

**2006 ANNUAL REPORT  
TO THE  
UTAH DIVISION OF OIL, GAS AND MINING**

**DUGOUT CANYON MINE  
C/007/039**

Canyon Fuel Company, LLC  
P.O. Box 1029  
Wellington, UT 84542

**File in:**

- Confidential
- Shelf
- Expandable

Refer to Record No 0039 Date 3/15/07  
In C/067/0089, 2007, Incoming  
For additional information

**Canyon Fuel Company, LLC**  
**Dugout Canyon Mine**  
P.O. Box 1029  
Wellington, Utah 84542



March 15, 2007

Ms. Pamela Grubaugh-Littig  
Utah Coal Regulatory Program  
Utah Division of Oil, Gas and Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, UT 84114-5801

**RECEIVED**

**MAR 16 2007**

**DIV. OF OIL, GAS & MINING**

RE: 2006 Annual Report for Dugout Canyon Mine, C/007/039

Dear Ms. Pamela Grubaugh-Littig,

Enclosed please find two copies of the Annual Report for 2006 for the Dugout Canyon Mine.

Sampling of the refuse pile was minimal for two reasons. The Dugout refuse pile was mined during 2006, the material was shipped to the Savage Loadout and blended for shipment to customers. Coal was shipped directly from the mine and washed at the preparation plant, which limited waste being placed at the refuse pile.

Please reference Appendix E, for information pertaining to the request associated with R645-301-525.700.

Should you have any questions concerning this submittal, please contact me at (435) 636-2869.

Sincerely yours,

  
Vicky S. Miller

enclosures

cc: Chris Hansen (letter only)  
Dave Spillman (enclosures)  
Central Files (enclosures)

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

**GENERAL INFORMATION**

Permitte Name	CANYON FUEL COMPANY, LLC
Mine Name	DUGOUT CANYON MINE
Operator Name (If other then permittee)	
Permit Expiration Date	MARCH 16, 2008
Permit Number	C/007/039
Authorized Representative Title	ERWIN SASS, GENERAL MANAGER
Phone Number	(435) 637-6360
Fax Number	(435) 636-2897
E-mail Address	esass@archcoal.com
Mailing Address	PO Box 1029, Wellington, Utah 84542
Designated Representative	
Resident Agent	C.T. Corporation Systems
Resident Agent Mailing Address	50 West Broadway, Salt Lake City, Utah 84104
Number of Binders Submitted	(1) Binder, Two Copies

**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)	42-01890	Rock Canyon Seam	N/A
	42-01888	Gilson Seam	N/A
MSHA Impoundment(s)	N/A		
NPDES/UPDES Permit(s)	UT0025593	UPDES Discharge Permit and Storm Water Discharge Permit	Nov. 30, 2009
PSD Permit(s) (Air)	DAQE-001-1999	Air Quality Permit	N/A
<b>Other</b>			
MSHA Mine ID(s)	1211-UT-09-01890-01	Refuse Pile	N/A

**CERTIFIED REPORTS**

List the certified inspection reports as required by the rules and under the approved plan that must be periodically submitted to 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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Refuse Piles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Impoundments	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>Other</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

**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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Subsidence Monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Vegetation Monitoring	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Raptor Survey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Soils Monitoring	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Water Monitoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
First quarter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Second quarter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Third quarter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fourth quarter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Geological / Geophysical	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Engineering	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non Coal Waste / Abandoned Underground Equipment*	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Other Data</b>					
Geomorphology	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
SNOTEL Report	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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.





**APPENDIX A**

**Certified Reports**

Excess Spoil Piles  
Refuse Piles  
Impoundments

As required under R645-301-514

**CONTENTS**

CERTIFIED IMPOUNDMENT REPORTS  
CERTIFIED REFUSE PILE REPORT

CERTIFIED IMPOUNDMENT REPORTS

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		Page 1 of 2	
Permit Number	ACT/007/039	Report Date	09/29/06
Mine Name	Dugout Canyon Mine		
Company Name	Canyon Fuel Company, LLC		
Impoundment Identification	Impoundment Name	Surface Facility Sedimentation Pond	
	Impoundment Number	None	
	UPDES Permit Number	UT0025593	
	MSHA ID Number	Impoundment - None (Mine - 42-01890)	
IMPOUNDMENT INSPECTION			
Inspection Date	09/18/06		
Inspected By	Dave Spillman		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Routine Quarterly Inspection and Annual Certification		
<p><b>1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.</b></p> <p><i>There were no signs of instability, structural weakness or other hazardous conditions observed during this inspection.</i></p>			
Required for an impoundment which functions as a SEDIMENTATION POND.	<p><b>2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.</b></p> <p><i>Sediment Storage Capacity - 100% = 0.34 acre-feet @ an elevation of 6,953.56 feet</i>  <i>- 60% = 0.20 acre-feet @ an elevation of 6,951.66 feet</i></p>		
	<p><b>3. Principle and emergency spillway elevations.</b></p> <p><i>Principal Spillway Elevation - 6,964.44 feet</i>  <i>Emergency Spillway Elevation - 6,964.5 feet</i></p>		
<p><b>Field Information.</b> 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 out slopes of embankments, etc.</p>			

**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.

*At the time of inspection, the impounded water elevation was approximately 18 inches below the outlet elevation of the primary spillway vertical riser. The sediment level could not be observed during the inspection due to the high water level, however, full sediment cleanout had been completed on May 10, 2006. It's not likely that sediment volume would be an issue due to the recent cleanout.*

**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: \_\_\_\_\_

**CERTIFIED REPORT**

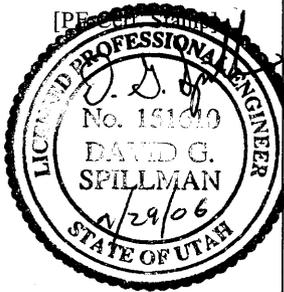
**IMPOUNDMENT EVALUATION (If NO, explain under Comments)**

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

**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: David G. Spillman, Technical Services Manager  
(Full Name and Title)

Signature: David Spillman Date: 09/29/06

P.E. Number & State: No. 151610, State of Utah

IMPOUNDMENT INSPECTION AND CERTIFIED REPORT		Page 1 of 2	
Permit Number	ACT/007/039	Report Date	09/28/06
Mine Name	Dugout Canyon Mine		
Company Name	Canyon Fuel Company, LLC		
Impoundment Identification	Impoundment Name	Refuse Pile Sedimentation Pond	
	Impoundment Number	None	
	UPDES Permit Number	UT0025593	
	MSHA ID Number	Impoundment -None (Refuse Pile 1211-UT-09-01890-01)	
IMPOUNDMENT INSPECTION			
Inspection Date	09/27/06		
Inspected By	Dave Spillman		
Reason for Inspection (Annual, Quarterly or Other Periodic Inspection, Critical Installation, or Completion of Construction)	Quarterly Inspection / Certification		
<p><b>1. Describe any appearance of any instability, structural weakness, or any other hazardous condition.</b></p> <p><i>Construction of the Refuse Pile Sedimentation Pond has been completed in accordance with the approved plan. There were no signs instability, structural weakness or other hazardous conditions observed during this inspection.</i></p>			
Required for an impoundment which functions as a SEDIMENTATION POND.	<p><b>2. Sediment storage capacity, including elevation of 60% and 100% sediment storage volumes, and, estimated average elevation of existing sediment.</b></p> <p><i>Sediment Storage Capacity (as designed) - 100% = 0.78 acre-feet @ an elevation of 5,895.9 feet</i>  <i>- 60% = 0.47 acre-feet @ an elevation of 5,894.7 feet</i></p>		
	<p><b>3. Principle and emergency spillway elevations.</b></p> <p><i>Emergency Spillway Elevation (as designed) - 5,902 feet</i></p>		
<p><b>4. Field Information.</b> 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 out slopes of embankments, etc.</p> <p><i>Impounded water appeared to be approximately 1.0 foot in depth at the time of the inspection. The accumulation of sediment has not yet reached the allowed 60% level.</i></p> <p><i>This pond has never discharged.</i></p>			

**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.

**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: \_\_\_\_\_

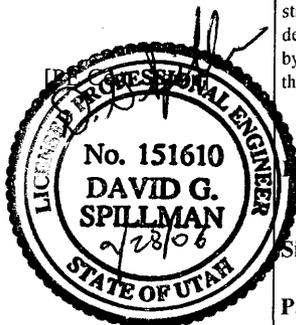
**CERTIFIED REPORT**

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

**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: David G. Spillman, Technical Services Manager  
(Full Name and Title)

Signature: David Spillman Date: 09/28/06

P.E. Number & State: No. 151610, State of Utah

CERTIFIED REFUSE PILE REPORT

**INSPECTION AND CERTIFIED REPORT ON  
EXCESS SPOIL PILE OR REFUSE PILE**

Page 1

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

**GENERAL INFORMATION**

Report Date September 28, 2006  
Permit Number C/007/039  
Company Name Canyon Fuel Company, LLC - Dugout Canyon Mine

**EXCESS SPOIL PILE OR REFUSE PILE IDENTIFICATION**

Pile Name Dugout Canyon Mine Refuse Pile  
Pile Number 1211-UT-09-01890-01  
MSHA ID Number 42-01890

Inspection Date September 27, 2006  
Inspected By David G. Spillman  
Reason for Inspection Quarterly Inspection & Certification

Attachment to Report? Yes  No

**Field Evaluation**

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

The foundation preparation was found to be in accordance with the approved plan.

2. Placement of underdrains and protective filter systems.

N/A

3. Installation of final surface drainage systems

All necessary drainage systems were constructed, functional and well established at the time of the inspection, with one exception. There was a breach observed in the berm surrounding Subsoil Pile #2. This appears to have happened during a recent thunderstorm and all water draining from this area would have been contained in the facility sediment pond. The berm needs to be repaired.

4. Placement and compaction of fill materials

Placement and compaction of all waste rock / refuse appears to have been completed in accordance with the approved plan.

5. Final grading and revegetation of fill.

N/A

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

There was no appearance of instability, structural weakness or other hazardous conditions observed during this 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

On May 15, 2006, Nielson Construction began screening and hauling refuse material from the site to Savage Coal Terminal (SCT) and/or the Dugout Mine site. The 2" minus material will be blended and sold with other stockpiled coal. The 2" x 6" material will be stockpiled at SCT and processed through the preparation plant when operational. All 6"+ material will be retained on site as waste. All screening and hauling operation were completed in August

At the time of this inspection, all Nielson Construction equipment had been demobilized from the site. Furthermore, the site had been secured in excellent condition. All remaining refuse / waste rock had been regraded, compacted and all drainage reestablished as necessary.

**CERTIFICATION STATEMENT**

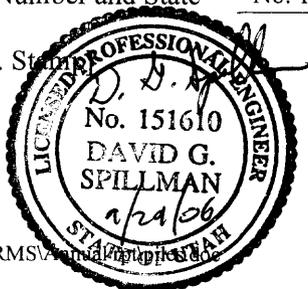
I hereby certify that; I am experienced in the construction of earth and rock fills; I am qualified and authorized in the State of Utah to inspect and certify the condition and appearance of earth and rock fills in accordance with the certified and approved designs for this structure; that the fill structure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

By David G. Spillman, Technical Services Manager  
*Full Name and Title*

Signature *David Spillman* Date 9/29/06

P.E. Number and State No. 151610, State of Utah

[Cert. Stamp]



O:\FORMS\...

**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**

2006 DUGOUT CANYON SUBSIDENCE MONITORING STATIONS MAP  
RAPTOR SURVEY INFORMATION (**CONFIDENTIAL**)  
SNOTEL REPORT

2006 SUBSIDENCE MONITORING MAP AND INFORMATION

RAPTOR SURVEY INFORMATION

CONFIDENTIAL

SNOTEL REPORT

## SNOTEL Narrative

□

United States      Natural Resources      Water and Climate Center  
 Department of      Conservation      Portland, Oregon  
 Agriculture      Service

## SNOW - PRECIPITATION UPDATE

Based on Mountain Data from NRCS SNOTEL Sites  
 As of THURSDAY: MARCH 1, 2007

BASIN Data Site Name	ELEV. (Ft)	SNOW WATER EQUIVALENT			TOTAL PRECIPITATION		
		Current	Average	% Avg	Current	Average	% Avg
UTAH							
PRICE-SAN RAFAEL							
SEELEY CREEK	10000	6.7	12.3	54	9.9	11.1	89
BUCK FLAT	9800	9.7	15.3	63	13.0	16.1	81
RED PINE RIDGE	9200	9.2	14.2	65	13.5	15.1	89
MAMMOTH-COTTONWOOD	8800	9.4	17.6	53	11.1	13.4	83
WHITE RIVER #1	8550	7.5	11.6	65	10.3	11.9	87
Basin wide percent of average				60	86		

-M = Missing data

\* = Data may not provide a valid measure of conditions.

Units = inches for the Current and Average Snow Water Equivalent and  
 Total Precipitation values

If the Basin wide percent of average value is flagged as potentially  
 invalid, care should be taken to evaluate if the value is representative  
 of conditions in the basin.

The SNOW WATER EQUIVALENT Percent of Average represents the snow water  
 equivalent found at selected SNOTEL sites in or near the basin compared to  
 the average value for those sites on this day.

The TOTAL PRECIPITATION Percent of Average represents the total precipitation  
 (beginning October 1st) found at selected SNOTEL sites in or near the basin  
 compared to the average value for those sites on this day.

Contact your state water supply staff for assistance.  
 Reference period for average conditions is 1971-2000.  
 Provisional data, subject to revision.  
 Western Regional Climate Center

**APPENDIX C**

**Legal Financial, Compliance and Related Information**

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

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

**CONTENTS**

REFER TO THE GENERAL CHAPTER ONE

**APPENDIX D**

**Mine Maps**

As required under R645-302-525-270

**CONTENTS**

2007 BASE CASE MAP

## DUGOUT CANYON MINE - Visual Checks for Subsidence

Dugout Canyon Mine, M&RP, Chapter 5, Section 525 "Visual checks for subsidence will be made during all surface activities, especially during water monitoring activities. These visual surveys will be used to detect surface irregularities and surface cracks."

Checks were performed on the following dates at the locations listed:

### Pace Canyon Fan Portal Facilities and Degas Wells (Various Sites)

April 3 -4, 11 -12, 17 - 20, 28,

May 2, 9, 12, 15, 22 - 26, 30 June 6-9, 12 - 16, 26 - 27, 30

July 5 - 6, 12-14, 24, 26 - 28 August 7 - 11, 21, 23, 25, 28 - 31

September 6 - 8, 12, 14, 18, 22, 25, 27 - 30 October 2 - 6, 16 - 18, 20, 24-27, 30

November 6 - 9, 15, 20 - 21

**No surface irregularities or surface cracks were observed.**

### Area of Degas Well G-3, G-7 and G-8

June 27 - Subsidence cracks were observed running through the pad of Well G-7, Pete Hess was contacted. A subsidence crack repair plan was submitted, approved and implemented. For additional information refer to UDOGM Inspection Report, June 28, 2006.

July 11 - Subsidence cracks were shown to and discussed with Leroy Mead of DWR.

