Canyon Fuel Company, LLC

Skyline Mines

A Subsidiary of Arch Western Bituminous Group, LLC

C/007/005

2006 Annual Report

File in:
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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	12/31/11

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					
Goshawk / Woodpecker Survey	☒	☐	☒	☐	Confidential File
Eccles Creek – Benthic Invert. Monitor. June 04	☒	☐	☒	☐	Appendix B
Trout 2004 - 1)Eccles 2)Burnout and James	☒	☐	☒	☐	Confidential Confidential
Geomorph – Eccles/Mud	☒	☐	☒	☐	Appendix B

*Reminder: If equipment has been abandoned during 2006, 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, 2006, 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 2006 As-Mined	☒	☐
	Skyline Mines Projected Mining 2007 - 2011	☒	☒
	Cumulative Subsidence 1982 - 2006	☐	☒
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

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

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	April 7, 2006
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	March 14, 2006		
Inspected By	Gregg Galecki		
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 1st quarter 2006. 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 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 1st quarter 2006 inspection. The site was snow covered (photos attached). The sedimentation pond was snow covered and did not contain any water or ice 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

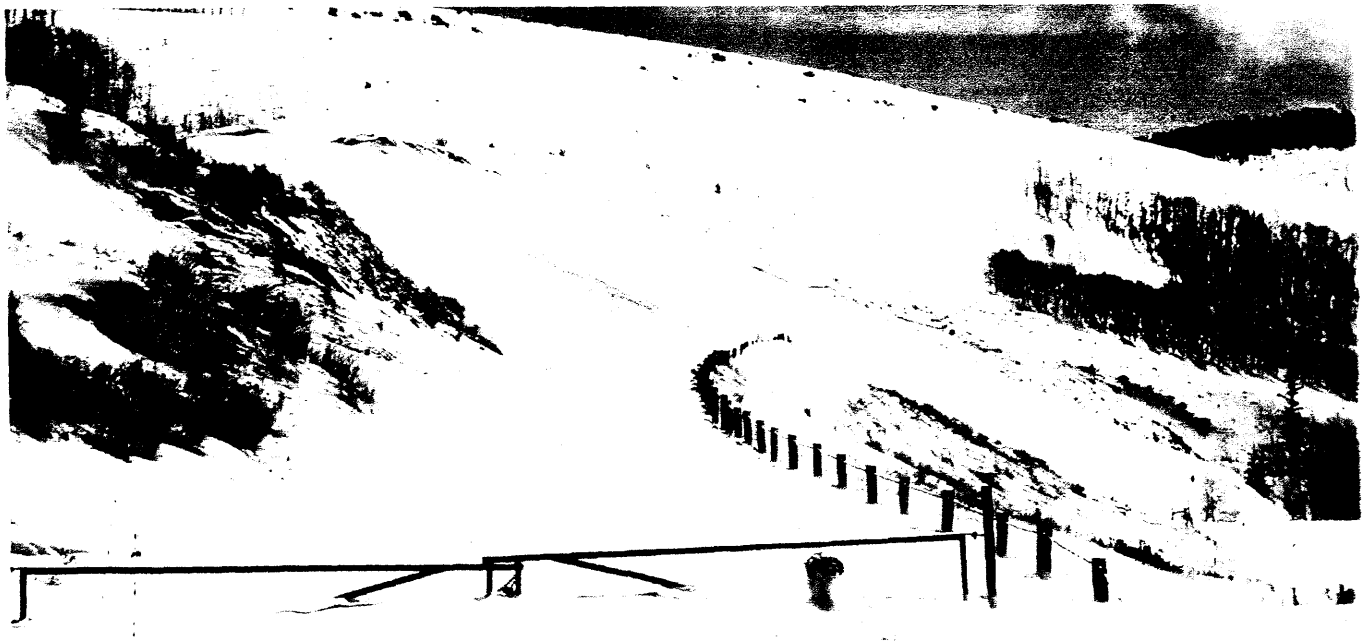
REGISTERED PROFESSIONAL ENGINEER (Cert. Stamp) CARL W WINTERS NO 22 157958-2202 STATE OF UTAH

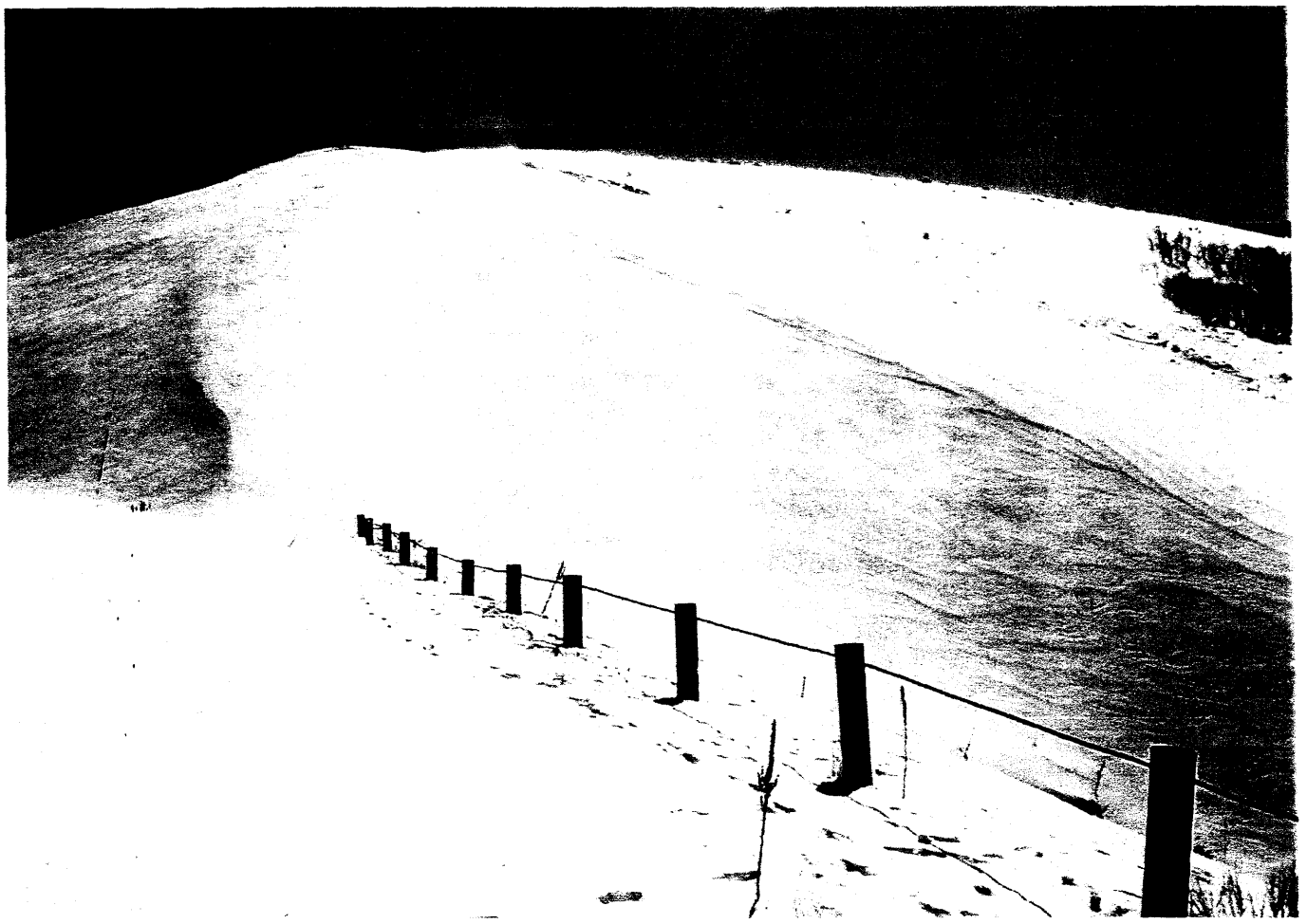
I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure 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, or under my direction 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: April 7, 2006





INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	July 5, 2006
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 30, 2006		
Inspected By	Carl Winters / Gregg Galecki		
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 2006. Approximately 10,993 tons were hauled to the site during the 2nd quarter 2006.

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

Topsoil removal and foundation preparation was conducted during the quarter. The northern face of the pile that was temporarily vegetated, was stripped and the topsoil stockpiled for the placement of additional refuse.

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 10,993 tons of gob were hauled to the waste rock site in the 2nd quarter of 2006.
Gob was placed in lifts of 12-inches or less and compacted in place using a tracked dozer and sheeps-foot roller. Material was placed throughout the waste rock site, including the top and toe of the pile.

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.

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

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE		

No instability or structural weakness was noted during the 2nd quarter 2006 inspection. The sedimentation pond contained a very minor puddle 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 56,217 tons of storage capacity remains within the currently permitted Waste Rock site after placing the 10,993 tons through June 2006.

Certification Statement

[Cert. Stamp]

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, or under my direction 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: **Date:** July 5, 2006

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
Permit Number	C/007/005	**Report Date**	October 12, 2006
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 26, 2006		
Inspected By	Carl Winters / Gregg Galecki		
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 2006. Approximately 57,507 tons were hauled to the site during the 2nd quarter 2006.

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

Topsoil removal and foundation preparation was conducted during the quarter. The northern face of the pile that was stripped of topsoil in the 2nd quarter 2006, was utilized for placement of an additional 57,507 tons of waste rock. The toe of the slope was advanced to the north for placement of the waste rock.

2. Placement of underdrains and protective filter systems.

No underdrains are present or required at this site. Areas that are to final grade, are capped with the prescribed amount of topsoil, seeded, top-dressed with straw, then held in place with a matting material.

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 57,507 tons of gob were hauled to the waste rock site in the 3rd quarter of 2006.
Gob was placed in lifts of 12-inches or less and compacted in place using a tracked dozer and sheeps-foot roller. Material was placed along the north face of the pile, including the top and toe of the pile.

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 3rd quarter 2006 inspection. The sedimentation pond contained minor 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. The survey estimated the 57,507 tons of waste rock placed through September 2006 would have filled the site to capacity. The current estimate is approximately 20,000 tons of capacity remain at the site. Due to the amount of waste rock currently being generated at the site, material may need to be stockpiled in the 4th quarter 2006 while waiting for expansion approval from DOGM. Permanent placement of the waste rock will take place once the permit modification is approved.

Certification Statement

[Cert. Stamp]
REGISTERED PROFESSIONAL ENGINEER
CARL W WINTERS
NO 22 157958-2202
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, or under my direction 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:** October 12, 2006

INSPECTION AND CERTIFIED REPORT ON EXCESS SPOIL PILE OR REFUSE PILE			
rmit Number	C/007/005	**Report Date**	January 8, 2007
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 27, 2006		
Inspected By	Carl Winters / Gregg Galecki		
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 4th quarter 2006. Approximately 52,132 tons were hauled to the site during the 3nd quarter 2006, and approximately 25,824 tons were hauled to the site in the 4th quarter 2006.

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

Topsoil removal and foundation preparation was conducted during the quarter. The northern face of the pile that was stripped of topsoil in the 2nd quarter 2006, was utilized for placement of a total of approximately 78,369 tons of waste rock in 2006. The toe of [redacted]e slope was advanced to the north for placement of the waste rock.

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

No underdrains are present or required at this site. Areas that are to final grade, are capped with the prescribed amount of topsoil, seeded, top-dressed with straw, then held in place with a matting material.

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 25,824 tons of gob were hauled to the waste rock site in the 4th quarter of 2006.
Gob was placed in lifts of 24-inches or less and compacted in place using a tracked dozer and sheeps-foot roller. Material was placed along the north face of the pile, including the top and toe of the pile.

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

[redacted]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 4th quarter 2006 inspection. The sedimentation pond contained minor 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.**

Historic records indicated the total storage capacity was approximately 334,125 tons. The Waste Rock area was surveyed with a total station during September 2005, determining that the north toe of the pile could be extended under the current permit to accommodate additional storage. The pile was resurveyed in December 2007. The 2007 survey estimates approximately 25,000 to 30,000 tons of capacity remain at the site.

Certification Statement

REGISTERED PROFESSIONAL ENGINEER [Seal/Stamp] W WINTERS NO 22 167856-2202 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, or under my direction 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:** January 15, 2007

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	April 4, 2006
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 14, 2006
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. The majority of the pond was covered with ice and the banks were covered with snow.

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 8569.75 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.

IMPOUNDMENT 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

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 8579.65 feet ASL with a discharge of approximately 150gpm 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.

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: Gregg A. Galecki **Date:** 4/4/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	April 4, 2006
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	March 14, 2006
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: 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 notmeasured during the inspection due to ice. The elevation of the ice was approximately 7917.00 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

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 (ice) surface elevation was 7,917.00 feet ASL, 2.70 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 1st quarter 2006. The pond embankment appears stable and without noticeable erosion. The pond surface was ice covered and the banks were covered in approximately 1-3 feet of snow.

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.

Total storage 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:** Gregg A. Sadelli **Date:** 4/4/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	April 4, 2006
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 14, 2006
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.

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 1st quarter gob pile inspection, the area was completely snow covered.

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 2006 therefore no water samples were obtained. The pond was snow covered and had no ice during the time of the inspection. 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 appears to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of the 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. Adelli **Date:** 4/4/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
ermit Number	C/007/005	**Report Date**	July 9, 2006
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 12, 2006
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: 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 8569.83 ft ASL. Although the volume has not apparently changed significantly since the 2nd quarter 2005, 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 50 percent of the sediment capacity.

3. Principle and emergency spillway elevations.

IMPOUNDMENT 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

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 8579.67 feet ASL with a discharge of approximately 170 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, with total phosphorus being analyzed once a month. 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 appears to be functioning as designed. The outlet structure was working as designed and appears to be in good working condition.

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 has varied between 0.00 and 0.09 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 97,059ft^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: Gregg A. Galecki **Date:** 7/10/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	July 10, 2006
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 12, 2006
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: 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 7915.0 during the inspection. Although the volume has apparently not changed significantly since the 4th Quarter 2005, 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

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 7,917.37 feet ASL, 2.33 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond discharged on April 25 and May 4, 2006. The pond embankment appears stable and without noticeable erosion.

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 5,450 ft^3. The volume calculations are based on a survey conducted in the Fall 2005.

Total storage 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 8174 ft^3, the estimated total water capacity remaining in the pond is approximately 51,188 ft^3 (1.17 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. Anderson **Date:** 7/10/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	July 10, 2006
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	June 9, 2006
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.

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 2nd quarter inspection, the pond had a small puddle of water.

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 second quarter of 2006 therefore no water samples were obtained. The pond had a small puddle in the bottom at the time of the inspection. 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 appears to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of the 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. Sadecki **Date:** 7/10/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	October 12, 2006
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 13, 2006
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: 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 8569.55 ft ASL. Although the volume has not apparently changed significantly since the 2nd quarter 2005, 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. Turbidity curtains installed in the pond capture a majority of the material in the upper 1/3 of the pond. A small to moderately sized delta is beginning to form at the inlet of the pond.

3. Principle and emergency spillway elevations.

IMPOUNDMENT 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

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 8579.65 feet ASL with a discharge of approximately 100 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; total phosphorus is analyzed once a month. Weekly samples include oil and grease, total dissolved solids, 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 appears to be functioning as designed. A small to moderately sized delta is beginning to form below the culvert. The outlet structure was working as designed and appears to be in good working condition.

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

The pond is scheduled for clean out in Spring 2007.

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 has varied between 0.00 and 0.09 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 80,000ft^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: Gregg A. Galecki **Date:** 10/12/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	October 12, 2006
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 13, 2006
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: 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 7915.44 during the inspection. .

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

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 7,919.54feet ASL, 0.16 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond discharged on April 25 and May 4, 2006. The pond did not discharge during the 3rd quarter 2006. The pond embankment appears stable and without noticeable erosion.

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 5,450 ft^3. The volume calculations are based on a survey conducted in the Fall 2005.

Total storage 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 8174 ft^3, the estimated total water capacity remaining in the pond is approximately 51,188 ft^3 (1.17 ac-ft).

A minor delta has formed at the inlet of the pond. The pond is scheduled for cleaning in Spring 2007.

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:** 10/12/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	October 12, 2006
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 26, 2006
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.

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 last cleaned of sediment in July of 2004. Moderate sediment has been deposited during the quarter due to recent activity. At the time of the 2nd quarter inspection, the pond had a small puddle of water.

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 third quarter of 2006 therefore no water samples were obtained. The pond had a small puddle in the bottom at the time of the inspection. 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 appears to have at least 90% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of the inspection was less than 0.1 acre-feet. A small delta of sediment has formed at the inlet of the pond. More sediment than normal has reported to the pond during the quarter due to frequent rains and increased deposition of rock at the site.

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:** 10/12/06

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	January 8, 2007
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 27, 2006
Inspected By	Gregg Galecki / 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 8569.60 ft ASL. Although the volume has not apparently changed significantly since the 2nd quarter 2005, 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. Turbidity curtains installed in the pond capture a majority of the material in the upper 1/3 of the pond. A moderately sized delta is beginning to form at the inlet of the pond.

3. Principle and emergency spillway elevations.

IMPOUNDMENT 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

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 8579.68 feet ASL with a discharge of approximately 400 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; total phosphorus is analyzed once a month. Weekly samples include oil and grease, total dissolved solids, 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 appears to be functioning as designed. A moderately sized delta is beginning to form below the culvert. The outlet structure was working as designed and appears to be in good working condition.

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

The pond is scheduled for clean out in 2007.

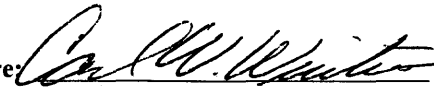
5. **Field Evaluation.** Describe any changes in the geometry of the impounding structure, average and maximum depths and elevations of impounded water, estimated sediment or slurry volume and remaining storage capacity, estimated volume of water impounded, and any other aspect of the impounding structure 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 has varied between 0.00 and 0.10 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 80,000ft^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:  **Date:** 1-15-07

CERTIFIED REPORT

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

COMMENTS AND OTHER INFORMATION

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

Certification Statement:

[PE Cert. Stamp]

REGISTERED 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: [signature] **Date:** January 15, 2007

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

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	January 8, 2007
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 27, 2006
Inspected By	Gregg Galecki / 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 not measured during the inspection. Thick ice prohibited accurately measuring the depth. Height of the ice was 0.04 feet below the discharge point.

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

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/ice surface elevation was 7,919.66 feet ASL, 0.04 feet below the spill point of the principal spillway.

The pond was not discharging at the time of the inspection. The pond discharged on October 19, 2006. The pond did not discharge again during the 4th quarter 2006. The pond embankment appears stable and without noticeable erosion.

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.

A minor delta has formed at the inlet of the pond. The pond is scheduled for cleaning in 2007.

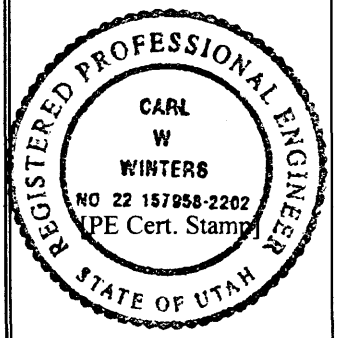
Qualification Statement	I hereby certify that; I am experienced in the construction of impoundments; I am qualified and authorized under the direction of a Registered Professional Engineer to inspect the condition and appearance of impoundments in accordance with the certified and approved designs for 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. Winter **Date:** 1/8/07

CERTIFIED REPORT

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

COMMENTS 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: ~~Date:~~ January 8, 2007

P.E. Number & State:
#22 157958-2202 Uts

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT			
Permit Number	C/007/005	**Report Date**	January 8, 2007
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	November 27, 2006
Inspected By	Gregg Galecki / 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 was noted at the site during the quarterly pond 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 last cleaned of sediment in July of 2004. Moderate sediment has been deposited during the quarter due to recent activity at the Waste Rock site. At the time of the 4th quarter inspection, the pond had two puddles of water covering approximately 30 percent of the pond floor.

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 during the 4th quarter of2006, therefore no water samples were obtained. The pond had puddles in the bottom at the time of the inspection. 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 appears to have at least 85% of its sediment storage capacity remaining. The estimated volume of water in the pond at the time of the inspection was less than 0.1 acre-feet. A small delta of sediment has formed at the inlet of the pond.

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:** [signature] **Date:** 1/8/07

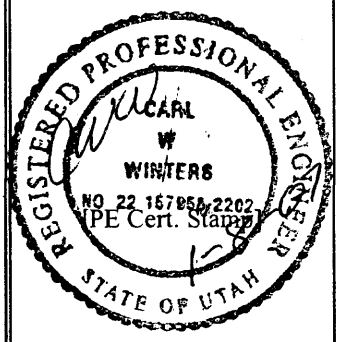
CERTIFIED REPORT

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

COMMENTS AND OTHER INFORMATION

The pond did not discharge in 2006. There have been no reports of discharge from the pond this quarter. The construction of the pond 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: [signature] **Date:** January 8, 2007

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

Inter·Mountain Laboratories, Inc.

Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380

Helper, UT 84526

672-8515

Report ID: S0609434001

Date: 11/29/2006

Work Order: S0609434

Project: Skyline Utah#6

Date Received: 9/23/2006

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Field Capacity	Wilt Point	Calcium	Magnesium	Sodium	Potassium	SAR
		s.u.	%	dS/m	%	%	meq/L	meq/L	meq/L	meq/L	
S0609434-001	WR-024	8.3	34.8	1.80	8.6	7.0	4.58	4.67	6.10	1.71	2.84
S0609434-002	WR-025	8.7	37.9	1.47	10.7	7.7	2.20	2.43	9.12	1.02	6.00
S0609434-003	WR-026	8.3	44.1	1.56	9.4	7.0	4.51	4.25	6.80	1.14	3.25
S0609434-004	WR-027	8.4	44.2	0.99	10.6	7.3	1.51	1.82	4.23	0.80	3.27
S0609434-005	WR-028	8.4	44.6	1.05	8.2	7.2	2.72	3.33	6.71	1.48	3.86
S0609434-006	WR-029	8.5	37.0	1.14	10.0	7.5	2.30	2.39	6.91	1.05	4.51
S0609434-007	WR-030	8.5	42.3	1.40	8.5	7.2	3.82	3.02	8.77	1.37	4.74
S0609434-008	WR-031	8.5	37.9	1.47	9.3	7.3	3.21	2.94	10.6	1.46	6.02
S0609434-009	WR-032	8.5	47.9	0.84	8.1	7.2	1.94	2.12	3.61	1.25	2.53
S0609434-010	WR-033	8.3	54.9	1.41	9.4	7.5	3.32	3.85	5.09	1.32	2.69
S0609434-011	WR-034	8.4	49.3	1.06	9.6	7.4	2.45	2.66	4.03	1.07	2.52
S0609434-012	WR-035	8.4	43.5	1.39	9.7	7.7	2.74	2.96	7.38	1.23	4.37
S0609434-013	WR-036	8.6	52.6	0.63	10.6	7.5	1.15	1.32	2.64	0.78	2.38
S0609434-014	WR-037	8.4	52.5	1.26	11.2	7.3	2.79	3.14	7.77	1.42	4.51
S0609434-015	WR-038	8.5	53.9	0.83	13.0	7.9	1.17	1.43	5.91	0.78	5.18
S0609434-016	WR-039	8.3	58.3	1.04			2.41	2.50	3.97	1.01	2.53
S0609434-017	WR-040	8.5	51.3	1.03	13.5	7.6	2.36	2.62	4.07	1.42	2.58

These results apply only 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, Neutral. Pot.= Neutralization Potential

Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen ABarten

Karen Barten, Soil Lab Supervisor

Inter·Mountain Laboratories, Inc.

Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380
Helper, UT 84526

Report ID: S0609434001

Date: 11/29/2006

Work Order: S0609434

Project: Skyline Utah#6

Date Received: 9/23/2006

Lab ID	Sample ID	Available Sodium meq/100g	Exchangeable Sodium meq/100g	Sand %	Silt %	Clay %	Texture	Coarse Fragment %
S0609434-001	WR-024	0.37	0.16	92.0	6.0	2.0	Sand	<1
S0609434-002	WR-025	1.13	0.79	89.0	9.0	2.0	Sand	<1
S0609434-003	WR-026	0.39	0.09	90.0	8.0	2.0	Sand	<1
S0609434-004	WR-027	0.50	0.31	90.0	9.0	1.0	Sand	<1
S0609434-005	WR-028	0.37	0.07	92.0	8.0	<0.1	Sand	<1
S0609434-006	WR-029	0.43	0.18	91.0	8.0	1.0	Sand	<1
S0609434-007	WR-030	0.74	0.37	91.0	7.0	2.0	Sand	<1
S0609434-008	WR-031	0.61	0.21	87.0	11.0	2.0	Sand	<1
S0609434-009	WR-032	0.24	0.06	94.0	6.0	<0.1	Sand	<1
S0609434-010	WR-033	0.40	0.13	91.0	8.0	1.0	Sand	<1
S0609434-011	WR-034	0.29	0.09	92.0	7.0	1.0	Sand	<1
S0609434-012	WR-035	0.62	0.30	91.0	7.0	2.0	Sand	<1
S0609434-013	WR-036	0.28	0.15	92.0	8.0	<0.1	Sand	<1
S0609434-014	WR-037	0.34	<0.01	92.0	7.0	1.0	Sand	<1
S0609434-015	WR-038	0.76	0.45	92.0	7.0	1.0	Sand	<1
S0609434-016	WR-039							<1
S0609434-017	WR-040	0.34	0.14	90.0	8.0	2.0	Sand	<1

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by Karen A Barten

Karen Barten, Soil Lab Supervisor

Inter·Mountain Laboratories, Inc.

Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380
Helper, UT 84526

Report ID: S0609434001

Date: 11/29/2006

Work Order: S0609434

Project: Skyline Utah#6

Date Received: 9/23/2006

Lab ID	Sample ID	Boron	TKN	Nitrogen Nitrate	Selenium	TOC	Total Sulfur	T.S. AB	Neut. Pot.	T.S. ABP
		ppm	%	ppm	ppm	%	%	t/1000t	t/1000t	t/1000t
S0609434-001	WR-024	0.42	0.76	0.85	<0.02	59.8	1.01	31.6	84.0	52.5
S0609434-002	WR-025	0.39	0.89	1.74	<0.02	51.0	0.64	19.9	74.5	54.6
S0609434-003	WR-026	0.69	0.96	0.70	<0.02	65.2	0.74	23.2	74.3	51.1
S0609434-004	WR-027	0.69	0.98	0.83	<0.02	61.1	0.63	19.7	74.6	55.0
S0609434-005	WR-028	0.57	1.04	0.94	<0.02	64.4	0.69	21.5	64.2	42.7
S0609434-006	WR-029	0.52	1.02	0.59	<0.02	65.4	0.45	13.9	70.2	56.3
S0609434-007	WR-030	0.55	0.96	1.54	<0.02	55.6	0.68	21.3	90.0	68.6
S0609434-008	WR-031	0.58	0.89	0.82	<0.02	54.8	0.58	18.0	87.1	69.1
S0609434-009	WR-032	0.45	1.13	0.51	<0.02	66.8	0.65	20.3	60.6	40.3
S0609434-010	WR-033	0.69	0.95	0.31	<0.02	66.0	0.71	22.3	69.6	47.2
S0609434-011	WR-034	0.71	1.04	0.41	<0.02	58.3	0.49	15.3	85.0	69.7
S0609434-012	WR-035	0.54	1.00	0.31	<0.02	53.8	0.84	26.3	76.2	49.9
S0609434-013	WR-036	0.52	1.14	0.15	<0.02	64.2	0.63	19.6	66.7	47.2
S0609434-014	WR-037	0.66	1.20	<0.02	<0.02	60.8	0.77	24.0	71.7	47.7
S0609434-015	WR-038	0.41	1.01	0.34	<0.02	54.6	0.46	14.3	75.3	61.0
S0609434-016	WR-039		0.97			64.2	0.60	18.8	47.4	28.6
S0609434-017	WR-040	0.44	0.62	0.46	<0.02	56.4	0.56	17.6	71.8	54.1

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barte

Karen Barten, Soil Lab Supervisor

Inter·Mountain Laboratories, Inc.

Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380
Helper, UT 84526

Report ID: S0610175001

Date: 11/29/2006

Work Order: S0610175

Project: Skyline Utah#6

Date Received: 10/9/2006

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Calcium	Magnesium	Sodium	Potassium	SAR	Available Sodium	Exchangeable Sodium
		s.u.	%	dS/m	meq/L	meq/L	meq/L	meq/L		meq/100g	meq/100g
S0610175-001	WR-041	7.9	43.6	0.92	2.66	3.08	4.27	0.89	2.52	0.36	0.17
S0610175-002	WR-042	7.9	39.5	0.85	2.01	2.20	2.85	0.70	1.96	0.50	0.39
S0610175-003	WR-043	7.8	40.5	1.58	4.99	5.42	5.56	1.19	2.44	0.56	0.34
S0610175-004	WR-044	7.8	36.5	1.23	3.66	4.41	4.39	0.76	2.19	0.46	0.30
S0610175-005	WR-045	7.8	40.1	0.82	2.42	3.01	2.69	0.47	1.64	0.33	0.22
S0610175-006	WR-046	7.7	41.5	1.45	4.28	4.95	4.33	0.91	2.01	0.47	0.29
S0610175-007	WR-047	7.7	40.8	1.57	4.83	5.40	4.99	1.08	2.20	0.48	0.28
S0610175-008	WR-048	7.7	43.1	0.99	2.66	2.99	3.00	0.60	1.79	0.55	0.42
S0610175-009	WR-049	7.7	40.4	1.43	4.32	5.01	4.21	0.89	1.95	0.46	0.29
S0610175-010	WR-050	7.6	39.3	1.55	5.85	6.04	4.23	0.89	1.73	0.42	0.25
S0610175-011	WR-051	7.6	38.4	1.82	7.47	7.92	5.14	1.18	1.85	0.42	0.22
S0610175-012	WR-052	7.5	35.3	2.07	10.3	9.75	5.23	1.13	1.65	0.43	0.25

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barten

Karen Barten, Soil Lab Supervisor

Inter·Mountain Laboratories, Inc.

Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380
Helper, UT 84526

Report ID: S0610175001

Date: 11/29/2006

Work Order: S0610175

Project: Skyline Utah#6

Date Received: 10/9/2006

Lab ID	Sample ID	Coarse Fragment	Boron	TKN	Nitrogen Nitrate	Selenium	TOC	Total Sulfur	T.S. AB	Neut. Pot.	T.S. ABP
		%	ppm	%	ppm	ppm	%	%	t/1000t	t/1000t	t/1000t
S0610175-001	WR-041	29.7	0.99	1.08	0.92	<0.02	66.9	0.72	22.5	66.8	44.3
S0610175-002	WR-042	10.0	0.69	0.85	0.97	<0.02	59.0	0.79	24.7	77.6	52.9
S0610175-003	WR-043	30.1	0.69	0.83	<0.02	<0.02	64.9	0.96	30.0	79.4	49.5
S0610175-004	WR-044	18.4	0.70	0.70	0.84	<0.02	59.6	0.93	29.0	84.0	55.0
S0610175-005	WR-045	16.7	0.78	0.89	0.67	<0.02	62.5	0.75	23.4	79.1	55.7
S0610175-006	WR-046	20.0	0.89	1.14	1.27	<0.02	64.2	0.76	23.7	66.1	42.4
S0610175-007	WR-047	20.0	0.58	1.07	0.99	<0.02	61.0	0.95	29.5	77.6	48.1
S0610175-008	WR-048	12.1	0.67	1.08	1.54	<0.02	67.6	0.76	23.6	78.5	54.9
S0610175-009	WR-049	19.1	0.57	1.08	1.17	<0.02	70.8	0.89	27.8	80.0	52.2
S0610175-010	WR-050	19.9	0.86	0.98	0.92	0.02	64.9	0.85	26.5	77.6	51.1
S0610175-011	WR-051	25.3	0.61	0.83	0.94	<0.02	109	1.31	40.9	70.0	29.0
S0610175-012	WR-052	20.8	0.76	0.69	0.97	<0.02	61.9	0.82	25.5	76.5	51.1

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barten

Karen Barten, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(800) - 828-1097

Soil Analysis Report

Canyon Fuel Company, LLC.
HCR-35, Box 380
Helper, UT 84526

Report ID: S0701270001

Project: Skyline Utah#6
Date Received: 1/16/2007

Date: 3/2/2007
Work Order: S0701270

Lab ID	Sample ID	pH	Saturation	Electrical Conductivity	Field Capacity	Wilt Point	Calcium	Magnesium	Sodium	Potassium	SAR
		s.u.	%	dS/m	%	%	meq/L	meq/L	meq/L	meq/L	
S0701270-001	WR-053-06	8.0	50.1	1.02	10	6.9	3.32	4.20	3.04	0.54	1.57
S0701270-002	WR-054-06	7.9	45.0	1.76	13	8.0	6.30	9.47	4.69	0.89	1.67
S0701270-003	WR-055-06	7.9	42.7	1.60	12	7.8	5.50	8.95	4.68	0.78	1.74
S0701270-004	WR-056-06	7.7	51.3	1.87	9.3	7.4	8.39	9.43	3.80	0.68	1.27
S0701270-005	WR-057-06	7.8	54.3	1.47	13	7.6	6.41	7.74	3.48	0.53	1.31
S0701270-006	WR-058-06	8.1	55.1	1.27	14	7.8	3.90	6.12	4.64	0.80	2.07
S0701270-007	WR-059-06	8.0	51.5	1.09	8.6	6.5	3.45	5.19	4.70	0.58	2.26
S0701270-008	WR-060-06	8.0	47.1	1.06	11	7.6	2.52	3.80	4.99	0.51	2.81
S0701270-009	WR-061-06	8.0	45.3	1.68	13	7.6	5.98	7.54	6.56	1.42	2.52
S0701270-010	WR-062-06	8.3	45.8	1.59	12	6.8	4.90	5.66	5.53	1.13	2.41
S0701270-011	WR-063-06	8.3	45.8	0.85	11	6.5	1.96	1.48	4.09	0.27	3.12

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barten
Karen Barten, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(800) - 828-1097

Soil Analysis Report

Canyon Fuel Company, LLC.
HCR 35, Box 380
Helper, UT 84526

Report ID: S0701270001

Project: Skyline Utah#6
Date Received: 1/16/2007

Date: 3/2/2007
Work Order: S0701270

Lab ID	Sample ID	Available Sodium meq/100g	Exchangeable Sodium meq/100g	Sand %	Silt %	Clay %	Texture	Boron ppm	TKN %	Nitrogen Nitrate ppm	Selenium ppm
S0701270-001	WR-053-06	0.29	0.13	60.0	14.0	26.0	Sandy Clay Loam	0.65	1.11	0.73	<0.02
S0701270-002	WR-054-06	0.36	0.15	60.0	14.0	26.0	Sandy Clay Loam	0.49	1.22	1.27	<0.02
S0701270-003	WR-055-06	0.28	0.08	62.0	12.0	26.0	Sandy Clay Loam	0.51	1.07	0.82	<0.02
S0701270-004	WR-056-06	0.38	0.18	64.0	13.0	23.0	Sandy Clay Loam	0.86	1.24	0.54	<0.02
S0701270-005	WR-057-06	0.31	0.12	60.0	18.0	22.0	Sandy Clay Loam	0.99	1.30	0.03	<0.02
S0701270-006	WR-058-06	0.44	0.19	66.0	13.0	21.0	Sandy Clay Loam	0.82	1.02	0.76	<0.02
S0701270-007	WR-059-06	0.35	0.10	74.0	12.0	14.0	Sandy Loam	0.73	1.01	0.38	<0.02
S0701270-008	WR-060-06	0.37	0.14	72.0	12.0	16.0	Sandy Loam	0.49	1.09	<0.02	0.03
S0701270-009	WR-061-06	0.51	0.21	68.0	16.0	16.0	Sandy Loam	0.42	1.11	0.17	<0.02
S0701270-010	WR-062-06	0.45	0.20	70.0	13.0	17.0	Sandy Loam	0.41	0.95	<0.02	<0.02
S0701270-011	WR-063-06	0.33	0.14	74.0	10.0	16.0	Sandy Loam	0.47	1.24	0.06	<0.02

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barten
Karen Barten, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
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Soil Analysis Report

Canyon Fuel Company, LLC.
HCR 35, Box 380
Helper, UT 84526

Report ID: S0701270001

Project: Skyline Utah#6
Date Received: 1/16/2007

Date: 3/2/2007
Work Order: S0701270

Lab ID	Sample ID	Total Carbon %	TOC %	Total Sulfur %	T.S. AB t/1000t	Neut. Pot. t/1000t	T.S. ABP t/1000t
S0701270-001	WR-053-06	53.8	53.2	0.37	11.7	51.1	39.4
S0701270-002	WR-054-06	42.2	41.3	0.48	15.0	70.3	55.3
S0701270-003	WR-055-06	50.6	49.9	0.75	23.3	55.6	32.3
S0701270-004	WR-056-06	53.5	53.0	0.69	21.5	43.9	22.4
S0701270-005	WR-057-06	55.9	55.4	0.64	20.0	43.9	23.9
S0701270-006	WR-058-06	49.5	48.9	0.79	24.6	50.8	26.3
S0701270-007	WR-059-06	54.9	54.3	0.44	13.6	48.4	34.8
S0701270-008	WR-060-06	52.9	52.4	0.50	15.6	40.4	24.8
S0701270-009	WR-061-06	45.3	44.6	0.45	14.1	60.6	46.5
S0701270-010	WR-062-06	50.4	49.4	0.51	16.0	77.2	61.2
S0701270-011	WR-063-06	47.9	47.5	0.37	11.4	36.6	25.2

These results apply only 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, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Barten
[redacted]ren Barten, Soil Lab Supervisor

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

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

2006 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 June 2006 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 2005 seedlings appeared to moderately well; approximately 30 to 40% appeared to have survived the year. The 2006 seedlings appear to have done poorly with very little survival. After planting, the weather in the weeks following planting was unseasonably warm and dry with only approximately 38 percent of the normal precipitation falling – having less than 0.2 inches of precipitation over the three (3) weeks following planting.

The following plants have been ordered for the spring of 2007: Gambel Oak, Western Thimbleberry, and Oakleaf Sumac. These plants, provided the crop survives, will be planted in May or June 2007, again in the former test plot area of the conveyor bench.

Riparian Plant Community Monitoring Report of Selected Reaches in Winter Quarters Canyon

August 2006

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 2007

TABLE OF CONTENTS

INTRODUCTION

Study Objectives

Underground coal mining activities have been planned in areas below Winter Quarters Canyon and Woods Canyon over the next several years. Before, during, and after this mining occurs, Canyon Fuel committed to conducting studies of the riparian plant communities in these canyons to monitor potential impacts of the mining activities. The first such study began in 2005 with the objective to provide a comprehensive baseline data set of representative sample reaches of the *entire area* in Winter Quarters and Woods Canyons that could potentially be impacted by future underground mining. The 2005 monitoring year has been called the ***Initial Baseline Year*** for the riparian studies.

Regular monitoring of the riparian zones should provide data to determine long-term trends, natural variability and benchmark information including the possible impacts to the riparian plant communities caused by mining beneath the creeks of the canyons. That said, additional monitoring studies were planned to be conducted after the 2005 baseline study year. Or, in the subsequent years, the studies were planned to focus on locations where impacts from mining, if any, would most likely occur. In those monitoring years, sample frequency was designed to be intensified in the areas where: 1) underground mining is planned for the near future (for more baseline data), 2) where mining is currently occurring, and 3) where mining has occurred in the recent past.

The methodologies used in the studies were consistent between years. They were 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 (which can occur as a result of several factors i.e. precipitation changes). Rather, the studies were 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.

The Study Areas

Winter Quarters and Woods 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 canyons located about 3 miles west of the town of Scofield, in Carbon County, Utah. The study areas of Woods and Winter Quarters Canyon are located within the Manti-La Sal National Forest. 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.

METHODS

Sample Design, Transect Placement & Frequency

The riparian vegetation of specific reaches in Winter Quarters Canyon and Woods Canyon were surveyed in August 2006. Selection of the sample locations of the reaches were based on the underground coal mining schedule of the Skyline Mines. In 2006, and in other years that follow the *Initial Baseline Year* (2005) described above, the riparian vegetation surveys have been designed to concentrate on recently mined areas, current mining, and areas to be mined in the near future. More specifically, the surveys are to be conducted where mining activities are planned under the streams according to the following schedule: 1) two years prior to mining specific areas, 2) the year of the mining activities, and 3) two years after mining has occurred in the areas. During these study periods, sampling will be intensified by placing sample stations at regular intervals every 400 ft., rather than the 800 ft. spacing that was used in the *Baseline Year*. [***NOTE**: In the Initial Baseline Year (2005) sample locations were placed every 800 ft with the exception of those areas that were scheduled to be mined in late-2005; in those areas the 400 ft spacing was used*].

