	0.08	0.29

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By:

Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	TOC	Total Sulfur	T.S. AB	Neutral. Pot.	T.S. ABP
		%	%	t/1000t	t/1000t	t/1000t
05S02661	WR-001	49.1	0.65	20.3	34.7	14.4
05S02662	WR-002	19.4	0.35	10.9	25.4	14.5
05S02663	WR-003	77.8	0.81	25.3	43.1	17.8
05S02664	WR-004	75.0	0.80	25.0	41.3	16.3
05S02665	WR-005	67.1	0.69	21.6	36.7	15.2
05S02666	WR-006	65.8	0.66	20.6	32.2	11.6
05S02667	WR-007	22.2	0.31	9.68	87.5	77.8
05S02668	WR-008	17.5	0.13	4.06	146	142
05S02669	WR-009	31.9	0.23	7.19	98.5	91.3
05S02670	WR-010	52.9	0.66	20.6	40.2	19.6

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	pH	Saturation	EC @ 25°C	Calcium	Magnesium	Sodium	SAR	Sand	Silt	Clay	Texture
		s.u.	%	dS/m	meq/L	meq/L	meq/L		%	%	%	
05S02669	WR-009	7.8	34.0	0.27	1.22	0.73	1.09	1.10	73.8	18.7	7.5	SANDY LOAM
05S02669D	WR-009	7.7	31.0	0.36	1.88	1.16	1.34	1.09	75.0	17.5	7.5	SANDY LOAM

hese results only apply to the samples tested.

bbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
bbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
liscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

eviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	Coarse Fragments %	Field Capacity %	Wilt Point %	Available Sodium meq/100g	Exchangeable Sodium meq/100g	Boron ppm	Nitrogen Nitrate ppm	Selenium ppm	TKN %
05S02669	WR-009	39.9			78.2	78.2	1.23	1.44	<0.02	0.10
05S02669D	WR-009	0.0			76.0	76.0	1.04	1.48	<0.02	0.90

hese results only apply to the samples tested.

bbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
bbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
liscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter·Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010502661

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Table 6
Date Received: 06/03/05

Set #0105S02661
Report Date: 06/17/05

Lab Id	Sample Id	TOC	Total Sulfur	T.S. AB	Neutral. Pot.	T.S. ABP
		%	%	t/1000t	t/1000t	t/1000t
105S02669	WR-009	31.9	0.23	7.19	98.5	91.3
105S02669D	WR-009	32.8	0.23	7.19	98.0	90.9

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: _____
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010509459

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 10/10/05

Set #0105S09459
Report Date: 11/01/05

Lab Id	Sample Id	Boron	Nitrogen Nitrate	Selenium	TKN
		ppm	ppm	ppm	%
)105S09459	WR-011	1.13	7.62	0.26	0.42
)105S09460	WR-012	1.38	51.2	1.00	1.05

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Sheeley
Joey Sheeley, Soils Lab Supervisor

Inter·Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010509459

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 10/10/05

Set #0105S09459
Report Date: 11/01/05

Lab Id	Sample Id	Coarse Fragments %	Field Capacity %	Wilt Point %	Available Sodium meq/100g	Exchangeable Sodium meq/100g	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t
)105S09459	WR-011	67.4	26.1	10.7	1.04	0.66	38.2	0.60	18.7	66.5	47.7
)105S09460	WR-012	70.4	24.4	16.7	4.39	2.51	35.8	0.73	22.8	61.1	38.3

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Sheeley
Joey Sheeley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1673 Terra Avenue
Sheridan, WY 82801

Report ID: 010509459

Soil Analysis Report

Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 10/10/05

Set #0105S09459
Report Date: 11/01/05

Lab Id	Sample Id	pH	Saturation	EC @ 25°C	Calcium	Magnesium	Sodium	SAR	Sand	Silt	Clay	Texture
		s.u.	%	dS/m	meq/L	meq/L	meq/L		%	%	%	
)105S09459	WR-011	7.8	33.2	4.18	18.0	14.3	11.4	2.84	68.0	16.0	16.0	SANDY LOAM
)105S09460	WR-012	8.2	32.4	9.68	16.5	26.2	58.0	12.5	64.0	18.0	18.0	SANDY LOAM

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Sheeley
Joey Sheeley, Soils Lab Supervisor

Inter·Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Report ID: 010514511

Soil Analysis Report

Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 12/15/05

Set #0105S14511
Report Date: 01/04/06

Lab Id	Sample Id	pH	Saturation	EC @ 25°C	Calcium	Magnesium	Sodium	SAR	Sand	Silt	Clay	Texture
		s.u.	%	dS/m	meq/L	meq/L	meq/L		%	%	%	
0105S14511	WR-013	7.6	41.9	2.65	17.0	12.4	5.36	1.40	68.0	19.0	13.0	SANDY LOAM
0105S14512	WR-014	7.6	46.4	3.67	19.9	18.9	10.1	2.29				

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot = Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Shurley

Joey Shurley, Soils Lab Supervisor

Inter-Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Report ID: 010514511

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 12/15/05

Set #0105S14511
Report Date: 01/04/06

Lab Id	Sample Id	Coarse Fragments %	Field Capacity %	Wilt Point %	Available Sodium meq/100g	Exchangeable Sodium meq/100g	TOC %	Total Sulfur %	T.S. AB t/1000t	Neutral. Pot. t/1000t	T.S. ABP t/1000t
0105S14511	WR-013	62.4	28.0	8.4	0.40	0.18	35.7	0.49	15.3	79.5	64.2
0105S14512	WR-014	75.8	29.7	8.8	0.81	0.34	39.2	0.88	27.5	106	78.5

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Sheeley
Joey Sheeley, Soils Lab Supervisor

Inter Mountain Laboratories, Inc.

1633 Terra Avenue
Sheridan, WY 82801

Report ID: 010514511

Soil Analysis Report
Canyon Fuel Company, LLC
Skyline Mine
HC 35 Box 380
Helper, UT 84526

Client Project ID: Waste Rock Samples
Date Received: 12/15/05

Set #0105S14511
Report Date: 01/04/06

Lab Id	Sample Id	Boron	Nitrogen Nitrate	Selenium	TKN
		ppm	ppm	ppm	%
0105S14511	WR-013	0.96	0.62	0.02	1.22
0105S14512	WR-014	1.02	0.80	0.04	2.38

These results only apply to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neut. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed By: Joey Sheeley
Joey Sheeley, Soils Lab Supervisor

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted]t Number	C/007/005	Report Date	March 23, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Mine Site Sediment Pond	
	Impoundment Number	001	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	March 17, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No signs of instability were observed. No hazardous conditions were observed during the inspection of the pond.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 72,658 ft^3
60% Elevation: 8568.5 feet ASL (above sea level)
100% Elevation: 8571.5 feet ASL
During the 3rd quarter 2004 inspection the sedimemt level was approximately 8,567.0 ft ASL (21,797 ft^3). The current elevation of the sediment within the pond at the discharge point was approximately 8569.9 ft ASL. The remaining sediment volume storage capacity is approximately 14,532 ft^3. Skyline Mine plans to clean out the sediment pond this year.

3. Principle and emergency spillway elevations.

Principal and Emergency Spillway Elevations: 8579.6 feet ASL (The outlet structure for Pond 001 serves as both the Principal and Emergency Spillways)

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		

[redacted]**ield Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Water elevation at the time of inspection was 8579.65 feet ASL with a discharge of approximately 200 gpm occurring. The sediment pond has discharged a majority of the time this quarter. A sample of the mine discharge water, including this pond's discharge, has been taken on weekly basis throughout the quarter as required by the mine's UPDES permit. On a biweekly basis the water sample is analyzed for total iron and total dissolved solids. Weekly samples include oil and grease, total suspended solids, pH and conductivity.

Surface water is collected from the upper mine pad and discharged to the pond through a culvert located on the west end of the pond. The culvert appeared to be functioning as designed. The outlet structure was working as designed and appeared to be in good working condition.

A small area on the north side of the pond has a colony of cattails. The colony poses no threat to the operation of the pond.

The pond was cleaned of most of its sediment in October 2003.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The overall geometry of the pond does not appear to have been modified this quarter. However, the pond banks were covered with snow. Minor changes to the pond geometry could not be observed due to the snow cover. The pond has discharged periodically this quarter. The minimum elevation has been approximately 8579.0. Water height over the lip of the discharge pipe can vary between 0.00 and 0.26 feet. Total storage volume for water and sediment combined is 179,014 ft^3 (4.1 ac-ft).

[redacted]on the estimated volume of sediment, the estimated volume of water in the pond is 157,217 ft^3 (3.61 ac-ft).

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Gregory A. Galecki **Date:** 3/23/05

[redacted]

OUNDMENT INSPECTION AND CERTIFIED REPORT			
it N ber	C/007/005	Report Date	March 23, 2005
e Name	Skyline Mines		
pany Name	Canyon Fuel Company		
oundment tification	Impoundment Name	Rail Loadout Sediment Pond	
	Impoundment Number	002	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

POUNDMENT INSPECTION

ection Date	March 17, 2005
ected By	Gregg Galecki

son for Inspection al, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of ruction)	Quarterly

Describe any appearance of any instability, structural weakness, or any other hazardous condition.

site was snow covered at the time of the inspection.
instal[illegible] of the embankment was noted during the inspection. No hazardous conditions were noted at the time of the inspection.

ired for an impoundment h functions as a IMENTATION POND.	2. **Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.** Sediment Storage Capacity: 54,710 ft^3 60% Elevation: 7915.0 feet ASL (above sea level) 100% Elevation: 7915.6 ASL The current elevation of the sediment within the pond at the discharge point was not measured during the inspection. The pond was completely frozen over. During the last quarterly inspection the sediment level was approximately 7914.8 feet ASL. This volume has apparently not changed since the last quarter. The sediment pond was cleaned of sediment in the last week of October 2003.
	3. **Principle and emergency spillway elevations.** Principle Spillway Elevation: 7919.7 feet ASL Emergency Spillway Elevation: 7922 feet ASL

4. **Field Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Current water surface elevation was 7,919.4 feet ASL, 0.1 feet below the spill point of the principal spillway. The pond surface is currently covered by several inches of ice.

The pond was not discharging at the time of the inspection. The pond has not been decanted since October 2003. The pond embankment appears stable and without noticeable erosion. Vegetation growing on the embankment and outslopes does not appear to create hazardous conditions. However, there were several inches of snow covering the site at the time of the inspection and minor changes to the pond geometry could have occurred but not observed.

The pond discharged on March 23, 2005, at a rate of 2.0 gpm. Depth of the water over the Spillway was too small to measure <0.01 ft. A sample of the water was sent to the lab for analysis.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The geometry of the pond does not appear to have changed recently. The sediment volume in the pond during the 4th quarter inspection was estimated to be 25,531 ft^3 with a remaining sediment storage capacity of 29,179 ft^3. The water level at the time of the inspection was 7,919.4 ft ASL. The maximum elevation during the year, which occurred in early spring when the pond did discharge, was approximately 7919.8.

Total storage capacity of water and sediment combined is 95,380 ft^3 (2.2 ac-ft). Assuming the sediment volume is approximately 29,179 ft^3, the estimated total water capacity remaining in the pond is approximately 66,201 ft^3 (1.52 ac-ft).

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Greg A. Hallock **Date:** 3/23/05

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted] Number	C/007/005	Report Date	March 23, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Waste Rock Site Sediment Pond	
	Impoundment Number	003	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	March 17, 2005, Site inaccessible due to the depth of snow cover.
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

The site was inaccessible at the time of this quarterly inspection.

[redacted] stability was noted at the site during the 3rd quarter 2004 quarterly gob site inspection.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 6906 ft^3
60% Elevation: 7860.8 feet ASL (above sea level)
100% Elevation: 7861.3 ASL
Current Sediment Level Elevation: The pond was cleaned of sediment in July of 2004, including the small delta that had developed at the east end of the pond. At the time of the 3rd quarter gob pile inspection, there was only a small puddle of water present in the lowest portion of the pond.

3. Principle and emergency spillway elevations.

Principal and Emergency Spillways Elevation: 7865.5 feet ASL (The outlet of Pond 003 serves as both the principal and emergency spillway).

4. Field Information. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

This pond did not discharge in the first quarter of 2005, therefore no water samples were obtained.

5. Field Evaluation. Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The site was inaccessible at the time of the inspection. Since no material has been placed at this site since the 3rd quarter 2004 Gob Inspection and no other surface work has occurred, it is unlikely any significant changes to the geometry of the pond have occurred in this quarter.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Gregg A. Galuski **Date:** 3/23/05

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted] Number	C/007/005	Report Date	July 5, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Mine Site Sediment Pond	
	Impoundment Number	001	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	June 22, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No signs of instability were observed. No hazardous conditions were observed during the inspection of the pond.

[redacted]

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 72,658 ft^3
60% Elevation: 8568.5 feet ASL (above sea level)
100% Elevation: 8571.5 feet ASL
The current elevation of the sediment within the pond at the discharge point was approximately 8569.77 ft ASL. Although the volume has not apparently changed significantly since the last quarter, approximately 1,057 tons of sediment were removed from the pond in June 2005. Typically, the track hoe operator tries to stay a safe distance from the discharge standpipe – where the sediment elevation is measured quarterly. This could account for the minimal change in sediment elevation. The remaining sediment volume storage capacity is approximately 36,417 ft^3. Skyline Mine plans to survey the pond later this year to get a more accurate estimate of the remaining sediment volume storage capacity.

3. Principle and emergency spillway elevations.

[redacted]

ENT INSPECTION AND CERTIFIED REPORT		
	Principal and Emergency Spillway Elevations: 8579.6 feet ASL (The outlet structure for Pond 001 serves as both the Principal and Emergency Spillways)	

formation. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation n, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment pairs, monitoring information, vegetation on outslopes of embankments, etc.

on at the time of inspection was 8579.63 feet ASL with a discharge of approximately 100 gpm occurring. The sediment harged a majority of the time this quarter. A sample of the mine discharge water, including this pond's discharge, has been kly basis throughout the quarter as required by the mine's UPDES permit. On a biweekly basis the water sample is otal iron and total dissolved solids. Weekly samples include oil and grease, total suspended solids, pH and conductivity.

r is collected from the upper mine pad and discharged to the pond through a culvert located on the west end of the pond. ppeared to be functioning as designed. The outlet structure was working as designed and appeared to be in good working

on the north side of the pond has a colony of cattails. The colony poses no threat to the operation of the pond.

as cleaned of approximately 1, 057 tons of sediment in June 2005.

Evaluation. Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, ed sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure e its stability or function which has occurred during the reporting period.

geometry of the pond does not appear to have been modified this quarter. The pond has discharged a majority of the time . The minimum elevation has been approximately 8579.58. Water height over the lip of the discharge pipe can vary 00 and 0.26 feet. Total storage volume for water and sediment combined is 179,014 ft^3 (4.1 ac-ft).

he estimated volume of sediment removed in June 2005, approximately an additional 21,885 ft^3 volume is available for water

tion Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. Signature: Gregg A. Galecki Date: 5 July 05

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted]rmit Number	C/007/005	Report Date	June 28, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Rail Loadout Sediment Pond	
	Impoundment Number	002	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	June 22, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

[redacted]tability of the embankment was noted during the inspection. No hazardous conditions were noted at the time of the inspection.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 54,710 ft^3
60% Elevation: 7915.0 feet ASL (above sea level)
100% Elevation: 7915.6 ASL
The current elevation of the sediment within the pond at the discharge point was measured during the inspection at approximately 7914.8 feet ASL. Although the volume has apparently not changed since the last quarter, approximately 308 tons of sediment was removed from the pond in June 2005. Typically, the track hoe tries to stay a safe distance from discharge standpipe, which could account for the same elevation being measured.

3. Principle and emergency spillway elevations.

Principle Spillway Elevation: 7919.7 feet ASL
Emergency Spillway Elevation: 7922 feet ASL

4. **Field Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Current water surface elevation was 7,917.7 feet ASL, 1.80 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond discharged due to rain and snowmelt for a few hours on the following days: April 19, April 26, and May 11, 2005, at rates of 4 gpm, 25 gpm, and 20 gpm, respectively. The pond embankment appears stable and without noticeable erosion. Vegetation growing on the embankment and outslopes does not appear to create hazardous conditions.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The geometry of the pond does not appear to have changed with the removing of sediment in June 2005. The sediment volume in the pond after sediment removal was estimated to be 19,154 ft^3 with a remaining sediment storage capacity of 35,556 ft^3. The water level at the time of the inspection was 7,917.7 ft ASL. The maximum elevation during the year, which occurred in early spring when the pond did discharge, was approximately 7919.8.

[redacted] storage capacity of water and sediment combined is 95,380 ft^3 (2.2 ac-ft). Assuming the sediment volume is approximately 19,154 ft^3, the estimated total water capacity remaining in the pond is approximately 76,226 ft^3 (1.75 ac-ft).

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. Signature: Gregg A. Hallsten Date: 28 June 05

[redacted]

NDMENT INSPECTION AND CERTIFIED REPORT			
[redacted]er	C/007/005	Report Date	July 5, 2005
ame	Skyline Mines		
ny Name	Canyon Fuel Company		
ndment ication	Impoundment Name	Waste Rock Site Sediment Pond	
	Impoundment Number	003	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

OUNDMENT INSPECTION

ction Date	June 22, 2005
cted By	Gregg Galecki

on for Inspection al, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of uction)	Quarterly

escribe any appearance of any instability, structural weakness, or any other hazardous condition.

nstability was noted at the site during the quarterly pond site inspection.

[redacted]

uired for an impoundment h functions as a IMENTATION POND.	2. **Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.** Sediment Storage Capacity: 6906 ft^3 60% Elevation: 7860.8 feet ASL (above sea level) 100% Elevation: 7861.3 ASL Current Sediment Level Elevation: The pond was cleaned of sediment in July of 2004, including the small delta that had developed at the east end of the pond. At the time of the 2nd quarter gob pile inspection, there was only a small puddle of water present in the lowest portion of the pond.
	3. **Principle and emergency spillway elevations.** Principal and Emergency Spillways Elevation: 7865.5 feet ASL (The outlet of Pond 003 serves as both the principal and emergency spillway).

[redacted]

[redacted]formation. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

is pond did not discharge in the second quarter of 2005 therefore no water samples were obtained. The pond had minimal water in it the time of the inspection. Water occupied only the lowest-most portion of the pond. The vegetation on the out slopes of the pond bankment do not appear to present any type of hazardous conditions. No instability was noted in the pond embankment.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

No[redacted]nges have been noted in the geometry of the pond since the last inspection. The pond has evidently held very little water. The po[redacted]ars to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of [redacted]he inspection was less than 0.02 acre-feet.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Gregg A. Galecki **Date:** 5 July 05

[redacted]

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted]t Number	C/007/005	Report Date	October 6, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Mine Site Sediment Pond	
	Impoundment Number	001	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	September 27, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No signs of instability were observed. No hazardous conditions were observed during the inspection of the pond.

[redacted]

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 72,658 ft^3
60% Elevation: 8568.5 feet ASL (above sea level)
100% Elevation: 8571.5 feet ASL
The current elevation of the sediment within the pond at the discharge point was approximately 8569.77 ft ASL. Although the volume has not apparently changed significantly since the last quarter, approximately 1,057 tons of sediment were removed from the pond in June 2005. Typically, the track hoe operator tries to stay a safe distance from the discharge standpipe – where the sediment elevation is measured quarterly. This could account for the minimal change in sediment elevation. The pond was surveyed using a total station. The survey indicated the pond is approximately 25 percent full of sediment.

3. Principle and emergency spillway elevations.

[redacted]

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		
[redacted]	Principal and Emergency Spillway Elevations: 8579.6 feet ASL (The outlet structure for Pond 001 serves as both the Principal and Emergency Spillways)	

4. **Field Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Water elevation at the time of inspection was 8579.63 feet ASL with a discharge of approximately 150 gpm occurring. The sediment pond has discharged a majority of the time this quarter. A sample of the mine discharge water, including this pond's discharge, has been taken on weekly basis throughout the quarter as required by the mine's UPDES permit. On a biweekly basis the water sample is analyzed for total iron and total dissolved solids. Weekly samples include oil and grease, total suspended solids, pH and conductivity.

Surface water is collected from the upper mine pad and discharged to the pond through a culvert located on the west end of the pond. The culvert appeared to be functioning as designed. The outlet structure was working as designed and appeared to be in good working condition.

A small area on the north side of the pond has a colony of cattails. The colony poses no threat to the operation of the pond.

The pond was cleaned of approximately 1, 057 tons of sediment in June 2005.

[redacted]

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The overall geometry of the pond does not appear to have been modified since the cleaning in June 2005 quarter. The survey indicated portions of the pond are slightly deeper than the as-built construction. The pond has discharged a majority of the time this quarter. The minimum water elevation has been approximately 8579.61. Water height over the lip of the discharge pipe can vary between 0.00 and 0.26 feet. The survey indicated the total storage volume for water and sediment combined is approximately 350,437 ft^3 (8.0 ac-ft).

Based on the estimated volume of sediment removed in June 2005, approximately an additional 261,069 ft^3 volume is available for water storage.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. Signature: Gregg A. Galetti Date: 10/6/05

[redacted]

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted] Number	C/007/005	Report Date	October 6, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Rail Loadout Sediment Pond	
	Impoundment Number	002	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	September 27, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No instability of the embankment was noted during the inspection. No hazardous conditions were noted at the time of the inspection.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 54,710 ft^3
60% Elevation: 7915.0 feet ASL (above sea level)
100% Elevation: 7915.6 ASL
The current elevation of the sediment within the pond at the discharge point was measured during the inspection at approximately 7914.8 feet ASL. Although the volume has apparently not changed since the last quarter, approximately 308 tons of sediment was removed from the pond in June 2005. Typically, the track hoe tries to stay a safe distance from discharge standpipe, which could account for the same elevation being measured.

3. Principle and emergency spillway elevations.

Principle Spillway Elevation: 7919.7 feet ASL
Emergency Spillway Elevation: 7922 feet ASL

4. **Field Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation [redacted]mation, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment [redacted]ion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Current water surface elevation was 7,917.05 feet ASL, 2.65 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond did not discharge during the 3rd quarter 2005. The pond embankment appears stable and without noticeable erosion. Vegetation growing on the embankment and outslopes does not appear to create hazardous conditions.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The geometry of the pond does not appear to have changed with the removing of sediment in June 2005. The sediment volume in the pond after sediment removal was estimated to be 19,154 ft^3 with a remaining sediment storage capacity of 35,556 ft^3. The water level at the time of the inspection was 7,917.7 ft ASL. The maximum elevation during the year, which occurred in early spring when the pond did discharge, was approximately 7919.8.

[redacted]torage capacity of water and sediment combined is 95,380 ft^3 (2.2 ac-ft). Assuming the sediment volume is approximately [redacted]ft^3, the estimated total water capacity remaining in the pond is approximately 76,226 ft^3 (1.75 ac-ft). The pond will be surveyed during the 4th quarter 2005 and confirm the remaining capacity.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Gregg A. Hadachi **Date:** 10/6/05

[redacted]

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
[redacted] Number	C/007/005	Report Date	October 6, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Waste Rock Site Sediment Pond	
	Impoundment Number	003	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	September 27, 2005
Inspected By	Gregg Galecki
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No instability was noted at the site during the quarterly pond site inspection.

[redacted]

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 6906 ft^3
60% Elevation: 7860.8 feet ASL (above sea level)
100% Elevation: 7861.3 ASL
Current Sediment Level Elevation: The pond was cleaned of sediment in July of 2004, including the small delta that had developed at the east end of the pond. At the time of the 3rd quarter gob pile inspection, there was only a small puddle of water present in the lowest portion of the pond.

3. Principle and emergency spillway elevations.

Principal and Emergency Spillways Elevation: 7865.5 feet ASL (The outlet of Pond 003 serves as both the principal and emergency spillway).

[redacted]

4. **Field Information.** Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment modification/repairs, monitoring information, vegetation on outslopes of embankments, etc.

This pond did not discharge in the third quarter of 2005 therefore no water samples were obtained. The pond had minimal water in it at the time of the inspection. Water occupied only the lowest-most portion of the pond. The vegetation on the out slopes of the pond embankment do not appear to present any type of hazardous conditions. No instability was noted in the pond embankment.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

No changes have been noted in the geometry of the pond since the last inspection. The pond has evidently held very little water. The pond appears to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of inspection was less than 0.02 acre-feet.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Gregg A. Galecki **Date:** 10/6/05

MPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	Report Date	November 29, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Mine Site Sediment Pond	
	Impoundment Number	001	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	November 7, 2005
Inspected By	Carl Winters
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No signs of instability were observed. No hazardous conditions were observed during the inspection of the pond.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 187,427ft^3 (based on 2005 survey and MRP as-built drawings)
64% Elevation: 8568.0 feet ASL (above sea level)
100% Elevation: 8571.0 feet ASL
The current elevation of the sediment within the pond at the discharge point was approximately 8570.49 ft ASL. Although the volume has not apparently changed significantly since the 2nd quarter, approximately 1,057 tons of sediment was removed from the pond in June 2005. Typically, the track hoe operator tries to stay a safe distance from the discharge standpipe – where the sediment elevation is measured quarterly. This could account for the minimal change in sediment elevation. The pond was surveyed using a total station. The survey indicated the pond contains approximately 48 percent of the sediment capacity.

3. Principle and emergency spillway elevations.

[redacted]NDMENT INSPECTION AND CERTIFIED REPORT		
	Principal and Emergency Spillway Elevations: 8579.6 feet ASL (The outlet structure for Pond 001 serves as both the Principal and Emergency Spillways) Total volume of pond at Spillway: 350,437 ft^3 Required runoff storage: 163,010 ft^3 100% Sediment storage: 187,427 ft^3 60% Sediment storage: 112,456 ft^3	

Field Information. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Water elevation at the time of inspection was 8579.63 feet ASL with a discharge of approximately 100gpm occurring. The sediment pond has discharged a majority of the time this quarter. In periods of cold weather the pond ices-over and no water discharges from the pond. A sample of the mine discharge water, including this pond's discharge, has been taken on weekly basis throughout the quarter as required by the mine's UPDES permit. On a biweekly basis the water sample is analyzed for total iron and total dissolved solids. Weekly samples include oil and grease, total suspended solids, pH and conductivity.

Surface water is collected from the upper mine pad and discharged to the pond through a culvert located on the west end of the pond. The culvert appeared to be functioning as designed. The outlet structure was working as designed and appeared to be in good working condition.

[redacted]ll area on the north side of the pond has a colony of cattails. The colony poses no threat to the operation of the pond.

A series of turbidity curtains are installed in the pond to help reduce the suspended load within the pond.

The pond was cleaned of approximately 1, 057 tons of sediment in June 2005.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The overall geometry of the pond does not appear to have been modified since the cleaning in June 2005. The survey indicated portions of the pond are slightly deeper than the as-built construction. The pond has discharged a majority of the time this quarter. The minimum water elevation has been 8579.60 – at zero discharge. Water height over the lip of the discharge pipe can vary between 0.00 and 0.26 feet. The survey indicated the total storage volume for water and sediment combined is approximately 350,437 ft^3 (8.0 ac-ft).

Based on the estimated volume of sediment removed in June 2005, approximately an additional 98,059ft^3 volume is available for sediment storage while still maintaining the required volume for water storage.

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** [redacted] **Date:** 11-29-05

TI[redacted]D REPORT

[redacted]OUNDMENT EVALUATION (If NO, explain under Comments)	YES	NO
Is impoundment designed and constructed in accordance with the approved plan?	Yes	
Is impoundment free of instability, structural weakness, or any other hazardous condition?	Yes	
Has the impoundment met all applicable performance standards and effluent limitations from the previous date of inspection?	Yes	

MMENTS AND OTHER INFORMATION

eedances of the tons/per day permit limit have occurred in this and the previous quarter of this year. However, since the water ity was acceptable with regard to all other parameters and participation in a downstream salinity reduction program has been made Utah Division of Water Quality (as allowed in the mine's UPDES Permit), no enforcement action is warranted.

rtification Statement:

[PE Cert. Stamp]

PROFESSIONAL ENGINEER
CARL
W
WINTERS
NO 22 157958-2202
STATE OF UTAH

I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself or under my direction and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability in accordance with the Utah R645 Coal Mining Rules.

By:
Carl W. Winters, Engineering Manager

Signature Carl W. Winters **Date:** 11-25-05

P.E. Number & State:
22-157958-2202 UTah

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	Report Date	November 29, 2005
Mine Name	Skyline Mines		
Company Name	Canyon Fuel Company		
Impoundment Identification	Impoundment Name	Rail Loadout Sediment Pond	
	Impoundment Number	002	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IMPOUNDMENT INSPECTION

Inspection Date	November 7, 2005
Inspected By	Carl Winters
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly

1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.

No instability of the embankment was noted during the inspection. No hazardous conditions were noted at the time of the inspection.

Required for an impoundment which functions as a SEDIMENTATION POND.

2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.

Sediment Storage Capacity: 13,624 ft^3
60% Elevation: 7915.0 feet ASL (above sea level)
100% Elevation: 7915.6 ASL
The current elevation of the sediment within the pond at the discharge point was measured during the inspection at approximately 7914.34 feet ASL. Although the volume has apparently not changed significantly since the last quarter, approximately 308 tons of sediment was removed from the pond in June 2005. Typically, the track hoe tries to stay a safe distance from discharge standpipe, which could account for the same elevation being measured.

3. Principle and emergency spillway elevations.

Principle Spillway Elevation: 7919.7 feet ASL
Emergency Spillway Elevation: 7922 feet ASL
Total volume of pond at Spillway: 59,362 ft^3
Required runoff storage: 45,738 ft^3
100% Sediment Storage: 13,624 ft^3
60% Sediment Storage: 8,174 ft^3

[redacted] Information. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

Current water surface elevation was 7,917.16 feet ASL, 2.01 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond did not discharge during the 4th quarter 2005. The pond embankment appears stable and without noticeable erosion. Vegetation growing on the embankment and outslopes does not appear to create hazardous conditions.

5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

The geometry of the pond does not appear to have changed with the removing of sediment in June 2005. The sediment volume in the pond after sediment removal was estimated to be 10,527 ft^3 with a remaining sediment storage capacity of 3,097 ft^3. The volume calculations are based on a survey conducted in the Fall 2005. The maximum elevation during the year, which occurred in early spring when the pond did discharge, was approximately 7919.8.

[redacted]orage capacity of water and sediment combined is 59,362 ft^3 (2.2 ac-ft) – comparing the as-built drawings with the Fall 2005 survey. Assuming the sediment volume is approximately 10,527 ft^3, the estimated total water capacity remaining in the pond is approximately 48,835 ft^3 (1.12 ac-ft).

Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability. **Signature:** Carl W. Winters **Date:** 11-29-05

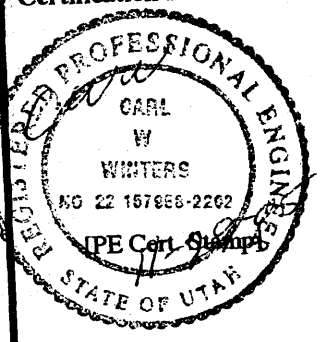
[redacted]

ERTIFIED REPORT

POUNDMENT EVALUATION (If NO, explain under Comments)	YES	NO
Is impoundment designed and constructed in accordance with the approved plan?	Yes	
Is impoundment free of instability, structural weakness, or any other hazardous condition?	Yes	
Has the impoundment met all applicable performance standards and effluent limitations from the previous date of inspection?	Yes	

OMMENTS AND OTHER INFORMATION

Certification Statement:



I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself or under my direction and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability in accordance with the Utah R645 Coal Mining Rules.

By:
Carl W. Winters, Engineering Manager

Signature: Carl W. Winters **Date:** 11-29-05

P.E. Number & State:
22-157958-2202 Utah

[redacted]DMENT INSPECTION AND CERTIFIED REPORT			
nit Number	C/007/005	Report Date	November 22, 2005
e Name	Skyline Mines		
npany Name	Canyon Fuel Company		
oundment ntification	Impoundment Name	Waste Rock Site Sediment Pond	
	Impoundment Number	003	
	UPDES Permit Number	UT0023540	
	MSHA ID Number	NA	

IPOUNDMENT INSPECTION

spection Date	November 7, 2005
spected By	Carl Winters
ason for Inspection nual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of nstruction)	Quarterly

Describe any appearance of any instability, structural weakness, or any other hazardous condition.

o i[redacted]ility was noted at the site during the quarterly pond site inspection.

tequired for an impoundment hich functions as a EDIMENTATION POND.	2. **Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.** Sediment Storage Capacity: 6906 ft^3 60% Elevation: 7860.8 feet ASL (above sea level) 100% Elevation: 7861.3 ASL Current Sediment Level Elevation: The pond was cleaned of sediment in July of 2004, including the small delta that had developed at the east end of the pond. At the time of the 4th quarter gob pile inspection, there was only a small puddle of water present in the lowest portion of the pond.
	3. **Principle and emergency spillway elevations.** Principal and Emergency Spillways Elevation: 7865.5 feet ASL (The outlet of Pond 003 serves as both the principal and emergency spillway).

Field Information. Provide current water elevation, whether pond is discharging, type and number of samples taken, monitoring/instrumentation information, inlet/outlet conditions, or other related activities associated with the pond including but not limited to sediment cleanout, pond decanting, embankment erosion/repairs, monitoring information, vegetation on outslopes of embankments, etc.

pond did not discharge in the fourth quarter of 2005 therefore no water samples were obtained. The pond had minimal water in it e time of the inspection. Water occupied only the lowest-most portion of the pond. The vegetation on the out slopes of the pond ankment do not appear to present any type of hazardous conditions. No instability was noted in the pond embankment.

Field Evaluation. Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure affecting its stability or function which has occurred during the reporting period.

changes have been noted in the geometry of the pond since the last inspection. The pond has evidently held very little water. The nd ap[illegible]s to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of inspection was less than 0.02 acre-feet.

Qualification Statement

I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability.

Signature: Jon W. Winters **Date:** 11-29-05

RTIFIED REPORT

POUNDMENT EVALUATION (If NO, explain under Comments)	YES	NO
Is impoundment designed and constructed in accordance with the approved plan?	Yes	
Is impoundment free of instability, structural weakness, or any other hazardous condition?	Yes	
Has the impoundment met all applicable performance standards and effluent limitations from the previous date of inspection?	Yes	

OMMENTS AND OTHER INFORMATION

ie pond has not discharged in 2005. There have been no reports of discharge from the pond this quarter. The construction of the nd has not been modified in several years.

Certification Statement:

[PE Cert. Stamp]

I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of impoundments in accordance with the certified and approved designs for this structure; that the impoundment has been maintained in accordance with approved design and meet or exceed the minimum design requirements under all applicable federal, state and local regulations; and, that inspections and inspection reports are made by myself or under my direction and include any appearances of instability, structural weakness or other hazardous conditions of the structure affecting stability in accordance with the Utah R645 Coal Mining Rules.

By: Carl W. Winters, Engineering Manager

Signature: Carl W. Winters **Date:** 11-29-05

P.E. Number & State: 22-157958-2002 Utah

APPENDIX B

Reporting of Technical Data

Including monitoring data, reports, maps, and other information
As required under the approved plan or as required by the Division

In accordance with the requirement of R645-310-130 and R645-301-140

CONTENTS

2005 Vegetation Report
Riparian Plant Communities, Winter Quarters Canyon & Woods Canyon, August 2005 – Mt. Nebo Scientific
Survey for Northern Goshawks & Three-toed Woodpeckers in Manti-La Sal National Forest, Mt. Nebo Scientific – **Confidential file**
Biological Survey for Sensitive Amphibian Species Within Select Areas of Winter Quarters and Woods Canyons
2005 Raptor Survey (letter), Utah Division of Natural Resources – **Confidential file**
Electrofishing Survey of Boardinghouse & Eccles Creeks: 2001 & Observations Made: 2002 & 2003 – **Confidential file**
An Assessment of the Macroinvertebrates of James Canyon Creek and Burnout Creek in September 2003 – Mt. Nebo Scientific
Results of the 2005 Annual Geomorphic Evaluation of Eccles and Mud Creeks, Earthfax Engineering
2005 Subsidence Monitoring Map

Canyon Fuel
Company, LLC.
Skyline Mine
A Subsidiary of Arch Western Bituminous Group, LLC

Gregg Galecki, Environmental Coord.
HCR 35, Box 380
Helper, UT 84526
(435) 448-2636 - Office
(435) 448-2632 - Fax

2005 Vegetation Report for Skyline Mine

The following seedlings were purchased from the Lone Peak Nursery in Draper Utah:

- Cliff Rose,
- White stem Rabbitbrush
- Utah Serviceberry

The seedlings were planted in May and June 2005 along the conveyor bench just west of the former vegetative test plot. The plants were grown from seeds collected from plants in Utah and Colorado at elevations similar to the mine site. The 2004 seedlings appeared to fare better than the 2003 seedlings; approximately 40 to 50% appeared to have survived the year. The 2005 seedlings appear to have done moderately well with an early success ratio of approximately 50% survival.

The following plants have been ordered for the spring of 2006: Curlleaf Mahogany, Fringed Sage, and Winterfat. These plants, provided the crop survives, will be planted in early May 2006 again in the former test plot area of the conveyor bench.

Riparian Plant Communities
Winter Quarters Canyon
&
Woods Canyon

August 2005

A Baseline Monitoring Study
for the
Skyline Mines

August 2005

Prepared by

Mt. Nebo Scientific, Inc.
330 East 400 South, Suite 6
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

Canyon Fuel Company, LLC.
Skyline Mines
HC 35 Box 380
Helper, Utah 84526

March 2006

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Quantitative Data 5

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INTRODUCTION

Underground coal mining activities have been planned in areas below Winter Quarters Canyon and Woods Canyon over the next several years. These canyons are located within the Wasatch Plateau, a high plateau that lies between the Colorado Plateau and Great Basin regions of western United States. The area is located about 3 miles west of the town of Scofield, in Carbon County, Utah. Winter Quarters Canyon and Woods Canyon are also located within the Manti-La Sal National Forest (Sec. 35, T.12 S, R6E; Sec. 2, 3, 10, 11, T13S, R6E). Geologically, most of the area is Cretaceous in age with formations present that include the Price River, North Horn and Blackhawk formations.

The dominant plant communities of these canyons were riparian, spruce-fir, aspen/grass, sagebrush/grass and mountain herblands. Because mining activities have been planned below perennial streams, a baseline study was conducted that concentrated on the riparian plant communities in the Winter Quarters and Woods canyons. Sample transect lines did, however, also extend into the adjacent upland communities.

The study was conducted in the growing season of 2005 at elevations between 8,200 ft and 8,600 ft above sea level. A variety of biological and other resource information can be studied to evaluate and characterize riparian complexes including vegetation, geology, channel morphology, aquatic biology, soils, and stream flow. The primary focus of this study was on vegetation, however, as a means of providing baseline data that could later be compared to followup studies by future

monitoring of the riparian communities in the Winter Quarters and Woods Canyons. Regular monitoring should provide data to determine long-term trends, natural variability and benchmark information including the possible impacts on the riparian plant communities from mining beneath the creeks of the canyons.

This study employed vegetation monitoring methods described by the USDA Forest Service for a "Riparian Area Evaluation". The study was not designed to provide data that could show *subtle* changes to community structure and species composition as a result of *minor* changes to the riparian habitat. Rather, the study was designed to be compared with future monitoring studies in an attempt to document *major* impacts to the plant communities along the stream due to catastrophic events, such as loss of water and habitat from the effects of subsidence caused from underground mining.

METHODS

The riparian vegetation of the perennial reaches in Winter Quarters Canyon and Woods Canyon including their tributaries have been surveyed. Field work for a baseline survey was conducted from August 26 through September 1, 2005. The vegetation monitoring methods of the study have been primarily based on those described by the USDA Forest Service manual for a *"Level III Riparian Area Evaluation"* (Integrated Riparian Evaluation Guide, March 1992). Qualitative and quantitative data were recorded at sample stations that were established in the field.

Sample Placement & Frequency

In the first year of the studies, the overall objective of the study plan was to begin with one complete baseline data set for all riparian areas near the perennial streams located in the mine permit area. For subsequent years, sample station locations will be pre-determined and mapped based on the time periods schedules for the proposed underground mining activities. Sample frequency have been, and will continue to be, intensified in those areas: 1) where underground mining is planned for the near future, 2) where mining is currently occurring, and 3) where mining has occurred in the recent past. Although subject to modification, the proposed sample frequency and placement have been described below.

Baseline Year: During the 2005 study year, a Level III Survey was modified to record the data listed on Table 1. The survey was conducted on all perennial streams and tributaries of Winter Quarters

TABLE 1: RIPARIAN COMPLEX DATA SHEET

CLIENT:
COMPLEX: Riverine - Number
WATERBODY NAME:
LOCATION:
DATE:
OBSERVER(S):
QUAD NAME:
GEOLOGIC PARENT MATERIAL:
ASPECT:
STREAM GRADIENT:
ELEVATION: .
ADJACENT UPLAND VEGETATION (looking downstream)
Left: Right:
VEGETATIVE DESCRIPTION (Dominance by Community Types)
SUCCESSIONAL STATUS:
APPARENT FORAGE TREND:
ESTIMATED FORAGE PRODUCTION:
BEAVER ACTIVITY:
PHOTOGRAPH TAKEN: (from right side unless otherwise stated)
LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA:
SPECIES OBSERVED:
POOL ATTRIBUTES
- % area in pools:
- % pool area made up of pools > 2' deep:

AQUATIC VEGETATION
- % streambed with filamentous algae:
- % stream margin with rooted aquatic:

BANK TYPE & VEGETATION OVERHANG
- % bank length undercut (<90°):
- % bank length gently sloping (>135°):
- % bank length with overhanging vegetation:

BANK CONDITION (bankfull area only)
- % bank length vegetated, stable:
- % bank length unvegetated, stable:
- % bank length vegetated, unstable:
- % bank length unvegetated, unstable:

NOTES:
QUANTITATIVE DATA SUMMARY:
PHOTOGRAPHIC DOCUMENTATION:

Creek and Woods Creek that were located within the permit area and proposed for future mining. The sample locations were placed at regularly spaced intervals, or approximately every 800 ft over the stream reaches – *with the exception of those areas where underground mining will first begin.* In areas to be mined in late- 2005, sample sites were placed at intervals closer to 400 ft. For this sample period, the area to be mined first was located in Section 11, T13S, R6E (see sample map).

Subsequent Years: In those years that follow the *Baseline Year* described above, the riparian vegetation surveys will concentrate on the current mine or recently mined areas. Or, in the areas where mining activities are planned under the streams, riparian sampling will be conducted: 1) two years prior to mining these areas, 2) the year of the mining activities, and 3) two years after mining has occurred in those areas. During these study periods, sample stations will be placed at the more-intensive interval spacing of 400 ft.

Line transects were placed at each station location. Locations and extent of the transects were semi-permanently marked using numbered and flagged wooden stakes, and 12-inch metal rods.

Geomorphological stream channel data outlined in the Level III protocol were not be recorded as part of this study because Canyon Fuel Company has conducted other studies that will suffice for this information. Additionally, soils information through the Natural Resources Conservation Service (NRCS) were not available for the study areas.

Qualitative Data

The "Riparian Complex Data Sheet" shown on Table 1 lists all of the qualitative and quantitative data that has been, and will continue to be, collected in the future at each sample station.

Photographic stations for documentation and future comparisons have also been established at each sample location. A sample location map has been included in this report.

Quantitative Data

As mentioned previously, USFS protocol was employed as a model to drive the study plan. The *Community Type Cover* is one method to record cover in the USFS Level III protocol. At the sample locations, transect lines have been placed across (or perpendicular to) the stream channel. By design, the line transects vary in lengths which are based on several factors. Although sometimes limited by topographical features such as cliffs, the intent was to make the transects long enough to cover the entire stream, its riparian communities, plus an additional 10 ft on each side of the stream to record the adjacent upland communities. Monitoring the total extent of the riparian plant communities including some upland community data should provide information about possible increases or decreases in the riparian communities relative to the adjacent upland communities.