### Water Monitoring was Performed in the Following Areas

Dugout Creek Area - 3/25, 6/12, 8/7, 8/8, 10/3, 10/4, 10/9, 10/16

Pace Canyon Area - 3/23-25, 6/10-12, 6/15, 6/18, 7/9, 7/18, 7/20, 7/26, 10/4,  
10/14, 10/30

Pace Creek Area - 3/24-25, 6/12, 7/18, 10/14

Rock Creek Area - 3/24, 6/11, 7/18, 10/14

**No surface irregularities or surface cracks were observed.**

**APPENDIX E**

**Other Information**

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

**CONTENTS**

GEOMORPHOLOGY STUDY  
WASTE ROCK ANALYSIS – REFUSE PILE  
January 5, 2007, Memo VIA E-MAIL, To: All Coal Mine Operators  
Subject: Submittal of Annual Report for 2006, Outgoing File



# GEOMORPHOLOGY EVALUATION

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**RESULTS OF THE 2006  
GEOMORPHOLOGY EVALUATION  
OF THE PACE CREEK STREAM CHANNEL**

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Prepared for

**CANYON FUEL COMPANY**  
Dugout Canyon Mine  
Wellington, Utah

February 2007

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Prepared by

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



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**LIST OF APPENDICES**

Appendix A – Reference Site Photographs

Appendix B – Copy of Filed Log Book

Appendix C –Survey Tabulations with Individual Cross Section and Profile Drawings

**RESULTS OF THE 2006  
GEOMORPHOLOGY EVALUATION  
OF THE PACE CREEK STREAM CHANNEL**

**CHAPTER 1  
INTRODUCTION**

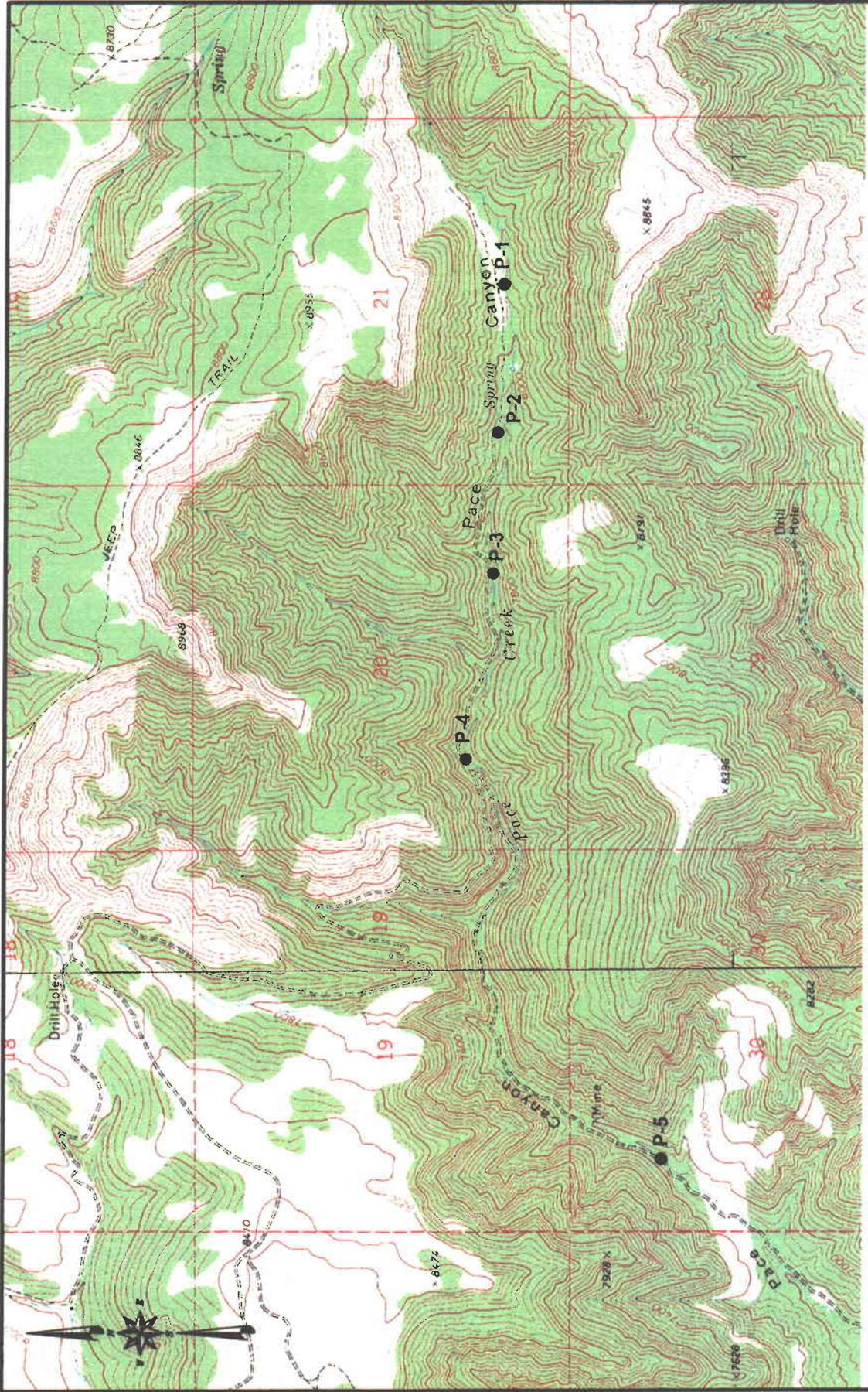
In late 2005/early 2006, Canyon Fuel Company constructed a fan portal in Pace Canyon to allow safer underground access to their coal reserves. To assist in evaluating the hydrologic impacts of that fan portal, stream reference reaches were established in the stream in September 2005 and baseline geomorphic data were collected from the stream (EarthFax Engineering, 2005). These reference reaches were then re-surveyed in 2006 to assess impacts to the geomorphology of the stream, if any. The purpose of this document is to present the results of the 2006 survey and to compare the current results with prior data.

## CHAPTER 2

### FIELD DATA COLLECTION METHODS

The locations of reference sites previously established on Pace Creek are shown on Figure 2-1. Monitoring of the reference sites was conducted on October 30, 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 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, top of bank, 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).



BASE MAP: USGS 7.5' QUADRANGLE PINE CANYON, UTAH (1972) AND MOUNT BARTLES, UTAH (1972)



FIGURE 2-1. REFERENCE SITE LOCATIONS

### CHAPTER 3 RESULTS SUMMARY

Cross section and selected profile spreadsheets and drawings are provided in Appendix C. These data were plotted for 2005 and 2006 to visually assess changes, if any, in the geomorphology of Pace Creek since the last survey. These plots are presented in Figures 3-1 through 3-5.

In steep canyon streams such as Pace Creek, 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 the top of the stream bank) are highly subjective since it is frequently difficult to discern between certain stream bank features and the adjacent hillside. All of these factors may contribute to reduced data quality within the survey area.

Notwithstanding these survey difficulties, Figures 3-1 through 3-5 indicate that no substantial changes occurred in the reference site profiles and cross-sections between 2005 and 2006. Hence, 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.

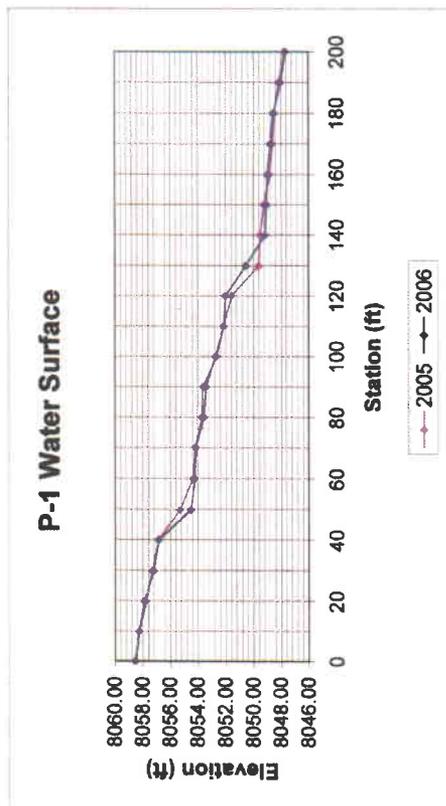
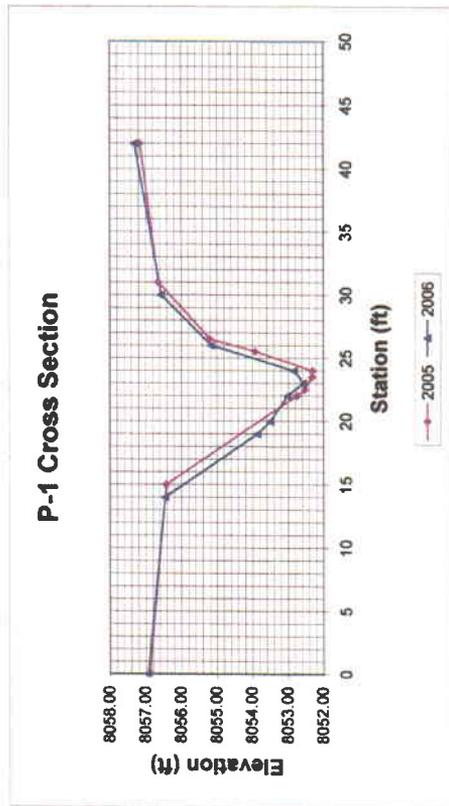
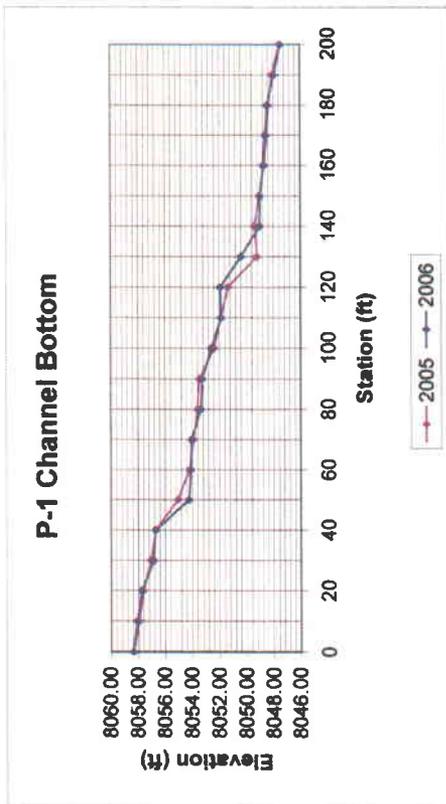
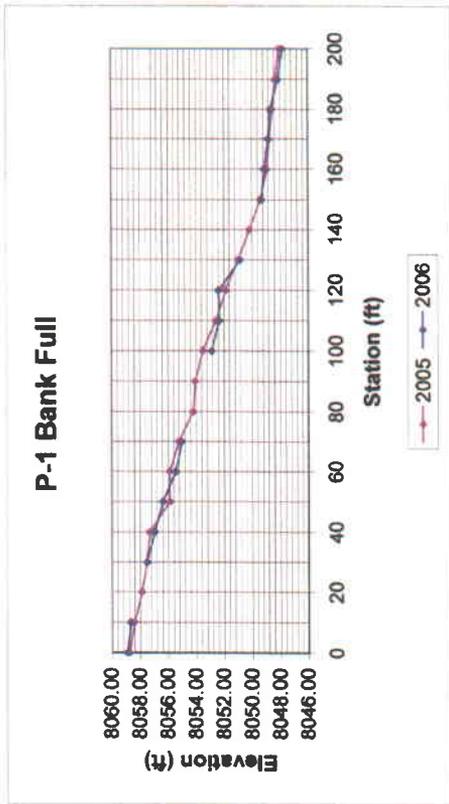


FIGURE 3-1. P-1 CROSS-SECTION AND PROFILES

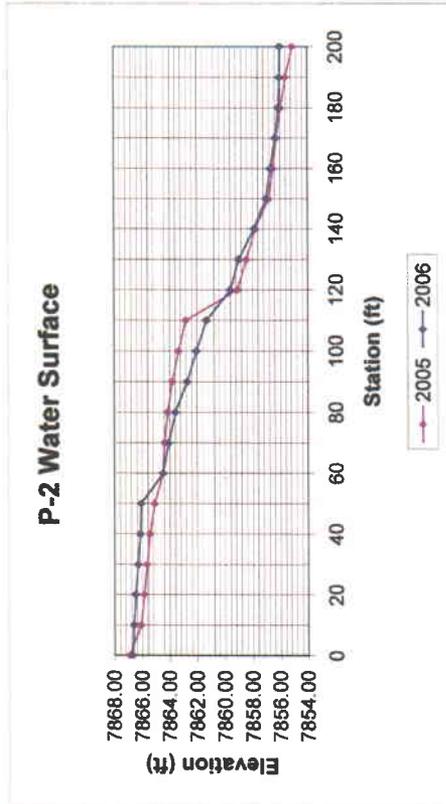
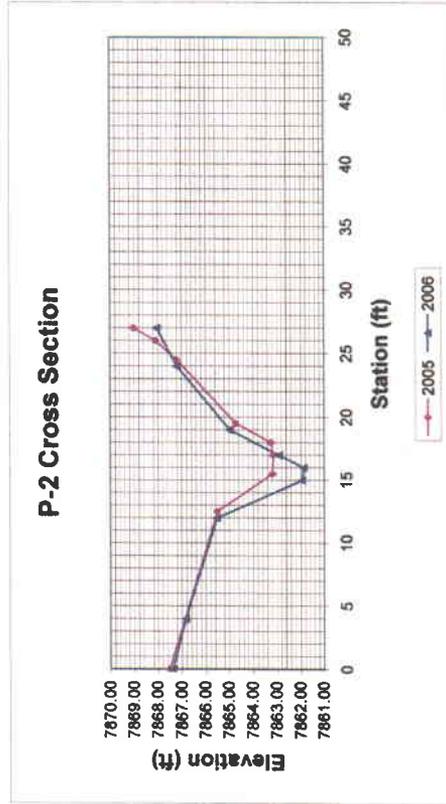
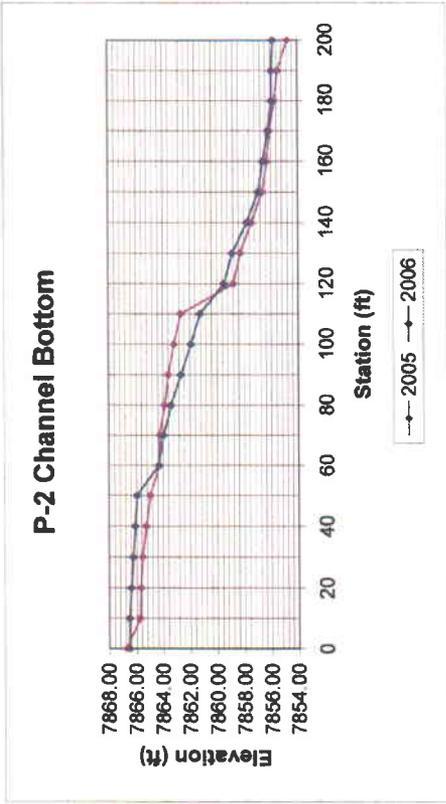
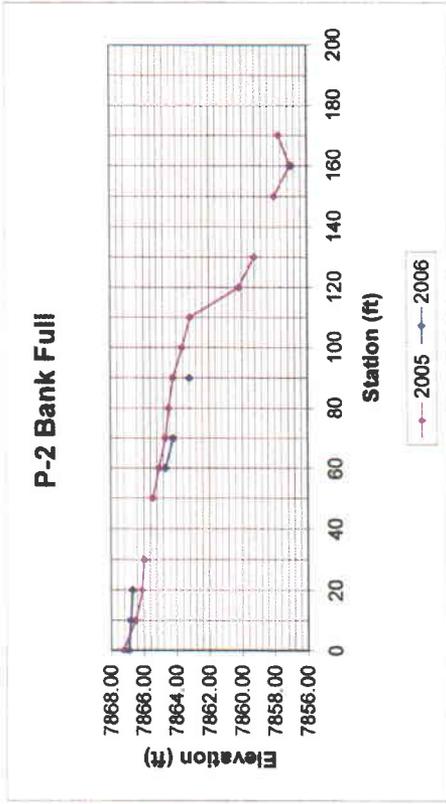