Line transects were placed at each sample station. Locations and extent of the transects were semi-permanently marked using numbered and flagged wooden stakes and 12-inch metal rods. The vegetation monitoring methods of the studies 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 the sample

stations established in the field. In the first year of the studies, the overall objective of the study plan was to begin monitoring years with one complete baseline data set for all riparian areas near the perennial streams located in the mine permit area prior to any mining. As mentioned, in the subsequent monitoring years, sample station locations have been determined and mapped based on the time period schedule for the proposed underground mining activities.

Geomorphological stream channel data outlined in the Level III protocol were not being 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

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:
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:

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

USDA Forest Service protocol was employed as a model to drive the study plan for quantitative data. *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, 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*.

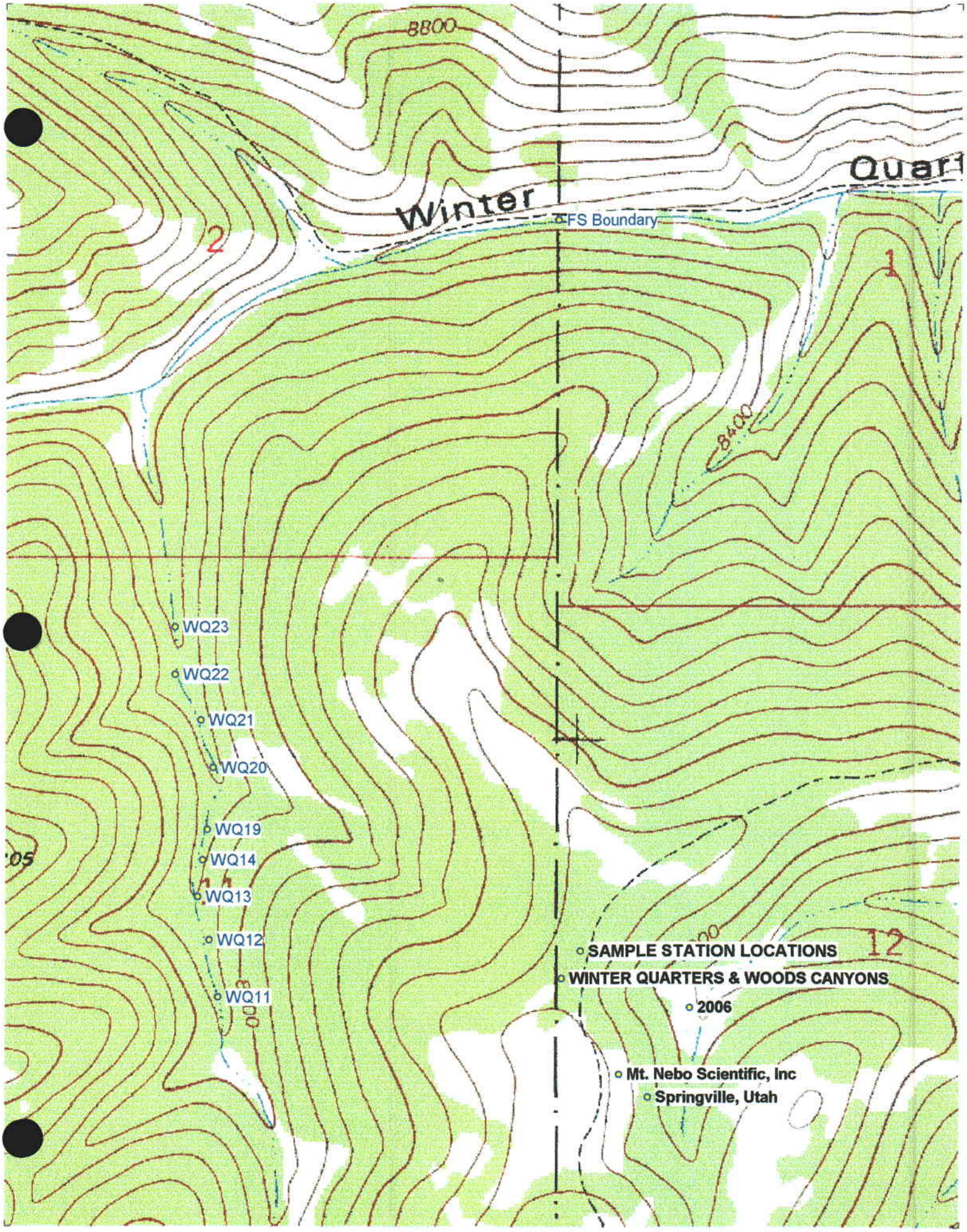
RESULTS & DISCUSSION

Listed below is a summary of the sample stations for the study areas in 2006 (Table 2). 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 (2006)

Winter Quarters Canyon
STATION NAME
WQ-11
WQ-12
WQ-13
WQ-14
WQ-19
WQ-20
WQ-21
WQ-22
WQ-23

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.


8800
Winter
Quar
FS Boundary
2
1
8400
WQ23
WQ22
WQ21
WQ20
WQ19
WQ14
WQ13
WQ12
WQ11
12
SAMPLE STATION LOCATIONS
WINTER QUARTERS & WOODS CANYONS
2006
Mt. Nebo Scientific, Inc
Springville, Utah

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-11

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

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: 30

% 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: 40

% bank length vegetated, unstable: 0

% bank length unvegetated, unstable: 10

NOTES:

1) The bottom of the steep bank is where I began the measurements for the riparian community.
2) The upper banks had some riparian species but it's obvious they were 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 is planned in 2006 to ~0.10 mile past it where it ends in 2008).
4) We sampled ~ every 400 ft along this reach.

DATA SUMMARY

WQ-11: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Grass/Forb/Picea pungens/Populus tremuloides	21.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Geranium richardsonii	1.00
Ranunculus cymbalaria	1.00
TOTAL COVER (Upland Species)	21.00
TOTAL COVER (Riparian Species)	2.00
ROCK (channel)	3.00
WATER (channel)	1.00
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	27.00

PHOTOGRAPHIC DOCUMENTATION

WQ-11

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-12

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 °

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: 700 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	*Carex hoodii*
		Rudbeckia occidentalis	
		Senecio sp.	

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: 20 (Racy)

BANK TYPE & VEGETATION OVERHANG
% bank length undercut (<90°): 0
% bank length gently sloping (>135°): 0
% bank length with overhanging vegetation: 50 (herbaceous)

BANK CONDITION
% bank length vegetated, stable: 80
% bank length unvegetated, stable: 20
% bank length vegetated, unstable: 0
% bank length unvegetated, unstable: 0

:

NOTES:

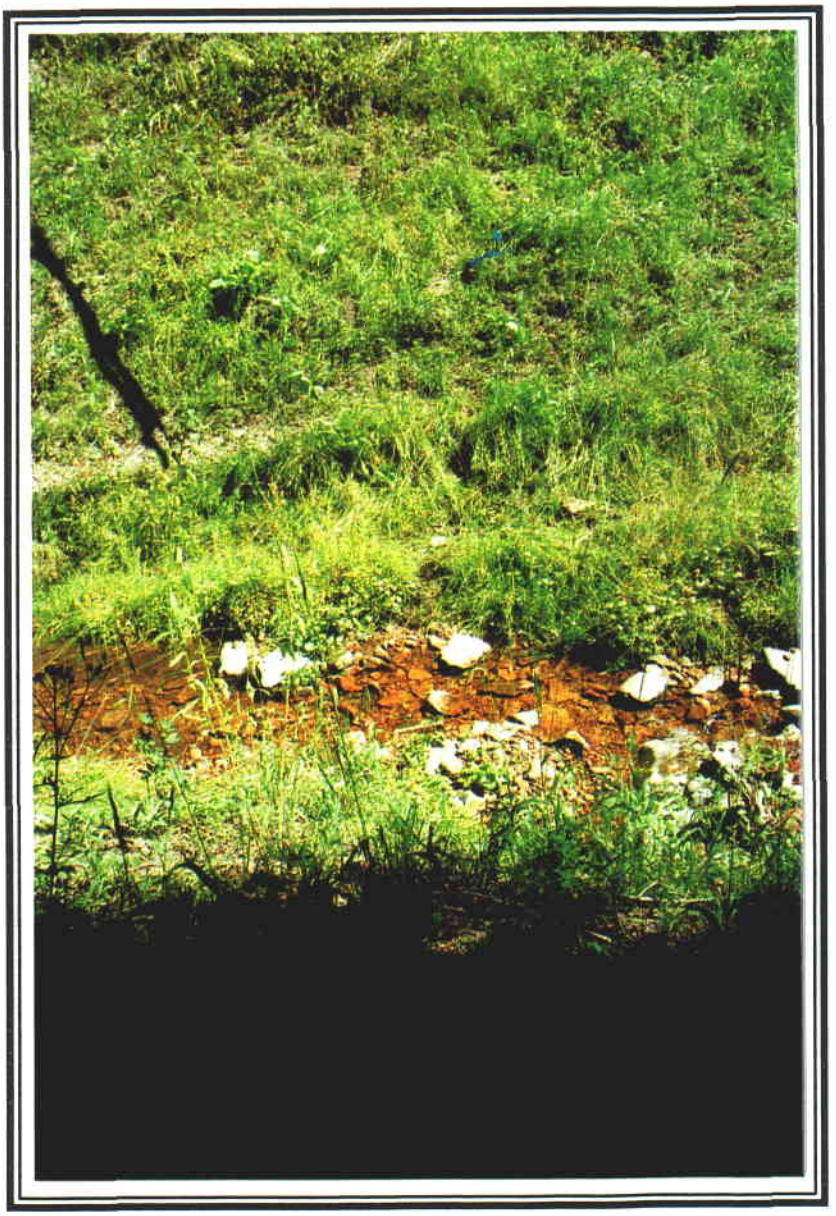
1) New stakes were placed on this site.
2) On the right side there were 2 trails. The lower trail went through the riparian community.
3) The "upland" area support some riparian species (i.e. buttercup and horsetail), but they were most likely the result of side-slope moisture.
4) GPS EPE was 60 ft. in this area.
5) Transect width was 29' in 2005; it was 28' in 2006 (stake was down due to some soil movement).

DATA SUMMARY

WQ-12: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Grass/Forb	9.00
Picea pungens	5.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Carex hoodii/Agrostis stolonifera	7.00
Ranunculus cymbalaria	1.00
TOTAL COVER (Upland Species)	14.00
TOTAL COVER (Riparian Species)	8.00
ROCK (channel)	2.00
WATER (channel)	4.00
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	28.00

PHOTOGRAPHIC DOCUMENTATION



WQ-12

RIPARIAN COMPLEX RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-13

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

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: 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		*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	
		Senecio serra	
		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: 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: 90
- % bank length unvegetated, stable: 10
- % bank length vegetated, unstable: 0
- % bank length unvegetated, unstable: 0

NOTES:

1) 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) Total transect length was 41.5' in 2006; it was 42.0' in 2005 (possible downward movement of

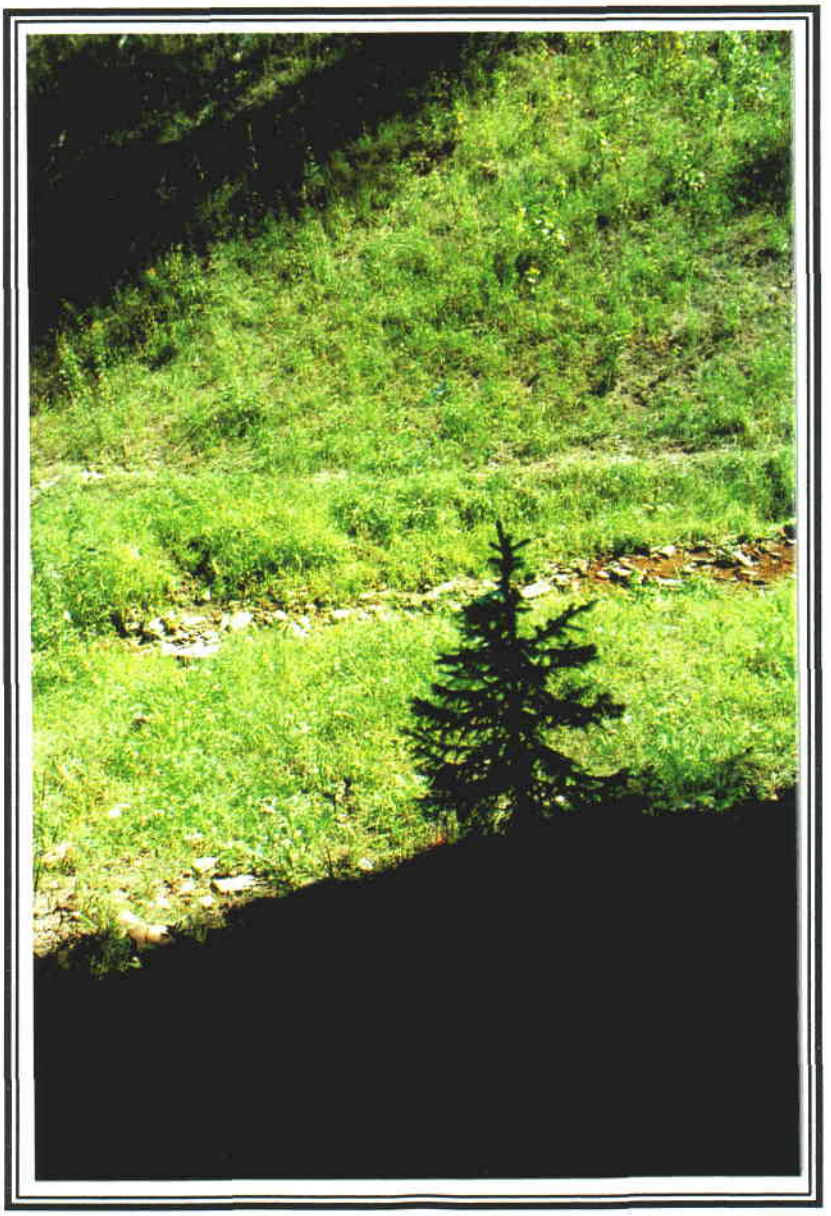
soil).
2) Stakes were replaced in 2006. They could use some blue paint next year.

DATA SUMMARY

WQ-13: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Populus tremuloides	10.00
Populus tremuloides/Picea pungens	9.50
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Equisetum arvensis	3.00
Carex hoodii/Agrostis stolonifera	13.00
TOTAL COVER (Upland Species)	19.50
TOTAL COVER (Riparian Species)	16.00
ROCK (channel)	3.00
WATER (channel)	3.00
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	
TOTAL COVER	41.50

PHOTOGRAPHIC DOCUMENTATION



WQ-13

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: NumberWQ-14

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

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		*Helianthella uniflora*	*Carex hoodii*
		Ranunculus cymbalaria	*Elymus canadensis*
		Urtica dioica	*Poa pratensis*
		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°): 60
- % 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:

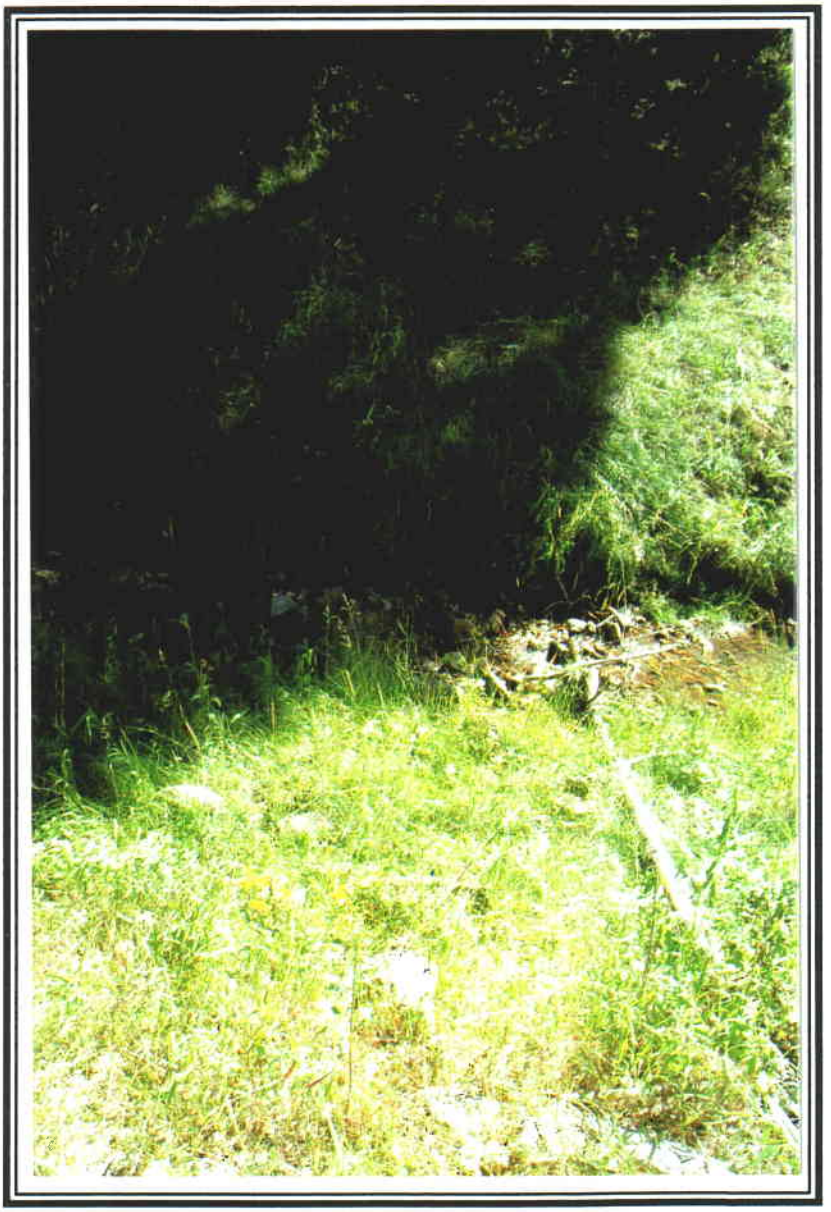
1) Like WQ-13, the left side rose to a higher elevation. The species here seemed to be mostly influence by the stream (rather than hillside).
2) Right side upland community measured was *Elymus canadensis;* left side was *Poa pratensis/Elymus canadensis.*

DATA SUMMARY

WQ-14: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Populus tremuloides/Picea pungens	20.50
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Carex hoodii/Agrostis stolonifera	6.50
Ranunculus cymbalaria	1.00
TOTAL COVER (Upland Species)	20.50
TOTAL COVER (Riparian Species)	7.50
ROCK (channel)	4.5
WATER (channel)	0.5
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	33.00

PHOTOGRAPHIC DOCUMENTATION



WQ-14

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-19

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-2 ^{o}

ELEVATION: 8,633ft

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: 300 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		*Achillea millefolium*	*Poa secunda*
Populus tremuloides		*Epilobium sp.*	
		Osmorhiza obtusa	
		Ranunculus cymbalaria	
		Rudbeckia occidentalis	
		Viguiera multiflora	

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: 80 (Racy)

BANK TYPE & VEGETATION OVERHANG

% bank length undercut (<90°): 10
% bank length gently sloping (>135°): ±10
% bank length with overhanging vegetation: 20

BANK CONDITION

% bank length vegetated, stable: 70
% bank length unvegetated, stable: 15
% bank length vegetated, unstable: 0
% bank length unvegetated, unstable: 15 (riparian banks stable)

NOTES:

1) Site located just upstream from a spring area.
2) Placed site upstream from the spring to decrease influence of the stream water.
3) Left hillside was sloughing in this area.

DATA SUMMARY

WQ-19: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Picea pungens/Poa secunda	11.00
Populus tremuloides	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Ranunculus cymbalaria	4.00
TOTAL COVER (Upland Species)	21.00
TOTAL COVER (Riparian Species)	4.00
ROCK (channel)	0.00
WATER (channel)	6.00
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	31.00

PHOTOGRAPHIC DOCUMENTATION

WQ-19

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-20

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,567 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Spruce/Aspen Right: Aspen/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: 900 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)
Picea pungens		*Epilobium angustifolium*	*Agrostis stolonifera*
Populus tremuloides		*Equisetum arvense*	*Elymus canadensis*
		Geranium richardsonii	*Carex hoodii*
		Rudbeckia occidentalis	
		Senecio serra	
		Thalictrum fendleri	

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°): 50
- % bank length gently sloping (>135°): 25
- % bank length with overhanging vegetation: 5

BANK CONDITION
- % bank length vegetated, stable: 75
- % bank length unvegetated, stable: 25
- % bank length vegetated, unstable: 0
- % bank length unvegetated, unstable: 0

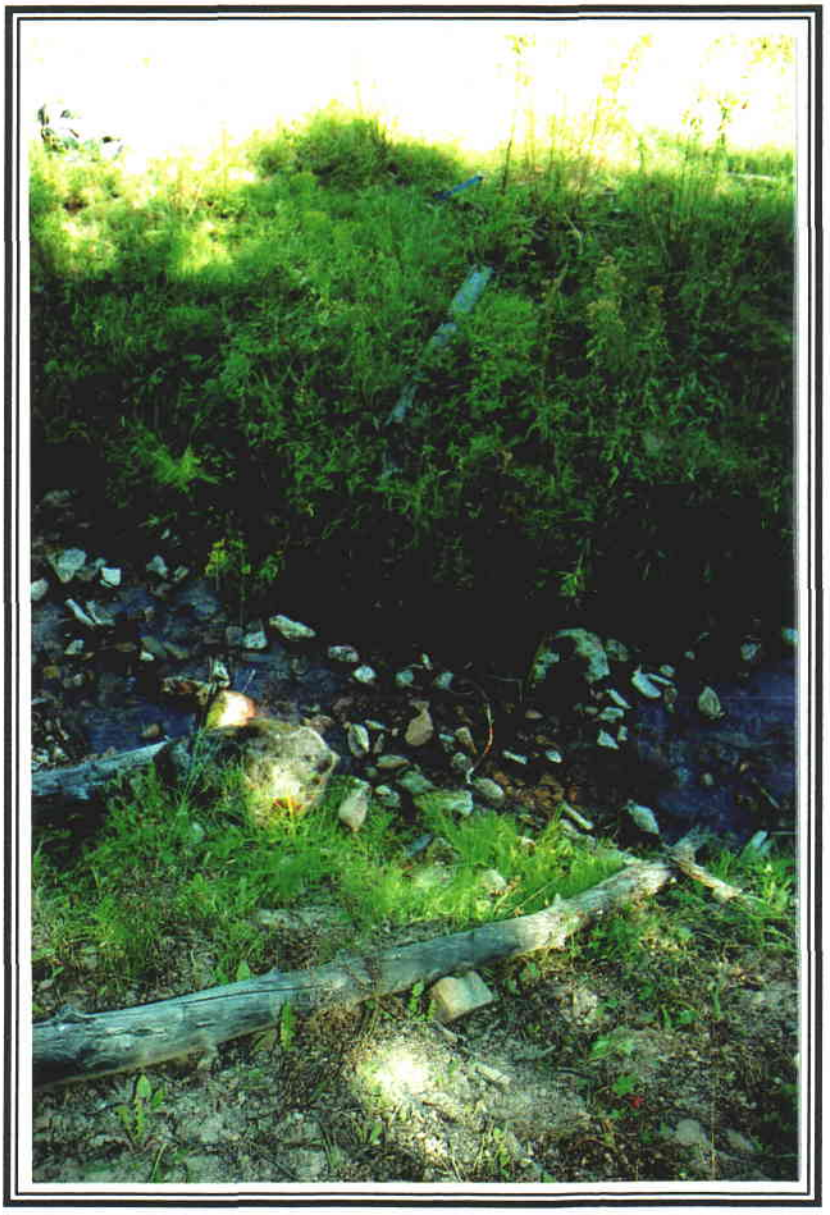
NOTES:

DATA SUMMARY

WQ-20: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Populus tremuloides/Picea pungens	20.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera/Geranium richardsonii	2.00
Carex hoodii	1.00
TOTAL COVER (Upland Species)	20.00
TOTAL COVER (Riparian Species)	3.00
ROCK (channel)	2.00
WATER (channel)	3.00
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	28.00

PHOTOGRAPHIC DOCUMENTATION



WQ-20

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-21

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,560 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Open/Spruce/Aspen Right: Open to 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 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	*Symphoricarpos oreophilus*	*Aster sp.*	*Agrostis stolonifera*
Populus tremuloides		*Carduus nutans*	*Carex hoodii*
		Helianthella uniflora	*Elymus canadensis*
		*Ranunculus cymbalaria**	
		*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: 0

BANK CONDITION
- % bank length vegetated, stable: 90
- % bank length unvegetated, stable: 10
- % bank length vegetated, unstable: 0
- % bank length unvegetated, unstable: 0

NOTES:

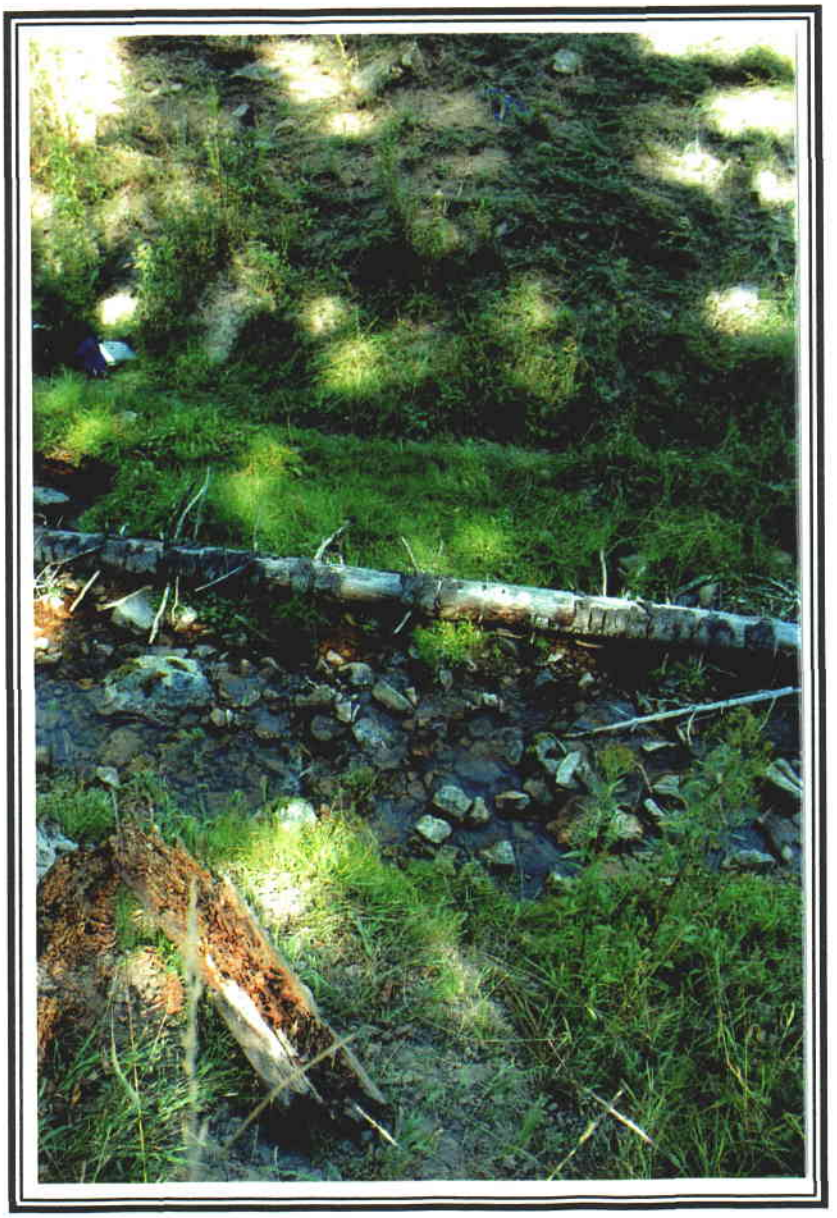
1) Good study site - there was an obvious transition from stream riparian to upland.
2) The riparian zone here was wider than up- or down-stream.
3) Site was located in a flatter area that holds the riparian species well.

DATA SUMMARY

WQ-21: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Grass/Forb/Picea pungens/Populus tremuloides	10.00
Populus tremuloides/Mountain Herbland	12.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	6.50
Carex hoodii	1.5
TOTAL COVER (Upland Species)	22.00
TOTAL COVER (Riparian Species)	8.00
ROCK (channel)	3.00
WATER (channel)	3.00
BAREGROUND (channel)	0.00
LITTER	1.00
MOSS	0.00
TOTAL COVER	37.00

PHOTOGRAPHIC DOCUMENTATION



WQ-21

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-22

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,527 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Spruce/Aspen Right: Open to 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: 900 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*	*Geranium richardsonii*	*Agrostis stolonifera*
Populus tremuloides		*Senecio serra*	*Carex hoodii*
		Ranunculus cymbalaria	*Elymus canadensis*
		Urtica dioica	*Carex nebrascensis*
		Veratrum californicum	*Juncus longistylis*

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°): 50
- % bank length with overhanging vegetation: 5

BANK CONDITION
- % bank length vegetated, stable: 95
- % bank length unvegetated, stable: 5
- % bank length vegetated, unstable: 0
- % bank length unvegetated, unstable: 0

:

NOTES:

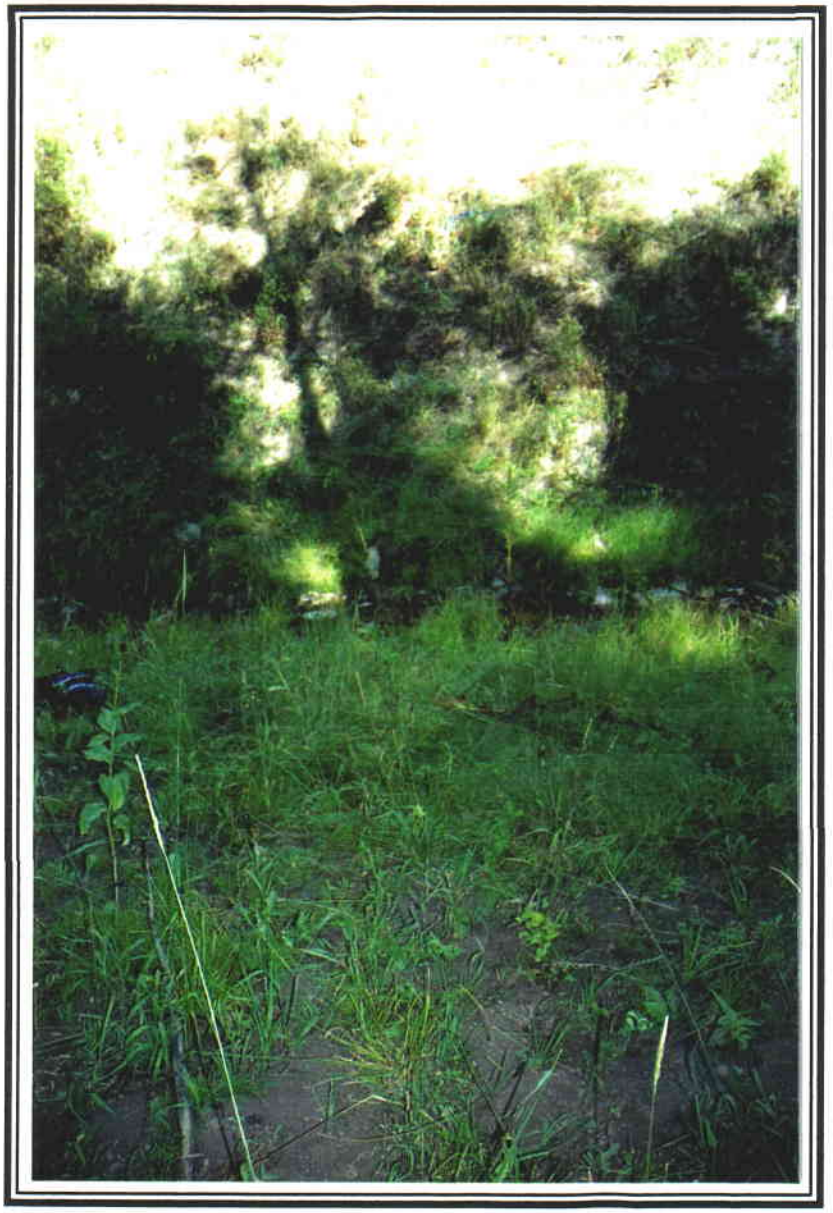
1) There was a wide riparian area on the left side.
2) It was difficult to tell where the stream water or the hillside water influenced the riparian plants, but I thought the stream had most influence in the area where the riparian cover approached 100%. On the left side, this was an area of about 12'.
3) There were riparian spp. at higher elevations where I considered it was more upland.

DATA SUMMARY

WQ-22: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Populus tremuloides/Mountain Herbland	11.00
Populus tremuloides/Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	9.00
Juncus longistylis/Carex nebrascensis	3.00
Ranunculus cymbalaria	6.00
TOTAL COVER (Upland Species)	21.00
TOTAL COVER (Riparian Species)	18.00
ROCK (channel)	1.50
WATER (channel)	2.50
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	43.00

PHOTOGRAPHIC DOCUMENTATION



WQ-22

RIPARIAN COMPLEX DATA SHEET
AUGUST 2006

CLIENT: Canyon Fuel Company, Skyline Mines

COMPLEX: Number WQ-23

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

LOCATION: Wasatch Plateau, Utah

DATE: August 2006

OBSERVER(S): P.D. Collins

QUAD NAME: Scofield, Utah

GEOLOGIC PARENT MATERIAL: Blackhawk Formation

STEAM ASPECT: N

STREAM GRADIENT: 1-3 ^{o}

ELEVATION: 8,481 ft

SIZE OF COMPLEX: (see quantitative data)

ADJACENT UPLAND VEGETATION (looking downstream)

Left: Spruce/Fir Right: Open to 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 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		*Equisetum arvense*	*Agrostis stolonifera*
Populus tremuloides		*Geranium richarsonii*	*Carex hoodii*
		Ranunculus cymbalaria	*Elymus canadensis*
		Senecio serra	

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°): 10
- % bank length with overhanging vegetation: 20

BANK CONDITION
- % bank length vegetated, stable: 85
- % bank length unvegetated, stable: 15
- % bank length vegetated, unstable: 0
- % bank length unvegetated, unstable: 0

:

NOTES:

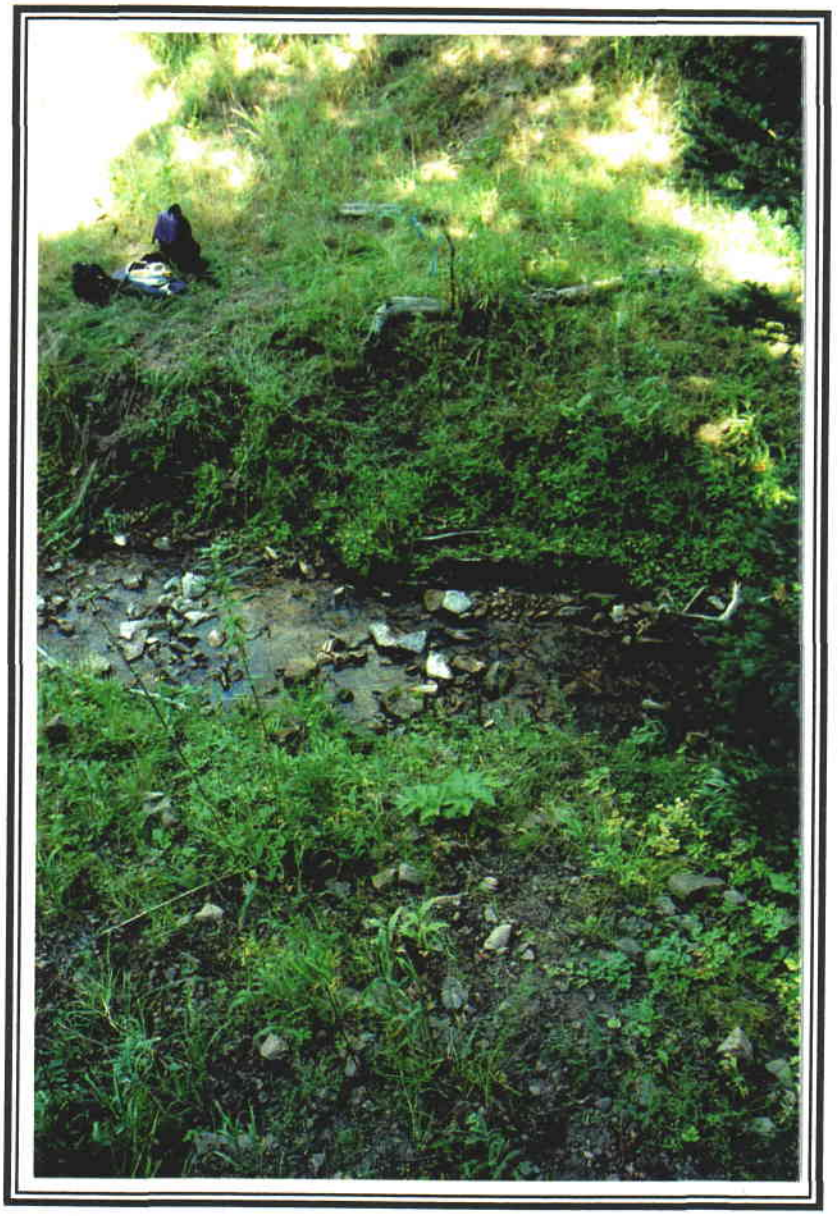
1) On the left side, the upper 3 ft of the riparian zone may be influenced by hillside *and* stream water.
2) This sample site was located very near where underground mining ends in 2008.

DATA SUMMARY

WQ-23: Cover by community types in Winter Quarters Canyon (August 2006).

UPLAND VEGETATION	Cover (ft)
Populus tremuloides/Mountain Herbland	11.00
Populus tremuloides/Picea pungens	10.00
RIPARIAN VEGETATION	
Dominant Woody Species	
Dominant Herbaceous Species	
Agrostis stolonifera	3.00
Agrostis stolonifera/Ranunculus cymbalaria	1.50
Juncus longistylis/Carex nebrascensis	3.00
TOTAL COVER (Upland Species)	21.00
TOTAL COVER (Riparian Species)	7.50
ROCK (channel)	2.00
WATER (channel)	2.50
BAREGROUND (channel)	0.00
LITTER	0.00
MOSS	0.00
TOTAL COVER	33.00

PHOTOGRAPHIC DOCUMENTATION



WQ-23

ECCLES CREEK
BENTHIC INVERTEBRATE
MONITORING

JUNE 2004

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 E. 400 S., Suite 6
Springville, UT 84663
(801) 489-6937

by

Dennis K. Shiozawa, Ph.D.
and
Kalani Kauwe

for

CANYON FUEL COMPANY, LLC.
Skyline Mines
HC 35 Box 380
Helper, Utah 84526

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INTRODUCTION

In August, 2001, an aquifer tapped by Skyline Mine near Scofield, UT, was discharged into Eccles Creek. The discharge maintained the stream at approximately bank-full levels until a diversion was completed to transfer part of the water into Electric Lake. The increased discharge had the potential to impact the stream benthic community, and this report summarizes the results of monitoring in Eccles Creek for spring, 2004.

Eccles Creek has been sampled intermittently since 1979 (Shiozawa 2003), and this report uses some of the previous data as estimates of baseline community structure. The samples taken in June, 2004, represent the sixth series taken from the stream following increased discharge. This project was undertaken for Canyon Fuel Company with the objective of determining the impact of the increased flows on the stream community.

METHODS

Quantitative samples from Eccles Creek were taken from the same locations sampled in July and October, 2002, and June and October, 2003. The three stations in Eccles Creek were designated as (1) above South Fork (EC-2: N 39^0 40.970', W 111.11.579', 8406 feet elevation), (2) Eccles Creek at Whisky Canyon (EC-4: N 39^0 40.908', W 111.10.747', 8234 feet elevation), and (3) Lower Eccles Creek (EC-5: N 39^0 41.001', W 111.10.031', 8074 feet elevation). Five replicate samples were taken per station. All samples were taken from locations in the stream where rubble or cobble substrates were present to reduce variability induced by habitats dominated by silt and sand sediments. A box sampler with a net mesh of 250 microns was used to collect the samples. The substrate was stirred to a depth of approximately five cm. All rocks within the area of the sampler were removed and individually washed to insure quantitative collection of the invertebrates. The samples were concentrated on a 64 micron mesh screen and field preserved in ethyl alcohol. A GPS unit was used to both locate and record the positions of the sample stations.

In the laboratory, the samples were sorted in pans illuminated from underneath. After visually sorting and removing invertebrates from a sample, the sample residue was concentrated, and then sub-sampled with a Stempel pipette. The sample residue was concentrated to a volume of 200 ml, and five 2 ml subsamples were processed under magnification with a dissecting scope. Invertebrates were identified to the lowest possible taxonomic level using the keys of Merritt and Cummins (1996). The mean density per subsample was used to project the total density of organisms in the sample residue. These data were then added to the total invertebrate count from the visual sorting of the sample. The data from all five samples were used to determine the density of taxa per square meter at each station. Mean biomass estimates were also generated so that trends in standing crop could be documented.