Once the transects were placed, the line-intercept method was employed to measure the extent of

each major riparian plant community. The plant communities have been named by the dominant two plant species. If only one species dominates the community by a wide margin, the plant community was named by this single species. In this report, when reference is made to the left or right side of the drainage, this means "river left" or "river right", *as characterized by looking downstream.*

RESULTS & DISCUSSION

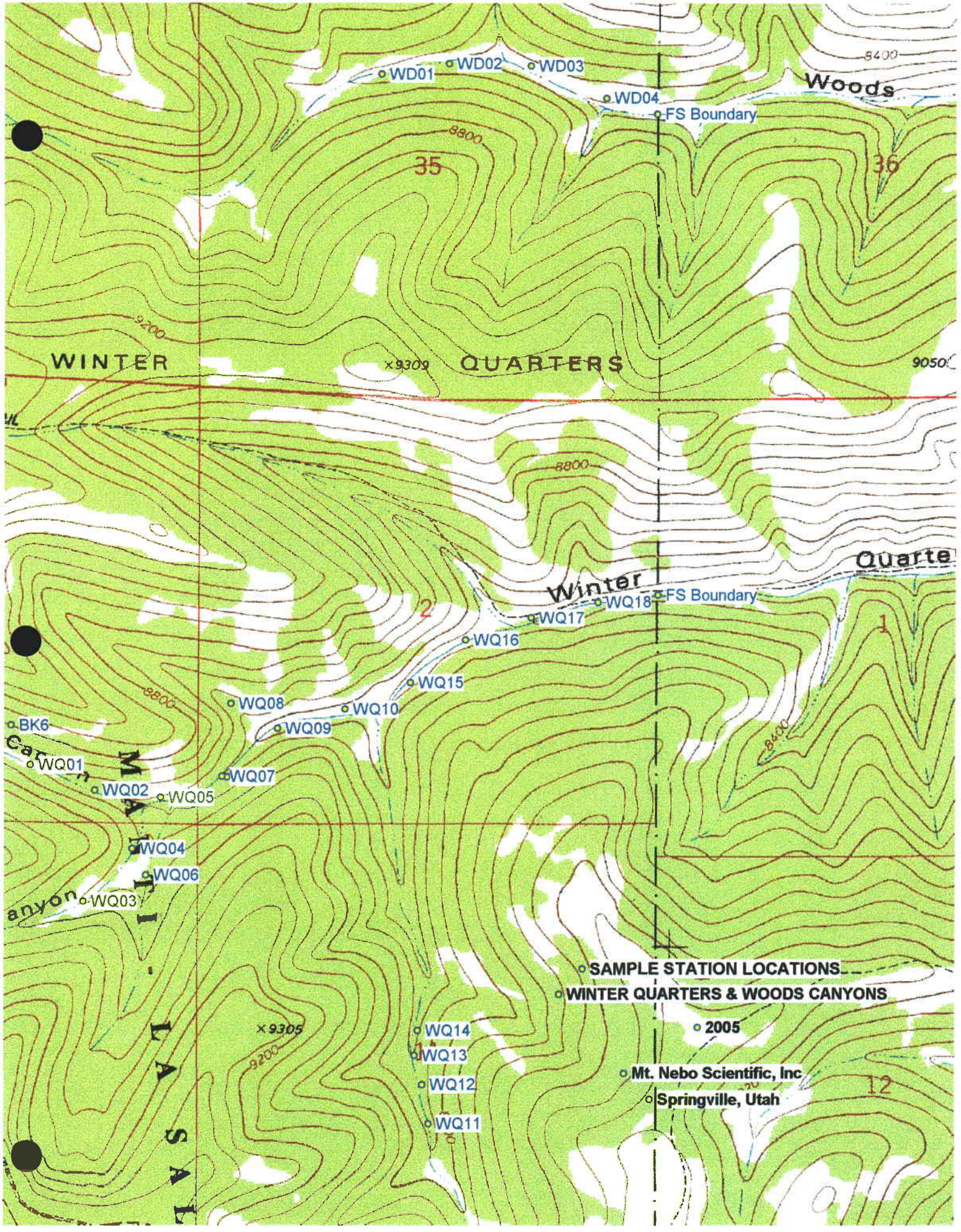
Listed below is a summary of the sample stations for the study areas in 2005 (Table 1). For a map of the locations, refer to the *Sample Station Locations for Winter Quarters Canyon & Woods Canyon* in this report.

TABLE 2: Riparian Sample Stations in Winter Quarters Canyon & Woods Canyon	
Winter Quarters Canyon	**Woods Canyon**
STATION NAME	STATION NAME
WQ-01	WD-01
WQ-02	WD-02
WQ-03	WD-03
WQ-04	WD-04
WQ-05	
WQ-06	
WQ-07	
WQ-08	
WQ-09	
WQ-10	
WQ-11	
WQ-12	
WQ-13	
WQ-14	
WQ-15	
WQ-16	
WQ-17	
WQ-18	

Sample results are shown for each site on the data sheets provided in this report. Each sheet shows all qualitative and quantitative data recorded as well as photographic documentation.

There was some thought in establishing "control" sample stations in riparian areas that are *not* proposed to be undermined in the future. Several areas were considered with map review, followed by observations of them in the field. However, the environmental conditions of these sites seemed

to be too dissimilar to be used as controls. Moreover, because many of the sample stations studied in this report are to be mined in the *distant* future. Consequently, these areas could represent controls *before mining has occurred under them*. For example, mining in Woods Canyon, Bob's Canyon, and much of Box Canyon are not scheduled to be mined until after the year 2010. It is therefore believed that several areas sampled for the 2005 baseline study reported in this document could be used as controls if desired for future study.


WD01
WD02
WD03
WD04
FS Boundary
Woods
8400
8800
35
36
WINTER
×9309
QUARTERS
9050
9200
8800
Winter
Quarte
WQ18
FS Boundary
WQ17
WQ16
WQ15
WQ08
WQ10
WQ09
BK6
WQ01
WQ07
WQ02
WQ05
WQ04
WQ06
WQ03
8400
SAMPLE STATION LOCATIONS
WINTER QUARTERS & WOODS CANYONS
2005
Mt. Nebo Scientific, Inc
Springville, Utah
WQ14
WQ13
WQ12
WQ11
×9305
9200
12

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-01

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; Bob's Canyon

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STREAM ASPECT: E

STREAM GRADIENT: ~2 °

ELEVATION: 8,687 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Snowberry Right: Blue spruce

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 600 lbs./acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Symphoricarpos oreophilus*	*Helianthella uniflora*	*Agrostis stolonifera*
	Rubus idaeus	*Veratrum californicum*	*Elymus canadensis*
		Senecio sp.	*Carex hoodii*
		Rumex crispus	
		Geranium richardsonii	
		Thalictrum fendleri	
		Urtica dioica	

POOL ATTRIBUTES

% area in pools: 10

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 30

% bank length with overhanging vegetation: 0

BANK CONDITION

% bank length vegetated, stable: 60

% bank length unvegetated, stable: 35

% bank length vegetated, unstable: 5

% bank length unvegetated, unstable: 0

NOTES:

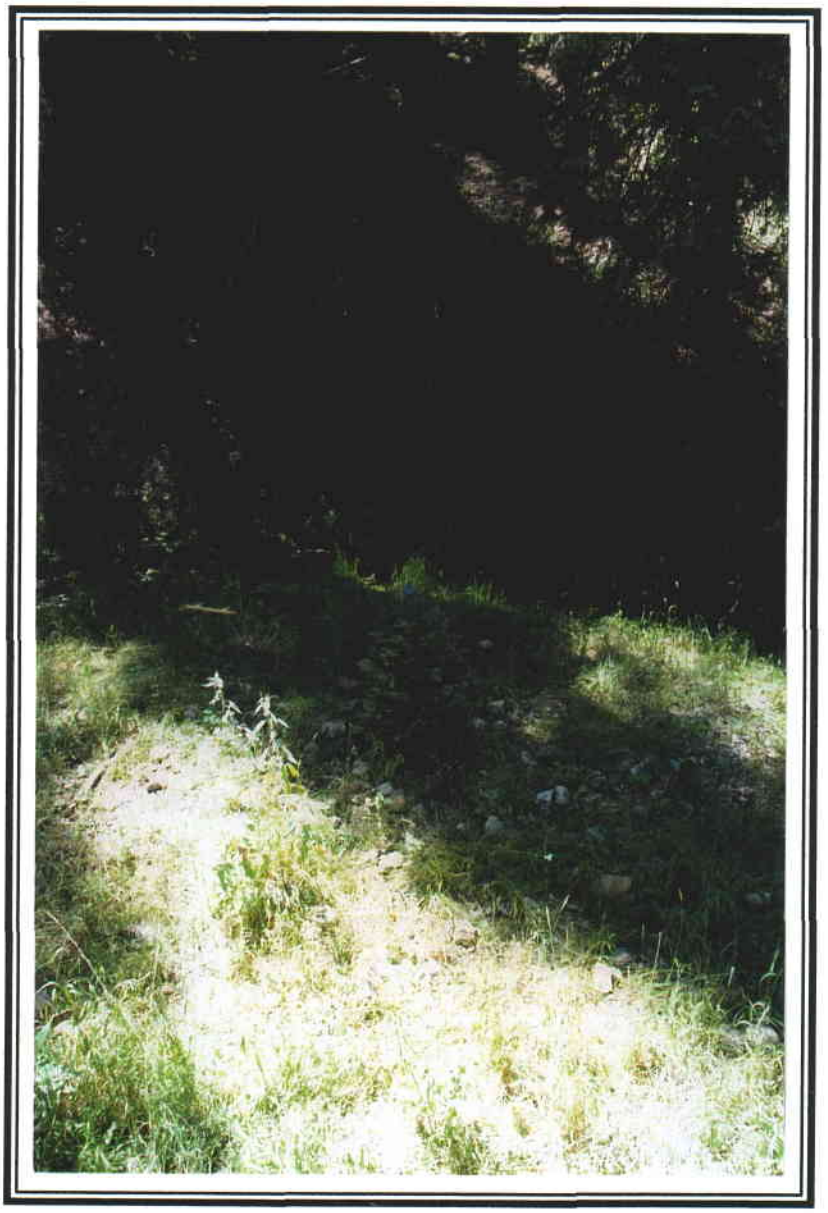
1) The left side bench was all riparian, with a higher spot of *Elymus canadensis* that also seemed to be a riparian area; the right side rose steeply to upland plants after 1.5 ft.
2) The may have been some hillside moisture influence here from the steep adjacent areas.

DATA SUMMARY

WQ-01: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Symphoricarpos oreophilus	10.00
Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	1.50
Carex hoodii/Agrostis stolonifera	12.50
Elymus canadensis	11.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	25.00
ROCK (channel)	0
WATER (channel)	4
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	49.00

PHOTOGRAPHIC DOCUMENTATION



WQ-01

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-02

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; Bob's Canyon

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: ~2°

ELEVATION: 8,619 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Snowberry Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 600 lbs./acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Equisetum arvense*	*Carex hoodii*
		Epilobium angustifolium	*Elymus canadensis*
		Helianthella uniflora	
		Lupinus argenteus	
		Rudbeckia occidentalis	
		Thalictrum fendleri	
		Urtica dioica	

POOL ATTRIBUTES

% area in pools: 20

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 20

% bank length with overhanging vegetation: 10

BANK CONDITION

% bank length vegetated, stable: 65

% bank length unvegetated, stable: 35

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

NOTES:

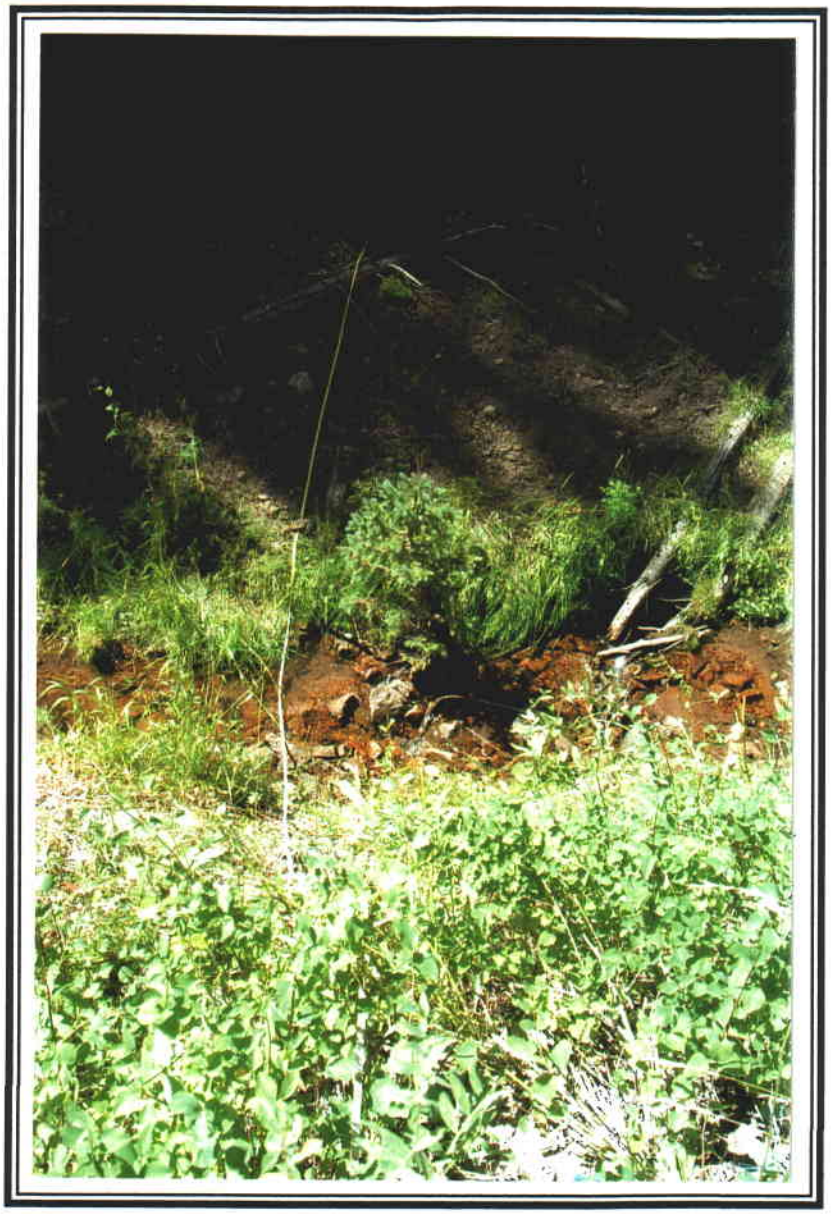
1) The right side had a bench that supported some riparian species, but it was probably due to hillside moisture, not the stream directly.
2) The riparian area measured was well defined below the right bench and left hillside.

DATA SUMMARY

WQ-02: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Abies concolor	10.50
Symhoricarpus oreophilus	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Carex hoodii	1.50
Carex hoodii/Agrostis stolonifera	2.00
TOTAL COVER (Upland Species)	20.50
TOTAL COVER (Riparian Species)	3.50
ROCK (channel)	2
WATER (channel)	2
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	28.00

PHOTOGRAPHIC DOCUMENTATION



WQ-02

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-03

WATERBODY NAME: Winter Quarters Canyon Creek; upper Box Canyon

LOCATION: Southern Wasatch Plateau, Utah; upper Box Canyon

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: ENE

STREAM GRADIENT: 2°

ELEVATION: 8,729 ft.

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Mtn. Herbland Right: Mtn. Herbland

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 1300 lbs./acre

BEAVER ACTIVITY: see Notes

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Helianthella uniflora*	*Bromus carinatus*
		Senecio serra	*Carex nebrascensis*
		Viguiera multiflora	*Carex hoodii*
			Juncus longistylis

POOL ATTRIBUTES

% area in pools: 50

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 50

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 30

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 90

BANK CONDITION

% bank length vegetated, stable: 90

% bank length unvegetated, stable: 10

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

NOTES:

1) This site was approx. 400 ft upstream frm a very old beaver dam.
2) There was very little water at the site - about 6 inches wide at ~ 1 gal/min flow.
3) This site's elev. may be too high to always observe water. This was a good water year; there may be no water here in lower prec. years.
4) The adjacent areas were open areas (Mtn. Herblands)

DATA SUMMARY

WQ-03: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Mountain Herbland	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Carex hoodii/Carex nebraskensis	4.00
Juncus longistylis/Carex hoodii	6.50
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	10.50
ROCK (channel)	0
WATER (channel)	0.5
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	31.00

PHOTOGRAPHIC DOCUMENTATION

WQ-03

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-04

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; lower Box Canyon

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: NE

STREAM GRADIENT: ~2 ^{o}

ELEVATION: 8,664 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Aspen/Mtn. Herbland Right: Blue Spruce/Mtn. Herbland

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 1100 lbs/acre

BEAVER ACTIVITY: Historical activity a few hundred feet upstream.

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Agastache urticifolia*	*Agrostis stolonifera*
Populus tremuloides		*Aster sp.*	*Carex hoodii*
		Geranium richardsonii	*Elymus canadensis*
		Ligusticum porteri	
		Lupinus sp.	
		Mimulus guttatus	
		Ranunculus cymbalaria	
		Senecio serra	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 25

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 5

% bank length gently sloping (>135°): 40

% bank length with overhanging vegetation: 50 (herb.)

BANK CONDITION

% bank length vegetated, stable: 90

% bank length unvegetated, stable: 10

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

:

NOTES:

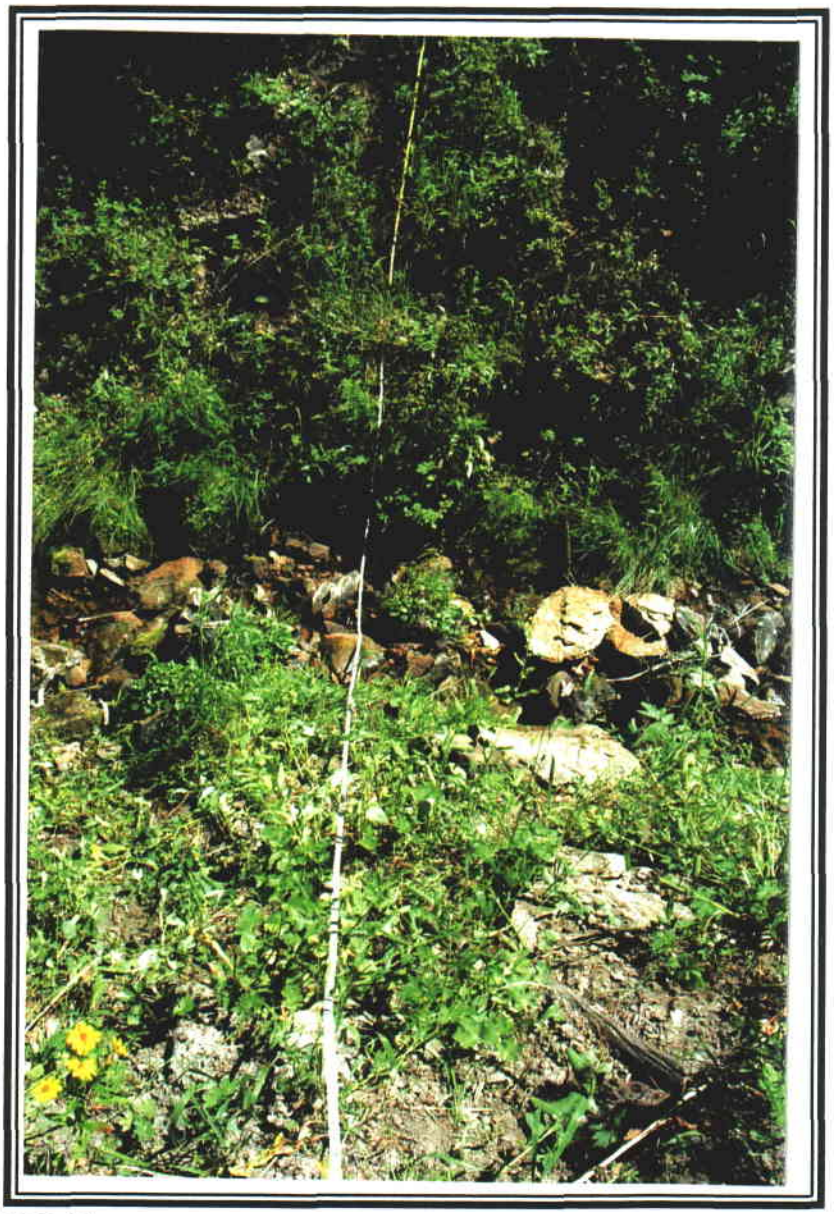
1) This site is approx. midway between main channel and upper Box Canyon sample point.

DATA SUMMARY

WQ04: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Populus tremuloidesMountain Herbland	10.00
Picea pungensMountain Herbland	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Geranium richardsonii	1.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	1.00
ROCK (channel)	4
WATER (channel)	3
BAREGROUND (channel)	0
LITTER	0
MOSS	1
TOTAL COVER	29.00

PHOTOGRAPHIC DOCUMENTATION



WQ-04

within the permit area RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-05

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; upper Winter Quarters

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: ~1-2°

ELEVATION: 8,568 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Aspen/Snowberry Right: Blue Spruce

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 150 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Salix sp.*	*Geranium richardsonii*	*Agrostis stolonifera*
Populus tremuloides	*Symphoricarpos oreophilus*	*Lupinus sp.*	*Elymus canadensis*
	Rubus idaeus	*Rudbeckia occidentalis*	*Elymus trachycaulus*

POOL ATTRIBUTES

% area in pools: 40

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 50

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 25

BANK CONDITION

% bank length vegetated, stable: 30

% bank length unvegetated, stable: 25

% bank length vegetated, unstable: 20

% bank length unvegetated, unstable: 25

:

NOTES:

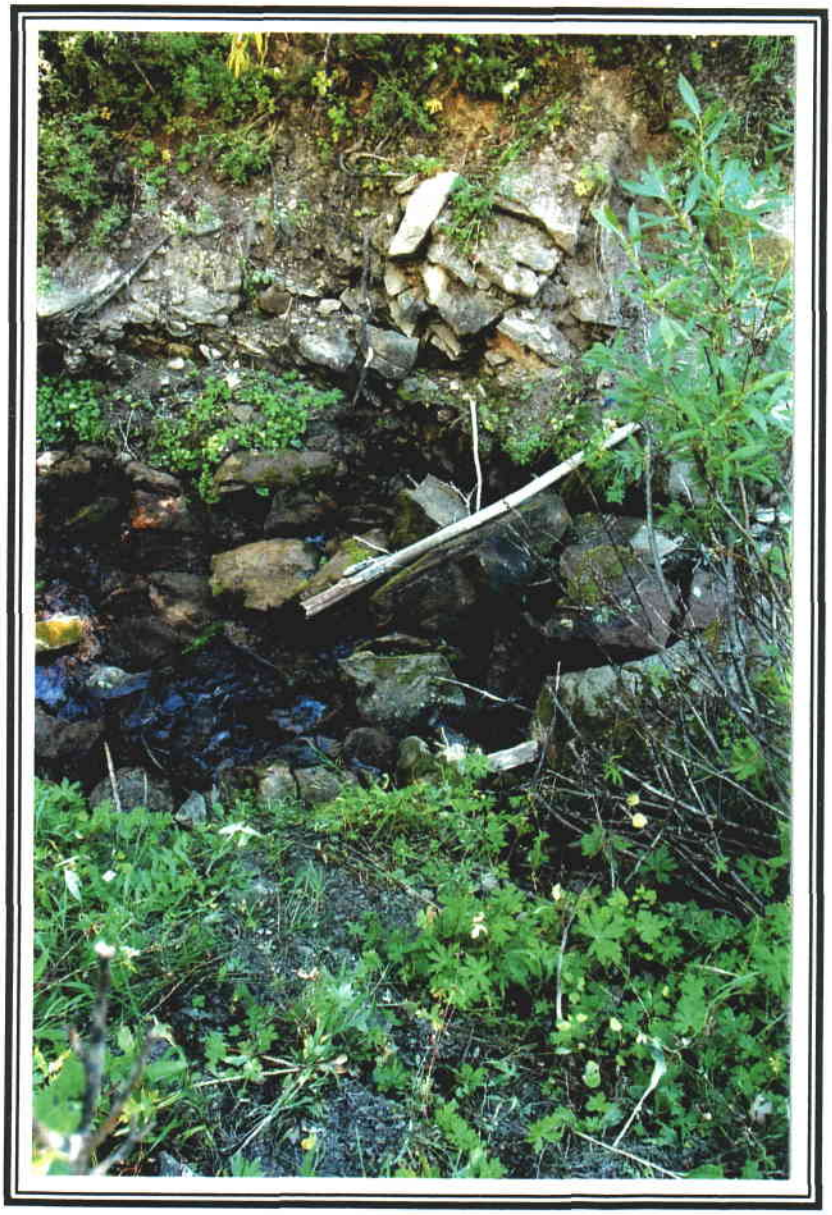
1) Site was located a little below the confluence with Box Canyon and a little above the confluence with a no-name drainage.
2) There was not much of a riparian zone here due to steep slope and rocky banks.

DATA SUMMARY

WQ-05: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens	10.00
Populus tremuloides/Symphoricarpos oreophilus	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	2.50
Agrostis stolonifera/Geranium richardsonii	2.00
Geranium richardsonii	4.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	8.50
ROCK (channel)	1
WATER (channel)	1.5
BAREGROUND (channel)	1
LITTER	0
MOSS	0
TOTAL COVER	32.00

PHOTOGRAPHIC DOCUMENTATION



WQ-05

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-06

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; Upper No-Name

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,709 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Blue Spruce Right: Blue Spruce

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 250 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea engelmannii		*Geranium richardsonii*	*Agrostis stolonifera*
		Osmorhiza obtusa	*Bromus carinatus*
		Ranunculus cymbalaria	
		Rudbeckia occidentalis	

POOL ATTRIBUTES

% area in pools: 35

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 50 (woody)

BANK CONDITION

% bank length vegetated, stable: 65

% bank length unvegetated, stable: 35

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

:

NOTES:

1) This was a good water year. Drier years may not show water at this site.
2) Flow was about 3 gal/min.
3) The right bank was steep and moisture from it may influence the riparian comm. in the springtime.

DATA SUMMARY

WQ-06: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens	10.00
Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	2.5
Agrostis stolonifera/Geranium richardsonii	2.00
Geranium richardsonii	4.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	8.50
ROCK (channel)	1
WATER (channel)	1.5
BAREGROUND (channel)	1
LITTER	0
MOSS	0
TOTAL COVER	32.00

PHOTOGRAPHIC DOCUMENTATION

WQ-06

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-07

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: NE

STREAM GRADIENT: ~1-2°

ELEVATION: 8,501 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Aspen Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 500 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Rubus idaeus*	*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Agastache urticifolia*	*Elymus canadensis*
		Galium bifolium	
		Geranium richardsonii	
		Mimulus guttatus	
		Ranunculus cymbalaria	
		Rudbeckia occidentalis	
		Senecio serra	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 40

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 10

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 45

% bank length gently sloping (>135°): 15

% bank length with overhanging vegetation: 10

BANK CONDITION

% bank length vegetated, stable: 40

% bank length unvegetated, stable: 20

% bank length vegetated, unstable: 40

% bank length unvegetated, unstable: 0

NOTES:

1) I had to search for riparian comm. here. I found a point bar with good vegetation but it seemed a little precarious and susceptible to loss by high runoff. It is located directly across from a 7 ft tall spruce tree.

DATA SUMMARY

WQ-07: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Abies concolor	10.00
Populus tremuloides	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	4.50
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	4.50
ROCK (channel)	0.5
WATER (channel)	9
BAREGROUND (channel)	0
LITTER	1
MOSS	0
TOTAL COVER	35.00

PHOTOGRAPHIC DOCUMENTATION

WQ-07

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-08

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah; "Lost Canyon" (my name)

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: SE

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,558 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Aspen/Picea pungens Right: Aspen/Grass

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 250 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Symphoricarpos oreophilus*	*Equisetum arvense*	*Elymus canadensis*
Populus tremuloides		*Geranium richardsonii*	
		Ranunculus cymbalaria	
		Rudbeckia occidentalis	

POOL ATTRIBUTES

% area in pools: 50

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 40 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 30

% bank length gently sloping (>135°): 50

% bank length with overhanging vegetation: 15

BANK CONDITION

% bank length vegetated, stable: 65

% bank length unvegetated, stable: 20

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 15

NOTES:

1) Poor GPS coverage here. Called the waypoint from the hillside and moved it down for the map.
2) Chris Hansen did not have this area on his map for us to monitor, but when I was in Gregg Galecki's office he added it.
3) There was a spring just downstream from this point ~ 200 ft.
3)

DATA SUMMARY

WQ-08: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Populus tremuloides	10
Populus tremuloides/Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Ranunuculus cymbalaria	3.50
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	3.50
ROCK (channel)	1.5
WATER (channel)	1
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	26.00

PHOTOGRAPHIC DOCUMENTATION

WQ-08

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-09

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2 °

ELEVATION: 8,398 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Blue Spruce Right: Blue Spruce

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Decreasing

ESTIMATED FORAGE PRODUCTION: 150 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Rubus idaeus*	*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Equisetum arvense*	*Carex hoodii*
		Geranium richardsonii	*Elymus canadensis*
		Lepidium montanum	*Phleum pratensis*
		Mimulus guttatus	
		Ranunculus cymbalaria	
		Urtica dioca	

POOL ATTRIBUTES

% area in pools: 10

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae:

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0 (upper bank was cut)

% bank length gently sloping (>135°): 50

% bank length with overhanging vegetation: 10

BANK CONDITION

% bank length vegetated, stable: 30

% bank length unvegetated, stable: 30

% bank length vegetated, unstable: 10

% bank length unvegetated, unstable: 30

NOTES:

1) The banks appeared to have a lot of pressure from grazing.
2) There was a spring flowing on left side but it should not influence this riparian area much.

DATA SUMMARY

WQ-09: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	3.00
Carex hoodii	1.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	4.00
ROCK (channel)	5
WATER (channel)	4
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	33.00

PHOTOGRAPHIC DOCUMENTATION

WQ-09

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-10

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,388 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Grass/Forb Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Decreasing (heavy grazing)

ESTIMATED FORAGE PRODUCTION: 1200 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Carduus nutans*	*Agrostis stolonifera*
		Circium spp.	
		Rudbeckia occidentalis	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 5

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 50

% bank length gently sloping (>135°): 30

% bank length with overhanging vegetation: 0

BANK CONDITION

% bank length vegetated, stable: 70

% bank length unvegetated, stable: 0

% bank length vegetated, unstable: 20

% bank length unvegetated, unstable: 10

NOTES:

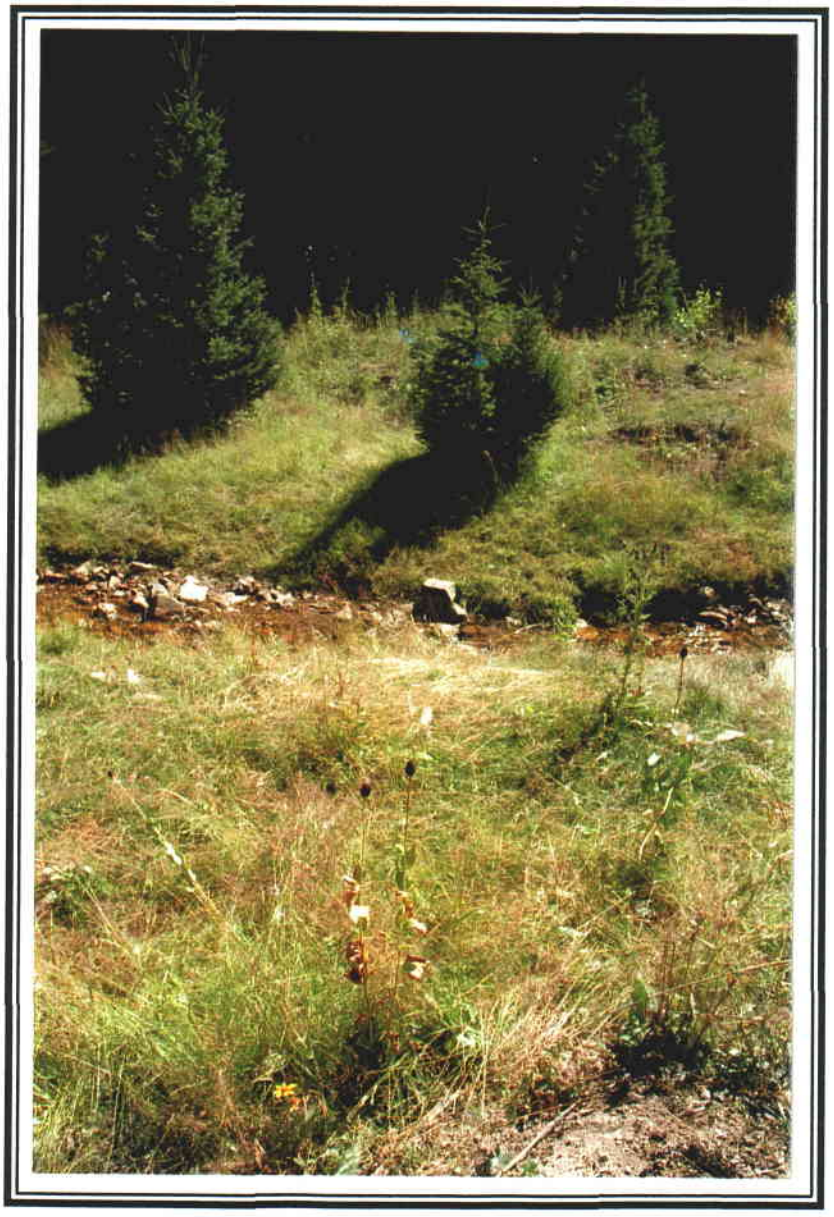
1) Heavy grazing pressure in this area.
2) Banks are eroding; soils with live redtop have fallen into stream.

DATA SUMMARY

WQ-10: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb	10.00
Picea pungens/Abies concolor	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	28.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	28.00
ROCK (channel)	0
WATER (channel)	5
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	53.00

PHOTOGRAPHIC DOCUMENTATION



WQ-10

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-11

WATERBODY NAME: Winter Quarters Canyon Creek (Section 11 tributary)

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,727 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Grass/Forb/Spruce/Aspen Right: Grass/Forb/Spruce/Aspen

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 500 lbs/acre

BEAVER ACTIVITY: Historical activity lower in this drainage.

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Ribes sp.*	*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Descurainia pinnata*	*Bromus carinatus*
		Delphinium barbeyi	*Carex hoodii*
		Geranium richardsonii	
		Equisetum arvense	
		Lupinus sp.	
		Osmorhiza obtusa	
		Ranunculus cymbalaria	

POOL ATTRIBUTES

% area in pools: 40

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 10 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 40

BANK CONDITION

% bank length vegetated, stable: 50

% bank length unvegetated, stable: 45

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 5

NOTES:

1) The bottom of the steep bank is where began the measurements for the riparian community.
2) The upper banks had some riparian species but it's obvious the they mostly influenced by side slope water.
3) In this Sec. 11 tributary of WQ Canyon, we sampled beginning at this WQ-11 site (or ~0.10 mi beyond where mining begins in 2006 to ~0.10 mile past it where it ends in 2006).
4) We sampled ~ every 400 ft along this reach.

DATA SUMMARY

WQ-11: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb/Picea pungens/Populus tremuloides	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	3.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	3.00
ROCK (channel)	1
WATER (channel)	3
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	27.00

PHOTOGRAPHIC DOCUMENTATION

WQ-11

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-12

WATERBODY NAME: Winter Quarters Canyon Creek (Section 11 tributary)

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,716 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Blue Spruce Right: Grass Forb (to Aspen higher)

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 500 lbs/acre

BEAVER ACTIVITY: Historical use lower in this drainage

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
		Equisetum arvense	*Agrostis stolonifera*
		Mimulus guttatus	*Elymus canadensis*
		Ranunculus cymbalaria	*Juncus hoodii*
		Rudbeckia occidentalis	*Juncus longistylis*
		Senecio sp.	

POOL ATTRIBUTES

% area in pools: 25

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 20 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 50

BANK CONDITION

% bank length vegetated, stable: 70

% bank length unvegetated, stable: 30

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

:

NOTES:

1) This site needs a stake on the left side. I used a thick stick this year to mark it.
2) On the right side there were 2 trails. The lower trail went through the same riparian comm. (about ½ of less is what I called riparian).
3) The "upland" area support some riparian species (i.e. buttercup and horsetail), but they were most likely the result of side-slope moisture.
4) We had poor GPS coverage in this area, so we paced between sites (160 paces for 400 ft).
5) What I called riparian area was next to stream.

DATA SUMMARY

WQ-12: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb	10.00
Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	2.00
Juncus longistylis/Ranunculus cymbalaria	1.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	3.00
ROCK (channel)	3
WATER (channel)	3
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	29.00

PHOTOGRAPHIC DOCUMENTATION

WQ-12

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-13

WATERBODY NAME: Winter Quarters Canyon Creek (Section 11 tributary)

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,673 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Spruce/Aspen Right: Aspen

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 1000 lbs/acre

BEAVER ACTIVITY: Historical use lower in canyon.

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Achillea millefolium*	*Agrostis stolonifera*
Populus tremuloides		*Aster sp.*	*Bromus carinatus*
		Epilobium sp.	*Carex hoodii*
		Geranium richardsonii	*Elymus canadensis*
		Helianthella uniflora	*Phleum alpinum*
		Mimulus guttatus	*Poa pratensis*
		Ranunculus cymbaria	
		Rudbeckia occidentalis	
		Senecio serra	
		Urtica dioica	

POOL ATTRIBUTES

% area in pools: 5

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 30 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 50

% bank length with overhanging vegetation: 5 (herb)

BANK CONDITION

% bank length vegetated, stable: 70

% bank length unvegetated, stable: 25

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 5

NOTES:

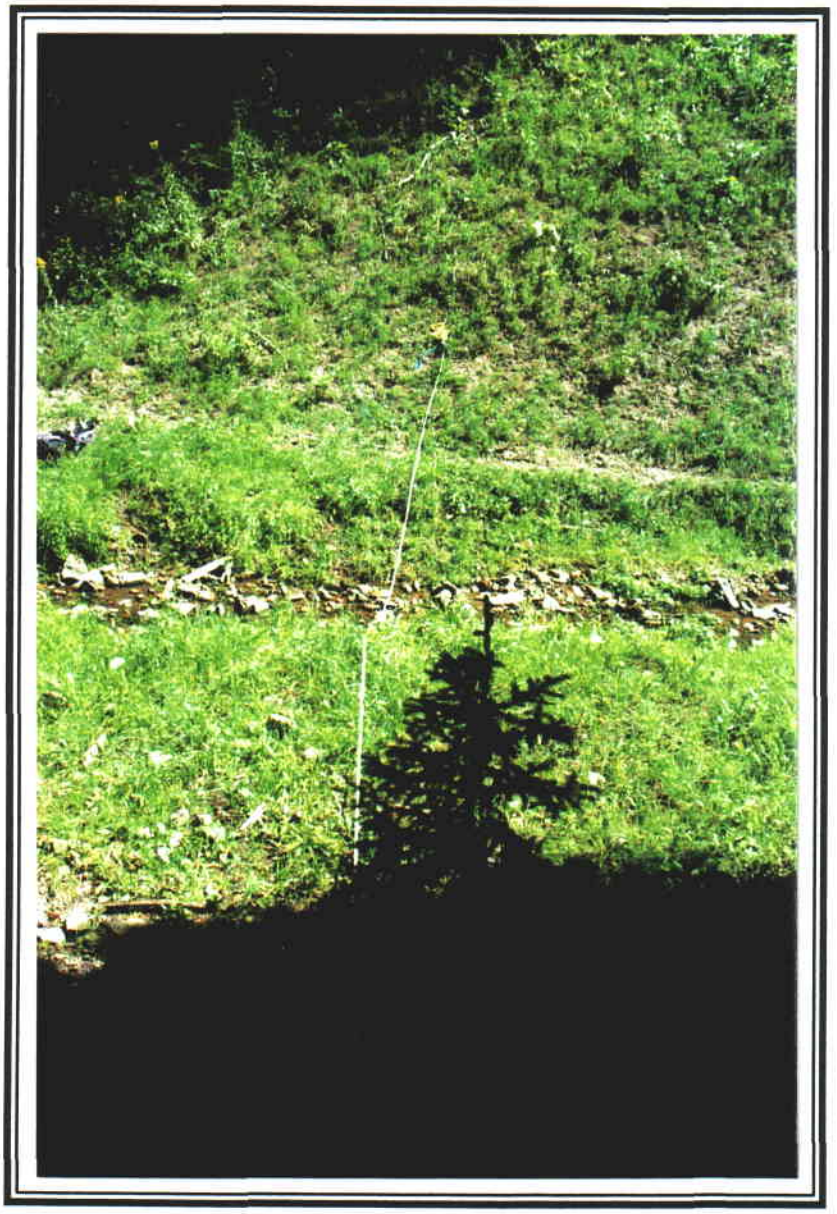
1) Unlike many other sites, the left side rose to a higher elevation. The species here seemed to be mostly influence by the stream (rather than hillside). I measured riparian species on the side from near the small blue spruce tree (5 ft) on the transect line.
2) This site needs a stake on the right side. I used a thick stick this year to mark it.

DATA SUMMARY

WQ-13: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Populus tremuloides	10.00
Populus tremuloides/Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	4.00
Carex hoodii/Agrostis stolonifera	13.50
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	17.50
ROCK (channel)	2.5
WATER (channel)	2
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	42.00

PHOTOGRAPHIC DOCUMENTATION



WQ-13

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-14

WATERBODY NAME: Winter Quarters Canyon Creek (Section 11 tributary)

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,658 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Spruce/Aspen Right: Spruce/Aspen

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: stable

ESTIMATED FORAGE PRODUCTION: 800 lbs/acre

BEAVER ACTIVITY: Historical use lower in canyon

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Ribes*	*Aster sp.*	*Agrostis stolonifera*
Populus tremuloides		*Delphinium barbeyi*	*Carex hoodii*
		Geranium richardsonii	*Elymus canadensis*
		Helianthella uniflora	
		Ranunculus cymbalaria	
		Urtica dioica	
		Vicia americana	

POOL ATTRIBUTES

% area in pools: 20

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 10 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 20

% bank length gently sloping (>135°): 65

% bank length with overhanging vegetation: 10

BANK CONDITION

% bank length vegetated, stable: 90

% bank length unvegetated, stable: 7

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 3

:

NOTES:

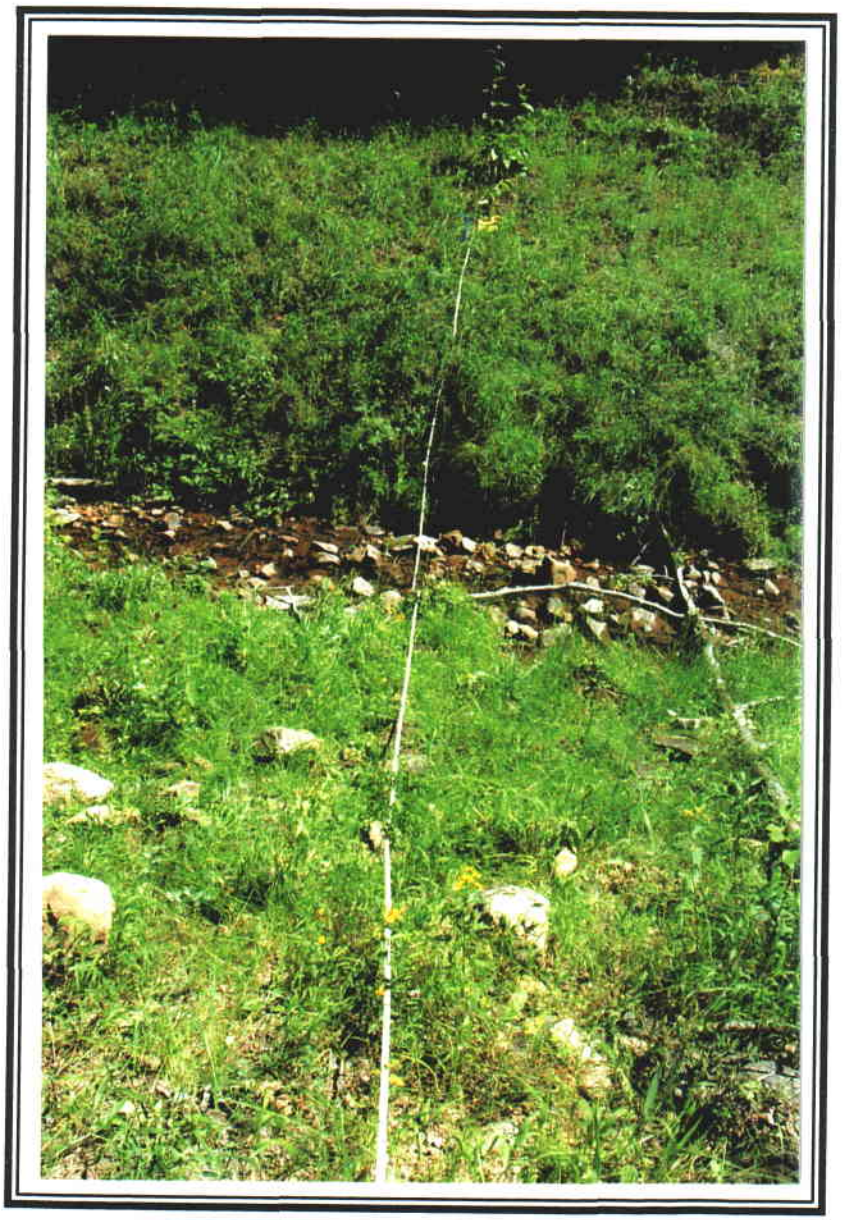
1) Like WQ-13, the left side rose to a higher elevation. The species here seemed to be mostly influence by the stream (rather than hillside).