FIGURE 3-2. P-2 CROSS-SECTION AND PROFILES

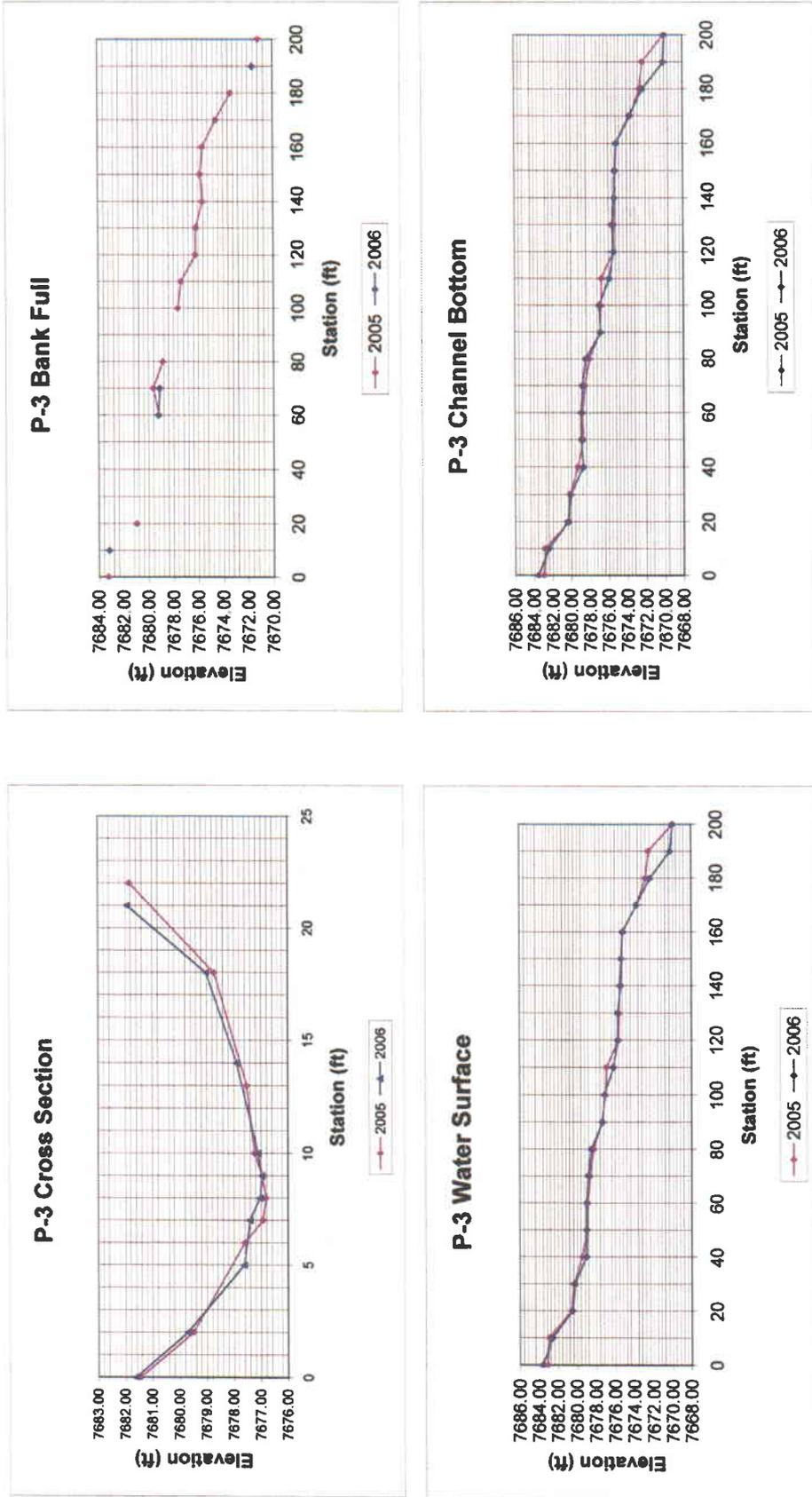


FIGURE 3-3. P-3 CROSS-SECTION AND PROFILES

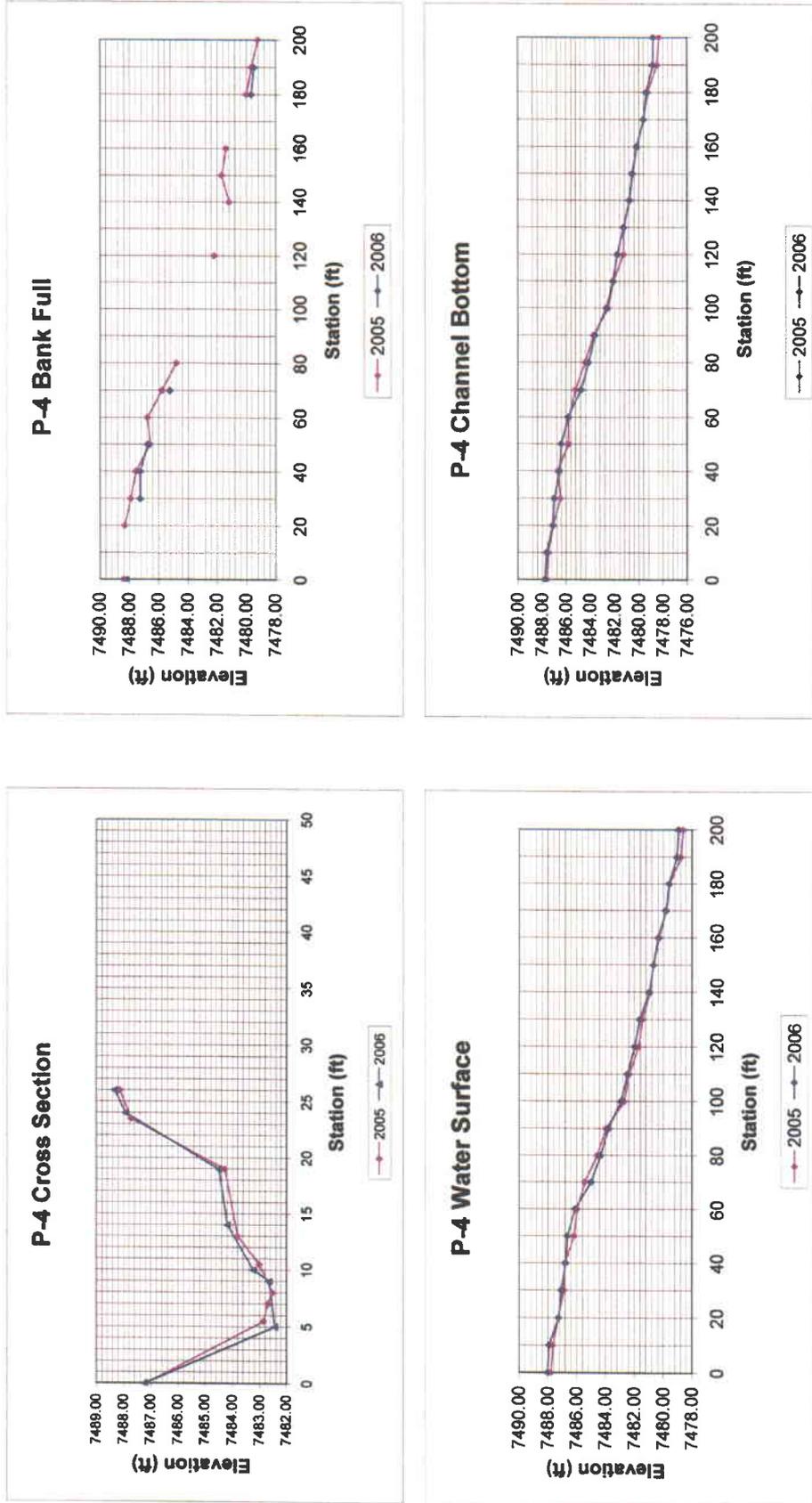


FIGURE 3-4. P-4 CROSS-SECTION AND PROFILES

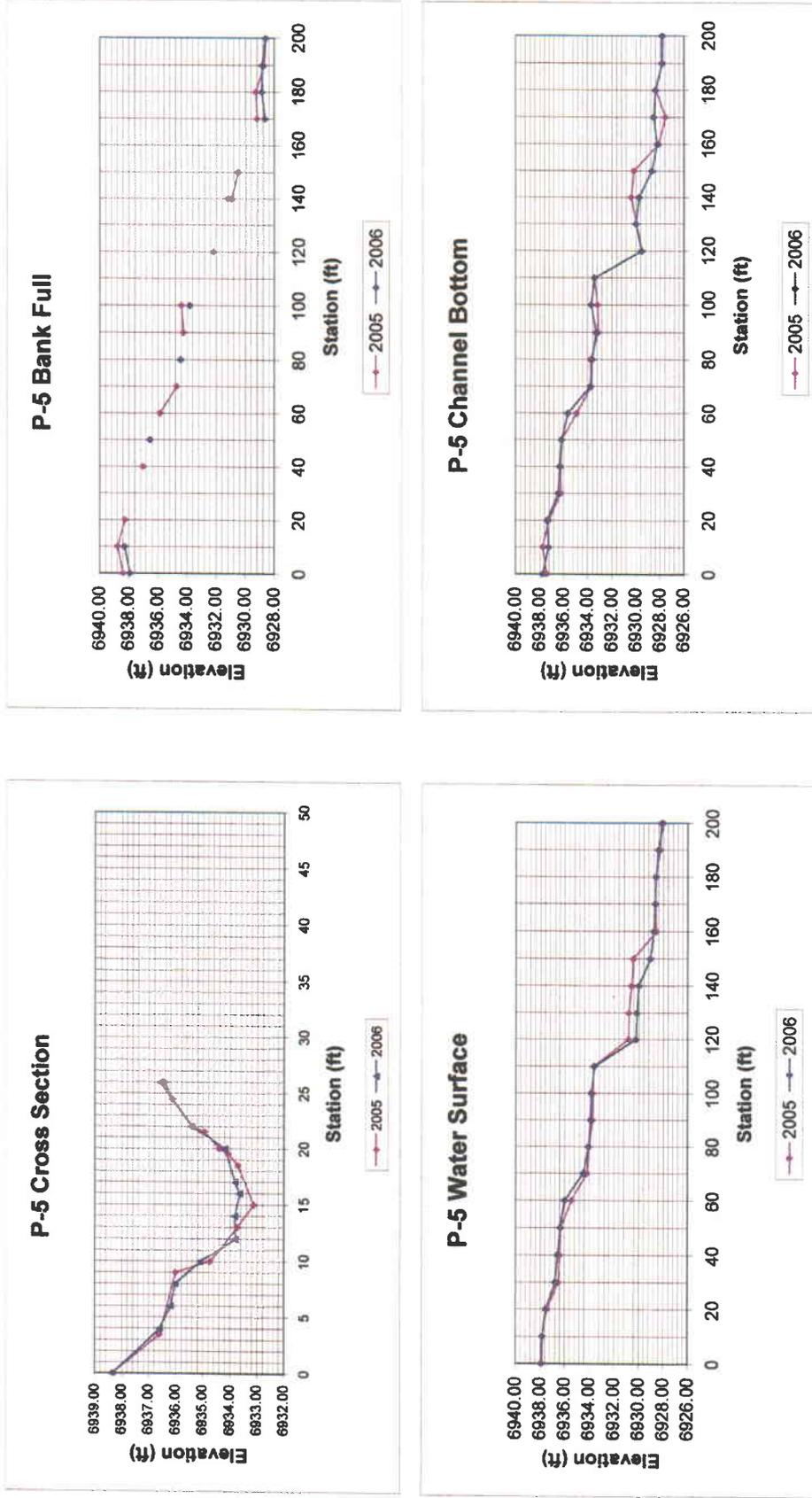


FIGURE 3-5. P-5 CROSS-SECTION AND PROFILES

## CHAPTER 4

### REFERENCES

EarthFax Engineering, Inc. 2005. Geomorphology Evaluation of the Pace Creek Stream Channel. Project report submitted to Canyon Fuel Company. Midvale, Utah.

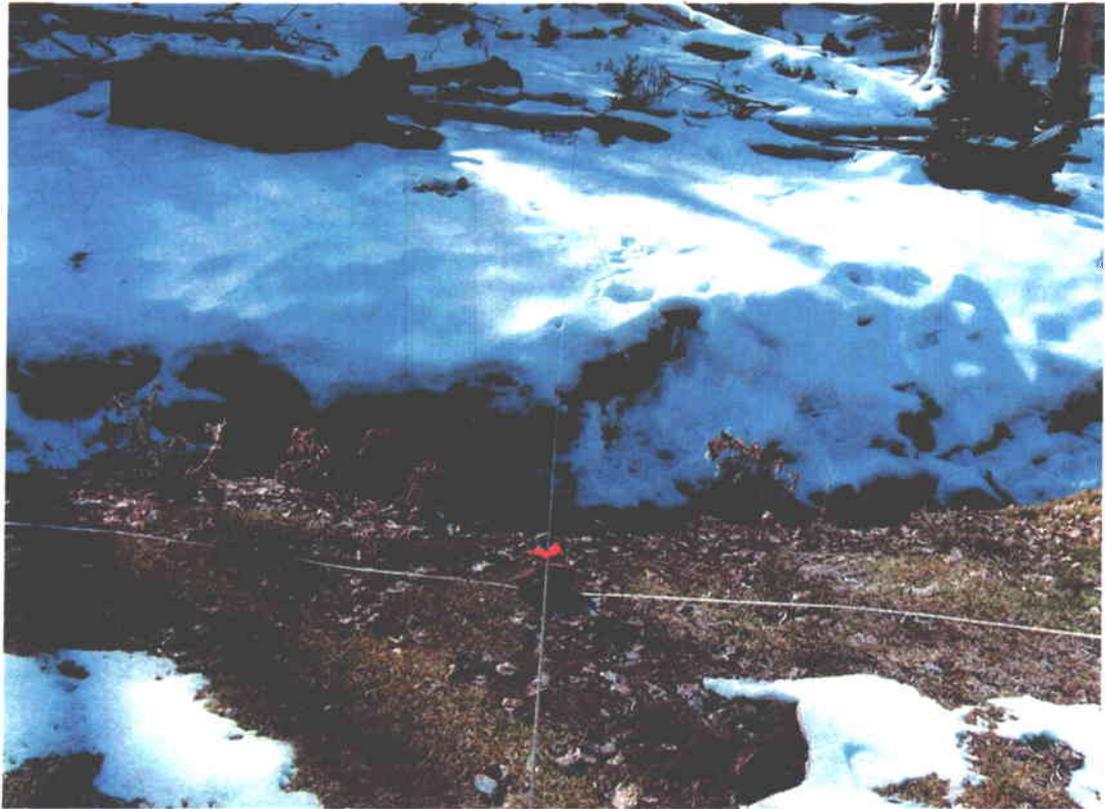
Harrelson, C.C., C.L. Rawlins, and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. General Technical Report RM-245. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colorado.