Analyses included comparisons of the number of taxa and mean densities in the June, 2004, samples with those generated from samples taken October, 2003; June, 2003; October, 2002; November,

2001 (Shiozawa 2002a); July, 2002 (Shiozawa 2002c);1979 (Winget 1980); and 1992 (Ecosystems Research Institute,1992). These comparisons allow a general evaluation of changes that have occurred since the increased discharge of water into the stream channel from the mine and help place the results in perspective relative to other perturbations and baseline conditions.

The community tolerance quotient (CTQ; Winget and Mangum 1979) was used to gain insight into the condition of the stream relative to idealized system predicted from slope, water chemistry, and substrate. Water chemistry for Eccles Creek was provided by EarthFax Engineering (2001). The following estimates were used for alkalinity and sulfate levels: Eccles Creek alkalinity recorded levels at 264 mg/l and sulfate estimated at 49 mg/l. The gradient in Eccles Creek is approximately 3.3%. With its combination of physical properties, it had a predicted community tolerance quotient (CTQp) of 80 (Winget and Mangum 1979). The biotic condition index was used to further interpret the data generated with this procedure.

Diversity was calculated for the stations using the Shannon-Weiner index (Pieliou 1977). This allows a general comparison among sample stations and dates. Diversity indices take the number of taxa and their individual densities into account generating a single value for each station. The greater the number of species or taxa and generally the more even the distribution of densities among taxa, the higher the index value. Finally, the data were clustered with the UPGMA algorithm using the Bray-Curtis measure of dissimilarity (Poole 1974, Krebs 1989). The NTSYSpc package was utilized to generate the cluster dendrograms (Rolf 2000).

RESULTS AND DISCUSSION

Number of Taxa

A total of 25 taxa, were collected from Eccles Creek in the spring, 2004, samples. The total number of taxa is more than have been collected in any of the post mine discharge samples to date. In comparison, just five taxa (*Baetis*, *Hydropsyche*, *Pedicia*, chironomids, and ostracods) were collected from Eccles Creek in the 2001 sampling series. In the spring, 2004, samples, ten taxa were collected in station EC2, 14 taxa in EC4, and 21 taxa in EC5 (Table 1). The baseline 1979 samples (Winget 1980) had up to 42 taxa at a station, although the spring, 1979, samples recorded between 27 to 38 taxa per station with 35 taxa at EC4 and 38 at EC 5. No samples were taken at station EC2 that spring.

The number of taxa in stations EC2 and EC4 in spring, 2004, were similar to the number collected in the early 1990s (Ecosystems Research Institute, 1992). If the stream was to be considered as recovered to the pre-mining level, the number of taxa would need to increase substantially especially in the upper station. The number of taxa in Eccles Creek, between the impacts of the early 1990s and the increased discharge in 2001, is unknown. However, studies in the 1980s documented the impact of the road (Shiozawa 2002b), so it is reasonable to assume that just prior to the increased

Table 1. Number of taxa collected from Eccles Creek.

	Winget, 1980		Ecosystems Research Institute, 1992			Shiozawa, 2002a	Shiozawa, 2002c	Shiozawa, 2003	Shiozawa & Hansen, 2004	Shiozawa & Kauwe, 2005	This Report
Sampling Date	May-June, 1979	Aug., 1979	June, 1990	Oct., 1990	Sept., 1991	Nov., 2001	July, 2002	Oct., 2002	June, 2003	Oct., 2003	June, 2004
South Fork tributary above mine, upper site (USF2)			20	11							
South Fork tributary above mine (USF)			12	9	21						
Middle Fork tributary above mine (UMF)			14	18							
Eccles Creek below mine (EC1)			4	2							
Eccles Creek above south Fork (EC2)		42	6		6		6	11	11	5	10
South Fork Eccles Creek (SF)	36	35	12								
Eccles Creek below South Fork (EC3)	27	30									
Eccles Creek at Whisky Canyon (EC4)	35	37	7	17	15	6	14	7	9	13	14
Lower Eccles Creek (EC5)	38	21	12	13/11	14		6	11	9	11	21

discharge of 2001, between 21 to 33 taxa were in the system. This would suggest that station EC5 could be near the recovery level for number of taxa in the June, 2004, samples. However, both stations EC2 and EC4 still need to have substantial increases in the number of taxa.

Total Density Comparisons

The total density (Table 2) of invertebrates in the June, 2004, sampling series was 60809/m^2, ten-fold higher than obtained in June, 2003, when the average was 6670/m^2. This is due to chironomids and oligochaetes especially in EC4 and EC5. The total density for June, 2004, is also higher than both the July, 2002, (Shiozawa 2002c) and the 1990 (Ecosystems Research Institute, 1992) estimates and are within the high range (except for EC2) of the densities recorded in 1979. As noted in previous reports (Shiozawa 2002c, 2003), the invertebrate densities should increase to 15000/m^2 or higher, if total numbers were to approximate the baseline condition. Based upon that measure, parts of the stream have now recovered, although EC2 appears to still require a 50% increase in total density.

Taxa Specific Densities

While total densities can give a quick picture of the state of the stream system, they can also be misleading if the component taxa are not considered. High densities of relatively few taxa are common in stressed or polluted systems, because under such conditions a few tolerant taxa are able to monopolize resources in an environment with reduced predation and competition.

Baetis increased in abundance in the June, 2004, samples (Table 3) from a low of 1151/m^2 in EC2 to over 8300/m^2 in EC5. This group was absent or rare in the June, 2003, sampling series (Shiozawa and Hansen 2004). In the July, 2002, samples (Shiozawa 2002c), *Baetis* densities were moderate at 242/m^2, 491/m^2, and 200/m^2 in EC2, EC4, and EC5 respectively. The October, 2002, samples showed *Baetis* absent at EC2, about the same density at EC4 (400/m^2), and higher at EC5 (1297/m^2). In the June, 2003, samples only six *Baetis* per square meter were found at EC4, and none were present at EC2 or EC5. The densities in EC2, EC4, and EC5 respectively in June, 2004, were 1151, 2624, and 8302 per square meter. This indicates that the baetid mayflies are now doing well. The basis for their recovery is not known, but it could be associated with increased precipitation in spring, 2004, possibly changing chemical conditions in the stream and increasing the flushing of detritus into the stream.

The mayfly *Cinygmula* was essentially absent in all stations in June, 2004. In June, 2003, it was in moderate densities in the upstream site (EC2) at 230/m^2, but rare or absent in the middle (EC4) and lower (EC5) sites. This genus was also absent in the fall, 2002, samples but was in low densities at stations EC2 and EC4 in July, 2002. *Cinygmula* is characteristic of relatively high quality stream systems being a scraper-gatherer, feeding on algae and detritus on the surface of rocks. Prior to the construction of the road, this genus reached densities of over 8000/m^2 in late summer, although spring and early summer densities were around 1000/m^2 in the middle and upper reaches of Eccles Creek (Shiozawa 2002b).

Table 2. Total invertebrate densities per square meter for selected studies on Eccles Creek.

	Winget, 1980		Ecosystems Research Institute, 1992			Shiozawa, 2002a	Shiozawa, 2002c	Shiozawa, 2003	Shiozawa &Hansen, 2004	Shiozawa & Kauwe, 2005	This Report
Sampling Date	May-June, 1979	Aug., 1979	June, 1990	Oct., 1990	Sept., 1991	Nov., 2001	July, 2002	Oct., 2002	June, 2003	Oct., 2003	June, 2004
South Fork tributary above mine, upper site (USF2)			1089	528							
South Fork tributary above mine (USF)			1144	216	2455						
Middle Fork tributary above mine (UMF)			1503	3812							
Eccles Creek below mine (EC1)			164	16							
Eccles Creek above south Fork (EC2)		73181	267		89		3703	1260	6265	1267	10865
South Fork Eccles Creek (SF)	9321	17773	1356								
Eccles Creek below South Fork (EC3)	18093	23247									
Eccles Creek at Whisky Canyon (EC4)	11634	25273	1719	3928	1419	61	8757	1491	10351	5004	73950
Lower Eccles Creek (EC5)	18661	2526	2212	4104/ 2863	1468		4927	2879	3387	16919	97614

Table 3. June, 2004, sample data and invertebrates per square meter.

	Eccles Creek above South Fork (EC2)						Eccles Creek Whisky Canyon (EC4)						Lower Eccles Creek (EC5)					
Taxa	1	2	3	4	5	#/m²	1	2	3	4	5	#/m²	1	2	3	4	5	#/m²
Ephemeroptera: *Baetis*	70	11	93	6	10	**1151**	8	70	60	51	244	**2624**	468	44	418	368	72	**8302**
Ephemeroptera: *Cinygmula*	0	1	0	0	1	**12**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Ephemeroptera: *Epeorus*	0	0	0	0	0	**0**	0	0	0	1	0	**6**	0	0	0	0	0	**0**
Plecoptera: early instar	0	0	0	0	0	**0**	0	0	0	0	0	**0**	39	0	0	0	0	**236**
Plecoptera: *Diura knowltoni*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	**6**
Plecoptera: *Hesperoperla pacifica*	0	0	0	0	0	**0**	0	1	0	0	0	**6**	0	0	0	0	0	**0**
Plecoptera: *Isoperla*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	3	0	0	0	**18**
Plecoptera: *Perlomyia utahensis*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	1	1	**12**
Plecoptera: *Zapada*	0	0	0	0	1	**6**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Trichoptera: *Brachycentrus*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	0	0	**6**
Trichoptera: *Dicomoescus*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	1	0	**6**
Trichoptera: *Hesperophylax*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	1	0	0	**6**
Trichoptera: *Hydropsyche*	0	0	0	0	0	**0**	0	9	0	0	3	**73**	0	33	0	0	0	**200**
Trichoptera: *Hydropsyche* pupae	0	0	0	0	0	**0**	0	13	0	2	7	**133**	0	0	0	0	0	**0**
Trichoptera: *Hydroptila*	0	0	0	0	0	**0**	0	2	0	3	1	**36**	1	0	0	0	0	**6**
Trichoptera: *Ochrotricia*	0	0	0	0	1	**6**	1	33	0	53	132	**1327**	4	48	315	590	5	**5830**
Trichoptera: *Neothremma*	0	0	0	0	1	**6**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Trichoptera: *Rhycophila*	6	1	3	1	0	**67**	0	0	0	1	0	**6**	0	0	0	0	0	**0**
Trichoptera: pupae	3	0	1	0	0	**24**	0	5	0	0	3	**48**	0	3	0	1	0	**24**
Coleoptera: Dytiscidae	0	0	0	0	0	**0**	0	0	0	1	0	**6**	0	0	0	0	0	**0**
Coleoptera: *Optioservus*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	1	**6**
Diptera: Caloparyphus	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	30	1	0	**188**

Diptera: Chironomidae larva	332	122	147	376	23	**6060**	212	608	212	810	1172	**18265**	1458	868	1407	1197	590	**33451**
Diptera: Chironomidae pupae	1	34	0	1	0	**218**	3	6	0	20	35	**388**	16	12	19	20	35	**618**
Diptera: Ceratopogonidae	0	0	0	0	0	**0**	0	0	0	0	0	**0**	32	0	0	0	0	**194**
Diptera: *Hemerodromia*	0	0	0	0	0	**0**	0	1	0	0	0	**6**	0	0	1	0	0	**6**
Diptera: *Hemerodromia* pupae	0	0	1	0	0	**6**	2	2	0	3	3	**61**	0	3	4	1	2	**61**
Diptera: *Simulium*	0	0	0	0	0	**0**	0	0	0	0	0	**0**	14	0	0	0	0	**85**
Copepoda	30	0	30	0	0	**364**	30	30	0	60	0	**727**	0	90	150	270	0	**3091**
Ostracoda	0	0	0	0	0	**0**	30	30	0	0	90	**909**	0	0	120	570	60	**4545**
Hydracarina	0	0	0	0	1	**6**	0	0	0	0	30	**182**	0	2	1	1	0	**24**
Oligochaeta	61	31	151	181	61	**2939**	909	1032	2104	2323	1712	**48965**	438	1582	1990	97	1161	**37378**
Totals:	503	200	426	565	98	**10865**	1195	1872	2376	3328	3432	**73950**	2620	2817	4618	4122	1931	**97614**

The hydroptilid caddisfly, *Ochrotricha* (a micro-cadddisfly), was absent from both the upstream (EC2) and downstream (EC5) sites in June, 2003, but was abundant in EC4. In June, 2004, it was essentially absent in the upstream site, EC2, where a density of just six per square meter was recorded. However, it was abundant in both EC4 (1327/m^2) and EC5 (5830/m^2). Densities were high in several samples (these were mostly detected in subsamples). These insects attach to the surface of rocks and woody debris and feed on algae growing on the surface of the substrate. This taxon is tolerant to stressful conditions and their feeding behavior, utilizing algae on the surface of rocks, means they are not reliant on continual detritus input and deposition. The substrate at station EC2, while highly armored, should have contained enough epilithic algae to support these caddisflies. So their absence as that station is not clear.

Hydropsyche was also absent at station EC2 in the spring, 2004, sample series. It was absent in this site in spring, 2003, as well, and in July, 2002, it was found at about 18/m2, 73/m^2, 200/m^2 in 2004. This genus was the dominant benthic macroinvertebrate in the October, 2002, samples (1030/m^2, 1024/m^2, 1321/m^2 at stations EC2, EC4, and EC5 respectively). This difference could be due to temporal changes (seasonal emergence) or a lack of food for filter feeders because of the high flushing induced by the increased flows. The July, 2002, samples had densities of 18/, 1027/m^2, and 494/m^2 at stations EC2, EC4, and EC5 respectively. While lower densities may be characteristic during the early summer, a complete absence of individuals of this genus appears to be unlikely. This implies that other changes in the environment have a role in the disappearance of this group from the stations.

Chironomids were the dominant taxon in the June, 2004, samples. They showed significant increases over the June, 2003, densities being present at station EC2 at 6060/m^2 compared to the 2003 density of 3837/m^2. Station EC4 had chironomid larvae at 18265/m^2 compared to 7042/m^2 in June, 2003, and 33451/m^2 compared to 2424/m^2 in June, 2003, at station EC5 (Table 3). This family has undergone a dramatic increase in density. Midges are quite opportunistic and can disperse readily. In the absence of high densities of other taxa, they can develop very high densities. We did not identify the midges below the family level, but it is certain that the chironomid community included grazers and predators. The numbers at station EC2 did not have the high increases seen at stations EC4 and EC5.

Oligochaetes were the other taxa to show dramatic increases in density being 2939/m^2, 48965/m^2, and 37378/m^2 in stations EC2, EC4, and EC5 respectively. Their higher densities in the two downstream sites reflect the increased abundance of interstitial sediments. Oligochaetes are deposit feeders, burrowing into sand and other depositional microhabitats. The scarcity of such deposits at station EC2 is likely related to their lower densities at that station. Both Copepoda, 364/m^2, 727/m^2, and 3091/m^2 at stations EC2, EC4, and EC5 respectively, and Ostracoda 0/m^2, 909/m^2, and 4545/m^2 at stations EC2, EC4, and EC5 respectively also reflect the differences between station EC2 and the other two stations.

As with the spring, 2003, samples, the total densities of invertebrates in Eccles Creek in June, 2004, and the higher number of taxa at each site suggest that the stream is undergoing a recovery. But the major recovery seems to be occurring in the lower two stations, and EC2 appears to be responding

quite differently to the continued mine discharge into the stream. In June, 2003, the two aquatic insects that showed increases, *Cinygmula* and *Ochrotricha*, are grazers. The two that were lost from the system, *Baetis* and *Hydropsyche*, fed more heavily on detrital food sources. The resurgence of the two detrital feeders suggests that detrital input and/or retention has increased. This could be associated with the termination of the extended drought and the flushing of allochthnous detritus into the stream system. Thus, increased runoff may have neutralized the impact of the continual scouring and armoring of the streambed by the mine water input.

Biomass

Total biomass for each site (Table 4) was determined. Such estimates allow insight into the actual partitioning of energy stored in the living system at different locations and time periods. As with the June, 2003, samples, the June, 2004, samples showed that both the middle (EC4) and lower (EC5) sites have the highest standing crop. Just as in June and October, 2003, the lowest station (EC5) was just half of the middle station (EC4) biomass. The biomass in the middle station was double what it was the previous fall. In contrast, the biomass estimate for EC2 was actually lower than it was the previous June suggesting at best no change in the community condition or possibly a reduction in the benthos at that station. When the June, 2003, biomass estimates are compared to the October, 2002, samples, the June, 2003, biomass estimates were about half of the October, 2002, biomass estimates. The June, 2004, biomass estimates in station EC2 were again about half of the previous fall's biomass. But both stations EC4 and EC5 were much higher than the fall, 2003, estimates being about two and one and a half times higher respectively.

Table 4. Biomass comparisons, October, 2002, through June, 2004.

	Upper Eccles (EC2)				Middle Eccles (EC4)				Lower Eccles (EC5)			
Sample	Oct., 2002	June, 2003	Oct., 2003	June, 2004	Oct., 2002	June, 2003	Oct., 2003	June 2004	Oct., 2002	June, 2003	Oct., 2003	June, 2004
1	0.58 g	0.13 g	0.23 g	0.26g	0.24 g	0.14 g	1.39 g	0.10g	0.21 g	0.14 g	0.41 g	0.23g
2	0.34 g	0.31 g	0.13 g	0.10g	0.40 g	0.10 g	0.59 g	4.38g	0.04 g	0.07 g	0.19 g	0.71g
3	0.07 g	0.05 g	0.06 g	0.06g	0.27 g	0.06 g	0.50 g	0.18	0.40 g	0.01 g	0.37 g	.057g
4	0.31 g	0.04 g	0.28 g	0.06g	0.05 g	0.12 g	0.19 g	0.33g	0.43 g	0.05 g	0.64 g	1.07g
5	0.29 g	0.11 g	0.33 g	0.05g	0.07 g	0.24 g	0.43 g	1.06g	0.10 g	0.10 g	0.03 g	0.62g
Total	1.59 g	0.64 g	1.03 g	0.53 g	1.03 g	0.66 g	3.11 g	6.05 g	1.18 g	0.37 g	1.64 g	2.69 g
per m^2	9.64 g/m^2	3.88 g/m^2	6.24 g/m^2	3.21 g/m^2	6.24 g/m^2	4.00 g/m^2	18.82 g/m^2	36.66 g/m^2	7.15 g/m^2	2.24 g/m^2	9.95 g/m^2	16.28 g/m^2

Biotic Condition Index

Community tolerance quotients are a part of the biotic condition index developed by Winget and Mangum (1979). The community tolerance quotients are of two types, the actual community tolerance quotient, CTQa, and the predicted community tolerance quotient, CTQp. The predicted community tolerance quotient is based on water chemistry, substrate, and gradient and was determined to be 80 using the directions in Winget and Mangum (1979). CTQa values are a simple arithmetic mean of pre-assigned index values for the taxa present at a given station. The CTQa indices for the June, 2004, samples and an idealized stream, based on a combination of taxa collected from Boardinghouse Creek in November, 2001, and all taxa collected in Eccles Creek from 2001-2004 are given in Table 5. Generally, CTQa values less than 65 represent high quality waters while those between 65 and 80 represent situations with moderate to high quality water. CTQa values greater than 80 represent low water quality or stressed systems. The June, 2004, CTQa values were 82.72, 91.4, and 87.91 at stations EC2, EC4, and EC5 respectively. All are greater than 80, thus indicating water quality problems with Eccles Creek. However, in June, 2003, these stations had CTQa values of 86.8, 94.3, and 96.9 and in July, 2002, these same stations had CTQa values of 99, 52, and 66 (Table 6). It, therefore, appears that the three stations are still undergoing changes in their CTQa values and that the only consistent site is EC2 which has given readings of poor water quality since the initial 2002 sampling. The general trends of all three stations showed an increase in stress from October, 2002, to June, 2003, with a decrease in fall, 2003, and then an increase in stress level in June, 2004. This indicates that significant problems still exist with Eccles Creek, especially station EC2, and confirms the changes detected with individual taxa and biomass.

Table 5. Tolerance quotients.

Eccles Creek; June, 2004 Taxa	above South Fork (EC2)	at Whisky Canyon (EC4)	Lower Eccles (EC5)	Ideal stream (species list, including Boarding-house Creek)
Ephemeroptera: Baetidae: Baetis	72	72	72	72
Ephemeroptera: Ephemerellidae: *Drunella sp.*	0	0	0	48
Ephemeroptera: Ephemerellidae: *Drunella dodsei*	0	0	0	4
Ephemeroptera: Ephemerellidae: *Seratella*	0	0	0	48
Ephemeroptera: Ephemerellidae: *Ephemerella*	0	0	48	48
Ephemeroptera: Heptageniidae: *Cinygmula*	48	0	0	21
Ephemeroptera: Heptageniidae: *Epeorus*	0	21	0	21
Ephemeroptera : Leptophlebidae: *Paraleptophlebia*	0	0	0	24
Plecoptera early instar	0	0	36	36

Plecoptera: Leuctridae: *Perlomyia utahensis*	0	0	18	18
Plecoptera: Nemouridae: *Malenka californica*	0	0	0	36
Plecoptera: Nemouridae: *Zapada*	16	0	0	16
Plecoptera: Perlididae: *Hesperoperla pacifica*	0	18	0	18
Plecoptera: Perlodidae: *Diura knowltoni*	0	0	24	24
Plecoptera: Perlodidae: *Skwalla parallela*	0	0	0	18
Plecoptera: Perlodidae: *Isoperla*	0	0	48	48
Trichoptera: pupae	108	108	108	108
Trichoptera: Brachycentridae: *Brachycentrus*	0	0	24	24
Trichoptera: Brachycentridae: *Micrasema*	0	0	0	24
Trichoptera: Hydropsychidae: *Arctopsyche*	0	0	0	18
Trichoptera: Hydropsychidae: *Hydropsyche*	0	108	108	108
Trichoptera: Hydroptilidae: *Hydroptila*	0	108	108	108
Trichoptera: Hydroptilidae: *Ochrotricia*	108	108	108	108
Trichoptera: Limnephilidae: *Dicosmecus*	0	0	24	24
Trichoptera: Limnephilidae: *Hesperophylax*	0	0	108	108
Trichoptera: Psychomyiidae: *Tinodes*	0	0	0	108
Trichoptera: Rhyacophilidae: *Rhyacophila*	18	0	0	18
Trichoptera: Uenoidae: *Neothremma alica*	0	0	0	8
Trichoptera: Uenoidae: *Oligoplebodes*	0	0	0	24
Coleoptera: Dytiscidae	0	72	0	72
Coleoptera: Elmidae: *Optioservus*	0	0	108	108
Coleoptera: Haliplidae: *Peltodytes*	0	0	0	54
Diptera: Ceratopogonidae	0	0	108	108
Diptera: Chironomidae	108	108	108	108
Diptera: Empididae: *Chelifera*	0	0	0	108
Diptera: Empididae: *Hemerodromia*	108	108	108	108
Diptera: Simuliidae: *Simulium*	0	0	108	108
Diptera: Stratiomyidae: *Allognasa*	0	0	0	108

Diptera: Stratiomyidae: *Caloparyphus*	0	0	108	108
Diptera: Tipulidae: *Dicranota*	0	0	0	24
Diptera: Tipulidae: *Limnophila*	0	0	0	72
Diptera: Tipulidae: *Tipula*	0	0	0	36
Diptera: Tipulidae: *Pedicea*	0	0	0	72
Diptera: Tipulidae: *Antocha*	0	0	0	24
Collembola	0	0	0	108
Hemiptera: Saldidae	0	0	0	108
Acari: Hydracarnia	108	108	108	108
Ostracoda	0	108	108	108
Copepoda	108	108	108	108
Cladocera	0	0	0	108
Mollusca: Gastropoda: *Gyraulus*	0	0	0	108
Mollusca: Spharidae: *Sphaerium*	0	0	0	108
Oligochaeta	108	108	108	108
Tricladida: Planariidae	0	0	0	108
Nematoda	0	108	108	108
Total	910	1371	2022	3694
n	11	15	23	55
CTQa	82.72	91.4	87.91	67.16

Comparisons of Community Tolerance Quotient and Biotic Comparison Indices

CTQa values for Eccles Creek can be compared from the 1979, 1990, and 2000 time periods. These values detected the impact in the 1990s in three stations below the mine (EC1, EC2, and EC4; Table 6), when the stations recorded increases in the CTQa values from the 50s and 60s to the 60s and 70s. The 1990 spill did not reach the lowest station, EC5, which maintained its CTQa in the 50s range. Beginning in 2001, the average CTQa for the stream jumped to 94 and stayed above 70 in 2002, and in June, 2003, it was again near 94 but fell to 78 in the fall of that year. In June, 2004, it increased to 87. Based on the CTQa values, the mine discharge has had a more intense impact on the stream than did the 1990 detergent spill, and between 2001 and June, 2004, the number of clean water taxa has decreased substantially in both EC4 and EC5.

Table 6. CTQa and BCI values for selected studies on Eccles Creek.

	Winget, 1980		Ecosystems Research Institute, 1992			Shiozawa, 2002a	Shiozawa, 2002c	Shiozawa, 2003	Shiozawa &Hansen, 2004	Shiozawa, 2005	This Report
Sampling Date	May-June, 1979	Aug., 1979	June, 1990	Oct., 1990	Sept., 1991	Nov., 2001	July, 2002	Oct., 2002	June, 2003	Oct., 2003	June, 2004
	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI	CTQa /BCI
South Fork tributary above mine, upper site (USF2)			59/133	53/151							
South Fork tributary above mine (USF)			49/163	59/136	45/178						
Middle Fork tributary above mine (UMF)			54/148	49/163							
Eccles Creek below mine (EC1)			67/119	108/74							
Eccles Creek above south Fork (EC2)		65/123			73/110		99/81	86/93	87/92	88/91	83/97
South Fork Eccles Creek (SF)	59/136	64/125	55/145								
Eccles Creek below South Fork (EC3)	65/123	55/145									
Eccles Creek at Whisky Canyon (EC4)	62/127	61/131	69/116	70/114	63/127	94/85	52/154	69/116	94/79	76/105	91/88
Lower Eccles Creek (EC5)	59/136	74/108	53/151	55/145 57/140	58/138		66/121	69/116	97/82	71/112	88/91
Average	62/131	64/126	59/140	64/132	60/138	94/85	72/119	75/108	93/86	78/102	87/92

The biotic condition index (BCI) is simply CTQp/CTQa X 100. This measure, according to Winget and Mangum (1979), can be used in conjunction with CTQa to generate a broader interpretation of the state of the stream system. Ideally, if all predictors are accurate, a pristine system will have a BCI of 100 (CTQp = CTQa). BCI values below 100 represent a condition where fewer clean water taxa than predicted are present and thus indicate a reduction in the quality of the habitat. Any BCI value above 100 represents communities whose clean water taxa are in greater abundance than predicted. In 32 of the 43 sample stations presented in this report (Table 6), the BCI was over 100. None of the stations sampled in June, 2004, had a BCI value above 100, although two stations, EC4 and C5, had values over 100 in fall, 2003. The BCI values generated in previous studies of Eccles Creek indicate that the CTQp is systematically biased in its prediction of the expected average community tolerance quotient. However, that implies that a BCI value less than 90 is a strong indication of problems in the system. In general, stations EC4 and EC5 have fluctuating BCI values tending to have higher values (more clean water taxa) in the fall and fewer clean water taxa in the spring. However, it also appears that the trend is one of increasing BCI index readings each year. This indicates that the community, rather than recovering, is still deteriorating in condition.

CTQp values are likely to induce a systematic error into the computation. The interpretation given in Winget and Mangum (1979) cannot be assumed to have consistent properties when compared across streams. Further, the CTQa values are based on the average index from just those taxa that are present, and all taxa are weighted equally regardless of differences in abundance. A site could conceivably have just a single individual and nothing else. For example, one specimen of *Neothremma* would give the sample a CTQa of eight. One *Neothremma* and 5000 chironomids would have a CTQa of 58 while 5000 chironomids would have a CTQa of 108. For these reasons, the CTQa and BCI values cannot be relied upon as stand alone indicators of stream condition.

Diversity Index

Diversity indices are a way of combing both number of taxa and relative densities into a single measurement. High diversity index values indicate more taxa and a greater number of individuals per taxon. Low diversity values generally reflect a depauperate fauna in both species and somewhat in numbers. The baseline stations (the 1979 samples, Table 7) had diversity values ranging between about 1.96 and 3.5. The areas impacted in 1990-1991 had diversities values around one. But in September, 1991, the values fell to around 0.5. However, in that same sample series, the Upper South Fork had a diversity of 0.7 considerably lower than in the previous year.

Diversity values from 2001-2002 were below 1.0 for all sampled stations. In June, 2003, the diversity index value exceeded 1.0 at station EC2, and the diversity value has stayed above 1.1 since then. Station EC4 exceeded a diversity index value of 1.0 in October, 2003, but the long-term trend appears to be hovering just below the 1.0 level with the June, 2004, value at 0.982. Station EC5 has had its diversity value fluctuating below that of station EC4 until the June, 2003, sample period when it had the highest diversity value (1.147) recorded in the post discharge period. It appears that a slight recovery may be underway in the downstream-most station, EC5. However, the diversity values are significantly below those of the reference conditions established in the 1970s. Both

Table 8. Diversity indices, based on natural logs, for selected studies on Eccles Creek.

	Winget, 1980		Ecosystems Research Institute, 1992			Shiozawa, 2002a	Shiozawa, 2002c	Shiozawa, 2003	Shiozawa & Hansen 2004	Shiozawa, 2005	This Report
Sampling Date	May-June, 1979	Aug., 1979	June, 1990	Oct., 1990	Sept., 1991	Nov., 2001	July, 2002	Oct., 2002	June, 2003	Oct., 2003	June, 2004
South Fork tributary above mine, upper site (USF2)			1.63	1.9							
South Fork tributary above mine (USF)			1.72	1.9	0.702						
Middle Fork tributary above mine (UMF)			1.66	1.9							
Eccles Creek below mine (EC1)			1.06	0.7							
Eccles Creek above south Fork (EC2)		1.964	1.58		0.400		0.398	0.836	1.314	1.190	1.165
South Fork Eccles Creek (SF)	3.510	3.322	1.62								
Eccles Creek below South Fork (EC3)	2.450	2.743									
Eccles Creek at Whisky Canyon (EC4)	2.450	3.060	1.22	1.6	0.666	0.757	0.957	0.835	0.955	1.432	0.982
Lower Eccles Creek (EC5)	2.280	2.590	1.24	1.8/ 1.4	0.416		0.829	0.341	0.789	0.750	1.474

stations EC4 and EC5 would need to have diversity indices in the 2.5 to 3.5 range. Station EC2 would only need to double its index value to return to the pre-development conditions.

Cluster Analysis

The final analysis utilized in this study was clustering. This approach generates a visual representation of the relationships among samples based upon their similarity or dissimilarity to one another. The dissimilarity index utilized in this study considers both quantitative counts of individuals within each taxon and their relative densities. The cluster results (Figure 1) separate the majority of the spring-summer samples, including all of the reference samples, into one cluster while the fall samples are part of a second cluster. The exceptions are eight spring samples taken in the 1990s and one sample taken in fall, 2003, at station EC5. The 1990 samples occur in the fall cluster but show a high dissimilarity to other members of the fall grouping. The fall, 2003, samples from EC5 placed that station in the spring-summer samples with it being most similar to the 1979 reference samples. The overall separation of spring-summer samples from the fall samples illustrates very clearly the effect of seasonality.

The spring, 2004, samples joined the spring-summer cluster as was expected. Station EC2 for the spring, 2004, clustered most tightly with station EC4 from both 2002 and 2003 suggesting that the community at the upstream-most sampling site (EC2) may be converging toward a structure similar to that previously seen in EC4. Station EC4 was well scoured immediately after the increase in discharge into the stream. However, both EC4 and EC5 in spring, 2004, combined to form a separate cluster joining basally to the spring-summer cluster. While these sites were most similar to the spring-summer cluster, they joined at a dissimilarity level above 0.8 which is very divergent. This indicates that while they retain some of the seasonal signal, their community structure is becoming more divergent rather than converging with the baseline data from the late 1970s. Thus, the cluster analysis indicates that the stream is still far from its original condition and the lower stations appear to be in a transitional state, but to where is not clear.

CONCLUSIONS

Eccles Creek in June, 2004, still showed significant impacts from the increased inflow of water. The number of taxa had increased beyond that recorded in previous sampling periods since the increase in discharge, but the number of taxa was still just 40% to 55% of the total number recorded per station in the 1979 samples. Stations EC2 and EC4 appear to be the ones that have recovered the least. Total densities of invertebrates for all stations had increased dramatically especially the two downstream stations, EC4 and EC5. Their increases exceeded what would be expected in an unimpacted system, but high densities in low diversity systems is common when a system has been impacted.

Baetis returned in numbers in the spring, 2004, samples at all stations and at densities that imply it is doing well. However, the grazer, *Cinygmula*, became rare suggesting that something impacted

this taxon perhaps either food availability or recruitment. The causal factors are not known. Another grazer, *Ochrotricha*, was essentially absent at Station EC2 but had good densities at stations EC4 and EC5. The downstream abundance of *Ochrotricha*, which utilizes the same general food type as *Cinygmula*, suggests that *Cinygmula* may have been more limited by recruitment failure rather than by a lack of food. The net spinning caddisfly, *Hydropsyche*, was absent at Station EC2 and in low densities relative to previous years at the other two stations. Its distribution was similar to that of *Ochrotricha*. Chironomids and oligochaetes increased at all stations but were most abundant at stations EC4 and EC5. Their numbers reflect the better conditions at these two downstream stations.

Biomass estimates did not increase in station EC2 from the previous spring sample period. However, both EC4 and EC5 did have significant increases again reflecting the improved conditions at those two stations. The CTQa indices indicated that the taxa composition at all three stations tended to have relatively fewer clean water taxa. Station EC2 has been relatively consistent in its CTQa ranging between 99 and 83 from 2002 to this sample series. It may have improved slightly from the initial sample in July, 2002. EC4 and EC5 both appear to have gotten worse as time progressed. Both had CTQa values in the high 50s and low 60s in July, 2002, but in this last series, their CTQa values were about 90. When the CTQa was adjusted for the physical parameters in the stream, station EC2 had consistently lower BCI values than expected. Stations EC4 and EC5 both had fluctuating BCI values tending to meet the expected score during the fall sampling period and then having lower BCI scores than predicted during the spring sampling periods. However, their BCI values appear to be on an upward trend indicating decreasing quality.

In contrast to the CTQa and BCI indices, the diversity of station EC2 appears to have slightly improved since the initial sampling in 2002. Its diversity level is still much lower than we would expect in an unimpacted stream, but the increase in diversity is generally interpreted as a positive indicator of change. Station EC4 does not appear to have changed much, but EC5 may have improved considerably from winter, 2003, to spring, 2004. All stations still need substantial increases in their diversity indices before they could be considered recovered.

The cluster analysis indicated that the upstream most station, EC2, was becoming more similar to station EC4 in previous spring samples. However, both EC4 and EC5 for the June, 2004, sampling series had a significant increase in dissimilarity between their community structure and the spring samples taken in previous years. These two stations cluster out together, with a dissimilarity less than 0.30 between each other, and they are part of the spring-summer cluster, but their cluster was also over 80% dissimilar from the other spring-summer stations. That high dissimilarity suggests that the two stations are on a separate trajectory taking them farther away from the baseline spring-summer community structure documented in the 1970s.

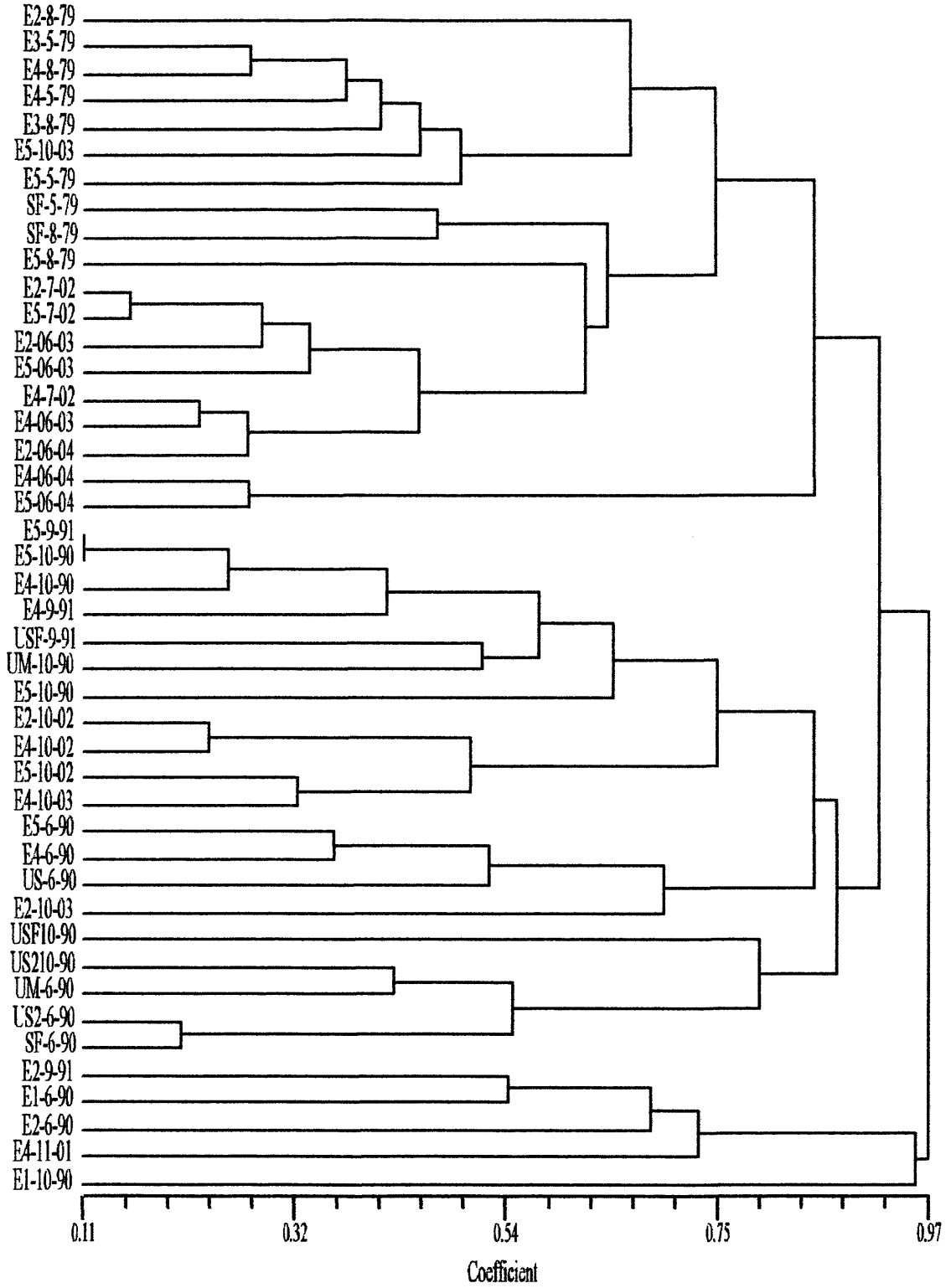
In spring, 2004, the community again had detritivores as a significant component especially in the downstream two stations where both midges and oligochaetes were abundant. This may be associated with increased runoff into the system which would increase allochthnous detritus input. However, the upstream most station, EC2, showed the effects of the armoring of the sediment through the continued high flows. The armored substrate then tends to be cemented together by the

precipitation of carbonates. The carbonate precipitate has cemented the rubble and even woody debris into a solid stream bed that is incapable of retaining particulate organic matter and which also severely limits interstitial habitat for stream invertebrates. This marl or tufa streambed may have existed prior to the increased discharge since it has been observed in other nearby unimpacted streams (Shiozawa personal observation), but in those cases, the marl is much lower in extent and loose sediments form a veneer over the encrusted substrate. In those systems, sediments input from side drainages and the riparian appear to be in a quasi-equilibrium with stream export.

In Eccles Creek, the sustained high flow tends to rapidly flush sediment out of the stream channel especially in the upper-most reaches where the inflowing mine water is the most sediment starved. It does appear that some of the sediments are accumulating in the downstream stations especially EC5. The retention of the sediments may be in part assisted by beaver activity, which often favors the retention of fine sediments, and these foster increases in taxa that burrow into fine substrates such as chironomids and oligochaetes. Other taxa, especially stoneflies, which require higher interstitial oxygen tensions associated with coarse sediments, will be excluded from such habitats. Conditions now suggest that the high carbonate content of the water is also important. As the water degasses carbon dioxide in the turbulent upper reaches of the stream, the loss of carbonic acid shifts the stream to a more basic pH. This favors calcium carbonate precipitation and a cementing of the substrate. This amplifies the problem of low sediment retention.