DATA SUMMARY

WQ-14: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Populus tremuloides/Picea pungens	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Ranunuculus cymbalaria	7.50
Carex hoodii/Agrostis stolonifera	1.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	8.50
ROCK (channel)	1.5
WATER (channel)	3
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	33.00

PHOTOGRAPHIC DOCUMENTATION



WQ-14

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-15

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: NE

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,328 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Grass/Forb Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Unstable

APPARENT FORAGE TREND: Decreasing

ESTIMATED FORAGE PRODUCTION: 600 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Chrysothamnus nauseosus*	*Achillea millefolium*	*Agrostis stolonifera*
		Carduus nutans	*Phleum pratensis*
		Circium spp.	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 5

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 25

% bank length with overhanging vegetation: 5

BANK CONDITION

% bank length vegetated, stable: 70

% bank length unvegetated, stable: 5

% bank length vegetated, unstable: 20

% bank length unvegetated, unstable: 5

:

NOTES:

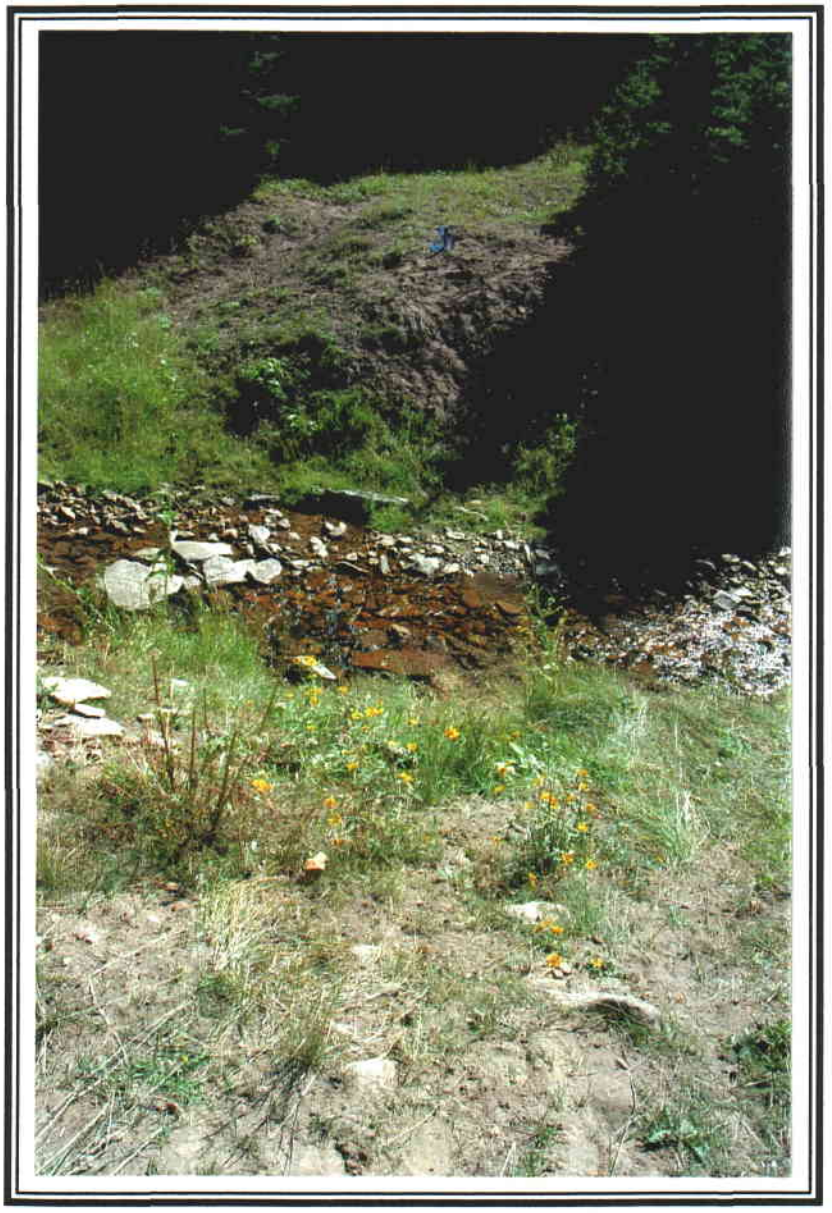
1) By the amount of bareground on the upper elevation banks, grazing pressure seems evident.
2) However, the banks near the stream seemed rather stable.

DATA SUMMARY

WQ-15: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb	10.00
Picea pungens/Abies concolor	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	9.50
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	9.50
ROCK (channel)	1
WATER (channel)	6.5
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	37.00

PHOTOGRAPHIC DOCUMENTATION



WQ-15

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-16

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: ENE

STREAM GRADIENT: ~1-2°

ELEVATION: 8,313 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Grass/Forb Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 1100 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Salix sp.*	*Achillea millefolium*	*Agrostis stolonifera*
	Symphoricarpos oreophilus	*Circium sp.*	
		Geranium richardsonii	
		Helianthella uniflora	
		Potentilla gracilis	
		Rudbeckia occidentalis	
		Trifolium sp.	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 25

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 50

% bank length gently sloping (>135°): 50

% bank length with overhanging vegetation: 2

BANK CONDITION

% bank length vegetated, stable: 90

% bank length unvegetated, stable: 5

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 5

NOTES:

1) I only marked 6 ft of upland comm. on left side, otherwise stake would have been on the main trail.

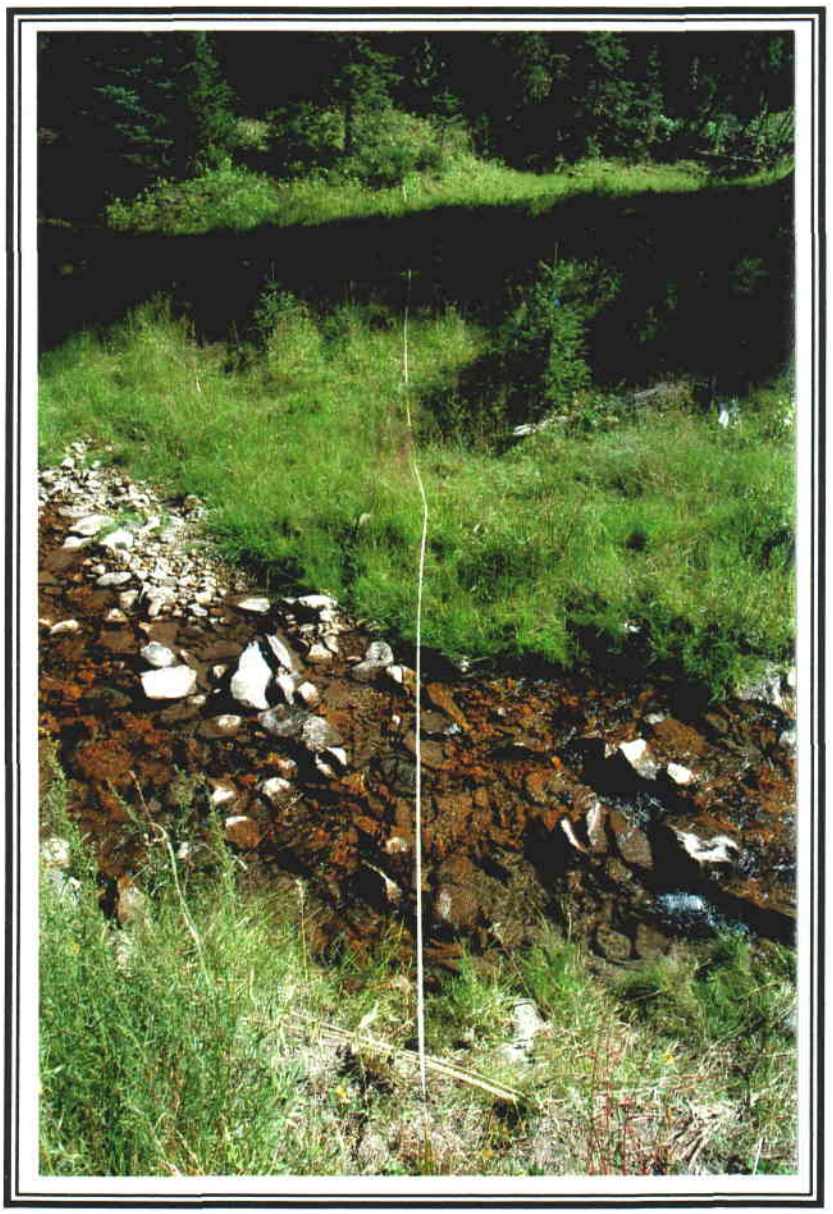
2) The riparian comm. was so wide on the right side that maybe it's influence by water from hillside, but it seemed more stream influence to me.

DATA SUMMARY

WQ-16: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb	6.00
Picea pungens/Abies concolor	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	41.00
TOTAL COVER (Upland Species)	16.00
TOTAL COVER (Riparian Species)	41.00
ROCK (channel)	0
WATER (channel)	7
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	64.00

PHOTOGRAPHIC DOCUMENTATION



WQ-16

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-17

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8262 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Sagebrush/Grass Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 1300 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Salix sp.*	*Achillea millefolium*	*Agrostis stolonifera*
		Circium sp.	*Elymus canadensis*
		Fragaria vesca	*Juncus arcticus*
		Potentilla gracilis	*Phleum pratensis*
		Rudbeckia occidentalis	
		Verbascum thapsus	

POOL ATTRIBUTES

% area in pools: 20

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 10

% bank length gently sloping (>135°): 10

% bank length with overhanging vegetation: 5

BANK CONDITION

% bank length vegetated, stable: 80

% bank length unvegetated, stable: 10

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 10

NOTES:

1) We were not sure why there was such a wide comm. of riparian species on both side of the creek.

DATA SUMMARY

WQ-17: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Artemisia tridentata/Grass	10.00
Picea pungens/Abies concolor	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Equisetum arvensis	79.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	79.00
ROCK (channel)	0
WATER (channel)	7
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	106.00

PHOTOGRAPHIC DOCUMENTATION

WQ-17

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-18

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,232 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Grass/Forb Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Stable

ESTIMATED FORAGE PRODUCTION: 1100 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Symphoricarpos óreophilus*	*Achillea millefolium*	*Agrostis stolonifera*
		Carduus nutans	*Juncus arcticus*
		Fragaria vesca	*Juncus hoodii*
		Geranium richardsonii	
		Helianthella uniflora	
		Rudbeckia occidentalis	
		Urtica dioica	
		Viola adunca	

POOL ATTRIBUTES

% area in pools: 35

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 25

BANK CONDITION

% bank length vegetated, stable: 80

% bank length unvegetated, stable: 20

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

NOTES:

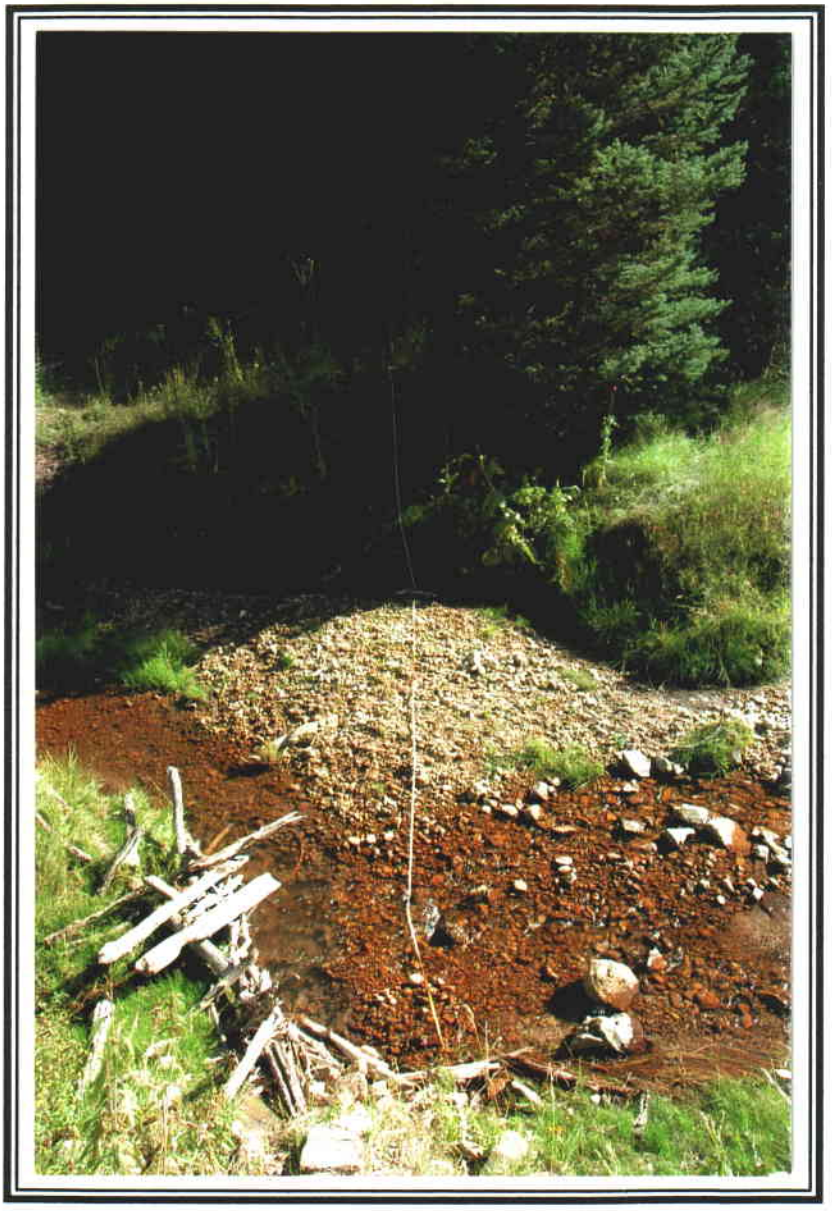
1) Upper left bank was unstable.
2) There was lots of dry cobble on channel bottom.
3) We ended the study area her because we were < 0.15 mile for the FS boundary.

DATA SUMMARY

WQ-18: Baseline plant community cover types in Winter Quarters Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Grass/Forb	10.00
Picea pungens/Abies concolor	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	45.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	45.00
ROCK (channel)	14
WATER (channel)	7
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	86.00

PHOTOGRAPHIC DOCUMENTATION



WQ-18

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWD-01

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: ENE

STREAM GRADIENT: 1-2°

ELEVATION: 8,475 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Blue Spruce Right: Blue Spruce

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 1000 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens		*Helianthella uniflora*	*Agrostis stolonifera*
		Mimulus guttatus	*Carex hoodii*
		Potentilla gracilis	*Hordeum brachyantherum*
		Ranunculus cymbalaria	
		Urtica dioica	

POOL ATTRIBUTES

% area in pools: 50
% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0
% stream margin with rooted aquatic: 50

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 20
% bank length gently sloping (>135°): 60
% bank length with overhanging vegetation: 0

BANK CONDITION

% bank length vegetated, stable: 60
% bank length unvegetated, stable: 25
% bank length vegetated, unstable: 5
% bank length unvegetated, unstable: 10

:

NOTES:

1) Upland vs riparian comm. were obvious due to bank elevation increase.

DATA SUMMARY

WD-01: Baseline plant community cover types in Woods Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Grass	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	9.00
Hordeum brachyantherum/Rancunculus cymbalaria	2.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	11.00
ROCK (channel)	1
WATER (channel)	8
BAREGROUND (channel)	2.5
LITTER	2.5
MOSS	0
TOTAL COVER	45.00

PHOTOGRAPHIC DOCUMENTATION

WD-01

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWD-02

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2°

ELEVATION: 8,444 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Blue Spruce/Grass Right: Blue Spruce/Grass

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 800 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Picea pungens	*Rubus idaeus*	*Achillea millefolium*	*Juncus longistylis*
		Geranium richardsii	*Elymus canadensis*
		Lathyrus sp.	
		Mimulus guttatus	
		Urtica dioica	
		Viguiera multiflora	

POOL ATTRIBUTES

% area in pools: 20
% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0
% stream margin with rooted aquatic: 5

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 25
% bank length gently sloping (>135°): 30
% bank length with overhanging vegetation: 50 (herb)

BANK CONDITION

% bank length vegetated, stable: 55
% bank length unvegetated, stable: 45
% bank length vegetated, unstable: 0
% bank length unvegetated, unstable: 0

NOTES:

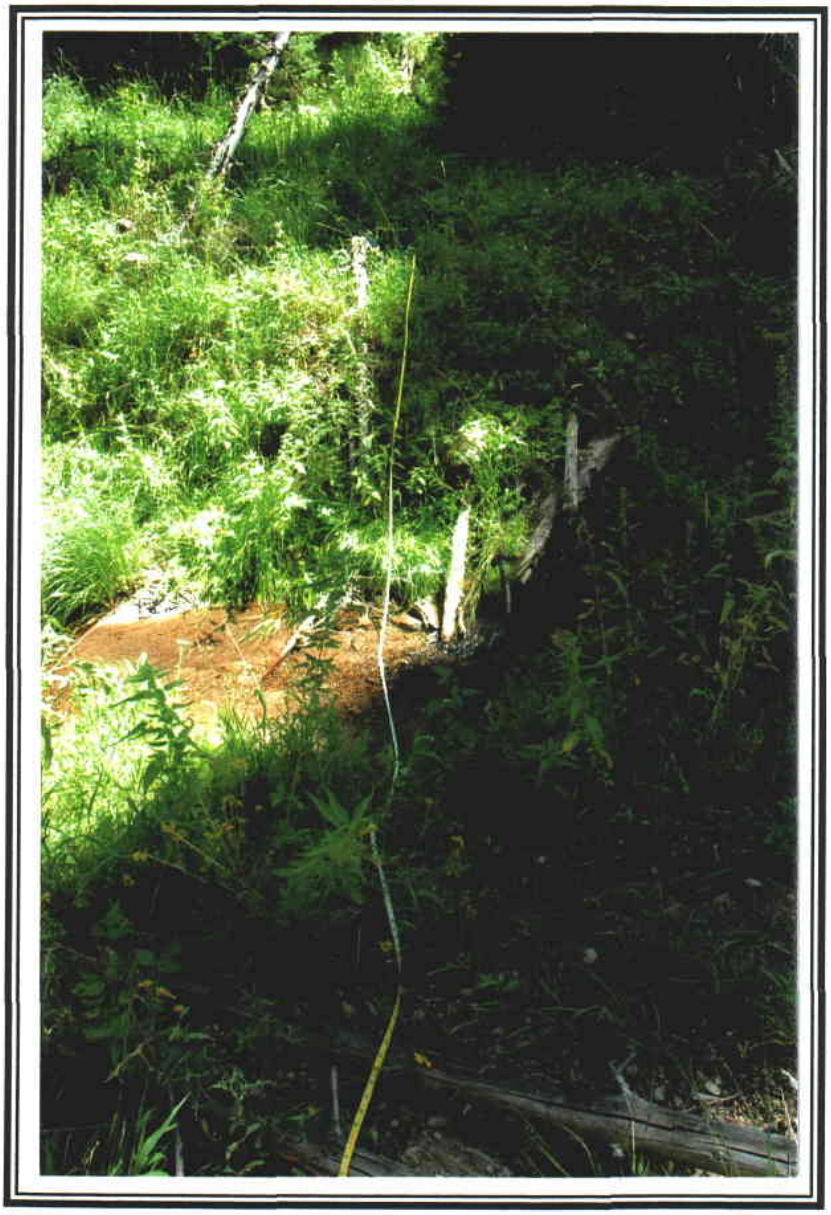
1) The location of this site was just down from red ($1000 fine) sign.
2) A well-defined channel delineated the riparian comm.
3) Bank elevation went up ~ 3.5 ft above stream.

DATA SUMMARY

WD-02: Baseline plant community cover types in Woods Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Grass	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Geranium richardsonii/Equisetum arvense	1.00
Urdica dioica/Elymus canadensis	2.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	3.00
ROCK (channel)	0
WATER (channel)	3
BAREGROUND (channel)	3
LITTER	0
MOSS	0
TOTAL COVER	29.00

PHOTOGRAPHIC DOCUMENTATION



WD-02

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWD-03

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: ESE

STREAM GRADIENT: 1-2°

ELEVATION: 8,392 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Nettle/Grass Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 700 lbs/acre

BEAVER ACTIVITY: No

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Abies concolor	*Fragaria vesca*	*Epilobium angustifolium*	*Agrostis stolonifera*
Picea pungens	*Rosa woodsii*	*Taraxacum officinale*	*Carex nebrascensis*
		Vicia americana	*Hordeum brachyantherum*
		Viguiera multiflora	*Juncus longistylis*
		Urtica dioica	

POOL ATTRIBUTES

% area in pools: 0

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 0

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 0

% bank length gently sloping (>135°): 0

% bank length with overhanging vegetation: 0

BANK CONDITION

% bank length vegetated, stable: 0

% bank length unvegetated, stable: 0

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 0

:

NOTES:

1) This sample site was located 0.18 mile downstream (instead of 0.15 mi) because if complexity of measuring the communities a 0.15 mile (it was near drainage confluence).

DATA SUMMARY

WD-03: Baseline plant community cover types in Woods Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Abies concolor	10.00
Urdica dioica/Grass spp.	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	4.50
Carex nebraskenis/Agrostis stolonifera	4.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	8.50
ROCK (channel)	1
WATER (channel)	3.5
BAREGROUND (channel)	0
LITTER	0
MOSS	0
TOTAL COVER	33.00

PHOTOGRAPHIC DOCUMENTATION

WD-03

RIPARIAN COMPLEX DATA SHEET
AUGUST 2005

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWD-04

WATERBODY NAME: Winter Quarters Canyon Creek

LOCATION: Southern Wasatch Plateau, Utah

DATE: August 26, 2005 - September 1, 2005

OBSERVER(S): P.D. Collins[2]

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: E

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,321 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Woods Rose/Grass Right: Spruce/Fir

VEGETATIVE DESCRIPTION (Dominance by Community Types)

Community Name	% of Complex
(refer to quantitative data results for this information)	

SUCCESSIONAL STATUS: Climax

APPARENT FORAGE TREND: Increasing

ESTIMATED FORAGE PRODUCTION: 700 lbs/acre

BEAVER ACTIVITY: no

PHOTOGRAPH TAKEN: Yes

LAND USE ACTIVITIES THAT COULD INFLUENCE RIPARIAN AREA: Mining, grazing, hunting, recreation.

SPECIES OBSERVED:

Trees	Shrubs	Forbs	Grasses (or grasslike)
Abies concolor	*Ribes sp.*	*Artemisia dracunculus*	*Agrostis stolonifera*
Picea pungens		*Equisetum arvense*	*Juncus longistylis*
		Fragaria vesca	
		Geranium richardsonii	

POOL ATTRIBUTES

% area in pools: 40

% pool area made up of pools > 2' deep: 0

AQUATIC VEGETATION

% streambed with filamentous algae: 0

% stream margin with rooted aquatic: 10

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 40

% bank length gently sloping (>135°): 40

% bank length with overhanging vegetation: 35

BANK CONDITION

% bank length vegetated, stable: 60

% bank length unvegetated, stable: 20

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 20

NOTES:

1) We put this sample site 0.18 mi (not 0.15) from last site because of the spring at 0.15 mi on the left side would have made it difficult to measure accurately.
2) Both upland sides seemed to have hillside water influence.
3) This was the final sample site in Woods Canyon. Therefore, there was a buffer at the top and bottom ends. It was located < 0.15 mile from the FS boundary.

DATA SUMMARY

WD-04: Baseline plant community cover types in Woods Canyon riparian areas (August 2005).
USDA Forest Service Protocol (1992)

UPLAND VEGETATION	
Picea pungens/Abies concolor	10.00
Rosa woodsii/Grass spp.	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	1.00
Agrostis stolonifera/Juncus longistylis	4.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	5.00
ROCK (channel)	0
WATER (channel)	4
BAREGROUND (channel)	2
LITTER	0
MOSS	0
TOTAL COVER	31.00

PHOTOGRAPHIC DOCUMENTATION

WD-04

Biological Survey for Sensitive Amphibian Species Within Select Areas of Winter Quarters & Wood Canyons

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September 2005

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INTRODUCTION

Several amphibian species native to Utah have been experiencing significant declines in recent years, mostly as a result of degradation and loss of vital habitat. Many of these species are now on state and/or federal lists as a result of these declines. In order to address the threats facing many of these species, regulatory agencies suggest that biological inventories be conducted on activities that may negatively impact these species or the habitat that they depend upon.

Underground mining activities are tentatively planned for areas associated with Winter Quarters Canyon and Woods Canyon in Carbon County, Utah. In an effort to identify potential impacts as a result of these mining activities, biological surveys were conducted 1) to determine if potential aquatic habitat existed for two amphibian species of concern; spotted frog, *Rana luteiventris*, and the boreal toad, *Bufo boreas* and 2) to detect presence of these two species within the proposed project area.

General Habitat Requirements and Distribution of Target Species

Both species typically inhabit a variety of habitat types including cold water ponds, streams, lakes, and springs adjacent to mixed coniferous and subalpine forest, grassland and brush land usually below 2300 m a.s.l for spotted frog and below 2800 m a.s.l. in Utah. Habitat usually consists of a small spring, pond or slough with a variety of herbaceous emergent, floating, and submergent vegetation. Vegetation most commonly associated with these species includes: bullrush (*Scirpus sp.*), sedges (*Carex spp*), cattails (*Typha sp.*), duckweed (*Lemnaceae sp.*), rushes (*Juncus spp.*), watercress (*Nasturtium officinale*), grasses (Graminae) and algae.

Spotted frog breeding occurs early with the spring thaw and although spotted frog are known to use temporary bodies of water for breeding in more mesic parts of their range, in Utah, breeding sites are predominantly associated with a spring or some other permanent water source. Spotted frogs begin breeding in early-March and continue to the middle of April however, breeding populations at higher elevations tend to begin breeding toward the end of March and can continue through the first of May. Boreal toads begin breeding can occur from early May through mid July depending on

weather conditions and elevation. Both tend to breed in shallow, standing water, often within 2 m on the northwestern or northern side of a small wetland. Wetland types vary widely as long as required microhabitat characteristics are present. Usually flow rates in breeding sites are nonexistent or very slight resulting in standing water habitats. Water temperatures during breeding typically range between 11°C and 20°C.

Following the breeding season, adult and juvenile spotted frog tend to occupy predominately standing water habitats such as pools, oxbows along stream systems, emergent sloughs, beaver ponds, springs, and artificial ponds, usually with a cool water inflow source. Typical characteristics include average water temperatures between 15° C and 20° C, organic substrates, abundant grasses, sedges, and some canopy as well as abundant structures such as logs, downed tree trunks and other debris. This is similar to juvenile boreal toads following the breeding season; however, adult boreal toads usually leave breeding habitats migrating back to upland areas.

During summer periods, larvae of both species tend to use open, shallow, warmer water averaging between 16° C and 25° C. Areas with deeper water used to escape predation and periods of inclement weather are usually nearby. Substrates typically consist of fine sediments, mostly organic. Vegetation usually consists of abundant submerged and floating vegetation and algae.

Distribution of spotted frog near the Wasatch Plateau is limited to areas in Sanpete County near the town of Fairview. Spotted frogs have been documented in Utah County but not within the small portion of this county that rises near the Wasatch Plateau. No records of spotted frog presence have been documented along the eastern portions of the Wasatch Plateau or in the Colorado River Drainage Basin. Distribution of boreal toad along the Wasatch Plateau (including Carbon County) has been documented and presence is considered "confident" by the Utah Natural Heritage Program. Records of boreal toad have also been documented in areas near Scofield Reservoir.

Survey Area

The areas that were surveyed included all aquatic habitat within a 25-30 meter corridor along the mainstem streams and their tributaries in Winter Quarters Canyon (including Bobs and Box Canyons) and Woods Canyon. All areas surveyed were above 2450 m a.s.l.

METHODOLOGY

Survey Approach

We conducted an area-based survey that targeted spotted frog and boreal toad within the survey area. Techniques used for surveying these species focused on methods suitable for these species. For the most part, the field techniques were methods of general observation as historically practiced by biologists and included searching for organisms in all possible microhabitats during the appropriate season and time of day. The general approach used for conducting this survey was based on short-term, time-constrained visual encounter surveys (VES's). Specific methodologies used are described below. All methods for sampling the project area were consistent with protocols and methods established by Heyer et al 1994, Corn and Bury 1990, and the State of Utah, Division of Wildlife Resources standard protocols established spotted frog and boreal toad

Amphibian Survey Methodology

VES's and audio strip transects (AST's) were used to detect presence/no presence detected of target species during the estimated peak breeding activity periods. For spotted frog populations in Utah this period can occur from mid-March through late-April depending on weather conditions and elevation. Since the elevation of the survey area is between 8000 and 8500 feet, it was anticipated that surveys would not be conducted until mid-late April. Peak breeding activity of other high elevation spotted frog populations (e.g. Wasatch County) were used to target survey dates within the survey area. VES's were conducted along the stream within a 25-30-meter corridor. For

boreal toad populations in Utah the peak breeding period can occur from early May through mid-July depending on weather conditions and elevation. Surveys were initially targeted for early June since the elevation of the survey area is between 8000 and 8500 feet. Peak breeding activity of other boreal toad populations were also used to better determine survey dates within the survey area.

RESULTS

Identification of Habitat and Presence of Amphibians

Three habitat and amphibian surveys were conducted from May to August 2005. The first habitat and amphibian survey was conducted on May 14 and 15th, 2005. The primary purpose of this survey was to identify any suitable habitat within the project area for both amphibian species. Areas that were accessible for habitat surveys included only the lower reach of Winter Quarters Canyon below its south fork tributary and a small segment within the south fork tributary (Section 11). Deep snow prevented either access and/or detection of potentially suitable habitats in all other areas. Three potentially suitable habitats were identified within Winter Quarters Canyon (Table 1, Figures 2 – 4). No amphibians or sign were observed or heard during this survey.

A second habitat and amphibian survey was conducted on June 19 and 20, 2005. All reaches and tributaries within the project area were accessible at this time. Although several seeps were identified in Box Canyon, Bobs Canyon, the tributary east of Bobs Canyon, and along all reaches of Winter Quarters Canyon, we did not identify any additional potentially suitable amphibian habitat within the survey corridor. Woods Canyon was surveyed during this second sampling period. Potentially suitable habitat was identified only in the lower reach near the Forest Service boundary (Table 1, Figure 5). No amphibians or their sign were observed or heard during the second survey.

The third amphibian survey was conducted on August 5 and 6, 2005 and focused primarily on areas identified as potentially suitable habitat in the previous surveys. No additional suitable habitat was identified and no amphibians or their sign were observed or heard during the third survey.

Habitat Suitability

The majority of aquatic habitat within the project area was deemed not suitable for spotted frog or boreal toad primarily due to lack of the following criteria 1) warm water habitat (>12° C), 2) standing shallow water habitat with sufficient sunlight, 3) emergent macrophytes or algae to provide cover and 4) availability of potential food resources (algae and small invertebrates) for developing larvae. Most of these habitats had cool water temperatures (<12° C), were fast flowing, with minimal emergent macrophytes (Figure 1).

Table 1: Summary of sites identified as potentially suitable amphibian habitat.

Site	Location	UTMs	H_20 Temp	Description	Suitability
A	Lower Winter Quarters	-	16.7°C	Ephemeral Pond	Low
B	Middle Winter Quarters	3942984N 11112238W	18.3°C	Ephemeral Pond	Fair
C	South Fork winter Quarters	12480701 E 4395309N	13°C	Inactive Beaver Pond	Fair
D	Lower Woods Canyon	12483955E 4397548N	12-18°C	Active Beaver Ponds	Good

Figure 1: Typical aquatic habitat consisted of cold, fast flowing water with little emergent macrophytes. Photo is of Bob's Canyon.

Sites A through D had one or a combination of the criteria listed above and were initially considered potentially suitable habitat. Site A is a small ephemeral pond that appeared to be potentially suitable during the first survey, however by the June survey was identified as unsuitable for amphibians as the depth and surface area of the water had significantly decreased since the previous survey (Figure 2). Though spotted frog and boreal toad larvae could develop and metamorphose during this time frame, 2005 was considered a "wet" year. In an average year, this site would probably not be wet for a sufficient amount of time. Site A was also mostly shaded by the surrounding canopy which could limit development of larval amphibians.

Site B is also a small ephemeral pond that is considered potentially suitable habitat that may serve as a breeding site for amphibians (e.g. boreal toad) in some years. By the third survey, however, Site B was nearly dry (Figure 3).

Site C is an inactive beaver pond and was determined to be unsuitable habitat for amphibians due to cold water temperatures, presence of cutthroat trout, lack of sufficient cover, and lack of sufficient food resources (Figure 4).

Site D is a series of active beaver ponds in Woods Canyon that provide all of the criteria listed above including sufficient water temperatures, shallow standing water, and emergent vegetation (Figure 5). Though we did not observe any amphibians in this site, additional surveys in multiple years may determine presence of some amphibian species, particularly the tiger salamander (*Ambystoma tigrinum*) and boreal toad.

CONCLUSIONS

Surveys of aquatic habitats conducted in Woods, Winter Quarters, Box, and Bobs Canyon and associated tributaries determined that there were few habitats available amphibians, particularly for spotted frog. The lack of suitable habitat supports the lack of observations of amphibians or signs of amphibians during our survey. The habitat that was identified as potentially suitable may support boreal toad and tiger salamander activity in some years; however the presence of spotted frog is unlikely. Since amphibian breeding site selection can fluctuate on an annual basis further surveys in multiple years would be required to determine presence or absence of boreal

toad or tiger salamanders within the project area, especially since both have been documented along the Wasatch Plateau.

LITERATURE CITED

Corn P.S. and R.B. Bury. 1990. Sampling methods for terrestrial amphibians and reptiles. U.S. Department of Agriculture, Forest Service, General Technical Report PHW-GTR-256,

Heyer, W.R. M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster. 1994. Measuring and Monitoring Biological Diversity. Standard methods for amphibians. Smithsonian Institute. 364 pp.

Figure 2: Site A during a) first, b) second, and c) third survey period.

a.

b.

c.

Figure 3: Site B during a) first survey period and b) third survey period.

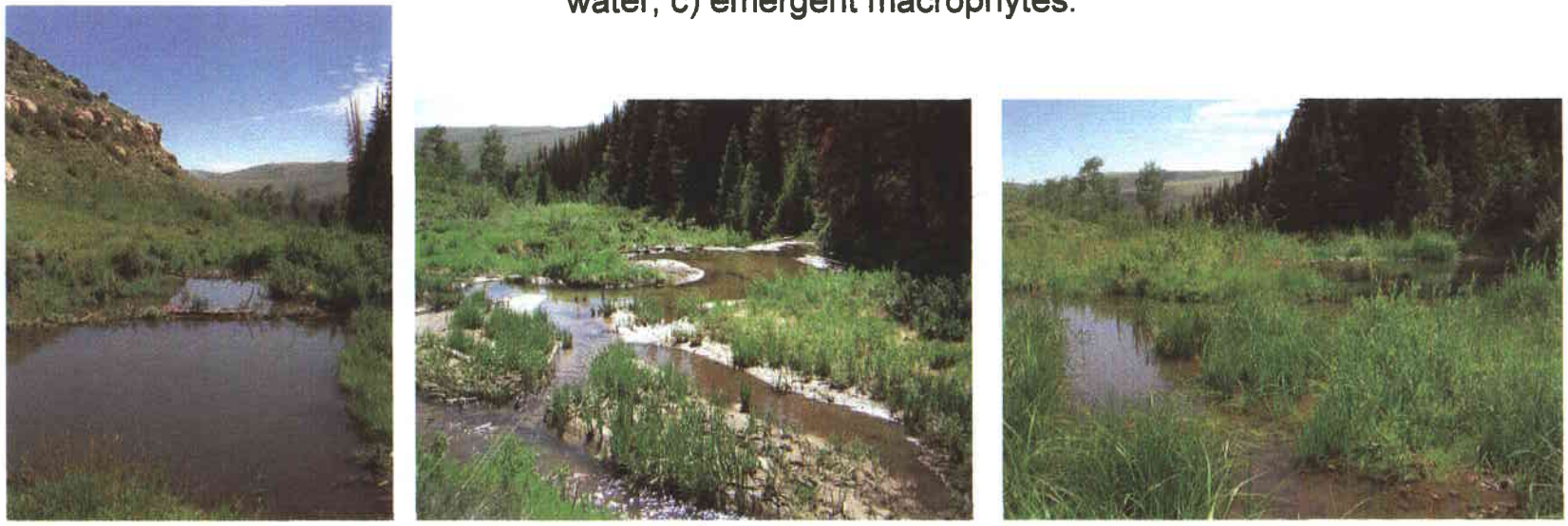
a.

b.

Figure 4: Site C during a) second and b) third survey period.

a. b.

Figure 5: Site D a) a series of active beaver ponds with suitable habitat including b) shallow back water, c) emergent macrophytes.



a. b. c.

AN ASSESSMENT OF THE MACROINVERTEBRATES OF JAMES CANYON CREEK AND BURNOUT CREEK IN SEPTEMBER 2003

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Sample Data for Burnout Creek . . . . . Appendix A
Sample Data for James Canyon Creek . . . . . Appendix B

INTRODUCTION

James Canyon Creek and Burnout Creek of the Huntington Creek Drainage Basin, Carbon County, Utah, are both located in an area subject to subsidence due to coal mining activities. Both streams have been monitored since the fall of 2000 so that any changes associated with subsidence in the watersheds can be documented.

This report on James Canyon Creek and Burnout Creek will cover samples taken on September 16, 2003. These are the seventh set of benthic invertebrate samples that have been taken from James Canyon Creek and the sixth set that has been taken from Burnout Creek.

METHODS

Quantitative samples were taken with a modified box sampler (Shiozawa 1986) using a capture net with a net mesh of 253 microns. Three samples were taken at both James Canyon Creek and Burnout Creek, as prescribed to Canyon Fuels Corporation by the Utah Division of Wildlife Resources (Table 1). The samples were preserved in the field with ethyl alcohol and were returned to the laboratory for processing. The samples were sorted in a backlit illuminated pan. Organisms were identified to the lowest taxonomic unit possible. Small specimens and those of questionable identity were examined under magnification. After the sample had been sorted with the unaided eye and visible invertebrates removed, the remaining material was subsampled and examined under magnification to insure the small organisms were included in the counts. Identification was based on the keys of Merritt and Cummins (1994). The mean values for each taxon were used to determine the density per square meter. Standing crop was estimated from wet weights of total invertebrates collected at each station.

The USFS Biotic Condition Index (Winget and Mangum 1979) was calculated with the community tolerance quotient (CTQa). The predicted community tolerance quotient (CTQp), based on water chemistry data provided in Winget (1972) for the Huntington Creek drainage, was 80. Diversity was calculated using the Shannon-Weiner index (Pielou 1977). Cluster analysis was run with NTSYS-pc, using the Bray-Curtis dissimilarity index with the UPGMA clustering algorithm. Data from all sampling periods (fall 2000 through fall 2003) for both Burnout Creek and James Canyon Creek have been included in the cluster analysis.

Table 1. Sampling station locations

Canyon	GPS coordinates	Elevation
James	N 39°38.033' W 111° 13.739'	8627 ft
Burnout	N 39° 38.929' W 111° 14.171'	8613 ft

RESULTS AND DISCUSSION

Biological Characterization

Number of Taxa

Burnout Creek recorded 26 different taxa in the fall 2003 sampling series (Table 2). This was a 4% decrease from the fall samples taken in 2001 (no samples were taken in the fall of 2002). The fall 2003 samples had the lowest number of taxa thus far recorded from fall samples in Burnout Creek, but was only 3 taxa less than the long term site average of 29 taxa. The plecopteran, *Hesperolperla pacifica*, was recorded in Burnout Creek for the first time.

James Canyon Creek had 27 taxa in the fall 2003 sampling series (Table 2). This was three taxa more than were collected in the previous fall sample, a 13% increase, but was still below the long term site average of 28 taxa. Two new taxa were recorded in James Canyon Creek, *Gyraulus* (Mollusca) and *Hesperolperla pacifica*.

Table 2. Number of Taxa collected from Burnout and James Canyon Creeks

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003
Burnout Creek	33	34	27	30	-	23	26
James Canyon Creek	31	35	30	27	24	23	27

Total Densities

Burnout Canyon had a total density of 55,995 organisms per square meter (Table 3). This was a 180% increase in taxa per square meter over the fall 2001 samples, exceeding the site average of 22,633 organisms per square meter by over 33,000. Several factors may be important in the increase in total densities. First the procedure of examining subsamples of the sorted sample material under magnification was instituted, and this procedure increased the counts by insuring that organisms not easily recognized by the unaided eye were found. It increased counts of microcrustaceans such as copepods and ostracods, and it also increased the identification of early instar macroinvertebrates. Second, it is likely that the samples were taken shortly after the hatching of eggs of a number of aquatic insects, especially ephemeropterans. Such hatches are not just a function of season (e.g. Fall), and can be influenced by annual variations in stream condition such as air and water temperature, light conditions etc. That could increase the total densities because the newly hatched organisms have not yet undergone the usual high mortality associated with their early stadia (age classes).

James Canyon Creek recorded a total density of 109,060 organisms per square meter (Table 3).

This was a 172% percent increase in taxa per square meter over the fall 2002 sample. The fall 2003 sample for James Canyon exceeded the long term average by more than 75,000 organisms per square meter. Again the high numbers are strongly associated with the presence of newly hatched organisms, including both ephemeropterans and plecopterans at this site.

Table 3. Total invertebrate densities per square meter for Burnout and James Canyon Creeks

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003
Burnout Creek	12590	35236	19995	38167	-	25178	55995
James Canyon Creek	34732	31344	11716	30309	40161	51488	109060

Taxa Specific Densities

In Burnout Canyon Creek, the dominant species (Table 4) were: *Baetis* (Ephemeroptera; 11,403/m^2), Ostracoda (Crustacea; 10,878/m^2), and early instar Ephemeroptera (6,222/m^2), comprising 20%, 19%, and 11% of the total population, respectively.

Within Burnout Canyon Creek the following taxa were found in densities greater than 500 per square meter: *Baetis*, *Cinygmula* (Ephemeroptera), *Drunella doddsi* (Ephemeroptera), early instar Ephemeroptera, *Brachycentrus echo* (Trichoptera), *Rhyacophila* (Trichoptera), *Optioservus* (Coleoptera), Ceratopogonidae (Diptera), Chironomidae (Diptera), *Simulium* (Diptera), Copeopoda (Crustacea), Ostracoda, Hydracarina (Arachnida), and *Sphaerium* (Mollusca).