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**APPENDIX A**

Reference Site Photographs



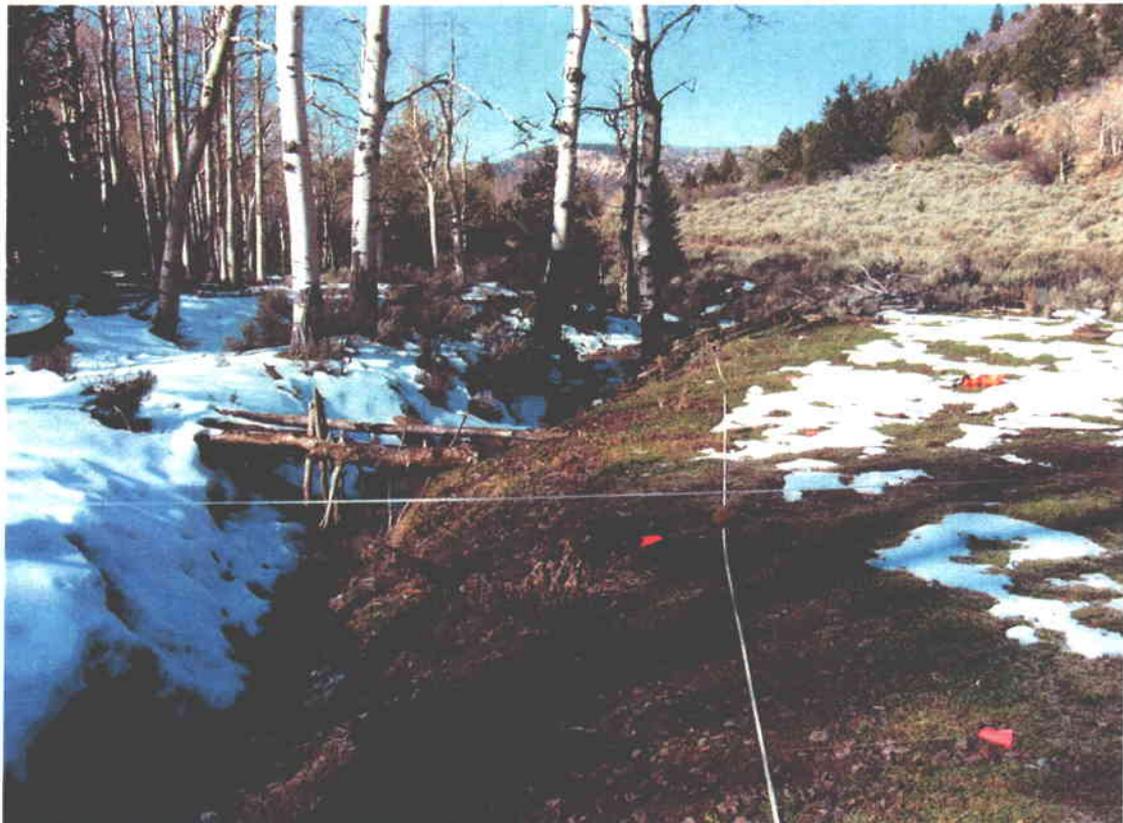
P-1 cross section



P-1 lower upstream view



P-1 upper upstream view



P-1 downstream view



P-2 cross section



P-2 upstream view



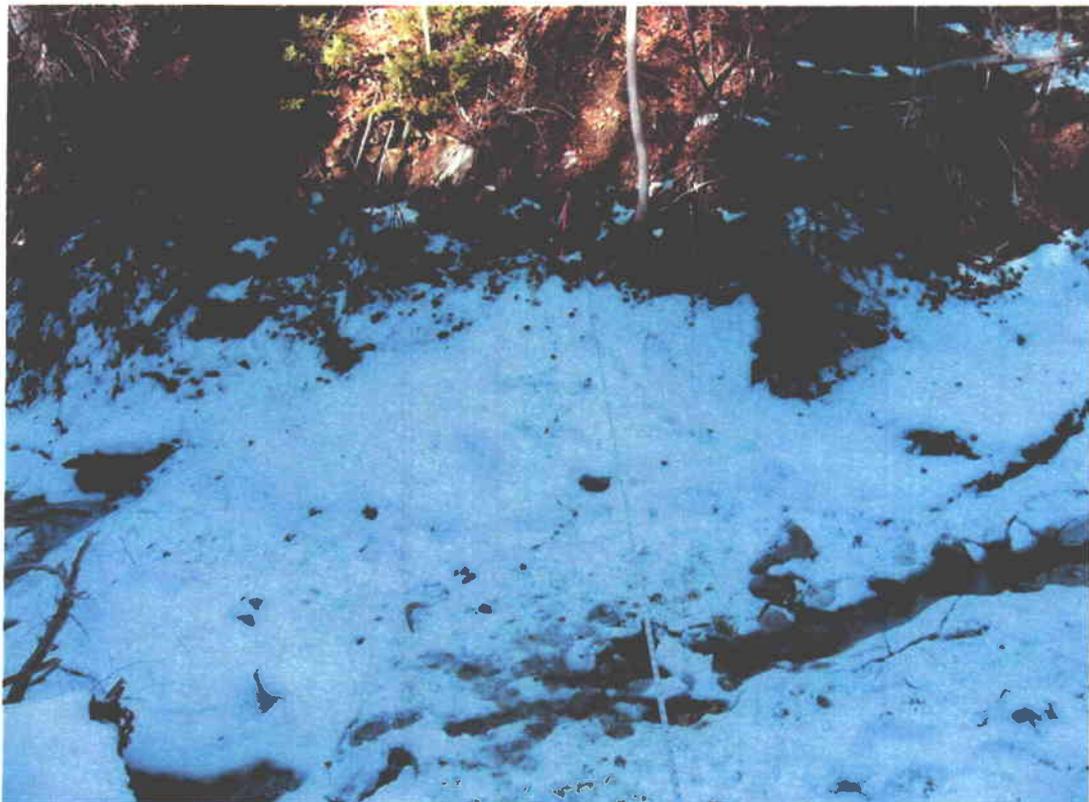
P-2 cross section



P-2 upstream view



P-2 downstream view



P-3 cross section



P-3 upstream view



P-3 upper downstream view



P-3 lower downstream view



P-4 cross section



P-4 lower upstream view



P-4 upper upstream view



P-4 downstream view



P-5 cross section



P-5 upstream view



P-5 downstream view

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**APPENDIX B**

Copy of Field Log Book

2006 Survey - 30 Oct 2006 P-1 Profile

Measurements looking upstream BM = 6.67

Sta	Top L	Bank	W/S	Bottom	Top R
0+00	2.13	4.76	5.11	5.30	2.66
0+10	2.79	5.01	5.44	5.58	2.73
0+20	2.88	-	5.82	5.94	-
0+30	3.35	6.16	6.51	6.81	-
0+40	3.53	6.71	6.85	6.94	4.61
0+50	3.92	7.30	9.18	9.44	6.17
0+60	4.44	8.22	9.46	9.57	5.71
0+70	5.14	8.64	9.54	9.65	6.23
0+80	5.93	-	10.14	10.31	6.98
0+90	6.72	-	10.25	10.43	7.37
1+00	7.07	10.80	10.92	11.08	8.02
1+10	7.69	11.34	11.53	11.80	9.02
1+20	8.05	11.30	11.65	11.76	9.16
1+30	9.41	12.84	13.13	13.29	12.34
1+40	10.08	-	14.51	14.65	10.66
1+50	10.67	14.37	14.61	14.68	11.84
1+60	11.40	14.55	14.68	14.92	-
1+70	14.36	14.84	14.90	15.08	14.54
1+80	14.71	15.00	15.12	15.22	14.79
1+90	15.05	15.53	15.65	15.73	15.18
2+00	15.66	15.84	16.02	16.21	15.30

BM Close = 6.67

P-1 Cross section

Sta	to L	Looking upstream	to R	Stationing
0+00	6.36		0+42	
0+12	7.11		0+30	
0+16	8.51		0+26	
0+18	10.83		0+24	
0+19	11.10		0+23	
0+20	10.65		0+22	
0+22	10.17		0+20	
0+23	9.81		0+19	
0+28	7.21		0+14	
0+42	6.73		0+00	

BM Close = 6.67

P-2 profile

Sta	Top L	Banked	WS	Bottom	Top R
0+00	3.05	3.98	4.19	4.39	0.99
0+10	3.40	4.10	4.30	4.40	3.18
0+20	2.79	4.22	4.42	4.52	3.93
0+30	2.31	-	4.59	4.66	3.87
0+40	-	-	4.76	4.82	4.02
0+50	-	-	4.83	4.96	-
0+60	5.05	6.24	6.43	6.60	5.41
0+70	5.43	6.72	6.87	6.94	5.97
0+80	6.41	-	7.34	7.53	6.23
0+90	5.51	7.72	8.19	8.25	5.91
1+00	5.42	-	8.87	8.99	5.97
1+10	-	-	9.60	9.68	7.56
1+20	-	-	11.32	11.43	8.14
1+30	-	-	11.92	12.05	10.99
1+40	<del>13.03</del>	-	13.03	13.12	10.68
1+50	-	-	13.88	13.96	11.00
1+60	-	13.96	14.20	14.31	10.52
1+70	-	-	14.58	14.69	11.28
1+80	-	-	14.80	14.98	14.61
1+90	-	-	14.87	14.98	11.96
2+00	-	-	14.90	15.09	14.40

BM = 3.90

BM close = 3.94

P-2 cross section

R to L Sta	Elev.	L to R Sta
0+00	3.90	0+27
0+08	3.73	0+24
0+08	5.96	0+19
0+10	8.04	0+17
0+11	9.06	0+16
0+12	9.00	0+15
0+15	5.42	0+12
0+23	4.08	0+4
0+27	3.55	0+00

BM close = 3.94

P-3 profile	Top L	Bottom	Top R	BM = 4.64
Sta	Top L	Bottom	Top R	
0+00	—	0.00	—	
0+10	—	1.04	—	
0+20	—	3.14	1.22	
0+30	2.61	3.38	2.55	
0+40	2.90	4.62	—	
0+50	2.97	4.64	—	
0+60	3.95	4.65	—	
0+70	—	4.79	4.13	
0+80	4.20	5.14	4.29	
0+90	5.22	6.32	—	
1+00	—	6.50	5.06	
1+10	—	7.45	—	
1+20	—	7.93	—	
1+30	—	7.93	—	
1+40	—	8.24	—	
1+50	7.55	8.28	4.75	
1+60	7.44	8.43	8.05	
1+70	8.09	9.87	8.56	
1+80	—	11.30	9.57	
1+90	—	13.41	9.26	
2+00	—	13.66	—	
				BM close = 4.63

P-3 cross section

Sta	Elev	L to R Sta
0+00	1.71	0+21
0+03	4.61	0+18
0+07	5.73	0+14
0+11	6.58	0+10
0+12	6.66	0+9
0+13	6.59	0+8
0+14	6.22	0+7
0+16	6.01	0+5
0+19	3.92	0+2
0+21	2.00	0+0

BM close = 4.63

P-4 cross section

Sta	ELW	Sta	ELW
0+00	2.42	0+10	2.82
0+10	6.24	0+20	7.52
0+20	6.56	0+30	8.10
0+30	7.52	0+40	8.30
0+40	8.10	0+50	3.52
0+50			

BM close = 2.75

BM = 2.74

P-4	Profile	Top L	Bottom	Top R
Sta		WS	Bottom	Top R
0+00		2.70	2.93	2.12
0+10		2.81	3.08	2.04
0+20		3.49	3.60	2.72
0+30	0.57	3.67	3.73	3.22
0+40	0.96	3.98	4.18	3.56
0+50		4.09	4.32	3.14
0+60		4.64	4.89	2.24
0+70		5.73	5.96	3.43
0+80		6.40	6.63	5.67
0+90		6.93	7.11	-
0+100		7.80	8.05	6.61
1+10		8.24	8.59	7.90
1+20		8.75	8.96	8.30
1+30		9.09	9.46	7.33
1+40		9.76	9.98	9.01
1+50		10.03	10.17	9.35
1+60		10.44	10.55	9.70
1+70		10.91	11.12	9.82
1+80	8.03	11.13	11.34	10.50
1+90	8.88	11.69	11.89	-
2+00	9.44	11.79	11.92	-

BM close = 2.75

P-5 profile	Top L	Banked	WS	Bottom	Top R
Sta					
0+00	1.70	3.32	3.38	3.50	1.41
0+10	1.93	2.95	3.42	4.00	1.93
0+20	1.92	-	3.69	3.87	2.39
0+30	2.20	-	4.45	4.78	2.22
0+40	2.72	-	4.67	4.91	2.93
0+50	3.21	4.70	4.87	5.09	-
0+60	3.42	-	5.24	5.59	-
0+70	-	-	6.76	7.47	-
0+80	4.96	6.81	7.18	7.63	-
0+90	6.09	-	7.35	7.95	-
1+00	-	7.43	7.40	7.55	5.80
1+10	-	-	7.66	7.81	6.45
1+20	-	-	11.02	11.70	7.58
1+30	-	-	11.10	11.24	7.96
1+40	-	<del>10.27</del>	11.25	11.50	7.67
1+50	-	10.72	12.17	12.55	7.10
1+60	10.12	-	12.46	13.00	6.39
1+70	10.57	12.60	12.58	12.70	6.81
1+80	11.08	12.37	12.64	12.84	6.80
1+90	11.35	12.41	12.84	13.42	7.60
2+00	-	12.62	13.22	13.43	8.10
BM box = 3.25					

P-5 cross section

Sta	Elev.	
0+00	4.65	4+12
0+04	5.82	Sta
0+06	7.06	0+26
0+09	7.42	0+22
0+10	7.60	0+20
0+12	7.42	0+17
0+14	7.44	0+16
0+16	6.16	0+14
0+18	5.22	0+12
0+20	5.05	0+10
0+22	4.65	0+8
0+26	2.90	0+6
		0+4
		0+0
BM box = 3.25		

Photo log (30 Oct 2006)