As emphasized in previous reports (Shiozawa 2002a, b, c), the benthic community in Eccles Creek is unlikely to return to the structure that existed in 1979 unless the sustained discharge is eliminated. The higher flushing rate relative to the input of allochthonous detritus will tend to prevent the re-establishment of the 1979 community structure, especially in the upper reaches of the stream. It may be possible for the lower reaches, especially EC5 to mover closer to the 1979 standard, since the lower reaches should be able to accumulate detritus flushed from upstream.

Figure 1. UPGMA cluster dendrogram of relationships among stations and dates sampled.



LITERATURE CITED

Cummins, K. W. 1974. Structure and function of stream ecosystems. Bioscience 24:631-641.

EarthFax Engineering. 2001. Memo to Chris Hansen of Canyon Fuel Company, Skyline Mine. October 24, 2001.

Ecosystems Research Institute. 1992. Eccles Creek invertebrate studies and rock dissolution experiments. Report to Skyline Mines. Utah Fuel Company. Coastal States Energy Company.

Krebs, C. J. 1989. Ecological Methodology. Harper and Row Pub. Inc. NY, NY. 654 pp.

Merritt, R. W. and K. W. Cummins (eds.). 1996. An Introduction to the Aquatic Insects of North America. Kendall/Hunt Publishing Co. Dubuque, Iowa. 862 pp.

Pielou, E. C. 1977. Mathematical Ecology. John Wiley and Sons. NY, NY. 385 pp.

Poole, R. W. 1974. An Introduction to Quantitative Ecology. McGraw-Hill, Inc. 532 pp.

Rolf, F. J. 2000. NTSpc: Numerical taxonomy and multivariate analysis system. Version 2.1. Exeter Software. Setauket, NY.

Shiozawa, D. K. and J. R. Barnes. 1977. The microdistribution and population trends of larval *Tanypus stellatus* Coquillett and *Chironomus frommeri* Atchley and Martin (Diptera: Chironomidae) in Utah Lake, Utah. Ecology 58(3):610-618.

Shiozawa, D. K. 1983. Density independence versus density dependence in streams. pp. 55-72 in Stream Ecology: Application and Testing of General Ecological Theory. eds., J. R. Barnes and G. W. Minshall. Plenum Press, New York.

Shiozawa, D. K. 2002a. The benthos of Bordinghouse and Eccles Creeks and the impact of increased water discharge into Eccles Creek in 2001. Report to Canyon Fuel Co, LLC. Skyline Mines. February, 2002.

Shiozawa, D. K. 2002b. A compilation and comparison of the Eccles Creek macro-invertebrate data for the period of 1979-2002. Report to Canyon Fuel Co, LLC. Skyline Mines. September, 2002.

Shiozawa, D. K. 2002c. The benthos Eccles Creek and the impact of increased water discharge in 2002. Report to Canyon Fuel Co, LLC. Skyline Mines. October, 2002.

Shiozawa, D. K. 2003. Eccles Creek benthic invertebrate monitoring, October, 2002. Report to Canyon Fuel Co, LLC. Skyline Mines. June, 2003.
Shiozawa, D. K. and J. Hansen. 2004. Eccles Creek benthic invertebrate monitoring, June, 2003.

Report to Canyon Fuel Co, LLC. Skyline Mines. June, 2004.

Shiozawa, D. K. and K. Kauwe. 2005. Eccles Creek benthic invertebrate monitoring, October, 2003. Report to Canyon Fuel Co, LLC. Skyline Mines. June, 2005.

Winget, R. N. 1980. Aquatic ecology of surface waters associated with the Skyline Project, Coastal States Energy Company. General Aquatic Resource Description. Report to Coastal States Energy Company.

Winget, R. N. and F. A. Mangum. 1979. Biotic condition index: integrated biological, physical, and chemical stream parameters for management. U. S. Forest Service Intermountain Region. Ogden, UT.

RESULTS OF THE 2006 ANNUAL GEOMORPHIC EVALUATION OF ECCLES AND MUD CREEKS

Prepared for

CANYON FUEL COMPANY
Skyline Mine
Helper, Utah

February 2007

Prepared by

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

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RESULTS OF THE 2006 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.

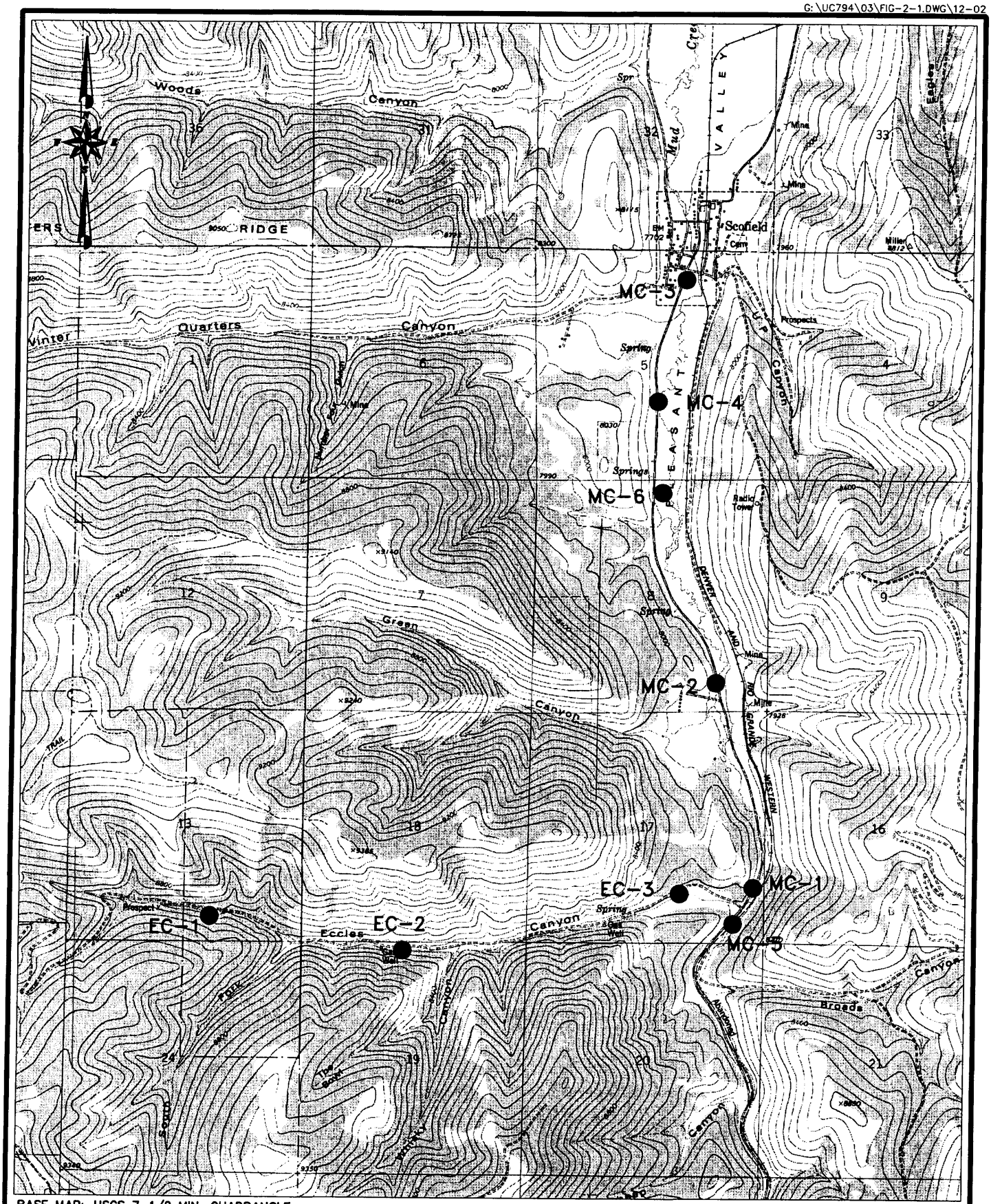
Beginning in late 2001, EarthFax Engineering has conducted detailed evaluations of the impact of the mine-water discharge on geomorphic conditions in Eccles Creek and its receiving stream Mud Creek (see EarthFax, 2002). As part of the earlier evaluation, nine reference reaches were established to assist in annual monitoring of the stability of Eccles and Mud Creeks. The purpose of this document is to present the results of the 2006 annual collection of data from the reference reaches and to compare the current results with prior data.

CHAPTER 2
FIELD DATA COLLECTION METHODS

The locations of reference sites previously established on Eccles and Mud Creeks are shown on Figure 2-1. Monitoring of the reference sites was conducted on October 9, 2006 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). Results of previous surveys had indicated that top-of-bank measurements were highly subjective in these mountain streams. Coupled with the short day length and the need to collect the required data prior to the onset of darkness, no top-of-bank measurements were collected during the 2006 evaluation.

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



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

0' 3000'

FIGURE 2-1. LOCATION OF REFERENCE SITES

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CHAPTER 3
RESULTS SUMMARY

Cross section and selected profile spreadsheets and drawings are provided in Appendix C. These data were plotted for 2002 and 2006 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. 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 unrelated to the mine-water discharge 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.

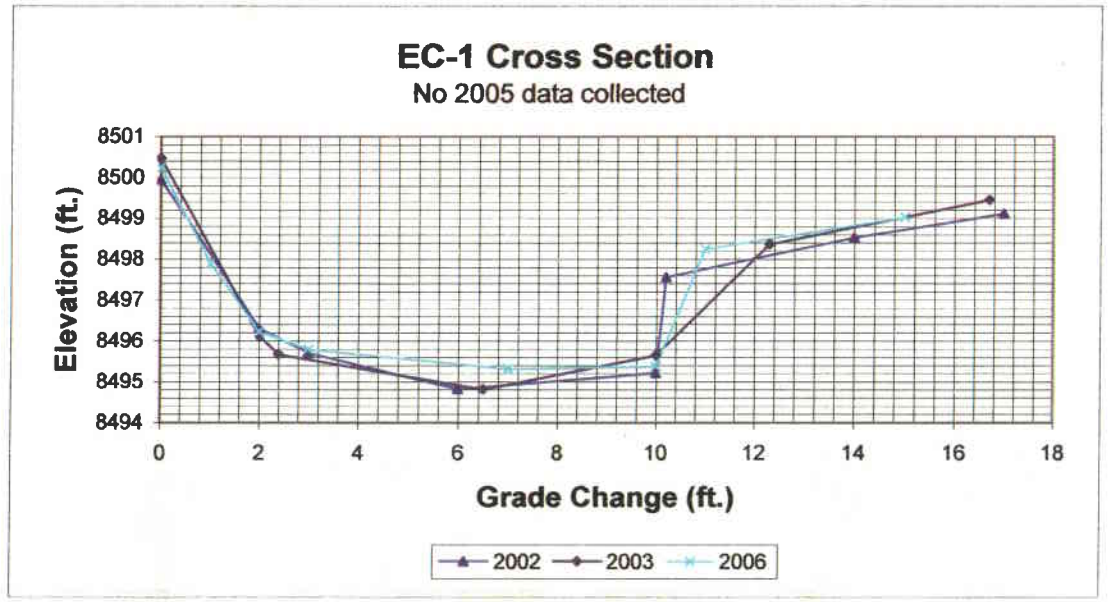
Notwithstanding the survey difficulties noted above, Figures 3-1 through 3-9 indicate that no substantial changes occurred in the reference site profiles and cross-sections between 2002 and 2006, with the exception of stations MC-3, MC-4, and EC-1. Variations in the conditions at MC-3 resulted from the 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 2006 survey was conducted using the elevation of the cross-section pin of the right bank. The calculations were completed by

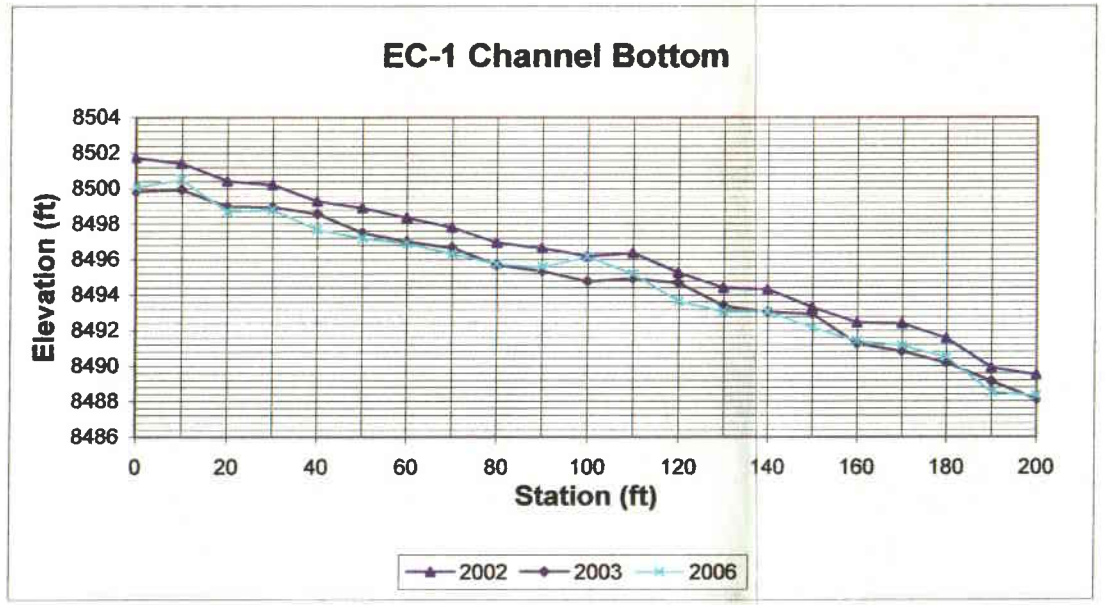
assuming that the difference in elevation between the pin and the benchmark was the same from the prior year. Also, a new beaver dam had been constructed at the original upstream location as well as a smaller dam downstream of the road crossing. These dams are reflected in the profiles.

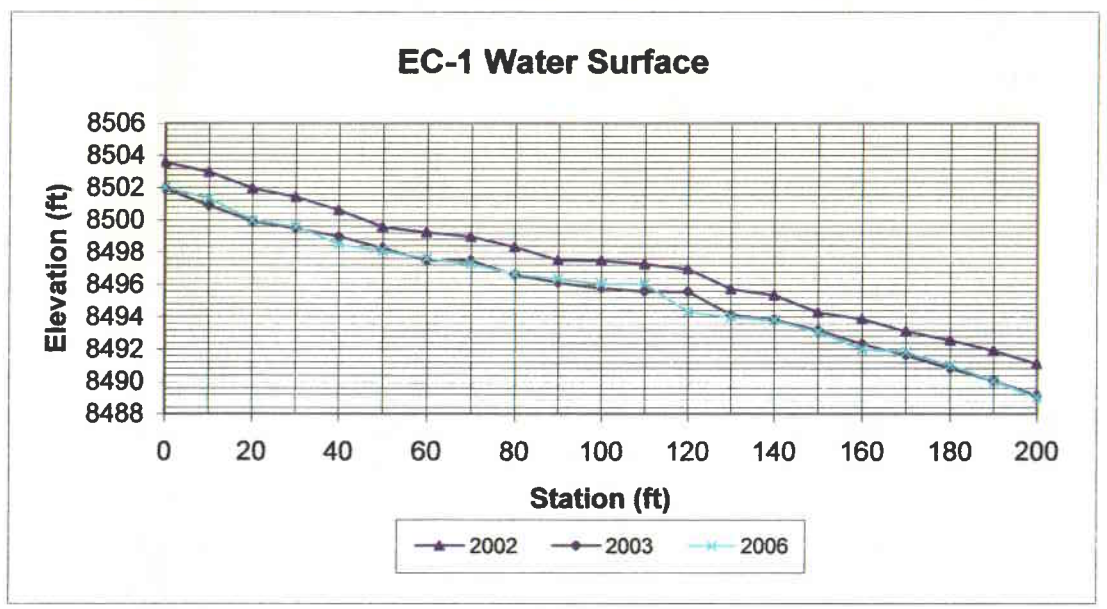
The channel bottom at MC-4 exhibited more variation in 2006 than was apparent in prior years. Visual observations of the stream channel at this location indicated short stretches of aggradation and degradation that did not previously exist in the reach. This reach exists within a pasture that is heavily grazed, with banks that show signs of extensive damage from livestock access to the stream.

As indicated in the 2003 annual report (EarthFax, 2003), differences between 2002 and 2006 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 2006 profile data, but also the 2003 profile data. As indicated, essentially no difference exists between the 2003 and 2006 profiles, indicating that the shift occurred in the 2002 survey.

Notwithstanding the above observations, the 2006 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.







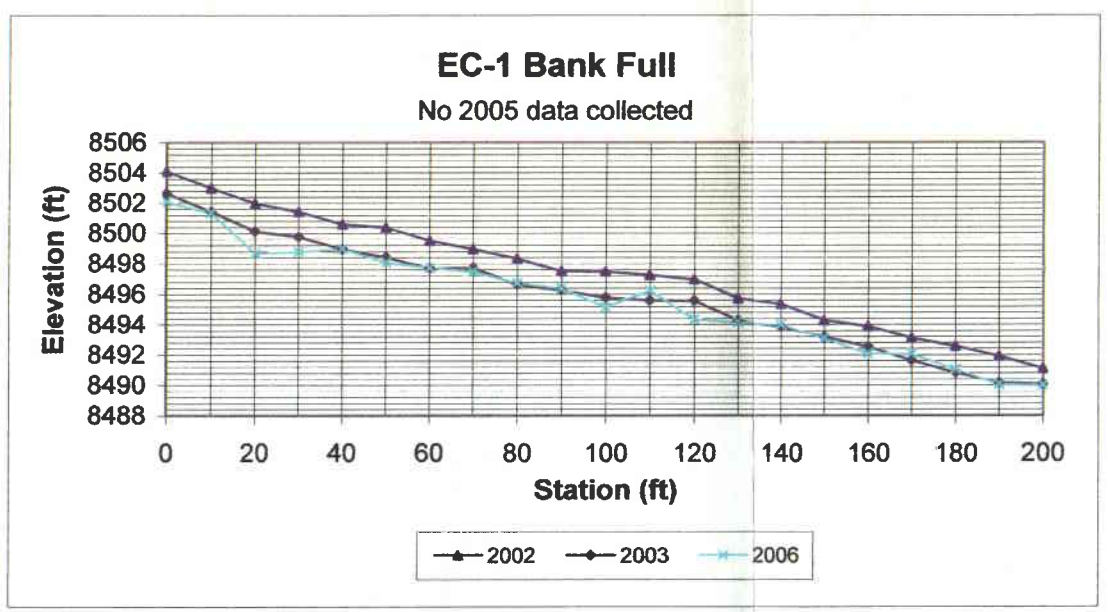
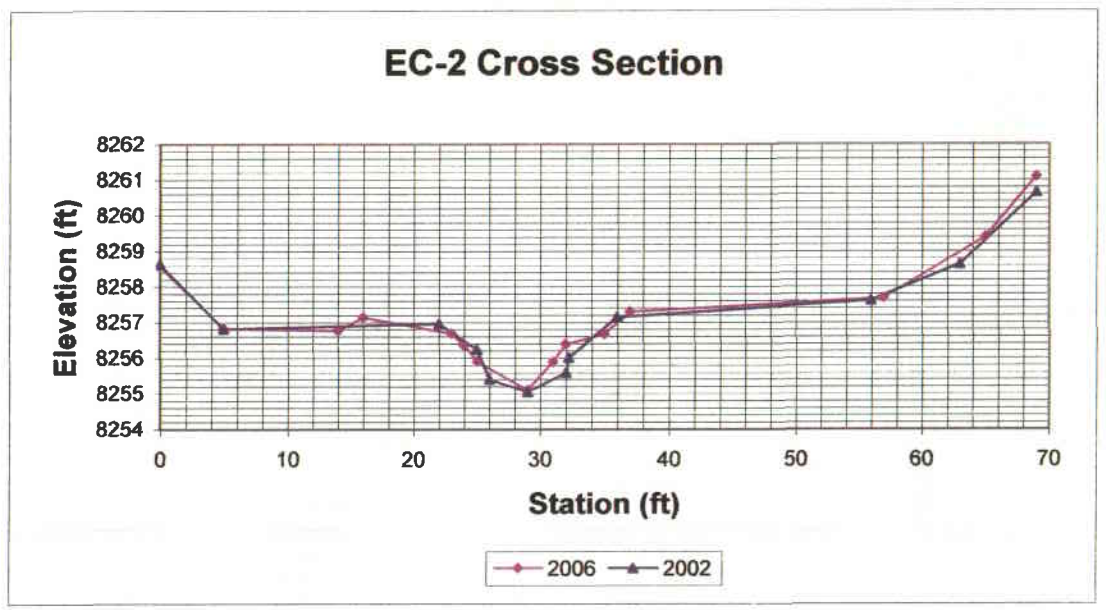
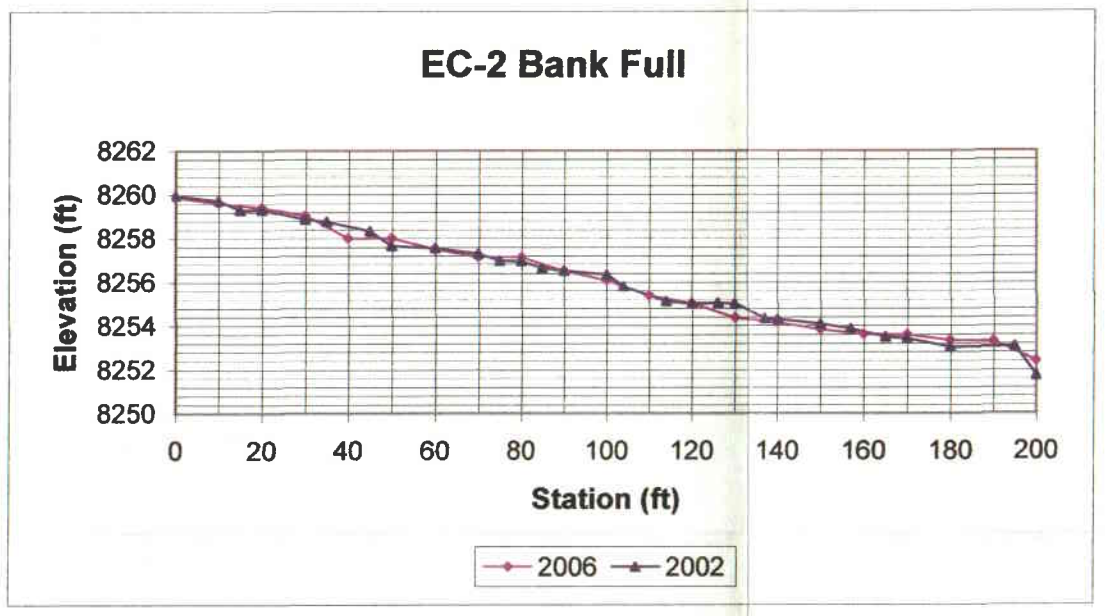
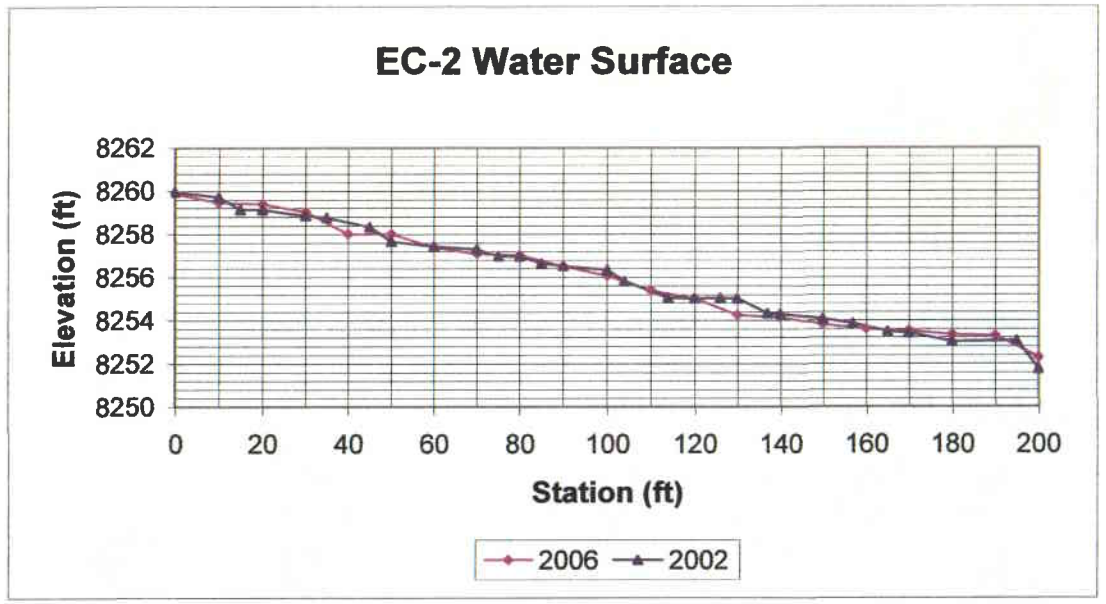


FIGURE 3-1. EC-1 CROSS-SECTION AND PROFILES

EarthFax







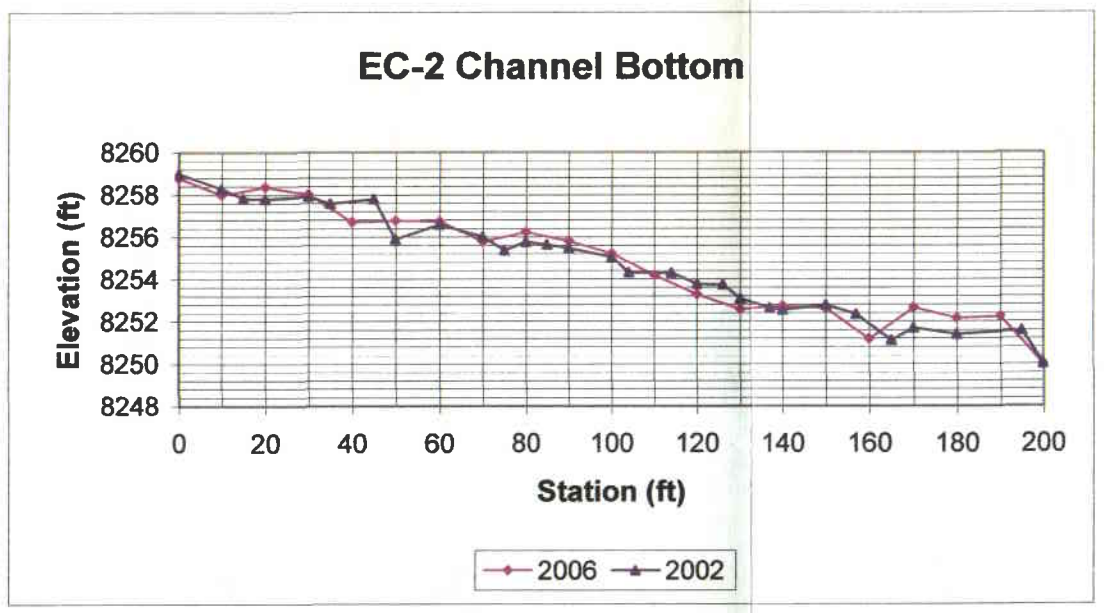


FIGURE 3-2. EC-2 CROSS-SECTION AND PROFILES

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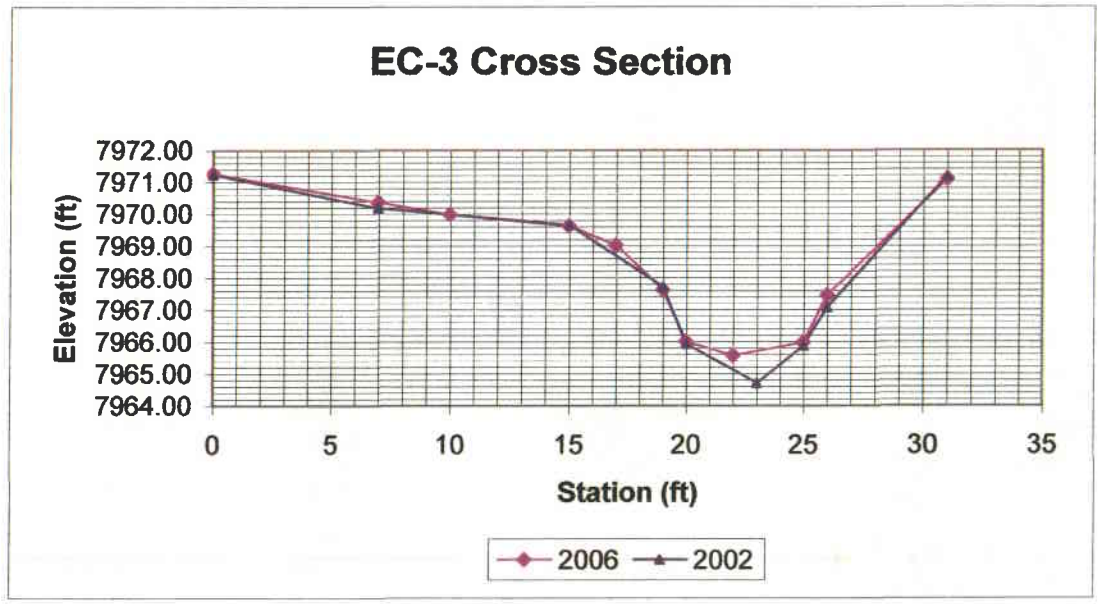
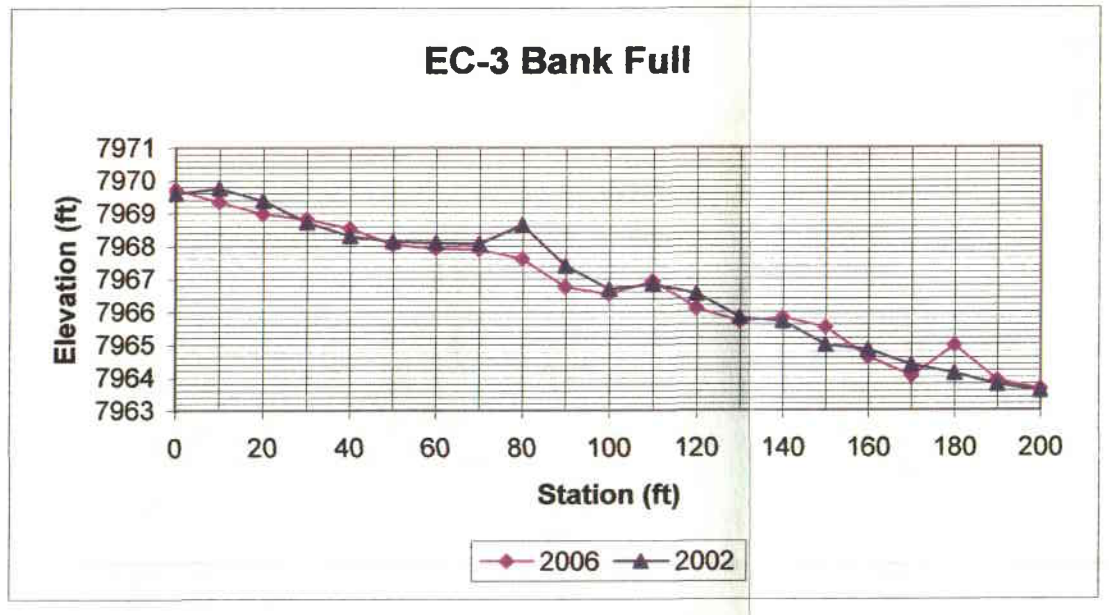
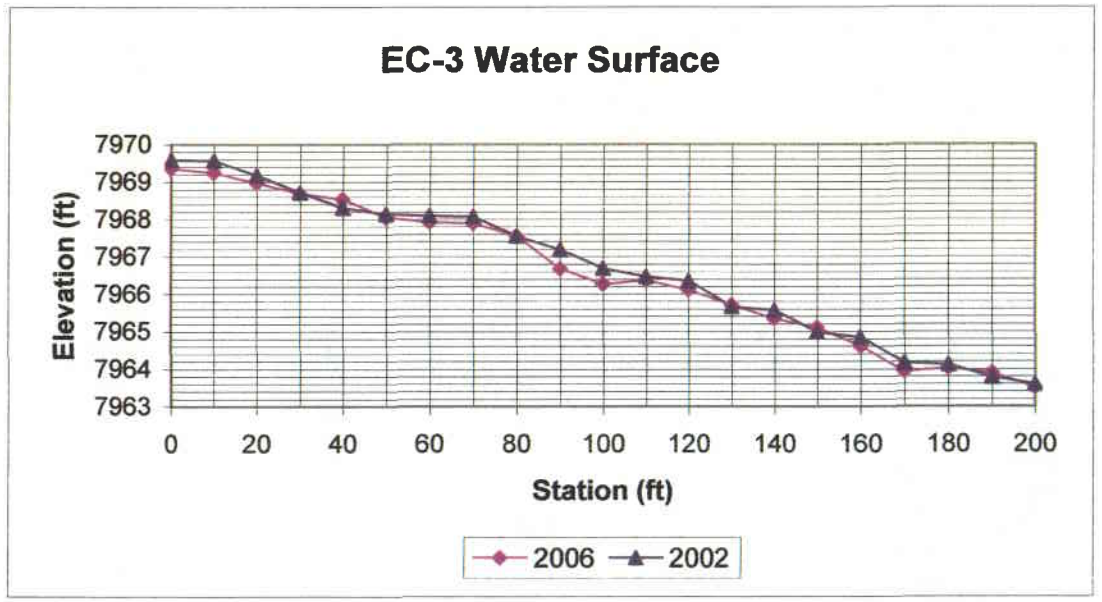






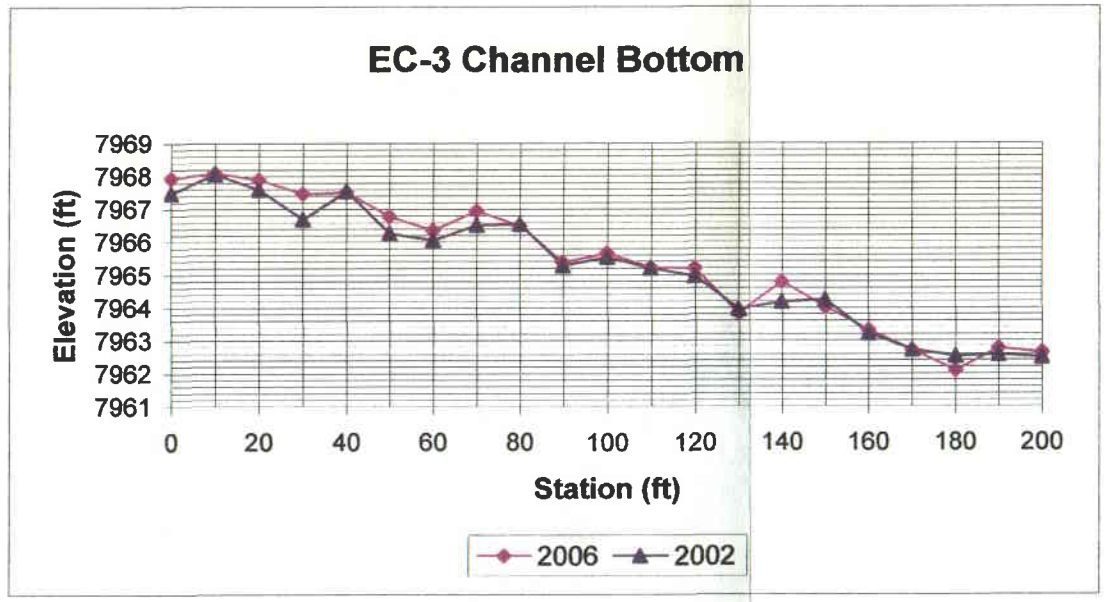
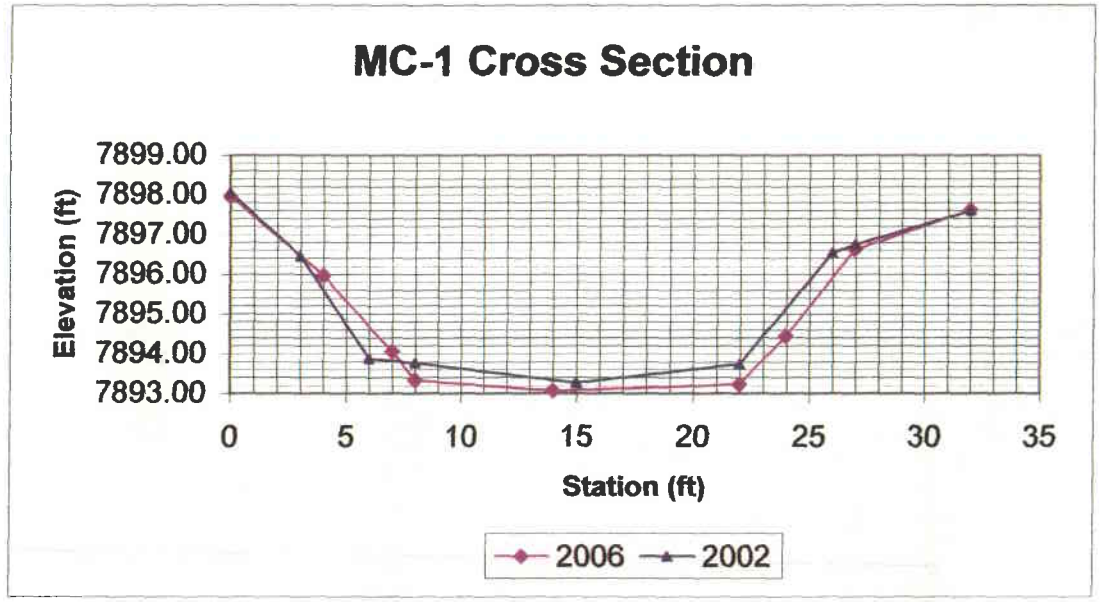
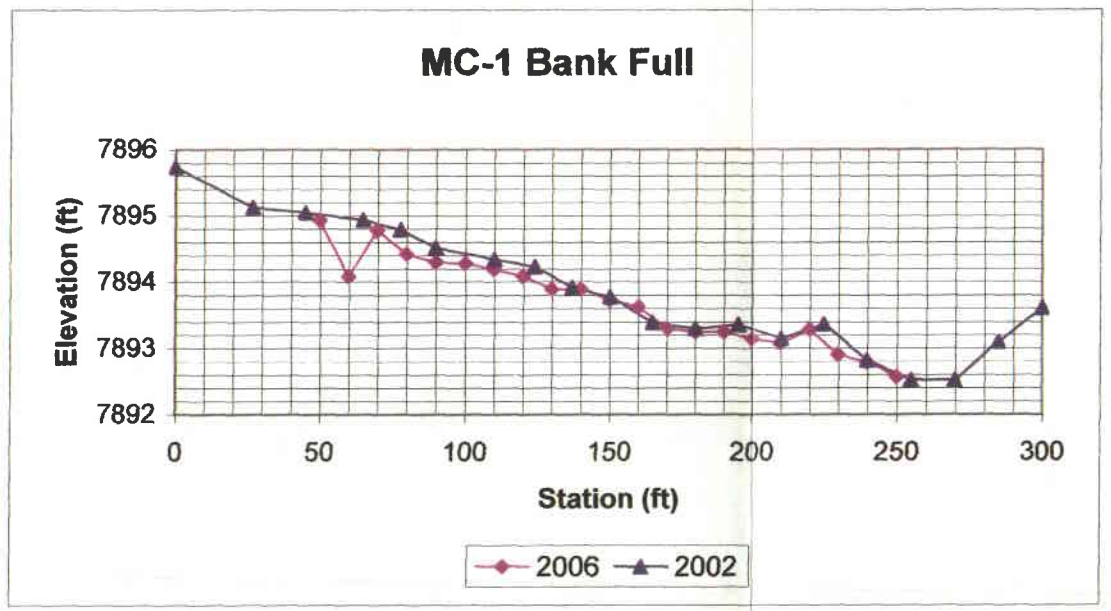