In James Canyon Creek, the dominant species (Table 5) were: Chironomidae (62,963/m^2), *Baetis* (18,241/m^2), and Ostracoda (6,363/m^2), comprising 58%, 17%, and 6% of the total population, respectively. Within James Canyon Creek the following taxa were found in densities greater than 500 per square meter: *Baetis*, *Cinygmula*, early instar Ephemeroptera, early instar Plecoptera,: *Zapada* (Plecoptera), *Neothremma alicia* (Trichoptera), *Rhyacophila*, Ceratopogonidae, *Chelifera* (Diptera), Chironomidae, Copeopoda, Ostracoda, Hydracarina, and *Sphaerium.*

As noted above in the discussion of total densities, the conditions that favored identifying higher densities include both the more accurate processing methods (also used in the Fall of 2002) as well as the timing of hatching of the eggs of the dominant aquatic taxa. Examination of the numbers of ostracods and copepods illustrates the increased resolution by sample processing, since hte numbers collected in the fall of 2002 and later are similar in magnitude.

Table 4. Summary of invertebrate densities by taxa for Burnout Creek Fall 2003

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Spring 2003	Fall 2003
Ephemeroptera: *Baetis*	404	949	848	545	879	11403
Ephemeroptera: *Cinygmula*	566	10	1050	636	525	4909
Ephemeroptera: *Drunella doddsi*			10			778
Ephemeroptera: *Drunella grandis*		20	20	10	40	61
Ephemeroptera: *Epeorus iron*				71	10	
Ephemeroptera: *Ephemerella*	182	20		71		91
Ephemeroptera: early instar*			101			6222
Ephemeroptera: *Heptagenia*	91			10		
Ephemeroptera: *Paraleptophlebia*	1161	40	525	10		
Ephemeroptera: *Rhithrogena*	10			10		
Plecoptera: early instar*	50	20		10		20
Plecoptera: *Diura knowltoni*	20					
Plecoptera: *Hesperoperla pacifica*						10
Plecoptera: *Isoperla*	71	10	10	10	20	
Plecoptera: *Malenka californica*	141					
Plecoptera: *Megarcys signata*			10			
Plecoptera: *Skwalla parallela*		10		10		30
Plecoptera: *Sweltsa*	50		20			10
Plecoptera: *Zapada*	10	10				40
Trichoptera: pupae					10	
Trichoptera: *Amiocentrus*		10				
Trichoptera: *Brachycentrus echo*		10	30	10	10	1020
Trichoptera: *Dicosmoecus*		10	131			
Trichoptera: *Ecclisocosmoecus*	20					
Trichoptera: *Hydropsyche*					10	20
Trichoptera: *Lepidostoma*	10	71		30		
Trichoptera: *Limnephilus*					10	
Trichoptera: *Micrasema*	10	131	141	242		
Trichoptera: *Moselyana*	20					
Trichoptera: *Neothremma alicia*	252	81	101	51	152	333
Trichoptera: *Oligophlebodes*	40	202	515	30		

Trichoptera: *Platycentropus*		10				
Trichoptera: *Rhyacophila* (larvae)	121	101	121	202	576	707
Trichoptera: *Rhyacophila* (pupae)						
Coleoptera: *Heterlimnius* (larvae)	353	2828	2505	455	10	20
Coleoptera: *Heterlimnius* (adult)	40	51	152	71		
Coleoptera: Hydrophilidae		10				
Coleoptera: *Optioservus* (larvae)	71			1262	1111	5838
Coleoptera: *Optioservus* (adult)				161	40	677
Diptera: pupae*						30
Diptera: *Agabus*					10	
Diptera: *Antocha* (larvae)	40	152		50		
Diptera: *Antocha* (pupae)		20				
Diptera: *Caloparyphus*		20	40			
Diptera: Ceratopogonidae		20	20		30	2535
Diptera: *Chelifera*		121			10	
Diptera: Chironomidae (larvae)	3919	21927	2636	29685	13080	4192
Diptera: Chironomidae (pupae)		485		1010	51	505
Diptera: *Dicranota*	20	10	10	10		20
Diptera: *Euparyphus*	20		10			61
Diptera: *Pericoma*	111		10			
Diptera: *Ptychoptera*	81					
Diptera: *Simulium* (larvae)	121	30	323	81	212	2192
Diptera: *Simulium* (pupae)		30		10		
Diptera: *Tipula*	10	30	40	10	40	182
Crustacea: *Asellus*	10					
Crustacea: Cladocera		495		545		
Crustacea: Copeopoda				10	303	1525
Crustacea: Ostracoda	4202	5181	5656	1576	6454	10878
Arachnida: Hydracarina	20	202		10	313	626
Mollusca: *Sphaerium*	40	364	253	364	929	1030
Annelida: Oligochaeta	303	899	3596	636	343	30
Tricladida: Planariidae		626	1111	263		
Collembola		20				
Number of taxa*	33	34	27	30	23	26
Totals	12590	35236	19995	38167	25178	55995

Table 5. Summary of invertebrate densities by taxa for James Canyon Creek Fall 2003

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003
Ephemeroptera: *Baetis*	2848	1030	2444	404	6757	2283	18241
Ephemeroptera: *Cinygmula*	313	384	404	485		697	5040
Ephemeroptera: *Drunella doddsi*			30				40
Ephemeroptera: *Drunella grandis*		1566		1485		949	20
Ephemeroptera: *Epeorus iron*				10	283		
Ephemeroptera: *Ephemerella*	980	20	10	91	2434		10
Ephemeroptera: early instar	30		495			1010	2949
Ephemeroptera: *Heptagenia*	30						
Ephemeroptera: *Paraleptophlebia*	40		81	20	91		
Ephemeroptera: *Rhithrogena*		51					
Plecoptera: early instar	646	879	30	293	152	20	1626
Plecoptera: *Alloperla*						10	
Plecoptera: *Diura knowltoni*							
Plecoptera: *Hesperoperla pacifica*							61
Plecoptera: *Isoperla*	71		51	10	212		10
Plecoptera: *Malenka californica*	10		142		121		
Plecoptera: *Megarcys signata*			10				
Plecoptera: *Paraperla*		10					
Plecoptera: *Skwalla parallela*		414		61			111
Plecoptera: *Sweltsa*		10	30				
Plecoptera: *Zapada*	242	111	182	111	758		2010
Trichoptera: *Allomyia*	131						
Trichoptera: *Amiocentrus*							
Trichoptera: *Arctopsyche grandis*	51		10		20		
Trichoptera: *Brachycentrus echo*		172		10			
Trichoptera: *Dicosmoecus*	10			30	10		182
Trichoptera: *Ecclisocosmoecus*							
Trichoptera: *Hydropsyche*		10			10		20
Trichoptera: *Lepidostoma*		30	10		172		
Trichoptera: *Micrasema*	81		30				
Trichoptera: *Moselyana*							

Trichoptera: *Neothremma alicia*	3000	1384	758	727	2475	1848	869
Trichoptera: *Oligophlebodes*		364	153	20			
Trichoptera: *Platycentropus*							
Trichoptera: *Rhyacophila* (larvae)	394	798	293	576	556	1040	515
Trichoptera: *Rhyacophila* (pupae)		30		30			
Coleoptera: *Heterlimnius* (larvae)	30	192	51				
Coleoptera: *Heterlimnius* (adult)		20		40			
Coleoptera: *Optioservus* (larvae)	10			1263	283	384	81
Coleoptera: *Optioservus* (adult)				162	51		20
Coleoptera: Staphylinidae		10	10			505	
Diptera: *Antocha* (larvae)	10			10	51		
Diptera: *Antocha* (pupae)							
Diptera: *Atherix*	10						
Diptera: *Atrichopogon*						10	
Diptera: *Caloparyphus*		51	20				
Diptera: Ceratopogonidae	40	61		10		586	747
Diptera: *Chelifera*	51	81		40		91	1030
Diptera: Chironomidae (larvae)	23533	20614	4464	21947	19917	23351	62963
Diptera: Chironomidae (pupae)	20	455	10	323	20	212	2424
Diptera: Chryogaster						20	
Diptera: *Dicranota*	20						51
Diptera: *Dixa*		10				81	
Diptera: *Euparyphus*	10		50		71		141
Diptera: *Hemerodromia*		10		10		0	
Diptera: *Limnophila*		20				0	
Diptera: *Pericoma*	30					1091	
Diptera: Phoridae			10				
Diptera: *Ptychoptera*			10				
Diptera: *Simulium* (larvae)	91	10	111		939	40	81
Diptera: *Simulium* (pupae)							
Diptera: *Tipula*		10			61	81	455
Diptera: *Trichoclinocera*		10					
Diptera: *Wiedemannia*	81	91	20				
Crustacea: *Asellus*							
Crustacea: Cladocera		51		343		848	

Crustacea: Copeopoda	10					596	980
Crustacea: Ostracoda	1778	859	323	162	1202	10837	6363
Arachnida: Hydracarina	10	101	20	81	20	1343	960
Mollusca: *Sphaerium*	20	354	71	141		3535	1040
Mollusca: *Gyraulus*				0			10
Annelida: Hirudinea				0	10		
Annelida: Oligochaeta	101	192	40	394	71	20	10
Tricladida: Planariidae		828	1343	1020	3414		
Collembola		51					
Number of taxa*	31	35	30	27	24	23	27
Totals	34732	31344	11716	30309	40161	51488	109060

Biomass

Burnout Creek recorded a biomass of 88.27 grams per square meter, a 38% increase from the fall 2001 sample. (Table 6) This is biomass estimate exceeded the site average of 42.40 by over 45 grams per square meter.

James Canyon Creek biomass for fall 2003 was 154.53 grams per square meter, a 244 % increase over the previous fall's biomass. This sample series' biomass was more than three fold greater than the long-term average of 45.10 grams per square meter. The increased biomass in James Canyon Creek may be indicative of recovery from the perturbations in 2001, but an additional factor may be the lack of fish access to the stream, which developed with the fall in the reservoir level.

Table 6. Biomass in grams for Burnout and James Canyon Creeks, comparisons 2000-2003

	Burnout Creek						James Canyon Creek						
Sample	**F2000**	**S2001**	**F2001**	**S2002**	**S2003**	**F2003**	**F2000**	**S2001**	**F2001**	**S2002**	**F2002**	**S2003**	**F2003**
1	**n/a**	2.02g	1.09g	1.04g	1.26g	3.30g	**n/a**	1.16g	0.86g	1.27g	1.03g	1.70g	4.90g
2	**n/a**	0.67g	4.47g	0.94g	1.29g	2.90g	**n/a**	0.72g	0.63g	2.89g	2.87g	3.21g	4.99g
3	**n/a**	0.48g	**0.78g**	1.93g	0.82g	2.54g	**n/a**	**0.62g**	0.84g	1.50g	0.55g	2.28g	5.41g
Total		3.17g	6.34g	3.91g	3.37g	8.74g		2.50g	**2.33g**	5.66g	**4.45g**	**7.19g**	**15.30g**
per m^2	**g/m^2**	32.02 g/m^2	64.03 g/m^2	39.49 g/m^2	34.04 g/m^2	88.27 g/m^2	**g/m^2**	25.25 g/m^2	**25.53 g/m^2**	**57.17 g/m^2**	**44.95 g/m^2**	**72.62 g/m^2**	**154.53 g/m^2**

Communtiy Tolerance Quotient and Biotic Condition Indices

The community tolerant quotient (CTQa) was generated using the ratings for individual invertebrate taxa (Table 7) provided by Winget and Mangum (1979). Under this measure lower values represent higher habitat qualities. Generally CTQa values less than 65 represent high quality waters, while those between 65 and 80 represent situations with moderate to high quality water (Winget and Mangum 1979). CTQa values greater than 80 represent low water quality or stressed systems.

Burnout Creek had a CTQa value of 64.38, this was four points higher than for the fall 2001 samples (Tables 7 and 8). The long-term average CTQa for Burnout was 64.66, which places the current value essentially equal to the average. This value classifies Burnout Creek as having high water quality based on the criteria above.

James Canyon Creek had a value of 65.2 which was 6 points higher than the fall 2002 sample (Table 7 and 8). The average CTQa for James Canyon Creek was 67.9, which puts the current CTQa below average, and thus indicates a higher quality community. The CTQa value classifies James Canyon Creek as having moderate to high water quality.

The BCI allows a comparison of a stream to a physical parameter-based estimate of water quality, the CTQp. Higher BCI values are better (as contrasted with CTQa values), and a BCI of 100% indicates that hte community is what would be predicted based on the physical characteristics of the stream alone. The Huntington drainage has a CTQp rated at an 80, so the BCI is calculated as = 100 X CTQp/CTQa = 100 X 80/CTQa.

The BCI value for Burnout was 124.3, which is just below the site average of 125.36 (Table 8). The BCI value for James Canyon was 122.7, which is above the site average of 118.6 (Table 8). In both streams the actual community composition indicates that the streams are in better condition than would be expected based on the physical parameters for the streams. The deviations from the long-term averages are likely not significant with this index.

Table 7. Tolerance quotients for Burnout and James Canyon Creeks

Burnout and James Canyon Creeks Fall 2003 Taxa	Burnout Creek	James Canyon Creek	Ideal Stream
Ephemeroptera: Baetidae: *Baetis spp.*	72	72	72
Ephemeroptera: early instar *	72	72	72
Ephemeroptera: Ephemerellidae: *Drunella doddsi*	4	4	4

Ephemeroptera: Ephemerellidae: *Drunella grandis*	24	24	24
Ephemeroptera: Ephemerellidae: *Ephemerella*	48	48	48
Ephemeroptera: Ephemerellidae: *Seratella tibialis*			24
Ephemeroptera: Heptageniidae: *Cinygmula*	21	21	21
Ephemeroptera: Heptageniidae: *Epeorus iron*			21
Ephemeroptera: Heptageniidae: *Heptagenia*			48
Ephemeroptera: Heptageniidae: *Rithrogena*			21
Ephemeroptera: Leptophlebiidae: *Paraleptophlebia*			24
Plecoptera: Chloroperlidae: *Alloperla severa*			24
Plecoptera: Chloroperlidae: *Paraperla frontalis*			24
Plecoptera: Chloroperlidae: *Sweltza*	24		24
Plecoptera: early instar *	36	36	36
Plecoptera: Leuctridae: *Paraleuctra*			18
Plecoptera: Nemouridae: *Malenka californica*			36
Plecoptera: Nemouridae: *Zapada*	16	16	16
Plecoptera: Perlidae: *Hesperoperla pacifica*	18	18	18
Plecoptera: Perlodidae: *Diura knowltoni*			24
Plecoptera: Perlodidae: *Isoperla*		48	48
Plecoptera: Perlodidae: *Megarcys signata*			24
Plecoptera: Perlodidae: *Skwalla parallela*	18	18	18
Trichoptera: pupae			108
Trichoptera: Brachycentridae: *Amiocentrus*			24
Trichoptera: Brachycentridae: *Brachycentrus*	24		24
Trichoptera: Brachycentridae: *Micrasema*			24
Trichoptera: Hydropsychidae: *Arctopsyche grandis*			18
Trichoptera: Hydropsychidae: *Hydropsyche*	108	108	108
Trichoptera: Lepidostomatidae: *Lepidostoma*			18
Trichoptera: Limnephilidae: *Imania* (*Allomyia*)			48
Trichoptera: Limnephilidae: *Dicosmoecus*		24	24

Trichoptera: Limnephilidae: *Ecclisocomoecus*			108
Trichoptera: Limnephilidae: *Limnephilus*			108
Trichoptera: Limnephilidae: *Moselyana*			108
Trichoptera: Limnephilidae: *Platycentropus*			108
Trichoptera: Rhyacophilidae: *Rhyacophila*	18	18	18
Trichoptera: Uenoidae: *Neothremma alicia*	8	8	8
Trichoptera: Uenoidae: *Oligophlebodes*			24
Coleoptera: Dytiscidae: *Agabus*			72
Coleoptera: Elmidae: *Heterlimnius*	108		108
Coleoptera: Elmidae: *Optioservus*	108	108	108
Coleoptera: Hydrophilidae			72
Coleoptera: Staphylinidae			108
Diptera: pupae	108		108
Diptera: Athericidae: *Atherix*			24
Diptera: Ceratopogonidae	108	108	108
Diptera: Ceratopogonidae: Atrichopogon			108
Diptera: Chironomidae	108	108	108
Diptera: Dixidae: *Dixa*			108
Diptera: Empididae: *Chelifera*		108	108
Diptera: Empididae: *Hemerodromia*			108
Diptera: Empididae: *Trichoclinocera*			108
Diptera: Empididae: *Wiedemannia*			108
Diptera: Muscidae: *Limnophora*			108
Diptera: Phoridae			108
Diptera: Psychodidae: *Pericoma*			36
Diptera: Ptychopteridae: *Ptychoptera*			108
Diptera: Simuliidae: *Simulium*	108	108	108
Diptera: Syrphidae: *Chrysogastera*			108
Diptera: Stratiomyidae: *Caloparyphus*			108

Diptera: Stratiomyidae: *Euparyphus*	108	108	108
Diptera: Tipulidae: *Antocha*			24
Diptera: Tipulidae: *Dicranota*	24	24	24
Diptera: Tipulidae: *Tipula*	36	36	36
Crustacea: Cladocera			108
Crustacea: Copepoda	108	108	108
Crustacea: Isopoda: *Asellus*			108
Crustacea: Ostracoda	108	108	108
Arachnida: Hydracarina	108	108	108
Mollusca: Planoribidae: *Gyraulus*		108	108
Mollusca: Sphaeriidae: *Sphaerium*	108	108	108
Annelida: Hirudinea			108
Annelida: Oligochaeta	108	108	108
Tricladida: Planariidae			108
Collembola			108
Total	1867	1891	5095
Nuber of taxa	29	29	76
CTQa	64.38	65.21	

Table 8. CTQa and BCI values for Burnout and James Canyon Creeks

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003
	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI
Burnout Creek	58.3/137.2	60.8/131.6	60.0/133.3	64.1/124.8	—	80.1/99.9	64.4/ 124.3
James Canyon Creek	65.6/121.9	72.0/111.1	68.7/116.4	66.1/121.0	59.0/135.9	76.0/105.3	65.2/ 122.7

Diversity Indices

Diversity indices combine the number of taxa and their relative densities into a single measurement. High diversity index values indicate more taxa and a more even number of individuals per taxon.

Low diversity values generally reflect a depauperate fauna in both species and somewhat in numbers, although very high densities in just a few taxa will lower diversity scores.

Burnout Creek in the fall of 2003 recorded a diversity value of 2.310, its highest since the beginning of this project,. The value was significantly greater than the site average of 1.6708 (Table 9). James Canyon Creek in the fall of 2003 recorded a diversity index value of 1.451. This was below the site average of 1.64. Both Burnout and James Canyon creeks had diversity levels that were reasonably good (see reference levels for Eccles Creek in Shiozawa 2002) although James Cnayon Creek was not nearly as high as one would expect for a generally unimpacted system. Part of this may be an artifact associated with the relatively small sample size of three replicates per stream prescribed for these two locations., but James Canyon Creek may have had other perturbations such as the blockage of trout access to the stream as the level of Electric Lake fell.

Table 9. Diversity indices, based on natural logs, for Burnout and James Canyon Creeks

	Fall 2000	Spring 2001	Fall 2001	Spring 2002	Fall 2002	Spring 2003	Fall 2003
Burnout Creek	2.032	1.459	2.202	1.111	--	1.550	2.310
James Canyon Creek	1.246	1.519	2.112	1.279	1.747	1.854	1.451

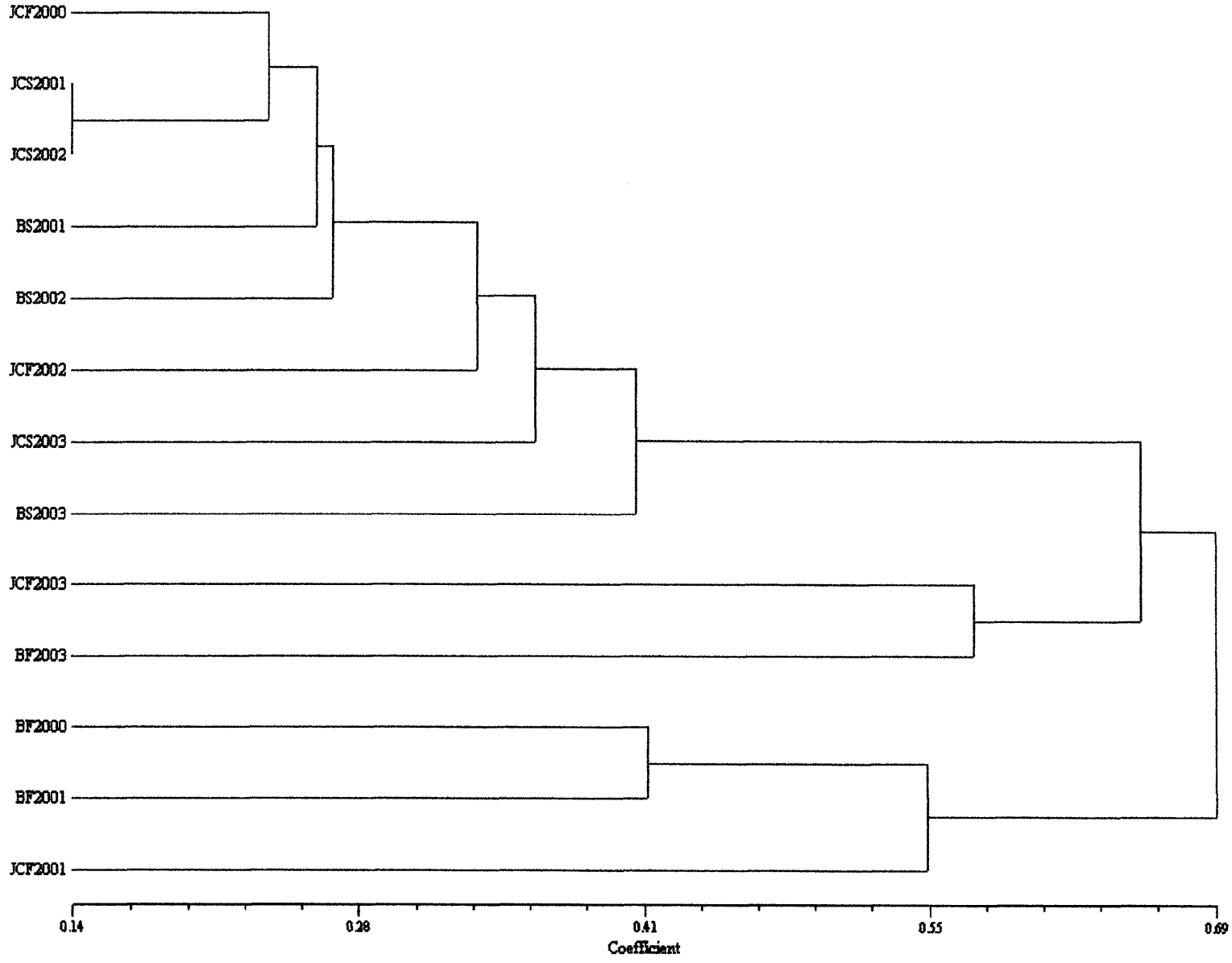
Cluster Analysis

Cluster analysis (Figure 1) resulted in three main clusters separated at a dissimilarity value of approximately 0.6. The top cluster (cluster 1) contains all of the spring samples for both sites plus two fall sample periods from James Canyon Creek (fall 2000 and 2002). Within cluster 1 both the James Canyon Creek and Burnout Creek spring samples appear to become more dissimilar as time progresses.

Cluster 3, the lower grouping consists of the James Canyon Creek fall 2001 sample and Burnout Creek fall 2000 and 2001 samples. This may be indicative of a general seasonal effect in Burnout Creek, but the shift of the fall 2003 sample series for both James Canyon Creek and Burnout Creek to cluster 2, a grouping slightly more similar to cluster 1, suggests that the two streams as a whole are moving towards a diminished seasonal signal.

Both James Canyon Creek and Burnout Creek are becoming increasingly dissimilar to what they were in previous sampling periods. This pattern may be related to the continuing drought, both streams have diminished trout access, and James Canyon is completely blocked to the upstream movement of spawning trout from Electric Lake. The loss of predation pressure from fry and young of the year trout may result in other forces driving the structure of the benthic community. That would result in shifts that are secondarily related to the drought conditions as well as the fall in lake level. The Burnout site is above a waterfall that acts as a partial barrier to upstream fish movement, but some trout have been observed above the falls, and during spawning runs trout congregated in the plunge pool attempt to jump the falls and it is likely that a few are able to ascend it (Shiozawa, personal obsertvations).

Figure 1. UPGMA Cluster dendrogram of relationships among communities from Burnout and James Canyon Creeks



Conclusions

Both Burnout and James Canyon creeks show a dramatic increase in invertebrate density for the fall of 2003. While chironomids were once again a dominant taxon in both sample stations, the collector-gatherer *Baetis* (Ephemeroptera) was much more apparent in this sample series then in the past. This appears to be a reflection of high numbers of early instars. Thus the timing of hatching may have been such that they were more readily collected in this sample series. Ostracods were also very abundant in both sample locations. Within the James Canyon Creek, in addition t the increase in ephemeropterans and plecopterans, *Chelifera* (Diptera) was much more common than in previous sample periods. The increase in accuracy of sorting may have increased hte counts of invertebrates, but another factor that may be involved in the increased density of invertebrates is the change in density of fish. The low lake levels that have existed since the spring of 2002 have discouraged, and likely prevented, spawning access to James Canyon Creek. A significant reduction in young of the year fish would result in changes in the benthic community because of reduced fish predation pressure. The biomass in Burnout Creek and in James Canyon Creek was dramatically higher, having more then doubled from the last report, which again may reflect the absence of trout predation.

Both streams had lower CTQa values than in previous sample periods, indicating an increase in habitat quality. This was also reflected in the BCI values. These indicate that the streams have high and moderate to high water quality. The CTQa is nearly at the average for the previous sampling periods. Diversity indices indicate that Burnout Creek has improved. It received its highest diversity value since monitoring began, while James Canyon Creek is slightly lower then average. However, the robustness of these estimates are subject to the same concerns noted above for the CTQa estimation. The diversity data is in concordance with the BCI, showing an overall improvement.

Cluster analysis of sample dates indicates that the fall 2003 samples in both James Canyon and Burnout creeks were most closely related to each other, falling into their own cluster, although their dissimilarity with each was high, at 0.56. The fall 2003 cluster is more similar to a cluster containing spring samples of Burnout Creek and spring and fall samples of James Canyon Creek than to a cluster containing mostly fall samples from Burnout Creek. The two streams are still shifting in their associations, but the interpretation of this is still not clear. The drought and the lower levels of Electric Lake are confounding factors. It is possible that the natural annual variation is such that we would expect community shifts that result in relatively high year to year changes in dissimilarity values.

Regardless, the streams do not appear to be suffering from any catastrophic impacts. They are showing relatively good index values. This is especially the case in Burnout Creek.

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Appendix A: Sample Data for Burnout Creek Fall 2003

		Site 1	Site 2	Site 3	Mean	#/m^2
Ephemeroptera	*Baetis sp.*	353	514	262	376.33	11402.9
	Cinygmula	232	131	123	162	4908.6
	Drunella doddsi	38	38	1	25.6667	777.7
	Drunella grandis	3	1	2	2	60.6
	Ephemerella sp.	0	1	8	3	90.9
	Early instar Ephemeroptera*	155	315	146	205.333	6221.6
Plecoptera	Early instar Plecoptera*	1	1	0	0.66667	20.2
	Hesperoperla pacifica	0	1	0	0.33333	10.1
	Skwalla parallela	0	3	0	1	30.3
	Sweltza	0	0	1	0.33333	10.1
	Zapada	1	2	1	1.33333	40.4
Trichoptera	*Brachycentrus echo*	64	4	33	33.6667	1020.1
	Hydropsyche	0	1	1	0.66667	20.2
	Neothremma alicia	2	30	1	11	333.3
	Rhyacophila	33	1	36	23.3333	707
Coleoptera	*Heterlimnius* (larvae)	1	1	0	0.66667	20.2
	Optioservus (larvae)	196	136	246	192.667	5837.8
	Optioservus (adult)	51	13	3	22.3333	676.7
Diptera	Diptera pupae*	2	0	1	1	30.3
	Ceratopogonidae	1	152	98	83.6667	2535.1
	Chironomidae *(larva)*	123	182	110	138.333	4191.5
	Chironomidae *(pupa)*	40	6	4	16.6667	505
	Dicranota	0	0	2	0.66667	20.2
	Euparyphus	1	3	2	2	60.6
	Simulium (larvae)	156	10	51	72.3333	2191.7
	Tipula (Tipulidae)	5	8	5	6	181.8
Crustacea	*Copepoda*	1	0	150	50.3333	1525.1
	Ostracoda	231	254	592	359	10877.7
Arachnid	*Hydracarnia*	30	0	32	20.6667	626.2
Mollusca	*Sphaerium sp.*	33	32	37	34	1030.2
Misc.	*Oligochaeta*	1	1	1	1	30.3
Totals		1754	1841	1949		55994.4

*Not used in total taxa counts or calculations for diversity indices.

Appendix B. Sample data for James Canyon Creek Fall 2003

		Site 1	Site 2	Site 3	Mean	#/m^2
Ephemeroptera	*Baetis sp.*	587	929	290	602	18240.6
	Cinygmula	154	109	236	166.3333	5039.9
	Drunella doddsi	2	2	0	1.333333	40.4
	Drunella grandis	0	2	0	0.666667	20.2
	Ephemerella sp.	1	0	0	0.333333	10.1
	Early instar Ephemeroptera	98	33	161	97.33333	2949.2
Plecoptera	Early instar plecoptera	63	33	65	53.66667	1626.1
	Hesperoperla pacifica	4	0	2	2	60.6
	Isoperla	0	0	1	0.333333	10.1
	Skwalla parallela	7	2	2	3.666667	111.1
	Zapada	60	88	51	66.33333	2009.9
Trichoptera	*Dicosmoecus*	6	3	9	6	181.8
	Hydropsyche	2	0	0	0.666667	20.2
	Neothremma alicia	74	10	2	28.66667	868.6
	Rhyacophila	7	7	37	17	515.1
Coleoptera	*Optioservus* (larvae)	1	5	2	2.666667	80.8
	Optioservus (adult)	1	1	0	0.666667	20.2
Diptera	Ceratopogonidae	36	0	38	24.66667	747.4
	Chelifera (Empididae)	3	66	33	34	1030.2
	Chironomidae *(larva)*	1727	2918	1589	2078	62963.4
	Chironomidae *(pupa)*	61	60	119	80	2424
	Dicranota	0	2	3	1.666667	50.5
	Euparyphus	3	3	8	4.666667	141.4
	Simulium (larvae)	4	4	0	2.666667	80.8
	Tipula (Tipulidae)	6	4	35	15	454.5
Crustacea	*Copepoda*	0	31	66	32.33333	979.7
	Ostracoda	151	133	346	210	6363
Arachnid	*Hydracarnia*	63	0	32	31.66667	959.5
Mollusca	*Sphaerium sp.*	100	2	1	34.33333	1040.3
	Gyraulus	0	0	1	0.333333	10.1
Misc.	*Oligochaeta*	1	0	0	0.333333	10.1
Totals		3222	4447	3129		109059.8

*Not used in total taxa counts or calculations for diversity indices.

RESULTS OF THE 2005 ANNUAL GEOMORPHIC EVALUATION OF ECCLES AND MUD CREEKS

Prepared for

CANYON FUEL COMPANY
Skyline Mine
Helper, Utah

March 2006

Prepared by

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RESULTS OF THE 2005 ANNUAL GEOMORPHIC EVALUATION OF ECCLES AND MUD CREEKS

CHAPTER 1
INTRODUCTION

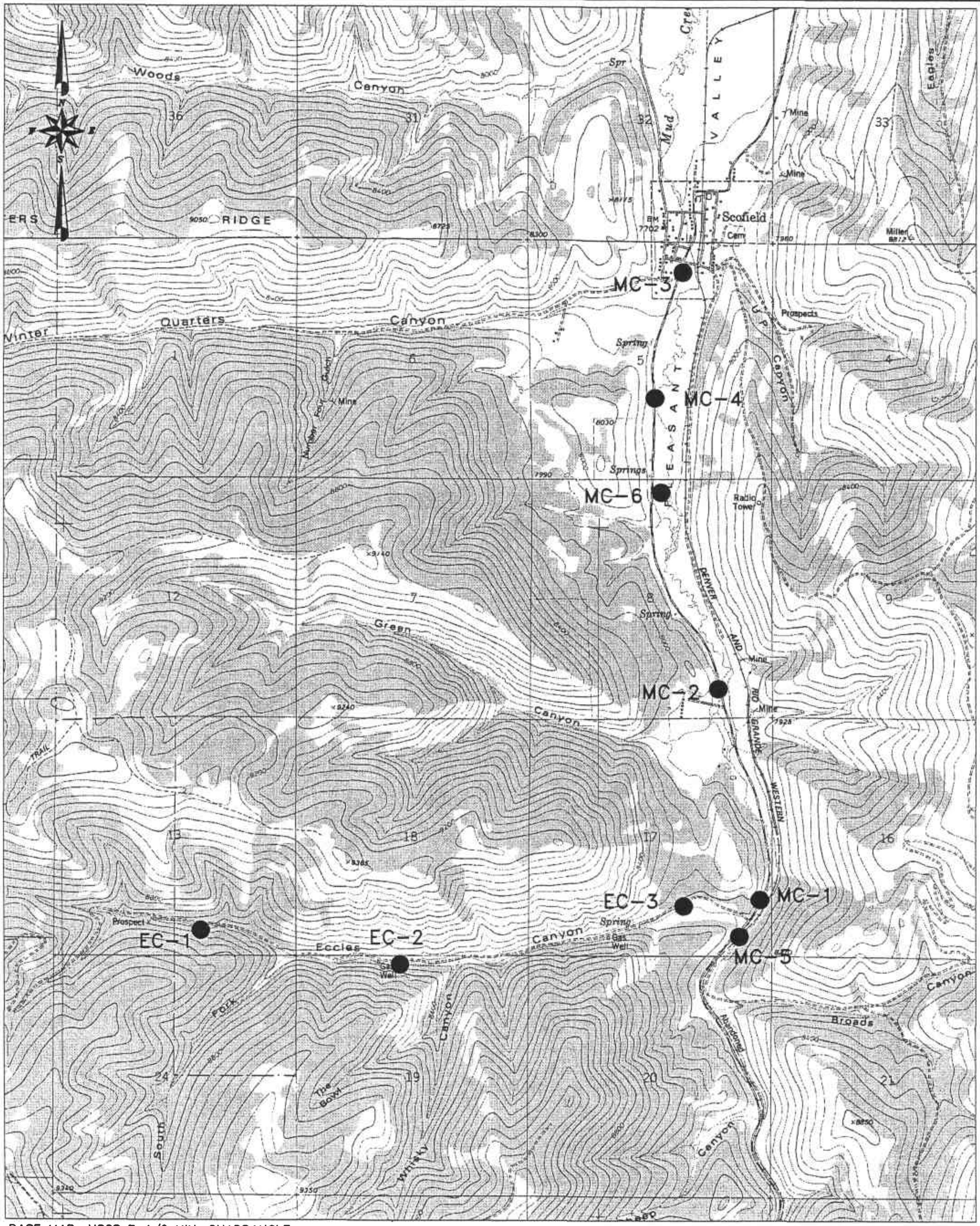
In early August 2001, the advancing face of the Skyline Mine encountered fractured sandstone, resulting in a significant inflow of water to the mine. From early September 2001 through July 2003, this water was discharged from the mine to Eccles Creek at rates ranging from about 7,000 and 10,000 gallons per minute ("gpm"), compared with an average discharge for the 30 months prior to August 2001 of about 1,500 gpm. Except for a period of lower discharge (less than about 1,000 gpm) in the first two-thirds of 2004, the discharge from the mine since July 2003 has typically ranged from about 3,000 to 5,000 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 2005 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 November 25, 2005 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, and indications of bankfull stage. 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). Frozen soil conditions precluded safe access to the top of the stream banks from the channel at several locations. Coupled with the short day length and the need to collect the required data prior to the onset of an impending winter storm, no top-of-bank measurements were collected during the 2005 evaluation.



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 Appendix C. These data were plotted for 2002 and 2005 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 as recommended by Harrelson et al. (1994), resulting in some variation in location from year to year. Also, as noted in Chapter 2, the 2005 survey was conducted at a time when the stream banks were frozen, often making top-of-bank measurements either difficult or unsafe. Finally, some measurements (e.g., 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 bankfull stage and the adjacent hillside. And although Mud Creek exists in a broader floodplain, down cutting has made it difficult to objectively establish a bankfull stage in several locations. All of these factors may contribute to reduced data quality within the survey area.

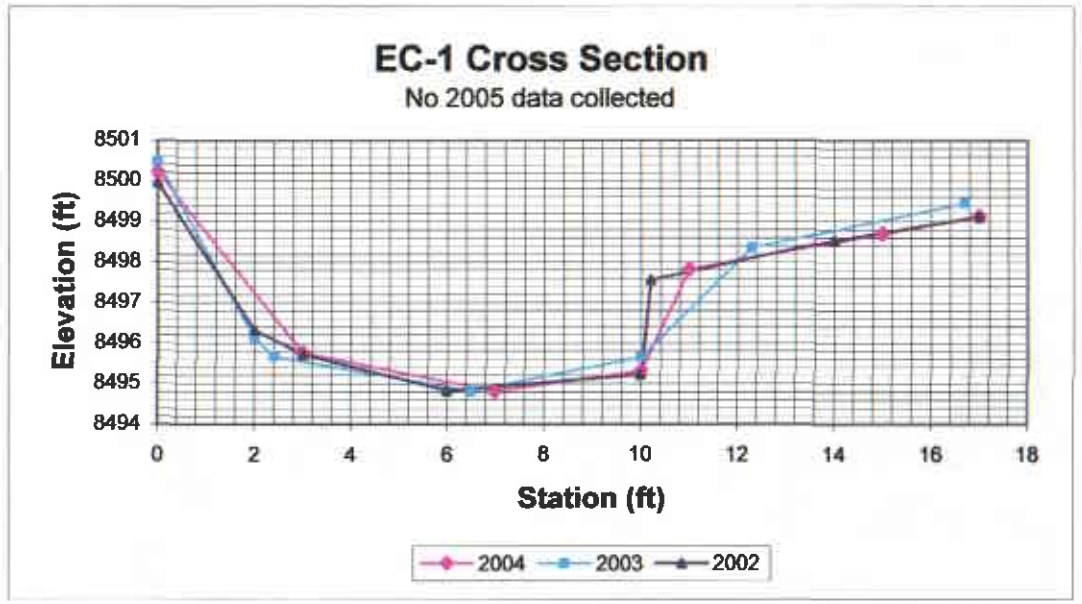
Notwithstanding the survey difficulties noted above, Figures 3-1 through 3-9 indicate that no substantial changes occurred in the reference site profiles and cross-sections between 2002 and 2005, with the exception of stations MC-3 and EC-1. Variations in the conditions at MC-3 resulted from the 2003 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 resulted in aggradation of the stream in some locations and downcutting of the stream in other. This debris was removed by county crews in 2003 and placed in a large pile on top of the bench mark, obscuring its location. The 2005 survey was conducted using the

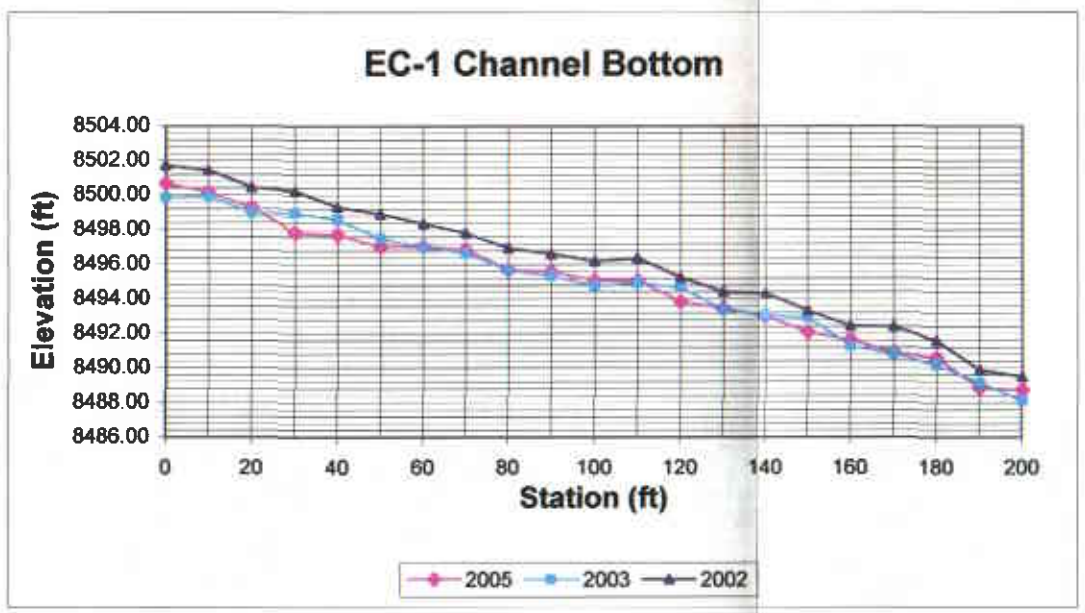
elevation of the cross-section pin of the right bank. The calculations were completed by assuming that the difference in elevation between the pin and the benchmark was the same from the prior year. Also, a new beaver dam had been constructed at the original upstream location as well as a smaller dam downstream of the road crossing. These dams are reflected in the profiles.

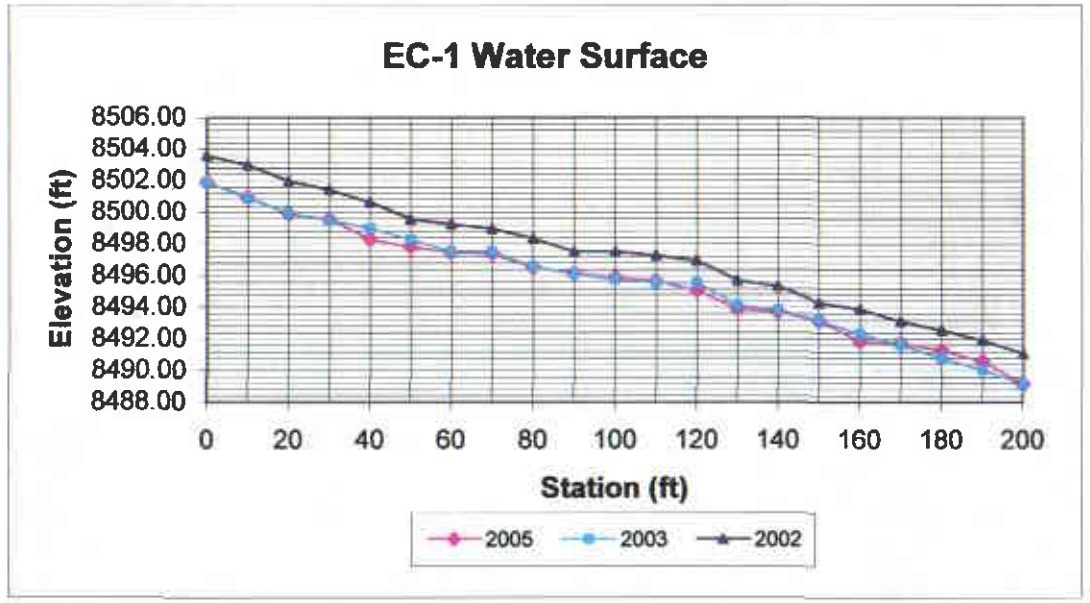
As indicated in the 2003 annual report (EarthFax, 2003), differences between 2002 and 2005 at EC-1 are likely due to a longitudinal shift in the profile end points along the channel. To assess this effect, Figure 3-1 includes not only the 2002 and 2005 profile data, but also the 2003 profile data. As indicated, essentially no difference exists between the 2003 and 2005 profiles, indicating that the shift occurred in the 2002 survey. It should also be noted that the onset of darkness in the canyon bottom precluded the accurate and safe collection of survey data at the downstream end of EC-1. Given the unsafe conditions, the dark conditions, and the impending arrival of a significant winter storm, the cross section at EC-1 could not be surveyed following surveying of the profile. Nonetheless, visual observations and comparisons of survey data in the upstream portion of the profile indicate the no substantial change has occurred in conditions at EC-1.