- 1 P-1 down
- 2 P-1 up #1
- 3 P-1 up #2
- 4 P-1 cross
- 5 P-2 up
- 6 P-2 down
- 7 P-2 cross
- 8 P-4 down
- 9 P-4 up #1
- 10 P-4 up #2
- 11 P-4 cross
- 12 P-3 up
- 13 P-3 down #1
- 14 P-3 down #2
- 15 P-3 cross
- 16 P-5 up
- 17 P-5 down
- 18 P-5 cross

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**APPENDIX C**

Survey Tabulations with  
Individual Cross Section and Profile Drawings

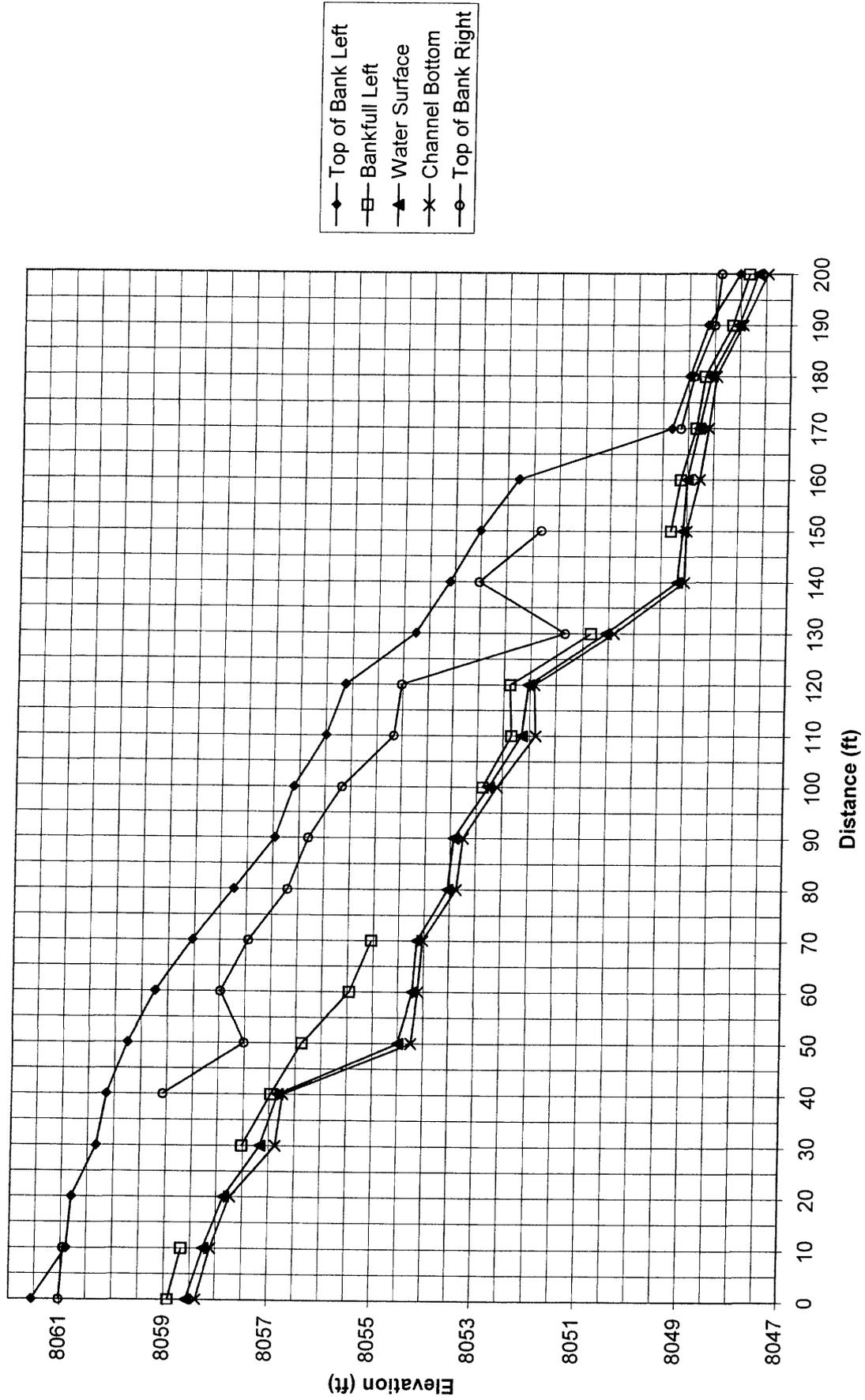
Profile: P-1

Survey date: 30-Oct-06  
 Benchmark elevation (ft): 8057  
 Rod reading at benchmark (ft): 6.68

Station	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	2.13	8061.55	4.76	8058.92	5.11	8058.57	5.30	8058.38	2.66	8061.02
10	2.79	8060.89	5.01	8058.67	5.44	8058.24	5.58	8058.10	2.73	8060.95
20	2.88	8060.80			5.82	8057.86	5.94	8057.74		
30	3.35	8060.33	6.16	8057.52	6.51	8057.17	6.81	8056.87		
40	3.53	8060.15	6.71	8056.97	6.85	8056.83	6.94	8056.74		
50	3.92	8059.76	7.30	8056.38	9.18	8054.50	9.44	8054.24		
60	4.44	8059.24	8.22	8055.46	9.46	8054.22	9.57	8054.11		
70	5.14	8058.54	8.64	8055.04	9.54	8054.14	9.65	8054.03	4.61	8059.07
80	5.93	8057.75			10.14	8053.54	10.31	8053.37	6.23	8057.45
90	6.72	8056.96			10.25	8053.43	10.43	8053.25	6.98	8056.70
100	7.07	8056.61	10.80	8052.88	10.92	8052.76	11.08	8052.60	7.37	8056.31
110	7.69	8055.99	11.34	8052.34	11.53	8052.15	11.80	8051.88	8.02	8055.66
120	8.05	8055.63	11.30	8052.38	11.65	8052.03	11.76	8051.92	9.02	8054.66
130	9.41	8054.27	12.84	8050.84	13.13	8050.55	13.29	8050.39	9.16	8054.52
140	10.08	8053.60			14.51	8049.17	14.65	8049.03	12.34	8051.34
150	10.67	8053.01	14.37	8049.31	14.61	8049.07	14.68	8049.00	10.66	8053.02
160	11.40	8052.28	14.55	8049.13	14.68	8049.00	14.92	8048.76	11.84	8051.84
170	14.36	8049.32	14.84	8048.84	14.90	8048.78	15.08	8048.60		
180	14.71	8048.97	15.00	8048.68	15.12	8048.56	15.22	8048.46	14.54	8049.14
190	15.05	8048.63	15.53	8048.15	15.65	8048.03	15.73	8047.95	14.79	8048.89
200	15.66	8048.02	15.84	8047.84	16.02	8047.66	16.21	8047.47	15.18	8048.50
									15.30	8048.38

Max. Water Surface Slope (fraction): 0.233  
 Min. Water Surface Slope (fraction): 0.007  
 Avg. Water Surface Slope (fraction): 0.055

# 2006 Profile P-1

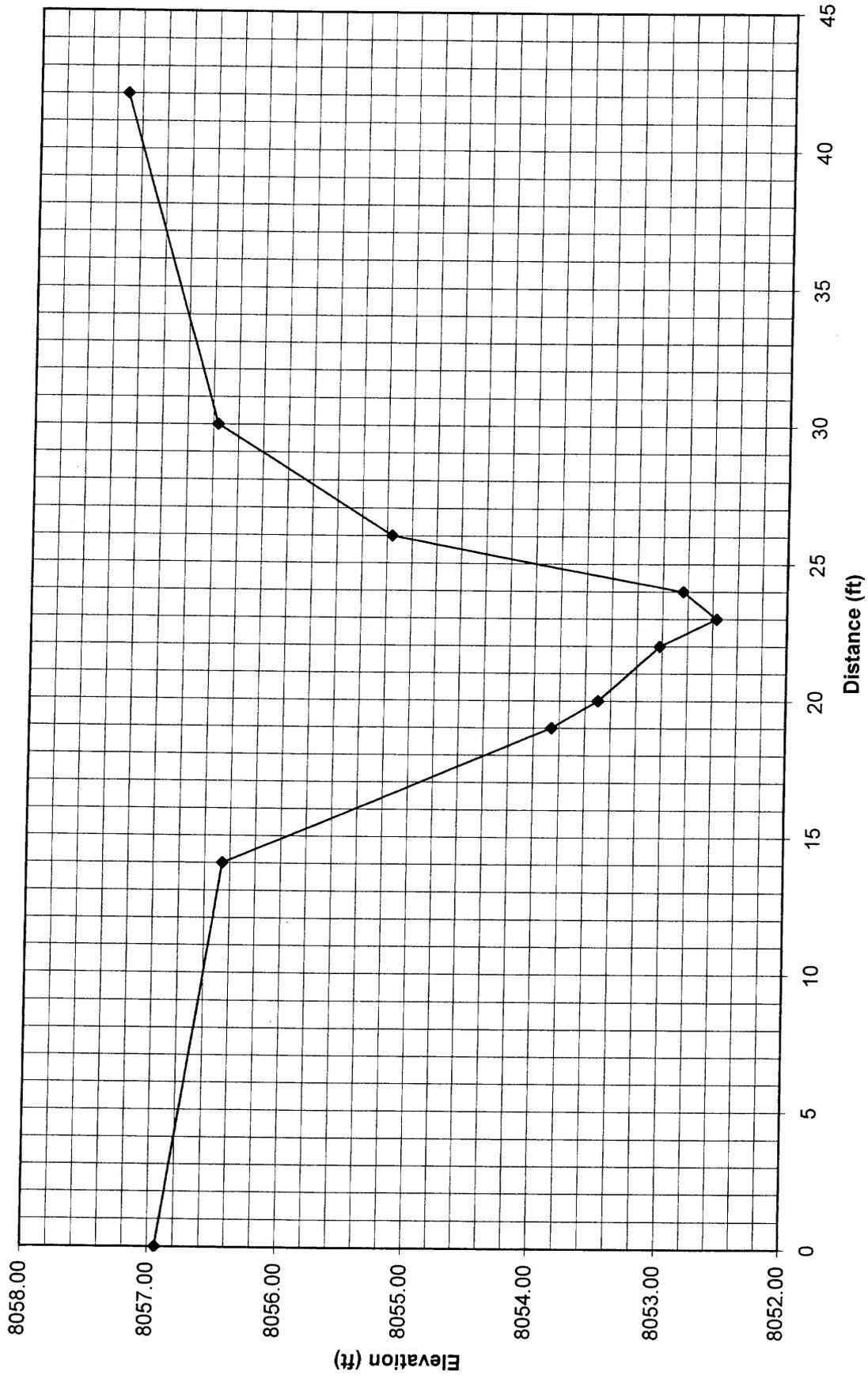


Cross Section: P-1

Survey date: 30-Oct-06  
Benchmark elevation: 8057.00  
Benchmark rod reading: 6.67

Station	Rod Reading	Elevation
42	6.36	8057.31
30	7.11	8056.56
26	8.51	8055.16
24	10.83	8052.84
23	11.10	8052.57
22	10.65	8053.02
20	10.17	8053.50
19	9.81	8053.86
14	7.21	8056.46
0	6.73	8056.94

# 2006 Cross Section P-1



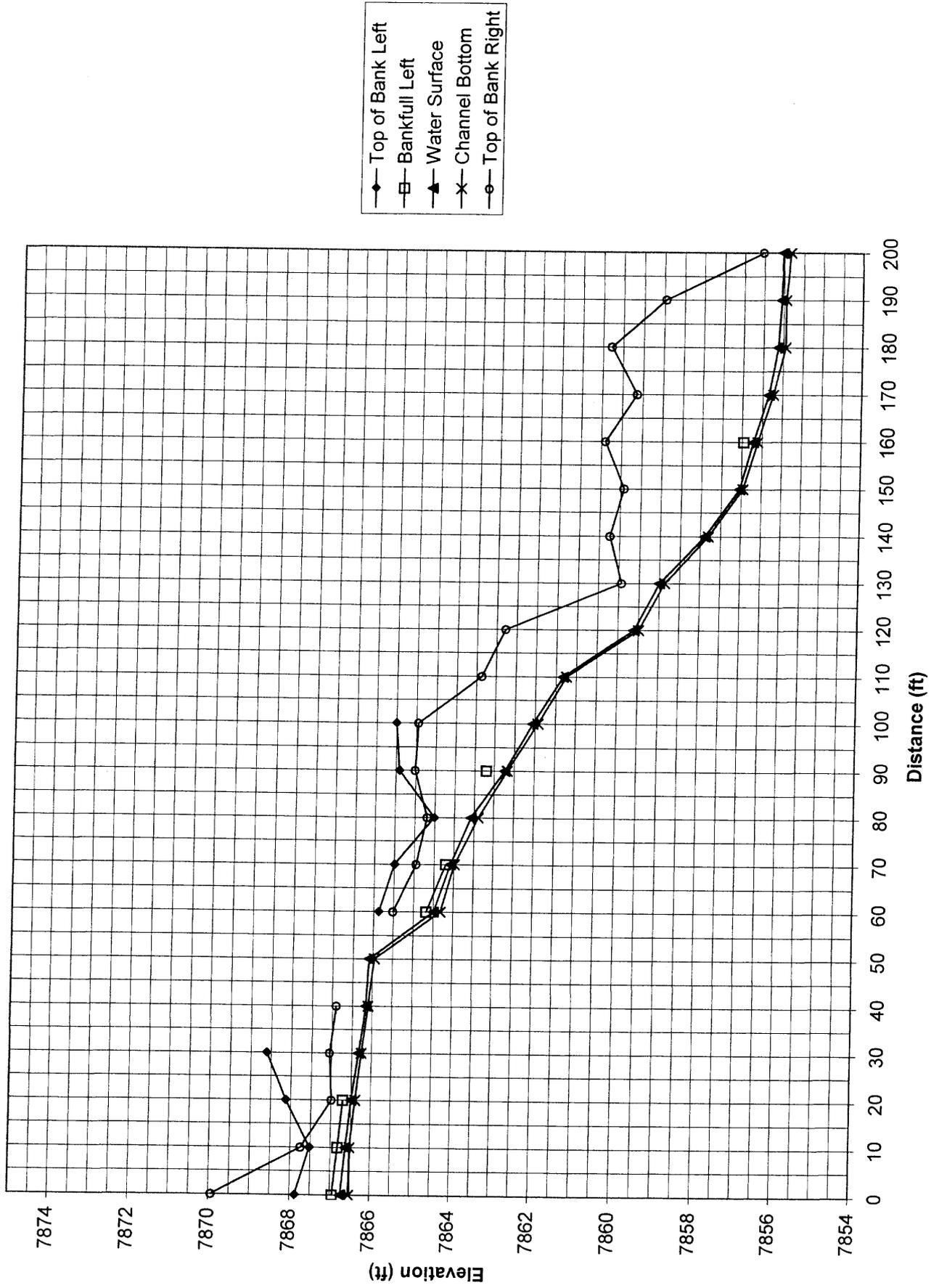
Profile: P-2

Survey date: 30-Oct-06  
 Benchmark elevation (ft): 7867  
 Rod reading at benchmark (ft): 3.92