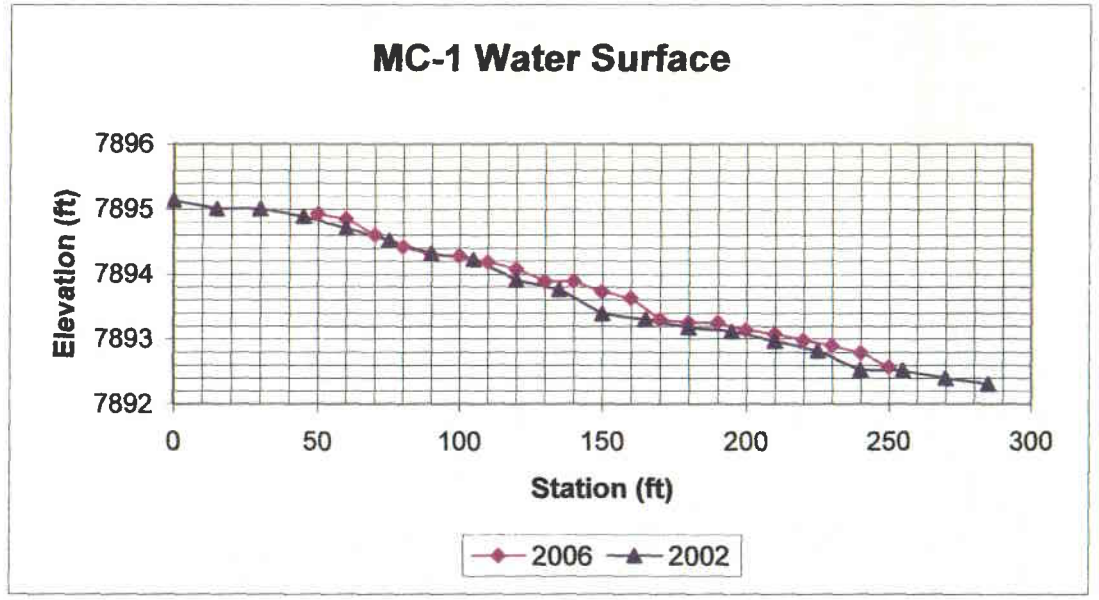
FIGURE 3-3. EC-3 CROSS-SECTION AND PROFILES

EarthFax

UC794-12







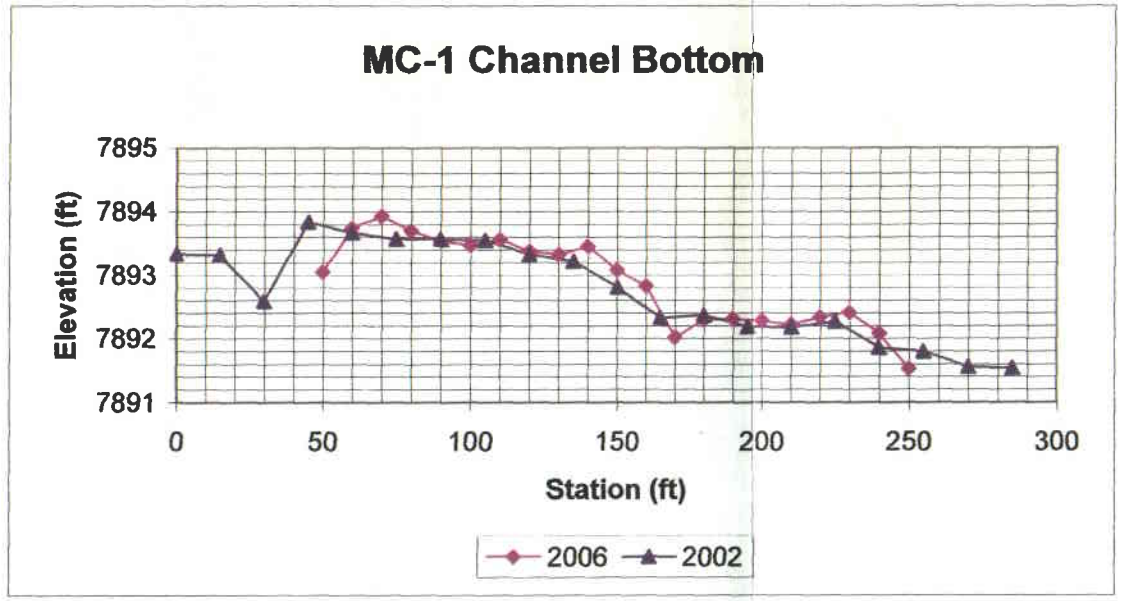
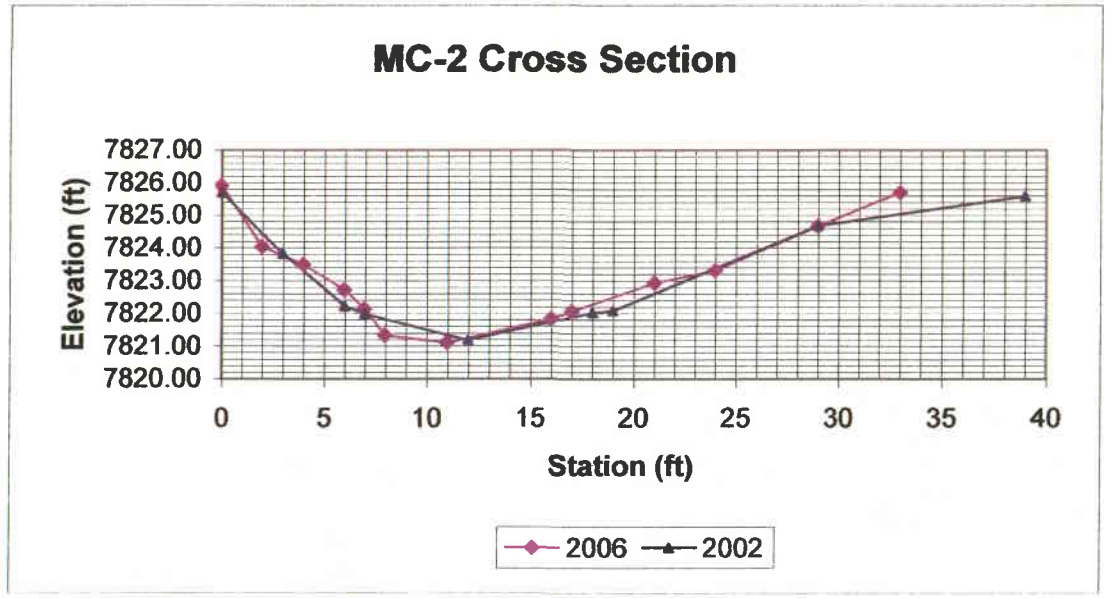
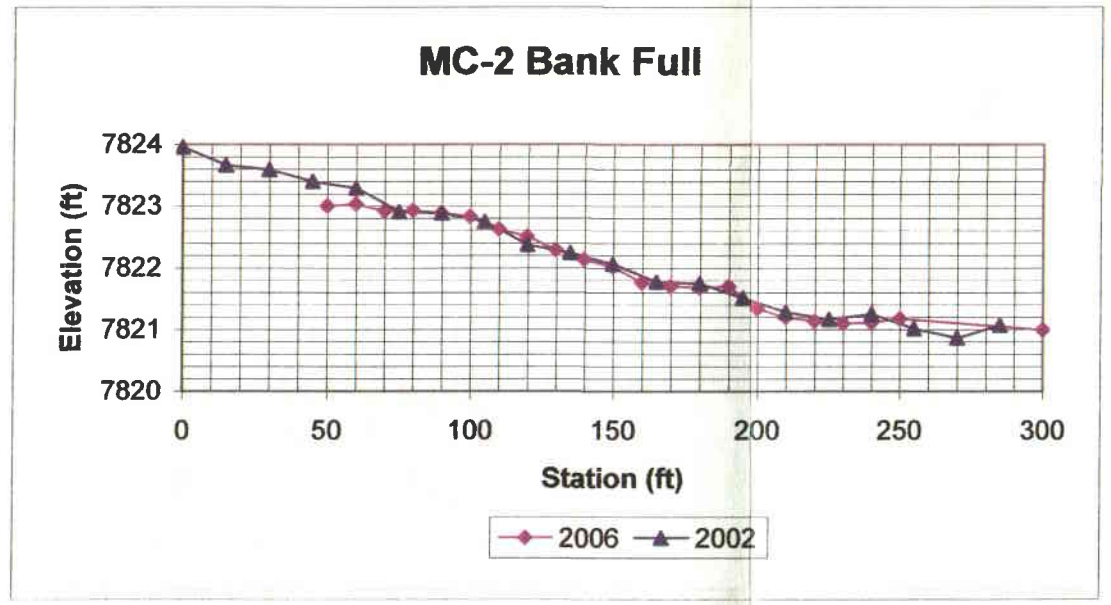
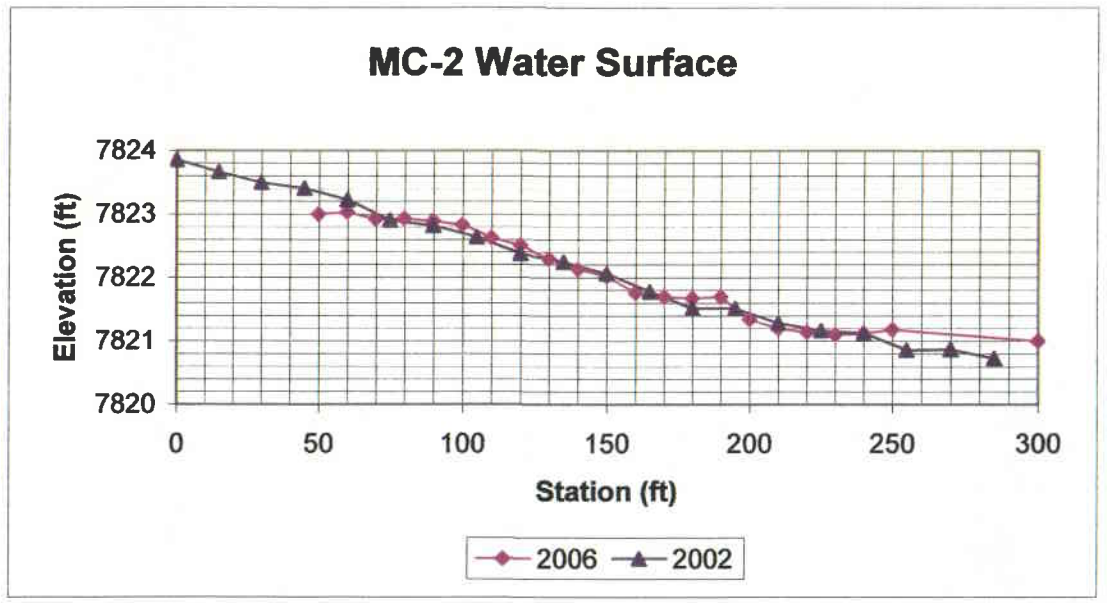


FIGURE 3-4. MC-1 CROSS-SECTION AND PROFILES

EarthFax







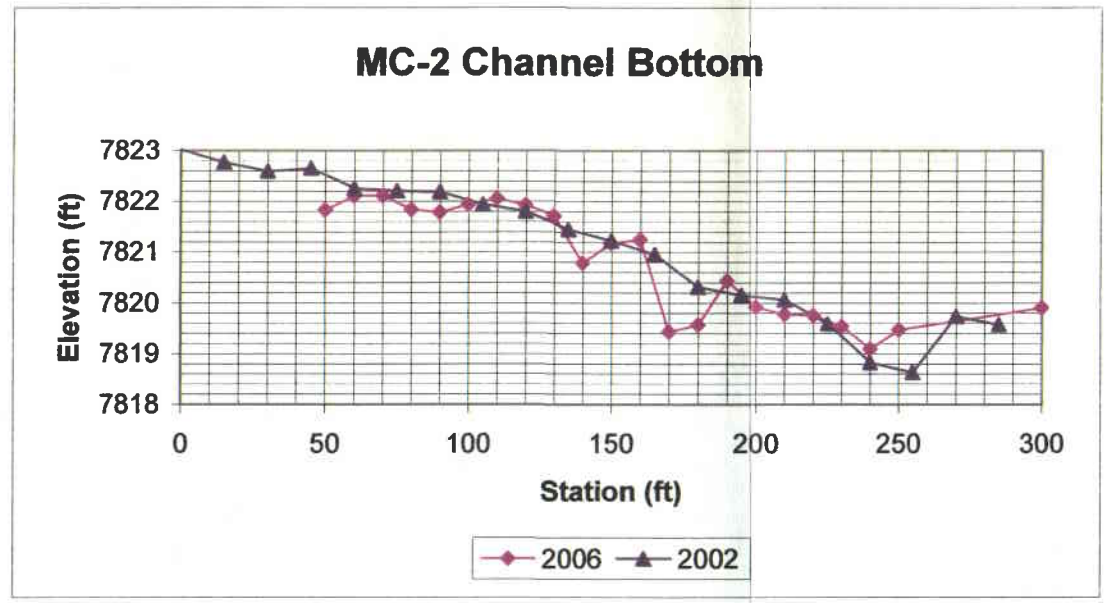
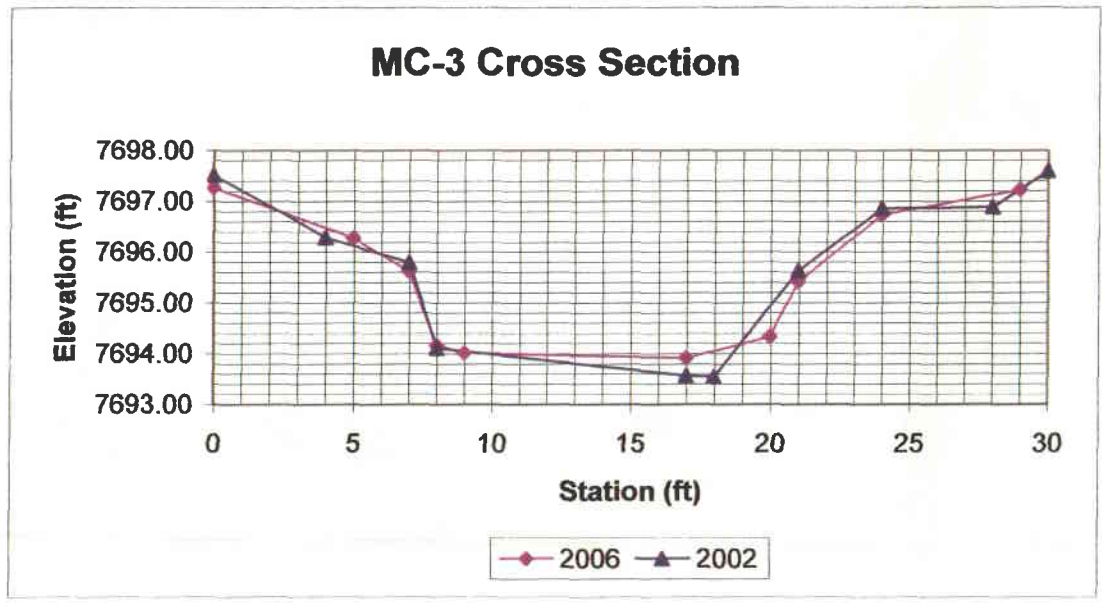
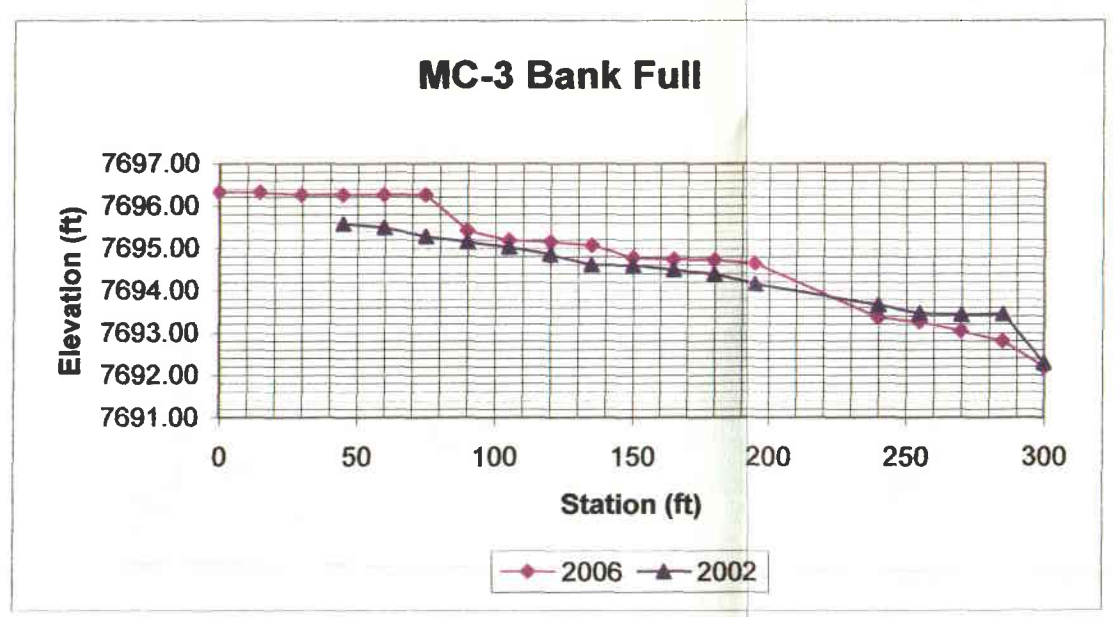


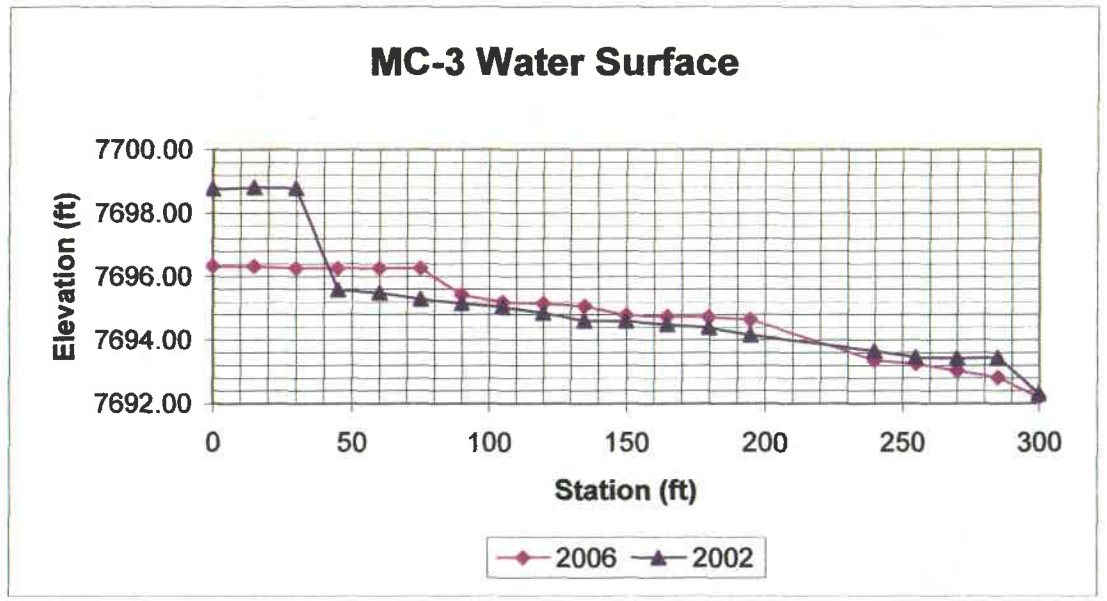
FIGURE 3-5. MC-2 CROSS-SECTION AND PROFILES

EarthFax

UC794-12







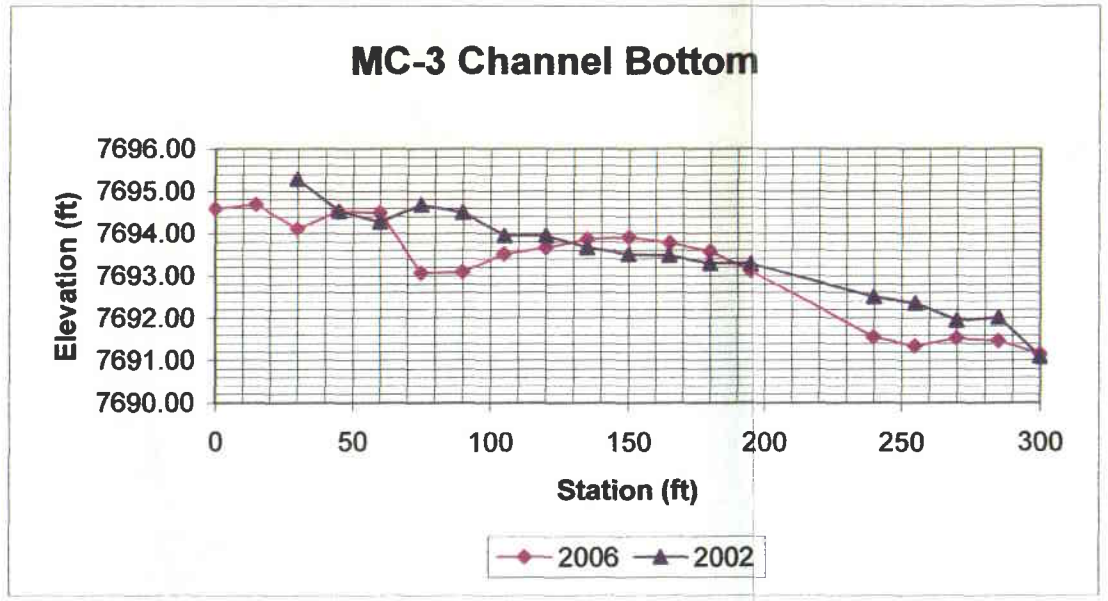
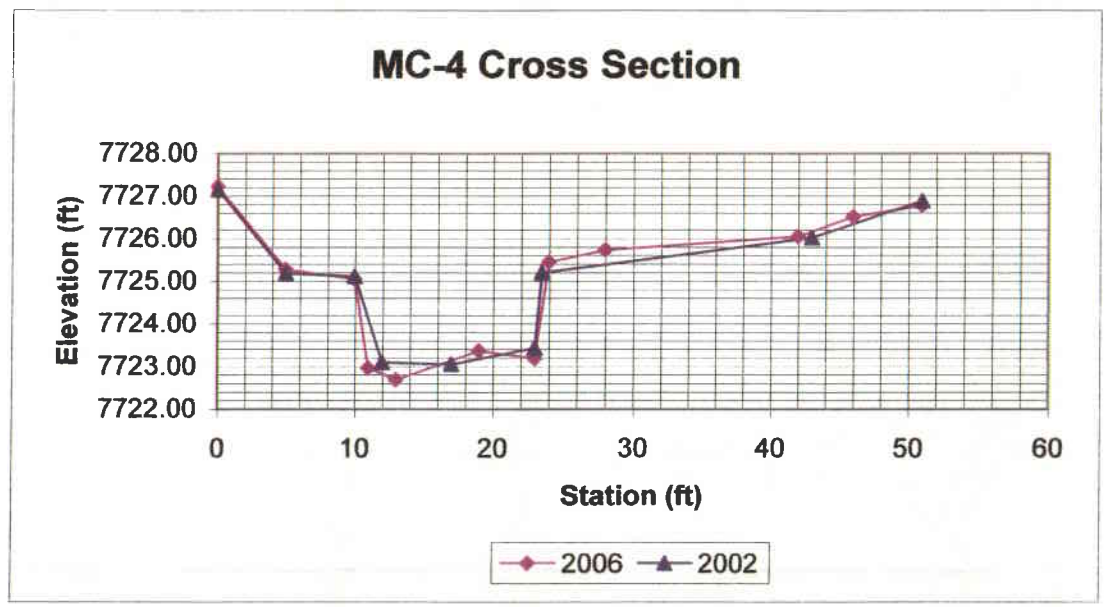
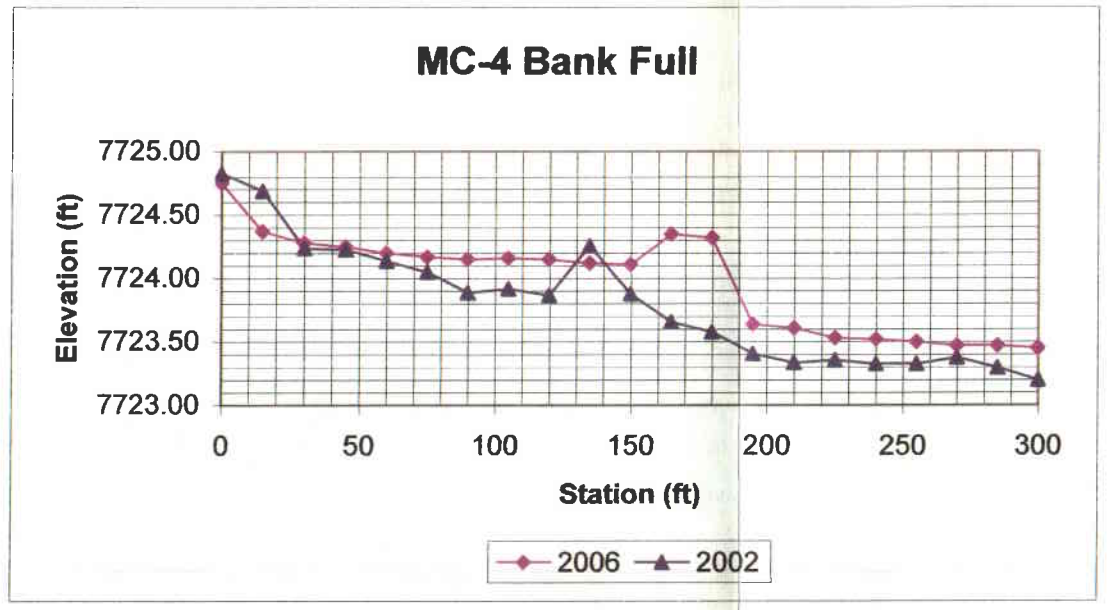


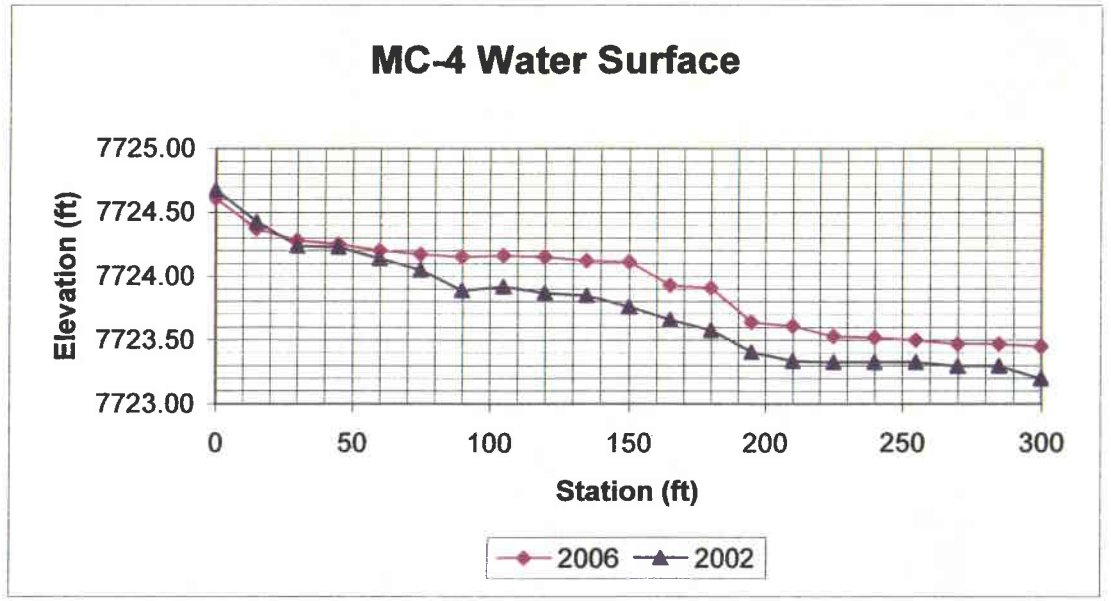
FIGURE 3-6. MC-3 CROSS-SECTION AND PROFILES

EarthFax

UC794-12







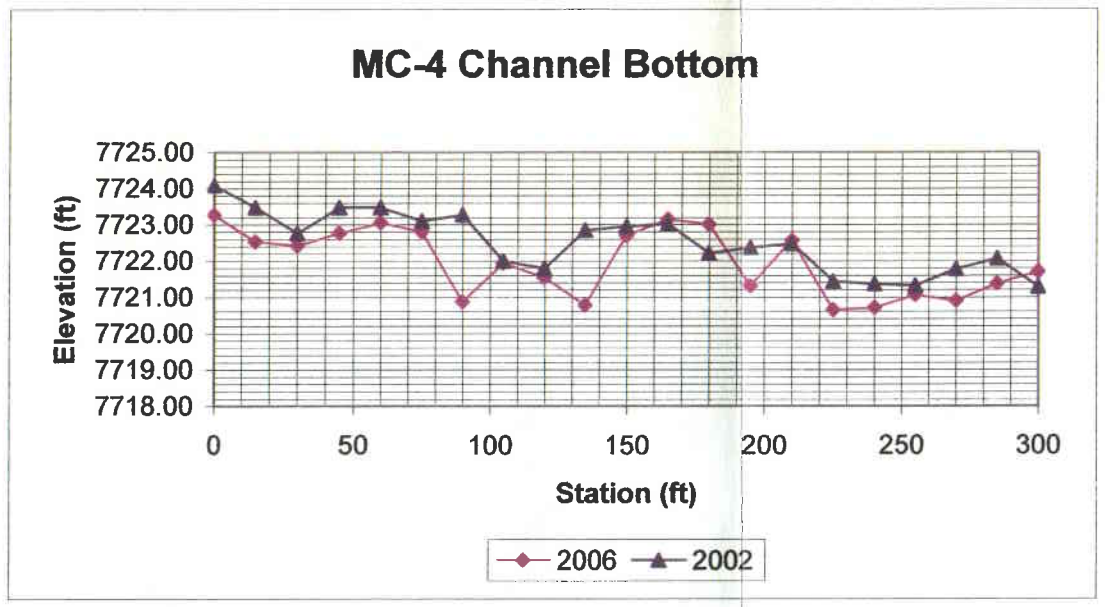
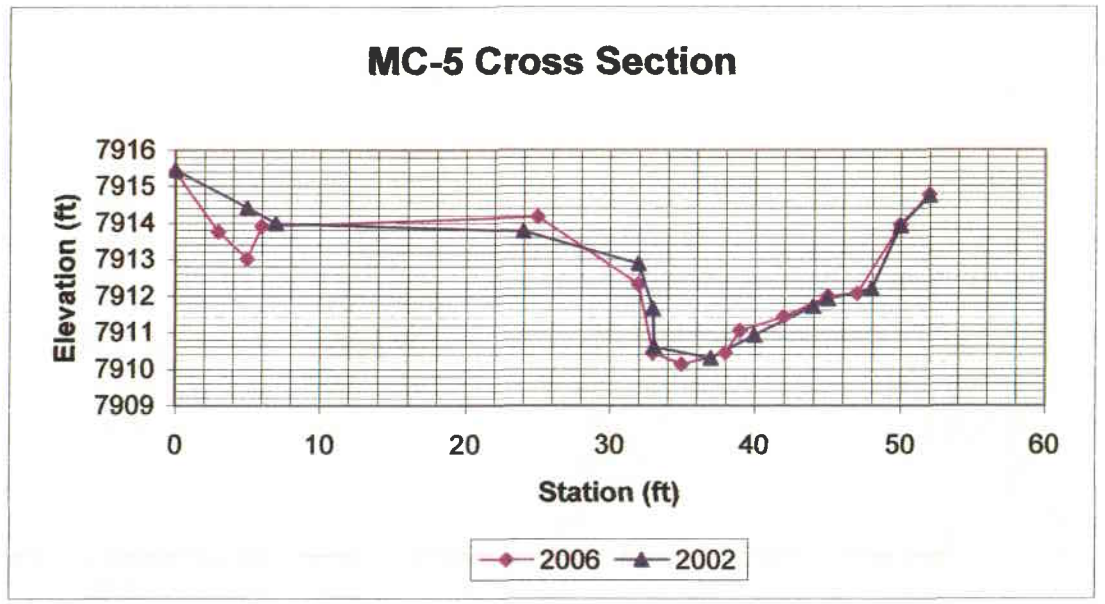
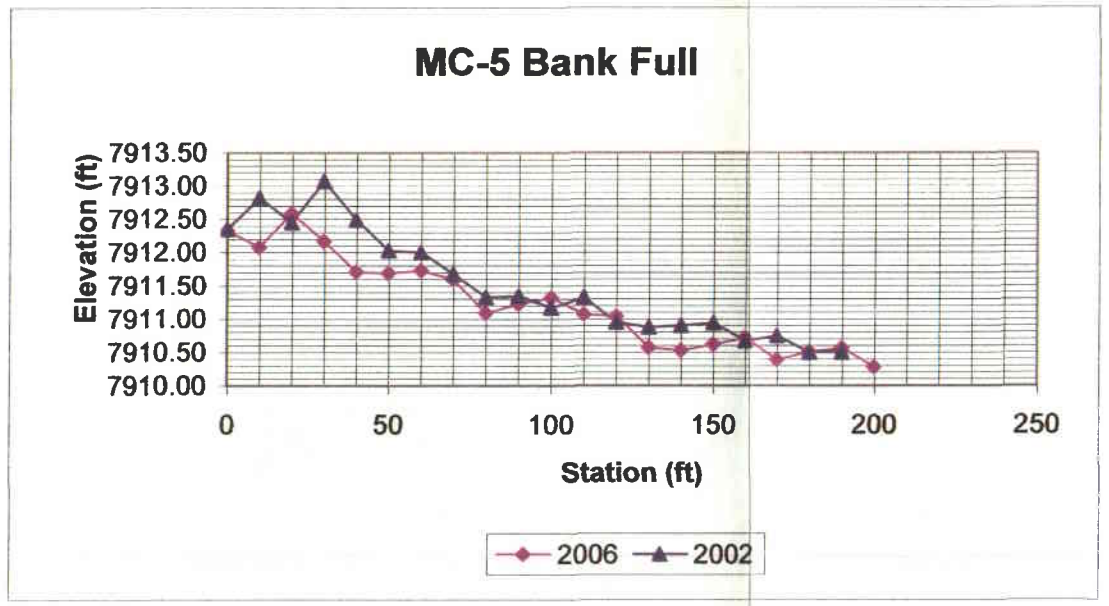
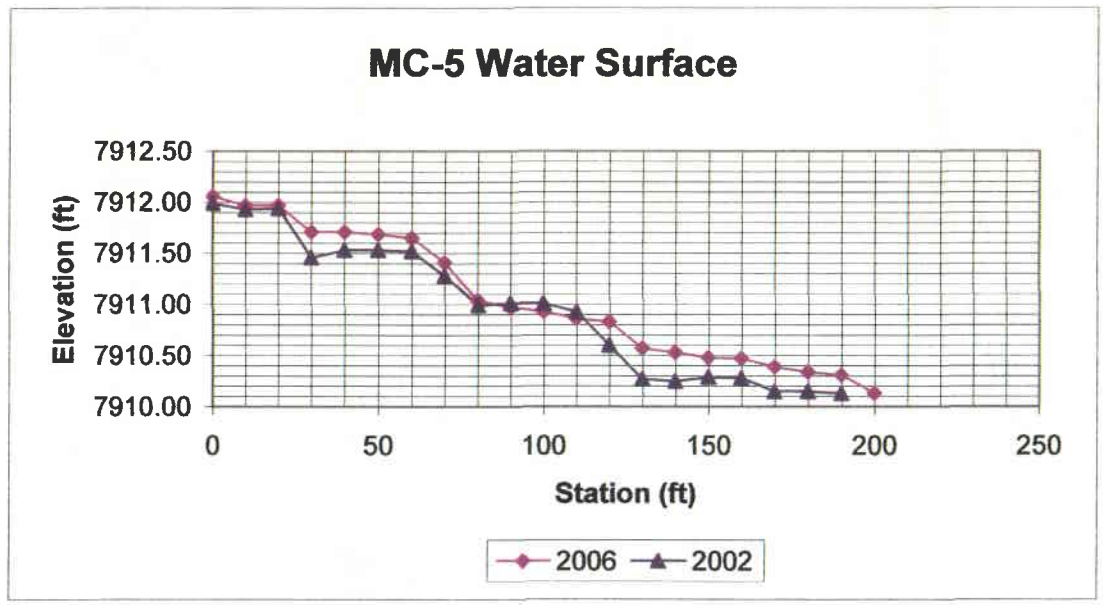


FIGURE 3-7. MC-4 CROSS-SECTION AND PROFILES

EarthFax







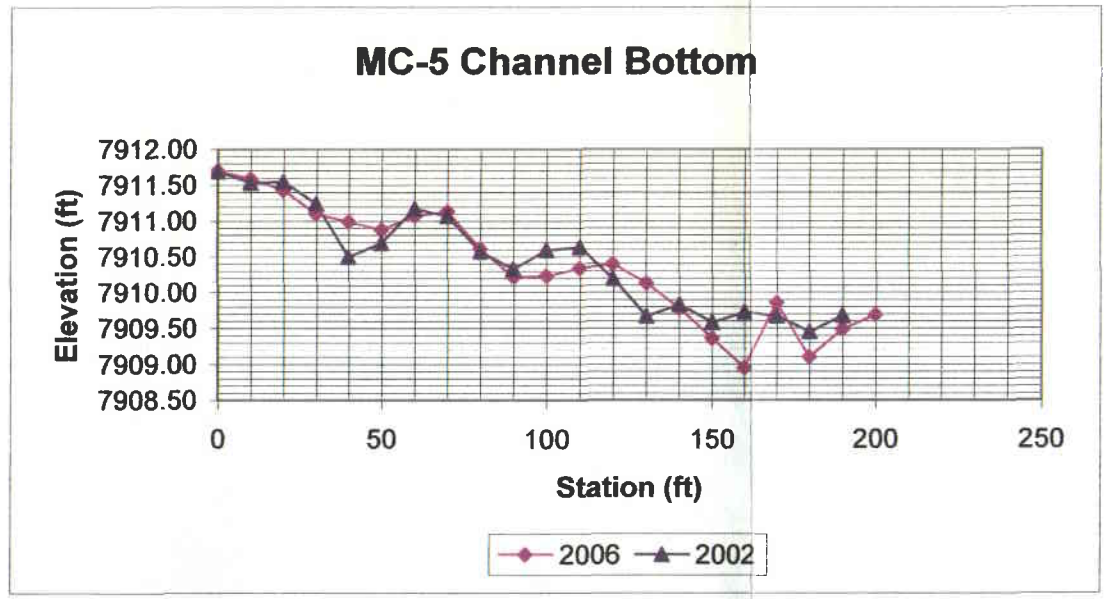
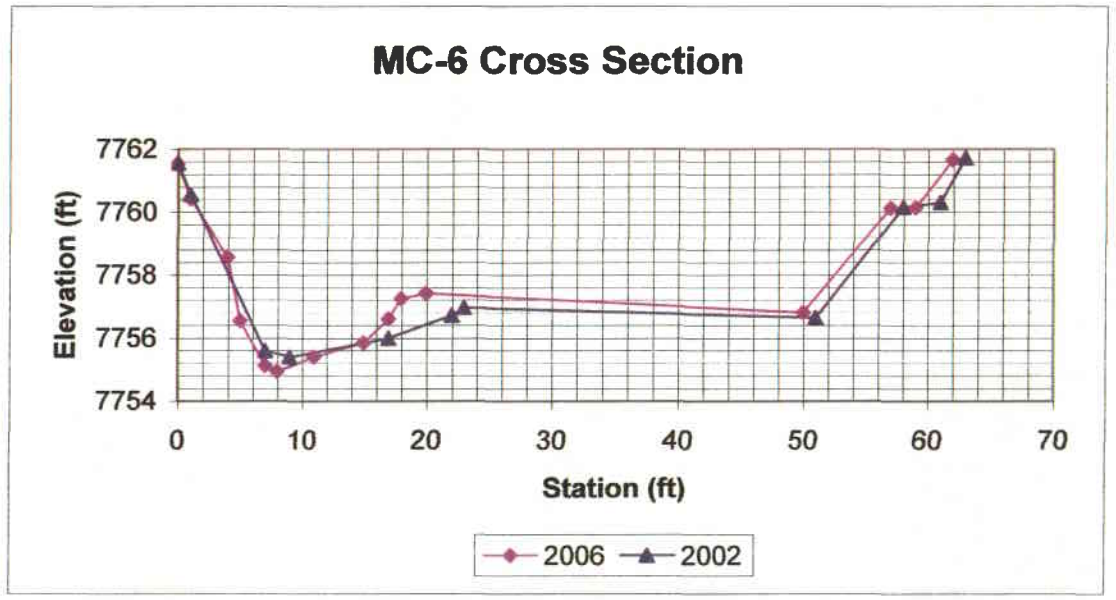
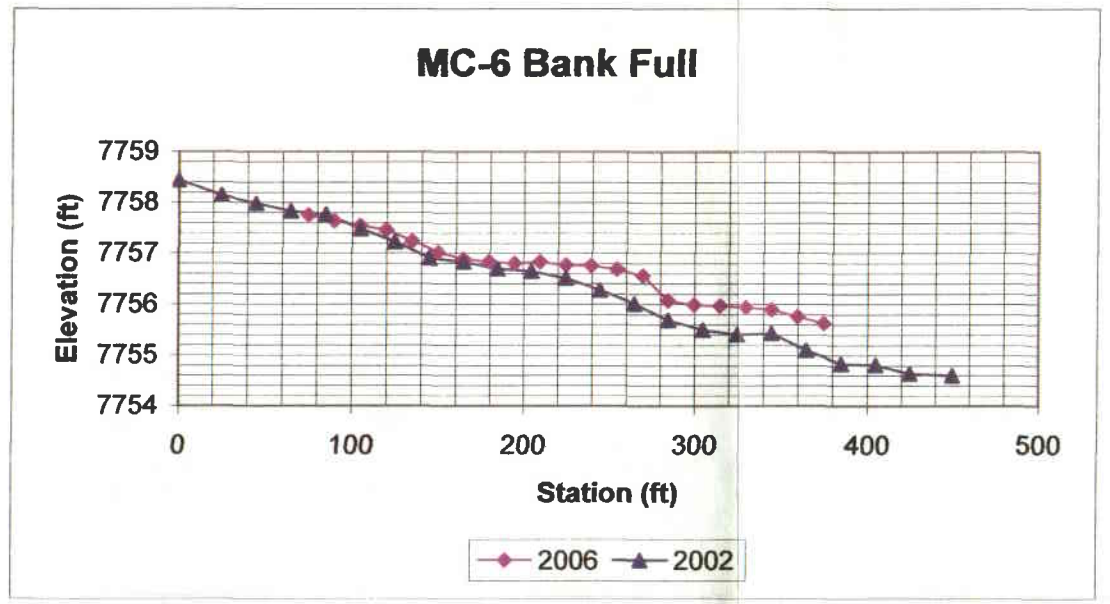
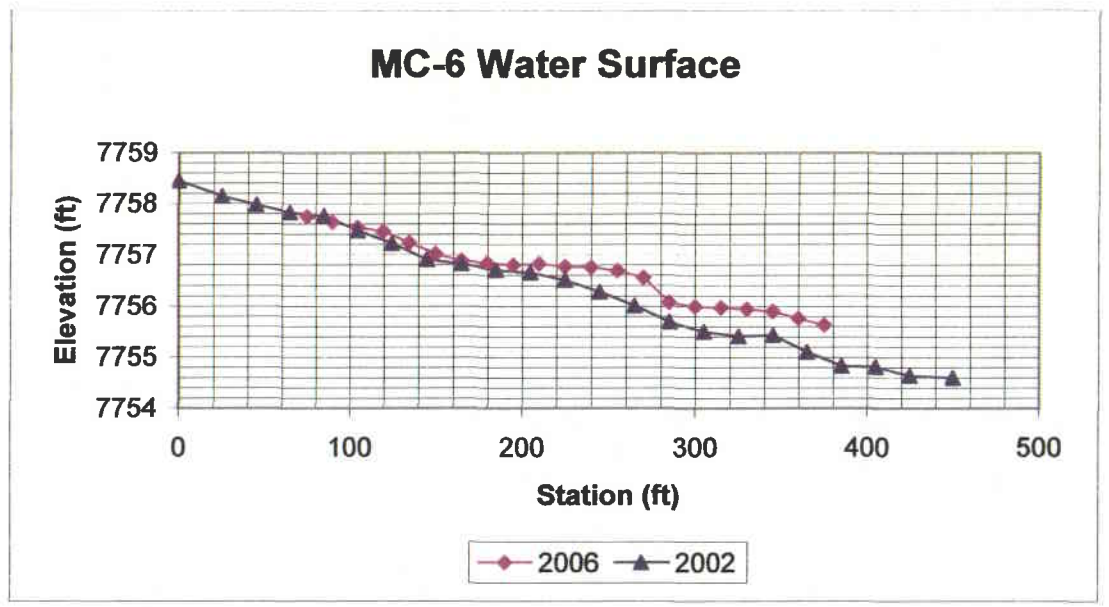


FIGURE 3-8. MC-5 CROSS-SECTION AND PROFILES

EarthFax







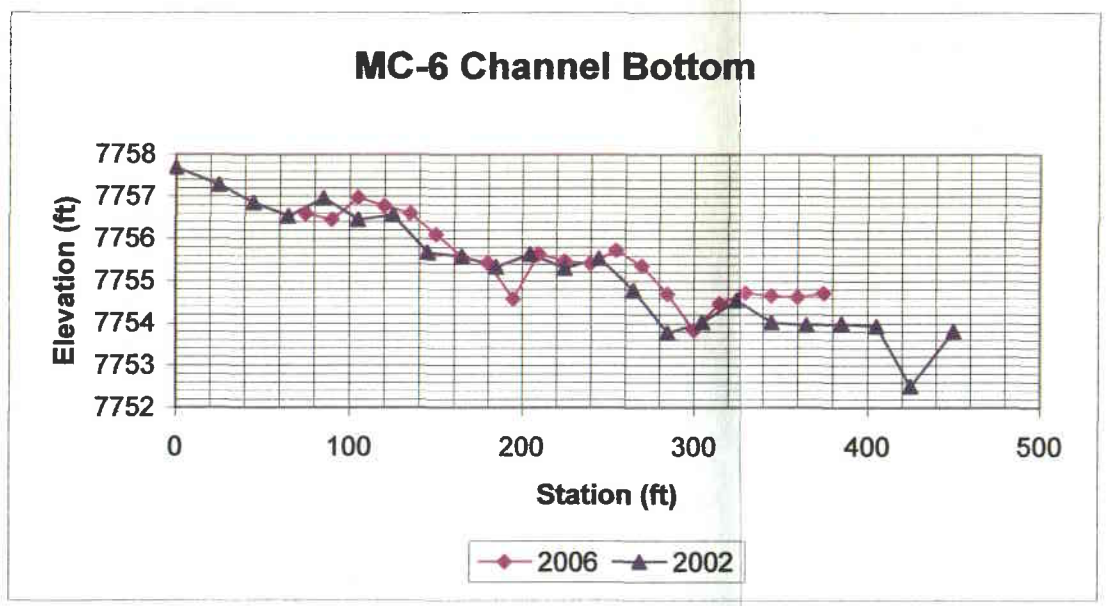


FIGURE 3-9. MC-6 CROSS-SECTION AND PROFILES

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.