It is also of note that the increase in the water surface at MC-5 in 2005 is only apparent and not real. The stream was frozen at this location, requiring that water-surface elevations be measured on top of the ice. The presence of ice at this location also altered some of the apparent bankfull observations and cross section measurements.

Notwithstanding the above observations, the 2005 survey data and visual observations of the reference reaches indicate that mine-water discharges have not substantially impacted geomorphic conditions in Eccles or Mud Creeks.







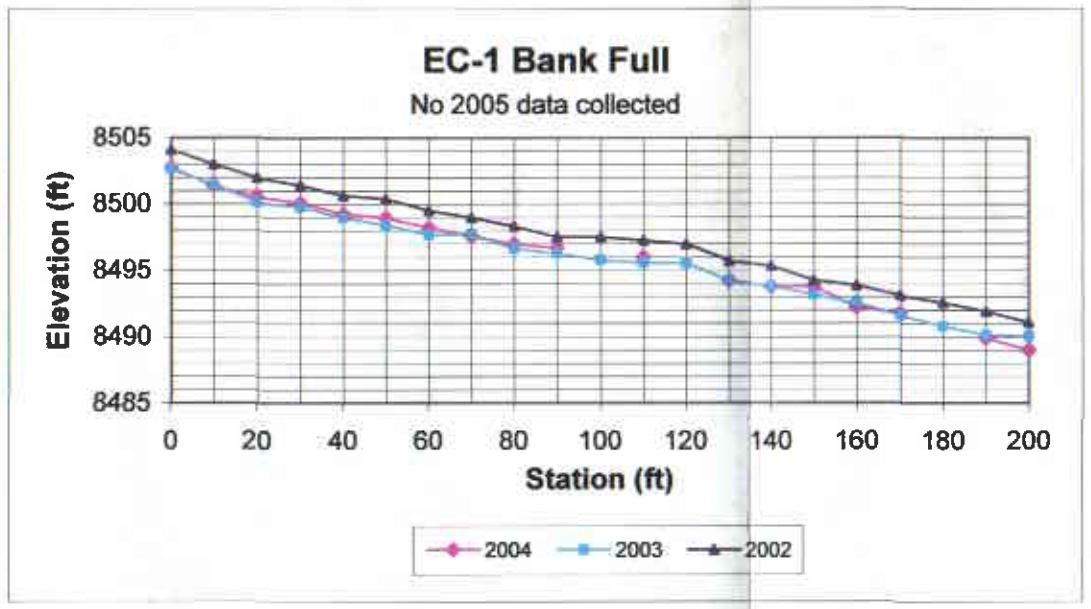
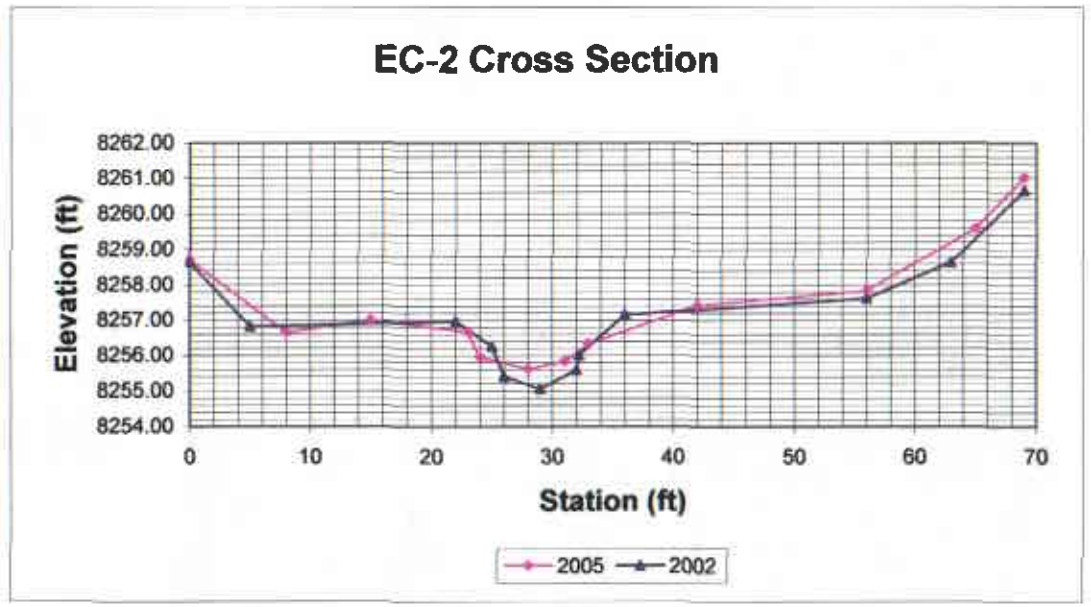
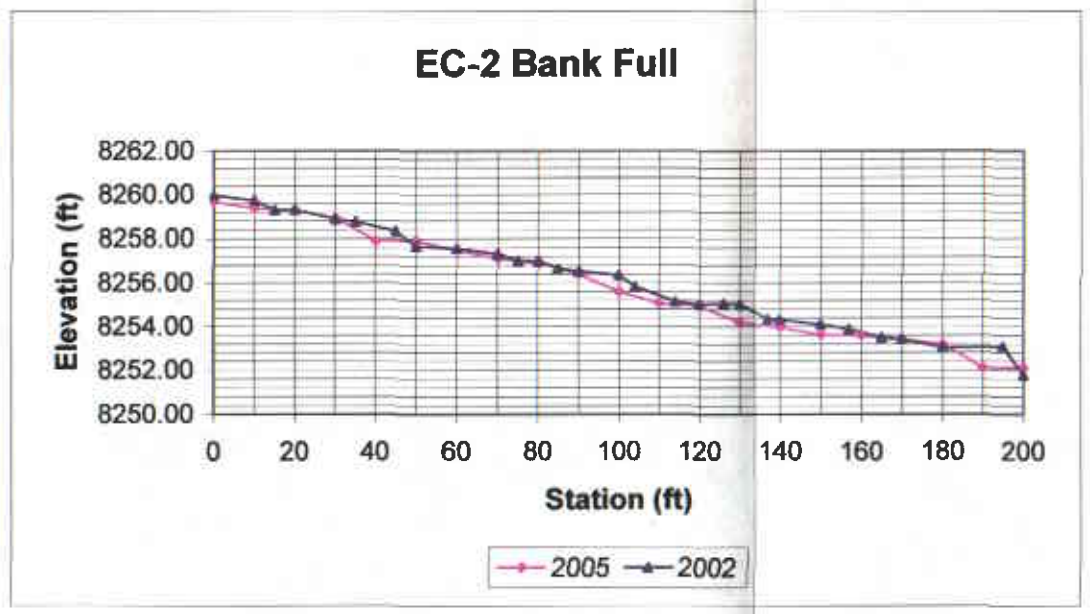
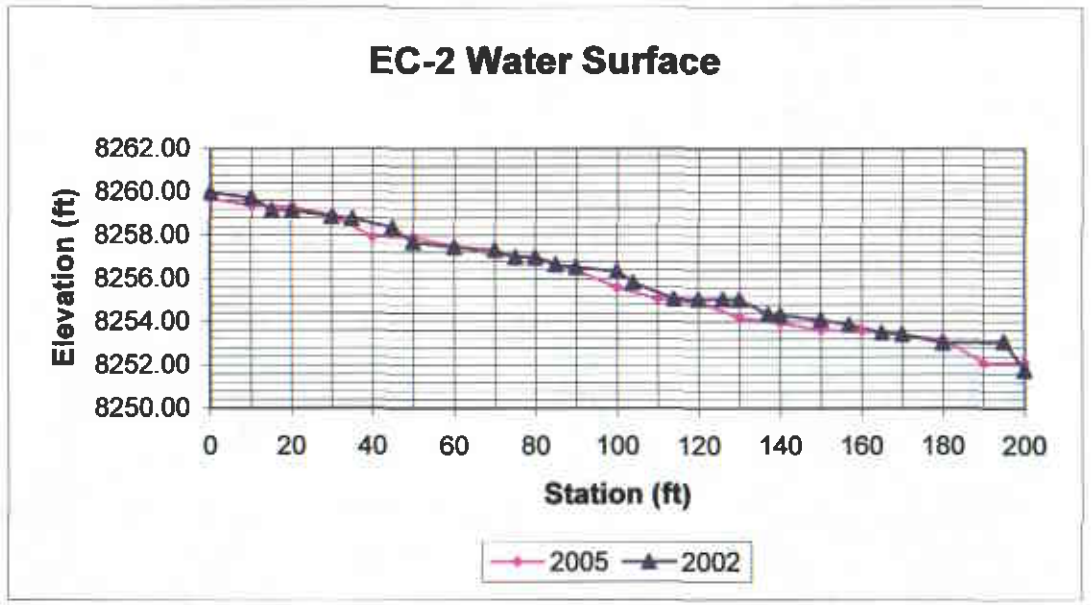


FIGURE 3-1. EC-1 CROSS-SECTION AND PROFILES

EarthFax







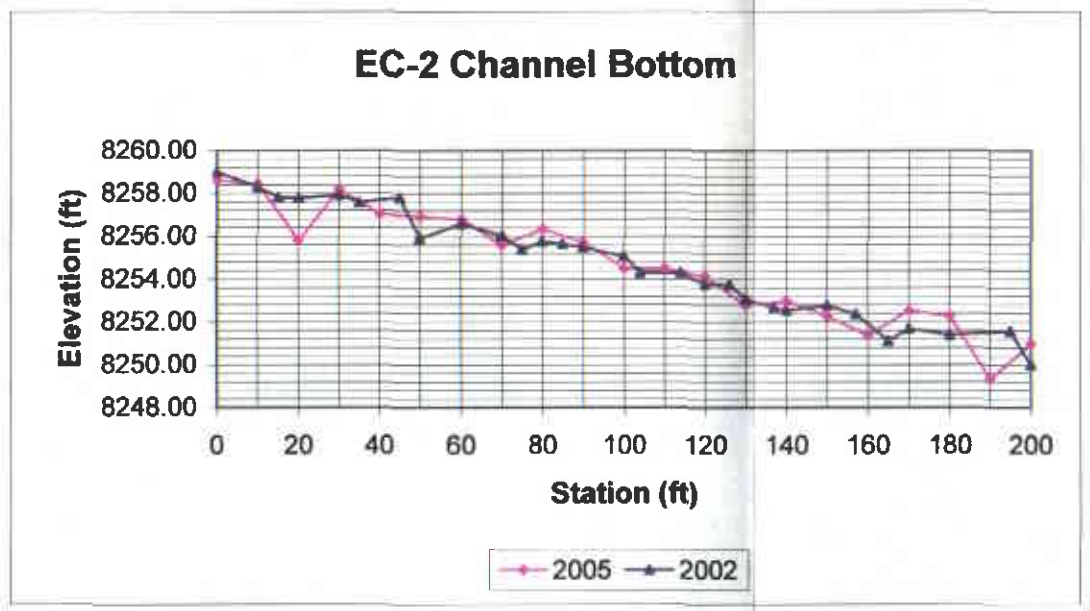
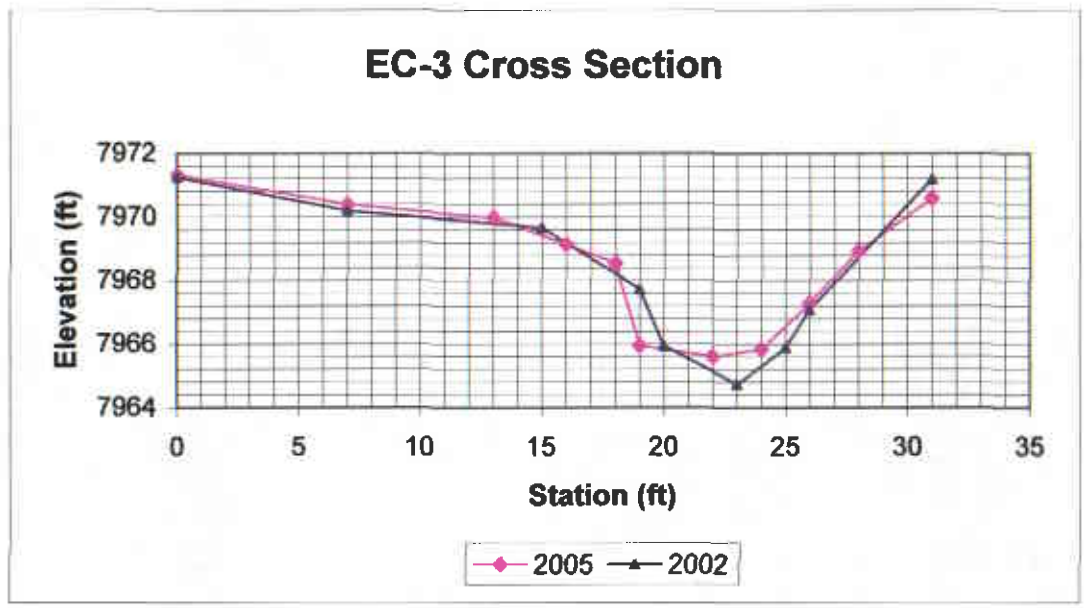
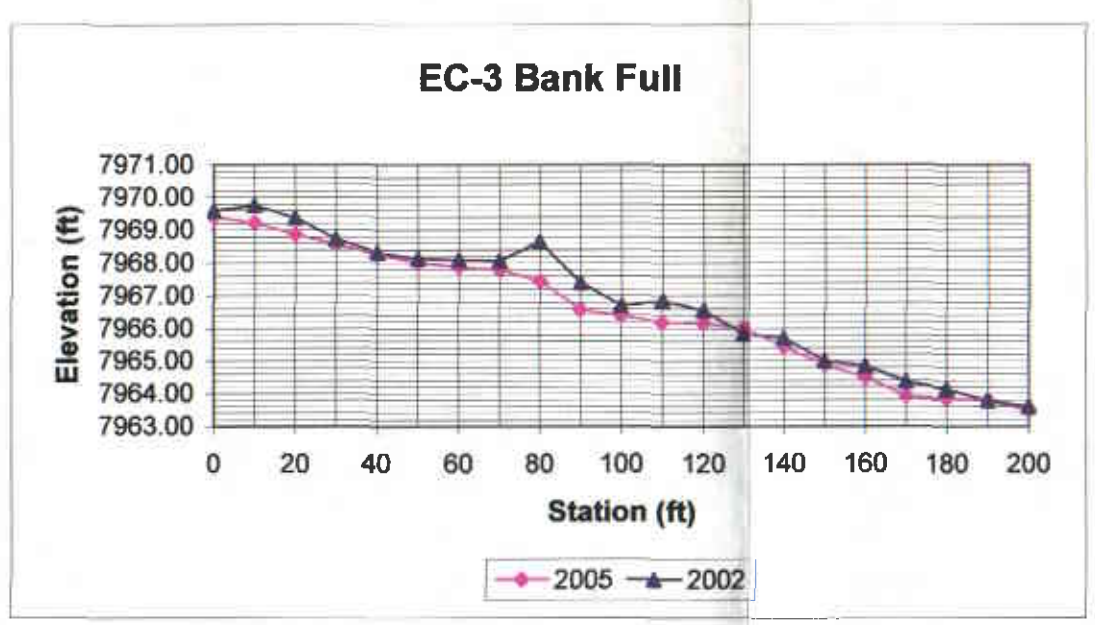
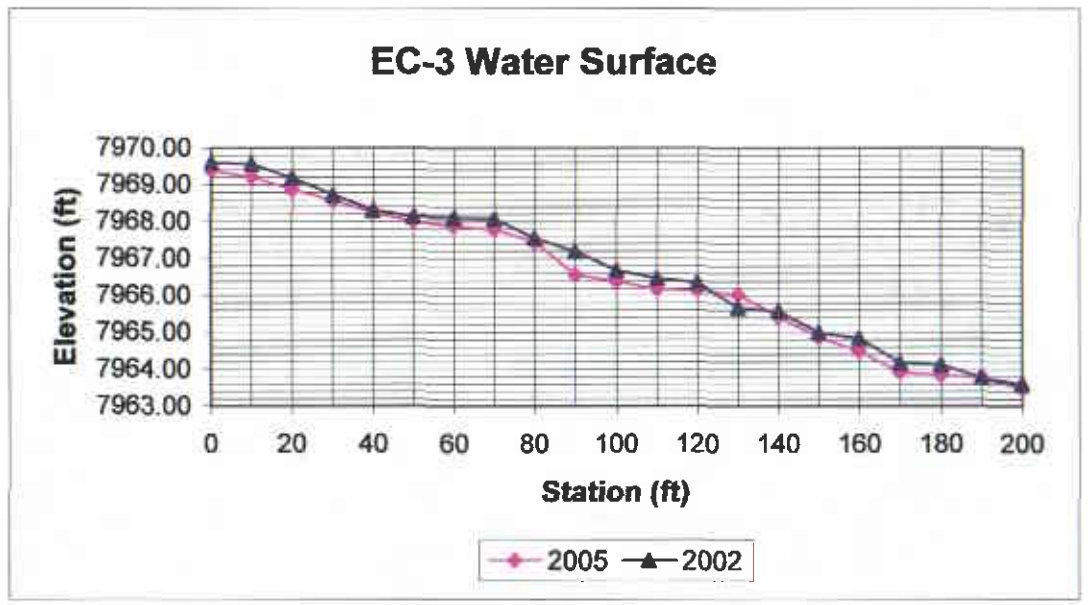


FIGURE 3-2. EC-2 CROSS-SECTION AND PROFILES

EarthFax







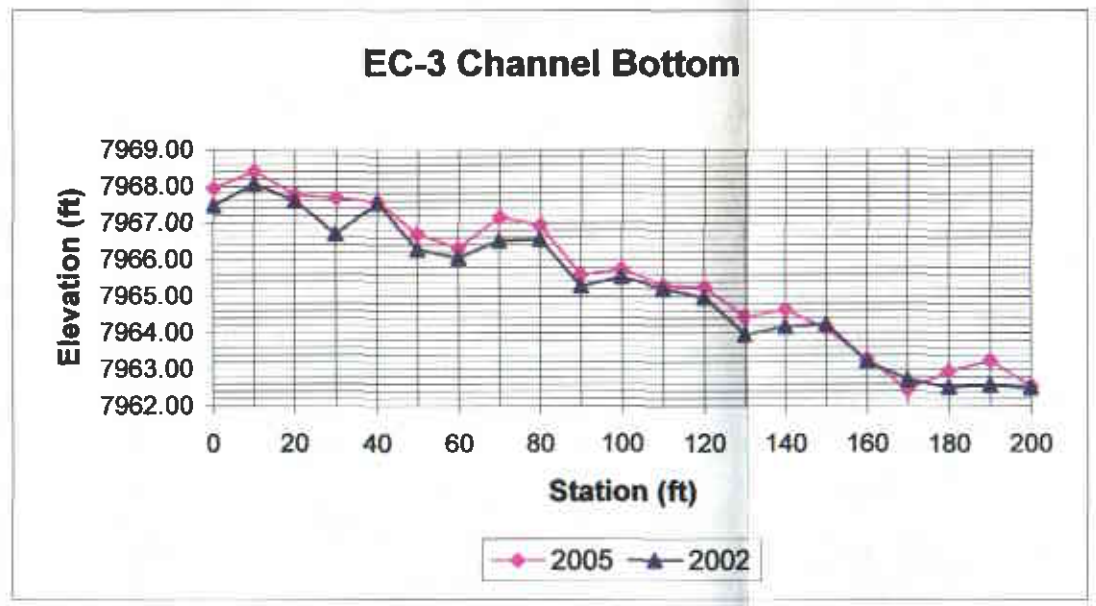
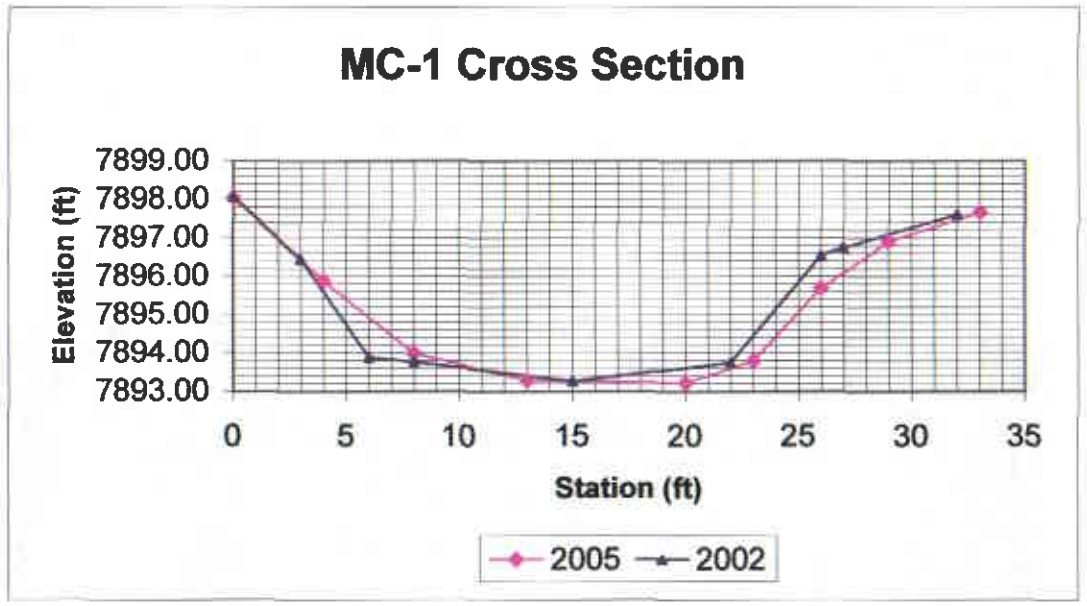
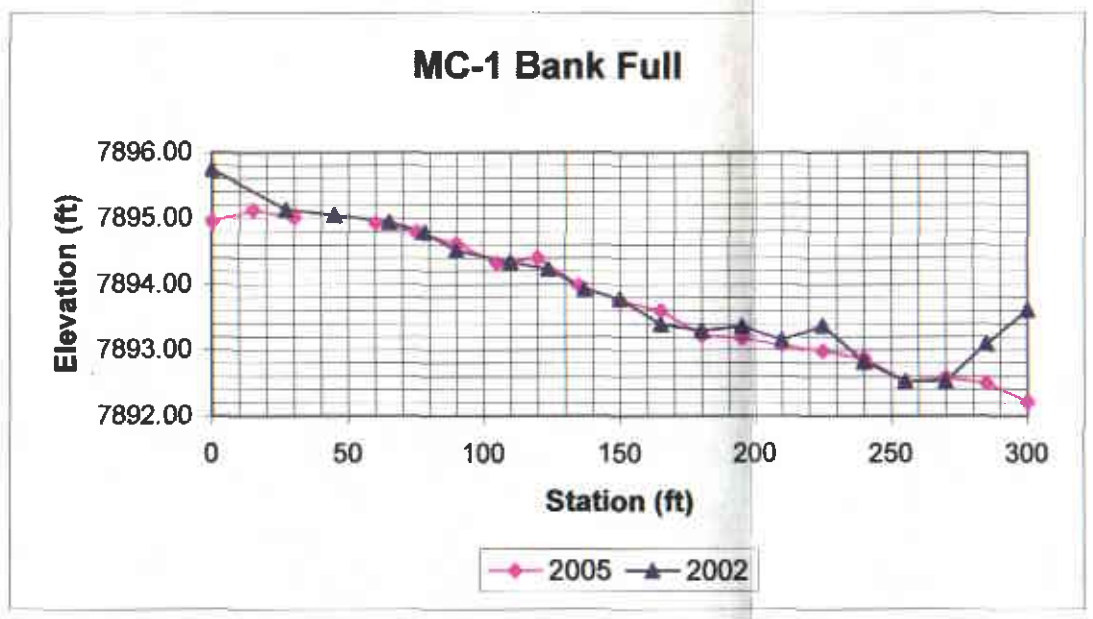
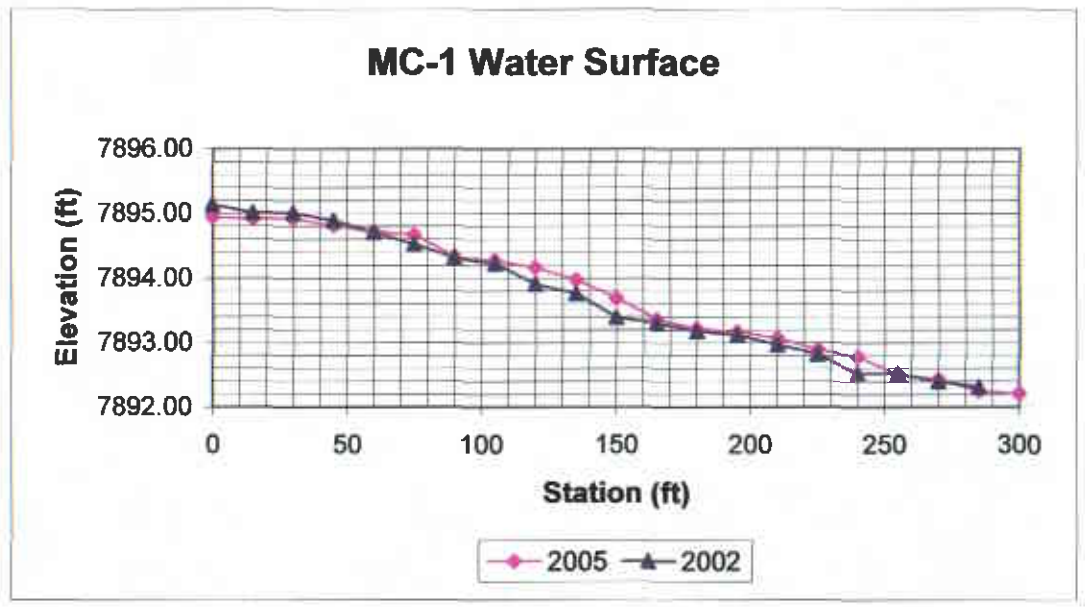


FIGURE 3-3. EC-3 CROSS-SECTION AND PROFILES

EarthFax







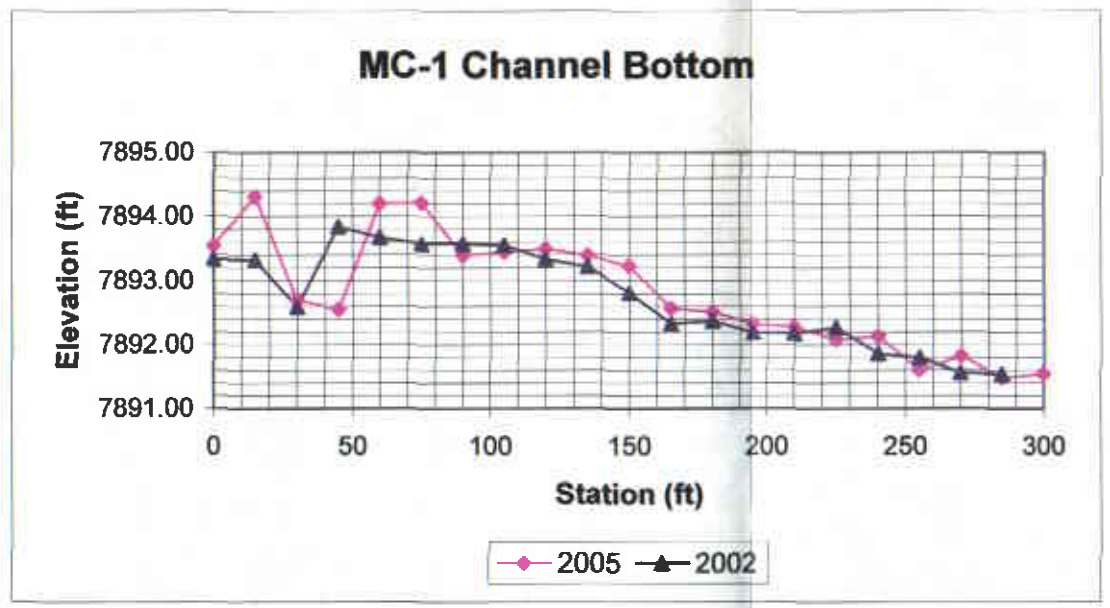
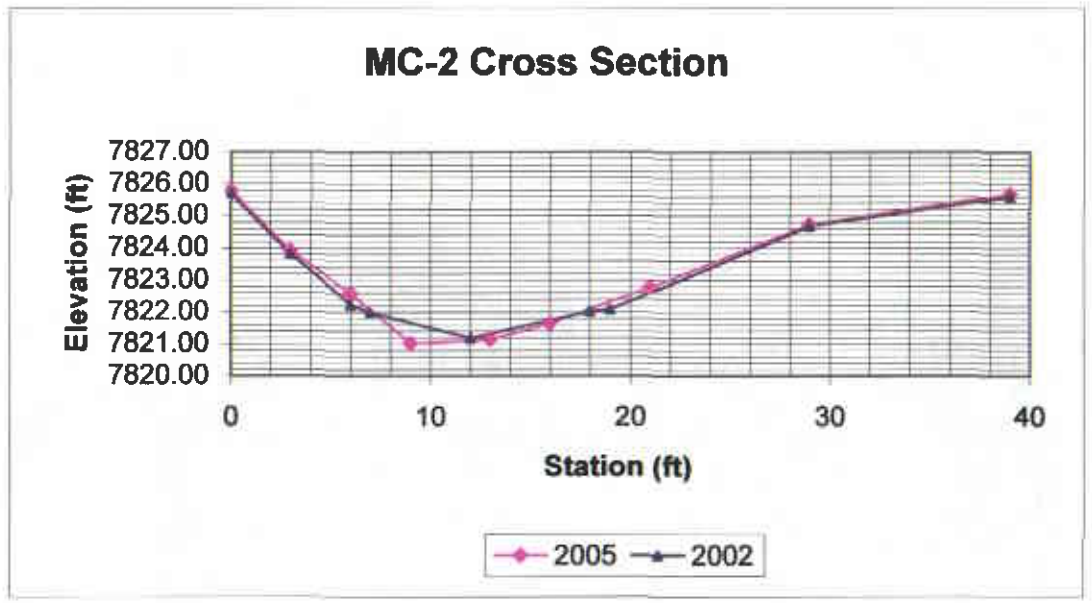
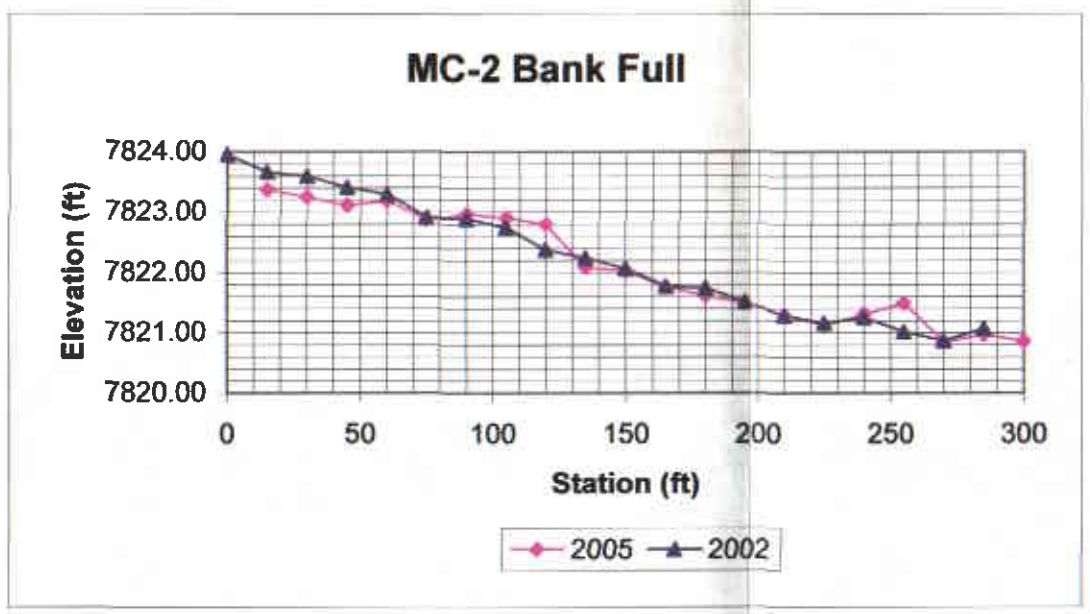
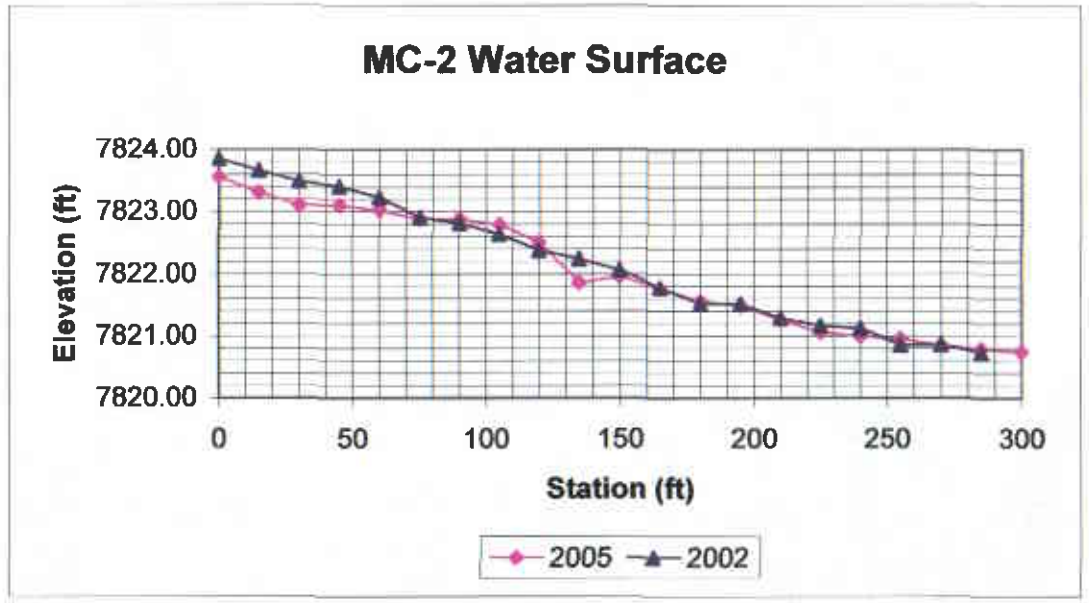


FIGURE 3-4. MC-1 CROSS-SECTION AND PROFILES

EarthFax







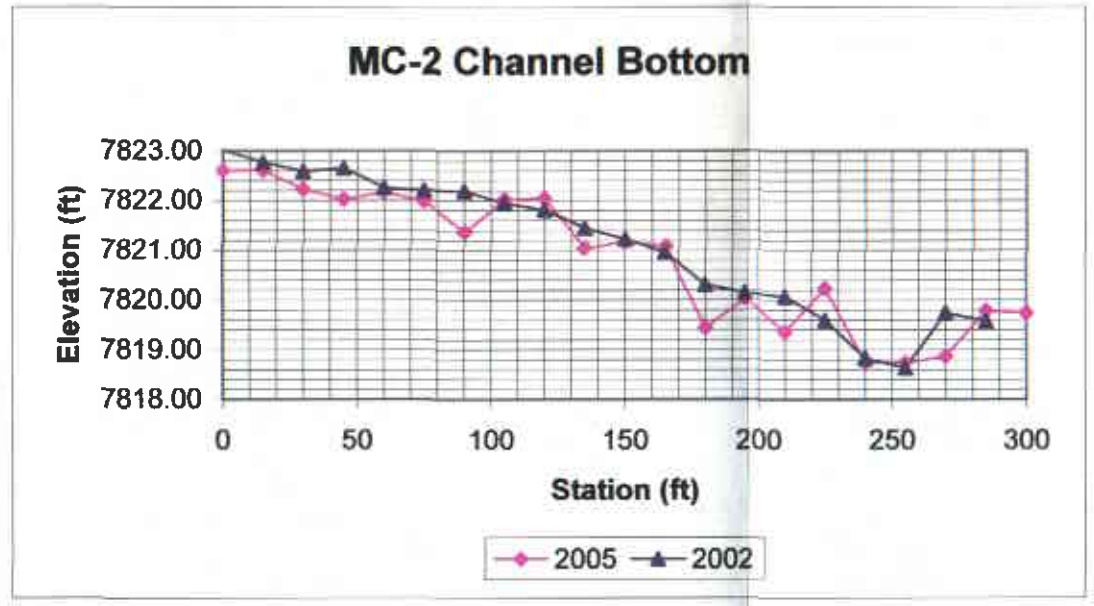


FIGURE 3-5. MC-2 CROSS-SECTION AND PROFILES

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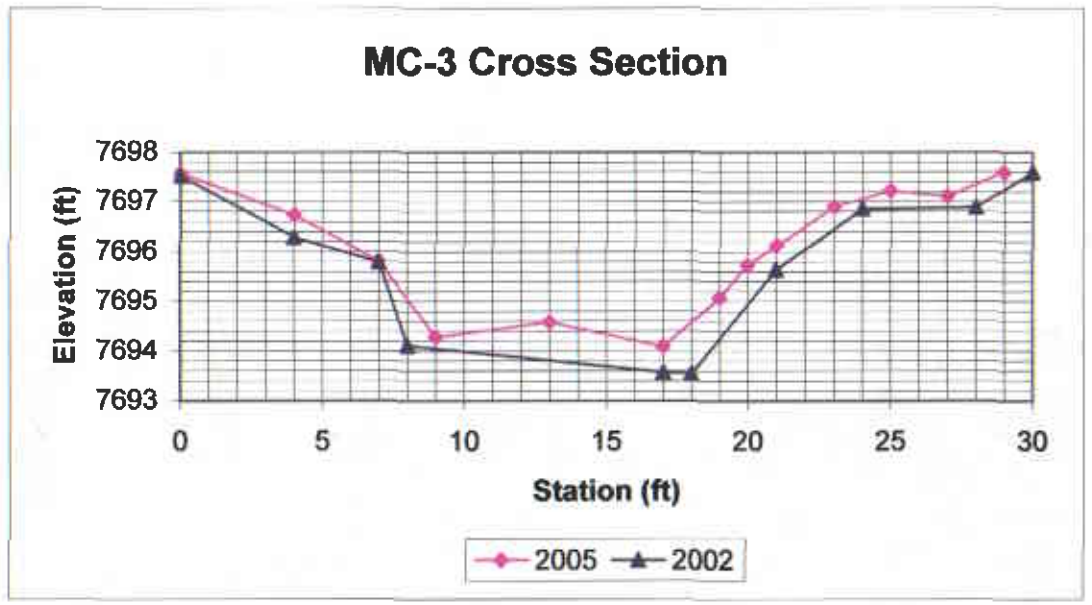

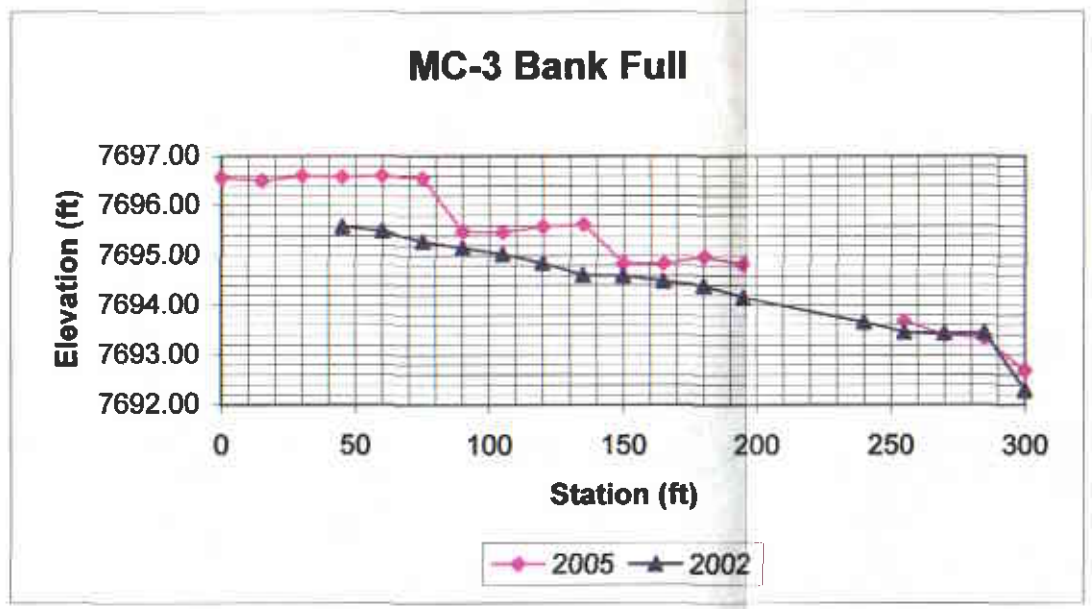

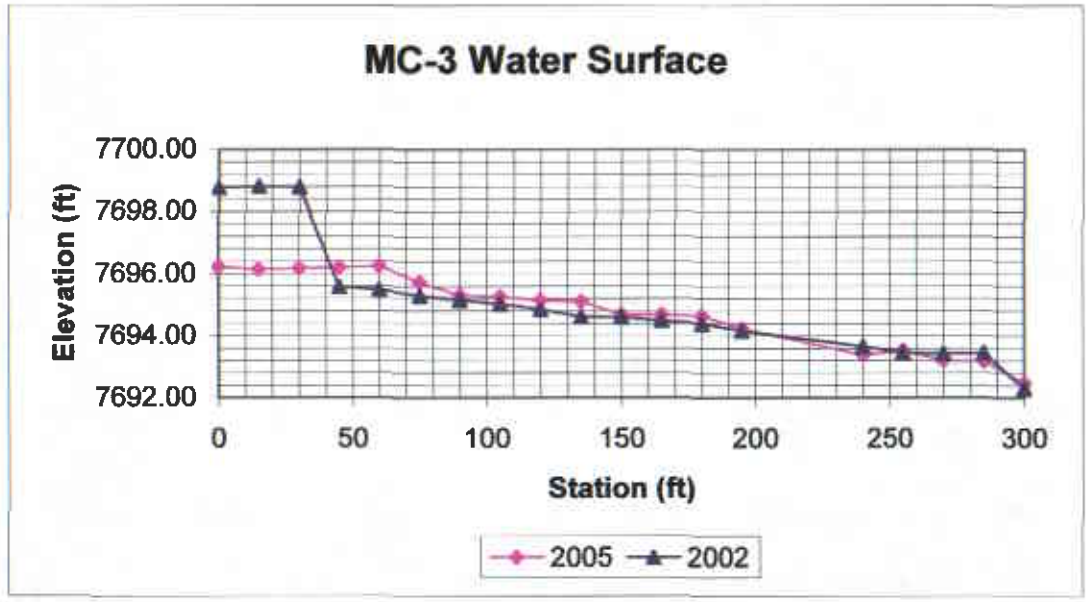

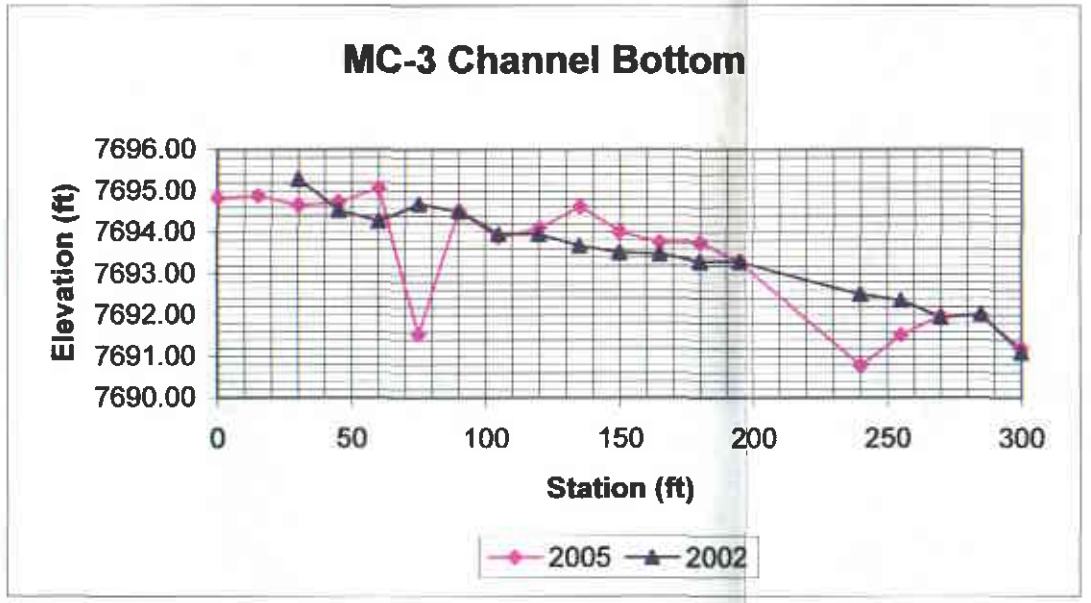

FIGURE 3-6. MC-3 CROSS-SECTION AND PROFILES

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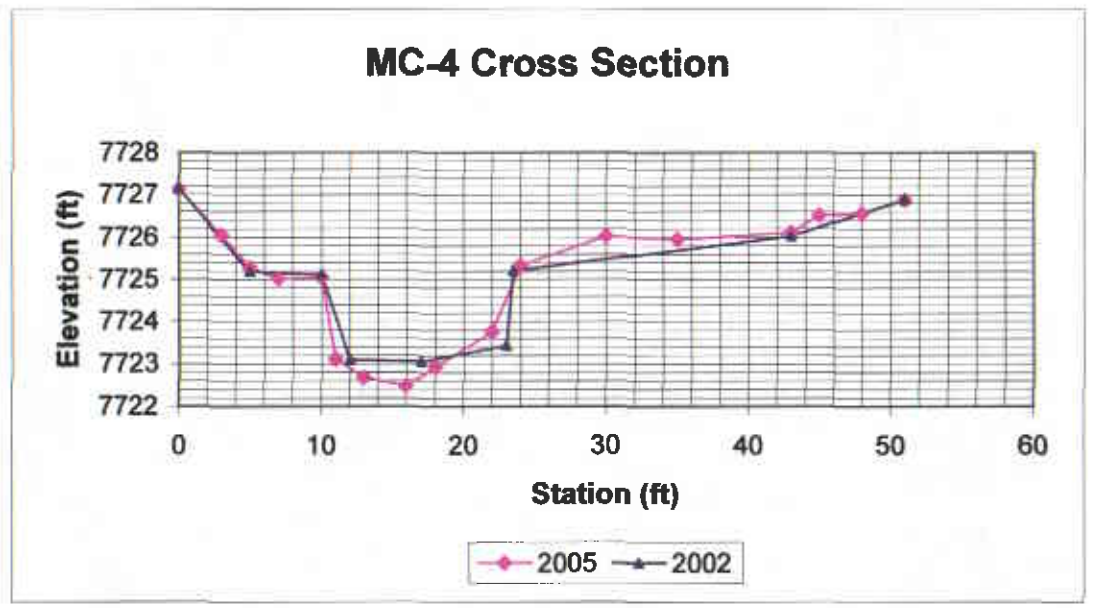