Station	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	3.05	7867.87	3.98	7866.94	4.19	7866.73	4.39	7866.53	0.99	7869.93
10	3.40	7867.52	4.10	7866.82	4.30	7866.62	4.40	7866.52	3.18	7867.74
20	2.79	7868.13	4.22	7866.70	4.42	7866.50	4.52	7866.40	3.93	7866.99
30	2.31	7868.61			4.59	7866.33	4.66	7866.26	3.87	7867.05
40					4.76	7866.16	4.82	7866.10	4.02	7866.90
50					4.83	7866.09	4.96	7865.96		
60	5.05	7865.87	6.24	7864.68	6.43	7864.49	6.60	7864.32	5.41	7865.51
70	5.43	7865.49	6.72	7864.20	6.84	7864.08	6.94	7863.98	5.97	7864.95
80	6.41	7864.51			7.34	7863.58	7.53	7863.39	6.23	7864.69
90	5.51	7865.41	7.72	7863.20	8.19	7862.73	8.25	7862.67	5.91	7865.01
100	5.42	7865.50			8.87	7862.05	8.99	7861.93	5.97	7864.95
110					9.60	7861.32	9.68	7861.24	7.56	7863.36
120					11.32	7859.60	11.43	7859.49	8.14	7862.78
130					11.92	7859.00	12.05	7858.87	10.99	7859.93
140					13.03	7857.89	13.12	7857.80	10.68	7860.24
150					13.88	7857.04	13.96	7856.96	11.00	7859.92
160			13.96	7856.96	14.20	7856.72	14.31	7856.61	10.52	7860.40
170					14.58	7856.34	14.69	7856.23	11.28	7859.64
180					14.80	7856.12	14.98	7855.94	10.64	7860.28
190					14.87	7856.05	14.98	7855.94	11.96	7858.96
200					14.90	7856.02	15.09	7855.83	14.40	7856.52

Max. Water Surface Slope (fraction): 0.172  
 Min. Water Surface Slope (fraction): 0.003  
 Avg. Water Surface Slope (fraction): 0.054

# 2006 Profile P-2

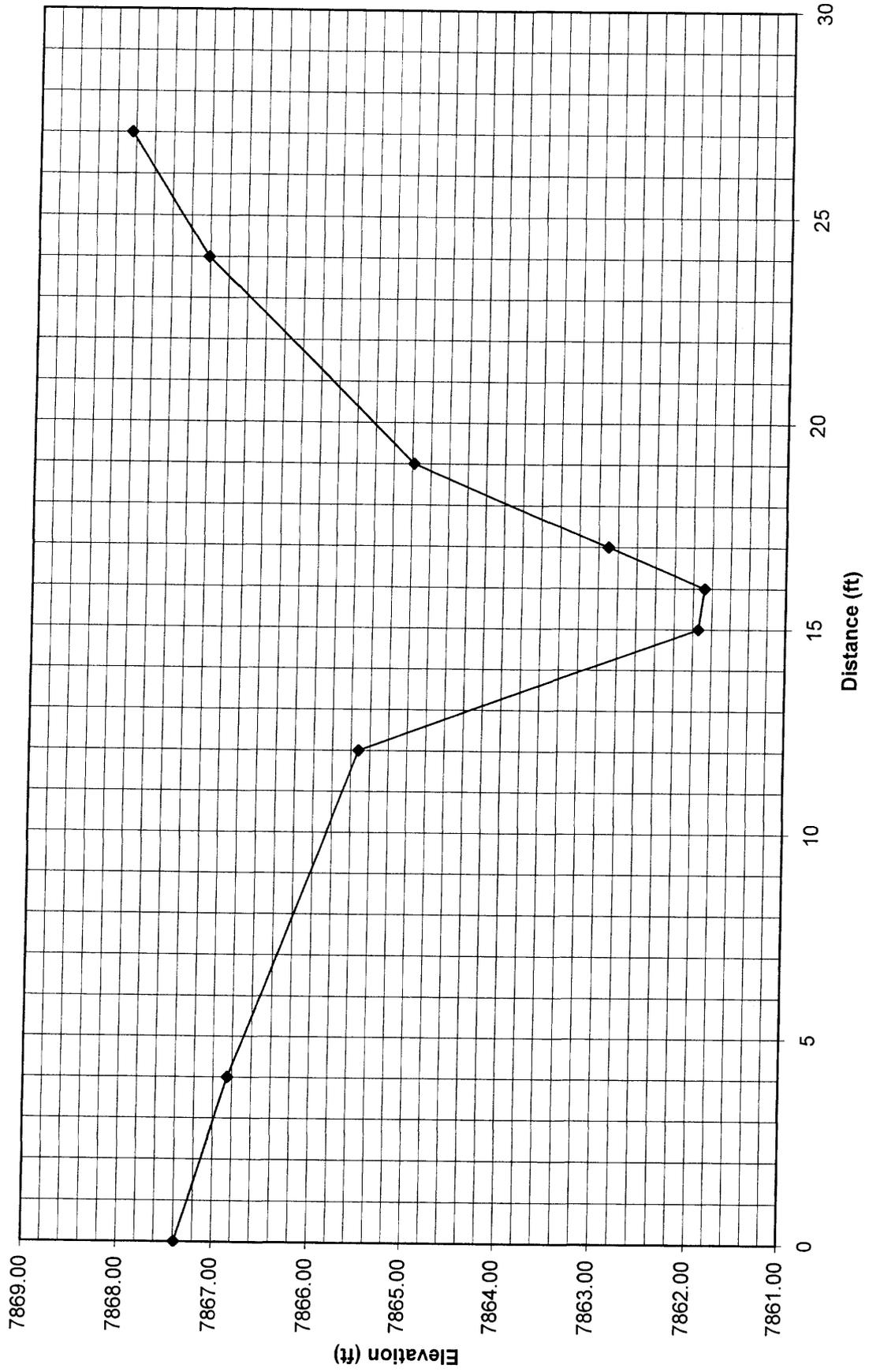


Cross Section: P-2

Survey date: 30-Oct-06  
Benchmark elevation: 7867.00  
Benchmark rod reading: 3.94

Station	Rod Reading	Elevation
27	2.90	7868.04
24	3.73	7867.21
19	5.96	7864.98
17	8.04	7862.90
16	9.06	7861.88
15	9.00	7861.94
12	5.42	7865.52
4	4.09	7866.85
0	3.55	7867.39

# 2006 Cross Section P-2



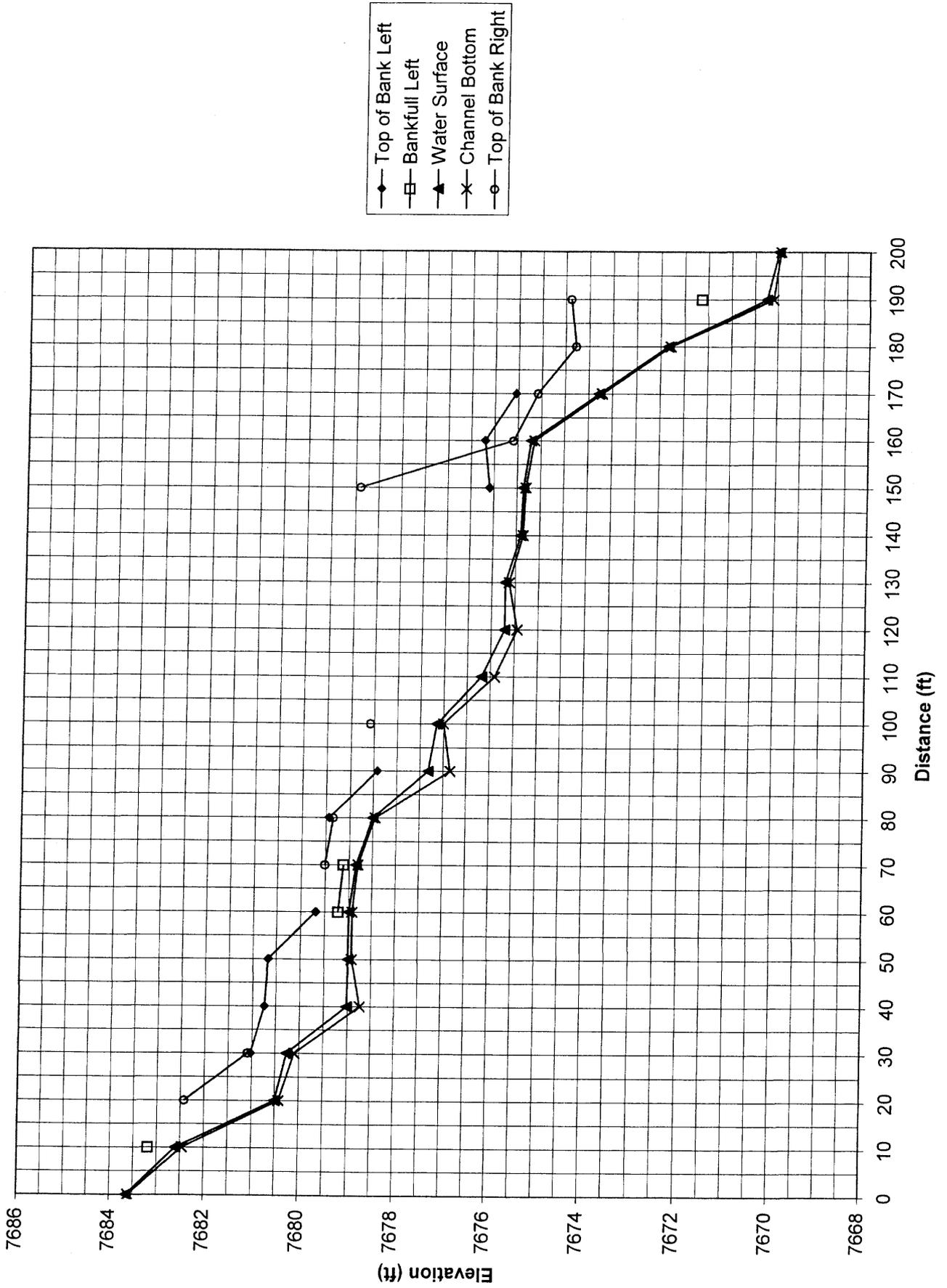
Profile: P-3

Survey date: 30-Oct-06  
 Benchmark elevation (ft): 7679  
 Rod reading at benchmark (ft): 4.64

Station	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0					0.00	7683.64	0.03	7683.61		
10			0.45	7683.19	1.04	7682.60	1.18	7682.46		
20					3.14	7680.50	3.22	7680.42	1.22	7682.42
30	2.61	7681.03			3.38	7680.26	3.54	7680.10	2.55	7681.09
40	2.90	7680.74			4.62	7679.02	4.90	7678.74		
50	2.97	7680.67			4.64	7679.00	4.72	7678.92		
60	3.95	7679.69	4.42	7679.22	4.65	7678.99	4.72	7678.92		
70			4.52	7679.12	4.79	7678.85	4.83	7678.81	4.13	7679.51
80	4.20	7679.44			5.14	7678.50	5.19	7678.45	4.29	7679.35
90	5.22	7678.42			6.32	7677.32	6.80	7676.84		
100					6.50	7677.14	6.64	7677.00	5.06	7678.58
110					7.45	7676.19	7.73	7675.91		
120					7.93	7675.71	8.20	7675.44		
130					7.93	7675.71	8.01	7675.63		
140					8.24	7675.40	8.29	7675.35		
150	7.55	7676.09			8.28	7675.36	8.33	7675.31	4.75	7678.89
160	7.44	7676.20			8.43	7675.21	8.50	7675.14	8.05	7675.59
170	8.09	7675.55			9.87	7673.77	9.93	7673.71	8.56	7675.08
180					11.30	7672.34	11.35	7672.29	9.37	7674.27
190			12.01	7671.63	13.41	7670.23	13.55	7670.09	9.26	7674.38
200					13.66	7669.98	13.70	7669.94		

Max. Water Surface Slope (fraction): 0.211  
 Min. Water Surface Slope (fraction): 0.000  
 Avg. Water Surface Slope (fraction): 0.068

# 2006 Profile P-3

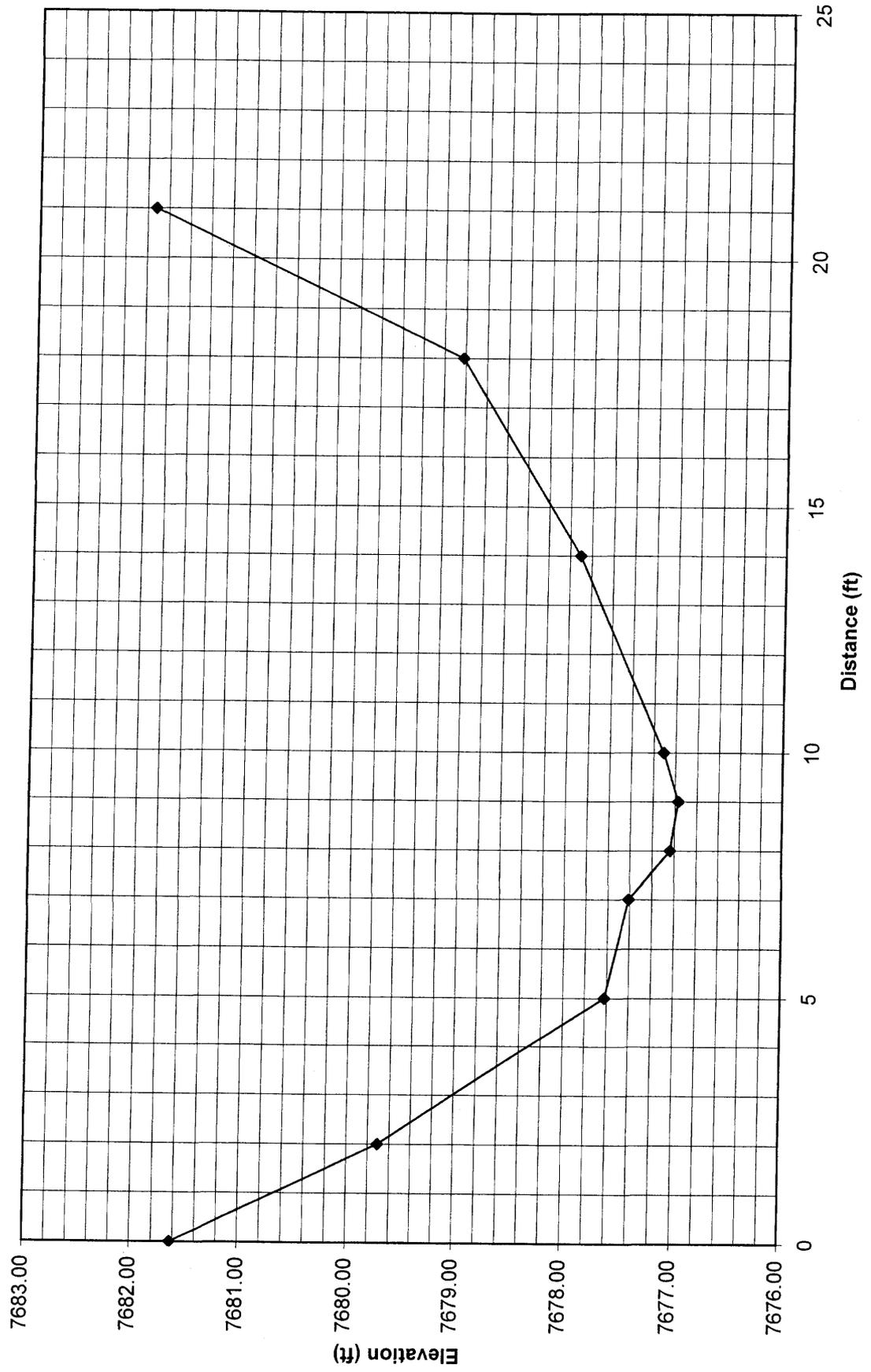


Cross Section: P-3

Survey date: 30-Oct-06  
Benchmark elevation: 7679.00  
Benchmark rod reading: 4.63