EarthFax Engineering, Inc. 2003. Annual Monitoring Evaluation of Mine-Water Discharge Impacts in Eccles Creek and Mud Creek. Project report submitted to Canyon Fuel Company. Midvale, Utah.

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

APPENDIX A

Reference Site Photographs

EC-1 cross section

EC-1 upstream view

EC-1 downstream view

EC-2 cross section

EC-2 lower upstream view

EC-2 upper 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 upstream view

MC-1 downstream view

MC-2 cross section

MC-2 upstream view

MC-2 upper downsream view

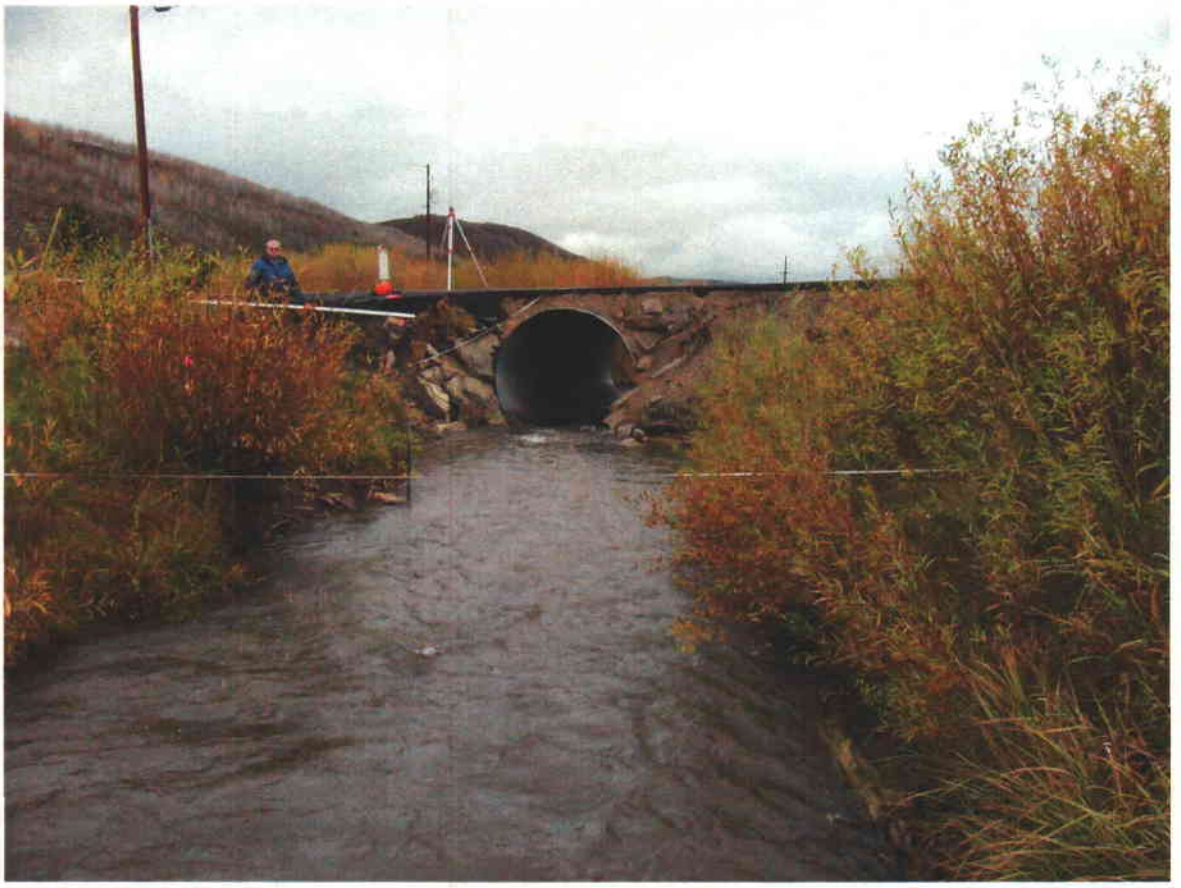
MC-2 first intermediate downstream view

MC-2 second intermediate downstream view

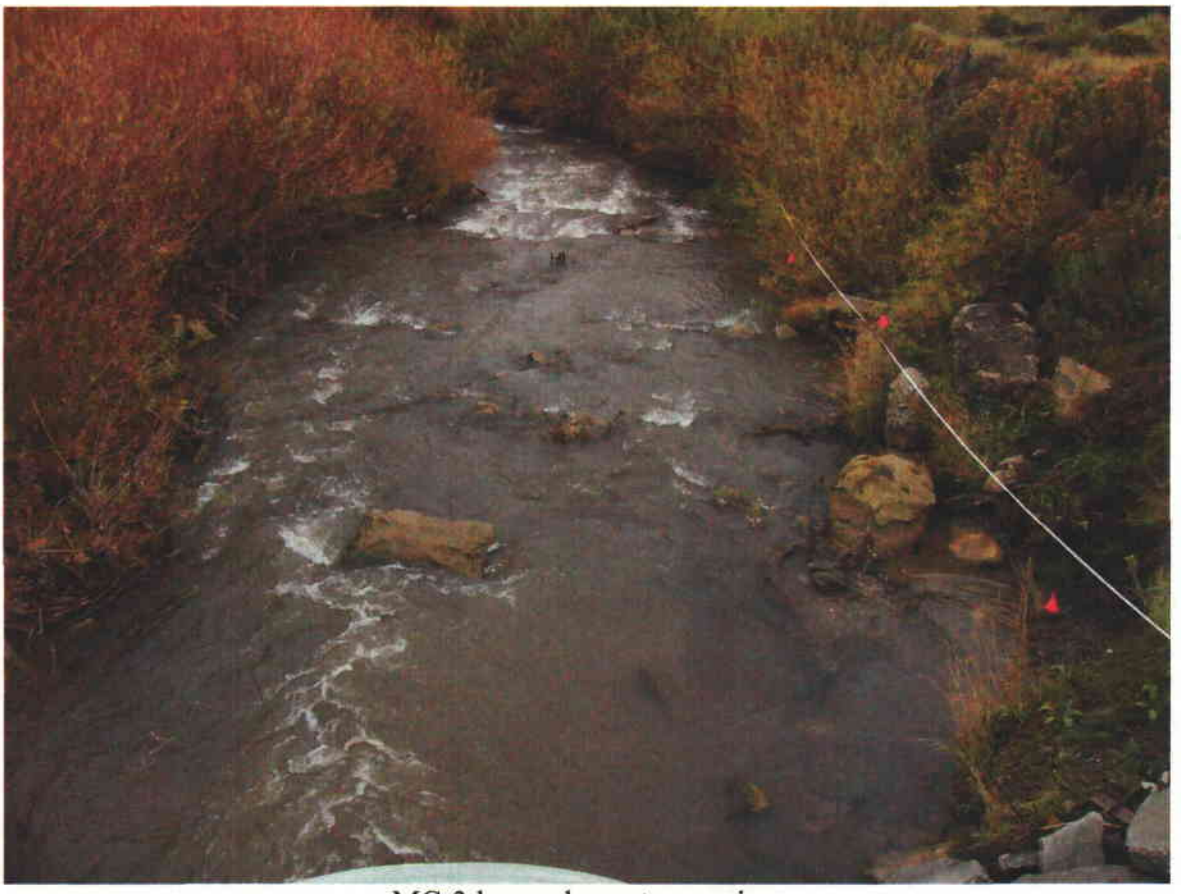
MC-2 lower downstream view

MC-3 cross section

MC-3 upstream view



MC-3 upper downstream view



MC-3 lower downstream view

MC-4 cross section

MC-4 lower upstream view

MC-4 upper upstream view

MC-4 upper downstream view

MC-4 lower downstream view

MC-5 cross section

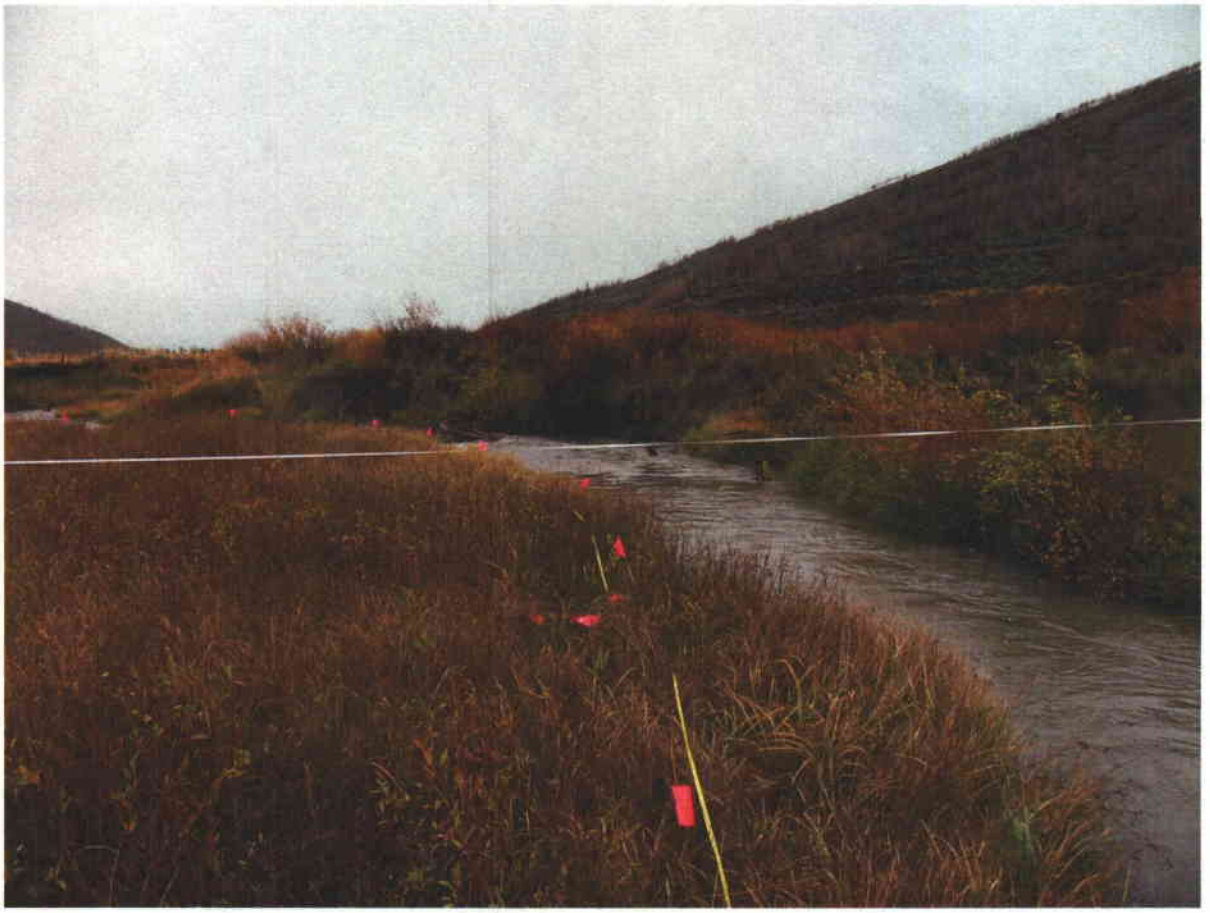
MC-5 upstream view

MC-5 upper downstream view

MC-5 lower downstream view

MC-6 cross section

MC-6 lower upstream view



MC-6 upper downstream view

MC-6 lower downstream view

APPENDIX B

Copy of Field Log Book

UC-794-12

2006 Eccles/Mud Creek survey

9 Oct 2006 – overcast,
Start 07:50

Photo log

1	EC-1 up	25	MC-2 cross
2	EC-1 down	26	MC-2 up
3	EC-1 cross	27	MC-2 down 1
4	EC-2 cross	28	" " 2
5	EC-2 up 1	29	" " 3
6	EC-2 up 2	30	" " 4
7	EC-2 up 3	31	MC-6 cross 1
8	EC-2 down 1	32	" " 2
9	EC-2 down 2	33	MC-6 up 1
10	EC-2 down 3	34	" " 2
11	EC-3 cross	35	MC-6 down 1
12	EC-3 up 1	36	" " 2
13	EC-3 up 2	37	" " 3
14	EC-3 up 3	38	MC-4 cross 1
15	EC-3 down	39	" " 2
16	MC-5 cross	40	MC-4 down 1
17	MC-5 up 1	41	" " 2
18	MC-5 up 1 reject	42	MC-4 up 1
19	MC-5 up 2	43	" " 2
20	MC-5 down 1	44	" " 3
21	MC-5 down 2	45	MC-3 cross
22	MC-1 cross	46	MC-3 up 1
23	MC-1 up	47	" " 2
24	MC-1 down	48	MC-3 down 1
			" " 2

EC-11 Profile

BM = 4.20

Sta	WS	Bottm	Backfill
0+00	1.30	3.21	1.21
0+10	1.97	2.80	1.97
0+20	3.34	4.62	4.62
0+30	3.72	4.53	4.53
0+40	4.82	5.64	4.33
0+50	5.24	6.11	5.24
0+60	5.68	6.42	5.57
0+70	6.03	6.99	5.84
0+80	6.67	7.58	6.58
0+90	6.95	7.72	6.95
1+00	7.29	7.16	8.16
1+10	7.28	8.15	7.09
1+20	8.98	9.67	8.98
1+30	9.33	10.25	9.16
1+40	9.52	10.25	9.32
1+50	10.25	11.14	10.25
1+60	11.32	11.90	11.25
1+70	11.49	12.15	11.27
1+80	12.31	12.81	12.28
1+90	13.30	14.80	13.30
2+00	14.30	15.00	13.35

BM close = 4.19

EC-1 Cross sectin

New BM = 1.29

Sta	Elev
0+00	0.17
0+01	2.52
0+02	4.19
0+03	4.62
0+07	5.09
0+10	5.03
0+11	2.16
0+15	1.39

BM close = 1.29

EC-2 profile BM = 4.08

Sta	NS	Bottom	BF
0+00	1.92	3.00	1.92
0+10	2.33	3.80	2.17
0+20	2.38	3.43	2.38
0+30	2.75	3.78	2.75
0+40	3.79	5.10	3.79
0+50	3.78	5.03	3.78
0+60	4.40	5.07	4.28
0+70	4.71	6.03	4.65
0+80	4.77	5.58	4.66
0+90	5.28	6.00	5.28
1+00	5.72	6.59	5.72
1+10	6.40	7.63	6.40
1+20	6.77	8.53	6.77
1+30	7.55	9.22	7.43
1+40	7.65	9.08	7.65
1+50	7.97	9.18	7.97
1+60	8.19	10.63	8.19
1+70	8.27	9.15	8.20
1+80	8.46	9.65	8.46
1+90	8.50	9.58	8.50
2+00	9.51	11.83	9.40

BM close = 4.08

EC-2 cross section

Sta	Elev.
0+00	3.22
0+05	4.97
0+14	5.03
0+16	4.66
0+23	5.11
0+24	5.45
0+25	5.89
0+29	6.70
0+31	5.91
0+32	5.41
0+35	5.13
0+37	4.49
0+57	4.12
0+65	2.40
0+69	0.71

BM close = 4.08

EC-3 profile

BM = 7.87

Sta	NS	Bottom	Bench
0+00	10,10	11,63	9,74
0+10	10,21	11,36	10,12
0+20	10,48	11,57	10,48
0+30	10,76	11,99	10,63
0+40	10,92	11,94	10,92
0+50	11,41	12,68	11,41
0+60	11,53	13,11	11,53
0+70	11,56	12,52	11,56
0+80	11,90	12,96	11,85
0+90	12,78	14,08	12,70
1+00	13,19	13,80	12,93
1+10	13,08	14,23	12,53
1+20	13,35	14,26	13,35
1+30	13,75	15,64	13,75
1+40	14,12	14,68	13,63
1+50	14,35	15,45	13,94
1+60	14,85	16,15	14,85
1+70	15,52	16,76	15,42
1+80	15,43	17,38	14,49
1+90	15,56	16,70	15,56
2+00	15,95	16,82	15,82

BM close = 7,87

EC-3 cross sectio

Sta	Elev
0+00	8,19
0+07	9,09
0+10	9,48
0+15	9,83
0+17	10,44
0+19	11,83
0+20	13,45
0+22	13,88
0+25	13,47
0+26	11,99
0+31	8,38

BM close = 7.

MC-5 profile

BM = 4.20

Sta	NS	Bottom	Backfill
0+00	7.49	7.85	7.22
0+10	7.58	7.96	7.47
0+20	7.58	8.12	6.96
0+30	7.84	8.45	7.38
0+40	7.84	8.56	7.84
0+50	7.86	8.67	7.86
0+60	7.90	8.48	7.82
0+70	8.14	8.42	7.95
0+80	8.51	8.94	8.46
0+90	8.58	9.33	8.32
1+00	8.62	9.32	8.23
1+10	8.69	9.21	8.48
1+20	8.72	9.15	8.51
1+30	8.98	9.42	8.98
1+40	9.02	9.77	9.02
1+50	9.07	10.19	8.93
1+60	9.08	10.60	8.83
1+70	9.16	9.69	9.16
1+80	9.21	10.45	9.04
1+90	9.24	10.06	8.99
2+01	9.42	9.86	9.27

BM close = 4.20

MC-5 Cross section

Sta	Elev.
0+00	4.15
0+03	5.79
0+05	6.54
0+06	5.64
0+25	5.38
0+32	7.23
0+33	9.11
0+35	9.42
0+38	9.11
0+39	8.50
0+42	8.17
0+45	7.56
0+47	7.48
0+50	5.60
0+52	4.78

BM close = 4.20

MC-1 profile | BM = 9.51

Beginning to rain / sleet

Sta	WS	Bottom	Backfill
0+00	13.10	14.98	13.10
0+10	13.18	14.29	13.95
0+20	13.43	14.10	13.25
0+30	13.61	14.33	13.61
0+40	13.73	14.49	13.73
0+50	13.75	14.56	13.75
0+60	13.84	14.47	13.84
0+70	13.95	14.65	13.95
0+80	14.14	14.70	14.14
0+90	14.14	14.58	14.14
1+00	14.30	14.95	@ WS
1+10	14.40	15.20	
1+20	14.73	16.01	
1+30	14.78	15.73	
1+40	14.78	15.72	
1+50	14.89	15.75	
1+60	14.95	15.81	
1+70	15.05	15.69	14.75
1+80	15.13	15.62	@ WS
1+90	15.24	15.95	
2+00	15.46	16.50	

BM close = 9.49

MC-1 cross sect

Sta	Elev
0+00	10.07
0+04	12.06
0+07	13.98
0+08	14.69
0+14	14.96
0+22	14.80
0+24	13.59
0+27	11.40
0+32	10.41

BM close = 9.50

MC-2 profile

BM = 5.25

Sta	WS	Bottom	Bankfull @ WS
0+00	9.29	10.46	
0+10	9.26	10.18	
0+20	9.37	10.18	
0+30	9.36	10.45	
0+40	9.40	10.50	
0+50	9.46	10.35	
0+60	9.66	10.23	
0+70	9.78	10.36	
0+80	10.00	10.58	
0+90	10.16	11.50	
1+00	10.27	11.11	
1+10	10.53	11.04	
1+20	10.59	12.86	
1+30	10.61	12.72	
1+40	10.59	11.85	
1+50	10.95	12.37	
1+60	11.09	12.51	
1+70	11.15	12.53	
1+80	11.19	12.75	
1+90	11.17	13.20	
2+00	11.11	12.82	
2+30	11.29	12.38	

Rain stopped, Cold

BM close = 5.25

MC-2 cross section

Sta	Elev
0+00	8.39
0+02	8.25
0+04	8.79
0+06	9.57
0+07	10.15
0+08	10.95
0+11	11.18
0+16	10.45
0+17	10.22
0+21	9.35
0+24	8.97
0+29	7.61
0+33	6.59

BM close = 5.25

MC-6 profile

BM = 2.80

Backsight @ WS

Sta	WS	Bottom
0+00	8.89	10.05
0+15	9.00	10.18
0+30	9.10	9.66
0+45	9.18	9.86
0+60	9.40	10.04
0+75	9.62	10.54
0+90	9.75	11.08
1+05	9.80	11.21
1+20	9.84	12.07
1+35	9.81	11.00
1+50	9.87	11.17
1+65	9.88	11.23
1+80	9.95	10.92
1+95	10.08	11.28
2+10	10.57	11.95
2+25	10.65	12.81
2+40	10.67	12.17
2+55	10.70	11.92
2+70	10.74	11.99
2+85	10.88	12.02
3+00	11.01	11.93

BM close = 2.80

Drizzling

MC-6 cross section

Sta	Elev
0+00	5.10
0+01	6.22
0+04	8.07
0+05	10.09
0+07	11.57
0+08	11.70
0+11	11.23
0+15	10.79
0+17	10.03
0+18	9.39
0+20	9.22
0+50	9.82
0+57	6.51
0+59	6.50
0+62	4.97

BM Close = 2.80

MC-4 profile

BM = 3.96

Sta	WS	Bottom	Bankfull
0+00	7.99	9.32	7.85
0+15	8.23	10.06	@ WS
0+30	8.32	10.18	
0+45	8.35	9.83	
0+60	8.40	9.54	
0+75	8.43	9.79	
0+90	8.45	11.72	
1+05	8.44	10.66	
1+20	8.45	11.06	
1+35	8.48	11.82	
1+50	8.49	9.90	
1+65	8.67	9.45	8.25
1+80	8.69	9.59	8.28
1+95	8.96	11.29	@ WS
2+10	8.99	10.04	
2+25	9.07	11.95	
2+40	9.08	11.89	
2+55	9.10	11.54	
2+70	9.13	11.70	
2+85	9.13	11.22	
3+00	9.15	10.90	

BM close = 3.95

Overcast

MC-4 cross section

Sta	Elev
0+00	5.37
0+05	7.32
0+10	7.55
0+11	9.63
0+13	9.91
0+19	9.23
0+23	9.41
0+24	7.15
0+28	6.86
0+42	6.54
0+48	6.08
0+51	5.82

BM close = 3.96

Rt bank X sec marker – top = 10,31 (Main RM?)
ground = 10,71

MC-3 profile

Sta	WS	Bottom	Backfill
0+00	11,58	13,32	@ WS
0+15	11,59	13,22	
0+30	11,65	13,80	
0+45	11,65	13,39	
0+60	11,65	13,42	
0+75	11,65	14,84	
0+90	12,49	14,82	
1+05	12,72	14,40	
1+20	12,76	14,25	
1+35	12,84	14,04	
1+50	13,13	14,00	
1+65	13,17	14,13	
1+80	13,19	14,33	
1+95	13,27	14,80	
2+10	} Culvert		
2+25			
2+40	14,55	16,36	
2+55	14,65	16,57	
2+70	14,87	16,39	
2+85	15,10	16,45	
3+00	15,72	16,76	

Top of BM close = 10,33

Up from beaver dam (old)
@ beaver breach
Down from dam

Overcast

MC-3 cross section

Sta	Elev
0+00	10,65
0+05	11,64
0+07	12,30
0+08	13,75
0+09	13,90
0+17	14,00
0+20	13,59
0+21	12,50
0+24	11,18
0+29	10,69

Top BM close = 10,33

APPENDIX C

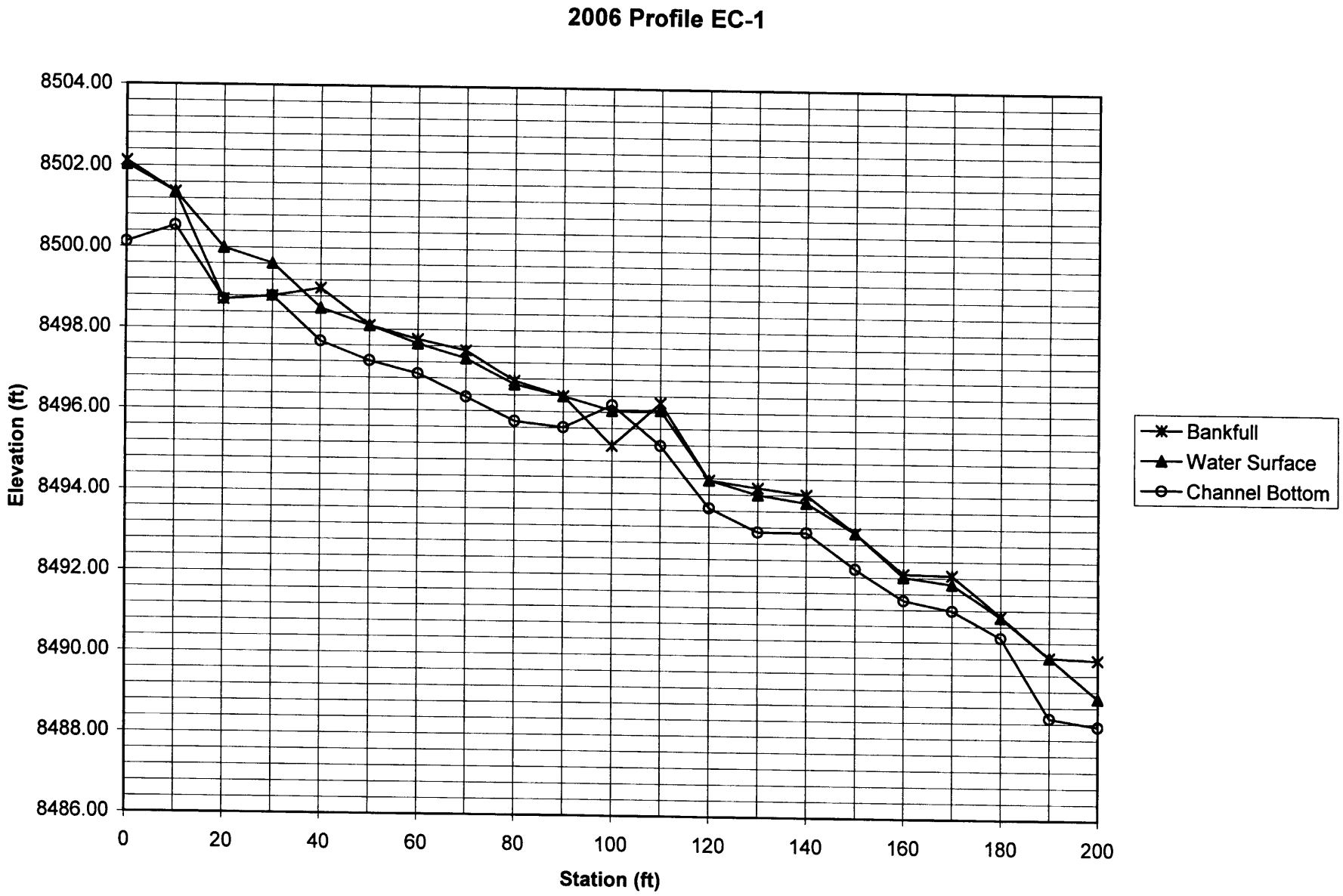
Survey Tabulations with
Individual Cross Section and Profile Drawings

Profile: EC-1

Benchmark elevation (ft): 8499.13 Survey date: 10/9/2006
Rod reading at benchmark (ft): 4.2

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
0	1.30	8502.03	3.21	8500.12				1.21	8502.12
10	1.97	8501.36	2.80	8500.53	0.67	10.00	0.067	1.97	8501.36
20	3.34	8499.99	4.62	8498.71	1.37	10.00	0.137	4.62	8498.71
30	3.72	8499.61	4.53	8498.80	0.38	10.00	0.038	4.53	8498.80
40	4.82	8498.51	5.64	8497.69	1.10	10.00	0.110	4.33	8499.00
50	5.24	8498.09	6.11	8497.22	0.42	10.00	0.042	5.24	8498.09
60	5.68	8497.65	6.42	8496.91	0.44	10.00	0.044	5.57	8497.76
70	6.03	8497.30	6.99	8496.34	0.35	10.00	0.035	5.84	8497.49
80	6.67	8496.66	7.58	8495.75	0.64	10.00	0.064	6.58	8496.75
90	6.95	8496.38	7.72	8495.61	0.28	10.00	0.028	6.95	8496.38
100	7.29	8496.04	7.16	8496.17	0.34	10.00	0.034	8.16	8495.17
110	7.28	8496.05	8.15	8495.18	-0.01	10.00	-0.001	7.09	8496.24
120	8.98	8494.35	9.67	8493.66	1.70	10.00	0.170	8.98	8494.35
130	9.33	8494.00	10.25	8493.08	0.35	10.00	0.035	9.16	8494.17
140	9.52	8493.81	10.25	8493.08	0.19	10.00	0.019	9.32	8494.01
150	10.25	8493.08	11.14	8492.19	0.73	10.00	0.073	10.25	8493.08
160	11.32	8492.01	11.90	8491.43	1.07	10.00	0.107	11.25	8492.08
170	11.49	8491.84	12.15	8491.18	0.17	10.00	0.017	11.27	8492.06
180	12.31	8491.02	12.81	8490.52	0.82	10.00	0.082	12.28	8491.05
190	13.30	8490.03	14.80	8488.53	0.99	10.00	0.099	13.30	8490.03
200	14.30	8489.03	15.00	8488.33	1.00	10.00	0.100	13.35	8489.98

Max. Water Surface Slope (fraction): 0.170
Min. Water Surface Slope (fraction): -0.001
Avg. Water Surface Slope (fraction): 0.065

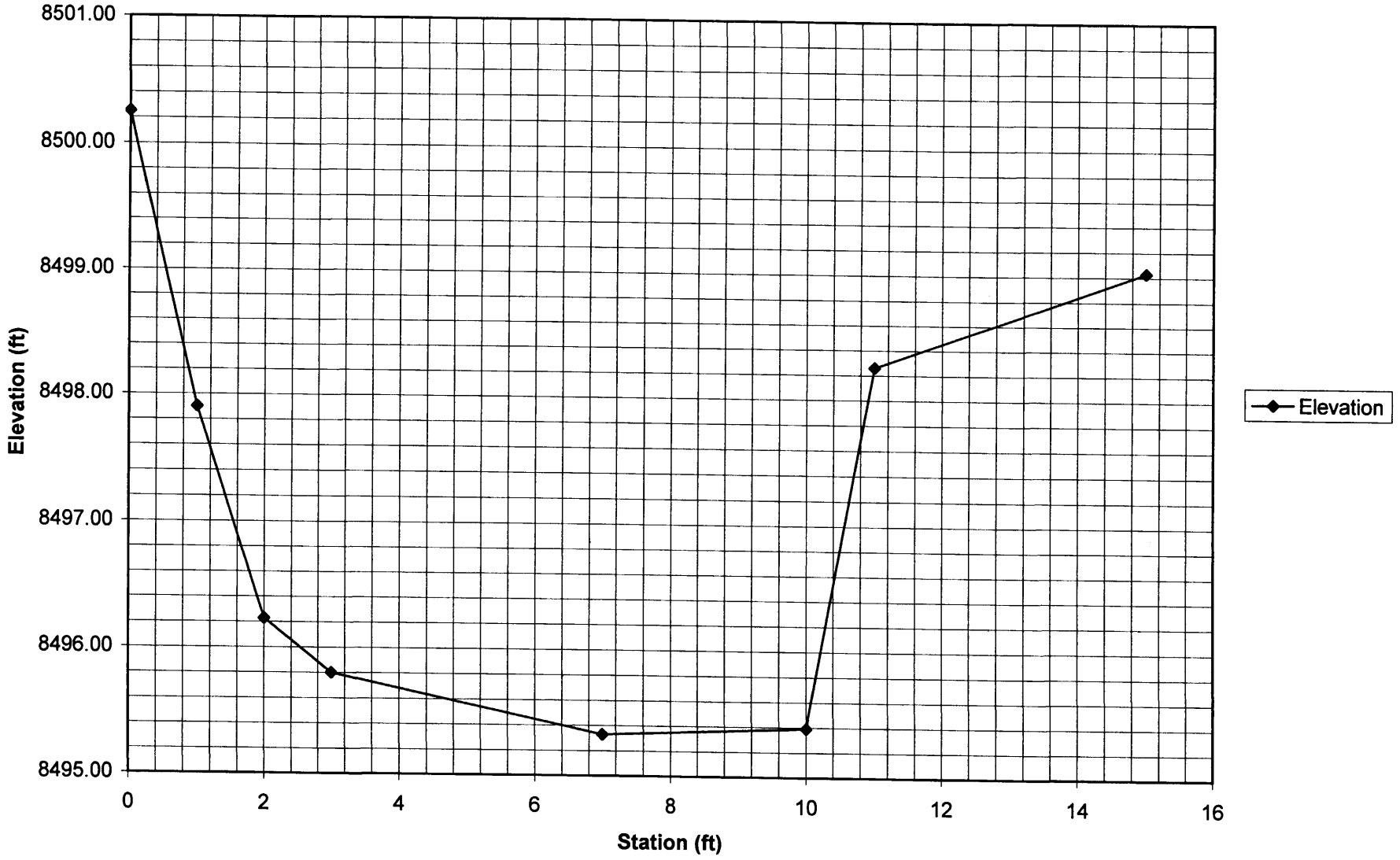

2006 Profile EC-1
8504.00
8502.00
8500.00
8498.00
8496.00
8494.00
8492.00
8490.00
8488.00
8486.00
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
200
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Sect EC-1

Benchmark elevati 8499.13 Survey Dat 10/9/2006
BenchMark Rod Re 1.29

Station	Rod Readin	Elevation
0	0.17	8500.25
1	2.52	8497.90
2	4.19	8496.23
3	4.62	8495.80
7	5.09	8495.33
10	5.03	8495.39
11	2.16	8498.26
15	1.39	8499.03