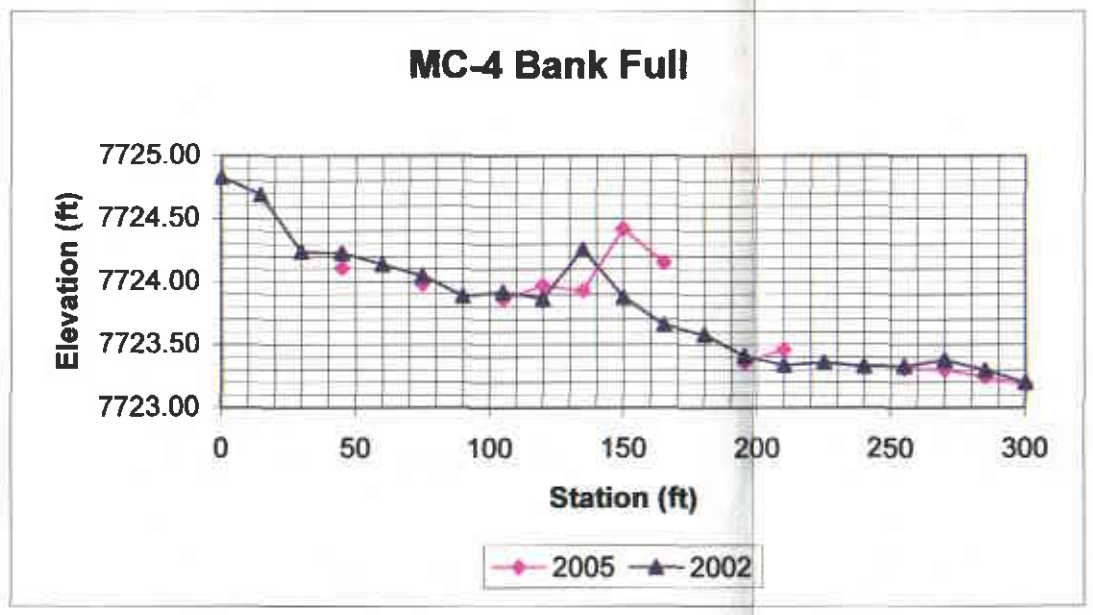

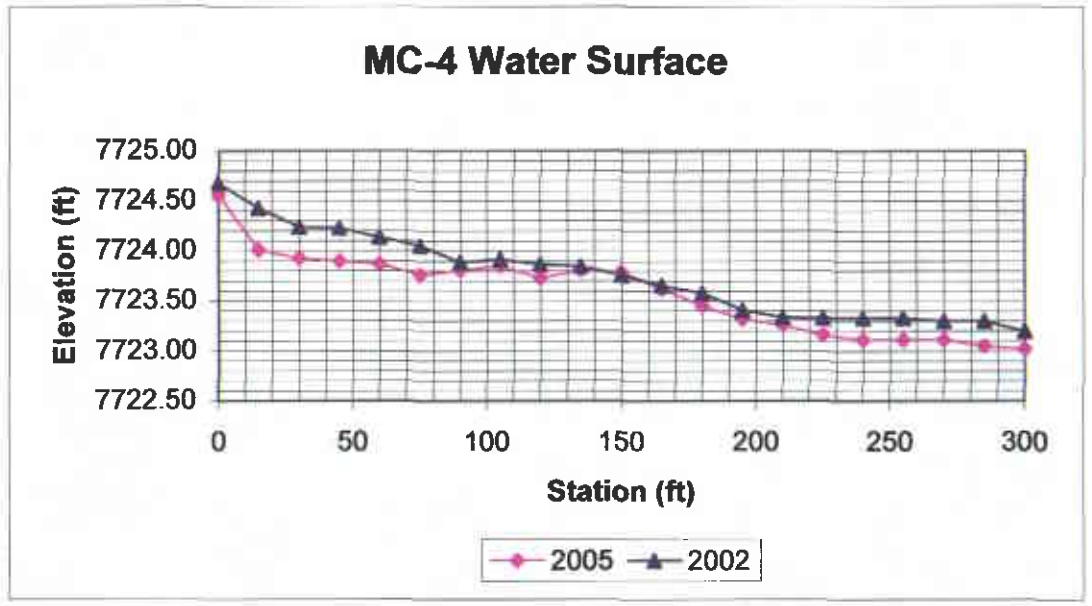

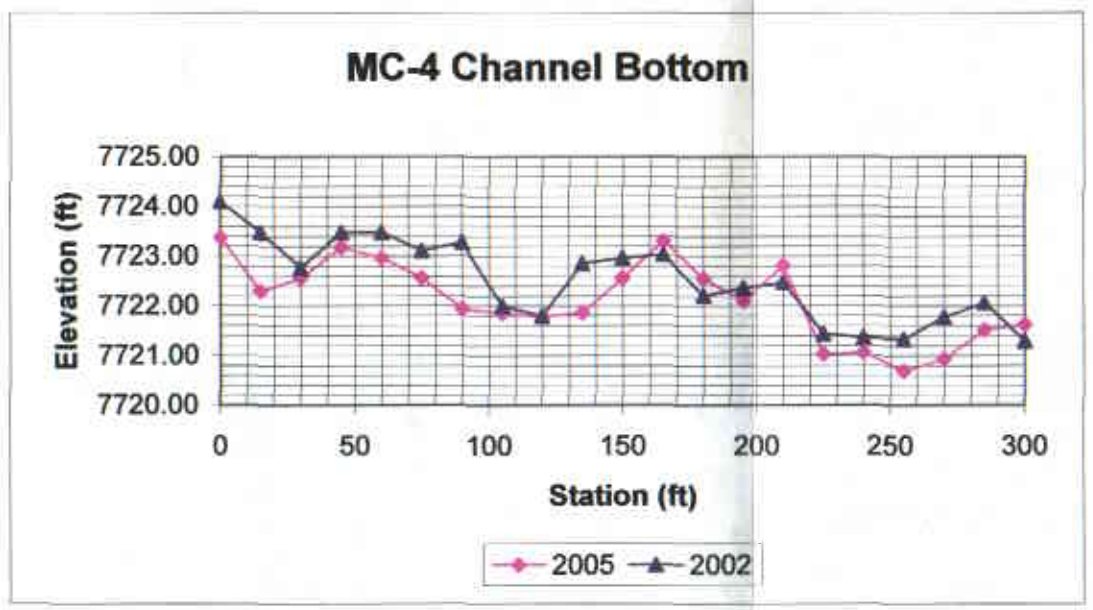

FIGURE 3-7. MC-4 CROSS-SECTION AND PROFILES

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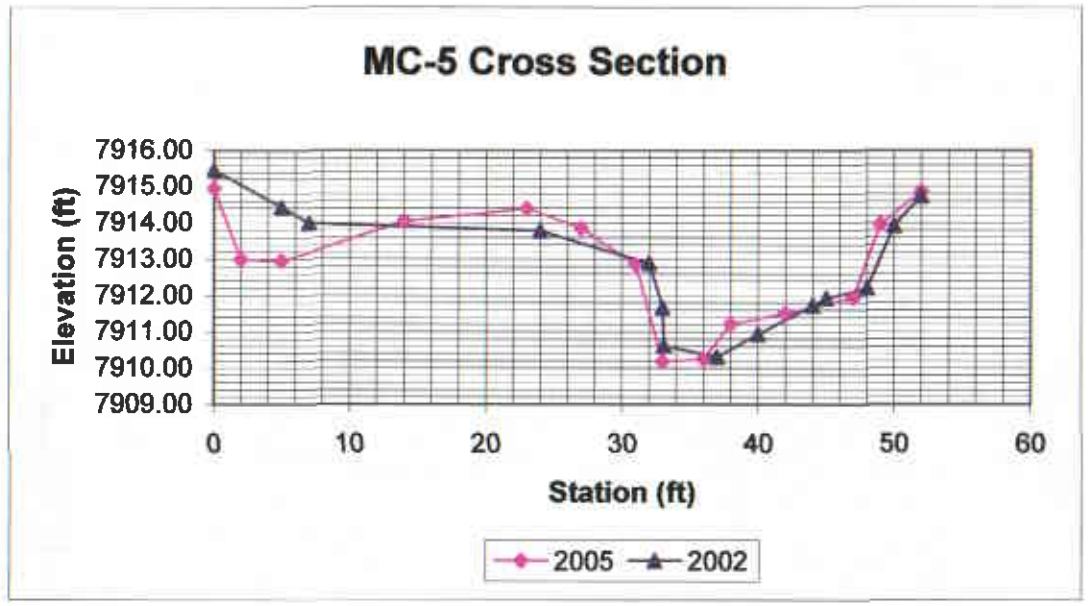
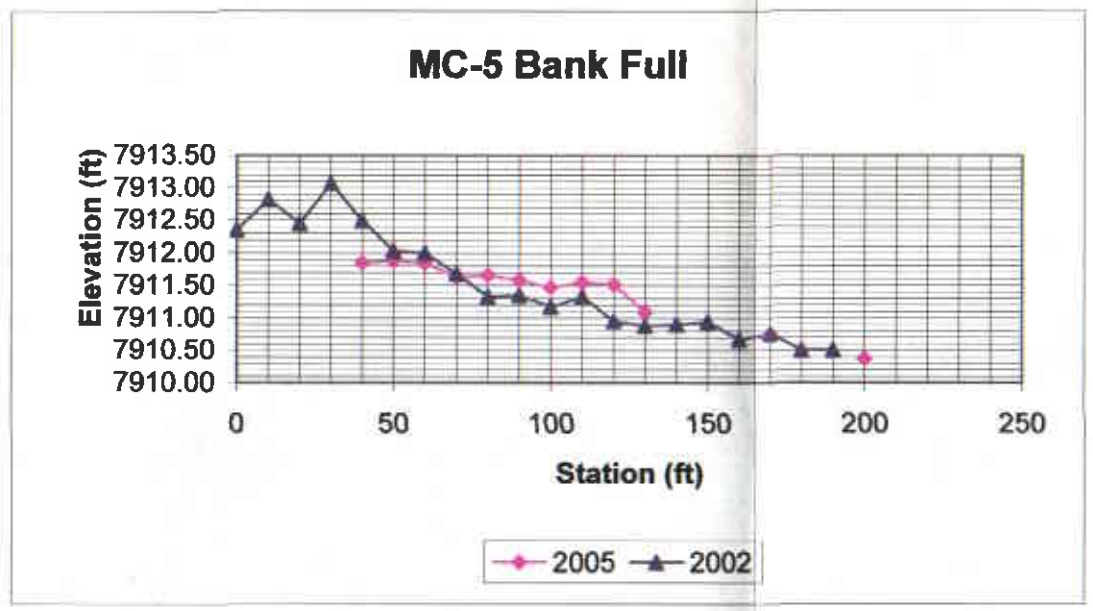
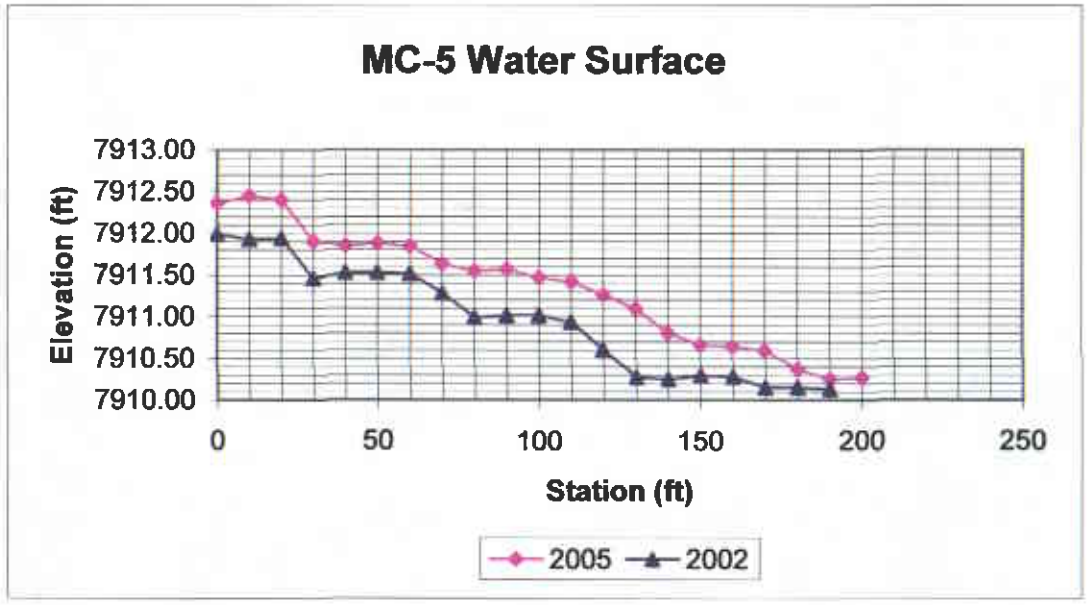






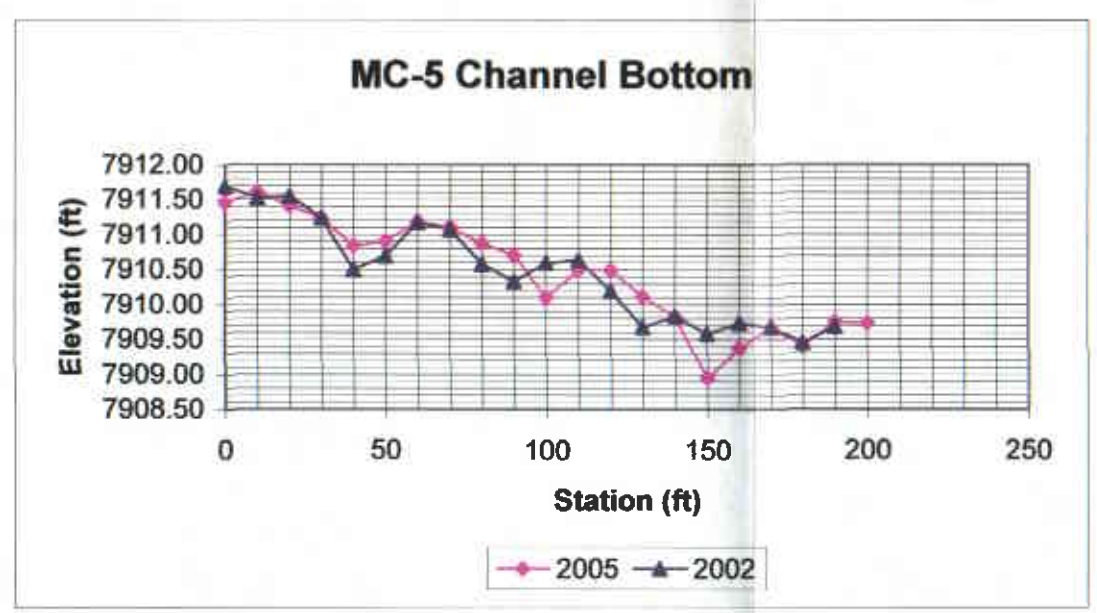
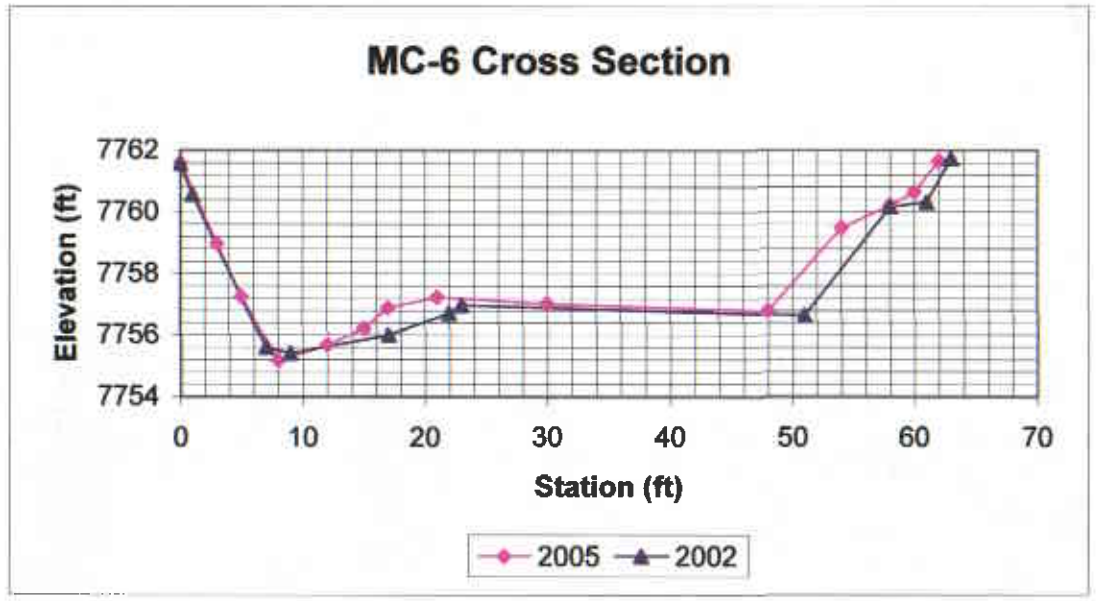
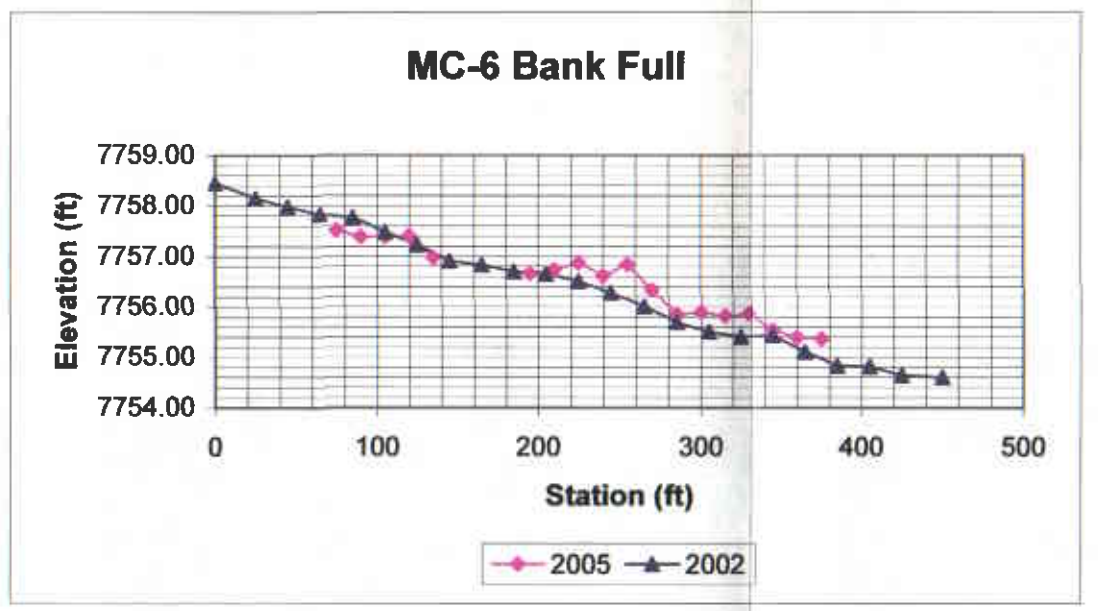
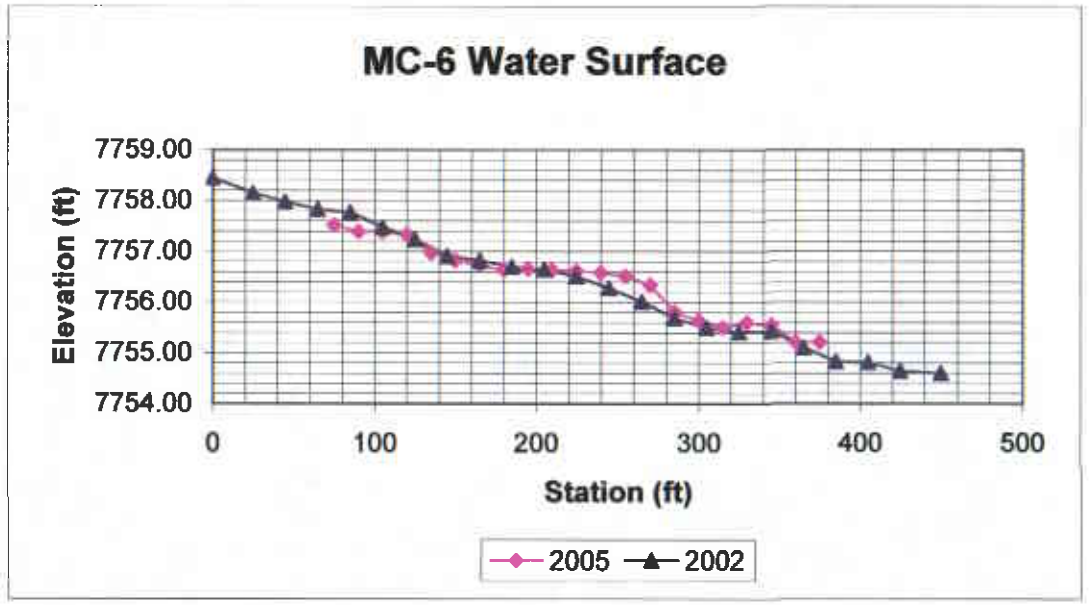


FIGURE 3-8. MC-5 CROSS-SECTION AND PROFILES

EarthFax







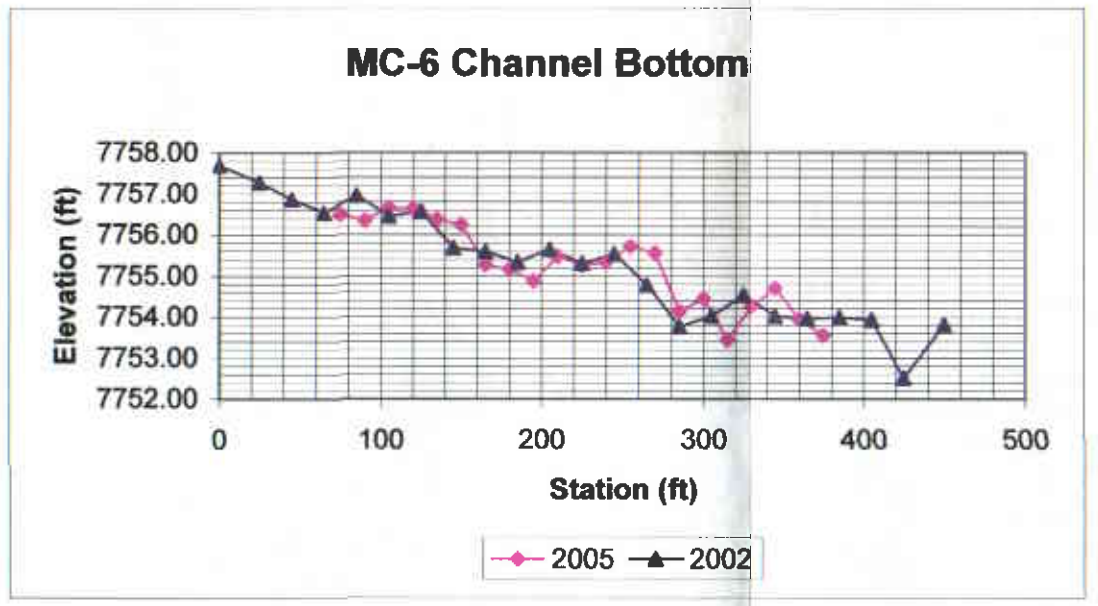


FIGURE 3-9. MC-6 CROSS-SECTION AND PROFILES

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.

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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 upper downstream view

EC-1 lower downstream view

EC-2 cross section

EC-2 upstream view

EC-2 upper downstream view

EC-2 lower downstream view

EC-3 cross section

EC-3 lower upstream view

EC-3 upper upstream view

EC-3 downstream view

MC-1 cross section

MC-1 lower upstream view

MC-1 upper upstream view

MC-1 downstream view

MC-2 cross section

MC-2 upstream view

MC-2 upper downstream view

MC-2 middle downstream view

MC-2 lower downstream view

MC-3 cross section

MC-3 upstream view

MC-3 upper downstream view

MC-3 lower downstream view

MC-4 cross section

MC-4 upstream view

MC-4 upper downstream view

MC-4 lower downstream view

MC-5 cross section

MC-5 upstream view

MC-5 downstream view

MC-6 cross section

MC-6 downstream

MC-6 lower upstream view

MC-6 upper upstream view

APPENDIX B

Copy of Field Log Book

UC-7 94-11 25 NOV 2005

Photo	log	
1	MC-3	cross section
2	MC-3	down
3	MC-3	bllow culvert
4	MC-3	up
5	MC-4	cross
6	MC-4	up
7	MC-4	down #1
8	MC-4	down #2
9	MC-4	cross
10	MC-4	down
11	MC-4	up #1
12	MC-4	up #2
13	MC-2	cross
14	MC-2	up
15	MC-2	down #1
16	MC-2	down #2
17	MC-2	down #3
18	MC-1	cross
19	MC-1	down
20	MC-1	up #1
21	MC-1	up #2
22	MC-5	cross
23	MC-5	down
24	MC-5	up

Photo	log	(cont'd)
25	EC-3	up #1
26	EC-3	cross
27	EC-3	up #2
28	EC-3	down
29	EC-2	cross
30	"	up
31	"	down #1
32	"	down #2
33	EC-1	cross
34	"	lower #1
35	"	lower #2
36	"	up

MC-1 profile

BM = 3.22

Sta	WS	Bottom	Bankfull
0+00	6.81	8.21	6.80
0+15	6.83	7.44	6.63
0+30	6.83	4.05	6.74
0+45	6.94	9.20	—
0+60	7.03	7.55	6.83
0+75	7.08	7.54	6.96
0+90	7.42	8.36	7.13
1+05	7.48	8.31	7.43
1+20	7.58	8.26	7.35
1+35	7.77	8.36	7.77
1+50	8.06	8.52	8.00
1+65	8.39	9.18	8.15
1+80	8.53	9.24	8.53
1+95	8.58	9.43	8.57
2+10	8.68	9.47	8.68
2+25	8.86	9.67	8.77
2+40	8.97	9.62	8.88
2+55	9.24	10.15	9.24
2+70	9.32	9.93	9.17
2+85	9.50	10.27	9.26
3+00	9.54	10.21	9.54

MC-1 Cross section

Sta	Elev.	Sta
0+00	4.09	0+33
0+04	4.84	0+29
0+07	6.06	0+26
0+10	7.96	0+23
0+13	8.53	0+20
0+20	8.47	0+13
0+25	7.77	0+08
0+29	5.87	0+04
0+33	3.72	0+00

BM close = 3.21

Reversed direction

MC-2 profile

BM = 0.82

Sta	WS	Bottom	Bankfull
0+00	4.30	5.25	—
0+15	4.55	5.25	4.49
0+30	4.75	5.63	4.61
0+45	4.76	5.83	4.75
0+60	4.84	5.69	4.68
0+75	4.98	5.87	4.99
0+90	4.98	6.50	4.90
1+05	5.07	5.84	4.96
1+20	5.36	5.81	5.06
1+35	6.00	6.82	5.78
1+50	5.90	6.69	5.83
1+65	6.10	6.78	6.10
1+80	6.30	8.42	6.24
1+95	6.37	7.82	6.36
2+10	6.60	8.51	6.58
2+25	6.80	7.63	6.73
2+40	6.86	9.12	6.55
2+55	6.90	9.12	6.37
2+70	7.01	9.00	7.01
2+85	7.07	8.08	6.89
3+00	7.12	8.12	7.00

Deep pool immediately downstream of Sta 3+00

MC-2 cross section

Sta	Elev.	Sta
~~0+00~~	2.18	0+39
~~0+10~~	3.13	0+29
~~0+18~~	5.08	0+21
~~0+23~~	6.22	0+16
~~0+26~~	6.71	0+13
~~0+30~~	6.84	0+09
~~0+33~~	5.28	0+06
~~0+36~~	3.94	0+03
~~0+39~~	2.07	0+00

BM close = 0.81

Reverse direction

MC-3 Profile

Sta	Wet Surf	Bottom	Bankfull	
0+00	9.75	11.15	9.40	
0+15	9.83	11.10	9.48	
0+30	9.80	11.33	9.38	
0+45	9.77	11.25	9.40	
0+60	9.73	10.92	9.38	
0+75	10.25	14.45	9.43	At break in beaver dam
0+90	10.69	11.48	10.50	
1+05	10.73	12.10	10.51	
1+20	10.84	11.88	10.40	
1+35	10.88	11.36	10.36	
1+50	11.30	11.97	11.14	
1+65	11.30	12.22	11.14	
1+80	11.34	12.24	11.01	
1+95	11.75	12.70	11.16	At culvert entrance
2+10	Culvert			
2+25				
2+40	12.60	15.20	—	At culvert outlet
2+55	12.46	14.47	12.30	
2+70	12.78	14.00	12.58	
2+85	12.80	14.00	12.44	
3+00	13.52	14.80	13.30	

MC-3 cross section BM = 8.39

Reverse direction

Sta	Elev.	Sta
~~0+00~~	8.39	~~0+29~~
~~0+02~~	8.87	0+27
~~0+04~~	8.76	0+25
~~0+06~~	9.08	0+23
~~0+08~~	9.86	0+21
~~0+09~~	10.25	0+20
~~0+10~~	10.91	0+19
~~0+12~~	11.89	0+17
~~0+16~~	11.40	0+13
~~0+20~~	11.70	0+09
~~0+23~~	10.17	0+07
~~0+25~~	9.25	0+04
~~0+29~~	8.41	0+00

BM elev = 8.39

Note — Normal BM covered by debris from culvert clean out. Used Rt bank cross section marker (at ground) for BM.

MC-4 profile

BM = 3.24

Sta	WS	Bottom	Backfill
0+00	5.55	6.74	—
0+15	6.10	7.81	—
0+30	6.18	7.55	—
0+45	6.21	6.94	6.00
0+60	6.24	7.15	—
0+75	6.35	7.54	6.13
0+90	6.30	8.17	—
1+05	6.26	8.26	6.25
1+20	6.38	8.33	6.14
1+35	6.30	8.25	6.18
1+50	6.32	7.55	5.69
1+65	6.49	6.81	5.96
1+80	6.66	7.56	—
1+95	6.79	8.02	6.75
2+10	6.85	7.30	6.65
2+25	6.95	9.08	—
2+40	7.00	9.05	—
2+55	7.00	9.42	6.80
2+70	7.00	9.18	6.81
2+85	7.06	8.60	6.87
3+00	7.09	8.49	6.93

BM close = 3.24

MC-4 cross section

reverse direction

Sta	Elev.	Sta
~~0+00~~	3.24	0+51
~~0+03~~	3.55	0+48
~~0+06~~	3.60	0+45
~~0+08~~	4.00	0+43
~~0+16~~	4.16	0+35
~~0+21~~	4.08	0+30
~~0+27~~	4.78	0+24
~~0+29~~	6.35	0+22
~~0+33~~	7.18	0+18
~~0+35~~	7.63	0+16
~~0+38~~	7.44	0+13
~~0+45~~	7.01	0+11
~~0+44~~	5.06	0+10
~~0+44~~	5.09	0+07
~~0+46~~	4.83	0+05
~~0+48~~	4.05	0+03
~~0+51~~	2.99	0+00

BM close = 3.24

Note - BM covered w/ frozen soil, Shot ground @ Rt cross section marker as BM

MC-5 profile BM = 5.55

Sta	WS	Bottom	Backfill
0+00	8,54	9,44	—
0+10	8,45	9,29	—
0+20	8,50	9,49	—
0+30	9,00	9,67	—
0+40	9,05	10,06	9,05
0+50	9,02	10,00	9,02
0+60	9,06	9,72	9,06
0+70	9,27	9,80	9,27
0+80	9,35	10,03	9,24
0+90	9,33	10,20	9,32
1+00	9,43	10,80	9,43
1+10	9,48	10,41	9,35
1+20	9,64	10,41	9,39
1+30	9,81	10,79	9,81
1+40	10,10	11,08	—
1+50	10,24	11,95	—
1+60	10,26	11,53	—
1+70	10,31	11,24	10,15
1+80	10,53	11,50	—
1+90	10,65	11,16	—
2+00	10.63	11,17	10,153

Tie down immed. upstream

At tie down

MC-5 cross section

Reverse direction

Sta	Elev.	Sta
~~0+00~~	6,04	0+52
~~0+03~~	6,94	0+49
~~0+05~~	8,96	0+47
~~0+10~~	9,39	0+42
~~0+14~~	9,69	0+38
~~0+16~~	10,66	0+36
~~0+19~~	10,73	0+33
~~0+21~~	8,05	0+31
~~0+25~~	7,05	0+27
~~0+29~~	6,51	0+23
~~0+38~~	6,86	0+14
~~0+47~~	7,95	0+05
~~0+50~~	7,91	0+02
~~0+52~~	5,96	0+00

BM close = 5.54

MC-6 profile BM = 2.20

Sta	WS	Bottom	Bankfull
0+00	8.52	9.55	8.52
0+15	8.65	9.69	8.65
0+30	8.65	9.39	8.65
0+45	8.71	9.40	8.64
0+60	9.07	9.67	9.07
0+75	9.22	9.80	—
0+90	9.31	10.76	—
1+05	9.40	10.88	—
1+20	9.38	11.16	9.38
1+35	9.40	10.57	9.30
1+50	9.42	10.78	9.17
1+65	9.45	10.70	9.43
1+80	9.52	10.33	9.20
1+95	9.70	10.48	9.71
2+10	10.23	11.90	10.19
2+25	10.40	11.60	10.15
2+40	10.54	12.60	10.22
2+55	10.44	11.79	1018
2+70	10.50	11.34	10.50
2+85	10.83	12.10	10.65
3+00	10.85	12.49	10.68

MC-6 cross section

Reversed direction

Sta	Elev.	Sta
0+00	4.38	0+62
0+02	5.40	0+60
0+04	5.83	0+58
0+08	6.56	0+54
0+19	9.25	0+48
0+32	9.02	0+30
0+41	8.80	0+21
0+45	9.14	0+17
0+47	9.82	0+15
0+50	10.36	0+12
0+54	10.87	0+08
0+57	8.78	0+05
0+59	7.06	0+03
0+62	4.45	0+00

BM close = 2.19

EC-3 profile — BM = 6.36

Sta	WS	Bottom	Bankfull
0+00	8.56	10.01	8.58
0+10	8.73	9.54	8.73
0+20	9.08	10.18	9.08
0+30	9.38	10.27	9.38
0+40	9.70	10.38	9.70
0+50	9.94	11.26	9.94
0+60	10.07	11.64	10.07
0+70	10.16	10.80	Same as WS →
0+80	10.50	11.02	
0+90	11.38	12.35	
1+00	11.56	12.21	
1+10	11.77	12.65	
1+20	11.80	12.70	
1+30	11.93	13.02	
1+40	12.52	13.32	
1+50	13.08	13.85	
Move gun. Old BM = 6.36			New BM = 1.64
1+60	8.74	9.95	
1+70	9.31	10.79	
1+80	9.39	10.27	
1+90	9.45	9.99	
2+06	9.75	10.70	

Dead tree in stream (at 1+30)

EC-3 cross section

	Sta	Elev.
0+31	~~0+00~~	2.65
0+28	~~0+03~~	4.29
0+26	~~0+05~~	5.95
0+24	~~0+07~~	7.40
0+22	~~0+09~~	7.63
0+19	~~0+12~~	7.29
0+18	~~0+13~~	4.69
0+16	~~0+15~~	4.09
0+13	~~0+18~~	3.26
0+07	~~0+24~~	2.84
0+00	~~0+31~~	1.91

↑ Reversed direction

BM close = 1.63

EC-2 profile

BM = 4.38

Backfall

Sta	WS	Bottom
0+00	2.42	3.48
0+10	2.73	3.65
0+20	2.81	3.60
0+30	3.18	3.90
0+40	4.20	5.05
0+50	4.20	5.19
0+60	4.60	5.33
0+70	5.01	6.53
0+80	5.10	5.77
0+90	5.72	6.40
1+00	6.51	7.60
1+10	7.04	7.61
1+20	7.19	7.96
1+30	7.90	9.32
1+40	8.15	9.12
1+50	8.48	9.84
1+60	8.51	10.74
1+70	8.70	9.58
1+80	8.92	9.83
1+90	10.00	12.77
2+00	10.00	11.15

EC-2 cross section

	Sta	Elev.
0+69	~~0+00~~	1.08
0+65	~~0+04~~	2.51
0+56	~~0+13~~	4.26
0+42	~~0+27~~	4.68
0+33	~~0+36~~	5.76
0+31	~~0+38~~	6.27
0+28	~~0+41~~	6.49
0+24	~~0+45~~	6.15
0+23	~~0+46~~	5.43
0+15	~~0+54~~	5.09
0+08	~~0+61~~	5.45
0+00	~~0+69~~	3.39

Reversed direction

EC-1 profile BM = 6.52

Stg	WS	Bottom	Bankfull
0+00	3.75	4.99	
0+10	4.68	5.49	
0+20	5.75	6.37	
0+30	6.08	7.83	
0+40	7.37	7.95	
0+50	7.85	8.63	
0+60	8.20	8.59	
0+70	8.25	8.79	
0+80	9.10	9.94	
0+90	9.46	10.05	
1+00	9.76	10.58	
1+10	9.95	10.60	
1+20	10.60	11.80	
1+30	11.75	12.17	
1+40	11.95	12.65	
Move	sum.	Old BM = 6.53	New BM 0.75
1+52	6.33	7.40	
1+60	7.65	7.88	
1+70	8.75	8.18	
1+80	8.20	8.90	
1+90	8.90	10.65	
2+00	10.33	10.75	

Dark. Questionable data.

Dark. No GPS. Cell spot. Surveyed left for home. Wet, miserable.