Station	Rod Reading	Elevation
21	1.71	7681.92
18	4.61	7679.02
14	5.73	7677.90
10	6.52	7677.11
9	6.66	7676.97
8	6.59	7677.04
7	6.22	7677.41
5	6.01	7677.62
2	3.92	7679.71
0	2.00	7681.63

# 2006 Cross Section P-3



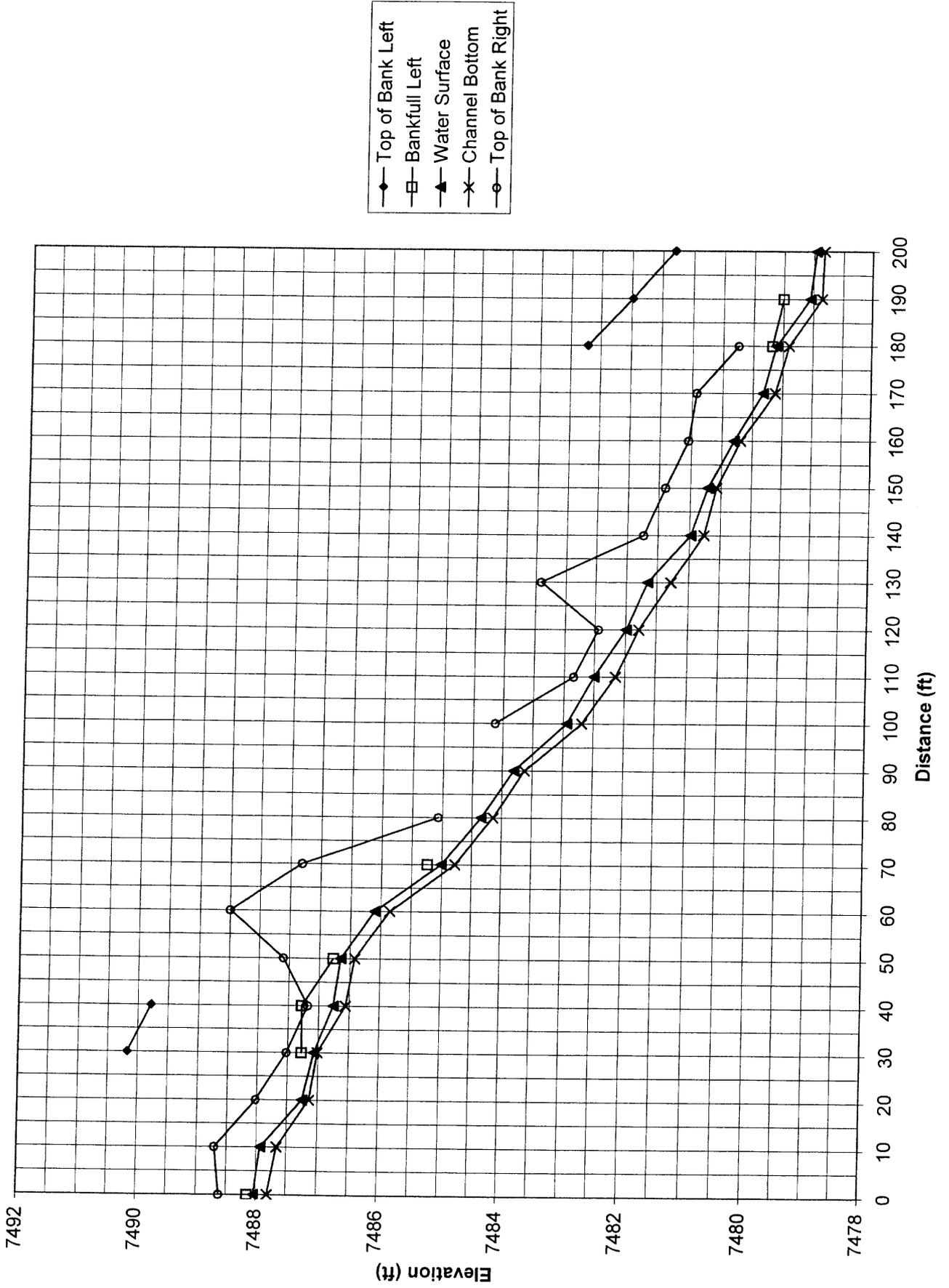
Profile: P-4

Survey date: 30-Oct-06  
 Benchmark elevation (ft): 7488  
 Rod reading at benchmark (ft): 2.74

Station	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0			2.59	7488.15	2.70	7488.04	2.93	7487.81	2.12	7488.62
10					2.81	7487.93	3.08	7487.66	2.04	7488.70
20					3.49	7487.25	3.60	7487.14	2.72	7488.02
30	0.57	7490.17	3.47	7487.27	3.67	7487.07	3.73	7487.01	3.22	7487.52
40	0.96	7489.78	3.46	7487.28	3.98	7486.76	4.18	7486.56	3.56	7487.18
50			3.97	7486.77	4.09	7486.65	4.32	7486.42	3.14	7487.60
60					4.64	7486.10	4.89	7485.85	2.24	7488.50
70			5.50	7485.24	5.73	7485.01	5.96	7484.78	3.43	7487.31
80					6.40	7484.34	6.60	7484.14	5.67	7485.07
90					6.93	7483.81	7.11	7483.63		
100					7.80	7482.94	8.05	7482.69	6.61	7484.13
110					8.24	7482.50	8.59	7482.15	7.90	7482.84
120					8.75	7481.99	8.96	7481.78	8.30	7482.44
130					9.09	7481.65	9.46	7481.28	7.33	7483.41
140					9.76	7480.98	9.98	7480.76	9.01	7481.73
150					10.03	7480.71	10.17	7480.57	9.35	7481.39
160					10.44	7480.30	10.55	7480.19	9.70	7481.04
170					10.91	7479.83	11.12	7479.62	9.82	7480.92
180	8.03	7482.71	11.06	7479.68	11.13	7479.61	11.34	7479.40	10.50	7480.24
190	8.76	7481.98	11.24	7479.50	11.69	7479.05	11.89	7478.85		
200	9.44	7481.30			11.79	7478.95	11.92	7478.82		

Max. Water Surface Slope (fraction): 0.109  
 Min. Water Surface Slope (fraction): 0.010  
 Avg. Water Surface Slope (fraction): 0.045

# 2006 Profile P-4

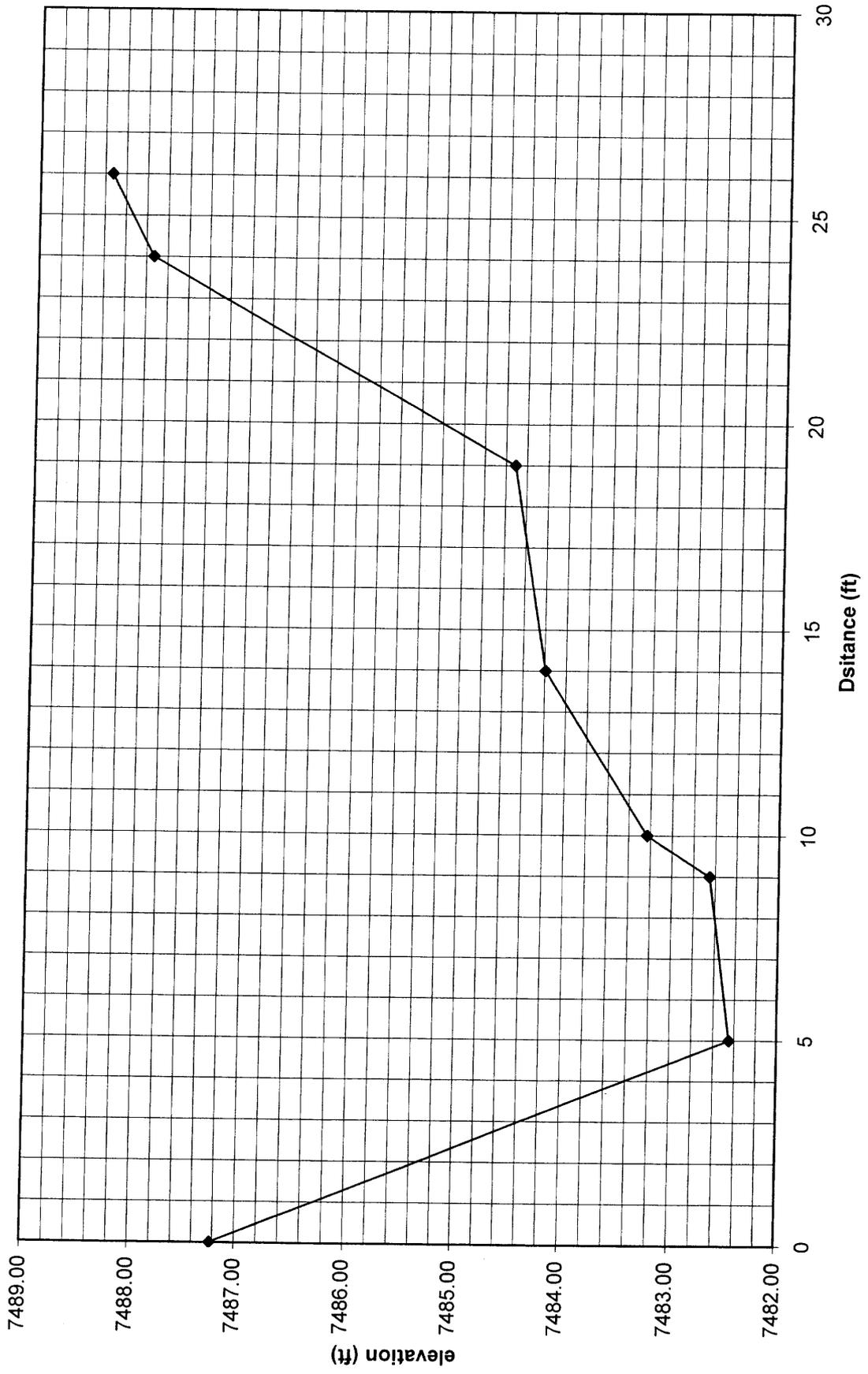


Cross Section: P-4

Survey date: 23-Sep-05  
Benchmark elevation: 7488.00  
Benchmark rod reading: 2.75

Station	Rod Reading	Elevation
26	2.42	7488.33
24	2.82	7487.93
19	6.24	7484.51
14	6.56	7484.19
10	7.52	7483.23
9	8.10	7482.65
5	8.30	7482.45
0	3.52	7487.23

2006 Cross Section P-4



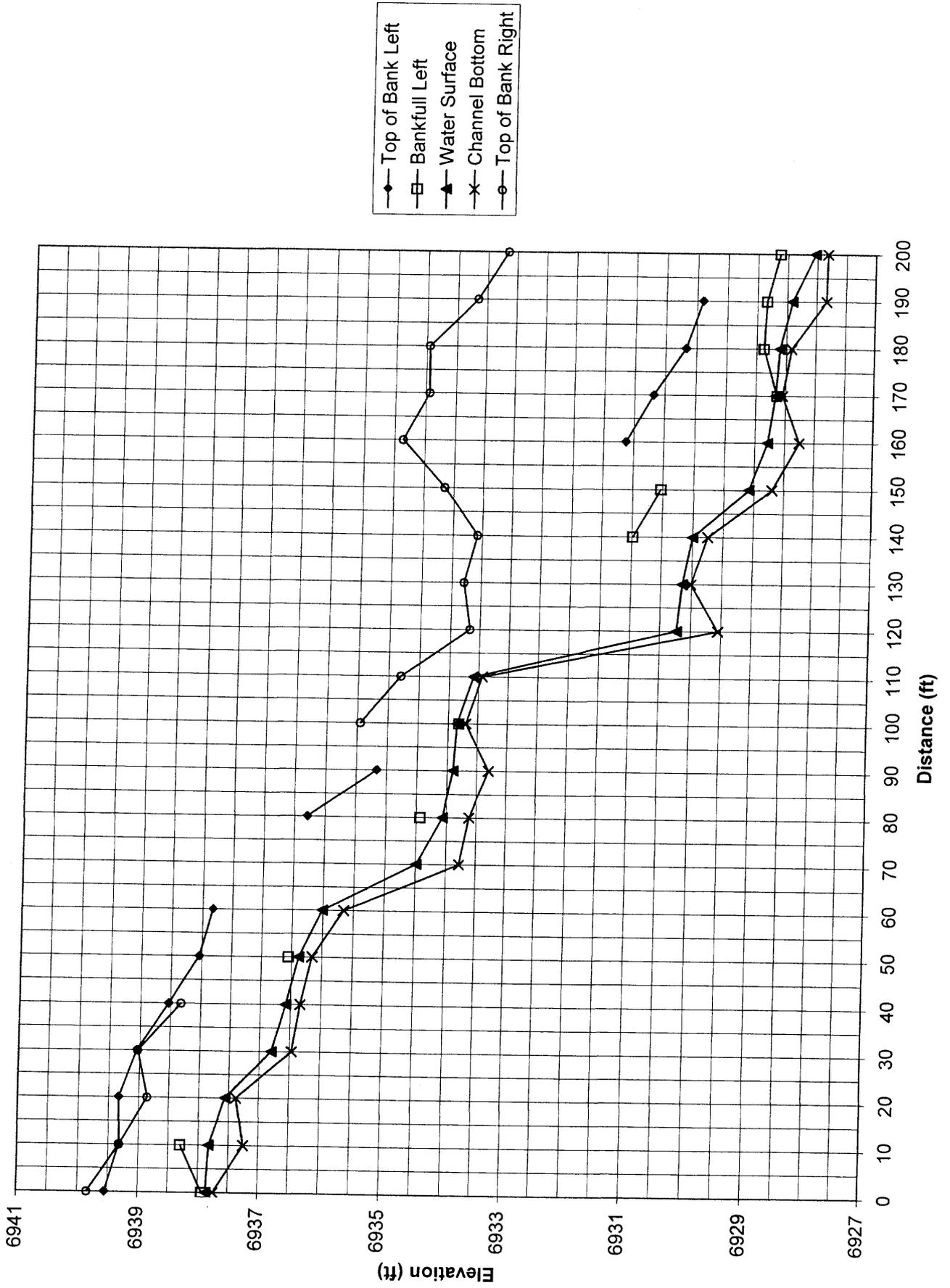
Profile: P-5

Survey date: 30-Oct-06  
 Benchmark elevation (ft): 6938  
 Rod reading at benchmark (ft): 3.25