2006 Cross Section EC-1



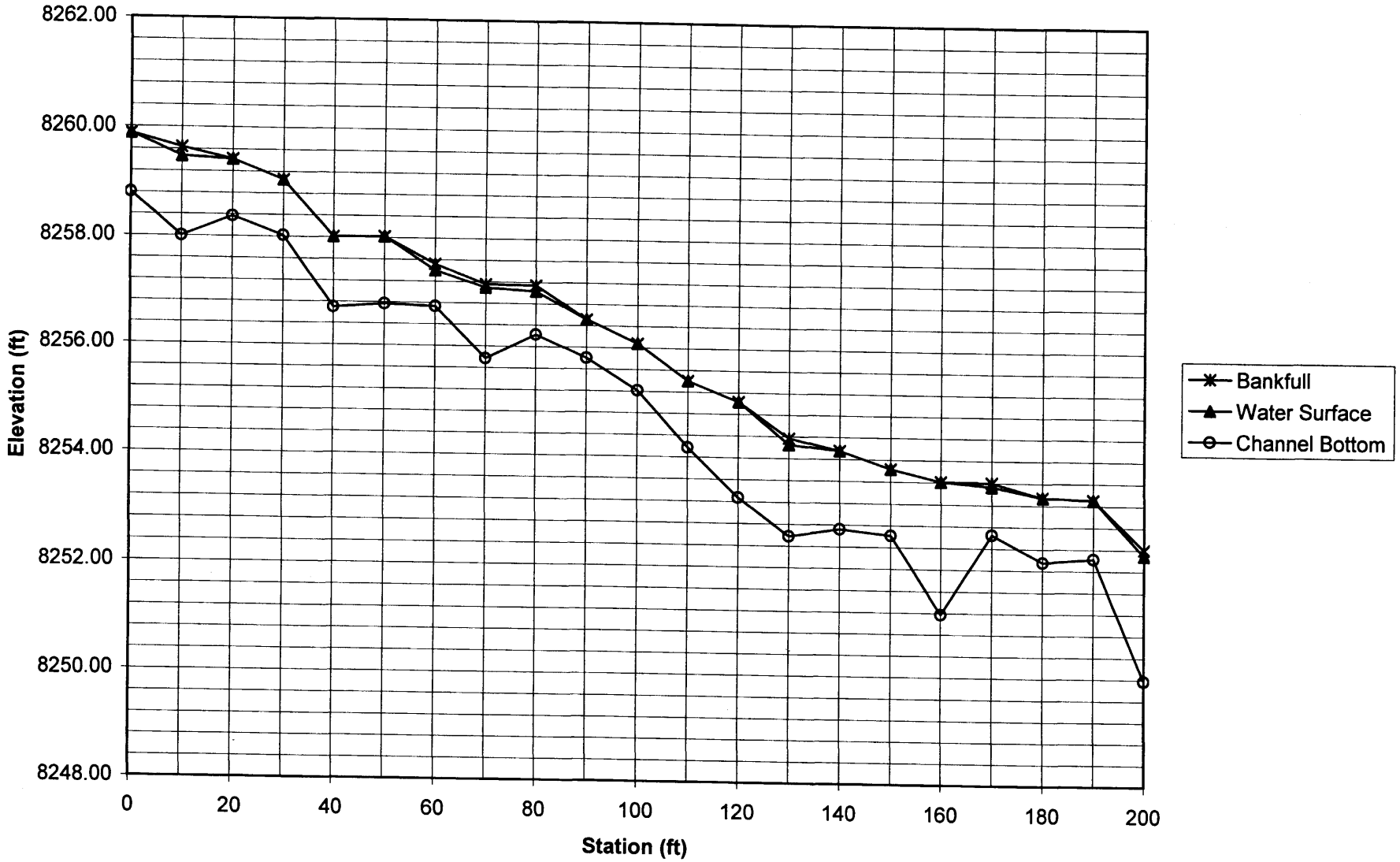
Profile: EC-2

Benchmark elevation (ft): 8257.72 Survey date: 10/9/2006
Rod reading at benchmark (ft): 4.08

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
0	1.92	8259.88	3.00	8258.80				1.92	8259.88
10	2.33	8259.47	3.80	8258.00	0.41	10.00	0.041	2.17	8259.63
20	2.38	8259.42	3.43	8258.37	0.05	10.00	0.005	2.38	8259.42
30	2.75	8259.05	3.78	8258.02	0.37	10.00	0.037	2.75	8259.05
40	3.79	8258.01	5.10	8256.70	1.04	10.00	0.104	3.79	8258.01
50	3.78	8258.02	5.03	8256.77	-0.01	10.00	-0.001	3.78	8258.02
60	4.40	8257.40	5.07	8256.73	0.62	10.00	0.062	4.28	8257.52
70	4.71	8257.09	6.03	8255.77	0.31	10.00	0.031	4.65	8257.15
80	4.77	8257.03	5.58	8256.22	0.06	10.00	0.006	4.66	8257.14
90	5.28	8256.52	6.00	8255.80	0.51	10.00	0.051	5.28	8256.52
100	5.72	8256.08	6.59	8255.21	0.44	10.00	0.044	5.72	8256.08
110	6.40	8255.40	7.63	8254.17	0.68	10.00	0.068	6.40	8255.40
120	6.77	8255.03	8.53	8253.27	0.37	10.00	0.037	6.77	8255.03
130	7.55	8254.25	9.22	8252.58	0.78	10.00	0.078	7.43	8254.37
140	7.65	8254.15	9.08	8252.72	0.10	10.00	0.010	7.65	8254.15
150	7.97	8253.83	9.18	8252.62	0.32	10.00	0.032	7.97	8253.83
160	8.19	8253.61	10.63	8251.17	0.22	10.00	0.022	8.19	8253.61
170	8.27	8253.53	9.15	8252.65	0.08	10.00	0.008	8.20	8253.60
180	8.46	8253.34	9.65	8252.15	0.19	10.00	0.019	8.46	8253.34
190	8.50	8253.30	9.58	8252.22	0.04	10.00	0.004	8.50	8253.30
200	9.51	8252.29	11.83	8249.97	1.01	10.00	0.101	9.40	8252.40

Max. Water Surface Slope (fraction): 0.104
Min. Water Surface Slope (fraction): -0.001
Avg. Water Surface Slope (fraction): 0.038

2006 Profile EC-2

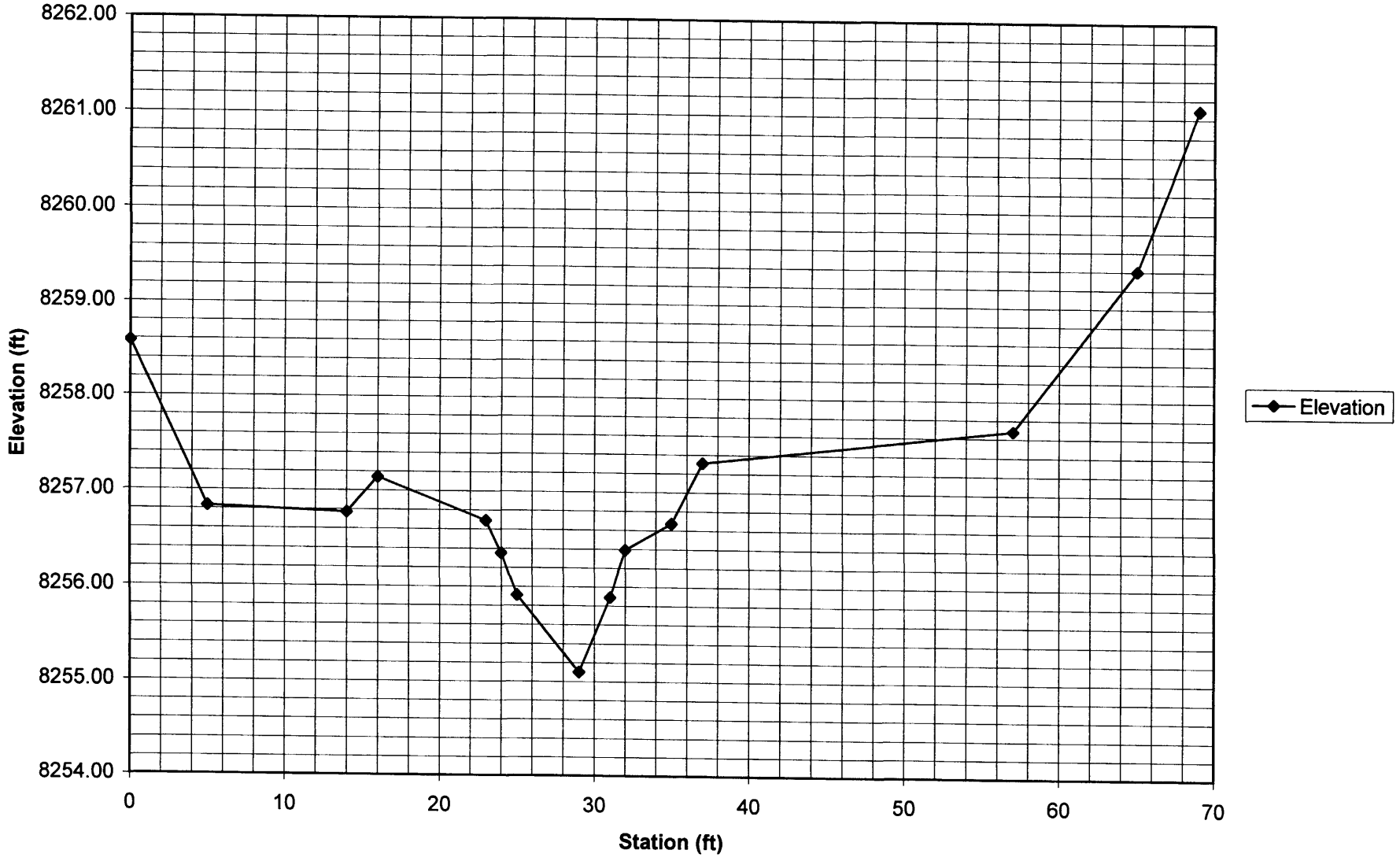


Cross Section: EC-2

Benchmark elevation: 8257.72 Survey Date: 10/6/2006
BenchMark Rod Reading: 4.08

Station	Rod Reading	Elevation
0	3.22	8258.58
5	4.97	8256.83
14	5.03	8256.77
16	4.66	8257.14
23	5.11	8256.69
24	5.45	8256.35
25	5.89	8255.91
29	6.70	8255.10
31	5.91	8255.89
32	5.41	8256.39
35	5.13	8256.67
37	4.49	8257.31
57	4.12	8257.68
65	2.40	8259.40
69	0.71	8261.09

2006 Cross Section EC-2

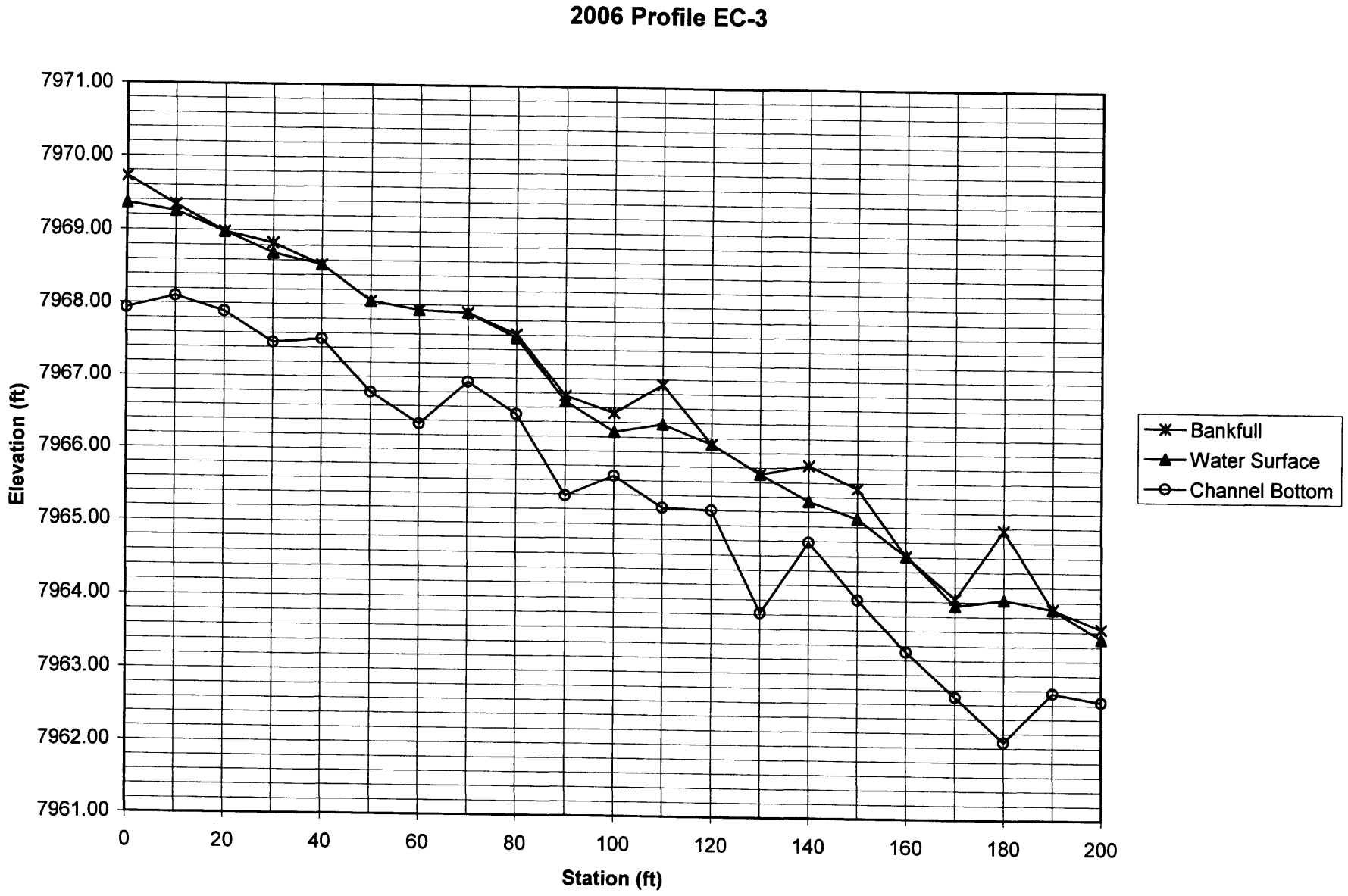


Profile: EC-3

Benchmark elevation (ft): 7971.59 Survey date: 10/9/2006
Rod reading at benchmark (ft): 7.87

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
0	10.10	7969.36	11.53	7967.93				9.74	7969.72
10	10.21	7969.25	11.36	7968.10	0.11	10.00	0.011	10.12	7969.34
20	10.48	7968.98	11.57	7967.89	0.27	10.00	0.027	10.48	7968.98
30	10.76	7968.70	11.99	7967.47	0.28	10.00	0.028	10.63	7968.83
40	10.92	7968.54	11.94	7967.52	0.16	10.00	0.016	10.92	7968.54
50	11.41	7968.05	12.68	7966.78	0.49	10.00	0.049	11.41	7968.05
60	11.53	7967.93	13.11	7966.35	0.12	10.00	0.012	11.53	7967.93
70	11.56	7967.90	12.52	7966.94	0.03	10.00	0.003	11.56	7967.90
80	11.90	7967.56	12.96	7966.50	0.34	10.00	0.034	11.85	7967.61
90	12.78	7966.68	14.08	7965.38	0.88	10.00	0.088	12.70	7966.76
100	13.19	7966.27	13.80	7965.66	0.41	10.00	0.041	12.93	7966.53
110	13.08	7966.38	14.23	7965.23	-0.11	10.00	-0.011	12.53	7966.93
120	13.35	7966.11	14.26	7965.20	0.27	10.00	0.027	13.35	7966.11
130	13.75	7965.71	15.64	7963.82	0.40	10.00	0.040	13.75	7965.71
140	14.12	7965.34	14.68	7964.78	0.37	10.00	0.037	13.63	7965.83
150	14.35	7965.11	15.45	7964.01	0.23	10.00	0.023	13.94	7965.52
160	14.85	7964.61	16.15	7963.31	0.50	10.00	0.050	14.85	7964.61
170	15.52	7963.94	16.76	7962.70	0.67	10.00	0.067	15.42	7964.04
180	15.43	7964.03	17.38	7962.08	-0.09	10.00	-0.009	14.49	7964.97
190	15.56	7963.90	16.70	7962.76	0.13	10.00	0.013	15.56	7963.90
200	15.95	7963.51	16.82	7962.64	0.39	10.00	0.039	15.82	7963.64

Max. Water Surface Slope (fraction): 0.088
Min. Water Surface Slope (fraction): -0.011
Avg. Water Surface Slope (fraction): 0.029

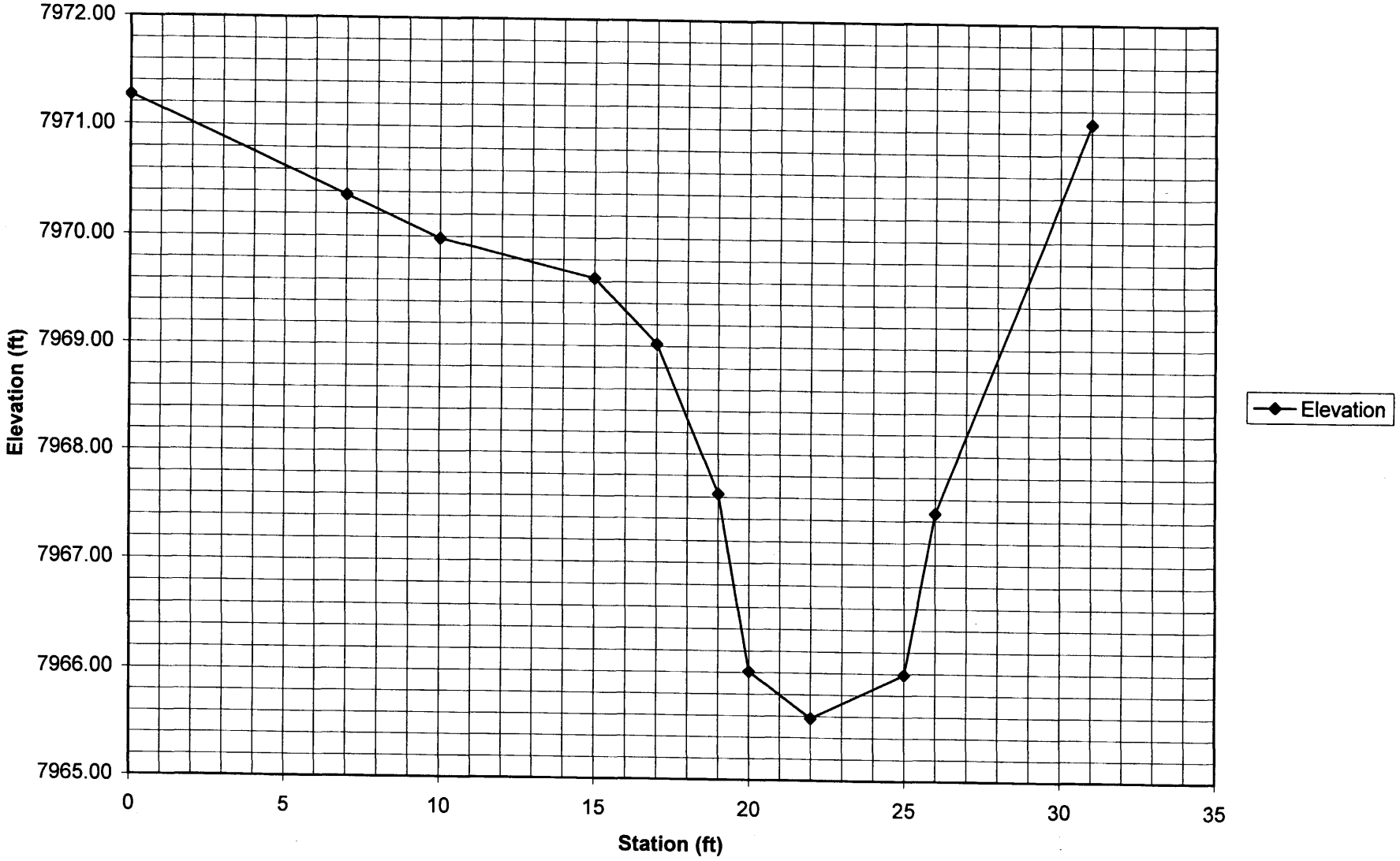

2006 Profile EC-3
7971.00
7970.00
7969.00
7968.00
7967.00
7966.00
7965.00
7964.00
7963.00
7962.00
7961.00
Elevation (ft)
0
20
40
60
80
100
120
140
160
180
200
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: EC-3

Benchmark elevation: 7971.59 Survey Date: 10/6/2006
BenchMark Rod Reading: 7.87

Station	Rod Reading	Elevation
0	8.19	7971.27
7	9.09	7970.37
10	9.48	7969.98
15	9.83	7969.63
17	10.44	7969.02
19	11.83	7967.63
20	13.45	7966.01
22	13.88	7965.58
25	13.47	7965.99
26	11.99	7967.47
31	8.38	7971.08

2006 Cross Section EC-3

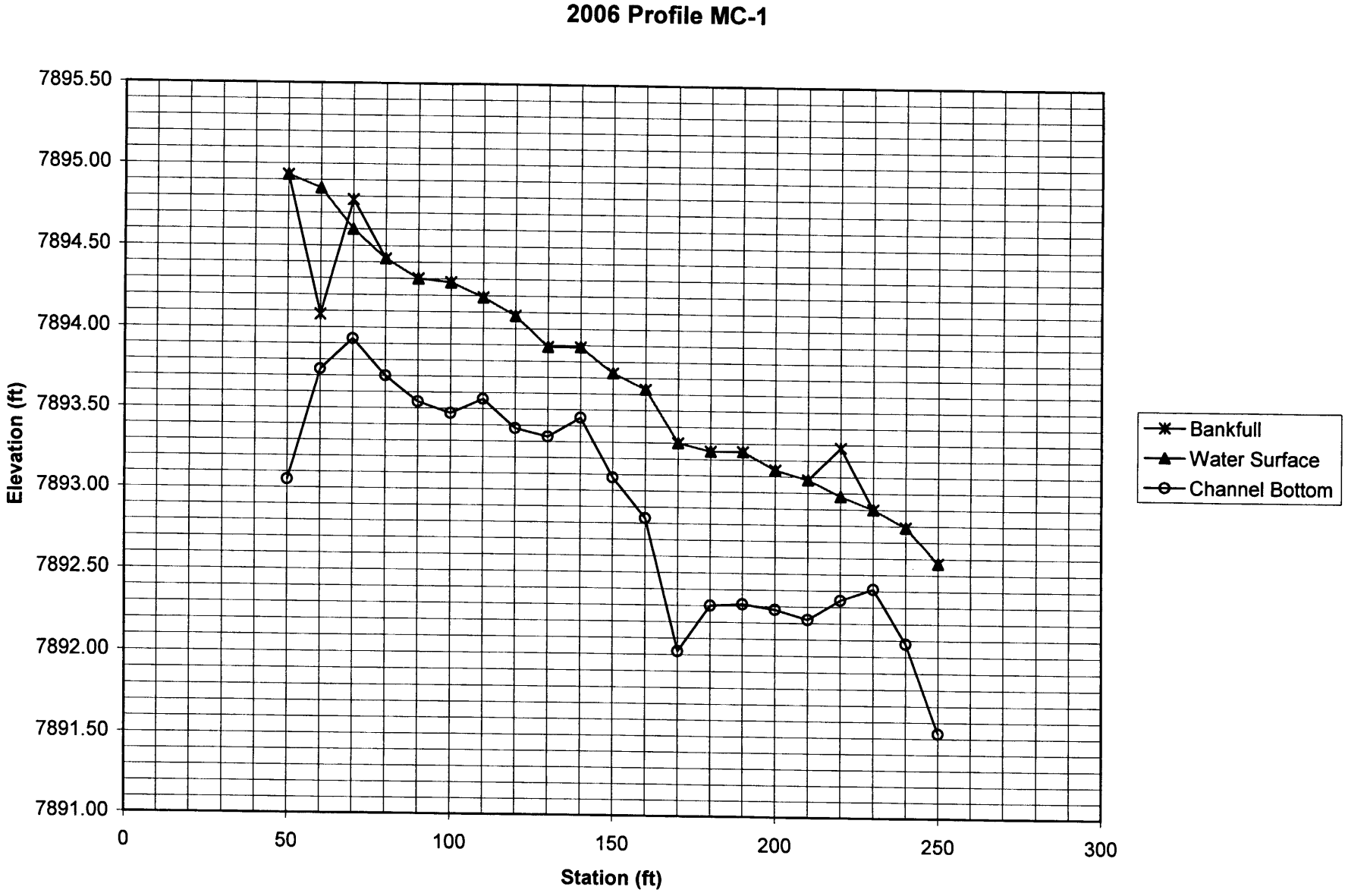


Profile: MC-1

Benchmark elevation (ft): 7898.53 Survey date: 10/9/2006
Rod reading at benchmark (ft): 9.5

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
50	13.10	7894.93	14.98	7893.05				13.10	7894.93
60	13.18	7894.85	14.29	7893.74	0.08	10.00	0.008	13.95	7894.08
70	13.43	7894.60	14.10	7893.93	0.25	10.00	0.025	13.25	7894.78
80	13.61	7894.42	14.33	7893.70	0.18	10.00	0.018	13.61	7894.42
90	13.73	7894.30	14.49	7893.54	0.12	10.00	0.012	13.73	7894.30
100	13.75	7894.28	14.56	7893.47	0.02	10.00	0.002	13.75	7894.28
110	13.84	7894.19	14.47	7893.56	0.09	10.00	0.009	13.84	7894.19
120	13.95	7894.08	14.65	7893.38	0.11	10.00	0.011	13.95	7894.08
130	14.14	7893.89	14.70	7893.33	0.19	10.00	0.019	14.14	7893.89
140	14.14	7893.89	14.58	7893.45	0.00	10.00	0.000	14.14	7893.89
150	14.30	7893.73	14.95	7893.08	0.16	10.00	0.016	14.30	7893.73
160	14.40	7893.63	15.20	7892.83	0.10	10.00	0.010	14.40	7893.63
170	14.73	7893.30	16.01	7892.02	0.33	10.00	0.033	14.73	7893.30
180	14.78	7893.25	15.73	7892.30	0.05	10.00	0.005	14.78	7893.25
190	14.78	7893.25	15.72	7892.31	0.00	10.00	0.000	14.78	7893.25
200	14.89	7893.14	15.75	7892.28	0.11	10.00	0.011	14.89	7893.14
210	14.95	7893.08	15.81	7892.22	0.06	10.00	0.006	14.95	7893.08
220	15.05	7892.98	15.69	7892.34	0.10	10.00	0.010	14.75	7893.28
230	15.13	7892.90	15.62	7892.41	0.08	10.00	0.008	15.13	7892.90
240	15.24	7892.79	15.95	7892.08	0.11	10.00	0.011	15.24	7892.79
250	15.46	7892.57	16.50	7891.53	0.22	10.00	0.022	15.46	7892.57

Max. Water Surface Slope (fraction): 0.033
Min. Water Surface Slope (fraction): 0.000
Avg. Water Surface Slope (fraction): 0.012

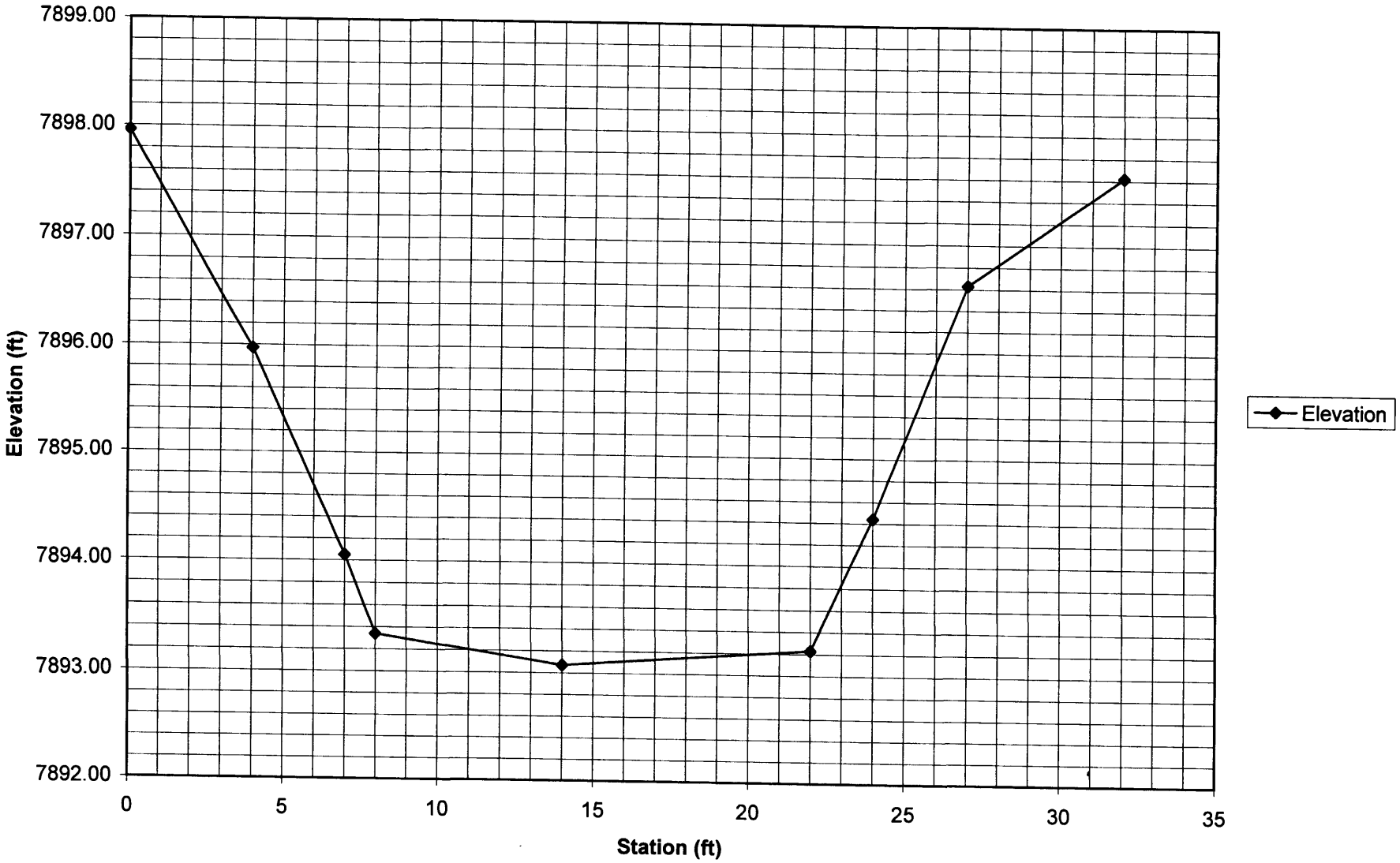

2006 Profile MC-1
7895.50
7895.00
7894.50
7894.00
7893.50
7893.00
7892.50
7892.00
7891.50
7891.00
Elevation (ft)
0
50
100
150
200
250
300
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-1

Benchmark elevation: 7898.53 Survey Date: 10/6/2006
BenchMark Rod Reading: 9.50

Station	Rod Reading	Elevation
0	10.07	7897.96
4	12.06	7895.97
7	13.98	7894.05
8	14.69	7893.34
14	14.96	7893.07
22	14.80	7893.23
24	13.59	7894.44
27	11.40	7896.63
32	10.41	7897.62

2006 Cross Section MC-1



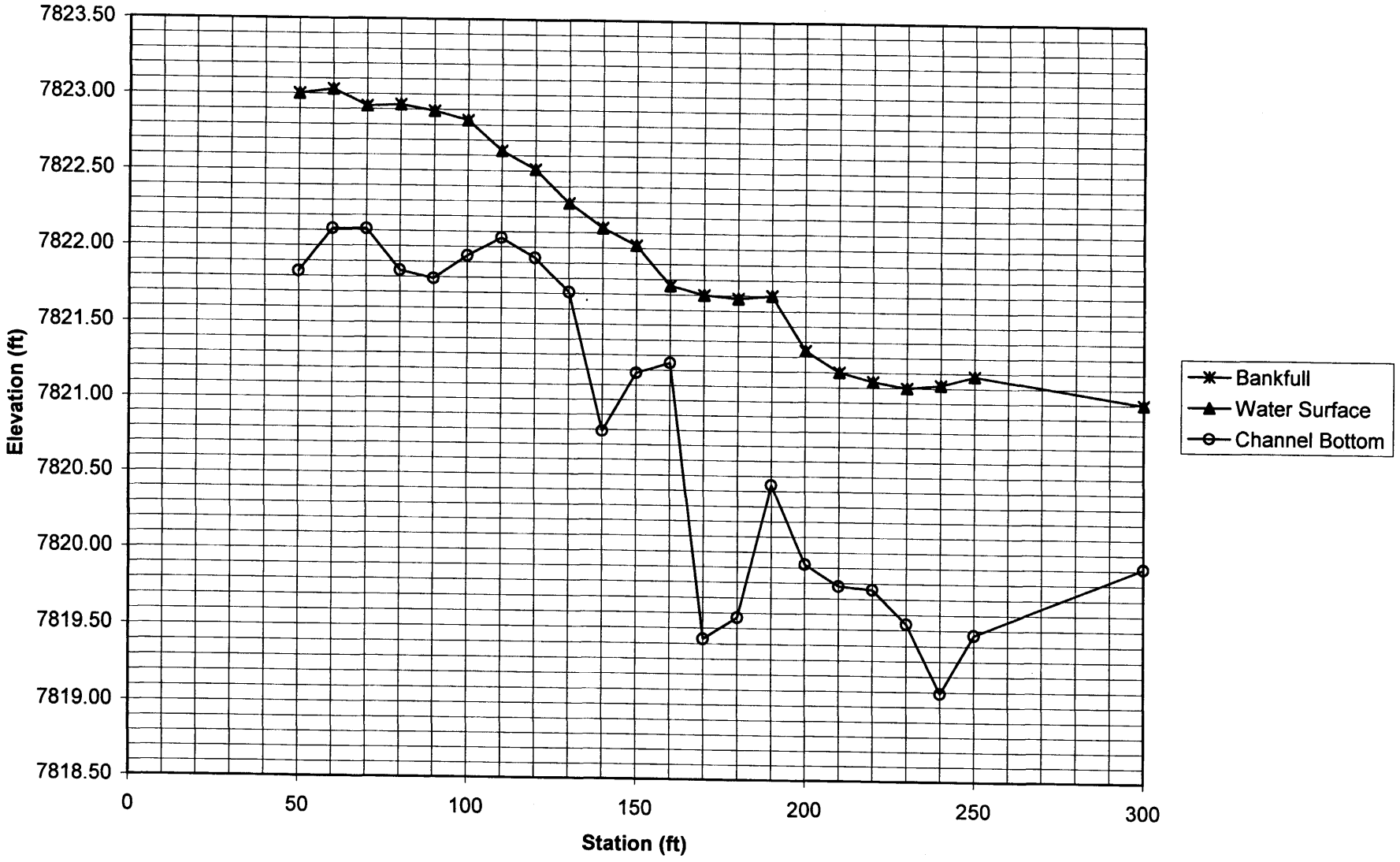
Profile: MC-2

Benchmark elevation (ft): 7827.04 Survey date: 10/9/2006
Rod reading at benchmark (ft): 5.25

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
50	9.29	7823.00	10.46	7821.83				9.29	7823.00
60	9.26	7823.03	10.18	7822.11	-0.03	10.00	-0.003	9.26	7823.03
70	9.37	7822.92	10.18	7822.11	0.11	10.00	0.011	9.37	7822.92
80	9.36	7822.93	10.45	7821.84	-0.01	10.00	-0.001	9.36	7822.93
90	9.40	7822.89	10.50	7821.79	0.04	10.00	0.004	9.40	7822.89
100	9.46	7822.83	10.35	7821.94	0.06	10.00	0.006	9.46	7822.83
110	9.66	7822.63	10.23	7822.06	0.20	10.00	0.020	9.66	7822.63
120	9.78	7822.51	10.36	7821.93	0.12	10.00	0.012	9.78	7822.51
130	10.00	7822.29	10.58	7821.71	0.22	10.00	0.022	10.00	7822.29
140	10.16	7822.13	11.50	7820.79	0.16	10.00	0.016	10.16	7822.13
150	10.27	7822.02	11.11	7821.18	0.11	10.00	0.011	10.27	7822.02
160	10.53	7821.76	11.04	7821.25	0.26	10.00	0.026	10.53	7821.76
170	10.59	7821.70	12.86	7819.43	0.06	10.00	0.006	10.59	7821.70
180	10.61	7821.68	12.72	7819.57	0.02	10.00	0.002	10.61	7821.68
190	10.59	7821.70	11.85	7820.44	-0.02	10.00	-0.002	10.59	7821.70
200	10.95	7821.34	12.37	7819.92	0.36	10.00	0.036	10.95	7821.34
210	11.09	7821.20	12.51	7819.78	0.14	10.00	0.014	11.09	7821.20
220	11.15	7821.14	12.53	7819.76	0.06	10.00	0.006	11.15	7821.14
230	11.19	7821.10	12.75	7819.54	0.04	10.00	0.004	11.19	7821.10
240	11.17	7821.12	13.20	7819.09	-0.02	10.00	-0.002	11.17	7821.12
250	11.11	7821.18	12.82	7819.47	-0.06	10.00	-0.006	11.11	7821.18
300	11.29	7821.00	12.38	7819.91	0.18	50.00	0.004	11.29	7821.00

Max. Water Surface Slope (fraction): 0.036
Min. Water Surface Slope (fraction): -0.006
Avg. Water Surface Slope (fraction): 0.009

2006 Profile MC-2

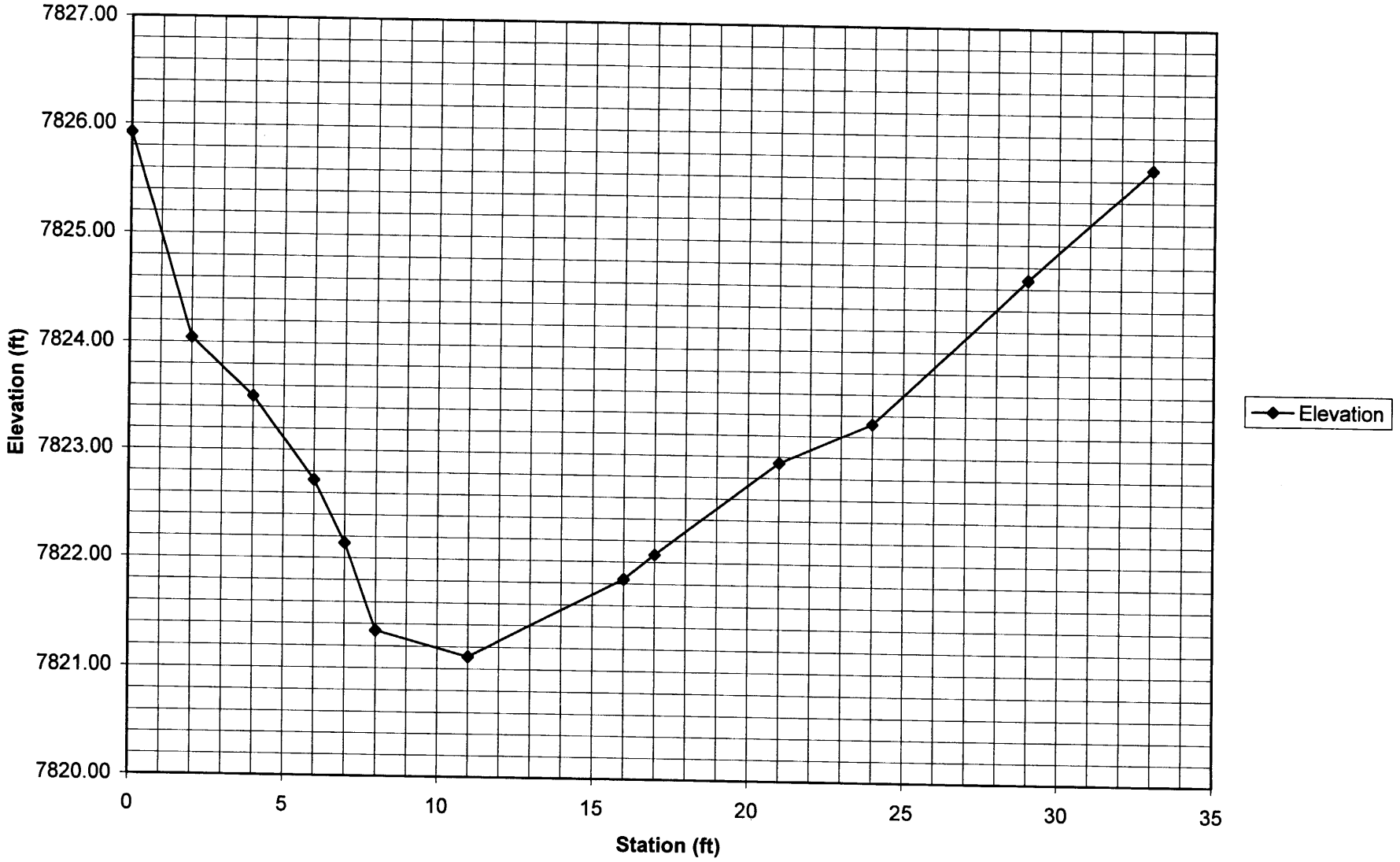


Cross Section: MC-2

Benchmark elevation: 7827.04 Survey Date: 10/6/2006
BenchMark Rod Reading: 5.25

Station	Rod Reading	Elevation
0	6.37	7825.92
2	8.25	7824.04
4	8.79	7823.50
6	9.57	7822.72
7	10.15	7822.14
8	10.95	7821.34
11	11.18	7821.11
16	10.45	7821.84
17	10.22	7822.07
21	9.35	7822.94
24	8.97	7823.32
29	7.61	7824.68
33	6.59	7825.70