APPENDIX C

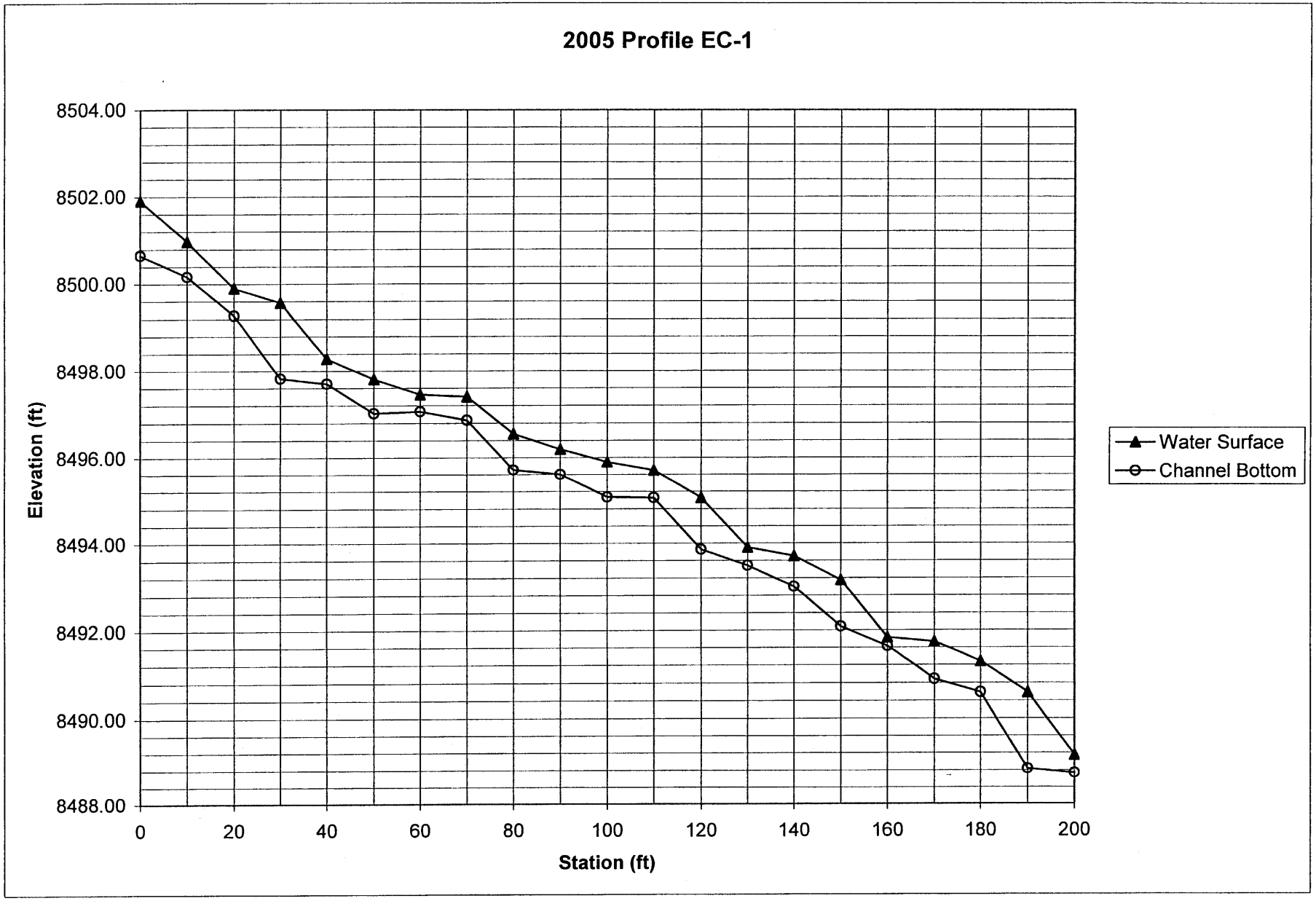
Survey Tabulations with
Individual Cross Section and Profile Drawings

Profile: EC-1

Benchmark elevation (ft):	8499.13	Survey date:	11/25/2005
Rod reading at benchmark (ft):	6.52	Move gun at sta. 150	0.35

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	3.75	8501.90	4.99	8500.66			
10	4.68	8500.97	5.49	8500.16	0.93	10.00	0.093
20	5.75	8499.90	6.37	8499.28	1.07	10.00	0.107
30	6.08	8499.57	7.83	8497.82	0.33	10.00	0.033
40	7.37	8498.28	7.95	8497.70	1.29	10.00	0.129
50	7.85	8497.80	8.63	8497.02	0.48	10.00	0.048
60	8.20	8497.45	8.59	8497.06	0.35	10.00	0.035
70	8.25	8497.40	8.79	8496.86	0.05	10.00	0.005
80	9.10	8496.55	9.94	8495.71	0.85	10.00	0.085
90	9.46	8496.19	10.05	8495.60	0.36	10.00	0.036
100	9.76	8495.89	10.58	8495.07	0.30	10.00	0.030
110	9.95	8495.70	10.60	8495.05	0.19	10.00	0.019
120	10.60	8495.05	11.80	8493.85	0.65	10.00	0.065
130	11.75	8493.90	12.17	8493.48	1.15	10.00	0.115
140	11.95	8493.70	12.65	8493.00	0.20	10.00	0.020
150	6.33	8493.15	7.40	8492.08	0.55	10.00	0.055
160	7.65	8491.83	7.85	8491.63	1.32	10.00	0.132
170	7.75	8491.73	8.60	8490.88	0.10	10.00	0.010
180	8.20	8491.28	8.90	8490.58	0.45	10.00	0.045
190	8.90	8490.58	10.65	8488.83	0.70	10.00	0.070
200	10.33	8489.15	10.75	8488.73	1.43	10.00	0.143

Max. Water Surface Slope (fraction):	0.143
Min. Water Surface Slope (fraction):	0.005
Avg. Water Surface Slope (fraction):	0.064


2005 Profile EC-1
8504.00
8502.00
8500.00
8498.00
8496.00
8494.00
8492.00
8490.00
8488.00
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
200
Station (ft)
Water Surface
Channel Bottom

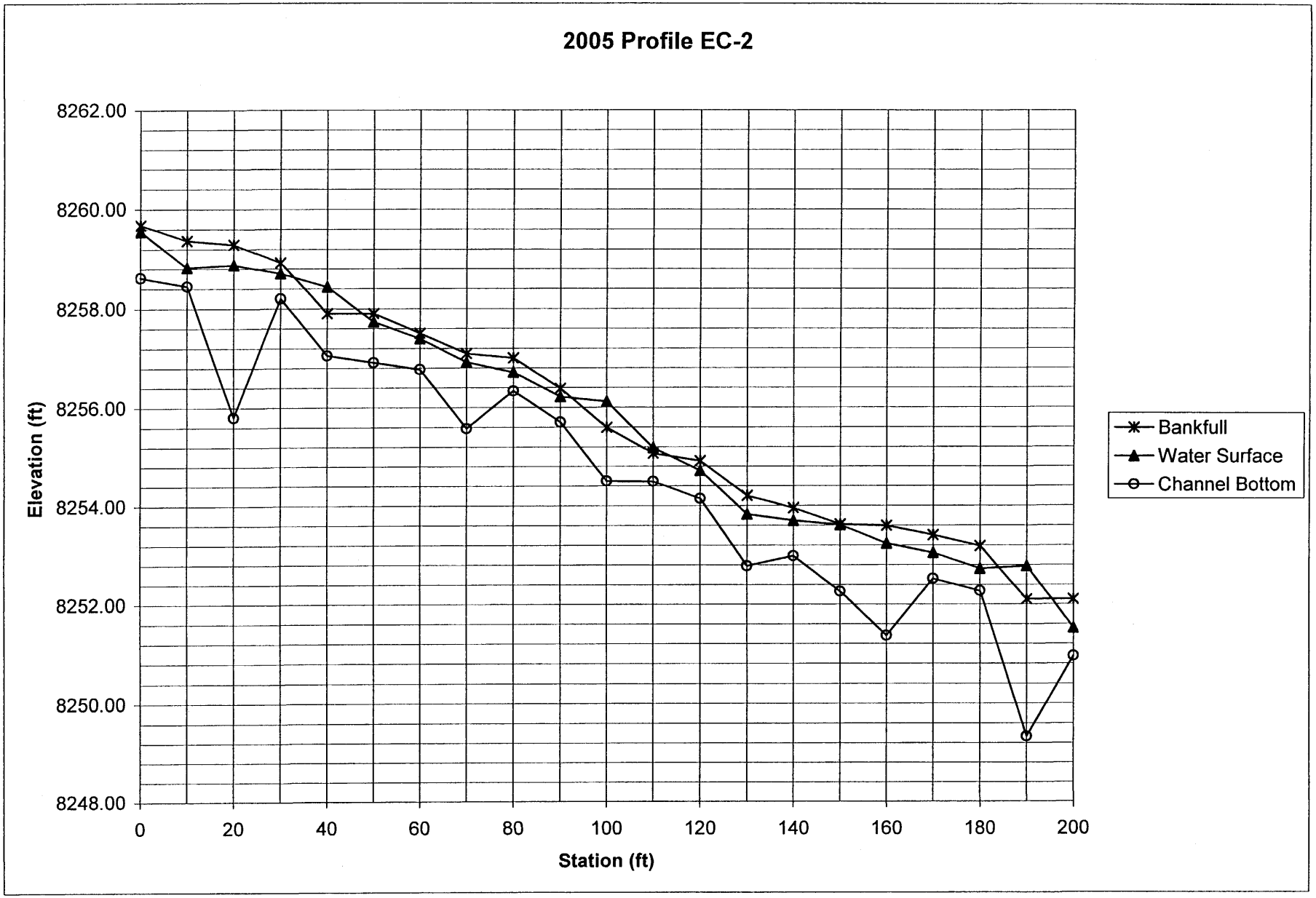
No cross section measured at EC-1 in 2005 due to safety concerns brought on by darkness and icy conditions.

Profile: EC-2

Benchmark elevation (ft): 8257.72 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 4.38

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	2.42	8259.68	2.42	8259.68	3.48	8258.62			
10	2.73	8259.37	2.73	8259.37	3.65	8258.45	0.31	10.00	0.031
20	2.81	8259.29	2.81	8259.29	6.30	8255.80	0.08	10.00	0.008
30	3.18	8258.92	3.18	8258.92	3.90	8258.20	0.37	10.00	0.037
40	4.20	8257.90	4.20	8257.90	5.05	8257.05	1.02	10.00	0.102
50	4.20	8257.90	4.20	8257.90	5.19	8256.91	0.00	10.00	0.000
60	4.60	8257.50	4.60	8257.50	5.33	8256.77	0.40	10.00	0.040
70	5.01	8257.09	5.01	8257.09	6.53	8255.57	0.41	10.00	0.041
80	5.10	8257.00	5.10	8257.00	5.77	8256.33	0.09	10.00	0.009
90	5.72	8256.38	5.72	8256.38	6.40	8255.70	0.62	10.00	0.062
100	6.51	8255.59	6.51	8255.59	7.60	8254.50	0.79	10.00	0.079
110	7.04	8255.06	7.04	8255.06	7.61	8254.49	0.53	10.00	0.053
120	7.19	8254.91	7.19	8254.91	7.96	8254.14	0.15	10.00	0.015
130	7.90	8254.20	7.90	8254.20	9.32	8252.78	0.71	10.00	0.071
140	8.15	8253.95	8.15	8253.95	9.12	8252.98	0.25	10.00	0.025
150	8.48	8253.62	8.48	8253.62	9.84	8252.26	0.33	10.00	0.033
160	8.51	8253.59	8.51	8253.59	10.74	8251.36	0.03	10.00	0.003
170	8.70	8253.40	8.70	8253.40	9.58	8252.52	0.19	10.00	0.019
180	8.92	8253.18	8.92	8253.18	9.83	8252.27	0.22	10.00	0.022
190	10.00	8252.10	10.00	8252.10	12.77	8249.33	1.08	10.00	0.108
200	10.00	8252.10	10.00	8252.10	11.15	8250.95	0.00	10.00	0.000

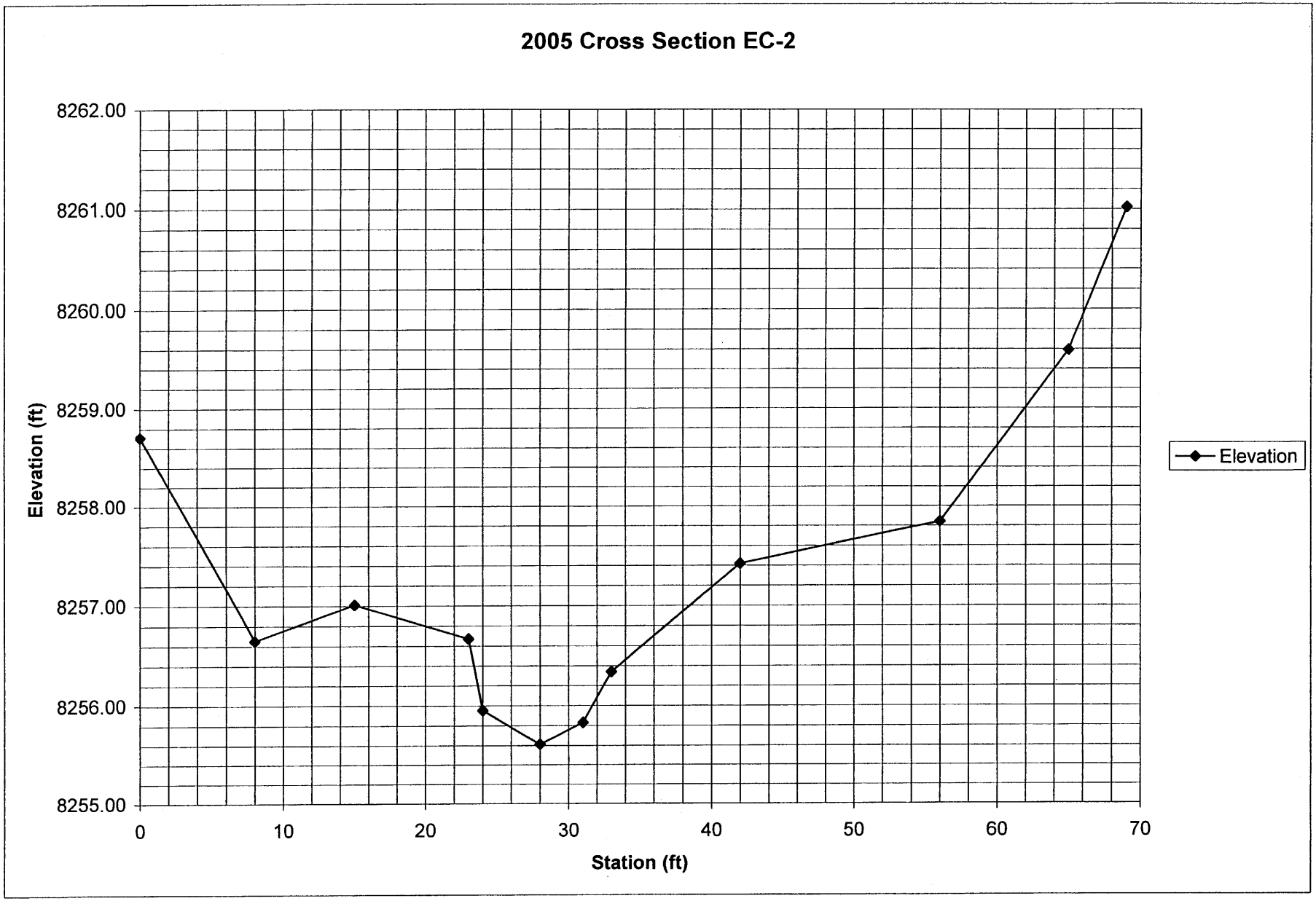
Max. Water Surface Slope (fraction): 0.108
Min. Water Surface Slope (fraction): 0.000
Avg. Water Surface Slope (fraction): 0.038


2005 Profile EC-2
8262.00
8260.00
8258.00
8256.00
8254.00
8252.00
8250.00
8248.00
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
200
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: EC-2

Benchmark elevation: 8257.72 Survey Date: 11/25/2005
BenchMark Rod Reading: 4.38

Station	Rod Reading	Elevation
0	3.39	8258.71
8	5.45	8256.65
15	5.09	8257.01
23	5.43	8256.67
24	6.15	8255.95
28	6.49	8255.61
31	6.27	8255.83
33	5.76	8256.34
42	4.68	8257.42
56	4.26	8257.84
65	2.51	8259.59
69	1.08	8261.02

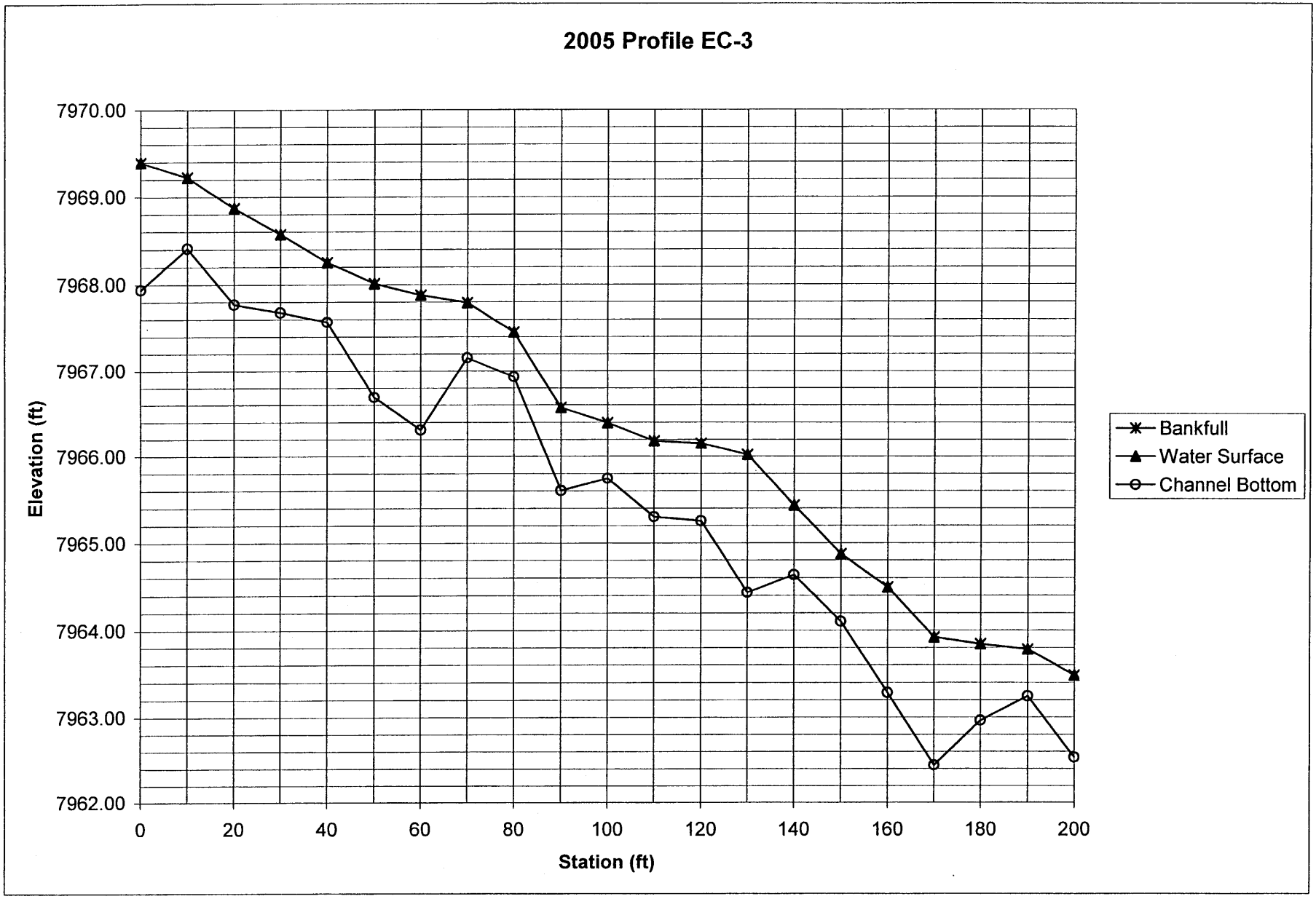

2005 Cross Section EC-2
8262.00
8261.00
8260.00
8259.00
8258.00
8257.00
8256.00
8255.00
Elevation (ft)
0
10
20
30
40
50
60
70
Station (ft)
Elevation

Profile: EC-3

Benchmark elevation (ft): 7971.59 Survey date: 11/25/2005
Rod reading at benchmark (ft): 6.36 Move gun at sta.160: 1.64

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	8.56	7969.39	8.56	7969.39	10.01	7967.94			
10	8.73	7969.22	8.73	7969.22	9.54	7968.41	0.17	10.00	0.017
20	9.08	7968.87	9.08	7968.87	10.18	7967.77	0.35	10.00	0.035
30	9.38	7968.57	9.38	7968.57	10.27	7967.68	0.30	10.00	0.030
40	9.70	7968.25	9.70	7968.25	10.38	7967.57	0.32	10.00	0.032
50	9.94	7968.01	9.94	7968.01	11.26	7966.69	0.24	10.00	0.024
60	10.07	7967.88	10.07	7967.88	11.64	7966.31	0.13	10.00	0.013
70	10.16	7967.79	10.16	7967.79	10.80	7967.15	0.09	10.00	0.009
80	10.50	7967.45	10.50	7967.45	11.02	7966.93	0.34	10.00	0.034
90	11.38	7966.57	11.38	7966.57	12.35	7965.60	0.88	10.00	0.088
100	11.56	7966.39	11.56	7966.39	12.21	7965.74	0.18	10.00	0.018
110	11.77	7966.18	11.77	7966.18	12.65	7965.30	0.21	10.00	0.021
120	11.80	7966.15	11.80	7966.15	12.70	7965.25	0.03	10.00	0.003
130	11.93	7966.02	11.93	7966.02	13.52	7964.43	0.13	10.00	0.013
140	12.52	7965.43	12.52	7965.43	13.32	7964.63	0.59	10.00	0.059
150	13.08	7964.87	13.08	7964.87	13.85	7964.10	0.56	10.00	0.056
160	8.74	7964.49	8.74	7964.49	9.95	7963.28	0.38	10.00	0.038
170	9.31	7963.92	9.31	7963.92	10.79	7962.44	0.57	10.00	0.057
180	9.39	7963.84	9.39	7963.84	10.27	7962.96	0.08	10.00	0.008
190	9.45	7963.78	9.45	7963.78	9.99	7963.24	0.06	10.00	0.006
200	9.75	7963.48	9.75	7963.48	10.70	7962.53	0.30	10.00	0.030

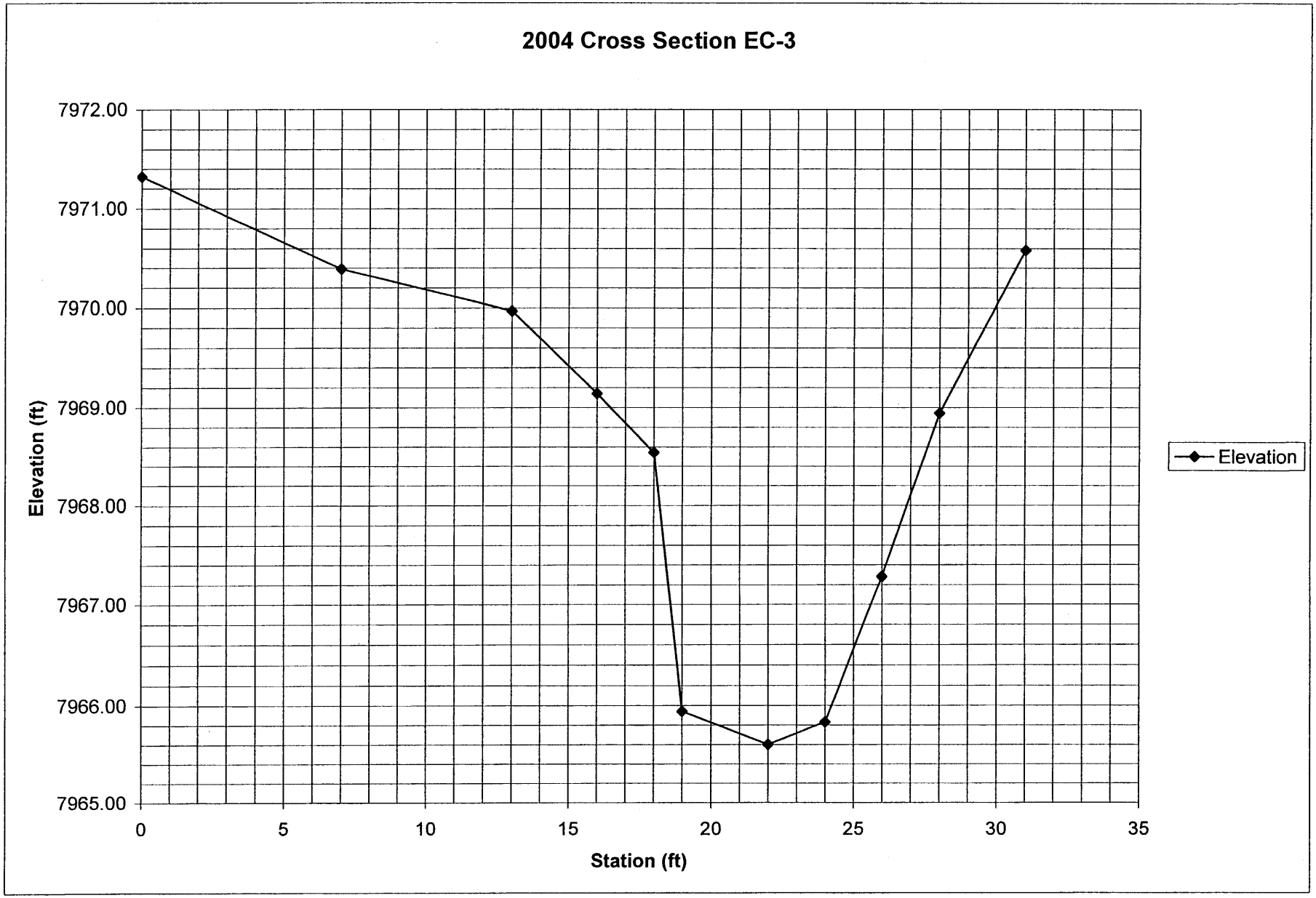
Max. Water Surface Slope (fraction): 0.088
Min. Water Surface Slope (fraction): 0.003
Avg. Water Surface Slope (fraction): 0.030


2005 Profile EC-3
7970.00
7969.00
7968.00
7967.00
7966.00
7965.00
7964.00
7963.00
7962.00
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
200
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: EC-3

Benchmark elevation: 7971.59 Survey Date: 11/25/2005
BenchMark Rod Reading: 1.64

Station	Rod Reading	Elevation
0	1.91	7971.32
7	2.84	7970.39
13	3.26	7969.97
16	4.09	7969.14
18	4.69	7968.54
19	7.29	7965.94
22	7.63	7965.60
24	7.40	7965.83
26	5.95	7967.28
28	4.29	7968.94
31	2.65	7970.58

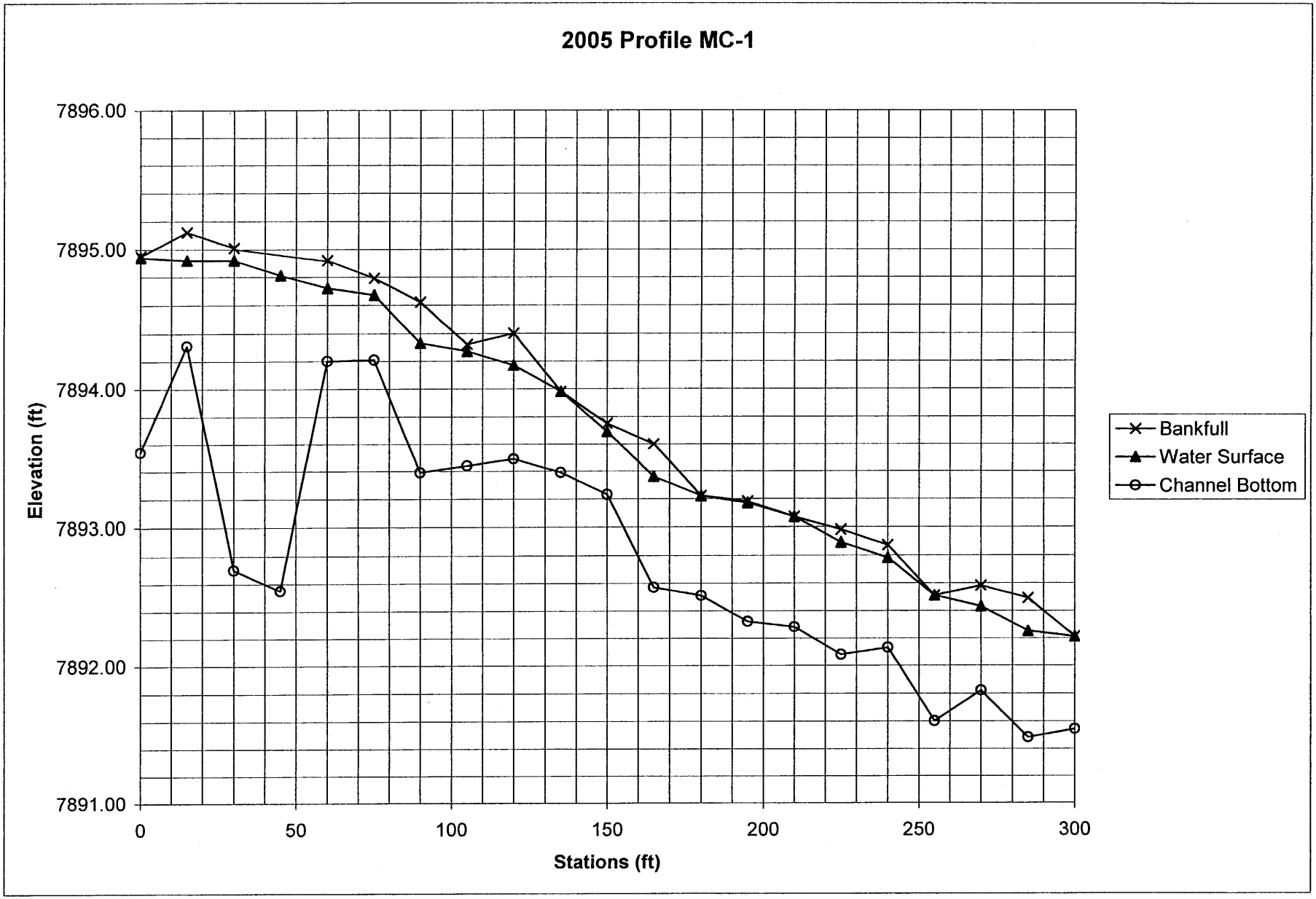

2004 Cross Section EC-3
7972.00
7971.00
7970.00
7969.00
7968.00
7967.00
7966.00
7965.00
Elevation (ft)
0
5
10
15
20
25
30
35
Station (ft)
Elevation

Profile: MC-1

Benchmark elevation (ft): 7898.53 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 3.22

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	6.80	7894.95	6.81	7894.94	8.21	7893.54			
15	6.63	7895.12	6.83	7894.92	7.44	7894.31	0.02	15.00	0.001
30	6.74	7895.01	6.83	7894.92	9.05	7892.70	0.00	15.00	0.000
45			6.94	7894.81	9.20	7892.55	0.11	15.00	0.007
60	6.83	7894.92	7.03	7894.72	7.55	7894.20	0.09	15.00	0.006
75	6.96	7894.79	7.08	7894.67	7.54	7894.21	0.05	15.00	0.003
90	7.13	7894.62	7.42	7894.33	8.36	7893.39	0.34	15.00	0.023
105	7.43	7894.32	7.48	7894.27	8.31	7893.44	0.06	15.00	0.004
120	7.35	7894.40	7.58	7894.17	8.26	7893.49	0.10	15.00	0.007
135	7.77	7893.98	7.77	7893.98	8.36	7893.39	0.19	15.00	0.013
150	8.00	7893.75	8.06	7893.69	8.52	7893.23	0.29	15.00	0.019
165	8.15	7893.60	8.39	7893.36	9.18	7892.57	0.33	15.00	0.022
180	8.53	7893.22	8.53	7893.22	9.24	7892.51	0.14	15.00	0.009
195	8.57	7893.18	8.58	7893.17	9.43	7892.32	0.05	15.00	0.003
210	8.68	7893.07	8.68	7893.07	9.47	7892.28	0.10	15.00	0.007
225	8.77	7892.98	8.86	7892.89	9.67	7892.08	0.18	15.00	0.012
240	8.88	7892.87	8.97	7892.78	9.62	7892.13	0.11	15.00	0.007
255	9.24	7892.51	9.24	7892.51	10.15	7891.60	0.27	15.00	0.018
270	9.17	7892.58	9.32	7892.43	9.93	7891.82	0.08	15.00	0.005
285	9.26	7892.49	9.50	7892.25	10.27	7891.48	0.18	15.00	0.012
300	9.54	7892.21	9.54	7892.21	10.21	7891.54	0.04	15.00	0.003

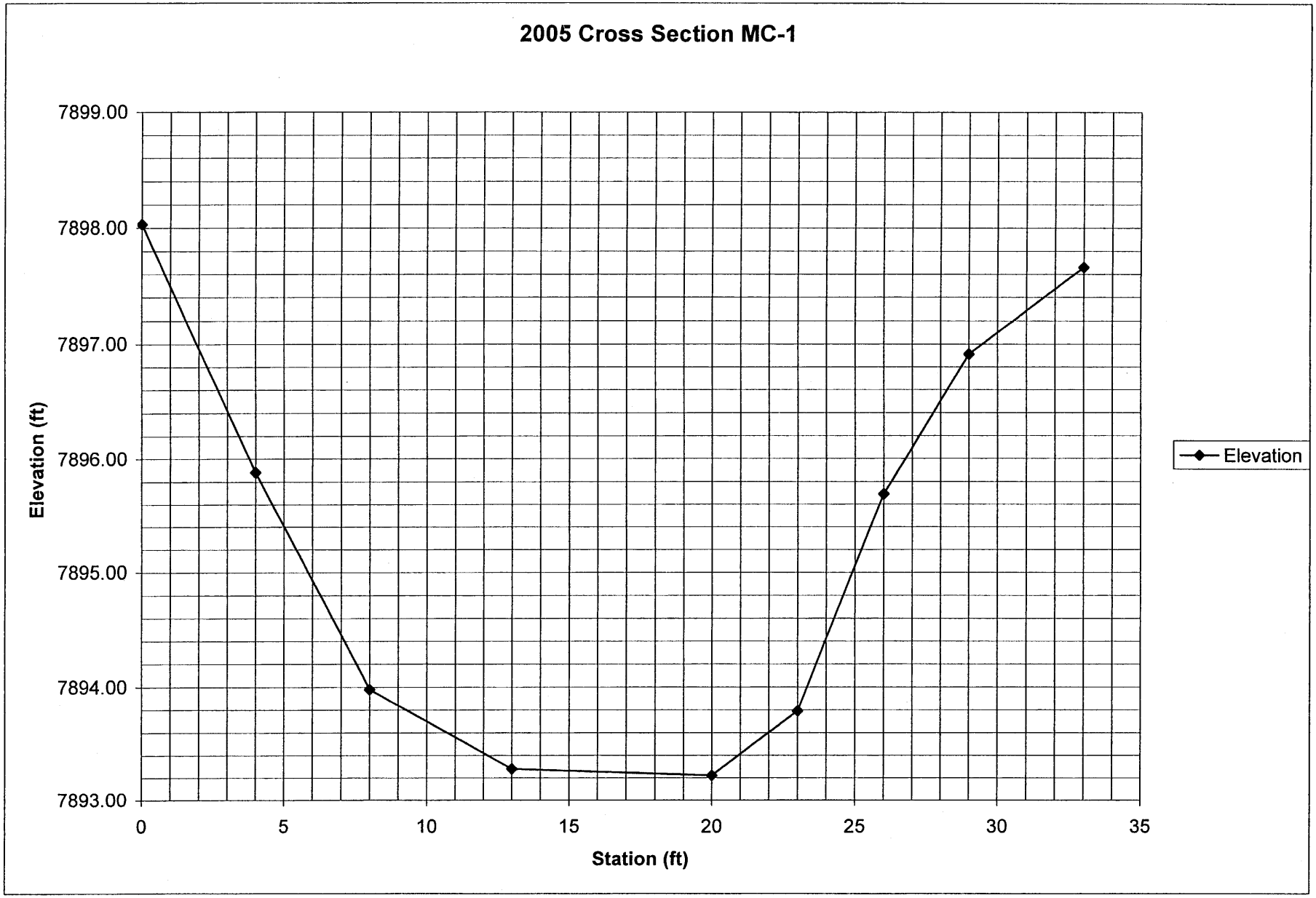
Max. Water Surface Slope (fraction): 0.023
Min. Water Surface Slope (fraction): 0.000
Avg. Water Surface Slope (fraction): 0.009


2005 Profile MC-1
7896.00
7895.00
7894.00
7893.00
7892.00
7891.00
Elevation (ft)
0
50
100
150
200
250
300
Stations (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-1

Benchmark elevation: 7898.53 Survey Date: 11/25/2005
BenchMark Rod Reading: 3.22

Station	Rod Reading	Elevation
0	3.72	7898.03
4	5.87	7895.88
8	7.77	7893.98
13	8.47	7893.28
20	8.53	7893.22
23	7.96	7893.79
26	6.06	7895.69
29	4.84	7896.91
33	4.09	7897.66

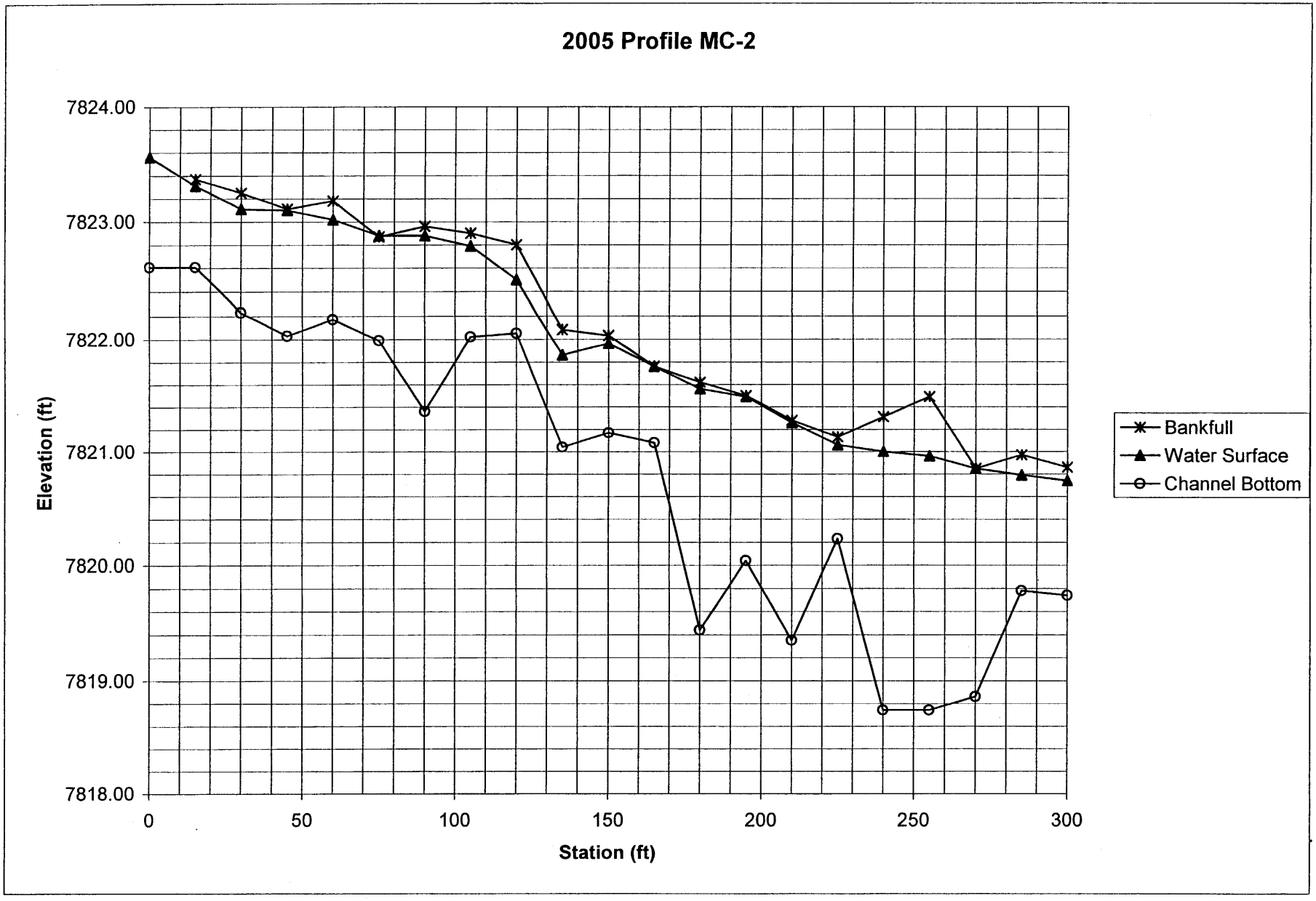

2005 Cross Section MC-1
7899.00
7898.00
7897.00
7896.00
7895.00
7894.00
7893.00
Elevation (ft)
0
5
10
15
20
25
30
35
Station (ft)
Elevation

Profile: MC-2

Benchmark elevation (ft): 7827.04 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 0.82

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0			4.30	7823.56	5.25	7822.61			
15	4.49	7823.37	4.55	7823.31	5.25	7822.61	0.25	15.00	0.017
30	4.61	7823.25	4.75	7823.11	5.63	7822.23	0.20	15.00	0.013
45	4.75	7823.11	4.76	7823.10	5.83	7822.03	0.01	15.00	0.001
60	4.68	7823.18	4.84	7823.02	5.69	7822.17	0.08	15.00	0.005
75	4.99	7822.87	4.98	7822.88	5.87	7821.99	0.14	15.00	0.009
90	4.90	7822.96	4.98	7822.88	6.50	7821.36	0.00	15.00	0.000
105	4.96	7822.90	5.07	7822.79	5.84	7822.02	0.09	15.00	0.006
120	5.06	7822.80	5.36	7822.50	5.81	7822.05	0.29	15.00	0.019
135	5.78	7822.08	6.00	7821.86	6.82	7821.04	0.64	15.00	0.043
150	5.83	7822.03	5.90	7821.96	6.69	7821.17	-0.10	15.00	-0.007
165	6.10	7821.76	6.10	7821.76	6.78	7821.08	0.20	15.00	0.013
180	6.24	7821.62	6.30	7821.56	8.42	7819.44	0.20	15.00	0.013
195	6.36	7821.50	6.37	7821.49	7.82	7820.04	0.07	15.00	0.005
210	6.58	7821.28	6.60	7821.26	8.51	7819.35	0.23	15.00	0.015
225	6.73	7821.13	6.80	7821.06	7.63	7820.23	0.20	15.00	0.013
240	6.55	7821.31	6.86	7821.00	9.12	7818.74	0.06	15.00	0.004
255	6.37	7821.49	6.90	7820.96	9.12	7818.74	0.04	15.00	0.003
270	7.01	7820.85	7.01	7820.85	9.00	7818.86	0.11	15.00	0.007
285	6.89	7820.97	7.07	7820.79	8.08	7819.78	0.06	15.00	0.004
300	7.00	7820.86	7.12	7820.74	8.12	7819.74	0.05	15.00	0.003

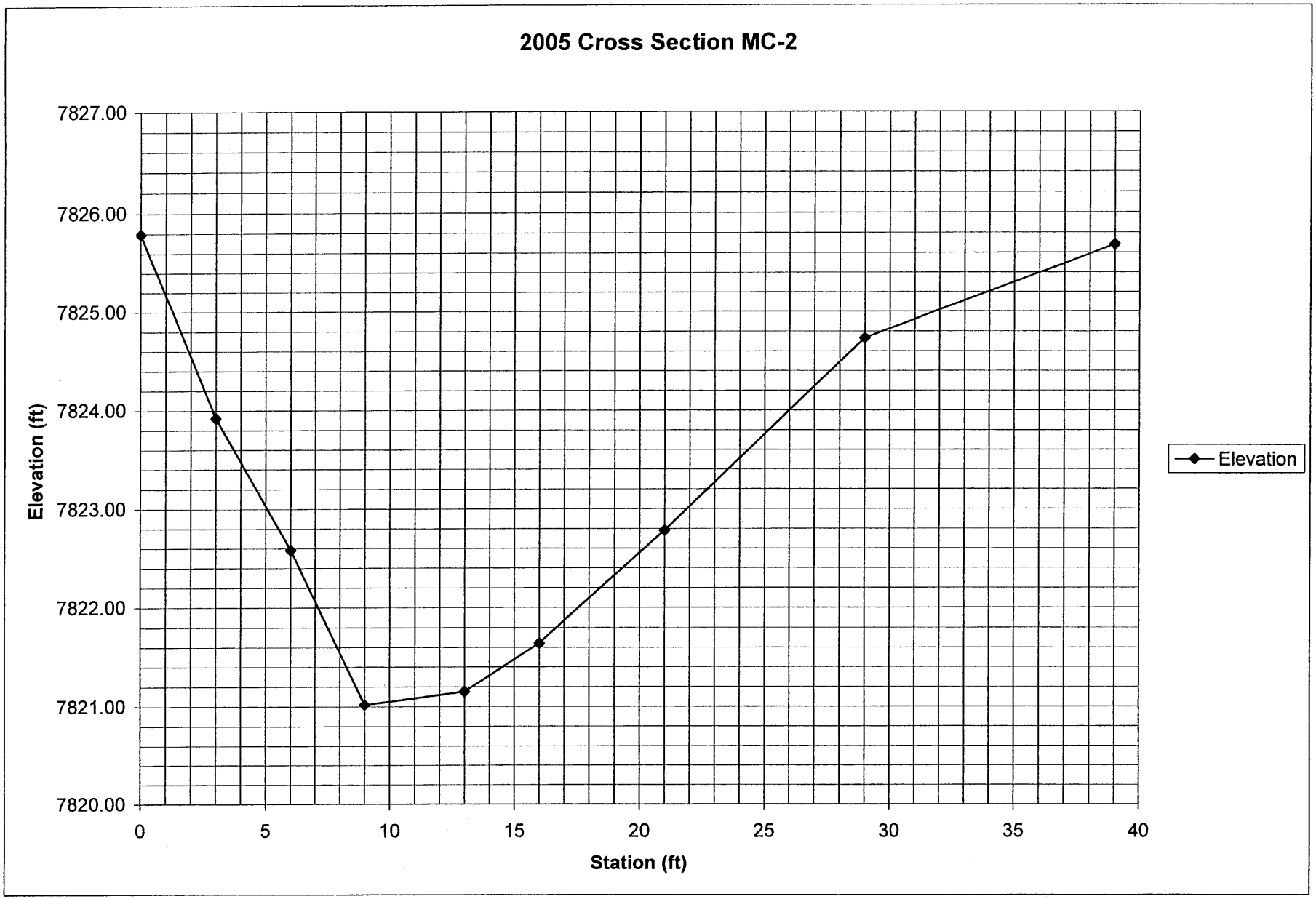
Max. Water Surface Slope (fraction): 0.043
Min. Water Surface Slope (fraction): -0.007
Avg. Water Surface Slope (fraction): 0.009