Station	Top of Bank Left		Bankfull Left		Water Surface		Channel Bottom		Top of Bank Right	
	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation	Rod Reading	Elevation
0	1.70	6939.55	3.32	6937.93	3.38	6937.87	3.50	6937.75	1.41	6939.84
10	1.93	6939.32	2.95	6938.30	3.42	6937.83	4.00	6937.25	1.93	6939.32
20	1.92	6939.33			3.69	6937.56	3.87	6937.38	2.39	6938.86
30	2.20	6939.05			4.45	6936.80	4.78	6936.47	2.22	6939.03
40	2.72	6938.53			4.67	6936.58	4.91	6936.34	2.93	6938.32
50	3.21	6938.04	4.70	6936.55	4.87	6936.38	5.09	6936.16		
60	3.42	6937.83			5.24	6936.01	5.59	6935.66		
70					6.76	6934.49	7.47	6933.78		
80	4.96	6936.29	6.81	6934.44	7.18	6934.07	7.63	6933.62		
90	6.09	6935.16			7.35	6933.90	7.95	6933.30		
100			7.43	6933.82	7.40	6933.85	7.55	6933.70		
110					7.66	6933.59	7.81	6933.44	5.80	6935.45
120					11.02	6930.23	11.70	6929.55	6.45	6934.80
130					11.10	6930.15	11.24	6930.01	7.58	6933.67
140					11.25	6930.00	11.50	6929.75	7.46	6933.79
150			10.27	6930.98	12.17	6929.08	12.55	6928.70	7.67	6933.58
160	10.12	6931.13	10.72	6930.53	12.46	6928.79	13.00	6928.25	7.10	6934.15
170	10.57	6930.68	12.60	6928.65	12.58	6928.67	12.70	6928.55	6.39	6934.86
180	11.08	6930.17	12.37	6928.88	12.64	6928.61	12.84	6928.41	6.81	6934.44
190	11.35	6929.90	12.41	6928.84	12.84	6928.41	13.42	6927.83	6.80	6934.45
200			12.62	6928.63	13.22	6928.03	13.43	6927.82	7.60	6933.65
									8.10	6933.15

Max. Water Surface Slope (fraction): 0.336  
 Min. Water Surface Slope (fraction): 0.004  
 Avg. Water Surface Slope (fraction): 0.049

# 2006 Profile P-5

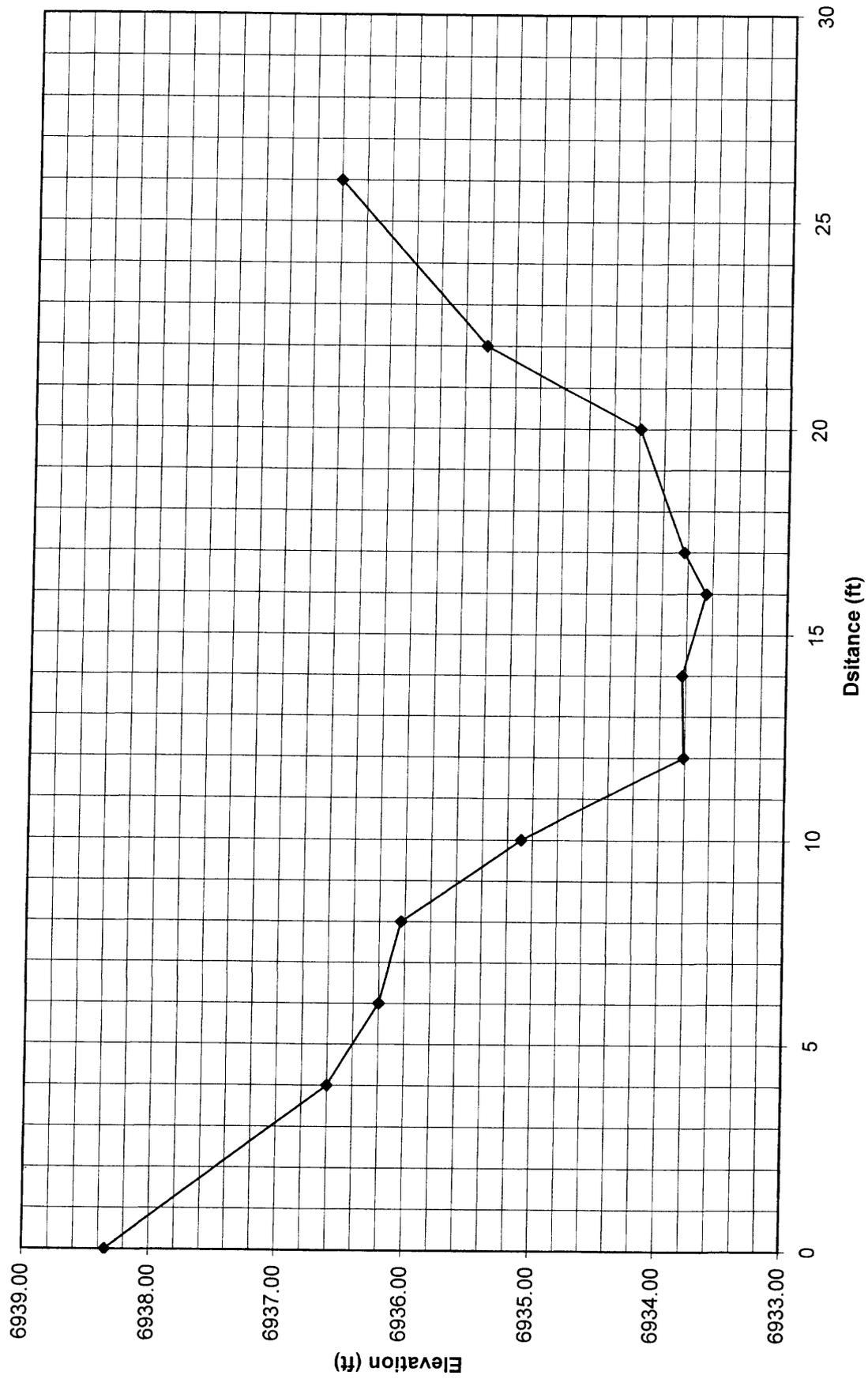


Cross Section: P-5

Survey date: 30-Oct-06  
Benchmark elevation: 6938.00  
Benchmark rod reading: 3.25

Station	Rod Reading	Elevation
26	4.65	6936.60
22	5.82	6935.43
20	7.06	6934.19
17	7.42	6933.83
16	7.60	6933.65
14	7.42	6933.83
12	7.44	6933.81
10	6.16	6935.09
8	5.22	6936.03
6	5.05	6936.20
4	4.65	6936.60
0	2.90	6938.35

# 2006 Cross Section P-5



WASTE ROCK ANALYSIS



Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380

Helper, UT 84526

Report ID: S0612270001

Project: Dugout Canyon Mine

Date Received: 12/14/2006

Date: 3/2/2007

Work Order: S0612270

Lab ID	Sample ID	pH	Saturation %	Electrical		Field		Wilt		Calcium meq/L	Magnesium meq/L	Sodium meq/L	Potassium meq/L	SAR
				Conductivity dS/m	Capacity %	Point %	Electrical							
S0612270-001	WS Nov.	7.3	27.1	1.63	14	7.1	7.00	8.16	5.57	1.41	2.02			
S0612270-002	WS Dec.	7.9	25.3	1.27	14	6.8	2.04	1.86	11.7	0.92	8.35			

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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 Barten

Karen Barten, Soil Lab Supervisor



Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380

Helper, UT 84526

Report ID: S0612270001

Date: 3/2/2007

Work Order: S0612270

Project: Dugout Canyon Mine

Date Received: 12/14/2006

Lab ID	Sample ID	Available		Exchangeable		Sand	Silt	Clay	Texture
		Sodium	meq/100g	Sodium	meq/100g				
S0612270-001	WS Nov.	0.36	0.21	62.0	28.0	10.0			Sandy Loam
S0612270-002	WS Dec.	0.86	0.57	70.0	19.0	11.0			Sandy Loam

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2O<sub>sol</sub>= 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, Pyr/S= 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



Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380

Helper, UT 84526

Report ID: S0612270001

Date: 3/2/2007

Work Order: S0612270

Project: Dugout Canyon Mine

Date Received: 12/14/2006

Lab ID	Sample ID	Nitrogen				
		Boron ppm	TKN %	Nitrate ppm	Phosphorus ppm	Selenium ppm
S0612270-001	WS Nov.	0.99	2.59	0.37	0.57	0.06
S0612270-002	WS Dec.	1.41	0.80	0.35	1.09	0.05

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2O<sub>sol</sub>= 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 Koster

Ken Barten, Soil Lab Supervisor



Soil Analysis Report

Canyon Fuel Company, LLC.

HCR 35, Box 380

Helper, UT 84526

Report ID: S0612270001

Project: Dugout Canyon Mine

Date Received: 12/14/2006

Date: 3/2/2007

Work Order: S0612270

Lab ID	Sample ID	Total Carbon		Total Sulfur		T.S.		Neut.		T.S.	
		%	%	%	%	AB	ABP	Pot.	Pot.	ABP	ABP
S0612270-001	WS Nov.	2.0	1.2	0.44	13.9	67.3	53.4				
S0612270-002	WS Dec.	4.9	4.4	1.46	45.7	41.5	-4.21				

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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 Koster

Ken Barten, Soil Lab Supervisor

# Inter-Mountain Laboratories, Inc.

## Soil Analysis Report Canyon Fuel Company, LLC.

Report ID: S0610189001

Project: Dugout Canyon Mine  
Date Received: 10/11/2006

Date: 11/29/2006  
Work Order: S0610189

HCR 35, Box 380  
Helper, UT 84526

Lab ID	Sample ID	pH s.u.	Saturation %	Electrical Conductivity dS/m	Field Capacity %	Wilt Point %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	Potassium meq/L	SAR
S0610189-001	G-11	7.9	26.7	0.38	13.3	9.6	1.97	0.94	0.49	0.08	0.41
S0610189-002	G-12	7.9	31.2	0.44	16.8	11.3	2.33	1.18	0.34	0.20	0.26
S0610189-003	G-13	7.8	33.5	0.43	18.8	12.0	2.74	0.85	0.18	0.29	0.14
S0610189-004	G-14	7.2	40.2	0.45	20.6	12.5	3.18	0.94	0.16	0.28	0.11
S0610189-005	Refuse	7.5	45.7	2.52	9.2	4.9	14.6	12.3	2.67	0.86	0.73

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate  
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= 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 Barten  
Karen Barten, Soil Lab Supervisor

INCORPORATED

FEB 16 2007

Div. of Oil, Gas & Mining

**Inter-Mountain Laboratories, Inc.**

**Soil Analysis Report  
Canyon Fuel Company, LLC.**

Report ID: S0610189001

Date: 11/29/2006  
Work Order: S0610189

Project: Dugout Canyon Mine  
Date Received: 10/11/2006

HCR 35, Box 380  
Helper, UT 84526

Lab ID	Sample ID	Available Sodium		Exchangeable Sodium		Sand %	Silt %	Clay %	Texture
		meq/100g	meq/100g	meq/100g	meq/100g				
S0610189-001	G-11	0.05	0.03	34.0	35.0	31.0			Clay Loam
S0610189-002	G-12	0.06	0.05	40.0	28.0	32.0			Clay Loam
S0610189-003	G-13	0.03	0.02	39.0	31.0	30.0			Clay Loam
S0610189-004	G-14	0.04	0.04	40.0	30.0	30.0			Clay Loam
S0610189-005	Refuse	0.19	0.07	18.0	48.0	34.0			Silty Clay Loam

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= 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 Barten*  
Karen Barten, Soil Lab Supervisor

INCORPORATED

FEB 16 2007

Div. of Oil, Gas & Mining

**Inter-Mountain Laboratories, Inc.**

**Soil Analysis Report  
Canyon Fuel Company, LLC.**

Report ID: S0610189001

Date: 11/29/2006  
Work Order: S0610189

Project: Dugout Canyon Mine  
Date Received: 10/11/2006

HCR 35, Box 380  
Helper, UT 84526

Lab ID	Sample ID	Boron ppm	TKN %	Nitrogen		Phosphorus ppm	Selenium ppm	TOC %	Total Sulfur %	T.S.		Neut. Pot. µ/1000t	T.S. ABP µ/1000t
				Nitrate ppm	Nitrite ppm					AB	AB		
S0610189-001	G-11	0.10	0.04	0.64	0.64	1.77	<0.02	<0.1	<0.01	<0.01	133	133	
S0610189-002	G-12	0.15	0.06	3.55	3.55	2.27	<0.02	0.5	<0.01	<0.01	155	155	
S0610189-003	G-13	0.13	0.14	0.54	0.54	1.67	<0.02	0.7	0.01	0.45	143	143	
S0610189-004	G-14	0.16	0.15	5.72	5.72	4.66	<0.02	0.9	<0.01	<0.01	15.7	15.7	
S0610189-005	Refuse	0.47	1.05	0.21	0.21	0.78	0.06	58.2	0.41	12.9	10.6	-2.34	

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= 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 Barten*

Karen Barten, Soil Lab Supervisor

INCORPORATED

FEB 16 2007

Div. of Oil, Gas & Mining

UDOGM MEMO  
SUBJECT: SUBMITTAL OF ANNUAL REPORT 2006  
JANUARY 5, 2007

January 5, 2007

VIA E-MAIL

To: All Coal Mine Operators  
Subject: Submittal of Annual Report for 2006, Outgoing File

Dear Mine Operator:

This letter is to remind you to file an Annual Report for 2006, for your coal mining and reclamation operations. Please be sure to submit the following items as part of the 2006 Annual Report:

- 1) Raptor and archeology reports stamped as confidential and in a separate folder stamped confidential (R645-300-124.300);
- 2) Mine map identifying mining in 2006 as well as the mining proposed for the next five years [PE Certified] (R645-301-512 and R645-301-521); and
- 3) Notices of Proposed Mining sent to water conservancy districts and all owners and occupants of surface property above the underground workings (R645-525.700).

*525.700 Public Notice of Proposed Mining. At least six months prior to mining, or within that period if approved by the Division, the underground mine operator will mail a notification to all owners and occupants of surface property and structures above the underground workings. The notification will include, at a minimum, identification of specific areas in which mining will take place, dates that specific areas will be undermined, and the location or locations where the operator's subsidence control plan may be examined.*

The regulation referenced and shown above includes no reference to notification of water conservancy districts or to the information being required for inclusion in annual reports. There is no commitment in the permittee's M&RP to include this information in their annual report. Therefore it has not been provided.

At the request of Division personnel the information has been previously submitted to the Division.

Please submit two copies by April 1, 2007 (one copy to the Salt Lake Office and one to the Price Field Office). Forms and instructions can be found on the Division's website:

<http://www.ogm.utah.gov/coal/AnnualRPT/AnnualReport.htm>  
or you can request a copy by contacting the Division.

If you have any questions, please call either Wayne Hedberg at (801) 538-5286 or Pamela Grubaugh-Littig at (801) 538-5268.

Sincerely,

D. Wayne Hedberg  
Permit Supervisor

Pamela Grubaugh-Littig  
Permit Supervisor