2006 Cross Section MC-2



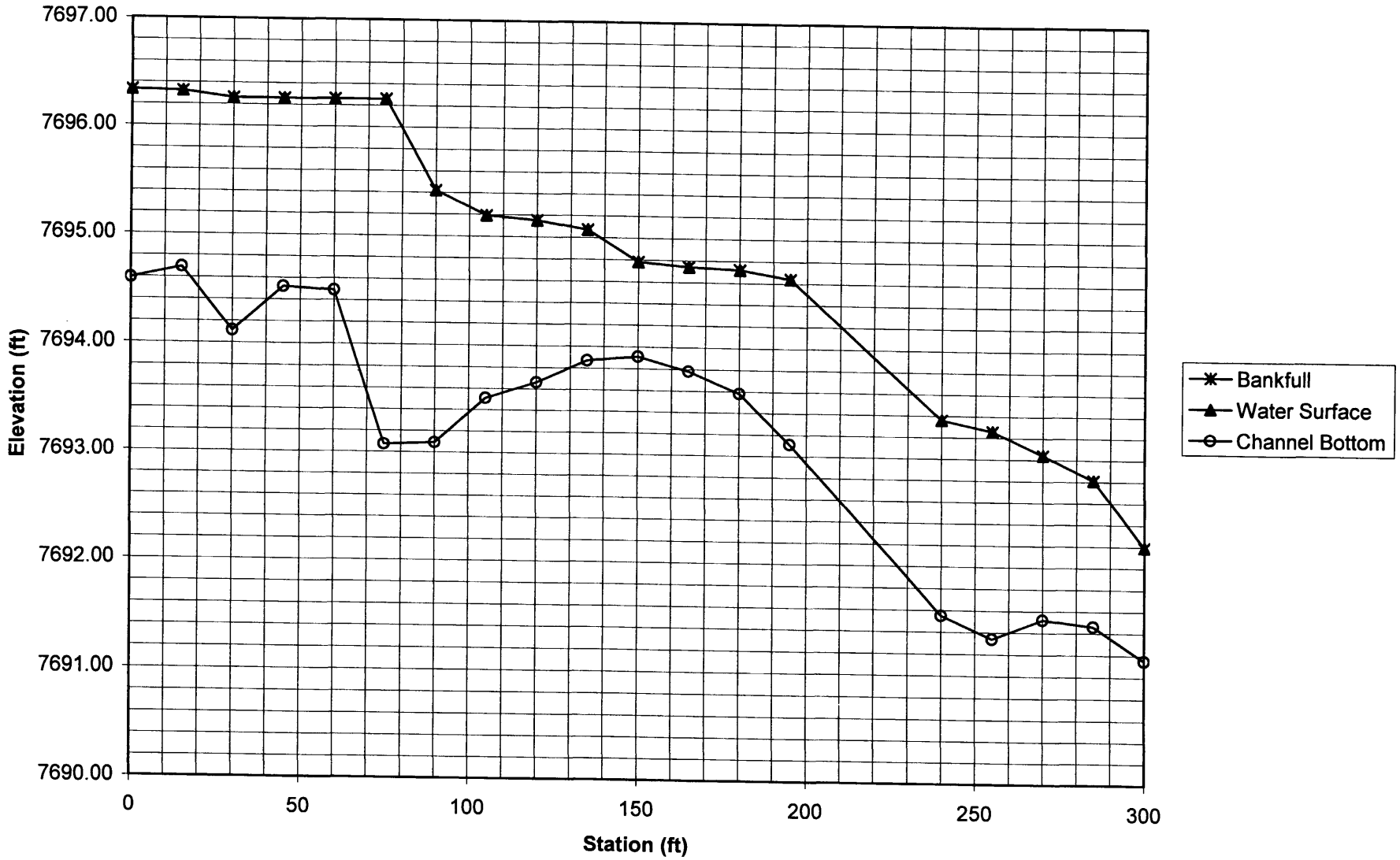
Profile: MC-3

Benchmark elevation (ft): 7697.59 Survey Date: 10/6/2006
Rod reading at Benchmark (ft): 10.32

Station	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	11.58	7696.33	11.58	7696.33	13.32	7694.59			
15	11.59	7696.32	11.59	7696.32	13.22	7694.69	0.01	15.00	0.001
30	11.65	7696.26	11.65	7696.26	13.80	7694.11	0.06	15.00	0.004
45	11.65	7696.26	11.65	7696.26	13.39	7694.52	0.00	15.00	0.000
60	11.65	7696.26	11.65	7696.26	13.42	7694.49	0.00	15.00	0.000
75	11.65	7696.26	11.65	7696.26	14.84	7693.07	0.00	15.00	0.000
90	12.49	7695.42	12.49	7695.42	14.82	7693.09	0.84	15.00	0.056
105	12.72	7695.19	12.72	7695.19	14.40	7693.51	0.23	15.00	0.015
120	12.76	7695.15	12.76	7695.15	14.25	7693.66	0.04	15.00	0.003
135	12.84	7695.07	12.84	7695.07	14.04	7693.87	0.08	15.00	0.005
150	13.13	7694.78	13.13	7694.78	14.00	7693.91	0.29	15.00	0.019
165	13.17	7694.74	13.17	7694.74	14.13	7693.78	0.04	15.00	0.003
180	13.19	7694.72	13.19	7694.72	14.33	7693.58	0.02	15.00	0.001
195	13.27	7694.64	13.27	7694.64	14.80	7693.11	0.08	15.00	0.005
240	14.55	7693.36	14.55	7693.36	16.36	7691.55	1.28	45.00	0.028
255	14.65	7693.26	14.65	7693.26	16.57	7691.34	0.10	15.00	0.007
270	14.87	7693.04	14.87	7693.04	16.39	7691.52	0.22	15.00	0.015
285	15.10	7692.81	15.10	7692.81	16.45	7691.46	0.23	15.00	0.015
300	15.72	7692.19	15.72	7692.19	16.76	7691.15	0.62	15.00	0.041

Max. Water Surface Slope (fraction): 0.056
Min. Water Surface Slope (fraction): 0.000
Avg. Water Surface Slope (fraction): 0.012

2006 Profiel MC-3

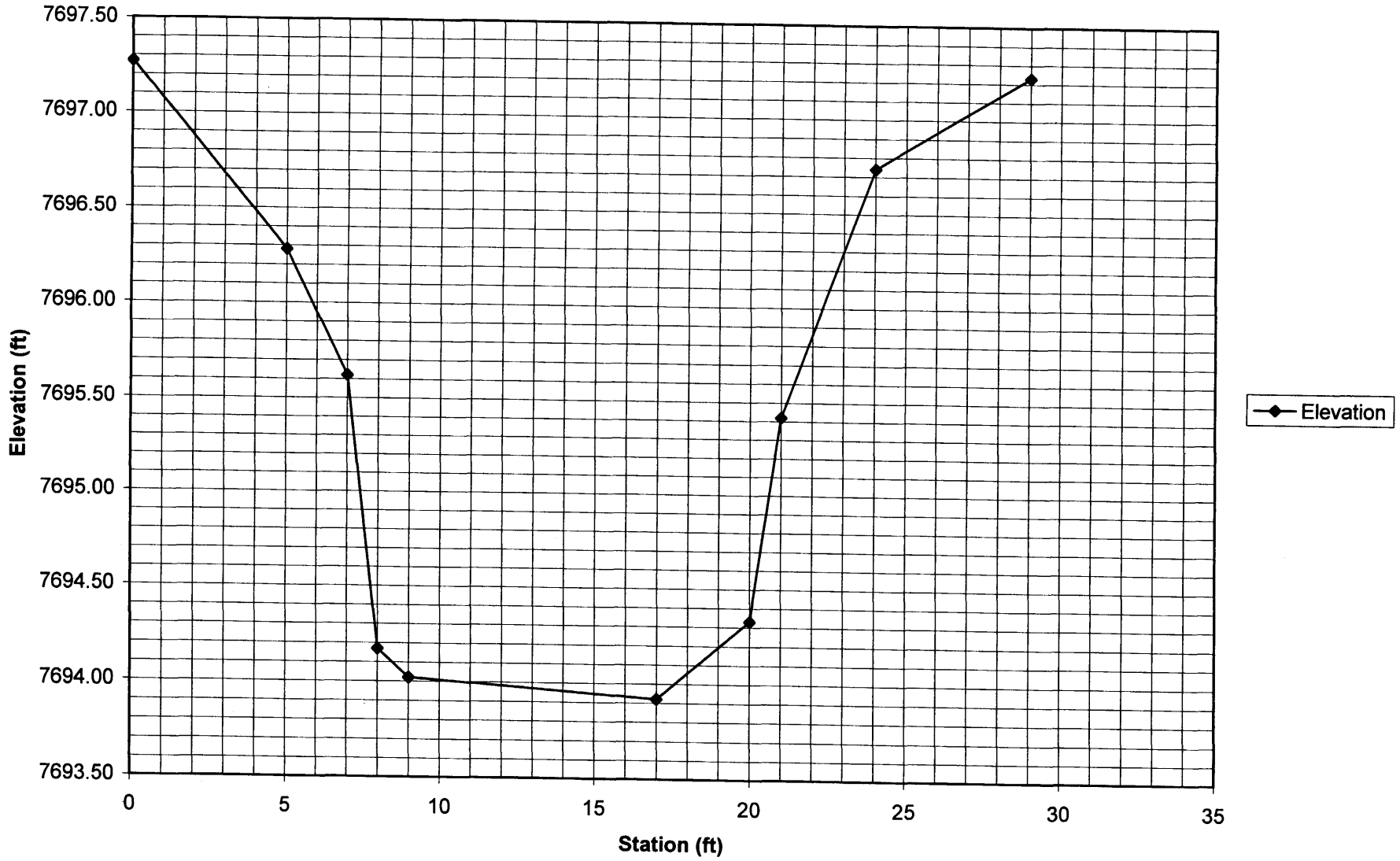


Cross Section: MC-3

Benchmark elevation: 7697.59 Survey Date: 10/6/2006
BenchMark Rod Reading: 10.33

Station	Rod Reading	Elevation
0	10.65	7697.27
5	11.64	7696.28
7	12.30	7695.62
8	13.75	7694.17
9	13.90	7694.02
17	14.00	7693.92
20	13.59	7694.33
21	12.50	7695.42
24	11.18	7696.74
29	10.69	7697.23

2006 Cross Section MC-3



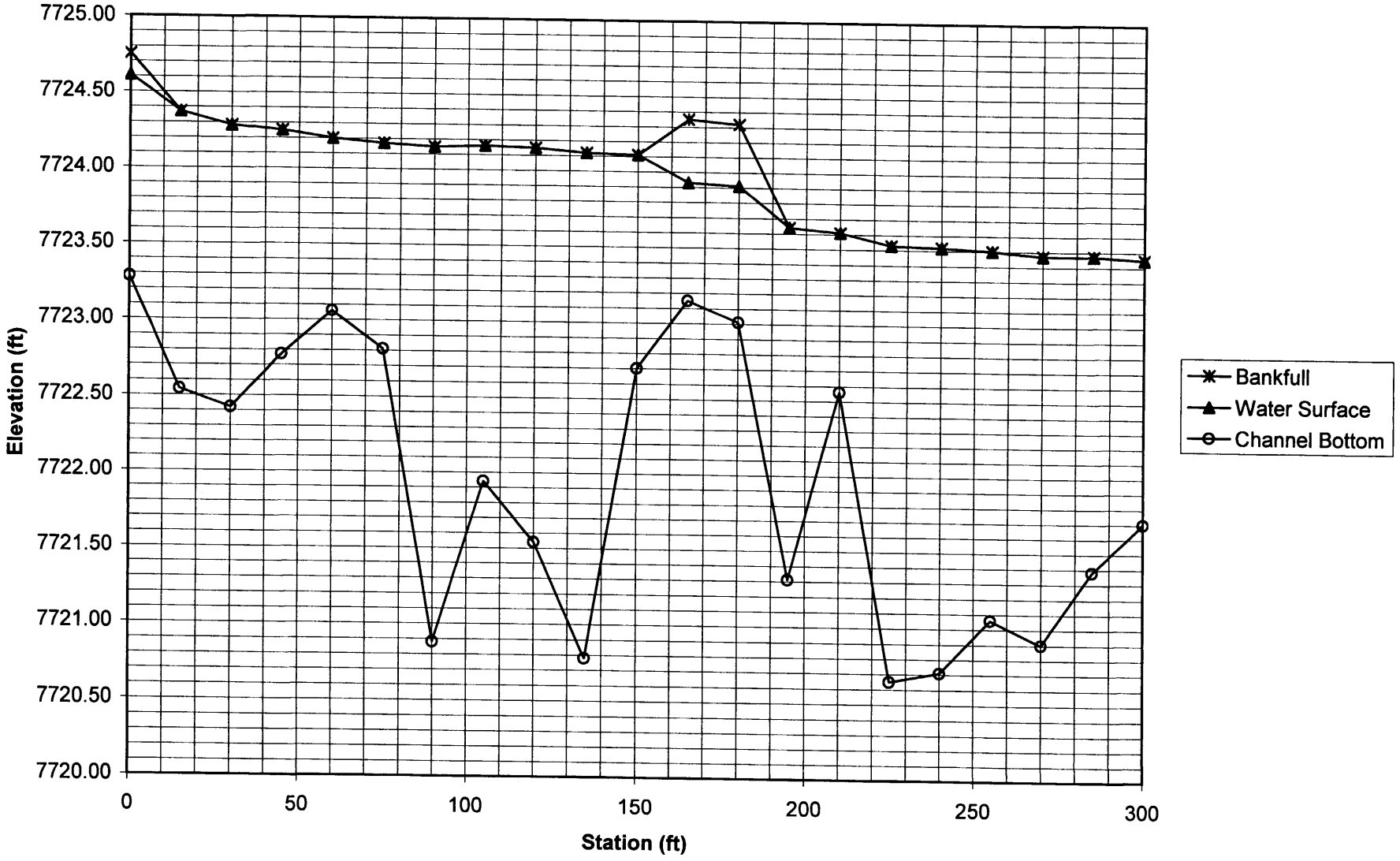
Profile: MC-4

Benchmark elevation (ft): 7728.64 Survey Date: 10/9/2006
Rod reading at Benchmark (ft): 3.96

Station	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
0	7.85	7724.75	7.99	7724.61	9.32	7723.28			
15	8.23	7724.37	8.23	7724.37	10.06	7722.54	0.24	15.00	0.016
30	8.32	7724.28	8.32	7724.28	10.18	7722.42	0.09	15.00	0.006
45	8.35	7724.25	8.35	7724.25	9.83	7722.77	0.03	15.00	0.002
60	8.40	7724.20	8.40	7724.20	9.54	7723.06	0.05	15.00	0.003
75	8.43	7724.17	8.43	7724.17	9.79	7722.81	0.03	15.00	0.002
90	8.45	7724.15	8.45	7724.15	11.72	7720.88	0.02	15.00	0.001
105	8.44	7724.16	8.44	7724.16	10.66	7721.94	-0.01	15.00	-0.001
120	8.45	7724.15	8.45	7724.15	11.06	7721.54	0.01	15.00	0.001
135	8.48	7724.12	8.48	7724.12	11.82	7720.78	0.03	15.00	0.002
150	8.49	7724.11	8.49	7724.11	9.90	7722.70	0.01	15.00	0.001
165	8.25	7724.35	8.67	7723.93	9.45	7723.15	0.18	15.00	0.012
180	8.28	7724.32	8.69	7723.91	9.59	7723.01	0.02	15.00	0.001
195	8.96	7723.64	8.96	7723.64	11.29	7721.31	0.27	15.00	0.018
210	8.99	7723.61	8.99	7723.61	10.04	7722.56	0.03	15.00	0.002
225	9.07	7723.53	9.07	7723.53	11.95	7720.65	0.08	15.00	0.005
240	9.08	7723.52	9.08	7723.52	11.89	7720.71	0.01	15.00	0.001
255	9.10	7723.50	9.10	7723.50	11.54	7721.06	0.02	15.00	0.001
270	9.13	7723.47	9.13	7723.47	11.70	7720.90	0.03	15.00	0.002
285	9.13	7723.47	9.13	7723.47	11.22	7721.38	0.00	15.00	0.000
300	9.15	7723.45	9.15	7723.45	10.90	7721.70	0.02	15.00	0.001

Max. Water Surface Slope (fraction): 0.018
Min. Water Surface Slope (fraction): -0.001
Avg. Water Surface Slope (fraction): 0.004

2006 Profile MC-4

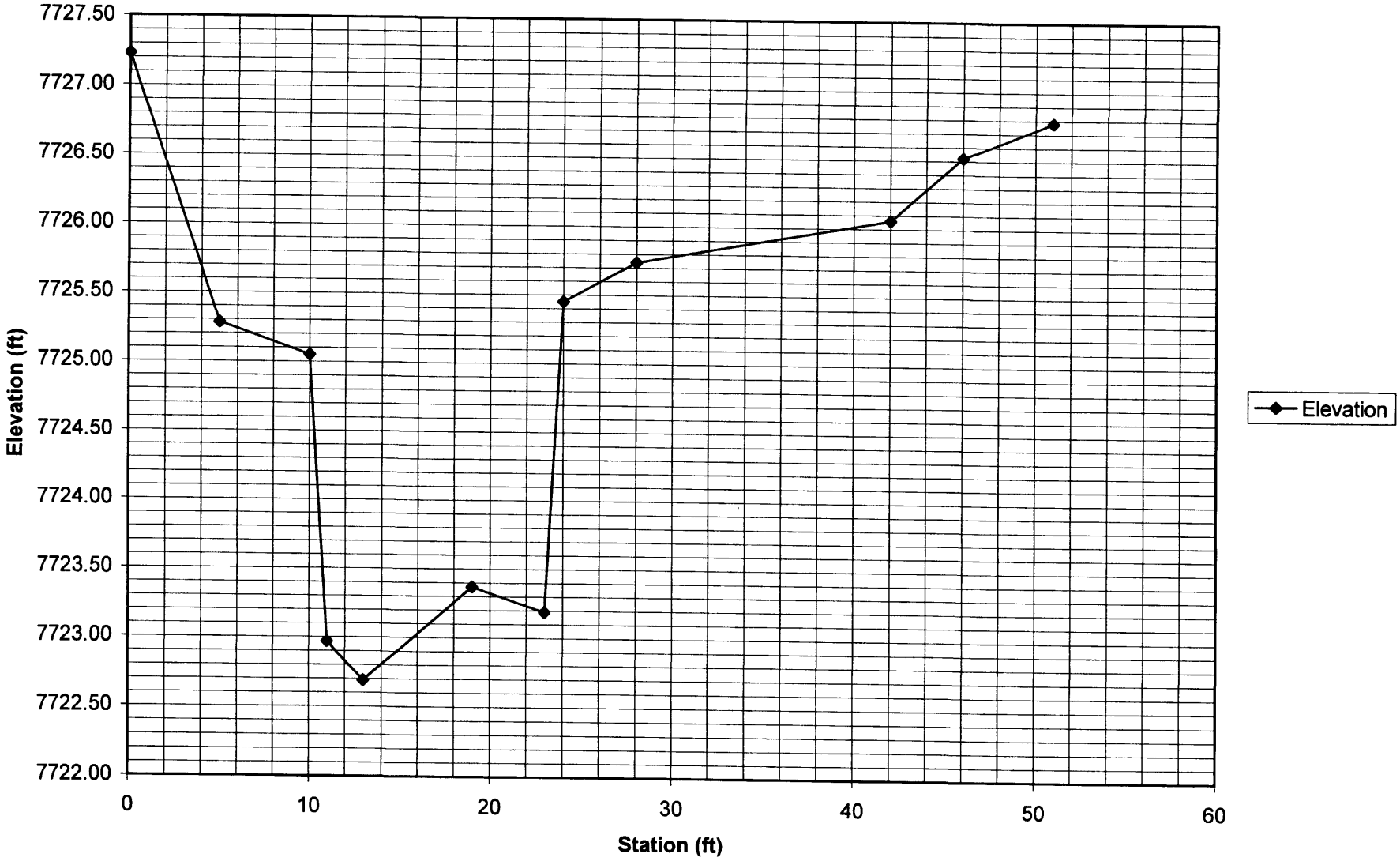


Cross Section: MC-4

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

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

2006 Cross Section MC-4

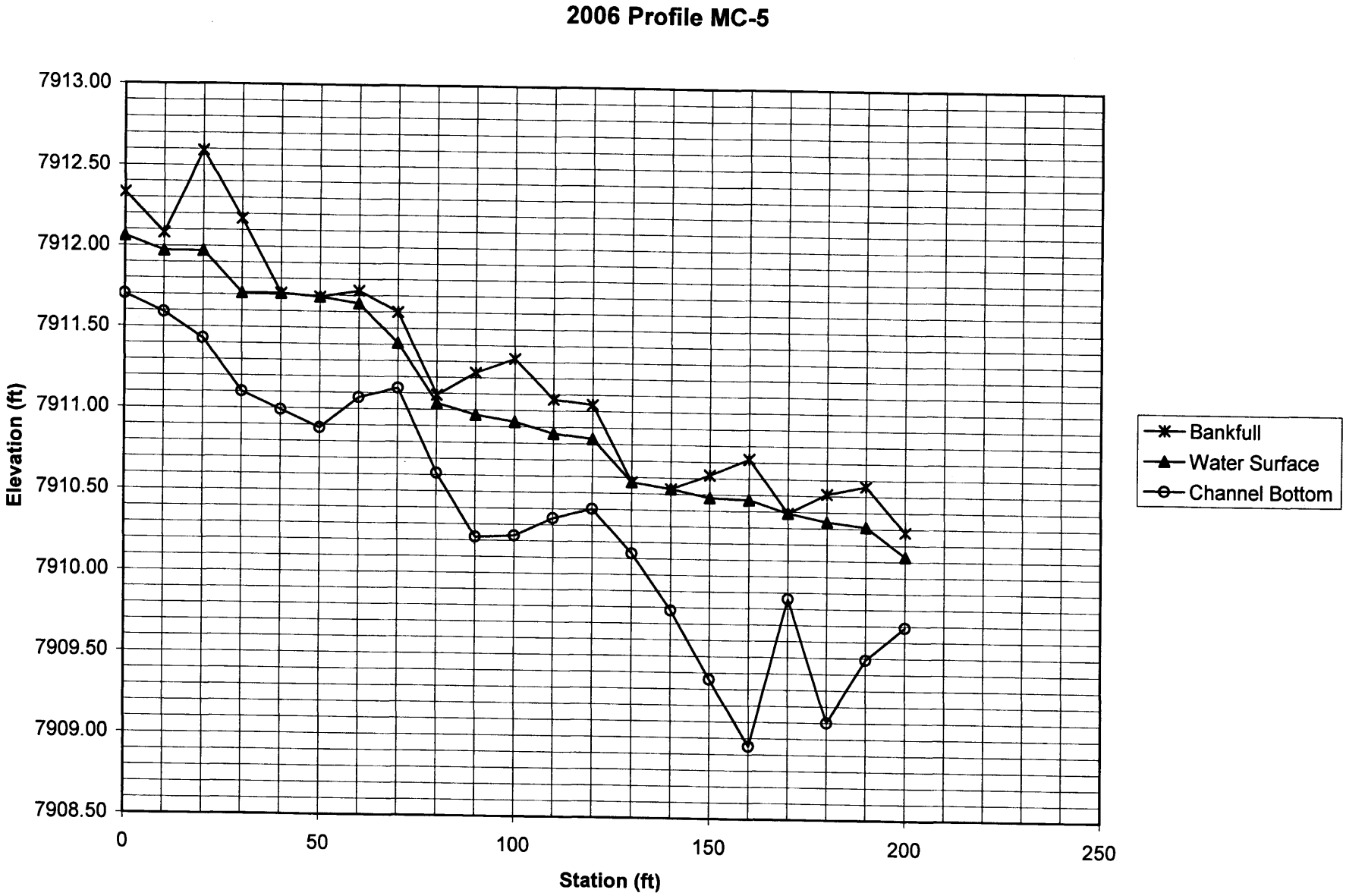


Profile: MC-5

Benchmark elevation (ft): 7915.35 Survey date: 10/9/2006
Rod reading at benchmark (ft): 4.2

	Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations			Bankfull (ft)	
Station	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)	Rod Reading	Elevation
0	7.49	7912.06	7.85	7911.70				7.22	7912.33
10	7.58	7911.97	7.96	7911.59	0.09	10.00	0.009	7.47	7912.08
20	7.58	7911.97	8.12	7911.43	0.00	10.00	0.000	6.96	7912.59
30	7.84	7911.71	8.45	7911.10	0.26	10.00	0.026	7.38	7912.17
40	7.84	7911.71	8.56	7910.99	0.00	10.00	0.000	7.84	7911.71
50	7.86	7911.69	8.67	7910.88	0.02	10.00	0.002	7.86	7911.69
60	7.90	7911.65	8.48	7911.07	0.04	10.00	0.004	7.82	7911.73
70	8.14	7911.41	8.42	7911.13	0.24	10.00	0.024	7.95	7911.60
80	8.51	7911.04	8.94	7910.61	0.37	10.00	0.037	8.46	7911.09
90	8.58	7910.97	9.33	7910.22	0.07	10.00	0.007	8.32	7911.23
100	8.62	7910.93	9.32	7910.23	0.04	10.00	0.004	8.23	7911.32
110	8.69	7910.86	9.21	7910.34	0.07	10.00	0.007	8.48	7911.07
120	8.72	7910.83	9.15	7910.40	0.03	10.00	0.003	8.51	7911.04
130	8.98	7910.57	9.42	7910.13	0.26	10.00	0.026	8.98	7910.57
140	9.02	7910.53	9.77	7909.78	0.04	10.00	0.004	9.02	7910.53
150	9.07	7910.48	10.19	7909.36	0.05	10.00	0.005	8.93	7910.62
160	9.08	7910.47	10.60	7908.95	0.01	10.00	0.001	8.83	7910.72
170	9.16	7910.39	9.69	7909.86	0.08	10.00	0.008	9.16	7910.39
180	9.21	7910.34	10.45	7909.10	0.05	10.00	0.005	9.04	7910.51
190	9.24	7910.31	10.06	7909.49	0.03	10.00	0.003	8.99	7910.56
200	9.42	7910.13	9.86	7909.69	0.18	10.00	0.018	9.27	7910.28

Max. Water Surface Slope (fraction): 0.037
Min. Water Surface Slope (fraction): 0.000
Avg. Water Surface Slope (fraction): 0.010

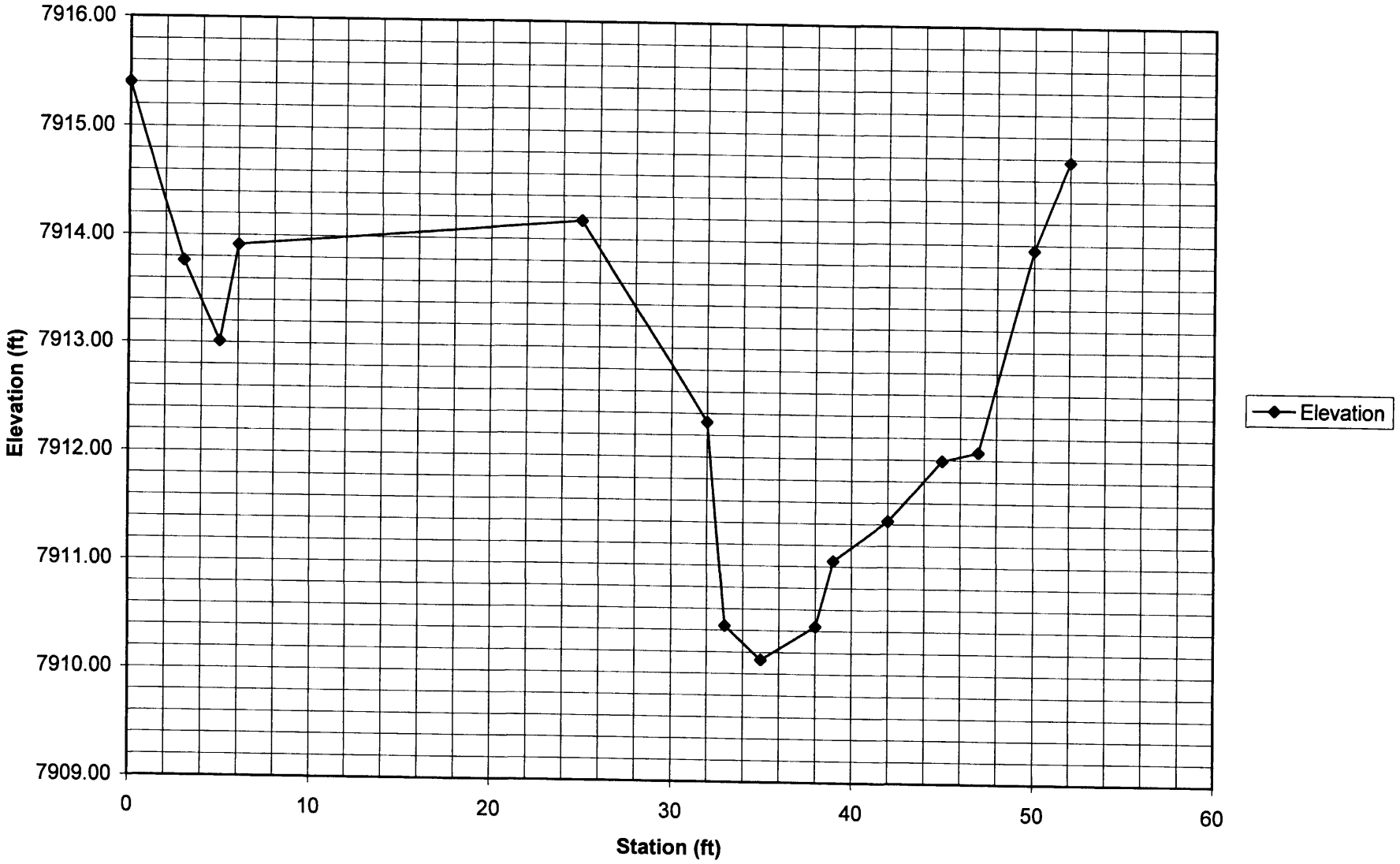

2006 Profile MC-5
7913.00
7912.50
7912.00
7911.50
7911.00
7910.50
7910.00
7909.50
7909.00
7908.50
Elevation (ft)
0
50
100
150
200
250
Station (ft)
Bankfull
Water Surface
Channel Bottom

Cross Section: MC-5

Benchmark elevation: 7915.35 Survey Date: 10/6/2006
BenchMark Rod Reading: 4.20

Station	Rod Reading	Elevation
0	4.15	7915.40
3	5.79	7913.76
5	6.54	7913.01
6	5.64	7913.91
25	5.38	7914.17
32	7.23	7912.32
33	9.11	7910.44
35	9.42	7910.13
38	9.11	7910.44
39	8.50	7911.05
42	8.12	7911.43
45	7.56	7911.99
47	7.48	7912.07
50	5.60	7913.95
52	4.78	7914.77

2006 Cross Section MC-5



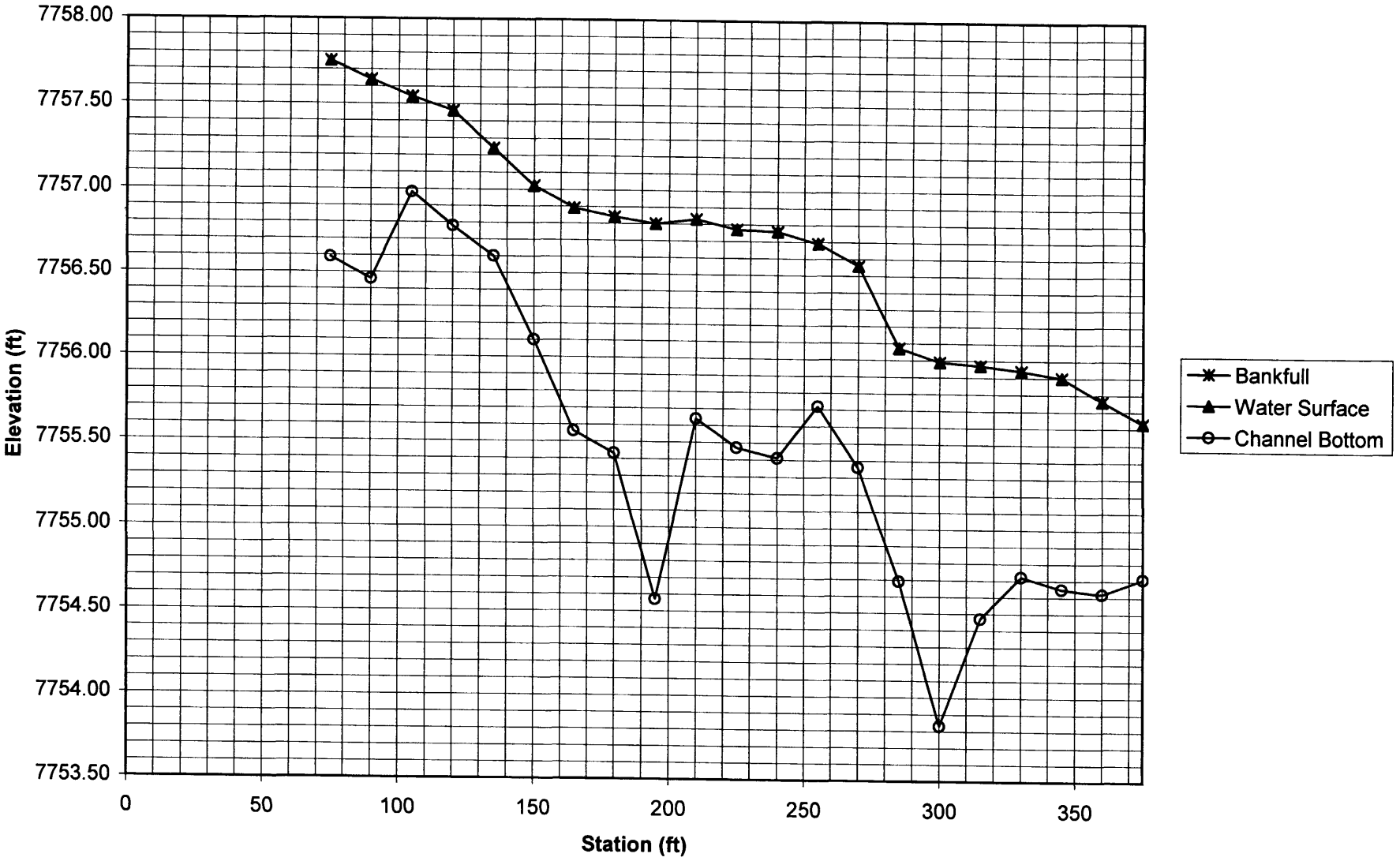
Profile: MC-6

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

Station	Bankfull (ft)		Water Surface (ft)		Channel Bottom (ft)		Water Surface Calculations		
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Elev change	Distance	Slope (fraction)
75	8.52	7757.52	8.52	7757.52	9.55	7756.49			
90	8.65	7757.39	8.65	7757.39	9.69	7756.35	0.13	15.00	0.009
105	8.65	7757.39	8.65	7757.39	9.39	7756.65	0.00	15.00	0.000
120	8.64	7757.40	8.71	7757.33	9.40	7756.64	0.06	15.00	0.004
135	9.07	7756.97	9.07	7756.97	9.67	7756.37	0.36	15.00	0.024
150			9.22	7756.82	9.80	7756.24	0.15	15.00	0.010
165			9.31	7756.73	10.76	7755.28	0.09	15.00	0.006
180			9.40	7756.64	10.88	7755.16	0.09	15.00	0.006
195	9.38	7756.66	9.38	7756.66	11.16	7754.88	-0.02	15.00	-0.001
210	9.30	7756.74	9.40	7756.64	10.57	7755.47	0.02	15.00	0.001
225	9.17	7756.87	9.42	7756.62	10.78	7755.26	0.02	15.00	0.001
240	9.43	7756.61	9.45	7756.59	10.70	7755.34	0.03	15.00	0.002
255	9.20	7756.84	9.52	7756.52	10.33	7755.71	0.07	15.00	0.005
270	9.71	7756.33	9.70	7756.34	10.48	7755.56	0.18	15.00	0.012
285	10.19	7755.85	10.23	7755.81	11.90	7754.14	0.53	15.00	0.035
300	10.15	7755.89	10.40	7755.64	11.60	7754.44	0.17	15.00	0.011
315	10.22	7755.82	10.54	7755.50	12.60	7753.44	0.14	15.00	0.009
330	10.18	7755.86	10.44	7755.60	11.79	7754.25	-0.10	15.00	-0.007
345	10.50	7755.54	10.50	7755.54	11.34	7754.70	0.06	15.00	0.004
360	10.65	7755.39	10.83	7755.21	12.10	7753.94	0.33	15.00	0.022
375	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

2006 Profile MC-6

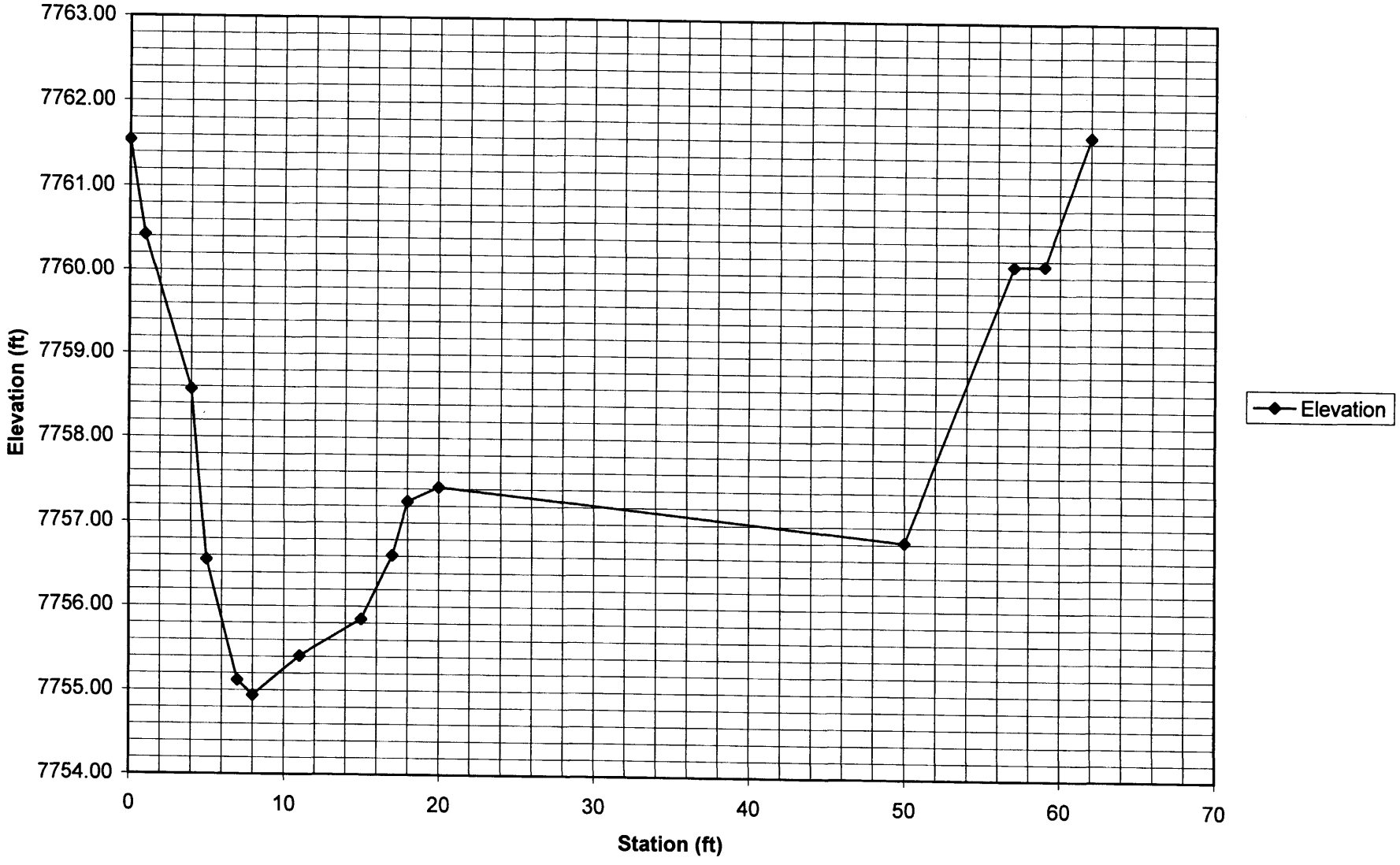


Cross Section: MC-6

Benchmark elevation: 7763.84 Survey Date: 10/6/2006
BenchMark Rod Reading: 2.80

Station	Rod Reading	Elevation
0	5.10	7761.54
1	6.22	7760.42
4	8.07	7758.57
5	10.09	7756.55
7	11.52	7755.12
8	11.70	7754.94
11	11.23	7755.41
15	10.79	7755.85
17	10.03	7756.61
18	9.39	7757.25
20	9.22	7757.42
50	9.82	7756.82
57	6.51	7760.13
59	6.50	7760.14
62	4.97	7761.67

2006 Cross Section MC-6



APPENDIX D

Mine Maps

As required under R645-302-525-270

CONTENTS

Skyline Mines, Mine 3 Levels 2 and 3 2006 As-Mined – CONFIDENTIAL FILE
Skyline Mines Projected Mining 2007 – 2011 – CONFIDENTIAL FILE

APPENDIX E

Other Information

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

CONTENTS

None