2005 Profile MC-2
7824.00
7823.00
7822.00
7821.00
7820.00
7819.00
7818.00
Elevation (ft)
0
50
100
150
200
250
300
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-2

Benchmark elevation: 7827.04 Survey Date: 11/25/2005
BenchMark Rod Reading: 0.82

Station	Rod Reading	Elevation
0	2.07	7825.79
3	3.94	7823.92
6	5.28	7822.58
9	6.84	7821.02
13	6.71	7821.15
16	6.22	7821.64
21	5.08	7822.78
29	3.13	7824.73
39	2.18	7825.68

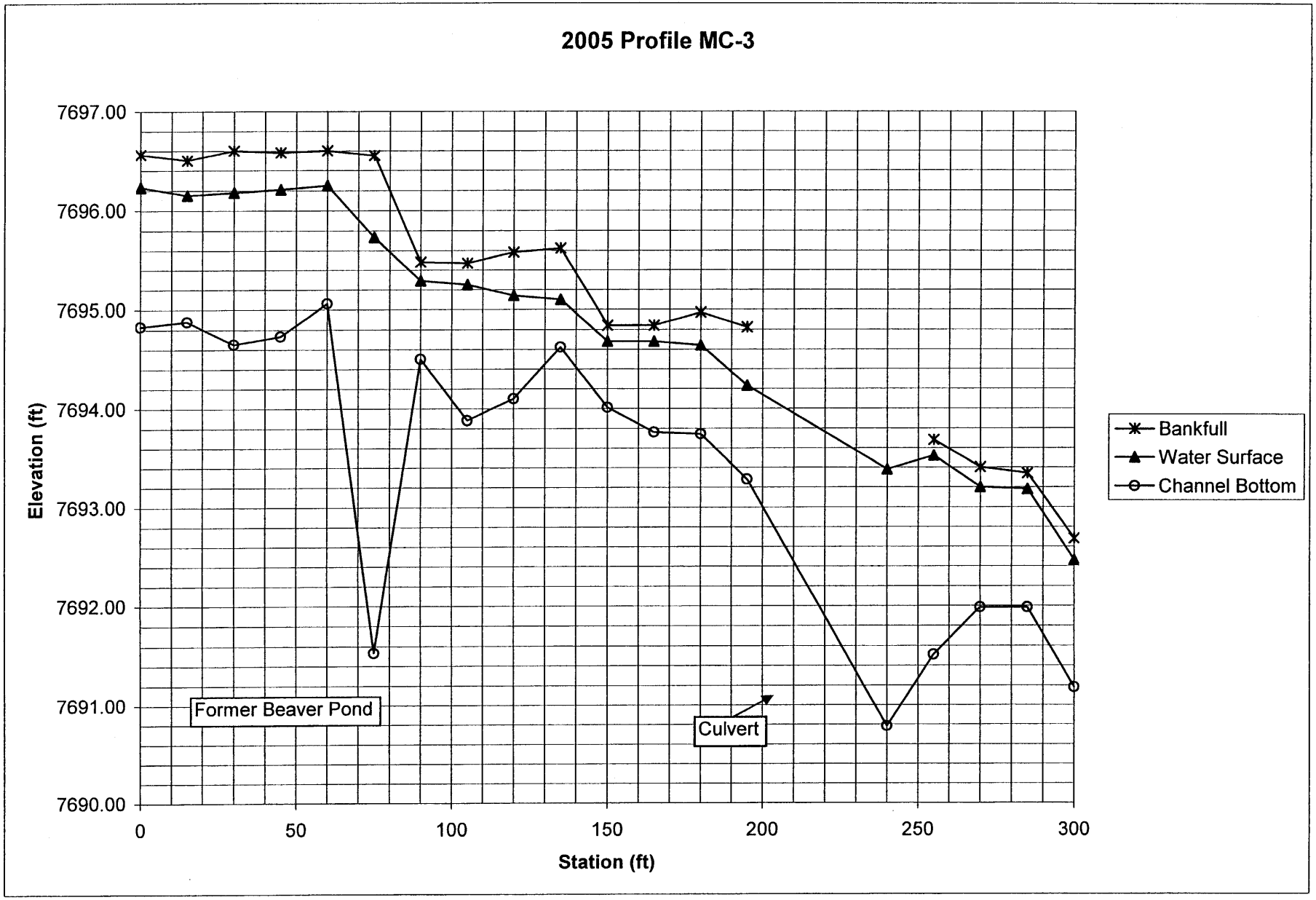

2005 Cross Section MC-2
7827.00
7826.00
7825.00
7824.00
7823.00
7822.00
7821.00
7820.00
Elevation (ft)
0
5
10
15
20
25
30
35
40
Station (ft)
Elevation

Profile: MC-3

Benchmark elevation (ft): 7697.59 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 8.39

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	9.42	7696.56	9.75	7696.23	11.15	7694.83			
15	9.48	7696.50	9.83	7696.15	11.10	7694.88	0.08	15.00	0.005
30	9.38	7696.60	9.80	7696.18	11.33	7694.65	-0.03	15.00	-0.002
45	9.40	7696.58	9.77	7696.21	11.25	7694.73	-0.03	15.00	-0.002
60	9.38	7696.60	9.73	7696.25	10.92	7695.06	-0.04	15.00	-0.003
75	9.43	7696.55	10.25	7695.73	14.45	7691.53	0.52	15.00	0.035
90	10.50	7695.48	10.69	7695.29	11.48	7694.50	0.44	15.00	0.029
105	10.51	7695.47	10.73	7695.25	12.10	7693.88	0.04	15.00	0.003
120	10.40	7695.58	10.84	7695.14	11.88	7694.10	0.11	15.00	0.007
135	10.36	7695.62	10.88	7695.10	11.36	7694.62	0.04	15.00	0.003
150	11.14	7694.84	11.30	7694.68	11.97	7694.01	0.42	15.00	0.028
165	11.14	7694.84	11.30	7694.68	12.22	7693.76	0.00	15.00	0.000
180	11.01	7694.97	11.34	7694.64	12.24	7693.74	0.04	15.00	0.003
195	11.16	7694.82	11.75	7694.23	12.70	7693.28	0.41	15.00	0.027
240			12.60	7693.38	15.20	7690.78	0.85	45.00	0.019
255	12.30	7693.68	12.46	7693.52	14.47	7691.51	-0.14	15.00	-0.009
270	12.58	7693.40	12.78	7693.20	14.00	7691.98	0.32	15.00	0.021
285	12.64	7693.34	12.80	7693.18	14.00	7691.98	0.02	15.00	0.001
300	13.30	7692.68	13.52	7692.46	14.80	7691.18	0.72	15.00	0.048

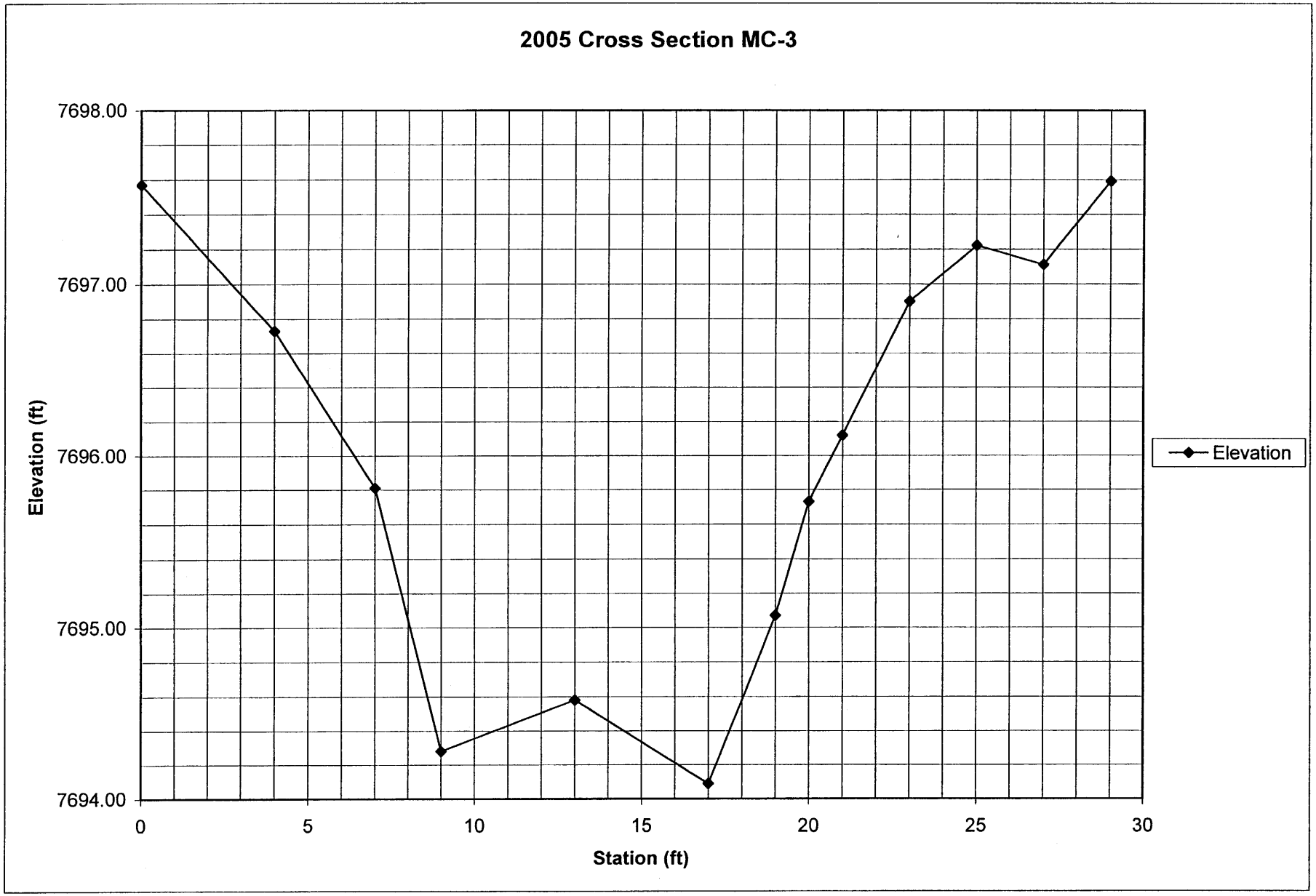
Max. Water Surface Slope (fraction): 0.048
Min. Water Surface Slope (fraction): -0.009
Avg. Water Surface Slope (fraction): 0.012


2005 Profile MC-3
7697.00
7696.00
7695.00
7694.00
7693.00
7692.00
7691.00
7690.00
Elevation (ft)
0
50
100
150
200
250
300
Station (ft)
Former Beaver Pond
Culvert
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-3

Benchmark elevation: 7697.59 Survey Date: 11/25/2005
BenchMark Rod Reading: 8.39

Station	Rod Reading	Elevation
0	8.41	7697.57
4	9.25	7696.73
7	10.17	7695.81
9	11.70	7694.28
13	11.40	7694.58
17	11.89	7694.09
19	10.91	7695.07
20	10.25	7695.73
21	9.86	7696.12
23	9.08	7696.90
25	8.76	7697.22
27	8.87	7697.11
29	8.39	7697.59

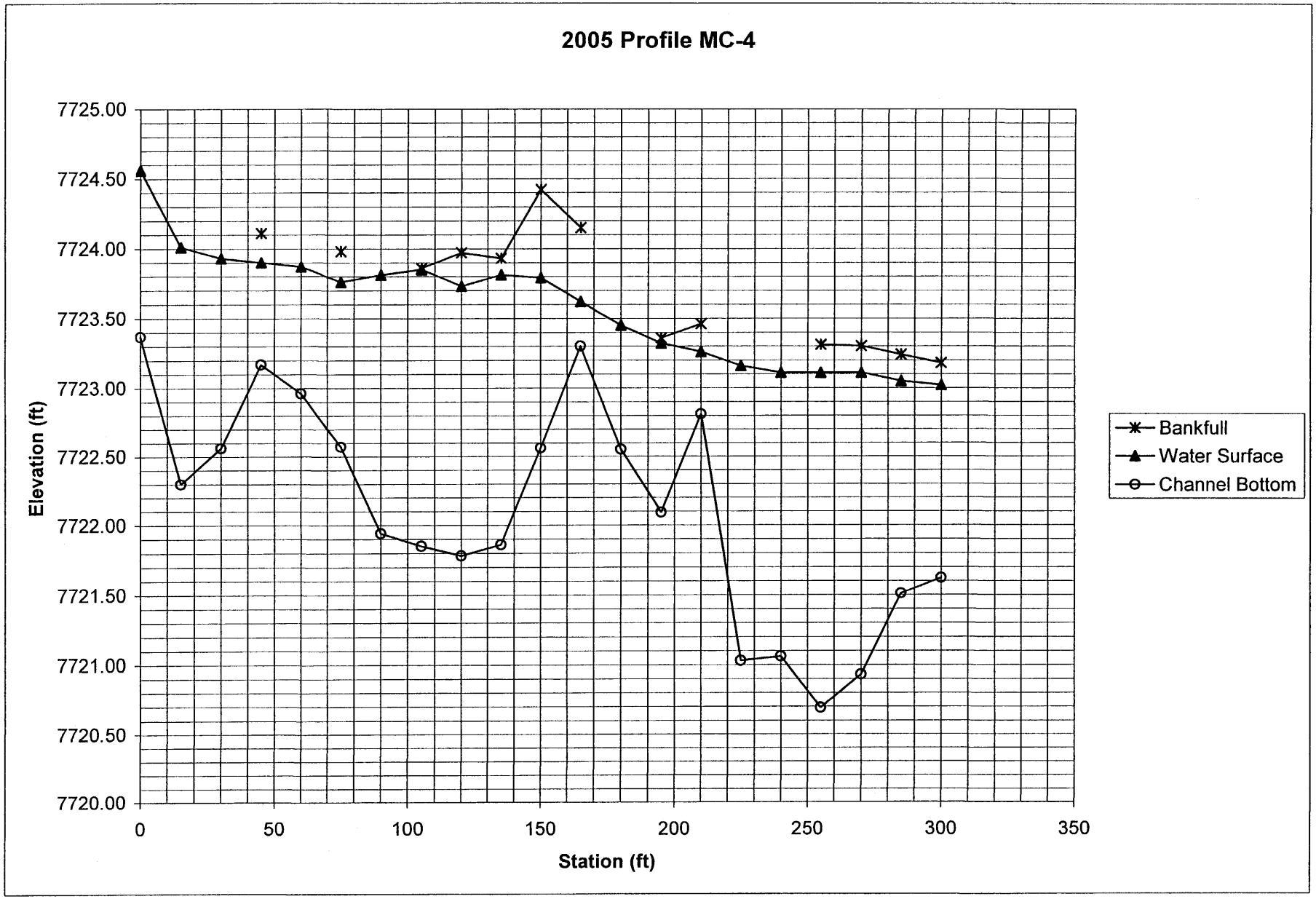

2005 Cross Section MC-3
7698.00
7697.00
7696.00
7695.00
7694.00
Elevation (ft)
0
5
10
15
20
25
30
Station (ft)
Elevation

Profile: MC-4

Benchmark elevation (ft): 7726.87 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 3.24

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0			5.55	7724.56	6.74	7723.37			
15			6.10	7724.01	7.81	7722.30	0.55	15.00	0.037
30			6.18	7723.93	7.55	7722.56	0.08	15.00	0.005
45	6.00	7724.11	6.21	7723.90	6.94	7723.17	0.03	15.00	0.002
60			6.24	7723.87	7.15	7722.96	0.03	15.00	0.002
75	6.13	7723.98	6.35	7723.76	7.54	7722.57	0.11	15.00	0.007
90			6.30	7723.81	8.17	7721.94	-0.05	15.00	-0.003
105	6.25	7723.86	6.26	7723.85	8.26	7721.85	-0.04	15.00	-0.003
120	6.14	7723.97	6.38	7723.73	8.33	7721.78	0.12	15.00	0.008
135	6.18	7723.93	6.30	7723.81	8.25	7721.86	-0.08	15.00	-0.005
150	5.69	7724.42	6.32	7723.79	7.55	7722.56	0.02	15.00	0.001
165	5.96	7724.15	6.49	7723.62	6.81	7723.30	0.17	15.00	0.011
180			6.66	7723.45	7.56	7722.55	0.17	15.00	0.011
195	6.75	7723.36	6.79	7723.32	8.02	7722.09	0.13	15.00	0.009
210	6.65	7723.46	6.85	7723.26	7.30	7722.81	0.06	15.00	0.004
225			6.95	7723.16	9.08	7721.03	0.10	15.00	0.007
240			7.00	7723.11	9.05	7721.06	0.05	15.00	0.003
255	6.80	7723.31	7.00	7723.11	9.42	7720.69	0.00	15.00	0.000
270	6.81	7723.30	7.00	7723.11	9.18	7720.93	0.00	15.00	0.000
285	6.87	7723.24	7.06	7723.05	8.60	7721.51	0.06	15.00	0.004
300	6.93	7723.18	7.09	7723.02	8.49	7721.62	0.03	15.00	0.002

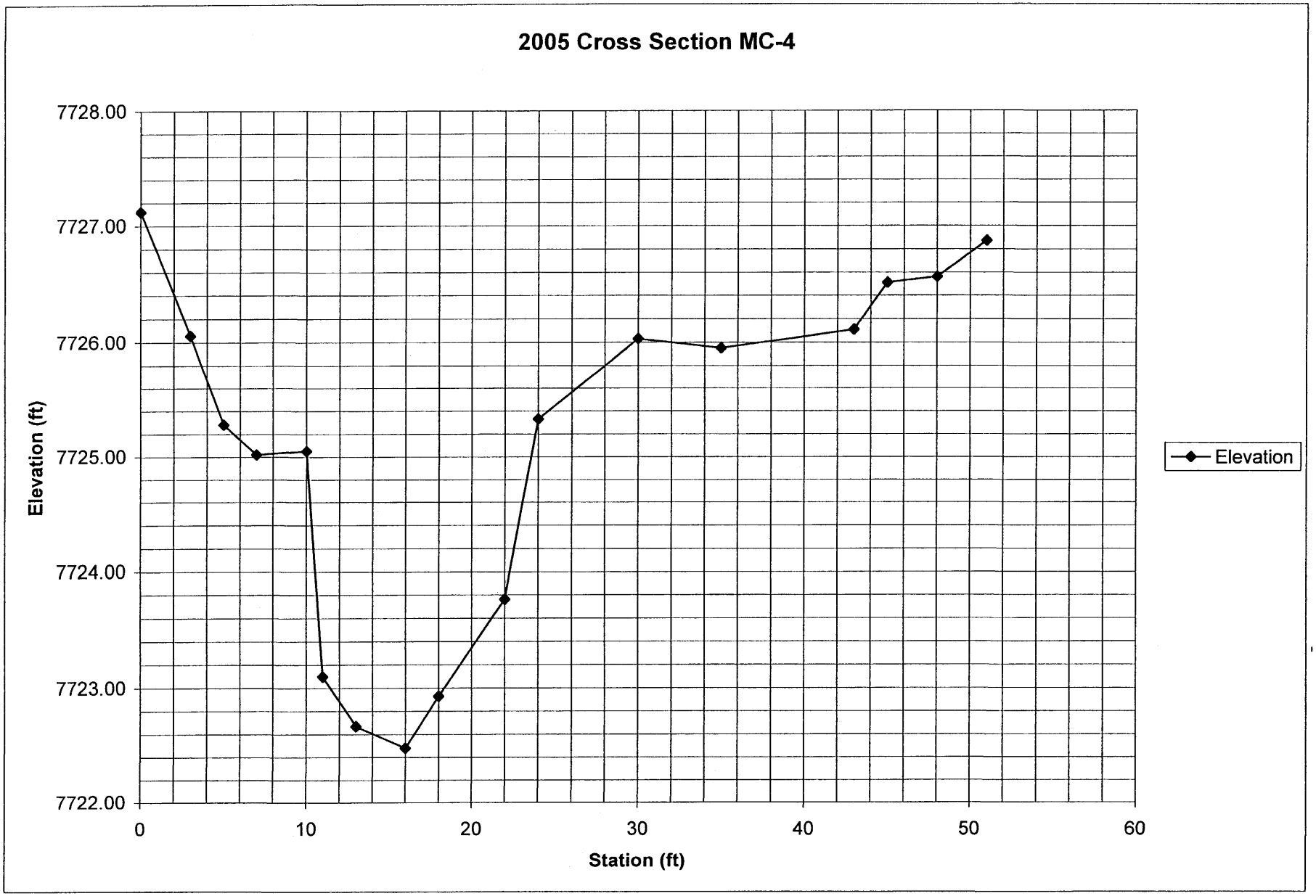
Max. Water Surface Slope (fraction): 0.037
Min. Water Surface Slope (fraction): -0.005
Avg. Water Surface Slope (fraction): 0.005


2005 Profile MC-4
7725.00
7724.50
7724.00
7723.50
7723.00
7722.50
7722.00
7721.50
7721.00
7720.50
7720.00
Elevation (ft)
0
50
100
150
200
250
300
350
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-4

Benchmark elevation: 7726.87 Survey Date: 11/25/2005
BenchMark Rod Reading: 3.24

Station	Rod Reading	Elevation
0	2.99	7727.12
3	4.05	7726.06
5	4.83	7725.28
7	5.09	7725.02
10	5.06	7725.05
11	7.01	7723.10
13	7.44	7722.67
16	7.63	7722.48
18	7.18	7722.93
22	6.35	7723.76
24	4.78	7725.33
30	4.08	7726.03
35	4.16	7725.95
43	4.00	7726.11
45	3.60	7726.51
48	3.55	7726.56
51	3.24	7726.87

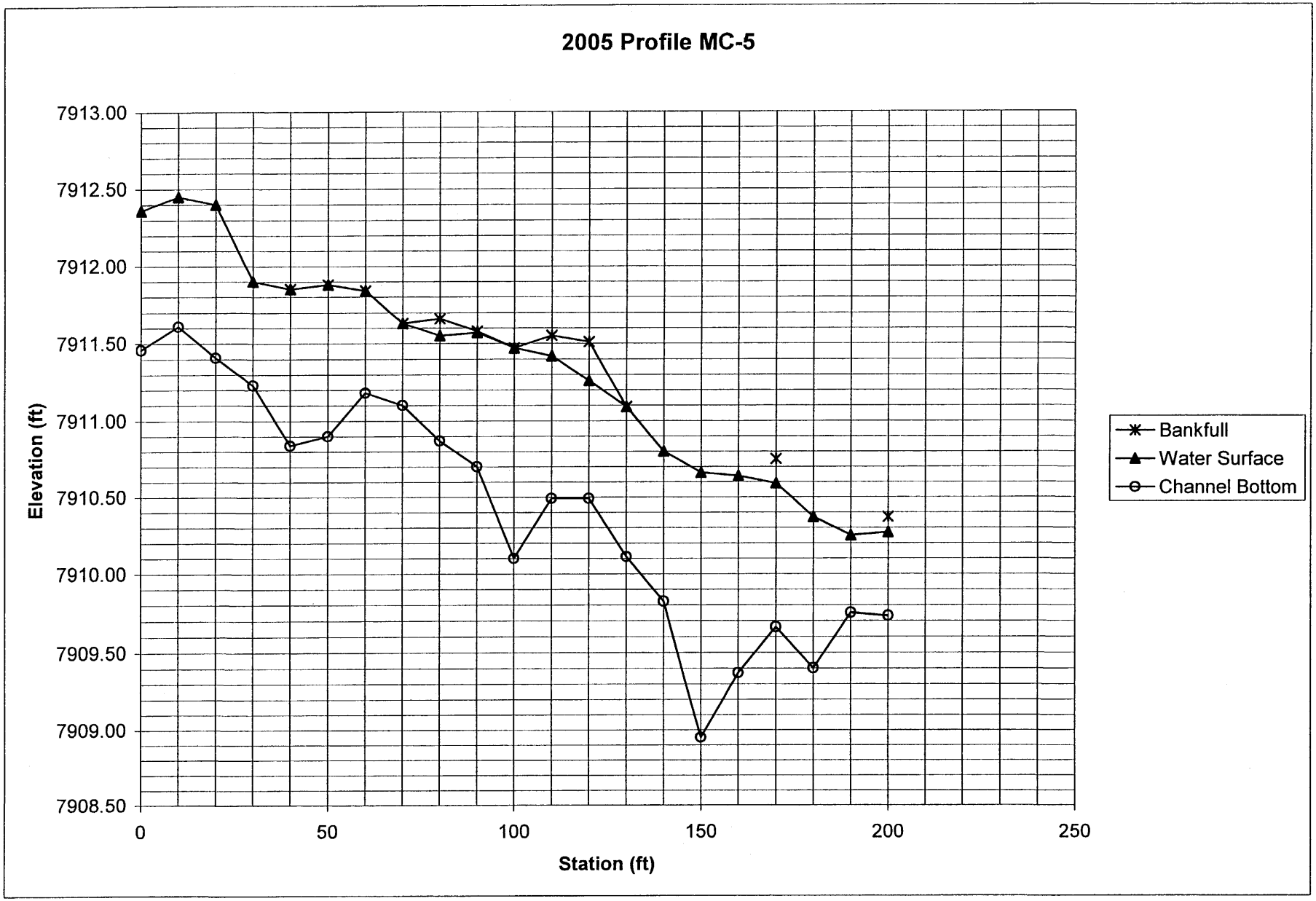

2005 Cross Section MC-4
7728.00
7727.00
7726.00
7725.00
7724.00
7723.00
7722.00
Elevation (ft)
0
10
20
30
40
50
60
Station (ft)
Elevation

Profile: MC-5

Benchmark elevation (ft): 7915.35 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 5.55

	Bankfull Left		Water Surface		Channel Bottom		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0			8.54	7912.36	9.44	7911.46			
10			8.45	7912.45	9.29	7911.61	-0.09	10.00	-0.009
20			8.50	7912.40	9.49	7911.41	0.05	10.00	0.005
30			9.00	7911.90	9.67	7911.23	0.50	10.00	0.050
40	9.05	7911.85	9.05	7911.85	10.06	7910.84	0.05	10.00	0.005
50	9.02	7911.88	9.02	7911.88	10.00	7910.90	-0.03	10.00	-0.003
60	9.06	7911.84	9.06	7911.84	9.72	7911.18	0.04	10.00	0.004
70	9.27	7911.63	9.27	7911.63	9.80	7911.10	0.21	10.00	0.021
80	9.24	7911.66	9.35	7911.55	10.03	7910.87	0.08	10.00	0.008
90	9.32	7911.58	9.33	7911.57	10.20	7910.70	-0.02	10.00	-0.002
100	9.43	7911.47	9.43	7911.47	10.80	7910.10	0.10	10.00	0.010
110	9.35	7911.55	9.48	7911.42	10.41	7910.49	0.05	10.00	0.005
120	9.39	7911.51	9.64	7911.26	10.41	7910.49	0.16	10.00	0.016
130	9.81	7911.09	9.81	7911.09	10.79	7910.11	0.17	10.00	0.017
140			10.10	7910.80	11.08	7909.82	0.29	10.00	0.029
150			10.24	7910.66	11.95	7908.95	0.14	10.00	0.014
160			10.26	7910.64	11.53	7909.37	0.02	10.00	0.002
170	10.15	7910.75	10.31	7910.59	11.24	7909.66	0.05	10.00	0.005
180			10.53	7910.37	11.50	7909.40	0.22	10.00	0.022
190			10.65	7910.25	11.15	7909.75	0.12	10.00	0.012
200	10.53	7910.37	10.63	7910.27	11.17	7909.73	-0.02	10.00	-0.002

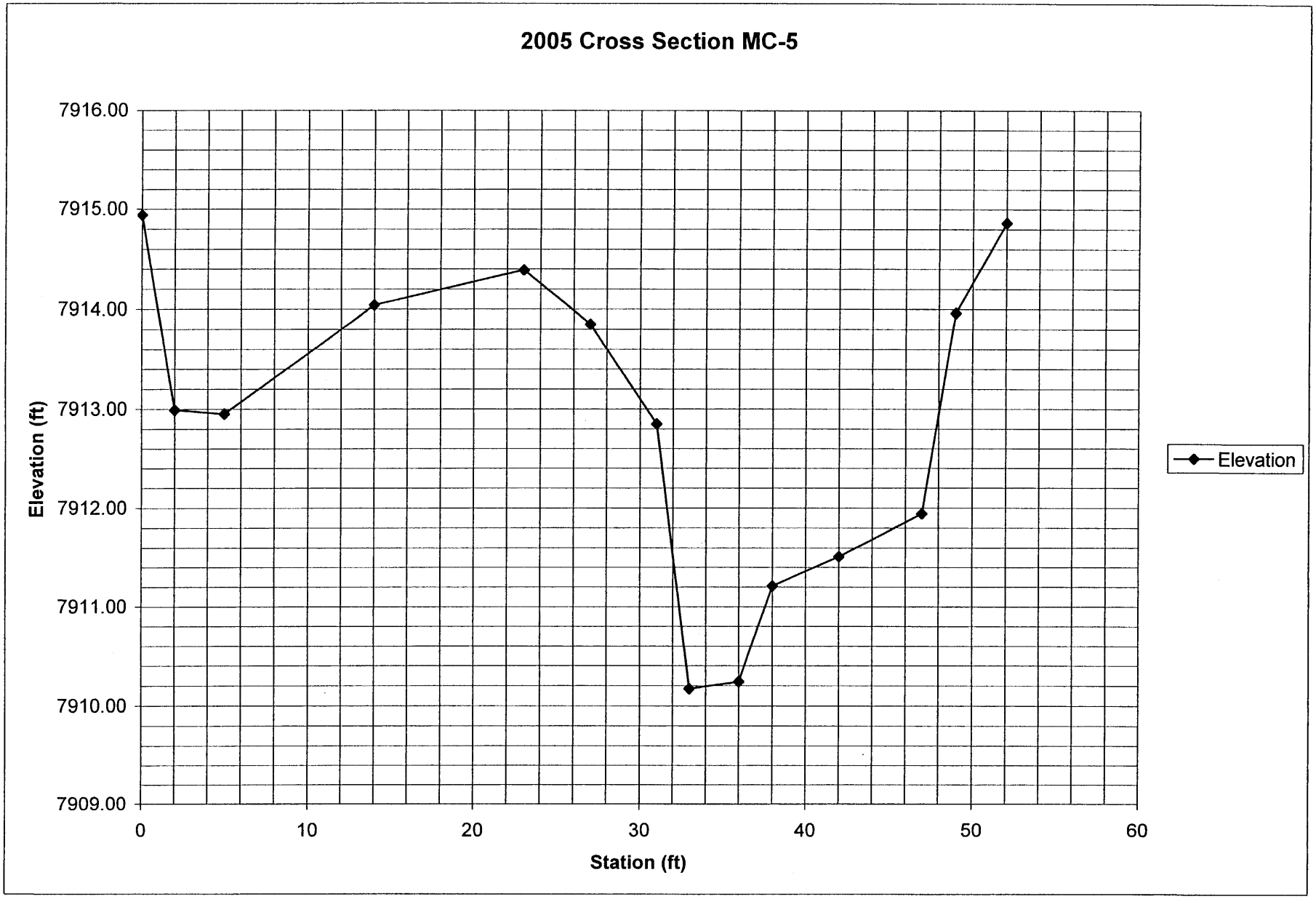
Max. Water Surface Slope (fraction): 0.050
Min. Water Surface Slope (fraction): -0.009
Avg. Water Surface Slope (fraction): 0.010


2005 Profile MC-5
7913.00
7912.50
7912.00
7911.50
7911.00
7910.50
7910.00
7909.50
7909.00
7908.50
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-5

Benchmark elevation: 7915.35 Survey Date: 11/25/2005
BenchMark Rod Reading: 5.55

Station	Rod Reading	Elevation
0	5.96	7914.94
2	7.91	7912.99
5	7.95	7912.95
14	6.86	7914.04
23	6.51	7914.39
27	7.05	7913.85
31	8.05	7912.85
33	10.73	7910.17
36	10.66	7910.24
38	9.69	7911.21
42	9.39	7911.51
47	8.96	7911.94
49	6.94	7913.96
52	6.04	7914.86

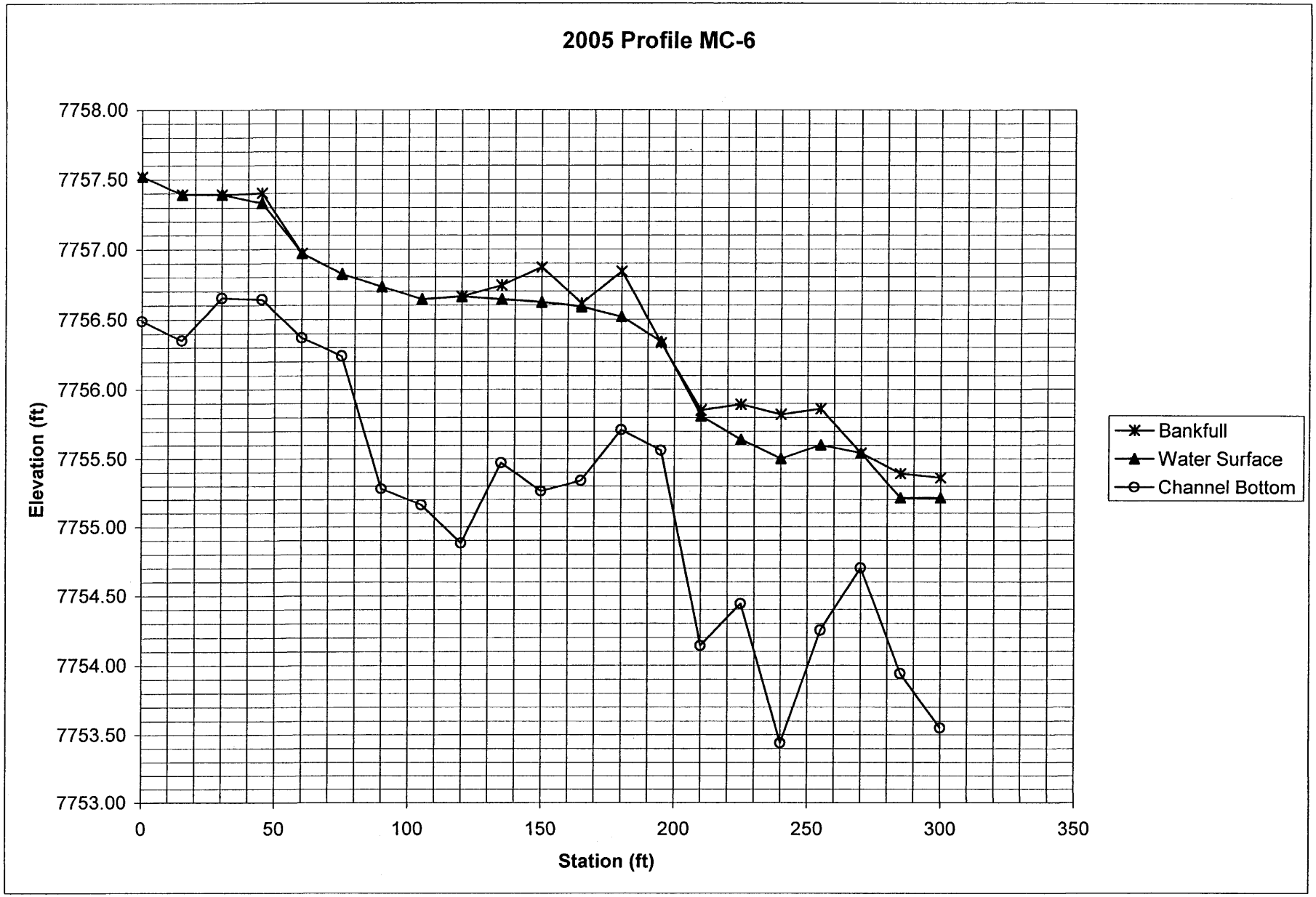

2005 Cross Section MC-5
7916.00
7915.00
7914.00
7913.00
7912.00
7911.00
7910.00
7909.00
Elevation (ft)
0
10
20
30
40
50
60
Station (ft)
Elevation

Profile: MC-6

Benchmark elevation (ft): 7763.84 Survey Date: 11/25/2005
Rod reading at Benchmark (ft): 2.20

	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
Station	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	8.52	7757.52	8.52	7757.52	9.55	7756.49			
15	8.65	7757.39	8.65	7757.39	9.69	7756.35	0.13	15.00	0.009
30	8.65	7757.39	8.65	7757.39	9.39	7756.65	0.00	15.00	0.000
45	8.64	7757.40	8.71	7757.33	9.40	7756.64	0.06	15.00	0.004
60	9.07	7756.97	9.07	7756.97	9.67	7756.37	0.36	15.00	0.024
75			9.22	7756.82	9.80	7756.24	0.15	15.00	0.010
90			9.31	7756.73	10.76	7755.28	0.09	15.00	0.006
105			9.40	7756.64	10.88	7755.16	0.09	15.00	0.006
120	9.38	7756.66	9.38	7756.66	11.16	7754.88	-0.02	15.00	-0.001
135	9.30	7756.74	9.40	7756.64	10.57	7755.47	0.02	15.00	0.001
150	9.17	7756.87	9.42	7756.62	10.78	7755.26	0.02	15.00	0.001
165	9.43	7756.61	9.45	7756.59	10.70	7755.34	0.03	15.00	0.002
180	9.20	7756.84	9.52	7756.52	10.33	7755.71	0.07	15.00	0.005
195	9.71	7756.33	9.70	7756.34	10.48	7755.56	0.18	15.00	0.012
210	10.19	7755.85	10.23	7755.81	11.90	7754.14	0.53	15.00	0.035
225	10.15	7755.89	10.40	7755.64	11.60	7754.44	0.17	15.00	0.011
240	10.22	7755.82	10.54	7755.50	12.60	7753.44	0.14	15.00	0.009
255	10.18	7755.86	10.44	7755.60	11.79	7754.25	-0.10	15.00	-0.007
270	10.50	7755.54	10.50	7755.54	11.34	7754.70	0.06	15.00	0.004
285	10.65	7755.39	10.83	7755.21	12.10	7753.94	0.33	15.00	0.022
300	10.68	7755.36	10.83	7755.21	12.49	7753.55	0.00	15.00	0.000

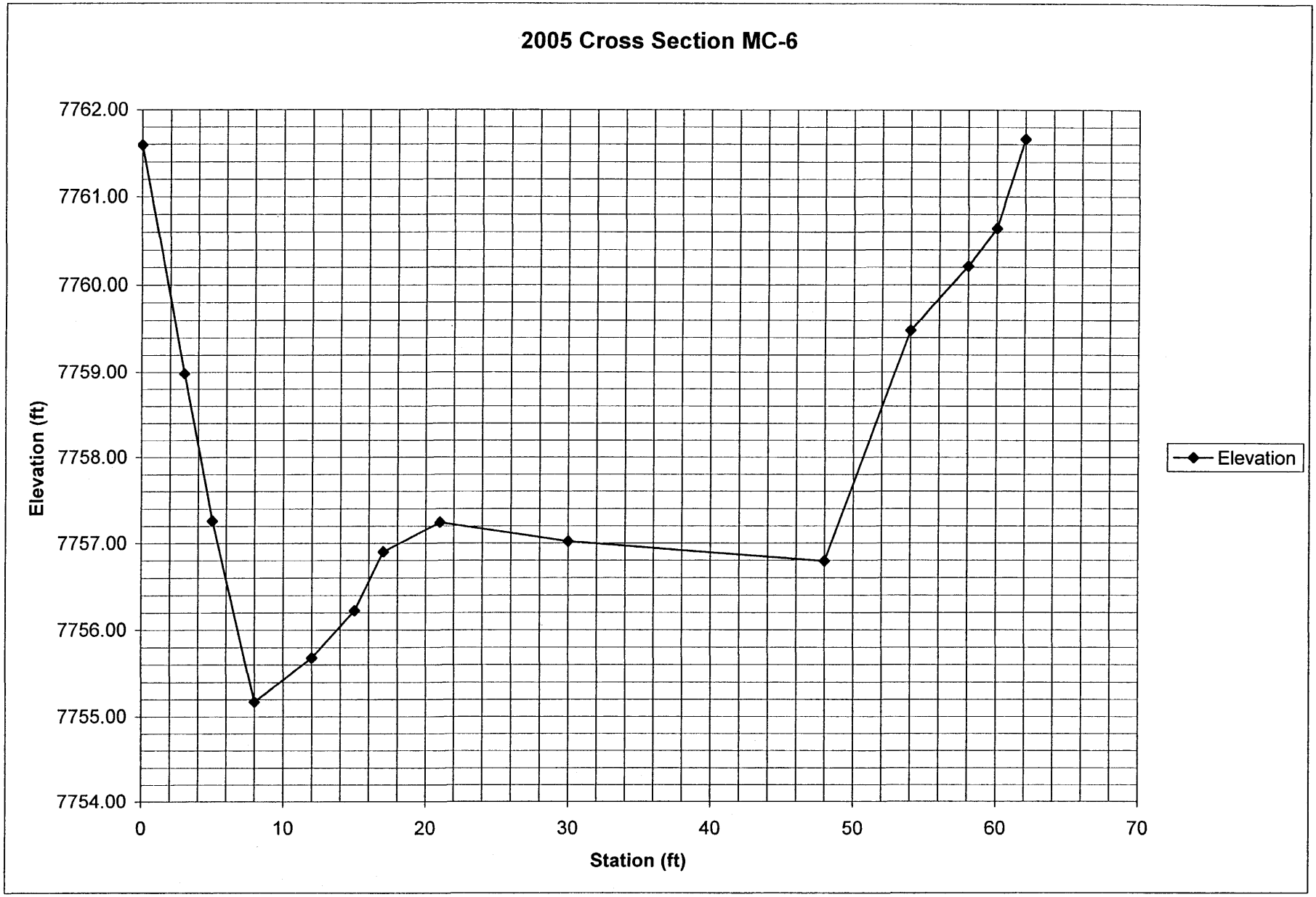
Max. Water Surface Slope (fraction): 0.035
Min. Water Surface Slope (fraction): -0.007
Avg. Water Surface Slope (fraction): 0.008


2005 Profile MC-6
7758.00
7757.50
7757.00
7756.50
7756.00
7755.50
7755.00
7754.50
7754.00
7753.50
7753.00
Elevation (ft)
0
50
100
150
200
250
300
350
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-6

Benchmark elevation: 7763.84 Survey Date: 11/25/2005
BenchMark Rod Reading: 2.20

Station	Rod Reading	Elevation
0	4.45	7761.59
3	7.06	7758.98
5	8.78	7757.26
8	10.87	7755.17
12	10.36	7755.68
15	9.82	7756.22
17	9.14	7756.90
21	8.80	7757.24
30	9.02	7757.02
48	9.25	7756.79
54	6.56	7759.48
58	5.83	7760.21
60	5.40	7760.64
62	4.38	7761.66


2005 Cross Section MC-6
7762.00
7761.00
7760.00
7759.00
7758.00
7757.00
7756.00
7755.00
7754.00
Elevation (ft)
0
10
20
30
40
50
60
70
Station (ft)
Elevation

APPENDIX C

Legal Financial, Compliance and Related Information

Annual Report of Officers
As submitted to the Utah Department of Commerce

Other change in ownership and control information
As required under R645-301-110

CONTENTS

None - See General Chapter 1

APPENDIX D

Mine Maps

As required under R645-302-525-270

CONTENTS

Skyline Mines, Mine 3 Levels 2 and 3 2005 As-Mined - CONFIDENTIAL FILE
Skyline Mines Projected Mining 2006 – 2010 - CONFIDENTIAL FILE

APPENDIX E

Other Information

In accordance with the requirements of R645-301 and R645-302

CONTENTS

None